SOUTHERN UTAH UNIVERSITY

FOREST STEWARDSHIP PLAN

351 West Center
Cedar City, UT 84720

Prepared by:
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Division of Forestry, Fire & State Lands
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This plan meets the criteria for Forest Stewardship Plans established by the Utah Forest Stewardship Coordinating Committee.

Approved by:

_____		_____	
Landowner	Date	State Forester	Date
_____		**Recommended for Approval By**:	
Area Manager	Date		
_____		_____	
Area Forester	Date	Forest Stewardship Coordinator	Date

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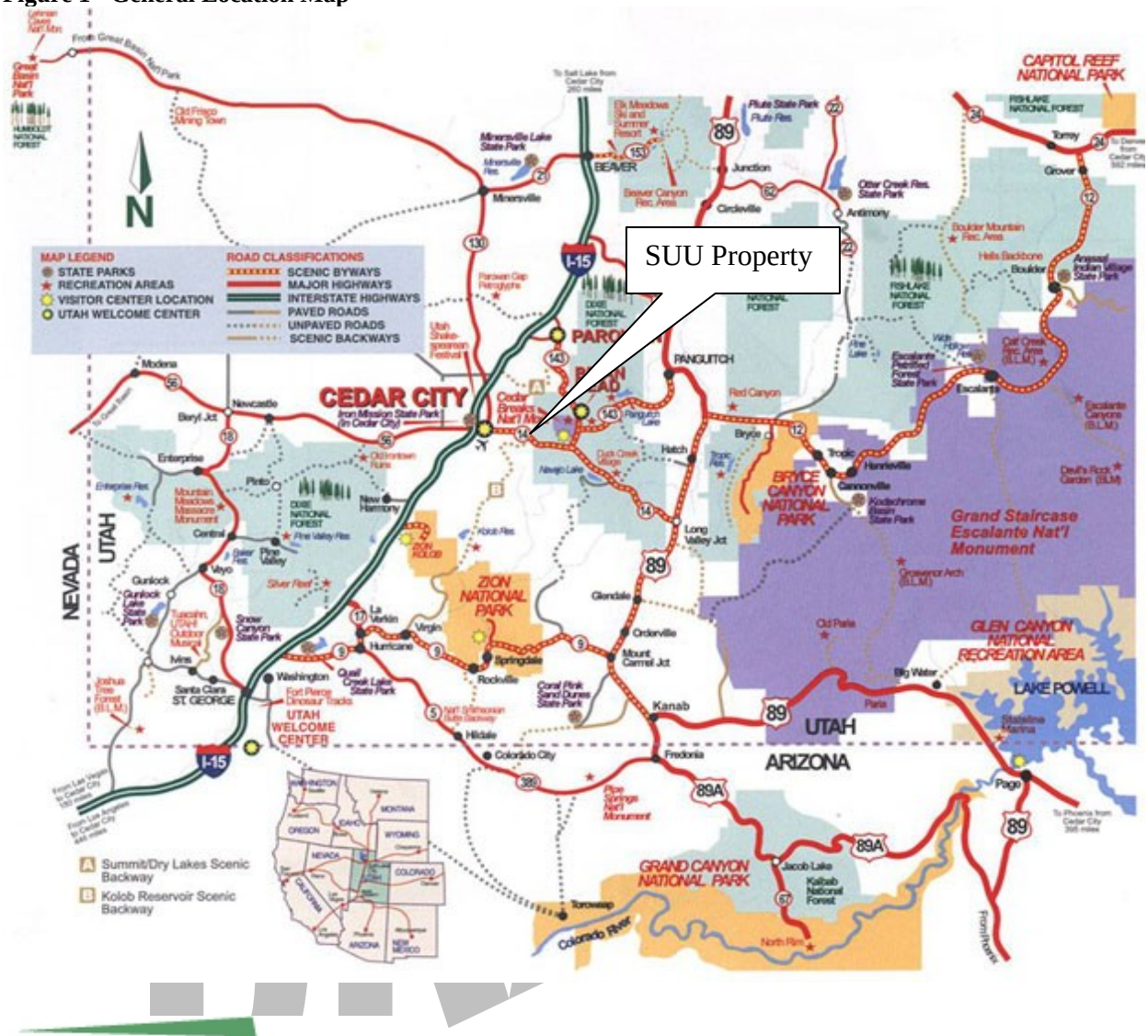
Figure 1 - General Location Map



UTAH DNR FORESTRY

General Location Map

SUU Property

Plan Summary

General Property Description

Property Location: The property consists of two compartments located north and south of Hwy 14, about 11 miles east of downtown Cedar City, UT.

Legal Description:

West Unit:

Township 36 South; Range 10 West
Section 36 SLB&M; Iron County (approximately the NW ¼).

East Unit:

Township 36 South; Range 10 West
Section 36 SLB&M; Iron County (approximately the E ½).

Township 36 South; Range 9 West
Section 31 SLB&M; Iron County (approximately the W ¼).

Township 37 South; Range 10 West
Section 1 SLB&M; Iron County (approximately the E 3/4).

Township 37 South; Range 9 West
Section 6 SLB&M; Iron County (approximately the W ½).

Township 37 South; Range 9 West
Section 7 SLB&M; Iron County (approximately the W ½).

Township 37 South; Range 10 West
Section 11 SLB&M; Iron County (approximately the SE ¼).

Township 37 South; Range 10 West
Section 12 SLB&M; Iron County.

Township 37 South; Range 9 West
Section 18 SLB&M; Iron County (approximately the NW ¼).

Township 37 South; Range 10 West
Section 14 SLB&M; Iron County (approximately the NE ¼).

Township 37 South; Range 10 West
Section 13 SLB&M; Iron County (approximately the NE 3/4).

Township 37 South; Range 9 West
Section 19 SLB&M; Iron County (approximately the NW ¼).

USGS Topographic Map Reference: Flanigan Arch and Webster Flat, 7.5 minute USGS topographic map.

Access: From Cedar City, proceed east on Hwy 14 for about 11 miles. Continue another mile and the Woods Ranch recreation area located on the south side of Hwy 14 represents the eastern property line.

Adjacent Ownership: The property is surrounded by private land and the Dixie National Forest. Ashdown Gorge Wilderness, Cedar Breaks National Monument, and Brian Head Ski Area are nearby.

