

Appendix E – Ecological Site Descriptions

1. Ecological Site Descriptions

The ecological site is a product of all the environmental factors responsible for its development including soils, topography, climate and fire (NRCS 2014). An ecological site is recognized and described based on its ability to produce and support a particular plant community. The following ecological sites are present within the FBFA and surrounding areas. The FBFA contains 40 different ecological sites.

1.1 Rangelands

Sandy Loam Upland 10–14” (Site ID: R035XA117AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys and deep canyons and occurs in an upland position on gently sloping plains or alluvial fans. Elevations range from 4,800–6,300 feet and precipitation averages 10 to 14 inches per year. The potential native plants are *Stipa* species, Indian ricegrass, galleta, and blue grama, fourwing saltbush, winterfat, and cliffrose. Annual production is between 245–805 lbs/acre. Soils are deep and well-drained and range from sandy loam to fine sandy loam texture (4–10 inches thick). Soils have high permeability but have a very low available water capacity. These sites are compatible with planned livestock grazing systems and provides suitable wildlife habitat and sufficient resources for grazing wildlife.

Sandy Loam Upland 6–10” (Site ID: R035C317AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons. Elevation range for these sites 5,000–6,800 feet and precipitation averages 10 to 14 inches per year. The potential for native plants are Wyoming big sagebrush, Utah juniper, Colorado pinyon-cliffrose, Mormon tea, fourwing saltbush, blackbrush, Indian ricegrass, needle and thread, western wheatgrass *Galleta*, black and blue grama, and sand dropseed. Annual production is between 315–525 lbs/acre. Soils are deep, well drained and textures range from very fine sandy loam to sandy loam. Soils at this site hold moisture within root depth of plant community. These sites are favorable for grazing throughout much of the year (except with restricting snow cover). Cool season mid grasses will be replaced by big sagebrush, rabbit brush, snakeweed and lower value forbs and grasses with continuous grazing during winter and spring seasons. These sites provide food for wildlife that utilize grass as a major component of their diet.

Sandy Loam Upland 6–10” (Site ID: R035XB219AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys and deep canyons occurring in an upland position. Elevations range from 3,800–5,800 feet and precipitation averages 6 to 10 inches per year. The potential native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual production is between 535–700 lbs/acre. Soils are deep and moderately well drained and range from sandy loam to loamy sand (4–10 inches thick). Soils are moderately permeable. These sites are suitable for yearlong livestock grazing and provide some food and cover for some wildlife primarily limited to grassland species.

Sandy Loam Upland 6–10” Warm (Site ID: R035XB235AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs on summits and risers of fan terraces and structural benches of plateaus. Elevation range for these sites range from 3,800–5,800 feet and precipitation averages 6 to 10 inches per year. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual production is between 150–300 lbs/acre. Soils are deep to very deep and range from loamy sand to sandy loam. These sites are suitable for yearlong livestock grazing. Soils on this site are vulnerable to wind erosion, particularly in overgrazed areas, roads, cattle trails, and concentration areas. These sites offer a diversity of vegetation for wildlife.

Clay Loam Upland 10–14” (Site ID: R035XA107AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys and deep canyons and occurs in an upland position on mostly level to slightly sloping plains and rolling hills. Elevations range from 4,800–6,300 feet and precipitation averages 10 to 14 inches per year. The potential native plants are Stipa species, Indian ricegrass, galleta, blue grama, fourwing saltbush, winterfat, and cliffrose. Annual production is between 200–680 lbs/acre. Soils are moderately deep to deep and are well-drained and range from sandy clay loam, clay loam or loam with 0 to 30% coarse fragments. Permeability of soils is very slow to moderately slow. These sites are suitable for yearlong livestock grazing and provides suitable habitat for variety of wildlife species.

Clayey Wash 6–10” (Site ID: R035XB202AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons. Elevations range from 3,800–5,800 feet and precipitation averages 6 to 10 inches per year. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual production is between 450–700 lbs/acre. Soils in these sites are deep and well drained and have textures ranging from clay loam to vertic clays. Permeability of soils in these sites ranges from moderately slow to very slow. These sites are suitable for grazing and can greatly benefit from prescribed grazing systems with schedule rest periods during the cool seasons. This site performs as a transitory site for grassland wildlife due to the proximity of water.

