

Expert Workshops for Pima County's Cienega Corridor Properties

November 1, 2019 and March 6, 2020

FINAL REPORT



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OVERVIEW

Pima County is currently developing a management plan for its Cienega Corridor properties (Figure 1). The Cienega Corridor Management Plan will guide its management of the Cienega Creek Natural Preserve, a portion of Colossal Cave Mountain Park excluding the leased area, and the Agua Verde parcels as well as several other parcels in the Cienega Corridor. The Cienega Corridor Management Plan will also meet Pima County's obligation to develop a management plan within two years of any property's allocation as mitigation under the Multi-Species Conservation Plan (MSCP).

The Preserve was originally assembled from 14 different land acquisitions in the late 1980s to serve as mitigation for the 100 miles of bank protection that was proposed in the wake of the 1983 floods. However, The US. Government at that time had no framework for accepting such an effort. In 2018 Cienega Creek Natural Preserve gained new status. Much of it is now committed as mitigation for development occurring in eastern Pima County under the MSCP. The management plan will focus on conservation of natural and cultural resources, administration of the Empirita Ranch headquarters, public use planning, fire management, hazardous materials planning and management of easements.

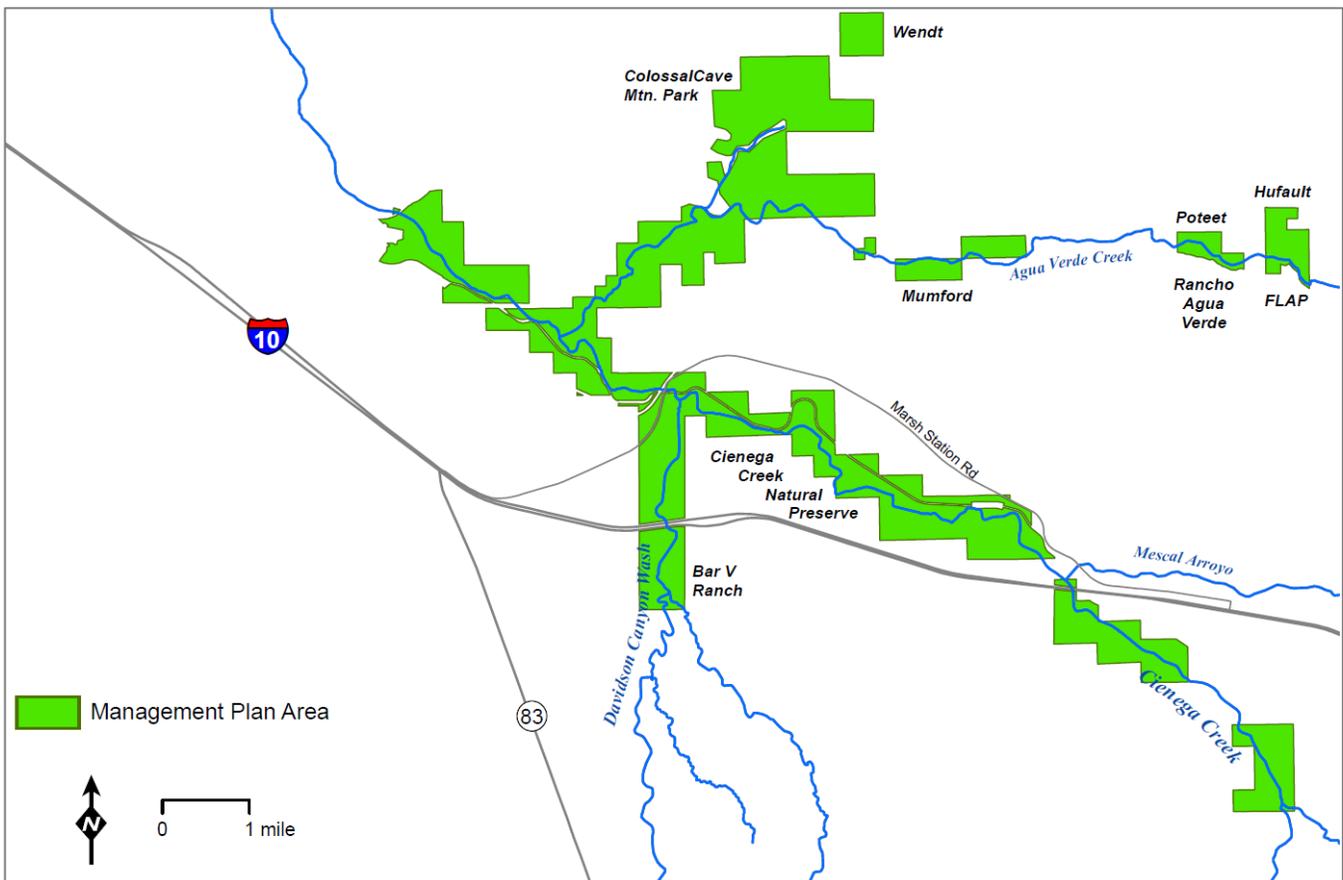


Figure 1

To inform the development of this plan, the county convened two workshops of subject matter experts during the winter of 2019 and spring of 2020. Workshop 1 was held on November 1, 2019 with 37 participants (Appendix A) who discussed and provided feedback on the Resource Priorities, and conducted an initial threats assessment for these resources. Workshop 2 was held on March 6, 2020 with 26 participants (Appendix B) who provided further review of the threats assessment and input on

Desired Future Conditions and management strategies. Agendas for each meeting are provided in Appendix C. Southwest Decision Resources facilitated both meeting and compiled the notes and report. The summary outcomes of both meetings are presented here.

RESOURCE PRIORITIES

During Workshop 1, participants were provided with draft Resource Priorities developed by the Pima County planning team (see Appendix D). Participants worked in small resource-focused groups to review these and discuss suggested additions and edits.



A summary of feedback from participants is presented below. Additions/suggestions are presented in *blue italics*; removals are presented as ~~strikethrough~~. For a detailed summary of discussion and deliberation, see the [Workshop 1 Meeting Summary](#). Following Workshop 1, the county planning team synthesized feedback into a final list of Resource Priorities (Appendix E).

Aquatic community

- ~~Floodplains~~ (*move to mesic*)
- Ponds
- Perennial/intermittent streams, springs, and cienegas
- Cattails (*exclude or modify*)
- Lowland leopard frog
- Gila chub
- Gila topminnow
- Longfin dace
- Huachuca water umbel
- Northern Mexican garter snake
- *Suggested addition: Aquatic macro invertebrates*
- *Suggested addition: Sonora mud turtle*
- *Suggested addition: Tinajas*
- *Suggested addition: Black hawk*

Mesic riparian vegetation community

- ~~Middle elevation: Oak scrub-grassland ecotone~~ (*move to xeric*)

- *Floodplains (moved from aquatic)*
- Cottonwood-willow
- Mesquite woodland
- Mixed broadleaf interior southwest or riparian deciduous forest
- Sonoran riparian scrub
- Sacaton grassland
- Merriam's mouse
- Abert's towhee
- Arizona Bell's vireo
- Southwestern willow flycatcher
- Yellow-billed cuckoo
- Western red bat
- Western yellow bat
- *Suggested addition: Black hawk*
- *Suggested addition: Gray hawk*
- *Suggested addition: Box turtle*

Xeric Riparian Community - *The group agreed to add Xeric Riparian as a new resource priority*

- *Mesquite woodlands*
- *Sacaton grassland*
- *Sonoran riparian scrub*
- *Arizona Bell's vireo*
- *Oak scrub*
- *Box turtle*

Upland vegetation community

- ~~Desertscrub: Saltbush desert scrub~~
- Upland grassland/mixed grass-scrub
- Succulents (saguaros and agave)
- ~~Pima pineapple cactus~~
- Rufous-winged sparrow
- ~~Desert box turtle~~
- California leaf-nosed bat
- Lesser long-nosed bat
- Mexican long-tongued bat
- Pale Townsend's big-eared bat
- Needle-spined pineapple cactus
- Sonoran desert tortoise
- *Suggested addition: Pollinators*
- *Suggested addition: Contiguous groundcover*
- *Suggested addition: Biocrust and soil health*
- *Suggested addition: Human component*

Rock Outcrops: limestone, talus, rock shelters, and caliche caves (Group 3)

- Talus slopes
- Rock outcrops (non-limestone)

- Rock shelters and Caliche caves
- Limestone outcrop
- Talus snail species and other terrestrial snail species.
- *Potential addition: Invertebrates*
- *Potential addition: reptiles*
- *Potential addition: lichens, mosses, ferns*

Wide-ranging terrestrial wildlife (Group 4)

- Xeroriparian and other passages under I-10
- bears
- mountain lion
- deer
- coatimundi
- tortoise
- *Suggested addition: box turtle*
- *Suggested addition: badger*
- *Suggested addition: kit-fox*
- *Suggested addition: skunk*
- *Suggested addition: antelope jackrabbit*
- *Suggested addition: Connectivity between parcels in the planning area*
- *Potential addition: bobcat*

Mines, caves, adits, bridges; upland bat roost habitat (Group 4)

- Mines
- Caves and adits
- Bridges
- *Suggested addition: Colossal Cave Mountain Park*
- *Suggested addition: Rock shelters*
- *Suggested addition: Food resources*

Cultural and physical landscapes (Note: these will be addressed separately for Cienega watershed)

- Watershed (physical bounds of landscape)
- Human movements across the watershed
- Human movements between watersheds
- Landforms (physical constants in the landscape)
- Vegetation communities – past and present
- Stream terraces
- Streams/drainages
- Water management sites
- Natural processes
- Locations of raw materials
- Ranching era infrastructure
- Mining era infrastructure
- CCC era – buildings, erosion structures, range management infrastructure,

Cultural sites

- CCC sites

- Hohokam sites
- Sobaipuri sites
- O’odham sites
- Native American Ancestral Sites on Holocene Terraces
- Culturally important places from known oral histories
- Culturally important collecting areas
- Historic sites: buildings, features, cemeteries
- Three bridges – railroad history; railroad camp; railroads cross old and new lines
- AZ EE:2:44(ASM) Marsh Station Site (SDCP priority resource)
- AZ EE:2:51(ASM) Mescal Wash Site (SDCP priority resources)
- AZ BB:14:498(ASM) Cienega Stage Stop (SDCP priority resource)
- AZ EE:2:492(ASM) Old Pantano Townsite (SDCP priority resource)
- AZ EE:25(ASM) New Pantano Townsite (SDCP priority resources)
- Loss of Rancho del Lago estate

Heritage connections

- Stewardship
- Engagement
- Education
- Impactful/meaningful Activities
- Stories of the Land
- Research

DESIRED FUTURE CONDITIONS

During Workshop 2 participants were provided with draft Desired Future Conditions for all Resource Priorities (presented in black text below). In small groups, participants discussed and provided feedback. A summary of comments are provided in *blue italics*. The county team will incorporate these suggestions and finalize the Desired Future Conditions as part of the planning process.

