
THE ADAPTIVE MANAGEMENT PROGRAM
8/19/2024
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Adaptive Management and Monitoring Plan

Version 2.0

Prepared for:
Desert Conservation Program

February 2, 2023

Prepared by:
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Contributors:

2024 Biennial Adaptive Management Report - FINAL

Prepared for:
Desert Conservation Program, Clark County, Nevada

February 4, 2024

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PURPOSE OF THE AMR

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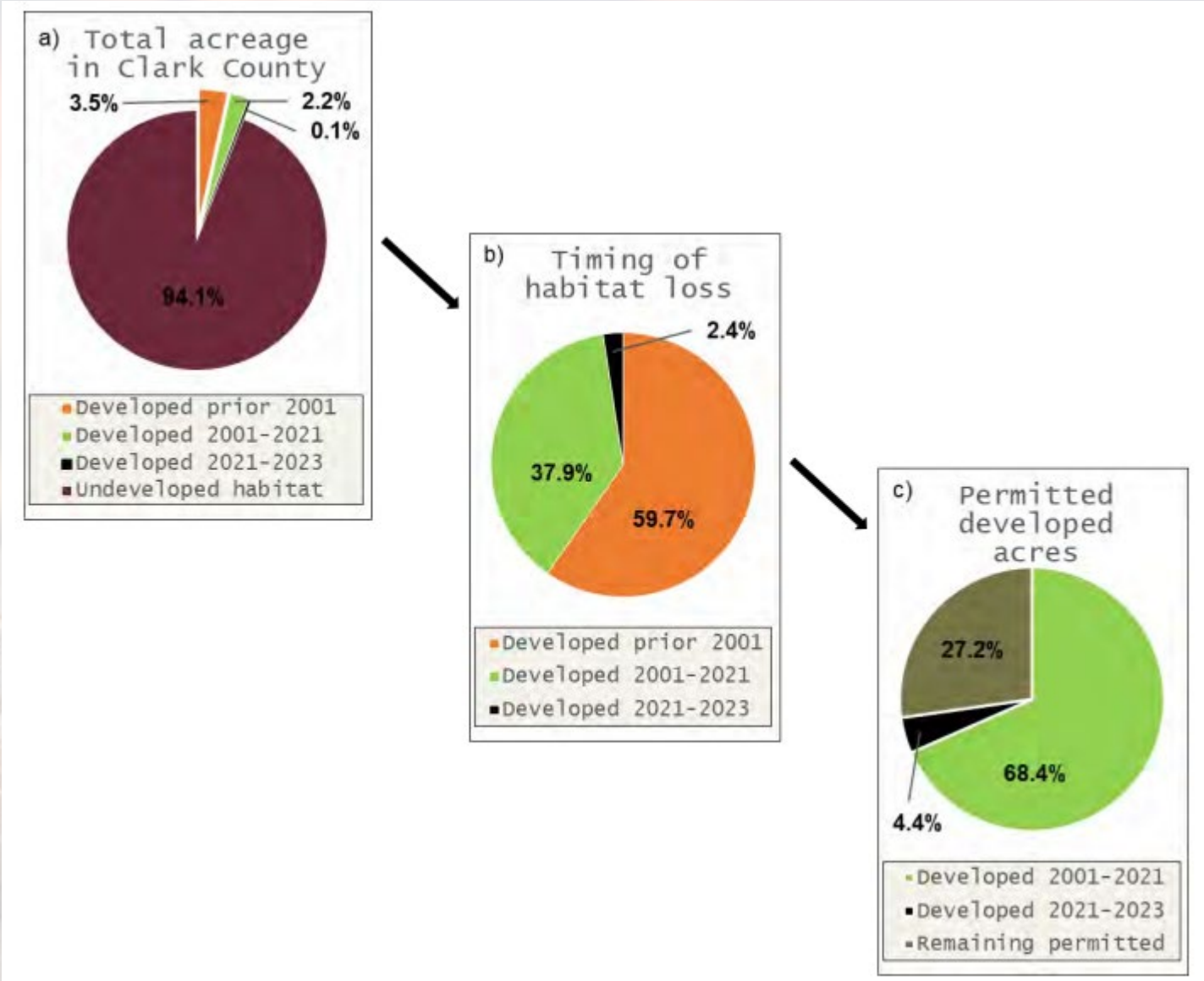
Document and analyze the following 4 items and provide recommendations to improve the Desert Conservation Program's AMP and MSHCP implementation every 2 years

1. Analyze all land-use trends in Clark County to ensure that take and habitat disturbance are balanced with conservation
2. Track habitat loss by ecosystem
3. Evaluate the effectiveness of management actions at meeting MSHCP goals of conservation and recovery
4. Monitor population trends and ecosystem health

1. LAND USE TRENDS

- Habitat loss
  - 2001-2021: 114,471acres
  - 2021-2023: 7,527 acres
- General habitat loss is commensurate with what's expected given the percentage of habitat loss.



