

Ecological site R041XA111AZ **Volcanic Hills 16-20" p.z.**

Last updated: 4/09/2021
 Accessed: 05/18/2024

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

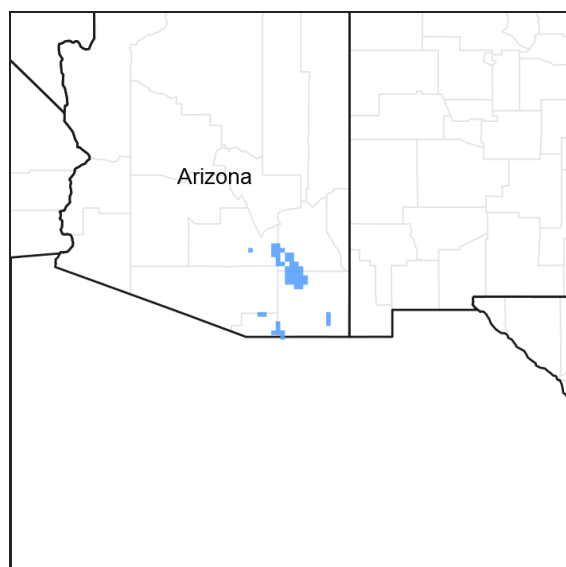


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 041X–Madrean Archipelago

AZ 41.1 – Mexican Oak-Pine Forest and Oak Savannah

Elevations range from 4500 to 10,700 feet and precipitation ranges from 16 to 30 inches. Vegetation includes Emory oak, Mexican blue oak, Arizona white oak, one-seed juniper, alligator juniper, sacahuista, California bricklebrush, skunkbush sumac, Arizona rosewood, wait-a-bit mimosa, sideoats grama, blue grama, purple grama, wooly bunchgrass, plains lovegrass, squirreltail, and pinyon ricegrass. The soil temperature regime ranges from thermic to mesic and the soil moisture regime ranges from aridic ustic to typic ustic. This unit occurs within the Basin and Range Physiographic Province and is characterized by numerous mountain ranges that rise abruptly from broad, plain-like valleys and basins. Igneous and metamorphic rock classes dominate the mountain ranges and sediments filling the basins represent combinations of fluvial, lacustrine, colluvial and alluvial deposits.

Associated sites

F041XA112AZ	Sandy Wash 16-20" p.z. woodland
F041XA113AZ	Sandy Bottom 16-20" p.z. woodland
F041XA123AZ	Volcanic Hills 20-23" p.z. (QUEM, JUDE2, QUAR)

R041XA102AZ	Shallow Hills 16-20" p.z.
R041XA109AZ	Clay Loam Upland 16-20" p.z.

Similar sites

F041XA123AZ	Volcanic Hills 20-23" p.z. (QUEM, JUDE2, QUAR)
R041XC330AZ	Volcanic Hills 12-16" p.z. Clayey

Table 1. Dominant plant species

Tree	(1) <i>quercus emoryi</i> (2) <i>juniperus deppeana</i>
Shrub	(1) <i>erigonum wrightii</i> (2) <i>nolina microcarpa</i>
Herbaceous	(1) <i>bouteloua curtipendula</i> (2) <i>eragrostis intermedia</i>

Physiographic features

This site occurs in the middle elevations of the Madrean Basin and Range province in southeastern Arizona. It is on hill-slopes and ridge-tops. Slope aspect is site differentiating at elevations near common resource area boundaries.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge (3) Saddle
Flooding frequency	None
Elevation	1,372–1,768 m
Slope	15–65%
Aspect	N, E, S

Climatic features

Precipitation in this zone of the common resource area ranges from 16-20 inches per year with elevations from 4700-5500 feet. Approximately 40% of this moisture comes as gentle rain or snow during the winter-spring (Oct-Apr) season; originates in the north Pacific and Gulf of California and comes as frontal storms with long duration and low intensity. The remaining 60% falls in the summer season (May-Sep); originates in the Gulf of Mexico and are convective, usually brief, intense thunderstorms. Snow is common Dec-Mar, averaging 5-15 inches per year, but rarely lasts more than a week. May and June are the driest months. Humidity is low.

Temperatures are mild. Freezing temperatures are common at night from Oct-May, but daytime temperatures are almost always over 40 F. Below 0 F temperatures can occur Dec-Feb. Daytime summer highs rarely exceed 95 F.

Species like plains lovegrass, prairie junegrass, whiteball acacia, shrubby buckwheat and Emory oak begin growth in late March to April. Warm season grasses begin growth in July or August with receipt of the first summer rains.

Table 3. Representative climatic features

Frost-free period (average)	200 days
Freeze-free period (average)	
Precipitation total (average)	508 mm

Influencing water features

There are no water features associated with this site.

Soil features

These are shallow soils formed on basic and intermediate igneous rocks like basalt and andesite and on shale and clay-stones. Bedrock is hard and unweathered. Soil surface textures range from very cobbly clayloam to gravelly loam. Soils are fine loamy to clayey textured. They have well developed covers of rocks, cobbles and/or gravels. They are dark colored throughout. Plant-soil moisture relationships are fair to good. Numerous areas of rock outcrop occur intermingled with soil areas.

Soils mapped on this site include: SSA-661 Eastern Pinal and Southern Gila counties MU 22 Collarbutton; SSA-666 Cochise county Northwestern part MU's 23 Cherrycow, 53 Kuykendall and Cherrycow, 58 Magoffin and Budlamp; SSA-667 Santa Cruz and parts of Cochise and Pima counties MU Fad Luzena; SSA-671 Cochise county Douglas-Tombstone part MU's 43 Castledome & 95 Kuykendal; SSA-673 Graham County, Arizona, Southwestern part MU 2 Beaumain and Cherrycow.

Table 4. Representative soil features

Parent material	(1) Alluvium–tuff (2) Colluvium–basalt
Surface texture	(1) Gravelly clay loam (2) Very cobbly loam (3) Cobbly clay loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Slow to very slow
Soil depth	25–51 cm
Surface fragment cover <=3"	15–60%
Surface fragment cover >3"	3–15%
Available water capacity (0-101.6cm)	2.54–8.13 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–2
Soil reaction (1:1 water) (0-101.6cm)	6.1–7.8
Subsurface fragment volume <=3" (Depth not specified)	5–45%
Subsurface fragment volume >3" (Depth not specified)	1–8%

Ecological dynamics

The plant communities found on an ecological site are naturally variable. Composition and production will vary with yearly conditions, location, aspect, and the natural variability of the soils. The Historical Climax Plant Community represents the natural potential plant communities found on relict or relatively undisturbed sites. Other plant communities described here represent plant communities that are known to occur when the site is disturbed by factors such as fire, grazing, or drought.

Production data provided in this site description is standardized to air dry weight at the end of the summer growing season. The plant communities described in this site description are based on near normal rainfall years.

NRCS uses a Similarity Index to compare existing plant communities to the plant communities described here. Similarity index is determined by comparing the production and composition of a plant community to the production and composition of a plant community described in this site description. To determine Similarity index, compare the production (air dry weight) of each species to that shown in the plant community description. For each species, count no more than the maximum amount shown for the species, and for each group, count no more than the maximum amount shown for each group. Divide the resulting total by the total normal year production shown in the plant community description. If the rainfall has been significantly above or below normal, use the total production shown for above or below normal years. If field data is not collected at the end of the summer growing season, then the field data must be corrected to the end of the year production before comparing it to the site description. The growth curve can be used as a guide for estimating production at the end of the summer growing season.

State and transition model

41.1 Volcanic Hills 16-20" p.z. (R041XA111AZ)

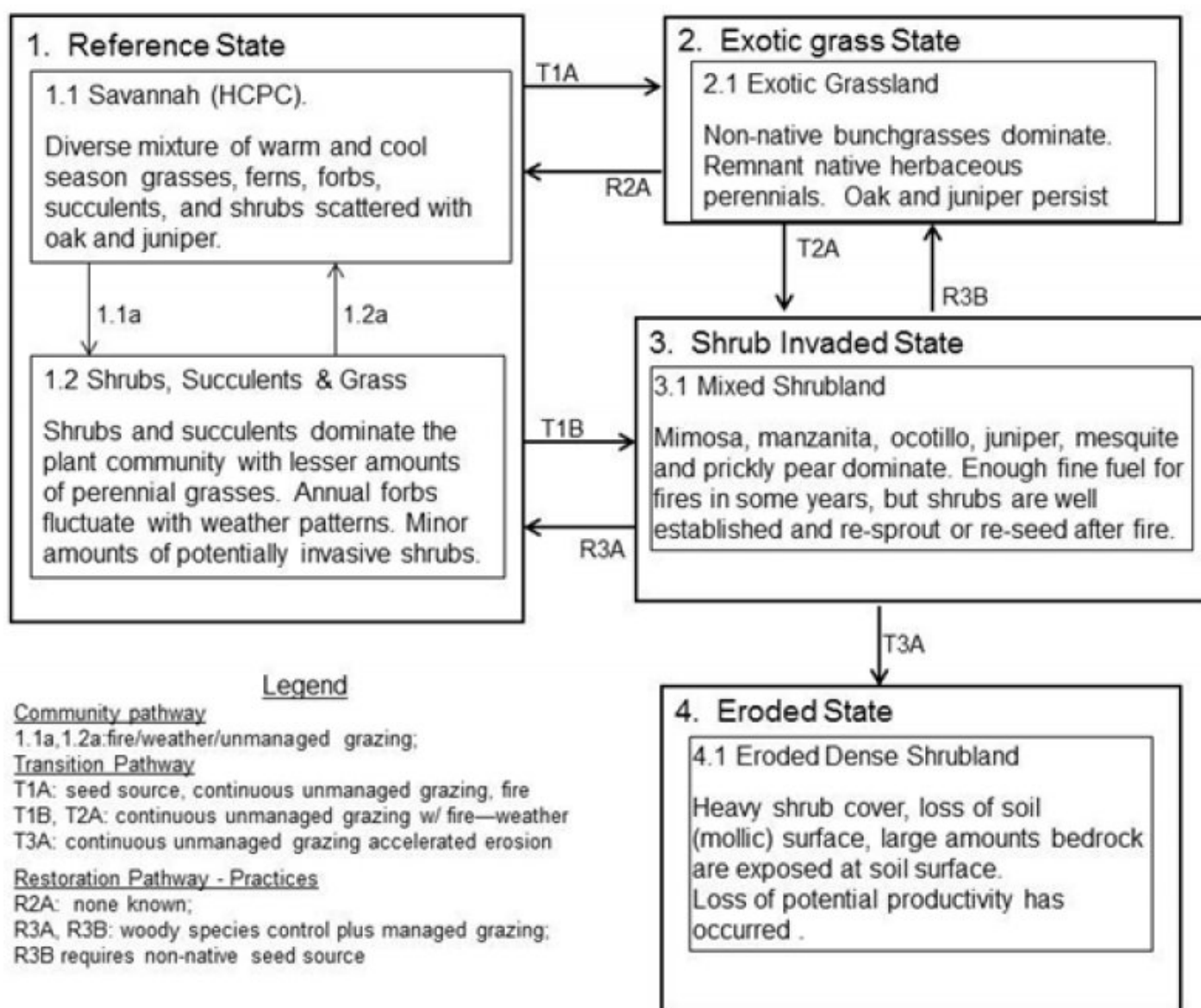


Figure 4. 41-1 Volcanic Hills STM diagram

State 1 Reference

Community 1.1 Savannah (HCPC)