Acreage: The SUU property is 2,579 acres; 48% forested (1,242 acres).

Table 1. Stand and Property Acreage.

Stand	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Property
Acreage	74	99	92	68	42	17	36	54	26	46	21	140	29	90	79	147	46	46	50	40	2579

Elevation: 7009 - 9538 feet.

Watershed Description:

Jack Rabbit Wash/Rush Lake – Crow Creek/Coal Creek
Hydrologic Unit Code: 160300060306

Jack Rabbit Wash/Rush Lake – Ashdown Creek
Hydrologic Unit Code: 160300060304

Wildland Urban Interface (WUI): There are approximately 2239 acres of the SUU property in the wildland urban interface. WUI is defined as property within 1.5 linear miles of a structure. The SUU Mountain Ranch Property is currently part of the Mountain Ranch / Woods Ranch Area Community Wildfire Protection Planning effort. Please consult that CWPP plan for more information on the Wildland Urban Interface and management recommendations.

General Resource Description and Assessment

Forest: Spruce/fir forest with components of Douglas-fir and aspen.

Range/Understory: Juniper woodland, grassland, and tall forb.

Riparian/Wetlands: There are riparian areas and wetlands on this property, however there are no waterbodies on the 303(d) list of impaired waterways.

Conservation Easement: There are currently no conservation easements on this property. This property may qualify for the Forest Legacy Program.

Cover Types:

Table 2. Vegetation Cover Types.

Land Cover – Southwest ReGAP Analysis	
Vegetation Type	Acres
Colorado Plateau Pinyon-Juniper Woodland	110
Inter-Mountain Basins Montane Sagebrush Steppe	108
Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland	37
Inter-Mountain Basins Volcanic Rock and Cinder Land	98
Inter-Mountain West Aspen-Mixed Conifer Forest and Woodland Complex	375
Rocky Mountain Aspen Forest and Woodland	596
Rocky Mountain Cliff and Canyon	27
Rocky Mountain Gambel Oak-Mixed Montane Shrubland	596
Rocky Mountain Lower Montane Riparian Woodland and Shrubland	15
Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland	229
Rocky Mountain Ponderosa Pine Woodland	167
Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland	210
Southern Rocky Mountain Montane-Subalpine Grassland	10
Grand Total	2579

Purpose

This Forest Stewardship Management Plan guides natural resource management activities and provides the general management direction for the SUU property. This plan describes management objectives, desired future conditions, priorities for action, and recommended resource management practices to achieve desirable benefits resulting from implementation.

Resource Conditions

The property is located in the spruce/fir zone just outside of the Dixie National Forest in Iron County, Utah. The terrain ranges from steep, rocky cliffs and canyons, to high subalpine mountains, to rolling montane fields. Forest resources are primarily white fir, Engelmann spruce, aspen, and Douglas-fir with small components of blue spruce, subalpine fir, juniper, ponderosa pine, and limber pine. The remainder of the property is open, grass fields, dry creek beds, and lava fields. The understory vegetation consists primarily of snowberry, dwarf Oregon grape, Gambel oak, kinnikinnick, mullein, grass and forbs.

The forests overall are moderately healthy. Aspen stands are declining due to lack of regeneration and white fir encroachment. Steps should be taken to mitigate the aspen decline and to restock the forests with desirable species such as aspen, Engelmann spruce and Douglas-fir. The stands on the north side of state highway 14 are in moderate health due to the lack of proper management, active sheep grazing, and its dry nature with south facing slopes. The aspen component has been completely lost in some stands and additional loss is eminent in additional stands without aggressive action. Stands in the south are in moderate health due to conifer encroachment of aspen and lack of disturbance.

Management/Implementation Period

The following list of activities briefly describes recommended actions to move toward a desired future condition during a 10-year planning period.

Table 3. Management/Implementation Actions.

Action	Scope
Aspen Regeneration	664 acres
Forest Stand Improvement	1179 acres
Reforestation Planting Douglas-fir, Engelmann Spruce, and ponderosa pine	937 acres
Demonstration Forest	40 acres
Range Improvement	All (2579 acres)
Invasive Species Control	All (2579 acres)
Control Access and Prevent Trespass	Perimeter and Pastures, where needed

Management Objectives

The landowner objectives are to practice long-term stewardship utilizing the principles of ecosystem-based, multiple-use management and protection of the natural resources on the property. These objectives were developed under the direction of the SUU Mountain Ranch Resource Advisory Council Additional. Objectives and Desired Future Conditions listed below are summarized. For a full listing, consult the appendix. Concurrent with landowner interests, resource management objectives include:

1. Manage for aspen regeneration/health, where appropriate with full stocking and a productive grass/forb understory.

2. Regenerate understocked, previously logged, areas with desirable tree species.

3. Minimize white fir and subalpine fir encroachment.

4. Rehabilitate recently logged areas.

5. Create and manage a demonstration forest with the cooperation of FFSL.

6. Maintain and improve the grazing resources for long-term, sustainable sheep grazing.
7. Protect and enhance wildlife habitat.
8. Reduce risk of catastrophic wildfire to forests, existing facilities, and infrastructure.
9. Maintain insect activity at endemic levels.
10. Prevent noxious weed outbreaks on the property.
11. All activities will support and enhance the other components of the Mountain Ranch Resource Management Plan.

Desired Future Condition

Desired future condition for the forest resources is a point in time when forest health is stable, stands are nearing full production for the long term, and other management objectives are met. Some indicators of the desired future condition will be when aspen is successfully regenerated to replace declining aspen stands. White fir and subalpine fir stocking will be greatly reduced. Douglas-fir and Engelmann spruce will be successfully regenerated and in a stable condition. The grazing resource and aesthetic appearance will be maintained or improved. Noxious weeds will be kept under control.

Division Purpose

The purpose of the Division of Forestry, Fire and State Lands' Forest Stewardship Program is to encourage long-term stewardship of non-industrial private forestlands by assisting private landowners with the active management of their forest and natural resources.

Resource Management Recommendations

Table 4. Resource Management Recommendations.

