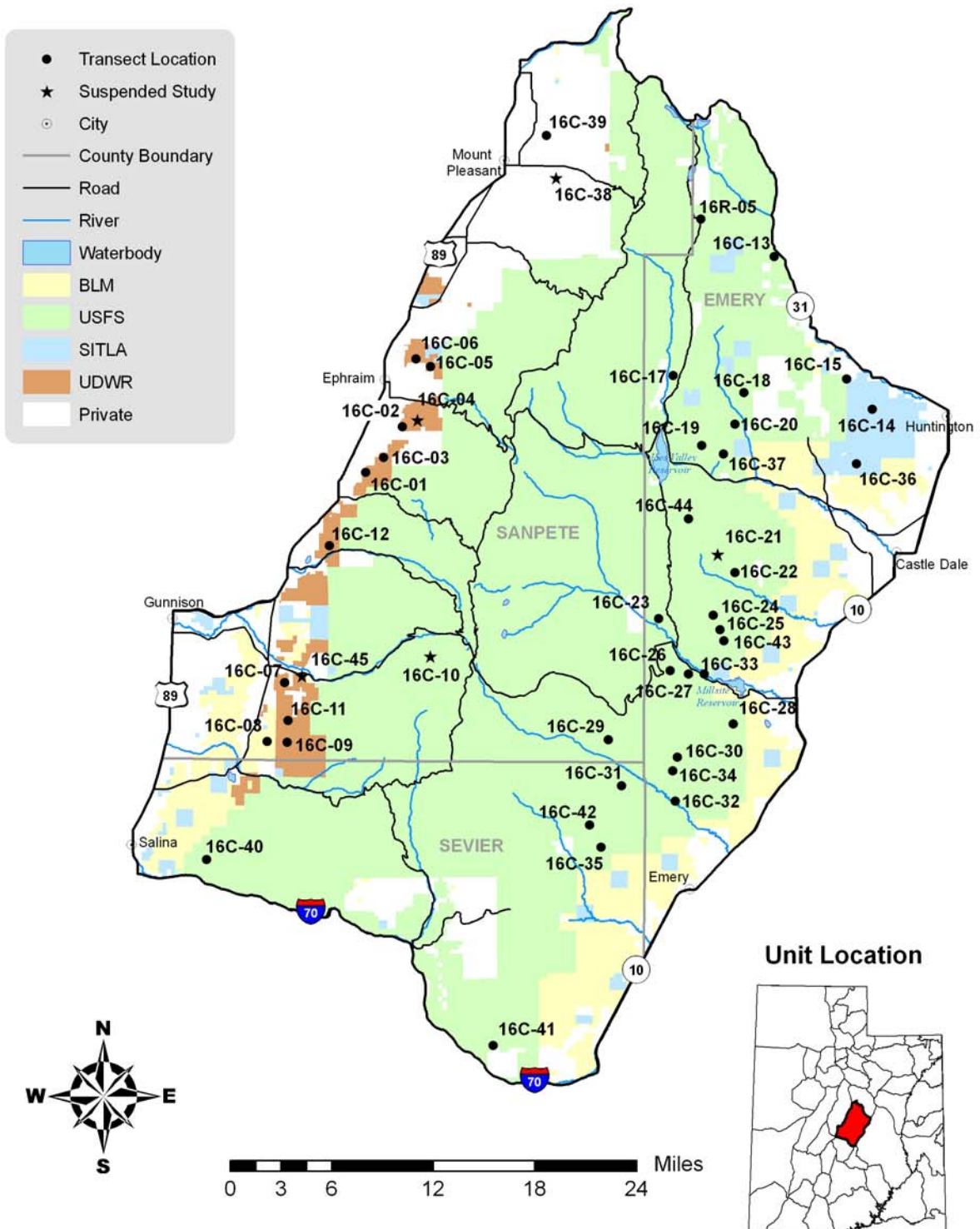


Management Unit 16C



WILDLIFE MANAGEMENT UNIT 16C - CENTRAL MOUNTAINS, MANTI SOUTH

Boundary Description

Sanpete, Emery, and Sevier counties - Boundary begins at the junction of Highway SR-10 and Highway SR-31 at Huntington; then south on SR-10 to Interstate 70; west on I-70 to Highway US-89 at Salina; north on US-89 to SR-31 at Fairview; southeast on SR-31 to SR-10 at the beginning point at Huntington.