Figure 5. Volcanic Hills 16-20" pz., Savannah (HCPC)

The historic native state includes the native plant communities that occur on the site, including the historic climax plant community. This state includes other plant communities that naturally occupy the site following fire, drought, flooding, herbivores, and other natural disturbances. The historic climax plant community represents the natural climax community that eventually reoccupies the site with proper management. The potential plant community on this site is a diverse mixture of warm and cool season perennial grasses, ferns, forbs, succulents, shrubs and trees. A tree canopy of Mexican live-oak species and juniper ranges from 5-15% and lends the site a savannah appearance. Most perennial herbaceous species are well dispersed throughout the plant community. A few species occur only under tree canopies. Other species like herbaceous sage and amole occur in patches of various sizes on this site. With continuous grazing, mid-grasses decline and are replaced by a continuous turf of species like blue grama, purple grama and curly mesquite. Naturally occurring wildfires in June-August were an important factor shaping this plant community. Fire-free intervals ranged from 10-20 years. In the absence of fire and/or with continuous grazing, species like amole, mimosa, mesquite, prickly pear and one-seed juniper can increase. Oak species on the site are very tolerant of fire. Stones, cobbles and gravels protect the soil from erosion after fire or heavy grazing use. Trees range from 5-50 stems per acre. Periodic drought can occur in this MLRA and can cause significant grass mortality. Significant drought has occurred in the past in the 30s, mid 50s, 1975-76, 1988-89, 1995-96 and 2002. Grasshopper infestations can cause considerable grass mortality, especially in drought years. Bare areas can be taken over by annuals like goldeneye, red brome, little barley and bitterweed, in years with wet winters following drought, or in grasshopper out-break years.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	504	1121	1311
Shrub/Vine	15	112	291
Tree	56	168	280
Forb	12	56	179
Total	587	1457	2061

Table 6. Soil surface cover

Tree basal cover	0-1%
Shrub/vine/liana basal cover	0-2%
Grass/grasslike basal cover	8-15%

Forb basal cover	0-1%
Non-vascular plants	0-1%
Biological crusts	0-1%
Litter	25-70%
Surface fragments >0.25" and <=3"	15-50%
Surface fragments >3"	3-15%
Bedrock	0-5%
Water	0%
Bare ground	5-20%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	—	0-5%	1-10%	0-5%
>0.15 <= 0.3	—	0-5%	5-15%	1-15%
>0.3 <= 0.6	—	1-5%	10-30%	1-5%
>0.6 <= 1.4	—	1-5%	1-10%	0-5%
>1.4 <= 4	0-3%	0-5%	—	—
>4 <= 12	5-15%	—	—	—
>12 <= 24	—	—	—	—
>24 <= 37	—	—	—	—
>37	—	—	—	—

Figure 7. Plant community growth curve (percent production by month).
AZ4111, 41.1 16-30. Growth begins in the spring, semi-dormancy occurs during the June drought, most growth occurs during the summer rainy season..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	10	0	15	45	20	5	0	0

Community 1.2

Shrubs, Succulents & Grass

Shrubs and succulents dominate the plant community with lesser amounts of perennial grass canopies. With the return of favorable climate and fire the site returns to a savannah aspect.

Pathway 1.1a

Community 1.1 to 1.2

Extended periods with no disturbance (fire or grazing) allow the build-up of perennial grass biomass that result in plant decadence while shrubs and succulents flourish. Periodic drought also causes significant grass mortality.

Conservation practices

Bedding
Alley Cropping
Waste Storage Facility
Brush Management
Animal Mortality Facility

Composting Facility
Irrigation Canal or Lateral
Deep Tillage
Clearing and Snagging
Conservation Cover
Conservation Crop Rotation
Contour Farming
Contour Orchard and Other Perennial Crops
Contour Buffer Strips
Prescribed Burning
Cover Crop
Critical Area Planting
Residue Management, Seasonal
Dam, Diversion
Sediment Basin
Water Well Decommissioning
Dike
Waste Treatment Lagoon
Waste Facility Closure
Diversion
Pond
Windbreak/Shelterbelt Establishment
Fence
Field Border
Irrigation Field Ditch
Riparian Herbaceous Cover
Riparian Forest Buffer
Filter Strip
Firebreak
Stream Habitat Improvement and Management
Aquatic Organism Passage
Aquaculture Ponds
Fish Raceway or Tank
Fishpond Management
Dam
Grade Stabilization Structure
Grassed Waterway
Hedgerow Planting
Hillside Ditch
Dry Hydrant
Irrigation Reservoir

Irrigation System, Microirrigation
Sprinkler System
Irrigation System, Surface and Subsurface
Irrigation System, Tailwater Recovery
Irrigation Water Management
Anionic Polyacrylamide (PAM) Application
Land Reclamation, Landslide Treatment
Land Reclamation, Toxic Discharge Control
Mine Shaft and Adit Closing
Land Clearing
Precision Land Forming
Irrigation Land Leveling
Land Smoothing
Lined Waterway or Outlet
Access Control
Mole Drain
Mulching
Tree/Shrub Site Preparation
Obstruction Removal
Forage Harvest Management
Forage and Biomass Planting
Livestock Pipeline
Pond Sealing or Lining, Flexible Membrane
Pond Sealing or Lining, Soil Dispersant
Pond Sealing or Lining, Bentonite Sealant
Pumping Plant
Land Reclamation, Abandoned Mined Land
Land Reclamation, Currently Mined Land
Grazing Land Mechanical Treatment
Range Planting
Drainage Water Management
Rock Barrier
Row Arrangement
Roof Runoff Structure
Access Road
Heavy Use Area Protection
Recreation Area Improvement
Recreation Land Grading and Shaping
Trails and Walkways
Stormwater Runoff Control
Spoil Spreading

Spring Development
Animal Trails and Walkways
Streambank and Shoreline Protection
Open Channel
Channel Bed Stabilization
Stripcropping
Structure for Water Control
Cross Wind Trap Strips
Nutrient Management
Feed Management
Integrated Pest Management (IPM)
Terrace
Vegetative Barrier
Herbaceous Wind Barriers
Subsurface Drain
Surface Drain, Field Ditch
Surface Drain, Main or Lateral
Surface Roughening
Tree/Shrub Establishment
Watering Facility
Underground Outlet
Vertical Drain
Waste Recycling
Waste Transfer
Vegetated Treatment Area
Water Harvesting Catchment
Water and Sediment Control Basin
Waterspreading
Water Well
Restoration and Management of Rare and Declining Habitats
Wetland Wildlife Habitat Management
Upland Wildlife Habitat Management
Shallow Water Development and Management
Early Successional Habitat Development/Management
Windbreak/Shelterbelt Renovation
Forest Trails and Landings
Constructed Wetland
Wetland Restoration
Wetland Creation
Wetland Enhancement
Tree/Shrub Pruning

Forest Stand Improvement
Monitoring Well
Anaerobic Digester
Roofs and Covers
Barnyard Runoff Management
Cistern
Controlled Livestock Lounging Area
Floodproofing
Livestock Shade Structure
Snow Harvesting
Controlled Stream access for Livestock Watering
Grass Buffer Strip
Record Keeping
Waste Field Storage Area
Infiltration Ditches
Well Plugging
Livestock Use Area Protection
Rinsate Management
Silage Leachate Collection and Transfer
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management
Vegetated Sinkhole Buffer
Livestock Cooling Pond
Pathogen Management
Waste Water & Feedlot Runoff Control
Irrigation Water Conveyance-modular Polyethylene Ditch & Canal Lining
Grade Stabilization Structure-Tire Bales
Irrigation Water Conveyance, Corrugated, Ribbed or Profile wall thermal pipeline
Prescribed Grazing
Stream Crossing
TA Planning
TA Design
TA Application
TA Check-Out
Existing Practice Payment
Stewardship Payment
Fuel Break
Amendments for the Treatment of Agricultural Waste
Reduced Water and Energy Coffee Conveyance System
Irrigation Water Conveyance, On-Ground Aluminum Pipeline
Pond Sealing or Lining, Compacted Clay Treatment

Silvopasture Establishment
Well Water Testing
Shellfish Aquaculture Management
Crop By-Product Transfer
Woody Residue Treatment
Waste Separation Facility
Waste Treatment
Salinity and Sodic Soil Management
Irrigation Water Conveyance, Corrugated Metal Pipeline
Invasive Plant Species Control
Pond Sealing and Lining, Soil Cement
Irrigation Water Conveyance, Anionic Polyacrylamide Ditch and Canal Treatment
Residue and Tillage Management, No-Till/Strip Till/Direct Seed
Residue and Tillage Management, Mulch Till
Residue and Tillage Management, Ridge Till
Multi-Story Cropping
Renewable Energy System
Individual Terrace
Engine Replacement
Dust Control on Unpaved Roads and Surfaces
Karst Sinkhole Treatment
Bioretention Basin
Agrichemical Handling Facility
Cross Wind Ridges
Road/Trail/Landing Closure and Treatment
Fish and Wildlife Structure
Comprehensive Nutrient Management Plan - Written
Comprehensive Nutrient Management Plan - Applied
Forest Management Plan - Written
Forest Management Plan - Applied
Grazing Management Plan - Written
Grazing Management Plan - Applied
Integrated Pest Management Plan - Written
Integrated Pest Management Plan - Applied
Irrigation Water Management Plan - Written
Irrigation Water Management Plan - Applied
Agricultural Energy Management Plan, Headquarters - Written
Agricultural Energy Management Plan, Headquarters - Applied
Comprehensive Air Quality Management Plan - Written
Comprehensive Air Quality Management Plan - Applied
Drainage Water Management Plan - Written

Drainage Water Management Plan - Applied
Conservation Plan Supporting Transition from Irrigation to Dry-land Plan - Written
Transition from Irrigation to Dry-land Plan - Applied
Conservation Plan Supporting Organic Transition - Written
Conservation Plan Supporting Organic Transition - Applied
Fish and Wildlife Habitat Plan - Written
Fish and Wildlife Habitat Plan - Applied
Pollinator Habitat Plan - Written
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Denitrifying Bioreactor
Orchard and Vinyard Air Quality Management
Irrigation Ditch Lining
Irrigation Pipeline
Seasonal High Tunnel System for Crops
Agricultural Secondary Containment Facility
Fueling Facility, Above Ground Storage
Controlled Traffic Farming
Waste Gassification Facility
VEGETATED SUBSURFACE DRAIN OUTLET
Field Operations Emissions Reduction
Structure Sediment Removal
Livestock Confinement Facility
Milking Center Wastewater Treatment
Monitoring and Evaluation
ORGANIC SORBENTS FOR THE REMEDIATION OF OIL-CONTAMINATED SOILS
Air Filtration and Scrubbing
Combustion System Improvement
Dust Control on Unpaved Roads and Surfaces
Herbaceous Weed Control
DUST CONTROL FROM ANIMAL ACTIVITY ON OPEN LOT SURFACES
FARMSTEAD ENERGY IMPROVEMENT
Nutrient Management Plan - Written
Nutrient Management Plan - Applied
Agricultural Energy Management Plan, Landscape - Written
Agricultural Energy Management Plan, Landscape - Applied
Spill Prevention, Control and Countermeasure (SPCC) Plan - Written
Spill Prevention, Control and Countermeasure (SPCC) Plan - Applied
IPM Herbicide Resistance Weed Conservation Plan - Written
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Bivalve Aquaculture Gear and Biofouling Control

Pathway 1.2a

Community 1.2 to 1.1

With managed grazing, favorable climate and fire this site recovers moderately well in 2 to 3 years.