2. HABITAT LOSS BY ECOSYSTEM

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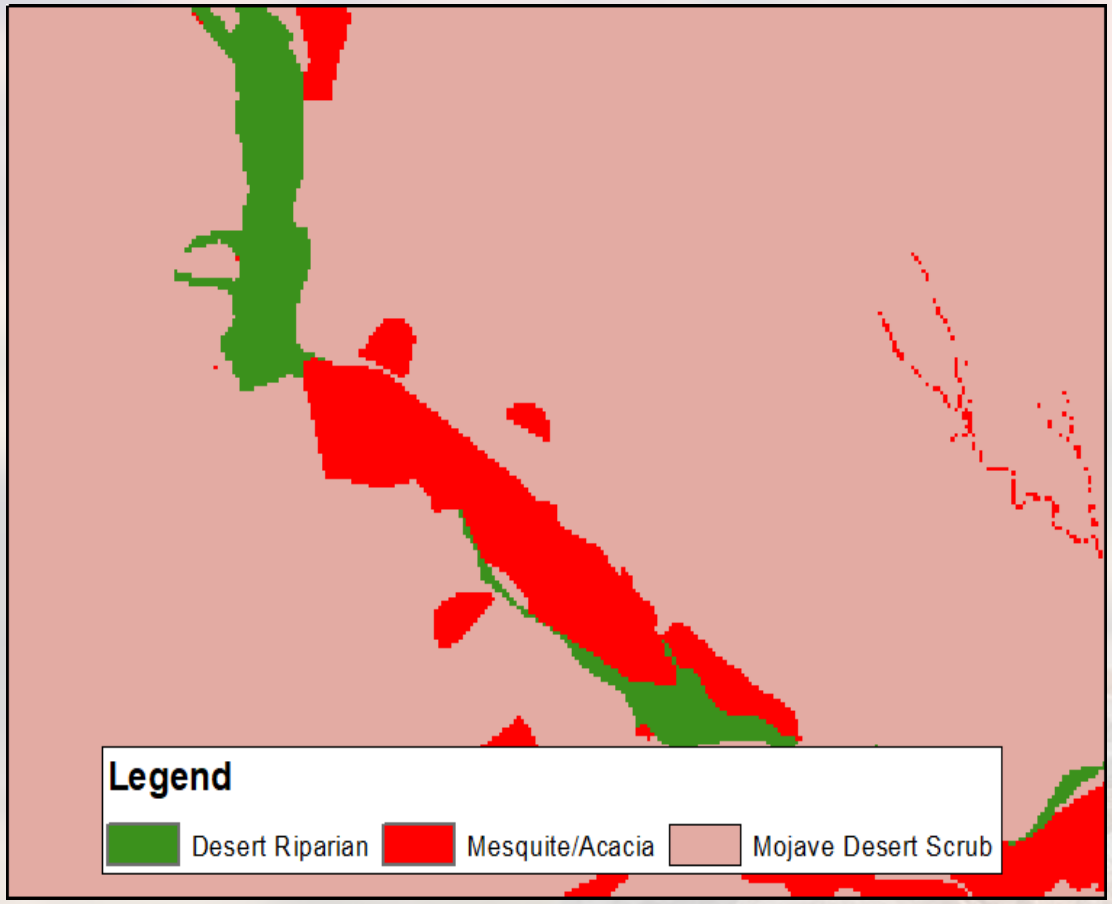
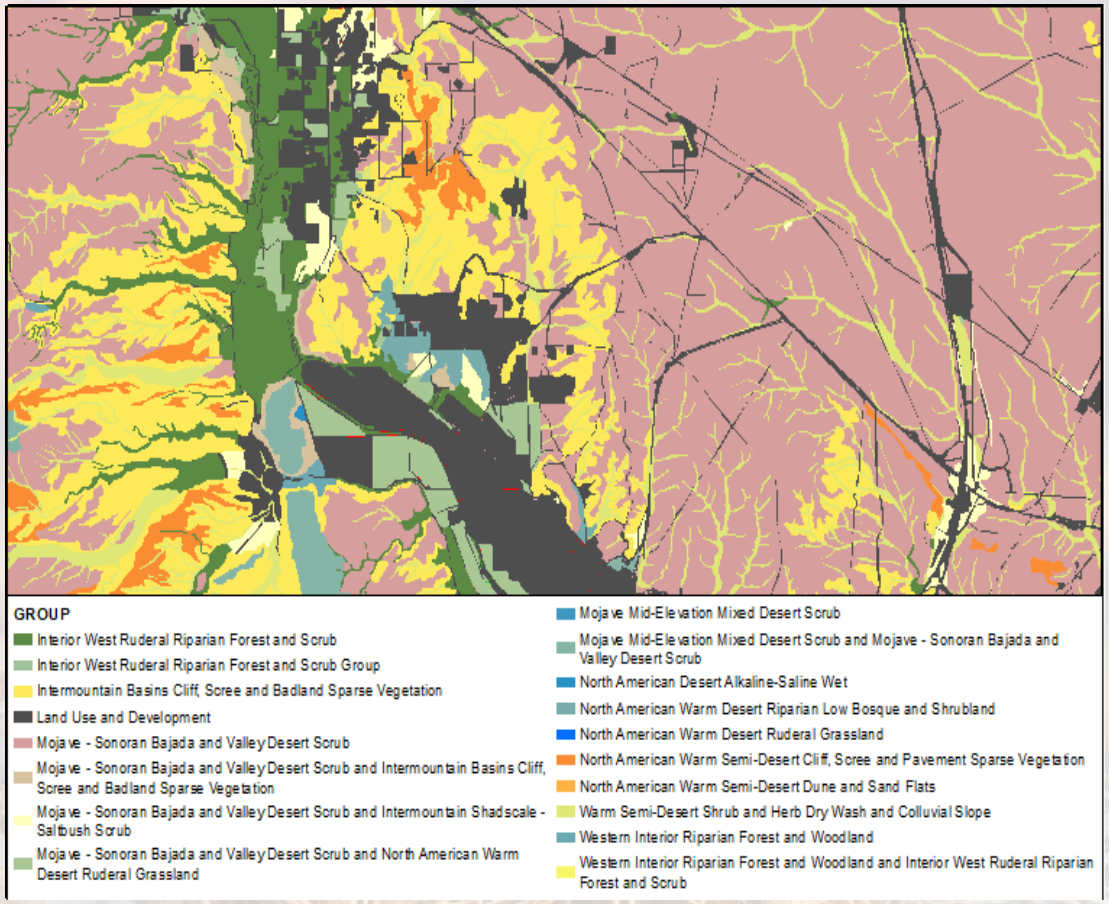


2012 Ecosystems Map
(3 classes)



2020 – 2022 Coarse Level
Mapping (18 Classes)

2. HABITAT LOSS BY ECOSYSTEM

- Total of 7,357 acres were developed between 2021-2023
- 6,176 acres occurred in desert scrublands
- 106 acres occurred in what was previously described as riparian habitat

Recommendations

- Develop conservation actions for the highest total loss habitats
- Develop conservation actions for the highest proportional loss habitats

USNVC division	Total baseline acres in 2019 (% of mapped area)[1]	Developed acres (i.e., habitat loss)			
		Prior 2019[2]	2019 – 2021[3]	2021 - 2023	Cumulative 2019 - 2023 (% of USNVC division in county)
Californian Forest & Woodland	601 (0.0%)	0	0	0	0 (0.0%)
Developed	299,872 (7.2%)	284,376	2	0	0 (0.0%)
North American Warm Desert Scrub & Grassland	2,139,051 (51.1%)	0	4,455	3,228	7,683 (0.4%)
Rocky Mountain Forest & Woodland	73,844 (1.8%)	0	0	0	0 (0.0%)
Southwestern North American Warm Desert Freshwater Marsh & Bosque	6,078 (0.1%)	0	6	1	7 (0.1%)
Urban Interface Mojave Desert Scrub	38,127 (0.9%)	0	4,514	2,878	7,392 (19.4%)
Vacant or Cleared	61,243 (1.5%)	0	1,821	1,075	2,896 (4.7%)
Water	1,199 (0.0%)	0	2	8	10 (0.8%)
North American Western Interior Brackish Marsh, Playa & Shrubland	18,385 (0.4%)	0	90	78	168 (0.9%)
Western North American Cool Semi-Desert Scrub & Grassland	1,217,744 (29.1%)	0	68	70	138 (0.0%)
Western North American Grassland & Shrubland	216 (0.0%)	0	0	0	0 (0.0%)
Western North American Interior Chaparral	39,910 (1.0%)	0	0	0	0 (0.0%)
Western North American Interior Flooded Forest	5,688 (0.1%)	0	0	16	16 (0.3%)
Western North American Pinyon - Juniper Woodland & Scrub	280,425 (6.7%)	0	0	0	0 (0.0%)
Western North American Temperate Freshwater Marsh, Wet Meadow & Shrubland	2,728 (0.1%)	0	4	3	7 (0.3%)
Total	4,185,112	284,376	10,963	7,357	18,317 (0.4%)

3. EFFECTIVENESS OF MANAGEMENT ACTIONS

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Biological Goal 1: Maintain or improve habitat quality and quantity within DCP reserve system lands to promote resiliency, redundancy, and representation for covered species

Biological Goal 2: Maintain stable or increasing populations of covered species occurring within DCP reserve system lands.

Biological Goal 3: Foster community and stakeholder engagement to maintain or improve covered species populations and their habitats.