1. Aquatic Community

- Water permanence in pools – The number of perennial aquatic pools > 0.5 m in depth—as measured during June—is maintained or improved in the Cienega Creek Natural Preserve over a five-year rolling average.
- Hydrologic regime – Water is present in multiple reaches of Cienega Creek Natural Preserve during June.
- Water quality – Total dissolved solids and priority metals are maintained at the levels identified in the 1989 baseline study for Cienega Creek at Marsh Station Road, and the pre-Rosemont mine baseline in Davidson.
 - *May want to include nutrients and phosphates.*
 - *What about E. coli? If there is urban development, an increase in public use, or an increase in cattle, there may be an impact.*
- Native fish persistence – Two or more native fish species are present in multiple reaches of Cienega Creek Natural Preserve.
- Native amphibian persistence – Lowland leopard frogs are seen through perennial reaches of Cienega Creek and these are in multiple reaches.

- F. Aquatic non-native species presence – No non-native fish or crayfish are detected during field visits or reported by partners within Cienega Corridor.
- G. Aquatic non-native species presence – Bullfrogs are absent or in such low numbers as to lack recruitment (multiple age stages, egg masses) within CCNP.

Aquatic – Potential missing components

- *Insect communities - A DFC for this might be a positive direction in the Hilsenhoff index (community index) over the course of the plan.*
- *Erosion, incompatible recreation (ORV) - Lidar could capture this. There is also sedimentation monitoring, which is the product of erosion.*
- *Algae blooms - If an aquatic plant or algae were taking over, this would be noted during other monitoring efforts and could be investigated further.*

2. Mesic and Xeric Riparian Community

- A. Riparian plant community health – The extent of Cottonwood and willow forests along Cienega Creek and Posta Quemada Wash are maintained at level no less than 20% below the 2015 baseline.
 - *Group discussed what percentage should be used. 10-25% were suggested, but the group decided to stay with 20%.*
 - *Would be useful to see map of what 20% less cottonwood-willow forest would look like .*
- B. Riparian plant community health – The mesquite forest canopy cover is maintained in most places in the Cienega Corridor with only minimal loss due to fire or bank erosion based on the 2015 baseline.
- C. Riparian oblique bird species persistence – Yellow-billed cuckoos continue to be detected in the Preserve at levels similar to the initial MSCP monitoring baseline.
- D. Hydrologic regime – Shallow groundwater levels at key monitoring wells are maintained at levels sufficient to support existing riparian tree species and upward variations allowing recruitment of these species.
- E. Riparian plant community health – Total vegetation volume and/or other metrics such as canopy cover is maintained at level no less than 10% below 2015 baseline in the Corridor where depth to water is insufficient to support mesic riparian vegetation.
- F. Riparian plant community health – Channel depths based, as measured by bare earth lidar, are not consistently downcutting or aggrading between the Pantano gage to Empirita Headquarters. No evidence of downcutting along the Agua Verde relative to baseline (once established).
- G. Non-native plant species presence – There is no evidence of recruitment of new tamarisk or Arundo patches in CCNP, or if so, it is removed quickly.
 - *What about newer non-native species that are not listed here? Limiting to just these two seems to miss a lot.*
 - *Would walking along the corridor as in wet/dry mapping, actually pick up recruitment of tamarisk?*
 - *Probably not, walks do not go to overbank areas.*
 - *How are we defining recruitment? Maybe recruitment isn't the right word because you might get a big flush of seedlings but all or most may not survive.*
- H. Non-native plant species presence – Non-native grass species are not dominant in either sandy wash or sandy loam deep ecological sites within the watershed.

3. Upland Communities (includes upland vegetation, terrestrial wildlife, rock outcrops, bat roosts)

- A. Bare ground – Percent bare ground in long-term soil-and-vegetation plots in the vicinity of the Cienega Corridor is below plot baseline, measured every five years.
- *We don't just want bare ground not to increase, we may want it to not decrease past a certain point.*
 - *Could change "is below plot baseline" to "within natural range of variability"*
- B. Native plant cover – Plant cover in long-term soil-and-vegetation monitoring plots in the vicinity of the Cienega Corridor is at or greater than plot baseline, measured every five years.
- C. Native plant cover – Vegetation in watershed is maintained consistent with reference areas for major ecological sites /meets PC rangeland health standards.
- D. Non-native plant cover – The relative percent of non-native plants in long-term soil-and-vegetation is stable or has declined relative to plot baseline, measured every five years.
- E. Fire regime – Prescribed or wildland fires have occurred in only semi-desert grasslands, but not riparian areas in the watersheds.
- *The wording is confusing. The intention is that fire is only occurring where it should occur.*
 - *The group discussed that the fire regime is different within the different communities.*
 - *The group agreed on updated language: Fires remains within the expected range of variability in planning area and its contributing watersheds.*
- F. Cave site integrity – Natural caves used by bats during the baseline are still in a natural state and minimal intrusions or destructive activities have occurred based on site inspection (Note, the planning area excludes the Colossal Cave lease).
- *Could consider adding that cave microhabitats are not degrading/drying out. But what could we do about this through management, if it is due to climate as opposed to operations? (In this management plan, the caves considered exclude the lease.)*
- G. Mining – No mining is occurring anywhere on the Cienega Corridor properties.
- H. Wildlife movement corridors – Terrestrial wildlife habitat is maintained within 75% of the Beier wildlife linkages and all are still viable.
- *This is at a really high scale, and is only focused on movement. Is there a need for a smaller scale movement DFC, or one addressing fragmentation? And if recreation has an effect on movement, should this be represented in the DFCs?*
 - *Possible DFC related to wildlife diversity - loss or addition of species detection on cameras (for those that already have multiple years of data).*
 - *Possible DFC related to fragmentation - Quantify road inventory, utility corridor, OHV incursions. Group discussed, but it was not clear if this would work.*

Overall feedback

- *Think more about the overall ecological function. Consider the DFCs in a more integrated view (particularly DFCs A-D).*
- *Suggested addition to DFCs - Soil stability and erosion dynamics (or ecological function) are within the natural range of variability, based on NRCS ecological sites.*
- *It may be appropriate to have DFCs at different scales (e.g. nested objectives).*

4. Cultural Resources (includes Site Integrity and Heritage Conditions)

- A. Site integrity: SDCP sites – Maintain little to no change in site integrity for SDCP identified cultural sites (i.e. Pantano Townsite).

- *Instead of “little to no change” change to “less than 5% for pre-historic and historic sites”*
- B. Site integrity: Historic sites – Maintain little change in structural and site integrity for historic sites with above ground adobe features.
 - *There may need to be more types of historic sites than above ground adobe*
 - *Change to no change in site integrity for priority historic sites. This way, more historic sites will be included.*
 - C. Site integrity: Landscape scale – Maintain little to no change in site integrity scores relative to 2019 baseline across all inventoried cultural sites. Scoring is based on a 1-4 scale related to site steward poor, fair, good, very good qualitative ratings.
 - D. Site integrity: Anthropogenic effects – Minimal to no evidence of anthropogenic vandalism or looting of known cultural sites or objects. Focus on sites that have known history of anthropogenic disturbances.
 - E. Site integrity: Environmental effects – Limit natural environmental impacts (erosion) to the expected range of variability over time. Focus on sites that have known history of erosion issues.
 - F. Heritage connections: Anthropogenic effects – Increase public awareness and thereby eliminate looting and vandalism, the physical destruction of cultural resources.
 - G. Heritage Connections: Information sharing – Engage in three or more programs that involve active participation in sharing importance of the cultures (i.e. Site Steward Program, grants and funding, research).
 - H. Heritage Connections: Public engagement – Involvement of at least one local community in cultural resource preservation planning and/or actions.
 - I. Heritage Connections: Education – One educational project, presentation, tour, or program will be conducted per year.
 - J. Heritage Connections: Tribal engagement – Staff will present to the Four Southern Tribes Working Group on the Cienega Corridor monitoring and progress towards desired conditions every two years.

Overall feedback

- *Anthropogenic effects and Environmental effects will be subsets of Landscape Scale*
 - *Anthropogenic and natural processes are the causal factor for most of the impacts on sites*
 - *It may be easier to mitigate anthropogenic changes than natural processes*
 - *Suggestion - maintain little to no change in site integrity based upon site steward ratings; for landscape, no more than 10%*
- *Priority sites, historic sites, and landscape sites - These categories are still fuzzy and need more work.*

THREATS ASSESSMENT

A threats assessment was completed over the course of both workshops. The threats assessment was based on the method used by The Nature Conservancy (see Appendix G). As part of the threats assessment, the county developed a Situation Analysis that summarizes the evolving understanding of threats and how they are affecting the Resource Priorities (Figure 2 and Appendix F.) It also outlines how threats and stressors are conceptualized differently. A *threat* is a specific source or driver of the stressor degrading the quality of condition of a specific resource priority. A stressor is a more general process that may impair the function of a Resource Priority. A threat may occur outside the planning area (such as groundwater pumping); a stressor must occur within the planning area.

Conceptual Situation Analysis – Threats + Stressors

Each Threat can be a source of one or more Stressors. We standardized nomenclature of Threats per Nature Conservancy where possible.

Colored arrows show which Threats contribute to the Stressor.

Stressors directly affect the Resource Priorities. Stressors need to occur within the study area, whereas Threats may be located outside.

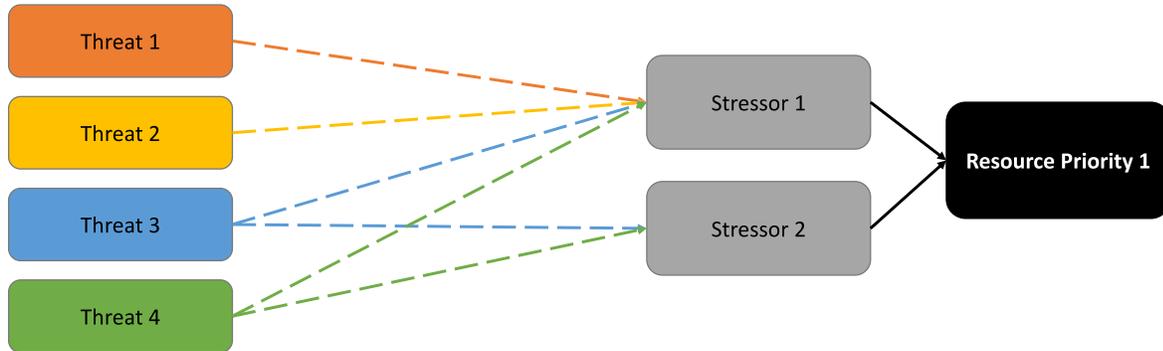


Figure 2

In Workshop 1, participants were provided with a draft list of threats for each Resource Priority. In small groups they provided feedback on the threats and any that may have been missing, and subsequently performed a group assessment of the *scope* and *severity* of each threat (see Appendix G for a definition of terms). In Workshop 2 participant reviewed the initial scope and severity ratings and assessed the *irreversibility* of threats. A summary of results from each workshop are presented below. See Appendix H for the final Threats Assessment developed by the county following Workshop 2.