Conservation practices

Bedding
Alley Cropping
Waste Storage Facility
Brush Management
Animal Mortality Facility
Composting Facility
Irrigation Canal or Lateral
Deep Tillage
Clearing and Snagging
Conservation Cover
Conservation Crop Rotation
Contour Farming
Contour Orchard and Other Perennial Crops
Contour Buffer Strips
Prescribed Burning
Cover Crop
Critical Area Planting
Residue Management, Seasonal
Dam, Diversion
Sediment Basin
Water Well Decommissioning
Dike
Waste Treatment Lagoon
Waste Facility Closure
Diversion
Pond
Windbreak/Shelterbelt Establishment
Fence
Field Border
Irrigation Field Ditch
Riparian Herbaceous Cover
Riparian Forest Buffer
Filter Strip
Firebreak
Stream Habitat Improvement and Management
Aquatic Organism Passage
Aquaculture Ponds

Fish Raceway or Tank
Fishpond Management
Dam
Grade Stabilization Structure
Grassed Waterway
Hedgerow Planting
Hillside Ditch
Dry Hydrant
Irrigation Reservoir
Irrigation System, Microirrigation
Sprinkler System
Irrigation System, Surface and Subsurface
Irrigation System, Tailwater Recovery
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Land Reclamation, Landslide Treatment
Land Reclamation, Toxic Discharge Control
Mine Shaft and Adit Closing
Land Clearing
Precision Land Forming
Irrigation Land Leveling
Land Smoothing
Lined Waterway or Outlet
Access Control
Mole Drain
Mulching
Tree/Shrub Site Preparation
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Rock Barrier

Row Arrangement
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Bivalve Aquaculture Gear and Biofouling Control

State 2

Exotic grasses

Community 2.1

Exotic grassland

This state occurs where non-native grass species like Lehmann, Boer and weeping lovegrass, and yellow bluestem have invaded the plant community from adjacent areas with a seed source or from roads and trails running through the site. As these species increase to dominate the site native perennial grasses and forbs are reduced to minor amounts.

State 3

Shrub Invaded

Community 3.1

Mixed Shrubland



Figure 8. Volcanic Hills 16-20" pz., Mixed Shrubland w/ mimosa and juniper

This state occurs where shrubby species like mesquite, juniper, mimosa, whitethorn, ocotillo and prickly pear have invaded or increased to dominate the plant community in the absence of fire for long periods. Sufficient fine fuels still exist to carry fires, but shrubs are well established and re-sprout and quickly re-assume dominance.

State 4

Eroded

Community 4.1

Eroded Dense Shrubland



Figure 9. Volcanic Hills 16-20" p.z., Eroded w/ annual goldeneye

This state occurs where sheet and rill erosion is accelerated due to severe trailing, soil compaction and lack of perennial grass cover. In some places it is due to poorly designed road and trail construction. As the soil surface is lost to erosion, clayey (argillic) horizons, and next, hard volcanic bedrock is exposed at the surface. This greatly alters surface hydrology (more, faster runoff) and reduces potential productivity of the site.

Transition T1A
State 1 to 2

Non-native bunchgrass seed is purposely planted or inadvertently introduced into the plant community (wind-blown or mechanical transport). Disturbances such as fire or drought can disrupt the native perennials allowing the non-native grasses an opportunity to expand their range from disturbed or planted areas. Long term events such as continuous unmanaged grazing or community phase pathway 1.1a allow non-native bunchgrasses a competitive advantage over natives.

Transition T1B
State 1 to 3

Continuous unmanaged grazing with heavy to severe utilization reduces perennial bunchgrasses. Fire continuity, intensity and frequency are reduced.

Restoration pathway R2A
State 2 to 1

No restoration pathway known at this time. Perhaps future development of herbicide or biological treatment to remove perennial exotics will occur.

Conservation practices

Bedding

Alley Cropping
Waste Storage Facility
Brush Management
Animal Mortality Facility
Composting Facility
Irrigation Canal or Lateral
Deep Tillage
Clearing and Snagging
Conservation Cover
Conservation Crop Rotation
Contour Farming
Contour Orchard and Other Perennial Crops
Contour Buffer Strips
Prescribed Burning
Cover Crop
Critical Area Planting
Residue Management, Seasonal
Dam, Diversion
Sediment Basin
Water Well Decommissioning
Dike
Waste Treatment Lagoon
Waste Facility Closure
Diversion
Pond
Windbreak/Shelterbelt Establishment
Fence
Field Border
Irrigation Field Ditch
Riparian Herbaceous Cover
Riparian Forest Buffer
Filter Strip
Firebreak
Stream Habitat Improvement and Management
Aquatic Organism Passage
Aquaculture Ponds
Fish Raceway or Tank
Fishpond Management
Dam
Grade Stabilization Structure
Grassed Waterway

Hedgerow Planting
Hillside Ditch
Dry Hydrant
Irrigation Reservoir
Irrigation System, Microirrigation
Sprinkler System
Irrigation System, Surface and Subsurface
Irrigation System, Tailwater Recovery
Irrigation Water Management
Anionic Polyacrylamide (PAM) Application
Land Reclamation, Landslide Treatment
Land Reclamation, Toxic Discharge Control
Mine Shaft and Adit Closing
Land Clearing
Precision Land Forming
Irrigation Land Leveling
Land Smoothing
Lined Waterway or Outlet
Access Control
Mole Drain
Mulching
Tree/Shrub Site Preparation
Obstruction Removal
Forage Harvest Management
Forage and Biomass Planting
Livestock Pipeline
Pond Sealing or Lining, Flexible Membrane
Pond Sealing or Lining, Soil Dispersant
Pond Sealing or Lining, Bentonite Sealant
Pumping Plant
Land Reclamation, Abandoned Mined Land
Land Reclamation, Currently Mined Land
Grazing Land Mechanical Treatment
Range Planting
Drainage Water Management
Rock Barrier
Row Arrangement
Roof Runoff Structure
Access Road
Heavy Use Area Protection
Recreation Area Improvement

Recreation Land Grading and Shaping
Trails and Walkways
Stormwater Runoff Control
Spoil Spreading
Spring Development
Animal Trails and Walkways
Streambank and Shoreline Protection
Open Channel
Channel Bed Stabilization
Stripcropping
Structure for Water Control
Cross Wind Trap Strips
Nutrient Management
Feed Management
Integrated Pest Management (IPM)
Terrace
Vegetative Barrier
Herbaceous Wind Barriers
Subsurface Drain
Surface Drain, Field Ditch
Surface Drain, Main or Lateral
Surface Roughening
Tree/Shrub Establishment
Watering Facility
Underground Outlet
Vertical Drain
Waste Recycling
Waste Transfer
Vegetated Treatment Area
Water Harvesting Catchment
Water and Sediment Control Basin
Waterspreading
Water Well
Restoration and Management of Rare and Declining Habitats
Wetland Wildlife Habitat Management
Upland Wildlife Habitat Management
Shallow Water Development and Management
Early Successional Habitat Development/Management
Windbreak/Shelterbelt Renovation
Forest Trails and Landings
Constructed Wetland

Wetland Restoration
Wetland Creation
Wetland Enhancement
Tree/Shrub Pruning
Forest Stand Improvement
Monitoring Well
Anaerobic Digestor
Roofs and Covers
Barnyard Runoff Management
Cistern
Controlled Livestock Lounging Area
Floodproofing
Livestock Shade Structure
Snow Harvesting
Controlled Stream access for Livestock Watering
Grass Buffer Strip
Record Keeping
Waste Field Storage Area
Infiltration Ditches
Well Plugging
Livestock Use Area Protection
Rinsate Management
Silage Leachate Collection and Transfer
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management
Vegetated Sinkhole Buffer
Livestock Cooling Pond
Pathogen Management
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Irrigation Water Conveyance-modular Polyethylene Ditch & Canal Lining
Grade Stabilization Structure-Tire Bales
Irrigation Water Conveyance, Corrugated, Ribbed or Profile wall thermal pipeline
Prescribed Grazing
Stream Crossing
TA Planning
TA Design
TA Application
TA Check-Out
Existing Practice Payment
Stewardship Payment
Fuel Break

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Pond Sealing or Lining, Compacted Clay Treatment
Silvopasture Establishment
Well Water Testing
Shellfish Aquaculture Management
Crop By-Product Transfer
Woody Residue Treatment
Waste Separation Facility
Waste Treatment
Salinity and Sodic Soil Management
Irrigation Water Conveyance, Corrugated Metal Pipeline
Invasive Plant Species Control
Pond Sealing and Lining, Soil Cement
Irrigation Water Conveyance, Anionic Polyacrylamide Ditch and Canal Treatment
Residue and Tillage Management, No-Till/Strip Till/Direct Seed
Residue and Tillage Management, Mulch Till
Residue and Tillage Management, Ridge Till
Multi-Story Cropping
Renewable Energy System
Individual Terrace
Engine Replacement
Dust Control on Unpaved Roads and Surfaces
Karst Sinkhole Treatment
Bioretention Basin
Agrichemical Handling Facility
Cross Wind Ridges
Road/Trail/Landing Closure and Treatment
Fish and Wildlife Structure
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Comprehensive Nutrient Management Plan - Applied
Forest Management Plan - Written
Forest Management Plan - Applied
Grazing Management Plan - Written
Grazing Management Plan - Applied
Integrated Pest Management Plan - Written
Integrated Pest Management Plan - Applied
Irrigation Water Management Plan - Written
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Agricultural Energy Management Plan, Headquarters - Written

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Comprehensive Air Quality Management Plan - Written
Comprehensive Air Quality Management Plan - Applied
Drainage Water Management Plan - Written
Drainage Water Management Plan - Applied
Conservation Plan Supporting Transition from Irrigation to Dry-land Plan - Written
Transition from Irrigation to Dry-land Plan - Applied
Conservation Plan Supporting Organic Transition - Written
Conservation Plan Supporting Organic Transition - Applied
Fish and Wildlife Habitat Plan - Written
Fish and Wildlife Habitat Plan - Applied
Pollinator Habitat Plan - Written
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Denitrifying Bioreactor
Orchard and Vinyard Air Quality Management
Irrigation Ditch Lining
Irrigation Pipeline
Seasonal High Tunnel System for Crops
Agricultural Secondary Containment Facility
Fueling Facility, Above Ground Storage
Controlled Traffic Farming
Waste Gassification Facility
VEGETATED SUBSURFACE DRAIN OUTLET
Field Operations Emissions Reduction
Structure Sediment Removal
Livestock Confinement Facility
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Monitoring and Evaluation
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FARMSTEAD ENERGY IMPROVEMENT
Nutrient Management Plan - Written
Nutrient Management Plan - Applied
Agricultural Energy Management Plan, Landscape - Written
Agricultural Energy Management Plan, Landscape - Applied
Spill Prevention, Control and Countermeasure (SPCC) Plan - Written
Spill Prevention, Control and Countermeasure (SPCC) Plan - Applied

IPM Herbicide Resistance Weed Conservation Plan - Written
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Bivalve Aquaculture Gear and Biofouling Control

Transition T2A

State 2 to 3

Continuous unmanaged grazing with heavy to severe utilization results in persistently low perennial grass cover and extended fire free periods. Remnant native perennial grasses cannot re-colonize areas with shrub competition.

