IMPLEMENTATION PLAN AND BUDGET

2023-2025

Final – February 2023

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desert conservation PROGRAM

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INTRODUCTION

The Clark County Desert Conservation Program manages Endangered Species Act compliance on behalf of Clark County and the cities of Boulder City, Henderson, Las Vegas, North Las Vegas, Mesquite and the Nevada Department of Transportation (collectively, the Permittees) through implementation of the Clark County Multiple Species Habitat Conservation Plan (MSHCP) and associated Section 10(a)(1)(B) incidental take permit (Permit Number TE 034927-0). Clark County serves as the implementing agent on behalf of the Permittees and the Desert Conservation Program is the Plan Administrator for the MSHCP.

The Clark County MSHCP and associated incidental take permit allow private landowners to develop land in Clark County without the need for individual project-by-project consultations and negotiation with the U.S. Fish and Wildlife Service to comply with the Endangered Species Act. This permit provides a streamlined process for compliance with the Endangered Species Act by private landowners.

In exchange for the regional permit, the Desert Conservation Program implements conservation measures that mitigate impacts to Covered Species resulting from private-land development activities. Categories and examples of conservation measures are described in the MSHCP and associated incidental take permit and include such activities as research, public information, education and outreach, species inventory and monitoring, habitat enhancement and restoration, the Wild Desert Tortoise Assistance Line, installation and maintenance of fencing along roadways to reduce tortoise mortality, law enforcement within the reserve system, and acquisition of additional reserve system lands to increase or preserve habitat connectivity and promote ecological resiliency.

The MSHCP provides guidance on developing biennial budgets for implementation. This report describes the process followed to develop the 2023-2025 Implementation Plan and Budget for the Clark County MSHCP and the outcome of the budget deliberations.

MSHCP IMPLEMENTATION PLAN AND BUDGET PROCESS

Per section 2.8.3.3 of the MSHCP, Clark County is responsible for providing management and administration of the MSHCP through a Plan Administrator, and as such, the County Manager shall appoint a Plan Administrator to implement the MSHCP on behalf of the Permittees. The Director of the Clark County Department of Environment and Sustainability currently serves as the Plan Administrator and manages the Desert Conservation Program.

In general, the Plan Administrator is responsible for day-to-day operations, the preparation and implementation of a biennial Implementation Plan and Budget, compliance monitoring and reporting, and making recommendations to the Clark County Board of County Commissioners, which has final decision-making authority over implementation of the MSHCP.

Guidance for the development of biennial implementation plans and budgets can be found in Section 2.1.12 of the MSHCP. Generally, it prescribes key provisions of the budget development process, which include:

- Developing the biennial calendar outlining explicit steps, dates, and responsible parties
- Calculation of available funding
- Adaptive Management Program recommendations
- Ensuring biennium proposals are developed

- Holding budget sessions
- Submittal of the Implementation Plan and Budget
- U.S. Fish and Wildlife Service review of the Implementation Plan and Budget
- Presenting the Implementation Plan and Budget to the Board of County Commissioners for approval or disapproval

Since inception of the MSHCP, the prescriptive calendar and budget process outlined in Section 2.1.12 have served as general guidance to the parties. However, the Implementation Plan and Budget process has continued to evolve over the years based on recommendations from the Adaptive Management Program, advisory committees, and a Program Management Analysis (Kirchoff 2005). Necessary adjustments have been made to arrive at implementation plans and budgets, all of which have been approved by the U.S. Fish and Wildlife Service.

The Plan Administrator has identified the budget process as an area of the MSHCP requiring significant revision and thus has been working with the U.S. Fish and Wildlife Service on a major amendment to the MSHCP. In the short-term, and to continue to mitigate for incidental take in good faith, the Plan Administrator proposed a budget process responsive to the key provisions outlined in the MSHCP for the 2011-2013 budget process. This same process continues to be used today to develop the 2023-2025 Implementation Plan and Budget.

BUDGET PROCESS CLARIFICATION

Among the MSHCP's guidance documents, the Implementing Agreement is the controlling document over the other documents. The Implementing Agreement states that through June 30, 2005, the Plan Administrator shall expend $2.05 million per year. During the remaining term of the permit, the Plan Administrator shall expend $1.75 million per year including cost of living adjustments of no more than 4 percent per year. Thus, the minimum required expenditure over the entire 30-year permit is $54,300,000 (February 1, 2001 through February 1, 2031).

Pursuant to the Implementing Agreement, if the Plan Administrator expends more than is required, the excess amount will be credited against future required expenditures. It is the Plan Administrator's position that all funds that have been allocated through the Implementation Plan and Budget process each biennium, and expended by the Plan Administrator for MSHCP projects, are to be included in the amount of required and excess expenditures.

By the end of the 2007-2009 biennium (June 30, 2009), the Permittees had expended more than $57 million and had met the MSHCP's minimum required expenditure. Therefore, in March 2010, the Plan Administrator sought to clarify the language in the MSHCP and Implementing Agreement with the following statement:

> In the event the County's actual expenditures exceed the total minimum required expenditure over the 30-year term of the permit prior to the end of the permit term, the County must expend any remaining funds in cooperation with the [U.S. Fish and Wildlife Service] for the conservation of species and habitats.

This statement makes clear that the budget process outlined in the MSHCP and Implementing Agreement is not necessary when determining how to expend remaining mitigation funds once the minimum required expenditure has been met. Instead, the Plan Administrator, in cooperation with the U.S. Fish and Wildlife Service,

will determine the conservation measures to be funded and implemented. The Plan Administrator received formal concurrence from the U.S. Fish and Wildlife Service on this clarification on April 14, 2010.

FUNDING

SECTION 10 FUNDS

Funding to implement the permit conditions and conservation actions in the MSHCP is primarily derived from the $550 per-acre mitigation fee (also referred to as Section 10 funding) collected by the Permittees. This funding is enterprise funding and can only be used for the purposes of implementing the MSHCP.

SOUTHERN NEVADA PUBLIC LAND MANAGEMENT ACT FUNDS

Additional funding is available from the sale of federal land in Clark County as authorized by the Southern Nevada Public Land Management Act (SNPLMA) of 1998, as amended. This funding is awarded on a competitive basis and is not guaranteed. The Bureau of Land Management (BLM) administers the SNPLMA funding program and calls for project nominations approximately every 1 to 3 years, with each call for nominations referred to as a "SNPLMA Round". Eighteen rounds of nominated projects have been funded to date with Round 19 currently in progress at the time of this writing.

The Round 19 call for nominations was published on September 6, 2021 and nominations were accepted through November 5, 2021. The following three projects were identified as suitable for submission under Round 19:

1) Fine-scale Vegetation Map of Clark County, $1,000,000.00
2) Mark Recapture Surveys on Demography Plots, $888,000.00
3) Muddy River Restoration – Phase II, $1,613,521.00

Round 19 nominations were submitted to BLM on November 3, 2021. The submission of these nominations was ratified by the Board of County Commissioners at the December 7, 2021 meeting. Following the submission of nominations, internal issues were identified with carrying out components of the Muddy River Restoration – Phase II project, thus this project will be withdrawn from consideration. If these issues are resolved, the Desert Conservation Program may re-submit this nomination for consideration under a future funding round.

The BLM has announced their intent to open the Round 20 call for nominations in summer/fall of 2023. In anticipation of this, Desert Conservation Program staff have begun identifying potential project concepts that would be suitable to nominate for SNPLMA funding under Round 20. These projects would also be implemented as conservation actions under the 2023-2025 Implementation Plan and Budget. Round 20 nominations will be submitted to Board of County Commissioners for approval. Projects that have been identified as suitable for nomination under Round 20 include the following:

- Tule Springs Fossil Bed National Monument, Corn Creek Road Fence, $1,300,000.00
- Boulder City Conservation Easement (BCCE) Translocation Plan Update, $550,000.00
- Desert Tortoise Connectivity Management Plan Implementation, $590,000.00

LICENSE PLATE FUNDS

Since 2018, the Desert Conservation Program has received additional revenue through the sale of specialty license plates in Nevada. Sales of the desert tortoise license plate earned approximately $115,000.00 in revenue during the 2021-2023 biennium; this is additional revenue that is available to use towards the implementation of the MSHCP for the 2023-2025 biennium.

RE-ALLOCATION OF FUNDS APPROVED IN THE 2019-2021 IMPLEMENTATION PLAN AND BUDGET

The 2019-2021 IPB included implementation of the "To the Max" Campaign for $433,755.00, to implement the DCP public information, education, and outreach programs. To take advantage of increased rainfall following several years of below-average rainfall, the Desert Conservation Program proposed a re-allocation of $250,000.00 from the "To the Max" Campaign project towards rare plant surveys to be conducted during spring and summer 2023. The remainder of the budget, $183,755.00, shall be used to implement public information, education, and outreach programs of the "To the Max" campaign. The re-allocation of these funds was coordinated with the U.S. Fish and Wildlife Service and concurrence for this request was provided in a letter dated February 6, 2023.

DE-OBLIGATION OF PREVIOUSLY ALLOCATED FUNDS

De-obligation of previously allocated funds for three projects has been determined necessary, as described further below.

SNPLMA Round 16 nominations were submitted to BLM on April 29, 2016. A total of three nominations were submitted, and ultimately two of those projects were approved for funding, including the Muddy River Restoration project for $2,770,000.00. Significant Purchasing Department issues have been experienced and multiple unanticipated delays have been occurred throughout implementation of this project. The Desert Conservation Program has been unable to get construction bid documents processed through the Clark County Purchasing Department, and due to County purchasing procedures, we are unable to complete the project within the SNPLMA grant period of performance. Therefore, this project is being terminated and $2,214,489.22 will be de-obligated. If issues with the Purchasing Department are resolved, this project may be re-submitted in a future SNPLMA round to allow for completion of the restoration effort.

The 2021-2023 Implementation Plan and Budget described three projects proposed for funding under Round 18 of SNPLMA:

1) State Route (SR) 159 Fencing, $1,149,500.00
2) Rainbow Gardens Bearpoppy Conservation, $3,878,000.00
3) Piute-Eldorado Restoration, $3,663,000.00

Following the submission of these Round 18 nominations on September 14, 2020, the Nevada Department of Transportation withdrew their support for the SR159 Fencing project, so this nomination was withdrawn from SNPLMA funding consideration by the Desert Conservation Program. Therefore, funds identified in the 2021-2023 Implementation Plan and Budget for the SR159 Fencing project are being de-obligated.

The Willow Creek Fencing project was included in the 2021-2023 Implementation Plan and Budget and $100,000.00 in Section 10 funding was allocated to the project. However, on further investigation of the site, and with rapidly rising costs of materials following the pandemic, the current estimate to complete the project is $1,300,000.00. Given the high cost of constructing a fence in this remote location, the project has been cancelled and Section 10 funds allocated in the 2021-2023 Implementation Plan and Budget will be de-obligated.

PROJECT CONCEPT DEVELOPMENT

Although the process of developing the Implementation Plan and Budget has varied over the past biennia, the general steps of the budget development process are to determine available funding and to identify and recommend actions that further the purpose of the MSHCP. Certain actions that are stipulated by the Section 10 Incidental Take Permit are considered required expenditures to maintain compliance, and therefore are non-discretionary. Non-discretionary actions include administering and managing MSCHP implementation, supporting the Adaptive Management Program, managing the BCCE, managing acquired properties and water rights, maintaining the tortoise fencing program along major roads, and operation of the Wild Desert Tortoise Assistance Line. Additional actions that are considered non-discretionary include actions specified by a Master Permit for the Removal or Destruction of Fully-protected Flora issued to the MSHCP Permittees by the Nevada Division of Forestry.

Other actions that further the goals and objectives of the MSHCP but are not directly specified in the incidental take permit or the master permit issued by Nevada Division of Forestry, are considered discretionary. These may include actions such as scientific research projects and desert tortoise augmentation projects. Both non-discretionary and discretionary actions are funded through the biennial Implementation Plan and Budget process and are approved by the Board of County Commissioners.

The process for developing the 2023-2025 Implementation Plan and Budget was an iterative process that began in April 2022. The Plan Administrator prepared draft budget principles and a draft process and schedule, which were provided to the U.S. Fish and Wildlife Service, Nevada Division of Forestry, and the independent Science Advisor Panel for review and comment on March 31, 2022. Attachment A outlines the process and schedule agreed to by the parties and used to prepare the 2023-2025 Implementation Plan and Budget. The budget principles, available in Attachment B, guide the development and selection of project concepts for the 2023-2025 biennium.

Based on the budget principles, the Science Advisor Panel prepared an independent review of the program and provided recommendations for discretionary funding projects. Additionally, the U.S. Fish and Wildlife Service and Nevada Division of Forestry were invited to submit funding recommendations to the Plan Administrator for consideration in the 2023-2025 Implementation Plan and Budget process. The Plan Administrator then prepared project concepts and budgets considering the various funding recommendations, guidance in the incidental take permit and MSHCP, the budget clarification agreed to between the Plan Administrator and U.S. Fish and Wildlife Service, current status of these efforts, needs anticipated during the 2023-2025 biennium, the budget principles developed by the Plan Administrator, and previous budgets and expenditures.

The Plan Administrator prepared the following non-discretionary project concepts for the 2023-2025 Implementation Plan and Budget:

1. Administration of the MSHCP: includes the imposition and oversight of a $550-per-acre development fee, implementation of an endowment fund, and implementation of conservation actions.
2. Monitoring: provides for ongoing species and habitat monitoring efforts to inform the adaptive management program.
3. Adaptive Management Program: provides for the continued implementation of an Adaptive Management Program, a required element of the MSHCP. This program examines different ways to meet MSHCP objectives using a science-based approach and helps answer questions relevant to land managers. Includes funding for the independent Science Advisor Panel and species and ecosystem monitoring within the reserve system.
4. Management of the Riparian Reserves: maintenance and management of Riparian Reserve Units along the Muddy and Virgin rivers.
5. Desert Tortoise Translocation: conduct translocation of wild desert tortoises displaced by development; identify additional sites suitable for translocation; conduct pre- and post-translocation monitoring of tortoises.
6. Desert Tortoise Fencing: provide for installation of desert tortoise fencing in high-priority locations and to provide for ongoing monitoring and maintenance of existing fencing.
7. Management of the BCCE: provide for peace officer patrols of the BCCE and funding to conduct activities as outlined in the easement agreement and BCCE management plan.

The Plan Administrator prepared the following discretionary project concepts for inclusion in the 2023-2025 Implementation Plan and Budget:

8. Permit Amendment Support: provide funding for supporting analyses necessary for the permit amendment application as well as consultants that will aid the County in preparing application documents and any associated agreements, management plans, or supplemental analyses.
9. Fine-scale Vegetation Map of Clark County: provides funding to complete the development of a fine-scale vegetation map; initial phases of this project were described in the 2019-2021 and 2021-2023 Implementation Plan and Budget documents.
10. Pocket Mouse Connectivity Assessment: gather and consolidate information on habitat requirements, geographic distribution, population isolation/connectivity, and genomic health of the desert pocket mouse; identify specific threats to species persistence; and develop/prioritize current and future management needs.
11. Arizona Toad Distribution Studies: conduct surveys to determine whether Arizona toad still occurs in Clark County and whether/to what degree populations have hybridized with Woodhouse's toad.
12. Gila Monster Genetic Sampling: collect genetic samples to provide additional information about habitat requirements, geographic distribution, and genetic diversity of Nevada Gila monsters to determine specific threats to species persistence and the identification of current and future critical management needs.
13. Web-based MSHCP Data Clearinghouse: create an online mapping application that will display various MSHCP-relevant datasets and provide simple tools for spatial analysis.
14. Web-accessible Data Portal: create a web-accessible database and an interface to allow MSHCP data to be collected, catalogued, visualized, filtered, and accessed by staff and contractors.

15. Subsidized Predator Management at the BCCE: implement recommendations from the BCCE Predator Management Plan to reduce the rate of predation on desert tortoises at the BCCE.
16. Age-class Study of Riparian Woody Species: collect data within the Riparian Reserve Units to assess what species and which locations are expanding, and to what extent, and which species and locations may benefit from additional planting efforts.
17. Riparian Restoration Effectiveness Monitoring: analyze existing remote sensing data and collect new data to document the extent and character of riparian bird nesting habitat across the Riparian Reserve Units.
18. BCCE Translocation Plan Update: revise and update the BCCE translocation plan for continued translocation of tortoises removed from construction sites to the BCCE.
19. Connectivity Management Plan Implementation: implement management recommendations made in the Desert Tortoise Connectivity Management Plan to improve habitat connectivity across Clark County.
20. Mark Recapture Surveys on Demography Plots: implement desert tortoise monitoring using mark-recapture surveys on demography plots across Clark County to collect data that will aid in determining the sustainability of desert tortoise populations.
21. Surveys for Gypsum Endemics: assist the U.S. Fish and Wildlife Service in the completion of their species status assessments and 12-month status reviews for the Las Vegas bearpoppy and the Mojave poppy bee by funding research that will broaden the understanding of the distribution and status of these species.
22. Restoration Materials and Techniques: study the effects of pre-conditioning treatments on native plant species that are considered important for Mojave desert tortoise habitat restoration so that more resilient nursery and seed stock can be developed.
23. Threecorner Milkvetch Germination Studies: increase our understanding of threecorner milkvetch and the poorly understood dynamics of its reproductive ecology to enable more informed management and conservation of this rare species.
24. Relocation of the Wesley E. Niles Herbarium: provides support for the relocation of the herbarium from its current location at University of Nevada, Las Vegas to the College of Southern Nevada, Henderson Campus.
25. Drone Occupancy Sampling Comparison: conduct occupancy sampling using drones concurrently with human sampling efforts to compare the two methods and to determine whether using drones with machine learning is a more cost-effective way to collect occupancy data than the current protocols.
26. Predator-Prey Dynamics: continues research on the relationship between black-tailed jackrabbit, coyote, and desert tortoise populations in the context of making better informed decisions regarding translocation of desert tortoises; additionally, this project will collect data supporting larger studies related to the spread of rabbit hemorrhagic disease to new populations.
27. Autogenic Restoration on the BCCE: research and implement autogenic restoration techniques to expedite the desert's own naturally occurring restoration processes following disturbance.
28. Artificial Neural Network to Identify Vegetation Classes – Proof of Concept: produce a proof of concept for identifying vegetation assemblages via imagery and artificial intelligence as a lower cost means of providing regular updates to the Clark County Vegetation Map.

The complete project concepts are available in Attachment C.

PROJECT CONCEPT TIMEFRAMES

Section 2.1.12 of the MSHCP outlines the biennial budget development process. Additionally, per Clark County Fiscal Directives, funding for the Desert Conservation Program must be approved by the Clark County Board of County Commissioners, which has final decision-making authority over budgets and implementation of the MSHCP. Thus, it is the goal of the Desert Conservation Program to develop project concepts that can be completed within the two-year planning timeframe of the biennial budget development process. Note that project concept summaries are written with the two-year biennium timeframe in mind, but that work on many of these projects was begun in previous biennia and/or may continue past the current biennium. Because funding for each biennium must be approved by the Board of County Commissioners, funding for ongoing projects cannot be guaranteed past the current biennium. However, unexpended funds from the current biennium may be rolled over for expenditure in future planning years (except for funds budgeted for MSHCP Administration, which are fixed to each biennium and cannot roll over). Funds obtained from SNPLMA grants must be spent within 5 years of fund award; thus SNPLMA-funded project concept summaries may be written with longer project timeframes in mind.

SUMMARY OF DISCUSSIONS

STAKEHOLDER DISCUSSIONS TO DATE

A draft of the Process and Schedule and Budget Principles were provided to the independent Science Advisor Panel, the U.S. Fish and Wildlife Service, and the Nevada Division of Forestry on March 31, 2022. No substantive comments were received. The final Process and Schedule and Budget Principles are provided in Attachments A and B, respectively.

The Science Advisor Panel provided an independent analysis of the program with funding recommendations on May 27, 2022. Funding recommendations were also provided by U.S. Fish and Wildlife Service on July 14, and by Nevada Division of Forestry on July 20. Senior-level staff within the Desert Conservation Program reviewed all funding recommendations to determine which projects should be advanced in the 2023-2025 Implementation Plan and Budget. A summary of all funding recommendations and response to recommendations is included in Attachment E.

A copy of the draft 2023-2025 Implementation Plan and Budget report, including project concepts and proposed budgets, was provided to U.S. Fish and Wildlife Service, Nevada Division of Forestry, Nevada Department of Wildlife, and the Science Advisor Panel on November 7, 2022, with comments due by December 13, 2022. Only the Science Advisor Panel chose to submit comments on the stakeholder draft. A summary of comments and response to comments is provided in Attachment F.

PUBLIC COMMENT PERIOD AND RESPONSE TO COMMENTS

The Draft 2023-2025 Implementation Plan and Budget report was posted on Clark County's website (https://www.clarkcountynv.gov/government/departments/environment_and_sustainability/desert_conservation_program/index.php) on January 17, 2023. The public comment period closed at 5:00 p.m. PST on February 5, 2023. No public comments were received and the Final 223-2025 Implementation Plan ad Budget is scheduled to be presented to the Board of County Commissioners for approval at the February 21, 2023 meeting.

