

Rainey Creek - Existing Vegetation

Tools

- Ecological Unit mapping
- Habitat Typing

Existing Conditions

- Delineation of stands with similar vegetation
- Field sampled vegetation (FSVeg)
- Forest Vegetation Simulator-modeling(FVS-SVS)
- Dominate species Discussion
 - Wildlife use,
 - existing conditions
 - regeneration process (KEY)
 - Possible actions to return habitat benefits to wildlife

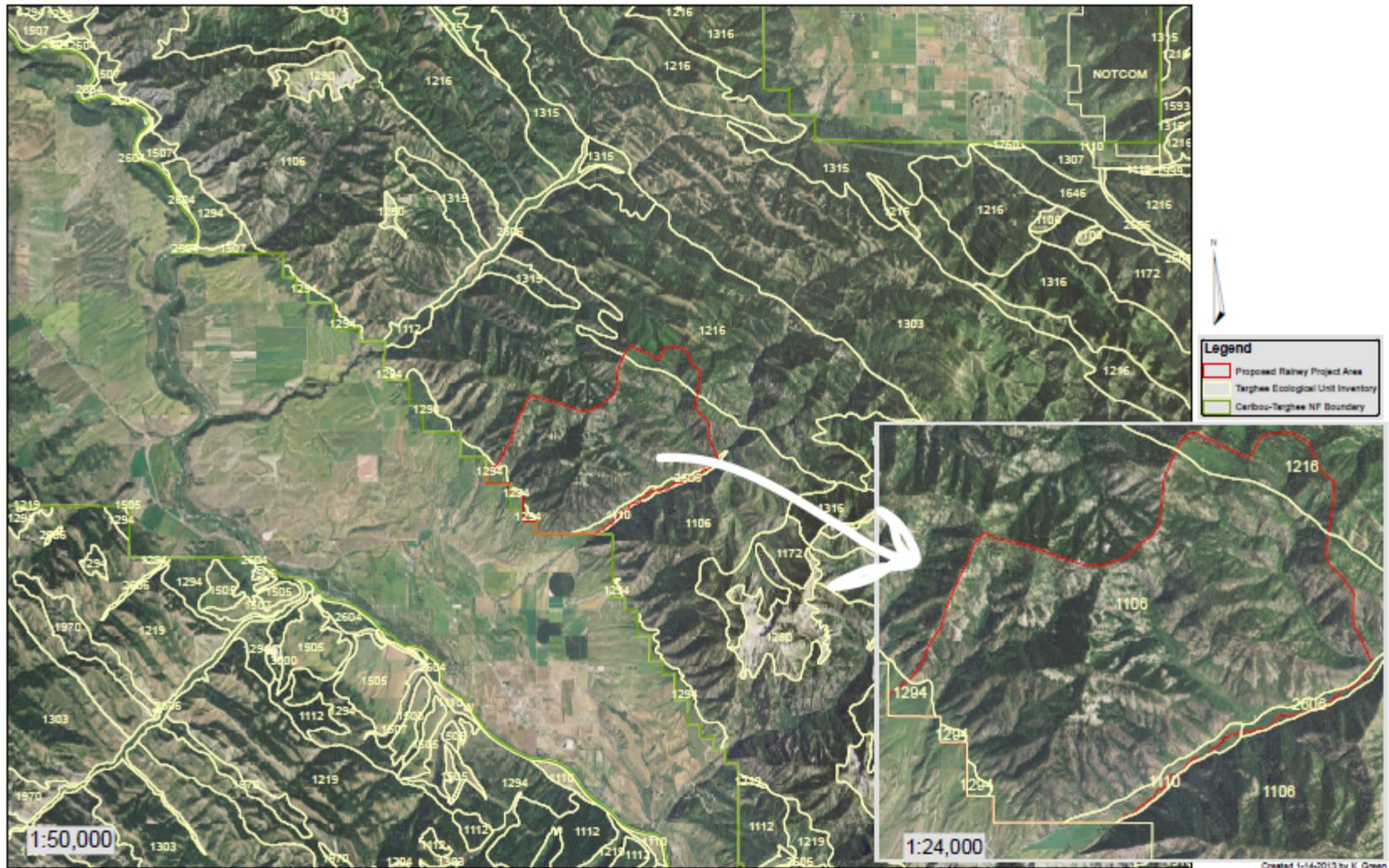
Summary

Ecological Unit/Type

A category of land defined for a unique combination of:

- Vegetation
- Soil
- Topography
- Geology
- Climate

Rainey Creek Project- Targhee Ecological Unit Inventory Map



Ecological Unit 1106

1106—ABLA/PHMA5 Gany - PSME/BERE, SYOR2 Fritz association, 40 to 70 percent slopes

Summary

This ecological unit is on mountains in the warm portion of the forested zone (fig. 8). The landscape is characterized by very steep, high relief mountains which have moist north facing and dry south facing sideslopes. Commonly the north facing sideslopes support closed canopy forests of mixed conifers. The south facing sideslopes support open canopy forests of mixed conifers over a layer of curtleaf mountain mahogany with variable cover. Spur ridges and draws moderately dissect the sideslopes in dendritic and parallel patterns. Rock outcrops are common on south facing slopes. Large scale rock slides are common in some areas.

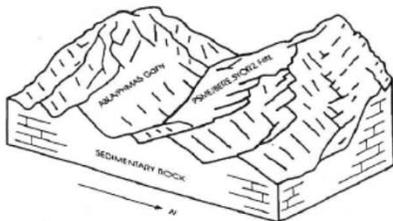


Figure 8. Block diagram of ecological unit 1106.

Ecological Unit Setting

Subsection: Big Hole Mountains and Teton Range
Landform: mountains
Elevations: 5200 to 8000 feet
Average annual precipitation: 22 inches
Average annual air temperature: 38 degrees F
Geology: sedimentary

Ecological Unit Composition

50 percent - ABLA/PHMA5 Gany Ecological Type
30 percent - PSME/BERE, SYOR2 Fritz Ecological Type
20 percent - contrasting inclusions

ABLA/PHMA5 Gany (50%)

Setting

Slopes: 40 to 70 percent
Landform position: north facing sideslopes

Vegetation

Potential Natural Community

- subalpine fir/mallow ninebark p.a.

Present Vegetation

- Douglas-fir/mallow ninebark community
- subalpine fir/mallow ninebark p.a.

Soils

Name: Gany series
Taxonomic class: Loamy-skeletal, mixed, superactive Calcic Cryoborolls
Parent material: local alluvium or colluvium derived from limestone and loess
Typical profile:

- 2 to 0 inches: forest litter
- 0 to 8 inches: dark grayish brown gravelly silt loam
- 8 to 19 inches: brown extremely gravelly loam
- 19 to 62 inches: brown extremely gravelly loam

Depth class: very deep (greater than 60 inches)
Permeability: moderate

AWC, surface to 20 inches: 2.0 inches
AWC, surface to 60 inches: 5.0 inches
Drainage class: well drained
Water table: none
Flooding hazard: none
Kw factor: 0.15
T factor: 3

PSME/BERE, SYOR2 Fritz (30%)

Setting

Slopes: 40 to 70 percent
Landform position: south facing sideslopes

Vegetation

Potential Natural Community

- Douglas-fir/Oregongrape p.a., whortleleaf snowberry phase

- Warm portion of forested zone. Very steep high relief mountains. Moist north facing and dry south facing side slopes. North facing slopes commonly support closed canopy forests of mixed conifers. South facing slopes support open canopy forests of mixed conifer over a layer of mountain mahogany with variable cover. Spur ridges and draws moderately dissect side slopes in dendritic and parallel patterns. Rock outcrops are common on south facing slopes. Large scale rock slides are common in some areas.

Habitat Type

Area of land potentially capable of producing similar plant communities at climax.

Concept of Succession-

Plant communities thru time.

Seral – a plant or plant community replaced by another species or plant community over time.

