

DEER HERD UNIT MANAGEMENT PLAN

Deer Herd Unit # 16, Central Mtns and Deer Herd Unit #12, San Rafael August, 2018

CENTRAL MOUNTAINS BOUNDARY DESCRIPTION

Utah, Carbon, Emery, Juab, Sevier and Sanpete counties - Boundary begins at the junction of US-6 and I-15 in Spanish Fork; southeast on US-6 to SR-10 in Price; south on SR-10 to I-70; west on I-70 to US-50 at Salina; north on US-50 to I-15 at Scipio; north on I-15 to US-6 in Spanish Fork.

This boundary includes three subunits including;

Central Mountains, Manti Subunit - Carbon, Emery, Sanpete, Sevier and Utah counties—Boundary begins at the junction of US-6 and US-89 in Spanish Fork Canyon; southeast on US-6 to Price and SR-10; south on SR-10 to I-70; west on I-70 to US-89; north on US-89 to US-6 in Spanish Fork Canyon. USGS 1:100,000 Maps: Nephi, Price, Huntington, Manti, Salina.

Central Mountains, Nebo Subunit - Juab, Millard, Sanpete, Sevier and Utah counties—Boundary begins at US-6 and I-15 at Spanish Fork; southeast on US-6 to US-89 near Thistle; south on US-89 to US-50 at Salina; northwest on US-50 to I-15 at Scipio; north on I-15 to US-6 at Spanish Fork. Excludes all CWMUs. USGS 1:100,000 Maps: Maps: Delta, Manti, Nephi, Provo, Salina.

San Rafael Unit - Carbon, Emery, Sanpete, Sevier and Utah counties—Boundary begins US-6 and US-10 in Price; southeast on US-6 to Interstate 70; east on I-70 to the Green River; south along this river to the Colorado River; south along this river (and the west shore of Lake Powell) to SR-95; north on SR-95 to SR-24 (hunters may harvest deer within 2 miles south of SR-24 between SR-95 and the Notom Road); west on SR-24 to Caineville and the Caineville Wash road; north on this road to the Cathedral Valley road; northwest on the Cathedral Valley road to the Capital Reef National Park boundary; north and west on the CRNP boundary back to the Cathedral Valley road; west on this road to Rock Springs Bench and the Last Chance Desert road; north on this road to the Blue Flats road; north and east on this road to the Willow Springs road; north on this road to the Windy Peak road; north and west on this road to I-70; east on I-70 to US-10; north on US-10 to US-6 in Price. Excludes all CWMUs. USGS 1:100,000 Maps: Hanksville, Hite Crossing, Huntington, La Sal, Loa, Manti, Nephi, Price, Salina, San Rafael Desert.

LAND OWNERSHIP

| Ownership | Yearlong range | | Summer Range | | Winter Range | |
|--------------------------------------|----------------|-------------|---------------|-------------|----------------|-------------|
| | Area (acres) | % | Area (acres) | % | Area (acres) | % |
| Forest Service | 0 | 0% | 721980 | 73.8% | 300717 | 28.3% |
| Bureau of Land Management | 24 | 2.2% | 28187 | 2.9% | 224215 | 21.1% |
| Utah State Institutional Trust Lands | 1039 | 93.4% | 14980 | 1.5% | 110636 | 10.4% |
| Private | 50 | 4.5% | 198911 | 20.3% | 353779 | 33.3% |
| Department of Defense | 0 | 0% | 0 | 0% | 200 | 0% |
| Utah State Parks | 0 | 0% | 23 | 0% | 116 | 0% |
| Utah Division of Wildlife Resources | 0 | 0% | 14774 | 1.5% | 72704 | 6.8% |
| TOTAL | 1113 | 100% | 978855 | 100% | 1062367 | 100% |

UNIT MANAGEMENT GOALS

- Manage for a population of healthy animals capable of providing a broad range of recreational opportunities, including hunting and viewing.
- Balance deer herd impacts on human needs, such as private property rights, agricultural crops and local economies.
- Maintain the population at a level that is within the long term carrying capacity of the available habitat, based on winter range trend studies conducted by the DWR every five years.

POPULATION MANAGEMENT OBJECTIVES

- Target Winter Herd Size - Manage for a 5-year target population of *42,000 wintering deer (modeled number) during the five-year planning period unless range conditions become unsuitable, as evaluated by DWR. Range Trend data coupled with annual browse monitoring will be used to assess habitat condition. Biologists will continue to carefully monitor winter ranges and make recommendations to improve and protect winter habitat. Should over-utilization and range damage by deer occur, recommendations will be made to reduce deer populations to sustainable levels in localized areas.

* Changed from 60,600 to 42,000 (recommended) in 2020

Long Term Objective: (numbers below reflect numbers recommended in 2020, amended from original 2018 plan)

Central Mountains, Manti Subunit - 28,000 deer (amended from 38,000 to 28,000 in 2020)

Central Mountains, Nebo Subunit - 14,000 deer (amended from 22,600 to 14,000 in 2020)

Total Central Mountains Objective - 42,000 deer (amended from 60,600 to 42,000 in 2020)

- Herd Composition - A three year average postseason buck to doe ratio of 15 to 17 bucks/100 does in accordance with the statewide plan.
- Harvest - General Season unit by unit buck deer hunt regulations, using archery, any legal weapon, and muzzleloader hunts. Buck permits will be adjusted to maintain buck/doe ratio objectives. Caution and moderation will be used when adjusting buck permit numbers. Antlerless permits may be issued to address specific localized crop depredation or range degradation concerns.

POPULATION MANAGEMENT STRATEGIES

Monitoring

- Population Size - A population estimate will be made based on herd composition counts conducted by biologists, harvest surveys, and mortality estimates based on radio collar studies and range rides. These data will be used in a computer model to determine a winter deer herd population estimate.
- Buck Age Structure - Monitor age class structure of the buck population through the use of checking stations, postseason classification, uniform harvest surveys and field bag checks.
- Harvest - The primary means of monitoring harvest will be through the statewide uniform harvest survey and the use of checking stations (Table 1a-c).
- Research - Continue to deploy GPS collars to monitor spatial use, survival, reproduction, and cause-specific mortality. Other research such as the statewide effort to collect body condition scores and disease profiles may continue as needed. The Manti subunit will likely be used as a surrogate for the entire central mountains area. Research projects addressing predator-prey dynamics as it pertains to mule deer should also be pursued.

Table 1a. Population Trends and Harvest for the Central Mountains, Manti Deer Subunit.

| Year | Buck harvest | Post-Season F/100 doe | Post-Season B/100 doe | Post-Season Population | Objective | % of Objective |
|------------|--------------|-----------------------|-----------------------|------------------------|-----------|----------------|
| 2015 | 2,215 | 64 | 23 | 25,700 | 38,000 | 68% |
| 2016 | 2,459 | 64 | 16 | 23,300 | 38,000 | 61% |
| 2017 | 2,141 | 63 | 13 | 23,500 | 38,000 | 62% |
| 3 Year Avg | 2,272 | 64 | 17 | | | |

Table 1b. Population Trends and Harvest for the Central Mountains, Nebo Deer Subunit.

| Year | Buck harvest | Post-Season F/100 doe | Post-Season B/100 doe | Post-Season Population | Objective | % of Objective |
|------------|--------------|-----------------------|-----------------------|------------------------|-----------|----------------|
| 2015 | 1,238 | 52 | 16 | 14,900 | 22,600 | 66% |
| 2016 | 1,485 | 66 | 15 | 12,900 | 22,600 | 57% |
| 2017 | 1,209 | 64 | 17 | 13,700 | 22,600 | 61% |
| 3 Year Avg | 1,311 | 61 | 16 | | | |

Table 1c. Harvest Trends for the San Rafael portion of the Manti subunit.