Comments may be submitted to DCP@ClarkCountyNV.gov.

PROPOSED 2023-2025 IMPLEMENTATION PLAN AND BUDGET

Upon consideration of all the discussions and comments to date, the Plan Administrator has proposed a 2023-2025 biennial budget of $16,530,362.00. Proposed expenditures are detailed in Table 2 below. If unforeseen opportunities arise for additional conservation projects, the Plan Administrator may pursue funding approval for those projects with the Clark County Board of County Commissioners in coordination with the U.S. Fish and Wildlife Service. This Implementation Plan and Budget Report will be submitted to the Clark County Board of County Commissioners for approval following all stakeholder discussions and the public review period.

Table 2.

Proposed 2023-2025 Implementation Plan and Budget

CONCEPT NUMBER	PROJECT TITLE	FUNDING SOURCE		
		SECTION 10 FUNDS	SNPLMA FUNDS	LICENSE PLATE FUNDS
ADMINISTRATION*				
1	General Administration	$ 1,901,915.00	$	$
1	Staff Salaries and Benefits to Implement Conservation Projects**	$ 3,135,643.00	$	$
	Subtotal (Administration)	$ 5,037,558.00	$	$
NON-DISCRETIONARY CONSERVATION PROJECTS				
2	Monitoring	$1,335,301.00	$	$
3	Adaptive Management Program	$637,958.00	$	$
4	Management of the Riparian Reserves	$ 68,204.00	$	$
5	Desert Tortoise Translocation	$ 327,800.00	$	$
6	Desert Tortoise Fencing	$	$1,300,000.00 Round 20	$80,000.00
7	Management of the BCCE	$ 378678.00	$	$
	Subtotal (Non-discretionary Conservation Projects)	$ 2,767,941.00	$ 1,300,000.00	$ 80,000.00
DISCRETIONARY CONSERVATION PROJECTS				
8	Permit Amendment Support	$847,802.00	$	$
9	Fine-scale Vegetation Map of Clark County	$	$1,000,000.00 Round 19	$
10	Pocket Mouse Connectivity Assessment	$300,000.00	$	$

CONCEPT NUMBER	PROJECT TITLE	FUNDING SOURCE		
		SECTION 10 FUNDS	SNPLMA FUNDS	LICENSE PLATE FUNDS
11	Arizona Toad Distribution Studies	$ 310,121.00	$	$
12	Gila Monster Genetic Sampling	$ 97,099.00	$	$
13	Web-based MSHCP Data Clearinghouse	$ 250,000.00	$	$
14	Web-accessible Data Portal	$ 60,000.00	$	$
15	Subsidized Predator Management at the BCCE	$ 265,000.00	$	$ 35,000.00
16	Age-class Study of Riparian Woody Species	$ 75,000.00	$	$
17	Riparian Restoration Effectiveness Monitoring	$ 300,000.00	$	$
18	BCCE Translocation Plan Update	$	$ 550,000.00 Round 20	$
19	Connectivity Management Plan Implementation	$	$ 590,000.00 Round 20	$
20	Mark Recapture Surveys on Demography Plots	$	$ 888,000.00 Round 19	$
21	Surveys for Gypsum Endemics	$ 390,209.00	$	$
22	Restoration Materials and Techniques	$ 312,754.00	$	$
23	Threecorner Milkvetch Germination Studies	$ 346,956.00	$	$
24	Relocation of the Wesley E. Niles Herbarium	$ 26,130.00	$	$
25	Drone Occupancy Sampling Comparison	$ 95,000.00	$	$
26	Predator Prey Dynamics	$ 375,792.00	$	$
27	Autogenic Restoration on the BCCE	$ 270,000.00	$	$
28	Artificial Neural Network to Identify Vegetation Classes – Proof of Concept	$.60,000.00	$	$
	Subtotal (Discretionary Conservation Projects)	$ 4,381,863.00	$ 3,028,000.00	$ 35,000.00

CONCEPT NUMBER	PROJECT TITLE	FUNDING SOURCE		
		SECTION 10 FUNDS	SNPLMA FUNDS	LICENSE PLATE FUNDS
BUDGET SUMMARY				
	Section 10 Funds		$ 12,087,362.00	
	Section 10 De-obligated Funds		($ 100,000.00)	
	SNPLMA Funds		$ 4,328,000.00	
	License Plate Funds		$ 115,000.00	
	TOTAL		**$16,530,362.00**	

* Administrative costs, including staff salaries and benefits, are not included in individual project concept budgets because administrative expenses are fixed to each biennium and do not roll over. Administrative costs that were budgeted for in previous biennia will become unavailable at the close of each biennium.

** Provides staff funding to directly implement the discretionary and non-discretionary projects proposed for the 2023-2025 biennium as well as 64 existing conservation projects from previous biennia.

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ATTACHMENT A

Process and Schedule

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In 2010, an analysis of MSHCP funding determined that the Permittees had met the minimum required expenditures anticipated to be spent for the entire 30-year permit. Following this analysis, Clark County sought clarification from the U.S. Fish and Wildlife Service (U.S. Fish and Wildlife Service) regarding what to do in the event the Permittees' expenditures exceed the total required expenditures for the stated term of the incidental take permit. The agreed upon clarification specifies that the budget process outlined in the Implementing Agreement is no longer necessary for determining how mitigation funds will be expended; rather Clark County, as the Plan Administrator for the MSHCP, will determine the appropriate expenditure of funds in cooperation with U.S. Fish and Wildlife Service. The following process and schedule is based on this clarification language formally agreed to by U.S. Fish and Wildlife Service in writing on April 14, 2010.

In addition to the clarification language that was agreed to in 2010, this process and schedule also incorporates requirements for coordinating the expenditure of funds with the Nevada Division of Forestry. These requirements are memorialized in the terms and conditions of the Special Permit for the Removal or Destruction of Plant Species in Clark County, Nevada, issued by Nevada Division of Forestry on March 26, 2019.

- Late March 2022: The Desert Conservation Program (Desert Conservation Program) Senior Team develops the draft Process and Schedule and draft Budget Principles documents.
- Late March 2022: The draft Process and Schedule and draft Budget Principles documents are provided to the Science Advisor, Nevada Division of Forestry, and U.S. Fish and Wildlife Service for review and comment.
- Mid-April 2022: Science Advisor, Nevada Division of Forestry, and U.S. Fish and Wildlife Service submit any comments on the draft Process and Schedule and draft Budget Principles.
- Late April 2022: Desert Conservation Program prepares and distributes final Process and Schedule and final Budget Principles.
- April - May 2022: Desert Conservation Program staff prepares draft project concepts and budgets for non-discretionary conservation measures; submits to Desert Conservation Program Senior Team for review and editing.
- Early June 2022: Desert Conservation Program Senior Team compiles a summary of non-discretionary project budgets and submits this to the Science Advisor, Nevada Division of Forestry, and U.S. Fish and Wildlife Service along with a request for recommendations on discretionary action funding.
- July 2022: Desert Conservation Program Plan Administrator briefs the Executive Committee on the upcoming IPB process; distributes final Process and Schedule and Budget Principles.
- Mid-July 2022: Science Advisor, Nevada Division of Forestry, and U.S. Fish and Wildlife Service submit their discretionary project funding recommendations. [1]
- Mid-July 2022: Desert Conservation Program Senior Team discusses discretionary project recommendations provided by the Science Advisor, Nevada Division of Forestry, and U.S. Fish and Wildlife Service; develops initial list of projects for inclusion in the draft IPB report.
- Late July - February 2023: Desert Conservation Program staff prepares draft project concepts and budgets for discretionary conservation measures; submits to Desert Conservation Program Senior Team for review and editing.

[1] At Desert Conservation Program's discretion, discretionary project funding recommendations may also be solicited from other stakeholders (e.g., Bureau of Land Management, Nevada Department of Wildlife, etc.).

- October - February 2023: Desert Conservation Program Senior Team staff compiles the draft IPB report; draft IPB report is provided to the Executive Committee, Science Advisor, Nevada Division of Forestry, and U.S. Fish and Wildlife Service for review and comment.
- February 2023: Desert Conservation Program Plan Administrator briefs Clark County management on upcoming IPB process.
- February 2023: U.S. Fish and Wildlife Service, Science Advisor, and Nevada Division of Forestry submit comments on the draft IPB report
- February 2023: Desert Conservation Program revises the draft IPB report as appropriate and posts draft IPB report for public comment.
- February 2023: Desert Conservation Program responds to public comment, finalizes IPB, and schedules item for Board of County Commission approval.
- February 2023: Board of County Commissions will vote on approving/adopting the 2023-2025 IPB.
- February – June 2023: Desert Conservation Program works with the Science Advisor and other experts to determine detailed methods for implementing conservation measures and for any effects or effectiveness data collection and analysis, if needed.
- July 1, 2023: The 2023-2025 IPB goes into effect. Project implementation may begin.
- TBD: If applicable, Desert Conservation Program staff prepares and submits proposals for funding under Round 20 and/or Round 21 of the Southern Nevada Public Lands Management Act (SNPLMA). This timeframe is to be determined, the call for nomination dates have not yet been established by the Bureau of Land Management. Funding awarded under SNPLMA is typically made available approximately 12-14 months following the call for funding nominations.

ATTACHMENT B

Budget Principles

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The following budget principles are to be used to guide and prioritize the development of project concepts, specifically those that are considered discretionary, not required, actions. Project concepts are expected to be responsive to these principles.

1. Fulfills explicit permit conditions outlined in the Section 10 Incidental Take Permit.
2. Responds to recommendations from the Nevada Division of Forestry for actions to mitigate impacts to fully protected flora species.
3. Focuses on mitigation and minimization actions that have a rational nexus to the level and impact of take that is occurring and those species impacted.

   From Spring 2019 through Spring 2021, approximately 11,154 acres of habitat were disturbed on private land. Disturbance by ecosystem type for the 2019-2021 biennium is as follows:

   - Mojave Desert scrub – 10,475 acres
   - Salt desert scrub – 505 acres
   - Blackbrush – 70 acres
   - Playa – 68 acres
   - Mesquite/acacia – 22 acres
   - Desert riparian – 13 acres
   - Mixed conifer – 1 acre
4. Provides for continued funding of ongoing and effective conservation measures.
5. Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program.
6. Responds to the most recent Science Advisor recommendations.
7. Focuses on projects with measurable outcomes that are pertinent to the Multiple Species Habitat Conservation Plan (MSHCP).
8. Advances the amendment of the MSHCP and its conservation strategy.
9. Addresses program goals. Program goals that have been identified for the 2023-2025 biennium include:
   - Augmentation of desert tortoise populations
   - Mitigation of impacts to Mojave Desert scrub, mesquite/acacia, salt desert scrub, playa, and desert riparian habitat
   - Continue to expand species and habitat monitoring under the Adaptive Management Program
   - Implement a monitoring program for ecosystem health
10. Addresses changed and unforeseen circumstances. At the time of this writing, no changed and unforeseen circumstances have been identified.

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ATTACHMENT C

Project Concepts

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MSHCP ADMINISTRATION

BACKGROUND AND NEED FOR PROJECT:

Administration of the Desert Conservation Program encompasses all aspects of implementing the MSHCP and complying with the incidental take permit issued by the U.S. Fish and Wildlife Service. Administering the MSHCP is categorized into the following functional units: permit and plan compliance, finance/administration, adaptive management, and project/contract management.

The benefit of properly implementing the MSHCP and complying with the incidental take permit is regional and streamlined environmental permitting that results in a reliable, certain, and predictable process for land development and other economic development activities in Clark County. The effective administration of the program also spares individual private-property owners from the complicated and time-consuming task of consulting with the U.S. Fish and Wildlife Service on a project-by-project basis. Administration of the MSHCP has allowed the orderly economic development of over 118,850 acres and has saved the community an estimated $397 million in environmental compliance costs.

Administrative costs can generally be categorized as follows: 1) County internal service charges, 2) Desert Conservation Program operational expenses, 3) Salaries and benefits - general administration and 4) Salaries and benefits - implement conservation projects.

COUNTY INTERNAL SERVICE CHARGES TO THE DESERT CONSERVATION PROGRAM

The Desert Conservation Program is a Division within the Department of Environment and Sustainability. As such, since 2008, the Desert Conservation Program has received internal service charges from Clark County related to the following items: vehicles, insurance, telephones, cell phones, printing and reproduction, postage, department overhead, county overhead, enterprise resource planning, and information technology support services. For the 2023-2025 biennium, these expenses are estimated to be $567,100.00.

DESERT CONSERVATION PROGRAM OPERATIONAL EXPENSES

In addition, the Desert Conservation Program requires a budget for day-to-day operational expenses for items such as construction contract administration services, repairs and maintenance of facilities, repairs and maintenance of equipment, training and travel, paper shredding, office supplies, software, computers and supplies, and refunds. For the 2023-2025 biennium these necessary expenses amount to $339,000.00.

SALARIES AND BENEFITS

The Administration project concept also provides for sufficient staff possessing the correct skill sets and experience to ensure successful implementation of the Desert Conservation Program and achieve a sustained response to Recommendation Number 27 in the Clark County Desert Conservation Program Management Analysis published by Kirchoff and Associates in December 2005 and adopted by the Board of County Commissioners. This independent analysis determined that the Desert Conservation Program was inadequately

staffed for the scope, scale, and complexity of the MSHCP and recommended that the county acquire additional staff resources to adequately administer the program.

Following the Program Management Analysis, the county prepared a staffing analysis and plan in 2006 to ensure a reliable total headcount of employees with sufficient skill sets and flexibility to implement the MSHCP. The ideal staffing estimate avoids staffing needs exceeding staff availability or overstaffing at any point and in any given role. Perceived staffing deficits and overages are first opportunities for resource-leveling and prioritization before taking action to supplement or decrease staffing levels.

The Desert Conservation Program is currently authorized for up to 17 full-time equivalents (FTEs), with 9 FTEs and 1 part-time position currently filled and 7.5 FTEs vacant. The Desert Conservation Program strives to achieve a 75 percent utilization rate of staff time to conservation projects and no more than 25 percent to overall administrative efforts such as required county training, departmental efforts such as the safety or time and attendance committees, staff meetings, or employee leave. The Desert Conservation Program is proposing to staff the 2023-2025 Implementation Plan and Budget with 10 FTEs; and one part-time position. This would leave 6.5 FTEs vacant and result in an estimated program vacancy savings of $1,595,563.00 for the 2023-2025 biennium.

Staff is organized into the following operational units:

- Permit and Plan Compliance. The program maintains a position dedicated to ensuring compliance with state and federal permits associated with state and federally-listed species. This area of work focuses on compliance tracking and reporting as outlined in the MSHCP. This position also manages efforts toward amending the MSHCP.
- Finance/Administration. The finance and administrative work consists of overseeing the assessment, collection, and reporting of mitigation fees collected by the Permittees; overseeing the reporting of land disturbance and exempt acres; overseeing the budgeting, accounting, and accounts payable areas of operation; and coordinating SNPLMA assistance agreements and compliance therewith.
- Adaptive Management. The Adaptive Management Program team provides the following:
    - Oversight and project management of Science Advisor, peer reviews, and spatial and statistical analysis contracts.
    - Analysis of land use trends, habitat loss by ecosystem, species and habitat monitoring data, and implementation status.
    - Production of periodic status reports on the Adaptive Management Program.
    - Participation in regional recovery implementation teams.
    - Ensuring availability of MSHCP technical reports to partners and public as appropriate.
    - Acquisition of best available scientific and commercial data from Desert Conservation Program staff efforts, agencies, consultants, and commercial sources to address the above analyses.
- Project/Contract Management. The project/contract management team is responsible for overseeing the procurement, contract and agreement management for the Program, and for providing project management and oversight for all projects, including but not limited to:
    - BCCE management
    - Wild desert tortoise assistance

- Fencing (for wildlife and habitat protection)
- Riparian property and water rights management
- Restoration
- GIS and data management
- Information, outreach, and education

The project management team is also responsible for communication with related project stakeholders and for identifying, resolving, or escalating important project-related issues, and managing the risks and contingencies related to all projects.

- District Attorney. The District Attorney - Civil Division's Office provides a dedicated attorney to provide legal counsel to the Desert Conservation Program in the areas of open meeting law, contract and procurement law, real estate law, and compliance with Section 10 of the Endangered Species Act. Since the Desert Conservation Program receives dedicated and priority support, the Desert Conservation Program funds 50 percent of the salary and benefits for the position and these figures are included in the Desert Conservation Program's salaries and benefits budget.

For the 2023-2025 biennium, the total required salaries and benefits budget is $4,180,858. It is important to note that only a portion, 25 percent or $1,045,215.00, of this budget is allocated for general administrative activities and that 75 percent of this budget, or $3,135,643.00, consists of the staff salaries and benefits dedicated to the direct implementation by staff of 90 existing and proposed conservation projects.

ADMINISTRATIVE BUDGET AMOUNTS IN CONTEXT

The total recommended Implementation Plan and Budget for 2023-2025 is $16,530,362.00. County internal service charges, Desert Conservation Program operating expenses, and salaries and benefits for general administration of the program amounts to $1,901,915.00, or 10.5 percent of the total proposed budget. It should be noted that 64 "master project" budgets totaling $37,131,444.07 are currently ongoing and will continue to be administered into the upcoming biennium, and that the administrative budget does not roll from biennium to biennium like other projects. When analyzed in this context, the general administration budget of $1,901,915.00 is 3.1 percent of the total funds being administered during the 2023-2025 Implementation Plan and Budget.

The remaining $14,628,447.00 or 88.5 percent of the 2023-2025 budget is comprised of the direct project costs of the proposed conservation projects ($11,446,727.00) and the Desert Conservation Program staff salaries and benefits to implement the existing and proposed conservation projects ($3,135,643.00).

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This project is not suitable for an adaptive management approach.

PROJECT GOAL(S):

The goal of the administration of the Desert Conservation Program is to implement the MSHCP in a manner that minimizes and mitigates the impacts of take to the maximum extent practicable and to ensure compliance with its associated incidental take permit (TE 034927-0).

PROJECT OBJECTIVE(S):

- Adequately staff the Desert Conservation Program with personnel possessing the skills and qualifications necessary to properly implement the program.
- Provide for County overhead expenses.
- Provide staff with adequate supplies, equipment, and support services to properly implement the program.

PROJECT APPROACH:

Administration of the Desert Conservation Program will be done in accordance with the MSHCP, incidental take permit, and Clark County policy, procedure, and practice. In the past, the Desert Conservation Program outsourced much of the work related to implementation of the MSHCP. Over the last five biennia, there has been a shift towards Desert Conservation Program staff taking a much more active role in performing the work necessary to comply with plan and permit requirements. The Desert Conservation Program will continue to use a combination of outsourcing and conducting work in-house to meet program requirements.

PROJECT COST

County Internal Service Charges	$517,100.00
Operational Expenses	$339,600.00
Salaries and Benefits for General Administration	$1,045,215.00
Salaries and Benefits for Implementation of Conservation Projects	$3,135,643.00
Total Administration Budget	$5,037,558.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #1 - Fulfills explicit permit conditions outlined in the Section 10 Incidental Take Permit. Permit Condition F and Section 2.1.8.2 of the MSHCP, require the Permittees to carry out the minimization, mitigation, and monitoring measures specified in Section 2.8 of the MSHCP.

MONITORING

BACKGROUND AND NEED FOR PROJECT:

Monitoring is a required component of any habitat conservation plan as it informs the adaptive management program and provides information necessary to evaluate the effectiveness of conservation actions. Species and habitat monitoring serves multiple purposes under the MSHCP. Monitoring can provide a basic understanding of how species populations are doing, as well as a better understanding of how mitigation actions are affecting target species. Specific to range-wide desert tortoise monitoring, the estimates that are derived from those surveys are necessary for the future delisting of the species.

This project would continue monitoring efforts for Covered Species and their habitat throughout the Clark County as described in the Adaptive Management and Monitoring Plan (Alta, 2017), or any subsequent versions.

REFERENCE

Alta, 2017. Adaptive management and Monitoring Plan. Prepared for the Clark County Desert Conservation Program. 72 pp.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This project is essential to the adaptive management program as it provides funding to conduct effectiveness monitoring and species evaluations that are used by the Science Advisor Panel to assess whether Biological Goals and Objectives are being met. It also provides for species-specific monitoring, which facilitates assessment of population status and trends over time.

PROJECT GOAL(S):

The goal of this project is to continue to monitor Covered Species and habitat quality within the Reserve System.

PROJECT OBJECTIVE(S):

The objectives of this project are:

- Provide a population estimate for each of the six Tortoise Conservation Areas over a 2-year period.
- Continue occupancy monitoring for desert tortoise and other reptiles on the BCCE.
- Continue to partner with Nevada Department of Wildlife to conduct road surveys to monitor reptile populations across Clark County, Nevada and to track Gila monsters that have been equipped with a radio-transmitter.
- Continue point count surveys for birds within the Reserve System and continue implementing established protocol surveys for the federally listed birds across the riparian properties.
- Continue habitat monitoring across the Reserve System.

