

D R A F T

WILD HORSE AND BURRO

HABITAT EVALUATION

PROCEDURES

USERS GUIDE

Bureau of Land Management

Nevada

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INTRODUCTION

These habitat evaluation procedures are in truth a rating system developed to provide the wild horse and burro (WH&B) specialist with the capability of using a standardized method to evaluate WH&B habitat within established Herd Areas. The system is designed to: 1) be applicable to the entire state of Nevada; 2) provide data for a broad spectrum of habitats, 3) allow ready analysis of impacts resulting from habitat changes; 4) provide for computer analysis and modeling capabilities and; 5) provide land managers with an understandable rating score. The system is basically a Habitat Suitability Index (HSI) Model (U.S. Fish and Wildlife Service 1981). Habitat suitability index models are unique because they are usually constrained to habitat information only with an emphasis of quantitative relationships between key environmental variables and habitat suitability. Habitat information is compiled into a distinct habitat model which is useful in quantitative assessments for establishing current habitat condition, monitoring existing use, and predicting impacts of management actions. The system uses a numerical index of habitat suitability on a 0.0 (unsuitable) to 1.0 (optimal) scale. This is based on the assumption there is a positive relationship between the index and the habitat's ability to support wild horse and burro use. The system can also be used as a support model for analysis within the Bureau of Land Management's Geographical Information System (GIS), and is directly applicable to the U.S. Fish and Wildlife Service's Habitat Evaluation Procedures (HEP).

Data needed for evaluation using this system are the same data used by range, wildlife, and watershed. Much of the data should, therefore, already be available or obtainable through coordinated monitoring and inventory efforts.

Most variables evaluated within this system are tied, by previous research, to the habitat requirements (life requisites) for wild horses and burros. Those variables not thoroughly addressed in the past will be discussed in this guide. Suitability indices (SI) are the numeric score between 0.0 and 1.0 which are applied to an individual variable. A life requisite SI can be an SI for a single variable or an SI averaged over several variables. The variables measured and applicable life requisites are as follows:

| <u>Variables</u> | <u>Life Requisites</u> |
|--------------------------------------------------------------------------------------------------------------|------------------------|
| Forage Plant Communities (V ₁) Seral Stage or Condition (V ₂) | Food |
| Water Distribution (V ₃) Flow (V ₄) Seasonal Availability (V ₅) | Water |
| Cover Land Forms and Trees (V ₆) | Cover |
| Man-Made or Natural Barriers (V ₇) | Space |
| Disturbance (V ₈) | Space |

The habitat evaluation procedures described in this Users Guide are easily applied and suitability indices simple to calculate. Judicious use of planning overlays and information available from other resources would allow a wild horse and burro specialist to rate a Herd Area without going to the field. It is strongly recommended that this not be done. Without an on-the-ground knowledge of the Herd Area the specialist would have no idea if the Habitat Suitability Index model used is providing an accurate picture of the habitat suitability.

Each wild horse and burro specialist is urged to test this model to insure its accuracy. While flying inventory test to determine if band locations are more closely tied to availability of one life requisite than another. Determine the optimum distance from water for the wild horses and burros in your Herd Areas. Test and document your findings so that the overall effectiveness of this model can be improved.

METHODOLOGY

Fixed Criteria

1. To evaluate forage and cover, the entire Herd Area is divided into plant communities or ecological sites and the acres for each recorded. All other variables are evaluated on an overall basis for the entire herd area.

2. The final Habitat Suitability Rating (HSR) for the Herd Area will be the lowest life requisite SI determined using the evaluating system.
3. All variables and life requisites must be evaluated even if management actions cannot impact them. For example: Although land forms may not be changeable by normal management the valuable cover provided may lower the overall impact of increased disturbance.
4. The Habitat Suitability Rating is specific to the Herd Area being evaluated. Use of this system to provide a source for relative analysis between Herd Areas violates the modeling criteria used to develop the rating.
5. If an SI for a life requisite will result in a zero, discontinue evaluation and determine if the Herd Area boundaries are accurate for the actual horse use.

Forage SI: A review of the literature and food studies indicates that the forage component preferred by wild horses and burros is grass (Berger 1986; Hansen 1982; Hansen 1985; Hansen and Hubbard 1975; Hansen, Clark and Lawhorn 1976; Nawa 1978; and USDI 1976.)

It would be simplest if the entire state had a completed Order 3 soil survey with ecological site correlation. This condition does not exist. Therefore, using ecological site descriptions provided by the USDA, Soil Conservation Service, the ecological sites were lumped into appropriate plant communities by Major Land Resource Area (MLRA) and a base value applied.

1. Plant Communities (V_1): Plant communities and their associated ecological sites have been developed for each MLRA in the state of Nevada. Each of these plant communities has been given a base value using the occurrence of preferred species within the applicable ecological sites. The SI for the plant community or ecological site is determined by locating which MLRA the herd area is in and using the appropriate plant community list (Appendix 1) record the base value for the plant community or ecological site being evaluated (Illustration 1). The acres for each community or ecological site are then multiplied times the base value (Illustration 1). The product is referred to as Optimum Acres.
2. Seral Stage or Condition Class (V_2): Because most of the forage species preferred by wild horses and burros are decreasers the ecological status (seral stage) or condition class will determine their availability. Modify the Optimum Acres figure by multiplying the Optimum Acres for each plant community or ecological site times the following values. The product of this calculation is referred to as Adjusted Acres (Illustration 1).

| <u>Ecological Status</u> | | <u>Condition Class</u> |
|-----------------------------------|--------------|----------------------------|
| <u>(Ecological Sites)</u> | <u>Value</u> | <u>(Plant Communities)</u> |
| Potential Natural Community (PNC) | 1.0 | Excellent |
| Late Seral | 0.75 | Good |
| Mid Seral | 0.50 | Fair |
| Early Seral | 0.25 | Poor |

Note: If a district has documentation to indicate that the preferred forage species is an increaser the modifying value can be adjusted accordingly.

Total the Adjusted Acres. Divide this total by the total acres in the Herd Area. The result is the Food Life Requisite SI.

Cover SI (V_6): The suitability Index for the cover life requisite is determined utilizing a value from a word model. Each plant community or ecological site is evaluated using the word model and a weighted SI calculated.

Determine the Cover SI for each plant community or ecological site analyzed for forage utilizing the word model below. Multiply the value times the appropriate acreage to obtain Cover Adjusted Acres (Illustration 1). Total the Cover Adjusted Acres. Divide the total Cover Adjusted Acres by the total acres within the Herd Area. This final value is the Cover Life Requisite SI (Illustration 1).