Results of group threats assessment – Workshop 1 (scope and severity)

Results summarized below depict how members of small groups rated the scope and severity of each threat: Very High (VH), High (H), Medium (M), or Low(L) (see Appendix G). Numbers indicate how many group members chose this rating. Threats added by the group are recorded in *blue italics*. Threats removed by the group are shown as strikethrough. For detailed notes on discussion of each threat, please see [Workshop 1 Meeting Summary](#).



Aquatic Habitats

Threat	Scope	Severity
1. Climate change / drought	VH-7	VH-7
2. Human development	VH-1, H-6	VH-1, H-3, M-3
3. Mining	VH-3, H-2, M-3	VH-2, H-5
4. Groundwater pumping	VH-4, H-3	VH-5, H-2
5. Invasive species	VH-2, H-3, M-2	VH-2, H-4, M-1
6. <i>Transportation / acute toxic spills</i>	M-4, L-3	VH-1, H-3, M-1
7. <i>Grazing (adverse)</i>	H-3, M-4	VH-1, H-3, M-1, L-2
8. Off-highway vehicles	VH-1, H-1, M-5	H-2, M-1, L-4
9. <i>Diversions</i>	M-1, L-6	H-2, M-4, L-1

Mesic Riparian Areas

Threat	Scope	Severity
1. Climate change / drought	VH-7	VH-7
2. <i>Human development</i>	VH-1, H-4, M-2	VH-1, H-4, M-1, L-1
3. Groundwater pumping	VH-3, H-4	VH-1, H-6
4. Invasive species	VH-2, H-3, M-2	VH-1, H-2, M-4
5. <i>Mining</i>	VH-3, H-4, M-1	VH-1, H-4, L-2
6. <i>Diversions</i>	M-1, L-6	H-1, M-4, L-2
7. <i>Grazing</i>	H-1, M-5, L-1	M-4, L-3
8. Off-road vehicles	H-2, M-5	H-2, M-4, L-1
9. <i>Wood cutting</i>	M-1, L-6	M-1, L-6
10. Population growth		
11. Conversion of Ranching, lot splitting		
12. Lack of recruitment		

Xeric Riparian

Threat	Scope	Severity
1. <i>Climate change / drought</i>	VH-6, H-1	H-3, M-3, L-1
2. <i>Human development</i>	VH-1, H-5, L-1	VH-3, M-4
3. <i>Invasive species</i>	VH-3, H-4	VH-3, M-4
4. <i>Mining</i>	H-6 VH-2	H-2, M-3
5. <i>Grazing</i>	VH-2, H-5	H-1, M-4, L-3
6. <i>Diversion</i>	M-3, L-4	H-4, L-2
7. <i>Off road vehicles</i>	H-5, M-2	VH-3, M-4

Upland vegetation community

Threat	Scope	Severity
1. Climate change/drought	VH-7	H-1, M-6
2. <i>Loss of water availability</i>	VH-6, H-1	H-3, M-4
3. High severity wildfires	H-1, M-6	H-2, M-5
4. Invasive grasses	H-1, M-6	H-2, M-5
5. Human development/fences, habitat fragmentation and roads	H-7	H-5, M-2
6. <i>Erosion</i>	H-6, M-1	H-3, M-4
7. Linear infrastructure (roads, rail, gaslines, etc.)	H-7	H-5, M-2

8. Mining	M-2, L-5	M-1, L-6
9. <i>Unmanaged recreation</i>		
10. Overgrazing		
11. Fire suppression (grasslands)		

Rock Outcrops: limestone, talus, rock shelters, and caliche caves

Threat	Scope	Severity
1. Climate Change and drought	VH-7	H-3, M-3, L-1
2. Unmanaged recreation (off-road travel)	M-7	M-2, L-2
3. Invasive plants	H-4, M-3	M-7
4. Mining		
5. Erosion		

Wide-ranging terrestrial wildlife

1. Development: residential, commercial, industrial	VH-5, H-2	VH-4, H-2, M-1
2. <i>Secondary roads</i>	VH-1, H-4, M-2	H-5, M-5
3. Interstate, Highway 83, <i>railroads</i>	VH-1, H-4, M-2	H-5, M-2
4. Linear utilities (powerlines and gaslines) <i>(merged powerlines and gaslines)</i>	M-4, L-3	M-4, L-3
5. Loss of surface water sources <i>(added "surface")</i>	VH-6, H-1	VH-3, H-4
6. Invasive species <i>(changed from woody species)</i>		
7. <i>Erosion</i>		
8. <i>Fire</i>		
9. <i>Loss of grassland</i>		
10. Mines		
11. Fencelines		
12. <i>Recreation</i>		

Mines, caves, adits, bridges; upland bat roost habitat

Threat	Scope	Severity
1. Mine closures		
2. <i>Loss of surface water</i>	VH-5, H-2	H-7
3. Human disturbance of mines/caves	M-3, L-1	M-4
4. Increased access to mines/caves		
5. Bridge maintenance		
6. <i>Loss of food resources</i>		
7. <i>Changes in phenology</i>		

Cultural and physical landscapes

Threat	Scope	Severity
1. Encroaching development/infrastructure	VH-5, H-5	VH-4, H-4
2. Climate change	VH-4, H-5, M-1	VH-7, H-3
3. Recreation activities	VH-1, H-7, M-2	VH-1, H-9
4. Change in vegetation communities/exotic grass – increased risk of fires		
5. Erosion		
6. Decrease in groundwater		
7. Adverse grazing		

Cultural sites

Threat	Scope	Severity
1. Vandalism/looting	VH-10	VH-1, H-3, M-6
2. Erosion (stream terraces)	H-2, M-7, L-1	H-7, M-3
3. Recreation activities	VH-4, H-6	H-10
4. Encroaching development/infrastructure		
5. Climate change/lowering water table		
6. Fire		
7. Soil piping / in fine grained alluvium		
8. Adverse grazing/trampling		

Heritage connections

Threat	Scope	Severity
1. New populations/growth/change leading to lack of connections to local area and resources	VH-5, H-3, M-2	VH-3, H-7
2. Reduced funding/resources	VH-4, H-6	VH-7, H-3
3. Data gaps	H-6, M-4	VH-1, H-7, M-2
4. Limited education/transfer of information		
5. Loss of connection between tribal people and places		
6. Lack of law enforcement		
7. Inability to sustain engagement		

Results of group threats assessment – Workshop 2 (irreversibility)

Between Workshop 1 and 2, the county planning team synthesized ratings for scope and severity, and provided draft ratings for those that remained unassessed after Workshop 1. In Workshop 2 participants reviewed these ratings in small groups, and discussed *irreversibility* ratings. Summary results are presented here. For detailed discussion notes, please see [Workshop 2 Meeting Summary](#).

Items in **bold** were discussed by the small groups. Updated ratings in bold are agreed changes. Ratings are recorded as (*scope / severity \irreversibility*), VH=very high, H=high, M=medium, L=low

Aquatic Habitats in Cienega Corridor	Climate change altering groundwater table, causing habitat loss, erosion, deposition, increasing water demand during drought, and altering water quality (VH H \ H) → no change
	Conversions to housing and commercial (L L \ M) → (L VH \ H)
	Mining (indirect effects) (M L \ L) → (M H \ H)
	Groundwater withdrawal (VH H \ M) → no change
	Invasive animals (H H \ M) → no change
	Chemicals and toxins (spills) (M H \ M) → no change
	Incompatible grazing (M H \ L) → (M M \ L)
	Incompatible recreation (ATVs) (M M \ L) → no change
	Surface water withdrawal (L M \ L) → no change
	Invasive plants (M H \ M) → no change

	Lack of dam maintenance (M M \ M) → no change
Mesic Riparian Areas in Cienega Corridor	Climate change causing flood, erosion, altered successional dynamics due to drought, altered community structure, fires (VH H \ H) → no change
	Conversions to housing and commercial (L VH \ M)
	Groundwater withdrawal (H H \ M)
	Invasive plants (H H \ M)
	Mining (indirect effects) (M M \ H)
	Surface water withdrawal (L M \ L)
	Incompatible grazing (M M \ L)
	Off-road vehicles (M M \ M)
	Wood cutting (L L \ M)
	Utility corridors (L H \ H-M) → (L H \ H)
	Fire suppression, fire breaks (L H \ H-M) → no change
	Lack of dam maintenance (L H \ M)
Xeric Riparian Areas in Cienega Corridor	Climate change altering floods, fire, ground water, erosion, deposition (VH M \ H) → (VH H \ H)
	Conversion to residential or commercial (L VH \ M)
	Invasive plants (H H \ M)
	Mining (indirect effects) (L H \ M)
	Incompatible grazing (M M \ L)
	Surface water withdrawals (Dam) (L M \ L)
	Incompatible recreation (ATVs) (M M \ L)
	Chemicals and toxins (H M \ M)
Surface water withdrawals (Stock ponds) (L M \ M) → remove	

Upland vegetation community in Cienega Corridor	Climate change/drought causing erosion, veg conversion, poor veg condition due to low moisture (VH M \ VH)
	Fire suppression in grassland (M M \ H) → no change
	Invasive grasses in desert scrub altering fire (M M \ H) → (H M \ H)
	Conversion to residential and commercial (L VH \ VH)
	Mining (direct effect) (L VH \ VH)
	Incompatible recreation (H M \ M)
	Incompatible grazing (M M \ M)
	Loss of key pollinators (M? ? \ ?) insufficient information to rank
	Change in phenology caused by climate change (VH ? \ ?) → (VH ? \ VH)
Fire suppression (in desert scrub) (VH M? M or H?) → (remove)	
Bat roosts (natural caves, soil pipes, mines, bridges) in Cienega Corridor	Obstruction of roost opening due to natural collapse (H / M \ VH)
	Climate change altering habitat quality for roosts and prey base (VH H \ H) → no change
	Incompatible recreation including obstruction or vandalism (L H \ M)
	Conversion to residential and commercial - direct (L L \ H)
	Bridge maintenance or replacement (L H \ VH)
Groundwater withdrawal causing loss of water (H H \ H)	
Rock and Caliche Outcrops in Cienega Corridor	Climate change altering temp and humidity of microhabitat (VH M \ VH)
	Incompatible recreation (off-road travel) (L M \ L)
	Invasive plants (M L \ M)
	Mining (direct effect) (L VH \ VH)