Early seral - pioneer

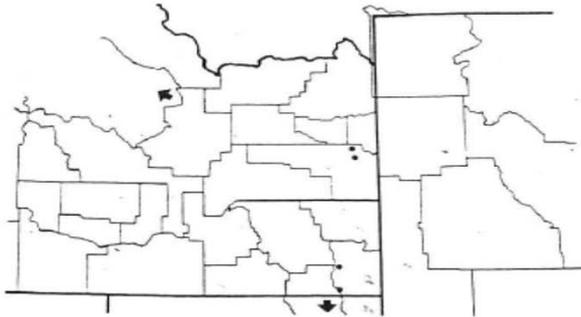
Mid seral

Late seral

Climax – self regenerating without disturbance.

Not replaced by other species.

Pinus Flexilis/Cercocarpus Ledifolius h.t.
(PIF/CELE; Limber Pine/Curl-Leaf Mountain-Mahogany)



Distribution—*PIF/CELE* is a minor h.t. that occurs sporadically from east-central Idaho to northern Utah. It extends roughly from 1 829 to 2 590 m (6,000 to 8,500 feet) and usually occupies rocky west-facing to south-facing slopes. Normally this h.t. represents the lower limits of forest trees and merges with *Cercocarpus* dominated communities or shrub steppe communities on adjacent drier sites. Adjacent more moist sites are usually in the *Pseudotsuga* series.

Vegetation.—Open stands of *P. flexilis*, often with *Pseudotsuga*, dominate a somewhat discontinuous layer of *Cercocarpus*. *Juniperus scopulorum* sometimes occurs, appearing comparatively robust, due to the open nature of the stands. *Berberis repens*, *Symphoricarpos oreophilus*, and *Artemisia tridentata* are common shrubs of widely varying coverage. *Hesperochloa kingii* and *Agropyron spicatum* are the most important grasses and their cover is inversely related to that of the trees and shrubs.

Soils.—Soil parent materials are usually sandstone and limestone. Soil pH data are lacking. Areas of bare rock reached 35 percent and that of bare soil 10 percent. Average litter depth per site reached 9 cm (3.5 in) but was normally about 1 cm (0.4 in).

Productivity/Management.—Timber potentials are quite low (appendix E-2) and regeneration is sporadic. *Cercocarpus* seedlings were not encountered and, in some areas, the size class distribution suggests that *Cercocarpus* may require fire for regeneration (Dealy 1975). The greatest value of existing trees may be the food and cover they provide for rodents, birds, and big game. *Cercocarpus* provides big game with winter cover and important browse but may limit production of forbs and grasses.

- **Limber Pine/Curl-leaf Mountain Mahogany**

Open stands of Limber pine, often with Douglas-fir, dominate a somewhat discontinuous layer of mountain mahogany. Juniper sometimes occurs appearing comparatively robust, due to the open nature of stands. Oregon grape, mountain snowberry and sagebrush are common shrubs. The greatest value of the existing trees may be the food and cover they provide for rodents, birds and big game. Mountain mahogany provides big game with winter cover and important browse but may limit production of forbs and grasses.

Agents of Change Disturbance

Natural Causes

Fire

Insects & Disease

Time - measured by succession

Floods, Wind events

Avalanche, Ice damage

Man Caused

Fire Exclusion through effective fire suppression

Timber or vegetation removal

Prescribed fire

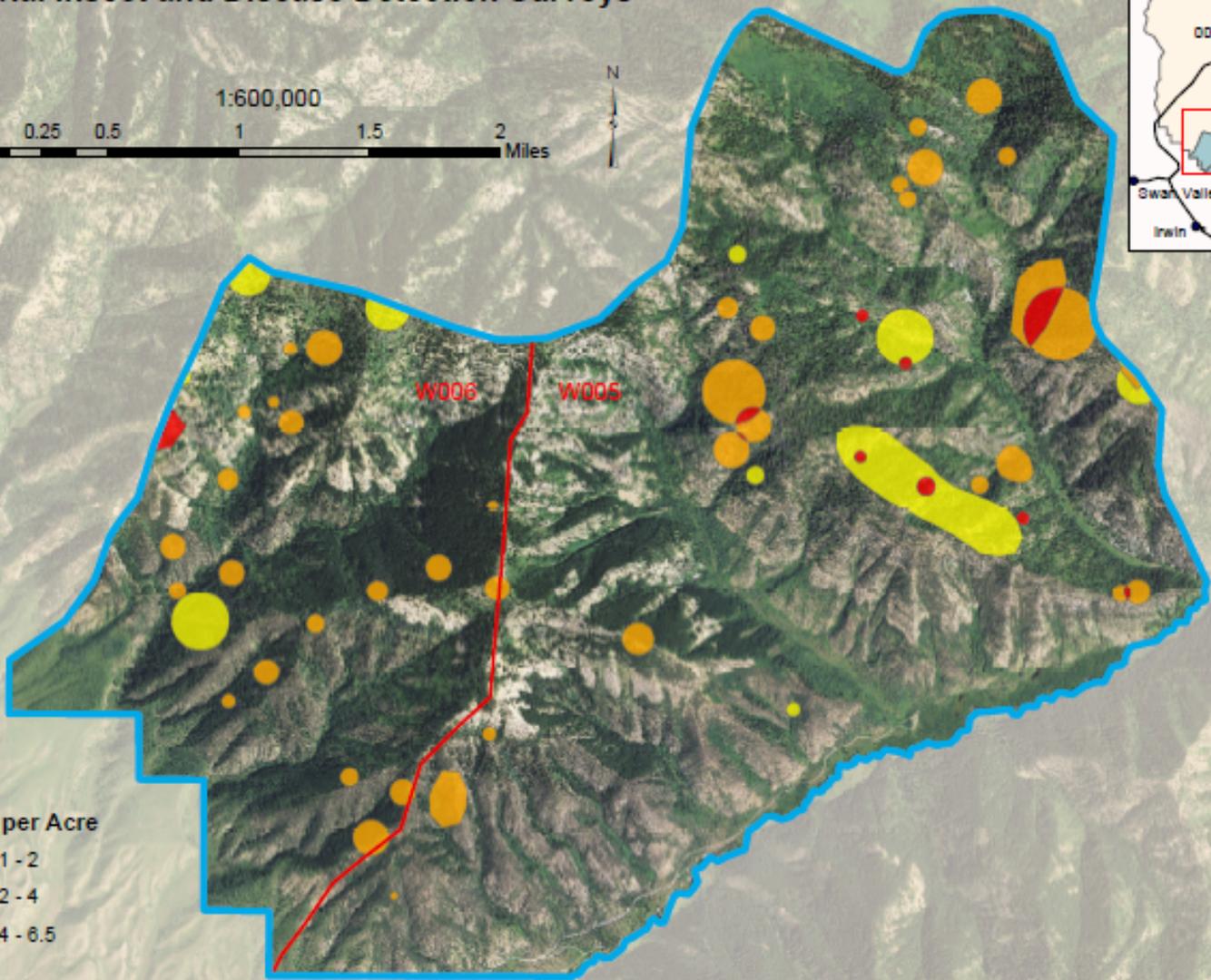
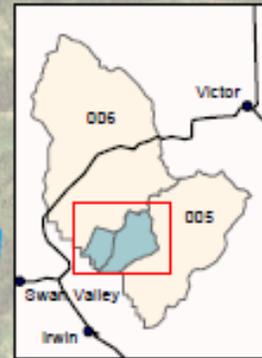
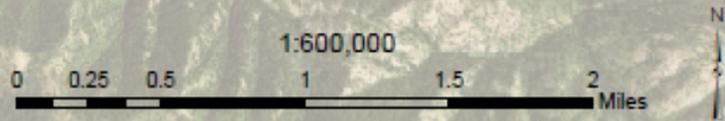
Land development – Loss of Open Space

Pasture land to subdivision

Woodlands to farmlands

Rainey Creek Tree Mortality 1991-2012 as detected by Aerial Insect and Disease Detection Surveys

Date: 1/24/2013



Rainey Creek Project		DF Acres	DF Trees	LPP Acres	LPP Trees	WBP Acres	WBP Trees	SAF Acres	SAF Trees	MORTALITY Acres	MORTALITY Trees
Watershed 005											
Prsc_code											
2.7(a)		307	683	4	18			17	35	327	736
3.2(j)		2	4							2	4
Watershed 006											
Prsc_code											
2.7(a)		105	229			21	40			125	269
Totals		414		4		21		17		454	1009

Healthy stands contain unhealthy trees.
This is a natural process.