Figure 1. Cover (V_6) Description

| <u>Value</u> | <u>Description</u> |
|--------------|---------------------------------------------------------------------------------------------|
| 0.0 | Steep and rocky (60%+ slope), 100%; no washes or trees. (Mountain Valley Fans) ¹ |

- 0.2 Steep and rocky terrain (60%+ slope), broken frequently by washes of varying widths, with no trees present. (Boundary Mountains) ²
- 0.4 Steep and rocky terrain (60%+ slope) broken frequently by washes of varying widths, with trees present. (Boundary Mountains) ²
- 0.6 Steep and rocky terrain (60%+ slope) with washes, 50 to 90%; plus level or rolling hills, 10 to 50% (Bounding Mountains) ²
- 0.8 Mesa-type terrain or trees present.
- 1.0 Rolling hills (18-30% slope), broken frequently by broad washes or high density of trees present. (Ballenas and Erosional Fan Remnants) ¹
- 0.8 Rolling hills (8-16% slope), such as alluvial fans, without washes over 4.6 m (15 ft) wide, trees present. (Alluvial Fans, particular Fan Collars and Fan Aprons) ¹
- 0.6 Rolling hills (8-16% slope), such as alluvial fans, without washes over 4.6 m (15 ft) wide. No trees present. (Alluvial Fans, particular Fan Collars and Fan Aprons) ¹

- 0.4 Level or slightly undulating (5-8% slope), 100%; within 1.6 km (1 mi) of trees or useable topography cover. (Fan Piedmont and Mountain Valley Fans)¹
- 0.2 Level or slightly undulating (5-8% slope), 100%; within 1.6 km (1 mi) of useable topography cover. No trees present. (Fan Piedmont and Mountain Valley Fans)¹
- 0.0 Level or slightly undulating (1-3% slope), 100% (example: dry lake beds and their margins, blue clay or slick rock). 1.6 km (1 mi) from usable topography cover. No trees present. (Alluvial Flat, Alluvial Plain, Sand Sheet, Beach Plain, Lake Plain, Axial-Stream Floodplain, Playa)¹

¹Major landform components described by Peterson (1981).

²Landforms not yet completed described.

Water SI: The potential for water use is contingent upon distribution, amount, and seasonal availability. Therefore, the Water SI is calculated using the following formula, $((SIV_3 - SIV_4) - SIV_5)$.

1. Distribution (V_3): How the water is distributed throughout a Herd Area is important in establishing how the Herd Area is used, and how management practices can effect the use. Only perennial, potable waters are rated for wild horse and burro use. The water sources may be natural or artificial. Due to the mobility of the animals involved, a 4-mile radius from water has been considered optimum. As more studies are documented this distance may change.

Using a drawing compass or template establish a 4-mile radius around each perennial water source in the Herd Area (Illustration 2). Determine what percent of the Herd Area is serviced by perennial water. The decimal of the percentage between 1.0 and 0.0 is the SIV_3 for distribution (Illustration 1).

2. Flow (V_4): Utilizing water inventory data, wildlife 6602 IHICS data or on-the-ground analysis, determine if the flow from the perennial water sources is sufficient to support the wild horses and burros present. Keep in mind that all the flow may not be available to only wild horses and burros (Illustration 3). If the flow is sufficient do not adjust the SIV_3 for distribution. If, however, there is insufficient water flow available subtract 0.1 from the SIV_3 (Illustration 1).

3. Seasonal Availability (V_5): Seasonal availability relates primarily to artificial water sources such as pipelines and wells. A pipeline may have sufficient flow, when available, to support all the animals using it. However, if the pipeline only flows when livestock are in the area this source is only seasonally available. This same case can apply to natural waters if pasture fences are constructed in such a way as to prohibit wild horse and burro access.

If some of the water sources are only seasonally available subtract 0.1 from the SIV_4 (flow) rating (Illustration 1).

Two water analyses should be calculated. One analysis should include private waters and a second analysis with only those water sources occurring on public land.

The rating which is left after SIV_3 has been adjusted by SIV_4 and SIV_5 is the final Water Life Requisite SI.

Space SI: The overall value of a Herd Area to wild horses and burros can be limited by the freedom of movement allowed. This freedom of movement is most often limited by man-made or natural barriers and unnatural disturbances. The formula for calculating the Space Life Requisite SI is $(SIV_7 + SIV_8)/2$.

1. Man-made or Natural Barriers (V_7): Man-made barriers such as fences or natural barriers such as impassable canyons will be rated using a word model. A single SI for the Herd Area is determined comparing the Herd Area to range improvement overlays, topographic maps, and on-the-ground observations in relation to the following word model. The rating is recorded as shown on Illustration 1.

Figure 2. Man-made or Natural Barriers (V_7) Description.

| <u>Value</u> | <u>Description</u> |
|--------------|-----------------------------------------------------------------------------------|
| 1.0 | No restriction |
| 0.75 | Restriction of normal distribution and movement within the Herd Area is low. |
| 0.50 | Restriction of normal distribution and movement within the Herd Area is moderate. |

0.25 Restriction of normal distribution and movement within the Herd Area is high.

0.0 Normal distribution and movement within the Herd Area is eliminated.

2. Disturbance (V_g): Disturbance is defined as buildings, roads, recreation, domestic livestock grazing, prospecting, mining (oil or mineral), industrial or commercial (including urban) development, farming or ranching, etc. A word model is used to rate the variable.

Using the following word model select the most appropriate value for the entire Herd Area and record it as shown on Illustration 1. Keep in mind that a value can be averaged between two descriptions if a singular description does not fit the disturbance.

Figure 3. Disturbance (V_g) Description

| <u>Value</u> | <u>Description</u> |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.0 | No disturbance. |
| 0.8 | Relatively no disturbance - management activity is only activity, where less than 100 people use each year, or where occasional grazing, prospecting, etc. may occur. |
| 0.6 | Low disturbance - area which perhaps only 500 people use each year. Also included would be small-scale mining or other commercial uses. |

- 0.4 Moderate disturbance - areas with roadways, used by people for recreational or commercial purposes on a daily basis which may occur repeatedly but not necessarily year-round. Includes ORV, wood cutting, etc.
- 0.2 High disturbance - areas used by hundreds of people each week, or concentrated economic development with a constant use by a few people, such as ore trucks moving through many times a day.
- 0.0 Severe disturbance - eliminates availability of herd area or removal of crucial habitat.

The space Life Requisite SI is determined by adding SIV_7 and SIV_8 together and dividing by 2 (Illustration 1).