Sandstone Upland 10–14” (Site ID: R035XA115AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs in an upland position on rolling mesa tops and rocky escarpments. Elevations range from 4,800–6,300 feet and precipitation averages 10 to 14 inches per year. The potential native plants are Stipa species, Indian ricegrass, galleta, blue grama, fourwing saltbush, winterfat, and cliffrose. Annual production is 210–485 lbs/acre. Soils are very shallow and shallow to sandstone and fractured shale bedrock with textures that range from loamy sand to fine sandy loam. Soils in these sites have low available moisture capacity and readily disperse heavy rains increasing runoff, erosion, and loss of moisture. Soils have slow to moderate permeability. These sites are suitable for livestock grazing and makes great winter range with protection from the wind.

Sandstone Upland 10–14” (Site ID: R035XA118AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs in an upland position as gently rolling plains and mesas. Elevations range from 4,800–6,300 feet and annual precipitation averages 10 to 14 inches. The potential native plants are *Stipa* species, Indian ricegrass, galleta, blue grama, fourwing saltbush, winterfat, and cliffrose. Annual production is 245 to 490 lbs/acre. Soils are deep and well-drained with textures ranging from sand to coarse sandy loam. Permeability in these sites is rapid and the soils have very low water capacity. These sites are favorable for livestock grazing throughout the year and provide food for grassland wildlife species.

Shallow Loamy 10-14” (Site ID: R035XA119AZ)

These sites characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occur on structural benches, mesas, and ridges. Elevations range from 4,800–6,300 feet and precipitation averages 10 to 14 inches per year. The potential for native plants are *Stipa* species, Indian ricegrass, galleta, blue grama, fourwing saltbush, winterfat, and cliffrose. Annual production is 390 to 570 lbs/acre. Soils are very shallow and shallow to limestone, sandstone or basalt bedrock or other plant root restricting layers. Soils textures range from a gravelly light clay loam to stony sandy loam. Soils exhibit slow to moderate permeability in these sites. These sites are suitable for livestock grazing and adapt well to prescribe grazing systems. The vegetation provides suitable cover and food for a variety of wildlife.

Sandy Upland 6-10” (Site ID: R035XB217AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs in an upland position on undulating plains, plateaus, and stabilized dunes. These sites will also occur on fan remnants, treads of abandoned floodplains, and summits of structural benches, which may be eolian-mantled. Elevations range from 3,800–5,800 feet and average precipitation is 6 to 10 inches per year. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual production ranges from 270 to 500 lbs/acre. The soils on these sites are deep, somewhat excessively drained, with no plant root restricting layers. Textures of the soils range from sand to coarse sandy loam. These sites are suitable for yearlong grazing by cattle and are easily traversed by all classes of livestock. Soils on these sites have high wind erosion hazard, particularly on disturbed areas such as roads and livestock concentration areas. These sites offer a fair diversity of vegetation for use by primarily grassland wildlife species.

Sandy Upland 6–10” Warm (Site ID: R035XB206AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs on stabilized dunes and sand sheets in dune fields. Elevations range from 3,800–5,800 feet and average annual precipitation ranges from 6 to 10 inches per year. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual production is 80 to 160 lbs/acre. Soils are moderately deep to very deep with textures ranging from coarse sand to loamy very fine sand.

Sandy Upland 6–10” Sodic (Site ID: R035XB223AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs as deep sandy sodic soils on stabilized dunes, undulating plateaus, and fan remnants. Elevations range from 3,800–5,800 feet and average annual precipitation at these sites ranges from 6 to 10 inches. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual production ranges from 250 to 565 lbs/acre. Soils are moderately deep to very deep (>40”). Soils in these sites are slightly to moderately sodic with sodicity increasing with depth. The textures of these soils range from coarse sand to coarse sandy loam. These sites are suitable for yearlong grazing by cattle, sheep, goats, and horses and are easily traversed by all classes of livestock. These sites do well with prescribed grazing systems as soils here have high wind erosion hazard, particularly on overgrazed areas, roads, cattle trails, and concentration areas. These sites have fair vegetative diversity for wildlife but limited available water which may restrict the potential for grassland wildlife species.