Insect & Diseases in Rainey Creek are at endemic levels.

1988 Spring Canyon Fire (2004)



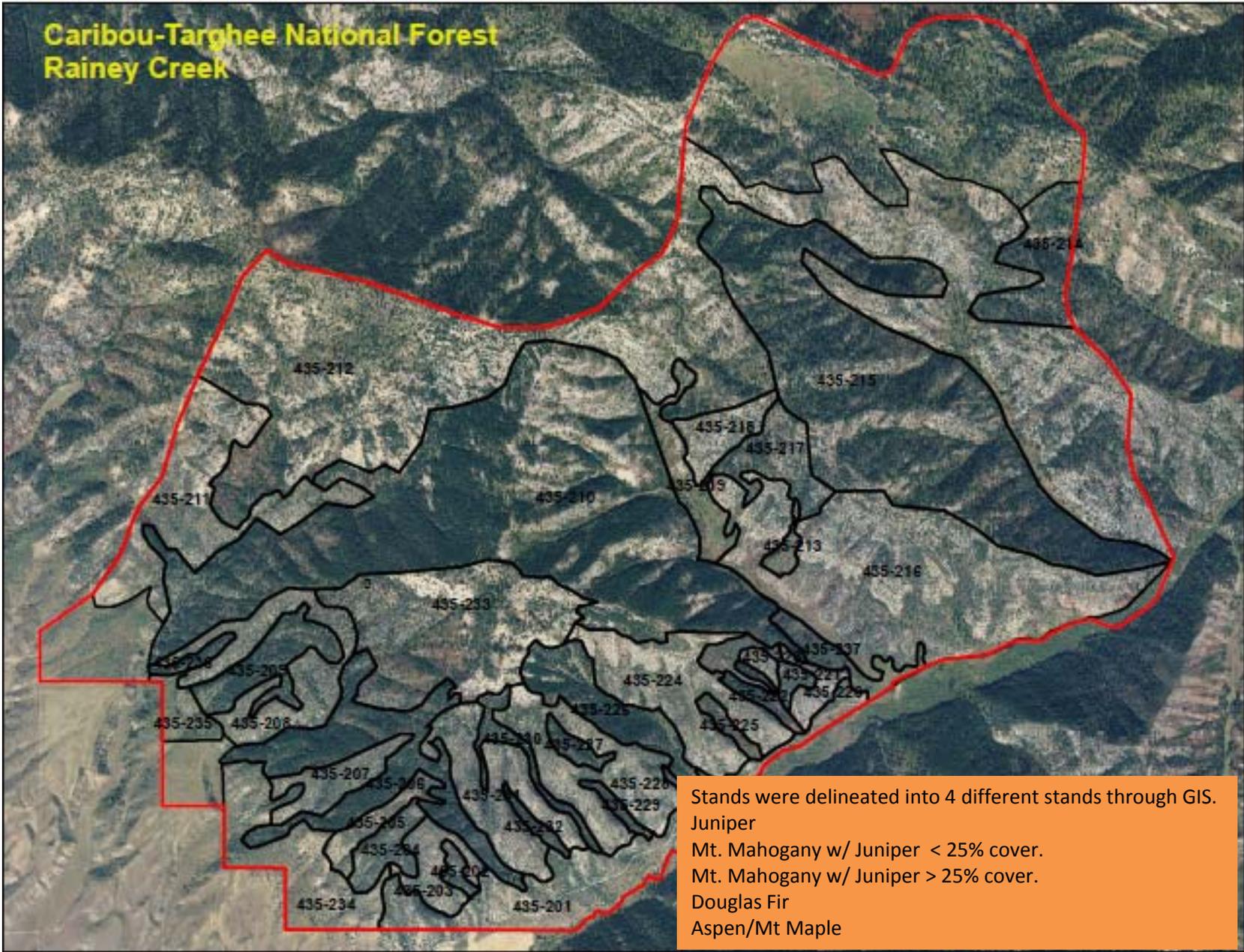
Spring Canyon Fire 2011



HOW TO DETERMINE EXISTING VEGETATION –MEASURE IT

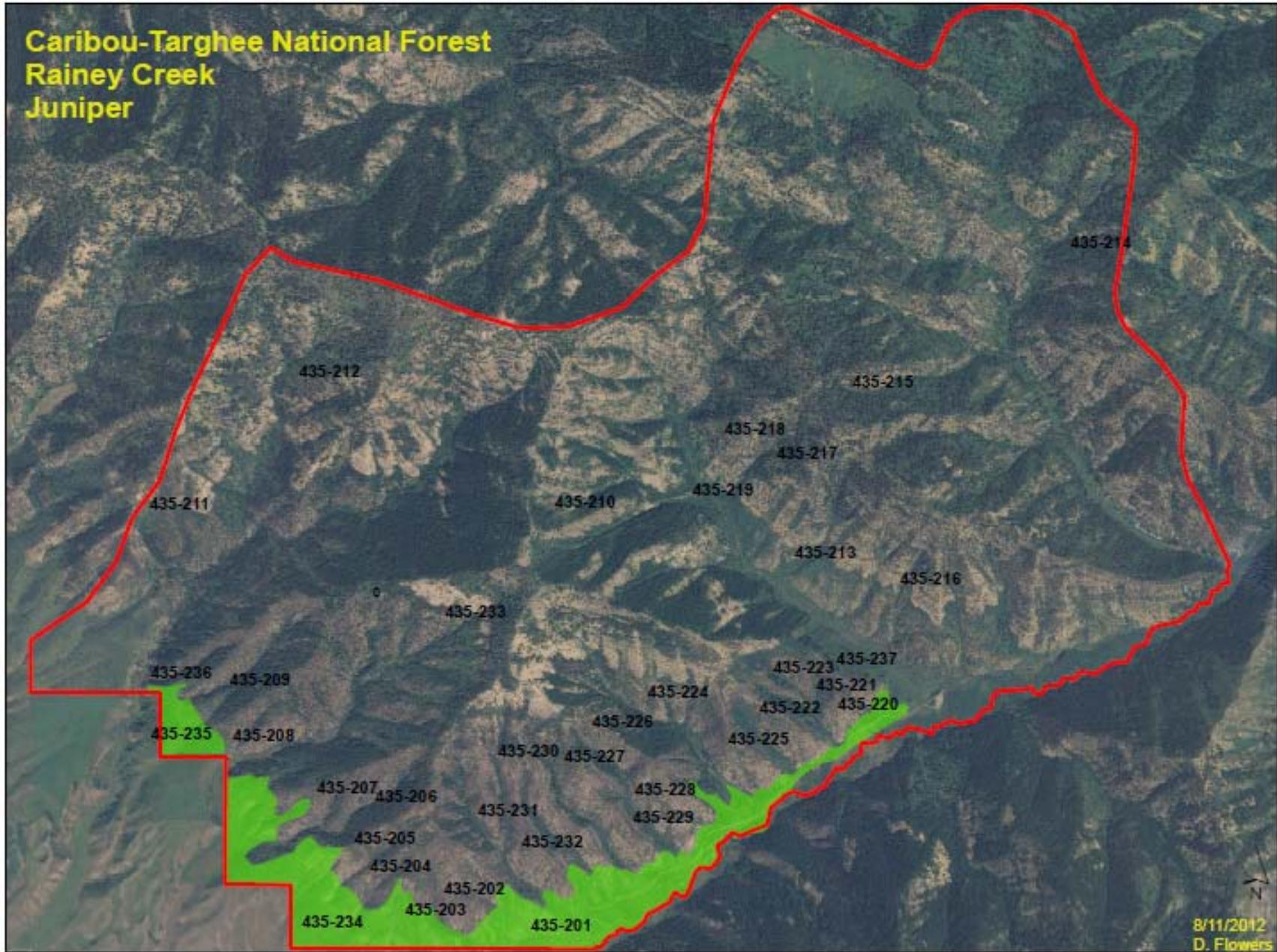
1. Delineate stands with similar characteristics:
 - Aspect, slope elevation
 - Species composition
 - Canopy Stand Structure
2. Lump similar stands into categories
3. We don't measure every stand, but randomly pick stands within each strata (similar stand) and measure:
Trees-diameters, heights, ages; shrubs; forbs; grasses; down woody; determine habitat type; take soil depths.