RESULTS

Herd Area Habitat Suitability Rating (HSR): The overall HSR for the Herd Area is based upon the lowest life requisite SI obtained in the analysis. This is to say that the least optimal life requisite among Food, Water, Cover, or Space indicates the overall suitability of a Herd Area. Therefore, wild horse and burro specialists and managers can readily see what is truly limiting the Herd Area suitability and determine what, if anything, can be done to improve the situation.

This model provides an easily understood HSR figure. The model does not, however, relieve the wild horse and burro specialist from their responsibility to think about what the model is pointing out and using their professional ability to reach sound management recommendations.

When evaluating proposed management actions be sure to analyze the total impact. An increase in disturbance level could be negated somewhat by the availability of optimum cover in the Herd Area. A fence being built in one corner of the Herd Area may not have too great of a negative impact to movement. But, what does the fence's construction do to forage or water availability? If a small Herd Area has an optimum water SI based on a few good water sources a short, properly placed fence could cut the Water SI in half or worse. One well placed water development could possibly raise an 0.4 water SI to 0.8. What will an expansion of a wood cutting area do to cover? Whether or not an impact is negative or positive requires a combination of numeric modeling and human analytical thinking.

1. We have a small 5,000 acre Herd Area.
2. One-half of the Herd Area has a soil survey with correlated ecological sites.
3. There are few waters within the Herd Area.
4. There are no natural barriers but there is one fence.
5. Disturbance is a result of small scale mining operations and livestock grazing.
6. Topography ranges from fan skirts to steep, rocky sloped mountains.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
HERD AREA HABITAT
SUITABILITY RATING
WORKSHEET

EXAMINER Harry Horse
DATE (YYMMDD) | 8 | 6 | 0 | 6 | 3 | 0
BLM ADMIN UNIT (ST/DI/RA/PU) | N | V | 0 | 7 | 7 | 8 | 0 | 4
HERD AREA NAME Pinto
HERD AREA NO. 1

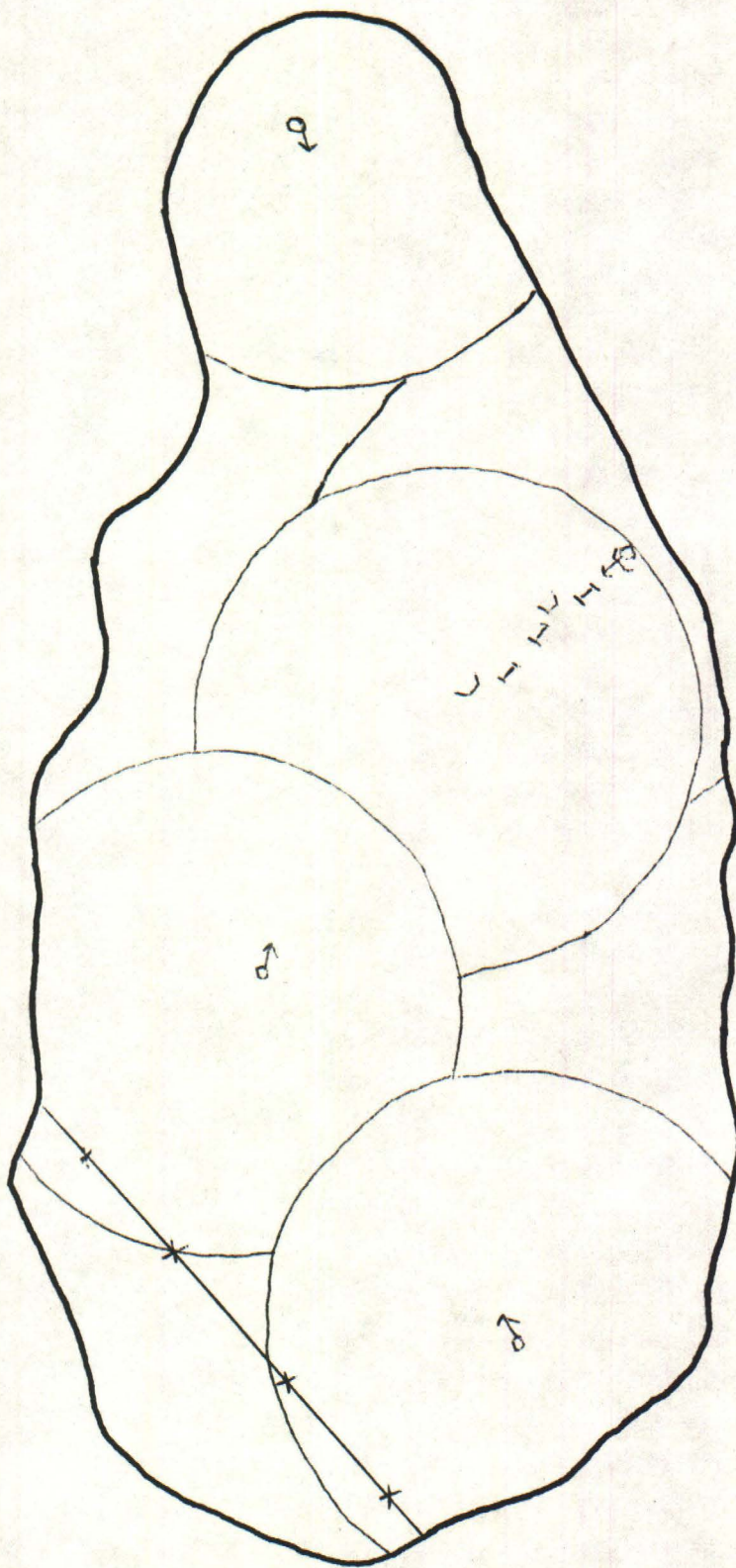
FOOD SI: 0.5
COVER SI: 0.3
WATER SI: 0.6
SPACE SI: 0.8

