

**Desert Tortoise Habitat Restoration in Burned Areas  
Within two National Conservation Areas in Southwestern Utah**

In the spring and summer of 2005 and 2006, significant portions of the Mohave Desert burned due to lightning strikes as well as human carelessness, burning approximately 25% of tortoise habitat within the Red Cliffs Desert Reserve (Reserve) and large areas of the Woodbury-Hardy study area on the Beaver Dam Wash. As a result, native tortoise populations within Southwestern Utah have declined up to 50% in some areas due primarily to habitat degradation resulting from large wildfires and introduction of exotic weeds (e.g., red brome, cheatgrass, etc.). By destroying perennial plants, which are critical resources to desert tortoises for protections and burrow sites, and altering forage quality and quantity, wildfires are changing habitat conditions and complicating recovery efforts. Without active management, non-native grasses and forbs are projected to increase at the expense of native shrub lands. Landscape-level restoration will increase desert tortoise survivor ship and fecundity in burned areas and help recover desert tortoise populations.

The goal of this project is to revegetate (with all native species) 200 acres of burned desert tortoise habitat within two National Conservation Areas (Beaver Dam Wash and Red Cliffs) near St. George, Utah. This project is year 1 of a two year project. The proposed project would occur on two 100-acre plots of burned desert tortoise habitat within the Red Cliffs and Beaver Dam Wash NCA. These plots will be intensively revegetated with at least 5,000 containerized plants. These plots will create "fertile" islands which will act as seed banks from which native plants can disperse. Implementation of the project will give the burned areas potential to recovery and reduce the abundance of annual brome grasses that foster destructive wildfires.

Without active management, non-native grasses and forbs are projected to increase at the expense of native shrublands. Areas heavily infested with non-native exotics (e.g., cheat grass, Russian thistle) will repeatedly burn ultimately converting the vegetation from a native desert shrubland to an exotic invasive grassland. Further, soil erosion during flooding are major concerns on denuded desert landscapes. Soil erosion is deleterious to human health via air pollution and complications with water management. Implementing restoration is a top priority for producing synergistic benefits ecologically and to nearby human communities.

## **Methods**

The two 100-acre plots, located within the Red Cliffs NCA and Woodbury Hardy Study Area in the Beaver Dam Wash NCA, were selected in areas previously burned, where invasive species (e.g., brome grasses, Russian thistle) are dominant. Prior to planting, areas of brome "thatch", where cover exceeds 50-100% will be removed with hand tools such as rakes to create an open soil surface for planting. Revegetation will consist of planting at least 5,000 containerized young native Mojave shrubs and forbs using hand tools at each site (densities=5,000/per acre unit). Within each polygon, certain areas will be planted more densely to create vegetated islands.

Containerized plants would include a variety of native perennial shrubs, grasses and forbs that provide tortoise forage or root structure for building burrows (Table 1). Temporary protective fencing or cages for individual plants will be used to reduce herbivory from small mammals (e.g., jackrabbits, pocket mice, etc.). A perimeter fence (range fence and in some areas tortoise mesh such as Red Cliffs NCA) has already been established on both proposed sites and will be maintained during the project. Native plants will be obtained from one or more native nurseries (e.g., Northern Arizona University, Lake Mead Nursery, Nevada Division of Forestry, College of Southern Nevada) and grown for a minimum of 6 to 12 months to develop root structure. We will provide UNLV with a grant to do the work (i.e., cooperative agreement). Scott Abella, Assistant Professor of Restoration Ecology will be the UNLV lead. He has a wealth of experience in desert restoration and specifically planting containerized plants (100+ publications). UDWR will act as project manager.

## **Future Management**

Because both of these sites are located within a National Conservation Area and both are critical habitat for the desert tortoise, BLM is mandated to place habitat protection and conservation as its highest management priority. We will work with the BLM to adaptively employ long-term weed treatments to protect the investment made in revegetation. In the absence of approval for herbicide, hand tools such as rakes will be used to strategically remove and break up fuel around the plantings, particularly if wet years occur after the plantings and result in brome fuel accumulation that exceeds 50-100% cover. Results from monitoring will help to inform future efforts to restore and rehabilitate desert tortoise habitat within Southwestern Utah.

This project is supported and funded by multiple agencies including FWS, BLM, UDNR, TNC, Washington County, and local gov't.

**Relationship of project proposal to Desert Tortoise Recovery Plan:**

This project is considered a Priority 1 Desert Tortoise recovery action within the Northeast Mojave and Upper Virgin River Recovery Units, as stated in the Desert Tortoise Recovery Action Plan in that it increases the presence of native species, increases plant diversity, and reduces the presence of exotic annual grasses. In addition, this projects goals and objectives are consistent with 28 goals and objectives from over 10 additional management plans.

**Effectiveness Monitoring:**

Paired vegetation monitoring plots (control and treatment) will be established to compare treated and untreated areas. Monitoring will be conducted annually to determine 1) the number of plants that survive in each plot and 2) to measure the impact of native plants on the presence of nonnative exotics (e.g., Bromus spp., Russian thistle). Variation will be incorporated into the plantings to determine if certain methods of planting are more successful than others and to ultimately determine the most effective methods that lower overall costs but maintain high survival rates of containerized plants. Desert tortoise transects will be randomly located within each plot, and surveyed during the active periods (spring and fall) to determine presence of tortoises and their sign.