Project Category	Number of projects and sub-projects assessed	Goal 1	Goal 2	Goal 3
AMP	21	15	18	2
BCCE	9	7	2	3
Conservation	11	9	9	0
PIE	5	0	0	5
Administration	11	7	10	4
Riparian	18	16	5	0
Wild desert tortoise	10	5	7	1

4. MONITORING POPULATION TRENDS

- Species that exceed thresholds are showing statistically significantly decline
- 9 species have sufficient data to make a determination
- None are exceeding thresholds currently

Species[a]	Monitoring Survey	Covered Species Group	Threshold[b] Exceeded?
Desert tortoise	Occupancy sampling	Desert upland reptiles[a]	No
Great Basin collared lizard			Unknown
Desert iguana			No
Large-spotted leopard lizard			No
Yellow-billed cuckoo	Federal protocol	-	No
Southwestern willow flycatcher	Federal protocol	-	No
Blue grosbeak	Point count / passive acoustic occupancy	Riparian birds	No
Summer tanager			Unknown
Vermillion flycatcher			Unknown
Arizona Bell's vireo			No
Ridgway's rail			*NA*
American peregrine falcon		Desert upland birds	Unknown
Phainopepla			No
Western burrowing owl			*NA*
Gilded flicker			*NA*
Loggerhead shrike			*NA*
Bendire's thrasher			*NA*
Le Conte's thrasher			*NA*
Golden eagle			*NA*
Silver-haired bat	Passive acoustic occupancy	Bats	Unknown
Long-eared myotis			Unknown
Long-legged myotis			Unknown
Townsend's big-eared bat			*NA*
Spotted bat			*NA*
Sticky ringstem	Three-tiered sampling	Desert upland plants[c]	Unknown
Las Vegas bearpoppy			Unknown
White bearpoppy			Unknown
Threecorner milkvetch			Unknown

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2024 ADAPTIVE MANAGEMENT EVALUATION

ADAPTIVE MANAGEMENT EVALUATION BACKGROUND

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- Completed every 4 years as part of the AMR
- Evaluates actions taken by the DCP to achieve the BGOs
- In depth evaluation of species monitoring
- In depth evaluation of habitat monitoring

Biological Goal 1: Maintain or improve habitat quality and quantity within DCP reserve system lands to promote resiliency, redundancy, and representation for covered species.	
Obj 1.1	Utilize invasive species treatment methods to maintain or decrease the 8-year average area requiring weed management.
Obj 1.2	Acquire riparian acreage at an equivalent rate as take over the life of the permit. An 8-year lag after riparian acreage is developed is allowed to account for the willing-seller, willing-buyer basis of property exchange, within the life of the permit.
Obj 1.3	Protect, restore, or otherwise increase the quality and quantity of habitat for MSHCP-covered species, as determined by the monitoring methods, definition of quality, and timeframes specified in the AMMP.
Obj 1.4	Incorporate natural ecological, hydrological, and geomorphological processes into restoration design and implementation to maintain ecological integrity, ecosystem function, and biological diversity. Include consideration that climate change may result in significant changes in these processes over historical frequencies and magnitudes. Review quadrennially as part of every other Adaptive Management Report (AMR) using project level worksheets (B1 Worksheets).
Obj 1.5	Identify critical uncertainties (e.g., climate change, human population growth) of MSHCP-funded projects on DCP reserve system lands and report on them in biennial updates to the DCP Reserve System Management Plans.
Obj 1.6	Incorporate concepts of ecosystem redundancy and representation to promote ecological resiliency in the biennial updates to the DCP Reserve System land Management Plans.
Obj 1.7	Protect and enhance connectivity (i.e., road restoration, culvert placement) within DCP reserve system lands for Desert Tortoise and other high priority covered species. Review and report on the status of these projects quadrennially in every other AMR.

EVALUATION OF ACTIONS TAKEN BY DCP TO ACHIEVE BGOS

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Each BGO was evaluated based on individual projects relate to that specific objective.

They were evaluated on how well they meet the SMART principles

Objective 1.3. Protect, restore, or otherwise increase the quality and quantity of habitat for MSHCP-covered species

Summary of whether actions are achieving BGO and SMART principles				
Specific	**Measurable**	**Achievable**	**Result-oriented**	**Time-fixed**
Increase habitat quality/quantity for 1 or more covered species through protection, restoration, and monitoring	Quantitative methods in AMMP	Yes	Projects are aimed at monitoring, protecting, and restoring habitat for 1 or more covered species	Assess biennially; continue by following AMMP habitat monitoring timeframe
✓	? Quantitative methods are in AMMP; data not yet available to test outcomes	? Data not yet available to test outcomes	✓	? Understanding of whether riparian habitat monitoring can be assessed biennially is in progress

Of 70 potential check marks

- 58 are on-track
- 12 are uncertain, generally due to lack of data
- One objective was failing

Objective 2.3. Translocate and augment desert tortoise populations

Summary of whether actions are achieving BGO and SMART principles				
Specific	**Measurable**	**Achievable**	**Result-oriented**	**Time-fixed**
Translocate and monitor survival	Translocation events; quantify survival rates	Yes, assuming availability/permission for translocations	Equivalent survivorship	Quadrennially
✓	✓	✓	☒	✓

TRANSLOCATE DESERT TORTOISE POPULATIONS

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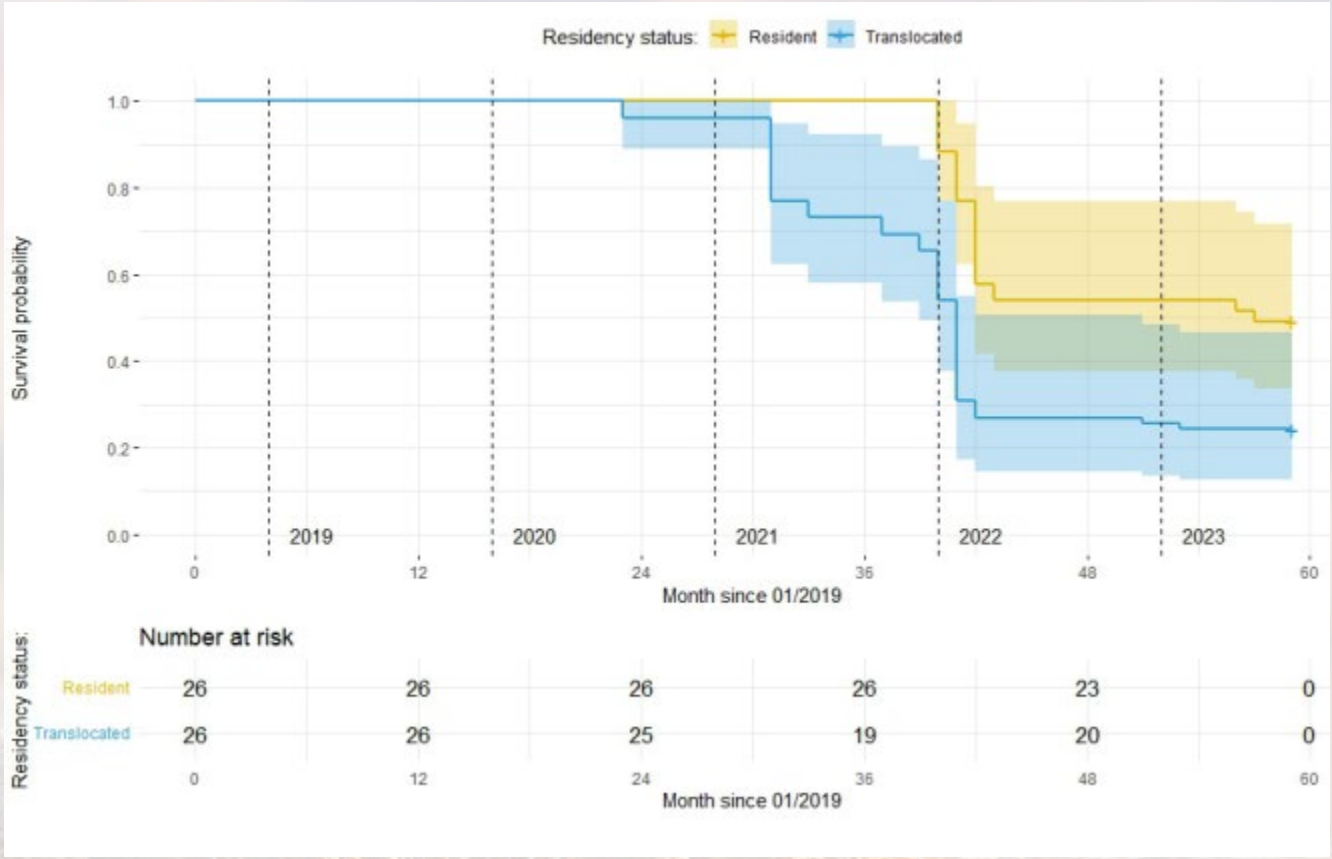
Obj 2.3: Translocate and augment desert tortoise populations in accordance with USFWS guidance through translocation programs that achieve survivorship rates within 10 percentage points of resident tortoise survival rates in the same areas.