HERD AREA HSR 0.3
(Equal to Lowest SI
for Life Requisites)

| ECO SITE NUMBER | PLANT COMMUNITY OR ECOLOGICAL SITE NAME | FOOD | | | | | COVER | | WATER | |
|-----------------|-----------------------------------------|---------|--------------|-------------------------------|----------------------|--------------------------------|---------------|----------------------------------|---------------------------------------------------------|------|
| | | 1 ACRES | 2 BASE VALUE | 3 OPTIMUM AC. (Col 1 x Col 2) | 4 STATUS/COND. VALUE | 5 ADJUSTED AC. (Col 3 x Col 4) | 6 COVER VALUE | 7 COVER ADJ. AC. (Col 1 x Col 6) | | |
| 24-2 | Loamy 5-8" pz | 1,000 | 0.8 | 800 | 0.75 | 600 | 0.6 | 360 | Water Base Value (SIV ₃) | 0.7 |
| 24-33 | Steep N.S. 10-12" pz | 1,000 | 0.7 | 700 | 0.75 | 525 | 0.6 | 375 | Flow Modifier (SIV ₄) | 0.0 |
| 24-28 | South slope 8-12" pz | 500 | 0.7 | 350 | 0.50 | 175 | 1.0 | 175 | (Taken from Form NV 4700-7) | |
| | Wyoming Big Sage-brush/Bunchgrass | 2,500 | 1.0 | 2,500 | 0.50 | 1,250 | 0.6 | 750 | Seasonal Availability (SIV ₅) | 0.1 |
| | | | | | | | | | (Taken From Form NV 4700-7) | |
| | | | | | | | | | WATER SI: | 0.6 |
| | | | | | | | | | (SIV ₃ -SIV ₄ -SIV ₅) | |
| | | | | | | | | | SPACE | |
| | | | | | | | | | Man-made or Natural Barrier Value (SIV ₇) | 0.75 |
| | | | | | | | | | Disturbance Value (SIV ₈) | 0.8 |
| | | | | | | | | | SPACE SI: | 0.8 |
| | | | | | | | | | (SIV ₇ +SIV ₈)/2 | |
| | TOTAL | 5,000 | | 4,350 | TOTAL | 2,550 | TOTAL | 1,660 | | |

FOOD SI: 0.5
(Tot. Col 5/Tot. Col 1)

COVER SI: 0.3
(Tot. Col 7/Tot. Col 1)



| <u>Base Value</u> | <u>Plant Communities with Applicable Ecological Sites MLRA23</u> |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.0 | <u>Wyoming big sagebrush/Bunchgrass</u> 023X006N Loamy 8-10" p.z. 023X020N Loamy 10-12" p.z. 023X032N Stony South Slope 10-12 p.z. |
| 1.0 | <u>Mountain big sagebrush/Bunchgrass</u> 023X007N Loamy 14-16" p.z. 023X015N Stony Loam 12-16" p.z. 023X016N South Slope 12-14" p.z. 023X019N North Slope 16-20" p.z. 023X022N Loamy Slope 12-14" p.z. 023X041N Loamy 12-14" p.z. |
| 0.8 | <u>Low sagebrush/Bunchgrass</u> 023X008N Mountain Ridges 12-16" p.z. 023X014N Shallow Loam 12-16" p.z. 023X017N Stony Claypan 12-16" p.z. 023X021N Claypan 10-12" p.z. 023X031N Stony Claypan 10-12" p.z. |
| 0.8 | <u>Shadscale saltbrush/Bunchgrass</u> 023X004N Loamy 5-8" p.z. |
| 0.7 | <u>Basin big sagebrush/Bunchgrass</u> 023X005N Dry Floodplain 8-10" p.z. 023X009N Loamy Bottom 8-10" p.z. 023X011N Sandy 8-12" p.z. 023X012N Semi-Desert Loam 6-8" p.z. 023X018N Stony South Slope 12-16" p.z. 023X033N Clayey 12-16" p.z. 023X040N Granitic Fan 8-12" p.z. |
| 0.7 | <u>Bitterbrush/Bunchgrass</u> 023X030N Eroded South Slope 10-12" p.z. |
| 0.7 | <u>Bolander silver sagebrush/Bunchgrass</u> 023X003N Clay Basin 12-14" p.z. |
| 0.6 | <u>Meadows</u> 023X013N Semi-Wet Meadow 6-14" p.z. 023X025N Wet Meadow 10-20" p.z. |
| 0.6 | <u>Western juniper/Big sagebrush/Bearded bluebunch wheatgrass</u> 023X024N Juniper Savanna 12-16" p.z. |
| 0.6 | <u>Riparian</u> 023X034N Streambank 8-12" p.z. |

| <u>Base Value</u> | <u>Plant Communities with Applicable Ecological Sites MLRA23</u> |
|-------------------|-------------------------------------------------------------------------------------------------------------------|
| 0.5 | <u>Black greasewood/Bunchgrass</u> 023X002N Sodic Flat 6-12" p.z. 023X010N Saline Bottom 8-10" p.z. |
| 0.4 | <u>Rubber rabbitbrush/Bunchgrass</u> 023X001N Churning Clay 12-16" p.z. |
| 0.3 | <u>Quaking aspen/grass</u> 023X028N Aspen Slopes 12-16" p.z. 023X029N Aspen Meadows 12-18" p.z. |
| 0.2 | <u>Curlleaf mountain mahogany/Mountain big sagebrush/Bunchgrass</u> 023X026N Mahogany Thickets 16-20" p.z. |
| 0.1 | <u>Aspen thickets</u> 023X027N Aspen Thickets 14-18" p.z. |

| <u>Base Value</u> | <u>Plant Communities with Applicable Ecological Sites MLRA24</u> |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.0 | <u>Wyoming big sagebrush/Bunchgrass</u> 024X005N Loamy 8-10" p.z. 024X020N Droughty Loam 8-10" p.z. 024X026N Stony Slope 6-10" p.z. 024X045N Eroded Slope 6-10" p.z. 024X047N Shallow Loam 8-10" p.z. |
| 1.0 | <u>Mountain big sagebrush/Bunchgrass</u> 024X021N Loamy Slope 12-14" p.z. 024X023N North Slope 14+" p.z. 024X029N South Slope 12-16" p.z. 024X032N Loamy Slope 14+" p.z. 024X034N Upland Browse 14+" p.z. |
| 1.0 | <u>Winterfat/Bunchgrass</u> 024X004N Silty 4-8" p.z. 024X014N Droughty Loam 4-8" p.z. |
| 0.9 | <u>Three tip big sagebrush/Bunchgrass</u> 024X046N Gravelly Loam 12-16" p.z. |
| 0.9 | <u>Black sagebrush/Bunchgrass</u> 024X016N Mountain Ridge 14-20" p.z. 024X030N Shallow Calcareous Loam 8-10" p.z. 024X031N Shallow Calcareous Loam 10-14" p.z. 024X042N Steep Gravelly Loam 14-18" p.z. |
| 0.8 | <u>Low sagebrush/Bunchgrass</u> 024X018N Claypan 10-12" p.z. 024X027N Claypan 12-16" p.z. |
| 0.8 | <u>Shadscale saltbush/Bunchgrass</u> 024X002N Loamy 5-8" p.z. 024X003N Sodic Terrace 6-8" p.z. 024X025N Loamy Slope 5-8" p.z. |
| 0.8 | <u>Fourwing saltbush/Bunchgrass</u> 024X048N Saline Fan 6-8" p.z. |
| 0.7 | <u>Basin big sagebrush/Bunchgrass</u> 024X001N Dunes 6-10" p.z. 024X006N Dry Floodplain 6-10" p.z. 024X017N Sandy 6-10" p.z. 024X028N South Slope 8-12" p.z. 024X033N Steep North Slope 10-12" p.z. 024X035N Shallow Gravelly Loam 10-14" p.z. 024X041N Wash 6-10" p.z. |

