



United States Department of the Interior

FISH AND WILDLIFE SERVICE
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In Reply Refer to:
FWS/R6 06E23000-2018-F-0607

Memorandum

To: Utah State Director, Bureau of Land Management, Utah State Office, 440 West 200 South, Suite 500, Salt Lake City, Utah 84101-1345

From: Utah Field Supervisor, Ecological Services, U.S. Fish and Wildlife Service, West Valley City, Utah

Subject: Biological Opinion for the Northern Corridor Highway Project

In accordance with section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et seq.), and the Interagency Cooperation Regulations (50 CFR section 402), this transmits the U.S. Fish and Wildlife Service's (FWS) biological opinion (BO) for actions associated with the Northern Corridor Highway Project (Project). The Project includes three Federal actions on the part of the Bureau of Land Management (BLM) from its responsibility under the Federal Land Policy and Management Act of 1976 (FLPMA, Public Law right-of-way (ROW) to the Utah Department of Transportation (UDOT) to construct a road through the Red Cliffs National Conservation Area (Red Cliffs NCA); 2) amend the Red Cliffs NCA Resource Management Plan (RMP) to allow for the ROW in the Red Cliffs NCA; and 3) amend the St. George Field Office RMP to facilitate the expansion of the Red Cliffs Desert Reserve (Reserve) to change management prescriptions in 3,471 acres (ac.) of BLM-administered land within the proposed 6,813 ac. Zone 6 conservation area (proposed Zone 6) comprised of predominantly BLM and SITLA land to offset the effects of the ROW within the Reserve.

Background

In 1995, Washington County prepared a Habitat Conservation Plan (HCP) for the conservation of Mojave desert tortoises (*Gopherus agassizii*; hereafter referred to as desert tortoises) in the

INTERIOR REGION 5
MISSOURI BASIN

KANSAS, MONTANA*, NEBRASKA, NORTH DAKOTA,
SOUTH DAKOTA

*PARTIAL

INTERIOR REGION 7
UPPER COLORADO RIVER BASIN

COLORADO, NEW MEXICO, UTAH, WYOMING

Upper Virgin River Recovery Unit (UVRU). In 1996, FWS issued an incidental take permit (ITP) for the 1995 Washington County HCP. This ITP allowed for development to occur in desert tortoise habitat on non-Federal lands in Washington County. One of the primary goals of the HCP conservation program was the establishment of the Red Cliffs Desert Reserve (Reserve) to protect a significant block of desert tortoise habitat in Washington County. When the FWS issued the 1996 ITP, Washington County and the HCP Partners (including BLM) established the Reserve. In 2009, most of the BLM-administered lands within the Reserve were designated as the Red Cliffs NCA. The FWS's ITP issued to Washington County expired in 2016. Prior to its expiration, Washington County applied to renew the ITP and amend their HCP (Amended HCP; Washington County 2020). Washington County amended the HCP to continue implementation of conservation measures from the 1995 HCP and to address new information regarding the status of desert tortoises in Washington County.

If a ROW crossing the Red Cliffs NCA is granted for the Northern Corridor highway, the Amended HCP includes a Northern Corridor changed circumstance that addresses effects of the highway to the HCP conservation program. A significant part of the Northern Corridor changed circumstance in the Amended HCP is to establish, administer, and manage a Reserve expanded by 6,813 ac. through the designation of a new Reserve Zone 6 (hereafter referred to as Zone 6). This area would be managed as part of the Reserve for the conservation of desert tortoises.

Separately, we are assessing the effects of Washington County's HCP conservation program in an intra-Service BO for our issuance of a new ITP (FWS 2021a). As the actions evaluated in this BO and the actions from the Amended HCP evaluated in the intra-Service BO are connected to each other, we recognize there could be confusion about which actions are associated with the Project and which actions are associated with Washington County's Amended HCP. Because of the connections between the Project and the Amended HCP, we evaluated actions proposed by Washington County in the intra-Service BO and actions proposed by UDOT, BLM, the State of Utah School and Institutional Trust Lands Administration (SITLA), and the Utah Department of Natural Resources (UDNR) to be evaluated in this BO. In particular, we recognize the inclusion of Zone 6 with the Northern Corridor highway can be confusing to readers of this BO. BLM and SITLA have committed to the establishment of Zone 6 on their lands to offset adverse effects from the highway as part of the changed circumstances for the Washington County HCP. This means the establishment of Zone 6 is directly contingent on the approval of the highway Project through the existing Reserve and becomes part of the proposed action in this BO. However, the inclusion of Zone 6 in the HCP by the County is a changed circumstance and considered in the analysis for the ITP and Intra-service BO. For additional details in how we considered and analyzed the effects of the actions in both BOs, see Appendix A.

In your letter, you requested our concurrence that the proposed action may affect, but is not likely to adversely affect the dwarf bear-poppy (*Arctomecon humilis*), Holmgren (Paradox) milkvetch (*Astragalus holmgreniorum*) and its designated critical habitat, Shivwits milkvetch (*Astragalus ampullarioides*), and Siler pincushion cactus (*Pediocactus sileri*). We concur with your determinations and include our rationales in Appendix B.

Although the Project crosses non-Federal lands, the BLM, as the action agency, has pursued section 7 consultation for the entire Project. We based this BO on information we received in your September 23, 2020, biological assessment (BA; BLM 2020a), correspondence, meetings, telephone conversations, field investigations, and other sources of information. A complete administrative record of this consultation is on file at the Utah Ecological Services Field Office. This BO evaluates the effects of the Project to the desert tortoise and desert tortoise designated critical habitat.

Consultation History

The information below summarizes significant steps in the consultation process:

- September 18, 2018: UDOT submitted an application to the BLM for a right-of-way (ROW) grant to construct a multi-lane, divided highway across the Red Cliffs (NCA).
- September 10-20, 2018: The Project National Environmental Policy Act (NEPA) contractors conducted desert tortoise surveys of the UDOT proposed alignment.
- September 18, 2018: The Project NEPA contractors presented the results of desert tortoise surveys. They found 44 desert tortoises, including 32 adults, in the ROW, with a higher density on the west side of Cottonwood Springs Road.
- May 29, 2019: We held a Purpose and Need Workshop in St. George with BLM and Project NEPA contractors.
- July 8-10, 2019: We held a workshop to identify Project alternatives with BLM, UDOT, and Project NEPA contractors in St. George, Utah.
- July 22-23, 2019: We had a meeting with Project NEPA contractors to discuss distribution and mapping of desert tortoises in the action area in St. George, Utah.
- October 2, 2019: We held a workshop to identify Project alternatives with BLM, UDOT, and Project NEPA contractors in St. George, Utah.
- November 13, 2019: We held a meeting to discuss Zone 6 actions with BLM and Project NEPA contractors as part of the proposed action.
- November 26, 2019: We held a meeting to discuss Project roadway alternatives and biology analysis needs with BLM and Project NEPA contractors in St. George, Utah.
- December 5, 2019: The Project and Washington County HCP Notice of Intent to prepare an Environmental Impact Statement was published in the Federal Register.

- December 6, 2019: We had a conference call to discuss special status plant analysis with BLM and Project NEPA contractors.
- December 17, 2019: We had a meeting with Project NEPA contractors to discuss desert tortoise resource analysis approach for EIS at the St. George Airport.
- December 17, 2019: We held a public scoping meeting for the Project Environmental Impact Statement at the Dixie Convention Center in St. George, Utah.
- January 24, 2020: We had a conference call with Project NEPA contractors regarding desert tortoise survey methodology.
- January 29, 2020: We held a workshop to identify Project alternatives with BLM and Project NEPA contractors in St. George, Utah.
- March 5, 2020: We held a conference call with Project NEPA contractors to discuss burrow survey approach and personnel qualifications to complete surveys.
- March 9-28, 2020: Project NEPA contractors conducted burrow surveys of corridor alignments.
- April 1, 2020: We had a conference call with BLM, UDOT, and Project NEPA contractors to discuss EIS alternatives, alignments, survey methods and results, data use, and desert tortoise density.
- June 12, 2020: The Notice of Availability for the Draft EIS, Draft RMP Amendments, and Draft Amended HCP was published in the Federal Register.
- June 24, 2020: We had a conference call with BLM, UDOT, and Project NEPA contractors to discuss the proposed approach to preparing the BA and consultation strategy.
- July 2, 2020: We had a conference call with BLM, UDOT, and Project NEPA contractors to discuss how desert tortoise data would be used, how to determine where to put wildlife crossing structures, FWS Kernel Density data, and Zone 6 conservation measures.
- July 15, 2020: We provided comments on a proposed process for development of the Project BA.
- July 16 & 21, 2020: We held online public meetings for the Project Environmental Impact Statement via Zoom.
- July 20, 2020: BLM provided a draft BA outline for our review.

- July 23, 2020: We provided comments on draft BA outline.
- July 29, 2020: We had a conference call with BLM, UDOT, and Project NEPA contractors to discuss desert tortoise data, crossing structures, ESA compliance, other conservation measures, and mitigation.
- August 11, 2020: We held a conference call with BLM and Project NEPA contractors to discuss desert tortoise data and crossing structures.
- August 11, 2020: BLM provided a draft BA for our review.
- August 20, 2020: We held a conference call with BLM, UDOT, and Project NEPA contractors to discuss additional conservation strategies (fencing, crossing structures).
- August 31, 2020: We provided our draft BA comments to BLM and Project NEPA contractors.
- September 1, 2020: We held a conference call with BLM, FWS, and UDOT to discuss desert tortoise data and conservation measures.
- September 17, 2020: We held a conference call with BLM and Project NEPA contractors to review BA comment responses and to finalize the BA.
- September 23, 2020: BLM submitted the final BA to us for consultation.
- October 9, 2020: BLM submitted a follow up email to us to amend the BA by adding citations on passage and clarifying the number of passages for the highway.
- November 13, 2020: We published the Notice of Availability for the Final EIS, Proposed RMP Amendments, and Final Amended HCP in the Federal Register.
- December 7, 2020: We provided the draft BO to BLM for review.
- December 11, 2020: We received comments from BLM and UDOT on the draft BO.

BIOLOGICAL OPINION

1.0 Proposed Action

The proposed action evaluated herein as the Project consists of:

1. BLM's issuance of a ROW to UDOT through the Red Cliffs NCA, including amendments to the 2016 Red Cliffs NCA RMP to allow for the one-time ROW issuance for an initial term of 30 years. This would allow for UDOT's construction and operation of the proposed Northern Corridor highway.
2. The management of BLM-administered lands in proposed Zone 6 as part of the Reserve to offset effects to Reserve Zone 3 from the Northern Corridor highway. This includes BLM's amendments to the St. George Field Office RMP to manage public lands within Zone 6 consistent with other BLM-administered lands within the Red Cliffs Desert Reserve. This also includes measures proposed by SITLA to allow Washington County to manage their lands to the benefit of desert tortoises and ESA-listed plant species until SITLA lands can be acquired for permanent protection.
3. Additional conservation actions in Reserve Zone 3 by BLM and UDNR to offset effects to Zone 3 from the Northern Corridor highway.

In the following paragraphs, we describe each of the three parts of the proposed action. Because the Project consists of multiple parts, it is important to spell out the roles of the respective agencies for the Project. For the Northern Corridor highway portion of the proposed action, UDOT applied to the BLM for a ROW grant to construct a multi-lane, divided highway across BLM-administered and private lands in the Red Cliffs NCA. UDOT is the applicant for the highway portion of the Project and BLM is the action agency. For the management of lands in proposed Zone 6, BLM and SITLA are proposing actions to offset the effects of the Northern Corridor highway and are thereby considered applicants. In addition, BLM is also the Federal agency responsible for actions occurring on their lands in Zone 6 and is considered the action agency for those actions. BLM and UDNR are proposing conservation actions to offset habitat degradation to Reserve Zone 3 from the Northern Corridor and the effects from wildfire and existing roads that are not related to the highway portion of the Project. For implementing conservation actions to offset habitat degradation portion of the proposed action, BLM, UDOT, and UDNR are the applicants and BLM is the action agency due to approvals for funding and authorizing actions on their lands.

1.1 BLM's issuance of a ROW and Northern Corridor Highway Construction and Operation

The UDOT applied to the BLM for a ROW grant to construct a multi-lane, divided highway across BLM-administered and private lands in the Reserve in Washington County, Utah. Congress designated areas of the Reserve in Federal ownership by creating the Red Cliffs NCA through the Omnibus Public Land Management Act of 2009 (OPLMA; Public Law 111-11).

OPLMA Subtitle O, Section 1977 also directs the Secretary to develop a comprehensive travel management plan for the land managed by the BLM in Washington County and, in accordance with the Federal Land Policy and Management Act of 1976 (FLPMA) (43 USC 1701 et seq.), “in developing the travel management plan, the Secretary shall (A) in consultation with appropriate Federal agencies, State, tribal, and local governmental entities (including Washington County and St. George City, Utah), and the public, identify one or more alternatives for a northern transportation route in the County.”

Under the Federal Land Policy and Management Act of 1976 (FLPMA, Public Law 94–579), BLM must respond to UDOT’s Northern Corridor highway ROW application. The BLM adopted a Resource Management Plan (RMP) for the Red Cliffs NCA in 2016. In order to authorize a ROW across the Red Cliffs NCA, the BLM must amend the Red Cliffs NCA RMP as required under FLPMA.

1.1.1 *Red Cliffs NCA RMP Amendment*

BLM issuance of a ROW to the UDOT necessitates an amendment to the Red Cliffs NCA RMP, as the current management designation for ROWs in the NCA does not accommodate the size of the proposed Northern Corridor highway. Thus, the purpose of the Red Cliffs NCA RMP Amendments is for a one-time authorization for the Northern Corridor highway to be constructed and maintained in the Red Cliffs NCA. The RMP Amendments, as an administrative action, authorize the issuance of a ROW permit to UDOT for construction and operation of the highway, and the act of amending the RMP does not cause effects to desert tortoises or their designated critical habitat. Therefore, the RMP Amendments as an administrative action will not be discussed further in this BO.

Northern Corridor Highway Construction and Operation

If BLM issues a ROW for the Northern Corridor highway, UDOT will then construct and maintain operation of the highway. The Northern Corridor is a proposed highway intended to reduce congestion, increase capacity, and improve east-west mobility on arterial and interstate roadways between State Route 18 (SR-18) and Interstate 15 (I-15) at milepost 13 in Washington County, Utah. The Northern Corridor highway ROW alignment would connect Green Spring Drive on the east to Red Hills Parkway on the west just north of the Pioneer Hills trailhead parking area. The Northern Corridor ROW would be approximately 4.3 miles long, with up to approximately 2.37 miles on BLM-administered lands (Figure 1).

The highway and ancillary facilities consist of several components including the highway, new intersections with existing roads, bridges and underpasses. The ROW application for the proposed highway does not leave the ROW available for additional aboveground or buried utilities beyond those necessary for construction and operation of the highway. A new ROW would be needed to allow for consolidating existing or adding new utilities.

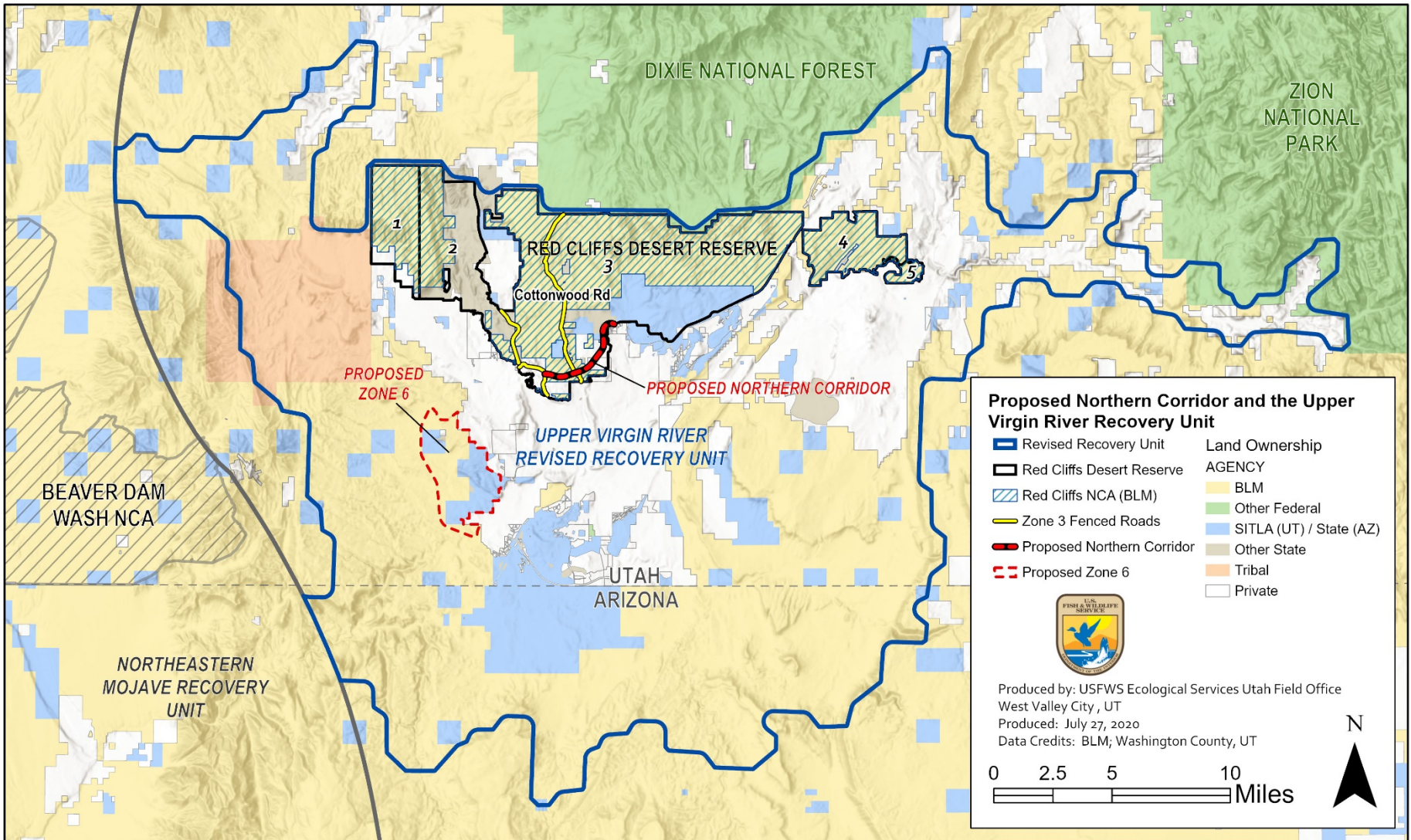


Figure 1. Proposed Project

The highway may be constructed in two phases. Though specific details of the phased construction would be determined by the applicant during the final design of the highway, the first construction phase would likely result in one lane in each direction, with a center median. The second phase would provide an additional lane in each direction and conversion of the intersection with Red Hills Parkway. For the intersection tie-ins, the BLM will also need to make any necessary ROW amendments to the City of St. George's existing FLPMA Title V ROW for the Red Hills Parkway.

The Northern Corridor highway includes design features such as desert tortoise exclusion fencing, shade structures, and underpasses to minimize effects to desert tortoises. To reduce the effects of habitat fragmentation from the 500 feet (ft.) wide Northern Corridor ROW, crossing structures (e.g., culverts, viaducts, or bridges) will be provided in appropriate locations to accommodate desert tortoise dispersal needs and to support demographic and genetic connectivity on both sides of the highway.

The Northern Corridor highway would be a multi-lane, divided highway with the following features, as described in the Project Plan of Development (POD):

- Four-lane divided highway: two 12-ft.-wide travel lanes in each direction, 8-ft. shoulder, and a 20-ft. center median.
 - Phase 1 – two-lane facility with median.
 - Phase 2 – widening to add additional lanes.
 - Other phases may include trails and cross-street connections.
- 500 ft. wide ROW (would vary between 300 and 500 ft. for construction requirements such as cut and fill slopes).
- Combination of curb and gutter, drainage swales, and ditches.
- A 10 to 14-ft. wide multi-use, paved trail accommodating bicyclists and pedestrians on both sides of the proposed highway. The trail will not have access to the Reserve except at Cottonwood Springs Road and Red Hills Parkway.
- Bridges and passage structures to facilitate desert tortoise movements on both sides of the highway.
- Desert tortoise exclusion fencing along both sides of the highway.
- Posted speed limit of 50 miles per hour.

New intersections

- A new at-grade intersection with traffic signals at Cottonwood Springs Road (also known as Old Dump Road or Turkey Farm Road); this connection would fit within the 500-ft. ROW. This is the only full access intersection between Red Hills Parkway and Green Spring Drive.
- A new intersection for connection to Red Hills Parkway, comprising initially an at-grade intersection with traffic signals and lighting. The intersection would later be converted to a grade-separated interchange with bridges, ramps, and lighting similar to a freeway interchange. The conversion to the interchange would occur by 2050, based on traffic levels and available funding.

Bridges

The proposed highway includes two bridges over large washes that are required for roadway design. These bridges will also facilitate desert tortoise passage to either side of the highway and one of the bridges will be extended to improve desert tortoise passage on adjacent flatter ground.

Desert tortoise passages

The roadway design included in the Final POD will incorporate passage structures across the Northern Corridor highway for desert tortoise with exclusion fencing along the highway. The Final POD is required before BLM can issue the Notice to Proceed for construction of the highway (BLM and FWS 2020a). The Northern Corridor highway includes a minimum of eight passages (including the two bridges discussed above). The exact locations of each passage structure are expected to be further refined through additional monitoring or field surveys and any new information that may be available at the time of final roadway design. Any changes in final design of desert tortoise passages are anticipated to be incremental and would not result in a material change or lesser conservation of desert tortoise, would be consistent with the review of effects and effectiveness, and provide the same level of protection as the passageways considered in this BO. The additional information will be used to ensure effective placement for desert tortoises where evidence of concentrated use or burrows are found, and to ensure the structure can support technical and economic feasibility for design, construction, and long-term maintenance. To the extent feasible and consistent with Northern Corridor highway design and engineering, UDOT will consider additional locations for desert tortoise passages where natural topography creates an opportunity. Passageways will vary in size and be developed in final design of the project in coordination with the BLM, with the goal of achieving the following general design elements:

- Creating passages of sufficient size, based on the best available information at the time, to promote usage by desert tortoises.
- Incorporating natural light through sizing the passage appropriately and incorporating ceiling grates, open air sections, or other elements that allow for natural light throughout the passage to promote use by desert tortoises.
- Establishing to the extent feasible, a natural surface continuous with the surrounding environment and incorporating appropriate vegetation and substrate along the bottom through the passages to promote usage by desert tortoises
- Focusing on fill areas and natural drainages to maximize the size of openings where consistent with natural topography.

In development of the final design, UDOT will make reasonable efforts to consult with the BLM, Utah Division of Wildlife Resources (UDWR), and FWS when determining the appropriate type of structure, sizing, and placement of passage structures for desert tortoises. Such determinations will be made based on current monitoring data, findings regarding minimizing fragmentation, construction techniques, and technology or equipment available at the time of roadway construction and the feasibility to incorporate such technology into the project design. Any deviations based on site-specific conditions, topography, or design and engineering from the

established parameters will be subject to review and approval by the BLM and FWS. UDOT will select the final structure type for the passages, which may incorporate culverts, bridges (including bridge extensions and piers), grade-separated intersections, pre-cast structures, or other methods that achieve the goals and parameters listed above, in accordance with current standards and published research studies.

Recreational trails

UDOT will install under-road passages for each of the three existing recreational trails that cross the ROW. The T-Bone Trail passage may be incorporated into the passage being designed for desert tortoises. All under-road passages must provide sufficient clearance to allow for safe passage of users, and UDOT and BLM will collaboratively determine the final design to be included in the Final POD.

Interpretive displays

UDOT will provide a minimum of eight waypoints along the new hike and bike path and install an interpretive display at each one. The content of the displays will be guided by the Red Cliffs NCA Interpretive Concept Plan and promote public education and understanding of the eight purposes for which the Red Cliffs NCA was designated. UDOT and BLM will collaboratively determine the final location and design of the waypoints and interpretive displays through the Final POD.

Roadway Lighting

UDOT will minimize lighting installation within the ROW to only emergency lighting where the roadway crosses the Red Cliffs NCA, except where additional lighting is necessary near intersections or other areas that would support safety and proper visibility for vehicles and pedestrians. In addition, we expect UDOT will utilize lighting for construction activities at night and during low-light conditions. Because UDOT has committed to using exclusion fencing to keep desert tortoises from the ROW during highway construction and operation and minimizing lighting to the minimum necessary for safe operation of the highway, we do not expect lighting to affect desert tortoises and will not analyze effects from lighting further in this BO.

Post construction

After construction, the project area would be stabilized using erosion and sediment control measures, have topsoil placed over fill material, and be seeded with a BLM-approved seed mixture to establish vegetation. UDOT will manage the long-term operation and maintenance of the Project, including regular inspections to ensure that all equipment, structures, and best management practices (BMPs) are in good working order (UDOT 2020).

1.2 Management of Land in Zone 6 as part of the Reserve

As discussed above, the approval of the Northern Corridor ROW and resulting highway triggers a changed circumstance to Washington County's Amended HCP. To address the effects from the Northern Corridor highway to the Reserve, BLM, SITLA, and Washington County would establish and manage a new 6,813 ac. Reserve Zone 6 area south and west of the existing Reserve. Approximately half of Zone 6 is currently managed by the BLM (3,471 ac.) and the other half is currently managed by the State of Utah School and Institutional Trust Lands Administration (SITLA; 3,229 ac.). Other approximate acreage includes 70 ac. of UDOT land and 42 ac. of privately owned land. As part of the proposed action, BLM would manage the public lands in Zone 6 consistent with and as a part of the Reserve for the conservation of desert tortoise. In addition, BLM would further seek opportunities to acquire other lands (SITLA or private) in non-Federal portions of Zone 6 to extend Federal protections throughout Zone 6.

1.2.1 BLM St. George Field Office RMP Amendment

As part of this Project and to ensure changes in land management are upheld through BLM's planning process, the BLM is amending their St. George Field Office RMP (SGFO RMP; BLM 1999; BLM 2016a) to allow for management of their lands and any lands acquired by BLM in Zone 6 consistent with the rest of the Reserve. While lands in Zone 6 can be acquired by the BLM, these lands cannot become part of the Red Cliffs NCA without an act of Congress. Specifically, BLM planning-level considerations in the SGFO RMP Amendment to allow for future tortoise management include the following:

- Acquisition of non-Federal lands from willing sellers, including 3,229 acres of SITLA lands.
- Make Federally managed grazing allotments unavailable for grazing.
- Designate an exclusion area that would prevent development of future rights-of-way.
- Reduce the total mileage of designated routes.
- Retention of all BLM-administered lands within proposed Reserve Zone 6.

