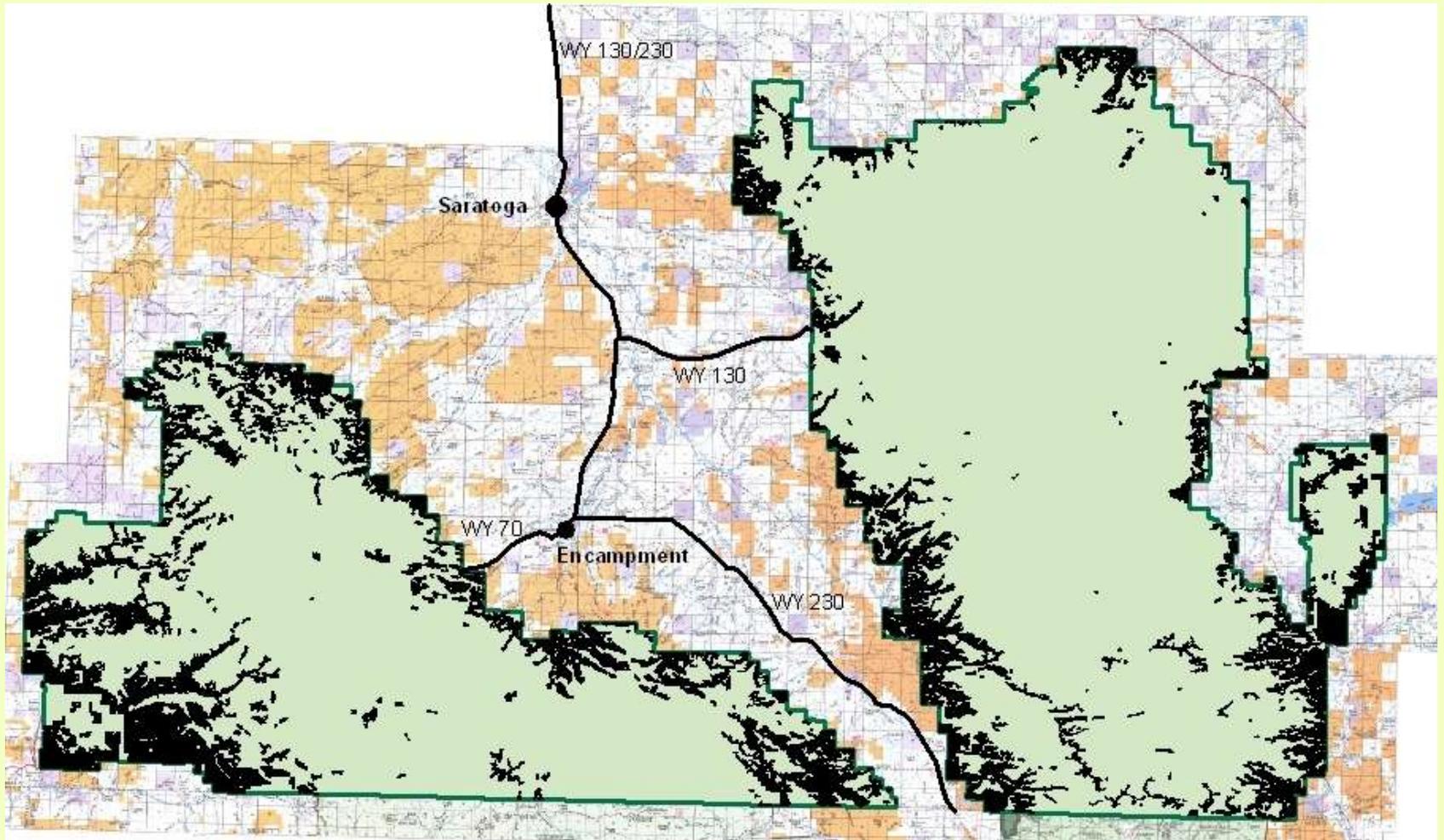


Condition of Mule Deer Habitat on National Forest Land in the Platte Valley

Shrublands, Aspen, Riparian areas
and Wetlands

Upland Shrublands

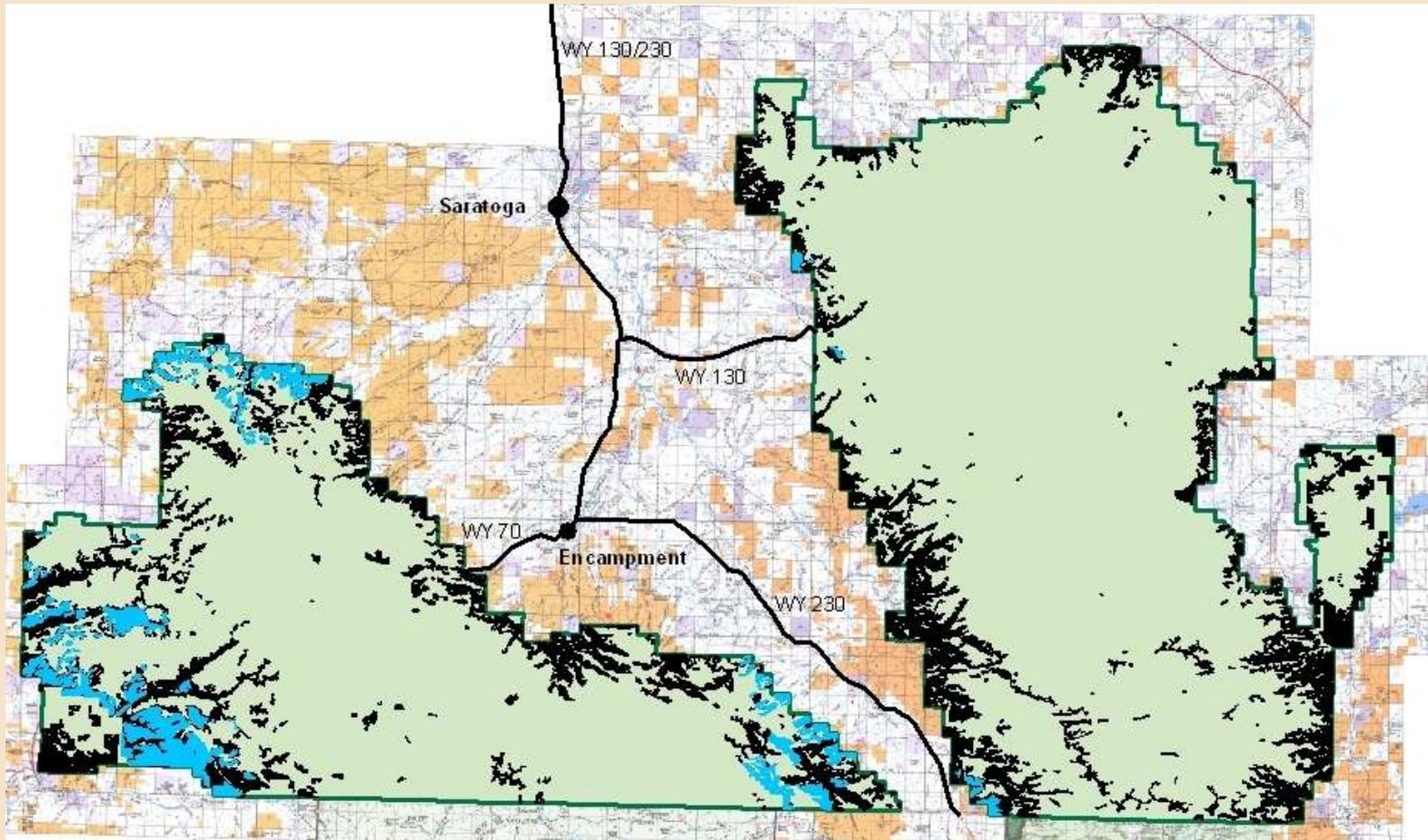


There are approximately 100,000 acres of upland shrublands on the Sierra Madre and Snowy Range, mostly distributed around the edges of both mountain ranges.

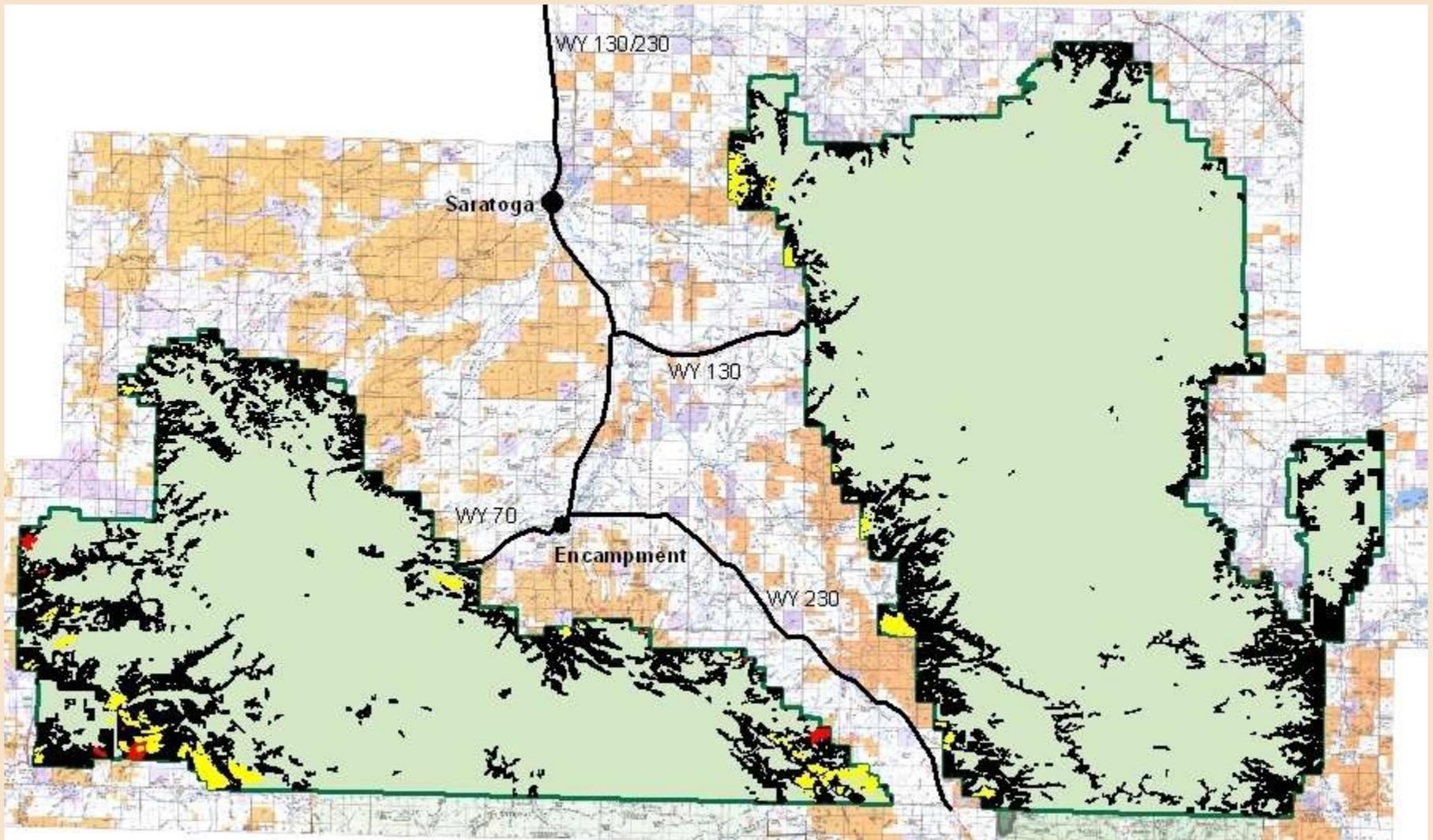


Upland shrublands include big sagebrush sites as well as mixed shrublands that usually include some sagebrush, but may also contain antelope bitterbrush, serviceberry, snowberry, rabbitbrush, Gambel's oak, chokecherry, alderleaf mountain-mahogany, or snowbrush ceanothus.