Mortality related to drought and predation.

Work has been initiated to investigate and mitigate for predation on the BCCE



Summary of whether actions are achieving BGO and SMART principles				
Specific	**Measurable**	**Achievable**	**Result-oriented**	**Time-fixed**
Translocate and monitor survival	Translocation events; quantify survival rates	Yes, assuming availability/permission for translocations	Equivalent survivorship	Quadrennially
✓	✓	✓	✗	✓

SPECIES MONITORING

- 28 species are included for monitoring and analysis
  - 3 federally listed species
  - 16 covered species
  - 9 species that will be covered under permit amendment
- 8 species had no declining trend
- 11 species did not have enough data to calculate a trend
- 9 non-covered species were not analyzed

Species[a]	Monitoring Survey	Covered Species Group	Threshold[b] Exceeded?
Desert tortoise	Occupancy sampling	Desert upland reptiles[a]	No
Great Basin collared lizard			Unknown
Desert iguana			No
Large-spotted leopard lizard			No
Yellow-billed cuckoo	Federal protocol	-	No
Southwestern willow flycatcher	Federal protocol	-	No
Blue grosbeak	Point count / passive acoustic occupancy	Riparian birds	No
Summer tanager			Unknown
Vermillion flycatcher			Unknown
Arizona Bell's vireo			No
Ridgway's rail			*NA*
American peregrine falcon		Desert upland birds	Unknown
Phainopepla			No
Western burrowing owl			*NA*
Gilded flicker			*NA*
Loggerhead shrike			*NA*
Bendire's thrasher			*NA*
Le Conte's thrasher			*NA*
Golden eagle			*NA*
Silver-haired bat	Passive acoustic occupancy	Bats	Unknown
Long-eared myotis			Unknown
Long-legged myotis			Unknown
Townsend's big-eared bat			*NA*
Spotted bat			*NA*
Sticky ringstem	Three-tiered sampling	Desert upland plants[c]	Unknown
Las Vegas bearpoppy			Unknown
White bearpoppy			Unknown
Threecorner milkvetch			Unknown

TORTOISE OCCUPANCY

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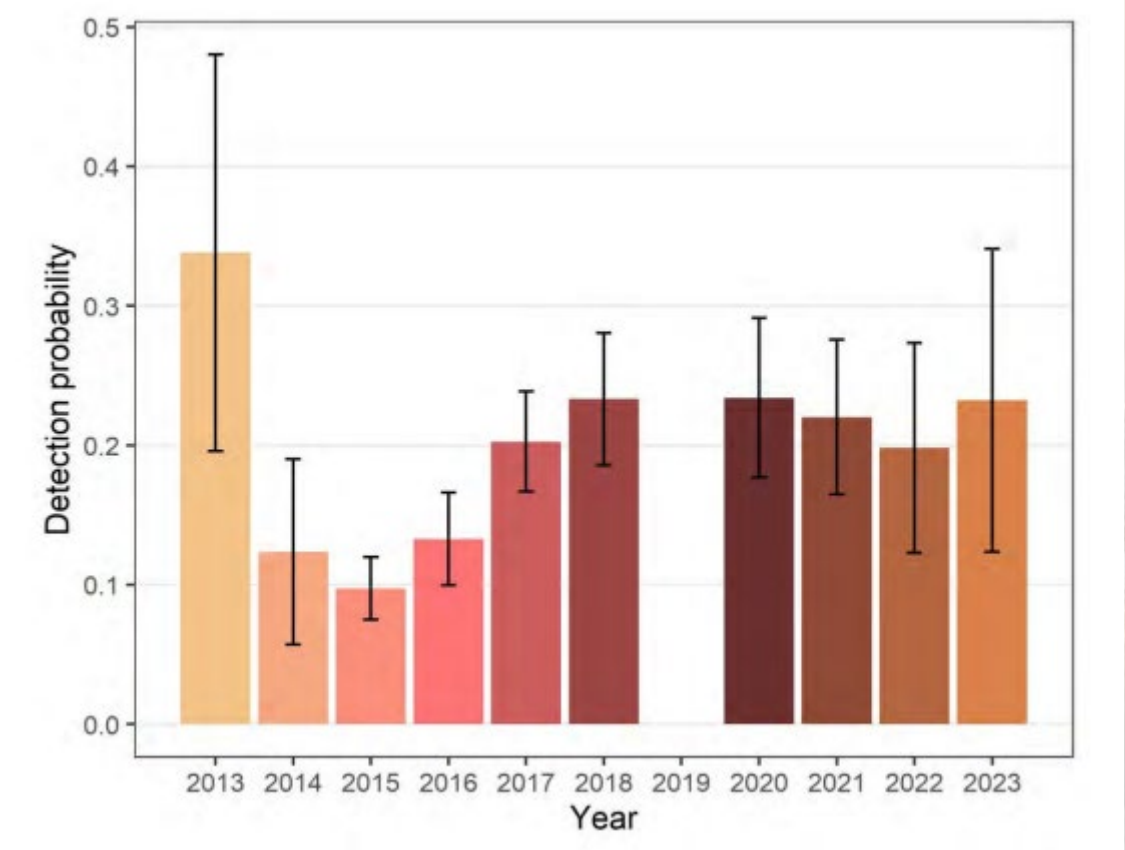
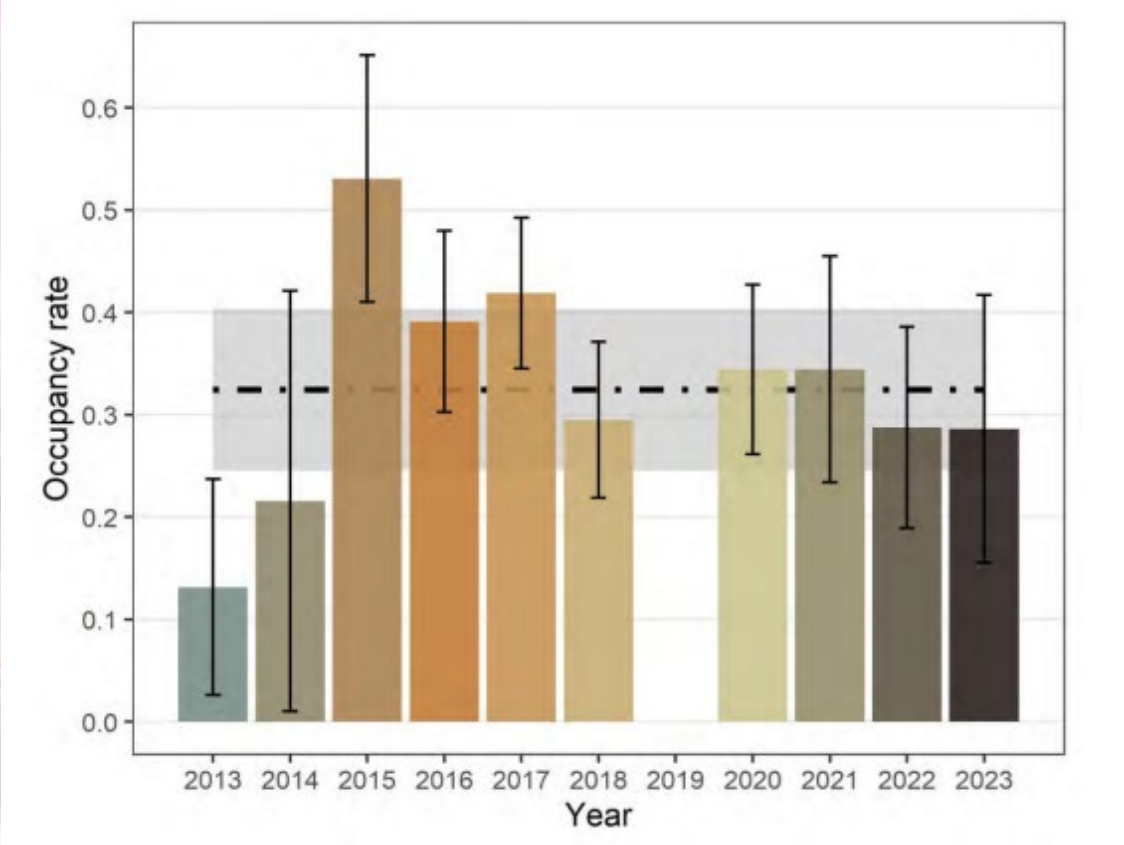
Detection Probability ranged from 10% to 34%