Recommended Practices/Stands	Practice Objective	Practice Description	Outcome and Additional Considerations
Aspen Regeneration Stands 2-5, 9-15	Ensure regeneration of aspen, mitigate aspen decline, maintain natural character of forest, and improve forest health and vigor.	Using a variety of harvesting, soil ripping and prescribed fire. Remove standing dead trees; leave at least 3 sound snags per acre for wildlife • When harvesting, thin no less than 75 percent of all aspen 5 inches in diameter or greater. • When ripping, rip 6-8 inches deep with a small dozer • When using fire, plan to kill at least 50% of live aspen	Practice will be considered a success when aspen regeneration, on average, meets or exceeds 1,000 trees per acre. Consult the appendix for more information.
Aspen Regeneration Stands 2, 3, 5	Ensure regeneration of aspen, mitigate aspen decline, maintain natural character of forest, and improve forest health and vigor.	Rest pastures north of highway 14 in order to give remaining aspen the opportunity to reach the overstory.	Practice will be considered a success when aspen regeneration exceeds 1000 stems/acre. Aspen forests in these stands have been heavily damaged by logging and grazing and these pastures must be rested if landowners want aspen to persist in these stands.
Forest Stand Improvement Stands 1-4, 6-10, 12-20	Reduce white fir and subalpine fir and western juniper encroachment upon desirable tree species, improve stocking of desirable tree species, ensure successful regeneration of desirable tree species, and mitigate aspen decline.	Thin white fir, subalpine fir and western juniper from below to a maximum diameter of 8” or 10”. Tree selection may be individual or in small patches. Remove all standing dead trees, leaving at least 3 sound snags per acre for wildlife.	Practice will be considered a success when white/subalpine fir is nearly absent with less than 100 stems in the smaller size classes. Consult the appendix for more information. Student or youth crews can be used for material 8” or smaller, use professional fallers for material 8” or larger
Reforestation of Douglas-fir Stands 2-9, 11-13, 17, 18	Improve forest health, restore vigor, maintain natural character of forest, and ensure economic viability of forest.	Plant Douglas-fir seedlings at 150 trees per acre. Care should be taken to use microsite planting techniques whenever possible.	Practice will be considered a success when Douglas-fir regeneration meets or exceeds, on average, 75 trees per acre. Consult the appendix for more information.

Recommended Practices/Stands	Practice Objective	Practice Description	Outcome and Additional Considerations
Reforestation of Engelmann Spruce Stands 11, 12, 16, 17	Improve forest health, restore vigorous trees, maintain natural character of forest, and ensure economic viability of forest.	Plant Engelmann spruce seedlings at 150 trees per acre. Care should be taken to use microsite planting techniques whenever possible.	Practice will be considered a success when Engelmann spruce regeneration, on average, meets or exceeds 75 trees per acre. Consult the appendix for more information.
Reforestation of Ponderosa Pine Stands 1 - 7	Improve forest health, restore vigorous trees, maintain natural character of forest, and ensure economic viability of forest.	Plant ponderosa pine seedlings at 150 trees per acre. Care should be taken to use microsite planting techniques whenever possible.	Practice will be considered a success when ponderosa pine regeneration, on average, meets or exceeds 75 trees per acre. Consult the appendix for more information.
Demonstration Forest Stand 12	Educate students of SUU, members of the public, and other natural resource professionals on the benefits of healthy forests. Demonstrate the benefits of sound, science-based, forest management.	Install education placards along roads and trails in each of the stands. Describe the management activities occurring in each stand.	Placards should be constructed of sufficient quality to endure natural weathering and light vandalism. Also, placards should be monitored annually for signs of wear, and replaced as needed. Consult the appendix for more information.
Range Improvement All Stands and Pastures	Maintain and improve current understory vegetation, and mitigate over-grazing. Ensure deferred rotation grazing system is followed. Install cattle guards to help control grazing when gates are left open	Scatter the following seed mix on areas with sparse vegetation or areas of high grazing use: Grass: #/ac Yellow sweet clover: 1 Orchard grass: 1 Ladac alfalfa: 2 Intermediate wheatgrass: 3 Slender wheatgrass: 3 Mountain brome: 3 Total: 13 #/ac	A hand or ATV-mounted spreader is suitable for this application. Incorporate soil ripping to help seeds establish into the ground. Practice will be considered a success when the total dry-weight production of a favorable year is increased and when all pastures score a 35 or better on the NRCS pasture condition assessment. Contact the NRCS for additional information on range management. Consult the appendix for more information.

Recommended Practices/Stands	Practice Objective	Practice Description	Outcome and Additional Considerations
Invasive Species Control All Stands, Roadsides, and Pastures	Prevent outbreak of noxious weeds.	Survey and monitor at least biennially for noxious weeds. If invasive plants become a problem, consult the Area Forester, NRCS, County Extension office or Weed Board	Practice will be considered a success if noxious weeds do not become a problem. Consult the appendix for more information.
Control Access and Prevent Trespass Perimeter and pastures, where needed. Install cattle guards	Control access to the SUU property, manage grazing resources, prevent trespass, and prevent damage to property.	Install and repair fences along perimeter and within pastures. Install cattle guards as necessary. Install gate on north side of property along SR 14.	Practice will be considered a success when trespass and property damage are contained to acceptable levels, livestock are contained to designated pastures. This is a necessary step to regulate grazing as well as promote aspen regeneration
Logging Rehabilitation	Reduce erosion, improve water quality, reduce off road trespass, stabilize soils for increased range production	Reclaim roads and skid trails, restore landings, create water bars, seed areas with bare mineral soil exposed	Soil erosion if prevented and soil is stabilized

Practice Implementation Schedule

Table 5. Practice Implementation Schedule.

Date	Practice	Location	Scope	Priority
2010	Aspen Regeneration	Stands 2, 3, 5, 9-15	664 acres	1
2010	Forest Stand Improvement	Stands 1-4, 6-10, 12-20	1179 acres	1
2011	Reforestation of Douglas-fir, Engelmann spruce, and ponderosa pine	Stands 1-9, 11-13, 16-18	937 acres	3
2012	Range Improvement	All	2579 acres	3
2010	Rehabilitation, Access Control and Trespass Prevention	Perimeter and Pastures, where needed	2579 acres	1
2011	Demonstration Forest	Stand 12	40 acres	2
2010	Invasive Species Control	All	2579 acres	2

Baseline Resource Assessment

Timber

Inventory Methods

7.5 minute quadrangle maps and aerial imagery was used with a GIS as a basis for most field activities. Property line locations were determined then plotted on maps and timber stands were roughly delineated using aerial imagery. These delineations were refined in the field and stand boundaries were set using timber species, timber size, age, or other attributes. This yielded 20 stands, some of which are made up of several parts. The inventory design was derived from the division standard of one plot every 10 acres, with a minimum of 3 plots per stand. The cruise method used was a variable plot using a specific basal acre factor (BAF), followed by a nested fixed plot 1/250, or 1/100, of an acre in size to assess regeneration.