Management Unit Description

The eastern portion of the unit, managed as part of the Southeastern Region, was sampled in 2009 and will be resampled in 2014. The western portion, managed as part of the Central Region, was sampled in 2007 and will be resampled in 2012. 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. Approximately 54% of unit 16's winter range is on land administered by the U.S. Forest Service and the BLM. Another 35% is on private land. The U.S. Forest Service administers 72% of the summer range, while 22% is private.

The upper limits of the winter range on subunit 16C - South-East Manti, generally follow the rim of the plateau and the 9,000 foot level of the south and west exposures of the large canyons and mountain slopes. A good description of winter range limits and prominent vegetative types can be found in the 1980 Utah Big Game Range Inventory (Giunta 1982).

The upper portions of the winter range on Forest Service lands are managed primarily for livestock grazing. Widespread watershed rehabilitation, 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 which are facilitated by the extensive road system in the mountains and foothills. The very lowest portion of the herd unit supports a low desert shrub type on unproductive shale hills. This acreage is not considered part of the winter range.

Key Areas

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, and Sage Flat. Deer also utilize these areas during mild winters. Elk utilize the mahogany and sagebrush on the lower points of the plateau, such as North and South Horn Mountain and Trail Mountain.

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 where many are monitored for trend. Chainings are sampled in the foothills from

Huntington Canyon to south of Dry Wash. Other key areas at Middle Mountain and Dry Mountain 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. Large areas of key winter range, also identified by the U.S. Forest Service in their Land and Resource Management Plan, are found on Trail Mountain, North Horn and South Horn Mountain, in lower Dry Wash, and along Muddy Creek. Mixed mountain brush and curlleaf mountain mahogany types are especially important in these areas.

Range Trend Studies

Unit 16C contains 29 trend study sites. Eighteen sites were originally established in 1988 and monitored through 2009. Of these six of the studies sample chained and seeded pinyon-juniper communities [Red Point (16C-14), Howard FS Chaining (16C-15), Middle Mountain (16C-17), Dry Mountain (16C-26), Birch Creek Chaining (16C-27) and South of Dry Wash (16C-28)], seven studies sample sagebrush-grass communities [East Mountain (16C-18), Miles Point (16C-20), North Horn-Rock Canyon (16C-22), Black Dragon (16C-23), South Horn 1/4 Corner (16C-25), Box Canyon Knolls (16C-31) and Muddy Creek (16C-32)], three studies sample mixed mountain brush communities [Trail Mountain Enclosure (16C-19), South Horn Enclosure (16C-24) and Upper Hole Trail (16C-30)], and two studies samples curlleaf mountain mahogany communities [West Huntington Canyon (16C-13) and Scab Hollow (16C-29)]. In the summer of 1994 five new studies were established. Three of these studies [Little Nelson Mountain (16C-33), South Sage Flat (16C-34) and Wildcat Knolls (16C-35)] sample sagebrush-grass communities, one study [Danish Bench (16C-36)] samples a chained and seeded pinyon-juniper communities and one study [Joes Valley Overlook (16C-37)] samples a mixed mountain brush community. The study at Danish Bench was established to replace Church Mine Road (16C-16), which was eliminated due to light utilization. Two trend studies [Cedar Mountain (16C-40) and Trough Hollow (16C-41)] were originally in other herd units but are now part of the Manti-Nebo Manti South unit. These two studies were established in 1985 and monitored regularly through 2009. In 2004, two study sites [Box Canyon Sage Grouse (16C-42) and Olson Draw Sage Grouse (16c-43)] were established to monitor sage grouse nesting and brooding habitat, both receive moderate elk use as well. Another new study [North Horn (16C-44)] was established in 2005 to monitor a mixed mountain brush community and replaced the North Horn Cap (16C-21) study, which was suspended. One special study [Scad Hollow (16R-5)] was established in 1998 and samples a wet meadow.