BLM implementation-level actions that may be authorized in the proposed SGFO RMP amendment includes:

- Prohibit physical geocaches in proposed Reserve Zone 6.
- Allow virtual geocaches in proposed Reserve Zone 6, provided they are compliant with other zone restrictions. Written approval from the BLM Field Manager would be required prior to the public posting of any virtual geocache placement.
- Prohibit the take-off and landing of powered parachutes, ultralight aircraft, remote-controlled aircraft, and unmanned aerial vehicles in proposed Reserve Zone 6.

- Manage proposed Reserve Zone 6 as closed to camping.
- Prohibit campfires within proposed Reserve Zone 6.
- Require users to pack out all solid human and pet waste.

1.2.2 Utah School and Institutional Trust Lands Administration (SITLA) Commitments for Zone 6

SITLA commits to allowing Washington County to manage their lands in Zone 6, foregoing other development opportunities on those lands in order to protect desert tortoises until such lands are acquired, as set forth in the 2020 Amended HCP and Implementation Agreement. The specific management actions Washington County is undertaking on SITLA lands for the benefit of desert tortoises are discussed and analyzed further in the HCP Intra-Service BO (FWS 2021a) and will not be discussed further in this BO.

1.3 Reserve Zone 3 Commitments

As partners to the HCP, the BLM, UDOT, and UDNR identified additional conservation measures to address effects from the Northern Corridor highway that would occur within Reserve Zone 3 and to restore and maintain the 1995 and Amended HCP conservation program for desert tortoise. The effects to the conservation program and the measures proposed to address those effects are summarized below with commitments ascribed accordingly to the respective agency.

- Desert Tortoise Passage Improvements on SR-18: To help offset effects from the highway to the Reserve, UDOT has committed to assess and monitor existing culverts in SR-18 and, if needed, to improve passage for desert tortoises. SR-18 is a fenced road that likely acts as a movement barrier between Reserve Zones 2 and Zone 3 (Responsible Entity: UDOT).
- Off-site Habitat Restoration: The BLM, FWS, UDNR's Watershed Restoration Initiative, and other stakeholders will establish a partnership focused on enhancing the condition and resilience of the Zone 3 sub-population of desert tortoises by improving habitat conditions and/or protecting habitat from future wildfires in areas away from the proposed Northern Corridor highway. Building upon their cooperative relationship, the partners will secure funding, collaboratively design and prioritize projects, and share resources, to implement habitat restoration at a level beyond what would have been achieved without the Northern Corridor highway, ultimately benefitting the desert tortoise within the Red Cliffs NCA. Acres and locations of treatments may vary from year to year based on availability of funding, new survey data, changes in conditions (e.g. wildfires), and other factors that will guide the partners to apply resources where they will achieve the most substantial benefits for the species. The partners will work toward restoring habitat every year, regardless of larger restoration projects that occur as a response to wildfires, with a target total acreage of approximately 2,600 ac. of successfully restored habitat over the 25-year term of the HCP. (Responsible Entities: BLM, FWS, and UDNR)

- The BLM will continue to coordinate and cooperate with UDNR’s Watershed Restoration Initiative to support their efforts to seek \$525,000 in state funding to supplement the BLM’s efforts both within areas that burned in 2020 and in other areas that may limit the spread of future fires. As an immediate response to the four fires that occurred in the Reserve in 2020, the BLM will conduct emergency stabilization efforts within the burned areas with an investment totaling approximately \$2,187,000, dependent on budget allocations. Additionally, the BLM has requested approximately \$400,000 in Federal restoration funding that would repair damaged facilities or fund other measures to support the emergency stabilization efforts (e.g. fencing repair to prevent unauthorized off-road motorized use). Projects will be consistent with the Red Cliffs NCA RMP and may include treatments and methods included in that plan, with subsequent site-specific environmental analysis as appropriate. This may include limitations on types of methods used for restoration but will also include consideration of other habitats for threatened and endangered species of flora and fauna. (Responsible Entities: BLM and UDNR)

1.4 Conservation Measures

The applicants and BLM have committed to the following conservation measures to reduce effects to species with the potential to occur in the action area:

1.4.1 Highway Measures (Responsible Entity: UDOT)

- Qualified biologists will act as biological monitors and be present on-site during Project-related actions that may affect ESA-listed species. Other personnel may assist with implementing terms and conditions that do not involve desert tortoise handling, monitoring, or surveys, but only under direct field supervision of the FWS and BLM- approved biologists. Specific biologist requirements for desert tortoise are described further in the Project BA and POD (see Special Status Species: Federally Listed Species measures in Table 3 of POD; UDOT 2020).
- The biological monitors will be responsible for determining compliance with measures as defined by the BO, ROW grant, or other agreements between UDOT, the BLM, and other Federal or State agencies. Biological monitors will have the authority to halt non-emergency construction activities not in compliance with these measures. Stop-work directives will be effective long enough to remedy the immediate situation and will be limited to the equipment and parties involved in the situation. All action of noncompliance or conditions of threat to listed species will be recorded immediately by the biological monitor and reported to applicable agencies. Biological monitors will be qualified biologists, as determined by the FWS.
- Desert Tortoise Monitor – Desert tortoise monitors are individuals who are approved by the FWS to:
 - assess habitat suitability;

- conduct presence/absence and abundance surveys for desert tortoises;
- monitor project activities within desert tortoise habitat;
- ensure proper implementation of conservation measures outlined in this document; and
- report incidents of non-compliance with the Reasonable and Prudent Measures and Terms and Conditions in the Biological Opinion (BO) issued for the Project by the FWS.

Desert tortoise monitors should have enough desert tortoise field experience (a minimum of 480 hours searching for tortoises and tortoise sign) to detect the presence of desert tortoises through observations of animals and sign including scat and burrows. A desert tortoise monitor is not authorized to handle desert tortoises. The monitor will keep detailed field notes and turn them in regularly to the biological monitor.

- Field Contact Representative – Field contact representatives (FCR) are individuals who are approved by the FWS to:
 - monitor some project activities within desert tortoise habitat (i.e., for this Project, unsuitable habitat);
 - assist with daily clearance sweeps;
 - assist with proper implementation of protective measures; and
 - call the desert tortoise monitor, biologist, BLM, UDWR, or FWS, with any questions or concerns.

The FCRs are not permitted to assess habitat suitability or conduct FWS protocol level surveys for desert tortoises because they do not have sufficient training or field experience. Because the Project area supports such high densities of desert tortoises, FCRs are not qualified to monitor within suitable habitat. Only qualified biologists and desert tortoise monitors are qualified to monitor in suitable habitat in the Project area.

- If a desert tortoise is found in the project area during project activities, the desert tortoise will not be approached or handled and all project activities within 300 ft. of the desert tortoise will be halted immediately until the animal leaves the area or is moved from the site. This distance can be adjusted down depending on specific circumstances as coordinated with the UDWR and BLM. The UDWR and BLM will be contacted to approach and relocate the desert tortoise. The FWS (and the Washington County HCP administrator, if directed by UDWR or BLM) will be notified within 24 hours if a desert tortoise is found in the project area.

- Desert tortoise short-distance translocation: concurrent with installation of desert tortoise exclusion fencing of the ROW, desert tortoises will be moved from harm's way and placed outside the ROW but within 984 ft. of an individual's presumed home range based on age and sex where possible, in accordance with established FWS protocols (FWS 2020a).
- In suitable desert tortoise habitat, the following protocols will apply for project activities that occur during the Most Active tortoise season (February 15 to November 30):
 - a. A desert tortoise biologist will be on site during all highway project activities for the protection of desert tortoises. The biologist will be responsible for determining compliance with the conservation measures as defined in a BO issued for the Project.
 - b. No more than one hour prior to daily construction activities commencing or by 7 a.m. each work day (whichever is later), a desert tortoise biologist will conduct a clearance sweep of that day's activity area (including a 330 ft. zone of influence on all sides) to identify desert tortoises and occupied burrows in the area. The monitor will also carefully inspect any hazards (e.g. trenches, open pipes). If temperatures are outside the range where desert tortoise activity is expected, the proponent may coordinate with the FWS to reduce monitoring requirements.
 - c. A desert tortoise monitor will be assigned to each grouping of equipment (heavy machines which use power to perform a construction function specific to the machine) operating in spatially disjunct areas within the project site. A grouping of equipment is defined as all construction equipment working within a 1,000-ft. linear distance from the first piece of equipment to the last piece of equipment. Equipment performing backfilling, re-contouring, and reclamation activities are included in this measure.
 - d. Project vehicle speeds in the project area will be limited to 15 miles per hour (mph). Speed limit signs will be posted when entering and exiting the Project area.
 - e. Blasting may be required for the highway. Blasting will not be conducted within 330 ft. of an occupied desert tortoise burrow due to possible direct effects of this action on burrow stability. The desert tortoise biologist will conduct 33 ft. belt transect protocol desert tortoise surveys prior to and within 330 ft. of any blasting. If a burrow is occupied, the UDWR, BLM, and FWS will be contacted to discuss appropriate translocation measures based on the case-specific circumstances. Any contractor performing blasting will comply with applicable regulations, codes, and standards established by the regulatory agencies, and follow the Reasonable and Prudent Measures and Terms and Conditions in this FWS BO to minimize effects to desert tortoise.
 - f. If highway project activities occur during the desert tortoise Most Active Season (February 15 to November 30, highest activity during March 15 to May 15 and August 20 to October 20), UDOT will hold a short refresher meeting with all highway project personnel that will be led by the desert tortoise biologist on February

- 15, or the first working day just prior to that date, and on March 15 and August 20 (or the first working day just prior to those dates). This meeting will include instruction and handouts to remind workers of the highway project's conservation measures. Refresher meetings will be held in addition to the pre-project meeting described below. However, if the initial pre-project meeting occurred recently (within one month prior to the most active season start date, March 15 or October 20), the refresher meeting that would have normally been held on that date is not required.
- g. Because shade structures are being installed, once-daily fence line checks by the desert tortoise biologist will be conducted no more than one hour prior to each day's project activities beginning, or at 7 a.m. (whichever is later).
 - h. Open trenches and other open excavations will be covered or provided with desert tortoise escape ramps. Excavations left open will be checked each morning for presence of tortoise prior to commencement of daily work and at the end of the work day. Escape ramps will have a slope no steeper than 3:1 and be a minimum of 3 ft. in length. Escape ramps will be placed at 328 ft. intervals. These distances will be reduced if the desert tortoise biologist and Federal agencies determine that the plug/escape ramp spacing is insufficient to facilitate animal escape from the trench.
 - i. No standing water caused by highway project operations will be permitted in desert tortoise habitat because this can attract desert tortoises and predators. Similarly, leaks on water trucks and water tanks will be repaired to prevent pooling water. If watering conditions could temporarily attract desert tortoises, the desert tortoise monitor assigned to a group of equipment constructing the project may periodically leave the group of equipment to patrol each area being watered.
 - j. The storing and handling of bulk hazardous waste materials will be excluded from the project areas within 1,969 ft. of active tortoise burrows.
- For suitable habitat, the same measures as above for the Most Active Season will be applied during the Less Active Season (December 1 to February 14), with the following exceptions:
 - a. A desert tortoise biologist is not required on site daily. A monitor will remain on-site during all project activities, conduct daily clearance sweeps out to a 328-ft. zone of influence, check any hazards, and check all backfilling, re-contouring, and reclamation activities prior to initiation. A desert tortoise biologist will conduct an initial pre-construction clearance survey and identify any occupied burrows or hibernacula. The biologist will also come out to the site weekly to check in with the monitor, review and collect field notes, and check any hazards.
 - b. The fence line will be checked once per day by the biologist or monitor.
 - c. A field contact representative will be assigned to each grouping of equipment as described above.

- For unsuitable habitat (within the fenced areas of Cottonwood Springs Road and Red Hills Parkway), the following conservation measures will be applied during the Most Active Season (February 15 to November 30):
 - a. A desert tortoise biologist will conduct an initial pre-construction clearance survey and identify any occupied burrows or other hibernacula adjacent to the desert tortoise exclusion fence.
 - b. A desert tortoise biologist will come out to the site weekly to check in with the monitor, review and collect field notes, and check any hazards.
 - c. A monitor will stay on-site and perform a clearance sweep out to 328 ft. and check any open trench and any other open excavations at least three times daily.
 - d. If a desert tortoise or fresh desert tortoise sign is found within the 328-ft. zone of influence of the project, the monitor will contact BLM, UDWR, and FWS to discuss appropriate translocation, avoidance, and minimization measures based on the case-specific circumstances.
 - e. No standing water caused by project operations will be permitted in desert tortoise habitat as this can attract desert tortoises and predators. Similarly, leaks on water trucks and water tanks will be repaired to prevent pooling water. If conditions favor tortoise activity, the FCR or a desert tortoise monitor assigned to a group of equipment constructing the project may periodically leave the group of equipment to patrol each area being watered.
 - f. If project activities occur during the desert tortoise Most Active Season (February 15 to November 30, highest activity during March 15 to May 15 and August 20 to October 20), the proponent will hold a short refresher meeting with all project personnel that will be led by the desert tortoise biologist on February 15, March 15, and August 20 (or the first working day just prior to those dates). This meeting will include instruction and handouts to remind workers of the project's conservation measures. Refresher meetings will be held in addition to the pre-project meeting described below. However, if the initial pre-Project meeting occurred recently (within one month prior to February 15, March 15, or October 20), the refresher meeting that would have normally been held on that date is not required.
- For unsuitable habitat (within the fenced areas of Cottonwood Springs Road and Red Hills Parkway), the following measures will be applied during the Less Active Season (December 1 to February 14):
 - a. The on-site desert tortoise monitor does not need to remain onsite during all Project activities.
 - b. A monitor will perform a sweep of any open trench and any other open excavations once daily.

- c. The desert tortoise biologist will visit the site once a week to review field notes and assess any hazards.
 - d. If a desert tortoise or fresh desert tortoise sign is found within the 328 ft. zone of influence of the project, the monitor or FCR will contact BLM, UDWR, and FWS to discuss appropriate translocation, avoidance, and minimization measures based on the case-specific circumstances.
- All individuals working onsite will be required to take a Worker Education Training Program, conducted by the Washington County HCP Office (Washington County 2006). The class will describe desert tortoises, and the appropriate measures to take upon discovery of a desert tortoise or burrow. The class will also include a discussion of construction techniques and conservation measures to minimize potential adverse effects. All project personnel will sign an affidavit certifying that they have read and understand the material presented in the brochure and class. UDOT will work with Washington County to maintain all records of affidavits.
 - At the beginning of the construction day and before they are filled, pits and trenches will be inspected for trapped animals. If any animals are found, they will be moved out of harm's way by a qualified biologist approved by the FWS and the BLM.
 - UDOT will develop and implement a Litter Management Plan for the ROW. During construction, trash and food items will be contained in closed (predator-proof) containers and removed regularly as needed to reduce attractiveness to opportunistic predators such as ravens, coyotes, and feral dogs. Refuse and trash, including stakes and flags, will be removed and disposed of properly. UDOT shall promptly remove and dispose of all litter and debris caused by its activities to the satisfaction of the BLM Authorized Officer.
 - UDOT will install and maintain Mojave desert tortoise exclusion fencing and shade structures along the approved ROW in accordance with the most recent FWS guidance as incorporated into the Final POD. Fencing precludes Mojave desert tortoise from entering the construction area or completed highway and shading provides thermal and predation cover for desert tortoise that encounter the exclusion fencing and pace along it. Attachment 1 in Appendix D of the Final EIS provides additional guidance on this measure. Maintenance may be conducted through coordination with Washington County or other entities.
 - Because shade structures are being installed, once daily fenceline checks by the desert tortoise biologist would be conducted no more than one hour prior to each day's project activities beginning or 7 a.m. (whichever is later). Fenceline checks would be conducted prior to activities, any breaches fixed, and if breaches are found, a coarse clearance survey would occur. UDOT will maintain increased monitoring in the following 2 weeks and when the more active season starts would also occur.

- Pre-construction clearance surveys would be conducted prior to the initiation of construction. Areas that have been cleared and fenced with permanent fencing would ensure regular monitoring and maintenance of the fenceline (at least annually).
- UDOT will prepare a Hazardous Materials, Hazardous Waste and Prevention Plan. Local, State, and Federal regulations related to the use, handling, storage, transportation, and disposal of hazardous materials will be followed. No equipment oil or fuel will be drained on the ground; oils or chemicals will be hauled to an approved site for disposal. All toxic substances (e.g., oil, gas, antifreeze) will be stored in waterproof closed containers at all times. Accidental spills will be reported and cleaned up immediately. The storing and handling of bulk hazardous waste materials would be excluded from the project areas within 600 meters of active tortoise burrows. Construction sites, staging areas, and access roads will be kept orderly during construction. Portable toilets will be used on-site and maintained on a regular schedule. A hazardous materials spill kit that is appropriate for the solvents involved in operation and maintenance of vehicles and machinery used during the Project will be kept on-site during construction. The BLM and other regulatory agencies will be contacted as soon as possible in the event of a fuel/oil or hazardous material spill. Actions will be taken to minimize the amount and spread of the spill material, including the use of straw bale plugs, earthen berms, and the use of absorbent materials. If necessary, soil remediation will be conducted, including the removal of contaminated soils to an approved facility and soil sampling to verify successful site remediation.
- UDOT will be required to obtain a Utah Pollutant Discharge Elimination System (UPDES) General Stormwater Discharge Permit from the State Division of Water Quality. The general permit requires the development and implementation of a Stormwater Pollution Prevention Plan that will identify good housekeeping BMPs, such as materials handling and storage, and fueling and equipment maintenance as well as site-specific measures to protect slopes and natural features, minimize erosion, and prevent eroded sediment from leaving the construction zone. The Plan will be prepared in accordance with the requirements of the UDOT Stormwater Management Program plan.
- UDOT shall prepare a Noxious Weed Management Plan will be prepared and submitted to the appropriate land management agencies for approval prior to the start of construction. The agencies will coordinate with FWS as needed.
- Broadcast applications of herbicides will be prohibited within the project area; if necessary, spot treatments will be applied by hand using herbicides approved by the U.S. Environmental Protection Agency and BLM in order to treat noxious weeds. The highway project area will be monitored and controlled, as necessary, for weeds for the life of the ROW grant (which may include maintenance activities).
- Any straw or other organic products used during construction, restoration, operations, maintenance, or for stabilization will be certified free of plant species listed on the Utah and Arizona noxious weed list or specifically identified in the agency-approved Weed Management Plan for the project.

- Construction vehicles and equipment will be cleaned with a high-pressure washer or high-pressure air and wire brush prior to arrival on the ROWs and prior to departure from areas of known noxious weed infestations to minimize the introduction or spread of noxious weeds. All water and material at the vehicle cleaning stations will be contained, collected, and hauled off site for disposal at an approved disposal site.
- UDOT or its certified licensed contractor will submit a request for a Pesticide Use Proposal to the BLM and other applicable agencies prior to the planned application of any herbicide and a Pesticide Application Record after the planned application of the herbicide. The Pesticide Use Proposal will identify areas of planned herbicide application. No herbicide mixing or rinsing of containers or application equipment will occur within 100 ft. of natural water sources (i.e., lakes, streams, or springs). An annual report on herbicide application on public lands within the ROWs will be provided to applicable agencies.
- Herbicides may not be sprayed within or around an exclusion area containing listed plants (buffers may be applied around areas in coordination with the FWS, depending on resource). These areas will be delineated with stakes and signs during construction or by GPS data. Removal of noxious and invasive weeds in these areas shall be accomplished by method(s) approved by the FWS or that are identified in this BO.
- UDOT will prepare a Reclamation Plan for the highway ROW for approval by the BLM. The Reclamation Plan will support the goal of returning the land to be reclaimed to a condition approximate to or more productive than that which existed before disturbance. The Reclamation Plan will include at least the following elements:
 - a. Reclamation timing,
 - b. Topsoil and Subsoil Measures,
 - c. Recontouring, Seeding, and Outplanting Measures,
 - d. Weed Control,
 - e. Performance Standards,
 - f. Reclamation Monitoring, including Reference sites (Qualitative and Quantitative),
 - g. Reclamation Success criteria, and
 - h. BLM Reclamation Goals and Process.
- All disturbed areas will be re-vegetated in compliance with the Red Cliffs NCA RMP or other applicable standards at the time of reclamation. The BLM would inspect reclamation activities at the end of construction to ensure disturbed areas are revegetated/restored according to the performance standards within the approved Reclamation Plan.

- Only the minimum amount of vegetation and topsoil necessary would be removed for each phase of construction. For each phase of construction, topsoil would be removed and stored in dedicated locations within the ROW for reclamation of areas disturbed by construction. Topsoil would be stored and applied during the reclamation of construction disturbances in accordance with the restoration and rehabilitation specifications shown in Table 3 of the POD. To preserve topsoil quality, topsoil would not be stored between phases of construction.
- UDOT shall submit a Fugitive Dust Control Plan to the Utah Division of Air Quality (DAQ) for construction activities. UDOT shall minimize fugitive dust from construction activities using methods such as watering and chemical stabilization of potential fugitive dust sources or other methods approved by the DAQ. In addition, UDOT shall minimize fugitive dust from material storage, handling, or hauling operations through the use of covers, stabilization, or other methods approved by the DAQ.

1.4.2 Special Plant Conservation Measures for actions in Zone 6 (Responsible Entities: BLM and SITLA)

- Pre-project habitat assessments will be completed across 100 percent of the project disturbance area within potential habitat prior to any ground disturbing activities to determine if suitable habitat is present.
- Surveys will be conducted within suitable habitat to determine occupancy. Surveys:
 - a. Must be conducted by qualified individual(s) and according to BLM and FWS accepted survey protocols.
 - b. Will be conducted in suitable and occupied habitat for all areas proposed for surface disturbance prior to initiation of project activities and within the same growing season, at a time when the plant can be detected (usually the flowering period). However, surveyors should verify that the plant is flowering by contacting a BLM or FWS botanist or demonstrating that the nearest known population is in flower.
 - c. Will occur within 300 ft. from the edge of any proposed ROW and/or project disturbance for roads and other facilities requiring removal of vegetation.
 - d. Will include, but not be limited to, plant species lists and habitat characteristics.
 - e. Will be valid until the beginning of the flowering period the following year.
 - f. Will be combined with historic plant location data for that particular site to delineate the outer boundary of occupied habitat. The 300-ft. avoidance buffer will then be applied to the outer boundary of occupied habitat for that site. This evaluation will occur in coordination with the BLM and FWS to ensure that the appropriate buffer is applied to protect active and dormant plants and dormant seed banks in occupied habitat.

- g. Reports (electronically submitted) and GIS shape files will be sent no later than December 31st to each of the following:
- Utah Natural Heritage Program (with copies of Natural Heritage Program field survey forms)
 - Applicable/affected landowners and/or management agencies, and
 - Appropriate BLM and FWS field offices.
- Where standard surveys are technically infeasible and otherwise hazardous due to topography, slope, etc., suitable habitat will be assessed and mapped for avoidance (hereafter, “avoidance areas”) and incorporate 300-ft. buffers. However, site-specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat.
 - Design project infrastructure to minimize effects within suitable habitat:
 - a. Limit new access routes created by any project.
 - b. Roads and utilities should share common ROWs where possible.
 - c. Reduce the width of ROWs and minimize the depth of excavation needed for any roadbed; where feasible, maintain natural contours within habitat.
 - d. Place signing to limit off-road travel in sensitive areas.
 - e. Stay on designated routes and other cleared/approved areas.
 - f. Noxious weeds within occupied habitat on all federal lands may be controlled with herbicides, in accordance with the 2007 BLM Herbicide PEIS Guidelines (https://eplanning.blm.gov/public_projects/nepa/70300/95866/115877/AppendixBHerbicideUseSOPs.pdf) and 2016 BLM Invasive Weed Management Plan Environmental Assessment, or most recent St. George Field Office guidance.
 - A Pesticide Use Permit will be approved through the action agency prior to weed control activities in occupied habitat. An approved Pesticide Use Permit will include the most recent BLM guidelines for herbicide use near sensitive plant species.
 - g. Erosion control measures (e.g., silt fencing) will be implemented to minimize sedimentation or concentrating water flow toward federally listed plants and populations located down slope of proposed surface disturbance activities. Such measures should only be installed within the area proposed for disturbance.
 - h. Only water (no chemicals, brine, or produced water) will be used for dust abatement measures.

- i. All disturbed areas will be re-vegetated with native species comprised of species indigenous to the area. Non-native species may be included in a seed mix provided that the selected species are sterile, non-rhizomatous, and unlikely to invade other areas. Seed mix should be approved by BLM botanists and FWS.
- Within occupied habitat, project infrastructure will be designed to avoid direct disturbance and minimize indirect effects to populations and to individual plants:
 - a. Follow the above recommendations for project design within suitable habitats.
 - b. Buffers of 300 ft. minimum will be maintained between the edge of disturbance and plants, populations, occupied habitat, and avoidance areas.
 - c. To avoid water flow and/or sedimentation into occupied habitat and avoidance areas, silt fences, hay bales, and similar structures or practices will be incorporated into the project design; appropriate placement of fill is encouraged.
 - d. Future construction activities will not occur during the flowering period within occupied habitat.
 - e. Roads authorized for motorized use will be graveled within 300 ft. of occupied habitat.
 - f. Dust abatement measures will be applied to disturbed areas during the active growing period (typically April 1st through July 31st) and throughout the lifetime of the project (initial construction through reclamation).
 - g. Before and during construction, areas for avoidance should be visually identifiable in the field (e.g., flagging, temporary fencing, rebar, etc.).
 - h. Place produced oil, water, or condensate tanks in centralized locations, away from occupied habitat.
 - i. Project related vehicle travel on dirt roads will obey a 15-mph speed limit in order to reduce dust during the time of the year when the species, pollinators, and associated habitat are most vulnerable to dust related effects during the flowering period.
 - Speed limit signs will be posted for any project personnel working in Zone 6.
 - A qualified botanist will be on site during any ground disturbing activity to monitor surface disturbance activities and assist with implementation of applicable conservation measures.
 - Occupied habitat within 300 ft. of the edge of the pipelines ROWs, roads ROWs, and associated facilities will be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat effects relative to project facilities. Annual reports will be

provided to the BLM and the FWS. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the FWS.

- Re-initiation of section 7 consultation with the FWS will be sought immediately if Project activities in Zone 6 may affect federally listed plants.

Additional information on the proposed action and applicant-committed conservation measures are described in pages 1 through 25 of the BLM's BA and in UDOT's POD for the Project.

