

Ecological site R029XY073NV BOULDERY SLOPE 8-12 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.

MLRA notes

Major Land Resource Area (MLRA): 029X–Southern Nevada Basin and Range

The Southern Nevada Basin and Range MLRA (29) represents the transition from the Mojave Desert to the Great Basin. It is cooler and wetter than the Mojave. It is warmer and typically receives more summer precipitation than the Great Basin. This area is in Nevada (73 percent), California (25 percent), and Utah (2 percent). It makes up about 26,295 square miles (68,140 square kilometers). Numerous national forests occur in the area, including the San Bernardino, Angeles, Sequoia, Inyo, Humboldt-Toiyabe, and Dixie National Forests. Portions of Death Valley National Monument, the Nuclear Regulatory Commission's Nevada Test Site, the Hawthorne Ammunition Depot, and the Nellis Air Force Range in Nevada and the China Lake Naval Weapons Center in California also are in this MLRA. The northeast part of the Paiute Indian Reservation and the southern third of the Walker River Indian Reservation are in the part of this MLRA in Nevada, and the Lone Pine, Fort Independence, and Big Pine Indian Reservations are in the part in California.

Physiography:

The entire area is in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. The area of broad, nearly level, aggraded desert basins and valleys between a series of mountain ranges trending north to south. The basins are bordered by sloping fans and pluvial lake terraces. The mountains are uplifted fault blocks with steep side slopes and not well dissected due to limited annual precipitation. Most of the valleys in this MLRA are closed basins or bolsons containing sinks or playa lakes.

Geology:

The mountains are dominated by Pliocene and Miocene andesite and basalt rocks, Paleozoic and Precambrian carbonate rocks prominent in some areas. Scattered outcrops of older Tertiary intrusives and very young tuffaceous sediments (Pliocene and Miocene) are in the western and eastern thirds of this MLRA. The valleys consist mostly of alluvial fill and playa deposits at the lowest elevations in the closed basins.

Climate:

The average annual precipitation is 3 to 12 inches (75 to 305 millimeters) in most of this area. It may be as high as 29 inches (735 millimeters), on the higher mountain slopes. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. Summers are dry, but sporadic storms are common in July and August.

Water Resources:

Water resources are scarce. Ground water and surface water sources are limited. Streams are small and intermittent. Quality of surface water is naturally degraded as streams cross area of valley fill effected by dissolved salts. Irrigation water may raise the levels of dissolved salts and suspended sediments causing contamination.

Soils:

Dominant soil orders include Entisols and Aridisols.

Ecological site concept

The Bouldery Slope 8-12 P.Z. site is on very bouldery or stony mountain and hill summits and sideslopes. Slopes range from 4 to 75 percent, but slope gradients of 15 to 50 percent are typical. Elevations are 4,400 to 7,000 feet. The soils are shallow to very shallow and well drained. These soils are typically associated with very large, exfoliating, ignimbritic boulders, or rock outcrop.

Associated sites

R029XY045NV	STONY CALCAREOUS SLOPE 8-12 P.Z. This site is on sideslopes and summits of low mountains and hills on all exposures. Slopes range from 8 to 75 percent, but slope gradients of 15 to 50 percent are typical. Elevations are 4,700 to about 5,500 feet. The soils associated with this site are shallow. They have formed predominantly from volcanic rock sources and have a shallow effective rooting zone with depth to a hardpan or bedrock ranging from 10 to 20 inches. The soils have high amounts of gravels throughout the soil profile. The soil surface typically has a cover of 75 percent or more rock fragments.
R029XY075NV	LOAMY SLOPE 10-12 P.Z. This site is on summits and sideslopes of hills and mountains on all exposures. Slopes range from 2 to over 50 percent, but slope gradients of 30 to 50 percent are typical. Elevations are 4,100 to about 6,300 feet. The soils are shallow over bedrock. These soils have formed in residuum and colluvium from volcanic rocks on steep mountain or hill slopes.

Similar sites

R029XY057NV	LOAMY ASH INFLUENCED SLOPE 12-14 P.Z. PSSPI dominant grass
R029XY010NV	LOAMY SLOPE 8-10 P.Z. Less productive site; ACHY-HECO26 codominant grasses
R029XY075NV	LOAMY SLOPE 10-12 P.Z. ACHY-HECO26 codominant.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata</i>
Herbaceous	(1) <i>Achnatherum speciosum</i>

Physiographic features

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Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mountain
Runoff class	Medium to very high
Elevation	1,341–2,134 m
Slope	4–75%
Water table depth	183 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is arid, characterized by cool, moist winters and hot, dry summers. Average annual precipitation is 8 to 10 (12) inches. Mean annual air temperature is 50 to 56 degrees F. The average growing season is about 120 to 150 days. No climate stations are associated with this site.