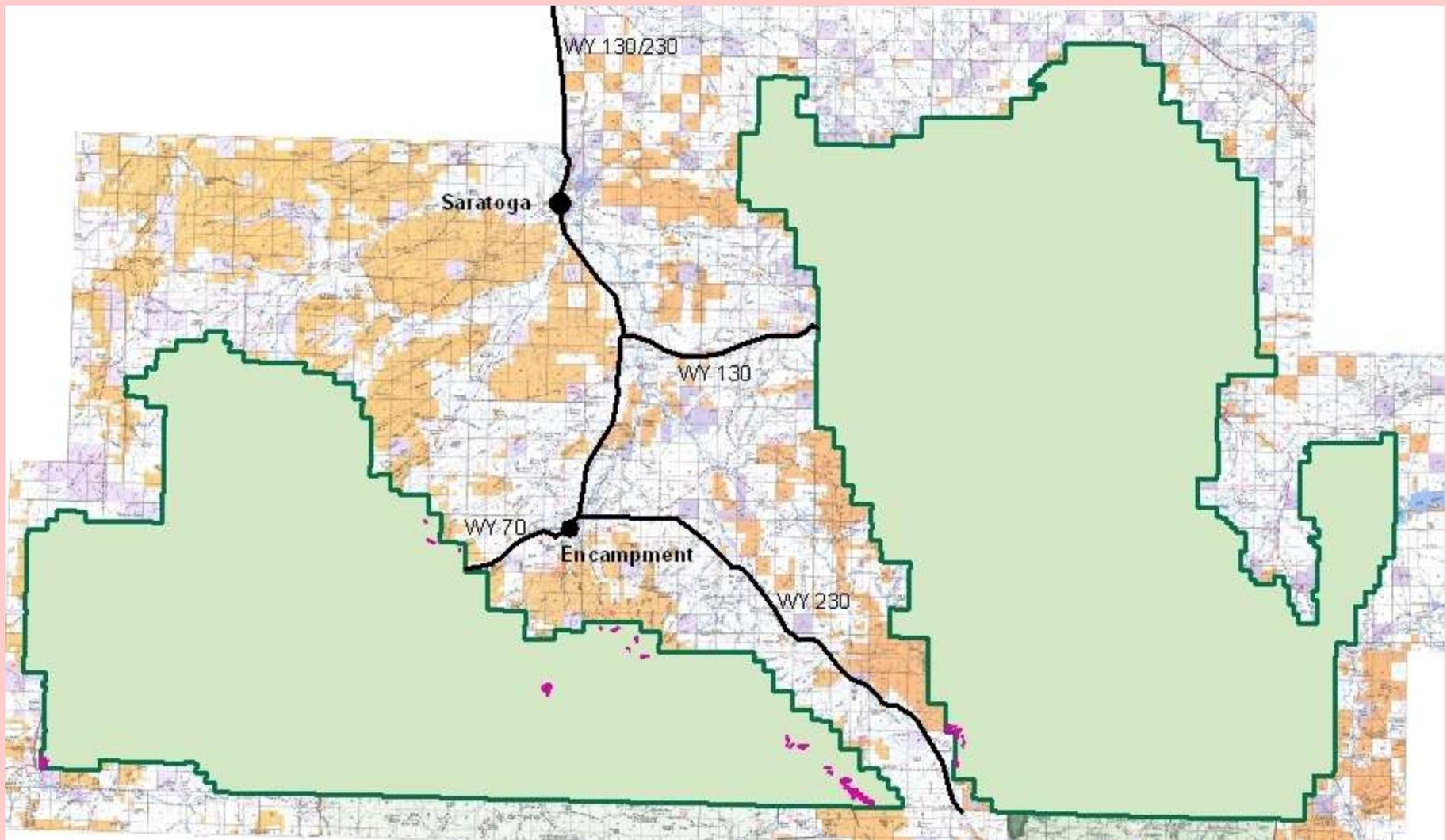
Sagebrush species include the mountain and Wyoming subspecies of big sagebrush and smaller populations of silver sagebrush, black sagebrush, threetip sagebrush and alkali sagebrush.



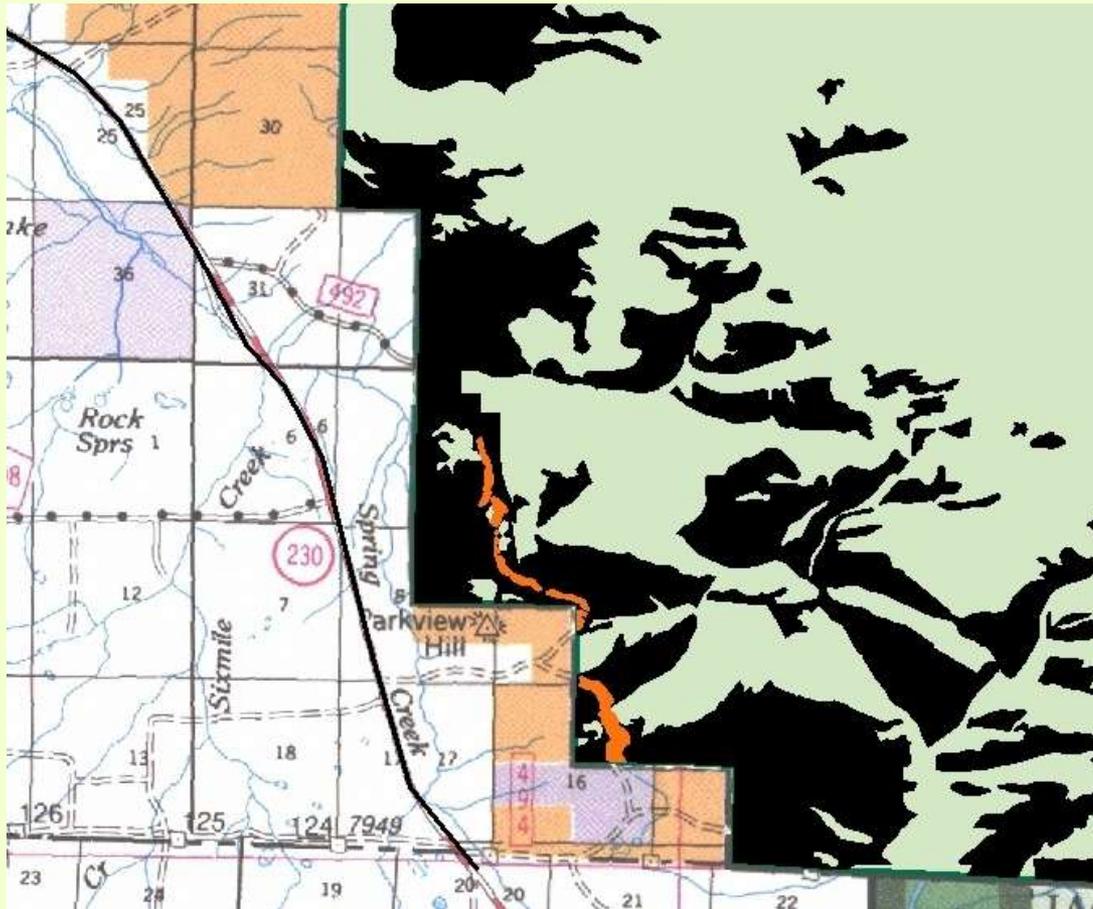
Forest Service rangeland managers have been chemically treating shrublands since the 1950's to increase herbaceous forage for cattle and wildlife. Approximately 21,000 acres were sprayed with the herbicide 2,4-D between 1956 and 1989 to kill big sagebrush. 90% of that was applied in the 1960's and 1970's.



Prescribed burns (shown in yellow) have been conducted periodically since 1980 to create a variety of shrubland age classes and increase herbaceous understory for cattle and wildlife. About 8,000 acres have been treated in this manner. There have also been a few shrubland wildfires (shown in red) since 1980. Wildfire burn acres in shrublands from 1980 to the present total about 3,100 acres.



From 1984-1994 Forest Service wildlife biologists experimented with fertilization of shrublands and clearcuts to enhance habitat for mule deer, bighorn sheep and elk. About 840 acres were fertilized.