SUMMARY
WILDLIFE MANAGEMENT UNIT 16C - CENTRAL MOUNTAINS, MANTI SOUTH

Community Types

There were twenty nine Range Trend studies sampled in WMU 16C during the summer of 2009. Eight studies [Red Point (16C-14), Howard FS Chaining (16C-15), Middle Mountain (16C-17), Dry Mountain (16C-26), Birch Creek Chaining (16C-27), South of Dry Wash (16C-28), Danish Bench (16C-36) and Cedar Mountain (16C-40)] sample areas that had been chained and seeded in the past to remove pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). All of these sites are considered to be within crucial deer winter habitat and substantial elk winter habitat.

Nine studies [East Mountain (16C-18), Miles Point (16C-20), North Horn-Rock Canyon (16C-22), Black Dragon (16C-23), South Horn 1/4 Exlosure (16C-25), Muddy Creek (16C-32), Wildcat Knolls (16C-35), Box Canyon Sage Grouse (16C-42) and Olson Draw Sage Grouse (16C-43)] sample mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) communities, one study [Little Nelson Mountain (16C-33)] samples a Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*) community, and two studies [Box Canyon Knolls (16C-31) and South Sage Flat (16C-34)] sample black sagebrush (*A. nova*) communities. All of the studies in sagebrush communities are considered to be within crucial deer winter habitat and substantial elk winter habitat.

Six study sites [Trail Mountain Exlosure (16C-19), South Horn Exlosure (16C-24), Upper Hole Trail (16C-30), Joes Valley Overlook (16C-37), Trough Hollow (16C-41) and North Horn (16C-44)] sample mixed mountain brush communities. All six of these studies are considered to be substantial elk winter habitat, five of these studies (16C-19, 16C-24, 16C-30, 16C-37 and 16C-41) are within crucial deer winter habitat and one study (16C-44) is with crucial deer summer habitat. Two studies [West Huntington Canyon (16C-13) and Scab Hollow (16C-29)] sample curleef mountain mahogany (*Cercocarpus ledifolius*). Both studies are within crucial deer winter habitat, but West Huntington Canyon is within crucial elk summer habitat and Scab hollow is within substantial elk winter habitat. One study [Scad Hollow (16R-5)] samples a wet meadow that is considered to be crucial deer summer habitat and substantial elk summer habitat.

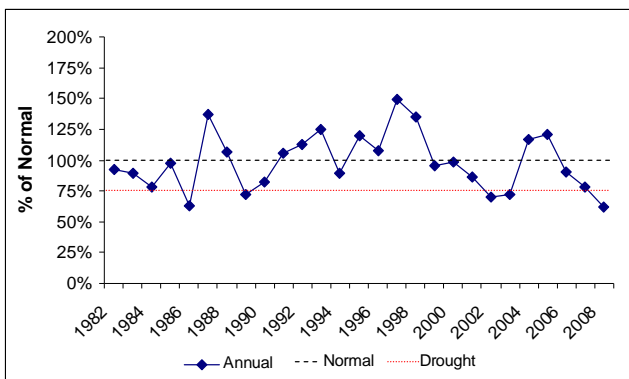


Figure 1. Percent annual precipitation based on the 27 year mean precipitation for WMU 16C, Central Mountains, Manti South. Precipitation data were collected at the Salina 24 E, Ferron and Castle Dale weather stations (Utah Climate Summary 2009).

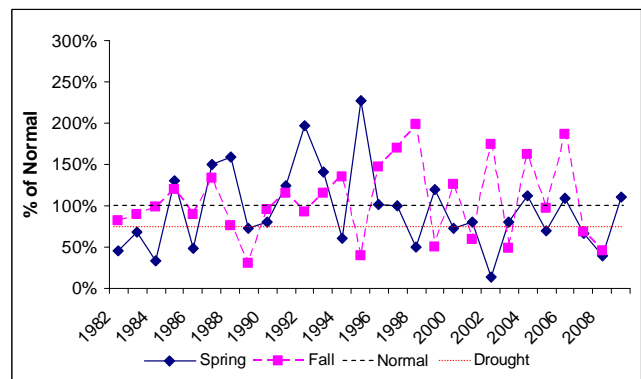


Figure 2. Percent annual precipitation based on the 27 year mean for spring (March-May) and fall (Sept.-Nov.) precipitation for WMU 16C, Central Mountains, Manti South. Precipitation data were collected at the Salina 24 E, Ferron and Castle Dale weather stations (Utah Climate Summary 2009).