Apparent occupancy ranged 13% to 53%

No trends detected





REPTILE OCCUPANCY

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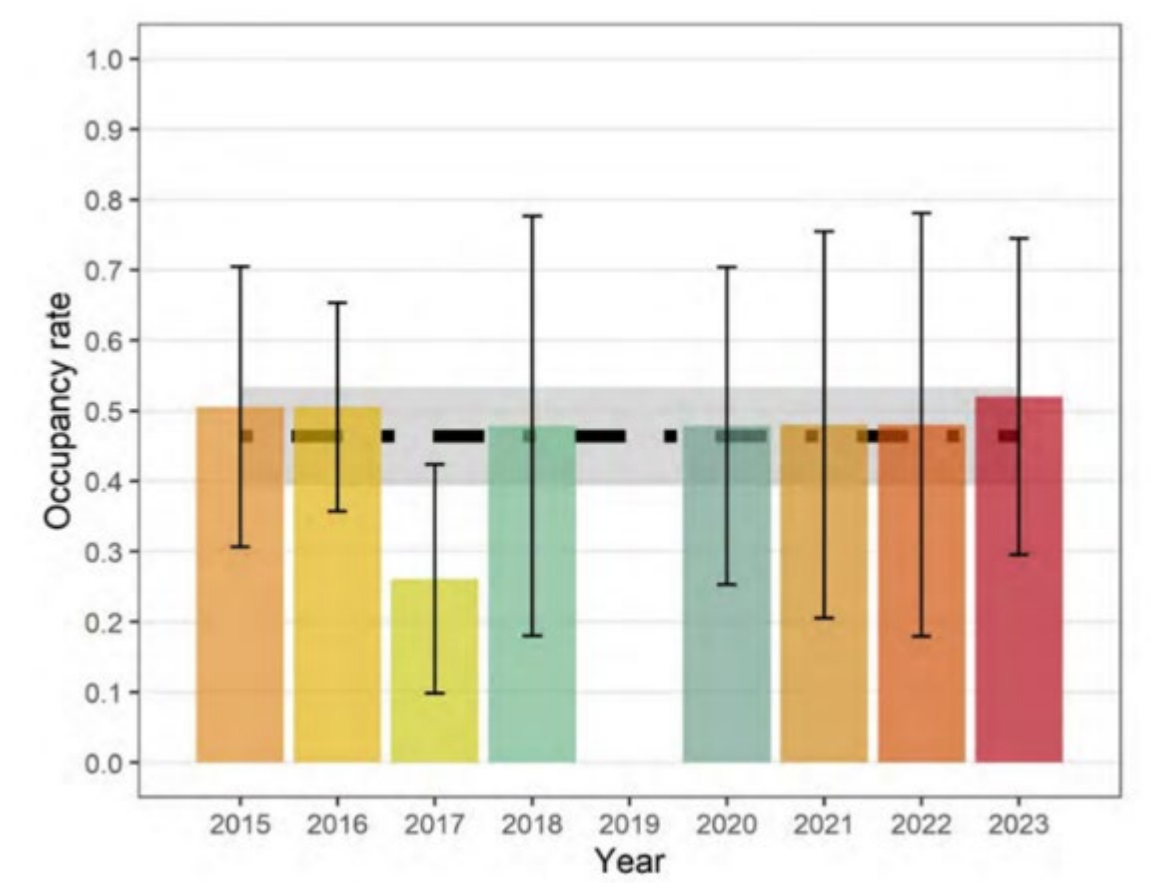
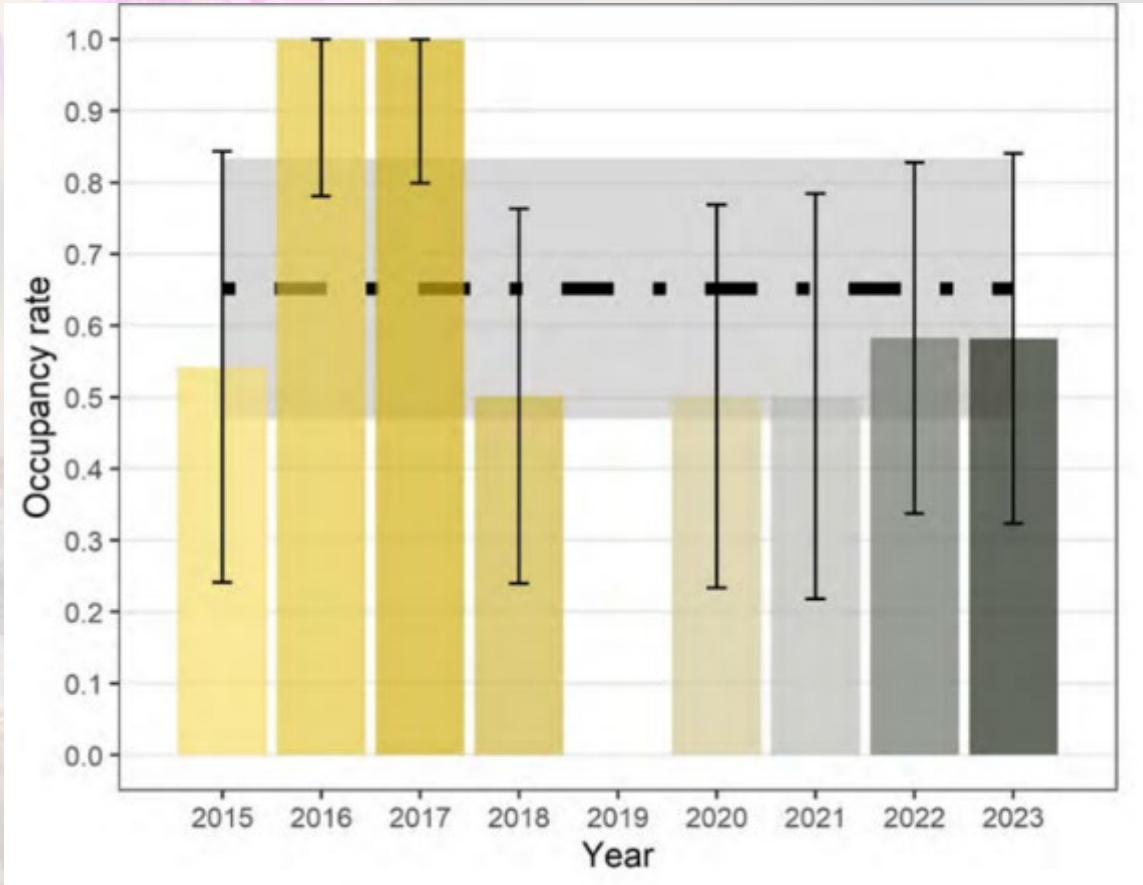
Desert Iguana