**Caribou-Targhee National Forest
Rainey Creek**



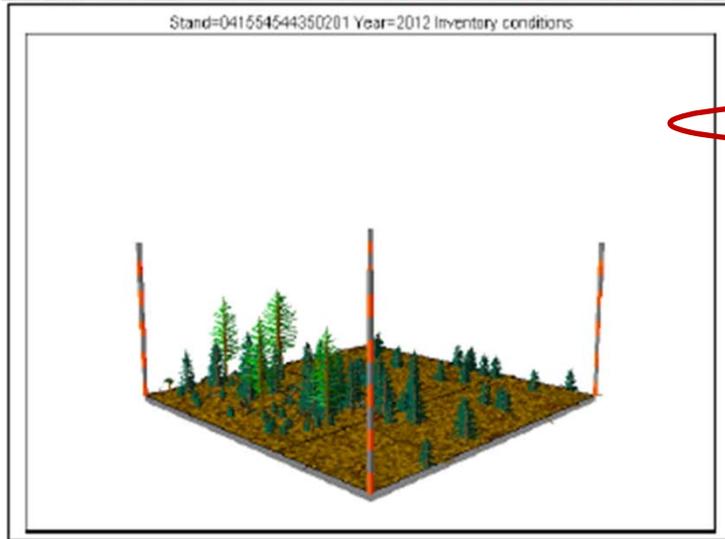
Stands were delineated into 4 different stands through GIS.
Juniper
Mt. Mahogany w/ Juniper < 25% cover.
Mt. Mahogany w/ Juniper > 25% cover.
Douglas Fir
Aspen/Mt Maple

**Caribou-Targhee National Forest
Rainey Creek
Juniper**



Rainy Creek

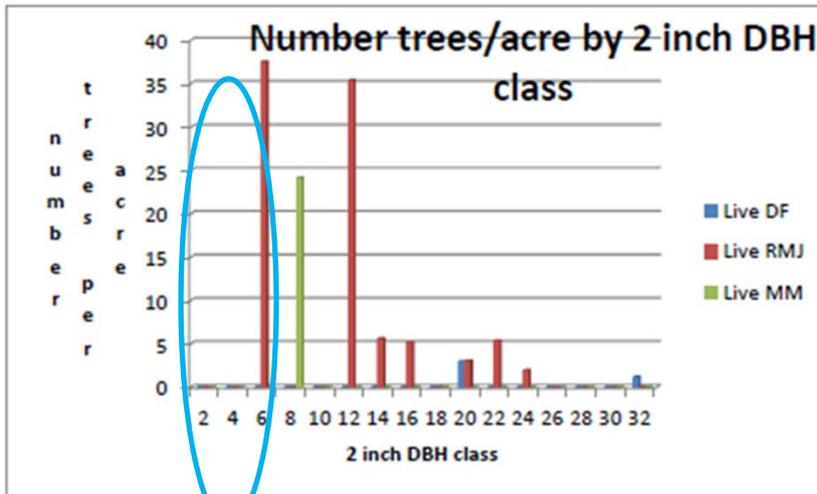
Display of the No-Action Alternative for Stand 435-0201 FVS-SVS Existing Conditions in 2012



Number trees/acre				
Diam Class	Live ALL	Live DF	Live RMJ	Live MM
2	0	0	0	0
4	0	0	0	0
6	37.6	0	37.6	0
8	24.2	0	0	24.2
10	0	0	0	0
12	35.4	0	35.4	0
14	5.6	0	5.6	0
16	5.2	0	5.2	0
18	0	0	0	0
20	6	3	3.1	0
22	5.4	0	5.4	0
24	2	0	2	0
26	0	0	0	0
28	0	0	0	0
30	0	0	0	0
32	1.2	1.2	0	0
All	122.7	4.1	94.3	24.2

Juniper
Stand
201

DF=Douglas-fir; RMJ= Rocky Mountain Juniper; MM=Curl leaf mountain mahogany



3 Species

Rocky Mountain Juniper

Mountain mahogany

Douglas-fir



Juniper Stand – average 51% Canopy Cover
Juniper shades out sun loving species

Rocky Mountain juniper *Juniperus scopulorum*



Existing Condition

- Juniper has/is expanding its range.
- The juniper has replaced Douglas-fir, Limber pine, snowberry, bitterbrush, serviceberry and chokecherry at the lower elevation.
- No young or regenerating junipers, Douglas-fir, Limber pine, snowberry, bitterbrush, serviceberry or chokecherry were encountered.
- Trees are old. Tree aged ranged from 33-216.
- All stem diameters measured >6.0 at root collar.

Rocky Mountain juniper *Juniperus scopulorum*



Reproduction

- Regenerate by seed from cones (berries)
- Seeds germinate the 2nd spring.
- 3-4 foot trees easily killed by fire.
- As trees mature, develop thicker bark & open crown allowing them to survive low fire. (Crown fire kills)

Possible Actions to return habitat benefits to wildlife

- Reduce densities of juniper where juniper has replaced other native trees and mountain shrubs.
- Re-introduce tree species and mountain shrubs that have been lost by the juniper expansion.
- Maintain reduced species composition of juniper and encourage some regeneration.

Mountain snowberry *Symphoricarpos oreophilus*



Existing Conditions

- Found through out all stands.
- Most plants are old.
- Few new or regenerating plants were seen.

Wildlife Value

- First species to leaf out making it sought after in early spring.
- Important forage for deer & elk in high elevation summer ranges.
- Not highly nutritious or palatable.

Mountain snowberry *Symphoricarpos oreophilus*



Reproduction

- Reproduces vegetatively sprouting from basal buds at root crown following fire.
- Regenerates from seed best on bare mineral soil in partial shade.
- Top killed by most fires of medium or high severity.

Possible Actions to return habitat benefits to wildlife

- Low severity fire will stimulate basal buds to regenerate and create new plants.
- Fire will create bare mineral soil for seed to establish.
- Adjacent taller shrubs & trees can provide partial shade to improve conditions for reestablishment (shade can be live or dead).

Antelope bitterbrush *Purshia tridentata*



Wildlife Use

- Critical browse for mule deer in winter.
- Mule deer, elk, moose, bighorn sheep utilize it extensively.
- Winter use is greatest in deep snow.

Existing Conditions

- Most plants are old.
- Generally bitterbrush is replaced by juniper where the bitterbrush and juniper ranges overlap.
- Outcompeted in the lower elevation stands of juniper and a missing component.

Antelope bitterbrush *Purshia tridentata*



Reproduction

- By seed, stem layering and sprouting after fire top kill.
 - Considered a weak sprouter after fire
 - Highly susceptible to fire kill. Often killed by summer or fall fire.
 - Multiple stemmed bitterbrush sprout better than single stemmed.
 - Single stem sprouts best when fire severity is low.
- **Possible Actions to return habitat benefits to wildlife**
 - Reduce densities of competing juniper
 - Low severity fire will promote some sprouting.
 - Insure mature plants are available to provide seed.

Saskatoon serviceberry *Amelanchier alnifolia*



Wildlife Use

- Upland game birds, song birds, rodents, consume fruits & buds.
- Important winter diet for big game.
- Utilization heaviest during deep snow.
- Elk generally browse all available twigs before moving to another area.

Existing Conditions

- Very low species composition.
- Where it is present, it is mostly older age class.
- No regeneration was observed.
- Should be abundant in lower elevations and almost absent. Juniper has replaced it.