Terrestrial wildlife in Cienega Corridor vulnerable to fragmentation from outside Corridor	Conversion to residential and commercial including roads, pets (VH H \ H)
	Interstate, Highway 83, railroads (L M \ VH)
	Linear utilities (powerlines and gaslines) (M M \ VH)
	Climate decreasing available surface waters (VH H \ VH)
	Invasive plants (M M \ M?)) → no change
	Groundwater withdrawals causing loss of water (H M \ L) → no change
	Surface water withdrawals diversions causing loss of water (L M \ L) word change
	Mines (indirect effect) (L L \ VH)
	Fencelines (H L \ L)
	Incompatible recreation (H L \ L) → (H M \ M)
Cultural Sites in Cienega Corridor	Climate change causing erosion and lowered water table (V M \ VH) → broken into: Climate change for sites in xeric zones (VH H \ H) Climate change for sites in mesic zones (VH H \ H) Climate change impacts on historic sites with build features (M M \ M)
	Incompatible recreation (ATVs) (H H \ M) → change to: Incompatible recreational uses inside the planning area (VH H \ M)
	Looting and vandalism (VH M \ VH)
	Lack of law enforcement /funding (M M \ L)
	Major road construction / expansion (L M \ H)
	Conversion to residential, commercial (L M \ H) → (VH H \ H)
	Utilities (L M \ VH)
	Lack of maintenance (H H \ M)
	Incompatible grazing (L L \ M)
Heritage Connections affecting Cienega Corridor	Loss of physical features and views (L M \ H)
	Looting and vandalism (? ? \ ?) → Change to: “Cultural degradation of heritage values”(H/VH/VH)
	Lack of funding and resources (H VH \ L)
	New populations (H H \ L?) → (VH H \ M)
	Limited education and transfer of information (H M \ M)
	Loss of access to cultural sites (M M \ L)
	Data gaps (H H \ L)
	Lack of maintenance (? ? \ ?)
	Incompatible grazing (M M \ L)
	Add: Scarce Resources [VH/VH/H]
	Add: Loss of Valuing Heritage Connections/Attachment to Place [H/H/M]
Add: Arizona State Land Department Decisions (not evaluated)	

STRATEGY DEVELOPMENT

During Workshop 2, participants worked in small groups to review current and past management strategies for the Cienega Corridor, and collaboratively develop new strategies to help achieve Desired Future Conditions. The list of current and recent strategies provided to participants appears in Appendix I. A summary of strategies suggested in each category is presented here. For further detail on all suggested strategies, please see [Workshop 2 Summary](#).

Strategies were discussed in three categories and participants had the opportunity to contribute to two topics each:

- A. Management policies and land acquisitions
- B. Outreach and engagement
- C. Protection and restoration

A. Management policies and land acquisitions

Suggested strategies

Acquisitions

1. Develop a cooperative agreement with State Lands
2. Pursue strategic land trades (with Arizona State Land Department or private entities)
 - Walden piece (NPS)
3. Acquire mining claims and patents to reduce mining impacts
4. Acquire lands: Amber Adit; Sink hole near Amber Adit

Management

5. Coordinate with other partners to provide recreation opportunities at a landscape-scale (beyond management area boundary)
6. More cooperative agreements for resource management (ability to transfer funds to other entities to help with management)
7. Plan for fires (protection, prescription and suppression)
8. Lend support to important legislation that can improve the management of natural and cultural resources in the planning area (e.g. Ecological Water Bill; groundwater policy)
9. Amend the existing strategy “Protection of significant habitat and maintenance of wildlife corridors shall be given consideration when assessing potential land acquisitions” to include cultural and other resources.
10. Protect water quality through limits on waste disposal (especially Colossal Cave area)
11. Inform public about recreation opportunities and rules
12. Expand the Active Management Area to include the whole Cienega area
13. Proactive planning for fire and other disaster management

B. Outreach and engagement

Suggested strategies

- Develop better coordination between agencies, private, and non-profit companies
- Host an event; coordinated between different agencies.
 - Semiannual, annual or biannual watershed event or meeting
 - This is already happening with the BLM for biological resources



- Focus on priority activities that will address desired future conditions
- Include small workshop groups
- Like Science on the Sonoita Plain - A science based program that includes cultural
- Organize a website or social media platform that incorporates many of the stakeholders.
- Develop and implement community outreach, education materials/programs (including workshops and speakers bureaus), and volunteer projects relating to Cienega Corridor programs and issues
 - Constituents
 - General public/ Local communities – Residents, visitors and recreational users
 - Civic organizations /Non-profit organizations
 - Developers
 - Schools
 - Private
 - Agencies
 - Policy makers
 - Current outreach
 - 4H – Bar V ranch, Little Rascals 4H
 - YES! (Youth Engaged Stewardship – Cienega Watershed Partnership)
 - Cienega Watershed Partnership – Science on the Sonoita Plain, State of Watershed
 - Vail Preservation Society (will be housed in the old post office building)
 - Cienega Creek visitor permit program
 - AZ State Parks - Site Stewards, Certificate program
 - National Register work
 - Arizona Archaeological and Historical
 - Pima County Environment Education – Living River of Words (LROW) program

C. Protection and restoration

Suggested strategies

1. There are areas where cattle have been excluded for a while where grasses are looking good, but would maybe be good to use grazing instead of fire for fuels reduction.
2. Work toward collaborative or cooperative agreement with Arizona State land.
3. Work with City of Tucson to extend reclaimed water lines to help with water withdrawals.
4. Fuels management – want to be able to use grazing to help with fine fuels in some places
5. Need better communication with recreation users (horses, OHV) to disperse impacts of these activities.

APPENDIX A: WORKSHOP ONE PARTICIPANTS

November 1, 2020

Adriana Zuniga	University of Arizona
Amanda Webb	Pima County Natural Resources Parks and Recreation
Brian Powell	Pima County Natural Resources Parks and Recreation
Carl Evertsbusch	Arizona Site Steward Program
Courtney Rose	Pima County
Dave Murray	Bureau of Land Management
David Scalero	Pima County Regional Flood Control District
Dennis Caldwell	Biologist
Don Carter	Pima County Natural Resources Parks and Recreation
Don Swann	Saguaro National Park
Doug Duncan	US Fish and Wildlife Service
Ed Kuklinski	Pima County contractor
Emily Burns	Sky Island Alliance
Fran Maiuri	Arizona Site Steward-Cienega Area Coordinator
Gary Huckleberry	Independent Consultant (Geoarchaeology)
Ian Murray	Pima County Office of Sustainability and Conservation
Izzy Stein	University and Arizona and Pima County
J.J. Lamb	Vail Preservation Society
Jeff Gicklhorn	Pima County
Jessica Moreno	Coalition for Sonoran Desert Protection
Julia Fonseca	Pima County
Kara O'Brien	Saguaro National Park
Karen Simms	Pima County Natural Resources Parks and Recreation
Kristin Terpening	Arizona Game and Fish Department
Laura Norman	USGS
Louise Misztal	Sky Island Alliance
Mariana Rivera-Torres	University of Arizona
Marisa Rice	Pima County Regional Flood Control District
Martie Maierhauser	Cienega Watershed Partnership
Melanie Alvarez	Pima Association of Governments
Michele Girard	Cuenca los Ojos
Rachel Loubeau	Pima County Natural Resources Parks and Recreation
Robin L Pinto	Cienega Watershed Partnership
Scott O'Mack	WestLand Resources

Shela McFarlin	Cienega Watershed Partnership
Trevor Hare	Watershed Management Group
Yue "Max" Li	Desert Museum and University of Arizona

Facilitation and notes: Southwest Decision Resources – Tahnee Robertson and Colleen Whitaker

APPENDIX B: WORKSHOP TWO PARTICIPANTS

March 6, 2020

Melanie Alvarez	Pima Association of Governments
Gita Bodner	The Nature Conservancy
Don Carter	Pima County Natural Resources Parks and Recreation
Carl Evertsbusch	Site Steward
Julia Fonseca	Pima County
Jeff Gicklhorn	Pima County Office of Sustainability and Conservation
Gregg Garfin	University of Arizona, School of Natural Resources and the Environment
Gary Huckleberry	University of Arizona - Consultant & Adjunct Researcher
Trevor Hare	Watershed Management Group
Ken Kingsley	University of Arizona, SWCA
J.J. Lamb	Vail Preservation Society
Fran Maiuri	Site Steward
Ian Murray	Pima County
Martie Maierhauser	Cienega Watershed Partnership
Shela McFarlin	Cienega Watershed Partnership
Susy Morales	RECON Environmental, Inc.
Brian Powell	Pima County Natural Resources Parks and Recreation
Frank Postillion	Cienega Watershed Partnership
Robin Pinto	Cienega Watershed Partnership
Marisa Rice	Pima County Regional Flood Control District
Courtney Rose	Pima County
David Scalerò	Pima County Regional Flood Control District
Annamarie Schaecher	Cienega Watershed Partnership
Karen Simms	Pima County Natural Resources Parks and Recreation
Izzy Stein	University of Arizona and Pima County
Amanda Webb	Pima County

Facilitation and documentation: Southwest Decision Resources – Tahnee Robertson and Colleen Whitaker

APPENDIX C: WORKSHOP AGENDAS

Experts Workshop for Pima County’s Cienega Corridor Management Plan

Friday November 1, 2019 | 9:00am - 2:00pm

Pima Association of Governments (1 E. Broadway, Tucson – Suite 401)

Parking: Pennington Garage (entrance on Scott between Pennington and Congress)

Agenda

9:00am	Registration, coffee, networking
9:15	Welcome, introductions and workshop overview Overview of planning process and background - <i>Julia Fonseca, Pima County</i>
10:00	Small group work: Resource Priorities Review and Initial Threat Prioritization <i>Participants will work in groups to review draft resource priorities and threats for each resource</i> Group Topics <ol style="list-style-type: none"> 1. Aquatic habitats & Mesic riparian areas 2. Historic sites & Holocene sites 3. Upland vegetation communities & Rock outcrops 4. Wildlife movement corridors & Bat roost habitats
11:30	Lunch and networking (Lunch provided from Café 54)
12:15	Small group work: Threat Assessment <i>Participants will work in the same groups as above to complete a threat assessment for resource priorities.</i>
1:45	Next steps and closing comments
2:00pm	Adjourn

Workshop for Pima County's Cienega Corridor Management
Friday, March 6, 2020 | 8:30am - 2:30pm
Pima County Water and Energy Sustainability Center (Radon Room)
 (2955 Calle Agua Nueva, Tucson 85745)

Agenda

Meeting Objectives

- Help identify desired future conditions for County-managed lands
- Contribute to a better understanding of threats affected these lands
- Identify potential conservation strategies for cultural and natural heritage

8:30am	Registration, coffee, networking
9:00	Welcome, introductions and workshop overview - <i>Tahnee Robertson, SDR</i>
9:10	Workshop #1 Summary and Resource Priorities - <i>Julia Fonseca, Pima County</i> Threats Assessment and Desired Future Conditions - <i>Jeff Gicklhorn, Pima County</i>
9:45	Small group work: Threats Assessment and Desired Future Conditions <i>Participants will choose one of three resource groups; discuss and provide feedback on the resource Threats Assessment and Desired Future Conditions.</i> Groups A. Cultural Resources (including Site Integrity and Heritage Connections) B. Uplands (including Rock Outcrops, Bat Roosts, and Terrestrial Wildlife) C. Aquatic and Riparian (including Mesic and Xeric)
11:15	Lunch and networking Lunch will be provided on-site
12:00pm	Strategies Café <i>Participants will visit 2 of the 3 topics below. In small groups you will review current and past strategies, and collaboratively develop new strategies to help achieve Desired Future Conditions</i> Topics A. Outreach and engagement B. Protection and restoration C. Management policies & land acquisitions
1:45	Break
2:00	Next steps and closing comments <ul style="list-style-type: none"> ● Opportunities for continued engagement in this area ● Comments from Pima County
2:30pm	Adjourn