Sandy Upland 10–14” (Site ID: R035XC315AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs on nearly level to gently rolling uplands to partially stabilized or stabilized dunes on plateaus, fans, and abandoned stream terraces. Elevations range from 5,000–6,800 feet and annual precipitation ranges from 10 to 14 inches. The potential for native plants are Wyoming big sagebrush, Utah juniper, Colorado pinyon – cliffrose, Mormon tea, fourwing saltbush, blackbrush, Indian ricegrass, needle and thread, western wheatgrass, galleta, black and blue grama, and sand dropseed. Annual production is 275 to 500 lbs/acre. Soils are deep to very deep and textures throughout these sites range from loamy fine sands to coarse sands. These sites are suitable for grazing throughout most of the year with shrubs providing forage during the period when snow covers palatable grasses.

Sandy Upland 10–14” Limy, Gravelly (Site ID: R035XC345AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs on mesa summits. Elevations range from 5,860–5,940 feet and average precipitation is 10 to 14 inches per year. The potential for native plants are galleta, Indian ricegrass, narrowleaf yucca, Mormon tea, and Utah juniper. Soil textures range from sand to loamy sand.

Sandy Slopes 10–14” (Site ID: R035XC37AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs on stabilized dunes with steep slopes. The elevations range from 5,000–5,800 feet with average precipitation from 10 to 14 inches per year. The potential for native plants are Wyoming big sagebrush, Utah juniper, Colorado pinyon – cliffrose, Mormon tea, fourwing saltbush, blackbrush, Indian ricegrass, needle and thread, western wheatgrass, galleta, black and blue grama, and sand dropseed. Annual production is 180 to 360 lbs/acre. Soils in this site are deep to very deep with textures of the soil ranging from fine sand, loamy sand to loamy fine sand. This site has limited suitability for grazing by cattle, horse, and sheep during spring, summer, and fall with a good variety of plants. Livestock grazing is severely restricted and proper grazing distribution is often

impossible to attain. This site provides a good deal of habitat diversity because of the variety of food, topography, exposures, and cover for wildlife species.

Loamy Wash 6–10” (Site ID: R035XB209AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs in a bottom position on floodplains and low stream terrace that are subject to flooding following rainfall events. Elevations range from 3,800–5,800 feet and average annual precipitation is 6 to 10 inches. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual production is 600 to 1,800 lbs/acre. These sites are suitable for yearlong grazing by cattle; however, continuous grazing during the winter and spring periods will decrease cool season grasses, which are replaced by warm season, lower forage value grasses and shrubs. These sites offer suitable habitat and forage for grassland wildlife species.

Loamy Upland 10–14” (Site ID: R035XC313AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs in plateaus fan terraces, and valley floors. Elevations range from 5,300–6,800 feet elevation and precipitation averages 10 to 14 inches per year. The potential for native plants are Wyoming big sagebrush, Utah juniper, Colorado pinyon – cliffrose, Mormon tea, fourwing saltbush, blackbrush, Indian ricegrass, needle and thread, western wheatgrass, galleta, black and blue grama, and sand dropseed. Annual production is 400 to 650 lbs/acre. Soils are generally deep to very deep with textures ranging from very fine sandy loam to light sandy clay loam. These sites are suitable for grazing throughout most of the year. When these sites are in excellent condition they provide some food for wildlife, primarily as early green forage. Pinyon and juniper make these sites more desirable to wildlife due to habitat diversity.

Loamy Upland 6–10” (Site ID: R035XB210AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs in an upland position on mesas, fans, structural benches, and plains. Elevations range from 3,800–5,800 feet and precipitation averages 6 to 10 inches per year. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual production is 265 to 520 lbs/acre. Soils are moderately deep to deep to any plant root restricting layers and have textures that range from fine sandy loam to sandy clay loam. These sites are suitable for yearlong grazing by cattle. Erosion is typically not a hazard in these sites unless the vegetational cover has been reduced. These areas are dominated by grassland wildlife species.

