USDA Natural Resources
Conservation Service

Ecological site R030XB140NV
CALCAREOUS LOAM 5-7 P.Z.

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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.

Ecological site concept

This site occurs on alluvial flats, fan aprons and fan remnants. Slopes range from 0 to 8 percent. Elevations range from 2500 to 4000 feet. The soils associated with this site are shallow and have formed in marsh deposited alluvium from limestone parent material. An argillic horizon occurs from 5 to 16 inches and a calcic horizon occurs from 7 to 16 inches.

This site is part of the group concept R030XB241CA.

Associated sites

R030XB005NV	**Arid Active Alluvial Fans**
R030XB006NV	**LOAMY 5-7 P.Z.**

Similar sites

R030XA050NV	**LOAMY 3-5 P.Z.** AMDU2 minor species
R030XA061NV	**LOAMY 5-7 P.Z.** ATCO dominant shrub
R030XA051NV	**COBBLY CLAYPAN 5-7 P.Z.** MESP2 major shrub
R030XB006NV	**LOAMY 5-7 P.Z.** ATCO dominant shrub
R030XB031NV	**SHALLOW LIMY 5-7 P.Z.** ATCO-MESP2 codominant shrubs
R030XA063NV	**SANDY 5-7 P.Z.** occurs on sand sheets

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Ambrosia dumosa* (2) *Atriplex confertifolia*
Herbaceous	(1) *Achnatherum hymenoides*

Physiographic features

This site occurs on alluvial flats, fan aprons and fan remnants. Slopes range from 0 to 8 percent. Elevations range

from 2500 to 4000 feet.

Table 2. Representative physiographic features

Landforms	(1) Alluvial flat (2) Fan apron (3) Fan remnant
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	Rare
Elevation	2,500–4,000 ft
Slope	0–8%
Aspect	Aspect is not a significant factor

Climatic features

The climate is hot and arid, with mild winters and very hot summers. Precipitation is greatest in the winter with a lesser secondary peak in summer, typical of the Mojave Desert. Average annual precipitation is 5 to 7 inches. Mean annual air temperature is 58 to 67 degrees F. The average growing season is about 230 to 300 days.

Table 3. Representative climatic features

Frost-free period (average)	300 days
Freeze-free period (average)	
Precipitation total (average)	7 in

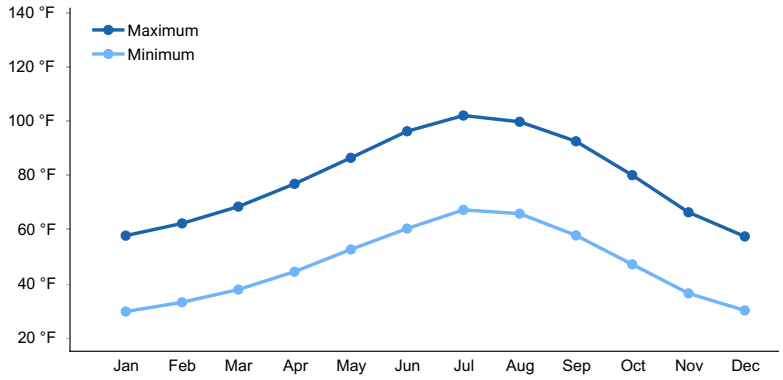


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are shallow and have formed in marsh deposited alluvium from limestone parent material. An argillic horizon occurs from 5 to 16 inches and a calcic horizon occurs from 7 to 16 inches. They are subject to rare flooding. The soils are well drained and available water capacity is low to very low. Potential for sheet and rill erosion is slight. Soil series correlated to this site includes Cornflat, classified as a loamy, carbonatic, thermic Lithic Calciargid.