APPENDIX D : DRAFT RESOURCE PRIORITIES HANDOUT (WORKSHOP ONE)

Resource Priority	Nested Resource
Aquatic community	Floodplains
	Ponds
	Perennial/intermittent streams, springs, and cienegas
	Cattails
	Lowland leopard frog
	Gila chub
	Gila topminnow
	Longfin dace
	Huachuca water umbel
	Northern Mexican garter snake
Mesic riparian vegetation community	Middle elevation: Oak scrub-grassland ecotone
	Cottonwood-willow
	Mesquite woodland
	Mixed broadleaf interior southwest or riparian deciduous forest
	Sonoran riparian scrub
	Sacaton grassland
	Merriam's mouse
	Abert's towhee
	Arizona Bell's vireo
	Southwestern willow flycatcher
	Yellow-billed cuckoo
	Western red bat
	Western yellow bat
Upland vegetation community	Desertscrub: Saltbush desert scrub
	Upland grassland/mixed grass-scrub
	Succulents (saguaros and agave)
	Pima pineapple cactus
	Rufous-winged sparrow
	Swainson's hawk
	Desert box turtle
	California leaf-nosed bat
	Lesser long-nosed bat
	Mexican long-tongued bat
	Pale Townsend's big-eared bat
	Needle-spined pineapple cactus
	Sonoran desert tortoise
	Giant spotted whiptail
Mines, caves, adits, bridges; upland bat roost habitat	Mines
	Caves and adits
	Bridges
Rock Outcrops: limestone, talus, rock shelters, and caliche caves	Talus slopes
	Rock outcrops (non-limestone)

Resource Priority	Nested Resource
	Rock shelters and Caliche caves
	Limestone outcrop
	Talusnail spp.
Wide-ranging terrestrial wildlife	Xeroriparian and other passages under I-10
	bears
	mountain lion
	deer
	coatimundi
Native American Ancestral Sites on Holocene Terraces	Hohokam sites
	Sobaipuri sites
	Culturally important places from known oral histories
	Culturally important collecting areas
	AZ EE:2:44(ASM) Marsh Station Site (SDCP priority resource)
	AZ EE:2:51(ASM) Mescal Wash Site (SDCP priority resources)
	O'odham sites
Historic Sites	Trails
	Railroads
	AZ BB:14:498(ASM) Cienega Stage Stop (SDCP priority resource)
	AZ EE:2:492(ASM) Old Pantano Townsite (SDCP priority resource)
	AZ EE:25(ASM) New Pantano Townsite (SDCP priority resources)
	Buildings and features

APPENDIX E : FINAL RESOURCE PRIORITIES

1. Aquatic Community

- Ponds
- Perennial/intermittent streams, springs, and ciénegas
- Tinajas
- Sonora mud turtle
- Lowland leopard frog
- Gila chub
- Gila topminnow
- Longfin dace
- Aquatic plants including Huachuca water umbel
- Northern Mexican garter snake
- Aquatic macro invertebrates

2. Mesic Riparian Community

- Floodplains
- Cottonwood-willow forest
- Mesquite woodland
- Mixed broadleaf interior southwest or riparian deciduous forest
- Sonoran riparian scrub
- Sacaton grassland
- Merriam's mouse
- Abert's towhee
- Arizona Bell's vireo
- Southwestern willow flycatcher
- Yellow-billed cuckoo
- Western red bat
- Western yellow bat
- Gray hawk
- Box turtle

3. Xeric Riparian Community

- Mesquite woodlands
- Sacaton grassland
- Sonoran riparian scrub
- Oak scrub
- Arizona Bell's vireo
- Box turtle

4. Upland Vegetation Community

- Upland grassland/mixed grass-scrub
- Biocrust
- Succulents (saguaro and agave)
- Rufous-winged sparrow
- California leaf-nosed bat
- Lesser long-nosed bat
- Mexican long-tongued bat
- Pale Townsend's big-eared bat
- Needle-spined pineapple cactus

- Sonoran desert tortoise
- Pollinators

5. Rock Outcrops

- Talus slopes
- Rock outcrops (non-limestone)
- Rock shelters and Caliche caves
- Limestone outcrop
- Talussnail and other terrestrial snail species

6. Terrestrial Wildlife Species

- Bears
- Mountain lion
- Deer
- Coatimundi
- Tortoise
- Box turtle
- Badger
- Skunks: spotted, hog-nosed, and hooded

7. Bat Roost Habitat

- Mines
- Caves and adits
- Soil piping cavities and caves
- Bridges
- Rock shelters

8. Cultural Sites

- CCC sites
- Hohokam sites
- Sobaipuri sites
- O'odham sites
- Native American Ancestral Sites on Holocene Terraces
- Culturally important places from known oral histories
- Culturally important collecting areas
- Historic sites: buildings, features, cemeteries
- Three bridges – railroad history; railroad camp; railroads cross old and new lines
- Listed SDCP priority cultural resources
- Rancho del Lago estate

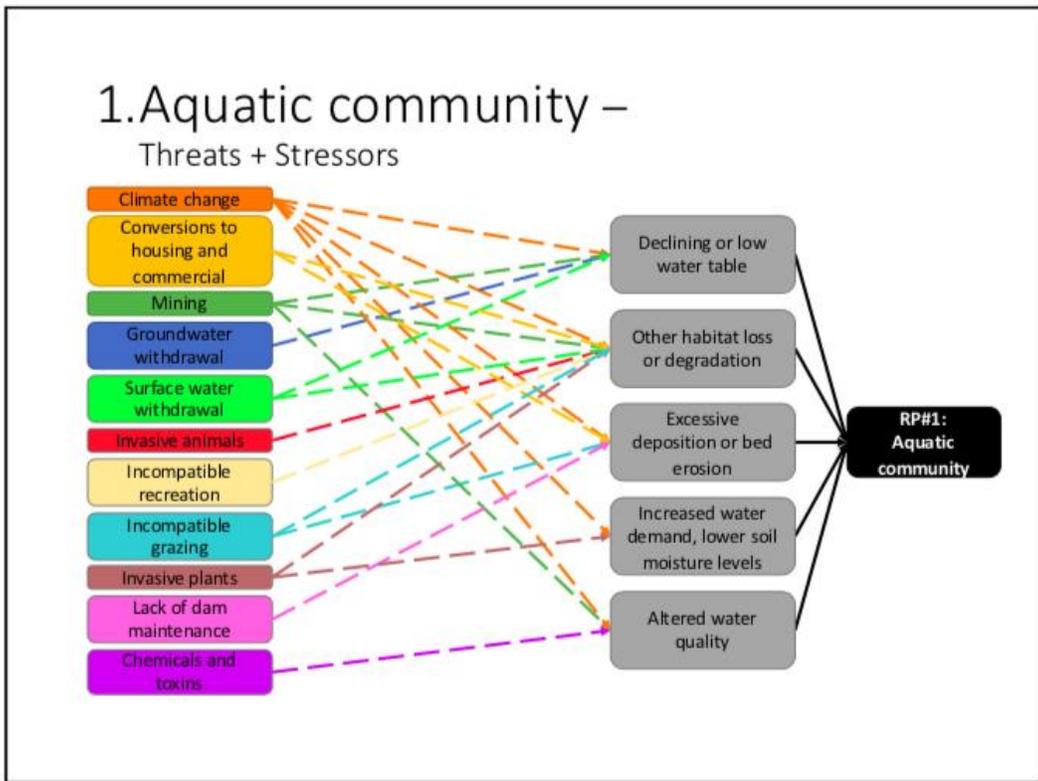
9. Heritage Connections

- Stewardship: site stewards and public archaeology
- Engagement: look at a continuum
- Education
- Impactful/meaningful Activities = interaction with resource
- Stories of the Land: oral histories, tribal stories/input, cross cultural connections, timeline, scientific and indigenous values, site histories – in depth scientific research at sites
- Research

1. Aquatic community – Final Nested Resources and Threats

<p><u>Nested Resources:</u></p> <ol style="list-style-type: none"> 1. Ponds 2. Perennial/intermittent streams, springs, and ciénegas 3. Tinajas 4. Sonora mud turtle 5. Lowland leopard frog 6. Gila chub 7. Gila topminnow 8. Longfin dace 9. Aquatic plants including Huachuca water umbel 10. Northern Mexican garter snake 11. Aquatic macro invertebrates 	<p><u>Threats:</u></p> <ol style="list-style-type: none"> 1. Climate change (including drought) 2. Conversions to housing and commercial (indirect) 3. Mining (indirect effects) 4. Groundwater withdrawal 5. Invasive species 6. Chemicals and toxins (spills) 7. Incompatible grazing 8. Incompatible recreation (ATVs) 9. Surface water withdrawal 10. Invasive plants 11. Lack of dam maintenance
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2



3

2. Mesic riparian community – Final Nested Resources and Threats

Nested Resources:

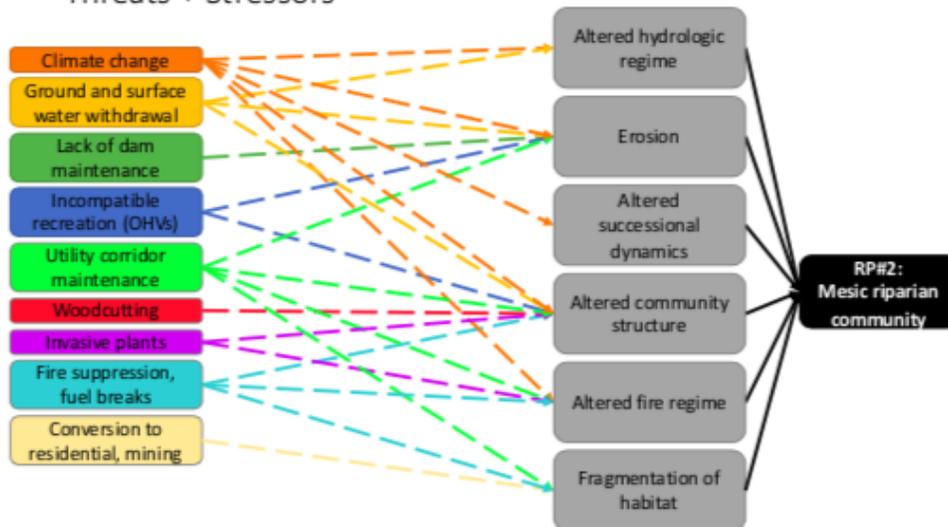
1. Floodplains
2. Cottonwood-willow forest
3. Mesquite woodland
4. Mixed broadleaf interior southwest or riparian deciduous forest
5. Sonoran riparian scrub
6. Sacaton grassland
7. Merriam's mouse
8. Abert's towhee
9. Arizona Bell's vireo
10. Southwestern willow flycatcher
11. Yellow-billed cuckoo
12. Western red bat
13. Western yellow bat
14. Gray hawk
15. Box turtle