Plot locations were established using a stratified, random method. The appropriate number of plots was placed randomly within each stand. After layout was complete, plot coordinates were placed into a GPS unit for field location. Then plots were located in a fashion that best utilized contour features and offered the best hiking efficiency to conduct this inventory.

The field data collected, analyzed, and used in this plan is intended for planning purposes only. Sampling for this project is light in comparison for what would be needed for a timber sale. Timber sales would require many more samples and a higher degree of scrutiny for defect to be acceptable for accurate appraisal purposes. Because of the need for higher quality standards to

satisfy the needs of timber sales, stand data contained herein should not be used for timber sale purposes.

Stand Characteristics

Table 6. Stand Characteristics.

Stand	Species*	Total Acres	Board Feet/Acre	Trees/Acre	Quadratic Mean Diameter	Approximate Age
1	WF, DF, ES	74	8710	1507	4.6	150
2	WF, AS, WJ, DF	99	9165	934	4.6	140
3	WF, AS	92	7207	722	3.9	97
4	WF, AS, WF, DF	68	707	269	3.5	141
5	WF, AS, DF	42	2072	83	9	134
6	WF, WJ, ES	17	2827	499	4.4	116
7	WF, AF, ES, WJ	36	1141	914	2.1	97
8	WF, AS, DF, ES	54	2927	2114	2.5	134
9	AS, WF, DF	26	18878	807	5.7	225
10	AS, ES, AF	46	17328	943	5.5	125
11	AS, WF, DF, ES	21	18911	905	6.3	122
12	AS, WF, ES, WJ	140	12279	1528	4	142
13	AS, AF, DF	29	12785	2061	3.6	125
14	AS, WF, WJ, ES, DF	90	19760	1511	5.9	134
15	AS, WF, DF, AF	79	18239	1496	4.9	119
16	WF, AS, ES, AF, LM	147	12516	3087	2.8	144
17	AS, AF, WF, ES, DF	46	22953	3255	3.4	205
18	WF, ES, AF, DF	46	7367	3044	2.6	223
19	AS, WF, DF, ES, AF	50	10568	2463	3	285
20	AS, WF, ES	40	7611	3017	2.3	374

**AF = Subalpine fir, AS = Quaking aspen, DF = Douglas-fir, ES = Engelmann spruce, LM = Limber pine, WF = Western juniper, WF = White fir*

Additional Characteristics

Table 7. Additional Stand Characteristics.

Stand	Successional Stage	Regeneration Characteristics (Trees Per Acre)	Understory Vegetation
1	Late Seral	DF 380, WF 986	Choke cherry, common juniper, snowberry, rose, musk thistle, kinnikinnick, and meadow rue.
2	Late Seral	WF 520, AS 250, WJ 36	Gambel oak, service berry, snowberry, kinnikinnick, currant, grass, and Rocky Mountain maple.
3	Climax	WF 643	Gambel oak, service berry, kinnikinnick, yarrow, currant, grass, and Rocky Mountain maple.
4	Early Seral	WF 185, AS 50, WJ 17	Mullen, musk thistle, yarrow, grass, snowberry, and common juniper.
5	Early Seral	WF 27, AS 6.1,	Snowberry, common juniper, and grass.
6	Mid Seral	WF 442, WJ 33	Snowberry, gambel oak, service berry, Rocky Mountain maple, grass, mullen, yarrow, and dwarf-Oregon grape.
7	Early Seral	WF 733, ES 78, AF 76,	Rocky Mountain maple, snowberry, grass, yarrow, musk thistle, mullen, and common juniper.
8	Climax	DF 50, WF 743, AS 375	Grass, snowberry, kinnikinnick, strawberry, yarrow, and common juniper.
9	Mid Seral	WF 333, AS 333	Dwarf-oregon grape, snowberry, grass, and sweet root.
10	Climax	AS 273, ES 250, AF 250	Currant, snowberry, and grass.
11	Stable	DF 83, WF 83, AS 547	Snowberry, strawberry, common juniper, and grass.
12	Mid Seral	WF 525, AS 875, ES 8, WJ 8	Strawberry, horsetail, kinnikinnick, grass, snowberry, and dwarf-Oregon grape.
13	Early Seral	DF 83, AS 1191, AF 690	Kinnikinnick, rose, and wintergreen.
14	Early Seral	WF 206, 858, 23, WJ 67	Yarrow, common juniper, snowberry, grass, currant, rose, kinnikinnick, and Gambel oak.
15	Mid Seral	DF 250, WF 265, AS 592. AF 138	Common juniper, kinnikinnick, rose, elderberry, snowberry, and dwarf-Oregon grape.
16	Mid Seral	LM 50, WF 1411, AS 1150, ES 165, 150	Kinnikinnick, rose, snowberry, yarrow, and grass.
17	Late Seral	WF 563, AS 1688, ES 63, AF 762	Dwarf-oregon grape, snowberry, grass, currant, strawberry, and yarrow.
18	Climax	WF 1527, ES 1370, AF 63	Horsetail, dwarf-Oregon grape, kinnikinnick, currant, yarrow, and grass.
19	Late Seral	DF 500, WF 624, AS 1188	Strawberry, horsetail, rattlesnake plantain, grass, sweetroot.
20	Early Seral	WF 500, AS 2417	Kinnikinnick, manzanita, currant, snowberry, and yarrow.

**AF = Subalpine fir, AS = Quaking aspen, DF = Douglas-fir, ES = Engelmann spruce, LM = Limber pine, WF = Western juniper, WF = White fir*
Seral – a temporal and intermediate stage in the process of succession
Climax – the culminating stage of plant succession for a given environment
Stable – a state in which an aspen clone will regenerate and not succumb to conifer encroachment

Forest Health

The lack of aspen regeneration in the understory is a noticeable problem on the SUU property and is considered to be the most important forest health issue at this time. Management must occur soon to avoid the additional senescence of aspen, and a conversion to a mixed conifer / white fir forest. Additional forest health concerns include risk of spruce beetle and mountain pine beetle, however insect risk rating for both of these insects fall into the low or moderate category for all stands. These insect risk rating reports are included in the appendix.

