INTRODUCTION

Appendix A contains the mapping criteria, classification descriptions, and desired condition tables for vegetation outside of designated wilderness areas. There are separate tables and/or narratives that relate to: (1) desired conditions for separate components of forested vegetation, (2) desired conditions for woodland and shrub types, and (3) desired conditions for riparian vegetation, including vegetation in riparian conservation areas (RCAs). Desired conditions do not represent a static state; they are dynamic because the ecosystems we are working with are dynamic. The desired conditions are not something that every acre of the Forest at every point in time will possess—there will always be spatial and temporal variability. However, achievement of desired conditions, well distributed across the planning unit, is a long-term goal of Forest management. For these reasons, the desired conditions are to be evaluated at either the 5^{th} field hydrologic unit (HU) or activity area (for snags and coarse woody debris), depending on the vegetation component of interest. A scale other than watershed may be used where it is determined that a different reference area is more appropriate for identifying opportunities for a specific type of treatment. Further details on the development of desired conditions can be found in Chapter 3 of the Final EIS, Appendix B of the Final EIS (Analysis Process), and in the Technical Reports that are part of the project record for Forested Vegetation, Snags and Coarse Woody Debris, and Non-Forest Vegetation.

In many areas, our current conditions deviate strongly from our desired conditions; this deviation creates opportunities for managing vegetation. Even under careful management, though, it may take several decades for these areas to approach desired conditions, and there are steps along that path where managers will have to choose among several approaches to maintain or trend toward desired conditions. There may be many different paths to a common endpoint that meet different management objectives, each with their own set of trade-offs. This will be the challenge of ecosystem management in managing vegetation and trying to achieve desired vegetative conditions. As we move forward in this process, and we learn more from monitoring and scientific research, our desired conditions may change, or we may alter the paths we choose to achieve them. For these reasons, it is not possible to describe a completely prescriptive approach to desired conditions, but merely offer guidance in how to consider desired conditions.

In some cases, there may be exceptions to the vegetative desired conditions. These exceptions may occur as a result of management direction in other resource areas, or when site-specific conditions are not appropriate for the desired conditions. Oftentimes, Management Area direction may have different, but overriding goals and objectives. Each Management Prescription Category (MPC) may also have a different theme as to how we would achieve desired conditions. All of this information needs to be considered when we design our projects. The desired conditions are general conditions that can be modified at the local or project level based on site-specific biophysical conditions.

DESIRED VEGETATION CONDITIONS

Forested Vegetation

Several tables below describe individual components of forested vegetation and their desired conditions. Table A-1 displays the Forested Potential Vegetation Groups. Forested vegetation refers to land that contains at least 10 percent crown cover by forest trees of any size, or land that formerly had tree cover and is presently at an earlier seral stage. Forested vegetation is described using habitat types, which use potential climax vegetation as an indicator of environmental conditions. At the level of the Forest Plan, forested habitat types have been further grouped into potential vegetation groups (PVGs) that share similar environmental characteristics, site productivity, and disturbance regimes. Additional information on PVGs is available in the section entitled Vegetation Classification and Mapping in this Appendix.

Table A-1. Forested Potential Vegetation Groups[1]

Potential Vegetation Group
PVG 1 – Dry Ponderosa Pine/Xeric Douglas-fir
PVG 2 – Warm Dry Douglas-fir/Moist Ponderosa Pine
PVG 3 – Cool Moist Douglas-fir
PVG 4 – Cool Dry Douglas-fir
PVG 5 – Dry Grand Fir
PVG 6 – Cool Moist Grand Fir
PVG 7 – Cool Dry Subalpine Fir
PVG 8 – Cool Moist Subalpine Fir
PVG 9 – Hydric Subalpine Fir
PVG 10 – Persistent Lodgepole Pine
PVG 11 – High Elevation Subalpine Fir

[1] Forested vegetation refers to land that contains at least 10 percent crown cover by forest trees of any size or type, or land that formerly had tree cover and is presently at an earlier seral stage.

Tree Size Class

Tree size class is determined by the size of the overstory trees. The average diameter of the trees in the overstory or uppermost tree layer determines the stand's tree size class. A canopy layer has a distinct break in height, and must have a non-overlapping canopy closure of at least 10 percent. A few individual trees (such as relic trees) representing a distinctly different tree size are not recognized as defining a distinct canopy layer if the total canopy cover of those trees is less than 10 percent. Tree size class can also be determined from aerial photos by interpreting the average crown diameter of the overstory trees. For example, if the overstory trees average 22 inches diameter at breast height (DBH), then the stand is classified as a large tree size class, regardless of the size of trees that may occur in understory layers. Within any canopy layer diameter may vary considerably between individual trees.

Tree size class is based on the following diameter groupings:

- Grass/Forb/Shrub/Seedling < 4.5 feet tall
- Sapling 0.1" – 4.9" DBH
- Small trees 5.0" – 11.9" DBH
- Medium trees 12.0" – 19.9" DBH
- Large trees >20" DBH.

Table A-2 displays the desired amounts for each tree size class at the Forest-wide and 5th field HU scales. This table shows, for each PVG, a range in the percent of an area's forested vegetation desired for each tree size class. The range for each size class reflects the dynamic development of trees, considering growth rates, the type and extent of disturbances, and varying growing conditions.

The range in Table A-2 was developed from estimates of the historical range of variability (HRV). The low end of the large tree size class range is based on half the low end of HRV, provided that the minimum value does not fall below 20 percent. The upper end of the range for large trees is equal to the mean HRV value. The 20 percent value is a threshold that represents the minimum percent of a landscape area retained in the large tree size class because it is deemed necessary for assuring the viability of terrestrial wildlife species. The range for the Grass/Forb/Shrub/Seedling growth stage is based on the range of large trees and the time interval needed for this growth stage to advance to the next tree size class. The information presented in Table A-2 represents the full range of desired conditions for tree size classes encompassed by all Management Prescription Categories.