Saskatoon serviceberry *Amelanchier alnifolia*



Possible Actions to return habitat benefits to wildlife

- Reduce competition from juniper by reducing juniper densities.
- Low severity fire will promote sprouting and create new plants.

How it Regenerates

- Rarely from seed.
- Root crown sprouting, rhizomes, and layering.
- Sprouts from root crown and rhizomes after fire.
- Top killed by moderate to severe fire.
- Deeply buried rhizomes enable it to sprout after even the most severe fire.

Chokecherry *Prunus virginiana*



Wildlife Use

- Fruits, leaves, twigs are important food for bears, moose, bighorn sheep, pronghorn, elk and deer.
- Chokecherry is food source for small mammals.

Existing Conditions

- Very low species composition. What is present is in old age classes.
- No regeneration was observed.
- Should be present in lower elevation stands, but juniper has replaced it.

Chokecherry *Prunus virginiana*



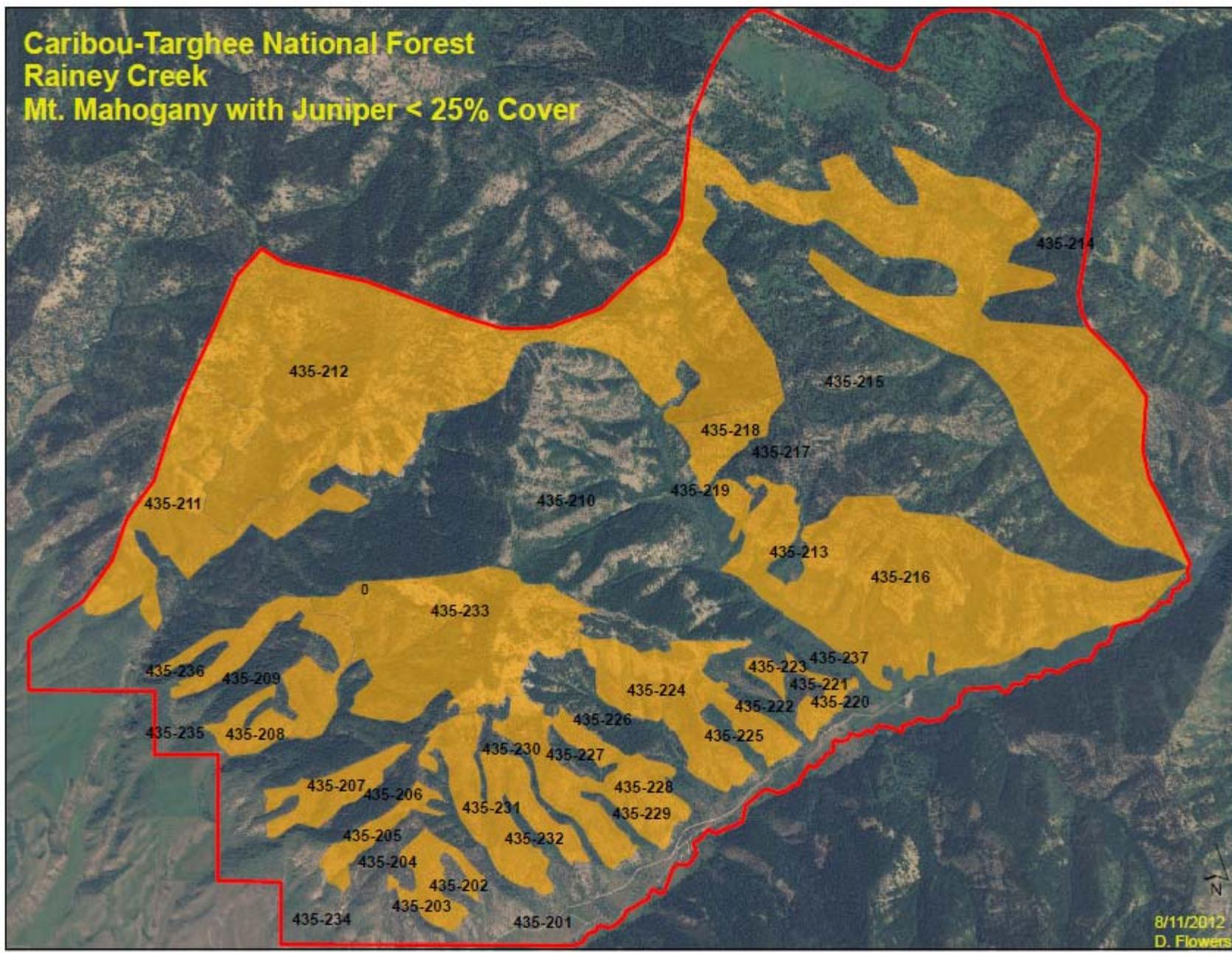
Reproduction

- Reproduces from seed and vegetatively by rhizomes.
- Well adapted to fire disturbance.
- Fire often kills above ground stem, but it quickly sprouts the same year following a spring burn, or the next growing season following fall fire.

Possible Actions to return habitat benefits to wildlife

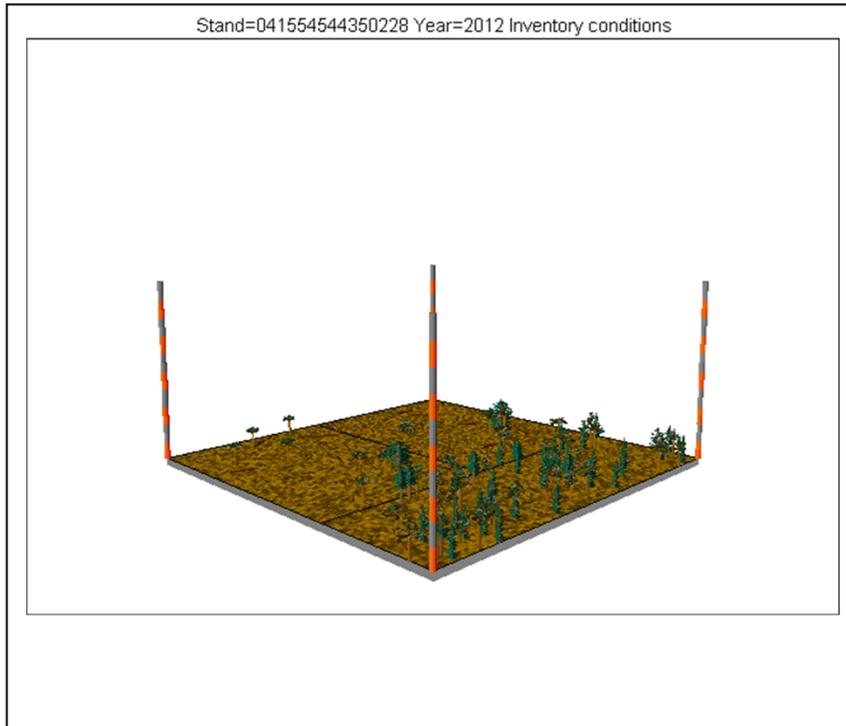
- Reduce competition from juniper to allow chokecherry in lower elevations.
- Chokecherry will regenerate after fire and increase in the years following fire.
- Maintain presence of Chokecherry plants where they exist to provide seed.