Background

Quaking aspen (*Populus tremuloides*) is one of the most iconic trees of southern Utah. Besides the pleasing aesthetics, aspen is very important to the ecology and economy of southern Utah. Aspen is unique among trees in southern Utah because it primarily reproduces from shoots, or "suckers," instead of seeding. This unique characteristic gives aspen the ability to regenerate by cloning itself; with many stems sharing the same roots, and DNA. Recently, an aspen clone in Utah has been identified as the largest living organism on the planet.

Scientists have recently noticed an alarming trend of aspen decline. This trend is exacting a heavy toll on the aspen stands of Cedar Mountain, where aspen is persistent. Aspen is persistent when it is the climax species, with little or no conifer component. When these persistent stands decline, they often convert to grass/tall forb communities, losing tree cover all together. Despite intensive efforts to spur aspen regeneration, the natural stands are still declining. Conifer encroachment is filling the void in some areas, but other stands are converting to grasslands and tall forbs. There are many factors that are speculated to cause this phenomenon: wildfire suppression, drought, grazing and wildlife browse, lack of disturbance, and climate change.

Aspen is also a seral, or early succession, tree. Seral trees are typically short-lived, fast-growing trees that are well adapted to disturbance. Aspen probably evolved with the frequent, low-intensity surface fires that were common in the pre-settlement west. Settlement of the western United States ushered in an era of wildfire suppression that, in some cases, greatly changed natural stand dynamics. Historically, low-intensity surface fires would reduce forb and conifer competition, prepare a mineral soil seed bed, and spur aspen regeneration. Scientific studies have suggested that restoring low-intensity fires to the landscape would improve aspen regeneration, and stave off aspen decline.

Aspen is an important food source for domestic livestock and wildlife. Young, tender aspen shoots are very palatable to animals. The grass/tall forb understory of many aspen stands provides great habitat for wildlife, such as deer and elk, and livestock, such as sheep and are more nutritious than adjacent grass stands. Sheep tending has been a vital part of the southern Utah's economy, and continues to be a major source for many families. Unfortunately, wildlife and livestock can devastate young aspen stands by over-grazing the young stems. Some methods to mitigate this effect include fencing, using chemical deterrents, hunting, and using rotation grazing systems.

In lieu of other disturbance, severing aspen stems spurs the clone to produce new shoots, or "suckers." Evidence suggests that logging aspen stands can be a cost-effective avenue to regenerate aspen clones. Aspen trees are easily injured, so care must be taken in selecting a harvesting method that will not damage the leave trees, or unnecessarily disturb the soil. Other important considerations in site disturbance are the geologic and topographic conditions of a site. These include factors like soil type, slope, and aspect. While aspen can grow in rocky or clay soils, it prefers loamy soils. Also, steep slopes and southern aspects can negatively affect site conditions because they tend to be drier. Care must be taken to mitigate the abiotic factors that can impede aspen regeneration.

Climate change may drastically affect the habitat and site conditions for aspen in the southern Rocky Mountains. Warmer temperatures may result in less rain and snow in the mountains, thus reducing the resources for trees. Species that prefer hotter, drier conditions, such as Gambel oak (*Quercus gambelii*) and juniper (*Juniperus sp*.), may spread and increase competition for trees. While this problem is beyond the scope of any small landowner, actions can be taken to mitigate competition. These actions include controlling shrubs by mechanical or chemical methods, maintaining aspen canopy cover, limiting conifer encroachment, and initiating aspen regeneration under current, favorable conditions.
Many different factors are likely causing the decline of aspen in southern Utah. Scientists are studying and testing old and new ideas to rescue aspen from further decline. While it is impossible for landowners to mitigate every factor, there are some cost-effective ways to secure the future of their aspen. Landowners who graze livestock should consider rotational grazing systems or entirely resting their land. Fencing may also help control the damage inflicted by wildlife and livestock. Soil ripping, dragging a tractor-mounted ripping blade through a stand, can stimulate aspen regeneration, without the need to thin. Timber harvesting, however, is a very cost effective way to finance stand regeneration. Consult with the appropriate state and federal agencies, such as the Division of Forestry, or the NRCS, before considering harvesting activity.

Understory Vegetation and Fuel Model

There are 3 main types of understory vegetation within the SUU property. Under aspen stands, a variety of grasses and forbs predominate with a shrub layer consisting of dwarf-Oregon grape, snowberry, and common juniper. Conifer stands include few grasses and different forbs and shrubs, such as snowberry, Rocky Mountain maple, and kinnikinnick. Rangelands include grasses and shrub species typical of drier sites, such as, Gambel oak, sagebrush, and mahogany. A more detailed description of vegetation types, site descriptions, and common species occurs in the appendix.

Table 8. Fuel Model Information.

Fuel Model Information		
Stand	Fuel Model	Fuel Description
1	8 (56%) 10 (44%)	Closed Timber and Timber (Litter and Understory)
2	5 (61%) 10 (39%)	Closed Timber Litter and Timber (Litter and Understory)
3	8 (78%) 10 (22%)	Closed Timber and Timber (Litter and Understory)
4	5 (96%) 10 (4%)	Closed Timber Litter and Timber (Litter and Understory)
5	8(93%) 10(7%)	Closed Timber and Timber (Litter and Understory)
6	5 (86%) 10 (14%)	Closed Timber Litter and Timber (Litter and Understory)
7	5 (99%) 10 (1%)	Closed Timber Litter and Timber (Litter and Understory)
8	8 (88%) 10 (12%)	Closed Timber and Timber (Litter and Understory)
9	10 (52%) 8 (48%)	Timber (Litter and Understory) and Closed Timber
10	8 (72%) 10 (22%)	Closed Timber and Timber (Litter and Understory)
11	5 (73%) 10 (27%)	Closed Timber Litter and Timber (Litter and Understory)
12	8 (67%) 10 (33%)	Closed Timber and Timber (Litter and Understory)
13	10 (80%) 8 (20%)	Timber (Litter and Understory) and Closed Timber
14	8 (58%) 10 (42%)	Closed Timber and Timber (Litter and Understory)
15	2 (65%) 10 (35%)	Timber (Grass and Understory) and Timber (Litter and Understory)
16	2 (67%) 10 (33%)	Timber (Grass and Understory) and Timber (Litter and Understory)
17	10 (99%) 12 (1%)	Timber (Litter and Understory) and Medium Slash
18	10 (51%) 8 (49%)	Timber (Litter and Understory) and Closed Timber
19	8 (57%) 10 (43%)	Closed Timber and Timber (Litter and Understory)
20	8 (77%) 10 (23%)	Closed Timber and Timber (Litter and Understory)