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|----------------|------|------|------|------|------|------|
| Hunters Afield | 1649 | 1264 | 1463 | 1531 | 1492 | 1558 |
| Harvest | 497 | 338 | 305 | 421 | 341 | 396 |

Population Augmentation

- Transplant deer to portions of the Manti subunit with low deer densities, particularly but not restricted to the southeast portions of the subunit. Consider transplant sources from areas with high deer densities and range over-utilization on this and other units as well as areas of urban nuisance populations.

Possible Transplant Locations (north to south; Figure 1)

Emery County: East Mtn, Stump Flat, Danish Bench, Cedar Bench, Horn Mtn/Biddlecome Ridge, Black Dragon, Dry Mtn, Sage Flat, Muddy Creek Cyn, Link Cyn

Sanpete County: McEwen Flat, The Pines/Greens Hollow/Wildcat Knolls

Sevier County: The Pines/Greens Hollow/Wildcat Knolls, Link Cyn, Quichupah Cyn/Water Hollow/Saleratus Benches, Trough and Mill Hollow/Gilson Valley

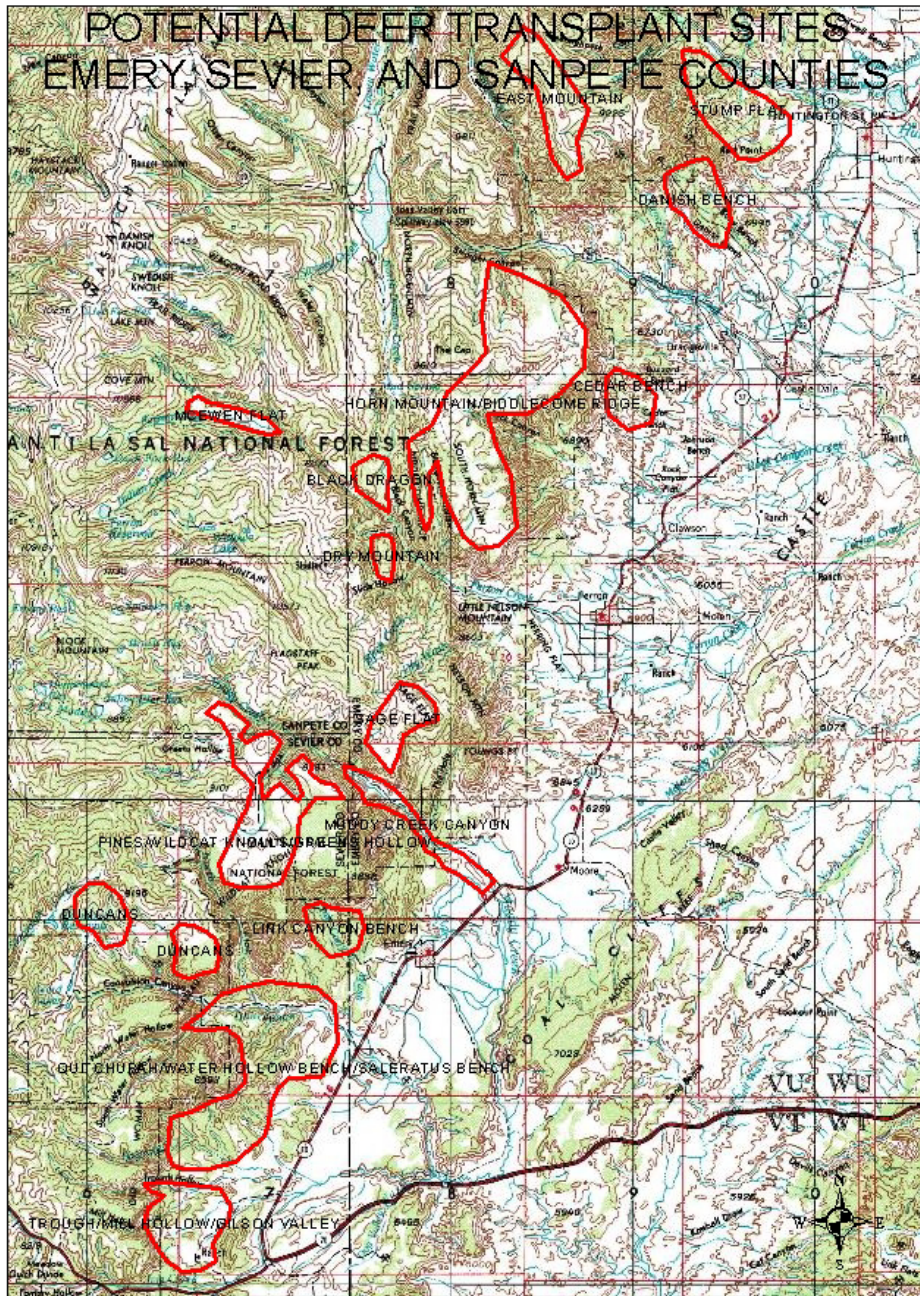


Figure 1. Map of Potential Deer Transplant Sites on the Southeast Manti.

- Transplant deer to portions of the Nebo subunit with low deer densities, particularly but not restricted to the southern portion of the San Pitch Mtns. Consider transplant sources from areas with high deer densities and range over-utilization on this and other units as well as areas of urban nuisance populations.

Possible Transplant Locations (counter-clockwise; Figure 2)

- Deep Creek WMA*
- Chriss Creek*
- Flat Canyon*
- Mellor Canyon*
- Maple Canyon WMA*
- Maple Canyon*
- Wales Canyon*