| <u>Base Value</u> | <u>Plant Communities with Applicable Ecological Sites MLRA24</u> |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.7 | <u>Riparian</u> 024X009N Saline Meadow 6-10" p.z. |
| 0.7 | <u>Torrey quailbush/Bunchgrass</u> 024X015N Deep Sodic Fan 6-10" p.z. |
| 0.7 | <u>Nuttall saltbush/Bunchgrass</u> 024X010N Sodic Floodplain 6-10" p.z. 024X012N Saline Terrace 6-8" p.z. |
| 0.6 | <u>Meadow, permanently wet</u> 024X043N Wet Meadow 6-8" p.z. |
| 0.6 | <u>Utah juniper/Black sagebrush</u> 024X053N |
| 0.6 | <u>Singleleaf pinyon/Mountain big sagebrush</u> 024X053N |
| 0.5 | <u>Utah juniper/Big sagebrush</u> 024X052N |
| 0.5 | <u>Singleleaf pinyon/Utah juniper/Black sagebrush</u> 024X051N |
| 0.5 | <u>Black greasewood/Bunchgrass</u> 024X007N Saline Bottom 6-10" p.z. 024X008N Sodic Flat 8-10" p.z. 024X011N Sodic Flat 6-8" p.z. 024X022N Sodic Terrace 8-10" p.z. |
| 0.4 | <u>Singleleaf pinyon/Utah juniper/Big sagebrush</u> 024X049N 024X050N |
| 0.4 | <u>Alkali rabbitbrush/Bunchgrass</u> 024X044N Wet Sodic Flat 6-8" p.z. |

| <u>Base Value</u> | <u>Plant Communities with Applicable Ecological Sites MLRA25</u> |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.0 | <u>Wyoming big sagebrush/Bunchgrass</u> 025X015N South Slope 8-12" p.z. 025X019N Loamy 8-10" p.z. |
| 1.0 | <u>Bearded bluebunch wheatgrass/Thurber's needlegrass</u> 025X050N Stony Bottom 8-10" p.z. |
| 1.0 | <u>Idaho fescue/Mountain brome</u> 024X047N/025X909INU Clayey 14-18" p.z. |
| 1.0 | <u>Mountain big sagebrush/Bunchgrass</u> 025X009N South Slope 12-14" p.z. 025X010N Steep North Slope 16+" p.z. 025X012N Loamy Slope 10-16" p.z. 025X016N South Slope 14-18" p.z. 025X021N Shallow Gravelly Loam 8-12" p.z. 025X027N/025X902IN Loamy 12-16" p.z. 025X029N Deep Loamy 16+" p.z. 025X042N Shallow Gravelly Loam 14-18" p.z. 025X046N Fractured Stony Loam 12-16" p.z. 025X056N Loamy 16+" p.z. 025X058N Bouldery Loam 10-16" p.z. |
| 0.9 | <u>Black sagebrush/Bunchgrass</u> 025X024N Mountain Ridge 16+" p.z. 025X025N Chalky Knoll 8-10" p.z. 025X026N Channery Hill 8-10" p.z. 025X055N Gravelly Slope 12-16" p.z. 025X057N Shallow Gravelly Ridge 10-16 p.z. |
| 0.8 | <u>Lupine/Needlegrass</u> 025X028N Snow Pocket 16+" p.z. |
| 0.8 | <u>Low sagebrush/Bunchgrass</u> 025X017N/025X906IN Claypan 12-16" p.z. 025X018N Claypan 10-12" p.z. 025X022N Cobbly Claypan 8-12" p.z. 025X051N Eroded Claypan 12-16" p.z. |
| 0.8 | <u>Early low sagebrush/Bunchgrass</u> 025X018N Claypan 10-12" p.z. 025X051N Eroded Claypan 12-16" p.z. 025X054N/025X914IN Clayey 12-15" p.z. |
| 0.8 | <u>Rubber rabbitbrush/Mat muhly</u> 025X011N Lake Terrace 8-12" p.z. |
| 0.7 | <u>Bitterbrush/Bunchgrass</u> 025X007N/025X907NU Upland Browse 12-16" p.z. |

| <u>Base Value</u> | <u>Plant Communities with Applicable Ecological Sites MLRA25</u> |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.7 | <u>Snowberry/Bunchgrass</u> 025X004N/025X911IN Loamy Slope 16+" p.z. |
| 0.7 | <u>Basin big sagebrush/Bunchgrass</u> 025X003N Loamy Bottom 8-14" p.z. 025X013N Churning Clay 8-12" p.z. 025X014N Loamy 10-12" p.z. |
| 0.7 | <u>Curleaf mountain mahogany/Mountain big sagebrush/Bunchgrass</u> 028B042N Mahogany Thickets 16-22" p.z. 028B043N Mahogany Savanna 16-22" p.z. |
| 0.7 | <u>Bolander silver sagebrush/Bunchgrass</u> 025X048N Clay Basin 8-10" p.z. |
| 0.7 | <u>Mat muhly/Nevada bluegrass</u> 025X049N Wet Clay Basin 8-10" p.z. |
| 0.6 | <u>Meadows</u> 025X006N Dry Meadow 10-16" p.z. 025X005N Wet Meadow 10-16" p.z. |
| 0.6 | <u>Utah juniper/Black sagebrush</u> 025X060N |
| 0.6 | <u>Singleleaf pinyon/Mountain big sagebrush</u> 025X061N |
| 0.6 | <u>Riparian</u> 025X001N Moist Floodplain 6-10" p.z. |
| 0.5 | <u>Utah juniper/Wyoming big sagebrush</u> 025X059N |
| 0.5 | <u>Singleleaf pinyon/Utah juniper/Black sagebrush</u> 025X063N |
| 0.4 | <u>Singleleaf pinyon/Utah juniper/Mountain big sagebrush</u> 025X062N |
| 0.4 | <u>Inland saltgrass/Mat muhly</u> 025X008N Wet Clay Bottom 8-12" p.z. |
| 0.3 | <u>Snowbrush thicket</u> 025X052N/025X904INU Ceanothus Thicket 16+" p.z. |
| 0.3 | <u>Riparian Aspen</u> 025X064N Riparian Aspen |
| 0.2 | <u>Aspen Thicket</u> 025X002N/025X901INU Aspen Thicket 16+" p.z. |
| 0.2 | <u>Cottonwood/Willow</u> 025X053N/025X910INU Riparian Cottonwood |