Threats:

1. Climate change / drought
2. Conversions to housing and commercial
3. Mining
4. Groundwater withdrawal
5. Invasive plants
6. Surface water withdrawal
7. Incompatible grazing
8. Off-road vehicles
9. Wood cutting
10. Utility corridors
11. Fire suppression, fire breaks
12. Lack of dam maintenance

4

2. Mesic riparian community – Threats + Stressors



5

3. Xeric riparian community – Final Nested Resources and Threats

Nested Resources:

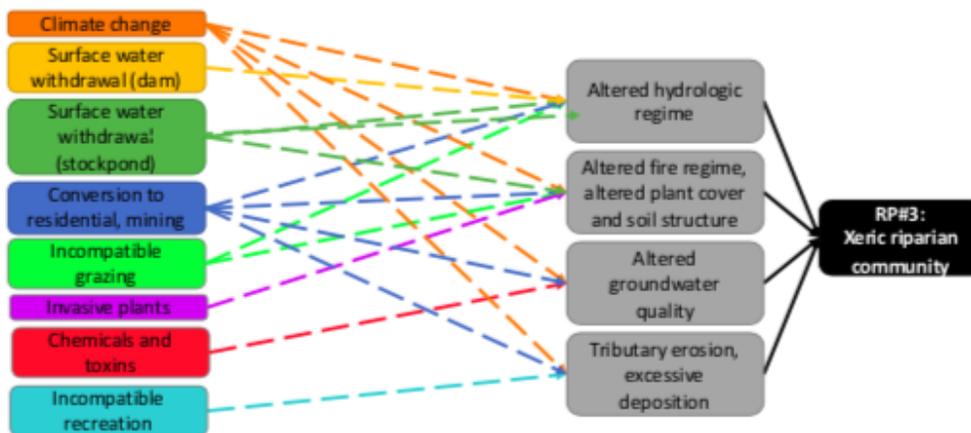
1. Mesquite woodlands
2. Sacaton grassland
3. Sonoran riparian scrub
4. Oak scrub
5. Arizona Bell's vireo
6. Box turtle

Threats:

1. Climate change
2. Conversion to residential or commercial
3. Invasive plants
4. Mining (indirect effects)
5. Incompatible grazing
6. Surface water withdrawals (Dam)
7. Incompatible recreation (ATVs)
8. Chemicals and toxins
9. Surface water withdrawals (Stock ponds)

6

3. Xeric riparian community – Threats + Stressors



7

4. Upland vegetation community – Final Nested Resources and Threats

Nested Resources:

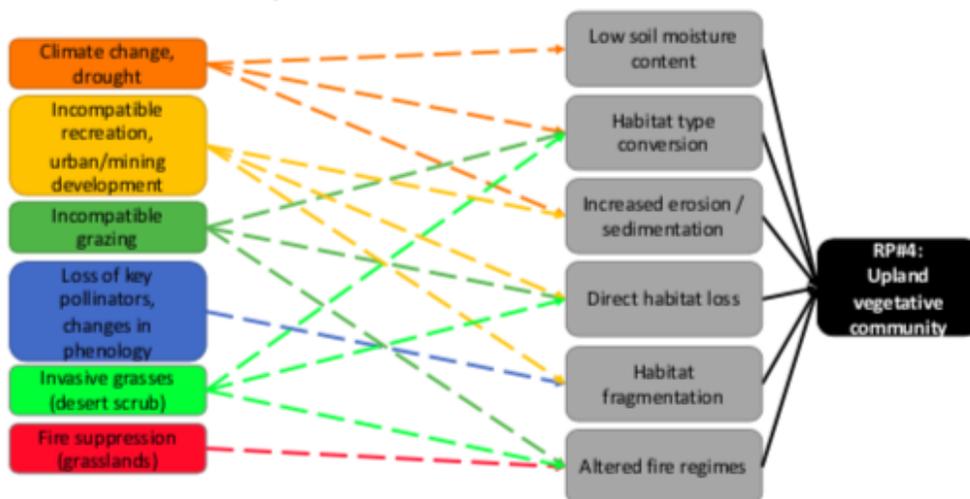
1. Upland grassland/mixed grass-scrub
2. Biocrust
3. Succulents (saguaros and agave)
4. Rufous-winged sparrow
5. California leaf-nosed bat
6. Lesser long-nosed bat
7. Mexican long-tongued bat
8. Pale Townsend's big-eared bat
9. Needle-spined pineapple cactus
10. Sonoran desert tortoise
11. Pollinators

Threats:

1. Climate change/drought
2. Fire suppression in grassland
3. Invasive grasses in desert scrub altering fire
4. Conversion to residential and commercial
5. Mining (direct effect)
6. Incompatible recreation
7. Incompatible grazing
8. Loss of key pollinators
9. Change in phenology caused by climate change

8

4. Upland vegetation community – Situation Analysis



9

5. Rock outcrops – Final Nested Resources and Threats

Nested Resources:

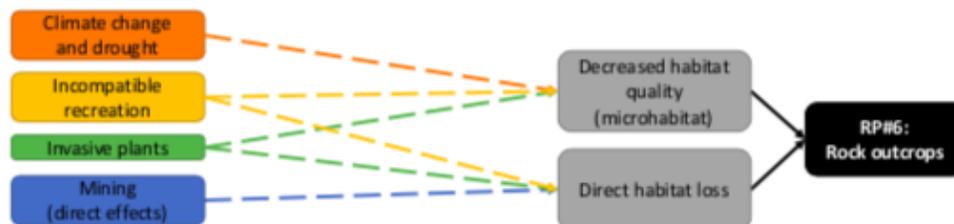
1. Talus slopes
2. Rock outcrops (non-limestone)
3. Rock shelters and Caliche caves
4. Limestone outcrop
5. Talussnail and other terrestrial snail species

Threats:

1. Climate change (heat, drought)
2. Incompatible recreation (off-road travel)
3. Invasive plants
4. Mining (direct effect)

10

5. Rock outcrops – Threats + Stressors



11

6. Terrestrial wildlife species –

Final Nested Resources and Threats

Nested Resources:

1. Bears
2. Mountain lion
3. Deer
4. Coatimundi
5. Tortoise
6. Box turtle
7. Badger
8. Skunks: spotted, hog-nosed, and hooded

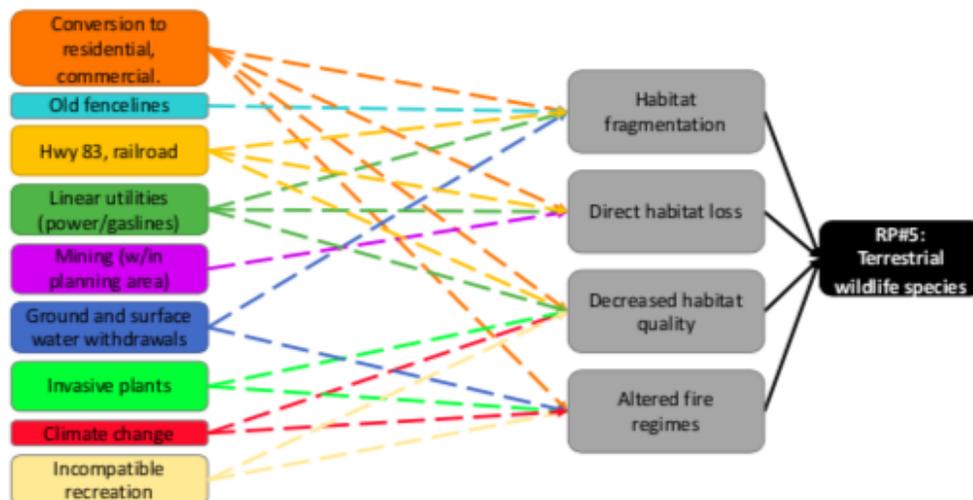
Threats:

1. Conversion to residential and commercial including roads, pets
2. Interstate, Highway 83, railroads
3. Linear utilities (powerlines and gaslines)
4. Climate change causing loss of water
5. Invasive plants
6. Groundwater withdrawals causing loss of water
7. Surface water withdrawals causing loss of water
8. Mines (indirect effect)
9. Old fences such as hogwire
10. Incompatible recreation

12

6. Terrestrial wildlife species –

Situation Analysis



13

7. Bat roost habitat

Final Nested Resources and Threats

Nested Resources:

1. Mines
2. Caves and adits
3. Soil piping cavities and caves
4. Bridges
5. Rock shelters

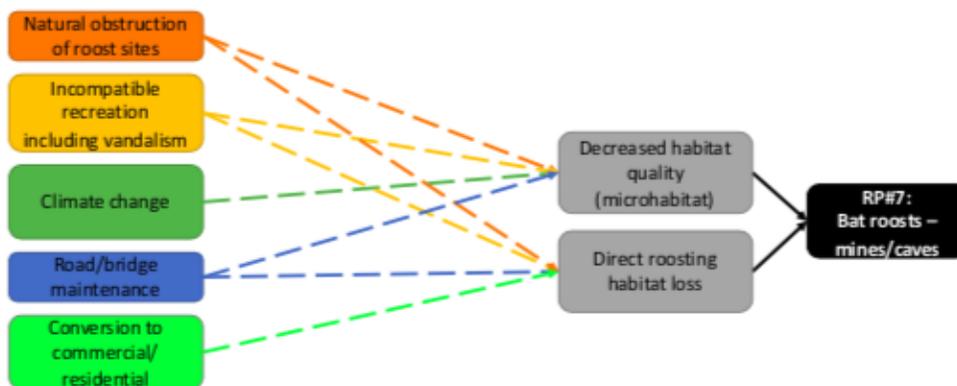
Threats:

1. Obstruction of roost opening due to natural collapse
2. Climate change causing loss of surface water, increased heat, increased water withdrawals
3. Incompatible recreation including obstruction or vandalism
4. Conversion to residential and commercial
5. Bridge maintenance or replacement
6. Groundwater withdrawal causing loss of water

14

7. Bat roost habitat

Situation Analysis



15

8. Cultural sites –

Final Nested Resources and Threats

Nested Resources:

1. CCC sites
2. Hohokam sites
3. Sobaipuri sites
4. O'odham sites
5. Native American Ancestral Sites on Holocene Terraces
6. Culturally important places from known oral histories
7. Culturally important collecting areas
8. Historic sites: buildings, features, cemeteries
9. Three bridges – railroad history; railroad camp; railroads cross old and new lines
10. Listed SDCP priority cultural resources
11. Rancho del Lago estate