Loamy Wash 6–10” Saline-Sodic (Site ID: R035XB211AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs in the drainage or bottom positions on the landscape that have the potential to flood following storm events. Elevations range from 3,800–5,800 feet and precipitation averages 6 to 10 inches per year. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual production is 500 to 800 lbs/acre. Soils are stratified flow deposited soils that are deep and well drained, formed from mixed alluvium. The textures of the soils in these sites ranges from very fine sandy loam to

sandy clay loam. These sites produce large amounts of quality forage during all grazing periods and prescribed grazing systems can benefit this site by allowing rest periods for the cool season species. The plant community provides a variety of food and cover plants for wildlife that utilize grass as a portion of their diet.

Loamy Bottom 6–10” Subirrigated, Saline (Site ID: R035XB212AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs in a bottom position and has a water table within reach of most of the herbaceous vegetation during the main part of the growing season. Elevations range from 4,500–5,500 feet and average precipitation per year is 6 to 10 inches. The potential for native plants are fourwing saltbush, vine mesquite, and alkali sacaton. Annual production is 40 to 60 lbs/acre. The soils that make up these sites are deep and poorly drained with textures that range from clay loam or clay about 8–10 inches thick underlain by a substratum of clay, silty clay, and clay loam.

Loamy Bottom 6–10” Perennial (Site ID: R035XB269AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs on low braided flood plains of the San Juan River. Elevations range from 4,600–5,000 feet with average annual precipitation 6 to 10 inches. The potential for native plants are Fremont cottonwood, coyote willow, rubber rabbitbrush, desert saltgrass, western wheatgrass. Annual production ranges from 15 to 75 lbs/acre. The soils are very deep and formed in alluvium from sandstone, shale, and quartzite. Soil textures include loamy fine sand, fine sandy loam, silt loam, stratified very gravelly coarse sand and sand. These sites are suitable for year-long grazing by all classes of livestock; however, grazing management should be used in these sites. These wetland sites attract maximum numbers of species of upland wildlife.

Sandy Wash 6–10” (Site ID: R035XB216AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs in a bottom position on stream terraces, floodplains, and drainageway channels. Elevations range from 3,800–5,800 feet and precipitation averages 6 to 10 inches per year. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual production is 450 to 900 lbs/acre. The soils on these sites are deep and well drained with textures that are mixed and stratified with thin horizons of loamy textures. These sites are not well suited for unmanaged grazing by various ungulates.

Sandstone Upland 10–14” (Site ID: R035XC333AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons. Elevations range from 5,000–6,800 feet with average precipitation of 10 to 14 inches per year. The potential for native plants are Wyoming big sagebrush, Utah juniper, Colorado pinyon – cliffrose, Mormon tea, fourwing saltbush, blackbrush, Indian ricegrass, needle and thread, western wheatgrass, galleta, black and blue grama, and sand dropseed. Annual production is 55 to 85 lbs/acre. Soils in these sites are shallow and textures range from loamy fine sand to sand and loamy sand. This site is suitable for grazing during any period of the year by cows, sheep, and horses. This site benefits from prescribed grazing allowing rest periods for the cool season species.

Sandstone Upland 6–10” (Site ID: R035XB204AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons. Elevations range from 3,800–5,800 feet and average annual precipitation ranges from 6 to 10 inches per year. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual production is 65 to 155 lbs/acre. Soils are well drained and very shallow and are formed in eolian, residuum, and alluvium derived from sandstone. Soil texture in these sites ranges from fine sand and channery loamy fine sand and exhibit slow to very slow permeability.

Sandstone Upland 6–10” Very Shallow, Warm (Site ID: R035XB230AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs on very shallow soils over weathered sandstone. Elevations range from 3,800–5,800 feet and average precipitation is 6 to 10 inches per year. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual production is 60 to 80 lbs/acre. Soils exhibit moderate to rapid permeability and are very shallow, soils that formed in eolian and alluvial deposits on hills, sand sheets on structural benches and plateaus. These sites are suitable for grazing during any period of the year by cattle, sheep, and horses. The plant community provides a variety of food and cover plants for wildlife. Grazing management that encourage cool season grass species are beneficial to pronghorn.