**Caribou-Targhee National Forest
Rainey Creek
Mt. Mahogany with Juniper < 25% Cover**

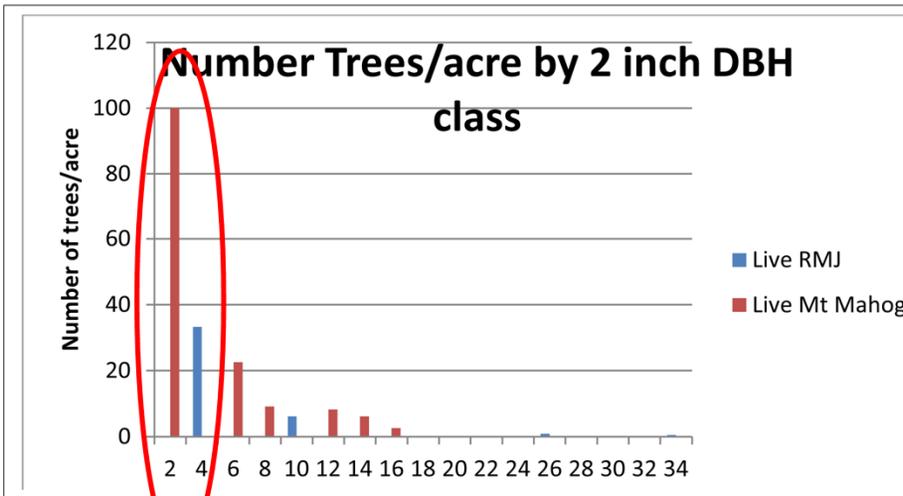


8/11/2012
D. Flowers

Rainey Creek Stand 228 <25% Canopy



Diam Class	Live ALL	Live RM	Live MC
2	100	0	100
4	33.3	33.3	0
6	22.6	0	22.6
8	9.1	0	9.1
10	6.1	6.1	0
12	8.2	0	8.2
14	6.1	0	6.1
16	2.6	0	2.6
18	0	0	0
20	0	0	0
22	0	0	0
24	0	0	0
26	0.9	0.9	0
28	0	0	0
30	0	0	0
32	0	0	0
34	0.5	0.5	0
All	189.5	40.9	148.6



Good Distribution of Age Classes

Rocky Mountain Juniper

Mountain Mahogany

Rocky mountain juniper composition

2012 = 22%

2112 = 23%

Stays about the same - dry site.

Curl-Leaf Mountain Mahogany *Cercocarpus ledifolius*



Wildlife Use

- Highly palatable to deer and provides important cover. "Well used" especially in the winter.
- Often browsed to deer reach, and small plants are kept hedged.
- Curleaf mountain-mahogany stands are important elk calving areas.

Existing Condition

- Major component of existing vegetation and dominates mid elevations.
- Existing trees are mostly old.
- Some regeneration was observed.
- Mahogany abundance has increased in the absence of fire.

Curl-Leaf Mountain Mahogany *Cercocarpus ledifolius*



Reproduction

- Predominantly by seed.
- Sprouts following fire are rare and short-lived
- Sprouting occurs to "some extent" from the trunk base following cutting.

Possible Actions to return habitat benefits to wildlife

- Reduce composition of mahogany to allow for other species. This will increase species diversity in mid elevations where Mahognay dominates.
- Maintain presence of mountain mahogany plants where they exist to provide seed.

Limber pine *Pinus flexilis*



Wildlife Use

- Large wingless seed has very high energy content.
- Critical food for rodents, birds & bears..

Existing Conditions

- Most large diameter trees have been killed by both mountain pine beetle and White pine blister rust.
- It is the climax species in the mid elevations.
- Limited regeneration was observed.
- Whitebark pine has been proposed for listing under ESA (warranted, but precluded at this time). Limber may be listed in the future.

Limber pine *Pinus flexilis*



Reproduction

- Reproduces entirely from seed.
- Clark's nutcracker disperses the seed to outlying sites at tree line and other harsh environments

Possible Actions to return habitat benefits to wildlife

- Maintain presence of Limber pine where they exist to provide seed.
- National Recovery strategies to regenerate 5-needled pines include planting genetically rust resistant containerized seedling.

Mountain big sagebrush *Artemisia tridentata*. Subspecies. *vaseyana*



Wildlife Use

- Highly preferred and nutritious winter forage for mule deer.
- Provides cover for wildlife.

Taxonomy

3 widely distributed subspecies of big sagebrush. Difficult to distinguish. Substantial overlap

- basin big sagebrush (*Artemisia tridentata* sub species *tridentata*)
- Wyoming big sagebrush (*Artemisia tridentata* sub species *wyomingensis*)
- mountain big sagebrush (*Artemisia tridentata* sub species *Vaseyana*)

Existing Conditions

- What is present is in old age classes.
- No regeneration was observed.
- Should be abundant but juniper has replaced it.

Mountain big sagebrush *Artemisia tridentata*.

Subspecies. *vaseyana*

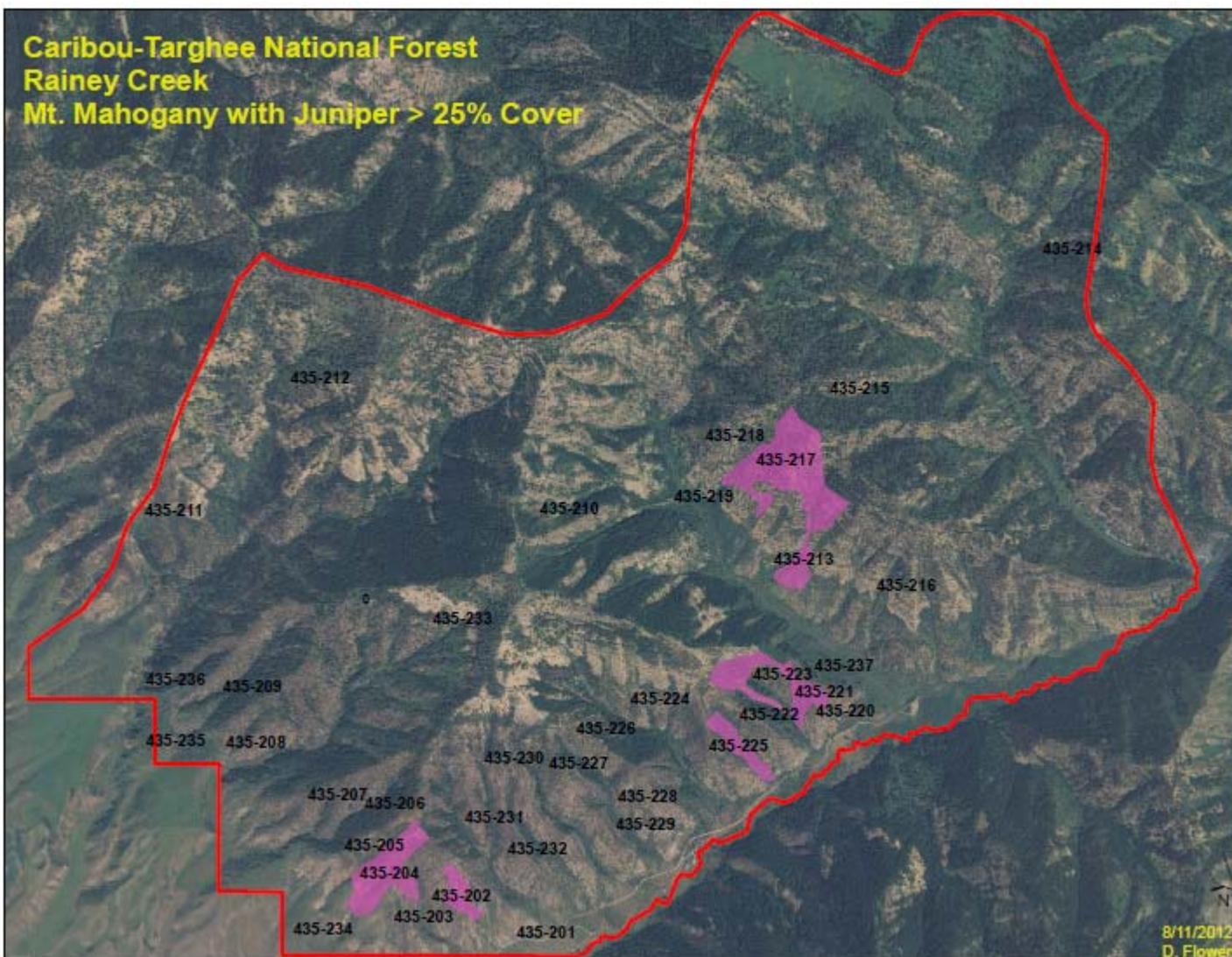
Reproduction

- Seed only.
- Seed matures in fall. And blown during fall and winter. Emergence occurs in winter or spring.
- Seeds are short-lived. Less than 5 years.
- Readily killed by fire.
- Post fire establishment is from seed.