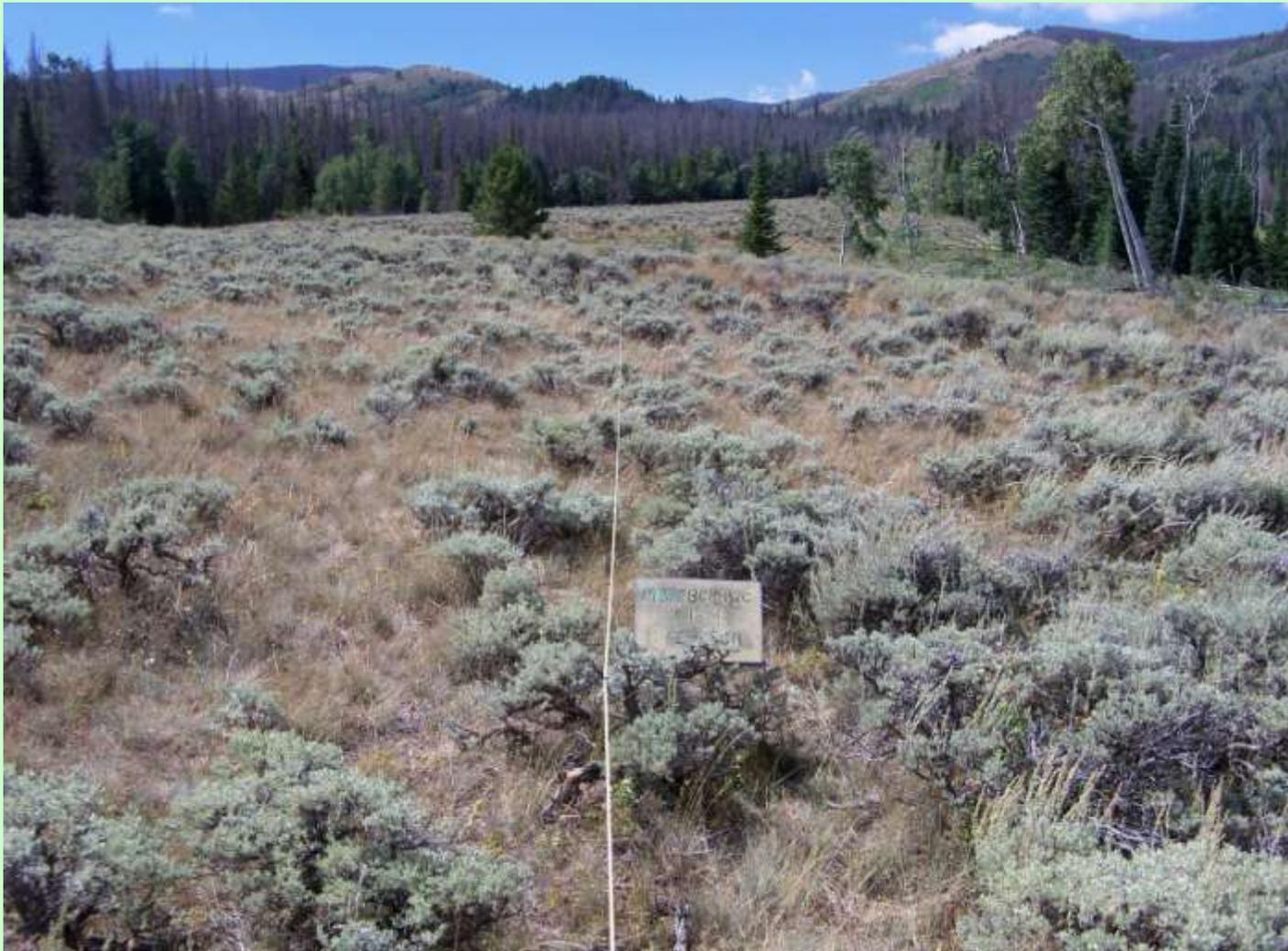


In 1995 about 70 acres in the Six Mile area were seeded with true mountain-mahogany and serviceberry, in an attempt to increase shrub species diversity for mule deer. The seed was broadcast by hand. We could not detect any new shrub establishment.



**So what's the condition of
our our National Forest
shrublands today?**

8/24/2009



Long term monitoring transects show most of our upland shrubland sites range from Fair to Good condition with an upward trend. The herbaceous layer is increasing in density and vigor and bare ground is decreasing.



Condition of the shrubs themselves varies by species palatability, site characteristics, current and past browsing history and age of the stands.



A photograph of a hillside covered in dry, yellowish-brown grass and shrubs. In the foreground, there is a large, dense shrub with green and yellow leaves. The background shows a forest of evergreen trees under a clear blue sky.

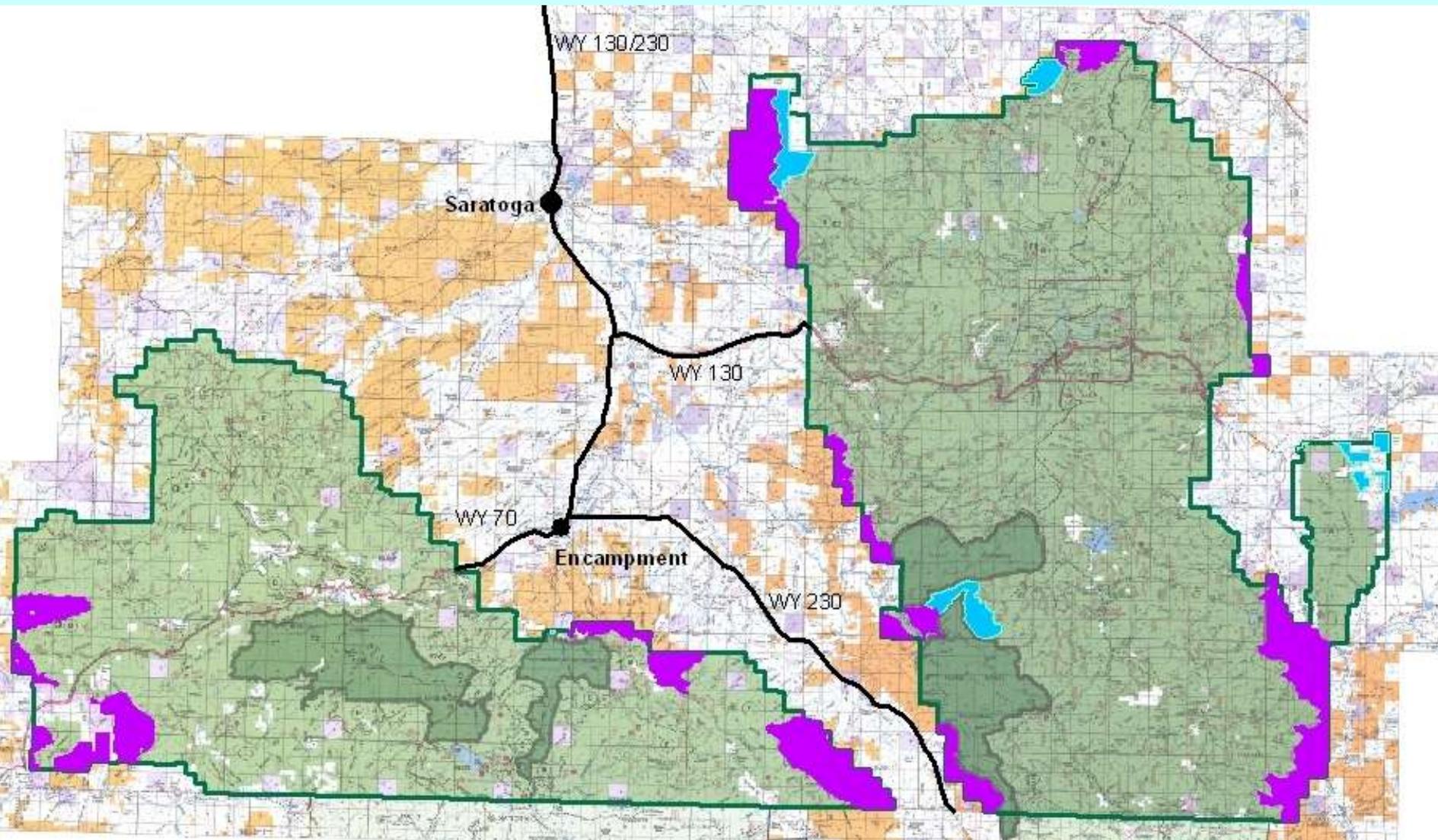
Alderleaf mountain mahogany

Palatability

Some upland shrub species are so palatable they are usually moderately to heavily browsed wherever they occur on the Sierra Madre and Snowy ranges, especially on big game winter ranges.

A photograph of a Serviceberry shrub in a field. The shrub is green and has small, round fruits. The background shows a wide, open landscape with mountains in the distance under a blue sky with white clouds.

Serviceberry



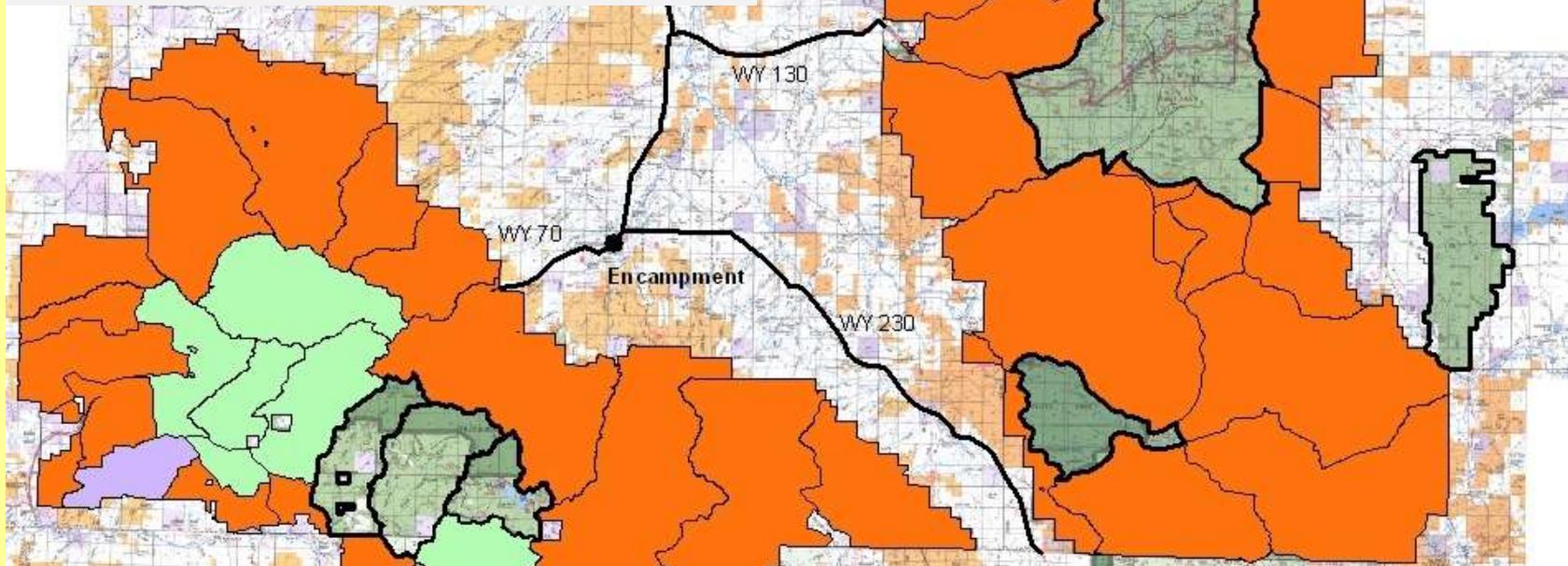
Forest Plan Management Emphasis Areas

Purple = Crucial winter range for deer and elk

Blue = Winter range for deer and elk

The crucial winter range areas are closed to motorized vehicles from Nov. 15 to April 30.

Orange = cattle allotments
Pale green = sheep allotments
Lavender = sheep & cattle allotments
No color filled in = vacant allotments



At present, all the National Forest grazing allotments on the east side of the Sierra Madre and on the Snowy Range are cattle allotments.

Cattle grazing can alter herbaceous understory of shrublands, but under present stocking levels and management systems they generally have light browsing impact upon mature upland shrubs. In localized areas such as fence corners, salt grounds and around water developments cattle can damage or destroy shrubs through trampling.