Restoration pathway R3A

State 3 to 1

Woody species control, native species seeding (as needed) supported by managed grazing. Shrub control maintained with herbicide and/or prescribed burning.

Conservation practices

Bedding
Alley Cropping
Waste Storage Facility
Brush Management
Animal Mortality Facility
Composting Facility
Irrigation Canal or Lateral
Deep Tillage
Clearing and Snagging
Conservation Cover
Conservation Crop Rotation
Contour Farming
Contour Orchard and Other Perennial Crops
Contour Buffer Strips
Prescribed Burning
Cover Crop
Critical Area Planting
Residue Management, Seasonal
Dam, Diversion
Sediment Basin
Water Well Decommissioning
Dike
Waste Treatment Lagoon
Waste Facility Closure
Diversion
Pond
Windbreak/Shelterbelt Establishment
Fence

Field Border
Irrigation Field Ditch
Riparian Herbaceous Cover
Riparian Forest Buffer
Filter Strip
Firebreak
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Access Road
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Recreation Area Improvement
Recreation Land Grading and Shaping
Trails and Walkways
Stormwater Runoff Control
Spoil Spreading
Spring Development
Animal Trails and Walkways
Streambank and Shoreline Protection
Open Channel
Channel Bed Stabilization
Stripcropping
Structure for Water Control
Cross Wind Trap Strips
Nutrient Management
Feed Management
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Terrace
Vegetative Barrier
Herbaceous Wind Barriers
Subsurface Drain
Surface Drain, Field Ditch
Surface Drain, Main or Lateral
Surface Roughening
Tree/Shrub Establishment
Watering Facility
Underground Outlet
Vertical Drain
Waste Recycling

Waste Transfer
Vegetated Treatment Area
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Wetland Restoration
Wetland Creation
Wetland Enhancement
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Forest Stand Improvement
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Anaerobic Digester
Roofs and Covers
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Livestock Shade Structure
Snow Harvesting
Controlled Stream access for Livestock Watering
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Waste Field Storage Area
Infiltration Ditches
Well Plugging
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Drainage Water Management Plan - Written
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Conservation Plan Supporting Transition from Irrigation to Dry-land Plan - Written
Transition from Irrigation to Dry-land Plan - Applied
Conservation Plan Supporting Organic Transition - Written
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Restoration pathway R3B

State 3 to 4

Restoration activities conducted when a non-native seed bank is present on site (African lovegrasses or yellow bluestem present along trails, roads or in disturbed areas) can result in an exotic grassland community. Native species seeding may enhance the native grass component. Restoration practices are woody species control and native species seeding (as needed) supported by managed grazing. Shrub control maintained with herbicide may favor the native grasses while prescribed burning may favor non-natives. Burning the mixed shrub community with a non-native grass seed source present can result in an exotic grassland co-dominant with shrubs.

Conservation practices

Bedding
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Waste Storage Facility
Brush Management
Animal Mortality Facility
Composting Facility
Irrigation Canal or Lateral
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Conservation Cover
Conservation Crop Rotation
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Transition T3A

State 3 to 4

Long-term, continuous, unmanaged grazing with heavy to severe utilization affects soil site stability and hydrologic functioning. Reduced soil cover, compaction, and A Horizon loss compound the effect of plant community changes (increased shrub/decreased perennial grass community) to increase surface water run-off rather than infiltration. Drought conditions accelerate this transition. Persistent reduced infiltration severely limits perennial grass recruitment.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					

1	Dominant mid-grasses			392–785	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	112–448	–
	bullgrass	MUEM	<i>Muhlenbergia emersleyi</i>	56–168	–
	plains lovegrass	ERIN	<i>Eragrostis intermedia</i>	56–168	–
	green sprangletop	LEDU	<i>Leptochloa dubia</i>	11–112	–
	Texas bluestem	SCCI2	<i>Schizachyrium cirratum</i>	0–112	–
	Orcutt's threeawn	ARSCO	<i>Aristida schiedeana</i> var. <i>orcuttiana</i>	0–112	–
	cane bluestem	BOBA3	<i>Bothriochloa barbinodis</i>	6–112	–
	woolyspike balsamscale	ELBA	<i>Elionurus barbiculmis</i>	0–56	–
	spiked crinkleawn	TRSP12	<i>Trachypogon spicatus</i>	0–56	–
2	Dominant short grasses			90–280	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	28–168	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	17–112	–
	purple grama	BORA	<i>Bouteloua radicata</i>	28–112	–
	curly-mesquite	HIBE	<i>Hilaria belangeri</i>	6–56	–
	slender grama	BORE2	<i>Bouteloua repens</i>	0–28	–
	black grama	BOER4	<i>Bouteloua eriopoda</i>	6–22	–
	common wolfstail	LYPH	<i>Lycurus phleoides</i>	1–22	–
	vine mesquite	PAOB	<i>Panicum obtusum</i>	1–22	–
3	Cool season perennial grasses			6–112	
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	1–56	–
	pinyon ricegrass	PIFI	<i>Piptochaetium fimbriatum</i>	0–34	–
	muttongrass	POFE	<i>Poa fendleriana</i>	0–22	–
	squirreltail	ELELE	<i>Elymus elymoides</i> ssp. <i>elymoides</i>	1–22	–
	sedge	CAREX	<i>Carex</i>	1–11	–
	flatsedge	CYPER	<i>Cyperus</i>	0–1	–
	densetuft hairsedge	BUCA2	<i>Bulbostylis capillaris</i>	0–1	–
4	Miscellaneous perennial grasses			6–56	
	tanglehead	HECO10	<i>Heteropogon contortus</i>	0–28	–
	purple muhly	MURI3	<i>Muhlenbergia rigida</i>	0–17	–
	silver bluestem	BOSA	<i>Bothriochloa saccharoides</i>	0–17	–
	Hall's panicgrass	PAHA	<i>Panicum hallii</i>	0–11	–
	maidencane	PAHE2	<i>Panicum hemitomom</i>	0–6	–
	plains bristlegrass	SEVU2	<i>Setaria vulpiseta</i>	0–6	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–6	–
	Mexican gamagrass	TRLA11	<i>Tripsacum lanceolatum</i>	0–6	–
	slim tridens	TRMU	<i>Tridens muticus</i>	0–6	–
	slim tridens	TRMUE	<i>Tridens muticus</i> var. <i>elongatus</i>	0–6	–
	bulb panicgrass	PABU	<i>Panicum bulbosum</i>	0–6	–
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	0–6	–
	Fendler threeawn	ARPUL	<i>Aristida purpurea</i> var. <i>longiseta</i>	0–6	–
	Wright's threeawn	ARPUW	<i>Aristida purpurea</i> var. <i>wrightii</i>	0–6	–
	spidergrass	ARTE3	<i>Aristida ternipes</i>	1–6	–

	spidergrass	ARTEG	<i>Aristida ternipes</i> var. <i>gentilis</i>	1–6	–
	Arizona cottontop	DICA8	<i>Digitaria californica</i>	0–2	–
	fall witchgrass	DICO6	<i>Digitaria cognata</i>	0–1	–
	nineawn pappusgrass	ENDE	<i>Enneapogon desvauxii</i>	0–1	–
	cotta grass	COPA13	<i>Cottea pappophoroides</i>	0–1	–
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	0–1	–
	Rothrock's grama	BORO2	<i>Bouteloua rothrockii</i>	0–1	–
5	Annual grasses			6–78	
	Mexican panicgrass	PAHI5	<i>Panicum hirticaule</i>	1–22	–
	mucronate sprangeltop	LEPAB	<i>Leptochloa panicea</i> ssp. <i>brachiata</i>	1–17	–
	Mexican sprangletop	LEFUU	<i>Leptochloa fusca</i> ssp. <i>uninervia</i>	0–11	–
	witchgrass	PACA6	<i>Panicum capillare</i>	0–6	–
	Arizona signalgrass	URAR	<i>Urochloa arizonica</i>	0–6	–
	Eastwood fescue	VUMIC	<i>Vulpia microstachys</i> var. <i>ciliata</i>	1–6	–
	Pacific fescue	VUMIP	<i>Vulpia microstachys</i> var. <i>pauciflora</i>	1–6	–
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	1–6	–
	little barley	HOPU	<i>Hordeum pusillum</i>	0–6	–
	sixweeks threeawn	ARAD	<i>Aristida adscensionis</i>	0–6	–
	prairie threeawn	AROL	<i>Aristida oligantha</i>	1–6	–
	tapertip cupgrass	ERACA	<i>Eriochloa acuminata</i> var. <i>acuminata</i>	0–6	–
	Mexican lovegrass	ERME	<i>Eragrostis mexicana</i>	0–1	–
	tufted lovegrass	ERPEP2	<i>Eragrostis pectinacea</i> var. <i>pectinacea</i>	0–1	–
	pitscale grass	HAGR3	<i>Hackelochloa granularis</i>	0–1	–
	needle grama	BOAR	<i>Bouteloua aristidoides</i>	0–1	–
	sixweeks grama	BOBA2	<i>Bouteloua barbata</i>	0–1	–
	matted grama	BOSI2	<i>Bouteloua simplex</i>	0–1	–
	Arizona brome	BRAR4	<i>Bromus arizonicus</i>	0–1	–
	feather fingergrass	CHVI4	<i>Chloris virgata</i>	0–1	–
	fragilegrass	AETE	<i>Aegopogon tenellus</i>	0–1	–
	delicate muhly	MUFR	<i>Muhlenbergia fragilis</i>	0–1	–
	littleseed muhly	MUMI	<i>Muhlenbergia microsperma</i>	0–1	–
	Bigelow's bluegrass	POBI	<i>Poa bigelovii</i>	0–1	–
	poverty dropseed	SPVA	<i>Sporobolus vaginiflorus</i>	0–1	–
	prairie false oat	TRIN5	<i>Trisetum interruptum</i>	0–1	–
Forb					
6	Perennial forbs			11–67	
	Louisiana vetch	VILUL2	<i>Vicia ludoviciana</i> ssp. <i>ludoviciana</i>	0–11	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	1–11	–
	largeflower onion	ALMA4	<i>Allium macropetalum</i>	0–6	–
	weakleaf bur ragweed	AMCO3	<i>Ambrosia confertiflora</i>	1–6	–
	firecrackerbush	BOTE2	<i>Bouvardia ternifolia</i>	0–6	–
	pepper	CAPSI	<i>Capsicum</i>	0–6	–
	bluedicks	DICA14	<i>Dichelostemma capitatum</i>	1–6	–
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	0–6	–