Table A-2. Forest-wide Range of Desired Size Classes
Expressed as Percentage of Forested Vegetation Within Each PVG
(Includes forested vegetation in RCAs)

Tree Size	PVG 1	PVG 2	PVG 3	PVG 4	PVG 5	PVG 6	PVG 7	PVG 8	PVG 9	PVG 10	PVG 11
G/F/S/S	1 – 18	5 – 7	9	14 – 15	3 – 7	7 – 9	7 – 16	15 – 17	13 – 15	16 – 23	9 – 15
Saplings	2 – 12	3 – 7	9	7 – 9	3 – 7	7 – 9	11 – 15	11 – 15	8 – 15	11 – 16	14 – 15
Small	2 – 18	5 – 21	18 – 27	19 – 22	4 – 22	11 – 27	21 -- 22	22 – 23	17 – 22	46 – 48	19 – 22
Medium	3 – 29	7 – 35	23 – 36	24 – 36	7 – 30	18 – 36	32 – 36	28 – 29	25 – 29	20	22 – 38
Large	24 – 91	30– 80	20 – 41	20 – 34	33 – 84	20 – 56	20 – 21	20 – 21	20 – 37		20 – 27

Similar to Table A-2, Table A-3 displays a portion of the desired ranges for the Grass/Forb/Shrub/Seedling and large tree size classes at the Forest-wide and 5th field HU scales. This table shows only that portion of the range that falls within the estimated HRV and thus presents only the HRV portion of desired condition range that is displayed in Table A-2. The low end of the large tree range is based on the low end of HRV, provided that the minimum value does not fall below 20 percent. The upper end of the range for large trees is equal to the mean HRV value. The upper end of the desired condition range is the same in Tables A-2 and A-3. The 20 percent minimum value in Table A-3 is the same as that shown in Table A-2 -- it represents the minimum percent of a forested landscape area that should remain in the large tree size class to ensure the viability of terrestrial wildlife species. The range for the Grass/Forb/Shrub/Seedling growth stage is based on the range of large trees and the time interval needed for this growth stage to advance to the next tree size class. The ranges in tree size classes in Table A-3 displays the desired condition encompassed by all Management Prescription Categories except MPC 5.2.

Table A-3. Desired Percentage Ranges for Size Classes of Forested Potential Vegetation Groups, Outside of MPC 5.2 (Includes forested vegetation in RCAs)

Tree Size	PVG 1	PVG 2	PVG 3	PVG 4	PVG 5	PVG 6	PVG 7	PVG 8	PVG 9	PVG 10	PVG 11
G/F/S/S	1 – 12	4 – 5	9	14 – 15	3 -- 4	7 – 8	7 – 16	15 – 17	13	16 – 23	9 – 15
Large	47 – 91	59– 80	23 – 41	20 – 34	66 – 84	28 – 56	20 – 21	20 – 21	31 – 37	20	20 – 27

Note: References to PVG 10 in the above table is to be applied to the Medium Tree Size Class (overstory trees average diameter ranges from 12.0 to 19.9 inches diameter breast height). The overstory trees in PVG 10 stands (persistent lodgepole) generally do not attain an average diameter within the large tree size class (20.0 inches diameter breast height) even though individual trees may equal or exceed 20 inches in diameter.

Table A-4 displays a portion of the desired ranges for the Grass/Forb/Shrub/Seedling and large tree size classes at the Forest-wide and 5th field HU scales. This table shows only that portion of the range that falls outside of the estimated HRV and thus presents only a portion of the desired condition range that is displayed in Table A-2. The part of the desired condition range applies to those areas allocated to Management Prescription Category 5.2 where timber production is an emphasis. The low end of the large tree size class range in Table A-4 is the same as in Table A-2 -- it is based on half the low end of HRV provided that the minimum value does not fall below 20 percent. The upper end of the range for large trees is equal to the low end of HRV for large trees. It should be noted that for several PVGs the requirement that a minimum of 20 percent of the forested landscape be retained in the large tree size class results in conditions that fall within the estimate Historical Range of Variability. This is true for PVGs 4, 7, 8, 10, and 11 where the low end of the range is at or below 20 percent. The reason for requiring the 20 percent minimum value in Table A-4 is the same as in Tables A-2 and A-3 -- it represents the minimum percent of a forested landscape area that should remain in the large tree size class to ensure the viability of terrestrial wildlife species.

Table A-4. Desired Percentage Ranges for Size Classes of Forested Potential Vegetation Groups, Within MPC 5.2

Tree Size	PVG 1	PVG 2	PVG 3	PVG 4	PVG 5	PVG 6	PVG 7	PVG 8	PVG 9	PVG 10	PVG 11
G/F/S/S	13 – 18	5 – 7	9	15	4 – 7	8 – 9	7	15	13 – 15	16	9
Large	24 – 46	30– 58	20 – 22	20	33 – 65	20 – 27	20	20	20 – 30	20	20

Note: References to PVG 10 in the above table is to be applied to the Medium Tree Size Class (overstory trees average diameter ranges from 12.0 to 19.9 inches diameter breast height). The overstory trees in PVG 10 stands (persistent lodgepole) generally do not attain an average diameter within the large tree size class (20.0 inches diameter breast height) even though individual trees may equal or exceed 20 inches in diameter.

The desired range of the Grass/Forb/Shrub/Seedling tree size class is also displayed and was developed in the same manner as in the two tables above. The desired range of the Grass/Forb/Shrub/Seedling tree size class varies between the three tables (A-2, A-3 and A-4) because of the percent of large tree size class range associated with MPCs and the time interval needed for trees to develop from the Grass/Forb/Shrub/ Seedling tree size class to the Sapling tree size class.

For example, PVG 7 has a desired range for large trees that is essentially the same regardless of MPC (20 percent in Table A-4 and 20–21 percent in Table A-3); however, the range of the Grass/Forb/Shrub/ Seedling tree size class is limited to 7 percent in MPC 5.2, while in all other MPCs the range varies from 7 to 16 percent. This wider range occurs in the MPCs other than 5.2 because a significant portion of PVG 7 occurs in MPCs (1.2, 3.1, and 4.1). These MPCs emphasize passive management strategies that would generally have the Grass/Forb/Shrub/Seedling tree size class developing into the Sapling tree size class over a longer time period than under active management in MPC 5.2. This time interval is estimated to be three times longer (30 years versus 10 years) under MPCs 1.2, 3.1, and 4.1 than under 5.2. The result is that the range of the Grass/Forb/Shrub/Seedling tree size class is greater in Table A-3 for PVG 7, even though the range of desired large tree size class is essentially the same regardless of MPC. In other PVGs this same relationship may not hold true because either the range of desired conditions for the large tree size class is substantially different, or there is only a small percentage of a PVG in an MPC requiring longer time intervals, or both.

Although current conditions may prevent us from obtaining desired condition for quite some time, over a longer period (perhaps more than 100 years) management actions should result in forested vegetation that is approaching Forest-wide desired conditions for tree size classes, when all of the 5th field HUs are averaged together. The 5th HU is deemed an appropriate analysis unit for evaluating project-level contributions because mid-scale data and other information is generally available or is feasible to generate. This scale also coincides with other scales of analysis that may be undertaken before or as part of project-level planning. The 5th field HU also facilitates a good distribution of desired components across the Forest.