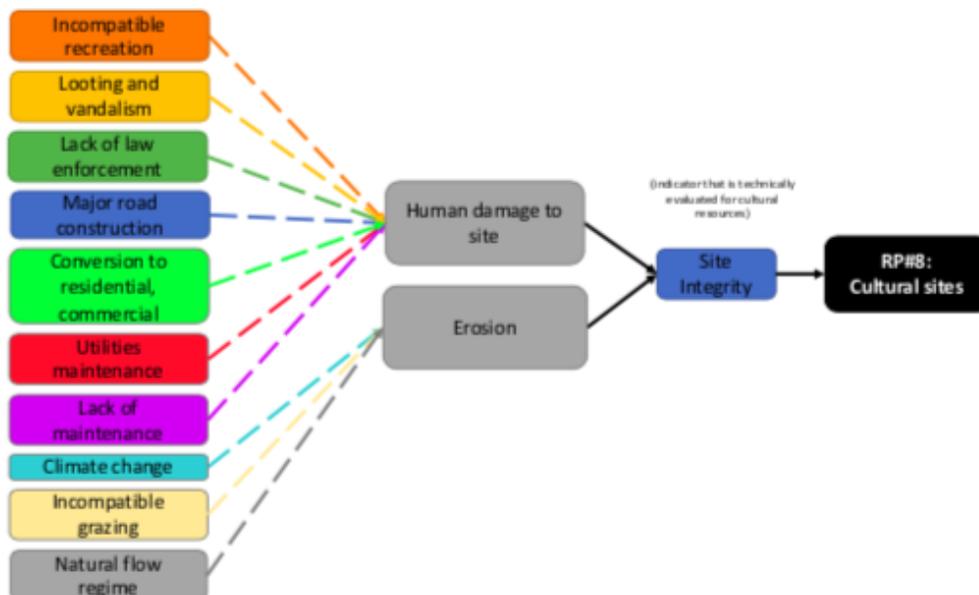
Threats:

1. Climate change (incl incr erosion)
2. Incompatible recreation (ATVs)
3. Looting and vandalism
4. Lack of law enforcement /funding
5. Major road construction / expansion
6. Conversion to residential, commercial
7. Utilities maintenance or new construction
8. Lack of maintenance
9. Incompatible grazing

16

8. Cultural sites –

Situation Analysis



17

9. Heritage connections – Final Nested Resources and Threats

Nested Resources:

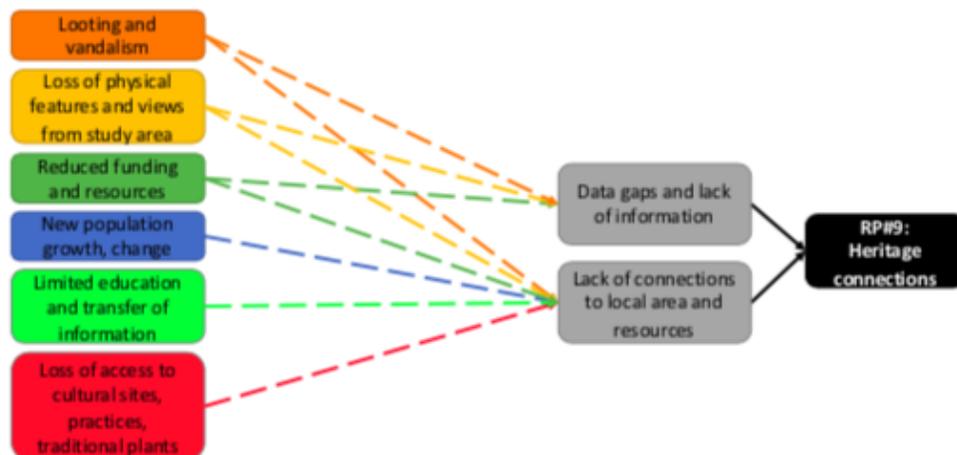
1. Stewardship: site stewards and public archaeology
2. Engagement: look at a continuum
3. Education
4. Impactful/meaningful Activities = interaction with resource
5. Stories of the Land: oral histories, tribal stories/input, cross cultural connections, timeline, scientific and indigenous values, site histories – in depth scientific research at sites
6. Research

Threats:

1. Looting and vandalism
2. Loss of physical features and views
3. Lack of funding and resources
4. New populations
5. Limited education and transfer of information
6. Loss of access to cultural sites
7. Utilities
8. Lack of maintenance
9. Incompatible grazing

18

9. Heritage connections – Situation Analysis



19

APPENDIX G: CRITERIA FOR DIRECT THREAT RATINGS USING THE NATURE CONSERVANCY'S METHOD

Scope - Defined as the proportion of the target in the planning area that can reasonably be expected to be affected by the threat within twenty years given the continuation of current circumstances and trends. For ecosystems and ecological communities, measured as the proportion of the target's occurrence. For species, measured as the proportion of the target's population.

- **Very High:** The threat is likely to be pervasive in its scope, affecting the target across all or most (71-100%) of its occurrence/population.
- **High:** The threat is likely to be widespread in its scope, affecting the target across much (31-70%) of its occurrence/population.
- **Medium:** The threat is likely to be restricted in its scope, affecting the target across some (11-30%) of its occurrence/population.
- **Low:** The threat is likely to be very narrow in its scope, affecting the target across a small proportion (1-10%) of its occurrence/population.

Severity - Within the scope, the level of damage to the target from the threat that can reasonably be expected given the continuation of current circumstances and trends. For ecosystems and ecological communities, typically measured as the degree of destruction or degradation of the target within the scope. For species, usually measured as the degree of reduction of the target population within the scope.

- **Very High:** Within the scope, the threat is likely to destroy or eliminate the target, or reduce its population by 71-100% within twenty years.
- **High:** Within the scope, the threat is likely to seriously degrade/reduce the target or reduce its population by 31-70% within twenty years.
- **Medium:** Within the scope, the threat is likely to moderately degrade/reduce the target or reduce its population by 11-30% within twenty years.
- **Low:** Within the scope, the threat is likely to only slightly degrade/reduce the target or reduce its population by 1-10% within twenty years.

Irreversibility (Permanence) - The degree to which the effects of a threat can be reversed and the target affected by the threat restored.

- **Very High:** The effects of the threat cannot be reversed and it is very unlikely the target can be restored, and/or it would take more than 100 years to achieve this (e.g., wetlands converted to a shopping center).
- **High:** The effects of the threat can technically be reversed and the target restored, but it is not practically affordable and/or it would take 21-100 years to achieve this (e.g., wetland converted to agriculture).
- **Medium:** The effects of the threat can be reversed and the target restored with a reasonable commitment of resources and/or within 6-20 years (e.g., ditching and draining of wetland).
- **Low:** The effects of the threat are easily reversible and the target can be easily restored at a relatively low cost and/or within 0-5 years (e.g., off-road vehicles trespassing in wetland).

APPENDIX H: FINAL THREATS ASSESSMENT

This final revised threats assessment reflects input received during both experts workshops.

Cienega Corridor Management Plan

REVISED THREAT ASSESSMENT

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For this management plan, we are evaluating threats using a common language derived mostly from The Nature Conservancy (TNC) nomenclature. This analysis attempts to separate threats from their effects (stressors). For instance, erosion (a stressor) can arise from multiple sources (threats). This review added clarity concerning the origin of stressors (for instance distinguishing human uses from an effect like habitat loss or vandalism). See the situation analyses for more information on stressors that affect Resource Priorities.

We used TNC criteria to rank the scope, severity and irreversibility of threats relative to the Corridor properties. Additional information about the criteria we used is presented in the attached document. I considering the rankings of threats from the first workshop in light of the plan’s 20-year planning horizon, and added scores for scope, severity and irreversibility to some resources where absent. These were then reviewed in the second workshop. Additional threats represented in the situation analyses are now included.

In general, most rankings consider how threats inside and outside the Corridor properties affect Resource Priorities (RPs) inside the managed properties. However, some threats like “conversion to housing” or “mining” are far less likely to occur within the Corridor management area due to restrictive covenants. Where the threat ranking is only ranked for a threat within the Corridor property, it is termed “direct” in the table below.

Resource Priority (RP)	Threats assessment ratings (scope severity \irreversibility) VH=Very High, H=High, M=Medium, L=Low; ID = Insufficient Data
Aquatic Habitats in Cienega Corridor	Climate change altering groundwater table, causing habitat loss, erosion, deposition, increasing water demand during drought, and altering water quality (VH H \ H)
	Conversions to housing and commercial (direct effect) (L VH \ H)
	Mining (M H \ H)
	Groundwater withdrawal (VH H \ M)
	Invasive animals (H H \ M)
	Chemicals and toxins (spills) (M H \ M)
	Incompatible grazing (M M \ L)
	Incompatible recreation (ATVs) (M M \ L)
	Surface water withdrawal (L M \ L)
	Invasive plants (M H \ M)
Mesic Riparian	Climate change causing flood, erosion, altered successional dynamics

Resource Priority (RP)	Threats assessment ratings (scope severity \irreversibility) VH=Very High, H=High, M=Medium, L=Low; ID = Insufficient Data
Areas in Cienega Corridor	due to drought, altered community structure, fires (VH H \ H)
	Conversions to housing and commercial (direct) (L VH \ M)
	Groundwater withdrawal (H H \ M)
	Invasive plants (H H \ M)
	Mining (M M \ H)
	Surface water withdrawal (L M \ L)
	Incompatible grazing (M M \ L)
	Off-road vehicles (M M \ M)
	Wood cutting (L L \ M)
	Utility corridors (L H \ H)
	Fire suppression, fire breaks (L H \ H-M)
Lack of dam maintenance (L H \ M)	
Xeric Riparian Areas in Cienega Corridor	Climate change altering floods, fire, ground water, erosion, deposition (VH H \ H)
	Conversion to residential or commercial (direct) (L VH \ M)
	Invasive plants (H H \ M)
	Mining (L H \ M)
	Incompatible grazing (M M \ L)
	Surface water withdrawals (Dam) (L M \ L)
	Incompatible recreation (ATVs) (M M \ L)
Chemicals and toxins (H M \ M)	
Upland vegetation community in Cienega Corridor	Climate change/drought causing erosion, veg conversion, poor veg condition due to low moisture (VH M \ VH)
	Fire suppression in grassland (M M \ H)
	Invasive grasses in desertscrub altering fire (H M \ H)
	Conversion to residential and commercial (direct) (L VH \ VH)
	Mining (direct effect) (L VH \ VH)
	Incompatible recreation (H M \ M)
	Incompatible grazing (M M \ M)
	Loss of key pollinators (ID=insufficient data to rank)
	Change in phenology caused by climate change (VH ID \ VH)
Bat roosts (natural caves, soil pipes, mines, bridges) in Cienega Corridor	Obstruction of roost opening due to natural collapse (H /M \ VH)
	Climate change altering habitat quality for roosts and prey base (VH H \ H)
	Incompatible recreation including obstruction or vandalism (L H \ M)
	Conversion to residential and commercial –direct (L L \ H)
	Bridge maintenance or replacement (L H \ VH)
	Groundwater withdrawal causing loss of water (H H \ H)
Rock and Caliche	Climate change altering temp and humidity of microhabitat (VH M \ VH)
	Incompatible recreation (off-road travel) (L M \ L)