PROJECT APPROACH:

Methods for species surveys will use established protocols as described in the Adaptive Management and Monitoring Plan and in collaboration with the Science Advisor Panel. Each of the objectives outlined above will be accomplished through monitoring methods as further described below.

DESERT TORTOISE POPULATION ESTIMATE

Population estimates for the six Tortoise Conservation Areas occurring in Clark County will be achieved using standard range-wide desert tortoise monitoring protocols that consist of line distance transects established and implemented by the U.S. Fish and Wildlife Service over the last 21 years.

REPTILE OCCUPANCY SAMPLING ON THE BCCE

Occupancy sampling for desert tortoise has been conducted on the BCCE since 2013, and beginning in 2020, these surveys were modified to include the collection of data on reptile occupancy for MSHCP Covered Species. Reptile occupancy sampling will continue to use the same protocols as used in previous years, although the number of plots and/or plot visits may be adjusted as needed.

REPTILE MONITORING ACROSS CLARK COUNTY

In addition to occupancy surveys for reptiles on the BCCE, we will continue to work with the Nevada Department of Wildlife to conduct road surveys for reptile species across Clark County. Additional reptile monitoring efforts will include targeted monitoring of Gila monsters that have been equipped with a radio-transmitter.

BIRD MONITORING

Surveys for federally listed bird species, southwestern willow flycatcher and yellow-billed cuckoo, will continue to use established federal protocols. In addition to the protocol-level surveys for federally listed species, point count survey methods will be used to monitor bird population on Reserve System properties. We will also initiate a pilot study to evaluate the effectiveness of passive acoustic monitoring as a viable option for monitoring in lieu of conducting point count surveys.

HABITAT MONITORING

We will continue to monitor desert upland and riparian ecosystems based on protocols described the latest version of the Adaptive Management and Monitoring Plan.

PROJECT COST

$1,355,301.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle # 1. Fulfills explicit permit conditions outlined in the Section 10 Incidental Take Permit. Permit condition H states that monitoring shall be carried out by the Permittees. This project will fund monitoring of Covered Species as well as their habitats.

Principle # 5. Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. This project relates specifically to multiple Biological Objectives by monitoring species populations so that actions can be taken if a decline in a Covered Species is observed.

Principle # 7. Focuses on projects with measurable outcomes that are pertinent to the MSHCP. This project will result in measurements of species density and/or occupancies that will inform the MSHCP and provide information on the effectiveness of mitigation actions.

Principle # 9. Addresses program goals. This project will continue to provide monitoring of Covered Species as well as continue to expand the monitoring program for ecosystem health.

ADAPTIVE MANAGEMENT PROGRAM

BACKGROUND AND NEED FOR PROJECT:

An Adaptive Management Program is a required element of the MSHCP. The Adaptive Management Program reviews past, current, and ongoing MSHCP activities; makes recommendations for potential projects that will meet MSHCP needs; identifies projects that do not meet MSHCP needs; provides designs for scientifically-sound monitoring protocols that are tailored to MSHCP questions; and helps to adjust currently funded projects to incorporate the best available science as it becomes available. To meet the requirements of this program, Clark County must seek out well qualified scientists and experts who can provide independent technical review of all MSHCP activities. Funding under this project concept also provides for field testing and refinement of various protocols and methodologies. Results are then used to guide future management and restoration actions for the benefit of Covered Species.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

The Adaptive Management Program provides for the review and evaluation of all projects and is therefore a crucial component in adaptively managing all projects for the MSHCP. It also conducts an evaluation of the Program to determine whether Biological Goals and Objectives are being met.

PROJECT GOAL(S):

The goal of this project is to ensure the use of best available scientific and technical data to make sound management recommendations for MSHCP implementation, as required by the Section 10 Incidental Take Permit.

PROJECT OBJECTIVE(S):

The above goal will be achieved by implementing the following objectives:

- Contract an independent Science Advisor Panel to provide in-depth advice on potential projects and deliverables, as well as assist with designing new projects and monitoring plans to help ensure an adaptive management approach to all appropriate projects. The Science Advisor Panel also develops the biennial Adaptive Management Report, which details land use trends, habitat loss by ecosystem, implementation status, and progress towards Biological Goals and Objectives.
- Provide for the ability to hire additional contractors or amend current contract(s) to ensure that the best available science is being used for all projects.

PROJECT APPROACH:

Staff and contractors will be used to perform the above functions using the best available scientific and commercial data. The Science Advisor Panel will continue to contribute their expertise to ensure that the best available science is being used in the development of new projects and to help determine appropriate places for adaptive management to be used within the program.

PROJECT COST

$637,958.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

Principle #1. Fulfills explicit permit conditions outlined in the Section 10 Incidental Take Permit. Permit Condition I states that the Permittees will ensure that a science-based Adaptive Management Program is developed and implemented as specified in the MSHCP. This project is the continuation of the science-based approach that was laid out in earlier biennia.

Principle #5. Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. Implementation of the Adaptive Management Program addresses all Biological Goals and Objectives. This project will influence all projects that are implemented to achieve the Biological Goals and Objectives for the program.

Principle #7 - Focuses on projects with measurable outcomes that are pertinent to the MSHCP. This project is pertinent to the MSCHP because it can create measurable outcomes such as number of birds surveyed, number of species present per site, percent of habitat occupied by Covered Species, etc.

Principle #9. Addresses program goals. The Adaptive Management Program will play a role in supporting or achieving many program goals, including augmentation of desert tortoise populations, restoration of desert tortoise habitat, restoration of riparian habitat, mitigation of impacts to mesquite/acacia, salt desert scrub, playa, and desert riparian habitats, and expanding species and habitat monitoring under this program.

MANAGEMENT OF THE RIPARIAN RESERVES

BACKGROUND AND NEED FOR PROJECT:

Condition K of the incidental take permit stipulates that take of covered avian species is conditioned upon the acquisition of private lands in desert riparian habitats along the Muddy and Virgin rivers and the Meadow Valley Wash in Clark County, Nevada. To comply with this permit condition, the Desert Conservation Program has acquired properties with riparian habitat along the Virgin and Muddy rivers in Clark County, Nevada. These properties comprise the Muddy River Reserve Unit and the Virgin River Reserve Unit (collectively, the Riparian Reserve Units), part of the overall Clark County Reserve System portfolio, which serves to mitigate impacts to Covered Species, and conserve habitats and important wildlife connectivity corridors.

This project will provide for the continuance of existing property monitoring and maintenance activities within the Riparian Reserve Units and management of water rights held by the Desert Conservation Program.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This project provides for maintenance and monitoring of the riparian properties and ongoing management of water rights. The science behind this is sound and the methods are fully accepted and have been standard practice for these reserve units for many years. This project would do well under a structured decision-making approach but a full adaptive management approach is not necessary at this time.

PROJECT GOAL(S):

The project goals are to:

- Mitigate impacts to MSHCP Covered Species by providing ongoing monitoring, maintenance, and management of the Riparian Reserves. This will ensure the properties' value for species covered by the MSHCP and facilitate successful habitat restoration.
- Maintain Desert Conservation Program's water rights in good standing and allow for acquisition or lease of additional water rights, if necessary.

PROJECT OBJECTIVE(S):

RIPARIAN RESERVE UNITS MANAGEMENT

- Review and analyze management actions for consistency with the *Riparian Reserve Units Management Plan*.
- Review and update the management plan to reflect current conditions and to describe desired future conditions.
- Respond to Permittee questions regarding the Riparian Reserve Units, associated water rights, and allowable activities.
- Maintain property in good condition. Clean trash, dead vegetation, and other debris, as necessary.
- Conduct inventories for native and non-native plant species.
- Coordinate with adjacent landowners as needed and maintain positive interactions with neighbors.
- Review applications for activities that may affect the Riparian Reserve Units.
- Install perimeter fencing and fencing for the protection of restoration sites and other important areas as neeeded.
- Inspect and repair property improvements (fences, groundwater pump and associated canal and pond, irrigation system, municipal water hookup, etc.) on a regular basis
- Maintain access roads and trails in good condition.
- Maintain or create fire breaks as needed.
- Develop and deliver information through brochures, websites, meetings, and other methods as appropriate to help instruct and inform the public about the purpose and benefit of the Riparian Reserve Units.
- Investigate and appropriately respond to unauthorized uses of the Riparian Reserve Units; coordinate with law enforcement and regulatory agencies as needed.

WEED CONTROL

- Conduct surveys of non-native weed species.
- Control incipient occurrences of invasive, non-native vegetation.
- Provide annual written summary of activity and recommendations.

MANAGEMENT OF WATER RIGHTS

- Maintain existing water rights in good standing.
- Pursue acquisition of additional water rights for habitat restoration, as needed.
- Identify water rights appropriate for transfer to other entities and facilitate transfer.

PROJECT APPROACH:

Field crews provided by contractors will be used to conduct plant inventories and targeted control of invasive and noxious weeds. Weed control efforts will consist of targeted herbicide spraying. Contractors will be hired to conduct routine property maintenance, as necessary, and to advise the Desert Conservation Program on water rights matters. All work will be conducted in accordance with the most recent Riparian Reserve Units Management Plan. Management activities may be conducted on existing properties or properties that may be acquired through the conclusion of the biennium on June 30, 2025.

PROJECT COST

$68,204.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #3 - Focuses on mitigation and minimization actions that have a rational nexus to the level and impact of take that is occurring and those species impacted. From Spring 2019 through Spring 2021, approximately 13 acres of desert riparian and 22 acres of mesquite/acacia habitat were disturbed.

Principle #4 - Provides for continued funding of ongoing and effective conservation measures. This project provides for ongoing management of riparian and mesquite/acacia habitat.

Principle #5 - This project will address the following Biological Goals and Objectives: Objectives R1.2 to maintain suitable breeding habitat for MSHCP-covered birds; R1.4 inventory, remove, and control invasive and non-native plant species; and R3.1 to collaborate with other stakeholders.

Principle #7 - Focuses on projects with measurable outcomes that are pertinent to the MSHCP. This project is pertinent to the MSCHP because Desert Conservation Program staff can create measurable outcomes such as number of site visits, type/extent of weeds removed, etc.

Principle #9 – Address program goals, specifically restoration of desert riparian habitat. Managing invasive plant species on the Reserve Units will allow more native species to populate the property and facilitate the natural restoration of desert riparian habitat.

DESERT TORTOISE TRANSLOCATION

BACKGROUND AND NEED FOR PROJECT:

While recent research on translocation has provided useful insight, results are currently only available for periods less than five years. Since it can take over 20 years for newly hatched tortoises of translocated animals to reach sexual maturity it will take at least that long to evaluate the usefulness of translocation as a recovery tool. Along with the time aspect of the problem, there are also various risks that have not been fully evaluated, and long-term success has not been documented. We do not fully understand the long-term impacts of translocation, including for example, altered disease dynamics or changes to effective population size. By continuing studies of previous translocation sites, we can begin to expand our knowledge of these issues. This project also supports the removal of tortoises from construction sites and their translocation back into the wild.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This project is ideal for an adaptive management approach. There are many uncertainties that still need to be addressed, especially considering the long lifespan of tortoises. There are plenty of opportunities to change strategies as a large portion of development in Clark County occurs within the range of the tortoise. This project may also be useful in evaluating the need for adaptive management in other projects on the BCCE.

PROJECT GOAL(S):

The goals of this project are to:

- Assess the state of translocated populations of desert tortoises on the BCCE to help better inform future translocation efforts.
- Ensure tortoises displaced from construction sites are properly cared for and safely released into an approved translocation site.

PROJECT OBJECTIVE(S):

The objectives of this project are to:

- Continue monitoring movement patterns, mortality rates, and health status of translocated versus resident tortoises on the BCCE over an extended period to allow for a better understanding of whether translocation is effective over the long term.
- Continue to operate the Wild Desert Tortoise Assistance Line.
- Perform health assessments on tortoises removed from construction sites and ensure appropriate health status prior to translocation to an approved site.

PROJECT APPROACH:

The Desert Conservation Program will continue to coordinate with the Desert Tortoise Recovery Office in conducting activities related to translocation of desert tortoises. This project will combine the use of radio telemetry and health assessments to obtain pertinent information relevant to translocations. Projects will focus

on post-translocation effectiveness monitoring, recording mortalities, tortoise health, and movement patterns. These data can be used in a larger analysis to assess the success of population augmentation.

The Wild Desert Tortoise Assistance Line is monitored by Desert Conservation Program staff. Calls received on the line are screened daily to ensure tortoises reported are wild tortoises in harm's way (i.e., on an active construction site and not an unwanted pet). Tortoises removed from construction sites are quarantined in pens for a minimum of two weeks until they are cleared of disease and considered healthy for translocation, at which point they are moved to an approved location.

PROJECT COST

$327,800.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

Principle # 1. Fulfills explicit permit conditions outlined in the Section 10 Incidental Take Permit. This project supports permit condition M by providing funding for the translocation program. This funding allows for tortoises to be assessed for disease and to ensure they are fit for translocation.

Principle # 3. Focuses on mitigation and minimization actions that have a rational nexus to the level and impact of take that is occurring and those species impacted. This project would implement minimization/mitigation actions by translocating tortoises that are removed from construction sites.

Principle # 4. Provides for continued funding of ongoing and effective conservation measures. This project would continue the translocation project that has been ongoing since late 2014. This project has been very useful, not only for its intended purpose of determining the successfulness of the translocation, but the data has also been used to publish a peer-reviewed journal article on survival rates within the Eldorado Valley. The project also provides continued funding for the operation of the Wild Desert Tortoise Assistance Line, which has been an effective minimization measure implemented since permit issuance.

Principle # 5. Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. This project would address Biological Goal and Objective D 2.1 to monitor and adaptively manage for desert tortoise populations and D 2.2 to augment populations through translocation programs when appropriate. This project will inform future translocation as well as identify new locations where translocation may be suitable.

Principle # 9. Addresses program goals. This project addresses the program goal for augmentation of desert tortoise populations. It will allow for a better understanding on how translocated tortoises interact with their environment as well as locate new areas for translocation.

DESERT TORTOISE FENCING

BACKGROUND AND NEED FOR PROJECT:

Desert tortoise mortality and illegal capture along roads and highways has been identified as a significant issue relative to recovery of this species. Further, the construction of roads and highways over the past century has permanently fragmented previously contiguous desert tortoise habitat and reduced connectivity among populations. Restricted movement may limit or entirely prohibit access to suitable habitat, resources, and mates on either side of existing roads and highways. The installation of tortoise fencing to limit mortality and encourage re-colonization of habitat has been recommended, yet many roads throughout desert tortoise habitat remain unfenced.

Condition N of the incidental take permit stipulates that the Permittees shall retrofit, repair, and construct desert tortoise proof fencing along highways and roads in Clark County. This project will provide funding for two fencing efforts to meet this permit condition: 1) construction of desert tortoise proof fencing and related infrastructure along Corn Creek Road within the Tule Springs Fossil Beds National Monument, and 2) Road Warriors, which uses a volunteer network to monitor and report maintenance needs for installed fencing and to conduct road mortality surveys to aid with effectiveness monitoring and prioritization of future fencing needs.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

TULE SPRINGS

The science to support fencing as an adequate means of desert tortoise protection is well established, so no adaptive management is needed.

ROAD WARRIORS

This project is a data collection project designed to validate a GIS model to help prioritize future conservation actions. This project will be useful in determining future mitigation locations and plays a role in the structured decision-making process of installing tortoise exclusion fence along roadways.

PROJECT GOAL(S):

TULE SPRINGS

The goal of this project is to reduce potential for roadway mortalities of desert tortoise and other wildlife within the monument.

ROAD WARRIORS

The goals of this project are to:

- Identify "tortoise hot-zones" that could be prioritized for installation of traffic signage, fencing, and culverts, and demographic population surveys.
- Assist the U.S. Fish and Wildlife Service with further development of a GIS-based model to identify and prioritize roads for installation of tortoise fencing.
- Provide assistance to Nevada Department of Wildlife in collection of road mortality data for the desert tortoise and other species they are responsible for monitoring and assist with collection of genetic samples for on-going studies and natural diversity archives.
- Further evaluate benefits of tortoise fencing to other species.

PROJECT OBJECTIVE(S):

TULE SPRINGS

- Install tortoise exclusion fencing along the north and south sides of Corn Creek Road from its intersection with U.S 95 to the eastern boundary of the Tule Springs Fossil Beds National Monument (total for both sides is approximately 21,500 feet).
- Install two tortoise guards and one swing gate at access points along Corn Creek Road.
- Install one wildlife culvert to allow for connectivity of habitats on the north and south side of the road.
- Relocate one interpretive kiosk, currently located within the Nevada Department of Transportation (NDOT) right-of-way, to a new location within the Monument and construct a small parking area.

ROAD WARRIORS

- Collect road mortality data on 50 to 70 miles of road per year to confirm the prioritization of roads by the GIS model and evaluate the effects of road mortality to the desert tortoise population.
- Create maps identifying "tortoise hot-zones" that could prioritize the installation of traffic signage, fencing, and culverts according to demographic population surveys.
- Create a database of data and photos by location for future studies.
- Conduct fence and culvert inspections on 30 to 60 miles of road per year; make minor repairs to tortoise fencing and culverts and report major repair needs to NDOT maintenance crews as needed.

PROJECT APPROACH:

TULE SPRINGS

Desert Conservation Program will coordinate with the National Park Service, U.S. Fish and Wildlife Service, and NDOT to assure that all required environmental analyses, surveys, and permits are completed prior to installation of the fence, gates, and tortoise guards. Desert Conservation Program staff will work with federal agencies and contractors to implement the fencing project. Authorized desert tortoise biologist(s) will consist of contractors

with appropriate experience and qualifications. Post-construction monitoring may also be included in this project to collect data on desert tortoise use of the culverts and other desert tortoise metrics.

ROAD WARRIORS

Volunteers with The Tortoise Group will be deployed to document observations of tortoise road mortality, live tortoise encounters, carcasses, tortoise burrows, and tortoise sign on or near roads. Photos, GPS location, and condition of carcasses or live tortoise will be recorded and submitted to the U.S. Fish and Wildlife Service and Nevada Department of Wildlife for review. Other data, such as date, time, weather conditions, and habitat quality will be documented as well.

The citizen scientist volunteers will also collect data regarding road mortality of other species observed during surveys and be trained to collect samples for genetic studies from all observed mortalities, including tortoises, that will be submitted to Nevada Department of Wildlife for their monitoring programs and genetic databases. Road surveys may also be conducted prior to and after installation of desert tortoise fencing to help collect data regarding potential benefits to other species monitored by Nevada Department of Wildlife.

During the inactive season, when tortoises are in brumation (October to March), volunteers will be trained by NDOT maintenance staff to conduct inspections of existing tortoise fencing, fill out reports, and make minor repairs. Volunteers will also inspect culverts that are suitable for tortoise passage to determine any maintenance needs; minor clearing of culverts will be performed, but any major cleanup or repairs will be reported to NDOT maintenance staff. Observations of major fence damage will also be reported to NDOT maintenance staff, who will be responsible for those repairs.

PROJECT COST

$1,380,000.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

Principle #1 - Fulfills explicit permit conditions outlined in the current permit. Permit Condition N requires the Permittees to retrofit, repair, and construct desert tortoise fencing along highways and roads within Clark County. This project will provide funding to implement fencing construction, make minor repairs to installed fence, and notify NDOT of any major repairs needed. This project also aids in the identification and prioritization of locations appropriate for future fence installation.

Principle #4 - Provides for continued funding of ongoing and effective conservation measures. Desert tortoise exclusionary fencing and other wildlife fencing is an established, effective measure to reduce mortality of sensitive species and provide for the protection of sensitive habitats. This project would provide funding to increase the amount of wildlife fencing within Clark County. Further, the successful Road Warriors pilot project demonstrated that this is a highly cost-effective and efficient method of conducting regular minor maintenance on over 450 miles of desert tortoise exclusionary fencing.

Principle #5 - This project will address Biological Goals and Objectives D 1.2, by helping to maintain intact functional habitat within the Tule Springs Fossil Beds National Monument by reducing roadway mortalities of desert tortoise and other wildlife, and D 3.1, collaboration with other stakeholders, as we will be collaborating with the National Park Service, U.S. Fish and Wildlife Service, NDOT, and The Tortoise Group on these projects.

MANAGEMENTOF THE BCCE

BACKGROUND AND NEED FOR PROJECT:

As partial mitigation for the take of desert tortoise and their habitat, the 1995 incidental take permit (Permit Number: PRT-801045) issued to the Permittees required that a conservation easement be established in the Eldorado Valley for the protection of the desert tortoise and its habitat. The BCCE was established by agreement between Clark County and the City of Boulder City in July of 1995 to fulfill this requirement of the incidental take permit. This project concept would provide for the continued management of the BCCE, including law enforcement patrols, ongoing site maintenance and upkeep, and weed inventories and treatment.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

As this project is mostly on-site property management and resource protection it does not lend itself to an adaptive management approach. Weed control may benefit from an adaptive management approach, however the Desert Conservation Program contracts with professionals who are tasked with determining what weed control measures are the most efficient and cost-effective.