How cattle use the herbaceous vegetation in shrublands can affect shrubland health in a variety of ways

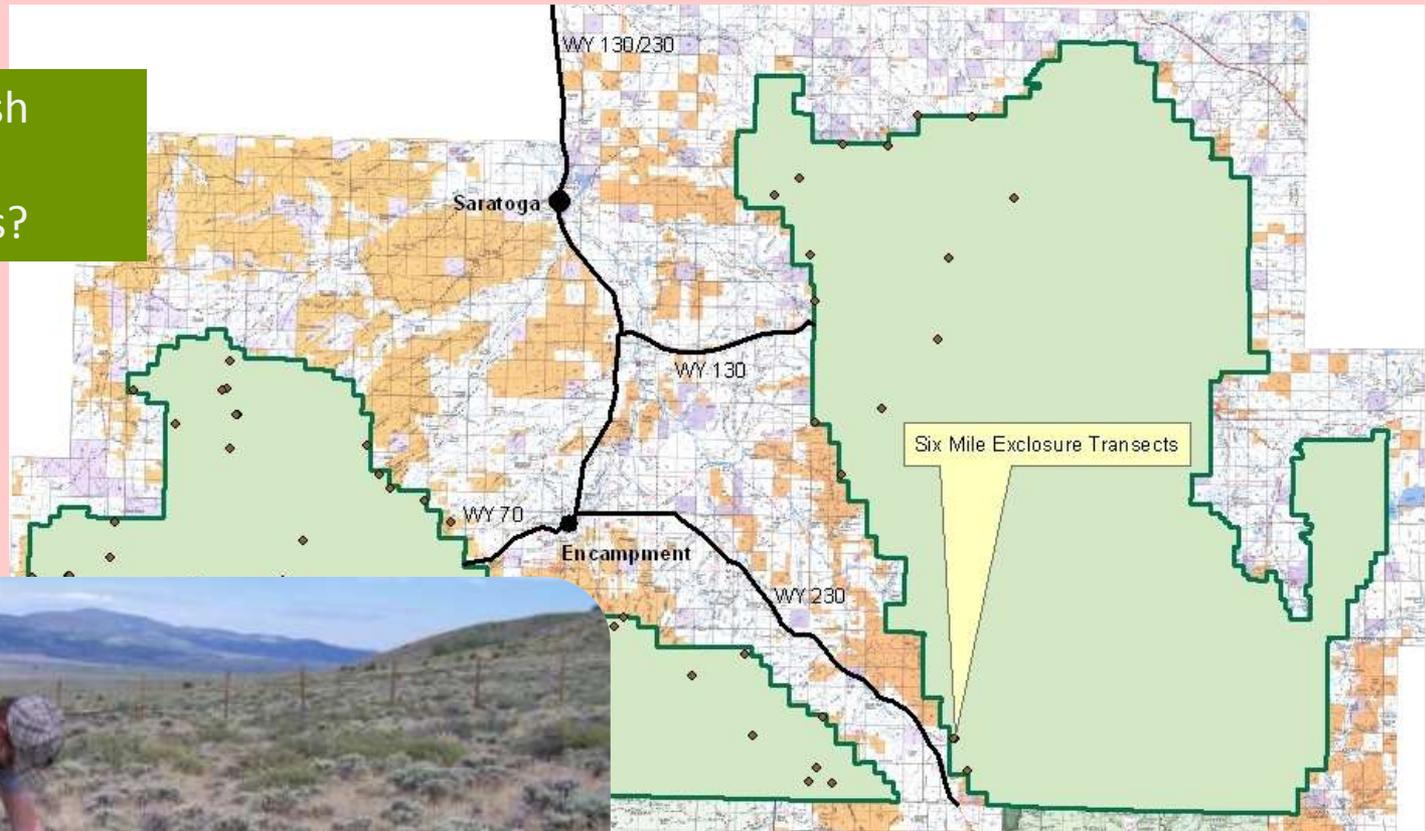
- Establishment of shrub seedlings
- Soil stability and water retention
- Herbaceous layer species composition, diversity and vigor

Forest Plan guidelines call for maximum forage utilization of 40-50% on most rangelands. We don't achieve that everywhere all the time, but we're getting there!

Burned shrublands are generally not grazed during the growing season for the first one or two years following fire.



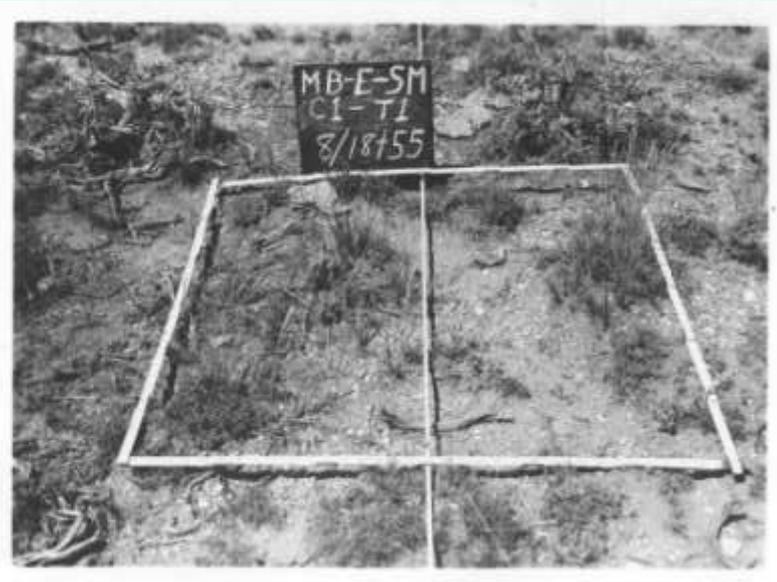
How do we distinguish livestock and wildlife effects on shrublands?



In 1952 two exclosures were built in the Six Mile area, one to exclude all large ungulates and the other to exclude cattle.

Permanent vegetation transects have been run periodically from 1955 to the present.

1955



Transect outside the exclosures; accessible to cattle and big game

2012



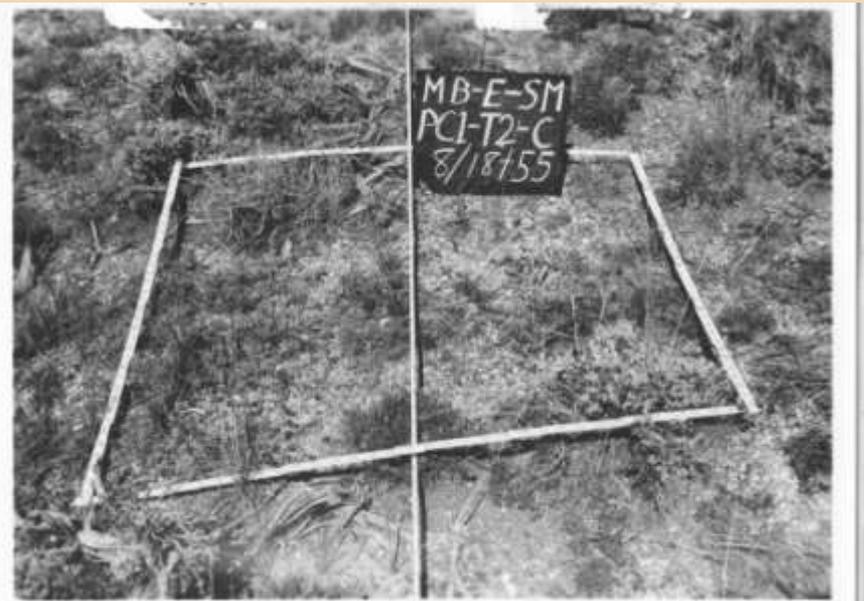
**C1-Outside Exclosures
NW,SE,3,13N,80W**

	1955	1960	1965*	1970	1980*	1985	2002	2012
Plant Density Index	37	29	43	43	42	56	52	54
Litter	11	34	14	27	18	15	15	18
Gravel	17	8	17	6	13	20	15	18
Bare Ground	34	29	26	25	26	9	14	12
Idaho Fescue	0	0.5	1	0	0	3	7	6
Needlegrass	4	0.5	1	0	0	0	0	0
Wheatgrass (Agsm, Agsp)	6	6	2	1	1	3	4	2
Bluegrass (mostly Posa)	2	3	1	3	3	4	10	15
Junegrass	2	3	0	3	3	4	4	<1
Dryland sedge	0	0	0	0	0	0	0	0
Big Sagebrush	8	5	7	13	5	11	10	11
Bitterbrush	0	0	0	0	0	0	0	0
Broom snakeweed	8	5	13	10	11	10	5	10
Date Read	18-Aug	18-Jul	20- Aug*	29-Jul	9-Sep*	13-Aug	25-Jun	27-Jun

*only 1 of 2 transects (T1) read in 1965 and 1980

Outside the exclosures there has been improvement in the diversity and composition of the plant community and in soil cover.

1955



Inside the cattle enclosure; accessible to elk and mule deer

2012



Inside the cattle enclosure there have been similar improvements over time, but with more marked improvement in soil cover.

PC1C-Cattle Enclosure NW,SE,3,13N,80W								
	1955	1960	1965	1970	1980	1985	2002	2012
Plant Density Index	33	21	35	39	40	47	53	59
Litter	31	50	33	39	40	35	26	18
Gravel	45.5	35.5	37.5	9.5	31.5	20	14	15
Bare Ground	13	16	15	29	11	11	7	7
Idaho Fescue	0	2	1	1	2	0	0	8
Needlegrass	2	0	0.5	0	0	0	2	0
Wheatgrass (mostly blueb)	6	6	5	3	3	4	6	5
Bluegrass	3	2	3	5	1	3	2	8
Junegrass	4	2	0.5	2	3	3	3	0
Dryland sedge	1	0	0	0	0	0.5	0.5	0
Big Sagebrush	6	3	5	7	8	10	10	12
Bitterbrush	0	0	0	0	0	3	5	7
Rabbitbr/Snakeweed	5	5	7	9	11	12	9	8
Date Read	18-Aug	18-Jul	23-Aug	29-Jul	9-Sep	13-Aug	25-Jun	28-Jun

1955



Inside the Game Exclosure; not accessible to cattle, deer, or elk

2012



Inside the game exclosure the increase in plant density, shrub canopy cover and ground cover was greater than outside the exclosures or in the cattle exclosure.

PC1G-Game Exclosure								
NW,SE,3,13N,80W								
	1955	1960	1965	1970	1980	1985	2002	2012
Plant Density Index	39	33	43	46	51	61	64	66
Litter	31	50	33	39	40	35	28	25
Gravel	19	8	16	2	7	2	4	4
Bare Ground	11	9	9	14	3	3	3	4
Idaho Fescue	0	0	1	0	2	6	10	11
Needlegrass	2	3	1	0	2	3	4	3
Wheatgrass/bottlebrush sqt	14	7	5	1	3	4	1	5
Bluegrass	5	5	2	2	2	1	1	3
Junegrass	0	0	1	2	3	3	1	0
Dryland sedge	1	0	1	0	0	0	1	<1
Big Sagebrush	11	13	28	33	32	32	40	31
Bitterbrush	2	3	3	3	5	7	4	9
Rabbitbr/Snakeweed	0	0	0	1	1	3	1	2
Date Read	18-Aug	18-Jul	23-Aug	29-Jul	9-Sep	13-Aug	26-Jun	27-Jun

2012 Cover/Frequency Transect Readings Compared (all cover measurements)

	Big Game Exclosure	Cattle Exclosure	Outside Exclosures
GROUND COVER			
Litter	50	19	17
Bare Ground	5	17	20
Gravel	3	18	24
Moss/Lichen	7	3	1
Basal Vegetation	27	23	26
SHRUBS			
Big sagebrush	31	10	10
Broom snakeweed	<1	11	12
Antelope bitterbrush	11	7	0
Douglas rabbitbrush	<1	0	0
Spineless horsebrush	2	0	<1
GRASSES/SEDGES			
Idaho fescue	31	11	4
Western wheatgrass	5	8	2
Needle-and-thread	5	0	0
Sandberg bluegrass	2	9	16
Junegrass	0	2	1
Letterman needlegrass	<1	0	0
Threadleaf sedge	0	<1	1
Nelson's needlegrass	7	0	0
Bluebunch wheatgrass	5	5	5
Fendler bluegrass	1	1	1
Canby bluegrass	8	1	1
FORBS			
# Perennial Forb Species	10	14	16