Precipitation

Vegetation trends are dependent upon annual and seasonal precipitation patterns. Precipitation data from this herd unit were compiled from the Salina 24 E, Ferron and Castle Dale weather stations (Figures 1 and 2). The units 27 year annual mean was 9.85 inches, the 28 year spring (March to May) mean was 2.20 inches, and the 27 year fall (Sept. to Nov.) mean was 2.82 inches. The unit annual precipitation was below 75% of the normal

annual mean (drought conditions) in 1986, 1989, 2002, 2003 and 2008 (Figure 1). Spring precipitation was below 75% of normal in 1982, 1983, 1984, 1986, 1989, 1994, 1998, 2000, 2002, 2005, 2007 and 2008 (Figure 2). Fall precipitation was below 75% of normal in 1989, 1995, 1999, 2001, 2003, 2007 and 2008 (Figure 2) (Utah Climate Summary 2009).

Browse

The median browse trend (Figure 5). Three sagebrush species were sampled in the unit; Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*) and black sagebrush (*A. nova*). Mountain big sagebrush was the most common species sampled and was sampled at 21 study sites in the unit. The mean density of mountain big sagebrush remained relatively similar from 1994 to 2004 then increased significantly from 2004 to 2009 (Figure 3a). Much of the increase in density is due to an increase in the recruitment of young plants in many of the studies. This is reflected in the mean cover trend as there was little change in mountain big sagebrush cover between 2004 and 2009. There was, however, a significant increase in cover early in the study from 1994 to 1999 (Figure 3b). The mean population decadence of mountain big sagebrush was moderately low since 1994, but did increase significantly from the low of 19% in 1999 to the high of 25% in 2004 (Figure 3c).

Wyoming big sagebrush was sampled on only three sites in the unit: 16C-15, 16C-32 and 16C-33. The mean density and cover of Wyoming big decreased significantly from 1999 to 2004 with a large die-off that occurred throughout the area during that time.

Density of the Wyoming big sagebrush population increased again in 2009 (Figure 3a) primarily due to an increase in young plants as there was little change in cover (Figure 3b). The mean population decadence of Wyoming big sagebrush reflected the large die-off with a significant increase from 1999 to 2004. Decadence decreased significantly again in 2009 to more moderate levels (Figure 3c).

Black sagebrush was sampled on 16 studies in the unit. The mean density of black sagebrush also decreased significantly from 1999 to 2004, but increased significantly in 2009 (Figure 3a) due to a good recruitment of young plants. The mean cover of black sagebrush also decreased significantly from 1999 to 2004, but because young plants provide little cover, the cover of black sagebrush changed little from 2004 to 2009 (Figure 3b). The mean decadence of black sagebrush has fluctuated throughout the sample years from a high of 19% in 2004 to a low of 10% in 2009 (Figure 3c).