Table 3. Representative climatic features

Frost-free period (average)	150 days
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Freeze-free period (average)	
Precipitation total (average)	305 mm

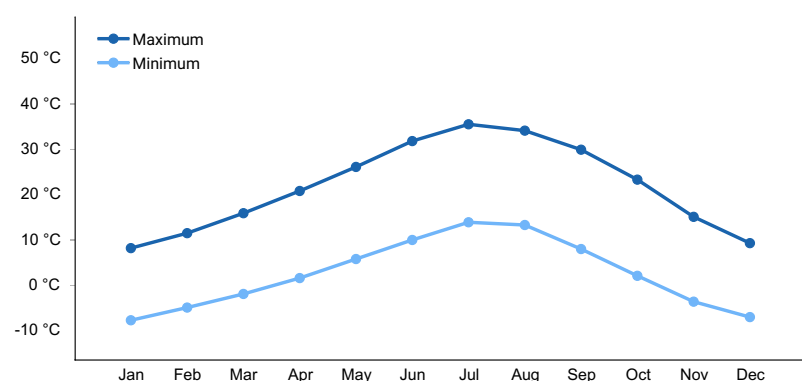


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils are shallow to very shallow and well drained. These soils are typically associated with very large, exfoliating, ignimbritic boulders, or rock outcrop. Runoff from these soils is medium to very high and permeability is moderate to moderately rapid. Available water capacity is very low although water retention is favorable in cracks and crevices within and between the boulders and rock outcrop. Soil series associated with this site include: Gabbvalley, Richinde, and Tejabe.

Table 4. Representative soil features

Parent material	(1) Colluvium–volcanic rock (2) Residuum–volcanic rock (3) Colluvium–welded tuff
Surface texture	(1) Very gravelly sandy loam (2) Very gravelly fine sandy loam (3) Very stony sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	10–51 cm
Surface fragment cover ≤3"	22–30%
Surface fragment cover >3"	10–15%
Available water capacity (0–101.6cm)	1.52–4.83 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)	6.6–7.8

Subsurface fragment volume ≤3" (Depth not specified)	22–45%
Subsurface fragment volume >3" (Depth not specified)	3–16%

Ecological dynamics

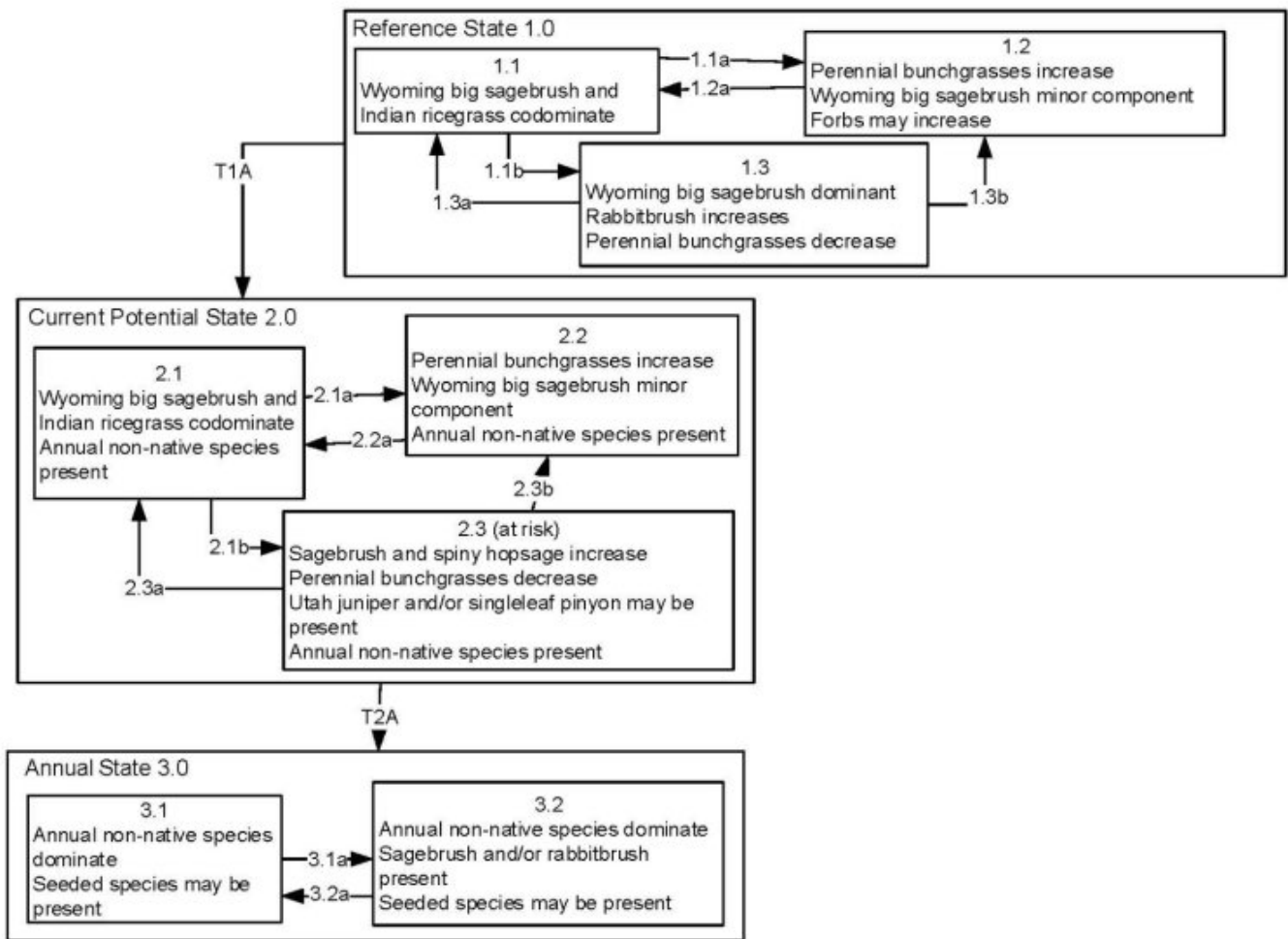
Where management results in abusive grazing use by livestock or feral horses, big sagebrush, rabbitbrush and horsebrush increase while desert needlegrass, Indian ricegrass and needle and thread decrease. There are sparse, scattered stands of singleleaf pinyon and Utah juniper that occur adjacent to this site and these trees readily increase on this site in the absence of natural fire. The shrub component of this site is very diverse. In areas of very shallow soil depth or droughty soils due to aspect, desert needlegrass decreases, as does overall production. In extremely bouldery areas, green ephedra may dominate the aspect.