Leopard Lizard



BIRD OCCUPANCY

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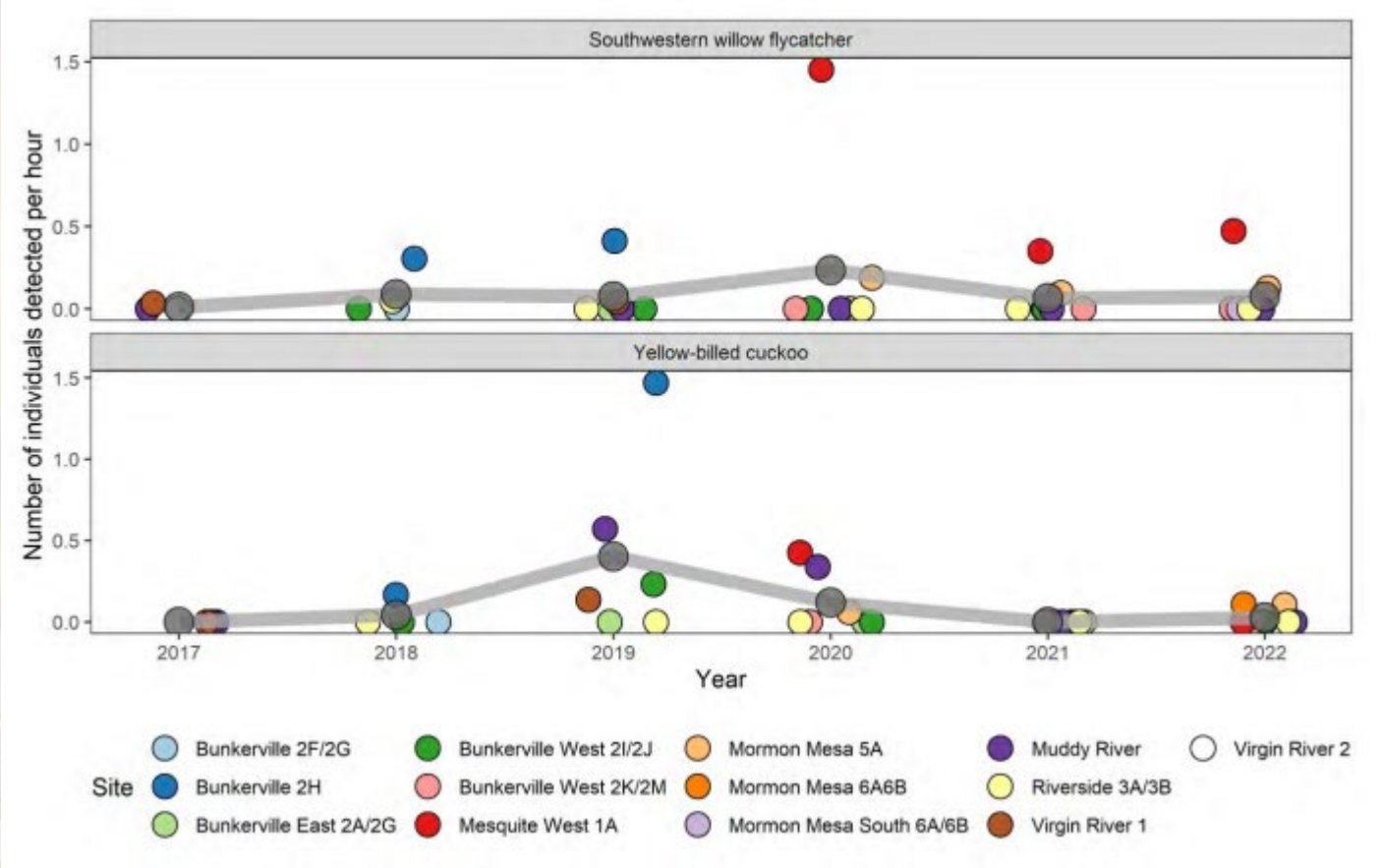
- Relative detection pre hour of survey effort has remained relatively steady
- We were able to estimated occupancy for Phainopepla, blue grosbeak, Arizona's Bell's vireo, LeConte's thrasher all of which showed no trend



PLANT SURVEYS

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- Exploratory plant surveys were conducted off the reserve units
- Three of the four species we are monitoring were found during survey
- Large populations of Blue Diamond cholla were also found during surveys.

Common name	Species	No. locs.	Area Occupied (ac)	No. individs.
Sticky ringstem	*Anulocaulis leiosolenus*	5	19.2	90
Las Vegas bearpoppy	*Arctomecon californica*	6	22.9	579
White bearpoppy	*Arctomecon merriamii*	3	37.5	135
Blue Diamond cholla	*Cylindropuntia multigeniculata*	6	1427.6	> 16,772
Threecorner milkvetch	*Astragalus geyeri* var. *triquetrus*	not found		

HABITAT MONITORING

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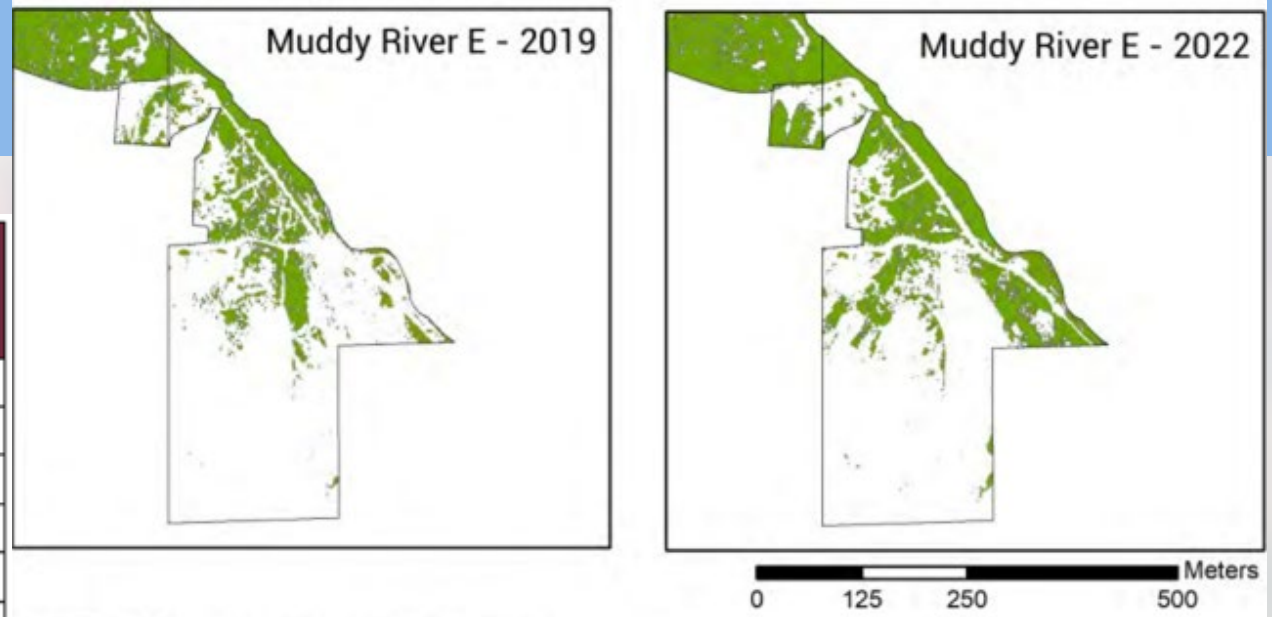
- Desert upland monitoring uses AIM protocols on 36 plots across the BCCE to be monitored every 5 years.
- Currently in the middle of the first round of surveys
- Riparian properties are monitored using commercially available remote sensing every 2 years and LiDAR every 10 years.