Table 4. Representative soil features

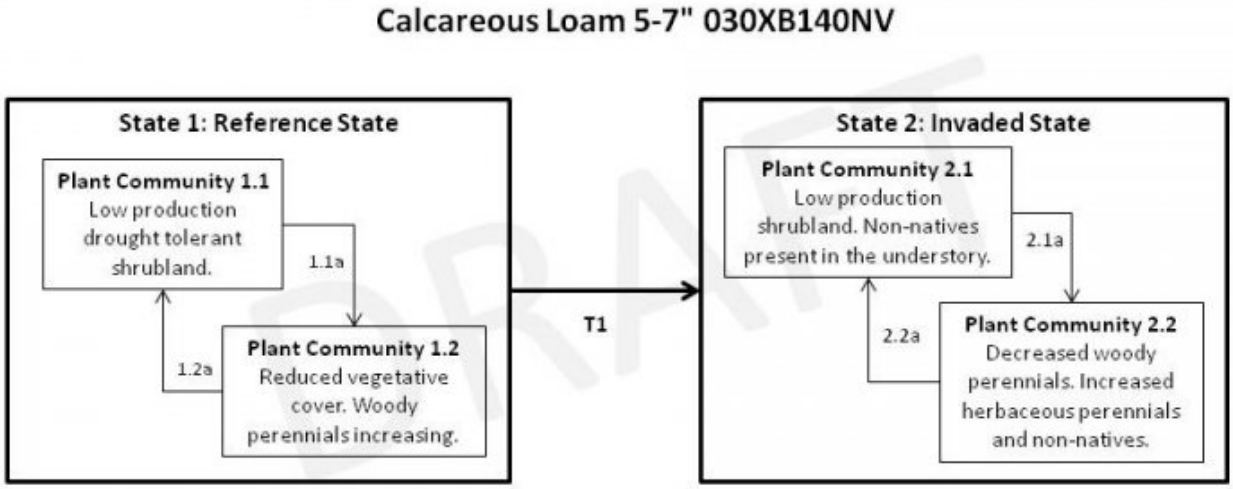
Parent material	(1) Alluvium–limestone
Surface texture	(1) Very gravelly fine sandy loam

Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid
Soil depth	14–20 in
Surface fragment cover <=3"	3–25%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	1.78–2.03 in
Calcium carbonate equivalent (0-40in)	40–70%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	8.2–8.6
Subsurface fragment volume <=3" (Depth not specified)	5–35%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The plant communities of this site are dynamic in response to changes in disturbance regimes and weather patterns. Community phase changes are primarily driven by long term drought. Historically, wildfire was infrequent and patchy, due to low fuel loading and widely spaces shrubs, and had a minimal impact.
The root systems of desert shrubs generally have equal amounts of resources dedicated to lateral and taproot production (Osmond et al 1990). Extensive taproots allow shrubs to extract water from deep in the soil profile, while shallow lateral roots can utilize water in the upper profile. Production of herbaceous vegetation is relatively low, but is dominated by warm season perennial bunchgrasses. Warm season grasses have higher light and temperature requirements to begin photosynthesis and grow most actively during the summer. Vegetation plays an important role in reducing the erodibilty of the soil surface. Incorrect management actions may result in reduced vegetative cover and increased soil erosion.
As ecological condition declines, creosotebush, white burrobrush, and wolfberry increase. Deep-rooted perennial bunchgrasses decrease and bare ground increases. Following mechanical disturbance or wildfire, introduced annual grasses and forbs readily invade or increase on this site. Disturbances, including wildfire, can increase resource availability by reducing the amount of resources (moisture, nutrients) used by resident vegetation through mortality or injury (Zouhar et al. 2008). The increased resource availability can make the system even more susceptible to invasion by non-natives.
Fire Ecology:
The historic mean fire return interval for shadscale communities range from 35 to 100 years. Shadscale communities are usually unaffected by fire because of low fuel loads, although a year of exceptionally heavy winter rains can generate fuels by producing a heavy stand of annual forbs and grasses. Native annual plants usually break down rapidly during the summer and do not create a long-lived fuelbed. Fine fuels from non-native annual grasses currently represent the most important fuelbed component. Fire generally kills white bursage. Shadscale is fire intolerant and it does not readily recover from fire, except for establishment through seed. Creosotebush is poorly adapted to fire because of its limited sprouting ability. Creosotebush survives some fires that burn patchily or are of low severity. Fire typically destroys aboveground parts of Anderson wolfberry, but the degree of damage to the plant depends on fire severity. Ephedra generally sprouts after fire damages aboveground vegetation. Underground regenerative structures commonly survive when aboveground vegetation is consumed by fire. However, severe fires may kill shallowly buried regenerative structures. Indian ricegrass can be killed by fire, depending on severity and season of burn. Indian ricegrass reestablishes on burned sites through seed dispersed from adjacent unburned areas.