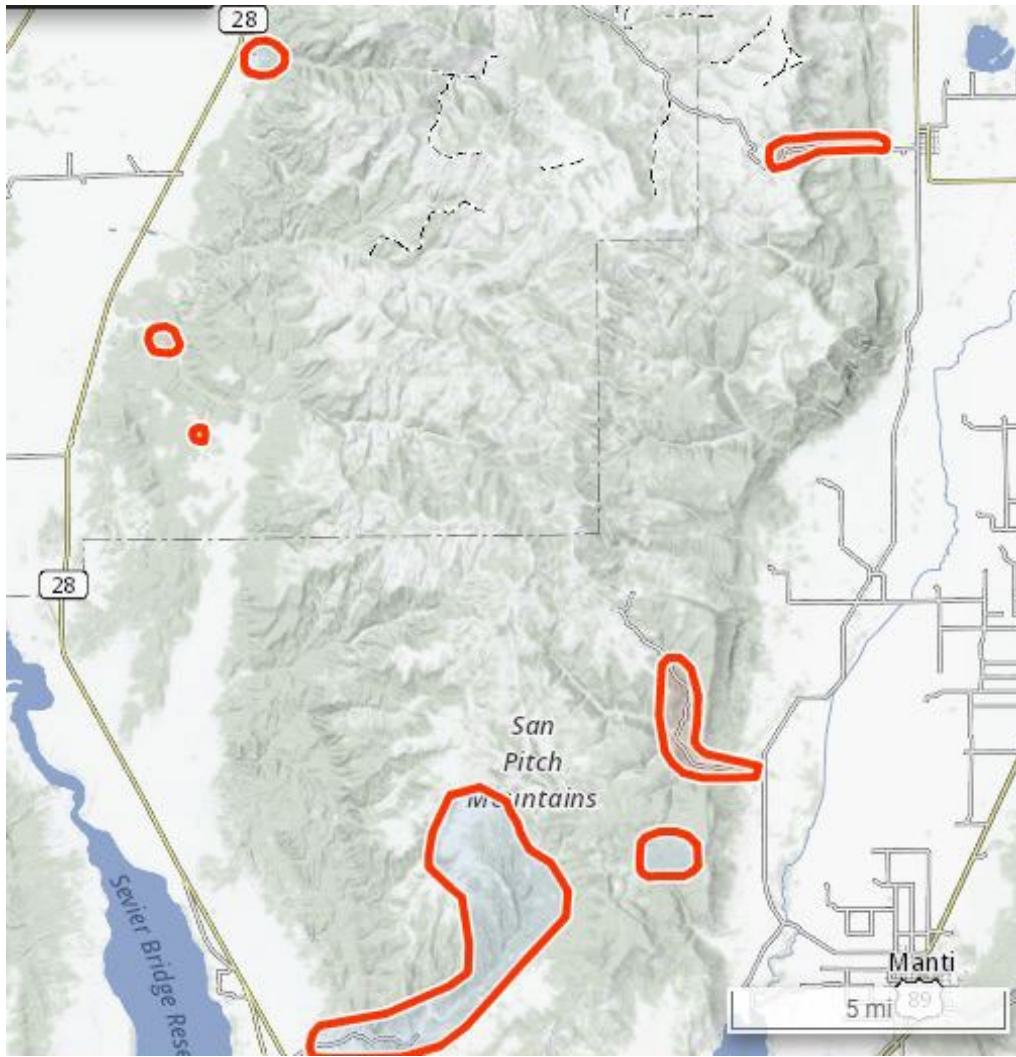


Figure 2. Map of Potential Deer Transplant Sites on the Nebo subunit, San Pitch Mtns.

Disease Management

Investigate and manage diseases that threaten mule deer populations and continue monitoring for chronic wasting disease (CWD) as stated in the statewide plan. This unit is a CWD positive unit. Continue surveillance through check stations and other methods to document prevalence, and location of positive animals.

Limiting Factors (may prevent achieving management objectives)

- Crop Depredation - Take all steps necessary to minimize depredation as prescribed by state law and DWR policy.
- Habitat - Winter range is a limiting factor for deer on this unit. Portions of critical winter ranges are in poor condition (See range trend summary below). Factors contributing to poor range conditions include recent droughts and range use by deer and domestic livestock. This has resulted in a reduction of winter range carrying capacity. Utilization of key shrub species on critical winter ranges will be closely monitored.
- Predation - Follow DWR predator management policy:

-If the population estimate is less than 90% of objective and is stable or decreasing and fawn to doe ratio drops below 70 for 2 of the last 3 years or if the fawn survival rate drops below 50% for one year, then a Predator Management Plan targeting coyotes will be implemented on that subunit. If the population trend is increasing the population must be below 65% of objective and meet the above criteria in order to initiate Predator Management for Coyotes. In 2015, the Central Mountains unit did not qualify for predator management specific to coyotes as the population trend was increasing and was 66% of objective.

- If the population estimate is less than 90% of objective and the doe survival rate drops below 85% for 2 of the last 3 years or below 80% for one year, then a Predator Management Plan targeting cougar would be implemented on that subunit.

- Highway Mortality - Cooperate with the Utah Dept. Of Transportation in construction of highway fences, passage structures and warning signs etc. Collect highway mortality data. A Deer Highway Crossing Study along SR-6 is ongoing. Propose analysis of SR-96, SR-31, and SR-264 to minimize highway mortalities in the future.
- Illegal Harvest - Should illegal kill become an identified and significant source of mortality, attempt to develop specific preventive measures within the context of an Action Plan developed in cooperation with the Law Enforcement Section.

HABITAT MANAGEMENT OBJECTIVES

- Protect, maintain, and/or improve deer habitat through direct range improvements to support and maintain herd population management objectives.
- Work with private landowners and federal, state, and local governments to maintain and protect critical and existing ranges from future losses and degradation through grazing management and OHV and Travel Plan modifications.
- Work with federal, private, and state partners to improve crucial deer habitats through the WRI process.
- Work with federal and state partners in fire rehabilitation on crucial deer habitat through the WRI process.
- Maintain and protect critical winter range from future losses. Acquire critical winter range when the opportunity arises.
- Minimize and mitigate impacts from energy development activities.
- Minimize deer vehicle collisions along highways on the unit.

HABITAT MANAGEMENT STRATEGIES

- Continue to improve, protect, and restore sagebrush steppe habitats critical to deer. Cooperate with federal land management agencies and private landowners in carrying out habitat improvements such as pinion-juniper removal, reseeding, controlled burns, grazing management, water developments etc. on public and private lands. Habitat improvement projects will occur on both winter ranges as well as summer range.

- Continue to monitor permanent range trend studies located throughout the unit.
- Conduct cooperative seasonal range assessments to evaluate forage condition and utilization. Determining opportunities for habitat improvements will be an integral part of these surveys. This will also be pivotal in determining if antlerless harvest is necessary.
- Work toward long term habitat protection and preservation through the use of agreements with federal agencies and local governments and the use of Conservation Easements etc. on private lands.
- Support, cooperate with, and provide input to land management planning efforts dealing with actions affecting habitat security, quality and quantity.
- Work with land management agencies and energy companies to minimize and mitigate impacts of energy development activities. Oil and Gas specific habitat biologists will lead this effort.
- Continue to monitor deer survival on this unit through GPS collar studies. Use GPS collar data to determine potential habitat improvement projects.
- Manage vehicle access on Division of Wildlife Resources land to limit human disturbance during times of high stress, such as winter and fawning.
- Manage riparian areas in critical fawning habitat to furnish water, cover and succulent forage from mid- to late summer.
- Protect deer winter ranges from wildfire by reseeding burned areas, creating fuel breaks and vegetated green strips and reseed areas dominated by Cheat grass with desirable perennial vegetation.
- Reduce expansion of pinyon-juniper and other woodlands into sagebrush habitats and improve habitats dominated by Pinion-Juniper woodlands by completing habitat restoration projects like lop & scatter, bullhog, and chaining.
- Manage conifer encroachment on important summer ranges by utilizing prescribed fire.
- Seek opportunities to increase browse in burned areas of critical winter range.
- Utilize antlerless deer harvest to improve or protect forage conditions when vegetative declines are attributed to deer over utilization.

PERMANENT RANGE TREND SUMMARIES – Nebo Subunit

Management Unit Description

This management unit incorporates most of the old North and South Nebo deer herd units and is approximately 943,923 acres in size. Nephi Canyon divides the northern and southern parts of the unit running east to west. A majority of the permanent range trend studies are placed on the western faces of the Wasatch and San Pitch Mountains (Figure 3).

The northern section of the Nebo unit is dominated by high mountains such as Santaquin Peak, Bald Mountain, and Mount Nebo. Mount Nebo represents the southernmost extension of the Wasatch Range. This range

is high and rugged, with steep slopes on the western portion and less steep slopes on the eastern portion of the mountain range. The San Pitch and Valley Mountains make up the majority of the southern portion of the unit. These mountains are lower and less steep than the northern part of the unit with shallow canyons throughout. Towns within this unit include Fountain Green, Moroni, Levan, Fayette, Payson, Chester, Wales and Salem. Towns partially included in the unit include Spanish Fork, Fairview, Mount Pleasant, Ephraim, and Manti.

Limiting Factors to Big Game Habitat

The principal limiting factor and management concern in the Nebo management unit is the lack of winter range in good condition, especially severe winter range on the west side of the unit. In the area from Spanish Fork Canyon south to Nephi, the normal winter range averages two miles or less in width. Severe winter range is even narrower, ranging from a few hundred yards to 1.5 miles in width. However, the winter range on the east and south sides of the unit is more expansive and not nearly as critical.