trailing fleabane	ERFL	<i>Erigeron flagellaris</i>	1–6	–
pearly globe amaranth	GONI	<i>Gomphrena nitida</i>	0–6	–
Wright's deervetch	LOWR	<i>Lotus wrightii</i>	0–6	–
slimleaf bean	PHAN3	<i>Phaseolus angustissimus</i>	0–6	–
Arizona spikemoss	SEAR2	<i>Selaginella arizonica</i>	0–6	–
American vetch	VIAM	<i>Vicia americana</i>	0–6	–
brownplume wirelettuce	STPA4	<i>Stephanomeria pauciflora</i>	0–3	–
white prairie aster	SYFAC	<i>Symphyotrichum falcatum</i> var. <i>commutatum</i>	0–2	–
Texas snoutbean	RHSET	<i>Rhynchosia senna</i> var. <i>texana</i>	0–2	–
Arizona bluecurls	TRAR	<i>Trichostema arizonicum</i>	0–2	–
New Mexico fanpetals	SINE	<i>Sida neomexicana</i>	0–2	–
orange fameflower	PHAU13	<i>Phemeranthus aurantiacus</i>	0–2	–
Cory's mistletoe	PHCO14	<i>Phoradendron coryae</i>	0–2	–
fineleaf hymenopappus	HYFI	<i>Hymenopappus filifolius</i>	0–2	–
Arizona snakecotton	FRAR2	<i>Froelichia arizonica</i>	0–2	–
New Mexico fleabane	ERNE3	<i>Erigeron neomexicanus</i>	0–2	–
spreading fleabane	ERDI4	<i>Erigeron divergens</i>	0–2	–
tuber anemone	ANTU	<i>Anemone tuberosa</i>	0–2	–
Cooley's bundleflower	DECO2	<i>Desmanthus cooleyi</i>	0–2	–
dwarf stickpea	CAHUR	<i>Calliandra humilis</i> var. <i>reticulata</i>	0–2	–
bastard toadflax	COUM	<i>Comandra umbellata</i>	0–2	–
carelessweed	AMPA	<i>Amaranthus palmeri</i>	0–2	–
woolly locoweed	ASMOB	<i>Astragalus mollissimus</i> var. <i>bigelovii</i>	0–2	–
sheep milkvetch	ASNO3	<i>Astragalus nothoxys</i>	0–2	–
branched noseburn	TRRA5	<i>Tragia ramosa</i>	0–2	–
Fort Huachuca vervain	VEGR2	<i>Verbena gracilis</i>	0–1	–
Rocky Mountain zinnia	ZIGR	<i>Zinnia grandiflora</i>	0–1	–
horsetail milkweed	ASSU2	<i>Asclepias subverticillata</i>	0–1	–
dense ayenia	AYMI	<i>Ayenia microphylla</i>	0–1	–
scarlet spiderling	BOCO	<i>Boerhavia coccinea</i>	0–1	–
climbing wartclub	BOSC	<i>Boerhavia scandens</i>	0–1	–
Mexican yellowshow	AMPA3	<i>Amoreuxia palmatifida</i>	0–1	–
Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0–1	–
crested anoda	ANCR2	<i>Anoda cristata</i>	0–1	–
perennial rockcress	ARPE2	<i>Arabis perennans</i>	0–1	–
southwestern pricklypoppy	ARPL3	<i>Argemone pleiacantha</i>	0–1	–
Watson's dutchman's pipe	ARWA	<i>Aristolochia watsonii</i>	0–1	–
Arizona milkvetch	ASAR6	<i>Astragalus arizonicus</i>	0–1	–
spider milkweed	ASAS	<i>Asclepias asperula</i>	0–1	–
chaparral asphed	ASHI3	<i>Aspicarpa hirtella</i>	0–1	–
broadleaf milkweed	ASLA4	<i>Asclepias latifolia</i>	0–1	–
leatherweed	CRPO5	<i>Croton nottsii</i>	0–1	–

	fingerleaf gourd	CUDI	<i>Cucurbita digitata</i>	0-1	-
	coyote gourd	CUPA	<i>Cucurbita palmata</i>	0-1	-
	purplenerve springparsley	CYMU2	<i>Cymopterus multinervatus</i>	0-1	-
	whiteflower prairie clover	DAAL	<i>Dalea albiflora</i>	0-1	-
	James' prairie clover	DAJA	<i>Dalea jamesii</i>	0-1	-
	dwarf prairie clover	DANA	<i>Dalea nana</i>	0-1	-
	downy prairie clover	DANE	<i>Dalea neomexicana</i>	0-1	-
	wholeleaf Indian paintbrush	CAIN14	<i>Castilleja integra</i>	0-1	-
	desert mariposa lily	CAKE	<i>Calochortus kennedyi</i>	0-1	-
	sego lily	CANU3	<i>Calochortus nuttallii</i>	0-1	-
	whitemargin sandmat	CHAL11	<i>Chamaesyce albomarginata</i>	0-1	-
	mala mujer	CNAN	<i>Cnidoscolus angustidens</i>	0-1	-
	birdbill dayflower	CODI4	<i>Commelina dianthifolia</i>	0-1	-
	Texas bindweed	COEQ	<i>Convolvulus equitans</i>	0-1	-
	whitemouth dayflower	COER	<i>Commelina erecta</i>	0-1	-
	desert larkspur	DEPA	<i>Delphinium parishii</i>	0-1	-
	trailing windmills	ALIN	<i>Allionia incarnata</i>	0-1	-
	Torrey's craglily	ECFL	<i>Echeandia flavescens</i>	0-1	-
	Mexican fireplant	EUHE4	<i>Euphorbia heterophylla</i>	0-1	-
	sun spurge	EURA2	<i>Euphorbia radians</i>	0-1	-
	wild dwarf morning-glory	EVAR	<i>Evolvulus arizonicus</i>	0-1	-
	shaggy dwarf morning- glory	EVNU	<i>Evolvulus nuttallianus</i>	0-1	-
	silver dwarf morning- glory	EVSE	<i>Evolvulus sericeus</i>	0-1	-
	scarlet beeblossom	GACO5	<i>Gaura coccinea</i>	0-1	-
	small matweed	GUDE	<i>Guilleminea densa</i>	0-1	-
	red bluet	HORU	<i>Houstonia rubra</i>	0-1	-
	babyslippers	HYVE	<i>Hybanthus verticillatus</i>	0-1	-
	pinkthroat morning-glory	IPLO	<i>Ipomoea longifolia</i>	0-1	-
	ragged nettlespurge	JAMA	<i>Jatropha macrorhiza</i>	0-1	-
	San Pedro daisy	LAPO4	<i>Lasianthaea podocephala</i>	0-1	-
	narrowleaf stoneseed	LIIN2	<i>Lithospermum incisum</i>	0-1	-
	Lewis flax	LILE3	<i>Linum lewisii</i>	0-1	-
	Greene's bird's-foot trefoil	LOGR4	<i>Lotus greenei</i>	0-1	-
	variableleaf bushbean	MAGI2	<i>Macroptilium gibbosifolium</i>	0-1	-
	lacy tansyaster	MAPI	<i>Machaeranthera pinnatifida</i>	0-1	-
	Mexican star	MIBI2	<i>Milla biflora</i>	0-1	-
	lemon beebalm	MOCIA	<i>Monarda citriodora</i> ssp. <i>austromontana</i>	0-1	-
	tufted evening primrose	OECA10	<i>Oenothera caespitosa</i>	0-1	-
	locoweed	OXYTR	<i>Oxytropis</i>	0-1	-
	beardlip penstemon	PEBA2	<i>Penstemon barbatus</i>	0-1	-

	Cataiina beardtongue	PEDI6	<i>Penstemon discolor</i>	0–1	–
	firecracker penstemon	PEEA	<i>Penstemon eatonii</i>	0–1	–
	longstalk chinchweed	PELO	<i>Pectis longipes</i>	0–1	–
	Parry's beardtongue	PEPA24	<i>Penstemon parryi</i>	0–1	–
	ivyleaf groundcherry	PHHE4	<i>Physalis hederifolia</i>	0–1	–
	white milkwort	POAL4	<i>Polygala alba</i>	0–1	–
	velvetseed milkwort	POOB	<i>Polygala obscura</i>	0–1	–
	shrubby purslane	POSU3	<i>Portulaca suffrutescens</i>	0–1	–
	slimflower scurfpea	PSTE5	<i>Psoralidium tenuiflorum</i>	0–1	–
	buffpetal	RHPH2	<i>Rhynchosida physocalyx</i>	0–1	–
	silverleaf nightshade	SOEL	<i>Solanum elaeagnifolium</i>	0–1	–
	Missouri goldenrod	SOMI2	<i>Solidago missouriensis</i>	0–1	–
	copper globemallow	SPAN3	<i>Sphaeralcea angustifolia</i>	0–1	–
	gooseberryleaf globemallow	SPGR2	<i>Sphaeralcea grossulariifolia</i>	0–1	–
	twinleaf senna	SEBA3	<i>Senna bauhinoides</i>	0–1	–
	Lemmon's ragwort	SELE8	<i>Senecio lemmonii</i>	0–1	–
	Huachuca Mountain ragwort	SEMU9	<i>Senecio multidentatus</i>	0–1	–
	cardinal catchfly	SILA2	<i>Silene laciniata</i>	0–1	–
	Sonoita noseburn	TRLA	<i>Tragia laciniata</i>	0–1	–
	slimleaf plainsmustard	SCLI12	<i>Schoenocrambe linearifolia</i>	0–1	–
	jewels of Opar	TAPA2	<i>Talinum paniculatum</i>	0–1	–
	Coulter's wrinklefruit	TECO	<i>Tetraclea coulteri</i>	0–1	–
	hairy founwort	TENE	<i>Tetramerium nervosum</i>	0–1	–
	longstalk greenthread	THLO	<i>Thelesperma longipes</i>	0–1	–
	Hopi tea greenthread	THME	<i>Thelesperma megapotamicum</i>	0–1	–
7	Annual Forbs			1–112	
	longleaf false goldeneye	HELOA2	<i>Heliomeris longifolia</i> var. <i>annua</i>	1–56	–
	bitter rubberweed	HYOD	<i>Hymenoxys odorata</i>	0–28	–
	New Mexico goosefoot	CHNE3	<i>Chenopodium neomexicanum</i>	0–11	–
	sensitive partridge pea	CHNI2	<i>Chamaecrista nictitans</i>	0–11	–
	smallflowered milkvetch	ASNU4	<i>Astragalus nuttallianus</i>	0–11	–
	Thurber's milkvetch	ASTH	<i>Astragalus thurberi</i>	0–11	–
	fewflower beggarticks	BILE	<i>Bidens leptcephala</i>	0–11	–
	pitseed goosefoot	CHBE4	<i>Chenopodium berlandieri</i>	0–11	–
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	0–6	–
	southwestern cosmos	COPA12	<i>Cosmos parviflorus</i>	0–3	–
	Wright's bird's beak	COWR2	<i>Cordylanthus wrightii</i>	0–2	–
	scrambled eggs	COAU2	<i>Corydalis aurea</i>	0–2	–
	wedgeleaf draba	DRCU	<i>Draba cuneifolia</i>	0–2	–
	New Mexico thistle	CINE	<i>Cirsium neomexicanum</i>	0–2	–
	redstar	IPCO3	<i>Ipomoea coccinea</i>	0–2	–
	Thurber's morning-glory	IPTH	<i>Ipomoea thurberi</i>	0–2	–
	Arizona poppy	KACP	<i>Kallstroemia grandiflora</i>	0–2	–