Plant communities were compared using a similarity coefficient:

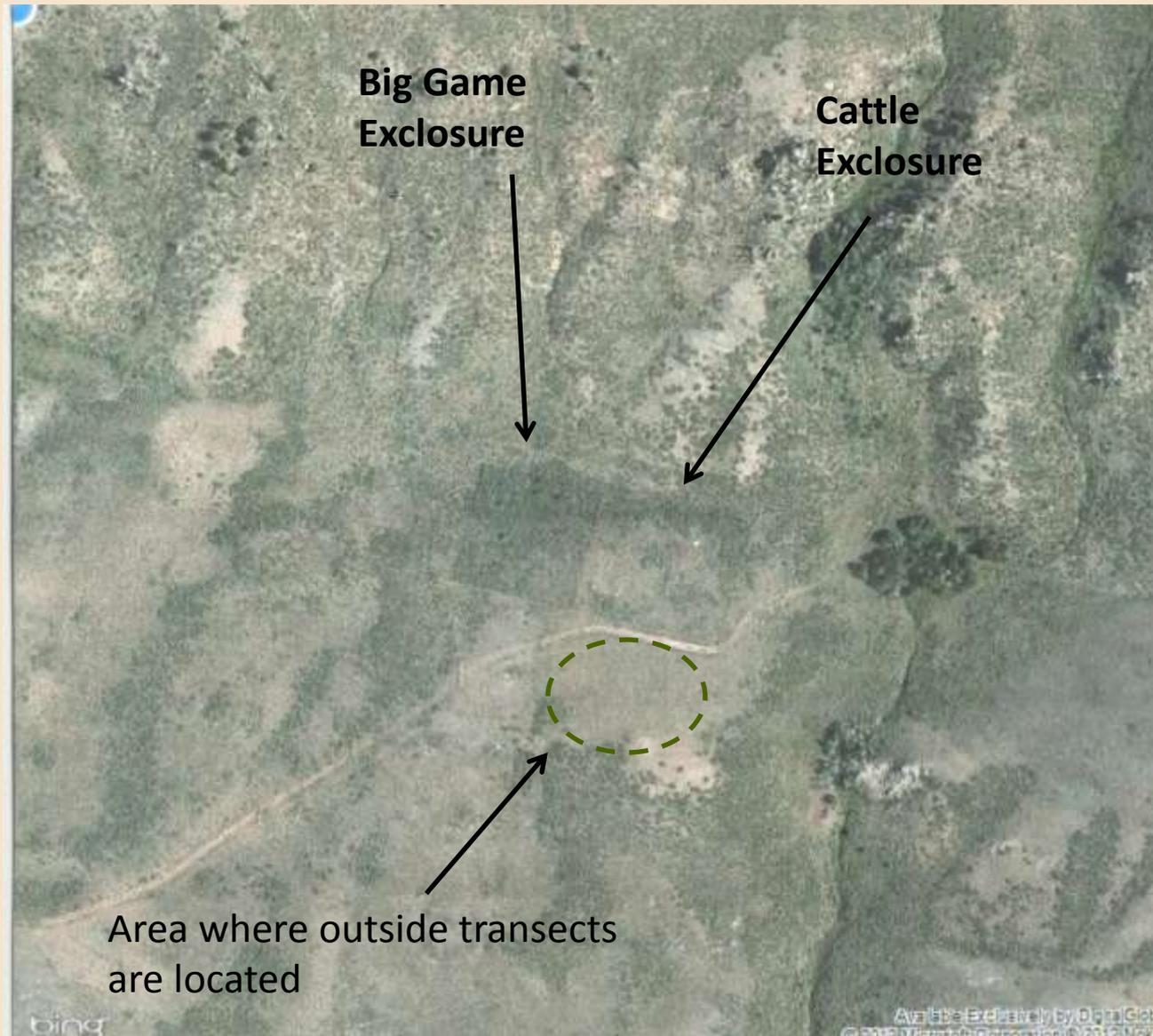
The Cattle Exclosure and Unprotected site were 82% similar

The Game Exclosure and Unprotected site were 42% similar

The Game Exclosure and Cattle Exclosure were 47% similar

2012 Aerial Photo of the Exclosures

Note that there are also site differences that influence the plant communities





Prescribed burning has increased production of herbaceous species, particularly grasses, on most sites.

It has also revitalized bitterbrush, serviceberry and other shrubs that sprout from the root crown following fire.

But...

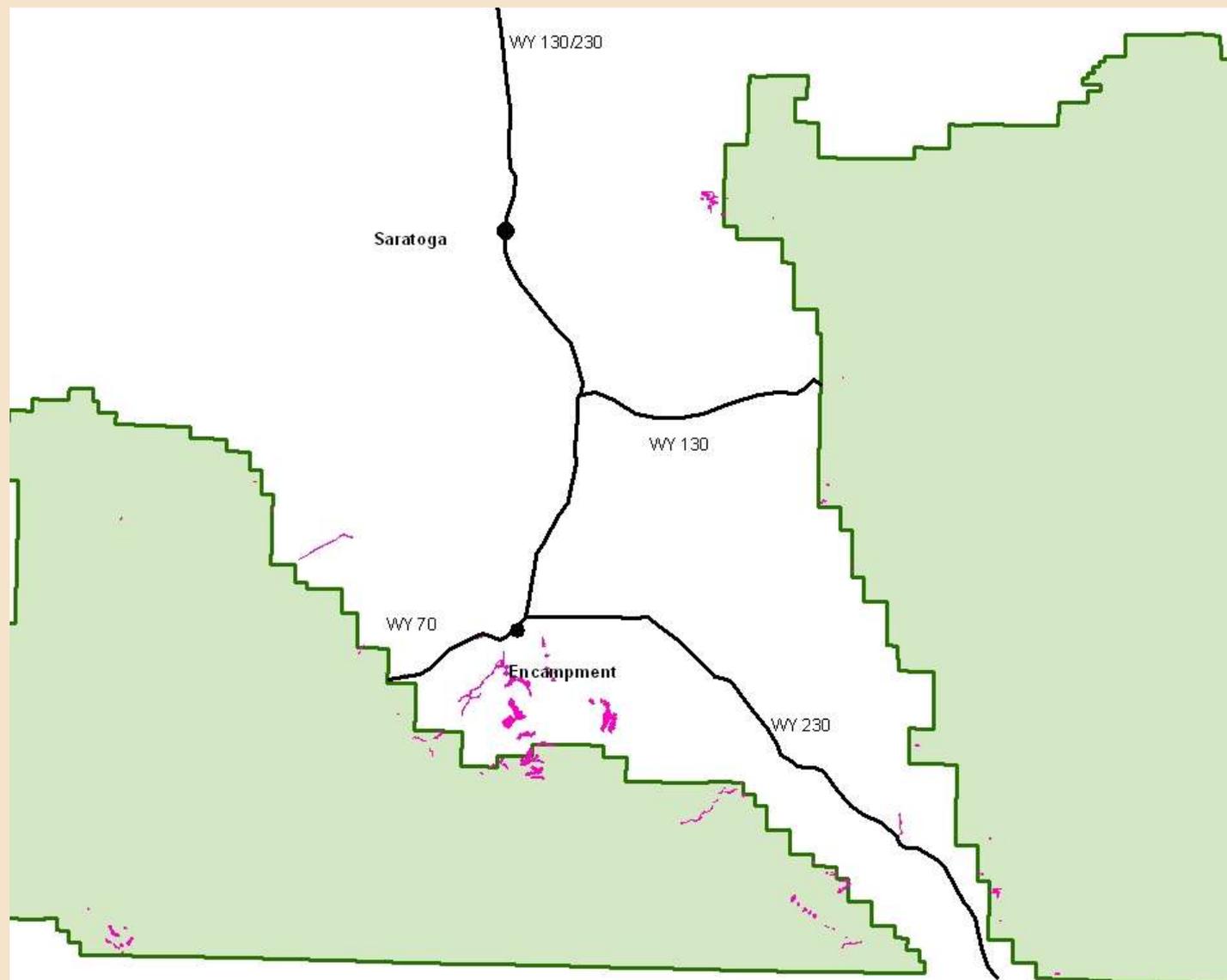




Prescribed burns (and wildfires) have resulted in cheatgrass infestations on some sites since 2000.

On a few sites fires have resulted in dominance by rubber rabbitbrush or silver sagebrush, which are less palatable to deer than big sagebrush and may delay establishment of new big sagebrush seedlings.





Since 2000 we've mapped about 500 acres of cheatgrass dominated shrublands on the Brush Creek/Hayden District. Some infestations are on the graded margins of roads, while many of the other infestations are on prescribed burn or wildfire sites.

An unforeseen after-effect of a prescribed burn at Six Mile (and possibly climate change?): In 2000, white-tailed prairie dogs moved into a site that we burned in 1989 and which still had low sagebrush canopy cover. Prairie dogs have since altered parts of the site dramatically.



In and around the prairie dog burrows there is poor ground cover, low plant species diversity, and a scarcity of shrubs other than broom snakeweed.

Big sagebrush re-establishment on burned and herbicide treated sites varies widely from site to site.