Canopy Closure

As previously mentioned the overstory or uppermost tree layer determines the tree size class, for a stand or other area delineated for management actions. Trees that compose a distinct break in height determine the canopy layer, and these trees must have a non-overlapping canopy closure of at least 10 percent. A few individual trees (such as relic trees) representing a distinctly different tree size are not recognized as defining a distinct canopy layer if the total canopy cover of those trees is less than 10 percent. These trees are instead included with the trees in the size class that are closest to their own size.

Canopy closure classes are based on the following:

- Low = 10-39% canopy closure
- Moderate = 40-69% canopy closure
- High = 70% or more canopy closure

Canopy closure may be determined through ocular estimates from aerial photo interpretation or while conducting stand exams. Canopy cover as expressed here represents total non-overlapping crown closure of all trees in a stand except for trees in the seedling size class. Trees in the seedling size class are used to estimate canopy closure only when they represent the only structural layer present.

For example, if the average diameter of the overstory trees is >20” DBH, then the stand is classified as being in the large tree size class, regardless of what size trees comprise other canopy layers that may be present in the understory. This is to be interpreted such that, in the 5th field HU of concern, the area occupied by stands classified as being in the large tree size class, for each potential vegetation group, should fall within the ranges indicated for each canopy closure class, or show that management actions will assist a PVG in moving towards a size class distribution within the ranges over the long-term.

Table A-5 displays the desired condition for canopy closure for the large tree size class associated with the large tree desired ranges displayed in Table A-3 above. This is the desired condition for all MPCs except 5.2.

Table A-5. Desired Percentage Ranges for Canopy Distribution within the Large Tree Size Class, Represented by Canopy Closure Classes – Outside of MPC 5.2
(Includes vegetation in RCAs)

Canopy Closure	PVG 1	PVG 2	PVG 3	PVG 4	PVG 5	PVG 6	PVG 7	PVG 8	PVG 9	PVG 10	PVG 11
Low	80-100	74 - 94	5 - 25	0 - 14	25 - 45	0 - 20	0 - 14	0	0	0	0 - 16
Moderate	0 -20	6 - 26	75 - 95	87-100	55 - 75	80-100	86-100	51 - 71	51 - 71	81-100	84-100
High	0	0	0	0	0	0	0	39 - 49	39 - 49	0 - 19	0

Note: References to PVG 10 in the above tables are to be applied to the Medium Tree Size Class (overstory trees average diameter ranges from 12.0 to 19.9 inches diameter breast height). The overstory trees in PVG 10 stands (persistent lodgepole) generally do not attain an average diameter within the large tree size class (= 20.0 inches diameter breast height) even though individual trees may equal or exceed 20 inches in diameter. Canopy closure classes are as follows: Low is 10-39%; Moderate is 40-69%; and High is >70%.

Table A-6 displays the desired condition for canopy closure for the large tree size class associated with the large tree desired ranges in Table A-4 above. This is the desired condition for MPC 5.2.

Table A-6. Desired Percentage Ranges for Canopy Distribution within the Large Tree Size Class, Represented by Canopy Closure Classes – Within MPC 5.2

Canopy Closure	PVG 1	PVG 2	PVG 3	PVG 4	PVG 5	PVG 6	PVG 7	PVG 8	PVG 9	PVG 10	PVG 11
Low	80-100	4-24	0-20	0-20	3-23	0-20	23-43	0	0	0	57-77
Moderate	0 -20	76-96	80-100	80-100	77-97	80-100	57-77	30-50	30-50	81-100	23-43
High	0	0	0	0	0	0	0	50-70	50-70	0 - 19	0

Note: References to PVG 10 in the above tables are to be applied to the Medium Tree Size Class (overstory trees average diameter ranges from 12.0 to 19.9 inches diameter breast height). The overstory trees in PVG 10 stands (persistent lodgepole) generally do not attain an average diameter within the large tree size class (≥ 20.0 inches diameter breast height) even though individual trees may equal or exceed 20 inches in diameter. Canopy closure classes are as follows: Low is 10-39%; Moderate is 40-69%; and High is >70%.

Although current conditions may prevent us from obtaining desired condition for quite some time, over a longer period (perhaps more than 100 years) management actions should result in forested vegetation that is approaching Forest-wide desired conditions for canopy closure, when all of the 5th field HUs are averaged together.

Species Composition

Table A-7 displays the desired condition ranges for forested vegetation species composition at the Forest-wide scale. Scales below the Forest-wide level are not expected to mirror these values because of the specific mix of habitat types that are present in individual analysis areas. For example, for PVG 1, the desired range of 96-99 percent ponderosa pine would be attained when evaluated at the Forest-wide scale.

The remainder of PVG 1, up to 4 percent of the area, would be any other combination of tree cover. For an individual 5th field HU, the proper species "mix" would be determined by the dominant management prescription categories (MPCs) for that watershed, and other concerns such as wildlife or wildland/urban interface.

Table A-7 represents the Forest-wide desired species composition across all size classes, as adapted from the Historical Range of Variability of the Idaho Southern Batholith Ecosystem (Morgan and Parsons 2001). Individual species represented by an asterisk (*) were not explicitly modeled during the development of the Historical Ranges of Variability. They were not included because they occur in habitat types that represent only a minor part of the PVGs within the Idaho Southern Batholith, or because of little information known about their historical occurrence within a PVG. This latter reason was often the case with quaking aspen.

The appropriate species composition for the 5th field HU being analyzed may vary from this table based on the mix of habitat types present. For project application it is necessary to determine the mix of habitat types that comprise the PVGs within the 5th field HU analysis area. For this usually more limited set of habitat types, describe the desired species composition that will achieve the goals of having landscapes dominated by early seral species that are better adapted to site conditions, and are usually more resilient to disturbances such as fire. The desired range of species in Table A-7 is evaluated for Forest-wide monitoring.

Table A-7. Desired Percentage Ranges for Species Composition of Forested Potential Vegetation Groups, For Forest-wide Evaluation

Species	PVG 1	PVG 2	PVG 3	PVG 4	PVG 5	PVG 6	PVG 7	PVG 8	PVG 9	PVG10	PVG11
Aspen	*	*	1-11	4-13	*	*	6-11	*	*	*	*
Lodgepole pine		*	*	10-20	*	1-5	28-42	25-34	29-37	82-94	18-25
Ponderosa pine	96-99	81-87	26-41	*	80-88	23-41	*				
Western larch					0-1	15-29	*	9-16	*		
Whitebark pine										*	32-47
Douglas-fir	0-2	10-16	47-69	66-81	7-17	15-25	24-34	23-37	*	*	
Englemann spruce					*	0-2	3-5	10-17	28-33	*	8-13
Grand fir					0-1	9-23	*				
Subalpine fir						0-3	12-21	11-17	29-33	*	18-29

Note: Use this table as a reference. For project purposes describe the desired species composition for the 5th field HU based on species composition of the habitat types present within the 5th field HU analysis area. Refer to the appropriate habitat type guide for the analysis area when determining the correct species mix including those species that may occur as accidentals.