2.0 Action Area

Our regulations define the action area as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR section 402.02). Therefore, the action area incorporates all areas that may be affected directly or indirectly by the Project (Figure 2) and includes the following:

- The ROW (approximately 500 ft. wide) that includes the areas directly affected by construction of the highway and associated features (bridges, underpasses, and intersections), construction laydown areas and staging areas;
- Areas affected by dust and human activity that may affect wildlife habitat, wildlife population behavior, or annual desert tortoise migration corridors. This was determined to be 1,667 ft. on either side of the edge of the ROW as dust is anticipated to extend approximately 650 ft. from the ROW and the average adult male desert tortoise home range is approximately 200 ac. (1,667 ft. radius; FWS 2011);
- All habitat south of the Northern Corridor ROW to account for fragmentation effects to desert tortoises from portions of the Reserve isolated from the remainder of the Reserve by the highway; and
- All of the Zone 6, including a buffer that extends out 1,667 ft. from SITLA lands on the west side of Zone 6 onto Federal lands outside Zone 6 to account for any indirect effects to desert tortoises from actions occurring on SITLA lands. This 1,667 ft. west-side buffer also includes a 300-ft. buffer to analyze effects to special status plants on all SITLA lands. On the east side of Zone 6, there is no tortoise habitat adjacent to SITLA lands. Therefore, the action area on the east side of Zone 6 includes only a 300-ft. buffer to account for indirect effects to ESA-listed plant species in this area.

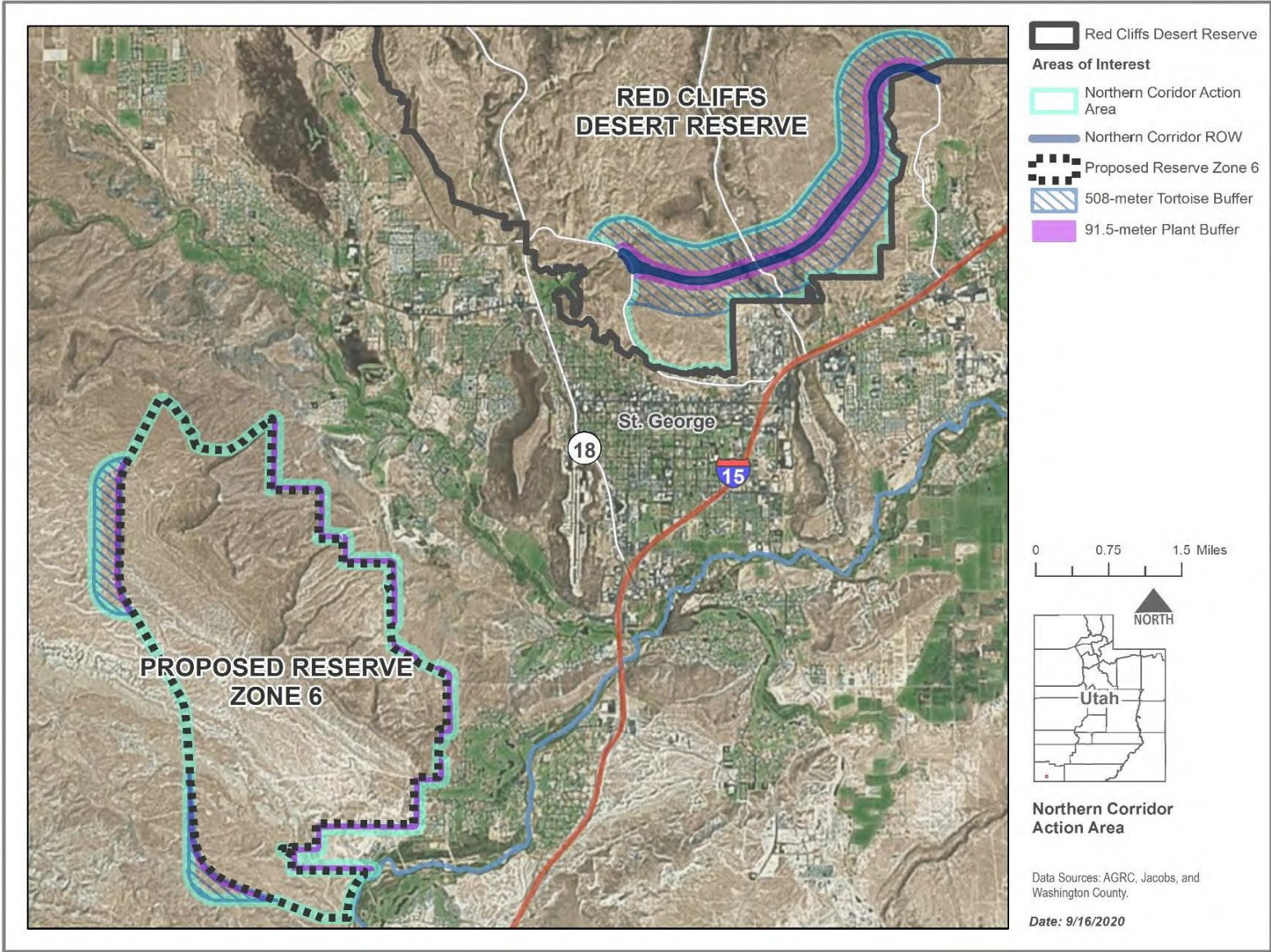


Figure 2. Northern Corridor proposed action areas

3.0 Status of the Species

The information in this section summarizes the range-wide status of each species considered in this BO. Further information on the status of these species, including a comprehensive status of the species, can be found in the administrative record for this project, documents on our web page ([Utah Ecological Services Office Species of Utah](#)), and in other references cited in each summary below.

3.1 Desert Tortoise

Desert tortoise occurs in the Mojave and Sonoran deserts in southern California, southern Nevada, Arizona, and the southwestern tip of Utah in the U.S., as well as Sonora and northern Sinaloa in Mexico (FWS 1994a, FWS 2011). The desert tortoise occurs in the broadest latitudinal range, climatic regimes, habitats, and biotic regions of any North American tortoise species (Auffenberg and Franz 1978, Bury 1982, Patterson 1982, Bury et al. 1994, Germano 1994). Records of desert tortoises range from below sea level to an elevation of 7,300 feet (ft; Luckenbach 1982), however desert tortoises in the Mojave Desert are usually found below 5,500 ft where precipitation ranges from 2 to 8 inches.

We listed the desert tortoise on the Beaver Dam Slope in Utah as threatened under the ESA, and designated critical habitat in 1980 (45 FR 55654). On August 4, 1989, new information on mortality resulted in the emergency listing of desert tortoises north and west of the Colorado River (excluding the Beaver Dam Slope) as endangered (54 FR 42270). Subsequently, the entire Mojave population of the desert tortoise west of the Colorado River in California and Nevada, and north of the river in Arizona and Utah, including the Beaver Dam Slope, was listed as a threatened species on April 2, 1990 (55 FR 12178). We signed the first Desert Tortoise (Mojave Population) Recovery Plan (Recovery Plan) (FWS 1994a) on June 28, 1994. We have a comprehensive review of the status of the species in the administrative record for this Project (FWS 1994a, FWS 2011, FWS 2021b).

3.1.1 *Critical Habitat*

On February 8, 1994, we designated approximately 6.4 million ac. of critical habitat for the Mojave population of the desert tortoise in portions of California, Nevada, Arizona, and Utah (59 FR 5820), which became effective on March 10, 1994. This designation includes primarily Federal lands in southwestern Utah, northwestern Arizona, southern Nevada, and southern California (FWS 1994b, FWS 2011). Critical habitat is a term defined and used in the ESA. It is specific geographic areas that contain physical and biological features essential to the conservation of an endangered or threatened species and that may require special management and protection (ESA section 3(5)(A)). The FWS identified the following physical and biological features of desert tortoise critical habitat:

1. sufficient space to support viable populations within the recovery units and to provide for movement, dispersal, and gene flow,

2. sufficient quantity and quality of forage species and the proper soil conditions to provide for the growth of such species,
3. suitable substrates for burrowing, nesting, and overwintering,
4. burrows, caliche caves, and other shelter sites,
5. sufficient vegetation for shelter from temperature extremes and predators, and
6. habitat protected from disturbance and human-caused mortality (FWS 1994b, FWS 2011).

3.1.2 Recovery Plans and Units

The 1994 Recovery Plan divided the range of the desert tortoise into six recovery units. Desert tortoise habitat in the Project action area is entirely within the UVRRU. In 2003, the FWS convened the Desert Tortoise Recovery Plan Assessment Committee (DTRPAC) to scientifically assess the Desert Tortoise Recovery Plan. The subsequent revised recovery plan reduces the number of recovery units from six to five based on genetics and data suggesting desert tortoise occur as metapopulations (FWS 2011). The UVRRU was retained in the revised recovery plan as one of the five recovery units (Figure 3).

The DTRPAC Report (Tracy *et al.* 2004, hereafter referred to as Report) also produced several findings and recommendations that served as the basis for revision of the 1994 Recovery Plan. The Report recognized that threats to the desert tortoise have cumulative, synergistic, and interactive effects, and that desert tortoise recovery depends on managing multiple threats. Threats facing desert tortoises have been increasing since we finalized the 1994 Recovery Plan. In addition, many recovery actions have not been fully implemented. The Report also recognized that desert tortoise populations may be distributed in metapopulations (group of populations separated by space) rather than single, large populations in recovery units. Thus, it is important to protect the corridors between habitat patches and populations, in addition to reducing multiple threats within management areas. The Report also noted that desert tortoise metapopulations require areas of suitable habitat for recovery, but these areas may be periodically vacant of desert tortoises. Hence, absence during one survey period does not indicate an area is not important to the species. The FWS signed the revised recovery plan on May 6, 2011 (FWS 2011). The revised recovery plan identifies desert tortoise conservation areas outside of critical habitat that are considered essential for the conservation and recovery of the species (FWS 2011, p.23).

Desert tortoises are an arid land reptile associated with desert scrub vegetation; primarily creosote bush (*Larrea tridentata*) flats, washes, and hillside slopes or bajadas. A robust herbaceous component to the shrubs and cacti of the creosote bush vegetation type is an important component of suitable habitat. Within these vegetation types, desert tortoises potentially can survive and reproduce where their basic habitat requirements are met including: a sufficient amount and quality of forage species; shelter sites for protection from predators and environmental extremes; suitable substrates for burrowing, nesting, and over-wintering; various plants for shelter; and adequate area for movement, dispersal, and gene flow. The Revised Recovery Plan (FWS 2011) contains a complete description of the range, biology, and ecology of the desert tortoise.



Figure 3. Desert tortoise recovery units and occurrence model.

Individual desert tortoises need burrows, native herbaceous vegetation, and water in order to complete each stage of the species' life cycle. These habitat components provide shelter throughout the year and food in the active seasons. Free-standing water is needed to encourage above-ground movement necessary for breeding, especially in the fall. Other needs associated with breeding, egg development, and hatching include suitable soils (friable but firm) with rocks and shrubs to provide a network of burrows, overlap and connectivity between home ranges (about 200 ac. per male), air temperatures during the active breeding season 69 to 91 °F, soil temperatures \leq 91 °F, low soil moisture (0.4 percent), and seasonal precipitation (primarily winter and spring).

Desert tortoises require extensive, connected landscapes to find mates, breed, and maintain genetic and demographic stability (FWS 2011). The available quality and quantity of habitat dictates the amount of resources needed to complete each stage of the life cycle for each tortoise. Therefore, desert tortoise habitat can be characterized according to quantity and quality. In order to be resilient, desert tortoises need sufficient abundance, recruitment, survivorship, growth (rate), and connectivity to other areas. Low abundance can be the result of low recruitment and survivorship, therefore a low growth rate or low habitat acreage available. Because desert tortoises are long-lived, they may persist in an isolated and small area for a long time and still maintain a resource pool for genetic diversity. However, over several generations, a minimum abundance level is necessary to ensure successful reproduction and to avoid inbreeding depression and loss of fitness. Connectivity within and between areas can help maintain demographic and genetic needs (FWS 2011).

Desert tortoises are most active during the spring and early summer when annual plants are most commonly available for forage (FWS 2011). Additional activity occurs during warmer fall months and occasionally after summer rainstorms. While rare, desert tortoises have also been observed above ground in the winter, including when there is snow on the ground. In Utah, we consider desert tortoises most active from approximately March 15 through October 15; however, depending upon weather conditions, they can be active outside of these dates as well (FWS 2021b). Desert tortoises spend the remainder of the year in burrows, escaping the extreme conditions of the desert (FWS 2011). We have determined three ranges of dates based on anticipated levels of desert tortoise activity and ambient temperatures in Utah (FWS 2021b):

- More active season: February 15 to November 30;
- Most active season: March 15 to May 15, and August 20 to October 20; and
- Less active season: December 1 to February 14.

Desert tortoise home range sizes vary with respect to location and year. An adult male desert tortoise has an average home range of approximately 200 ac. (FWS 2011). Over its lifetime, each desert tortoise may require more than 1.5 square miles of habitat and make forays of more than seven miles at a time (Berry 1986). During droughts, desert tortoises forage over larger areas, increasing the likelihood of injury or mortality through encounters with humans and predators (Boarman 2002). Direct loss of desert tortoises has occurred from illegal collection by humans for pets or consumption, intentional killing by humans, upper respiratory tract disease (URTD), predation by common ravens, kit foxes, coyotes, dogs off-leash, and other predators, and collisions with vehicles on paved and unpaved roads. Other threats affecting the desert tortoise include loss of habitat and habitat fragmentation from construction projects such as roads, housing and energy developments, and conversion of native habitat to agriculture (FWS 2011). Off-highway (OHV) use is also a threat to the species.

Habitat degradation influences desert tortoise health and survival and is occurring through habitat fragmentation, grazing, and wildfire. Wildfire is an increasingly important threat, because it degrades or eliminates habitat (Appendix D of FWS 1994a). Following wildfire, native plant species are often replaced by invasive, non-native species such as red brome (*Bromus rubens*) and cheat grass (*Bromus tectorum*), resulting in long-term habitat degradation

or loss. Over 500,000 ac. of desert lands burned in the Mojave Desert in the 1980s and approximately 500,000 ac. burned in the northeastern Mojave Desert, including in Utah, in 2005. Over 25,000 ac. of Mojave Desert burned in the UVRU, including Arizona, in 2006. The last significant fires in the UVRU were in July 2020 with over 19,000 ac. of suitable habitat burned.

Desert tortoise researchers established permanent plots in the 1970s to monitor desert tortoise populations, and researchers surveyed some of these plots through 2002. However, surveys in the Northeastern Mojave recovery unit (NEMRU) (Nevada, Utah, and Arizona) and other recovery units detected too few live desert tortoises to determine a population trend. In 1999, line distance sampling was used in Utah to estimate annual adult densities (McLuckie and Fridell 1999). Line distance sampling is a method used to estimate density or abundance based on the number and distance of observations from a line or transect in a given area. The FWS began using line distance sampling to monitor populations across the range of the desert tortoise in 2001 and have continued to use this method consistently throughout the range since 2004. Desert tortoise populations have declined significantly in four of the five recovery units (FWS 2015; Allison and McLuckie 2018). The NEMRU is the only recovery unit that has shown an upward trend for desert tortoise populations; however, population numbers remain near minimum viable population levels (FWS 2015).

4.0 Environmental Baseline

Regulations implementing the ESA (50 CFR 402.02) define the environmental baseline as the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present effects of all Federal, state, or private actions and other human activities in the action area, the anticipated effects of all proposed Federal projects in the action that have already undergone formal or early section 7 consultation, and the effects of state or private actions that are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline.

4.1 Status of the Species in the action area

As described above, the Project is located within the UVRU, which encompasses 325,898 acres of suitable desert tortoise habitat of which 56,187 acres (17 percent) was designated critical habitat in 1994 (59 FR 5820, February 24, 1994; Figure 4). Desert tortoises have a broad geographic range throughout UVRU, but with varying densities and clusters. The land is owned by a mixture of Federal, state, tribal and private entities (Figure 5). In this section, we discuss the history and information currently known about abundance within the Reserve and the recent development of Analytical Units (AUs) and our process for evaluating abundance outside of the Reserve. We also discuss the methods for calculating habitat acreage and abundance calculations.

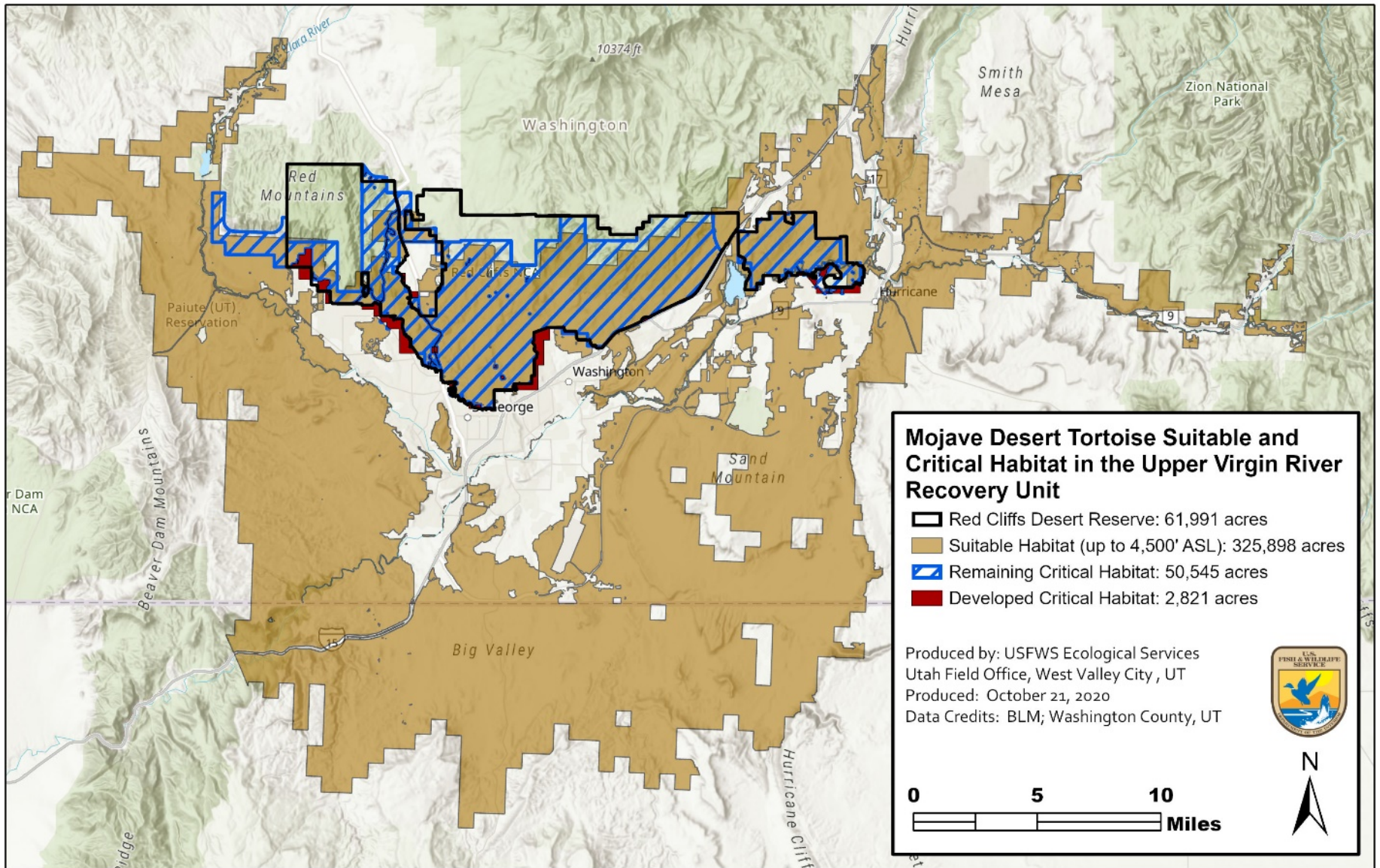


Figure 4. Desert tortoise suitable and critical habitat in the UVRU.

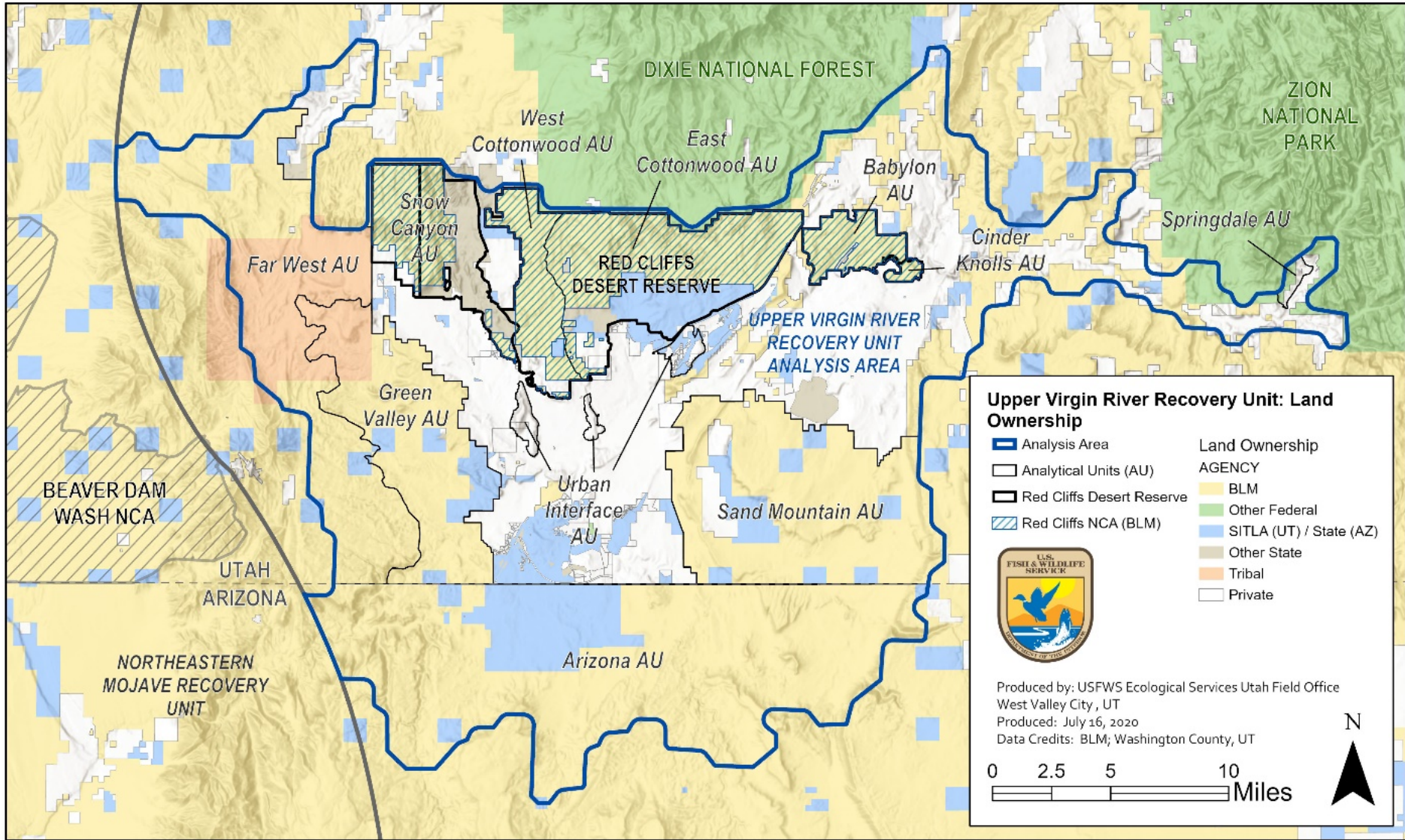


Figure 5. UVRU Land Ownership

4.1.1 Red Cliffs Desert Reserve

The desert tortoise population for the UVRU is primarily concentrated in the Red Cliffs Desert Reserve (Reserve). The majority (49,856 acres; 93 percent) of remaining designated critical habitat in the UVRU occurs in the Reserve (Figure 4). The Reserve (approximately 62,000 acres) is located north of St. George, Utah and adjacent to several other cities in Washington County and was established in 1996 and is a key component of the conservation strategy to offset the effects of development in Washington County. Its primary purpose is to protect desert tortoises and their habitat per the Washington County HCP (Washington County 1995). The 1995 HCP was developed for an incidental take permit (FWS 1996) to allow development on 12,264 acres of occupied desert tortoise habitat on private and State lands in the UVRU. That permit expired in 2016 and a proposed amendment to that plan was reviewed by FWS (Washington County 2020). The HCP is adaptively managed by the HCP Partners, which include Federal, State, and local entities.

The Reserve, and desert tortoise distribution therein, is segmented into five management zones, separated by topographical and human barriers (Figure 6). Reserve Zones 1, 2, and 3 are north of the cities of Ivins, St. George, and Washington and west of Interstate 15 (I-15). Reserve Zones 4 and 5 are north of the city of Hurricane, south of Leeds, and east of I-15 (Figure 6). The zones are described in detail in the 1995 HCP and the State's bi-annual Reserve monitoring report published by the State (Washington County 1995, McLuckie *et al.* 2020). Healthy wild desert tortoises found during clearance surveys for development on private lands in other areas are usually translocated to Zone 4. Zone 4 previously had few to no desert tortoises, though signs of desert tortoise indicated past occupancy; translocation efforts have repopulated the area, at least temporarily. Healthy desert tortoises with likely captive origin are placed in the State's adoption program, which requires movement outside the species' range and distribution consideration. The proposed Zone 6 (6,813 acres) may be added to the Reserve as part of a current proposal to help offset effects from the Northern Corridor highway in Reserve Zone 3 (Washington County 2020; Figure 6).

Distribution of desert tortoise are well known within most of the Reserve due to systematic surveys that are completed bi-annually in Reserve Zones 2, 3, 4, and 5 (McLuckie *et al.* 2020). Reserve Zone 1 is primarily on private lands and inaccessible terrain that was removed from the survey effort. In the Reserve, surveys are only conducted below 4,000 ft elevation, and slopes less than 45 degrees (for human safety).