Some of the major problems related to the limited winter range on the unit (especially low elevation severe winter range) include: restricted access to traditional wintering areas west of I-15, predominantly private ownership of critical ranges (57% of normal winter range), and agricultural depredation. To remedy the situation, the UDWR has acquired approximately 12,800 acres of winter range in the unit (11% of total winter range) and has attempted treatments and rehabilitation projects in these critical areas. The available winter range, especially critical areas on the west side of the unit, remains threatened by urban development and a high fire hazard caused by the presence of significant amounts of cheatgrass (*Bromus tectorum*). As previously mentioned, a major threat to deer winter habitat is the development of winter range on private property. Most of the winter range on the north end of the Nebo unit is privately owned: there is continual expansion of new home construction in the higher elevations of winter range in the communities of Spanish Fork, Salem, Woodland Hills and Elk Ridge. The same is true on the central part of the Nebo Unit, along Water Hollow and Big Hollow; the development there, however, is more for cabin lots and not for residential housing. Both of these areas have historically been very important winter ranges for large populations of mule deer. State- owned WMAs along the east and west side of the unit are important areas of protection. However, these WMAs may prove inadequate to sustain the deer population at the desired objective as private development continues in the future. Therefore, further habitat acquisition and rehabilitation are necessary to adequately maintain the winter range in this management unit.

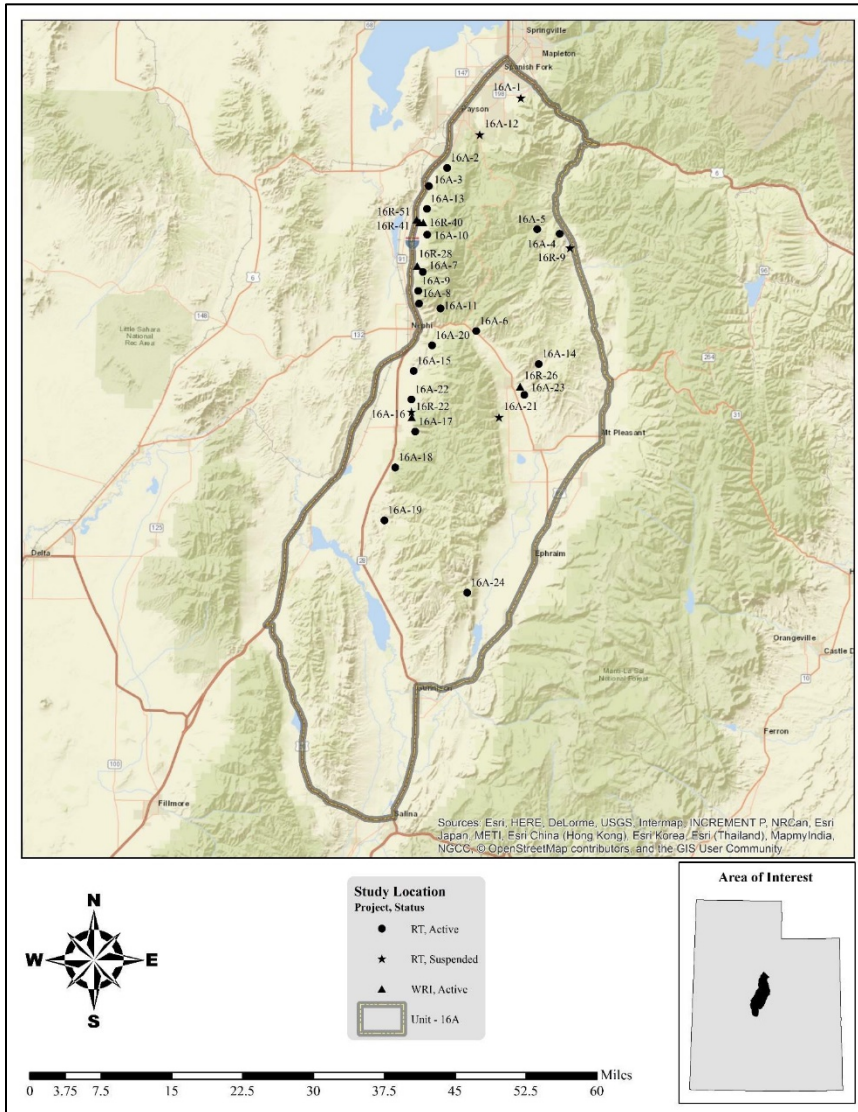


Figure 3. WMU 16A, Nebo, including range trend study sites.

Range Trend Studies

Twenty-one interagency range trend studies were sampled in Unit 16A during the summer of 2017 to establish a Desired Components Index (DCI) ranking for each study site (Figure 4). A total of twenty-four studies have been established within the Unit 16A since 1983. Thirteen studies were established in 1983, and of these studies five sample mixed oak and sagebrush communities, two studies sampled big sagebrush communities, one study samples bitterbrush communities, two studies sample cliffrose communities, and two sample mountain brush communities. Six studies were established in 1989, and of these studies four studies sample big sagebrush communities, one study samples a cliffrose community, and one study samples a mixed oak and sagebrush community. Two studies were established in 2007 and sample Wyoming big sagebrush communities. One study was established in 2012 and samples a pinyon pine and Utah juniper woodland.

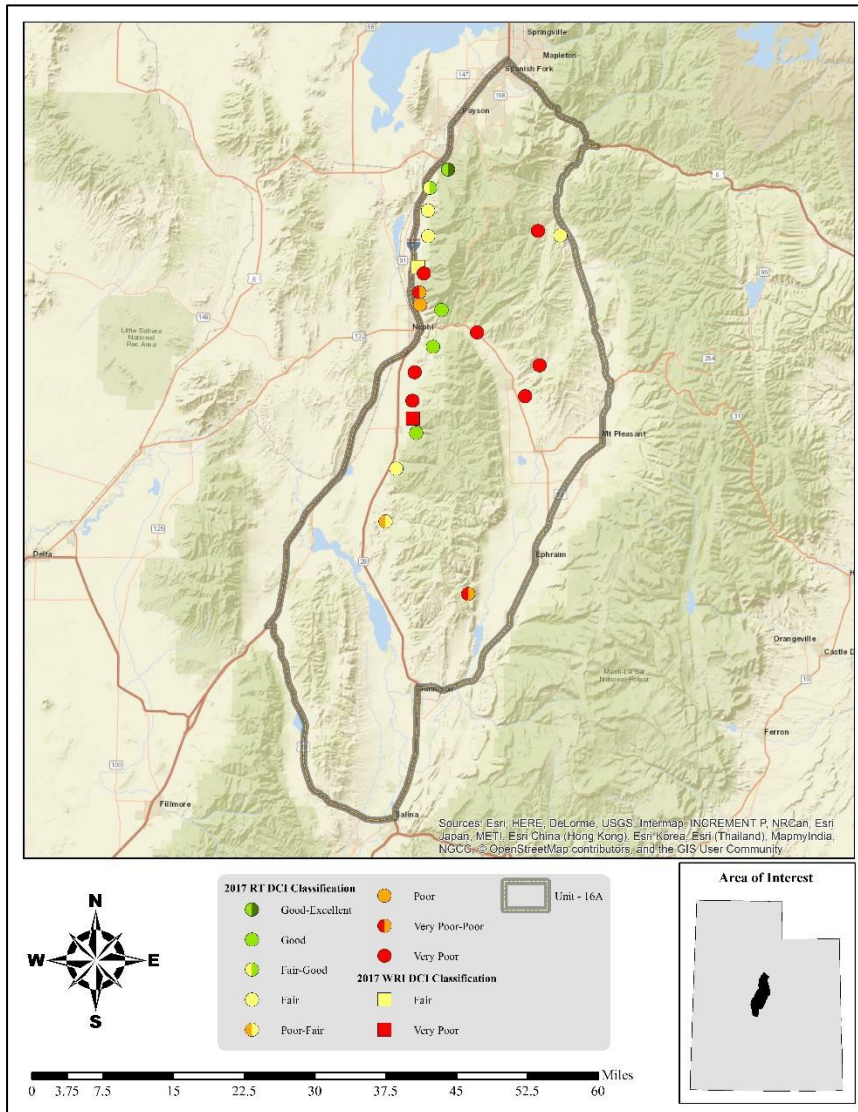


Figure 4. 2017 Desirable Components Index (DCI) ranking distribution by study site for WMU 16A, Nebo.