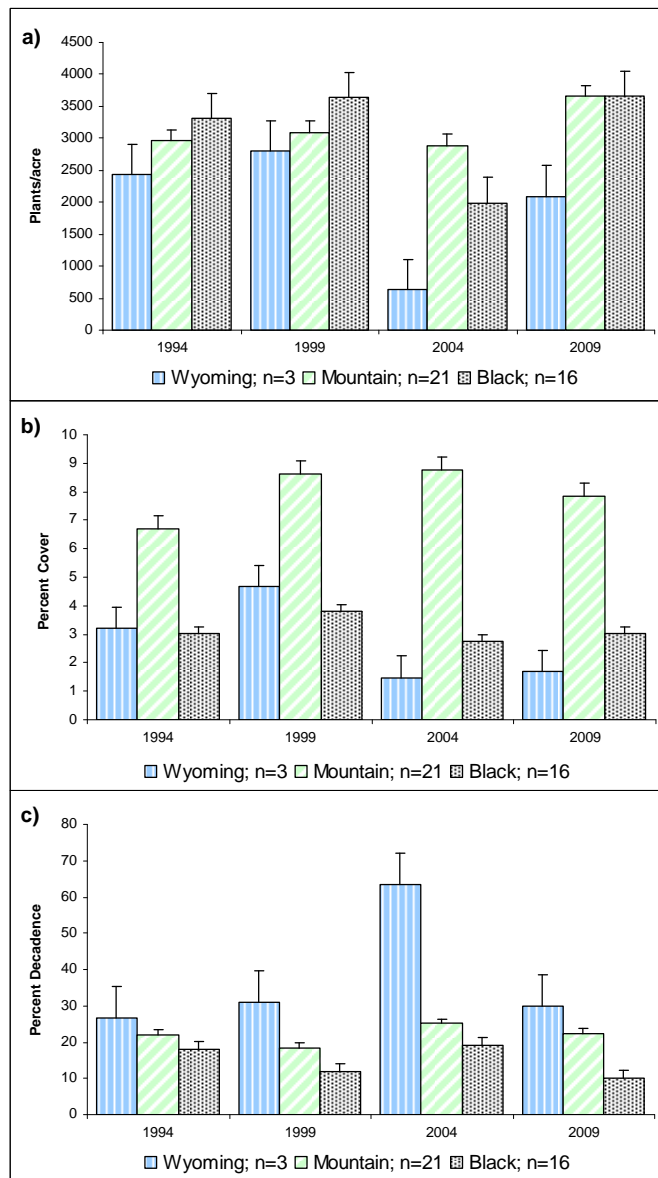


Figure 3. a) Mean density of sagebrush (*Artemisia* spp.) by year for WMU 16C, Central Mountains, Manti South. b) Mean cover of sagebrush by year for WMU 16C. c) Mean population decadence of sagebrush by year for WMU 16C.

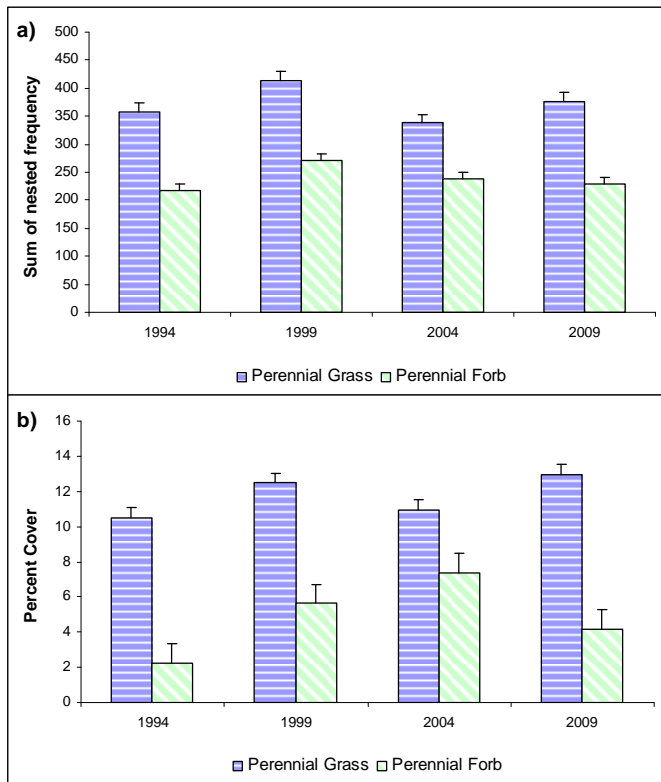


Figure 4. a) Mean perennial grass and perennial forb sum of nested frequency by year for WMU 16C, Central Mountains, Manti South. b) Mean perennial grass and perennial forb cover by year for WMU 16C.

Herbaceous Understory

The median grass trend (Figure 5). The mean perennial grass sum of nested frequency has fluctuated over the sample years with 1999 being significantly higher than all other sample years and 2004 being significantly lower than 1999 and 2009 (Figure 4a). The mean cover of perennial grass showed a similar trend, though cover was highest in 2009 and lowest in 1994 (Figure 4b). Cheatgrass (*Bromus tectorum*) was sampled on only a few studies at very low frequency and cover and was therefore not included in the unit summary.