4.1.2 Analytical Units

While most of our data has historically been gathered within the Reserve, at a workshop in 2019, we developed AUs for our evaluation of the entire UVRU. The Workshop experts identified 11 AUs in the UVRU, 10 units in Utah and 1 unit in Arizona (Figure 6). The AUs are sized based on topographical, anthropogenic, and ecological discussions with the biological experts. Topographical and anthropogenic barriers, as well as differences in habitat types, geography, stressors, conservation efforts, and other factors allowed us to delineate biologically meaningful sub-population AUs, within the larger UVRU population. Given our limited knowledge about occupancy outside Reserve, the factors that went into defining separate AUs included areas with known desert tortoise clusters, surrounding suitable habitat, and barriers to connectivity with

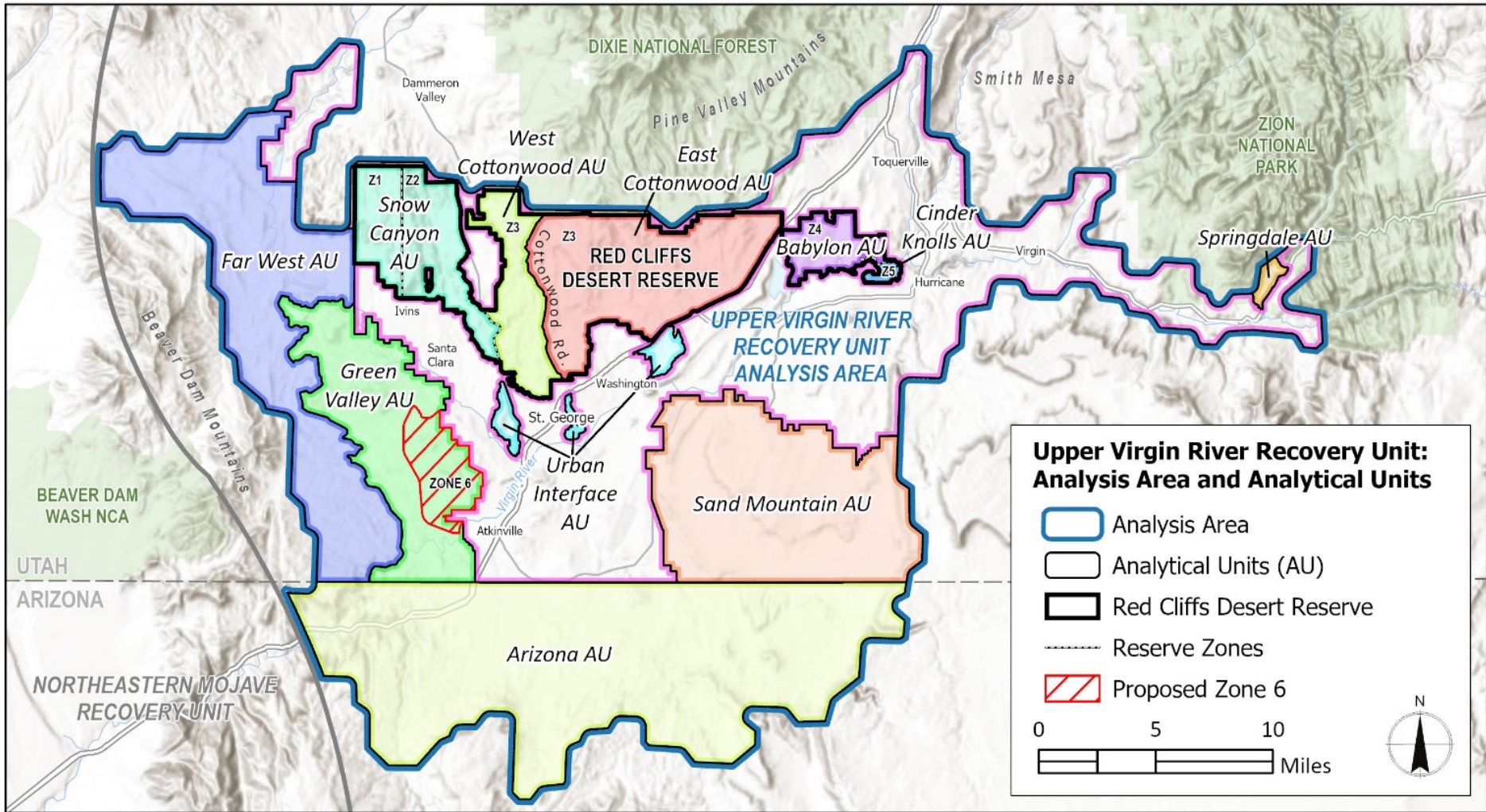


Figure 6. The UVRRU analysis area, 11 Analytical Units, and proposed Zone 6 (FWS 2019a). Unassigned areas are the non-colored areas within the analysis area. Note Z1-Z5 are the previously established Zones 1-5 in the Red Cliffs Desert Reserve.

other AUs. Reserve zones 1 through 5 are all nested within desert tortoise AUs (Table 1; Figure 6). Throughout this document when we refer to the Reserve, it also applies to the corresponding AUs (Figure 6). Our knowledge of tortoise distribution in more than half (six) of the AUs is limited, thus some uncertainty about the population distribution remains. Overall, breaking the UVRRU into smaller AUs distributed across the recovery unit has allowed us to evaluate current and future resiliency at smaller scales and then roll up our analysis into recovery unit resiliency.

4.1.3 Methods for calculating habitat acreage and abundance

In 2009, the USGS developed a habitat model for desert tortoises using 16 environmental variables such as precipitation, geology, vegetation, and slope (Figure 3; Nussear *et al.* 2009). The model is based on desert tortoise occurrence data from sources spanning more than 80 years, including data from the 2001 to 2005 range-wide monitoring surveys (FWS 2006). The model estimates the probability that a desert tortoise would occur in 1-km² pixels across the range given the habitat variables associated with each pixel. We estimated the suitable desert tortoise habitat areas by using modeled habitat projections (≥ 0.5 Habitat Potential Index Value, as defined in the layer provided by Nussear *et al.* 2009), removing impervious surfaces and other developed land cover, and applying a 4,500 ft elevation threshold (excluded areas higher than 4,500 ft). Impervious surfaces are those that are developed or otherwise affected to such an extent that they cannot support desert tortoise habitat (i.e. unsuitable or uninhabitable). Desert tortoises within the UVRRU are not generally known to occur at elevations exceeding 4,500 ft, but these higher elevation habitats could become occupied under projected climate change scenarios (FWS 2019b).

Estimated desert tortoise abundances are calculated based on bi-annual line distance surveys in Reserve, Beaver Dam Slope in the adjacent NEMRU, and an area within and adjacent to Zone 6 (Table 2 and Figure 6). Portions of Zone 6 were surveyed to determine whether the area provided any benefits from protecting the sub-population by adding it to the Reserve and whether it could offset effects from the Northern Corridor highway in Reserve Zone 3.

The UVRRU population outside the 1995 Reserve boundary was found to include some areas of higher occupancy and densities (Washington County 2017a). The overall occupancy and accurate density estimates remain uncertain in many areas in the absence of formal surveys; however, it is thought to be low overall, because most known higher-density HCP take areas have been cleared. In all areas without line distance surveys, we used 3.4 desert tortoises per mi² based on the local density derived using similar survey techniques in the Beaver Dam Slope of the adjacent NEMRU (Table 2; FWS 2018a). This number represents an average of high- and low-density areas throughout the UVRRU. The proposed Zone 6 area is one exception to the use of line distance sampling in the UVRRU outside the Reserve, because specific data was collected that applies to this area. With the detection of higher densities in Zone 6, Washington County conducted a survey of 5,150 ac. within the Green Valley AU using line distance sampling in 2017 (Washington County 2017a).

Table 1. The 11 AUs, west to east, for the UVRRU, including size and amount of suitable habitat.

Analytical Unit Name	Total Acres	Suitable Habitat Acres	Unit Description and Distributional Knowledge
Far West	52,773	45,300	Area of primarily Federal, Tribal, and State lands adjacent to the Beaver Dam Mountain region; largely fire-disturbed. Potentially important area for connectivity but limited distributional knowledge.
Arizona	99,537	86,894	Located in northern Arizona. Limited distributional knowledge; some observation in Virgin River Gorge. (Analytical Unit not included in 2011 recovery unit definition, which was limited to Utah).
Green Valley	31,433	30,661	Area of primarily Federal, Tribal, and State lands located west of St. George; bounded by the Santa Clara River and private lands to the east, and fire-disturbed lands to the west. Heavy recreation effects in the east including roads, trails, shooting, and dumping. Limited distributional knowledge in most of this area, one year of intensive surveys on 5,150 acres.
Snow Canyon (Zone 1 and 2)	16,434	6,290	Red Cliffs Desert Reserve, zones 1 and 2. Limited distributional knowledge in zone 1; extensive distributional knowledge in zone 2 through systematic surveys.
Urban Interface	3,229	1,555	Three isolated sub-units occur within the urban matrix; includes West Black Ridge, Black Ridge, and Sleepy Hollow. The first two occur in St. George City and the last area is south of I-15 near Exit 13. Several clearance surveys were conducted prior to construction and development. No systematic surveys.
West Cottonwood (Zone 3)	10,446	7,489	Portion of Red Cliffs Desert Reserve, zone 3, located west of Cottonwood Springs Road. Extensive distributional knowledge through systematic surveys.
East Cottonwood (Zone 3)	28,909	21,669	Portion of Red Cliffs Desert Reserve, zone 3, located east of Cottonwood Springs Road. Extensive distributional knowledge through systematic surveys. Burned habitat on west end, east end mostly unburned.
Sand Mountain	47,432	41,115	Sand Mountain and environs; includes primarily Federal and State lands east of Highway 7 and south of Sand Hollow Lake. Limited distributional knowledge.
Babylon (Zone 4)	5,489	5,404	Red Cliffs Desert Reserve, zone 4 (current translocation site). Distributional knowledge through systematic surveys. Diverse terrain and habitat types; burned habitat on northwest end of unit.
Cinder Knolls (Zone 5)	741	429	Red Cliffs Desert Reserve, zone 5. Extensive distributional knowledge through systematic surveys.
Springdale	906	280	West of Springdale, Utah; bounded by Zion Park Boulevard to the east, Lion Boulevard to the north, and Valley View Drive to the south. Distributional knowledge through distribution and density surveys and several years of radio-transmitter data.

Table 2. 2017 estimated population size and suitable habitat in each UVRRU analytical unit. Zones refer to the Red Cliffs Desert Reserve Zones 1 to 5 and Zone 6.

Habitat Unit	Source or calculation steps	Number of adult desert tortoises
Snow Canyon (Zone 1)	2.2 mi ² (1,397 acres) * 3.4 DT per mi ²	7 (2 - 24)
Snow Canyon (Zone 2)	McLuckie <i>et al.</i> 2018	201 (161 - 252)
West Cottonwood and East Cottonwood (Zone 3)	McLuckie <i>et al.</i> 2018	1,749 (1,286 - 2,380)
Babylon (Zone 4)	McLuckie <i>et al.</i> 2018	285 (160 - 507)
Cinder Knolls (Zone 5)	McLuckie <i>et al.</i> 2018	99 (75 - 131)
Total in the Reserve		2,341 (1,684 – 3,294)
Far West AU	70.8 mi ² (45,300 acres) *3.4 DT per mi ²	238 (73 - 770)
Arizona AU	135.8 mi ² (86,894) * 3.4 DT per mi ²	457 (141 - 1,477)
Green Valley AU (excluding Zone 6)	37.4 mi ² (23,916 acres) Surveyed Areas: 58.2 DT per mi ² * 1.9 mi ² Unsurveyed Areas: 3.4 DT per mi ² * 35.4 mi ²	232 (103 - 578)
Zone 6* *Systematic survey data available from one year	8.0 mi ² surveyed in Washington County 2017a (468 DT) + 2.54 mi ² (unsurveyed) * 3.4 DT per mi ²	361 (208 - 642)
Urban interface AU	2.4 mi ² (1,555 acres) * 3.4 DT per mi ²	8 (3 - 26)
Sand Mountain AU	64.2 mi ² (41,115 acres) * 3.4 DT per mi ²	216 (67 - 699)
Springdale AU	0.4 mi ² (280 acres) suitable habitat; 0.1 mi ² surveyed with an estimated 95 percent confidence interval of 4 – 59 (McLuckie <i>et al.</i> 2000), the remaining 0.3 mi ² * 3.4 DT per mi ² (CI: 0 - 3); however, 36 individuals were recently radio tracked within this AU (J. Stroud-Settles, Zion National Park Wildlife Program Manager, personal communication, March 24, 2020). ¹	36 (36 - 62)
Total for all AUs	AUs outside Reserve + AUs within Reserve	3,889 (2,315 to 7,548)

Unassigned areas ¹	123.1 mi ² (78,813 acres) * 3.4 DT per mi ²	415 (128 - 1,340)
Total <i>G. agassizii</i> outside Red Cliffs Desert Reserve	AUs outside Red Cliffs Desert Reserve + Unassigned Areas	1,963 (759–5,594) In Utah: 1,506 (618 in 4,117)
Total <i>G. agassizii</i>	Red Cliffs Desert Reserve + Outside Red Cliffs Desert Reserve	4,306 (2,443 to 8,888)

¹ Estimate based on the number of *G. agassizii* monitored by Zion National Park in 2017 (not based on survey data). Because no confidence intervals were available from monitoring data, we estimate the upper confidence by applying the upper density estimates from McLuckie et al. (2000) to the surveyed area, and used the density estimate from Beaver Dam Slopes to estimate density in unsurveyed habitats. We adjusted our median and minimum estimates to the known number of tortoises monitored in a recent radio tracking study (J. Stroud-Settles, Zion National Park Wildlife Program Manager, personal communication, March 14, 2019).

² Unassigned areas are potential habitat areas not included in the above AUs. They represent large areas of modeled suitable habitat with developed areas removed (86,894 acres), and they are scattered throughout the recovery unit.

The resulting UVRU estimate, approximately 4,300 adult desert tortoises with more than half in the Red Cliffs Desert Reserve (Table 2), was considered reasonable with local desert tortoise experts. Formal surveys are needed to better estimate abundance and density in all AUs. Allison and McLuckie (2018) recently provided a summary of population changes in the Reserve and documented an annual decline of 3.2 percent of desert tortoises in the Reserve from 1999 to 2014 (standard error 2.0 percent). This summary of population changes was based on the systematically collected data in the Reserve and includes most of the designated critical habitat in the area. There is limited data for desert tortoise population numbers on lands outside the Reserve, so it is unclear how numbers may be changing on these lands. However, we know that effects are likely occurring and potentially greater on lands outside the Reserve. Thus, we believe the decline rate is likely greater for areas outside the Reserve. In addition, the decline and implication for the population within the Reserve remains uncertain, because the desert tortoise is a long-lived species, and episodic losses in desert tortoise due to fires or drought, although documented as a decline in the population, may not reflect a population trend. Variables that influence population resilience such as fecundity, reproduction, recruitment, generation length, and other population variables are not well known. Natural variation in population size and the inherent difficulty of accurately parameterizing these population variables make it extremely difficult to accurately discern a true population trend over time from a population fluctuation over a short period of time (FWS 2006).

4.1.4 Threats

Threats to desert tortoises in the UVRU include habitat loss, habitat fragmentation, crushing, habitat degradation, predation, collection, and disease. The main sources of these threats are wildfire, invasive species, drought, predation, grazing, climate change, recreation (motorized and nonmotorized), disease, urbanization, roads, and human access (FWS 2021b).

4.1.4.1 Habitat loss and fragmentation

Habitat loss, predominately from development in the UVRU, has led to loss of desert tortoises throughout its range (FWS 2019a). Increasing development, such as buildings, roadways, and utility corridors, represents an expanding urban footprint that reduces desert tortoise habitat and expands the wildland-urban interface. Habitat fragmentation occurs when contiguous habitat is divided into smaller pieces of habitat. This fragmentation inhibits movement and ultimately can inhibit gene flow among populations. Rivers, mountain ranges, major changes in soil or habitat type are examples of natural features that isolate populations. Roadways, urbanization, and other human developments lead to anthropogenically-caused habitat fragmentation. Roads may have the largest effect on wildlife movement and habitat connectivity (Hellmund and Smith 2006). Increases in the wildland-urban interface can further intensify potential effects of infra-structure, roads and fragmented habitat.

The Project action area borders private and municipal lands in the cities of St. George, Ivins, Washington, and Hurricane. Built in 2014, completion of the fenced Red Hills Parkway, abutting the western boundary of the action area, resulted in the loss of approximately 32 ac. of occupied desert tortoise habitat. In addition, the Red Hills Parkway fragmented approximately 435 ac. of occupied habitat (west of the finished road) from the remaining Zone 3 (east of the road). In addition, several roads adjacent to the action area, including SR-18, Red Hills Parkway, Tuacahn Drive, and I-15 likely preclude or limit natural movement of tortoise populations across the roadways.

Within the Reserve, roads are limited, and some unpaved non-designated roads have been closed to all OHV use or have limited OHV use as a management strategy to reduce fragmentation and restore and maintain desert tortoise habitat. Road ROWs within the Reserve intersect with approximately 37.1 miles of desert tortoise habitat. As more permanent paved roads, Red Hills Parkway and Tuacahn Drive in the Reserve have culverts intended to serve as under-roadway passage structures for desert tortoise to minimize effects of habitat fragmentation. There are five culverts in Red Hills Parkway for which documented usage includes two desert tortoise detections using one culvert over three years of monitoring. Similarly, on the three culverts in Tuacahn Drive, two desert tortoises were detected using one culvert over two years of monitoring. More information is needed to understand if usage is limited by passage design or other ecological, biological, or environmental condition.

Though noise, vibration, and lights associated with highways are potential sources of disturbance to tortoises and other wildlife adjacent to roads, tortoises gain some protection from exclusion fencing along Red Hills Parkway within the Reserve. Desert tortoises are commonly found along these fences and are present in burrows immediately adjacent to the ROW fencing. No studies have been conducted to determine to what extent home range, site fidelity, or ecological or physiological condition of individual tortoises might be affected by the road.

Within the Reserve, 38 existing ROWs are authorized on BLM-administered lands, with additional ROWs on private lands. Five of the authorized existing ROWs occur within the proposed Northern Corridor highway alignment, including one fiber optic line, one water pipeline, two powerlines, and one underground phone line. New ROWs on BLM-administered

lands are restricted. Filing new mining claims are no longer authorized in the Red Cliffs NCA under OPLMA Section 1974. Valid existing claims could be developed in the future contingent on regulatory requirements to minimize loss or degradation of desert tortoise habitat as described in 43 CFR 3809 and 3715 (BLM 2016a).

Localized effects to habitat, mostly from recreation and motorized trails, can be found throughout Zone 6, particularly on SITLA owned lands. Numerous motorized and non-motorized recreational trails are found throughout the area. In addition, developed and informal parking areas, target practice areas, livestock fencing, and in some locations, large areas are cleared of vegetation, generally due to OHV use. Within Zone 6, tortoise habitat intersects with much of the 122.4 miles of travel routes that occur within the boundary. Of these unpaved roads and trails, 49.6 miles are for motorized use. Existing and user-created roads could potentially lead to tortoise injury or death and destruction of burrows. Roads also increase the spread of invasive plants, litter, and presence of predators that use these corridors.

While no utility corridors have been designated within Zone 6, three utility ROWs have been granted for a power line, a water line, and a road. These utilities occur along the eastern side of the Zone 6, on both SITLA and BLM-administered lands. As currently managed, mining can be allowed on SITLA lands if a permit is obtained. Portions of the BLM-administered lands within Zone 6 are closed to fluid mineral development (approximately 122 ac.), while the remaining acres are open with varying levels of restrictions. The BLM-administered lands within Zone 6 are also categorized as opened or opened with restrictions to locatable minerals. Additionally, approximately 1,150 ac. within the area are closed to mineral materials development, while the rest currently remain open (BLM 1999).

4.1.4.2 *Crushing*

Between the years 1987 and 2019, 146 injured or dead desert tortoises were observed along roads or trails within the Reserve or surrounding areas. Prior to 2010, several of the dead tortoises were found on Cottonwood Springs Road and Red Hills Parkway within or directly adjacent to the action area. From 2011 to 2018, several more were found along Red Hills Parkway adjacent to the action area (UDWR 2019a). Since 2015, 25 desert tortoise mortalities on roadways within the Reserve were reported to UDWR. Seven desert tortoise mortalities occurred in 2015, six in 2017, four in 2018, and eight in 2019 (UDWR 2019a). Because the reports are based on anecdotal observations, the actual number of mortalities may be underestimated.

Most paved roads in or surrounding the Reserve have tortoise fencing including I-15, SR-18, Red Hills Parkway, Tuacahn Road, and Cottonwood Springs Road. In Zone 6, most roadways are OHV trails and lack any tortoise exclusion fencing. As discussed above, desert tortoise populations in the Reserve have declined from 1999 to 2014, so the increased road mortalities may be due to an increase in traffic along roadways, an increase in the number of people observing road kills, improved reporting efforts, as well as compromised tortoise fencing.

4.1.4.3 Habitat Degradation

Habitat degradation within the UVRRU is caused by wildfires, invasive species, drought, climate change, grazing, recreation, and human development. Within the Reserve, habitat degradation associated with wildfires has been one of the largest drivers to declines in desert tortoise abundance. In addition, wildfires have increased with the introduction and spread of nonnative invasive plants, such as red brome, cheatgrass, and split grasses (BLM 2015; Brooks 1999; Brooks and Esque 2002). After a fire, nonnative vegetation is likely to increase in density, causing further habitat degradation (Boarman 2002).

Wildfires

Twenty-four fires have burned 19,240 ac. within the Reserve since 1976 and as recent as November 2020, with over 14,000 ac. burning multiple times (42 percent of all burned acres). The total number of acres burned counts the areas burned once and does not count the acreage of overlap between different fires. Most fires in the Reserve have occurred on lands that burned previously as is common for habitat where nonnative, invasive weeds like red brome and cheat grass, that experience cycles of wildfire, have become the dominant vegetation type.

During the summer of 2005, multiple large lightning-caused fires within the Reserve burned approximately 10,244 ac. of desert tortoise critical habitat and 1,267 ac. of additional desert tortoise habitat within the Reserve (Figure 7; FWS 2008 and 2018a, UDWR 2018). It is estimated that 15 percent of adult tortoises within Reserve Zone 3 died due to wildfires that year (UDWR 2007). Not only was mortality directly attributed to fire, but fire also caused the loss of tortoise forage (UDWR 2016).

The proliferation of invasive annual grasses is fueling an annual burn-reburn wildfire cycle in the Reserve (BLM 2016a). Non-native invasive grasses can promote more intense and regular fire (a fire cycle) as part of their life-history. Red brome and cheatgrass display characteristic traits that include rapid and dense growth in early season that outcompetes native vegetation. This fast growth is then followed by late season abrupt drying of above-ground growth. When ignited, these dry, dense grass fuels result in extreme fire heat and intensity which create charred disturbance areas. The early-season, fast-growing nature of these grasses leads to their further dominance in re-establishment and dominance the following spring. This life history is contrasted with the slow-growing, sparse plants typical of the Mojave desert vegetation community. The result is a change in the fire regime that excludes native vegetation over time and can lead to a monoculture of non-native grasses and loss of native vegetation diversity. Nonnative annual grasses (typically red brome and cheatgrass) are pervasive in every major vegetation community, which increase fire frequency and intensity (TNC 2011). Exotic annual grasses and forbs reach almost every area of the Reserve, ranging from 5 to 30 percent coverage within the landscape, with areas approaching 90 percent cover of nonnative grasses (BLM 2016a; USGS 2019). Based on this information, it is likely that the new wildfires will continue and result in additional stochastic loss of individuals. Therefore, it is highly probable that Red Cliffs Desert Reserve, Zone 3 will have another large wildfire again.

In 2016, a multi-agency restoration project was implemented on 100 ac. of land on the Red Cliffs NCA burned by the Mill Creek fire in 2005. More than 9,000 native plants were installed between 2016 and 2018. Overall, plants placed in 2016 had a low survival rate at just 6 percent (BLM 2019a). Improved techniques, a more aggressive supplemental watering schedule, and additional funding to purchase and maintain cages to improve plant survival resulted in much higher survival of outplantings in 2017. UDWR hopes to continue this project through June 2021 and is continuing to care for and assess survival rates of outplantings at the Red Cliffs restoration site (McLuckie 2020). Another study, conducted in 2018 by BLM, included planting over 500 native plants. By closely evaluating soil suitability for these plantings, supplemental watering was only needed on three occasions. The study found that there was 97 percent survivorship 6 months later, 74.1 percent of the plants survived after 11 months with no supplemental watering up to this point (BLM 2019a), and 49.8 percent were still alive 18 months from initial planting (pers. com. Kellam 2020).

Wildfire suppression activities are part of the active management of the Reserve intended to protect habitat and native vegetation communities. However, the change in fire regime to a burn-reburn cycle due to the dominance of invasive weed species demonstrates the cause-and-effect relationship between above average fall and winter precipitation that increases production of invasive annual brome grasses, and uncharacteristically large natural or human-caused wildfires during the summer months (BLM 2015).

The prevalence of nonnative annual grasses and forbs along roadways and the presence of humans increases the probability of human-caused fires (Gucinski et al. 2001). The July 2020 Cottonwood Trail Fire, caused by a spark on a road adjacent to the Reserve, burned 1,414 ac. within the Red Cliffs NCA in Zone 3 including 1,001 ac. of critical habitat; this area is outside of the action area. A minimum of 14 tortoises were identified to have died because of the fire (BLM 2020b); longer-term monitoring will be needed to determine the overall effects to the Zone 3 sub-population. Also, in July 2020, the Turkey Farm Road Fire burned 11,995 ac. of which 10,010 ac. were within Reserve Zone 3. This second human-caused fire burned along Cottonwood Springs Road mostly north and east of the action area. Approximately 66 ac. of tortoise habitat (also designated critical habitat) within the action area were reburned; however, no areas within the proposed Northern Corridor ROW were burned during the Turkey Farm Road Fire. Two additional fires of smaller size occurred in October and November of 2020 with much of the area reburning previously burned acreage outside of the action area.

Analysis of direct effects to tortoises have not been completed for the Turkey Farm Road Fire as of the writing of this BO. A large portion of the Turkey Farm Road Fire occurred within the footprint of the previous 2005 fires. Though desert tortoises exhibit high site fidelity and continue to use burned areas, the burned area within the Reserve continues to expand with each new burn, further degrading habitat. The proposed Northern Corridor action area includes 320 ac. of previously burned habitat. Specifically, the Northern Corridor ROW would cross about 41 ac. of previously burned areas, but no area within the ROW has been burned multiple times by wildfires.