Soils

Numerous soil types occur on the property. Below is a short description of the soil series that occur on the property. Please refer to the appendix of this document for a complete listing and detailed descriptions of the soils. The cranbay, faim, lava flows, orcap, rock outcrop, seth, and trag soils are rated as poorly suited for road construction due to the slope and strength of the soils. It is not recommended to construct roads and trails on these soil types on steep slopes. Be especially cautious when constructing roads on these soil types and follow the Forest Water Quality Guidelines in the appendix.

Table 9. Soil Types and Descriptions.

Series	Description
Cranbay	Very deep, well drained, alluvium and colluvium derived from limestone
Detra	Very deep, well drained, alluvium derived from sedimentary rock
Faim	Very deep, well drained, colluvium and residuum derived from sandstone, shale, and igneous rock
Lava Flows	Rocky boulders, nearly devoid of plants
Orcap	Moderately deep, well drained, colluvium and residuum derived from sedimentary rock
Rock Outcrop	Moderately deep, well drained, alluvium and colluvium derived from sedimentary rock
Seth	Very deep, well drained, colluvium and residuum derived from basalt
Trag	Very deep, well drained, colluvium and residuum derived from sandstone

Landslides and Geologic Considerations

There is evidence of mass movement or wasting on this property, as well as large mass movement events in the general area in the recent past. This is due in part to the unstable geology of the area, with steep slopes and erodable soils. The NRCS recommends several practices to avoid and prevent soil issues when considering management activities such as timber harvesting and road building:

- Avoid using roads when soil conditions are wet. It is unlikely that roads would be used during these times because of their high clay content and slipperiness, but it needs to be stressed.
- Employ the technique of outsloping roads and allow for proper drainage of roads. Trapping water on the road might allow percolation and lubrication of slip planes and resulting land slides.
- Add gravel to roads for improved access, and always avoid using heavy equipment when soils are wet. Vibration from heavy equipment increases pore pressure, which causes separation, suspension of soil particles in water, and, in extreme cases, can cause liquefaction, which is shaking a soil into liquid, mud-type state.

Please consult NRCS Access Road conservation standards and FFSL Forest Water Quality Guideline information in the appendix for general information about roads, their maintenance and other important management information that could impact soils. Site specific planning will need to occur before stand treatments are undertaken. A forest or civil engineer should be consulted before road building is undertaken. Doing so may eliminate costly and irreparable mass-wasting and erosion consequences.

Hydrology

Springs

There are 4 springs on the SUU property. Springs were identified using a combination of ground surveys, USGS 7.5 minute topographic maps, hydrologic maps, and GIS. Consult the 'Soils' section of the appendix for more information.

Streams

Crow Creek is a perennial Class 1 stream that flows northerly through the property. Ashdown Creek is a seasonal Class 2 stream that flows westerly through the north part of the property. There is a perennial Class 2 stream that flows northerly into Crow Creek in the southern part of the property. In addition to these water courses there are several other minor draws and intermittent streams. None of the waterbodies in the property appear on the 303(d) list of impaired waterbodies. Consult the Utah Forest Water Quality Guidelines, and the Area Forester, before engaging in any management activities in, or adjacent to, watercourses.

Waterbodies

There are no waterbodies on the property.

Wetlands

There are a few small wetlands on the property. Consult the Utah Forest Water Quality Guidelines, and the Area Forester, before engaging in any management activities in, or adjacent to, wetlands.

Range

A large portion of the property (52% or 1,337 acres) is rangeland, consisting of grasses, forbs and shrubs. Common species are Gambel oak, Utah juniper, snowberry, dwarf Oregon-grape, common juniper, and mahogany. The grasslands are productive and in fair condition due to the impact of grazing on the property. Musk thistle was identified on the property; however, populations were not of epidemic proportions. For additional information on vegetation types on this property, consult the 'Vegetation' section of the appendix.

Enhancing the grasslands may be a good way to maintain the aesthetic appeal of the property. Seeding is a good way to accomplish this objective. Landowners should work with the National Resource Conservation Service or the Division of Forestry, Fire and State Lands for advice concerning an appropriate seed mix. A recommended seed mix is provided in the 'Resource Management Recommendations' section of this document. Scatter seed at the recommended rate using a hand seeder or ATV-mounted spreader in any areas with significant bare soil exposed in August or late fall. Scarifying the soil surface after seeding may improve germination and seeding success.

Strategies such as these could be implemented using cost share dollars from the Forest Land Enhancement Program, Environmental Quality Improvement Program, Grazing Improvement Program, or other resources such as Dedicated Hunters, juvenile work crews, or possible Americorps volunteers. See information on range resources in appendix.

Fish and Wildlife

The SUU property is considered important habitat for the following species during certain times of the year.

Table 10. Wildlife Species and Habitat Information.

Species of Interest	Habitat Value	Season	Total Acres
Band-Tailed Pigeon	High	Spring/Early Fall	110
Black Bear	High	Year-long	2579
Blue Grouse	Substantial	Year-long	2551
Rocky Mountain Elk	High	Summer	2249
Mule Deer	High	Summer	2455
Mule Deer	High	Winter	124
Wild Turkey	High	Summer	2579

Threatened and Endangered Species

The Utah Division of Wildlife Resources (DWR) does not list any occurrences of threatened, endangered or species of concern in the general area of the property. A letter from the DWR to this effect is included in the appendix. If threatened or endangered species are found during the course of implementing this plan, management activities should be reviewed to insure they do not harm the species, or destroy the habitat they occupy. The landowner is advised to contact the DWR about any issues concerning wildlife.