State and transition model



State 1
Reference State

This state is representative of the natural range of variability under pristine conditions. Plant communities are dynamic in response to changes in disturbance regimes and weather patterns. Plant community phase changes are primarily driven by long-term drought. Historically, fire had little impact in this system due to low fuel loading and widely spaced shrubs.

Community 1.1
Reference Plant Community

Figure 2. Calcareous Loam

The reference plant community is dominated by shadscale, white bursage and creosotebush. Potential vegetative composition is about 10 percent grasses, 10 percent perennial and annual forbs and 80 percent shrubs. Approximate ground cover (basal and crown) is less than 10 percent (˜6 percent). The reference plant community is representative of a healthy climax condition.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	80	160	280
Grass/Grasslike	10	20	35
Forb	10	20	35
Total	**100**	**200**	**350**

Community 1.2
Plant Community 1.2

This plant community is representative of an early-seral plant community. Mature woody vegetation has been removed, shrub seedlings are common. Initially, herbaceous biomass increases. Shadscale seedlings commonly establish under the skeleton of dead shadscale. Sprouting shrubs recover quickly and also provide microsites for the establishment of shrub seedlings. This plant community is at-risk of invasion by non-natives. Non-native species readily establish in post-disturbance plant communities by taking advantage of increased availability of critical resources.

Pathway 1.2a
Community 1.2 to 1.1

Absence from disturbance and natural regeneration over time.

State 2
Invaded State

This state is characterized by the presence of non-natives in the understory. A biotic threshold is crossed, with the introduction of non-native annuals that are difficult to remove from the system and will alter disturbance regimes significantly from their historic range of variation. Introduced annuals such as red brome, redstem filaree and Mediterranean grass have invaded the reference plant community and have become a component of the herbaceous cover. These non-natives annuals are highly flammable and promote wildfires where fires historically have been infrequent.

Community 2.1

Invaded Plant Community 2.1

This plant community is compositionally similar to the reference plant community, with a trace of non-natives in the understory. Ecological processes have not been compromised at this time, but ecological resilience is reduced by the presence of non-natives. This site may respond differently following a disturbance, when compared to the reference plant community. Non-natives likely to invade this site include red brome, redstem filaree and Mediterranean grass.

Community 2.2
Invaded Plant Community 2.2

This plant community is characterized by decreased native woody perennials. Initially, this plant community phase is dominated by herbaceous biomass, which may or may not be non-native. Native shrubs capable of sprouting recover quickly and provide favorable sites for the establishment of other shrubs seedlings. Disturbance may result in increased bare ground, increasing the risk of soil erosion. This plant community is considered at-risk, due to the increased fuel loading from herbaceous biomass. Management should focus on managing non-native fuel loading, reducing anthropogenic impacts and protecting soil and ecological resources.

Pathway 2.1a
Community 2.1 to 2.2

Prolonged drought, wildfire, disease and/or insect attack.

Pathway 2.2a
Community 2.2 to 2.1

Recovery of woody perennials and absence from disturbance.