Changes in Big Sagebrush Canopy Cover on Brush Creek/Hayden District

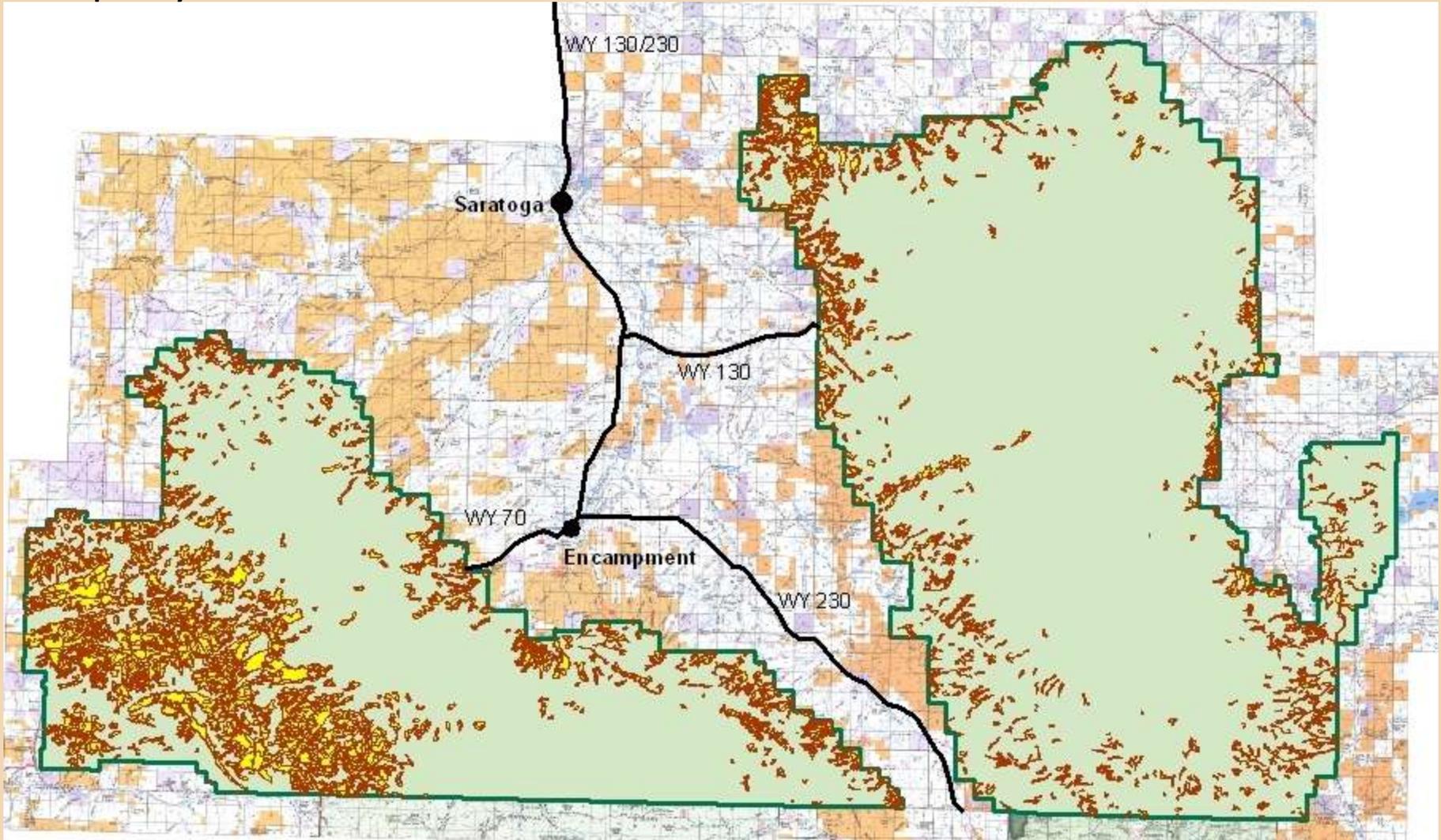
Transect Location	Treatment Type	Years Since Treatment	Canopy cover Change	Pre-treatment Canopy cover
Big Creek Park	2,4-D Spray	47	0→26%	19%
Big Creek Park	2,4-D Spray	47	0→27%	28%
Holroyd Park	2,4-D Spray	13	0→19%	23%
Holroyd Park	Burn	32	4→7%	19%
Holroyd Park	Burn	8	0→0%	32%
Two Creek	2,4-D Spray	37	2→17%	22% (Putr 24→40%)
Six Mile	2,4-D Spray	40	0→19%	34% (Putr 14→23%)
McLain Park	2,4-D Spray	43	4→15%	Unknown
Joe's Park	2,4-D Spray	20	0→7	13%
Hartt Creek	2,4-D Spray	39	0→20%	40%
Ethel's Pasture	2,4-D Spray	30	0→10%	24%
Ethel's Pasture	Burn	18	0→0%	10% (Syor 17→27%) (Putr 11→5%)
South Beeler Pasture	2,4-D Spray	30	0→28%	19%
South Beeler Pasture	Wildfire	7	0→1%	28%
Cottonwood East Pasture	2,4-D Spray	13	0→4%	14%
Logan Flats Pasture	2,4-D Spray	44	0→7%	1% (Arca 0→3%) Prespray Arca was 19%
Logan Flats Pasture	2,4-D Spray	44	0→11%	8% (Arca 4→15%)
Cook Allotment	Burn	12	0→7%	22% (Syor 12→25%)
North Brush – Sowder Ranch Exclsoure	Burn	11	0→<1%	10%
North Brush – Outside Sowder Ranch Excl.	Burn	11	0→<1%	28%

On big sagebrush sites that have not been treated within the past 60 years or longer, canopy cover does not always increase at a predictable rate and may decrease. An old big sagebrush stand is not necessarily a dense or decadent stand.

Transect Location	Measurement Interval and Canopy Cover Changes
Wood Mtn. C1	(34 year interval) canopy cover increased then decreased to near 1959 level; 14%→29%→17%
Wood Mtn. C2	(34 year interval) canopy cover increased, then decreased; 20%→38%→25%
Big Creek C3	(39 year interval) canopy cover increased; 16%→32%
Beaver Creek C1	(54 year interval) canopy cover decreased; 40%→20%
Beaver Creek C2	(52 year interval) canopy cover decreased; 26%→14%
Beaver Creek C3	(52 year interval) canopy cover fluctuated; 4%→9%→5%→9%
West Sheep Mtn C2	(31 year interval) canopy cover increased: 4% → 11%
Six Mile PC1G (Big Game Exclosure)	(57 year interval) canopy cover increased, then decreased; 11%→ 40%→31
Six Mile PC1C (Cattle Exclosure)	(57 year interval) canopy cover increased; 6% → 12%
Six Mile C1 (outside exclosures)	(57 year interval) canopy cover increased; 8% → 11%
Spring Creek C1	(39 year interval) canopy cover increased; 26% →35%
Spring Creek C2 (outside exclosure)	(12 year interval) canopy cover decreased; 19% → 17%
Spring Creek C3 (inside cattle exclosure)	(12 year interval) canopy cover increased; 26% →33%
Spring Creek C4	(12 year interval) canopy cover decreased; 17% →14%
Encampment C1 (outside exclosure)	(50 year interval) canopy cover decreased, then increased; 12%→5%→24%
Encampment PC1 (inside cattle exclosure)	(50 year interval) canopy cover increased; 9% → 22%
North Brush C2 (outside exclosure)	(11 year interval) canopy cover decreased, then increased: 28%→23%→28%
North Brush C3 (inside exclosure)	(11 year interval) canopy cover increased: 8% →10%
Bow River C2	(12 year interval) canopy cover increased: 8% →10%

Aspen Habitat

- Approximately 80,000 acres of aspen on the Sierra Madre and Snowy Range.
- Over half is located on the west side of the Sierra Madre.
- Majority of aspen stands have been converting to coniferous forest through natural succession
- Bark beetle epidemic has reversed that trend in many mixed aspen/ lodgepole pine stands
- Drought years of 1999-2005 resulted in the death of many mature and old aspen clones across the area, especially in drier locations.



Right: An old aspen clone killed by the 1999-2005 drought, but regenerating nicely on its own. Middle Cedar Creek area



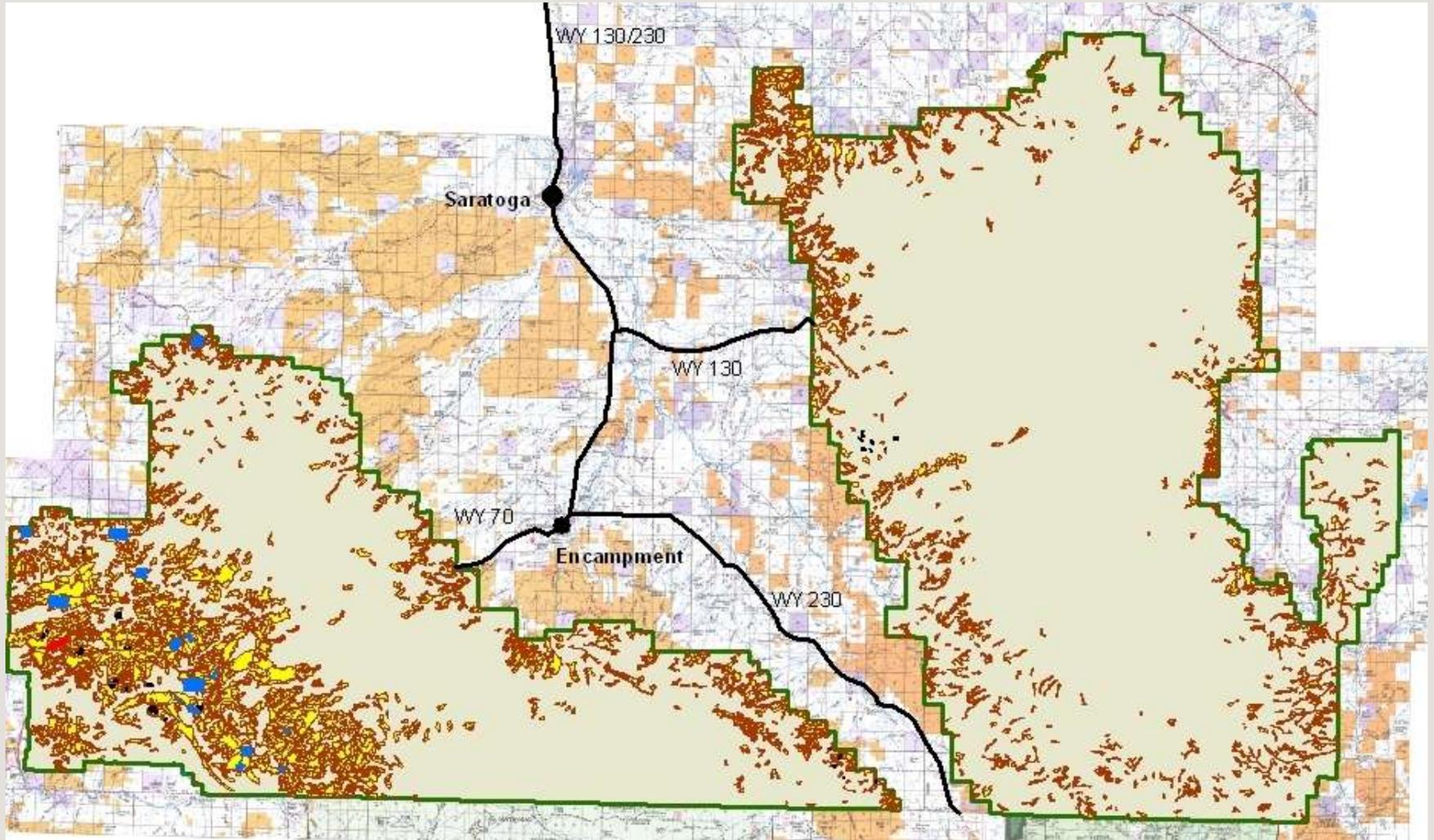
Left: Vigorous aspen stands, flourishing and expanding amid dead lodgepole pine stands. Quimby Park area

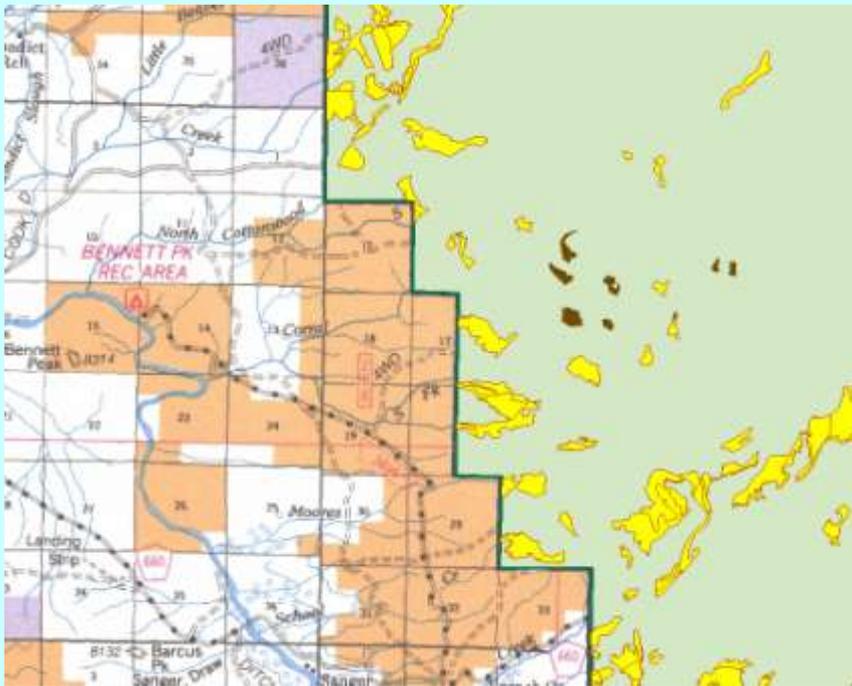
Since 1978 the Forest Service has been treating some aspen to reduce conifer encroachment or regenerate new stands.