Snags and Coarse Woody Debris

Snags and coarse woody debris are much finer-scale elements than vegetation components such as species composition, size class, and canopy closure. As such, they are to be evaluated during project planning for the activity area, which better reflects the scale at which to consider these elements and to plan projects that provide for maintaining or improving trends in snag and coarse wood amounts. The activity area for snags and coarse woody debris is the specific site affected, whether the effects are positive or negative. Actions affecting activity areas that need to be assessed include timber harvest, reforestation, timber stand improvement, and prescribed fire activities.

Snags and coarse wood are known to fluctuate both spatially and temporally. Snags are often found in clumps, whereas coarse wood recruitment over time may form from clumped snags. Coarse wood may move around on the landscape, often resulting in a more even distribution than snags. These tables are not meant to provide an even distribution of snags and coarse wood across every acre of the forested landscape, but to provide numbers that serve as a guide to approximate an average condition for an activity area.

Management actions should result in both short-term and long-term replacement of snags by retaining sufficient number of live trees, including those with broken tops, cavities, lightning scars, dead portions, etc. as future recruitment. Rely on site specific information, normal mortality rates, and experience with mortality of residual trees following vegetation management activities when determining the number of trees needed to provide for future snag recruitment.

Localized differences may also occur. For example, on certain habitat types, such as PVG 7 being managed for lodgepole pine as the early seral species, it may be difficult to have an abundance of material in the greater 20" DBH classes, primarily due to the smaller size generally attained by lodgepole pine trees. There may also be cases where local site conditions do not represent the conditions described by the Potential Vegetation Group. Such situations include broad ecotones between forest and non-forest communities, very shallow or highly disturbed soils like those that have resulted from some past mining activities, or other localized conditions that have affected the site potential. These differences should be documented during project design. Furthermore, although the best available science was used to determine desired condition values, new scientific information and monitoring studies may display that adjustments are needed in the numbers.

On a landscape or watershed level, certain areas can have very high snag/coarse wood numbers, while others may be much lower. At some point in time, areas that have low numbers may have a drastic increase due to a disturbance event, while a young regenerating forest that previously had high snag numbers may not have many current snags, but could have high tonnages of coarse wood left over from the previous stand and its disturbance event. Ecosystems and landscapes are dynamic; our intent is not to create a static condition on every acre, but to incorporate those dynamics into our implementation, while using management tools to improve conditions when necessary, or maintain those conditions that provide for desired components.

When planning an activity, the intent is to either maintain a desired condition, or to trend toward the desired condition. If an area is already within the range of desired conditions, a management action should either keep the area within the desired ranges, or when the action results in moving outside the range, a mechanism to move you back into the range needs to be provided. An example of this would be a prescribed burn that would burn some of the coarse woody debris, but would also create mortality of trees, which would become snags and future coarse woody debris. If an area is above or below the desired range, it may not be possible to meet the desired ranges over the short term. However, actions can be taken to trend toward the desired ranges. This would include leaving some portion of the snags and coarse woody debris that are available, although perhaps not enough to meet desired ranges. Another example is an action that over the long term produces larger size class trees, which would eventually become large snags and coarse woody debris.

Tables A-8 and A-9 display the desired ranges for snags and coarse woody debris that contribute toward wildlife habitat and long-term soil productivity.

Desired numbers were developed for each PVG so that the numbers would be reflective of productivities and disturbance regimes. Agee (2002) presents several diagrams that depict the spatial and temporal variability found in snag/coarse wood numbers, according to the fire regimes of different forest types.

Table A-8. Desired Range of Snags Per Acre for Potential Vegetation Groups

Diameter Group	PVG 1	PVG 2	PVG 3	PVG 4	PVG 5	PVG 6	PVG 7	PVG 8	PVG 9	PVG 10	PVG 11
10" – 20"	0.4-0.5	1.8-2.7	1.8-4.1	1.8-2.7	1.8-5.5	1.8-5.5	1.8-5.5	1.8-7.5	1.8-7.5	1.8-7.7	1.4-2.2
Greater than 20"	0.4-2.3	0.4-3.0	0.2-2.8	0.2-2.1	0.4-3.5	0.2-3.5	0.2-3.5	0.2-3.0	0.2-3.0	**NA**	1.4-2.2
Total	0.8-2.8	2.2-5.7	2.0-6.9	2.0-4.8	2.2-9.0	2.0-9.0	2.0-9.0	2.0-10.5	2.0-10.5	1.8-7.7	2.8-4.4
Minimum Height	**15'**	**30'**	**30'**	**30'**	**30'**	**30'**	**30'**	**30'**	**30'**	**15'**	**15'**

Note: This table is not meant to provide an even distribution of snags across every acre of the forested landscape, but to provide numbers that serve as a guide to approximate an average condition for an activity area.

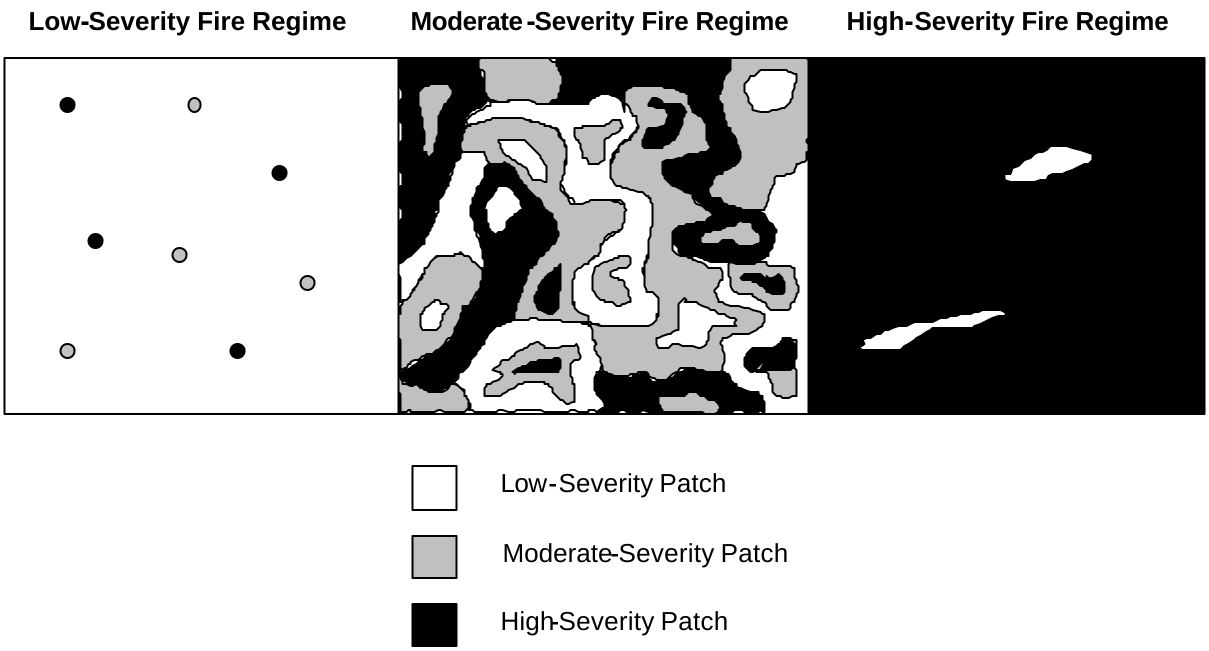
According to Agee, the landscape ecology of historical fire regimes is a function of place. Low-severity fire regimes had small patches and little edge, while high-severity regimes had the largest patch sizes and moderate edge. Moderate- or mixed-severity fire regimes had intermediate patch sizes and maximum amounts of edge. See Figure A-1.