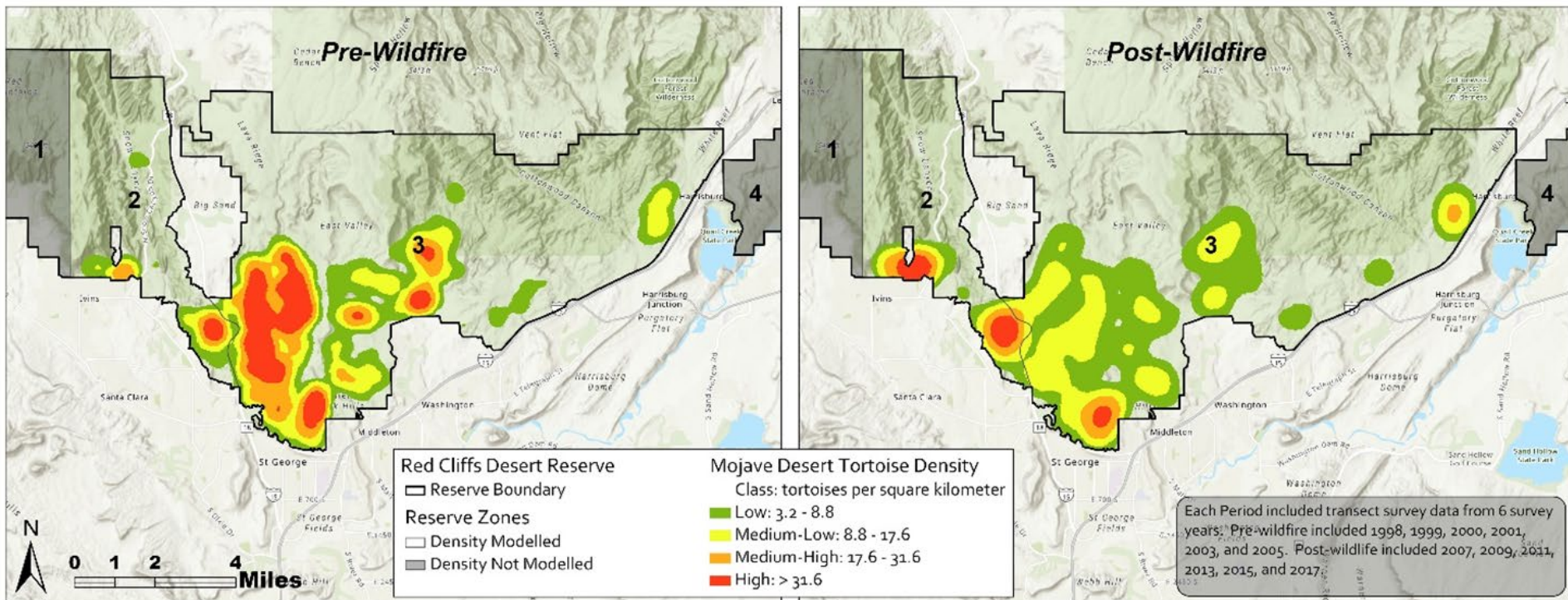


Figure 7. Desert tortoise densities before and after droughts and wildfires in the early 2000s. Desert tortoises in West Cottonwood AU (west of Cottonwood Springs Road) are approximately three times higher than densities in East Cottonwood Springs Road.

Invasive Species

Exotic and invasive grasses, including annual bromes (cheatgrass and red brome) and split grasses, and herbaceous weeds such as nonnative black mustard, African mustard, and London rocket (*Sisymbrium irio*), are pervasive throughout the Reserve, including the action area. These invasive grasses and forbs range from 5 to 30 percent coverage within the landscape (BLM 2016a). Many vegetation communities, particularly desert scrub, shrubland, and pinyon-juniper woodlands within the entirety of the Red Cliffs NCA as well as all areas that have been burned in the last two decades, are 90 to 100 percent diverged ecologically from what their original reference community was described to be (TNC 2011).

Localized vegetation surveys conducted in the Northern Corridor ROW show that plots associated with the proposed Northern Corridor ROW support a minimum foliar cover of 67 percent non-native or invasive species, of which 41 percent is cheatgrass. Thirty-seven out of the 46 plots surveyed for all the corridors fall within the action area. These plots range in invasive weed percent foliar coverage from 30 to 100 percent, with most of the plots having a foliar percent coverage of invasive weed species greater than 50 percent. Within the Reserve, half of the plots have a foliar percent cover of 70 percent or more of invasive weed species, reducing available forage for desert tortoises and increasing the probability of additional wildfires in the Reserve.

According to LANDFIRE Remap data (USGS 2019), 640 ac. or 10 percent of Zone 6 is classified as ruderal scrub, ruderal shrub, or non-native annual grassland, with non-native species-dominated understory as well as non-native-dominated herbaceous stands. There have been no specific vegetation surveys or analysis of the vegetation community makeup within proposed Zone 6; specifically, BLM assessment, inventory, and monitoring (AIM) surveys have not been conducted nor has an analysis similar to that of The Nature Conservancy's Landscape Conservation Forecasting Report been completed for the area. Therefore, no comparisons are made between the Reserve and Zone 6 with regards to exotic invasive species infestations.

Drought

Over the past century, annual precipitation in Washington County has been quite variable (NOAA 2020). Within the Reserve, a severe drought in 2002 resulted in no perennial or annual plant growth that year. Abnormal desert tortoise behavior was observed, including failure to hibernate, and there was an increase in URTD and the presence of emaciated tortoises (UDWR 2018). The following year, surveys identified 2.7 times the normal amount of shell remains, presumably a result of increased mortality from the drought. In 2003 the estimated population had dropped to 16.5 individuals per square kilometer from the 28.3 individuals per square kilometer recorded in 2001 (UDWR 2018). The frequency of severe drought, similar to conditions seen in 2002, is anticipated to occur from every other year up to every 15 to 30 years (Rangwala 2020).

Climate Change

In the past 25 years, Washington County has seen average annual temperatures above the mean of 61°F and precipitation has generally been lower than the annual mean of 12 in. (NOAA 2020; Rangwala 2020). Historically, the hottest summer day had a temperature of 105°F, and it is anticipated that the number of higher temperature summer days will continue to increase, while precipitation is predicted to fluctuate within ten percent above or below the mean. Climate change is expected to result in an increased frequency and duration of droughts, which in turn is anticipated to limit growth of some annual grasses and lead to increasing wind erosion that could affect biodiversity and air quality (Comer et al. 2013).

Desert tortoises may be particularly sensitive to changes in temperatures, because they cannot self-regulate their body temperatures (ectothermic) (Barrows 2011; Huey and Berrigan 2001). Increased temperatures could mean less time available for desert tortoises to forage above ground. It is unknown if this species could adapt rapidly enough to seasonal temperatures changes to shift its hibernation period or forage during cooler parts of the day or night.

During droughts, desert tortoises forage over larger areas, increasing the likelihood of injury or fatality through encounters with humans and predators (Boarman 2002). Increased flooding can trap desert tortoises in burrows (Lovich et al. 2011; FWS 2011; Berry and Murphy 2019) and may also increase the probability of individuals utilizing washes being washed into culvert debris piles adjacent to roads (Lovich et al. 2011). Additionally, flood events often breach desert tortoise-proof fences, resulting in more potential for vehicular collisions and increased maintenance of fence lines (FWS 2011).

Climate change may affect nest and hatchling survival (Wallis et al. 1999) by affecting precipitation, soil moisture, and food resource availability (Rostal et al. 1994; FWS 2011; Lovich et al. 2012; Gibbons 2013; Peterson 1996a). Drought can result in reduced clutch frequency, while increased rainfall may increase clutch frequency (Lovich et al. 1999; Lovich et al. 2015). Temperature also affects rate of egg development and incubation timing (Rostal et al. 1994, Lewis-Winokur and Winokur 1995).

Grazing

Livestock grazing affects desert tortoises foraging resources by reducing native plants, spreading nonnative vegetation, and disturbing soil (Fleischner 1994; Lovich and Bainbridge 1999; Reisner et al. 2013). Livestock tend to graze preferentially on native vegetation, allowing nonnative plants to gain a larger hold (USFWS 2011). Studies in desert tortoise habitat have shown that grazing has a negative correlation with the presence of tortoise sign (Berry et al. 2013; Keith et al. 2008). Recovery of fragile or slow-growing vegetation may take years following grazing removal, and the proliferation of low-forage-quality invasive species in the interim may continue to limit the productivity of an area for desert tortoises. In addition to habitat degradation, livestock may also trample desert tortoise individuals and collapse burrows (Lovich and Bainbridge 1999; Nussear et al. 2012).

Grazing by livestock was eliminated from the Reserve. Grazing by livestock is currently permitted in Zone 6 but would be removed as soon as possible after inclusion in the Reserve. Approximately 1,462 of the 3,229 ac. of SITLA lands are currently under active grazing leases (SITLA 2020a; 2020b), as are almost all BLM-administered lands (3,446 of 3,471 ac.) within Zone 6. Grazing on BLM-administered lands in tortoise habitat within this area occurs below 5,000 ft. elevation. BLM administers two allotments that overlap portions of Zone 6, with 2,793 ac. and 150 animal unit month (AUMs) associated with the Curly Hollow Allotment (UT1401503), and 653 ac. and 48 AUMs with the Box Canyon Allotment (UT0400901) (BLM 2020c). Virtually no grazing occurs within the River Pasture of the Curly Hollow Allotment in the southwest quadrant of Zone 6 due to a lack of desirable forage species and recreation pressure. Portions of the Box Canyon Allotment and the Holding Pasture of the Curly Hollow allotment within Zone 6 receive some active grazing.

Recreation

Each year, the Reserve attracts outdoor enthusiasts that partake in recreational activities such as sightseeing, hiking, camping, mountain biking, OHV use, rock-climbing, and horseback riding. Between October 1, 2018, and September 30, 2019, visitor numbers documented in the Red Cliffs NCA were 190,000 (BLM 2019b). Non-motorized recreational activities are permitted within the action area and result in degradation effects to desert tortoise habitat through the use of trails and creation of unauthorized trails that result in the presence of people in the backcountry. Recreational habitat degradation effects include soil and vegetation compaction and the spread of nonnative vegetation that can affect available habitat for tortoise foraging. Cross-country OHV use is prohibited within the action area as well as the larger Reserve, and OHV use is limited to designated routes (BLM 2017).

The Pioneer Trail trailhead is just under 0.2 mile from the west side of the ROW alignment near Red Hills Parkway. This and two other non-motorized trails (T-bone Mesa and Cottontail) would intersect the proposed Northern Corridor action area. A multi-use path within the ROW is also a proposed component of development of the roadway (see Proposed Action section above).

Zone 6 is a popular recreation destination with over 100 miles of roads and trails, including unpaved roads, and motorized and non-motorized trails, many of which were user created. An estimated 42 miles of unmaintained social trails have been created in addition to the 74 miles of managed trails within proposed Zone 6. The almost 3,229 ac. of SITLA lands support extensive OHV use, and considerable trail braiding has occurred from recreational activities (FWS 2021b). With 82,775 annual visits, Zone 6 has a higher density of recreation use than any area on public land in the Red Cliffs NCA (pers. com. Kiel 2019; pers. com. Voyles 2020). Uses include hiking, camping, rock-climbing, equestrian use, and sightseeing.

In general, desert tortoises in areas with heavy visitor use are vulnerable to collecting, vandalism, increased risk of wildfires, and road kills (Berry et al. 2008; Hughson and Darby 2013). Human presence is often attributed as a primary factor in desert tortoise declines (Berry and Murphy 2019). This intensive human use may affect desert tortoises and their habitat by inducing wildlife responses that affect behavior and modify use of suitable habitat (Taylor and Knight 2003).

Indirect threats from recreational activities include trash and litter along trails, soil and vegetation compaction from campgrounds, parking areas, or access routes, and disturbance of tortoises by approaching or handling. Public education can promote awareness and protection of sensitive species by recreationists through their on-the-ground activities (BLM 2017; Washington County 2017a and 2018a).

4.1.4.4 Predation

Raven predation is a natural component of the desert ecosystem and has been occurring in the Reserve for many years. Baseline data on raven predation has been gathered annually since 2015 to evaluate the raven population trend and abundance (Washington County 2019). Surveys are conducted at all known raven nesting areas and along transmission lines on Federal and non-Federal lands within and adjacent to the Reserve. Surveys have identified raven predation on hatchling and juvenile desert tortoises, including two individuals in 2015 (Washington County 2015), eight in 2017 (Washington County 2017b), four in 2018 (Washington County 2018), and fourteen in 2019 (Washington County 2019). As of 2019, all active raven nests were located on cliffs or cottonwood trees.

Remnants of old nests can be found on transmission line towers, although the power companies often remove the nests. Ravens are opportunistic feeders and scavengers and are known to follow human habitation. The increase in the human population may have led to an increase in ravens. Ravens learn quickly and may focus on juvenile tortoises as a reliable food source. If ravens have increased due to human habitation, ravens may be exerting increasing predation pressure on desert tortoise. In 2018, two carcasses were found beneath utility poles that are adjacent to Zone 5 (Washington County 2018). A raven was observed picking up a tortoise in Snow Canyon in Zone 2 in 2019 (Washington County 2019). Surveys conducted in 2019 found raven nests at 17 sites, including 11 inside the Reserve. A raven was observed dropping a tortoise on Cottonwood road within Zone 3 (Washington County 2019). Most raven nests that have been discovered within the Reserve are in Zone 3 (Washington County 2019). Ravens appear to be spreading across the Reserve likely due to increased human development. Survey and monitoring of raven nests on the Reserve can inform how their presence affects desert tortoise recruitment (Washington County 2018).

Pets are required to be on a leash within the Reserve, except for hunting dogs who are with a licensed hunter during official hunting seasons. Various reports over the last 10 years indicate predation of tortoises by dogs in the Reserve. Approximately 6 tortoise shells were observed near the Black Rock-climbing area in Snow Canyon State Park, and officials speculated that the tortoises were either scavenged or predated on by dogs (UDWR 2019b). Several years ago, two tortoises were injured as disclosed by the owner of the dogs that had mauled the tortoises.

4.1.4.5 Collection

One of the largest threats to desert tortoise is illegal collection of tortoises from their habitat (FWS 2011). A 2019 field report by UDWR indicated 38 incidents of suspected or confirmed illegal take of desert tortoises from the Reserve and surrounding areas (UDWR 2019b). Most

reports involved reproductive adults (84 percent); fewer reported incidents of juveniles and immature tortoises being taken are likely due to their smaller size and resulting difficulty in encountering them (UDWR 2019b). While 17 of the tortoises were returned to the Reserve after testing negative for disease, 13 were not able to be returned, and 6 were found dead or were euthanized due to injuries. It was not clear what became of two of the tortoises.

4.1.4.6 Disease

Desert tortoise within the Reserve have both URTD and shell disease (UDWR 2018). Shell disease was observed in relatively high-density tortoise areas, including areas around Cottonwood Wash, Middleton Wash and the Red Hills Parkway (UDWR 2018). In addition, URTD has been observed throughout the Reserve, including within the action area and the ROW, and the presence of tortoises with URTD clinical signs has increased since 2013 (UDWR 2018). Twelve percent of tortoises showing signs of URTD were identified in Zone 3 (UDWR 2018). Desert tortoise translocated long distance (e.g., greater than 984 ft.) and into Zone 4 of the Reserve require a health screening prior to release. Health evaluations, which include blood tests, reduce the potential for a tortoise exposing others to disease.

4.1.5 Assessment of AUs within the Action Area

The Project would directly affect three AUs in the UVRRU, the East Cottonwood, West Cottonwood, and Green Valley AUs (FWS 2021b). The Northern Corridor highway would bisect the West Cottonwood AU and the East Cottonwood AU latitudinally; Zone 3 of the Reserve comprises these AUs (Figure 3). The existing Cottonwood Springs Road bisects Zone 3 into the separate West Cottonwood and East Cottonwood AUs due to desert tortoise exclusion fencing along the road and lack of passage under or over the road. SR-18 separates West Cottonwood AU from the Snow Canyon AU. Zone 6 is in the Green Valley AU and includes contiguous habitat and potential movement corridors with the neighboring NEMRU. In the following section, we briefly describe the status of the species in each of the AUs.

4.1.5.1 West and East Cottonwood AUs

The action area for the Project includes the West and East Cottonwood AUs. These AUs support 75 percent of the Reserve population (FWS 2021b). To inform our status of the species in the action area for analysis of this Project, we created a GIS layer to model the distribution and relative abundance of desert tortoises within Zone 3 using the UDWR monitoring data collected between 2007 and 2017 (after the 2005 and 2006 wildfires). Our analysis shows the species has a clustered distribution on the landscape (Figure 8) and is not uniformly distributed across Zone 3. The highway crosses through an area modeled as high-density desert tortoise occupancy in Zone 3 (See Figure 8 below).

In addition to UDWR data, biologists completed surveys for desert tortoises and burrows in 2018 and 2020 for the proposed highway (BLM 2020a). The survey area was 812 ac. in total. During the surveys, biologists identified individuals and burrows as well as described habitat quality per BLM AIM protocols. The desert tortoise survey data were used in combination

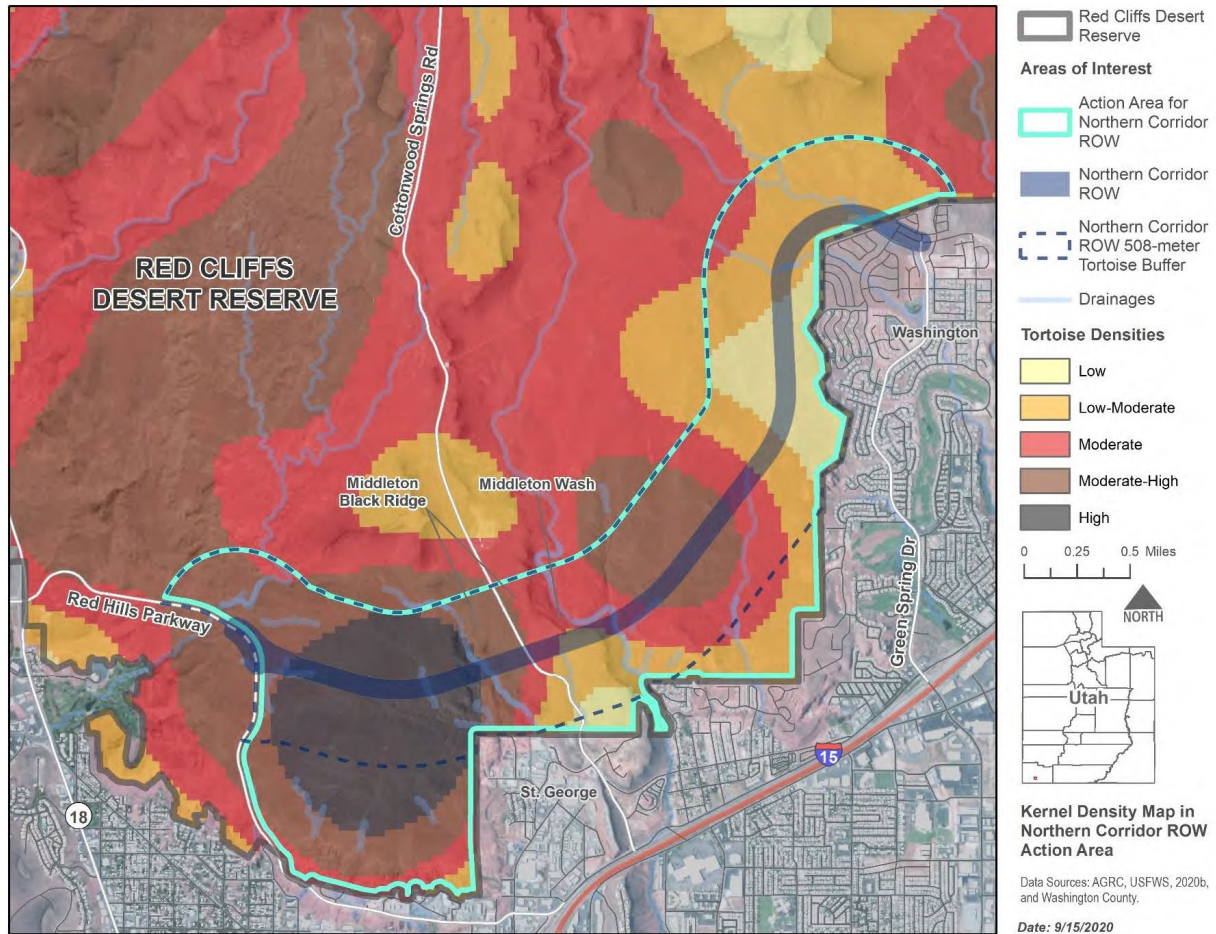


Figure 8. Desert Tortoise Density Map in Northern Corridor ROW action area.

with long-term monitoring data to prioritize desert tortoise passage locations for the proposed Northern Corridor highway.

Overall, the desert tortoise abundance has declined across the West and East Cottonwood AUs (Zone 3). This decline is generally attributed to diminished quality of habitat or episodic losses of individuals during wildfire events, both of which have increased with the establishment of non-native invasive grasses (TNC 2011). Although the specific action area within the West and East Cottonwood AUs has been relatively unaffected by major wildfires, desert tortoise density in the action area may be affected by nearby habitat conditions (Figure 7). Because of the effects of habitat degradation associated with non-native invasive grasses, and wildfires, the resiliency of the Zone 3 AUs are considered in moderate condition (FWS 2021b). Desert tortoises experience few barriers to movement within the West and East Cottonwood AUs. Resiliency for the adjacent Snow Canyon AU is also in moderate condition. The habitat factors in this AU are considered in good condition, although the smaller AU size and limited connectivity in the AU with other AUs may limit the sub-population (FWS 2021b).

Efforts are underway to restore habitats burned by recent fires in the affected AUs and the burned areas remain important for desert tortoise recovery. Generally, we expect that remaining and adjacent desert tortoises would repopulate burned areas at similar, pre-fire densities in the event the habitat is restored (Esque *et al.* 2003). Improving habitat conditions with native vegetation and preserving connectivity between the burned area in the northern portion of West Cottonwood AU and the dense group of individuals further south could prove important to the long-term status of this AU. Overall, the West and East Cottonwood AUs likely have the greatest influence on the resilience of the UVRU, because these units support desert tortoises at relatively high densities (some of the highest in the species' range) and collectively comprise a relatively large, intact area (FWS 2021b).

4.1.5.2 Green Valley AU

Washington County in cooperation with BLM and SITLA has proposed to manage the 6,813 ac. within the Green Valley AU for desert tortoises as Zone 6 in the Reserve. Recent surveys conducted across 5,150 ac. in the vicinity of Zone 6 (3,872 of which are within the Zone 6 boundaries) suggest that there are approximately 353 adult desert tortoises within the Zone 6 boundaries (Washington County 2017a; Table 3). However, we have no information on recent trends in the desert tortoise population in the Green Valley AU, and very little is known about the status of desert tortoise in the western part of Zone 6, as the area was avoided due to the presence of sensitive plant habitat. Community science data collected by Washington County documented the presence of desert tortoise in locations within unsurveyed areas in Zone 6 (Washington County 2017). This information supports our understanding of desert tortoise distribution in the area. Because these data are based on community science or observational data, they cannot be directly compared to densities collected using standard survey protocols.

As part of a desert tortoise workshop on UVRU, experts (FWS 2019a) speculated that density and abundance may decrease further west of the surveyed portions of Zone 6 where habitat changes (FWS 2019a), although observational data suggests desert tortoise numbers are relatively high within Zone 6 (Washington County 2017). Although individual desert tortoises have been occasionally relocated to the area in and around Zone 6 from nearby development, documented translocations likely only represent 10 to 20 animals (FWS 2021b).

Although most of the habitat in the Green Valley AU is considered to be in overall good condition, Zone 6 (22 percent of Green Valley AU; Figure 3) is affected by recreation. Non-motorized recreation activities can result in loss of habitat from development of recreational facilities, increased potential for crushing, collection, and predation, degradation of vegetation, and soil compaction (FWS 2011, Averill-Murray 2002, Berry *et al.* 2008, Hughson and Darby 2013). Trail braiding is extensive on the approximately 3,229 ac. of SITLA lands in this area.

Habitat connectivity is maintained between Zone 6 and the remainder of the Green Valley AU, which are primarily BLM-administered lands. While Zone 6 SITLA lands are bordered on the northeast, east, and southeast by residential developments, habitat to the west remains relatively intact and connected to the BLM-administered lands outside of Zone 6. This intactness may be important for supporting connectivity between the UVRU and the adjacent

NEMRU. The long-term viability of Zone 6 as a subpopulation isolated from other parts of the Reserve is likely dependent on continued connectivity through contiguous habitat and movement corridors with populations in the rest of the Green Valley AU and the neighboring NEMRU.

4.2 Status of Critical Habitat in the action area

The factors primarily affecting desert tortoise designated critical habitat across the range of the species include loss, degradation, and fragmentation of the habitat from urbanization, proliferation of roads, off highway vehicle activity, recreation activity, non-native plant invasion, wildfires, grazing, agricultural uses, solar farms, landfills, and military operations (FWS 2011). Loss, fragmentation, and degradation of critical habitat from anthropogenic and natural causes have reduced populations of the desert tortoise throughout the range of the species (FWS 2011). Large amounts of development have occurred throughout the range. These developments include buildings, solar farms, roads, military installations, agricultural fields, orchards, bridges, landfills, and other facilities for the public. These effects degrade or eliminate critical habitat for desert tortoises.

All critical habitat within the action area is in Zone 3. The action area contains less than one percent of the species' range-wide critical habitat. Range-wide, critical habitat is subdivided across five recovery units and 17 Tortoise Conservation Areas (TCAs). The Northern Corridor highway action area crosses designated critical habitat for the desert tortoise protected by the NCA and Reserve (Washington County 1995, 2020). The highway portion of the Project is located within the Red Cliffs TCA of the UVRU, which is the only TCA in the recovery unit. The Red Cliffs TCA contains approximately 42,598 ac. of designated critical habitat. The Project will cross approximately 276 ac. of critical habitat and fragment and degrade an additional 2,343 ac. of critical habitat (fragmented south of the ROW) in Zone 3. These 276 ac. of critical habitat lost and 2,343 ac. degraded account for approximately 6.2 percent of critical habitat in the total Red Cliffs TCA.

Within the Project action area, most of the physical and biological features are intact. Human development in the St. George area has led to some limitations on the ability of desert tortoises to move naturally to support the populations genetic exchange between animals in sub-populations. In addition, severe wildfire events in 2005, 2006, and 2020 resulted in degraded desert tortoise habitat within the Reserve (FWS 2011; BLM 2020a). These events have adversely affected the physical and biological features that provide sufficient space for movement and dispersal, sufficient quantity and quality of forage, and sufficient vegetation for shelter from temperature extremes and predators. Conversely, several habitat restoration projects led by the BLM and UDWR have occurred within the Reserve. These projects have focused on replacing non-native vegetation with native forbs and shrubs in the action area. The success and effectiveness of these restoration efforts continue to be evaluated (FWS 2021b). However, these projects cover small areas compared to what has burned (approximately 200 ac. restored compared to 19,240 ac. burned cumulatively, including reburned areas, across all years). Some areas that have burned once appear to be recovering naturally as evidenced by the most recent LANDFIRE Remap data; however, data show that a portion of areas previously burned are now dominated by invasive

species (TNC 2011, USGS 2019; FWS 2019a). In addition, some portions of critical habitat are affected by recreational use in the Reserve, but those affected areas still retain sufficient physical and biological features for desert tortoise to survive.