Blue = conifer removal by cutting (1,120 acres)

Black = aspen clearcut to promote regeneration (380 acres)

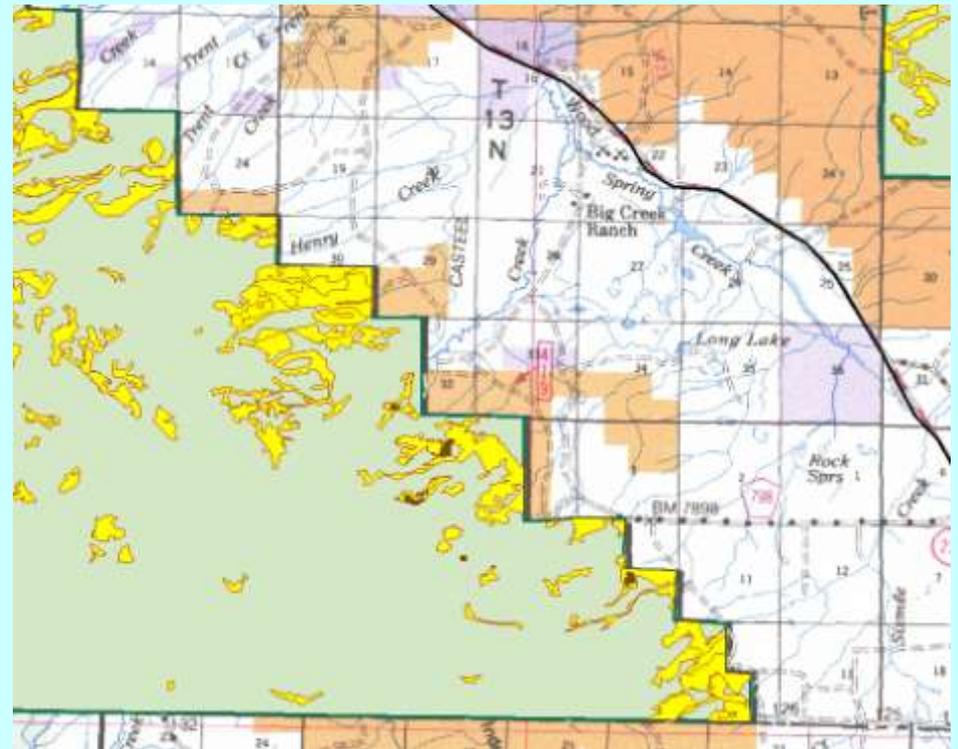
Red = understory burn to kill young conifers (195 acres)





Aspen clearcuts in the Barrett Ridge and Big Creek areas.

Very small aspen clearcuts of only a few acres may not regenerate very successfully due to heavy browsing of aspen sprouts by elk, deer and/or domestic livestock. Protection of young stands is often necessary for best results.





Left: Aspen stand with heavy subalpine fir encroachment. This is the natural successional path for much of our aspen, unless succession is set back by fire or cutting.

Right: A young aspen stand with little or no conifer component, except for common juniper in the understory. Many of the low elevation aspen stands on the east side of the Sierra Madre have juniper in the understory.





Cattle impacts to aspen stands

- Heavy grazing
- Trampling in loafing areas
- Browsing on aspen sprouts not a significant impact in most locations

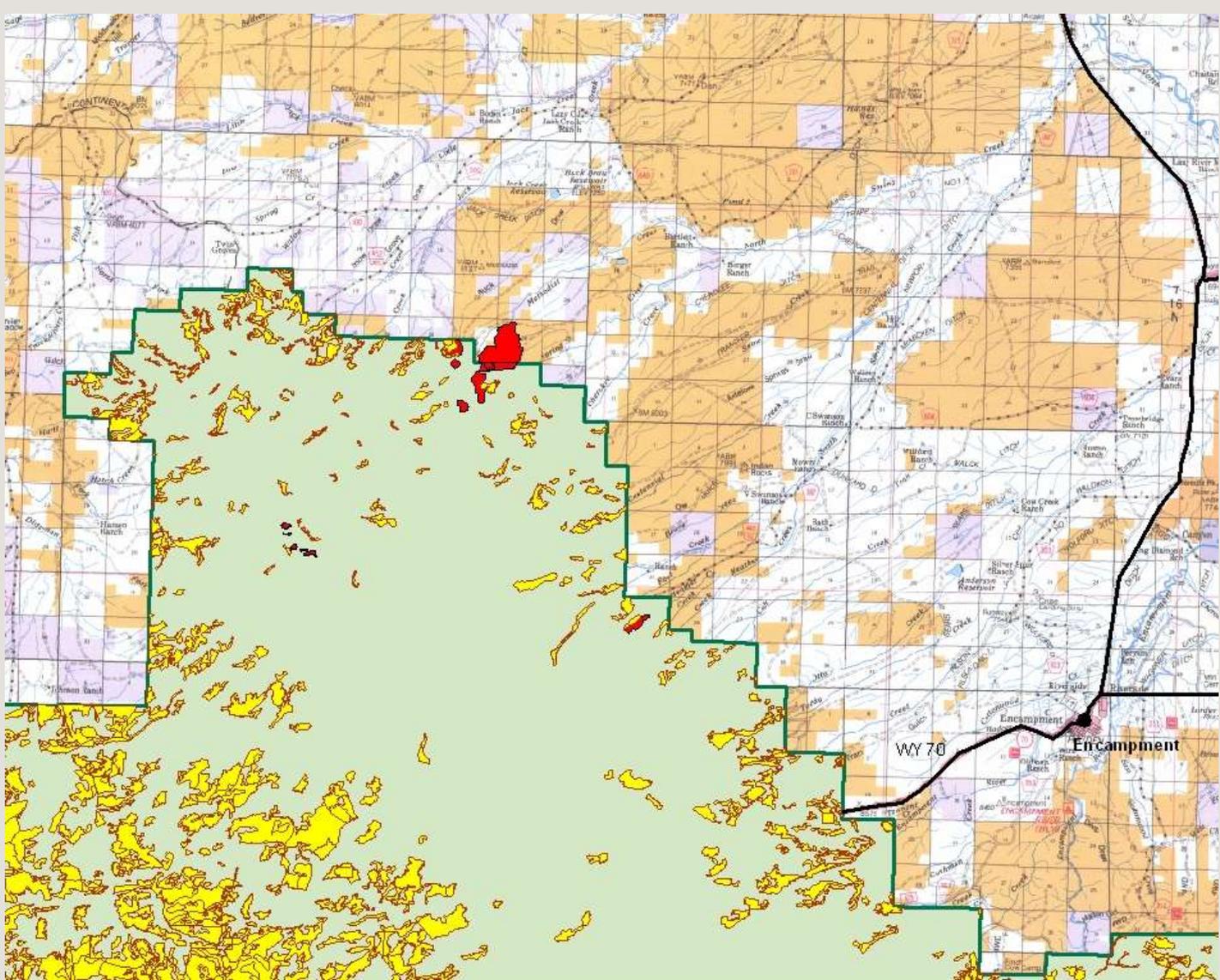
These types of impact mostly occurs in mid to late summer and in small aspen stands adjacent to sagebrush or riparian areas.