	Arizona poppy	MAON	<i>Kallstroemia grandiflora</i>	0-2	-
	tanseyleaf tansyaster	MATA2	<i>Machaeranthera tanacetifolia</i>	0-2	-
	woolly plantain	PLPA2	<i>Plantago patagonica</i>	0-2	-
	slender goldenweed	MAGR10	<i>Machaeranthera gracilis</i>	0-2	-
	Wright's cudweed	PSCAC2	<i>Pseudognaphalium canescens</i> ssp. <i>canescens</i>	0-2	-
	spreading fanpetals	SIAB	<i>Sida abutifolia</i>	0-2	-
	New Mexico copperleaf	ACNE	<i>Acalypha neomexicana</i>	0-2	-
	carelessweed	AMPA	<i>Amaranthus palmeri</i>	0-1	-
	crested anoda	ANCR2	<i>Anoda cristata</i>	0-1	-
	halfmoon milkvetch	ASAL6	<i>Astragalus allochrous</i>	0-1	-
	royal sandmat	CHDI5	<i>Chamaesyce dioica</i>	0-1	-
	pillpod sandmat	CHHI3	<i>Chamaesyce hirta</i>	0-1	-
	hyssopleaf sandmat	CHHY3	<i>Chamaesyce hyssopifolia</i>	0-1	-
	Coulter's spiderling	BOCO2	<i>Boerhavia coulteri</i>	0-1	-
	erect spiderling	BOER	<i>Boerhavia erecta</i>	0-1	-
	hoary bowlesia	BOIN3	<i>Bowlesia incana</i>	0-1	-
	purple spiderling	BOPU	<i>Boerhavia purpurascens</i>	0-1	-
	fringed redmaids	CACI2	<i>Calandrinia ciliata</i>	0-1	-
	sleepy silene	SIAN2	<i>Silene antirrhina</i>	0-1	-
	Abert's creeping zinnia	SAAB	<i>Sanvitalia abertii</i>	0-1	-
	sawtooth sage	SASU7	<i>Salvia subincisa</i>	0-1	-
	mesa tansyaster	MATA	<i>Machaeranthera tagetina</i>	0-1	-
	purslane	PORTU	<i>Portulaca</i>	0-1	-
	yerba porosa	PORU6	<i>Porophyllum ruderale</i>	0-1	-
	desert unicorn-plant	PRAL4	<i>Proboscidea althaeifolia</i>	0-1	-
	doubleclaw	PRPA2	<i>Proboscidea parviflora</i>	0-1	-
	whitestem blazingstar	MEAL6	<i>Mentzelia albicaulis</i>	0-1	-
	sweet four o'clock	MILO2	<i>Mirabilis longiflora</i>	0-1	-
	desert evening primrose	OEPR	<i>Oenothera primiveris</i>	0-1	-
	Arizona phacelia	PHAR13	<i>Phacelia arizonica</i>	0-1	-
	Mangas Spring phacelia	PHBO4	<i>Phacelia bombycina</i>	0-1	-
	Arizona popcornflower	PLAR	<i>Plagiobothrys arizonicus</i>	0-1	-
	warty caltrop	KAPA	<i>Kallstroemia parviflora</i>	0-1	-
	Gordon's bladderpod	LEGO	<i>Lesquerella gordonii</i>	0-1	-
	broadleaved pepperweed	LELA2	<i>Lepidium latifolium</i>	0-1	-
	intermediate pepperweed	LEVIM	<i>Lepidium virginicum</i> var. <i>medium</i>	0-1	-
	dotted blazing star	LIPU	<i>Liatris punctata</i>	0-1	-
	plains flax	LIPU4	<i>Linum puberulum</i>	0-1	-
	foothill deervetch	LOHU2	<i>Lotus humistratus</i>	0-1	-
	coastal bird's-foot trefoil	LOSAB	<i>Lotus salsuginosus</i> var. <i>brevivexillus</i>	0-1	-
	shortstem lupine	LUBR2	<i>Lupinus brevicaulis</i>	0-1	-
	bajada lupine	LUCOC	<i>Lupinus concinnus</i> ssp. <i>concinnus</i>	0-1	-

	Fendler's desertdandelion	MAFE	<i>Malacothrix fendleri</i>	0–1	–
	El Paso skyrocket	IPTH2	<i>Ipomopsis thurberi</i>	0–1	–
	ivyleaf morning-glory	IPHE	<i>Ipomoea hederacea</i>	0–1	–
	flaxflowered ipomopsis	IPLOL	<i>Ipomopsis longiflora</i> ssp. <i>longiflora</i>	0–1	–
	crestrib morning-glory	IPCO2	<i>Ipomoea costellata</i>	0–1	–
	camphorweed	HESU3	<i>Heterotheca subaxillaris</i>	0–1	–
	miner's lettuce	CLPEP	<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	0–1	–
	threadstem sandmat	CHRE4	<i>Chamaesyce revoluta</i>	0–1	–
	thymeleaf sandmat	CHSE6	<i>Chamaesyce serpyllifolia</i>	0–1	–
	slimseed sandmat	CHST8	<i>Chamaesyce stictospora</i>	0–1	–
	Abert's buckwheat	ERAB2	<i>Eriogonum abertianum</i>	0–1	–
	sanddune wallflower	ERCA14	<i>Erysimum capitatum</i>	0–1	–
	miniature woollystar	ERDI2	<i>Eriastrum diffusum</i>	0–1	–
	spreading fleabane	ERDI4	<i>Erigeron divergens</i>	0–1	–
	sorrel buckwheat	ERPO4	<i>Eriogonum polycladon</i>	0–1	–
	California poppy	ESCAM	<i>Eschscholzia californica</i> ssp. <i>mexicana</i>	0–1	–
	Arizona blanketflower	GAAR2	<i>Gaillardia arizonica</i>	0–1	–
	red dome blanketflower	GAPI	<i>Gaillardia pinnatifida</i>	0–1	–
	lesser yellowthroat gilia	GIFL	<i>Gilia flavocincta</i>	0–1	–
	El Paso gilia	GIME	<i>Gilia mexicana</i>	0–1	–
	Dakota mock vervain	GLBIB	<i>Glandularia bipinnatifida</i> var. <i>bipinnatifida</i>	0–1	–
	curlytop gumweed	GRNUA	<i>Grindelia nuda</i> var. <i>aphanactis</i>	0–1	–
	western trailing ticktrefoil	DEPR2	<i>Desmodium procumbens</i>	0–1	–
	poorjoe	DITE2	<i>Diodia teres</i>	0–1	–
	cryptantha	CRYPT	<i>Cryptantha</i>	0–1	–
	Chihuahuan prairie clover	DAEX2	<i>Dalea exigua</i>	0–1	–
	American wild carrot	DAPU3	<i>Daucus pusillus</i>	0–1	–
	sacred thorn-apple	DAWR2	<i>Datura wrightii</i>	0–1	–
	New Mexico ticktrefoil	DENE	<i>Desmodium neomexicanum</i>	0–1	–

Shrub/Vine

8	Dominant half shrubs			2–56	
	bastardsage	ERWR	<i>Eriogonum wrightii</i>	1–17	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0–6	–
	Bigelow's bristlehead	CABI6	<i>Carphochaete bigelovii</i>	0–6	–
	fairyduster	CAER	<i>Calliandra eriophylla</i>	0–6	–
	littleleaf ratany	KRER	<i>Krameria erecta</i>	0–6	–
	trailing krameria	KRLA	<i>Krameria lanceolata</i>	0–6	–
	prairie acacia	ACAN	<i>Acacia angustissima</i>	1–6	–
	yerba de pasmo	BAPT	<i>Baccharis pteronioides</i>	0–6	–
	California brickellbush	BRCA3	<i>Brickellia californica</i>	0–2	–
	Bigelow's false willow	BABI	<i>Baccharis bigelovii</i>	0–2	–
	heartleaf goldeneye	VICO	<i>Viguiera cordifolia</i>	0–2	–