Transition T1
State 1 to 2

Introduction of non-native species due to a combination of factors including: 1) surface disturbance, 2) changes in the kinds of animals and their grazing patterns, 3) drought and/or 4) changes in fire history.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			4–10	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	4–10	–
2	**Secondary Perennial Grasses**			1–10	
	desert needlegrass	ACSP12	*Achnatherum speciosum*	1–6	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	1–6	–
	big galleta	PLRI3	*Pleuraphis rigida*	1–6	–
3	**Annual Grasses**			1–10	
Forb					
4	**Perennial Forbs**			1–16	
5	**Annual Forbs**			1–20	
Shrub/Vine					
6	**Primary Shrubs**			108–190	
	burrobush	AMDU2	*Ambrosia dumosa*	60–80	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	30–50	–
	creosote bush	LATR2	*Larrea tridentata*	10–40	–
	water jacket	LYAN	*Lycium andersonii*	4–10	–
	jointfir	EPHED	*Ephedra*	4–10	–
7	**Secondary Shrubs**			10–20	
	fourwing saltbush	ATCA2	*Atriplex canescens*	2–6	–
	spiny hopsage	GRSP	*Grayia spinosa*	2–6	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	2–6	–
	desert pepperweed	LEFR2	*Lepidium fremontii*	2–6	–
	spiny menodora	MESP2	*Menodora spinescens*	2–6	–
	Fremont's dalea	PSFR	*Psorothamnus fremontii*	2–6	–
	Mojave yucca	YUSC2	*Yucca schidigera*	2–6	–

Animal community

Livestock Interpretations:
This site has limited value for livestock grazing, due to the low forage production. Grazing management should be keyed to dominant perennial grasses and palatable shrub production. White bursage is an important browse species. Browsing pressure on white bursage is particularly heavy during years of low precipitation, when production of winter annuals is low. White bursage is of intermediate forage value. It is fair to good forage for horses and fair to poor for cattle and sheep. However, because there is often little other forage where white bursage grows, it is often highly valuable to browsing animals. Shadscale is a valuable browse species, providing a source of palatable, nutritious forage for a wide variety of livestock. Shadscale provides good browse for domestic sheep. Shadscale leaves and seeds are an important component of domestic sheep and cattle winter diets. Many animals bed in or under creosotebush. Domestic sheep dig shallow beds under creosotebush because it provides the only shade in the desert scrub community. Creosotebush is unpalatable to livestock. Consumption of creosotebush may be fatal to sheep. Anderson wolfberry is sometimes used as forage by livestock. Palatability of Anderson wolfberry browse is presumably fair to low. This species is used as forage only when more desirable species are unavailable. The fruit, however, appears to be moderately palatable. Ephedra is important winter range browse for domestic cattle, sheep and goats. Indian ricegrass is highly palatable to all classes of livestock in both green and cured condition. It supplies a source of green feed before most other native grasses have produced much new growth. Stocking rates vary over time depending upon season of use, climate variations, site, and previous and current management goals. A safe starting stocking rate is an estimated stocking rate that is fine tuned by the client by adaptive management through the year and from year to year.

Wildlife Interpretations:
White bursage is an important browse species for wildlife. Shadscale is a valuable browse species, providing a source of palatable, nutritious forage for a wide variety of wildlife particularly during spring and summer before the hardening of spiny twigs. It supplies browse, seed, and cover for birds, small mammals, rabbits, deer, and pronghorn antelope. Many small mammals browse creosotebush or consume its seeds. Desert reptiles and amphibians use creosotebush as a food source and perch site and hibernate or estivate in burrows under creosotebush, avoiding predators and excessive daytime temperatures. Palatability of Anderson wolfberry browse is presumably fair to low. This species is used as forage only when more desirable species are unavailable. The fruit, however, appears to be moderately palatable. Anderson wolfberry is sometimes used as forage by feral burros. The red berries are eaten by some birds and mammals. Berries of this plant constituted two percent of the diet of chukar partridges. In some areas of southern Nevada, the fleshy leaves and juicy berries provide part of the succulence permitting Gambel quail to occupy desert areas devoid of drinking water. Mule deer, bighorn sheep, and pronghorn browse ephedra, especially in spring and late summer when new growth is available. Indian ricegrass is eaten by pronghorn in moderate amounts whenever available. A number of heteromyid rodents inhabiting desert rangelands show preference for seed of Indian ricegrass. Indian ricegrass is an important component of jackrabbit diets in spring and summer. Indian ricegrass seed provides food for many species of birds. Doves, for example, eat large amounts of shattered Indian ricegrass seed lying on the ground.

Hydrological functions

Runoff is very high. Permeability is moderately rapid. Rills and waterflow patterns are none to rare. Sparse shrub canopy and associated litter provide some protection from raindrop impact. Perennial herbaceous plants slow runoff and increase infiltration.