PROJECT GOAL(S):

The work conducted in this project will address elements of the Clark County MSHCP. Work will be conducted in accordance with the BCCE Agreement, as amended and restated in 2019, and the most updated version of the BCCE Management Plan.

The project goals are to:

- Increase the effectiveness of conservation actions within the BCCE.
- Protect and preserve the desert habitat for the benefit of MSHCP Covered Species and other native plants and animals.
- Manage the property and public use to meet conservation obligations and legal requirements.
- Deter the incidents of illegal activities and prohibited uses that occur on the BCCE.

PROJECT OBJECTIVE(S):

BCCE MANAGEMENT

- Review and analyze management actions for consistency with the BCCE Agreement, as amended and restated in 2019.
- Review all applications for activities that affect the BCCE and provide approval recommendations to the Plan Administrator. Applications may include rights-of-way projects, events, research and monitoring, and other activities allowable by written permission of the County. Coordinate application reviews with Boulder City and U.S Fish and Wildlife Service and monitor permitted project activities and restoration as required by Attachment F of the BCCE Agreement.

- Review and update the BCCE Management Plan to reflect current conditions, describe future restoration activities, and desired future conditions.
- Respond to Permittee and public questions regarding the BCCE and allowable activities.
- Coordinate with Boulder City, neighbors, and other easement holders as needed.
- Visit the BCCE weekly to monitor and maintain signage, fencing, desert tortoise guards, barriers, and kiosks in good condition.
- Develop and deliver information, using brochures, meetings, and videos that help instruct and inform users of the BCCE about authorized activities and how to conserve the habitat and protect the desert tortoise.

BCCE LAW ENFORCEMENT

- Patrol the BCCE 30 to 40 hours a week over three to four days. Patrols are always on Saturday and Sunday and then any other days Monday through Friday.
- Review law enforcement patrol reports weekly to determine trouble spots and to adjust patrol schedules and routes as needed.
- Meet on-site at least monthly with Desert Conservation Program staff to review issues and determine solutions to fix identified issues. Issues may include unauthorized off-road travel, dumping, shooting, camping, or any other illegal activities that are detrimental to the habitat.
- Make contact with all visitors to the BCCE and give them brochures indicating permitted activities and maps of open roads. Educate users of the BCCE first and cite repeat offenders.
- Allocate additional time to monitor areas of high violations.

BCCE WEED CONTROL –

- Conduct annual Winter and Spring/Summer weed surveys and controls by surveying public and private roadsides for non-native vegetation within the BCCE.
- Control incipient occurrences of invasive, non-native vegetation, exclusive of widespread and well-established species.
- Provide annual written reports on weed monitoring activities and recommendations.

BCCE SITE MAINTENANCE AND CLEANUP

- Cleanup along roadways, dump sites and target shooting sites every four months.
- Repair kiosks, energy zone fencing, fences and barriers, plus clean out cattle guards, desert tortoise culvert, and desert tortoise guards as needed.

PROJECT APPROACH:

Staff and contractors will be used to perform the above functions using the best available data. Appropriately certified peace officer personnel will conduct law enforcement activities with possible assistance from other parties. All work will be conducted in accordance with the BCCE Agreement, as amended and restated in 2019, and the most updated version of the BCCE Management Plan.

PROJECT COST

$378,678.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

Principle #1 - Fulfills explicit permit conditions outlined in the current permit. This project fulfills permit condition P, which requires the management of the BCCE to protect and manage the desert tortoise and its habitat.

Principle #3 – Focuses on mitigation and minimization actions that have a rational nexus to the level and impact of take that is occurring and those species impacted. The BCCE consists of Mojave Desert Scrub habitat, in which 10,475 acres of this type of habitat was disturbed from 2019 to 2021.

Principle #4 - Provides for continued funding of ongoing and effective conservation measures. This project provides for ongoing management of the BCCE by funding law enforcement, weed management, and signage and fencing maintenance activities.

Principle #5 - Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program This project addresses Biological Goals and Objectives D1.4 - inventory, remove, and control invasive and non-native plant species, D 3.2 - promote responsible recreation, and D 3.3 - provide law enforcement within the reserve system.

Principle #7 - Focuses on projects with measurable outcomes that are pertinent to the MSHCP. This project is pertinent to the MSCHP because it is an explicit permit condition that results in measurable outcomes such as number of patrol hours, number of visitors encountered, number of warnings and citations, and acres of weeds treated. This information can be compared across months and years to get a picture of activities on the BCCE.

PERMIT AMENDMENT SUPPORT

BACKGROUND AND NEED FOR PROJECT:

The MSHCP Permittees have been pursuing a formal amendment to the Clark County MSHCP and Section 10 Incidental Take Permit since 2007. The primary reasons for pursuing this amendment are to 1) increase the amount of take authorized by the permit to provide coverage for lands that are currently available for development or may become available in the future, 2) to revise the list of species covered by the permit, 3) to revise the conservation strategy, and 4) to increase the permit term to 50 years. This project would provide funding for supporting analyses necessary for the permit amendment application as well as consultants that will aid the County in preparing application documents and any associated agreements, management plans, or supplemental analyses.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This project would not require an adaptive management approach. This is a project to support permit amendment and is not management in nature. It may have a large effect on how the adaptive management program is implemented in the future but does not require an adaptive approach to implementation.

PROJECT GOAL(S):

The goal of this project is to prepare a revised MSHCP and associated application materials and environmental analyses to obtain an amended incidental take permit.

PROJECT OBJECTIVE(S):

The goal of this project will be achieved through several contracts as described below:

- Habitat Conservation Planning Consultant - Continue to fund the contract with the Habitat Conservation Planning consultant to assist the County with preparing the amended MSHCP and associated documents and analyses.
- Outside Legal Counsel - Will provide advocacy and legal advice and services to the Permittees, conduct critical reviews of draft documents, and assist with the preparation of legal agreements.
- Third-party NEPA Consultant. This consultant will be jointly selected by the Permittees and the U.S. Fish and Wildlife Service to prepare an Environmental Impact Statement, which will be required to issue an amended incidental take permit and to meet regulatory requirement under NEPA.
- Miscellaneous supporting surveys and analyses. Additional species surveys and model development may be necessary to finalize components of the MSHCP Amendment conservation strategy and impacts analysis.

PROJECT APPROACH:

Required components of the amendment application will be completed in cooperation with outside consultants. Once draft documents have been prepared, staff will work with U.S. Fish and Wildlife Service to coordinate internal review and publication for public comment. Following public comment periods, staff and

consultants will coordinate document revisions with the U.S. Fish and Wildlife Service and other stakeholders to develop a final amended MSHCP, prepare implementing agreements, and/or execute cooperative management agreements.

PROJECT COST

$847,802.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #8 – Advances the amendment of the MSHCP and its conservation strategy. The purpose of this project is to advance the MSHCP amendment by providing for all necessary actions and supporting analyses.

FINE-SCALE VEGETATION MAP OF CLARK COUNTY

BACKGROUND AND NEED FOR PROJECT:

As administrator of the MSHCP, the Desert Conservation Program (DCP) is required to monitor habitat loss and conduct a wide range of analyses to support the goals of the program. In order to manage resources and effectively plan land use, there is a need for accurate and up to date detailed vegetation maps. While the Clark County Ecosystem Map is adequate at displaying the distribution of ecosystems across the County, it does not provide detailed information on vegetation assemblages, which are required for accurate models and assessments of impacts and conservation actions. Further, changes have occurred to the vegetation and there have been many improvements to the spatial data standards and methods since the Clark County Ecosystem Map was developed that make development of a fine-scale vegetation map more attainable. Therefore, the DCP has begun the development of an update to the current spatial vegetation dataset.

This is a continuation of a project that began in 2020 with an expected completion in June 2025. Vegetation will be mapped to the Alliance level and the final product will comply with standards set forth by the U.S. National Vegetation Classification System, *Guide to the National Vegetation Classification Standard, Version 2* (Federal Geographic Data Committee, 2008).

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This project would be useful to the Desert Conservation Program by providing a more detailed and accurate map of vegetation communities within the County; this will aid with monitoring and in determining the focus of future conservation actions. It would also aid the Adaptive Management Program by helping to create more detailed models for use in evaluating projects to determine when adaptive management is necessary.

PROJECT GOAL(S):

The new spatial vegetation dataset is being prepared in accordance with the National Vegetation Classification System (NVC) (USNVC 2021), which will result in a product that has wide utility for a variety of federal and local land management agencies including BLM, U.S. Forest Service, U.S. Fish and Wildlife Service, and many others. This digitized product will align with similar vegetation mapping efforts that have occurred in surrounding areas (e.g., Lake Mead National Recreation Area, Mojave National Preserve, and Death Valley National Park), resulting in a significant part of the Mojave Desert having access to fine-scale vegetation data for the region.

PROJECT OBJECTIVE(S):

- Classify vegetation communities into a U.S. National Vegetation Classification hierarchy.
- Conduct vegetation sampling to classify vegetation and to assess map accuracy.
- Produce a final vegetation map with units mapped to the Alliance level.

PROJECT APPROACH:

This project will build on the coarse-level mapping effort completed in Phase I of the Clark County Vegetation Mapping Project to achieve a higher degree of specificity in location and vegetation classes to align with other vegetation mapping efforts that have been completed across the Mojave Desert. The taxonomic and spatial specificity of the Phase I product will be further refined from the Group level taxonomy to the NVC Alliance level taxonomy for natural vegetation and NVC Cultural Sub-formation for cultural vegetation (Table 3). Work zones will be defined based on experience obtained while developing the Coarse-level and partially based on complexity and other considerations.

PROJECT COST

$1,000,000.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

Principle #5 - Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. This project informs the Adaptive Management Program because it will result in development of a new vegetation map that will be used to refine species distribution models, monitor impacts, and evaluate conservation actions.

Principle #6 - Responds to the most recent Science Advisor recommendations. This project would address all, or portions of, three separate funding recommendations submitted by the Science Advisor Panel: Map Desert Riparian Areas and Corridors within Clark County; Map Mesquite/Acacia and Playa Areas within Clark County; and Develop Accuracy Assessment of Ecosystem or Vegetation Mapping of Clark County Properties.

Principle #8 - Advances the amendment of the MSHCP and its conservation strategy. This project supports advancement of the amendment by providing a fine-scale vegetation map that will identify baseline vegetation conditions within the Plan Area.

Principle #9 – Addresses program goals. This project would directly address the 2019-2021 program goal to acquire updated mapping data for ecosystems

POCKET MOUSE CONNECTIVITY ASSESSMENT

BACKGROUND AND NEED FOR PROJECT:

The desert pocket mouse (*Chaetodipus penicillatus*) has been identified as a species of conservation concern that warrants status as a Covered Species under a proposed amendment to the MSHCP and associated incidental take permit. However, information is lacking on habitat requirements, landscape connectivity, population genomics, distribution, and abundance of the species, which impacts the feasibility of identifying threats to the species, and thus the development of effective conservation strategies and management actions.

Though the desert pocket mouse is wide-spread and relatively common throughout the southwestern United States, it is not abundant in Clark County. The species is typically associated with small, isolated populations in brushy, active drainages within the Colorado River watershed. In the Las Vegas Valley portion of the watershed, much of the species-specific habitat has been developed or converted to flood control facilities, but the species is present in remnant habitat patches. Beyond the Las Vegas Valley, the species is found along the Virgin and Muddy rivers, and along the Colorado River south of Lake Mead and Laughlin. Based on the habitat requirements for the species and continued development in such areas, further impacts to pocket mouse habitat due to extended droughts and climate change put the species at potential risk.

Current research is studying initial population genomics questions, including genetic diversity among and within populations in Clark County; delineating the range of the subspecies *C. p. sobrinus* and *C. p. penicillatus*; estimating effective population sizes; and determining direction and extent of gene flow between populations. The results of that study will inform researchers on the genetic condition of the studied populations and identify populations at risk, either due to isolation or small population sizes.

Utilizing results from previous surveys and current genomics research, this study would use additional field surveys, expanded genetic analyses, habitat studies, and habitat/population modeling to identify potential threats to the long-term viability of the desert pocket mouse in Clark County. Continued regional development in known habitat, climate change, proliferation of non-native shrub species, among other factors threaten the long-term viability of the pocket mouse in southern Nevada. Understanding the role each of these plays will be critical to managing the species. Identification of such threats would also assist in the development of conservation goals and management actions designed to minimize or mitigate for such threats, as well as provide a mechanism for monitoring the health of pocket mouse populations in Clark County.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This research project is being implemented to better understand this species, its needs, and habitat requirements. This project will aid in directing future management needs for this species and will support adaptive management decisions on future related projects.

PROJECT GOAL(S):

The goal of this project is to gather and consolidate information on habitat requirements, geographic distribution, population isolation/connectivity, and genomic health of the desert pocket mouse; identify specific threats to species persistence; and develop/prioritize current and future management needs.

PROJECT OBJECTIVE(S):

The project objectives are as follows:

- Evaluate environmental features and habitat requirements of the desert pocket mouse to enhance our understanding of the species to support multiple conservation goals and objectives, including locating additional species populations, managing habitat to support the species, and developing/refining predictive habitat suitability models scaled appropriately for microhabitats utilized by the species.
- Further evaluate genomic indicators of effective population size and connectivity/isolation to identify populations at greatest risk to isolation or habitat patch size; such identification would support prioritization of conservation measures.
- Evaluate physiological response to climate change scenarios to understand long term potential for survival and adaptation of conserved populations. *C. p. sobrinus* is at the northern edge of its range presumably due to physiological constraints. As temperature and precipitation become more variable the environment may become less (or more) hospitable. This research would increase our understanding about the response of populations to climate change. This data would interface well with distribution modelling based on climate variables and site-specific field data such as depth of substrate, vegetation types, and food habits to identify the impact of habitat characteristics versus animal physiology toward the persistence of populations.
- Identify and evaluate barriers to immigration/emigration among isolated populations through refinement of habitat and population models, conducting field visits where necessary.
- Further define the distribution of and effective boundary between *C. p. sobrinus* and *C. p. penicillatus* to inform managers of each subspecies status in Nevada, and inform conservation decisions relative to each subspecies.
- Develop methodologies for and a program to establish and monitor relative abundance of the desert pocket mouse in multiple populations throughout the region to allow an assessment of the regional condition of the species.

PROJECT APPROACH:

The project would be a multi-institution collaboration with respective institutions being responsible for completing specific project objectives in a coordinated, integrated manner. Collaborators may include personnel from land and resource management agencies, local and regional Universities, and consultants.

Methods would include field work to determine critical habitat features, identify physical barriers to movement among populations, and evaluating relative abundance of the species. Genetic analyses of tissues collected from captured specimens would be conducted through a reputable lab experienced with such techniques. Lab based physiological experiments will be conducted to document basal metabolic rate, temperature, and water

homeostasis to determine adaptive potential and physiological tolerances of populations under various future climate change scenarios. Spatially-explicit habitat suitability and connectivity models appropriately scaled for the species would be developed to consider future scenarios for development, habitat alteration, and potential climate change.

PROJECT COST

$300,000.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #5 – Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. This project meets objective D3.1 to collaborate with other stakeholders and D4.2 to identify critical uncertainties.

Principle #8 – Advances the amendment of the MSHCP and its conservation strategy by providing critical data necessary for the development of an effective desert pocket mouse conservation strategy.

Principle #9 – Addresses program goals. This project addresses the goal of continuing to expand species and habitat monitoring under the Adaptive Management Program by providing insight into what degree of genetic and population connectivity currently exists in desert pocket mouse populations of southern Nevada.

ARIZONA TOAD DISTRIBUTION STUDIES

BACKGROUND AND NEED FOR PROJECT:

The Arizona toad has been petitioned for protection under the Endangered Species Act and is under consideration for inclusion as a Covered Species under the Clark County MSHCP Amendment. Threats to the toad include drought, changes in hydrological regimes of streams, and hybridization with Woodhouse's toads. The Arizona toad breeds in and resides primarily near slow-flowing streams. Impoundment of these streams and other hydrologic alterations could increase the threat of hybridization with Woodhouse's toads, which breed primarily in standing waters and have been aided in the region by hydrologic modification.

Based on surveys of historical collection localities and examination of museum specimens Arizona toads in Las Vegas Valley have likely been replaced by Woodhouse's toads or hybrids. Arizona toad–Woodhouse's toad hybrids are also common in Beaver Dam Wash, just across the Utah border. The last documented occurrence of Arizona toad in Clark County was in 1986 (https://www.gbif.org/occurrence/1145538364); this raises uncertainty about whether the species still occurs in Clark County. However, there are several recent observations of the species from surveys and citizen science observations (iNaturalist) from within 20 miles north and east of the Clark County border, which suggests the Arizona toad could still occur in the county or could recolonize suitable habitat under favorable conditions.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This project would not be suitable for an adaptive management approach. These methods are well established and the data will help to better understand the extent of the Arizona toad in Clack County and whether it should be included as a Covered Species under future amendments to the permit but this project will have little bearing on the Adaptive Management Program given the nature of the project and the species current status as a non-Covered Species.

PROJECT GOAL(S):

The goal of this project is to determine whether Arizona toad populations occur in Clark County and to determine whether (or to what extent) they have hybridized with Woodhouse's toads.

PROJECT OBJECTIVE(S):

The project objectives are as follows:

- Use eDNA to sample habitat for presence of Arizona toad and Woodhouse's toad.
- Conduct visual encounter surveys to determine presence and hybridization rates.
- Develop a habitat suitability map for Arizona toad.

PROJECT APPROACH:

Desert Conservation Program will work with the U.S. Geological Survey to conduct surveys for Arizona toad and Woodhouse's toad. To determine whether the Arizona toad still occurs in the county and to determine potential

threat from the Woodhouse's toad, extensive surveys of suitable, representative habitats will be conducted throughout the county. We will use environmental DNA (eDNA) surveys to sample water for evidence of the Arizona toad and Woodhouse's toad. We will include the Woodhouse's toad in our eDNA analyses to help evaluate its current and potential threats to the Arizona toad, including areas that might be considered for future conservation efforts. Visual encounter surveys will also be used at sampled locations to search for presence of each toad species and assess adults for evidence of hybridization based on previously established hybrid evaluation metrics. All accessible, historical Arizona toad locations in Clark County will be surveyed (less than 15 publicly known) and other survey efforts will be stratified based on presence of potential habitat for Arizona toads — especially in priority management areas such as areas that are likely to be developed or that have been proposed as conservation areas — and proximity to recently documented Arizona toads in neighboring counties in Utah and Arizona. Approximately 100 distinct locations will be surveyed in Clark County over 2 seasons (e.g., spring 2024 and 2025).

PROJECT COST

$310,121.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #8 - Advances the amendment of the MSHCP and its conservation strategy. Arizona toad has been petitioned for listing under the Endangered Species Act and thus, is under consideration to be included as a Covered Species under the MSHCP Amendment. However, little is known about the species within Clark County. This project would provide information necessary to determine whether inclusion as a Covered Species is appropriate; it will also provide information necessary to develop an effective conservation strategy for the species, if warranted.

GILA MONSTER GENETIC SAMPLING

BACKGROUND AND NEED FOR PROJECT:

Gila monsters (*Heloderma suspectum*) have been recommended to be included as a Covered Species under a proposed amendment to the MSHCP and associated incidental take permit. Significant work has been completed to collect data on demography, to understand home ranges of the species, and to estimate how the species will be impacted by climate changes. Gila monsters in Nevada primarily occur in Clark County, with only small portions of their range extending into Nye (southeastern) and Lincoln (southern) counties, but due to rarity of the species, gaps in genetic sampling still exist.

Field surveys will be conducted to obtain genetic samples from Gila monsters occurring in areas with low sampling rates. These will be used for landscape-level analysis and improving confidence intervals for various analyses across the habitat range occurring in Clark County.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This is a research project where the results may lead to management changes in the future, but the current project does not lend itself to an adaptive management approach.

PROJECT GOAL(S):

The goal of this project is to improve data analyses regarding the habitat requirements, geographic distribution, and genetic diversity of Nevada Gila monsters to determine specific threats to species persistence and the identification of current and future critical management needs.

PROJECT OBJECTIVE(S):

The project objectives are as follows:

- Analyze genetic samples to determine gene flow and genetic diversity among populations in Nevada. Combine analyses of gene flow, genetic differentiation, and recent migration rates with habitat suitability/connectivity models to determine the genetic diversity landscape of Gila monsters.
- Determine population estimates with improved confidence intervals based on the genetic sequencing information.

PROJECT APPROACH:

The project will be a multi-institution collaboration with respective institutions being responsible for completing specific project objectives. Collaborators may include personnel from Nevada Department of Wildlife, U.S. Geological Survey, and regional Universities.

Methods will include field work to collect blood samples and genetic analyses of samples will help determine genetic diversity, gene flow, and associated landscape factors.