	Arizonia orange	CHDUA	<i>Choisya dumosa</i> var. <i>arizonica</i>	0–2	–
	cliff goldenbush	ERCUS	<i>Ericameria cuneata</i> var. <i>spathulata</i>	0–2	–
	turpentine bush	ERLA12	<i>Ericameria laricifolia</i>	0–2	–
	gumhead	GYGL	<i>Gymnosperma glutinosum</i>	0–2	–
	showy goldeneye	HEMUM	<i>Heliomeris multiflora</i> var. <i>multiflora</i>	0–2	–
	Arizona water-willow	JUCA9	<i>Justicia candicans</i>	0–2	–
9	Evergreen shrubs			3–78	
	hairy mountain mahogany	CEMOP	<i>Cercocarpus montanus</i> var. <i>paucidentatus</i>	1–22	–
	Sonoran scrub oak	QUTU2	<i>Quercus turbinella</i>	0–22	–
	desert ceanothus	CEGR	<i>Ceanothus greggii</i>	1–17	–
	Toumey oak	QUTO2	<i>Quercus toumeyii</i>	0–17	–
	Palmer oak	QUPA10	<i>Quercus palmeri</i>	0–11	–
	smallflowered milkvetch	ASNU4	<i>Astragalus nuttallianus</i>	0–11	–
	Thurber's milkvetch	ASTH	<i>Astragalus thurberi</i>	0–11	–
	fewflower beggarticks	BILE	<i>Bidens leptcephala</i>	0–11	–
	pitseed goosefoot	CHBE4	<i>Chenopodium berlandieri</i>	0–11	–
	New Mexico goosefoot	CHNE3	<i>Chenopodium neomexicanum</i>	0–11	–
	sensitive partridge pea	CHNI2	<i>Chamaecrista nictitans</i>	0–11	–
	field bindweed	COAR4	<i>Convolvulus arvensis</i>	1–6	–
	leatherweed	CRPOP	<i>Croton pottsii</i> var. <i>pottsii</i>	1–6	–
	tuber anemone	ANTU	<i>Anemone tuberosa</i>	1–6	–
	rockcress	ARABI	<i>Arabidopsis</i>	1–6	–
	onion	ALLIU	<i>Allium</i>	1–6	–
	weakleaf bur ragweed	AMCO3	<i>Ambrosia confertiflora</i>	1–6	–
	spreading fleabane	ERDI4	<i>Erigeron divergens</i>	1–6	–
	trailing fleabane	ERFL	<i>Erigeron flagellaris</i>	1–6	–
	New Mexico fleabane	ERNE3	<i>Erigeron neomexicanus</i>	1–6	–
	wild dwarf morning-glory	EVAR	<i>Evolvulus arizonicus</i>	1–6	–
	Arizona snakecotton	FRAR2	<i>Froelichia arizonica</i>	1–6	–
	small matweed	GUDED	<i>Guilleminea densa</i> var. <i>densa</i>	1–6	–
	hairy false goldenaster	HEVIM3	<i>Heterotheca villosa</i> var. <i>minor</i>	1–6	–
	rincon rubberweed	HYQU2	<i>Hymenoxys quinquesquamata</i>	1–6	–
	ragged nettlespurge	JAMA	<i>Jatropha macrorhiza</i>	1–6	–
	Wright's deervetch	LOWR	<i>Lotus wrightii</i>	1–6	–
	variableleaf bushbean	MAGI2	<i>Macroptilium gibbosifolium</i>	1–6	–
	white four o'clock	MIAL4	<i>Mirabilis albida</i>	1–6	–
	Drummond's woodsorrel	OXDR	<i>Oxalis drummondii</i>	1–6	–
	butterweed	PAGL17	<i>Packera glabella</i>	1–6	–
	longstalk chinchweed	PELO	<i>Pectis longipes</i>	1–6	–
	Texas snoutbean	RHSET	<i>Rhynchosia senna</i> var. <i>texana</i>	1–6	–
	spreading fanpetals	SIAB	<i>Sida abutifolia</i>	1–6	–
	silverleaf nightshade	SOEL	<i>Solanum elaeagnifolium</i>	1–6	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	1–6	–

	scarlet globemallow	SPCOE	<i>Sphaeralcea coccinea ssp. elata</i>	1–6	–
	brownplume wirelettuce	STPA4	<i>Stephanomeria pauciflora</i>	1–6	–
	Palmer's crinklemat	TIPA	<i>Tiquilia palmeri</i>	1–6	–
	pinewoods spiderwort	TRPI	<i>Tradescantia pinetorum</i>	1–6	–
	American vetch	VIAM	<i>Vicia americana</i>	1–6	–
	whitemouth dayflower	COER	<i>Commelina erecta</i>	1–6	–
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	0–6	–
	chaparral asphhead	ASHI3	<i>Aspicarpa hirtella</i>	1–6	–
	redberry buckthorn	RHCR	<i>Rhamnus crocea</i>	0–6	–
	California buckthorn	FRCAC5	<i>Frangula californica ssp. californica</i>	0–6	–
	Wright's silktassel	GAWR3	<i>Garrya wrightii</i>	0–6	–
	red barberry	MAHA4	<i>Mahonia haematocarpa</i>	0–6	–
	common hoptree	PTTR	<i>Ptelea trifoliata</i>	0–6	–
	southwestern cosmos	COPA12	<i>Cosmos parviflorus</i>	0–3	–
	Wright's bird's beak	COWR2	<i>Cordylanthus wrightii</i>	0–2	–
	wedgeleaf draba	DRCU	<i>Draba cuneifolia</i>	0–2	–
	New Mexico copperleaf	ACNE	<i>Acalypha neomexicana</i>	0–2	–
	scrambled eggs	COAU2	<i>Corydalis aurea</i>	0–2	–
	New Mexico thistle	CINE	<i>Cirsium neomexicanum</i>	0–2	–
	pointleaf manzanita	ARPU5	<i>Arctostaphylos pungens</i>	0–2	–
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	0–2	–
	evergreen sumac	RHVIC	<i>Rhus virens var. choriophylla</i>	0–2	–
	Florida hopbush	DOVI	<i>Dodonaea viscosa</i>	0–2	–
	miner's lettuce	CLPEP	<i>Claytonia perfoliata ssp. perfoliata</i>	0–1	–
	cryptantha	CRYPT	<i>Cryptantha</i>	0–1	–
	Chihuahuan prairie clover	DAEX2	<i>Dalea exigua</i>	0–1	–
	American wild carrot	DAPU3	<i>Daucus pusillus</i>	0–1	–
	sacred thorn-apple	DAWR2	<i>Datura wrightii</i>	0–1	–
	New Mexico ticktrefoil	DENE	<i>Desmodium neomexicanum</i>	0–1	–
	threadstem sandmat	CHRE4	<i>Chamaesyce revoluta</i>	0–1	–
	thymeleaf sandmat	CHSE6	<i>Chamaesyce serpyllifolia</i>	0–1	–
	slimseed sandmat	CHST8	<i>Chamaesyce stictospora</i>	0–1	–
	royal sandmat	CHDI5	<i>Chamaesyce dioica</i>	0–1	–
	pillpod sandmat	CHHI3	<i>Chamaesyce hirta</i>	0–1	–
	hyssopleaf sandmat	CHHY3	<i>Chamaesyce hyssopifolia</i>	0–1	–
	halfmoon milkvetch	ASAL6	<i>Astragalus allochrous</i>	0–1	–
	carelessweed	AMPA	<i>Amaranthus palmeri</i>	0–1	–
	crested anoda	ANCR2	<i>Anoda cristata</i>	0–1	–
	Coulter's spiderling	BOCO2	<i>Boerhavia coulteri</i>	0–1	–
	erect spiderling	BOER	<i>Boerhavia erecta</i>	0–1	–
	hoary bowlesia	BOIN3	<i>Bowlesia incana</i>	0–1	–
	purple spiderling	BOPU	<i>Boerhavia purpurascens</i>	0–1	–
	fringed redmaids	CACI2	<i>Calandrinia ciliata</i>	0–1	–

	western trailing ticktrefoil	DEPR2	<i>Desmodium procumbens</i>	0–1	–
	poorjoe	DITE2	<i>Diodia teres</i>	0–1	–
	Abert's buckwheat	ERAB2	<i>Eriogonum abertianum</i>	0–1	–
	sanddune wallflower	ERCA14	<i>Erysimum capitatum</i>	0–1	–
	miniature woollystar	ERDI2	<i>Eriastrum diffusum</i>	0–1	–
10	Deciduous shrubs			3–45	
	cliff fendlerbush	FERU	<i>Fendlera rupicola</i>	0–11	–
	ocotillo	FOSP2	<i>Fouquieria splendens</i>	1–6	–
	catclaw mimosa	MIACB	<i>Mimosa aculeaticarpa</i> var. <i>biuncifera</i>	1–6	–
	velvetpod mimosa	MIDY	<i>Mimosa dysocarpa</i>	0–6	–
	Thurber's desert honeysuckle	ANTH2	<i>Anisacanthus thurberi</i>	0–6	–
	catclaw acacia	ACGR	<i>Acacia greggii</i>	0–6	–
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	1–6	–
	yellow trumpetbush	TEST	<i>Tecoma stans</i>	0–6	–
	milfoil wattle	ACMI	<i>Acacia millefolia</i>	0–2	–
	whitethorn acacia	ACCO2	<i>Acacia constricta</i>	0–2	–
	Wright's beebrush	ALWR	<i>Aloysia wrightii</i>	0–1	–
	Graham's mimosa	MIGR2	<i>Mimosa grahamii</i>	0–1	–
	pale desert-thorn	LYPA	<i>Lycium pallidum</i>	0–1	–
	lotebush	ZIOBC	<i>Ziziphus obtusifolia</i> var. <i>canescens</i>	0–1	–
11	Succulents			6–112	
	sacahuista	NOMI	<i>Nolina microcarpa</i>	1–56	–
	cactus apple	OPEN3	<i>Opuntia engelmannii</i>	0–11	–
	Schott's century plant	AGSC3	<i>Agave schottii</i>	0–11	–
	Palmer's century plant	AGPA3	<i>Agave palmeri</i>	1–11	–
	smallflower century plant	AGPA5	<i>Agave parviflora</i>	0–6	–
	goldenhead	ACAMP	<i>Acamptopappus</i>	1–6	–
	New Mexico copperleaf	ACNE	<i>Acalypha neomexicana</i>	1–6	–
	brownfoot	ACWR5	<i>Acourtia wrightii</i>	1–6	–
	giant hyssop	AGAST	<i>Agastache</i>	1–6	–
	trailing windmills	ALIN	<i>Allionia incarnata</i>	1–6	–
	carelessweed	AMPA	<i>Amaranthus palmeri</i>	1–6	–
	Mexican yellowshow	AMPA3	<i>Amoreuxia palmatifida</i>	1–6	–
	woolly angelica	ANTO	<i>Angelica tomentosa</i>	1–6	–
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	1–6	–
	Watson's dutchman's pipe	ARWA	<i>Aristolochia watsonii</i>	1–6	–
	dwarf milkweed	ASIN14	<i>Asclepias involucrata</i>	1–6	–
	horsetail milkweed	ASSU2	<i>Asclepias subverticillata</i>	1–6	–
	milkvetch	ASTRA	<i>Astragalus</i>	1–6	–
	dense ayenia	AYMI	<i>Ayenia microphylla</i>	1–6	–
	lyreleaf greeneyes	BELY	<i>Berlandiera lyrata</i>	1–6	–
	scarlet spiderling	BOCO	<i>Boerhavia coccinea</i>	1–6	–