The median forb trend (Figure 5). The mean perennial forb sum of nested frequency was similar in 1994, 2004, and 2009, but was significantly higher than all other sample years in 1999 (Figure 4a). The mean cover of perennial forbs increased significantly from 1994 to 1999, then increased again from 1999 to 2004, though not significantly, but decreased significantly from 2004 to 2009 (Figure 4b). No noxious weeds were sampled on the studies in this herd unit.

Desirable Components Index

Five of the studies that sample deer winter habitat, 16C-22, 16C-32, 16C-33, 16C-36, and 16C-40, are considered to be within the low potential scale for the deer Desirable Components Index (DCI). The mean DCI ranking for these studies has remained relatively stable at Fair over the sample years (Figure 6 and Table 1).

Nineteen studies, 16C-13, 16C-14, 16C-15, 16C-17, 16C-18, 16C-20, 16C-23, 16C-24, 16C-25, 16C-26, 16C-27, 16C-28, 16C-29, 16C-31, 16C-34, 16C-35, 16C-41, 16C-42 and 16C-43, are considered to be within the mid-level potential scale for the deer DCI on this unit. The mean mid-level potential DCI ranking of the unit increased from poor-fair to fair-good from 1994 to 1999 then decreased to fair in 2004 and 2009 (Figure 6 and Table 2).

Three studies, 16C-19, 16C-30 and 16C-44, are considered to be within the high potential scale for the deer DCI on this unit. There was little change in the mean high potential DCI ranking and scores remained similar over the sample years with a ranking of good (Figure 6 and Table 3).

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	10.2	6.4	1.6	15.1	0.0	1.4	0.0	34.6	Fair
99	8.8	3.5	3.8	21.2	-0.1	2.8	0.0	40.1	Fair
04	9.3	6.3	2.0	15.6	0.0	4.6	0.0	37.7	Fair
09	8.0	5.7	7.5	19.8	-0.1	1.2	0.0	42.2	Fair

Table 1. Low potential scale mean deer DCI scores (n=7) by year for WMU 16C, Central Mountains, Manti South. The deer DCI scores are divided into three categories based on ecological potentials which include low, mid-level and high.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	12.4	6.9	4.2	20.9	0.0	3.7	0.0	48.1	Poor-Fair
99	17.3	10.6	8.8	22.6	0.0	5.7	0.0	65.0	Fair-Good
04	16.2	7.7	4.9	20.0	0.0	4.7	0.0	53.5	Fair
09	15.3	9.5	8.6	20.4	0.0	4.5	0.0	58.2	Fair

Table 2. Mid-level potential scale mean deer DCI scores (n=17) by year for WMU 16C, Central Mountains, Manti South. The deer DCI scores are divided into three categories based on ecological potentials which include low, mid-level and high.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	25.8	11.5	8.7	18.2	0.0	10.0	0.0	74.2	Good
99	26.8	12.2	13.7	17.5	0.0	10.0	0.0	80.2	Good
04	26.7	12.5	12.7	20.2	0.0	9.4	0.0	81.6	Good
09	27.6	11.5	8.7	20.0	0.0	8.5	0.0	76.3	Good

Table 3. High potential scale mean deer DCI scores (n=3) by year for WMU 16C, Central Mountains, Manti South. The deer DCI scores are divided into three categories based on ecological potentials which include low, mid-level and high.