Aesthetics

The visibility of this property is very high due to its location along state highway 14, and near a national monument and a national forest. This property has numerous vistas and vantage points due to its mountains and steep topography. It is important to consider the visual impact of stand treatments and other management activities. To minimize the objections of recreationists, nearby homeowners, and the general public, treatment areas should be rehabilitated as soon as possible.

Recreation

The recreation component of the SUU Mountain Ranch RMP will be mainly dealt with by the recreation committee, chaired by Dr. Briget Eastep. A brief summary of uses and concerns follows. Primary forms of recreation include hunting, camping, hiking, ATV use, horseback riding, mountain biking and rock climbing. There are minor trespass problems, especially hunters damaging fences and gates. Due to the desire to establish a demonstration forest, a recreation plan will be developed to ensure harmony and cohesion with the multiple use values of the property. Consult the appendix and the Area Forester for more information.

By its nature, ATV travel has the potential to be one of the most detrimental uses because of the high level of potential impact if ATVs are operated carelessly. It is advisable that the landowners establish a policy on the property with regard to ATV use. Ideally, the policy will restrict ATV use to established roads and trails for any purpose. Enforcement of this policy, especially for young riders, will help curb negative impact to vegetation and soil, and limit unauthorized trails. With regard to unauthorized use of ATVs and 4-wheel-drive vehicles, the following should be considered:

- Gates should be placed as close to the main road as possible, so someone who is tampering with, or destroying, the gate is easily detected. Gates far from the main road in secluded locations are sometimes most prone to being tampered with.
- Tank traps can sometimes be viewed as jumps to ATVs. Their effectiveness needs to be carefully considered. Also, intentional hazards can introduce liability to the landowner.
- Gates constructed of high-quality, tough materials that meet the specifications of the Manual Uniform Traffic Control Devices are likely to be respected. Reflective tape and painted surfaces show increased investment, and are likely to be respected. Gates should be strong enough to preclude, or at least resist, being pulled down with vehicle winches.
- Gates should be placed in strategic locations where it is not physically possible to circumvent the gate. An example would be a steep hillside, or next to a large rock outcropping. In both of these cases, destroying the fence on either side of the gate would be a waste of time, because steepness, or obstruction, makes entry impossible.
- Fences are often respected, especially log worm fences.
- Barrier structures made from boulders should be sufficiently massive. Boulders that weigh 300 pounds, or less, can be moved by humans, and certainly with winches. Therefore, larger boulders are better.

Historic and Cultural

If evidence of sites is discovered during the course of implementing this plan, the landowner must notify the Division of State History as required under Utah Code Title 9-8-307. If, upon completion of a survey by the Division of State History, archaeological resources are found to be present, mitigating measures may have to be addressed for protection. The landowner should consider any of all viable management alternatives if any such sites are discovered on or near areas designated for management.

> *Utah Code Section 9-8-302, Definitions, states:*
> *(2) "Archaeological resources" means all material remains and their associations, recoverable or discoverable through excavation or survey, that provide information pertaining to the historic or prehistoric peoples of the state.*
> *(6) "Excavate" means the recovery of archaeological resources.*
> *(12) "Site" means any petroglyphs, pictographs, structural remains, location of archaeological deposits, or other location which is the source of specimens.*
> *(13) Specimen" means all man-made artifacts and remains of an archaeological of anthropological nature found on or below the surface of the earth, excluding structural remains.*
>
> *Utah Code Section 9-8-307, Report of discovery on state or private lands, states:*
> *(2) Any person who discovers any archaeological resources on privately owned lands shall promptly report the discovery to the division [of State History].*
> *(4) Nothing in this section may be construed to authorize any person to survey or excavate for archaeological resources.*

Additional Management Considerations

Harvesting

There are several stands identified in this Forest Stewardship Plan that will need to be treated using cable harvesting systems or even helicopters. These types of systems may cause ramifications for management due to the fact that there are so few companies in the local operating area that have this type of equipment. Cable and helicopter logging operations are also expensive to operate and set-up costs are significant. One approach that could be considered by the landowners would be to prepare all of these units into a single sale, and advertise accordingly. By doing this, units that would not be economically feasible on their own could be pulled together and would then be economical. Additionally, larger sales with more volume can attract operators with modern, long reach equipment that will be needed to treat these stands. Lastly, larger sales will increase competition which usually leads to better revenue and getting the best equipment and logging systems for the type of terrain to be treated.

Compartments that can be logged using ground based equipment can be treated at any time, and in any order the landowner would like to carry out a contract. A suggested sequence appears in table 5. These activities should be orchestrated to achieve other goals in unison, such as minimizing visual impacts. As discussed, it is recommended that a majority of the cable compartments be treated at once for economic and logistical reasons. This in itself will be a significant impact to the watershed. It is important to consult with a forester and use approved best management practices. This will reduce sedimentation downstream, allow roads to settle, vegetation to become established, and will allow landowners to formulate sale administration techniques based on past experience. Stands that are to be regenerated with aspen should be treated in large enough portions to discourage impacts from wildlife grazing of young aspen shoots.

Lastly, a major use of the SUU property is recreation and aesthetic enjoyment. A conservative approach to timing and scale of operations (within the confines of economic timber sales) can help ensure that the owners and users of this property are not negatively impacted when viewing treated stands. It is highly recommended that no matter the type of management undertaken, the landowner consult with, and use, the principles contained in Utah's Forest Water Quality Guidelines. For more information, consult the appendix and contact the Area Forester.

Conifer Regeneration

It is important to consider seed sources in a conifer forest situation. Future seedlings should come from the cones of on-site trees, or planted seedlings. Before a stand is harvested, the manager must ascertain where the seedlings for the next crop of timber will come from. Remaining trees, "leave trees," should be:

1. Healthy
2. Vigorous
3. Free of defect, insects, or disease
4. With good form
5. Have a high live, full crown ratio
6. Properly spaced, and
7. Be wind-firm
8. Of desirable species

Selecting for these traits will ensure that the most genetically superior trees will inherit the site. Failure to consider these recommendations can seriously jeopardize the future of stands with a lot of management potential. It is often better to utilize existing trees on site to avoid costly replanting and introduction of off-site stock. Off-site stock is often ill-suited to local climatic conditions and micro-site requirements.