PROJECT COST

$97,099.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #5 – Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. This project meets objective D3.1 to collaborate with other stakeholders and D4.2 to identify critical uncertainties about a species that is proposed to be covered under permit amendment.

Principle #8 – Advances the amendment of the MSHCP and its conservation strategy by providing critical data necessary for the development of an effective Gila monster conservation strategy.

Principle #9 – Addresses program goals. This project addresses the goal of continuing to expand species and habitat monitoring under the Adaptive Management Program by providing insight into what degree of genetic and population connectivity currently exists in Gila monster populations of southern Nevada.

WEB-BASED MSHCP DATA CLEARINGHOUSE

BACKGROUND AND NEED FOR PROJECT:

As administrator of the MSHCP, the Desert Conservation Program receives frequent requests to provide spatial data to agencies and stakeholders on the Plan Area, the Reserve System, mitigation activities, and other relevant spatial datasets, such as species distribution models and vegetation communities. Much of this spatial data and information is available upon request; however, any request takes staff time away from completing other valuable conservation activities. A streamlined web-accessible portal will improve accessibility and make spatial data available for viewing, as well as provide simple tools for analysis of spatial data. The clearinghouse would allow anyone with internet access the ability to view MSHCP relevant spatial data. The portal will incorporate existing datasets into a modern and accessible interface to allow for quickly obtaining authoritative data and maps on the MSHCP and permit amendment. This web-based data clearinghouse would include only those datasets that are non-confidential, or are not otherwise protected by law or licensing agreements.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This project would not require an adaptive management approach. This project would benefit the Desert Conservation Program and adaptive management program by helping to disseminate the data we collect to other agencies and stakeholders. That data could be used in conjunction with other data collected by agencies and stakeholders to create stronger inferences and help create best practices that can be incorporated into future Desert Conservation Program projects.

PROJECT GOAL(S):

The goal of this project is to make MSHCP data more easily accessible and to promote public information availability.

PROJECT OBJECTIVE(S):

The project objectives are as follows:

- Create an online spatial data portal to house data relevant to implementing the MSHCP (e.g., vegetation assemblages, species distributions, Reserve System, disposal boundaries, mitigation actions, etc.).
- Integrate tools into the data portal that will provide stakeholders and the public meaningful data relevant to their needs.

PROJECT APPROACH:

The Desert Conservation Program will work with software development contractors and internal County GIS staff to create the web-based mapping application. This is a software development project and a standard process will be followed. This will include a cycle of planning and scoping by engaging specific stakeholders, designing components and testing protocols, implementation of the design, testing, integration, and maintenance.

PROJECT COST

$250,000.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #5 - Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. The online mapping portal will provide a tool for examining species trends and evaluating conservation actions to further inform the adaptive management program. It will also promote stakeholder involvement by providing a simple tool for accessing MSHCP-relevant spatial datasets.

Principle #9: Addresses program goals. This will address the goal of continuing to expand species and habitat monitoring under the Adaptive Management Program by simplifying the process to access authoritative datasets and increasing the ease of analyses and reporting.

WEB ACCESSIBLE DATA PORTAL

BACKGROUND AND NEED FOR PROJECT:

As administrator of the MSHCP, the Desert Conservation Program is required to monitor habitat loss and conduct a wide range of analyses to support the goals of the program. During these activities large amounts of data are gathered, and a significant amount of this work is carried out by contractors, which can result in inconsistencies in data formats. A web accessible data portal will be a central location where species observations, conservation actions, and project data can be tracked and managed. Other benefits of the data portal include real time project tracking for internal staff and contractors, and additional data validation and verification tools. These would allow for more efficient data transmission and management for every field project that is administered by the Desert Conservation Program.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This project is not suitable for an adaptive management approach. This project would benefit the adaptive management program in consolidating all data that is collected by program staff and contractors, making it easier to find and analyze data and to analyze and to summarize lessons-learned for projects that can be incorporated into future work.

PROJECT GOAL(S):

The goal of this project is to allow data to be more easily collected and accessed by staff, cooperating agencies, vendors, and stakeholders.

PROJECT OBJECTIVE(S):

The project objectives are as follows:

- Create a database and an interface or interfaces to allow data to be collected, catalogued, visualized, filtered, and accessed.
- Maintain data in standardized formats and manage in ways to be accessible while maintaining proper permissions to protect project data.
- Incorporate existing datasets into the database and interface.
- Ensure that proper permissions are enforced so that sensitive data is available only to those authorized to access the data.

PROJECT APPROACH:

This is a software development project, and a standard process will be followed. This will include a cycle of planning and scoping by engaging specific stakeholders, designing requirements and testing protocols, implementation of the design, testing, integration, and maintenance.

PROJECT COST

$60,000.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #5: Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. This will aid in most data collection and data analysis projects, providing valuable information and analytical tools to adaptive management program staff and the Science Advisor Panel.

Principle #6: Responds to the most recent Science Advisor recommendations. This responds to the most recent Science Advisor recommendations to aid in data accessibility and efficiency for all projects.

SUBSIDIZED PREDATOR MANAGEMENT AT THE BCCE

BACKGROUND AND NEED FOR PROJECT:

Subsidized predators are predatory animals whose populations benefit from human-provided food, water, and refugia. These human-subsidized predator populations have been increasing substantially as human populations continue to grow. In the Mojave Desert of southern Nevada, common ravens (*Corvus corax*) and coyotes (*Canis latrans*) are the predominant subsidized predators. The increase in populations of these subsidized predators has been indicated as a threat to the survival and recovery of desert tortoise populations.

In 2013 the Desert Conservation Program began an assessment of subsidized predator populations within the BCCE which culminated in the development of a Predator Assessment and Management Plan in 2018. The plan makes several recommendations on methods to control and reduce subsidized predator populations in the vicinity of the BCCE to reduce the overall impact on desert tortoise populations. This project would provide funding to implement various management actions identified in the plan to reduce the rate of predation on desert tortoises.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This project is suitable for an adaptive management approach. The techniques proposed here for managing subsidized predator populations are relatively new and largely untested. Including an adaptive management component will aid in ensuring we use effective, efficient methods in future efforts.

PROJECT GOAL(S):

The goal of this project is to reduce the rate of predation on desert tortoise populations within the BCCE.

PROJECT OBJECTIVE(S):

The project objectives are as follows:

- Implement City wide measures to reduce Raven access to food and water and educate residents on the need for and purpose of measures.
- Create new signage along Highway 95 to discourage littering.
- Deploy modified version of the Techno-Tortoises to deter ravens from predating on hatchling and juvenile tortoises.
- Utilize lasers to prevent ravens from building nests in the vicinity of the BCCE.
- Monitor predator population levels to determine effectiveness of management actions.

PROJECT APPROACH:

This project will implement multiple measures to aid in the reduction of predation rates by subsidized predators. Measures may include public outreach and education to inform residents on what they can do, coordinating with the City of Boulder City to reduce access to subsidies at sites like the landfill and water treatment plant, use of techno tortoises, hazing through use of lasers or other tools, and oiling of raven eggs. The Desert

Conservation Program staff will coordinate with Boulder City to identify which techniques are acceptable and most effective. The Desert Conservation Program Staff will then work with appropriate vendors to implement the proposed project objectives.

Techno tortoises consist of a 3-d printed tortoise that delivers a noxious, non-toxic chemical when pecked at. This has been demonstrated to be an effective method of training ravens to avoid predating on tortoises.

PROJECT COST

$300,000.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #5 - 5. Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. Specifically, this project will help address objective 2.1, to adaptively manage desert tortoise populations.

Principal #6 - Responds to the most recent Science Advisor recommendations. This project was recommended by the Science Advisor Panel.

AGE-CLASS STUDY ON RIPARIAN WOODY SPECIES

BACKGROUND AND NEED FOR PROJECT:

Restoration efforts should be reflected in natural expansion of desired species, either by successful seedling establishment or vegetative spread. This project will assess what species and which locations are expanding within the Riparian Reserve Units, and to what extent, and which species and locations may benefit from planting efforts.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This project would not require an adaptive management approach. This project would be useful to the adaptive management program by providing an alternative means of assessing the effectiveness of past restoration projects, as well as providing information necessary to determine places where additional habitat enhancement may be necessary.

PROJECT GOAL(S):

These goals of this project are to:

- Collect data to assess what species and which locations are expanding, and to what extent.
- Determine which species and locations may benefit from additional planting efforts.
- Identify the cause of why some restoration efforts are less successful than others (e.g., catastrophic event, drought, or improper planting protocols for site conditions).

PROJECT OBJECTIVE(S):

The project objectives are as follows:

- Collect data on woody species (e.g., species richness, biomass, vegetation age class, etc.).
- Analyze data to determine whether natural recruitment is occurring and where additional planting may be warranted.
- Compare site conditions and growth of woody species to determine if the cause of differing success rates can be identified.

PROJECT APPROACH:

Staff and contractors will be used to perform the above functions. Data may be collected via the greenline monitoring method described by Winward (2000), or another similar method that offers a simple protocol for investigating age-class structure. Data will be analyzed to determine the effectiveness of past restoration activities in establishing and expanding native, woody riparian species.

REFERENCE

Winward, Alma H. 2000. Monitoring the vegetation resources in riparian areas. RMRS-GTR-47. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 49 p.

PROJECT COST

$75,000.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #1 – Fulfills explicit permit conditions outlined in the Section 10 Incidental Take Permit. This project fulfills permit condition H, to carry out the minimization, mitigation, and monitoring measures specified in section 2.8 of the MSHCP (conservation of Desert Riparian Habitat covered by the Permit).

Principle #3 – Focuses on mitigation and minimization actions that have a rational nexus to the level and impact of take that is occurring and those species impacted. From Spring 2019 through Spring 2021, approximately 13 acres of desert riparian and 22 acres of mesquite/acacia habitat were disturbed on private land. This project will focus on minimization actions by providing information as to the location and condition of vegetation species in riparian habitat. Habitat at the riparian reserve units is maintained and restored as mitigation for the take of desert riparian bird species and their habitat through development activities authorized by the incidental take permit.

Principle #4 – Provides for continued funding of ongoing and effective conservation measures. This project provides for ongoing inventory, monitoring, and research identified in Section 2.8.2.3 of the MSHCP.

Principle #5 – Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. Specifically, this project will help address objectives R1.2 to maintain suitable breeding habitat for MSHCP-covered birds; R1.3 to incorporate elements of natural riparian processes into restoration design and implementation; R1.4 to inventory, remove, and control invasive and non-native plant species; R1.5 to reduce habitat fragmentation and/or improve connectivity and habitat quality through restoration design and implementation; and R4.1 to identify critical uncertainties and address these through planning and adaptive management, when feasible (e.g., land use changes, catastrophic events—fire, climate change).

Principle #6 – Responds to the most recent Science Advisor recommendations. This project was recommended for inclusion in the 2023-2025 Implementation Plan and Budget by the Science Advisor Panel.

Principle #7 – Focuses on projects with measurable outcomes that are pertinent to the MSHCP. This project is pertinent to the MSHCP because Desert Conservation Program staff can create measurable outcomes such as number of acres of riparian and mesquite/acacia habitat restored.

Principle #9 – Addresses program goals, specifically restoration of desert riparian habitat and mitigation of impacts to mesquite/acacia habitat. Data collected through this project will provide information about the effectiveness of past restoration activities while informing future restoration efforts.

RIPARIAN RESTORATION EFFECTIVENESS MONITORING

BACKGROUND AND NEED FOR PROJECT:

The restoration, creation, and enhancement of desert riparian habitat is necessary for the survival of MSHCP covered riparian bird species. The Desert Conservation Program has restored, created, and enhanced habitat within the Riparian Reserve Units for the benefit of covered riparian bird species and additional restoration efforts are ongoing. This project will provide funding to establish baseline vegetation conditions on the Riparian Reserve Units that can be used to assess the health of the Riparian Reserve Units and to establish the effectiveness of restoration efforts by looking at the character and extent of nesting habitat for MSHCP covered birds pre- and post-restoration.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This project is considered part of the adaptive management process for evaluating current and future management actions. The findings from this project can be used to determine the effectiveness of habitat restoration efforts or other management projects, as well as direct future management actions.

PROJECT GOAL(S):

The goal of this project is to analyze existing remote sensing data and collect new data to document the extent and character of riparian bird nesting habitat across the Riparian Reserve Units and to aid in determining the effectiveness of ongoing and future restoration efforts.

PROJECT OBJECTIVE(S):

The project objectives are as follows:

- Identify existing data previously collected by Desert Conservation Program that can be used to create a spatial analysis of baseline conditions prior to conducting restoration activities.
- Collect new data where necessary to establish baseline conditions (e.g., recently acquired properties).
- Collect post-restoration data to evaluate character and extent of nesting habitat.
- Analyze data for trends and to determine the extent of nesting habitat pre- and post-restoration.

PROJECT APPROACH:

Staff and contractors will be used to perform the above functions using the best available data. Previous data collected by the Desert Conservation Program can be analyzed to establish baseline vegetation monitoring criteria, (e.g., cover types, height, density, etc.). New data will also be collected. Comparisons between baseline and new results will allow assessment of progress towards conservation goals.

PROJECT COST

$300,000.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #1 – Fulfills explicit permit conditions outlined in the Section 10 Incidental Take Permit. This project fulfills permit condition H, to carry out the minimization, mitigation, and monitoring measures specified in section 2.8 of the MSHCP (conservation of Desert Riparian Habitat covered by the Permit).

Principle #4 – Provides for continued funding of ongoing and effective conservation measures. This project provides for ongoing inventory, monitoring, and research identified in Section 2.8.2.3 of the MSHCP by conducting long-term monitoring of habitat trends and restoration success.

Principle #5 – Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. Specifically, this project will help address objectives R1.2 to maintain suitable breeding habitat for MSHCP-covered birds; R1.3 to incorporate elements of natural riparian processes into restoration design and implementation; R1.4 to inventory, remove, and control invasive and non-native plant species; R1.5 to reduce habitat fragmentation and/or improve connectivity and habitat quality through restoration design and implementation; and R4.1 to identify critical uncertainties and address these through planning and adaptive management, when feasible (e.g., land use changes, catastrophic events—fire, climate change).

Principle #6 – Responds to the most recent Science Advisor recommendations. This project was recommended for inclusion in the 2023-2025 Implementation Plan and Budget by the Science Advisor Panel.

Principle #7 – Focuses on projects with measurable outcomes that are pertinent to the MSHCP. This project is pertinent to the MSHCP because Desert Conservation Program staff can create measurable outcomes such as number of acres of riparian and mesquite/acacia habitat restored.

Principle #9 – Addresses program goals, specifically restoration of desert riparian habitat and mitigation of impacts to mesquite/acacia habitat. Monitoring for restoration success and determining the extent of habitat for Covered bird species within the Reserve Units will provide information necessary to determine whether biological goals and objectives for riparian and mesquite/acacia habitats are being met.

BCCE TRANSLOCATION PLAN UPDATE

BACKGROUND AND NEED FOR PROJECT:

In 2014 the U.S. Fish and Wildlife Service and Clark County completed a translocation plan for the BCCE that allowed for the translocation of up to 115 adult tortoises being held at the Desert Tortoise Conservation Center. The translocation plan was updated in 2017 to incorporate information on the number of tortoises released to date. At that time, 38 tortoises had been translocated to the BCCE, leaving 43 releases still available for County use. Between 2018 and 2021, Clark County translocated a total of 12 adult tortoises, with 7 more translocations expected to occur before the end of 2022. This leaves 25 translocation spaces remaining under the plan, which is set to expire at the end of 2022.

With few translocation spaces remaining under the current plan, and a continuing need for translocation of tortoises out of harm's way, the County desires to determine the suitability of the BCCE to accept additional tortoises above the limits identified in the 2014 plan. The BCCE occurs in the only Tortoise Conservation Area in Clark County where population densities are estimated to be in decline, therefore the translocation of tortoise beyond numbers identified in the 2014 plan may be warranted. Furthermore, these additional tortoises may be necessary to aid in stabilizing the population. This project would provide for updated density estimates to include in the BCCE translocation plan and will also expand density estimates to the south unit of the BCCE. It will also provide more up-to-date health information that can be incorporated into a new translocation plan for the area.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This project would assure the best available science is used to develop an updated translocation plan. The plan will address issues that have come up since development of the 2014 and 2017 plans and will allow for continued translocation as well as provide data to support ongoing research on long-term translocation projects.

PROJECT GOAL(S):

The goal of this project is to develop a revised translocation plan that can be used as a guide for continued translocation of tortoises removed from construction sites to the BCCE.

PROJECT OBJECTIVE(S):

The objectives for this project are as follows:

- Complete line distance sampling across the north and south units of the BCCE.
- Analyze line distance data to determine tortoise densities within the north unit of the BCCE.
- Complete protocol health assessments of tortoises encountered during line distance sampling surveys.
- Complete an updated translocation plan for the BCCE.

PROJECT APPROACH:

Work will be carried out by contractors to complete the objectives of this project. Line distance sampling will be conducted by two-person teams in accordance with protocols established by the U.S. Fish and Wildlife Service. Transects will be walked randomly and split evenly between the north and south sections of the BCCE. Data will be analyzed in accordance with general line distance sampling procedures with estimates for both the north and south sections. Health assessments will be conducted on all tortoises encountered during the line distance sampling. Disease sampling will follow established protocols and will be completed by personnel with the appropriate training and U.S. Fish and Wildlife Service approvals. Results for disease screening tests will be obtained and compared to previous work on the easement to any changes in population-level disease rates. Lastly, contractors or agency personnel will draft an updated translocation plan for the BCCE with new data incorporated and prepare a new estimate of the number of tortoises that can be safely translocated to the site.

PROJECT COST

$550,000.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle # 1: Fulfills explicit permit conditions outlined in the Section 10 Incidental Take Permit. This project supports Condition M in the permit by providing funding for the translocation program. This project would allow for the continued translocation of tortoises to the BCCE and ensure that the translocation program will continue for the foreseeable future.

Principle # 3. Focuses on mitigation and minimization actions that have a rational nexus to the level and impact of take that is occurring and those species impacted. This project would implement minimization/mitigation actions by allowing for the translocating tortoises that are removed from construction sites.

Principle # 5. Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. This project would address Biological Goal and Objective D 2.1 to monitor and adaptively manage for desert tortoise populations and D 2.2 to augment populations through translocation programs when appropriate. This project will inform future translocation as well as identify new locations where translocation may be suitable.

Principle # 9. Addresses program goals. This project addresses the program goal for augmentation of desert tortoise populations. It will allow for a better understanding on how translocated tortoises interact with their environment as well as locate new areas for translocation.

CONNECTIVITY MANAGEMENT PLAN IMPLEMENTATION

BACKGROUND AND NEED FOR PROJECT:

In 2021 the Desert Conservation Program completed a project to better understand desert tortoise connectivity across Clark County. That project culminated in a management plan that gave recommendations for maintaining and increasing connectivity throughout the county though culvert and fence maintenance, fire prevention and management, as well as identifying future research and modeling needs. This project would carry that work forward into implementation by addressing some of the issues laid out in that plan to maintain and enhance connectivity of desert tortoise habitat throughout Clark County.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This project is suitable for an adaptive management approach, particularly the management action of reconnecting culverts. Applying cameras to culverts or tracking tortoises will provide insight on how effective this action in improving/facilitating movement of desert tortoises across and through habitat areas.

PROJECT GOAL(S):

The goals for this project are to maintain current levels of connectivity through fire management actions and increase connectivity across roadways where available.

PROJECT OBJECTIVE(S):

The objectives of the project are as follows:

- Create a fire management plan for Clark County.
- Attach tortoise fencing to culverts indicated as passible by previous assessments and in high value tortoise habitat
- Determine how long it takes for tortoises to start using culverts once fences are reconnected.

PROJECT APPROACH:

Developing a fire management plan would help to prevent largescale wildfires in Clark County that may impede connectivity. Modeling will be necessary to assess each area's risk based on several relevant factors. The plan may include fire management goals and objectives, hazardous fuels monitoring, risk assessment, fire occurrence mapping, monitoring effectiveness of fuels treatment and stakeholder collaboration. The fire management plan will include list of potential risk areas and recommendations for reducing fire risk.

One of the main hindrances of connectivity in Clark County is a lack of connectedness across linear disturbances, such as highways and railroads. Of the 800+ culverts that are associated with fencing, only 72 passable culverts are connected to a fence in such a way that would facilitate movement of tortoises. For this portion of the project, fencing crews would work to change the configuration of the fence at passable culverts to connect the fence to the culvert. This would entail installing small portions of fencing from the main fence to the edge of the culvert and removing portions of the old fencing to open access to the culvert. It would also be useful to monitor a subset of these newly opened culverts via camera traps or other suitable methods to better understand the

factors that result in tortoises utilizing this new feature on the landscape. This can be done with cameras strategically placed within the culverts to monitor how and when they are utilized by tortoise. Machine learning will be used to quickly sort through photos.