Fire Ecology:

Sagebrush communities have historically been subjected to fires at varying intervals (20 to 70 years). Big sagebrush is killed by fire and establishes after fire from a seedbank; from seed produced by remnant plants that escaped fire; and from plants adjacent to the burn that seed in. Fire effects on Stansbury cliffrose are variable. Fire may kill or severely damage plants. Late-season fire also increases the risk of mortality. Stansbury cliffrose is a weak sprouter that is generally killed by severe fire. Green ephedra generally sprouts vigorously from the roots or woody root crown after fire and rapidly produces aboveground biomass from surviving meristematic tissue. Desert needlegrass has persistent dead leaf bases, which make it susceptible to burning. Fire removes the accumulation; a rapid, cool fire will not burn deep into the root crown. 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. Needle and thread is top-killed by fire. It may be killed if the aboveground stems are completely consumed. Needle and thread is classified as slightly to severely damaged by fire. Needle and thread sprouts from the caudex following fire, if heat has not been sufficient to kill underground parts. Recovery usually takes 2 to 10 years.

The reference plant community is dominated by mountain or Wyoming big sagebrush and desert needlegrass. Potential vegetative composition is about 50 percent grasses, 5 percent forbs, and 45 percent shrubs and trees. Approximate ground cover (basal and crown) is 10 to 25 percent.

State and transition model



Reference State 1.0 Community Phase Pathways

- 1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community, dominated by grasses and forbs.
- 1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
- 1.2a: Time and lack of disturbance allows for shrub regeneration.
- 1.3a: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.
- 1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.

Transition T1A: Introduction of non-native species such as bulbous bluegrass, cheatgrass and thistles.

Current Potential State 2.0 Community Phase Pathways

- 2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community dominated by grasses and forbs; non-native annual species present.
- 2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
- 2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
- 2.3a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush management with minimal soil disturbance; late-fall/winter grazing causing mechanical damage to sagebrush.
- 2.3b: High severity fire significantly reduces sagebrush cover leading to early mid-seral community.

Transition T2A High severity fire and/or soil disturbance (3.1). Inappropriate grazing that favors shrubs in the presence of non-native annual species (3.2).

Annual State 3.0 Community Phase Pathways

- 3.1a: Time and lack of fire, unlikely to occur.
- 3.2a: Fire.

Animal community

Livestock Interpretations:

This site has limited value for livestock grazing due to bouldery steep slopes. Grazing management should be keyed to perennial grass production. Desert needlegrass produces considerable basal foliage and is good forage

while young. Young desert needlegrass is palatable to all classes of livestock. Mature herbage is moderately grazed by horses and cattle but rarely grazed by sheep. 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. Needle and thread provides highly palatable forage, especially in the spring before fruits have developed. Needlegrasses are grazed in the fall only if the fruits are softened by rain. Big sagebrush is eaten by domestic sheep and cattle, but has long been considered to be of low palatability to domestic livestock, a competitor with more desirable species, and a physical impediment to grazing. Stansbury cliffrose is an important browse species for livestock, especially in the winter. Green ephedra is heavily browsed by livestock on winter range but only moderately or lightly browsed during other seasons.