Resource Priority (RP)	Threats assessment ratings (scope severity \irreversibility) VH=Very High, H=High, M=Medium, L=Low; ID = Insufficient Data
Outcrops in Cienega Corridor	Invasive plants (M L \M) Mining (direct effect) (L VH \VH)
Terrestrial wildlife in Cienega Corridor vulnerable to fragmentation from outside Corridor	Conversion to residential and commercial including roads, pets (VH H \H) Interstate, Highway 83, railroads (L M \VH) Linear utilities (powerlines and gaslines) (M M \VH) Climate decreasing available surface waters (VH H \VH) Invasive plants (M M \ M?) Groundwater withdrawals causing loss of water (H M \L) Surface water diversions causing loss of water (L M \ L) Mines (L L \VH) Fencelines (H L \ L) Incompatible recreation (H M \ M)
Cultural Sites in Cienega Corridor	Climate change: Climate change for sites in xeric zones (VH H \H) Climate change for sites in mesic zones (VH H \H) Climate change impacts on historic sites with build features (M M \ M) Incompatible recreational uses inside the planning area (VH H \ M) Looting and vandalism (VH M \VH)* Lack of law enforcement /funding (M M \L) Major road construction / expansion (L M \H) Conversion to residential, commercial (indirect only) (VH H \ H) Utilities (L M \ VH) Lack of maintenance (H H \M) Incompatible grazing (L L \ M)
Heritage Connections affecting Cienega Corridor	Loss of physical features and views (L M \H) Intentional degradation of heritage (H / VH / VH) Limited education and transfer of information (H M \M) Loss of access to cultural sites (M M \ L) Data gaps (H H \L) Incompatible grazing (M M \L) Scarce resources (VH VH /H) Loss of valuing heritage connections/attachment to place (VH H /M)

*This is really a stressor, not a threat.

APPENDIX I: CIENEGA CORRIDOR STRATEGIES FROM EXISTING PLAN

The following was provided as a handout to inform strategy development during Workshop 2

A. Policies for Management and Acquisition of County-Managed Conservation Lands

Strategies from CCC Strategic Plan:

1. Enforce laws regarding ATV/off-road vehicle use.
2. Coordinate law enforcement among county, state, and federal land managers with specific emphasis on preventing looting, vandalism, and other crimes against cultural resources on the public lands.
3. Coordinate and support implementation of recreation policies and strategies to identify appropriate areas for passive and active uses and high-impact recreation; appropriate trail and road access to public lands; and responsible parties for development and maintenance of trails.

Strategies from Cienega Creek Natural Preserve Management Plan:

4. Provide support to legislative measures to strengthen ADWR in-stream flow program
5. Discuss with impacted landowners and, if willing sellers are identified, acquire properties listed as high priority
6. Maintain and protect existing water rights through active participation in the State Adjudication program (ongoing)
7. Identify and prioritize acquisition of properties adjacent to the Preserve where existing land uses present a threat to water resources
8. Discuss acquisition, purchase or trade of State Trust Lands listed as priority in the management plan
9. Temporary closure of lands to public use as deemed necessary to protect natural resources or protect the welfare of the public
10. Requests for new utility line construction shall be reviewed on a case-by-case basis and either approved or denied in accordance with any declarations of Restriction, Covenants and Conditions (ongoing)
11. Cooperative agreements with research institutions such as the University of Arizona will be encouraged to the extent that they result in on-going research related to biophysical and cultural resources of the site. Information generated by this research shall be made available to Pima County for its use related to on-going management of its properties (ongoing)
12. No use or activities conducted on the properties will materially diminish the quality of surface water or groundwater (ongoing)
13. The introduction of non-native plant and wildlife species shall be prohibited. (DONE)
14. Hunting and trapping of wildlife on-site shall be in accordance with rules published annual by the Arizona Game and Fish Department (DONE)
15. Protection of significant habitat and maintenance of wildlife corridors shall be given consideration when assessing potential land acquisitions
16. All applicable Federal, State and County regulations pertaining to cultural resources protection shall be enforced
17. All wildland fires, regardless of ignition source, shall be appropriately managed and controlled
18. Develop a detailed fire response plan for the Preserve properties (done but may need revision)

19. Modify the permit system within limits as specified by the Board. (done but may need further revision)
20. Coordinate with railroad, ADOT and PDEQ on hazardous materials response plan (done but may need further revision).
21. Signs posted at key locations to inform visitors of prohibition on motor vehicles. (done but probably needs more)
22. Monitor utility line construction and repairs. (ongoing)
23. Continue assignment of a Park Manager at CCNP
24. Annually inspect resource conditions at Headquarters facilities (Empirita?) to determine maintenance needs and use restrictions
25. Develop a master plan for the Headquarters to preserve the historic character of the Ranch.
26. Prepare emergency response plans for exotic fish, crayfish and bullfrogs for the Preserve
27. Establish a system to record notable wildlife (done)
28. Inventory mineral claim status within the Preserve
29. Draft and record utility and access easements needed; abandon unneeded easements
30. Gather and maintain cultural resources documentation (ongoing)
31. Protect and monitor cultural resources during any prescribed burns
32. Implement a Class 3 CR survey on all of the added lands
33. Request CCNP be consolidated into one AZGFD management unit
34. Periodically inspect Preserve to identify location and extent of erosion problems
35. Acquire Pantano Dam inholdings and associated surface water rights
36. Periodically review impact of public uses on natural, cultural and scenic resources and amend management plan as appropriate
37. Monitor public access through Empirita Ranch area (Done – Visitor sign in)

B. Outreach and Engagement with the Broader Community

Strategies from the CCC Strategic Plan:

1. Develop and implement community outreach, educational materials/programs (including workshops and speakers bureaus), and volunteer projects relating to Cienega Corridor programs and issues.
2. Develop outreach materials and strategies (including website and “hotline” information) to increase reporting of illegal activities and their impacts in the Cienega Corridor.
3. Expand the Arizona Site Stewards program on county, state and federal lands.
4. Develop an outreach program for private landowners who may have archaeological, historical, and other cultural resources on their property.
5. Coordinate historic preservation and education-related functions among land and resource managing partners.
6. Involve the Vail School District and University of Arizona in a variety of education and outreach actions.
7. Mobilize and organize a public education series for residents regarding non-point source pollution and water harvesting and water recycling.
8. Identify and interpret suitable, publicly accessible historic and archaeological sites on county, state, and federal lands.
9. Conduct lectures and workshops for the public on heritage issues, cultural landscape, ranching, and the history and prehistory of the Cienega Corridor.
10. Promote a range of mitigation techniques for development – or promote sustainable

development.

11. Work with developers to identify “best practices” for environmentally sensitive development and incentives to promote quality, sensitive design practices.
12. Consider the use of best practices models and incentives in deed restrictions and home owners association materials.
13. Investigate the feasibility of implementing planning and zoning tools including buffer and/or other overlay zones, scenic routes, and enhanced subdivision regulations.
14. Review and comment on the sale, lease or permitting of State and Federal lands for intensive land uses
15. Review and comment on applications to sale, lease or permit use on State Trust and Federal Lands for mineral extraction
16. Review all development plans and rezoning applications for projects proposed in surrounding areas
17. Execute agreements with developers for trail easements through conditions of rezoning.
18. Develop an inventory of mineral claims and mineral status within the Cienega Creek watershed
19. Promote a variety of actions to preserve current and historic ranches, including the purchase of development rights (conservation easements).

Strategies from Cienega Creek Natural Preserve Management Plan

20. Coordination with TAS or others on bird surveys
21. Monitor cultural resources in the Preserve with Site Stewards (ongoing)
22. Enforce county statutes regarding litter
23. Provide trash collection at public entries (ongoing)
24. Enforce prohibition against camping
25. Evaluate land uses in the watershed for their impacts
26. Develop a heritage program on the cultural resources in the Preserve
27. Implement (modify) permit system to better accommodate public access at certain locations, monitor public use and insure recreation activities do not negatively impact natural and cultural resource protection goals.
28. Coordinate with property stewards to monitor activity and review of stewardship agreements at time of renewal

C. Protection and Restoration Projects (on the ground, anywhere)

Strategies from CCC Strategic Plan:

1. Conduct long-term wildlife monitoring and data collection on corridors to increase the knowledge base and promote conservation advocacy.
2. Coordinate the development of range improvement programs based on ranchers’ needs and/or ecological assessment.
3. Work with ADOT, Pima County, public lands managers, and others to develop strategies and construct roads that will reduce road kill, allow safe passage of wildlife, and minimize impacts to the surrounding landscape and resources..
4. Identify major sources of water pollution in the Corridor.
5. Coordinate monitoring of surface and groundwater for quality and quantity (DONE).
6. Identify landowners, volunteer groups, and individuals for monitoring and measuring of groundwater and precipitation (DONE. ALERT, Rainlog.org, others?).
7. Identify groundwater impacts from the railroad and road maintenance, both Interstate and County (e.g., herbicides, chemicals, leaching, rights of way, blading, sedimentation, erosion,

- hazardous materials).
8. Inventory the range of recreation uses and users in the Cienega Corridor.
 9. Update trail routes, trail access, and other recreation resource information and mapped data (master plan) for the area.
 10. Identify priority natural and cultural resource areas, including caves, archaeological sites, and cultural landscape features to be considered for specific protection measures while planning for recreation (Done through existing GIS layers).
 11. Work with the Arizona Trail Association to complete the Arizona Trail segment through the Corridor (Done).
 12. Identify priority invasive plant species and priority areas for management. (in progress)
 13. Decide on control strategies for priority invasive animal species and management areas.
 14. Develop and implement a monitoring protocol to determine the extent and/or re- emergence of targeted invasive species (in progress)
 15. Update County records for cave features, archaeological sites and survey data with Arizona State Museum data downloads (ongoing)
 16. Integrate cultural resources preservation for the Cienega Corridor into the Santa Cruz River National Heritage Area plan
 17. Maintain existing infrastructure. Identify new infrastructure needs and implement as resources become available.
 18. Inventory mineral claims and mineral status with the Cienega Corridor - Summarize results from AZ Geological Survey report; determine if claims are subject to appropriation without surface owner consent.
 19. Develop a fire safety and preparedness strategy.
 20. Mitigating impacts from utilities.
 21. Managing lands in the Cienega Corridor through staffing, volunteers and partnerships.

Strategies from Cienega Creek Management Plan

22. Restore flow downstream of Pantano Dam
23. Implement revegetation and stabilization programs as needed to control severe erosion in localized areas.
24. Re-vegetate disturbed areas within the Preserve to restore or enhance visual quality
25. Close and revegetate existing roads that are not necessary or desirable for public access, utility access or fire management
26. Restoration of sites previously cleared for agriculture or degraded due to cattle grazing
27. Modify perimeter fencing at Empirita Ranch
28. Collaborate with other Cienega Watershed Partnership members on invasive plant species management across jurisdictional boundaries
29. Coordinate and support efforts to control invasive, non-native plants.
30. Engage in wildlife enhancement and restoration activities as funding permits.