Table A-9. Desired Range of Coarse Woody Debris, in Tons Per Acre, and Desired Amounts in Large Classes for Potential Vegetation Groups

Indicator	PVG 1	PVG 2	PVG 3	PVG 4	PVG 5	PVG 6	PVG 7	PVG 8	PVG 9	PVG10	PVG11
Dry weight (Tons per ac.) in Decay Classes I and II	3 – 10	4 – 14	4 – 14	4 – 14	4 – 14	4 – 14	5 – 19	5 – 19	5 – 19	5 – 19	4 – 14
Distribution[1] >15"	>75%	>75%	>65%	>65%	>75%	>65%	>50%	>25%	>25%	>25%	>25%

Note: The recommended distribution is to try to provide coarse wood in the largest size classes, preferably over 15" in DBH, which provide the most benefit for both wildlife and soil productivity. This table is not meant to provide an even distribution of coarse wood across every acre of the forested landscape, but to provide numbers that serve as a guide to approximate an average condition for an activity area.

Figure A-1. Patch Dynamics of Fire Regimes (Agee 1998)

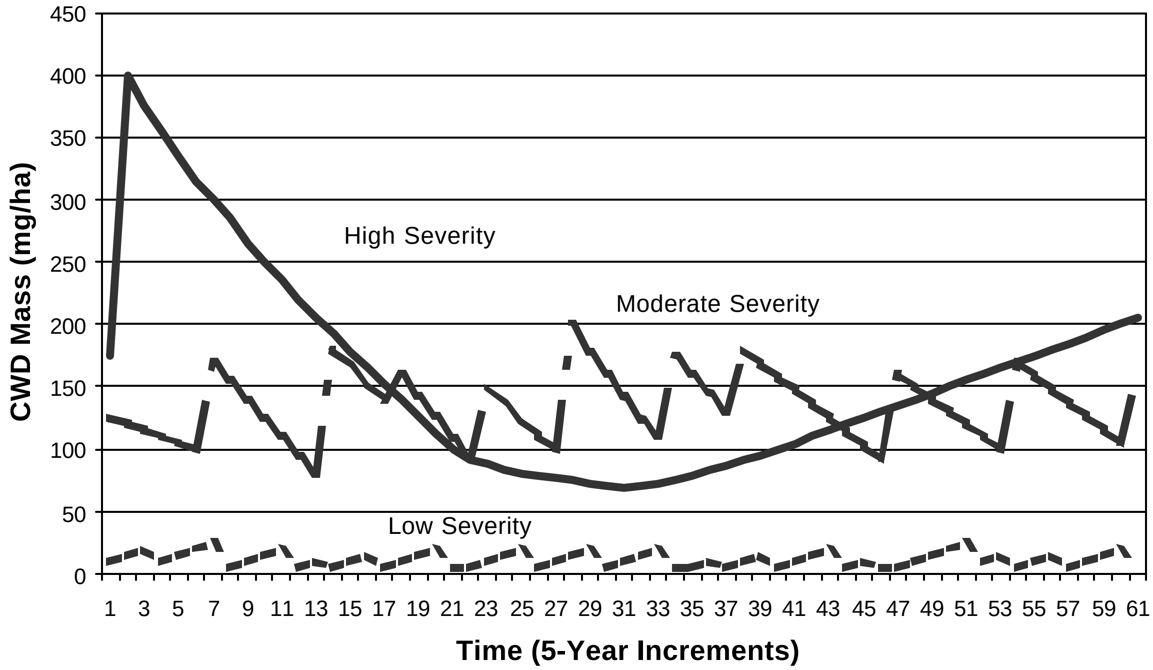


Agee (2002) also discusses how coarse woody debris dynamics (snags plus logs) have historically varied by fire regime (Figure A-2). In low-severity fire regimes, frequent, low-intensity fires limited coarse woody debris. His graph displays the fluctuations found in low-severity fire regimes, where levels will reach a peak, and then cycle downwards. As this graph displays, the peaks may be as high as 30-35 mg/ha (approximately 13-16 tons/acre), and the lows could be less than 1 mg/ha (approximately 0.5 tons/acre). The average on these graphs is probably somewhere around 5 tons (Graham pers. comm. 2001). Although fires were frequent, they rarely affected every acre. In moderate-severity fire regimes, fires both consumed and created coarse woody debris several times a century (Agee 2002). In high-severity fire regimes, a "boom-and-bust" dynamic operated: substantial coarse woody debris creation after a stand replacement fire, followed by a century or more without further substantial input.

These graphics represent well the spatial and temporal cycling of coarse woody debris and the patch dynamics at which they operate. Therefore, it is important to understand the dynamics of the particular PVG that a project is in, to best determine desired levels. In some PVGs, snags and coarse woody debris come as pulses over time (see Figure A-2). There may be little dead material available until a disturbance event, at which time levels may far exceed these desired conditions; over time levels will approach desired conditions, eventually recycling back to the first condition with little dead material.

Although snags and coarse woody debris are managed at the activity area, it is useful to have some knowledge of the larger landscape area to assist in determining the appropriate number and amount that fall within the desired ranges described in Tables A-8 and A-9. For example, in a watershed that has had large recent fires, there are probably an abundance of snags, therefore, project contributions may not be as important. In a heavily managed watershed, project contributions to snag and coarse wood levels may be more important than in a watershed with little active management. Areas with many roads may have higher impacts to snags from firewood gathering activities; therefore, scheduled projects may need to contribute higher levels within the desired range, to balance out effects that may or may not be directly related to the project.