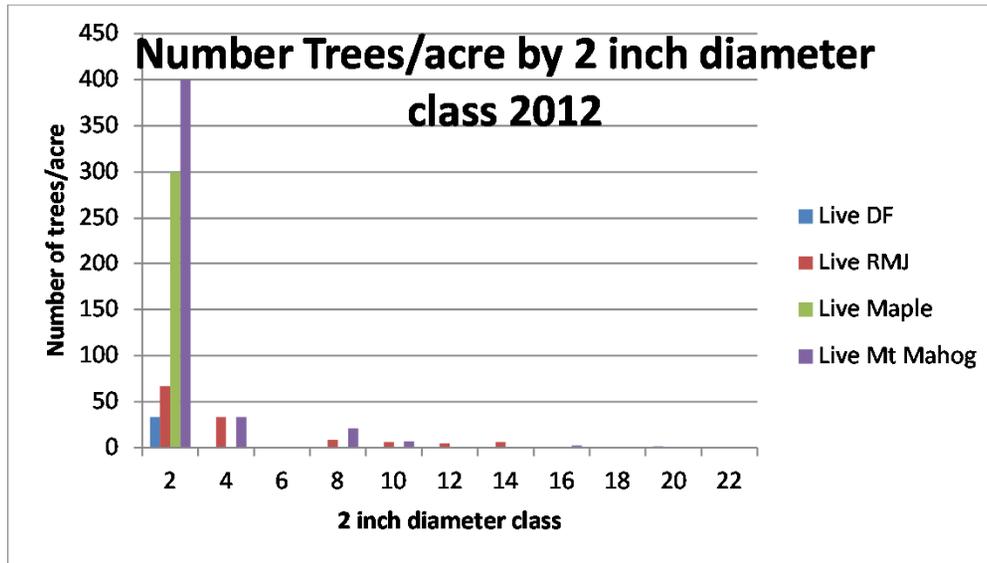
Possible Actions to return habitat benefits to wildlife

- Reduce composition of juniper to allow for sagebrush in lower elevations.
- Introduce sagebrush seed to create new age classes that are a missing vegetation component.
- Maintain presence of sagebrush where they exist to provide seed.

**Caribou-Targhee National Forest
Rainey Creek
Mt. Mahogany with Juniper > 25% Cover**



Rainey Creek Stand 204 Greater than 25% Canopy



Rainey Creek Year 2012 >25% Canopy Stand 204

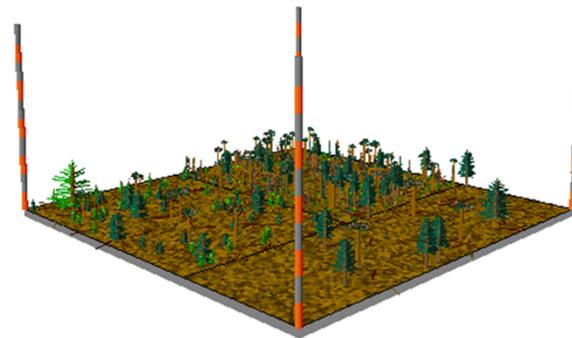
Diam Class	Live ALL	Live DF	Live RMJ	Live Maple	Live Mt.Mahog
2	800	33.3	66.7	300	400
4	66.7	0	33.3	0	33.3
6	0	0	0	0	0
8	29.6	0	8.5	0	21.2
10	12.9	0	6.1	0	6.8
12	5	0	5	0	0
14	6.1	0	6.1	0	0
16	2.4	0	0	0	2.4
18	0	0	0	0	0
20	1.5	1.5	0	0	0
22	1.2	0	1.2	0	0
All	925.3	34.8	126.8	300	463.6

Not as dry a site
Good age-class distribution

About 900 trees/acre

Douglas-fir
Rocky Mountain juniper
Maple
Mountain mahogany

Stand=041554544350204 Year=2012 Inventory conditions



Rocky Mountain Douglas-fir *Pseudotsuga menziesii*



Wildlife Use

- Seed is important food for chickadees, finches, squirrel, chipmunk, deer meadow mice, many other birds and mammals.
- Needles are important food for blue and spruce grouse.
- Beaver, deer, elk and rabbits eat foliage and twigs within their reach

Existing Conditions

- Large-diameter Douglas-firs experienced mortality from Douglas-fir beetle past 10 years.
- The lower elevation Juniper stand is a Douglas-fir habitat type. Juniper has replaced Douglas-fir at the lower elevation.
- Regenerating trees were found in clumps throughout the area.
- Light Western spruce budworm is currently defoliating needles.

Rocky Mountain Douglas-fir *Pseudotsuga menziesii*



Reproduction

- Reproduces from seed.
- Mature trees can survive moderate and severe fires due to thick bark.
- Reproduces best in mineral soil with partial shade. Seedlings sun scald and easily die.

Possible Actions to return habitat benefits to wildlife

- Reduce composition of juniper to allow for Douglas-fir in lower elevations where juniper has replaced it.
- Consider planting Douglas-fir in lower elevations with partial shade to reestablish its presence.
- Maintain presence of Douglas-fir trees where they exist to provide seed.

Bigtooth maple *Acer grandidentatum*



Existing Conditions

- Present in moist draws.
- All age classes exist where it is present.
- Not a significant vegetation component.

Wildlife Use

- Forage value is fair as it's tall growth limits its availability.
- Provides browse for big game but is generally consumed in small amounts.
- Consumption by mule deer is light in winter and moderate in summer.