	tringed reamaids	CAC12	<i>Calandrinia ciliata</i>	1-6	-
	exserted Indian paintbrush	CAEXE	<i>Castilleja exserta</i> ssp. <i>exserta</i>	1-6	-
	castilla	CAST1	<i>Castilla</i>	1-6	-
	lambsquarters	CHAL7	<i>Chenopodium album</i>	1-6	-
	hyssopleaf sandmat	CHHY3	<i>Chamaesyce hyssopifolia</i>	1-6	-
	heal and draw	CHNU2	<i>Chaptalia nutans</i>	1-6	-
	New Mexico thistle	CINE	<i>Cirsium neomexicanum</i>	1-6	-
	mala mujer	CNAN	<i>Cnidoscolus angustidens</i>	1-6	-
	scrambled eggs	COAU2	<i>Corydalis aurea</i>	1-6	-
	anil falso	COCAC6	<i>Coursetia caribaea</i> var. <i>caribaea</i>	1-6	-
	fingerleaf gourd	CUDI	<i>Cucurbita digitata</i>	1-6	-
	coyote gourd	CUPA	<i>Cucurbita palmata</i>	1-6	-
	American wild carrot	DAPU3	<i>Daucus pusillus</i>	1-6	-
	New Mexico ticktrefoil	DENE	<i>Desmodium neomexicanum</i>	1-6	-
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	1-6	-
	Abert's buckwheat	ERAB2	<i>Eriogonum abertianum</i>	1-6	-
	miniature woollystar	ERDI2	<i>Eriastrum diffusum</i>	1-6	-
	blanketflower	GAILL	<i>Gaillardia</i>	1-6	-
	Bisbee Peak rushrose	HESC2	<i>Helianthemum scoparium</i>	1-6	-
	Indian rushpea	HOGL2	<i>Hoffmannseggia glauca</i>	1-6	-
	hymenaea	HYMEN	<i>Hymenaea</i>	1-6	-
	Arizona poppy	KAGR	<i>Kallstroemia grandiflora</i>	1-6	-
	Coulter's horseweed	LACO13	<i>Laennecia coulteri</i>	1-6	-
	Fendler's bladderpod	LEFE	<i>Lesquerella fendleri</i>	1-6	-
	Gordon's bladderpod	LEGO	<i>Lesquerella gordonii</i>	1-6	-
	intermediate pepperweed	LEVIM	<i>Lepidium virginicum</i> var. <i>medium</i>	1-6	-
	Lewis flax	LILE3	<i>Linum lewisii</i>	1-6	-
	stiffstem flax	LIRI	<i>Linum rigidum</i>	1-6	-
	foothill deervetch	LOHU2	<i>Lotus humistratus</i>	1-6	-
	coastal bird's-foot trefoil	LOSAB	<i>Lotus salsuginosus</i> var. <i>brevivexillus</i>	1-6	-
	lupine	LUPIN	<i>Lupinus</i>	1-6	-
	hoary tansyaster	MACA2	<i>Machaeranthera canescens</i>	1-6	-
	blazingstar	MENTZ	<i>Mentzelia</i>	1-6	-
	lemon beebalm	MOCIA	<i>Monarda citriodora</i> ssp. <i>austromontana</i>	1-6	-
	green carpetweed	MOVE	<i>Mollugo verticillata</i>	1-6	-
	Arizona mousetail	MYCU	<i>Myosurus cupulatus</i>	1-6	-
	desert evening primrose	OEPR	<i>Oenothera primiveris</i>	1-6	-
	lakeshore panicgrass	PALA	<i>Panicum lacustre</i>	1-6	-
	Virginia creeper	PAQU2	<i>Parthenocissus quinquefolia</i>	1-6	-
	phacelia	PHACE	<i>Phacelia</i>	1-6	-
	ivyleaf groundcherry	PHHE4	<i>Physalis hederifolia</i>	1-6	-
	phlox	PHLOX	<i>Phlox</i>	1-6	-
	Arizona popcornflower	PLAR	<i>Plagiobothrys arizonicus</i>	1-6	-

	sweetscent	PLODO	<i>Pluchea odorata</i> var. <i>odorata</i>	1–6	–
	little hogweed	POOL	<i>Portulaca oleracea</i>	1–6	–
	doubleclaw	PRPA2	<i>Proboscidea parviflora</i>	1–6	–
	slimflower scurfpea	PSTE5	<i>Psoralidium tenuiflorum</i>	1–6	–
	thinleaf goldenhead	PYL12	<i>Pyrrocoma linearis</i>	1–6	–
	chia	SACO6	<i>Salvia columbariae</i>	1–6	–
	twingleaf senna	SEBA3	<i>Senna bauhinoides</i>	1–6	–
	velvet leaf senna	SEL14	<i>Senna lindheimeriana</i>	1–6	–
	sleepy silene	SIAN2	<i>Silene antirrhina</i>	1–6	–
	Missouri goldenrod	SOM12	<i>Solidago missouriensis</i>	1–6	–
	western silver aster	SYSE2	<i>Symphyotrichum sericeum</i>	1–6	–
	jewels of Opar	TAPA2	<i>Talinum paniculatum</i>	1–6	–
	Hopi tea greenthread	THME	<i>Thelesperma megapotamicum</i>	1–6	–
	stalked bur grass	TRRA	<i>Tragus racemosus</i>	1–6	–
	Fort Huachuca vervain	VEGR2	<i>Verbena gracilis</i>	1–6	–
	Louisiana vetch	VILUL2	<i>Vicia ludoviciana</i> ssp. <i>ludoviciana</i>	1–6	–
	Rocky Mountain zinnia	ZIGR	<i>Zinnia grandiflora</i>	1–6	–
	purple pricklypear	OPMAM	<i>Opuntia macrocentra</i> var. <i>macrocentra</i>	0–2	–
	tulip pricklypear	OPPH	<i>Opuntia phaeacantha</i>	0–2	–
	banana yucca	YUBA	<i>Yucca baccata</i>	0–2	–
	Schott's yucca	YUSC	<i>Yucca ×schottii</i>	0–2	–
	dollarjoint pricklypear	OPCH	<i>Opuntia chlorotica</i>	0–2	–
	white fishhook cactus	ECIN2	<i>Echinomastus intertextus</i>	0–1	–
	Leding's hedgehog cactus	ECLE2	<i>Echinocereus ledingii</i>	0–1	–
	rainbow hedgehog cactus	ECRI3	<i>Echinocereus rigidissimus</i>	0–1	–
	spinystar	ESVIV	<i>Escobaria vivipara</i> var. <i>vivipara</i>	0–1	–
	candy barrelcactus	FEWI	<i>Ferocactus wislizeni</i>	0–1	–
	Graham's nipple cactus	MAGR9	<i>Mammillaria grahamii</i>	0–1	–
	Macdougal's nipple cactus	MAHEM	<i>Mammillaria heyderi</i> var. <i>macdougalii</i>	0–1	–
	Wright's nipple cactus	MAWR2	<i>Mammillaria wrightii</i>	0–1	–
	Parry's agave	AGPA4	<i>Agave parryi</i>	0–1	–
	Santa Cruz beehive cactus	CORE3	<i>Coryphantha recurvata</i>	0–1	–
	Scheer's beehive cactus	COROS	<i>Coryphantha robustispina</i> ssp. <i>scheeri</i>	0–1	–
	walkingstick cactus	CYSP8	<i>Cylindropuntia spinosior</i>	0–1	–
	common sotol	DAWH2	<i>Dasylirion wheeleri</i>	0–1	–
	scarlet hedgehog cactus	ECCOC	<i>Echinocereus coccineus</i> var. <i>coccineus</i>	0–1	–
	pinkflower hedgehog cactus	ECFEF3	<i>Echinocereus fendleri</i> ssp. <i>fendleri</i>	0–1	–
	goldenflower century plant	AGCH2	<i>Agave chrysantha</i>	0–1	–

Tree

12	Trees			56–280	
	Emory oak	QUEM	<i>Quercus emoryi</i>	28–168	–
	Arizona white oak	QUAR	<i>Quercus arizonica</i>	0–112	–
	Mexican blue oak	QUOB	<i>Quercus oblongifolia</i>	0–28	–
	alligator juniper	JUDE2	<i>Juniperus deppeana</i>	0–28	–
	oneseed juniper	JUMO	<i>Juniperus monosperma</i>	0–11	–
	Mexican pinyon	PICE	<i>Pinus cembroides</i>	0–11	–
	border pinyon	PIDI3	<i>Pinus discolor</i>	0–11	–

Animal community

The plant community on this site is suitable for grazing by all classes of livestock at any season. Due to the presence of cool season grasses, perennial forbs and evergreen browse species, this site is especially well suited to winter-spring grazing when nearby upland areas are deficient in protein. Steep slopes, cobbly surfaces and areas of rock outcrop limit grazing distribution on this site. Fencing large areas of this site from adjacent uplands and grazing during the cool season will allow effective management of the forage resources. The site tends to have water in canyons during the winter and spring. Mountain lion predation on calves can be severe. Grazing dry cows and/or yearlings in the cool season and moving cows off as they calve will help avoid lion predation. Annual goldeneye and bitterweed can cause poisoning in the fall following years with wet winter-spring seasons. Locoweed can cause problems in dry springs following wet fall-winter seasons.

Mule deer and Coues whitetail deer both find excellent habitat on this site and can occur intermingled. The abundance of succulents like amole, prickly pear and cholla, together with good production of annual forbs, gives this site a very high carrying capacity for javalina. Natural water occurs infrequently as seeps or springs. Water developments are very important to the larger mammals using the site, as well as to numerous bird and small mammal species. Natural fires are important to maintain a balance between trees, shrubs, grasses and forbs; and benefit the many wildlife species on this site.

Hydrological functions

With shallow, clayey soils and steep slopes this site is a good producer of runoff.

Recreational uses

Hunting, horseback riding, hiking, camping, photography, prospecting, bird watching

Wood products

Oak species furnish fuel-wood and juniper species furnish posts and stays.

Other products

Acorns and chiltepins (wild chile peppers) for food. Agave for mescal making. Starleaf and hoptree for bug repellent. Rocks.

Inventory data references

Range 417s include 2 in good condition.

Type locality

Location 1: Cochise County, AZ	
Township/Range/Section	T11S R22E S17
General legal description	Willcox Field Office - Sierra Bonita Ranch

Location 2: Pima County, AZ	
Latitude	30° 33' 30"
Longitude	110° 52' 30"
General legal description	Tucson Field Office - Salero Ranch - un-surveyed - Grosvenor Hills
Location 3: Santa Cruz County, AZ	
Township/Range/Section	T23S R11E S24
General legal description	Bear Valley Ranch, Penasco Canyon
Location 4: Cochise County, AZ	
Township/Range/Section	T12S R22E S33
General legal description	SE 1/4, NW 1/4 of section; Willcox Field Office, Warbonnet Ranch, Winchester Mountains

Contributors

Dan Robinett
Larry D. Ellicott

Approval

Curtis Talbot, 4/09/2021

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	05/18/2024
Approved by	Curtis Talbot
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. Number and extent of rills:

2. Presence of water flow patterns:

3. Number and height of erosional pedestals or terracettes:

4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):

-
5. **Number of gullies and erosion associated with gullies:**
-
6. **Extent of wind scoured, blowouts and/or depositional areas:**
-
7. **Amount of litter movement (describe size and distance expected to travel):**
-
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**
-
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**
-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**
-
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**
-
12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**
- Dominant:
- Sub-dominant:
- Other:
- Additional:
-
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**
-
14. **Average percent litter cover (%) and depth (in):**
-
15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**
-

16. **Potential invasive (including noxious) species (native and non-native).** List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:
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17. **Perennial plant reproductive capability:**
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