Discussion and Recommendations

Mountain (Big Sagebrush)

The study sites within the Mountain (Big Sagebrush) ecological type vary in condition from very poor to good for deer winter range habitat. The sagebrush communities support plant populations that provide winter forage for wildlife. Introduced annual grasses are present on all sites in varying amounts. Bulbous bluegrass (*Poa bulbosa*) is also present on all sites within this ecological type and can reduce the ecological integrity and diversity of the plant communities. The Wash Canyon and Triangle Ranch study sites are both in Phase I of woodland encroachment and have potential for future encroachment.

Treatments to reduce the undesirable grasses may become necessary on some sites if these grasses persist on the sites. Areas with conifer encroachment should be treated (e.g. bullhog, chaining, lop and scatter, etc.) where feasible. If reseeding is necessary to restore herbaceous communities, care should be taken in seed selection and preference should be given to native species when possible.

Mountain (Oak)

The studies that are considered to be Mountain (Oak) ecological sites vary in condition from very poor to good for deer winter range habitat. The oak communities provide cover and forage for wildlife in winter. Bulbous bluegrass is present on all the sites sampled, and threatens the integrity and diversity of the plant communities. Introduced annual grasses are also present on all sites except Rees Flat: these grasses can increase fuel loads and pose a risk for wildfire. The Santaquin Hill site is currently in Phase I of woodland encroachment and has potential for future encroachment.

Treatments to reduce undesirable grasses may become necessary on some sites if high levels of these grasses persist. Areas with conifer encroachment should be treated (e.g. bullhog, chaining, lop and scatter, etc.) where feasible. If reseeding is necessary to restore herbaceous communities, care should be taken in seed selection and preference should be given to native species when possible.

Upland (Big Sagebrush)

The study sites within the Upland (Big Sagebrush) ecological type vary in condition from very poor to very poor-poor for deer winter range habitat on this unit. These lower elevation sagebrush communities support populations that provide winter forage for wildlife. The Old Pinery, Maple Canyon, and Levan North sites are currently in Phase I of woodland encroachment, indicating the potential for future encroachment or infilling. Introduced annual grasses are present on all sites to varying degrees, and can increase fuel loads and pose a risk for wildfire. Bulbous bluegrass is also present on all sites except Maple Canyon: this grass can alter and reduce the diversity of the plant community.

Treatments to reduced undesirable grasses might be necessary if high levels of these grasses persist. It is recommended that areas with significant conifer encroachment be treated (e.g. bullhog, chaining, lop and scatter, etc.) where feasible and maintenance should continue on sites that have already been treated. If reseeding is necessary to restore herbaceous communities, care should be taken in seed selection and preference should be given to native species when possible.

Upland (Cliffrose)

Studies that are considered to be Upland (Cliffrose) ecological sites vary in condition from very poor to good for deer winter range habitat on this unit. These cliffrose communities support browse populations that provide good winter forage for wildlife. These communities have the potential for invasion by annual grasses and introduced perennial grasses. Annual grasses, specifically cheatgrass (*Bromus tectorum*), can increase fuel loads and exacerbate the risk for wildfire. The Chicken Creek and Deep Creek study sites are currently in Phase I of conifer encroachment and are at risk for further encroachment.

Treatments to reduce annual grass might be necessary if high levels of these grasses become an issue in these communities. It is recommended that areas with significant conifer encroachment undergo a tree-removing treatment (e.g. bullhog, chaining, lop and scatter, etc.) where feasible. If reseeding is necessary to restore herbaceous communities, care should be taken in seed selection and preference should be given to native species when possible.

Treatments/Restoration Work

There has been an active effort to address many of the limitations on this unit through the Watershed Restoration Initiative (WRI). A total of 47,250 acres of land have been treated within the Nebo unit since the WRI was implemented in 2004 (Figure 5). An additional 2,636 acres are currently being treated and treatments have been proposed for 1,321 acres. Treatments frequently overlap one another bringing the total completed treatment acres to 51,207 acres for this unit. Other treatments have occurred outside of the WRI through independent agencies and landowners, but the WRI comprises the majority of work done on deer winter ranges throughout the state of Utah.

Anchor chaining to remove pinyon and juniper is the most common management practice in this unit. Bullhog treatments to treat pinyon and juniper are also frequently used. Seeding plants to augment the herbaceous understory is also very common. Other management practices include (but are not limited to): container stock planting, hand crews to remove pinyon and juniper, herbicide application to remove weeds, harrow, and other similar vegetation removal techniques.

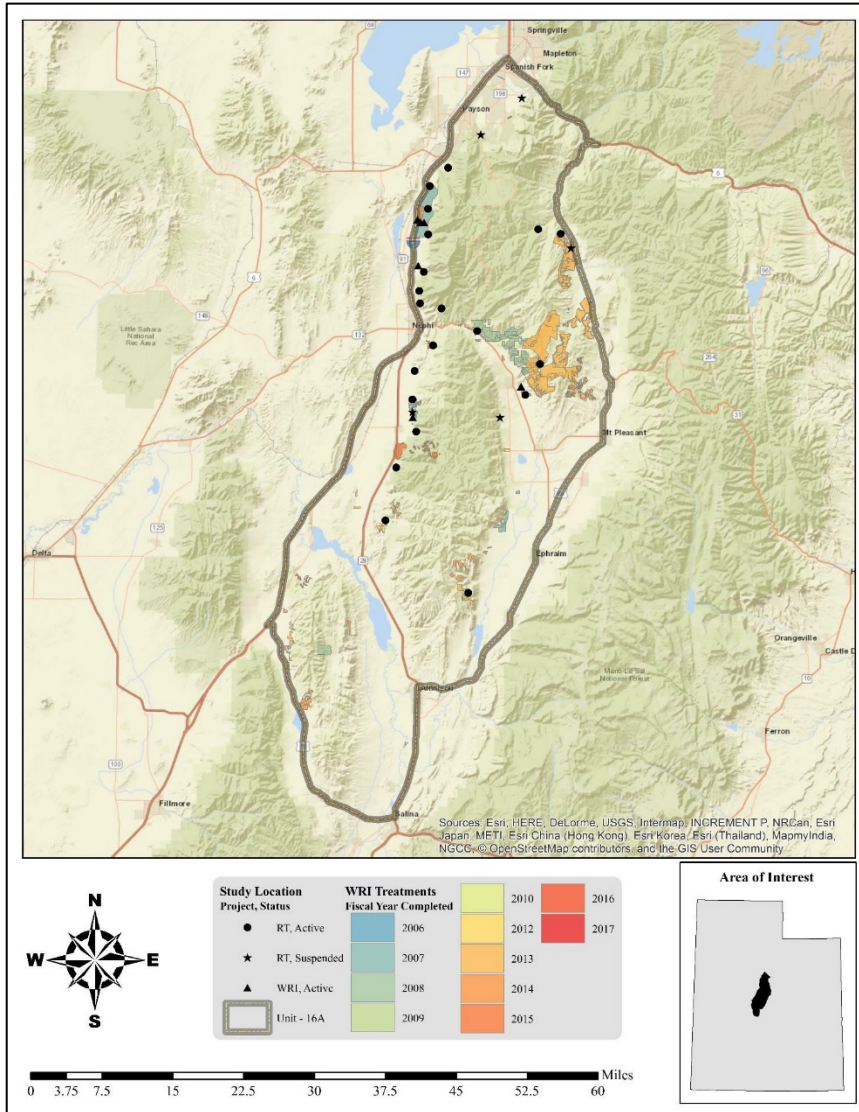


Figure 5. WRI treatments by fiscal year completed for WMU 16A, Nebo

PERMANENT RANGE TREND SUMMARIES - Manti Subunit

Management Unit Description

Geography

Wasatch Plateau

Unit 16B (Figure 6) covers the east and west sides of the Wasatch Plateau. Skyline Drive to Soldiers Summit roughly divides the eastern and western halves of the unit. This unit was previously called the Northeast Manti Deer Herd Unit 30. In the spring of 1998, this unit was incorporated into the much larger Wildlife Management Unit 16. Unit 16C was previously called Deer Herd Unit 31- South East Manti. It was enlarged in the spring of 1998 to include both the east and west sides of the Wasatch Plateau and renamed Wildlife Management Unit 16C. Unit 16C is a subunit of the very large management unit 16, which encompasses areas in Utah, Carbon, Juab, Sevier, and Sanpete Counties.