Figure A-2. Temporal Cycling of Coarse Woody Debris by Fire Regime (Agee 2002)



To assist in determining the appropriate amounts of snags and course wood to manage for, it is also important to utilize the historical fire regimes that are typically found in each PVG. Table A-10 illustrates the historic fire regime by PVG.

Table A-10. Historical Fire Regimes For Forested Potential Vegetation Groups

Potential Vegetation Group	Historical Fire Regime
1-Dry ponderosa pine – Xeric Douglas-fir	nonlethal
2-Warm, dry Douglas-fir – moist ponderosa pine	nonlethal
3-Cool, moist Douglas-fir	mixed1-mixed2
4-Cool, dry Douglas-fir	mixed1-mixed2
5-Dry grand fir	nonlethal-mixed1
6-Cool, moist grand fir	mixed1-mixed2
7-Warm, dry subalpine fir	mixed2
8-Warm, moist subalpine fir	lethal
9-Hydric subalpine fir	lethal
10-Persistent lodgepole pine	lethal
11-High elevation subalpine fir	mixed2

Many of our forest stands will not be able to meet desired conditions for many decades. In many instances, the desired conditions cannot be met at this point in time, or within the 10-15 year planning period. The desired conditions presented in Tables A-8 and A-9 may not occur in young and many intermediate aged stands. This is part of the temporal variability in the numbers of snags and coarse woody debris. As we move toward desired conditions in large tree size, canopy closure, and species composition, so will we also move toward the desired conditions for snags and coarse wood. An area or group of stands may be within desired conditions in this 50-year period, and in the next 50-year period they may fall outside the range of desired conditions, while an adjacent area moves into the desired condition ranges. Vegetation within landscapes is dynamic, and it is anticipated that desired conditions will be achieved in a dynamic fashion.

In seedling, sapling, and small tree size stands, it may be difficult to have large-diameter snags and coarse woody debris. In this case, some of the tonnage and snag numbers can be in smaller size classes. However, it is not expected that the total amounts will be made up in smaller size classes. But there will be opportunities to trend toward the desired ranges. An example would be in a stand dominated by 6”-12” DBH trees. In a thinning operation, we would want to leave some distribution of material that falls within the range of size classes available, with preponderance toward the larger (12” DBH) trees. However, the amount of material retained that is less than 6” diameter should be balanced against the fire hazard that it, and the finer material that often comes with it, may create.

Several different factors determine the potential fire hazard created by surface fuels including kind, depth, continuity, extent, connectivity to overstory vegetation, and adjacent fuels. The risk of creating a potentially hazardous condition should also be considered relative to the management objectives for the area. For example, the willingness to accept risk associated with retaining material in the smaller class may be much different for a wildland/urban interface area than in an isolated site adjacent to wilderness. In addition, juxtaposition of the area within the landscape relative to fuel breaks and vegetative mosaics can help frame risk to the landscape at large. In a stand of primarily 3”-6” DBH trees, it would be difficult to come close to desired ranges based on concerns about that sized material. In these cases, our activities should reflect a trend toward creating larger material, which ties in with the desired conditions for large trees as well. For these reasons, we have included size class distributions for both snags and coarse woody debris.

Another reason to reduce reliance on small size classes for coarse woody debris is that our primary objective is to provide the majority of the wood in the large (>15” diameter) size class, as this material is retained on site longer. As stated above, some small and intermediate stage stands will not have the larger material available, and the expectation is not to compensate with an abundance of material in the small and medium size classes. However, if that is all there is available, some material should be left in those size classes to assist with long-term soil productivity. Brown et al. (2001) indicate that on sites where most of the coarse wood loading is comprised of larger pieces (>15” diameter), there is less of a hindrance to using prescribed fire. Conversely, leaving excessive material in the 3-6” diameter size class could hamper prescribed fire efforts in the future by creating conditions where fire would not achieve desired effects.

Spatial distribution of snags and coarse wood is also important. It would not be desirable for all the dead material in a watershed to be clumped into one corner, and the remainder of the area to have very little or no material. Snags are generally found in clumps, and the watershed would have groups of clumps throughout. This is why the activity area was chosen as the distribution unit. Within an activity area, snags should be provided in patches or more uniformly, depending on what is appropriate for the PVG. Snag patches should be distributed across the activity areas rather than clumped together in a portion of the activity area. Coarse woody debris is generally somewhat more evenly distributed. Within an activity area, distribution for coarse wood should reflect historical disturbance regimes appropriate for the PVG. When implementing a project, document how the project maintains or trends toward the desired conditions.

Management treatments may not produce all the dead material in the amounts and/or decay classes desired in a single action. However, treatments should be designed to provide structural, compositional, and functional elements that contribute to long-term sustainability of snags and coarse wood. In many cases, actions will consume coarse wood (e.g., prescribed fire). However, if the action results in the development of large trees, this will contribute to providing the desired levels of large snags and coarse woody debris over time.

Historical fire regimes, particularly the non-lethal and mixed1 regimes, continually recycled material. Larger material may take several fire cycles before it is fully consumed. This constant recycling also helps to provide a variety of decay classes, another important component of achieving desired conditions. Some wildlife species prefer hard snags, while others prefer those with more decay. Therefore management actions should result in a variety of snag and coarse wood decay classes. Only decay classes I and II count towards the desired amounts, to provide for continual recruitment into decay class III. The goal is to provide coarse woody debris in decay class III, because this material is eventually incorporated into the soil.