Base Value Plant Communities with Applicable Ecological Sites MLRA26

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| 1.0 | <u>Wyoming big sagebrush/Bunchgrass</u> 026X010N Loamy 10-12" p.z. 026X011N South Slope 8-12" p.z. 026X015N Shallow Loam 10-12" p.z. 026X016N Loamy 8-10" p.z. 026X018N Shallow Granitic-Upland 10-12" p.z. 026X019N Churning Clay 10-12" p.z. 026X020N Sandy 8-10" p.z. 026X022N Stony Shallow Loam 8-10" p.z. 026X024N Loamy Outwash 6-8" p.z. 026X026N Granitic Upland 10-12" p.z. 026X029N Eroded Slopes 8-12" p.z. |
| 1.0 | <u>Mountain big sagebrush/Bunchgrass</u> 026X005N Loamy 12-14" p.z. 026X006N Granitic Upland 14-16" p.z. 026X007N Steep North Slope 14-20" p.z. 026X008N Granitic Fan 10-12" p.z. |
| 0.8 | <u>Low sagebrush/Bunchgrass</u> 026X023N Claypan 10-12" p.z. 026X025N Claypan 8-10" p.z. 026X028N Mountain Ridges 12-16" p.z. |
| 0.7 | <u>Antelope bitterbrush/Bunchgrass</u> 026X014N Dunes 10-12" p.z. |
| 0.7 | <u>Douglas rabbitbrush/Bunchgrass</u> 026X027N Churning Clay 8-10" p.z. |
| 0.7 | <u>Curlleaf mountain mahogany/Mountain big sagebrush</u> 026X009N Mahogany Slopes 14-18" p.z. |
| 0.7 | <u>Black greasewood/Bunchgrass</u> 026X002N Wet Sodic Bottom 026X004N Saline Bottom 026X012N Sodic Terrace 8-10" p.z. 026X013N Sodic Floodplain 8-10" p.z. 026X021N Sodic Flat |
| 0.6 | <u>Meadow, permanently wet</u> 026X003N Wet Meadow |
| 0.6 | <u>Riparian</u> 026X001N Moist Floodplain |
| 0.5 | <u>Western juniper/Wyoming big sagebrush</u> 026X017N Juniper Savanna 10-12" p.z. |

| <u>Base Value</u> | <u>Plant Communities with Applicable Ecological Sites MLRA27</u> |
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| 1.0 | <u>Wyoming big sagebrush/Bunchgrass</u> 027X007N Loamy Slope 8-10" p.z. 027X008N Loamy 8-10" p.z. 027X011N South Slope 8-10" p.z. 027X045N Sandy 8-10" p.z. 027X065N Droughty Slope 8-10" p.z. 027X067N Droughty Loam 8-10" p.z. 027X072N Granitic Slopes 8-12" p.z. 027X054N Loamy Slope 10-12" p.z. |
| 1.0 | <u>Mountain big sagebrush/Bunchgrass</u> 027X058N Loamy 10-12" p.z. 027X073N Granitic Slopes 12-14" p.z. |
| 1.0 | <u>Winterfat/Bunchgrass</u> 027X014N Silty 6-8" p.z. |
| 0.8 | <u>Junk sagebrush/Bunchgrass</u> 027X051N Eroded Slope 8-10" p.z. 027X070N Channery Hills 8-10" p.z. |
| 0.8 | <u>Low sagebrush/Bunchgrass</u> 027X020N Claypan 8-10" p.z. 027X046N Claypan 10-12" p.z. 027X049N Claypan 8-10" p.z. (s) 027X068N Shallow Granitic Upland 8-10" p.z. |
| 0.8 | <u>Shadscale saltbush/Bunchgrass</u> 027X013N Loamy 4-8" p.z. 027X017N South Slope 4-8" p.z. 027X019N Shallow Stony Loam 4-8" p.z. 027X028N Loamy Slope 6-8" p.z. 027X071N Shallow Silty 4-8" p.z. |
| 0.8 | <u>Shadscale saltbush/Bailey greasewood/Bunchgrass</u> 027X015N Very Stony Loam 4-6" p.z. 027X018N Gravelly Loam 4-6" p.z. 027X027N Shallow Slope 4-8" p.z. 027X030N Gravelly Loam 6-8" p.z. 027X043N Gravelly Loam 3-6" p.z. |
| 0.8 | <u>Fourwing saltbush/Bunchgrass</u> 027X009N Sandy 5-8" p.z. 027X023N Dunes 4-8" p.z. 027X053N Dunes 8-10" p.z. 027X060N Sandy 3-5" p.z. |

Base Value Plant Communities with Applicable Ecological Sites MLRA28

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| 1.0 | <u>Mountain big sagebrush/Bunchgrass</u> 028B015N Steep Loamy 12-16" p.z. 028B027N South Slope 12-16" p.z. 028B029N Loamy 16-22" p.z. 028B030N Loamy 12-16" p.z. 028B049N North Slope 12-16" p.z. |
| 1.0 | <u>Winterfat/Bunchgrass</u> 028B013N Silty 8-10" p.z. |
| 0.8 | <u>Low sagebrush/Bunchgrass</u> 028B037N Claypan 12-16" p.z. 028B038N Mountain Ridge 16-22" p.z. 028B045N Claypan 10-12" p.z. 028B054N Steep Claypan 12-16" p.z. |
| 0.8 | <u>Shadscale saltbush/Bunchgrass</u> 028B017N Loamy 5-8" p.z. |
| 0.8 | <u>Fourwing saltbush/Bunchgrass</u> 028B014N Sandy 5-8" p.z. 028B023N Clay Basin 5-12" p.z. |
| 0.7 | <u>Meadow, permanently wet</u> 028B001N Wet Meadow 5-12" p.z. 028B022N Wet Meadow 12-25" p.z. |
| 0.7 | <u>Wyoming big sagebrush/Bunchgrass</u> 028B005N Sandy 8-12" p.z. 028B007N Loamy 10-12" p.z. 028B010N Loamy 8-10" p.z. 028B012N Steep Loamy 8-12" p.z. 028B052N Droughty Loam 10-12" p.z. 028B056N Sodic Loam 8-10" p.z. |
| 0.7 | <u>Riparian</u> 028B002N Saline Meadow 5-12" p.z. |
| 0.7 | <u>Mountain mahogany/Bunchgrass</u> 028B043N Mahogany Savanna 16-22" p.z. 028B042N Mahogany Thickets 16-22" p.z. 028B066N Droughty Slope 12-14" p.z. |
| 0.7 | <u>Chokecherry/Bunchgrass</u> 029B026N Upland Browse 16-22" p.z. |