Habitat	Monitoring Survey	Monitored Habitat Characteristics	Threshold	Threshold Exceeded?[a]
Desert upland	AIM protocol augmented with remote sensing	Foliar cover	Statistically significant decline	Unknown
		Species richness	Statistically significant decline	Unknown
		Vegetation height	Statistically significant decline	Unknown
		Percent bare ground	Statistically significant increase	Unknown
		Proportion of soils surface in gaps	Statistically significant increase	Unknown
		Soil aggregate stability	Statistically significant decline	Unknown
Riparian	Remote sensing with ground truthing	Cover: • Vegetation composition • Total cover • Cover by functional group or species • Cover by canopy (understory vs overstory)	Thresholds are not defined for each riparian habitat characteristics because the MSHCP-covered avian species have widely diverging habitat requirements. A mosaic of habitat for all species should be maintained across all properties. The collective threshold for riparian habitat is a significant increase in acreage across all DCP riparian lands that does not meet requirements for any MSCHP-covered avian species (AMMP Appendix C; increase must not be due to natural event [e.g., severe flooding] nor the result of active restoration [e.g., tamarisk mastication]).	Unknown
		Vegetation Height: • Overall / average height • Height by canopy level		
		Vegetation Density		
		Vigor / greenness		

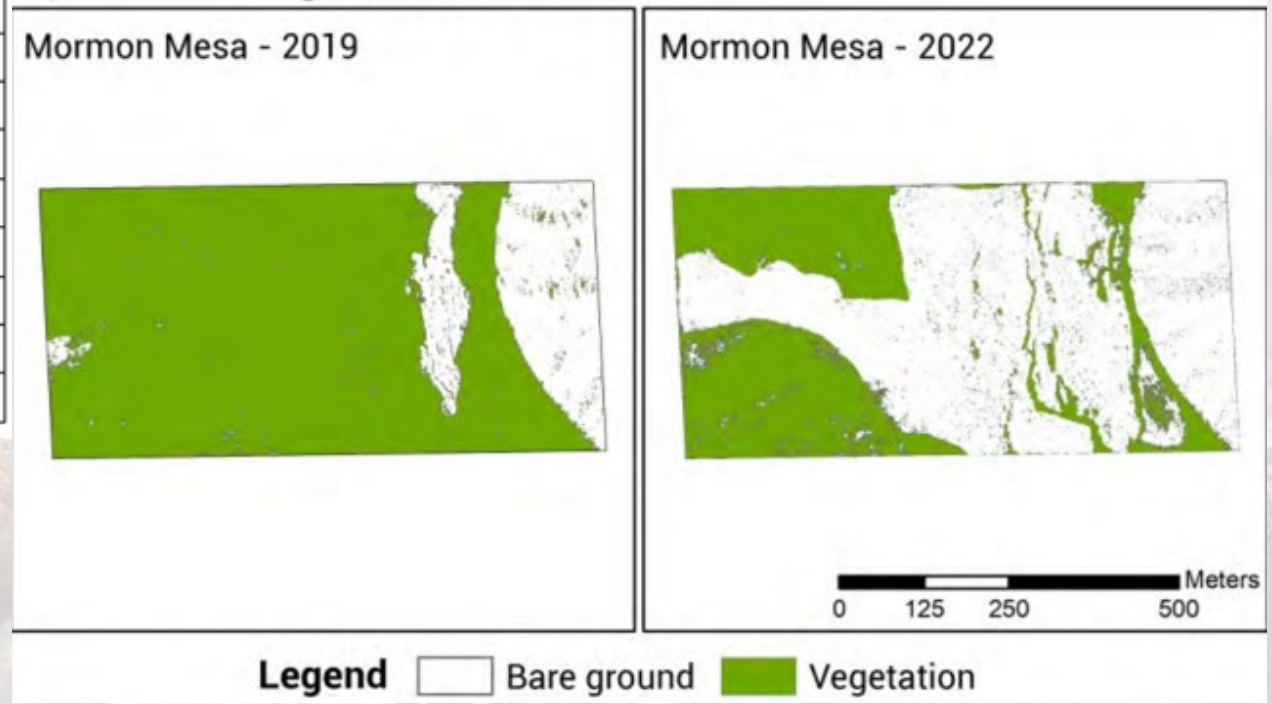
HABITAT MONITORING

Watershed	Riparian Property	Vegetative Cover (%)		Percent Change	10% Increase/ Decrease?[a]
		2019	2022		
Muddy River	A	57.4%	60.7%	5.8%	-
Muddy River	B	82.6%	90.5%	9.5%	-
Muddy River	C	34.1%	37.9%	11.2%	Increase
Muddy River	D	27.4%	51.5%	88.0%	Increase
Muddy River	E	20.6%	28.3%	37.2%	Increase
Muddy River	F	17.8%	25.3%	42.0%	Increase
Muddy River	**G**	80.6%	63.0%	**-21.9%**	**Decrease**
Muddy River	**H**	48.4%	38.2%	**-20.9%**	**Decrease**
Muddy River	**I**	8.2%	0.7%	**-92.1%**	**Decrease**
Virgin River	Bunkerville East	37.8%	38.2%	1.2%	-
Virgin River	Bunkerville West	57.6%	61.4%	6.6%	-
Virgin River	Mesquite	98.9%	99.1%	0.3%	-
Virgin River	**Mormon Mesa**	81.1%	39.2%	**-51.7%**	**Decrease**
Virgin River	Mormon Mesa South	90.1%	91.9%	1.9%	-
Virgin River	Riverside	33.2%	42.7%	28.6%	Increase