Wildlife Management Unit 16C (Figure 6) covers the southern portion of the Wasatch Plateau. As with unit 16B, this subunit's western and eastern halves are divided roughly by Skyline Drive. The upper limits of the winter range on 16C generally follows the rim of the plateau and the 9,000 foot level of the south and west exposures of the large canyons and mountain slopes. Many of the plateaus drop steeply to the valley floor below to the very lowest portion of the herd unit that supports a low desert shrub type on unproductive shale hills. This acreage is not considered part of the winter range.

Management unit 16B and 16C is large with deer summer and winter ranges covering nearly 1.4 million acres. The U.S. Forest Service (USFS) administers 81% of the summer range and the BLM 1%. Fifty-one percent of the winter range is on federal land with another 30% on private lands.

Central Mountains Manti North

Most of the winter range in subunit 16B lies on the east side of the Wasatch Plateau which is a broad alluvial fan ranging in elevation from 5500 to 7500 feet. It runs from Price Canyon south to Huntington Canyon. Other important winter ranges include a large section of land along the Price River in the Colton area, and below Scofield Reservoir. The winter range is made up of mountain big sagebrush and wyoming big sagebrush communities with pinyon-juniper woodlands interspersed throughout the area.

Central Mountains Manti South

The key deer wintering areas are the lower end of Muddy Creek and Ferron Creek, Black Dragon, Biddlecome Hollow, Cottonwood Canyon, and Huntington Canyon. Elk winter higher on Trail Mountain, North and South Horn Mountain, Sage Flat and the foot hills along US 89 from salina to Mount Pleasant. Deer also utilize these areas during mild winters. On the Southeast Manti Unit, much of the key winter range is on Forest Service lands. Pinyon-juniper benches become more limited to the south and there are mostly low desert shrub foothills associated with Muddy Creek. Overall, the pinyon-juniper type occupies a fair amount of the winter range at low elevations, but is not critical to the trend monitoring program. However, the chained and seeded portions of this type provide important wintering areas and are monitored for trend. Chaining treatments are sampled in the foothills from Huntington Canyon to south of Dry Wash. Other key areas at Middle and Dry Mountains are also sampled. The big sagebrush/grass range type is found on many key areas, especially on the North East Manti Unit, but also on high elevation elk winter range on Trail, East, and Horn Mountains. Big sagebrush/grass is limited on crucial deer winter range, but key areas are found on Black Dragon and Muddy Creek.

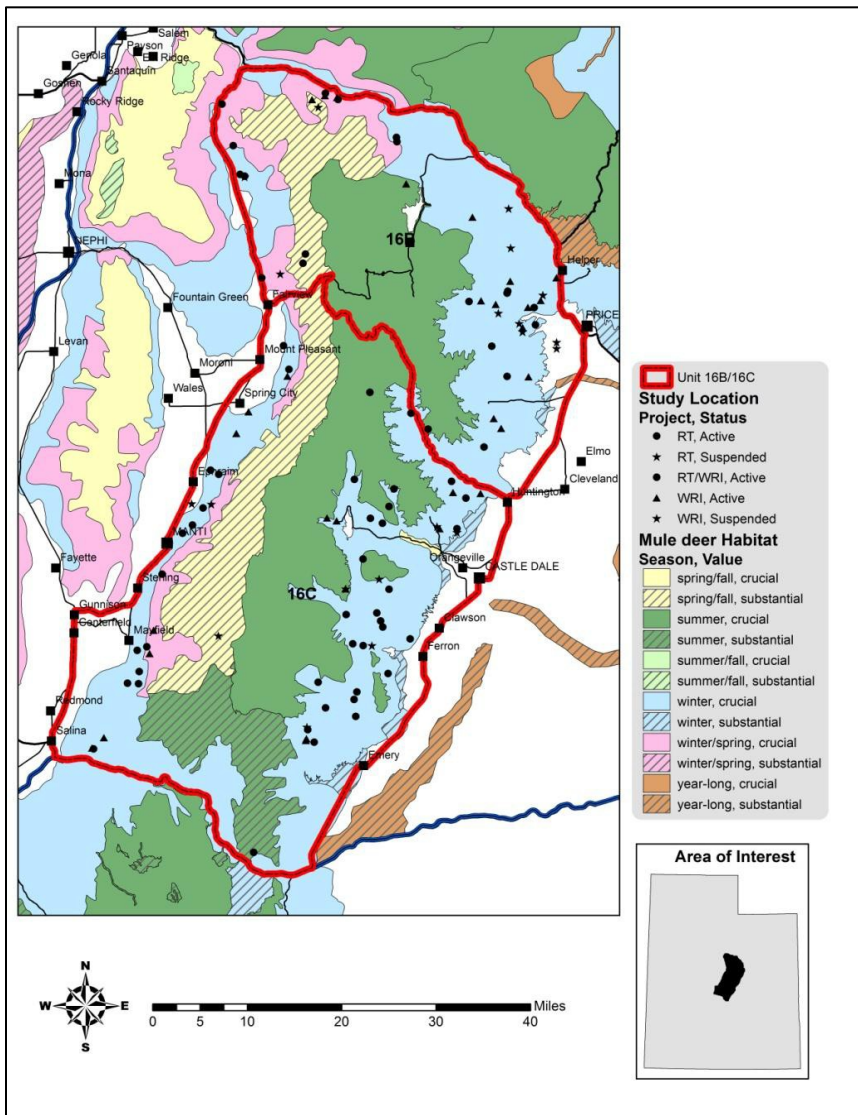


Figure 6. Seasonal Ranges on WMU 16B/16C, Manti Subunit, including range trend study sites.

Limiting Factors to Big Game Habitat

Central Mountains Manti North

The Manti-North area has historically supported a variety of wildlife and outdoor recreation, livestock grazing, ranches and farms, energy developments, and some forest industry. Industrial activities on the unit are associated primarily with coal production, electrical power generation, and oil and gas development. Exploration and development activities for oil and gas have the potential for future increases. Add to this a growing demand for low-sulfur Wasatch coal, and the demands placed upon winter ranges in this area will likely increase. Power plants, pipelines, slack piles, coal load-out facilities, ghost towns, railroads, and agriculture compete for valuable winter range property. An extensive road system provides year-round access to large portions of the winter range. Heavily used access roads to coal mines and gas wells dissect important winter ranges all along the east side of the Wasatch Plateau and are accountable for a large number of the highway deer mortality.

Central Mountains Manti South

The upper portions of the winter range on Forest Service lands are managed primarily for livestock grazing. Widespread watershed rehabilitation through contour trenching and seeding was done on this rangeland in the 1960's. An extensive road system provides access to a large percentage of the winter range. Many roads in crucial areas are open or maintained and used winter long in relation to various activities, namely mining, gas wells, the Horn Mountain TV towers, and for recreation. Access is more restricted further south in the Ferron and Muddy Creek drainages. The lowest foothill ranges are accessible year-round and are usually adjacent to agricultural areas. Coal mining and the power plants are the major economic activities in the area. Other associated impacts include road improvements, truck traffic, and an increased human population. Outdoor recreation is popular in the area. These activities include camping, hunting, fishing, four-wheeling, and snowmobiling and are facilitated by the extensive road system in the mountains and foothills.