Vegetative Hazard and Wildfire

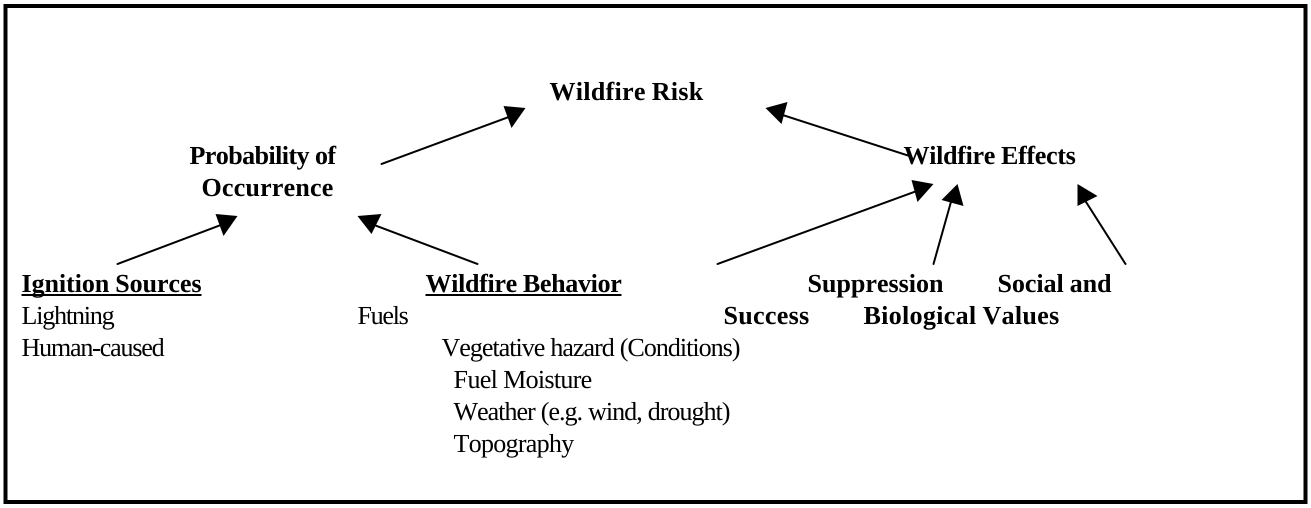
Vegetative desired conditions are directly related to vegetative hazard conditions in that they both define conditions that can occur on the landscape. In non-lethal and mixed1 fire regimes, conditions closest to historical are expected to reduce the risk of lethal wildfires due to the emphasis on larger, widely spaced trees. Ignitions that occur within these conditions are more likely to stay on the ground, increasing the chances of keeping a wildfire small (Omi and Martinson 2002, Wagle and Eakle 1979). This is not the case, however, in the mixed2 and lethal fire regimes. By definition, lethal fires are consistent with the way these regimes operate.

Wildfires, regardless of whether they are characteristic or uncharacteristic, are undesirable in some cases, particularly in wildland/urban interface areas. Although wildfire risks can in part be addressed through the use of defensible space, in many situations watersheds are a more appropriate scale to deal with concerns about firefighter and public safety, as well as the multitude of infrastructures, resources, and values that are often associated with interface. Therefore, the juxtaposition and arrangement of vegetative conditions relative to wildland/urban interface issues were considered at the watershed or 5th field HU scale. This is important because in some cases desired vegetative conditions may contribute to hazard. In particular, the desired conditions for forested vegetation in MPC 5.2 are more hazardous than areas outside of this MPC due to the emphasis on vegetative attributes that promote timber production. Here the large tree desired condition is lower than in other MPCs to allow for a greater mix of all size classes over time. In addition, stand densities are greater to provide sufficient volumes for removal of timber products.

Alhough these conditions increase the hazard associated with lethal wildfires, the risk of these types of events may be reduced using a variety of vegetation management techniques. These techniques can include strategic placement of fuel breaks, surrounding vulnerable areas with vegetative conditions where fires can be more easily suppressed, or arranging treatments in a way that breaks up the continuity of more hazardous conditions (Fulé 2001, Omi and Martinson 2002, Deeming 1990, Finney 2001, Graham et al. 1999). These types of treatments, if strategically located, can be effective without being extensive. Because desired conditions are evaluated at the 5th field HU or watershed scale, treatments to mitigate hazardous conditions to ajacent areas should not prevent achievement of desired vegetative conditions.

Although the vegetative management techniques described above can reduce the risk of lethal wildfire, they address only one (vegetative conditions) of several factors and, therefore, cannot eliminate this risk (Figure A-3). The efforts made by property owners on their own behalf are an essential element in protecting homes in the wildland/urban interface.

Figure A-3. Factors That Contribute To Wildfire Risk
(Adopted from Bachman and Allgöwer 1999)



Shrublands

Desired conditions have been developed for various sagebrush communities (refer to Vegetation Classification portion of this Appendix for descriptions of sagebrush types). Shrublands occur on areas not classified as forestland and where shrub cover is has the potential to be greater than 10 percent shrub cover. Desired conditions are expressed as ranges for the amounts of acres found in the various condition classes (canopy cover classes) for sagebrush. The canopy covers refers only to the canopy cover of sagebrush, and does not include the associated species that may be found co-occurring with sagebrush. To reach the desired ranges, conditions would have to be within these ranges. Forest-wide direction states that we will evaluate the desired conditions at the 5th level HU watershed. All of the desired ranges are Forest-wide desired conditions, and each watershed is the analysis unit that will therefore, contribute to the Forest-wide condition. Although current conditions may prevent us from obtaining desired condition for quite some time, over a longer period management actions should result in non-forested vegetation that is approaching Forest-wide desired conditions, when all of the 5th field HUs are averaged together. The 5th HU is deemed an appropriate analysis unit for evaluating project level contributions, and also ensures a distribution of desired components across the Forest.

Tables A-12 presents the desired condition values for the mountain big sagebrush and basin big sagebrush communities. As an example, in a watershed with 12,000 acres of mountain big sagebrush, 3600-4800 acres would be in the 0-10 percent canopy cover class, 3,600-4,800 acres would be in the 11-20 percent canopy cover class, and 2,400-3,600 acres with a greater than 21 percent canopy cover, but with no more than 600 acres with a canopy cover greater than 31 percent. This would average upward with other watersheds to meet Forest-wide desired conditions.

Often, other shrub species will co-occur with sagebrush species or subspecies. Refer to the Vegetation Classification portion of this Appendix for description of the types. The presence of these other species also has ecological importance in terms of their function and contribution to processes. However, sagebrush species and subspecies in this case are being used as indicators of conditions. If we manage to desired conditions, the other associated shrub species will also respond as we represent of range of conditions on the landscape for sagebrush community types.

Table A-11. Desired Condition Ranges for Mountain Big Sagebrush and/or Basin Big Sagebrush

Mt. Big Sagebrush Canopy Cover Classes	Desired Amounts Of Canopy Cover Classes By Percent Of Area
0-10% canopy cover	30-40% of area
11-20% canopy cover	30-40% of area
21-30%, >31% canopy cover	20-30% of total area, with <= 5% in the >31% canopy cover class

As was recognized for the forested vegetation types, in some cases it may take many years to develop conditions that meet the desired conditions. If a watershed has recently experienced a large extent wildfire, it can be many years before the necessary structural complexity can develop at a landscape level. Conversely, a watershed with little disturbance over many years may all be in a dense canopy cover. Management actions that reduce the canopy covers would be an example of "trending toward" desired conditions, even if only applied on a small scale. When at desired conditions, maintenance would entail management actions that keep the balance of canopy cover classes within the range of desired conditions, or can provide for moving back into desired conditions. As some acres become denser through succession, other acres may be treated to limit overall canopy cover density. Another example is a watershed at desired conditions, but with the canopy cover over 21 percent at the high end of range (30 percent of acres). Although at desired, it may be necessary for management activities to reduce some of the higher canopy covers, to prevent conditions from exceeding those desired ranges and not having enough in the other canopy cover classes. Natural disturbances will certainly play a role also in the movement of acres in and out of canopy cover classes.