**Project Timeline: Estimated Project Cost:**

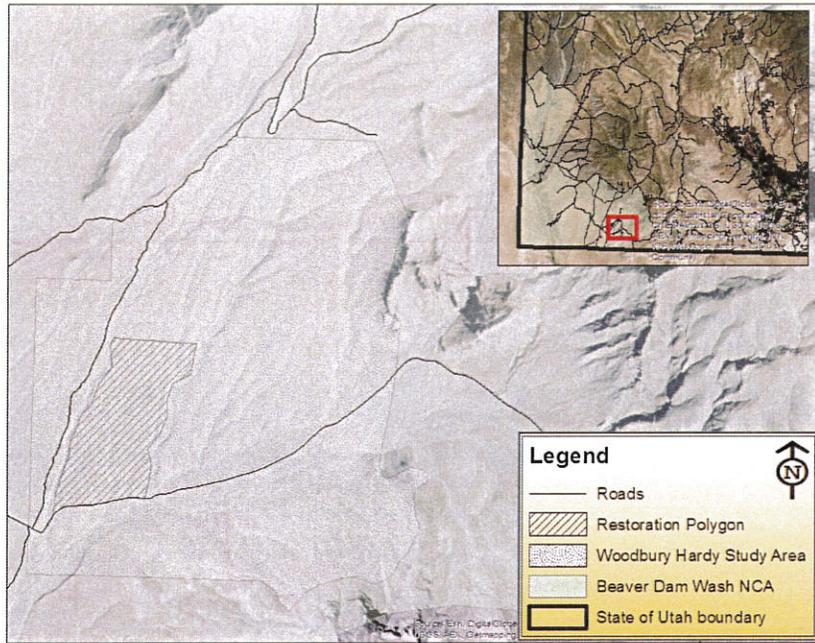
Funding is secured with The Nature Conservancy (\$12,188), Washington County Habitat Conservation Plan (\$45,000), and U.S. Fish and Wildlife Service (\$45,000, National Fish and Wildlife Foundation). In-kind funding is provided through BLM (\$1,500) and UDWR (\$1,000) to select polygons, complete NEPA, complete proposal, and secure funding. This is year one of a two year project.

- Year 1: Complete pre-project permitting (e.g., NEPA), secure funding, collect native seeds, grow containerized plants, and organize/plan outplantings in fall 2016.

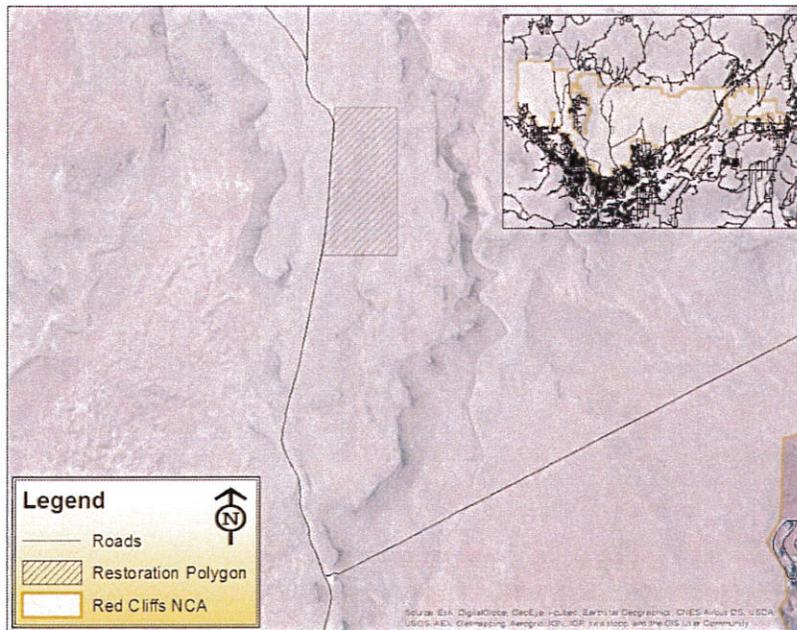
Budget (Year 1)	In-kind	BDW	RC	Total
BLM (e.g., NEPA)	1,500			1,500
Archeological Surveys (\$23.00/acre)		2,300	2,300	4,600
UDWR Project Manager (e.g., secure funding, administer)	1,000	1,500	1,500	4,000
Labor and Materials (e.g., \$8/plant w/ cages + labor)		35,000	35,000	70,000
Annual Monitoring and Reporting (15% of L&M)		5,250	5,250	10,500
Estimated Overhead (e.g., vehicles, admin, 17.5% of L,Mat,Mon)		7,044	7,044	14,088
<b>Total</b>				<b>104,688</b>

Table 1. List of native, perennial shrubs and forbs that provide tortoise forage or root structure for building burrows.

Latin Name	Common Name
<i>Encelia farinosa/virginensis</i>	Brittlebush/Virgin River Brittlebush
<i>Ambrosia dumosa</i>	White bursage
<i>Eriogonum fasciculatum</i>	Desert buckwheat
<i>Larrea tridentata</i>	Creosote bush
<i>Pleuraphis rigida</i>	Big galleta
<i>Lycium andersonii</i>	Wolfberry
<i>Mirabilis laevis</i>	Four o'clock
<i>Sphaeralcea ambigua</i>	Desert Globemallow
<i>Muhlenbergia porteri</i>	Bush Muhly
<i>Astragalus sp.</i>	Native milkvetch species
<i>Lomatium mohavense</i>	Mohave desertparsley
<i>Chamaesyce albomarginata</i>	Small whitemargin sandmat
<i>Stephanomeria pauciflora</i>	Brownplume wirelettuce
<i>Stephanomeria parryi</i>	Parry's wirelettuce
<i>Yucca schidigera</i>	Mohave yucca
<i>Yucca baccata</i>	Banana yucca



**Figure 1.** Map of proposed 100 acre plot within the Woodbury Hardy Study Area, Beaver Dam Wash National Conservation Area, Washington County, Utah.



**Figure 2.** Map of proposed 100 acre plot within the Red Cliffs Desert Reserve, Red Cliffs National Conservation Area, Washington County, Utah.