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:

Big sagebrush is highly preferred and nutritious winter forage for mule deer. Stansbury cliffrose is an important browse species for mule deer, pronghorn, game birds, and songbirds. Wild ungulates use it heavily in winter. Green ephedra is an important browse species for big game animals. Green ephedra is heavily used by wildlife on winter ranges. Young desert needlegrass is palatable to many species of wildlife. Desert needlegrass produces considerable basal foliage and is good forage while young. Desert bighorn sheep graze desert needlegrass. 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. Needle and thread is moderately important spring forage for mule deer, but use declines considerably as more preferred forages become available.

Hydrological functions

Runoff is medium to very high. Permeability is moderate to moderately rapid.

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 is used for camping and hiking and has potential for upland and big game hunting.

Other products

Triterpenoids extracted from Stansbury cliffrose have been shown to have inhibitory effects on HIV and Epstein-Barr virus. Native Americans used the inner bark for making clothing and ropes, and the branches for making arrows. Indian ricegrass was traditionally eaten by some Native Americans. The Paiutes used the seed as a reserve food source.

Other information

Stansbury cliffrose is recommended for wildlife, roadside, construction, and mine spoils plantings; and for restoring pinyon-juniper woodland, mountain brushland, basin big sagebrush grassland, black sagebrush, and black greasewood communities. It can be established on disturbed seedbeds by broadcast seeding, drill seeding, or transplanting. Fall or winter seeding is recommended. Green ephedra is listed as a successful shrub for restoring western rangeland communities and can be used to rehabilitate disturbed lands. It also has value for reducing soil erosion on both clay and sandy soils. Green ephedra establishes readily through direct seeding, transplants, and stem cuttings. Desert needlegrass seeds are easily germinated and have potential for commercial use. Desert needlegrass may be used for groundcover in areas of light disturbance, but it is susceptible to excessive trampling. Needle and thread is useful for stabilizing eroded or degraded sites.

Inventory data references

NASIS data used for abiotic narratives and tables.

Type locality

Location 1: Lincoln County, NV	
Township/Range/Section	T3S R62E S12
Latitude	37° 42' 4"
Longitude	114° 58' 55"
General legal description	NE¼ Section 12, T3S. R62E. MDBM. About 2 miles north of Pahroc Spring, North Pahroc Range, Lincoln County, Nevada.

Other references

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

United States Department of Agriculture, Natural Resources Conservation Service. 2022. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture, Agriculture Handbook 296.

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

Contributors

HA/GD

Approval

Kendra Moseley, 2/20/2025

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	07/12/2012
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are none to rare depending on steepness of slope; rills commonly observed in areas subjected to summer convection storms or rapid spring snowmelt.

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2. **Presence of water flow patterns:** Water flow patterns are none to few but can be expected in areas recently subjected

to summer convection storms or rapid snowmelt, usually on steeper slopes. Short (< 3 m) and stable.

3. **Number and height of erosional pedestals or terracettes:** Pedestals are none to rare. Occurrence is usually limited to areas of water flow patterns.
4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground 20 to 35 percent depending on amount of surface rock fragments
5. **Number of gullies and erosion associated with gullies:** None
6. **Extent of wind scoured, blowouts and/or depositional areas:** None
7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage from grasses and annual and perennial forbs) expected to move distance of slope length during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during large rainfall events.
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 3 to 6. (To be field tested.)
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically thin to thick platy or massive. Soil surface colors are light and are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is typically 1 to 1.5 percent dropping off quickly below. Organic matter content can be more or less depending on micro-topography.
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e. desert needlegrass, Indian ricegrass] slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact and provide some opportunity for snow catch and accumulation on site.
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Platy structure or argillic horizons are not to be interpreted as compacted layers.
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: deep-rooted, cool season, perennial bunchgrasses (desert needlegrass, Indian ricegrass > tall shrubs (big sagebrush, cliffrose)

Sub-dominant: associated shrubs > deep-rooted, cool season, perennial forbs > warm season perennial grasses = fibrous, shallow-rooted, cool season, perennial and annual forbs

Other: evergreen and deciduous trees

Additional:

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 percent of total woody canopy; some of the mature bunchgrasses (<20 percent) have dead centers.

14. **Average percent litter cover (%) and depth (in):** Reference Plant Community: Under canopy and between plant interspaces 15 to 25 percent and litter depth is ¼ inch.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (through June) \pm 600 lbs/ac; Favorable years about 800 lbs/ac and unfavorable years about 400 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 include cheatgrass, halogeton, Russian thistle, annual mustards, and knapweeds. Increasers include singleleaf pinyon and Utah juniper.

17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season years. Little growth or reproduction occurs during extended or extreme drought.