Both

Encroachment by pinyon-juniper woodland communities also poses a substantial threat to important sagebrush rangelands. Pinyon-juniper woodlands dominate the vegetation cover within the deer winter range. Encroachment and invasion of these woodlands into sagebrush communities has been shown to decrease sagebrush and herbaceous cover, and therefore decreases available forage for wildlife.

Range Trend Studies

Range Trend studies have been sampled within WMU 16B and 16C on a regular basis since 1985, with studies being added or suspended as was deemed necessary. Seventy-one interagency range trend studies were sampled in Unit 16B/C during the summer of 2014 to establish a Desired Components Index (DCI) ranking for each study site (Figure 7) Monitoring studies of WRI projects began in 2004. When possible, WRI monitoring studies are established prior to treatment and sampled on a regular basis following treatment. Due to the long-term nature of the studies, many of the Range Trend and WRI studies have had some sort of disturbance or treatment prior to or since study establishment.

Range Trend studies that have not had recent disturbance or treatments are summarized in this report by ecological site. Range Trend and WRI studies that have a disturbance or treatment during the reported sample period are summarized in this report by the disturbance or treatment type.

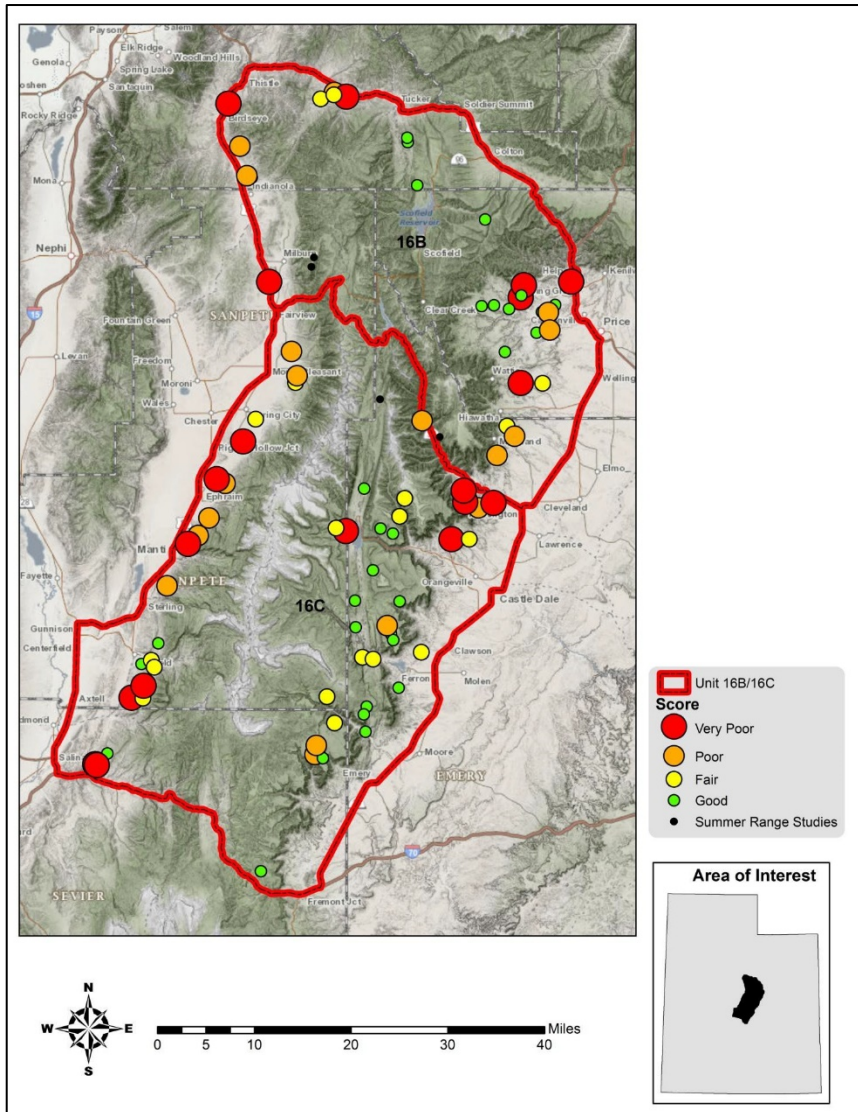


Figure 7. Deer winter range Desirable Components Index (DCI) ranking distribution by study site of most current sample date as of 2014 for WMU 16B/C, Manti North/South.

Discussion and Recommendations

High Mountain (Aspen)

This high mountain ecological site supports an aspen community and is generally considered to be in good condition for deer and elk summer range habitat on the Manti North unit. This community supports a diverse herbaceous understory that provides valuable forage during the summer months. While in generally good condition, introduced perennial grasses are present in the herbaceous understory. While providing valuable forage, these grass species can often be aggressive at higher elevations and can reduce the prevalence and abundance of other more desirable native grass and forb species. Additionally, the presence of noxious weeds, namely hounds tongue, have the potential to expand within the understory and reduce the amount of valuable forb species available to wildlife during summer months.

It is recommended that monitoring of this community continue. When reseeding is necessary to restore herbaceous species, care should be taken in species selection and preference should be given to native grass species when possible. Additional actions may be necessary to reduce the presence of noxious weeds within this

community type.

High Mountain (Slender Wheatgrass)

This high mountain ecological site supports grass and forb communities that are generally considered to be in good condition for deer and elk winter range habitat on Manti North unit. This community supports a diverse herbaceous component that provides valuable forage during the summer months. While in generally good condition, introduced perennial grasses are present in the community. Although they provide valuable forage, these grass species can often be aggressive at higher elevations and can reduce the prevalence and abundance of other more desirable native grass and forb species. Additionally, the presence of invasive and noxious weeds, namely tarweed and hounds tongue, have the potential to expand within the herbaceous community and reduce the amount of valuable forb species available to wildlife during summer months.

It is recommended that monitoring of this community continue. When reseeding is necessary to restore herbaceous species, care should be taken in species selection and preference should be given to native grass species when possible. Additional actions may be necessary to reduce the presence of noxious weeds within this community type.

High Mountain/Mountain (Mountain Big and Silver Sagebrush Communities)

The higher elevation mountain ecological sites that support sagebrush communities are generally considered to be in good condition for deer winter range habitat on this unit. These communities support robust shrub populations that provide valuable browse in mild and moderate winters. These sites are not prone to encroachment from pinyon-juniper trees or invasion of cheatgrass. As with the ecological potentials mentioned above, introduced perennial grasses are often the dominant herbaceous component on these study sites. While providing valuable forage, these grass species can often be aggressive at higher elevations and can reduce the prevalence and abundance of other more desirable native grass and forb species. Intensive herbivore may also lead to a weakened herbaceous community structure that can result in the introduction of invasive and noxious weeds that reduce the amount of valuable forb species available to wildlife during summer months.

It is recommended that monitoring of this community continue. If habitat rehabilitation is needed in these community types, it is likely not necessary to seed these forb communities due to their high diversity and resilience to disturbance. If reseeding is necessary to restore herbaceous species, care should be taken in species selection and preference should be given to native grass species when possible. Monitoring should also continue in order to watch for the presence of noxious weeds within this community type.