PROJECT COST

$590,000.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #5. Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. This project addresses objectives D4.1 and D 4.2 of the Biological Goals and Objectives. It deals with identifying fire management concerns which is a critical uncertainty addressed on D4.1, and addresses connectivity which is a main component of D4.2.

Principle #7. Focuses on projects with measurable outcomes that are pertinent to the MSHCP. This project would result in a measurable outcome in the increased number of culverts that connect two sides of roads and would provide a fire management plan. Both outcomes are pertinent to the MSHCP.

MARK RECAPTURE SURVEYS ON DEMOGRAPHY PLOTS

BACKGROUND AND NEED FOR PROJECT:

The Mojave population of desert tortoise (Gopherus agassizii) is listed as threatened as of April 2, 1990, based on population declines due to many identified causes including illegal collection, vandalism, release of captive tortoises, spread of disease, agricultural development, urban growth, landfills, livestock grazing, road construction, and irresponsible off-road travel. A recovery plan for the desert tortoise was developed and published by the U.S. Fish and Wildlife Service (USFWS) in 1994 and revised in 2011, with the goal of recovery and eventual delisting of the desert tortoise. However, because desert tortoises require 13 to 20 years to reach sexual maturity, have low reproductive rates during a long period of reproductive potential, and juveniles experience relatively high mortality, the recovery of the species is very challenging.

Monitoring progress toward recovery is one of the six strategic elements in the 2011 Revised Recovery Plan and a strategic monitoring plan is necessary to achieve the recovery criteria and adaptively manage the population. Per the Revised Recovery Plan demography plots are a critical component to delisting of the desert tortoise:

> RECOVERY OBJECTIVE 1 (DEMOGRAPHY). Maintain self-sustaining populations of desert tortoises within each recovery unit into the future: RECOVERY CRITERION 1. Rates of population change (λ) for desert tortoises are increasing (i.e., $\lambda > 1$) over at least 25 years (a single tortoise generation), as measured (a) by extensive, range-wide monitoring across tortoise conservation areas within each recovery unit, and (b) by direct monitoring and estimation of vital rates (recruitment, survival) from demographic study areas within each recovery unit [emphasis added].

Monitoring and estimation of vital rates gives insight into determining the rate of change in populations in the near and long term. Data can be correlated with recovery actions to determine and provide the greatest benefit for the species which can then be applied in other management areas. More specifically, monitoring vital rates through demographic plots is important to make sure populations maintain their size and trajectory. Demographic rates describe tortoise mortality rates as a whole and in each tortoise size class, as well as juvenile to adult transition. This looks at the problem from a different angle than the standard range-wide monitoring protocol and is a necessary component in understanding the population structure and change over time while also being a required component for delisting of the species.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

While this project will not require an adaptive management approach, it will inform the AMP and the USFWS on the health of tortoise populations within Clark County and may be useful in determining if other tortoise related projects are ultimately successful.

PROJECT GOAL(S):

The goal of this project is to collect demography data from permanent study sites across Clark County, NV.

PROJECT OBJECTIVE(S):

The objectives for this project are as follows:

- Conduct annual mark-recapture surveys at 8 permanent demography sites established in Clark County, Nevada: Piute Valley, Christmas Tree, River Mountains, Gold Butte, Mormon Mesa, Trout Canyon, Cactus Springs, and the Desert National Wildlife Refuge
- Create a database or each year that includes the survey results and tortoise encounter information for the 8 demography plot sites identified above in primary deliverable

PROJECT APPROACH:

This Round 19 Southern Nevada Public Land Management act project will consist of mark-recapture surveys at 8 permanent demography plots. Six of the plots have been surveyed in previous years, while Cactus Springs and Desert National Wildlife Refuge (DNWR) sites have not. Bird Springs Valley is an alternate site that will only be surveyed if there is a problem with completing all primary deliverables.

Each demography plot is 1-square kilometer (km2). Each survey will consist of three consecutive passes walked as 5-meter belt transects where each surveyor is responsible for 2.5 meters on either side of the transect. All tortoises encountered during the surveys will be marked with a unique identifier including an epoxy tag with a unique number and/or matching shell notches. Data collected for each capture will include the tortoise's unique identification, time and date of capture, location of capture, sex, size, and general health condition. Two to three plots will be completed each year during project implementation.

Following completion of the surveys data will be compiled in a database that is reviewed according to standard quality control and quality assurance procedures. The primary output from surveys will consist of a Microsoft Excel or Access database for each year that includes the survey results and tortoise encounter information. It will indicate the marked individuals so that tortoises can be followed over time, which is the information necessary to analyze demographic statistics. The database will also include information on when and where tortoises were found, sex, size class, and general health information. All survey methods, results, and recommendations will be summarized in a final report at the conclusion of the project.

PROJECT COST

$888,000.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #5 – Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. This project meets objective D2.1 to monitor and adaptively manage for desert tortoise populations and D3.1 to collaborate with other stakeholders.

Principle #7 – Focuses on projects with measurable outcomes that are pertinent to the MSHCP. This project would lead us to up-to-date demography rates that would give us a better understanding of the health of the tortoise population in Clark County and is a necessary variable in any delisting decision in the future.

SURVEYS FOR GYPSUM ENDEMICS

BACKGROUND AND NEED FOR PROJECT:

The U.S. Fish and Wildlife Service (U.S. Fish and Wildlife Service) has completed a positive 90-day finding in response to list the Las Vegas bearpoppy and the Mojave poppy bee as endangered. Both species will undergo a species status assessment as part of a 12-month finding. The U.S. Fish and Wildlife Service is scheduled to complete the SSA and 12-month status review of the Mojave poppy bee in FY 26, and new information will need to be provided by early 2025 to be incorporated into the SSA. Surveys for the species have been funded by Clark County, BLM, and U.S. Fish and Wildlife Service. Continued surveys will contribute to the U.S. Fish and Wildlife Service's species status assessment of these two petitioned species.

Both the Mojave poppy bee and the Las Vegas bear poppy are adapted to the harsh desert conditions they live in. The past couple years have seen severe drought in Clark County. During droughts, the Mojave poppy bee may have a prolonged diapause, which allows it to pause its emergence until conditions are more favorable. The Las Vegas bear poppy also is adapted to tolerate years of drought, and it produces a seed bank that can last decades waiting for conditions to improve prior to germination. Given the flexibility of these species to withstand unfavorable conditions, additional years of surveys will increase our chances of surveying during a year with more rainfall. A year, or several years, without severe drought would greatly increase our chances of finding the Mojave poppy bee and evaluating the status of the Las Vegas bear poppy, though with years of historic droughts back-to-back, it is unknown how far these species can push their climactic tolerances.

Additionally, the USDA ARS and USGS are collaborating to develop methods to utilize eDNA to survey for the Mojave poppy bee and other rare pollinators. Often surveys for the Mojave poppy bee have emphasized areas where it is associated with *Arctomecon* species, which may limit our broader understanding of the species distribution and status. The Mojave poppy bee's (as well as other rare pollinators) apparent rarity, small size, restricted adult temporal (daily, seasonal, climatically responsive) activity, and spatial distributions may be better understood with surveys of alternate food plants and more efficiently using eDNA techniques. A modest amount of additional funding from the MSHCP would allow for USDA and USGS researchers to extend survey efforts onto more areas located in Clark County in a more efficient manner for a more complete understanding of the species.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This survey project would not be appropriate for an adaptive management approach; however, the incorporation of eDNA as a method may help broaden the understanding of the Mojave poppy bee and make it easier to survey for in the future which would benefit the Desert Conservation Program and the adaptive management program.

PROJECT GOAL(S):

The goal of this project is to assist the U.S. Fish and Wildlife Service in the completion of their SSAs and 12-month status reviews for the Las Vegas bearpoppy and the Mojave poppy bee by funding research that will broaden the understanding of the distribution and status of these species.

PROJECT OBJECTIVE(S):

The project objectives are as follows:

- Utilize existing habitat suitability models, historical records, and local knowledge to identify undersurveyed areas to target for Las Vegas bearpoppy and Mojave poppy bee surveys.
- Perform targeted surveys for the Las Vegas bearpoppy, Mojave poppy bee, and associated resource plants during the spring and summer months as appropriate.
- Continue making advancements in the use of eDNA techniques for the study of the target species.

PROJECT APPROACH:

SPECIES SURVEYS

Surveys will be conducted throughout the flowering season (mid-March through as late as mid-June depending on the end of bloom). We will visit sites and document the status of host plants (number of plants that are dead, alive, blooming, etc.). Sites with ample bloom (at least 20 blooming plants) will be surveyed on a biweekly basis by two teams of two technicians. Surveys will particularly target under-surveyed locations of the Las Vegas bear poppy (*Arctomecon californica*), sites where the Mojave poppy bee historically occurred, and locations with alternate host plants for the Mojave poppy bee (*Perdita meconis*), such as *Argemone* spp. Each survey will begin in early morning and continue until bee activity ends (typically mid-day or early afternoon). For each survey, two methods will be employed, observation and sampling.

For observations, 10 plants in bloom will be selected across the population. As each plant in flower is located, observers will record the number of flowers in bloom as well as the number of buds and fruits. Bees visiting the flowers will be observed for five minutes per flower, and the total number of female *Perdita*, male *Perdita*, honey bees, and other pollinators will be recorded. If time and weather allow, up to three observation rounds will be conducted per site, per day.

The other method of surveying, sampling, will occur concurrently with the observation event (the two surveyors alternating), which is necessary to determine whether the *Perdita* observed are the Mojave Poppy Bee, and to identify the other potential pollinators of the Las Vegas bear poppy and *Argemone* spp. Because identifications of *Perdita* species are not possible in the field, vouchers are needed to confirm the identity and to potentially determine genetic diversity. By collecting males rather than females, collections will have negligible effect on the population. If potential *P. meconis* is found at the population, up to 20 males will be collected per site-. These will be used to verify the proportion of *Perdita* that are the Mojave poppy bee. Vouchers will be pinned and labelled with unique scannable matrix codes, and the data, including GPS recorded coordinates, will be entered into the National Pollinating Insects Collection database. Due to the sensitive nature of both the bees and the listed plants, records will be withheld, not served on GBIF of SCAN, or specific location data will be withheld. For sites without ample bloom (less than 20 flowering plants), we will only conduct the sampling portion of the

survey. Small populations or those without ample bloom will likely be limited to one visit per season in order to focus our efforts at sites with more available resources.

At locations where *P. meconis* is found, we will collaborate with USDA ARS and USGS researchers working to develop eDNA surveying methods to develop these methods specifically for *P. meconis* and the Las Vegas bear poppy.

SOIL SUBSTRATE RESEARCH

Las Vegas bear poppy is commonly considered a gypsophile endemic, but it has been known for decades that it is not strictly confined to highly gypsiferous substrates. The edaphic factors that mediate its distribution across substrates with varying gypsum content remain largely unexplored, and there is considerable confusion in the available literature on this apparently controversial topic. The topic is important for Las Vegas bear poppy conservation because it represents an understudied component of the habitat diversity that underlies the concept of representation used in species status assessment, as well as having implications for species distribution modeling. It is a question that can only be answered on the ground rather than through remote sensing applications. This will permit us to work across all land ownerships, something that is not possible for drone applications due to restrictions on NPS land.

We propose to examine the range and variety of edaphic conditions that can support Las Vegas bear poppy populations. We will use an extensive set of occurrence data from earlier studies, including our own drone surveys of Gold Butte, Bitter Springs Valley/White Hills, and Rainbow Gardens as well as reports of occurrences on unusual substrates from across the range, to select at least thirty study sites. At each site, we will characterize vegetation, quantify field soil physical properties, and collect soil samples for laboratory analysis using a replicated sampling scheme that accounts for local spatial variation. We will use presence of living Las Vegas bear poppies or their dead remains as verification of occupancy on a local scale.

We will also include replicated plant tissue sample collection where feasible, that is, where adult poppies are present. The objective is to detect unusual substrate chemistry that may characterize non-gypsiferous poppy habitat. Evidence for this would be seen in anomalously high tissue concentrations of evaporite-associated elements such as lithium or boron. We already have preliminary data to show that this approach will work. We will obtain the necessary permits prior to any tissue collection.

PROJECT COST

$390,209.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #1 – Fulfills explicit permit conditions outlined in the Section 10 Incidental Take Permit. This project fulfills permit condition J.4 (conservation of low elevation plant species covered by the Permit).

Principle # 2 – Responds to recommendations from the Nevada Division of Forestry for actions to mitigate impacts to fully protected flora species. This project will support the goal of mitigating impacts to Las Vegas bearpoppy, a fully protected flora species, by identifying where populations exist, its soil requirements, and its potential pollinators.

Principle #3 – Focuses on mitigation and minimization actions that have a rational nexus to the level and impact of take that is occurring and those species impacted. This project will focus on mitigation actions by providing information as to where protected plant species and potentially protected insect species are located. Areas where these species are located can then be monitored and protected.

Principle #5 – Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. This project will support objective D 1.2 and D 1.3 by helping to locate and maintain intact existing habitat and protect and conserve habitat for covered plants.

RESTORATION MATERIALS AND TECHNIQUES

BACKGROUND AND NEED FOR PROJECT:

An increasingly hotter and drier climate in recent decades has changed how restoration practitioners in the Mojave Desert think about re-assembling resilient plant communities, particularly in Mojave desert tortoise habitat burned by large wildfires. Re-seeding disturbances with species important for tortoise forage (herbaceous forbs) and cover (woody shrubs) has had historically low success in part because specific temperature and moisture requirements must be met to break seed dormancy in many cases, and non-native annuals often suppress native seedlings. Outplanting nursery-raised shrub seedlings helps bypass the impediments to establishment from seed; however, outplanted seedlings are often eradicated by small herbivores during the first year. Outplanting shrub seedlings is also more costly and labor intensive than seeding and is difficult to manage in remote locations, so robust seedlings that can endure post-planting conditions are vital if shrub outplanting is to become a practical option for large disturbances. Broadcast seeding of herbaceous forbs may be more feasible if seeds can be produced so that they can germinate, grow, and reproduce under water-limited conditions in habitat.

Interest has grown in the pre-conditioning of plant materials – where seeds or seedlings are exposed to an environmental stressor during propagation to improve tolerance to stress events after planting – especially for promoting restoration success in a hotter, drier climate. Exposing seedlings of woody shrubs to drought stress in the nursery setting is a well-known practice for enhancing post-planting survival in forested lands but has received little attention for desert species. The results of a pilot study by USGS indicated that pre-conditioning treatments show promise for increasing plants' abilities to endure drying soils during late spring and summer as well as to survive after repeated grazing by black-tailed jackrabbits. Longer pre-conditioning treatment is expected to show stronger responses, but more research is needed to determine how treatments can be optimized for each target species.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

If successful, this research project may lead to more effective dessert restoration efforts in the future. Future restoration projects could incorporate these techniques under an adaptive management approach.

PROJECT GOAL(S):

The goal of this project is to study the effects of pre-conditioning treatments on native plant species that are considered important for Mojave desert tortoise habitat restoration so that more resilient nursery and seed stock can be developed.

PROJECT OBJECTIVE(S):

The project objectives are as follows:

- Year one:

  - Employ experimental design to apply pre-conditioning treatments to Mojave Desert native shrub and forb species
  - Compare biometric indicators of health and success across the different treatments
- Year two:
  - Evaluate the growth and survival of pre-conditioned plant materials under natural stressors in a low-elevation Mojave Desert environment

PROJECT APPROACH:

Greenhouse treatments designed to pre-condition shrub outplants for drought resistance (by limiting watering and/or applying foliar sprays) and herbivore resistance (by clipping plant canopy) will be evaluated in the first year by comparing stem diameter, root and shoot mass, root-to-shoot ratio, and survival across the different treatments. Herbaceous forb species will be grown under varying moisture stress treatments. Their seeds will be evaluated for attributes promoting germination under low moisture conditions (low dormancy, large seed size). Woody shrub and forb species important for Mojave desert tortoise habitat will represent a variety of species and plant functional types used in restoration.

The second year of the study will evaluate the growth and survival of pre-conditioned plant materials under natural stressors in a research garden that occurs in the Mojave desert scrub south of Boulder City, Nevada. For pre-conditioned seedlings, seasonal soil drying and natural herbivory will be tested. Pre-conditioned seeds will be tested under seasonal soil drying and in competition with non-native annuals.

Rainfall at the testing garden occurs at the low range compared to other sites across the Mojave Desert ecoregion. In addition, non-native annuals and black-tailed jackrabbits at the site will provide a naturally occurring means of rigorously testing the pre-conditioned seedlings and seeds.

PROJECT COST

$312,754.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #4 – Provides for continued funding of ongoing and effective conservation measures. This project will provide for the continuation of ongoing research on the use of techniques to increase the success of restoration projects in desert tortoise habitat.

Principle #5 – Advances projects that support the Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. This project supports Objectives D1.2 and D4.1 by promoting the development of more resilient seed and nursery stock for use in the restoration of degraded desert tortoise habitat.

Principle #9 – Addresses program goals. This project ultimately supports the goal of mitigating impacts to Mojave desert scrub by developing techniques that can be used to increase restoration success at degraded sites.

THREECORNER MILKVETCH GERMINATION STUDIES

BACKGROUND AND NEED FOR PROJECT:

The U.S. Fish and Wildlife Service was recently petitioned to list the threecorner milkvetch (*Astragalus geyeri* var. *triquetrus*) as endangered. This species is a rare endemic restricted to specific geological substrates found within a constrained distribution in the Mojave Desert of southeastern Nevada and adjacent Arizona. This species will undergo a Species Status Assessment as part of a 12-month finding. Like many other listed and sensitive *Astragalus* species, threecorner milkvetch is imperiled by multiple threats such as: habitat loss from human disturbance, urban and commercial development, energy and utility corridors, off-highway vehicle usage, invasive plant species, and cattle grazing. The impacts of climate change and drought could have major implications for the continued success of the species, especially when compounded by other threats.

Populations of this desert annual have fluctuated dramatically, with marked declines occurring under the current megadrought in southwestern North America, the driest 20-year period of any such period during the past 1,200 years (Williams et al. 2021). Desert annual species are adapted to persist through seasonal or interannual drought periods by maintaining a live, ungerminated fraction of seeds in the surface soil "seed bank" that can endure long-term desiccation until favorable rainfall and temperatures return to trigger seed germination and plant growth (Philippi 1993). Accordingly, threecorner milkvetch population numbers have largely tracked the wet and dry periods since surveys began in the mid-1990s (The Nature Conservancy 2007). Most recently, threecorner milkvetch was found only sporadically during population surveys in 2020 due to delayed rainfall and was completely absent during 2021 and 2022 surveys due to historically low rainfall (2017-IRONWOOD-1755A). However, surface soils collected at four populations where plants emerged and reproduced during 2020 contained no threecorner milkvetch seeds, suggesting seeds are rarer in the seed bank than expected for this desert annual species and may be depleted from habitat (2019-USGS-1990A). Of concern is whether this depletion represents a short-term decrease in the species' populations or a declining persistence that will challenge future conservation and management. High priority research and management needs for the species include understanding reproductive biology, pollination ecology, seed bank research, effects of invasive plant species interactions, and impacts of global climate change (The Nature Conservancy 2007).

REFERENCES

Philippi, T. 1993. Bet-hedging germination of desert annuals: beyond the first year. American Naturalist 142:474-487.

The Nature Conservancy. 2007. A conservation management strategy for nine low elevation rare plants in Clark County, NV. Nevada Field Office, Reno, Nevada. Final Report, 17 April 2007.

Williams, A.P., B.I. Cook, and J.E. Smerdon. 2021. Rapid intensification of the emerging southwestern North American megadrought in 2020-2021. Nature Climate Change 12:232-234.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

Since this is a research effort, this project does not require an adaptive management approach. However, the information from this research is necessary to ensure meaningful restoration in the future for this species.

PROJECT GOAL(S):

The goal of this project is to increase our understanding of threecorner milkvetch and the poorly understood dynamics of its reproductive ecology to enable more informed management and conservation of this rare species.

PROJECT OBJECTIVE(S):

The project objectives are as follows:

- Examine multiple causes influencing threecorner milkvetch's population trends during a two-year study.
- Apply field treatments to evaluate pollen limitation, herbivore pressure, competitive effects of invasive plant species, and seed longevity.
- Determine seed dormancy and germination requirements in a controlled laboratory setting.

PROJECT APPROACH:

Multiple causes influencing threecorner milkvetch's population trends will be examined during this two-year study. A combination of field and laboratory experiments will address its seed ecology (seed dormancy patterns, germination requirements, seed longevity in the seed bank), biotic factors affecting reproduction (pollen limitation, herbivory, invasive plant competition), and their relationships with declining rainfall and increasing temperatures expected with climate change. This project integrates with on-going research that aims to grow seed-bearing adult plants through seasonal waterings of threecorner milkvetch habitat to germinate sparsely distributed seeds that occur in the seed bank but were not captured formerly in the smaller scale seed bank samples. This proposal adds field treatments within the watered habitats to evaluate pollen limitation and herbivore pressure (seed production resulting from caged vs. uncaged flowers and whole plants), competitive effects (seed production resulting when non-native annuals are removed vs. left intact around Threecorner milkvetch plants), and seed longevity (seed viability after seeds are buried and exhumed over time). Seeds collected from adult Threecorner milkvetch in the watered habitat will be used to determine seed dormancy and germination requirements in controlled temperature environments in the laboratory. Seeds produced from this project will comprise conservation collections for the species, which may be used for storing germplasm for future reintroduction or research to benefit the species.