5.0 Effects of the Action

In accordance with 50 CFR 402.02, effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action, and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17).

In this analysis, we evaluate the three parts of the proposed action to desert tortoises and their designated critical habitat. They include: 1) BLM's issuance of the ROW and the associated construction of the Northern Corridor highway; 2) BLM and SITLA's management of portions of Zone 6 as part of the Reserve to offset effects to Reserve Zone 3 from the Northern Corridor highway; and 3) BLM, UDNR and UDOT's conservation actions in Reserve Zone 3 to offset effects to Zone 3 from the Northern Corridor highway.

In the Reserve, including Zone 6, conservation measures would be implemented in accordance with the HCP and utility development protocols on non-Federal lands and in accordance with the St. George RMP and subsequent implementation-level NEPA on Federal lands. Similarly, installation of any improved or new desert tortoise passage structures in Zone 3 would be implemented in accordance with the Red Cliffs NCA RMP on Federal lands and the HCP utility development protocols on non-Federal lands.

5.1 BLM's issuance of a ROW and Northern Corridor Highway Construction and Operation

BLM's issuance of a ROW would allow for construction and operation (or implementation) of the Northern Corridor highway. The analysis area for effects from implementation of the Northern Corridor highway includes all suitable desert tortoise habitat in the ROW. The final highway corridor is expected to be approximately 4.3 miles in length and typically 300 feet in width. However, to account for slight shifts in the highway alignment, and locations where the ROW would be widened due to cut and fill slopes, we analyzed effects to desert tortoise based on a ROW width of 500 feet.

5.1.1 Estimates to Determine the Number of Desert Tortoises in the Highway Action Area

We estimated the number of adult desert tortoises that occur (e.g., reside, breed, nest, forage) within the Northern Corridor road effect zone (e.g. areas expected to be affected by the alignment) of the proposed alignment (FWS 2020b). The road effect zones are all part of the Northern Corridor ROW and action area, except for within the fenced-off and contained portions of Cottonwood Springs Road and Red Hills Parkway. Four road effect zones consistent with

those identified in the BA were used to delineate areas of habitat loss, degradation, and fragmentation (Appendix 1, section 1). These road effect zones include:

1. the proposed ROW (direct habitat loss),
2. the 1,667 ft. buffer extending outward from both sides of the ROW (which includes effects to annual home ranges that would overlap the ROW and be subject to habitat degradation),
3. the habitat fragment to the south of the ROW (where desert tortoise may be isolated from the remainder of the Zone 3 subpopulation; this includes the area south of the ROW in the 1,667 ft. buffer area), and
4. the total effect zone (which includes the combination of the ROW, buffered ROW area, and the habitat fragment with associated edge effects to the south).

To determine how many tortoises are likely to occur in the various road effect zones, we used the desert tortoise post-wildfire (early 2000's fires) GIS layer (described in the Status of the Species in the action area section above) to model the relative abundance of desert tortoises within Zone 3 (FWS 2020b). We then used the relative abundance layer to estimate the proportion of Zone 3 desert tortoises expected to occur within each road effect zone. Then we multiplied each expected proportion to the UDWR Zone 3 desert tortoise abundance estimate (n = 1,749 adult desert tortoises; UDWR 2018) to convert our estimates into units of adult desert tortoises (*Table 3*). The analysis discussed in the Assessment of Analytical Units section above identified a range of 0.4 to 82.8 tortoises per square mile within the Northern Corridor total effect zone (FWS 2020b). By calculating desert tortoise abundance as a proportion of Zone 3 abundance, we were able to scale our estimates to the UDWR abundance estimate (previously corrected for imperfect detection).

Table 3. Desert tortoise abundance estimates within road effect zones of the proposed Northern Corridor.

Road Effect Zone	Area (ac.)	Mean estimate adult desert tortoise	Percent of Zone 3 adult desert tortoises
ROW	276	39	2
ROW + Buffer	2,023	275	16
ROW + South Fragment	1,616	242	14
ROW + South Fragment + Buffer	2,623	366	21

An important component of habitat connectivity is ensuring subadult desert tortoises (hatchlings and juveniles) can naturally disperse and establish new home ranges (FWS 1994a). Survival and recruitment of subadults has become particularly important as adult survival rates decrease (FWS 2011). Currently, most juvenile and hatchling tortoises do not survive to reproductive age (FWS 1994). Approximately 12 percent of juvenile tortoises (including juveniles and hatchlings) survive to adulthood (Darst *et. al* 2013).

The FWS Survey Protocol includes calculations to estimate desert tortoise hatchlings and juveniles in occupied habitat (Turner *et al.* 1984, 1986, 1987; FWS 2019b). We expect 13.2 percent of desert tortoises alive in a population in one year to be an adult (> 180 mm carapace length). Hatchlings make up approximately 17.7 percent of the population (1.3 times as many hatchlings as adults, see Table 4) and juvenile desert tortoises (< 180 mm carapace length) comprise approximately 69.1 percent of the population (5.2 times as many juveniles as adults). Using this information and the information on the estimates of adult desert tortoises in Reserve Zone 3 (1,749; UDWR 2018) and in the UVRU (4,306; FWS 2020b), we estimate there are 1,749 adult desert tortoises, 9,095 juveniles, and 2,274 hatchlings in Reserve Zone 3 and there are 4,306 adult desert tortoises, 22,392 juveniles, and 5,598 hatchlings in the UVRU.

Using these occurrence estimates, Table 4 shows the number of desert tortoise hatchlings and juveniles that may be in the surrounding action area of the Project using the relative abundance layer analysis, as identified above. Accurately estimating the number of desert tortoise eggs in any given site is extremely difficult given that the eggs incubate buried beneath the soil surface. Therefore, we recognize that some indefinable loss of desert tortoise eggs in the ROW from Project activities is a possibility year-round.

Table 4. Potential number of hatchlings and juvenile desert tortoises in the Northern Corridor action area.

Life Stage	Number of desert tortoises predicted in the action area: (Number of adult desert tortoises x life stage multiplier = total hatchling or juvenile desert tortoises)
Number of hatchlings	ROW: 39 adult desert tortoises x 1.3 (FWS 2019b) = 50.7 Action area: 366 x 1.3 = 475.8
Number of juveniles (<180 mm carapace length)	ROW: 39 adult desert tortoises x 5.2 (FWS 2019b) = 202.8 Action area: 366 x 5.2 = 1,903.2

5.1.2 Northern Corridor Highway Construction

Based on a ROW width of 500 feet and a 4.3-mile highway corridor, we determined the highway ROW would affect 276 ac. of occupied desert tortoise habitat. Prior to any highway construction, tortoises would be removed from the ROW and translocated a short distance away, presumably within their existing home range. Preconstruction short-distance translocation clearance surveys for tortoises (following current FWS clearance protocols) would be conducted in association with exclusion fencing to reduce or eliminate mortality within the ROW. UDOT will install tortoise exclusion fencing and associated shade structures would be built to prevent injury or mortality of animals that would otherwise enter the construction zone or attempt to cross the completed highway. For the fences to be effective, UDOT will maintain the fences through routine inspection and repair of any breach.

Effects of Handling and Moving Tortoises During Preconstruction Surveys and During Construction

Desert tortoises in harm's way within the highway ROW may be captured and moved to safe areas prior to any ground disturbance. For the Project, desert tortoises are not expected to be moved further than 984 ft. from point of capture; therefore, desert tortoises will not be subject to long-distance translocation outside their estimated home ranges and the potential effects of long-distance translocation are not included in this BO.

Capturing, handling, and moving tortoises may result in accidental death or injury if performed improperly, such as during extreme temperatures, or if individuals void their bladders. Desert tortoises that voided their bladders during handling had lower overall survival rates (0.81 to 0.88) than those that did not void (0.96; Averill-Murray 2002). If improper field hygiene procedures are not followed, disease could be spread between individual tortoises (FWS 2009). FWS protocols for handling tortoises (FWS 2009), which apply to all actions, restrict capture and movement of tortoises under unsuitable temperatures and conditions.

If necessary, handling desert tortoises during burrow excavation or relocating them from the ROW area will cause some level of stress. The conservation measures previously described in the Applicant Committed Conservation Measures above relating to handling, burrow excavation, and short-distance translocation will help minimize the stress associated with these activities as well as decrease the chances of causing stress, infections, or fatality associated with non-sterile techniques. Consistent with FWS Translocation Guidance (FWS 2020a), FWS permitted biologists and monitors will move desert tortoises off the project site 984 ft. (300 m.) from their capture location, allowing them to remain within close proximity to, if not wholly within, their current home ranges to further minimize stress levels. Because much of the area within 984 ft. of the ROW is densely occupied by tortoises, the FWS, BLM, and UDOT will closely coordinate translocations during the clearance survey to ensure effects of resource competition to individual tortoises (those being moved and residents in the recipient site) are minimized. By removing tortoises prior to construction or moving tortoises found during construction, we expect a significant reduction in the risk of tortoises becoming crushed, buried, or injured from construction activities.

Effects of Exclusion Fencing

When fencing is installed, tortoises may pace along the fencing in an effort to find access to previously used burrows and habitat. This can lead to exposure to high temperatures that can raise carapace temperature to lethal limits (Peaden et al. 2017). The same study documented increasing carapace temperatures due to pacing along the fence. There is no published literature on how long a tortoise can withstand prolonged extreme temperatures before succumbing to death. Shrubs remaining along and near fences would help in preventing such fatalities by providing shade. Shade structures will be placed along the habitat side of installed fencing to provide thermoregulatory refuge for pacing tortoises, and authorized desert tortoise biologists and monitors will check for pacing tortoises along fencing and monitor their condition (See Conservation Measures above). Therefore, we expect the potential for tortoise fatalities from

spacing along fences to be minimized with the installation of shade structures and regular checks along tortoise fencing during construction.

Tortoise exclusion fencing has shown to be one of the most beneficial conservation actions to reduce the potential for death or injury along roads. Without exclusion fencing, tortoises are likely to enter construction zones or operational highways and could become crushed, buried, or injured from interactions with construction equipment or vehicles. Areas without desert tortoise exclusion fencing averaged about one fatality per every 2 miles of road per year (Boarman and Sazaki 1996). Installation of road exclusion fencing reduced tortoise fatalities by an estimated 93 percent (Boarman and Sazaki 1996). UDOT has committed to installing permanent desert tortoise exclusion fencing along the ROW prior to any construction and to maintain the desert tortoise exclusion fencing throughout the life of the Project. Therefore, we expect the installation of permanent tortoise exclusion fencing to reduce desert tortoise fatalities or injuries during highway construction and operation.

Road Construction Effects

After the construction ROW has been cleared of desert tortoises and exclusion fencing installed, UDOT will use heavy equipment to conduct ground-disturbing activities such as:

1. clearing and grubbing vegetation in the ROW,
2. cutting and filling slopes, grading the initial roadbed, and installing gravel to prepare the roadbed,
3. installing culverts, bridges, and passage structures to allow for the movement of water, people, and desert tortoises from one side of the road to the other,
4. installing the road surface and gutters, and
5. installing signs, any necessary lighting, and permanent exclusion fencing.

Desert tortoises are vulnerable to effects from ground-disturbing activities. Desert tortoise fatalities and injuries may result from crushing by construction equipment or vehicles during construction or maintenance activities and along access routes into work areas. Ground disturbing activities may also entomb desert tortoises in their burrows or dens. Because of increased human presence in the area, desert tortoises may be killed or injured due to collection or vandalism associated with increased encounters with workers, visitors, and unauthorized pets. Desert tortoises also may be attracted to the construction area by application of water to control dust, placing them at higher risk of death or injury. If ground disturbing activities are conducted during the winter months, when tortoises are less active (prior to March 1st), any adverse effects of surface-disturbing activities on active desert tortoises are less likely to occur.

Because of the difficulty in locating desert tortoises, especially sub-adults and eggs, an unknown number of tortoises and eggs may not be found during clearance surveys and consequently be killed by project activities. Any tortoise not detected during clearance surveys or tortoise that enter project areas following clearance are at risk for injury or death during project activities or subsequent use of project areas after construction is completed. To reduce the potential of undetected tortoises in the ROW, permanent exclusion fencing will be installed in appropriate

locations along the ROW. In addition, FWS permitted biologists and biological monitors will frequently check the Northern Corridor project area to ensure that adverse effects to any desert tortoises that were undetected or somehow re-enter the project area are minimized. All workers will participate in the Worker Education Training Program and speed limits will be limited to 15 mph during construction. Workers will be required to check under their vehicles prior to movement. Low speed limits for project vehicles and equipment would allow operators more time to see a desert tortoise in their path or harm's way and reduce the potential for workers inadvertently strike desert tortoises. Construction workers or others would not approach or handle desert tortoises found in the project area during project activities and all Project activities within 300 ft. of the desert tortoise would be halted immediately, until the desert tortoise leaves the area or is moved from the site by an approved biologist.

Effects from Exposure to Chemicals

The primary types of waste generated during construction activities would be nonhazardous solid and liquid wastes. The nonhazardous wastes produced by construction activities would include defective or broken electrical materials and batteries, empty containers, the typical refuse generated by construction activities, and other miscellaneous solid wastes. Limited quantities of hazardous materials would be used and stored on the Project site. The primary hazardous chemicals onsite during construction would be the fuels, lubricating oils, and solvents associated with construction equipment. During highway operation, these same chemicals may leak from vehicles onto the road surface and be washed into adjacent habitats during rainstorms. These hazardous chemicals could affect desert tortoises through exposure by contact with skin or by ingesting waste. If the exposure to hazardous chemicals occur at high enough doses, the exposure could lead to a reduction of feeding, breeding, or sheltering behaviors and ultimately causing decreased health or death. To minimize the potential for these effects, UDOT will prepare and adhere to the terms and conditions of the Hazard Materials, Hazardous Waste, and Spill Prevention Plan, the Stormwater Pollution Prevention Plan and National Pollutant Discharge Elimination System permit (See Conservation Measures section above), and implement the conservation measure to store hazardous construction materials 1,969 feet away from tortoise burrows and remove any hazardous and non-hazardous construction materials at the conclusion of construction activities.

Effects from temporary construction areas

There may be some areas within the ROW where temporary construction access is required and the area is outside of the permanent tortoise exclusion fencing. After construction, these areas could be accessed and used by desert tortoises. We would expect road construction activities in these areas to cause soil compaction, thereby damaging soil structure (including any biological soil crusts). Loss of soil structure can cause: (1) changes in annual and perennial plant production and species composition (Adams et al. 1982, Burge 1983, Bury 1978, Vollmer et al. 1976, Woodman 1983); (2) soil loss due to increased rates of water and wind erosion (Bury and Luckenbach 1983 and 1986, Nakata 1983, Wilshire 1977); (3) reduced soil moisture (Hinkley et al. 1983, Wilshire 1977); (4) reduced water infiltration rates (Hinkley et al. 1983, Wilshire and Nakata 1976); (5) changes in soil thermal regime (Webb et al. 1978); and (6) compaction or an

increase in surface strength (Burge 1983, Davidson and Fox 1974, Nakata 1983, Webb 1983, Wilshire 1977, Woodman 1983). In turn, these effects would reduce native plant growth, increase the potential for establishment and spread on invasive weeds, and make it more difficult for desert tortoises to dig burrows in compacted soils. Therefore, the degradation of soil structure can decrease the fitness of the desert tortoise through loss of forage and sheltering sites (Esque et al. 2014).

UDOT has committed to restoring all areas disturbed by highway construction, including those areas inside and outside of tortoise exclusion fencing. UDOT will prepare a formal habitat reclamation plan for all desert tortoise habitat and submit the plan to FWS and BLM. The reclamation plan will describe reclamation objectives and methods to be used, species of plants or seed mixture to be used, time of planting, blending with existing vegetation at ROW edges, fertilizer mix reviews and approvals, success standards, and follow-up monitoring. All disturbed areas will be re-vegetated in compliance with the Red Cliffs NCA RMP or other applicable standards at the time of reclamation. The BLM would inspect reclamation activities at the end of construction to ensure disturbed areas are revegetated/restored according to the performance standards within the approved Reclamation Plan. After approval, UDOT will implement the reclamation plan on all areas outside of the immediate road and trail impervious surfaces (i.e. pavement) within the ROW. We expect the implementation of the reclamation plan will help reduce the long-term effect of damage to soil structure from temporary construction disturbances and promote faster regeneration within and adjacent to habitat temporarily disturbed by the Project.

Effects from Dust

Construction activities including vehicle traffic on the roads within the action area may generate dust that could affect vegetation adjacent to and within the action area in the short-term. Because the highway and trail will be paved, we do not expect any effects from dust after construction. The buildup of dust on plant leaves could affect photosynthetic productivity and nutrient and water uptake, resulting in loss of potential foraging plants for desert tortoises. However, UDOT has committed to dust control measures during construction. Therefore, we expect any effects from dust to surrounding vegetation to be minimal and would not affect desert tortoise foraging outside of the ROW area.

Effects from Noise and Vibration

Construction activities are expected to occur during desert tortoise low and high activity periods over multiple years and are expected to cause noise and ground vibrations from the use of dozens of pieces of construction equipment. Noise levels at 50 ft. from the loudest equipment types for each construction activity, representing a conservative noise level, are generally expected to be between 68 and 85 decibels (dB). Similarly, equipment used during construction are likely to cause vibrations in the ground, but any ground vibration is unlikely to be noticeable more than 40 or 50 ft. beyond the source.

Increased noise levels and vibration may affect desert tortoise foraging, breeding, and sheltering behavior, leading to poor health, reduced breeding success, or increased risk of fatality during construction activities. While limited data exist on the effect of noise on desert tortoises, the species has relatively sensitive hearing (i.e., mean = 34 dB of sound pressure level), but few physiological effects when observed with short-term exposures to jet aircraft noise and sonic booms (Bowles et al. 1999). These results cannot be extrapolated to chronic exposures over the lifetime of an individual or a population. Based on the ability of other species to adapt to noise disturbance, noise attenuation as distance from the project increases, and the fact that desert tortoises do not rely solely on auditory cues for their survival, we do not expect any desert tortoises to be injured or killed as a result of project-related noise effects. Desert tortoises outside of the ROW may experience intermittent exposure to increased noise levels, but the effects would be temporary, and we do not expect desert tortoise foraging, breeding, or sheltering behavior will be substantially affected given the distance and expected noise attenuation from construction activities to areas outside of tortoise exclusion fencing and the ability of tortoises to move away from noise creating activities.

Most vibration effects would be captured within the ROW, where exclusion fencing and monitoring would reduce the potential for tortoises occurring in the area. We expect any construction taking place near the perimeter edge of the exclusion fence to be limited. Desert tortoises outside of the ROW may experience intermittent exposure to increased vibration, but the effects would be temporary, and we do not expect desert tortoise foraging, breeding, or sheltering behavior will be substantially affected given the distance and expected vibration attenuation from construction activities to areas outside of tortoise exclusion fencing and the ability of tortoises to move away from vibration creating activities.

Summary of Construction Effects

Overall, we expect death and injury of most subadult and adult tortoises to be avoided during construction activities through the implementation and compliance of Conservation Measures, including the use of authorized desert tortoise biologists and monitors who will be onsite during pre-construction and construction activities. A Worker Education Training Program will inform all personnel about the desert tortoise, including checking under vehicles prior to moving them and what to do should they encounter a tortoise. Tortoise injury and mortality will also be minimized through installing and monitoring desert tortoise fencing around construction areas and moving tortoises away from the ROW areas prior to beginning work. Enforced speed limits and signs will also aid in preventing injury or mortality to desert tortoises during construction. There is likely to be some alteration of tortoise breeding, feeding, or sheltering behaviors outside of the ROW caused by dust, noise, vibration, or chemical exposure effects, but we expect the application of conservation measures such as exclusion fencing and dust control to minimize those effects.

5.1.3 Northern Corridor Highway Operation

After construction, UDOT will operate and maintain the Northern Corridor highway for public vehicular use. As part of operational use of the highway, permanent desert tortoise exclusion fencing will remain in place and will be regularly monitored to prevent desert tortoises from entering the highway ROW, thus reducing the potential for death or injury from crushing. However, there are other effects associated with highway operation that affect areas within and adjacent to the ROW. These areas are referred to as edge effects.

Edge effects are a term commonly used in conjunction with the boundary between natural habitats and disturbed or developed land. Typically, edge effects that degrade the surrounding desert tortoise habitat include increased human access, increased predation, establishment and spread of invasive weeds, changes in hydrology, and increases in dust, noise, and vibration. Because the highway and associated trail will be paved, we do not see any dust effects from highway operation. The effects from noise and vibration would be similar to those described in the construction effects described above. Thus, we expect the effects from noise and vibration from highway operation to not substantially affect desert tortoise foraging, breeding, or sheltering behavior. Behavior will be substantially affected given the distance and expected vibration attenuation from construction activities to areas outside of tortoise exclusion fencing and the ability of tortoises to move away from vibration creating activities. In the following paragraphs, we discuss the effects of edge effects associated with increased human access, predation, and invasive weeds.

Effects from Increased Human Access

Operation of the Northern Corridor highway may provide an opportunity for increased human access within the Reserve. Increased human access can result in effects to desert tortoises from collection, disposal, habitat degradation, increased risk of wildfires, and predation. Tortoises may be subject to collection along the roadway due to their docile nature, ease of transportation, and attractiveness as pets. Capture of wild tortoises from adjacent habitat can result in the loss of breeding age individuals, which are more visible due to their larger size. The loss of breeding age tortoises could adversely affect successful breeding and reproduction into the future. In addition, unwanted pet tortoises are often released into habitat adjacent to roads, potentially exposing wild tortoises to harmful diseases, and introducing inappropriate genetic lineages (FWS 2011). However, we note those activities are illegal and will not be covered in this BO.

Increased human access within the Reserve via the Northern Corridor ROW may introduce the threat of unleashed dogs, who may attack, injure, or kill tortoises (FWS 2011). However, to minimize human access from the highway to areas outside of the highway ROW, UDOT will install fencing along the ROW to minimize the potential for effects from collection, disposal, and predation from dogs. Trash left behind along the ROW or thrown out of car windows may also attract predators such as ravens and coyotes and are discussed in the Effects from Predator Subsidies section below. Sparks from passing vehicles could also ignite fires within adjacent habitat, resulting in habitat loss. Effects from wildfires are discussed in the Invasive Weeds section below.

Predator subsidies

Avian predators, such as the common raven and scavengers (e.g., coyotes) benefit from a myriad of resource subsidies provided by human activities associated with road operation. As discussed in the Environmental Baseline, ravens, coyotes, and other opportunistic predators are known to prey on eggs, sub-adult, and adult desert tortoises. Tortoise predation cause injury or death, which further affect survival rates and population densities. Resource subsidies that can attract predators include food (e.g., garbage), water (e.g., detention ponds), nesting substrates (e.g., transmission lines and fencing), and cover from inclement weather or predators. Ravens are also attracted to structures along roads such as overpasses and billboards for nesting. Human activities also facilitate expansion of raven and coyote populations into areas where they were previously absent or in low abundance. Ravens likely will frequent the Project action area because of the introduction of such subsidies. In addition, wildlife roadkill provide additional attractants and subsidies for opportunistic predators and scavengers and we expect roadkill and litter to increase from the Project. Carcasses of any type (bird, mammal, etc.) may attract predators to the project site. Removal of carcasses when found would minimize the odor and further attraction to the site by predators.

Road kills and litter from vehicles and trail users in the action area may attract subsidized tortoise predators. To avoid and minimize the availability of predator subsidies during highway operation, UDOT proposes to control trash and other subsidized resources by implementing conservation measures, which include implementation of a litter and roadkill control program to minimize attraction of predators of desert tortoises to the Project action area.

Invasive weeds

Another effect from highway operation is the potential introduction and spread of invasive weed species into habitats within or adjacent to the highway ROW. It is widely known that roadsides are one of the primary pathways for invasive weed infestations in desert regions (Gelbard and Belnap 2003). Roadsides not only experience high levels of disturbance, but they also have high levels of productivity from rainfall flow off road surfaces and onto adjacent roadside areas (Johnson *et al.* 1975, cited in Brooks and Berry 2006). Where road densities are high, invasive weed richness and biomass may increase from the combined effects of high invasive weed biomass near roads, increased dispersal of seeds along and away from roads by vehicles, decreased distances from roads to other areas of the landscape, and locally high productivity levels along roadsides.

Infestations of invasive weeds can affect the quality and quantity of plant foods available to desert tortoises. Invasive weed species generally do not provide adequate nutrition to desert tortoises (Abella and Berry 2016). When they out-compete native forage plants, they reduce the amount of food available to desert tortoises. A study of captive Mojave desert tortoises and their response to a variety of diets ranging from all native grass to all invasive grass (*Bromus rubens*) found that 37 percent of the tortoises given only an invasive grass diet were found dead or were removed from the experiment due to poor body condition (Drake *et al.* 2016). The all-invasive grass group fared the worst of all diet groups, including those that mixed native and invasive grasses. Invasive weeds reduce habitat quality for desert tortoise, in particular, foraging habitat

(Tracy et al. 2004), leading to reduced tortoise health and potentially mortality. Additionally, diets that include invasive species may decrease desert tortoise health and therefore, survivorship and reproduction potential. Females may lay fewer eggs, although we are unaware of any research that demonstrates this effect. We expect no injury or fatality to desert tortoises from the presence of invasive weeds, but there could be a decrease in reproduction and an effect on how tortoises are distributed across the range.

In addition, the introduction of invasive weed species may lead to increased wildfire risk (FWS 2011; Brooks *et al.* 2003). As discussed in the Environmental Baseline section above, wildfires adversely affect desert tortoises by causing death, injury, habitat loss (FWS 2011; Brooks *et al.* 2003), and reductions in available forage for desert tortoises. Wildfires can also serve as vectors for additional invasive weed infestations by reducing competition for water and nutrient resources with native vegetation. Many invasive weed species can out-compete native vegetation species for those resources and prevent re-establishment of native vegetation after the fire.

While we cannot reasonably predict the increase in invasive weed abundance caused by the Northern Corridor highway in the action area, to address the potential for spread of invasive weeds from the Northern Corridor highway, UDOT will implement a series of conservation actions to reduce establishment of invasive weeds and remove any invasive weed infestations that do occur within the ROW. One of the primary conservation measures is the implementation of the formal habitat reclamation plan for all construction activities occurring in desert tortoise habitat. As part of the implementation of the plan, UDOT would revegetate all disturbed areas in compliance with the Red Cliffs NCA RMP or other applicable standards at the time of reclamation. The BLM would inspect reclamation activities at the end of construction to ensure disturbed areas are revegetated/restored according to the performance standards within the approved Reclamation Plan.