Upland (Pinyon-Utah Juniper)

The mid elevation upland pinyon and juniper communities are generally considered to be in poor to very poor condition for deer winter range habitat on these units. These communities support small, dispersed shrub populations that provide valuable browse in mild to moderate winters. These communities are prone to increases of pinyon-juniper tree density and cover as community phases climax. Climax community phases have reduced understory diversity and vigor, and shrub populations display high decadence and low densities if the progression is not set back through pinyon and juniper tree removal. As with the high potential mountain sites, these upland mid-potential sites have introduced perennial grasses present in the herbaceous understory. While providing valuable forage, these grass species can often be aggressive at higher elevations of these upland potentials and can reduce the prevalence and abundance of other more desirable native grass and forb species. Annual grass,

primarily cheatgrass, can also be an issue within these communities. Increased amounts of cheatgrass can increase fuel loads and increase the threat of wildfire within these communities. If wildfire occurs within these communities, they lose most of their value as deer winter range and reestablishment of valuable browse species is typically slow.

It is recommended that work to reduce pinyon-juniper should continue in these communities in order to diversify community structure and increase the availability of preferred browse in these crucial winter ranges for when winters are harsh. When reseeding is necessary to restore herbaceous species, care should be taken in species selection and preference should be given to native grass species when possible. Care should also be taken in selecting treatment methods that will not increase annual grass loads. Treatments to reduce annual grass may be necessary on some sites. Furthermore, work to diminish fuel loads and create fire breaks should continue in order to reduce the threat of catastrophic fire.

Upland (Shrub Communities)

These mid elevation upland communities are generally variable in deer winter range with many of the communities in poor to very poor condition; however, there are a few communities that are considered to be in good to excellent condition. These communities support many vegetation types including the following: black sagebrush, basin big sagebrush, Wyoming big sagebrush, mountain big sagebrush, antelope bitterbrush, and mahogany species. These communities support large, dense shrub populations that provide valuable browse in mild to moderate winters for deer. These communities are prone to encroachment from pinyon-juniper trees which can reduce understory shrub and herbaceous health if not addressed. As with the high potential mountain sites, these upland mid-potential sites have introduced perennial grasses present in the herbaceous understory. These grass species can often be aggressive at higher elevations of these upland potentials and can reduce the abundance of other more desirable native grass and forb species. Annual grass, primarily cheatgrass, can also be an issue within these communities. Increased amounts of cheatgrass can increase fuel loads and increase the threat of wildfire within these communities. If wildfire occurs within these communities they lose most of their value as deer winter range and reestablishment of valuable browse species is typically slow.

Although most of the communities have small populations of pinyon and juniper trees, it is strongly recommended that work to prevent and reduce pinyon-juniper encroachment should continue in these communities. When reseeding is necessary to restore herbaceous species, care should be taken in species selection and preference should be given to native grass species when possible. Moreover, care should be taken in selecting treatment methods that will not increase annual grass loads. Treatments to reduce annual grass may be necessary on some sites. Work to diminish fuel loads and create fire breaks should continue in order to reduce the threat of catastrophic fire that results in the loss of preferred browse. If a treatment to rejuvenate sagebrush occurs, care should be taken in selecting treatment methods that will not increase annual grass loads.

Semidesert (Birchleaf Mahogany, Black Sagebrush, and Shadscale)

The lower elevation semidesert shrub communities are generally considered to be in poor condition for deer winter range habitat on the unit. These communities support shrub populations that provide valuable browse in moderate to severe winters. These communities are susceptible to invasion from annual grasses, primarily cheatgrass. Increased amounts of cheatgrass can increase fuel loads and increase the threat of wildfire on within these communities. If wildfire occurs within these communities, they lose most of their value as deer winter range and reestablishment of valuable browse species is typically slow. Encroachment from pinyon-juniper trees is a moderate threat within these communities.

If a treatment to rejuvenate sagebrush occurs, care should be taken in selecting treatment methods that will not increase annual grass loads. Treatments to reduce annual grass may be necessary on some sites. Treatments to establish and increase browse species more rapidly following wildfire should also be implemented, and treatments to increase browse species on historic fires should be considered.

Treatments/Restoration Work

There has been an active effort to address many of the limitations on these units through the Watershed Restoration Initiative (WRI). A total of 36,336 acres of land have been treated within the Manti North and South units since the WRI was implemented in 2004 (Figure 8). As seen on the map, treatments occasionally overlap one another bringing the total treatment acres to 38,043 acres for this unit. Other treatments have occurred outside of the WRI through independent agencies and landowners, but the WRI comprises the majority of work done on deer winter ranges throughout the state of Utah.

Treatments to reduce pinyon-juniper woodlands such as bullhog, chaining, and lop-and-scatter are common management practices on this unit. Other common management treatments are those to rejuvenate sagebrush stands such as herbicide, disc, and harrow treatments. In addition to these treatments, many have had seeding treatments associated with it to increase desirable species.

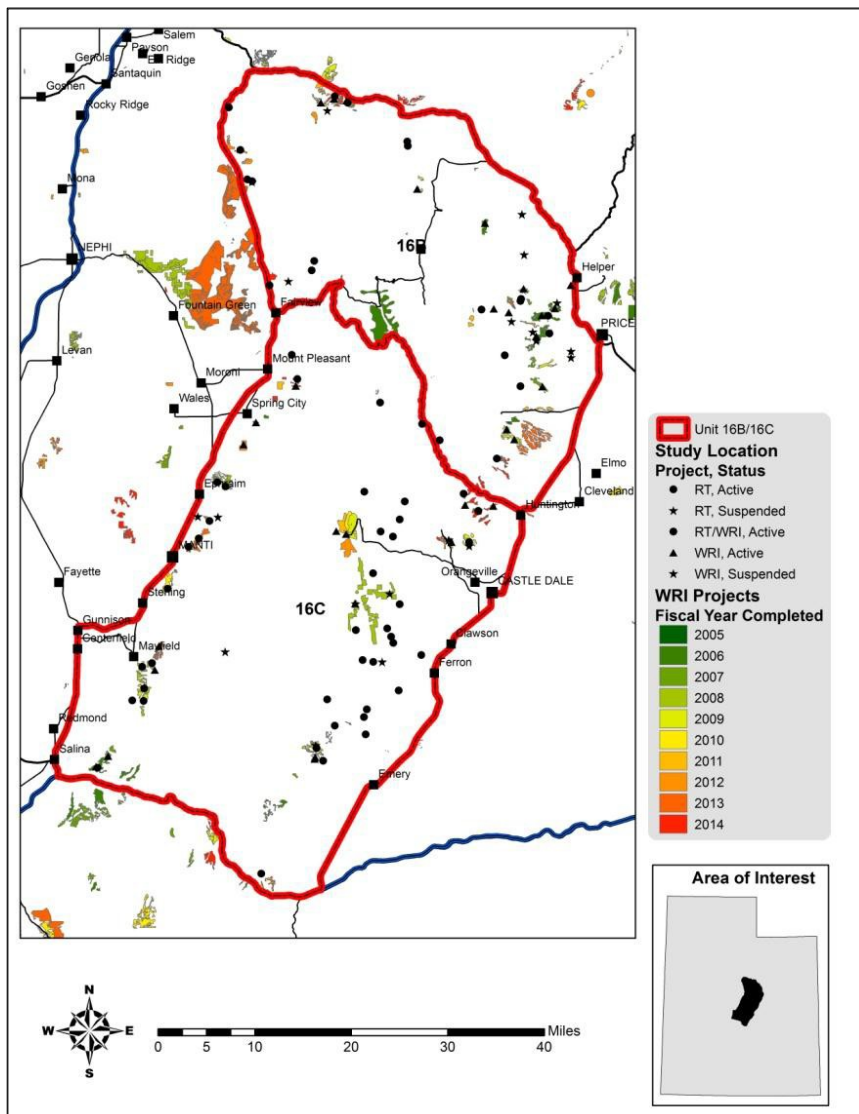


Figure 8. WRI treatments by fiscal year completed for WMU 16B/C,