| <u>Base Value</u> | <u>Plant Communities with Applicable Ecological Sites MLRA28</u> |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.7 | <u>Nuttall saltbush/Western wheatgrass</u> 028B065N Saline Terrace 10-12" p.z. |
| 0.6 | <u>Horsebrush/Bunchgrass</u> 028B068N Dune 10-12" p.z. |
| 0.6 | <u>Black greasewood/Bunchgrass</u> 028B004N Saline Bottom 5-12" p.z. 028B020N Sodic Flat 5-12" p.z. 028B021N Sodic Dunes 5-12" p.z. 028B057N Alkali Flat 8-10" p.z. 028B058N Sodic Terrace 8-10" p.z. |
| 0.5 | <u>Black sagebrush/Bunchgrass</u> 028B011N Shallow Calcareous Loam 8-12" p.z. 028B016N Shallow Calcareous Slope 8-12" p.z. 028B034N Mountain Ridge 12-16" p.z. 028B069N Eroded Slopes 10-14" p.z. |
| 0.5 | <u>Utah juniper/Black sagebrush</u> 028B059N |
| 0.5 | <u>White fir/Limber pine/White bark pine/Mountain big sagebrush</u> 028B063N |
| 0.5 | <u>Quaking aspen/Mountain big sagebrush</u> 028B064N |
| 0.4 | <u>Basin big sagebrush/Bunchgrass</u> 028B003N Loamy Bottom 5-12" p.z. 028B006N Wash 12-25" p.z. 028B009N Wash 5-12" p.z. 028B024N Loamy Bottom 12-25" p.z. 028B055N Clay Dunes 8-10" p.z. |
| 0.4 | <u>Utah juniper/Singleleaf pinyon/Black sagebrush</u> 028B060N |
| 0.4 | <u>Utah juniper/Singleleaf pinyon/Wyoming big sagebrush</u> 028B061N |
| 0.4 | <u>Utah juniper/Singleleaf pinyon/Mountain big sagebrush</u> 028B062N |
| 0.3 | <u>Quaking aspen/Grass</u> 028B025 Riparian Aspen |
| 0.3 | <u>Cottonwood/Grass</u> 028B033N Riparian Cottonwood |

Base Value Plant Communities with Applicable Ecological Sites MLRA29

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| 1.0 | <u>Wyoming big sagebrush/Bunchgrass</u> 029X006N Loamy 8-10" p.z. 029X010N Steep Loamy 8-12" p.z. 029X029N Loamy 10-12" p.z. 029X038N Cobbly Loam 8-12" p.z. 029X049N Sandy Loam 8-12" p.z. 029X057N Steep Loamy 12-16" p.z. 029X064N Cobbly Hill 8-12" p.z. |
| 1.0 | <u>Winterfat/Bunchgrass</u> 029X020N Silty 5-8" p.z. |
| 0.9 | <u>Fourwing saltbush/Winterfat/Bunchgrass</u> 029X012N Sandy 5-8" p.z. 029X015N Silty 8-12" p.z. 029X046N Sandy Loam 5-8" p.z. |
| 0.8 | <u>Blackbrush/Bunchgrass</u> 029X019N Blackbrush Hill 8-12" p.z. |
| 0.8 | <u>Mountain big sagebrush/Bunchgrass</u> 029X030N Loamy 12-16" p.z. 029X050N Loamy Upland 16-22" p.z. 029X051N Loamy Hill 16-22" p.z. |
| 0.8 | <u>Shadscale saltbush/Bailey greasewood/Bunchgrass</u> 029X017N Loamy 5-8" p.z. 029X022N Sodic Hill 5-8" p.z. 029X032N Sodic Upland 3-5" p.z. 029X033N Sodic Hill 3-5" p.z. 029X035N Loamy 3-5" p.z. 029X039N Gravelly Loam 3-5" p.z. |
| 0.8 | <u>Shadscale saltbush/Bunchgrass</u> 029X031N Sodic Hill 8-12" p.z. |
| 0.8 | <u>Fourwing saltbush/Bunchgrass</u> 029X034N Sandy 3-5" p.z. |
| 0.8 | <u>Spiny hopsage/Bunchgrass</u> 029X016N Loamy Upland 5-8" p.z. 029X021N Loamy Hill 5-8" p.z. |
| 0.7 | <u>Basin big sagebrush/Bunchgrass</u> 029X003N Loamy Bottom 3-12 p.z. 029X005N Wash 12-25" p.z. 029X009N Wash 5-12" p.z. 029X011N Sandy 8-12" p.z. |

| <u>Base Value</u> | <u>Plant Communities with Applicable Ecological Sites MLRA29</u> |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.7 | <u>Low sagebrush/Bunchgrass</u> 029X052N Claypan 16-22" p.z. 029X053N Mountain Ridge 16-22" p.z. |
| 0.7 | <u>Black sagebrush/Bunchgrass</u> 029X008N Shallow Calcareous Loam 8-12" p.z. 029X014N Shallow Calcareous Hill 8-12" p.z. |
| 0.7 | <u>Riparian</u> 029X025N Streambank 3-12" p.z. 029X026N Streambank 12-25" p.z. |
| 0.7 | <u>Joshua tree/Bunchgrass</u> 029X007N Joshua Upland 8-12" p.z. |
| 0.7 | <u>Curleaf mountain mahogany/Bearded bluebunch wheatgrass</u> 029X027N Mahogany Thicket 16-20" p.z. |
| 0.7 | <u>Littleleaf mountain mahogany/Nevada greasewood</u> 029X040N Mahogany Thicket 12-18" p.z. |
| 0.7 | <u>Fourwing saltbush/Rubber rabbitbrush/Bunchgrass</u> 029X041N Wash 3-5" p.z. |
| 0.7 | <u>Spiny menodora/Bailey greasewood/Bunchgrass</u> 029X036N Cobbly Loam 5-8" p.z. 029X037N Shallow Stony Loam 5-8" p.z. |
| 0.6 | <u>Meadows</u> 029X002N Saline Meadow 3-12" p.z. 029X044N Wetland 3-12" p.z. 029X001N Wet Meadow 3-12" p.z. |
| 0.6 | <u>Blackbrush/Bunchgrass/Yucca</u> 029X013N Blackbrush Slope 8-12" p.z. |
| 0.6 | <u>Quaking aspen/Mountain big sagebrush</u> 029X072N Aspen Woodland |
| 0.5 | <u>Mountain mahogany/Ponderosa pine</u> 029X071N |
| 0.5 | <u>Black greasewood/Bunchgrass</u> 029X004N Saline Bottom 3-12" p.z. 029X024N Sodic Terrace 3-12" p.z. 029X063N Dry Sodic Terrace 3-12" p.z. |
| 0.4 | <u>Singleleaf pinyon/Utah juniper/Big sagebrush</u> 029X065N Loamy Hill 12-14" p.z. 029X066N Loamy Slope 12-16" p.z. |