If invasive weed infestations do occur, UDOT will control invasive weeds through the use of established techniques, such as application of herbicides and the clearing or cutting vegetation by hand or with machinery. In controlling for invasive weeds, UDOT and their contractors shall comply with applicable State and local seed and noxious weed laws. Because the highway ROW will be isolated through the use of tortoise exclusion fencing, we do not expect any adverse effects from the clearing or cutting of vegetation by hand or machines.

Some herbicides used to control invasive weeds may be considered toxic to desert tortoises, which could cause decreased health or death to tortoises. Decreased health could further limit tortoise breeding, feeding, or sheltering success. There is limited literature on toxicity trials involving reptiles, but exposure to herbicide chemicals may cause changes in behavior, symptoms of poisoning (swollen eyes, nasal discharge, immobility, etc.), or even mortality with repeated exposure (Willemsen and Hailey 2001). Effects from exposure would be much greater in sub-adult tortoises than larger adults.

Herbicide use would follow those approved in BLM's Programmatic EIS's (PEIS) for Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States and Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on BLM Managed Lands in 17 Western States (BLM 2007; BLM 2016b). The herbicides that may be used, based on those allowed on BLM-administered lands, include aminopyralid, clopyralid, imazapyr, imazapic, glyphosate, metasulfuron methyl, and rimsulfuron. These herbicides are considered to have very low toxicity to mammals, birds, and fish when applied in accordance with all product label requirements and restrictions. Herbicides that are believed to have deleterious effects on reptiles, such as 2,4-D, would not be allowed. Any herbicide use during operational maintenance would be implemented during the less active tortoise season. In addition, the UDOT will adhere to the terms and conditions of the Stormwater Pollution Prevention Plan and National Pollutant Discharge Elimination System permit, and implement the terms of the BLM's PEIS, which address herbicide use and application on land and near bodies of water.

Effects from Altered Hydrology

Alluvial fans with complex hydrologic networks within desert ecosystems are a critically important influence on biotic communities and processes. Storm runoff from roads can cause increased erosion and undermine plant root networks, carry contaminants from road surfaces, and cause habitat degradation through the spread of invasive weed seeds into adjacent habitat, increasing their coverage near roads. The effects associated with the spread of invasive weeds to desert tortoises are discussed above in the Effects from Invasive Weeds section. The effects from contaminants are also discussed above in the Effects from Exposure to Chemicals section. Construction of roads and rail lines can disrupt and alter natural hydrologic systems by influencing surface-water flow paths, which can have a negative effect on plant communities and decrease habitat quality (Perkins *et al.* 2018). For example, lower densities of creosote were observed along channels severed by roads and a rail line within Mojave National Preserve (Perkins *et al.* 2018). Decreased habitat quality affects desert tortoises by reducing available forage, leading to reduced feeding success. In addition, erosional deposition can compact and harden soils and reduce the ability of tortoises to dig burrows, which can alter sheltering success.

To reduce the potential for effects from altered hydrology to desert tortoise habitats along the ROW, UDOT has designed the highway to include bridges and culverts to facilitate the transfer of water along existing washes and other drainage features. By appropriately designing those features to handle 100-year storm events, UDOT would be able to minimize the effects from altered hydrology during all, but the most extreme storm events.

Effects from habitat fragmentation

Landscape genetic analysis performed by Latch *et al.* (2011) identified both natural (slope) and anthropogenic (roads) landscape variables that significantly influenced desert tortoise gene flow of a local population. Although they found a higher correlation of genetic distance with slope compared to roads, desert tortoise pairs from the same side of a road exhibited significantly less genetic differentiation than tortoise pairs from opposite sides of a road. Habitat fragmentation

and physical barriers to movement imposed by transportation corridors and alignments may significantly decrease gene flow among tortoise populations and may result in increasing genetic isolation if connectivity is not restored (Dutcher *et al.* 2020). Desert tortoises have one of the highest risks for negative road effects due to longer movement distances, home range size, road mortality and relatively low fecundity in comparison to other herpetofaunal groups (Brehme *et al.* 2018). In addition to acting as a population sink, roads fragment habitat and significantly reduce connectivity, which can decrease population viability and increase the risk of local extirpation.

As discussed in the revised recovery plan (FWS 2011), habitat linkages are essential to maintaining range-wide genetic variation (Edwards *et al.* 2004, Segelbacher *et al.* 2010). Habitat linkages are also important because they maintain the ability to shift distribution in response to environmental stochasticity, such as climate change (Ricketts 2000, Fischer and Lindenmayer 2007). Natural and anthropomorphic constrictions can limit gene flow and the ability of desert tortoises to move among larger blocks of suitable habitat and populations. The proposed Northern Corridor highway crosses an area with some of the highest densities in the Reserve and in the species' range. Construction of a highway within the ROW is likely to impair connectivity and fragment 1,616 ac. of desert tortoise home range habitat, resulting in demographic and genetic consequences that could negatively affect population viability in the absence of effective passage across roadways.

Desert tortoises have been observed to move through drainage culverts contained by desert tortoise fencing, which can potentially facilitate genetic connectivity (BLM and FWS, unpublished data, 2020; Dutcher *et al.* 2020). Culvert studies conducted in southern Nevada provided observations of tortoises completely crossing through both corrugated metal pipes (CMPs) along U.S. 93 and concrete box culverts along U.S. 95 (BLM and FWS, unpublished data, 2020b). Tortoises were observed successfully crossing through several concrete box culverts with open medians and traveling under 4-lane roads up to a 225-ft. total distance at the U.S. 95 study site.

The UDOT proposes to construct two large spans or bridges and install at least six passage structures that may include culverts or other designs to facilitate desert tortoise natural movement across the Northern Corridor ROW. The POD includes eight passages for the 4.3-mile highway, or approximately one passage every 0.5 miles (805 meters), including the span of two major washes and several smaller ones. Washes are believed to be used by desert tortoises as movement corridors, potentially improving the likelihood of use. Desert tortoise exclusion fencing would direct tortoises into these structures, restrict access to the ROW, and minimize the potential of death or injuries.

Passage structures are known to provide for some level of movement across highways (Boarman *et al.* 1998; Deffner and Myers 2019). Some information suggests that tortoises exhibit a preference for the smaller diameter corrugated metal culverts because of their similarity to burrows, which they use for shelter and thermoregulation (Deffner and Myers 2019), but more information is needed to more accurately determine the appropriate design to provide effective passage that supports their life history needs for movement (FWS 2014 and FWS 2021b). We do

not have enough information to determine the effectiveness of tortoise passage structures at this time. However, UDOT has agreed to work with us and BLM to identify the most appropriate passage designs for the highway and will incorporate passage designs into the final design of the highway.

5.1.4 Northern Corridor Effects to Critical Habitat

As discussed above, the Red Cliffs TCA contains approximately 42,598 ac. of designated critical habitat. We expect the Northern Corridor highway will permanently remove approximately 276 ac. of desert tortoise designed critical habitat as part of highway construction in the ROW and that all critical habitat physical and biological features within the ROW will be permanently lost. We further expect the Northern Corridor highway will fragment and degrade an additional 2,343 ac. of critical habitat in the Reserve. The fragmentation and degradation effects to critical habitat are the same as those described in the Northern Corridor Construction and Operation Effects sections above. We expect those fragmentation and degradation effects to alter, but not eliminate the physical and biological features of critical habitat. The combined permanent removal (276 ac.) and habitat alteration from fragmentation and degradation (2,343 ac.) totals 2,619 ac. of critical habitat lost or degraded from the Northern Corridor highway. This accounts for approximately 6.2 percent of critical habitat in the total Red Cliffs TCA.

5.2 Project Effects from BLM Management of a portion of Zone 6 as part of the Reserve

5.2.1 Estimates to Determine the Number of Desert Tortoises in Zone 6

As discussed in the Environmental Baseline using the density estimates for portions of Zone 6 surveyed by Washington County in 2017 and the density estimate of the Beaver Dam Slope area for unsurveyed areas in Zone 6, we determined the Zone 6 may support 368 desert tortoises. Overall, the Zone 6 boundaries support much of a high-density sub-population and the largest known subpopulation outside the Reserve in the UVRU.

The following paragraphs assess the effects of management actions on BLM-administered lands in Zone 6 for desert tortoises.

5.2.2 Effects from Managing Recreational Use and Grazing

The actions proposed by BLM include both planning-level and implementation-level actions to manage recreational use in Zone 6 (BLM 2020a). Recreational use can increase the potential for adverse effects to desert tortoises such as collection, disposal, habitat degradation, increased risk of wildfires, and predation (see Effects from Increased Human Access in the Northern Corridor Highway Operation section above). The actions proposed by BLM are intended to reduce certain types of recreational use in Zone 6 that are most likely to cause adverse effects to desert tortoises. Thus, we expect these actions will improve conditions for desert tortoises in Zone 6, providing long-term beneficial effects in the area. Thus, we can expect the BLM actions to reduce certain types of recreational use will improve desert tortoise breeding, feeding, and sheltering and overall survival on BLM-administered lands in Zone 6.

Similarly, livestock grazing can also cause habitat degradation and crushing. Livestock grazing on the landscape can reduce available forage for desert tortoises, decreasing feeding success. In addition, livestock can step on tortoises or collapse burrows, causing tortoises to be crushed and result in injury or death. BLM's planning-level decision to make Federally managed grazing allotments unavailable for grazing would eliminate these effects to desert tortoises and improve desert tortoise breeding, feeding, and sheltering and overall survival on BLM-administered lands in Zone 6.

5.2.3 *Connectivity*

BLM-administered lands in Zone 6 will remain primarily unfenced, maintaining demographic and genetic connectivity to existing desert tortoise populations within undeveloped habitat on non-Federal and Federal lands. Connectivity with the NEMRU and other adjacent recovery units will not be negatively affected as a result of the creation of Zone 6. Adding Zone 6 to the Reserve would ensure demographic and genetic connectivity within the rest of the Green Valley AU and potentially with the NEMRU. Maintaining this existing connectivity would allow desert tortoises to interact with other tortoises in adjacent areas and ensure continued desert tortoise breeding, feeding, and sheltering and overall survival on BLM-administered lands in Zone 6.

5.2.4 *Effects from additional protected habitat*

The creation of Zone 6 will result in the permanent protection of 6,813 ac., including the commitment to acquire and manage SITLA and private lands in Zone 6. The protection of existing BLM-administered lands to the Reserve and the anticipated acquisition and protection of SITLA and private lands will promote population persistence within Zone 6 and with other areas of contiguous habitat, particularly if corridors for movement and connectivity on these lands can be maintained. This overall intactness should support the potential for recovery of the desert tortoise in the UVRRU and rangewide.

5.3 **Effects from Additional Reserve Zone 3 Commitments**

The conservation actions in Zone 3 include potential improvements to passage structures across SR-18, and post-fire restoration in Zone 3.

5.3.1 *Potential Passage Structure Improvements Across SR-18*

As discussed above, UDOT will evaluate and monitor existing passages along SR-18 for tortoise passage, including, as needed, additional maintenance activities and debris removal. As a result of monitoring, UDOT will consider modifying the passage structures to improve tortoise passage as feasible. We expect additional evaluation and monitoring of the passage structures and potential modification of the structures will improve desert tortoise passage across SR-18. This will increase demographic and genetic connectivity between Reserve Zones 2 and 3, allowing desert tortoises to interact with other tortoises between both areas and ensuring continued desert tortoise breeding, feeding, and sheltering and overall survival.

5.3.2 *Habitat Restoration in Reserve Zone 3*

In response to wildfires in Reserve Zone 3, BLM and UDNR's Watershed Restoration Initiative committed funding to restore and improve habitat conditions for desert tortoises in areas burned by wildfires in 2020 and in other areas in portions of Zone 3 affected by past fires. This includes funds to repair damaged facilities and other measures to support the emergency restoration efforts, such as repairing fencing to prevent unauthorized off-road motorized use in restored areas. In addition, BLM, FWS, Utah's Watershed Restoration Initiative, and other stakeholders will establish a partnership focused on improving habitat conditions in other parts of Reserve Zone 3 and protecting habitat from future wildfires.

Much of the effort in restoring habitat affected by the 2020 wildfires and future restoration efforts include seeding and planting burned areas with native plants and removing invasive weeds within burned areas. Many invasive weed species can out-compete native vegetation species for those resources and prevent re-establishment of native vegetation after fires (TNC 2011). Seeding and planting native species will reduce the potential for establishment of invasive weeds in burned areas, providing more forage base for desert tortoises and reducing the potential for future wildfires in the area, as native vegetation are less likely to burn than invasive weeds, such as brome grasses (See Invasive Species Threats in the Environmental Baseline section above). Thus, we expect the habitat restoration associated with the 2020 fires and future restoration efforts in other parts of Reserve Zone 3 will improve habitat conditions in Reserve Zone 3, increasing desert tortoise feeding, breeding, and sheltering success in the affected areas.

6.0 Cumulative Effects

Cumulative effects "...are those effects of future state, or private activities, not involving Federal activities that are reasonably certain to occur in the action area of the Federal action subject to consultation" (50 CFR section 402.02). We do not consider future Federal actions that are unrelated to the proposed action in this section because they require separate consultation pursuant to section 7 of the ESA.

Climate

Climate change is another stressor that may affect future distribution and habitat use by desert tortoise. Climate change is expected to result in increased temperatures and an increased frequency and duration of droughts, which in turn is anticipated to limit growth of some annual grasses used for desert tortoise forage (Comer et al. 2013). In addition, climate change is expected to lead to increasing occurrences of wildfires, which can cause long-term alteration of desert tortoise foraging habitat. Assuming a general increase in temperatures and increased frequency and duration of droughts, vegetation communities may shift to higher elevations. As vegetation communities shift, we expect desert tortoise populations to follow that shift as long as there is habitat protection in those areas to allow for movement of desert tortoises to follow vegetation communities. Much of Reserve Zone 3 includes higher elevation habitat to allow tortoises to follow vegetation communities to higher elevation areas. If habitat in higher

elevations were not protected, we would expect a contraction of suitable habitat for desert tortoises.

Human Access

The increasing human population in nearby communities has resulted in an increase in recreational activity in Zone 6 and the surrounding area. Recreational pursuits, particularly OHV and target shooting use can cause disturbance and injuries or death to individual desert tortoises and their habitat. In addition, unmanaged OHV use can cause habitat degradation for desert tortoises by reducing or eliminating plant growth and affecting available forage for tortoises. Protection of Zone 6 through the restriction of OHV and target shooting in Zone 6 may shift OHV use and target shooting to other non-Federal lands with desert tortoise outside and adjacent to Zone 6. Increased human presence, noise, and harassment can all disturb wildlife, particularly ground dwelling species with slow mobility such as the desert tortoise. In addition, there is an increased risk of desert tortoise injury or death due to wildfires that start from target shooting and from increased predation associated with increased urbanization and human use in surrounding areas.

7.0 Jeopardy and Adverse Modification Analysis

Section 7(a)(2) of the ESA requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat.

7.1 Jeopardy Analysis Framework

“Jeopardize the continued existence of” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). The following analysis relies on four components:

1. Status of the Species, which evaluates the range-wide condition of the listed species addressed, the factors responsible for that condition, and the species’ survival and recovery needs;
2. Environmental Baseline, which evaluates the condition of the species in the action area (excluding the consequences to the listed species or designated critical habitat caused by the proposed action), the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the recovery unit and thus the species;
3. Effects of the Action (including those from conservation measures), which includes all consequences to listed species that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action; and,

4. Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the species.

The jeopardy analysis emphasizes the range-wide survival and recovery needs of the listed species. We evaluate the proposed Federal action within this context, taken together with cumulative effects, for making the jeopardy determination.

7.2 Destruction or Adverse Modification Analysis Framework

The final rule revising the regulatory definition of “destruction or adverse modification of critical habitat” became effective on March 14, 2016 (81 FR 7214) and subsequently modified on October 28, 2019 (84 FR 44976). The revised definition states: “Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features”.

Similar to our jeopardy analysis, our destruction or adverse modification analysis of critical habitat relies on the following four components:

1. Status of Critical Habitat, which evaluates the range-wide condition of designated critical habitat in terms of the physical and biological features (PBFs), the factors responsible for that condition, and the intended recovery function of the critical habitat overall;
2. Environmental Baseline, which evaluates the condition of the critical habitat in the action area (excluding the consequences to the listed species or designated critical habitat caused by the proposed action), the factors responsible for that condition, and the recovery role of the critical habitat in the action area;
3. Effects of the Action, which includes all consequences to critical habitat that are caused by the proposed action (including the consequences of other activities that are caused by the proposed action), the consequences of any activities on the PBFs and how they will influence the recovery role of affected critical habitat units; and,
4. Cumulative Effects, which evaluate the effects of future, non-Federal activities in the action area on the PBFs and how they will influence the recovery role of affected critical habitat units.

7.3 Conclusion

After reviewing the current status of desert tortoise and its critical habitat, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the desert tortoise in the UVRU and rangewide. It is also our biological opinion that the

proposed action is not likely to destroy or adversely modify designated critical habitat for the desert tortoise. We base these conclusions on the following:

Desert Tortoise

- We estimate there are 1,749 adult desert tortoises, 9,095 juveniles, and 2,274 hatchlings in Reserve Zone 3 (total 13,118 desert tortoises in all life stages) and there are 4,306 adult desert tortoises, 22,392 juveniles, and 5,598 hatchlings in the UVRU (total 32,296 desert tortoises in all life stages). As discussed above in the Effects of the Action section, we estimate 39 adult desert tortoises, 203 juveniles, or 51 hatchlings will occur in the Northern Corridor ROW and 366 adult, 1,904 juveniles, and 476 hatchlings within the highway action area.
- As discussed in the Incidental Take Statement below, we do not expect all estimated 39 adult, 203 juveniles, or 51 hatchlings in the Northern Corridor ROW will be taken. Therefore, we estimate that 10 percent of adult desert tortoises (4 adults) may be injured or killed from being buried or being crushed during highway construction activities. As desert tortoise juveniles and hatchlings are difficult to detect, and we do not know where they are in the action area, we estimate that 50 percent of the estimated juveniles and hatchlings may be injured or killed from construction (101 juveniles and 25 hatchlings). Further, we anticipate 7 tortoises at all life stages would be injured or killed annually from public use of the road over the life of the highway. The ROW grant for the highway is for a 30-year initial term, so we anticipate 210 tortoises at all life stages could be injured or killed during this period.
- In sum, we anticipate the loss of desert tortoises from highway construction would represent less than 1 percent of adult desert tortoises in Reserve Zone 3 and the UVRU and approximately 1 percent of juvenile and hatchling tortoises in Reserve Zone 3 and less than 1 percent in the UVRU. In addition, the anticipated 210 tortoises injured or killed over the initial term of the ROW from highway operation are less than 2 percent of the current estimates of desert tortoises at all life stages in Reserve Zone 3 and less than 1 percent of desert tortoises at all life stages in the UVRU. Thus, we do not expect the lethal take of desert tortoises from the highway to appreciably affect both the survival and recovery of desert tortoises in the wild by reducing the reproduction, numbers, or distribution of the species in the UVRU or rangewide.
- Desert tortoises would be non-lethally harassed or harmed from project construction and operation, but through translocation, those tortoises would still be able to contribute to the survival and recovery of desert tortoises in the UVRU and rangewide.
- We do not anticipate any future road development within the Reserve and consider the Northern Corridor highway a changed circumstance that will be the only substantial development project affecting the Reserve in the future.

- The Northern Corridor highway alignment bisects an important high-density area in the UVRRU, an area that is already fragmented. To address the fragmentation effects to desert tortoises from the Project, the design included in the POD incorporates three connectivity components:
 - For the Northern Corridor, UDOT will include at a minimum eight passages, including two bridges across washes and six additional passages at locations to be determined in final design. Locations are expected to be further refined to ensure effective placement and function for desert tortoises where concentrated use or burrows are found and that will support technical and economic feasibility for design, construction, and long-term maintenance. UDOT will also consider additional locations for desert tortoise passages where natural topography creates an opportunity. Passage structures will be developed in final design of the project in coordination with the BLM and FWS, with the goal of achieving the design elements that strongly support desert tortoise dispersal and movement and based on the best available science at the time of design (see Proposed Action section above).
 - UDOT will evaluate and monitor existing passages along SR-18 for tortoise passage, including, as needed, additional maintenance activities and debris removal. UDOT will consider modifying the passage structures to improve tortoise passage as feasible.
- Approximately 2,619 ac. of critical habitat is being fragmented and degraded by the Project, in an area where the species is already declining due to other stressors such as fire and drought. The BLM, FWS, and Utah's Watershed Restoration Initiative, and other stakeholders, have committed to establishing a partnership focused on enhancing the condition and resilience of the Zone 3 sub-population of desert tortoise by improving habitat conditions and/or protecting habitat from future wildfires in areas outside the proposed Northern Corridor ROW. The partners will work toward restoring habitat every year, regardless of larger restoration projects that occur as a response to wildfires, with a target total acreage of approximately 2,600 ac. of successfully restored habitat over the 25-year term of the HCP. This is equivalent to the acreage in the Northern Corridor action area. Collectively in response to the 2020 wildfires, the HCP Partners applied for nearly \$3 million for emergency stabilization, restoration, and infrastructure (i.e., fencing).
- Up to 276 ac. of desert tortoise critical habitat will be lost within the ROW. This represents less than 1 percent of the 56,187 ac. of designated critical habitat in the UVRRU and the 6.4 million ac. of designated critical habitat rangewide. Thus, we do not expect the loss of desert tortoise designated critical habitat to alter critical habitat in a way that diminishes the value of critical habitat as a whole for the conservation of desert tortoises.

- Commitments by BLM and SITLA will offset loss of land in the ROW through the management and protection of approximately 6,813 ac. (3,350 ac. of which are non-Federal lands) for desert tortoise in Zone 6 and through the acquisition of non-Federal lands within proposed Reserve Zone 6 over the next 25 years. This will protect the largest desert tortoise sub-population in the UVRU and ensure the desert tortoises and their habitat in Zone 6 continues to contribute to the long-term survival and recovery of the desert tortoise.
- UDOT will install and maintain desert tortoise exclusion fencing and shade structures along the approved ROW in accordance with the most recent FWS guidance as incorporated into the Final POD. Fencing precludes desert tortoises from entering the construction area or completed highway and shading provides thermal and predation cover for desert tortoise that encounter the exclusion fencing and pace along it. FWS 2009 and FWS 2018 (Appendices A and B) provide additional guidance on this measure.
- Desert tortoise densities are high in the Northern Corridor highway project area. However, biological monitors and authorized biologists will be in place to move desert tortoises away from harmful situations during the construction period. Frequent monitoring of activities by biological monitors and authorized biologists will ensure that the likelihood of desert tortoise encounters and potential fatalities is low. In addition, we expect any injury or fatality of juvenile or hatchling tortoises from construction to be compensatory mortality, as only 12 percent of sub-adult tortoises survive to adulthood.
- UDOT has committed to reclaiming all suitable habitat temporarily disturbed by the Project construction. To guide restoration activities, the action agencies will develop a habitat reclamation plan to restore all suitable habitat temporarily disturbed by the Project. Development of the reclamation plan will occur in conjunction with FWS and the action agencies to incorporate re-seeding with native plants, re-contouring land, and incorporating erosion control measures. This will help ensure that suitable habitat temporarily affected by construction activities continues to contribute to the long-term survival and recovery of the desert tortoise.

8.0 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. The regulations define harm as “an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering” (50 CFR section 17.3). Harass is defined by regulation 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 behavioral patterns which include, but are not limited to, breeding, feeding or sheltering” (50 CFR section 17.3). Incidental take is defined as “...takings that result from, but are not the purpose of, carrying out

an otherwise lawful activity conducted by the Federal agency or applicant” (50 CFR section 402.02).

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 ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary and must be undertaken by BLM so that they become binding conditions of any grant or permit issued to the Project proponent, as appropriate, for the exemption in section 7(o)(2) to apply. If BLM fails to assume and implement the terms and conditions, or fails to require the applicants to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms that are added to any grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the effect of incidental take, BLM and the applicants, as appropriate, must report the progress of the action and its effect on the species to us as specified in the Incidental Take Statement [50 CFR section 402.14(i)(3)].

We note the effects of the Northern Corridor highway occur in an area that has been extensively surveyed for desert tortoises over the last 25 years. Thus, we have a high degree of confidence in the density estimates used to determine the number of desert tortoises in the ROW and action area and the amount of incidental take discussed below. In contrast, the HCP BO assesses an area that has had few, if any, surveys, but we believe contains low densities of desert tortoises. Thus, we determined it was more appropriate to use a habitat surrogate to as a metric to track take of desert tortoises for the Incidental Take Permit associated with Washington County’s HCP. For additional details on the use of the habitat surrogate, see the HCP BO (FWS 2021a).

8.1 Amount or Extent of Take Anticipated

Desert Tortoise

Take of the desert tortoise is reasonably certain to occur from construction and maintenance activities and associated conservation measures, including excavating burrows and relocating desert tortoises outside of the construction zone. Construction and maintenance activities will occur at any time of year, including during the desert tortoise’s higher active period (February 15 to November 30). As previously described, construction and maintenance activities during this period can result in direct injuries and fatalities from vehicle collisions and entombment, as well handling procedures during excavations and relocations. Construction and maintenance activities may also reduce the fitness of desert tortoises as vegetation used by desert tortoises for shelter and forage are removed when desert tortoises are active and may change the vegetation community in all seasons. These situations may result in injury, harassment, or death of desert tortoises. Take is not anticipated to result from the implementation-level decisions of related to the modification of management of BLM-administered lands within Zone 6 through the SGFO RMP amendments. Take associated with fencing on the SITLA lands would be covered under the Washington County utility development protocols.