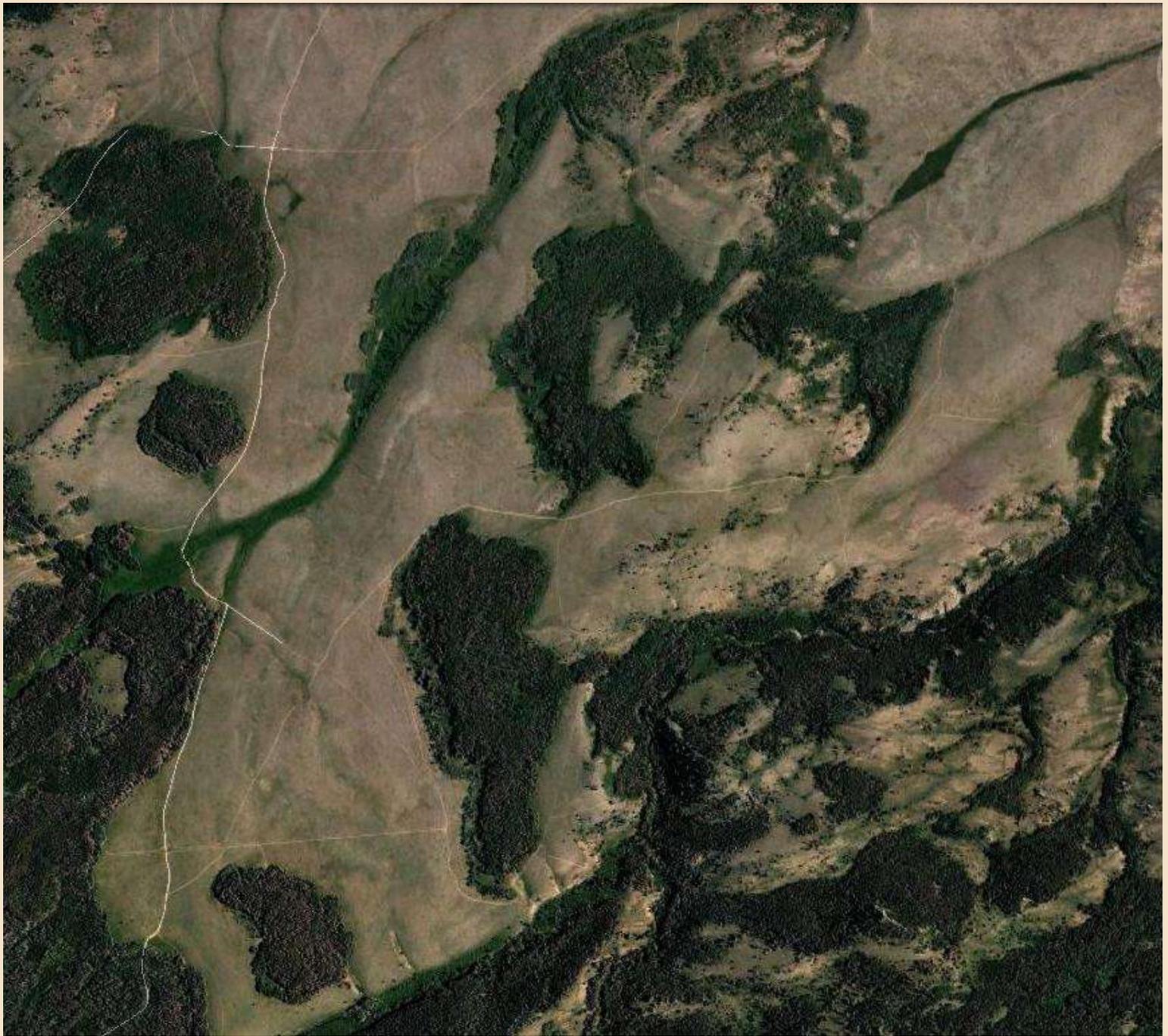
Wildlife effects on aspen

- Browsing of young sprouts
- Damage to bark of young and mature trees



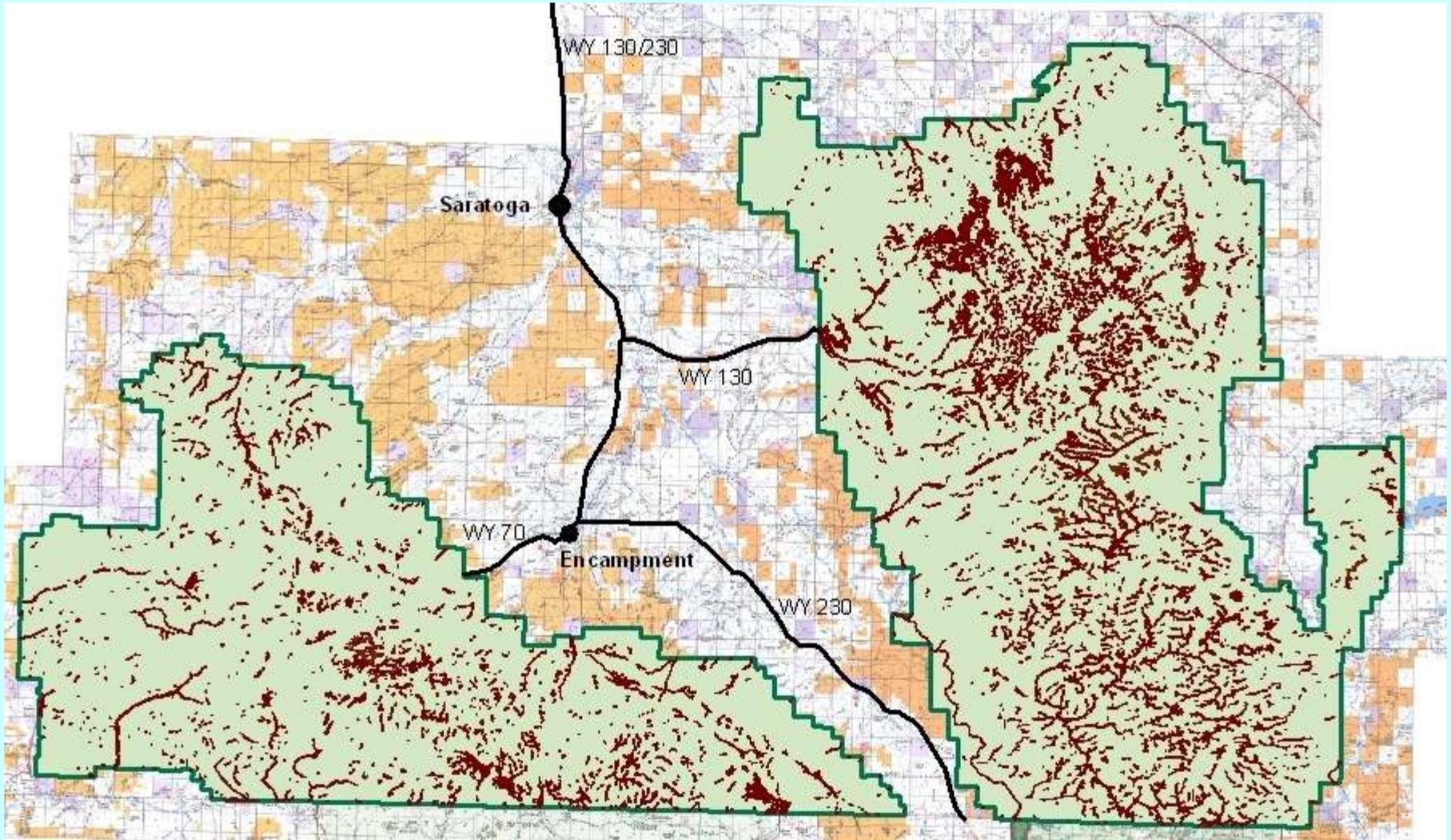


Proposed aspen regeneration treatments – part of the Savery Project
116 acres of aspen cutting; about 600 acres of encroached aspen burning



Riparian Area and Wetland Habitats

There are roughly 95,000 acres of riparian and wetland habitat on the Sierra Madre and Snowy Range, combined.





The majority of riparian and wetland habitats on the Brush Creek/Hayden District range from fair to excellent condition with stable or upward trends.

Improved livestock grazing systems, particularly the elimination of season-long grazing, and adjusted stocking rates are largely responsible for this improvement.

Good condition riparian areas, from an ecological and watershed management standpoint, mean more willows, alders and native sedges and grasses. More woody shrubs are usually beneficial to mule deer, but late successional sedge plant communities may not offer as much suitable forage.



1995



2010

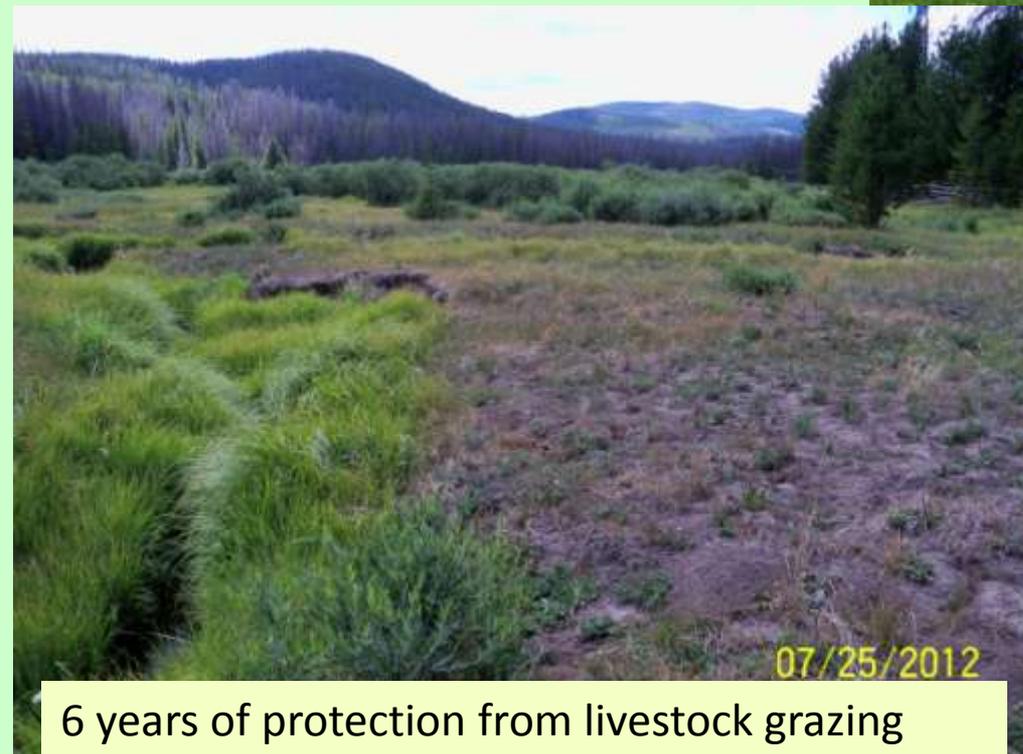


Improvement of Beaver Creek, tributary of North Fork Encampment River, brought about by implementation of a deferred grazing system and management of cattle distribution by a rider.

Transition zones, the meadows between the wet and dry plant communities, have been slower to improve



- Kentucky bluegrass /dandelion plant communities are hardy and persistent
- Transition zones are often favorite grazing sites for livestock and a variety of wildlife species
- Seasonality of moisture makes them slower to recover than sub-irrigated sites.



6 years of protection from livestock grazing



There are some locations where willows are declining instead of increasing, and this appears to be largely a result of browsing by elk; though in some instances cattle may be adding to the willow impacts.

Often the high impact areas are elk calving areas.

Above: Meadow on East Fork Encampment River. Most years 50-90% of annual growth of streamside willows has been browsed before cattle go onto the allotment in mid July.

Right: Grass Park, SE of Stillwater Park, showing heavily browsed (clubbed) willows. No livestock on this area since 2001.



1995



2012

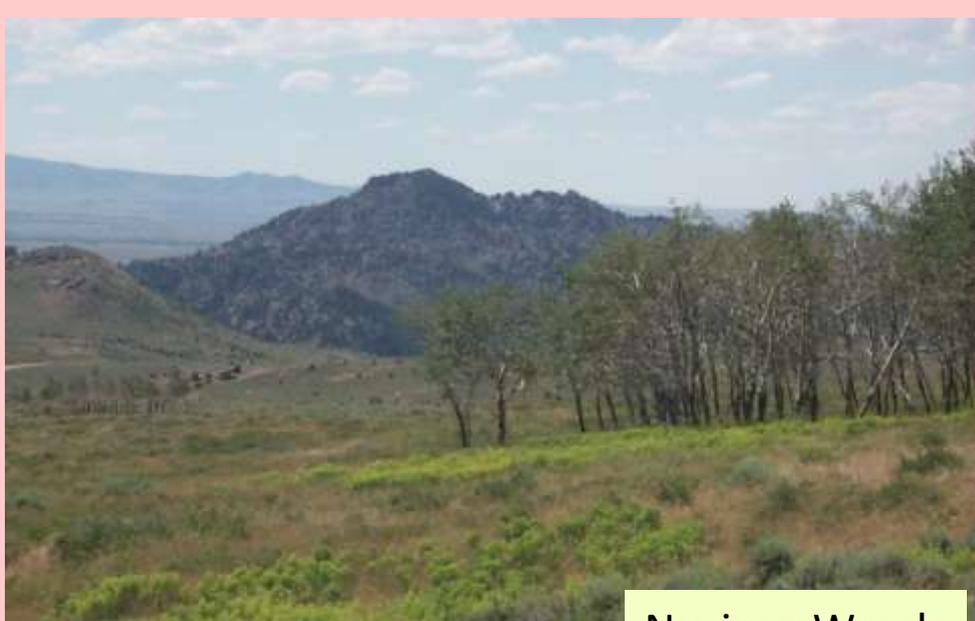


In fall of 1993 a cage was placed over one of a pair of similar height willows on upper Teddy Creek. A larger cage was substituted as the protected willow grew.

Livestock use in this meadow has been light for the past 7 years. The unprotected willow and many others in this meadow are gone, killed by repeated heavy browsing.



Recreational impacts



Noxious Weeds

Other challenges to maintaining healthy habitats



Off-road vehicle use