Sandstone/Shale Upland 6–10” (Site ID: R035XB215AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs in an upland position on plateaus, mesas, or buttes. It is on gently sloping to rolling plains and slopes. Elevations range from 3,800–5,800 feet and precipitation averages 6 to 10 inches per year. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual production is 190 to 360 lbs/acre. Soils are very shallow and shallow to bedrock with surface textures ranging from loamy sand to loam about 1–4 inches thick. These sites are suitable for yearlong grazing by cattle. If these sites become deteriorated they may respond slowly to management. Plant communities on these sites provide a variety of food and cover plants for wildlife.

Sandstone/Shale Upland 6–10” Warm (Site ID: R035XB226AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs on summits and gentle side slopes of plateaus, mesas, and pediments. Elevations range from 3,800–5,800 feet and average annual precipitation ranges from 6 to 10 inches. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. The soils on these sites are formed in residuum and pediment from sandstone (calcareous and non-calcareous), mudstone, shale, and conglomerate of the Chinle Formation and Carmel Formation. Most of the soils are very shallow to sandstone.

Colluvial Slopes 6–10” Warm (Site ID: R035XB236AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs in an upland position as colluvial sideslopes of hills, escarpments, and cliffs. Elevations range from 3,800–5,800 feet with 6 to 10 inches per year average

precipitation. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual production ranges from 44 to 115 lbs/acre. Soils are moderately deep to deep on slopes and may have small pockets of shallow soils. Textures of the soils in these sites ranges from extremely gravelly loam to fine sand to extremely gravelly fine sandy loam. These sites are favorable for sheep grazing (only) throughout most of the year. These sites respond well to grazing management that allows for rest of cool season species. Wildlife is limited due to steepness of topography and vegetative form and lack of water.

Limestone/Sandstone Upland 6–10” (Site ID: R035B232AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs on limestone and calcareous sandstone of the Kaibab formation on benches and slopes of plateaus. Elevations range from 3,800–5,800 feet with an average annual precipitation of 6 to 10 inches. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual production ranges from 150 to 300 lbs/acre. Soils associated with these sites have developed in mixed residuum an alluvium from parent material of limestone and sandstone. Soils are strongly effervescent at or near the surface and are very shallow to shallow, often with small areas of rock outcrop and/or soil of only a few inches in depth. These sites are suitable for grazing during any period of the year by cattle, sheep, and horses and provides a variety of food and cover for wildlife.

Limestone/Sandstone Upland 10–14” (Site ID: R035XC319AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs on gently rolling plateaus and structural benches. Elevations range from 5,000–6,800 feet and precipitation averages 10 to 14 inches per year. The potential for native plants are Wyoming big sagebrush, Utah juniper, Colorado pinyon – cliffrose, Mormon tea, fourwing saltbush, blackbrush, Indian ricegrass, needle and thread, western wheatgrass, galleta, black and blue grama, and sand dropseed. The soils are shallow to bedrock; however, rock outcrop is uncommon. Soil textures are dominantly loam, but can be fine sandy loam or sandy clay loam. These sites are usable yearlong by livestock and responds well to management despite shallow soils. Wildlife is supported when these sites are in excellent condition.

Limestone/Sandstone Cliffs 6–10” (Site ID: R035XB240AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs on all aspects. Elevations range from 3,800–5,800 feet with 6 to 10 inches of precipitation per year. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual production is 25 to 145 lbs/acre. Soils are very shallow or shallow to bedrock (<20”). The soils in these sites formed in alluvium, colluvium, and residuum from limestone, calcareous sandstone, and siltstone of the Kaibab Formation. Accessible areas are grazed by cattle, horses, sheep, goats, and wild horses. These areas provide sufficient habitat for a variety of bird species and other wildlife species.