- The applicants have committed to several measures to reduce the likelihood of desert tortoises entering the Northern Corridor highway footprint and will remove any desert tortoises that enter this area. Thus, we do not expect all estimated 39 adult, 203 juveniles, or 51 hatchlings in the Northern Corridor ROW will be taken. However, we cannot exclude the possibility that some desert tortoises may enter the Project footprint or remain undetected. Therefore, we estimate that 10 percent of adult desert tortoises (4 adults) may be injured or killed from being buried or being crushed during construction activities. As desert tortoise juveniles and hatchlings are difficult to detect, and we do not know where they are in the action area, we estimate that 50 percent of the estimated juveniles and hatchlings may be injured or killed from construction (101 juveniles and 25 hatchlings). Calculations for determining number of eggs in an area are difficult to confirm in the field. Therefore, an unknown number of eggs may be taken by the Project activities. The action agencies will track the known take of all desert tortoise eggs, hatchlings, juveniles, and adults from the construction and maintenance of the Project.
- Because desert tortoise densities are high in the Northern Corridor action area, we anticipate frequent encounters in the action area during construction and operation of the highway. Over the life of the highway, we expect that non-injury or non-lethal incidental take of desert tortoises for the purposes of translocating desert tortoises during both construction and maintenance activities is double the estimated adult, hatchling, or juvenile population in the ROW. Therefore, we anticipate a total of 78 adult, 406 juvenile, and 102 hatchling desert tortoises and an unknown number of eggs could be harassed due to being translocated away from construction or maintenance activities during the life of the road directly adjacent to the ROW.
- We expect there are likely to be some tortoises bypassing tortoise exclusion fencing when damaged or compromised after construction and those tortoises may wander onto the highway. If tortoises enter the highway, it is likely that the tortoises will be crushed from public use of the road. From 2015 to 2019, existing roads within the Reserve averaged approximately seven tortoises of all life stages killed or injured from public use of the road (UDWR 2019a). However, we note in the Effects of the Action section that the number of tortoises injured or killed by vehicles is likely an underestimate due to the difficulties in finding tortoise carcasses. Because of the difficulties in finding injured or killed tortoises, we anticipate vehicle use on the Northern Corridor highway to kill or injure no more than seven tortoises at all life stages annually for the life of the highway. The ROW grant for the highway is for a 30-year initial term, so we anticipate 210 tortoises at all life stages could be killed during this period.
- We anticipate 366 adult desert tortoises, 1,903 juveniles, and 476 hatchlings could be non-lethally harmed from their home ranges being fragmented and habitat degraded by the highway (See Tables 3 and 4 in Effects of the Action section above). We do not expect UDOT or BLM to track this estimated take. Instead, UDWR will monitor the effects of habitat fragmentation and degradation from the highway as part of annual monitoring of desert tortoise populations in the Reserve.

In sum, we anticipate the following:

- 4 adult desert tortoises, 101 juveniles, and 25 hatchlings to be injured or killed from construction activities.
- 78 adult, 406 juvenile, and 102 hatchling desert tortoises and an unknown number of eggs could be non-lethally harassed due to being translocated away from construction or maintenance activities during the life of the road directly adjacent to the ROW.
- 7 tortoises in total at all life stages killed or injured by vehicle use on the Northern Corridor highway annually for the life of the highway.
- 366 adult desert tortoises, 1,903 juveniles, and 476 hatchlings could be non-lethally harmed from their home ranges being fragmented and habitat degraded by the highway.

8.2 Effect of the Take

As discussed above, we estimate there are 4,306 adult desert tortoises, 22,392 juveniles, and 5,598 hatchlings in the UVRU, approximately half of which may occupy designated critical habitat in the Reserve. we estimate 39 adult, 203 juveniles, or 51 hatchlings will occur in the Northern Corridor ROW and that 10 percent of adults (4) and due to low detection rates, 50 percent of juvenile and hatchling tortoises (101 juveniles and 25 hatchlings) will be injured or killed from construction activities in the ROW. However, the four adult desert tortoises (less than one percent of the UVRU) that we anticipate may be killed during Project construction is unlikely to reduce appreciably the likelihood of survival and recovery of desert tortoises in the UVRU. Likewise, the 101 juveniles and 25 hatchlings each represent less than one percent of the estimated 22,392 juveniles and 5,598 hatchlings in the UVRU. Because adult mortality drives desert tortoise population demographics much more than juvenile mortality (0.87 and 0.12 respectively; Darst *et al.* 2013), these small percentages of possible juvenile and hatchling take are unlikely to affect the viability of the UVRU.

In addition, the anticipated seven tortoises at all life stages annually killed or injured from vehicle crushing during Project operation is also less than one percent of the estimated 4,306 adult desert tortoises, 22,958 juveniles, and 5,598 hatchlings in the UVRU.

As described in the Jeopardy and Adverse Modification Conclusion section, we determined that the Project is not likely to jeopardize the continued existence of desert tortoise. We also determined the Project is not likely to destroy or adversely modify designated critical habitat.

8.3 Reasonable and Prudent Measures and Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the action agencies must comply with the following terms and conditions, which implement the reasonable and prudent measures (numbered items) and outline reporting and monitoring requirements. The terms and conditions are non-discretionary.

The following reasonable and prudent measures and implementing terms and conditions are necessary and appropriate to minimize take of desert tortoise:

Reasonable and Prudent Measures

1. All Project personnel designated to handle desert tortoises will use the most recent desert tortoise handling protocols to minimize effects from handling or translocating tortoises.
2. The action agency and applicant will design the Project to minimize desert tortoise fragmentation by constructing passage structures to allow effective desert tortoise dispersal, within the scope of the Project and consistent with the POD.
3. The action agency will dedicate, to the best of their abilities, funding and staff toward targeting successful habitat restoration every year in the Red Cliffs NCA.
4. The action agency will ensure biological monitoring expertise on site. Authorized activities will require monitoring of the desert tortoise population throughout the duration of the project construction. The development of the appropriate level of monitoring will occur in coordination with the action agency and FWS.

Terms and Conditions

1. The action agency shall submit a desert tortoise translocation report to the Utah Ecological Services Field Office by February 1 for the previous calendar year. Specifically, the report shall briefly document the number of desert tortoises moved out of harm's way, as well as actions taken to implement these terms and conditions, the effectiveness of these terms and conditions at reducing take of desert tortoise, and information on individual desert tortoise encounters. The report shall make recommendations for modifying or refining these terms and conditions to enhance desert tortoise protection.
2. The action agencies shall notify the Utah Ecological Services Field Office of any post-construction desert tortoise fatalities documented within the ROW. The report should include the estimated age class, size, and sex of the desert tortoise. Additionally, any circumstances that can be determined regarding the fatalities should be included. The action agencies shall notify the Utah Ecological Services Field Office (801- 975-3330) within 72 hours of discovering the fatalities, or as soon as possible.

Review requirement: The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the effect of incidental take that might otherwise result from the proposed action. If the level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The action agencies must immediately provide an explanation of the causes of the taking and review with the Utah Ecological Services Field Office the need for possible modification of the reasonable and prudent measures.

8.4 Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species, you must provide initial notification to the FWS's Law Enforcement Office, 2900 4th Avenue N., Suite 301, Billings, MT 59101 (303 729-2285) and the Utah Ecological Services Field Office (801- 975-3330) within three working days of its finding. You must make written notification within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. Send the notification to the Law Enforcement Office with a copy to the Utah Ecological Services Field Offices. You must take care in handling sick or injured animals to ensure effective treatment and in handling dead specimens to preserve the biological material in the best possible state.

8.5 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA 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 plans, or to develop information.

Desert Tortoise

1. We recommend that the BLM hire permanent staff whose primary duties include expertise in restoration of desert tortoise habitat in Washington County.
2. We recommend that the BLM identify, protect, and restore desert tortoise (and other wildlife as appropriate) habitat corridors between the UVRRU and NEMRU in the SGFO RMP.
3. We recommend that the BLM hire additional law enforcement to support the growing recreation and visitation in the Red Cliffs NCA and the new Zone 6.
4. We recommend that the BLM prioritize acquisition of non-Federal lands from willing sellers in Zone 3 of the Red Cliffs Desert Reserve and opportunistically pursue lands in Zone 6 from willing sellers.
5. We recommend that the BLM fully implement the Revised Desert Tortoise Recovery Plan (FWS 2011) and subsequent revisions of the plan.
6. We recommend that the BLM and the applicants manage activities (minimizing waste, reducing perching and nesting opportunities for ravens, etc.) so that they do not contribute to the proliferation of predators within desert tortoise habitat.
7. We recommend that the action agencies coordinate and collaborate with other local, State, and Federal agencies as well as private groups to sponsor or assist with public

education regarding desert tortoise conservation to enhance public support for conservation activities. Groups for education and outreach may include OHV groups, hunting groups, homeowner associations, scout troops, public schools, libraries, and other audiences and venues associated with regional land use or educational programming.

8. We recommend BLM support County and State efforts to address other threatened and endangered species in Washington County through collaborative programs, initiatives and actions.

To be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, we request notification of the implementation of any conservation recommendations.

9.0 Re-initiation Notice

This concludes formal consultation on the proposed Northern Corridor Highway Project. As provided in 50 CFR section 402.16, reinitiation of formal consultation "...is required and shall be requested by the Federal agency or the FWS, where discretionary Federal involvement or control over the action has been retained or is authorized by law" and:

1. If the amount or extent of taking specified in the Incidental Take Statement is exceeded.
2. If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;
3. If the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the BO.
4. If a new species is listed or critical habitat designated that may be affected by the identified action.

To reinitiate section 7 consultation, BLM should immediately notify our office by phone or email if any of the reinitiation clauses are triggered.

In keeping with our trust responsibilities to American Indian Tribes, we encourage you to coordinate with the Bureau of Indian Affairs in the implementation of this consultation and, by copy of this BO, we are notifying the Cedar Band of Paiutes, the Kanosh Band of Paiutes, the Paiute Indian Tribe of Utah, the Chemehuevi Indian Tribe, the Koosharem Band of Paiutes, the Pueblo of Zuni, the Hopi Tribe, the Las Vegas Paiute Tribe, the San Juan Southern Paiute Tribe, the Indian Peaks Band of Paiutes, the Moapa Band of Paiute Indians, the Shivwits Band of Paiutes, the Kaibab Band of Paiute Indians, and the Navajo Nation of its completion. We also encourage you to coordinate the review of this project with the Utah Division of Wildlife Resources and the Washington County HCP Administration.

Thank you for your coordination in preparing the BA and your interest in conserving threatened and endangered species. If we can be of further assistance, please contact George Weekley at (385) 285-7929 or Hilary Whitcomb at (385) 285-7930.

cc (electronic):
Bureau of Land Management
Bureau of Indian Affairs

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Appendix A: Approach to the ESA Section 7 Assessment

Introduction

In the Final Environmental Impact Statement (FEIS) to Consider a Highway Right-of-Way, Amended Habitat Conservation Plan and Issuance of an Incidental Take Permit for the Mojave Desert Tortoise, and the Proposed Resource Management Plan Amendments, Washington County, Utah, the Bureau of Land Management (BLM) and the U.S. Fish and Wildlife Service (FWS) are considering multiple decisions on proposed actions that may affect the Mojave desert tortoise (desert tortoise) in the Upper Virgin River Recovery Unit (UVRRU). These decisions and proposed actions (hereafter referred as Proposed Actions) include the following:

- BLM's issuance of a ROW to UDOT through the Red Cliffs NCA, including the amendment to the 2016 Red Cliffs NCA RMP to allow for the ROW issuance. This would allow for UDOT's construction and operation of the proposed Northern Corridor highway.
- The management of lands in proposed Zone 6 as part of the Reserve to offset effects to Reserve Zone 3 from the Northern Corridor highway. This includes BLM's amendment to the St. George RMP to manage Zone 6 consistent with other BLM lands within the Red Cliffs Desert Reserve and SITLA managing their lands to the benefit of desert tortoises and ESA-listed plant species until SITLA lands can be acquired for permanent protection.
- Additional conservation actions in Reserve Zone 3 by BLM and UDNR to offset effects to Zone 3 from the Northern Corridor highway.
- FWS's decision to issue a section 10(a)(1)(A) incidental take permit (ITP) to Washington County for conservation measures intended to minimize take from development covered activities in desert tortoise habitat.

These actions and decisions may affect the desert tortoise and its designated critical habitat in the UVRRU, and each agency is responsible for ensuring their individual actions comply with section 7(a)(2) of the Endangered Species Act (ESA or Act). In an effort to streamline the environmental review of these inter-related actions, the BLM and the FWS combined their National Environmental Policy Act (NEPA) reviews into a single Environmental Impact Statement. However, the FWS must prepare separate biological opinions for each agency's respective decisions, one for the BLM actions associated with the Northern Corridor highway, and a separate intra-service biological opinion for our issuance of the ITP associated with the amended Washington County Habitat Conservation Plan (Washington County HCP or HCP).

Because the BLM actions ultimately allow for the construction of the proposed Northern Corridor highway, we have included the highway effects in the Northern Corridor biological opinion, as well as the proposed conservation measures by BLM and associated state partners. In our intra-service biological opinion, we analyze effects associated with FWS's potential

issuance of an ESA section 10 ITP Washington County HCP. The latter analysis includes effects associated with the implementation of the HCP, as well as Washington County's proposed conservation measures associated with the changed circumstance of the Northern Corridor. The intra-service biological opinion considers the effects of the construction of the proposed Northern Corridor highway as a contemporaneous action occurring within the permit area of the amended Washington County HCP.

Origin and Purpose of Consultation

In section 7 of the Endangered Species Act, 16 U.S.C. §§ 1531 *et seq.* (ESA or Act), Congress required that every Federal agency “...insure that any action authorized, funded or carried out by such agency, is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat ...determined to be critical...[critical habitat]....”¹ (16 U.S.C. § 1536(a)(2)). That is the standard for a section 7(a)(2) finding under the ESA.

To meet this standard, Congress required that the action agencies engage in consultation with the FWS or National Marine Fisheries Service and seek their biological opinion regarding whether the proposed action by the action agency meets this standard. Congress further instructed that “each agency shall use the best scientific and commercial data available” when implementing the Act [Act, section 7(a)(2)]. Regulations promulgated in 1986 established specific agency responsibilities and process for moving through consultation (50 C.F.R. § 402).

Action agency responsibility in consultation – likely effects of the action

To accomplish meeting the 7(a)(2) standard, the action agency defines its action area, seeks a species list from the FWS for species that may be present in the action area, and then sets about predicting the likely effects to that species (or critical habitat) from the proposed action. During this phase of consultation, the action agency may request and receive technical assistance from the FWS regarding information on the listed resources and ways to reduce effects to those resources.

All of the information on effects of the action is gathered together and transmitted to the FWS with a request for consultation and a biological opinion. When presented to the FWS the action agency's documents must include a description of the proposed action and the specific action area, the species or critical habitat impacted, and the probable biological effects to those resources, and other relevant information on the action of impacts. The document containing that information is typically referred to as a biological assessment and must use the best

¹ Jeopardize the Continued Existence of “...to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.”

Destruction or adverse modification - “... means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features.”

scientific or commercial data available. Assuming the necessary information is present in the request for consultation, the FWS begins consultation.

FWS's responsibility in consultation - development of the Biological Opinion

The consultation and FWS's biological opinions are not a review of the prudence of the proposed action or judgment regarding its value or effectiveness relative to other potential projects, or of the action agency taking no action. It is not a specific assessment of the recovery value of the project.² The FWS's responsibility in consultation is to take the action agency's analysis of how the proposed action is likely to affect the species in the action area and determine if, when examined against the species condition at a listed entity scale, the action agency's project is likely to violate the jeopardy or destruction or adverse modification standard. Thus, the FWS's charge under 7(a)(2) is legally mandated, narrow, and specific.

How the FWS develops a biological opinion

To address the threshold question of whether an agency action is likely to violate the 7(a)(2) standard, the FWS evaluates the following four categories of information.

Status of the Species - This category represents the biological or ecological information relevant to formulating a biological opinion and focuses on the current condition of the species (i.e. numbers, reproduction, distribution, etc.). The information is a broad and general examination of the species biology and condition at the scale of its range as described in its listing. This also includes a review of any factors that have, and are, influencing the species status.

Environmental Baseline - This category is similar to the status of the species in that it describes the condition of the species and its habitat, but is focused and limited to the action area (the areas where the proposed action will modify the land, water or air.). Information also includes a review of any factors that have and are influencing the species condition at the scale of the action area.

Effects of the Action - This category of information is the FWS's review of the action agency's analysis and discussion of how the proposed action (modifications to land, water, and air) are likely to result in an effect to the species (individuals of the species), in the action area. The analysis is the responsibility of the action agency and is required as part of the materials submitted to the FWS when requesting formal consultation (50 C.F.R. § 402.14). It describes how the proposed action modifies the environment, whether listed species will be exposed to those modifications, what the species' response will likely be if exposure occurs and then what biological effect (if any) is likely to result from the response.

² Separate from the consultation requirement of 7(a)(2), Federal action agencies are already required by Congress, under 7(a)(1) of the Act, to use their authorities to conserve (recover) listed species.

Cumulative Effects - This category describes the effects to the species (if any) from any future non-Federal actions that are reasonably certain to occur in the action area.

The 7(a)(2) Conclusion

The integration synthesis of this information forms the FWS's opinion on the 7(a)(2) finding. The FWS examines the effects from the proposed action and whether those effects resonate at the scale of the listed entity in such a way as to be likely to meet the elements in the definition of Jeopardy or the definition of Destruction or Adverse Modification (see definitions in Footnote 1 above) For both biological opinions, our Jeopardy determinations are made at the scale of the species' recovery unit or range-wide and the Destruction or Adverse Modification determinations are made at the scale of the entire designated critical habitat for that species.

If the opinion of the FWS is that the proposed action is not likely to violate the 7(a)(2) standard, then consultation is complete³ and this will inform the action agencies' decision on whether to move forward with the action.

Continuing obligation after Consultation

In all cases where discretionary Federal involvement or control over the action has been retained or is authorized by law, the action agency is responsible for monitoring the progress of its action and re-initiating the consultation if any of the following four conditions are met.

- 1) If the amount or extent of taking specified in the incidental take statement is exceeded;
- 2) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;
- 3) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or
- 4) if a new species is listed or critical habitat designated that may be affected by the identified action. (50 C.F.R. § 402.16)

The use of "best scientific and commercial data available" in biological assessments and biological opinions

Consultation documents, required by law as part of Section 7(a)(2) consultation, must be constructed using a legal framework, however the Endangered Species Act also requires that "*each agency shall use the best scientific and commercial data available*" [Act, section 7(a)(2)]. This is a broader concept than established scientific facts. Scientific facts are established through use of the scientific method where a specific hypothesis is tested using carefully designed and controlled experiments. The results are then subjected to statistical analysis. It is often the case that the available body of information necessary to inform a predicted outcome of

³ If the proposed action is no Jeopardy but anticipates effects to some individuals meeting the Act's definition of 'take' (under section 9), the Service enumerates that take and exempts it from the Act's prohibition in an Incidental Take Statement. ITSs include mandatory measures (RPMs) to reduce effect of the take.

a proposed action may be information that has not been subjected to the scientific method, partially because that proposed action has not been implemented and therefore outcomes have not been observed.

The FWS recognized this situation when it published its policy on information standards (Fed. Reg. Vol. 59, no. 126 July 1, 1994). The policy notes that information comes from a wide variety of sources, some of which is anecdotal, oral, unpublished gray literature and published articles from juried professional journals. All of this information can be evaluated and used in decisions under the Act.

Consultation in the face of limited information and uncertainty

The action agency and FWS often face a situation where there is limited information specific to the type of action proposed by the action agency. And as pointed out above, scientific and commercial data may come from various sources with varying degrees of scientific rigor. The agencies may even have to use information from different, but similar, projects to produce a reasonable prediction for future effects from proposed action. To judge the relevance and strength of the information to drive a prediction, a standard of “weight of the evidence” is used.

In contrast to a scientific proof approach, weight of evidence approach enables the agencies to move forward with a prediction when scientific proof is limited or lacking. Weight of evidence uses a whole set of information presented on an issue and judges (weighs) the degree to which, (or whether) the information favors one line of thinking, or another. It merges inferences from information that is qualitative and quantitative. In this way all information including scientific proof (if available), can be used to build a specific line of reasoning for the predicted outcome. Agencies can move from analyzing what the data represents, interpret the meaning and value of that data and then apply the result to the legal threshold question of whether the future project is likely to jeopardize the listed species or cause the destruction or adverse modification of its designated critical habitat.

The Act prescribes that the action agency’s consultation and the FWS’s preparation of a biological opinion will take place in a total of 135 days. This creates a tension around the consultation timeframe and the information available, and the certainty of the agency’s analysis.

Congress’ clear understanding was that even after a biological opinion was rendered, the action agencies had a continuing obligation to ensure compliance with 7(a)(2). This might include development of additional information or confirmation of assumptions made. The regulations at 50 C.F.R. § 402.16 supported this obligation by requiring the agency to reinitiate consultation if certain circumstances arose, including if new information “...*reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered...*”

Form of this Consultation

The Northern Corridor Project and the Washington County HCP consultations and resulting biological opinions are complex because aspects of the Proposed Actions may be implemented over extended periods of time, with actions that occur immediately after the NEPA Records of Decisions and long-term actions that require monitoring, evaluation, and adaptive management to ensure effectiveness of actions intended to benefit desert tortoises. It is also unusual in that the intent of both consultations must contemporaneously conclude that the BLM proposed actions and the FWS's proposed action do not result in jeopardy to the species or destruction or adverse modification of designated critical habitat. These conditions present challenges to the consultation documents and processes.

The challenge is fulfilling the FWS's responsibility for making a 7(a)(2) opinion while recognizing that not all future actions and their probable effects are known at this time. In 2015 the Services promulgated an addition to the regulations on Interagency Cooperation (50 C.F.R. § 402) that was designed to deal with conflicting court cases regarding incidental take in consultations. The concepts discussed in the preamble to the regulations and the regulatory definitions promulgated at that time can inform the challenge of the current consultation.

One of the terms added to the regulation for purposes of issuing an incidental take statement is for a "Mixed Programmatic Action." The regulations describe a mixed programmatic action as "... a Federal action that approves action(s) that will not be subject to further section 7 consultation, and also approves a framework for the development of future action(s) that are authorized, funded, or carried out at a later time, and any take of a listed species would not occur unless and until those future action(s) are authorized, funded, or carried out and subject to further section 7 consultation." The BLM Proposed Action for the Northern Corridor consultation fits the description of a mixed programmatic action because the proposed amendments to the St. George RMP for management of Zone 6 includes both planning-level actions (actions that set agency direction, but do not authorize implementation of those actions on the ground) and implementation-level actions (actions that can immediately be implemented upon approval). BLM's implementation of planning-level actions will be subject to future section 7 consultation, if necessary.

With BLM's proposed action for the RMP amendments including both planning-level and implementation level actions, our regulations support consulting on the BLM's action as a "mixed programmatic action." This distinction allows FWS to issue an incidental take statement for those parts of the action that are specific enough that we can meet the regulatory burden of reasonable certainty to issue an incidental take statement. Where that degree of certainty is not met, the FWS can still judge the action against the 7(a)(2) jeopardy/ adverse modification standard, make a conclusion, but not have to exempt take (since we can't meet the reasonable certainty burden). The planning-level decisions and actions where we cannot reasonably determine incidental take at this time would still be subject to ESA section 7(a)(2) compliance during implementation of those decisions and actions.

The FWS and BLM staffs and appropriate applicants have worked closely to share information on the Proposed Actions, species life history, monitoring and associated topics. Records of that coordination are included in our consultation file.

Appendix B. Concurrences

This appendix contains our concurrences with your “may affect, not likely to adversely affect” determinations for the endangered dwarf bear-poppy (*Arctomecon humilis*), the endangered Holmgren (Paradox) milkvetch (*Astragalus holmgreniorum*) and its designated critical habitat, the endangered Shivwits milkvetch (*Astragalus ampullarioides*), and the threatened Siler pincushion cactus (*Pediocactus sileri*).

You determined the Project “may affect, but is not likely to adversely affect” the endangered Dwarf bear-poppy (*Arctomecon humilis*). We concur with your determination for the Dwarf bear-poppy for the following reasons:

- There are no known Dwarf bear-poppy plants in the Northern Corridor portion of the action area; therefore, there will be no direct effects to individual plants. Habitat restoration activities will ensure suitable habitat exists after construction activities, which will ensure the long-term availability of suitable habitat for the plants to establish within the area.
- The protection of existing Dwarf bear-poppy populations by the establishment of Zone 6 are expected to have a long-term, beneficial effect to the species.
- The plant conservation measures agreed to by the BLM and SITLA will reduce the potential for any direct effects to individual plants or the indirect effects of fugitive dust from conservation activities in Zone 6. Therefore, any potential direct effects to individual Dwarf bear-poppy plants are expected to be discountable and any potential indirect effects from fugitive dust are expected to be discountable and insignificant. Additionally, the Integrated Weed Management Plan will reduce the likelihood of herbicide drift to Dwarf bear-poppy plants found outside of the action area, making any potential effects from herbicide application discountable.

You determined the Project “may affect, but is not likely to adversely affect” the endangered Holmgren (Paradox) milkvetch (*Astragalus holmgreniorum*) and its designated critical habitat. We concur with your determination for the Holmgren milkvetch for the following reasons:

- There are no known Holmgren milkvetch plants in the Northern Corridor portion of the action area; therefore, there will be no direct effects to individual plants. Habitat restoration activities will ensure suitable habitat exists after construction activities, which will ensure the long-term availability of suitable habitat for the plants to establish within the area.
- The protection of existing Holmgren milkvetch populations by the establishment of Zone 6 are expected to have a long-term, beneficial effect to the species and to designated critical habitat.
- The plant conservation measures agreed to by the BLM and SITLA will reduce the potential for any direct effects to individual plants or critical habitat and any indirect effects of fugitive dust from conservation activities in Zone 6. Therefore, any potential direct effects to individual Holmgren milkvetch plants or designated critical habitat are expected to be discountable and any potential indirect effects from fugitive dust are

expected to be discountable and insignificant. Additionally, the Integrated Weed Management Plan will reduce the likelihood of herbicide drift to Holmgren milkvetch plants found outside of the action area, making any potential effects from herbicide application discountable.

You determined the Project “may affect, but is not likely to adversely affect” the endangered Shivwits milkvetch (*Astragalus ampullarioides*). We concur with your determination for the Shivwits milkvetch for the following reasons:

- There are no known Shivwits milkvetch plants in the action area; therefore, there will be no direct effects to individual plants. Habitat restoration activities will ensure suitable habitat exists after construction activities, which will ensure the long-term availability of suitable habitat for the plants to establish within the area.
- The plant conservation measures agreed to by the BLM and SITLA will reduce the potential for any indirect effects of fugitive dust from any activities in the action area. Therefore, any potential indirect effects from fugitive dust are expected to be discountable and insignificant. Additionally, the Integrated Weed Management Plan will reduce the likelihood of herbicide drift to Shivwits milkvetch plants found outside of the action area, making any potential effects from herbicide application discountable.

You determined the Project “may affect, but is not likely to adversely affect” the threatened Siler pincushion cactus (*Pediocactus sileri*). We concur with your determination for the Siler pincushion cactus for the following reasons:

- There are no known Siler pincushion cacti in the action area; therefore, there will be no direct effects to individual plants. Habitat restoration activities will ensure suitable habitat exists after construction activities, which will ensure the long-term availability of suitable habitat for the plants to establish within the area.
- The plant conservation measures agreed to by the BLM and SITLA will reduce the potential for any indirect effects of fugitive dust from any activities in the action area. Therefore, any potential indirect effects from fugitive dust are expected to be discountable and insignificant. Additionally, the Integrated Weed Management Plan will reduce the likelihood of herbicide drift to Siler pincushion cacti found outside of the action area, making any potential effects from herbicide application discountable.