Recreational uses

Aesthetic value is derived from the diverse floral and faunal composition and the colorful flowering of wild flowers and shrubs during the spring and early summer. This site offers rewarding opportunities to photographers and for nature study. This site has potential for upland and big game hunting.

Other products

White bursage is a host for sandfood, a parasitic plant with a sweet, succulent, subterranean flowerstalk. Sandfood was a valuable food supply for Native Americans. Seeds of shadscale were used by Native Americans for bread and mush. Creosotebush has been highly valued for its medicinal properties by desert peoples. It has been used to treat at least 14 illnesses. Twigs and leaves may be boiled as tea, steamed, pounded into a powder, pressed into a poultice, or heated into an infusion. Native Americans used the fleshy berries of Anderson wolfberry either fresh or boiled and then dried them for later use. This shrub is also used as an ornamental valued chiefly for its showy red berries. Indian ricegrass was traditionally eaten by some Native Americans. The Paiutes used the seed as a reserve food source.

Other information

White bursage, shadscale and creosotebush may be used to revegetate disturbed sites in southwestern deserts. Once established, these species may improve sites for annuals that grow under its canopy by trapping fine soil, organic matter, and symbiont propagules. They may also increase water infiltration and storage.

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T17S R59E S28
Latitude	36° 26′ 40″
Longitude	115° 22′ 16″
General legal description	North of Corn Creek field station, north Las Vegas Valley, Clark County, Nevada.

Other references

Fire Effects Information System (Online; http://www.fs.fed.us/database/feis/plants/).

Osmond, C.B., L.F. Pitelka and G.M. Hidy. 1990. Plant Biology of the Basin and Range. Ecological Studies. Vol. 80.

USDA-NRCS Plants Database (Online; http://www.plants.usda.gov).

Zouhar, K., J.K. Smith and S. Sutherland. 2008. Effect of Fire on Nonnative Invasive Plants and Invasibility of Wildland Ecosystems. USDA Forest Service Gen. Tech. Rep. RMRS GTR-42-Vol. 6.

Contributors

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Approval

Sarah Quistberg, 2/26/2025

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)	P. Novak-Echenique
Contact for lead author	State Rangeland Management Specialist
Date	06/29/2011
Approved by	Sarah Quistberg
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are none to rare.

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2. **Presence of water flow patterns:** Water flow patterns are none to rare and occur in areas subjected to summer convection storms. Flow patterns short and stable.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are rare with occurrence typically limited to areas within water flow patterns.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground 40-55% depending on amount of surface rock fragments.

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5. **Number of gullies and erosion associated with gullies:** None

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None

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7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage from grasses and annual & perennial forbs) expected to move distance of slope length (< 20 ft) during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during large rainfall events.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil stability values should be 1 to 4 on most soil textures found on this site. (To be field tested.)

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically strong, very thick platy. Soil surface colors are pale browns and soils are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is less than 1 percent.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Sparse shrub canopy and associated litter break raindrop impact. Perennial herbaceous plants slow runoff and increase infiltration.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** Compacted layers are none. Subsoil argillic or calcic horizons are not to be interpreted as compacted layers.

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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: Reference Plant Community: deciduous shrubs >>

    Sub-dominant: evergreen shrubs >> deep-rooted, cool season, bunchgrasses > deep-rooted perennial forbs > annual forbs > warm-season bunchgrasses

    Other: succulents, annual grasses

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within individual shrubs common and standing dead shrub canopy material may be as much as 25% of total woody canopy; mature bunchgrasses commonly (<20%) have dead centers.

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14. **Average percent litter cover (%) and depth (in):** Under canopy and between plant interspaces 20-30%, <1/4" depth.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (February thru April [May]) ± 200 lbs/ac. Favorable years 350 lbs/ac and unfavorable years 100 lbs/ac.

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:** Potential invaders on this site include red brome, redstem filaree and Mediterranean grass.

17. **Perennial plant reproductive capability:** All functional groups should reproduce in above-average and average growing season years. Less reproduction will occur in below-average precipitation years. Some functional groups may not reproduce in below-average years.