PROJECT COST

$346,956.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #2 – Responds to recommendations from the Nevada Division of Forestry for actions to mitigate impacts to fully protected flora species. This project will help to mitigate impacts to the fully protected threecorner milkvetch by providing information about its requirements for reproduction, germination, and persistence of populations so that the permittees can implement actions that support the survival of this species.

Principle #4 – Provides for continued funding of ongoing and effective conservation measures. This project will continue ongoing research intended to help land managers protect threecorner milkvetch populations. It will also provide information for the U.S. Fish and Wildlife Service to complete their Species Status Assessment.

Principle #5 – Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. This project supports Objective D4.1 by identifying critical uncertainties such as the possible effects of climate change on threecorner milkvetch populations.

RELOCATION OF THE WESLEY E. NILES HERBARIUM

BACKGROUND AND NEED FOR PROJECT:

The Wesley E. Niles Herbarium specimen collection and associated taxonomic literature focuses on the native and naturalized flora of the Great Basin and Mojave Deserts. This herbarium and literature collection constitutes an invaluable, and irreplaceable warehouse of biological, geographical, and historical data. The collection can be used to:

1. Discover or confirm the identity of plants, including the determination of species new to science.
2. Document the flowering and fruiting times of plants, as well as the juvenile forms and growth patterns of plants.
3. Document the structure of plant populations and the co-occurrence of plant species at specific locales, including the effects of climate change.
4. Document variation in morphology/anatomy, as well as genetic variation, among locales.
5. Provide a repository for voucher specimens that are required for environmental impact studies, etc.
6. Provide information on the location of rare, threatened, or endangered species.
7. Provide information for studies of historical expeditions and travels.
8. Provide pollen.
9. Provide material for chemical analyses, such as documentation of pollution, potential discovery of new drugs, and ethnobotany.
10. Provide material for DNA analysis.
11. Provide material for teaching and educational tools for the public

The herbarium is currently located at the University of Nevada, Las Vegas but has been proposed for closure by the University. If closed, the specimens and associated literature will be distributed to other herbaria (e.g., the Missouri Botanical Gardens and New York Botanical Gardens) outside the state of Nevada and outside the Mojave Desert region. The College of Southern Nevada, Henderson Campus has offered t take over the housing of this important collection; however, they lack the necessary funds to complete the relocation effort. This project will provide funding to support the relocation of the Wesley E. Niles Herbarium to the College of Southern Nevada.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

While this project could be very beneficial to the Desert Conservation Program and the Adaptive Management Program by providing additional data to use in modeling efforts, the project itself does not require an adaptive management approach.

PROJECT GOAL(S):

The goal of this project is to retain the Wesley E. Niles Herbarium and associated literature collection in the southern Nevada region, where it will remain accessible by researchers and the public who may benefit from this collection.

PROJECT OBJECTIVE(S):

The objective of this project include:

- Purchase the necessary cabinets, mounting materials, and laboratory materials to support the maintenance of the collection at the College of Southern Nevada, Henderson Campus.
- Acquire specimen digitization equipment, with setup and training, to make the herbarium accessible.

PROJECT APPROACH:

Funding will be provided to the College of Southern Nevada to support the relocation effort. All relocation, establishment, and digitization work will be completed by staff and student volunteers at the College of Southern Nevada.

PROJECT COST

$26,130.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #5 - Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. This project would address Biological Objective R3.1 and D3.1 to collaborate with other stakeholders

DRONE OCCUPANCY SAMPLING COMPARISON

BACKGROUND AND NEED FOR PROJECT:

Occupancy surveys is the method the Desert Conservation Program currently uses to detect change in tortoise populations on the reserve systems. A decrease in occupancy of 4% over a period of 10 years will result in actions being taken to help increase the population with larger declines requiring swifter actions. In order to obtain this data the Desert Conservation Program contracts with outside firms to complete surveys on a yearly basis. However, the increasing costs of surveys means less money is available to implement on-the-ground conservation actions. Due to these rising costs, it is imperative to try to incorporate new technology where available to acquire similar data at lower costs, which will leave more funding available to put towards the implementation of conservation actions that directly benefit species.

One area of technology is advancing rapidly is aerial imagery collected through drones. With the addition of machine learning, drones can identify tortoises and burrows while being faster and covering more ground than traditional field sampling. This project proposes to overlap current field surveys with drone collected data and compare the efficiency and costs of the two methods to see if the technology is a viable and cost-effective means of carrying out occupancy sampling.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This project will lend valuable information to the adaptive management team on how to collect and use occupancy data going forward. This could change/optimize the approach and allow for funding to be shifted elsewhere.

PROJECT GOAL(S):

The goal of this project is to determine whether using drones with machine learning is a more cost-effective way to collect occupancy data than the current protocols.

PROJECT OBJECTIVE(S):

The objectives for this project are as follows:

- Collect drone imagery of each occupancy plot on the BCCE three times during the field season.
- Produce next day data on potential tortoise burrows for ground truthing
- Analyze and compare the two occupancy datasets to determine viability of methods.

PROJECT APPROACH:

Drones would be used to collect imagery of the 70 predefined 4-hectare occupancy plots. Three rounds of imaging would be collected and matched closely in time with ground surveys being conducted under a separate contract; as much as feasible, drone flights will be conducted on the same day that ground-based surveys are conducted. Machine learning or the latest technology applicable would then be used to identify burrows and tortoises that are above ground. Burrows identified during flights will have their locations relayed to the Desert Conservation Program as soon as possible so that ground truthing can occur to determine the status of the burrow. Both data sets will be analyzed and compared to see how close and accurate they are to one another. It may be necessary to repeat this process for one or two additional years to fully understand how well these methods compare to one another.

PROJECT COST

$95,000.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle # 5. Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. This project monitors desert tortoise populations in accordance with objective D2.1 in the Biological Goals and Objectives document.

Principle# 7. Focuses on projects with measurable outcomes that are pertinent to the MSHCP. This project has a measurable outcome and may allow for resources to be allocated from monitoring to conservation depending on the results of this study.

PREDATOR PREY DYNAMICS

BACKGROUND AND NEED FOR PROJECT:

Recently, concern has increased regarding the rates and causes of presumed coyote (*Canis latrans*) predation on a translocated population of the federally-listed Mojave desert tortoise (*Gopherus agassizii*) in the BCCE. In 2018, the Desert Conservation Program began a study to look at the abundance, distribution, movement patterns, habitat use, and ecology of coyotes in concert with their primary prey species, the black-tailed jackrabbit (*Lepus californicus*) in the BCCE. This project concept would build upon the work begun in 2018 to provide additional data on the dynamics of predator and prey relationships within the BCCE. Continued monitoring of predator and prey populations will result in an increased ability to make informed management decisions regarding desert tortoise translocations in the ecological context of larger predator-prey interactions in the BCCE and southern Nevada.

Additionally, in the past several months a disease spillover event occurred in the American southwest. Rabbit Hemorrhagic Disease Virus 2 (RHDV2) escaped from domestic rabbits and has infected 5 native lagomorph species causing dramatic die-offs in six states in the U.S., and five states in Mexico. The disease is not believed to affect species other than lagomorphs. However, disease and wildlife specialists have conferred extensively, and their primary concerns are: 1) potential prey switching of meso-predators (coyote and kit fox) and apex-predators (golden eagles) with the loss of their primary prey sources; 2) the potential effects of lagomorph die-offs on threatened and endangered species and other species at risk; 3) epidemiological behavior of the virus, e.g., if any lagomorphs acquire immunity or the pattern and timeframe during which die-offs will affect lagomorph populations; and 4) how a potential drop in rabbit abundance (as important herbivores) will affect primary production (especially of perennial plants) in habitats across the United States. The two top concerns are entirely consistent with the Clark County project.

The Clark County Predator/Prey Dynamics study is uniquely positioned – first, to answer the original management questions posed in the 2018 project, and secondly – this project appears to be the only research project with rabbits and coyotes already radio-collared in a location where the disease has presumably not reached. Therefore, this study may capture the events of this disease spillover event in real time and be prepared to capture predicted ecosystem changes that have not been previously quantified during an epidemic of this novel disease outbreak. This would extend this project an additional year and allow us to see if tortoise predation returns to normal once rabbit populations rebound.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This project will lend results that will inform the adaptive management program on current and future population augmentation projects. This project may also provide vital information related to a new virus in lagomorphs which may also lead to an adaptive management approach for addressing the impacts of the virus.

PROJECT GOAL(S):

The goal of this project is to provide information about predator and prey population dynamics of coyotes and their main prey source (lepids) as well as habitat use and health that is relevant to management of the BCCE as a sustainable habitat reserve to improve success of desert tortoise translocation programs.

PROJECT OBJECTIVE(S):

The objectives for this project are as follows:

- Determine variability in demographics of coyotes and jackrabbits in the BCCE
- Determine the home range and habitat use patterns of coyotes and jackrabbits
- Determine the health status and mortality rates for coyotes and jackrabbits
- Develop methods to obtain reliable density estimates that are cost effective
- Synthesize jackrabbit abundance and predator densities and movement

In the event RHDV2 infects rabbits in this study the researchers are to aid the U.S. Geological Survey (USGS) National Wildlife Heath Center and others in addressing the following concerns in relation to the novel virus in whatever way practical:

- Potential prey switching of meso-predators (coyote and kit fox) and apex-predators (golden eagles) with the loss of their primary prey sources.
- The potential effects of lagomorph die-offs on threatened and endangered species and other species at risk.
- Epidemiological behavior of the virus, e.g., if any lagomorphs acquire immunity or the pattern and timeframe during which die-offs will affect lagomorph populations.
- How a potential drop in rabbit abundance (as important herbivores) will affect primary production (especially of perennial plants) in habitats across the United States.

PROJECT APPROACH:

The project will consist of up to ten 1-kilometer survey plots located across the BCCE. Each plot would contain a grid of digital trail cameras. The project would also seek to undertake operations to mark and deploy GPS/VHF collars on 25 to 36 jackrabbits and similarly capture 10 to 12 coyotes in the BCCE. Cameras would be maintained to allow for continuous monitoring of the BCCE, via routine maintenance throughout the study. As study animals experience mortalities, GPS/VHF collars will be redeployed on new study jackrabbits to maintain sample size and collect further data. Health assessments will be completed for each animal and a protocol will be setup for the health assessments by the state wildlife veterinarian.

PROJECT COST

$375,792.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

Principle #4. Provides for continued funding of ongoing and effective conservation measures. This project addresses the goal of continuing funding of ongoing and effective conservation measures.

Principle # 5. Advances projects that support achieving Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. This project is designed to help inform the Adaptive Management Program on factors that may affect translocation and predation of desert tortoises. This project also addresses objectives D 2.1 and D 2.2 in the Biological Goals and Objectives for desert tortoise management and translocation. This project could also result in vital information regarding a new virulent disease and its effects on native rabbit populations which could have indirect negative effects on tortoise populations across their range.

Principle # 9. Addresses program goals. This project addresses the program goal for augmentation of desert tortoise populations. It will allow for a better evaluation of potential translocation sites and help to determine if any of these sites run the risk of high predation due to increased levels of predators in the area.

AUTOGENIC RESTORATION ON THE BCCE

BACKGROUND AND NEED FOR PROJECT:

After habitat disturbance takes place, active revegetation using seeding and outplanting are traditional restoration techniques that can be advantageous for rapidly revegetating sites. However, these techniques are labor and resource intensive, and total failures (i.e. no seedlings appearing or no plants surviving) are not unheard of, especially during drought conditions, which are expected to become more commonplace.

Abiotic restoration treatments require far less investment of both cost and effort, making them a logical alternative to more intensive forms of restoration. By leveraging on-site materials and naturally occurring seeds, shrubs etc., abiotic restoration treatments have the potential advantages of being relatively inexpensive, reducing logistical challenges, while also guaranteeing that the plants which eventually colonize the site will have indigenous and locally adapted genetics. The use of inert materials, such as rocks and dead plant material, at disturbed habitat sites has been shown to trigger soil accumulation to arrest soil erosion, trap seeds and provide shade to stimulate plant colonization, protect young plants from herbivory, and improve soil moisture retention. Moreover, abiotic treatments can be implemented even in dry years since they can persist for long periods of time, thereby being available to be taken advantage of whenever favorable conditions arise.

In desert shrub ecosystems, such as that of the Mojave desert tortoise, soil resources typically have a patchy distribution. Loss of this characteristic can slow the recovery of shrubs and other plants. This project will develop the use of connectivity modifiers to modify the abiotic environment and kick start the accumulation of soil resources into patches that promote recovery of a shrub ecosystem by testing the feasibility and performance of multiple abiotic treatments and evaluating their functions.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This project is ideal for an adaptive management approach. Lessons learned from this project could be used to adapt future restoration projects on the BCCE.

PROJECT GOAL(S):

The goal of this project is to research and implement restoration techniques that will expedite the desert's own naturally occurring restoration processes after disturbance.

PROJECT OBJECTIVE(S):

The project objectives are as follows:

- Utilize connectivity modifiers to modify the abiotic environment in a way that will facilitate accumulation of soil resources into patches that promote recovery of desert ecosystems
- Test a variety of abiotic treatments to compare their efficacy

PROJECT APPROACH:

The project will occur on degraded, bare soil within the Boulder City Conservation Easement. Site scouting will begin in the fall. Reference plots will also be identified to provide a comparison to sites where no interventions are implemented. Pre-treatment monitoring and treatment implementation will occur the following spring, and two years of post-treatment monitoring will be completed.

Treatments to be testing will include but not be limited to:

- Vertical mulch and variations (e.g. woody, herbaceous, mixed)
- Rock arrangements
- Soil microcontouring (e.g. pitting)
- Assisted natural regeneration (e.g. placing vertical mulch around natural seedlings)

Treatments and monitoring will occur at the microenvironment scale tailored to the fine-scale distribution of the abiotic structures. Monitoring quadrats will measure 0.25 m^2. In each treatment location and quadrat, measurements will include the fate of the abiotic structure (e.g., change in height of vertical mulch structures, number of rocks remaining in place for rock structures) and functions. Functions will include plant community composition (e.g., seedling recruitment), soil seed banks, and soil properties such as litter accumulation.

PROJECT COST

$270,000

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #1 – Fulfills explicit permit conditions outlined in the Section 10 Incidental Take Permit. This project fulfills permit conditions H (minimization, mitigation, and monitoring), I (science-based adaptive management), and P (management of the BCCE to protect and manage the desert tortoise and its habitat) by taking a scientific approach to testing restoration techniques for the improvement of desert tortoise habitat at the BCCE.

Principle #3 – Focuses on mitigation and minimization actions that have a rational nexus to the level and impact of take that is occurring and those species impacted. Habitat at the BCCE is maintained and restored as mitigation for the take of desert tortoises and their habitat through development activities authorized by the Incidental Take Permit.

Principle #5 – Advances projects that support the Biological Goals and Objectives or those that are designed to inform the Adaptive Management Program. This project supports Objectives D1.2 and D4.1 by restoring desert tortoise habitat while addressing uncertainties in restoration.

Principle #6 – Responds to the most recent Science Advisor recommendations. This project was recommended for inclusion in the 2023-2025 Budget by the Science Advisory Panel.

Principle #9 – Addresses program goals for the 2023-2025 biennium. This project addresses the goal of mitigation of impacts to Mojave desert scrub.

ARTIFICIAL NEURAL NETWORK TO IDENTIFY VEGETATION CLASSES – PROOF OF CONCEPT

BACKGROUND AND NEED FOR PROJECT:

As administrator of the MSHCP, the Desert Conservation Program is required to monitor habitat loss and conduct a wide range of analyses to support the goals of the program. A GIS dataset of the types of vegetation classes provides the baseline for inventory, monitoring, and research activities conducted in support of the program. The first phase of a new vegetation map has been completed based on the United States National Vegetation Classification System (USNVC). This dataset will need periodic updates to be able to track changes to the vegetation in a cost effective way. Artificial intelligence has been proven to be successful in image identification classification and is widely used across many industries.

This project will be a pilot project to assess the feasibility of utilizing Artificial Intelligence computer algorithms to create an update to the Clark County Vegetation Map by conducting a proof of concept using a smaller sample area. The success of this pilot project could result in more up to date data and a more accurate analysis in the future.

ADAPTIVE MANAGEMENT REVIEW SUMMARY:

This project would not require an adaptive management approach. This is a research project that will aid in developing new methods for updating spatial vegetation dataset that are used in many models and analyses that support implementation of the MSHCP, including the adaptive management program.

PROJECT GOAL(S):

Produce a proof of concept for a lower cost method of updating the Clark County Vegetation Map. The product will be useful for assessing scalability, accuracy, of the method compared to the traditional hand digitizing method currently employed.

PROJECT OBJECTIVE(S):

Allow a detailed analysis of utilizing artificial neural networks to update vegetation classification based on a thorough and detailed training dataset. This analysis will examine the following:

- Accuracy of the product using field site verification.
- Cost of a scaled up project to cover the entire Clark County Vegetation Map area
- Timeline of completing a project covering the entire Clark County Vegetation Map area.

PROJECT APPROACH:

This will be in cooperation with National Supercomputing institute and the UNLV Remote Sensing laboratory. A machine learning algorithm will be set up to process and classify the high-resolution NAIP imagery for contextual classification of vegetation. The National Supercomputing Institute with storage capacity as well as High Performance Computing capability. Google Earth Engine could also be utilized to augment the success of the results with built-in remote sensing data repository.

PROJECT COST

$60,000.00

BUDGET PRINCIPLES ADDRESSED BY THIS PROJECT CONCEPT

This project addresses the following budget principles:

Principle #9: Addresses program goals for mitigation of impacts to Mojave desert scrub, mesquite/acacia, salt desert scrub, playa, and desert riparian habitat by accurately measuring those ecosystems and ensuring accurate measurement of loss. This is also evaluating a strategy for ensuring a crucial dataset used to monitor ecosystem health is up to date and accurate.

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ATTACHMENT D

Funding Recommendations and Responses

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AGENCY	FUNDING RECOMMENDATION	DESERT CONSERVATION PROGRAM RESPONSE
U.S. Fish and Wildlife Service	The USFWS is scheduled to complete a species status assessment and 12-month status review of the Arizona toad in FY26 and new information will need to be provided by early 2025 to be incorporated into the SSA. USGS, in collaboration with partners, has been working to develop eDNA surveys throughout the range of the species but there has been less work done in the NV portion of the range. Surveying and mapping of the distributions and habitats of tributaries influencing Clark County, NV populations will provide information for the SSA and inform decisions about potential future management actions for conserving the toad and other aquatic dependent species.	Agreed. Funding for this work is included in Concept #10 – Arizona Toad Distribution Studies.
U.S. Fish and Wildlife Service	Incorporate imperfect detection into road mortality surveys when prioritizing roads and mapping "hot spots" (e.g., Hallisey et al. 2022. land 11:739. https://doi.org/10.3390/land11050739	U.S. Fish and Wildlife Service determines the protocols that are used in this project. This recommendation has been provided to the Service personnel overseeing the project.
U.S. Fish and Wildlife Service	Continuation of surveys of demographic plots throughout the County, using most recent protocols. Also, establish a new demographic monitoring plot within the LSTS and one north of the LSTS to add to the connectivity plot network in Ivanpah Valley being monitored by USGS and UNR (similar methods as for the Monitoring comment above)	Partially agreed. The Desert Tortoise Recovery Office was consulted during the development of this project; it has been submitted for funding under Round 19 of SNPLMA. However, additional plots around the LSTS were not a recommendation made by the Desert Tortoise Recovery Office during preparation of the grant application, and they therefore were not included. Since the application is currently under review, additional plots cannot be added at this time, but may be considered in the future.
U.S. Fish and Wildlife Service	Implement recommendations in the draft Connectivity Management Plan	Agreed. Funding for this project is included in Concept #19 – Connectivity Management Plan Implementation

AGENCY	FUNDING RECOMMENDATION	DESERT CONSERVATION PROGRAM RESPONSE
U.S. Fish and Wildlife Service	Conduct translocation experiments at upper-elevation sites (upper bajada on northwest end of Trout Canyon, north slope of Spring Mountains near Indian Springs) to evaluate habitat suitability and tortoise responses in a changing climate. USGS may be able to partner on something like this using captive tortoises that they have on hand.	Not agreed. While we agree that this would be worthwhile to pursue, it would require several desert tortoises be made available for the study; we are currently unaware of an appropriate cohort of tortoises that are available. Additionally, this effort would require a translocation plan be prepared by U.S. Fish and Wildlife Service; this is unlikely to be completed before the end of the biennium. If these obstacles are removed, we will consider including this study in a future biennium.
U.S. Fish and Wildlife Service	In the event that progress is made in developing the new Desert Tortoise Recovery Center, use this line item to contribute operational funding as a DTRC partner as part of the objectives to continue the Wild Desert Tortoise Assistance Line and performing health assessments prior to translocation.	Partially agreed. The Desert Conservation Program anticipates contributing to the financial management of the facility; however, it is understanding that the new facility is still in the very preliminary planning phases, thus there are no ongoing maintenance costs to contribute to currently.
U.S. Fish and Wildlife Service	The Service recently completed a positive 90-day finding in response to list the Las Vegas bearpoppy and the Mojave poppy bee as endangered. Both species will undergo a species status assessment as part of a 12-month finding. Continued surveys will contribute to the Service's species status assessment of these two petitioned species.	Agreed. Funding for this work is included in Concept #21 – Surveys for Gypsum Endemics.