Limestone/Sandstone Hills 10–14” (Site ID: R035XC308AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs on steeper hillsides and escarpments that have shallow soils over limestone and sandstone. Elevations range from 5,000–6,500 feet and precipitation averages

10 to 14 inches per year. The potential for native plants are Wyoming big sagebrush, Utah juniper, Colorado pinyon – cliffrose, Mormon tea, fourwing saltbush, blackbrush, Indian ricegrass, needle and thread, western wheatgrass, galleta, black and blue grama, and sand dropseed. Annual production averages 300 to 500 lbs/acre. Wildlife includes mule deer, cottontail rabbit, blacktail jackrabbit, several species of lizards and snakes coyote, and pronghorn.

Mudstone/Sandstone Hills 6–10”, Warm (Site ID: R035XB251AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs on hillslopes and breaks within the Moenkopi Formation and on toeslopes through summits of hills. Elevations range from 3,800–5,800 feet and precipitation averages 6 to 10 inches per year. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual productivity ranges from 3 to 10 lbs/acre. The soils in these sites are shallow or very shallow to mudstone or sandstone of the Moenkopi Formation.

Mudstone Slopes 6–10” (Site ID: R035XB283AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occur on mostly bare clay slopes commonly known as badlands in the painted desert. These sites occur on escarpments, hills, and structural benches, backslopes and footslopes of mesas, buttes and hill remnants. Elevations range from 3,800–5,800 feet and precipitation averages 6 to 10 inches per year. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual productivity ranges from 3 to 20 lbs/acre. These sites are very unproductive which require very large acreages to support a livestock operation. These sites are adapted to grassland wildlife species.

Basalt Upland 6–10” (Site ID: R035XB231AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs on summits and slopes of lava flows and footslopes of hills. Elevations range from 3,800–5,800 feet and average annual precipitation is 6 to 10 inches. The potential for native plants are shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. Annual production is 5 to 60 lbs/acre. The soils are shallow to basalt rubble and bedrock formed from residuum alluvium, and residuum from pyroclastic basalt flows.

Sedimentary Cliffs 10-14” (Site ID: R035XC302AZ)

These sites are characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs as steep canyon walls, with small plateaus, and ledges. These sites experience excessive drainage. Elevations range from 4,800–6,700 feet and precipitation averages 10 to 14 inches per year. The potential for native plants are Wyoming big sagebrush, Utah juniper, Colorado pinyon – cliffrose, Mormon tea, fourwing saltbush, blackbrush, Indian ricegrass, needle and thread, western wheatgrass, galleta, black grama, blue grama, and sand dropseed. Annual production is 200 to 450 lbs/acre. The soils are very shallow to shallow. These sites have complex geologic strata and has created a multitude of soil textures, and developments. These sites are quite steep which severely restricts use by livestock. These sites provide a great deal of habitat diversity because of the topography, exposures, plant community variation, and rockiness.

1.2 Forestlands

Pinus edulis-Juniperus osteosperma/Purshia stansburiana-Yucca baccata/Bouteloua curtipendula-Bouteloua gracilis (Site ID: F035XG714AZ)

This site is characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons and occurs on structural benches and mesas. Elevations range from 7,000–7,100 feet with average annual precipitation of 14 to 18 inches per year. The potential for native plants are banana yucca, Bigelow sage, black sagebrush, blue grama, cactus, *Ephedra*, pinyon, cliffrose, Utah agave, Utah juniper, western wheatgrass, Wyoming big sagebrush. Soils are loamy, mixed, superactive, mesic Aridic Lithic Haplustepts.

Pinus edulis-Juniperus osteosperma/Quercus xpauciloba-Purshia stansburiana/Muhlenbergia pungens (Site ID: F035XC374AZ)

This site is characterized by exposures of steep bedrock and cliffs, either barren or with sparse vegetation growing in cracks and crevices or in thin layers of eolian, alluvial, or colluvial material and occurs on structural benches and ledges on escarpments. Elevations range from 4,500–6,500 feet with average precipitation of 10 to 14 inches per year. The potential for native plants are broom snakeweed, Colorado pinyon, Sandhill muhly, Stansbury cliffrose, Utah juniper. Soils are deep and excessively drained.

Information from:

United States Department of Agriculture, Natural Resources Conservation Service. 2012. Soil Survey of Little Colorado River, Arizona, Parts of Coconino and Navajo Counties. Accessible online at http://soils.usda.gov/survey/printed_surveys/.