Some conifer species require a certain amount of shade be maintained on site to insure seedling survival. Opening a stand too drastically can result in a hot, dry, and overly harsh site that prohibits regeneration, or favors undesirable species. The desirability of a particular tree species over another is most often related to its value as: 1) aesthetic appeal, 2) wildlife value (food,

hiding cover, and thermal cover), 3) timber species, 4) susceptibility to disease, 5) potential to spread wildfire, 6) growth rate, 7) canopy characteristics, 8) wind firmness, 9) site compatibility, and 10) other factors.

Aspen Regeneration

Aspen has unique regeneration characteristics. When stems are severed, the underground portion of the organism is stimulated to send up regenerating sprouts or suckers. Performing a clearcut treatment mimics a natural disturbance such as fire, avalanche, windstorm, or other large-scale event. Severing all of the stems affords the best regeneration success because of disruption of auxins, plant hormones that suppress regeneration. Prescribed fire can enhance this effect. Over time, as a dense stand of aspen suckers turn into saplings, they will begin crowding each other and will self-thin. This process has the effect of concentrating site growth potential onto remaining trees.

Pathological Maturity

It is commonplace for foresters to recommend landowners to manage their aspen using a pathological rotation. This is done for several reasons. First, in most cases, an aspen stand will begin to decline somewhere from age 80 to 100 years old. Aspen cankers and other fungal diseases begin to increase as the stand matures. Regenerating the aspen stand somewhere in this 80 to 100 year window of opportunity is recommended to capture the value of the wood in the stand at the largest possible log size, while minimizing the amount of rot and canker within logs harvested.

If a regenerating clone is grazed too heavily by livestock or wildlife, the density of shoots can be negatively impacted. This might result in a loss of future aspen volume because stand stocking would not be as high as possible. Also, this will negatively impact the aesthetic value of the stands. More fully stocked stands also mean more income in the future. Another important consideration that can often increase income is the quality of logs grown in the stand. It is more typical for a stand of timber with a higher density to have taller and straighter trees because competition for sunlight forces trees to grow faster in an attempt to out-compete their neighbors.

Microsites

Seedlings need certain resources, such as sunlight, water, and nutrients, to survive and grow well. The better the planting site is at providing these resources, the better off the seedling. Not every resource will be available at every site. All planting spots have some deficit, or growth limiting factor, that restricts seedling survival and growth. Microsites are minute differences in planting sites that provide seedlings better access to critical resources.

These are sites immediately surrounding the seedling, that because of their physical, biological, or chemical, characteristics provide better growing conditions. An example of this is planting

seedlings on the north side of a down log to provide cooling shade to the young stem. Also, planting seedlings in small depressions may provide them with slightly more water than a neighboring planting spot, thus giving the seedling an extra advantage. While the differences in planting sites may seem miniscule, sometimes they make all the difference in seedling survival.

Wildlife

It is important to note that regardless of whether or not livestock use the stand/pasture that is to be regenerated, wildlife (primarily elk and deer) will always be there. It is not practical to control wildlife because fencing is cost-prohibitive, so monitoring must be done to make sure wildlife overuse does not occur. Monitoring a regenerating aspen clone is necessary to be certain the density of aspen shoots remains high.

It is a good idea when considering wildlife grazing pressure to treat the maximum number of acres possible at the same time. Treating large areas of aspen spreads out use by wildlife and reduces the concentrated effect of grazing pressure where animals are drawn to a regenerating clone. Harvesting too few acres can draw elk and deer into a small area and there is a very real chance this might turn an aspen stand into a meadow if regeneration is exhausted. This phenomenon has been documented on Monroe Mountain on a 100+ acre aspen stand, where cattle were fenced out, but where elk repeatedly grazed aspen to the point where the clone died.

Age Classes

Age classes are an important consideration in uneven-aged management scenarios. Uneven-aged systems are most often applied in conifer forests, and for particular reasons. Uneven aged management sometimes mimics the natural stand dynamics of stable, climax forests. Those reasons usually include trying to create a particular stand structure for wildlife, or for some other purpose. Another justification of uneven-aged systems is to regenerate a shade tolerant species, or to avoid the temporary, negative, visual impact of even-aged management.

Even-aged scenarios are often applied where timber production is a major goal, for regeneration of shade-intolerant species, or when high operational costs dictate removal of all timber at once. Aspen are primarily managed in an even-aged scenario because the biology of aspen is such that it favors large-scale, stand-replacing disturbances to trigger regeneration.

Wounding is an important consideration in aspen. Because of its thin bark, selectively harvesting aspen can easily result in stem wounding, especially in early spring. This can lead to fungal infection and degradation of the stand. Aspen is also a low-valued species, which dictates that unless there is a compelling reason to leave merchantable stems, they should be taken to reduce operating costs.

Succession

Succession is the transformation from one forest type, or dominant species, to another over time. This is occurring in stands 1, 3, and 6, where shade-intolerant (sun-loving) aspen in the overstory, is being replaced by shade-tolerant (shade-loving) white fir and subalpine fir in the understory. Undesirable species, such as white and subalpine fir, are also encroaching upon Douglas-fir and ponderosa pine. Stands that have significant stocking of undesirable species are often prone to insect and disease problems as well as catastrophic wildfires. This is a problem because there are so many beneficial reasons to propagate aspen: aesthetics, wildlife value, and fire resistance.

Future Timber Harvests

It is desirable to harvest timber from the property on a periodic basis for safety, aesthetic, and economic reasons. One important justification is to retain operational knowledge gained when timber is harvested. If timber were only harvested once a century, the knowledge of logging operations, and the steps that need to be taken, would not be passed from one owner, or custodian of the property, to the next. It is a desirable goal for knowledge to be passed down over time. This is not only for the sake of knowledge, but helps avoid site-specific problems that might not be apparent.

Another, equally important, reason to harvest regularly is to generate income at regular and predictable intervals. Doing this keeps the value of timber on the minds of owners, or managers, and can make managing timber into the future a priority if income can be counted upon at regular intervals. Regular income can offset the expenses incurred from owning and maintaining forested land. Periodic income can also be important for capital improvements to the property.

The forest products industry in Utah will also benefit from regular timber harvests on the SUU property. Regular harvests can reduce the “feast-or-famine” cycling of forest product supply to the industry. If other landowners take notice of what SUU is doing, there is a chance that they will also adopt good forestry practices. Lastly, periodic harvests are needed to prevent the encroachment of low-value species, like white and subalpine fir.

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Section Five – Wildlife

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