Bigtooth maple *Acer grandidentatum*



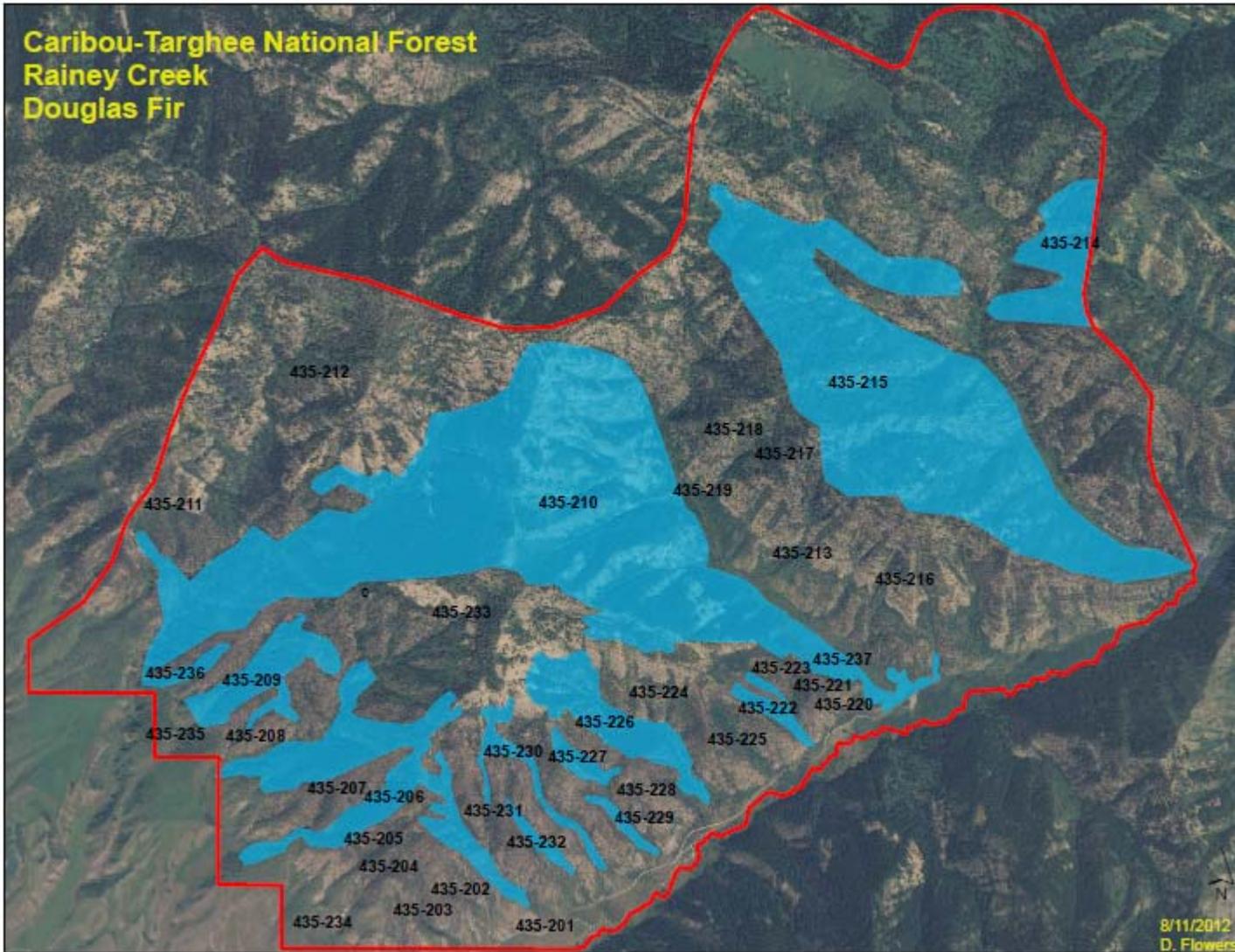
Reproduction

- Reproduces from seed and sprouts from root crown.
- Seedlings love shade.
- Sprouts from root crown when stems are burned.
- May be top killed by fire.
- Post fire sprouting is most likely to occur on moist sites in low severity fires.
- Severe burn is likely to damage ability to sprout.

Possible Actions to return habitat benefits to wildlife

- Low severity light fire will increase the presence of maple and create new young regeneration.
- Maintain presence of maple trees where they exist to provide seed.

**Caribou-Targhee National Forest
Rainey Creek
Douglas Fir**



Douglas-fir Dominated stands

- North facing slopes.
- Increasing moisture
- Presence of Subalpine fir with increasing elevation.
- Contains Douglas-fir, maple, serviceberry, few aspen. Greater species diversity.

quaking aspen *Populus tremuloides*



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Wildlife Use

- Important breeding, foraging, and resting habitat for a variety of birds and mammals.
- Especially valuable during fall and winter when protein levels are high relative to other browse species.
- Elk browse aspen year round.
- Deer use aspen year round.
- New growth on burns is especially palatable.

quaking aspen *Populus tremuloides*



Reproduction

- Seedling establishment is uncommon in the west.
- Regenerates by sprouting from the roots.
- Best sucker production follows a fire that top kills tree or other clearing.
- Up to 5,000 sprouts/acre are typical 1st year following fire.
- After 5-10 years, most sucker clumps reduce to a single stem.

quaking aspen *Populus tremuloides*

Existing Conditions

- Very little aspen is present in the project area.
- Largest aspen stand is adjacent to the trailhead/parking lot at the end of the Rainey Creek Road.
- The aspen patch is being replaced with juniper, Douglas-fir and other shrubs.

Possible Actions to return habitat benefits to wildlife

- Without active treatment, the stand will succeed to conifers and other mountain shrubs.
- Maintaining or increasing the presence of aspen will require cutting or burning of the existing stand.

Rainey Creek Aspen stand at Trailhead

All age classes present

Juniper & Douglas-fir replacing aspen. Aspen trees old.



Summary - 2 plant communities are at risk

Juniper stand

- Native trees and mountain shrubs have been replaced by juniper.
- This is a Douglas-fir Habitat type. Douglas-fir is not regenerating (replaced).

Aspen Stand

- Conifer trees (mostly juniper) is replacing the aspen.
- Aspen is in late seral succession.



Citation and Acknowledgements Please cite the PLANTS Database as:

USDA, NRCS. 2013. The PLANTS Database (<http://plants.usda.gov>, 11 January 2013). National Plant Data Team, Greensboro, NC 27401-4901 USA.

Rainey Creek Dominant Vegetation Table of selected attributes

Species	Reproduce by Seed	Reproduce by layering	Reproduce by mechanical cutting	Reproduce by sprouting after fire	Sprouts after low fire	Sprouts after Severe Fire	Ability to Survive Fire
Antelope bitterbrush	Yes	Yes	No	Yes	Single stem sprouts best	No	Top-kills
Sagebrush	Yes, only	No	No	No	No	No	Readily killed by fire
Snowberry	Yes in bare soil and partial shade	Yes, from basal sprouts	No	Yes	Sprouting ability undamaged by low severity fire	Yes, but weak sprouter after severe	Top killed by most medium or high severity
Saskatoon serviceberry	Yes	Yes	yes	Yes	Good sprouting in light to moderate severity fire	Deeply buried rhizomes sprout after even intense fire	Top-kills
Chokecherry	Yes	Yes, rhizomes	Yes	Yes	Yes, quickly resprouts	Varies. Has deep roots	Often top-killed
Mountain mahogany	Yes, mostly	No	Yes, to some extent	Yes, but sprouts are Rare	Yes, but sprouts are Rare	No. Likely killed	Older stems have tick bark and may survive light fires
Rocky Mountain juniper	Yes, only	No	No	No	No	No	3-4 foot easily killed. Large trees may survive low-medium fires. Severe crown fire kills
Aspen	Rarely	No	Yes, saplings sprout best	Yes, excellent	Yes, up to 5,000 stems may be expected	Deeper roots retain the ability to sucker	Thin bark. Easily top-kills
Douglas-fir	Yes. Only	No	No	No	No	No	Older thick bark trees may survive moderate fire. Scorched trees at risk to DFB
Limber pine	Yes. Only	No	No	No	No	No	Older trees may survive stem scorch in low severity
Maple	Yes	Yes in mountain brush zone	Yes, but limited	Yes	Yes. Best from young stems, moist sites in low severity	No. Likely killed	Top-killed Killed in severe fire

??Questions??

Jim Robertson

Climate Change for Rainy Creek- input

<u>Plot Location</u>	<u>Longitude</u>	<u>Latitude</u>	<u>Elevation (meters)</u>
041554544350201	-111.2728	43.4599	1742
041554544350204	-111.2800	43.4630	1904
041554544350228	-111.2607	43.4649	1871

GCM3_A2 model **C**anadian Center for Climate Modeling and Analysis **G**eneral **C**irculation **M**odel
 Scenario **A2** = High emissions, regionally diverse world, rapid growth

Climate Variable	1990	2030	2030 change from 1990	2060	2060 change from 1990	2090	2090 change from 1990
Mean Annual Temperature °C	5.2	7.0	+1.8	8.9	+3.7	10.6	+5.4
°F	41.4	44.6	+3.2	48.0	+6.6	51.1	+9.7
Mean Annual Precipitation mm	462.	468.	+6	498.	+36	511.	+49
Inches	18.2	18.4	+0.2	19.6	+1.4	20.1	+1.9
Growing Season precipitation mm	246.	235.	-11	265.	+19	262.	+16
Inches	9.7	9.3	-0.4	10.4	+0.7	10.3	+0.6
Mean maximum temperature °C	28.3	30.9	+2.6	32.7	+4.4	33.6	+5.3
°F	82.9	87.6	+4.7	90.9	+8.0	92.5	+9.6
Julian date of the first frost-free day in spring	160	153	-7	133	-27	128	-32
	June 9	June 2	-7	May 13	-27	May 8	-32
Number of frost-free days	88	99	+11	129	+41	152	+64

Plants/Trees that will be **hindered and decrease** from warmer wetter Climate

- Subalpine fir
- Curlleaf mountain mahogany
- Rocky Mountain juniper
- Lodgepole pine
- Quaking aspen
- Douglas-fir

Plants/Trees that will **benefit and increase** from warmer wetter Climate

- Rocky mountain maple
- Bigtooth maple
- Paper birch
- Western paper birch
- Englemann spruce
- Blue spruce
- Willow species

Plants/Trees that will **stay about the same** from warmer wetter Climate

- Limber pine
- Singleleaf Pinyon
- Plains cottonwood
- Gamble Oak