a.) Increase in vegetative cover



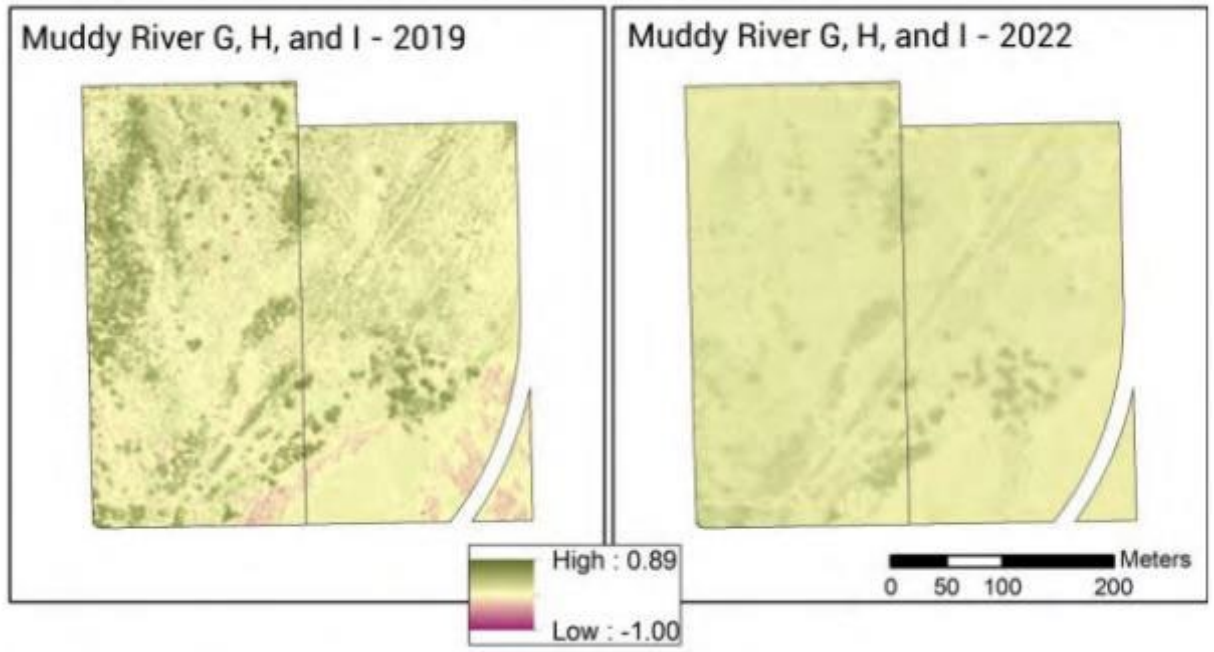
b.) Decline in vegetative cover



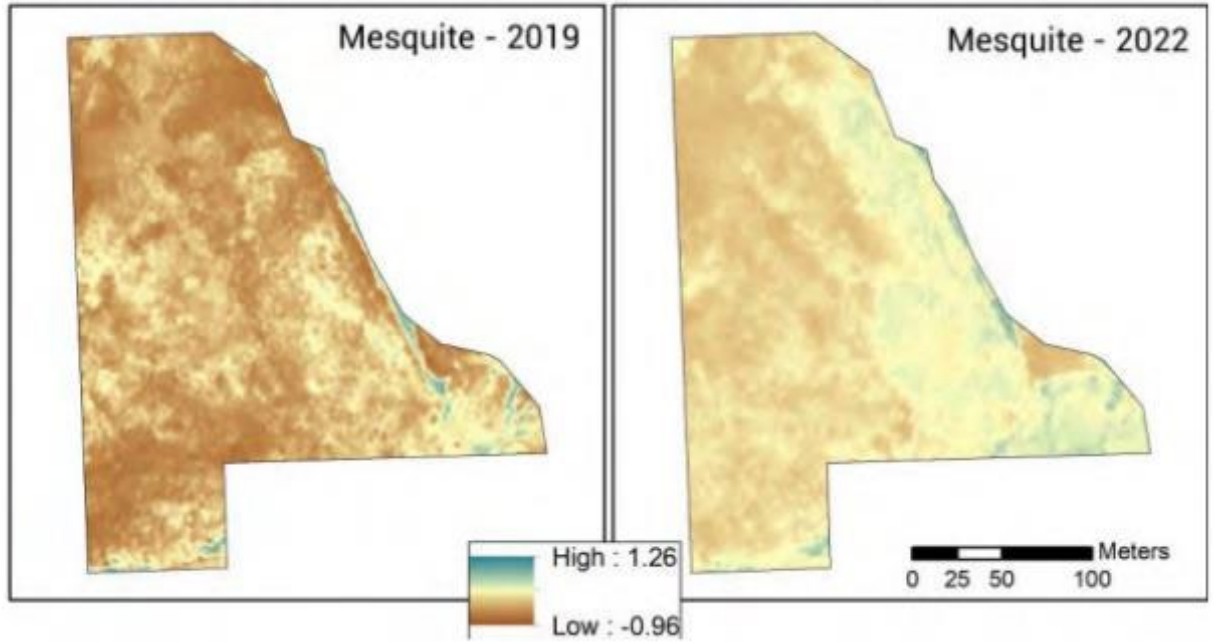
HABITAT MONITORING

Watershed	Riparian Property	NDVI[a]		Change
		2019	2022	
Muddy River	A	0.23	0.15	Decrease
Muddy River	B	0.21	0.17	Decrease
Muddy River	C	0.11	0.08	Decrease
Muddy River	D	0.07	0.13	Increase
Muddy River	E	0.04	0.09	Increase
Muddy River	F	0.00	0.10	Increase
Muddy River	G	0.12	0.07	Decrease
Muddy River	H	0.06	0.07	Increase
Muddy River	I	-0.11	0.10	Increase
Virgin River	Bunkerville East	0.08	0.09	Increase
Virgin River	Bunkerville West	0.09	0.04	Decrease
Virgin River	Mesquite	0.50	0.28	Decrease
Virgin River	Mormon Mesa	0.00	0.10	Increase
Virgin River	Mormon Mesa South	-0.03	0.14	Increase
Virgin River	Riverside	0.02	0.11	Increase

a.) NDVI - Normalized Difference Vegetation Index



b.) MSAVI - Modified Soil-Adjusted Vegetation Index



AMR CONCLUSION

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- General habitat loss is commensurate with what is expected given the percentage of habitat loss at this point in the timeline of the MSHCP.
- In a general sense, current conservation actions are balancing habitat take because the permit conditions are being met.
- Based on the 2019 USNVC division layer, North American Warm Desert Scrub & Grassland and Urban Interface Mojave Desert Scrub experienced the highest rate of development.
- Overall, the assessment of the effectiveness of the DCP's management actions is positive because all biological goals have projects that are either recently completed or in progress.
- No species are exceeding the threshold (i.e., showing a statistically significant decline), however, data for some species are not robust enough to model temporal trends in the population

THANK YOU TO THE PERMITEES

QUESTIONS? OR MEMES?

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Oklahoma Department of Wildlife Co...
@OKWildlifeDept

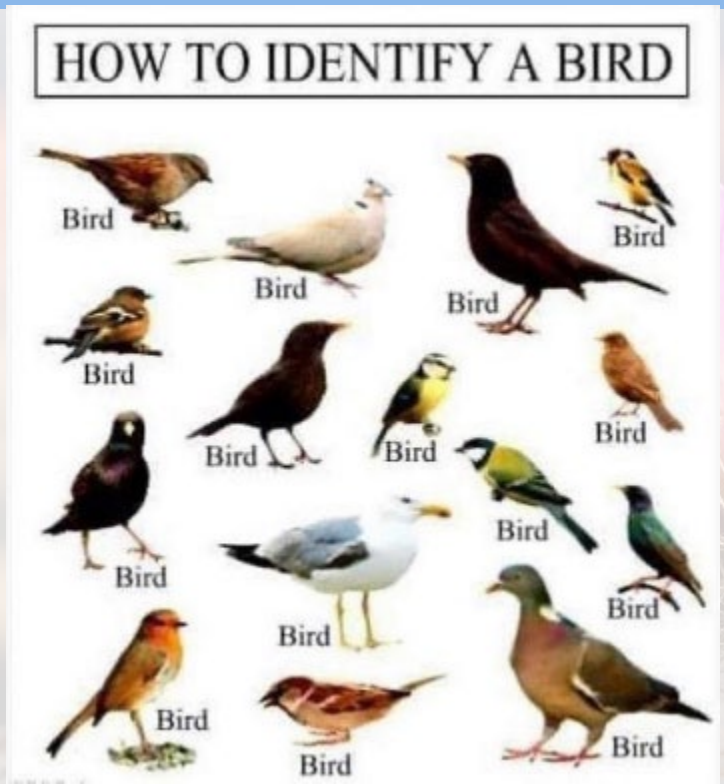
stranger: is this snake poisonous?

us: nah fam,

stranger: *picks up snake, gets bitten, starts foaming at the mouth*

us: it's venomous tho

12:06 PM · 02 Mar 23 · **1.2M** Views



Like I was saying, the circus is just one of my careers. The real money comes from Nat Geo documentaries

National Park Service
@NatlParkService

Living your life to the fullest does not have to involve selfies with bison.