| <u>Base Value</u> | <u>Plant Communities with Applicable Ecological Sites MLRA29</u> |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.4 | <u>Singleleaf pinyon/Utah juniper/Low sagebrush</u> 029X067N Shallow Calcareous Slope 14-18" p.z. 029X069N Shallow Calcareous Slope 12-14" p.z. 029X068N Claypan 12-16" p.z. |
| 0.4 | <u>Singleleaf pinyon/Utah juniper/Blackbrush</u> 029X070N Blackbrush Hill 12-16" p.z. |
| 0.4 | <u>White fir/Limber pine/Bristlecone pine</u> 029X073N |

| <u>Base Value</u> | <u>Plant Communities with Applicable Ecological Sites MLRA30</u> |
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| 1.0 | <u>Creosotebush/Bunchgrass/Mid Elevation (3300'-6200')</u> 030X009N Limy Upland 8-12" p.z. 030X011N Limy Hill 8-12" p.z. 030X012N Joshua Upland 8-12" p.z. 030X041N Sandy Upland 8-12" p.z. 030X042N Clay Plain 8-12" p.z. |
| 0.9 | <u>White burrobush/Bunchgrass</u> 030X013N Granitic Upland 8-12" p.z. |
| 0.9 | <u>White bursage/Brittlebush/Bunchgrass</u> 030X043N Granitic Hill 8-12" p.z. |
| 0.8 | <u>White bursage/White burrobush</u> 030X007N Granitic Upland 5-8" p.z. 030X008N Granitic Hill 5-8" p.z. |
| 0.8 | <u>Fourwing saltbush/Winterfat/Bunchgrass</u> 030X035N Sandy Upland 5-8" p.z. |
| 0.7 | <u>Blackbrush/Creosotebush/Bunchgrass</u> 030X015N Blackbrush Hill 8-12" p.z. |
| 0.7 | <u>Spiny hopsage/Fourwing saltbush/Bunchgrass</u> 030X052N Loamy Upland 5-8" p.z. |
| 0.7 | <u>Creosotebush/Bunchgrass/Low Elevation (1000'-5000')</u> 030X001N Limy Hill 5-8" p.z. 030X004N Limy Sandy Upland 5-8" p.z. 030X005N Limy Upland 5-8" p.z. 030X017N Limy Hill 3-5" p.z. 030X019N Limy Upland 3-5" p.z. 030X027N Limy Dunes 3-8" p.z. 030X028N Wash 3-12" p.z. 030X038N Limy Gyp Upland 5-8" p.z. 030X002N Limy Sodic Hill 5-8" p.z. 030X006N Limy Sodic Upland 5-8" p.z. 030X030N Limy Sodic Upland 3-5" p.z. 030X047N Barren Sodic Upland 3-8" p.z. 030X048N Lake Carbonate Deposits 3-5" p.z. 030X056N Limy Sodic Hill 3-5" p.z. 030X032N Dry Floodplain 3-12" p.z. 030X033N Sodic Sandy Upland 3-5" p.z. 030X037N Limy Sandy Upland 3-5" p.z. 030X020N Loamy Bottom 3-12" p.z. 030X039N Clay Plain 5-8" p.z. 030X046N Dry Outwash Plain 3-12" p.z. |

| <u>Base Value</u> | <u>Plant Communities with Applicable Ecological Sites MLRA30</u> |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.7 | <u>Big saltbush/Bunchgrass</u> 030X024N Saline Bottom 3-12" p.z. |
| 0.6 | <u>Meadows</u> 030X055N Wetland 3-12" p.z. 030X022N Wet Meadow 3-12" p.z. 030X023N Saline Meadow 3-12" p.z. |
| 0.6 | <u>Riparian</u> 030X021N Streambank 3-12" p.z. |
| 0.6 | <u>Shadscale saltbush/Shrub/Mid Elevation (3300'-6200')</u> 030X044N Sodic Hill 5-8" p.z. 030X050N Sodic Upland 3-5" p.z. 030X051N Sodic Upland 5-8" p.z. |
| 0.6 | <u>Parish goldeneye/White brittlebush</u> 030X016N Loamy Hill 3-5" p.z. 030X018N Granitic Upland 3-5" p.z. |
| 0.5 | <u>Blackbrush/Nevada ephedra</u> 030X014N Blackbrush Slope 8-12" p.z. |
| 0.5 | <u>Screwbean mesquite/Shadscale</u> 030X045N Coppice Dunes 3-8" p.z. |
| 0.5 | <u>Ponderosa pine/Mahogany/Gambel oak</u> 030X065N |
| 0.4 | <u>Blackbrush/Singleleaf pinyon/Utah juniper</u> 030X064N |
| 0.4 | <u>Singleleaf pinyon/Utah juniper/Wyoming big sagebrush</u> 030X062N |
| 0.4 | <u>Singleleaf pinyon/Utah juniper/Black sagebrush</u> 030X063N |
| 0.4 | <u>Desertholly/Shrub</u> 030X025N Sodic Flat 3-12" p.a. 030X026N Gyp Upland 3-8" p.z. 030X031N Limy Gyp Upland 3-5" p.z. 030X036N Clay Plain 3-5" p.z. |
| 0.4 | <u>Shadscale saltbush/Shrub</u> 030X040N Sodic Terrace 3-12" p.z. 030X060N Sodic Hill 3-5" p.z. 030X061N |
| 0.4 | <u>Limber pine/White fir/Bristlcone</u> 030X066N |

| <u>Base Value</u> | <u>Plant Communities with Applicable Ecological Sites MLRA30</u> |
|-------------------|-----------------------------------------------------------------------------------------|
| 0.3 | <u>Subalpine Bunchgrass</u> 030X067N Alpine Tundra |
| 0.3 | <u>Singleleaf pinyon/ Utah juniper/Mesquite/Bunchgrass</u> 030X029N Wash 12-15" p.z. |
| 0.3 | <u>Black greasewood/Shadscale</u> 030X057N Dry Sodic Terrace 3-12" p.z. |
| 0.2 | <u>Nevada dalea/Shadscale</u> 030X053N Dunes 3-8" p.z. |

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