AGENCY	FUNDING RECOMMENDATION	DESERT CONSERVATION PROGRAM RESPONSE
U.S. Fish and Wildlife Service	The USFWS is scheduled to complete a species status assessment (SSA) and 12-month status review of the Mohave poppy bee (MPB) in FY 26 and new information will need to be provided by early 2025 to be incorporated into the SSA. Surveys for the species have been funded by Clark County, BLM, and USFWS. The USDA ARS and USGS are collaborating to develop methods to utilize eDNA to survey for the MPB and other rare pollinators. Often surveys for the Mohave poppy bee have emphasized areas where it is associated with Arctomecon sp. which may limit our broader understanding of the species distribution and status. The MPB (as well as other rare pollinators) apparent rarity, small size, restricted adult temporal (daily, seasonal, climatically responsive) activity and spatial distributions may be better understood with surveys of alternate food plants and more efficiently using eDNA techniques. A modest amount of additional funding from the MSHCP would allow for USDA and USGS researchers to extend survey efforts onto more areas in a more efficient manner located in Clark County for a more complete understanding of the species.	Agreed. Funding for this work is included in Concept #21 – Surveys for Gypsum Endemics.
U.S. Fish and Wildlife Service	Continue to identify and fund projects to develop vegetative restoration techniques to effectively respond to landscape-scale disturbances (e.g., invasive species and altered fire regimes) in the Mojave Desert. May also assist with species recovery by increasing availability of native seeds and increasing opportunities for restoring damaged habitat.	Agreed. Funding for this work is included in Concept #22 – Restoration Materials and Techniques.

AGENCY	FUNDING RECOMMENDATION	DESERT CONSERVATION PROGRAM RESPONSE
Nevada Division of Forestry	"The USFWS was recently petitioned to list the threecorner milkvetch (Astragalus geyeri var. triquetrus [ASTGEY]) as endangered. Threecorner milkvetch is a rare species endemic to specific geological substrates found within a constrained distribution in the Mojave Desert of southeastern Nevada and adjacent Arizona. This species will undergo a species status assessment (SSA) as part of a 12-month finding as early as 2022. Like many other listed and sensitive Astragalus species, threecorner milkvetch is imperiled by multiple threats such as: habitat loss from human disturbance, urban and commercial development, energy and utility corridors, off-highway vehicle usage and cattle grazing. However, not all threats are anthropogenic. The impacts of climate change and drought could have major implications for the continued success of the species, especially in the face of invasive plants. For example, there was no emergence at the Gemini Solar site of ASTGEY this past spring putting essential monitoring on hold for a full year. Unfortunately, the germination ecology of this species is poorly understood. A vital component of a successful SSA and predicting impacts of climate change is a comprehensive understanding of seed ecology and seed germination. Additionally, an understanding of long-term seed viability in the soil seed bank is essential for bet hedging against zero-emergence years. There is a need to conduct laboratory germination experiments to unlock the mechanisms of ASTGEY seed germination, as well as long term seed burial and retrieval trials to understand viability. Understanding of these poorly understood dynamics is key knowledge gap in effective management and conservation of this rare species.	Agreed. Funding for this work is included in Concept #23 – Threecorner Milkvetch Germination Studies.
Nevada Department of Wildlife	Continue funding of ongoing monitoring work. This project supports the goals and objectives of the MSHCP and permit amendment by adding to the existing datasets of observations of reptiles that are covered or potentially covered under the MSHCP or permit amendment. These datasets aid in determining trends in reptile populations in Clark County in lieu of conducting reserve unit estimates.	Agreed. Funding for this work is included in Concept #2 – Monitoring.
Nevada Department of Wildlife	With recent inflation and supply-chain issues, inadequate funding was allocated for this project in the 21-23 IPB; add funds and resubmit this project as a SNPLMA funded project.	Agreed. Funding for this work is included in Concept #20 – Willow Creek Fencing.
Science Advisor Panel	"Project Goal: 'Avicaching' Engagement (DH) Project Objectives/Description: To identify as many birds as possible at specific locations – if there are any bird	Agreed. We are currently exploring potential work with some of our collaborators who participate in/utilize data from these efforts. We

AGENCY	FUNDING RECOMMENDATION	DESERT CONSERVATION PROGRAM RESPONSE
	hotspots, or IBA (important bird areas) that are accessible to the public. The project could include creating and promoting special avicaching events and promoting existing avicaching events put on by other groups (e.g., Christmas Bird Count)."	currently have adequate funding available for a variety of public outreach and education efforts, so no additional funding for this recommendation has been included in the 23-25 budget.
Science Advisor Panel	"Project Goal: Analyze existing DCP remote sensing data to document extent and character of riparian bird nesting habitat across Riparian Reserve lands. Project Objectives/Description: The Adaptive Management and Monitoring Plan, as well as the MSHCP, calls for inventory and monitoring of the extent and quality of habitat for riparian birds on Riparian Reserve Lands. Data collected by DCP in 2018 - 2019 is available to be analyzed according to methods researched by Alta Science and Engineering, Inc. (2022) to fulfill baseline monitoring needs, and in keeping with basic habitat quality criteria identified during the Monitoring Workshop in 2021. Remote sensing data available for analysis includes both multiband, sub-meter imagery, and vegetation height and topography data from manned-aircraftderived LiDAR measurements. These datasets are appropriate for use in establishing baseline cover and vegetation height conditions for all Riparian Reserve properties. The 2018 timing is somewhat early for Bunkerville West parcels K, L, and M (acquired in 2020), and considerably late for Mormon Mesa (acquired in 1990), Bunkerville East parcels C-G (acquired in 2014), and Muddy River parcels (acquired in 2002 and 2010). Protocol for analysis would follow findings from the Alta (2022) effort from spring of 2021, with emphasis on cover types and height of woody vegetation first, with a secondary emphasis on estimating canopy density and vegetative vigor."	Agreed. Funding for this work is included in Concept #17 – Analysis of Riparian Habitat Data.

AGENCY	FUNDING RECOMMENDATION	DESERT CONSERVATION PROGRAM RESPONSE
Science Advisor Panel	"Project Goal: Collect and analyze remote sensing data to determine effectiveness of conservation activities on Riparian Reserve Lands. Project Objectives/Description: The Adaptive Management and Monitoring Plan, as well as the MSHCP, calls for inventory and monitoring of the extent and quality of habitat for riparian birds on Riparian Reserve Lands. In the summer of 2023, remote sensing data used for baseline monitoring will be five years old and within the recommended 4- to 6-year interval for effectiveness monitoring. Multi-band remote sensing data would be collected for all riparian properties, whether obtained from publicly available sources or acquired new, and analysis performed that mirrors protocols from baseline data. Comparisons between baseline and new results will allow assessment of progress towards conservation goals. Based on recommended timing for habitat, this analysis would apply to habitat cover, patch density, and possibly vigor, focusing on changes in extent of desirable tall, woody species. Changes in heights of those habitats, requiring LiDAR, would be re-measured in 2028."	Agreed. Funding for this work is included in Concept #17 – Analysis of Riparian Habitat Data.
Science Advisor Panel	"Project Goal: Assess whether desired riparian woody species are successfully establishing or expanding on Riparian Reserve lands. Project Objectives/Description: Meeting goals for conserving and increasing habitat for ripariandependent birds is often achieved by protecting these habitats from a range of threats and allowing natural regeneration to occur. Clark County has gone to great lengths to purchase, fence, fireproof, and control weeds on Riparian Reserve lands, all while tamarisk beetle are greatly impacting dominant and competing tamarisk stands. The combination of efforts should be reflected in natural expansion of desired species, either by successful seedling establishment or vegetative spread. An age-class assessment would capture what species and which locations are expanding, and to what extent, and which species and locations may benefit from planting efforts. The greenline monitoring method of Winward (2000) offers a simple protocol for investigating age-class structure."	Agreed. Funding for this work is included in Concept #16 – Age-class Study of Riparian Woody Species.

AGENCY	FUNDING RECOMMENDATION	DESERT CONSERVATION PROGRAM RESPONSE
Science Advisor Panel	"Project Goal: Develop a web-accessible data portal that houses biological data (e.g., Tortoise/Bird/Veg attributes). Project Objectives/Description: To have data readily available and accessible to various users. DCP collects and manages a lot of long-term data sets, having data collected in a format that can auto-sync to a data portal and provide real-time updates. The goal is to have data managed / formatted in a way that it can be easily shared to other data sets or collaborating agencies/stakeholders. The project would consist of developing and populating the database in addition to creating the end-used interface."	Agreed. Funding for this work is included in Concept #13 – Web-accessible Data Portal.
Science Advisor Panel	"Project Goal: Reduce demonstrated subsidies to raven populations to reduce overall raven numbers and spillage from Boulder City facilities into Mojave desert tortoise habitat. Project Objectives/Description: Ravens are known major predators on juvenile desert tortoises and previous work in the Eldorado Valley and Boulder City Conservation Easement identified desert tortoise DNA in 32.3% of sampled raven pellets (Boarman and Mlenar-Boarman 2018). This same study also found that the primary subsidies for ravens in the area were the Boulder City landfill and sewage ponds. We propose funding work at the landfill and sewage ponds to reduce or prevent raven access and use of these subsidies via physical exclusion and/or laser harassment. Studies in the western Mojave desert have found that laser harassment is an effective raven deterrent and that displaced ravens do not travel into the desert. The goal of this project is a reduction in the total carrying capacity for ravens adjacent to the BCCE. The feasibility and cost of this project may be challenging to estimate until conversations with Boulder City staff determine their openness to such measures and identifying which techniques would be acceptable and most effective."	Agreed. Funding for this work is included in Concept #14 – Subsidized Predator Management at the BCCE.

AGENCY	FUNDING RECOMMENDATION	DESERT CONSERVATION PROGRAM RESPONSE
Science Advisor Panel	"Project Goal: Quantitatively describe shrub characteristics of occupied Mojave desert tortoise habitat. Project Objectives/Description: Identifying the shrub composition of occupied Mojave desert tortoise habitat within the BCCE will provide a goal for restoration projects. Shrubs are an important component of habitat – they directly provide cover for tortoises – but additionally they modify the environment by slowing wind erosion, accumulating fine soil particles, organic matter, and nutrients, and reducing soil water evaporative loss. Aerial imagery (i.e., satellite, plane, drone) would be used to identify the shrub species, sizes, density, and distribution in the BCCE in areas occupied by Mojave desert tortoises, comparing these findings to shrub characteristics of known "non-habitat" areas (including disturbed areas), and areas that may be habitat but are not occupied. This will help to establish quantitative benchmarks for assessing restoration success as well as identifying areas to be prioritized for restoration. The project may require some ground-truthing to confirm species and sizes. It is likely that this can be completed using existing aerial imagery, but it might be improved by obtaining new very highresolution images obtained with drones"	Not included. This work was completed as a component of the Occupancy Sampling and Covariates project. While we perhaps did not go into as much detail as is recommended here, we feel that this has been adequately addressed and additional work will not provide much additional utility. Given this, and in light of current budget availability, we will not be advancing this recommendation at this time.
Science Advisor Panel	"Project Goal: Quantitatively describe soil resources and characteristics of occupied Mojave desert tortoise habitat. Project Objectives/Description: Describe the patterns of soil resources, such as nutrients, organic matter, water content, soil particle sizes, etc., in occupied Mojave desert tortoise habitat within the BCCE to provide goals for restoration projects. In desert shrub ecosystems, soil resources typically have a patchy distribution. Comparing soil resource distributions in occupied habitat and comparing it to known non-habitat or areas that appear to be habitat but are not occupied would provide benchmarks for assessing restoration success. This would be accomplished through a spatially explicit sampling design and would require equipment that can analyze nutrients, soil particle sizes, and perhaps additional parameters. All the sampling and analysis could be completed in one year."	Not included. This work was completed as a component of the Occupancy Sampling and Covariates project. While we perhaps did not go into as much detail as is recommended here, we feel that this has been adequately addressed and additional work will not provide much additional utility. Given this, and in light of current budget availability, we will not be advancing this recommendation at this time.

AGENCY	FUNDING RECOMMENDATION	DESERT CONSERVATION PROGRAM RESPONSE
Science Advisor Panel	"Project Goal: Kickstart processes that will naturally restore soil resources that are characteristic of Mojave desert tortoise habitat. Project Objectives/Description: In desert shrub ecosystems, soil resources typically have a patchy distribution. Loss of this characteristic patchiness can slow the recovery of shrubs. This project would entail the use of "connectivity modifiers" (a.k.a. ConMods) to modify the abiotic environment (see Rader et al. 2021) and kickstart the accumulation of soil resources into patches that promote recovery of a shrub ecosystem. The microenvironments that result can be used in the future as sites for planting shrubs to improve establishment and survival."	Agreed. Funding for this work is included in Concept #25 – Autogenic Restoration on the BCCE.

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ATTACHMENT E

Summary of Stakeholder Comments and Reponses

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AGENCY	PAGE/ PROJECT CONCEPT	COMMENT	DESERT CONSERVATION PROGRAM RESPONSE
Science Advisor Panel	C-1 MSHCP Administration	Could you provide more description for "Continue reptile monitoring across Clark County"? Is this conducted alongside or separate from desert tortoise line distance and occupancy monitoring? Which reptiles are anticipated to be found at sufficient densities to allow for population trend estimation?	Page reference may be incorrect, as C-1: MSHCP Administration does not mention reptile monitoring. This is discussed on page C-5: Monitoring. Additional text was added to further describe ongoing reptile monitoring efforts. We have just completed the first year of surveys, so we do not currently have adequate data to evaluate population trends for species at this time.
Science Advisor Panel	C-5 Monitoring	"Continue reptile monitoring across Clark County, Nevada." - Suggest being more specific (e.g., BCCE?), as I don't think reptiles are currently monitored county-wide?	We initiated a project in 2022, in collaboration with Nevada Department of Wildlife, to provide support for their ongoing reptile monitoring efforts. These monitoring efforts consist of road surveys conducted across Clark County. Added text to project concept to clarify the nature of this work.
Science Advisor Panel	C-7 Adaptive Management Program	Consider revising to read" "…habitat loss by ecosystem, implementation status, and progress towards Biological Goals and Objectives."	Text revised as suggested.
Science Advisor Panel	C-10 Management of Riparian Reserves	Consider adding a bullet that specifies the management plan should 'describe desired future conditions' of the properties, or add it to the second bullet (i.e., 'Review and update the management plan to reflect current conditions, as well as describe desired future conditions.')	Text revised as suggested.
Science Advisor Panel	C-13 Desert Tortoise Translocation	"Projects will focus on looking at population changes, mortality, disease prevalence, and movement patterns and how effective translocation is at augmenting populations over time". Consider instead: "Projects will focus on post-translocation effectiveness monitoring, recording mortalities, tortoise health, and movement patterns. These data can be used in a larger analysis to assess the success of population augmentation." This includes the notion that the DCP data will be used as part of a larger	The assumption is correct. Text revised as suggested.

AGENCY	PAGE/ PROJECT CONCEPT	COMMENT	DESERT CONSERVATION PROGRAM RESPONSE
		analysis (which I think is the case?).	
Science Advisor Panel	C-15 Desert Tortoise Fencing	For the Road Warrior portion - do you have an estimate of the # kms that would be surveyed that you can include? (10km? 100 km?).	Road mortality surveys will typically cover between 50 and 70 miles (80 to 113 km) per year, while fence inspections will cover between 30 and 50 miles (48 to 80 km) per year. Text has been revised to indicate how many miles can be covered by surveys.
Science Advisor Panel	C-19 Management of the BCCE	Consider adding a bullet specifying that the management plan 'describe upcoming restoration activities (e.g., what, where, when, and why)'	Text revised as suggested.
Science Advisor Panel	C-30 Web-based Mapping	Consider changing the project title to more completely describe the project. The project description sounds like a data clearinghouse for use by stakeholders and interested public. It appears focused on spatial data (maps), but also refers to non-spatial data. A suggested new title is 'Web-based MSHCP Data Clearinghouse'.	Project title revised as suggested. To further clarify, this project includes the development of a map-based tool for viewing and analyzing spatial data. This would be modeled after the Upper Santa Anna River application that can be viewed here: https://www.uppersarhcp.com/dashboard. It is not intended to include non-spatial data. Project background was revised to clarify.
Science Advisor Panel	C-30 Web-based Mapping	Encourage the project to include planning and protection from nefarious actors, possibly by generalizing location data for vulnerable species in tabular and spatial forms, or some kind of login requirement for some datasets and not others.	Only non-confidential data, and data that is not otherwise protected by law or licensing agreements will be available through the application. Project description revised.
Science Advisor Panel	C-30 Web-based Mapping	Principle #5 should include promoting stakeholder involvement as a more direct aim for the budget principles.	Principle #5 revised as suggested.
Science Advisor Panel	C-35 Subsidized Predator Management	Consider adding Budget Principle #5 (supporting BGOs) applies to this project, specifically Objective 2.1 (adaptively manage for desert tortoise populations).	Text revised as suggested.
Science Advisor Panel	C-36 Restoration on Riparian Reserves	There is no mention of protection from grazing, i.e., fencing in this section. Is that assumed to be contained in the Riparian Reserves management section? If not, consider adding it to this project	This project has been deleted from the 2023-2025 Implementation Plan and Budget. With the Muddy River Restoration project going on hold for an indeterminate time, this has freed up substantial funding to apply to

AGENCY	PAGE/ PROJECT CONCEPT	COMMENT	DESERT CONSERVATION PROGRAM RESPONSE
		also.	other riparian restoration efforts; so additional funding is not needed at this time. Fencing is included in the Management of Riparian Reserves project concept. Text revised to clarify that this funding covers fencing needs.
Science Advisor Panel	C-38 Age-class study of Riparian Woody Species	Would an additional project goal be to identify why some areas may be expanding/lagging behind post-restoration? Perhaps that is included in the project, but knowing if it's a catastrophic event vs drought vs planted at wrong depth may be a first step to include here, if applicable.	Project goals and objectives revised to include this suggestion.
Science Advisor Panel	C-40 Riparian Habitat Data	Consider changing the title of this project to more generally describe the project, suggested titles are "Collection and Analysis of Riparian Habitat Data" or "Riparian Restoration Effectiveness Monitoring".	Project title revised to "Riparian Restoration Effectiveness Monitoring" as suggested.
Science Advisor Panel	C-40	Project objectives as listed are very general - if it is possible to refine/add more detail at this point, it's encouraged.	Project objectives revised to include more detail. Project background was also revised to further clarify the purpose of the project.
Science Advisor Panel	C-49	Are these bee survey/sampling methods outlined in this project description updated from the surveys that were completed previously? I recall the panel and DCP having concerns with the methods after the August symposium presentation.	Desert Conservation Program staff will collaborate with the Science Advisor Panel during development of the Scope of Work to ensure concerns are addressed in any upcoming survey efforts.
Science Advisor Panel	C-57, 58 Drone Occupancy Sampling Comparison	Are you planning on aligning the drone flights on the same morning as the ground-based field crews? This would be ideal, otherwise all of the process variability of tortoise/burrow detection and availability for detection would be mixed in with the sampling error, meaning that discrepancies between the two methods would be more difficult to tell. For example, were discrepancies	Project approach revised to state that we will make every effort to complete drone-based surveys on the same day as ground-based surveys.

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		due to different light, weather, and tortoise aboveground activity between sampling days? Or were they due to some bias in one or both of the methods? The more sampling days, the less this is an issue, but with only three days per plot, it could be a confounding factor, adding more noise and reducing the strength of the comparison.	
Science Advisor Panel	C-59 Autogenic Restoration on the BCCE	In order to learn how these structures perform, it would be helpful to measure nearby plots where no interventions are tried.	Project approach revised to include reference plots as a control in the project design.
Science Advisor Panel	C-59 Autogenic Restoration on the BCCE	I would encourage this project to be treated as a full research project, complete with control plots, to best verify the benefits afforded by the different treatment methods. In lieu of control plots, control-by-gradient measurements can be taken (e.g., monitoring takes place adjacent/within the treatment zone, but also at further distances from the treatment using declining effects over larger distances as the control).	Project approach revised to include reference plots as a control in the project design.