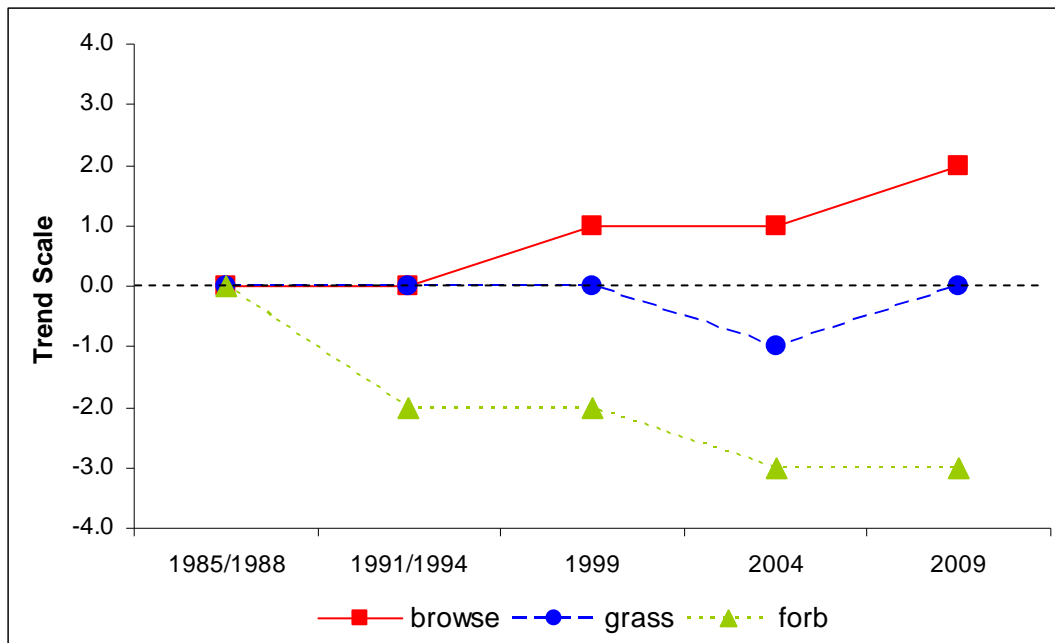


Figure 5. Cumulative median browse, grass and forb trends by year for WMU 16C, Central Mountains, Manti South.

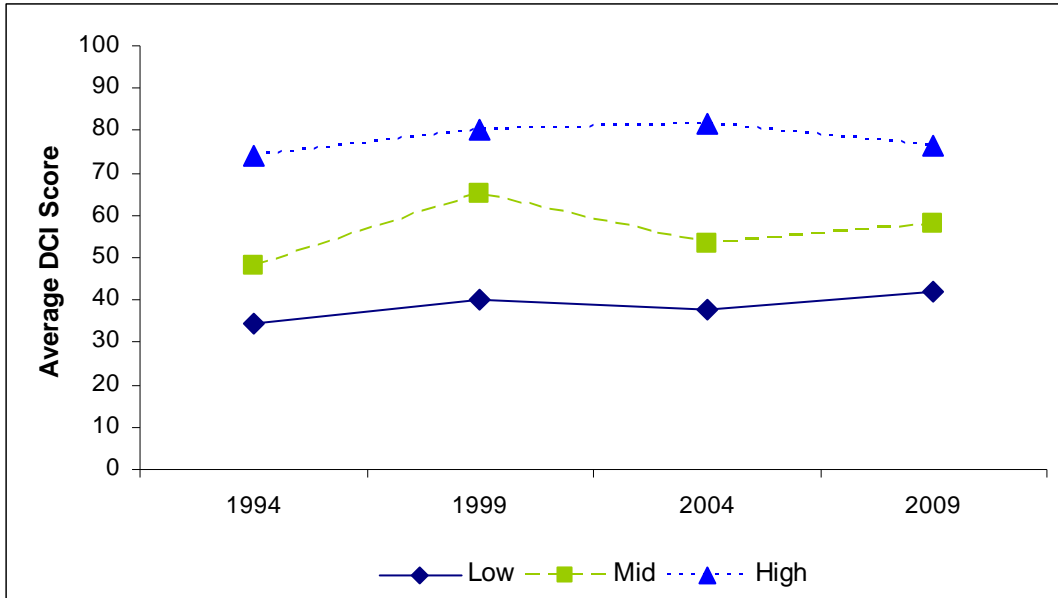


Figure 6. Mean low (n=7), mid-level (n=17) and high (n=3) potential scale DCI scores for WMU 16C, Central Mountains, Manti South. The deer DCI scores are divided into three categories based on ecological potentials which include low, mid-level and high.