Riparian Vegetation

For riverine riparian vegetation, which includes coniferous potential vegetation, refer to Tables A-1 through A-9 (size class (outside MPC 5.2), canopy closure (outside of MPC 5.2), species composition, snags, and coarse woody debris) for the desired conditions. This includes the upland portions of coniferous vegetation found in the RCAs. This information is also related to information presented in Appendix B, Table 1.

Riparian vegetation is dominated by a variety of species, age classes, and structures including deciduous trees, willows, alders, sedges and hydric grasses, depending on stream substrate, gradient, elevation, soil-hydrologic, and disturbance processes. Riparian areas have their own disturbance processes that influence vegetative dynamics, with an almost continual readjustment in successional stages in many areas. Riparian vegetation is also influenced by processes in the uplands, as well as by those upstream in the watershed.

There is a high variability in site conditions relative to the factors discussed above, which will influence riparian vegetation desired conditions in any site-specific location. Therefore, site-specific desired condition determinations are needed.

Grasslands, Montane Shrubs, Wetlands/Marshes, And Other Vegetation Types

Other vegetation types not described in the above sections do exist on the Forest. Desired conditions need to be determined on a project basis based on local and available information. Most of these other types are described in the Vegetation Classification section. Other Forest-wide and Management Area Direction may apply to these types, such as limiting potential establishment and spread of noxious weeds. Some of these communities may also be important as habitats for rare plants.

Spatial Patterns

Recent advances in theory and empirical studies of vegetation and landscape ecology indicate that if goals of maintaining biological diversity across landscapes are to be achieved in the long term, then management needs to consider issues such as variability, scale, pattern, disturbance, and biotic processes. This is a daunting task that requires both a conceptual framework to organize and simplify ecosystem complexity and knowledge of the details of particular systems (Spies and Turner 1999). Elements of spatial pattern—including items such as the amount, proportion, size, interpatch distance, variation in patch size, and landscape connectivity—occur within vegetation types and between vegetation types. Landscape spatial patterns affect ecological processes and can be illustrated through differences in plants species composition and structure, as well as habitat utilization by wildlife. Despite recent interest and progress, it remains challenging to determine for various processes or organisms the conditions under which spatial heterogeneity is and is not important (Spies and Turner 1999). Forested ecosystems often include recognizable patchiness, usually corresponding to physical changes in topography, hydrology, substrate, or as a reflection of large disturbances (Bormann and Likens 1979, Whittaker 1956). Patchiness in the landscape itself can create changes in microclimate at patch edges, displaying demographic fluxes of a large number of individual plant species. This can result in varied plant species distribution and edge- oriented patterns (Matlack and Litvaitis 1999). These effects can subsequently result in changes to ecological processes and habitat utilization.

Within a subwatershed or watershed, there may be several forested vegetation types interspersed with several non-forested vegetation types. Additionally, there may be several MPC designations superimposed upon these vegetation types. It is important to consider the composition of the landscape that contains a project area. At the project level, opportunities exist to consider spatial patterns and how a project can affect the spatial patterns, and what those effects (positive or negative) will be to plant and animal species. During project design, considerations of spatial patterns are dependent upon what conditions are currently present and the overriding management concerns for the area. Generally, these conditions and concerns are site-specific, depending on the appropriate scale at which the project is operating. Repeating patterns of change emerge at landscape scales, and some order can be found through descriptions of successional pathways, patch mosaics, and seral stages that facilitate the understanding and management of vegetation at landscape scales. The challenge and art is to simplify without losing important attributes and to work with simplifications without losing sight of the underlying complexity (Spies and Turner 1999). Another useful way of understanding vegetation dynamics is to characterize it as a shifting mosaic of patches of different ages and developmental stages (Bormann and Likens 1979). The proportion of different age classes or seral stages across a landscape and over time is one of the fundamental characteristics of the vegetation mosaic.

Quantitative methods are available (McGarigal and Marks 1995, Baker and Cai 1992, Turner and Gardner 1991, Turner 1990, Turner 1989, O'Neill et al. 1988) to describe spatial patterns that relate patterns to ecological processes in order to monitor changes through time, to compare different vegetation types, and to evaluate the effects of alternative management options within a spatial context (Spies and Turner 1999). Diaz and Apostol (1992) provide a process for developing and implementing land management objectives for landscape patterns, written specifically to help shape the landscapes created through National Forest land management activities. There is considerable variability in patterns among landscapes; the most productive approach is to make considerations on a case-by-case basis (Matlack and Litvaitis 1999). Subwatersheds may also possess very small amounts of a vegetation type. The majority of the vegetation type may be in an adjoining subwatershed, with only a small portion overlapping into the subwatershed of concern, or only small patches of a vegetation type may be found interspersed throughout. Consideration of whether or not meeting and sustaining a desired condition for such small amounts of vegetation will also depend upon the juxtaposition of these fragments to adjoining vegetation types or subwatersheds and the overriding management concerns of the area.

In some cases, the prevailing landscape pattern has been altered so strongly that determining appropriate landscape patterns may need to be based more on historical information. Historically, fire was an important disturbance that maintained the dynamics between native grass and big sagebrush dominance. Frequent small fires opened the shrub canopy and aided establishment of native perennial grasses at small scales, creating a mosaic of grass and shrub communities in different stages of development at large scales (Knick 1999). The dynamics of the system changed when cheatgrass invaded the sagebrush ecosystem, providing continuous fuels, compared to more patchily distributed native bunchgrasses. This facilitated fire spread and loss of shrubs, resulting in shrublands fragmented into smaller patches, thus increasing the boundaries and the spaces between patches. Ultimately, many patches did not persist (Knick and Rotenberry 1997). This is an example where patch and pattern have changed and so may no longer provide for the processes and habitat associated with these systems (Knick and Rotenberry 2000, Connelly et al. 2000, Paige and Ritter 1999, Knick and Rotenberry 1995, Rotenberry and Wiens 1980). Consideration of spatial patterns and subsequent management will be particularly difficult in these highly disrupted ecosystems and vegetation types.

Recommended management considerations to positively influence spatial patterns include:

- Maintaining or restoring the full range of age class and patch size distributions,
- Developing future goals for spatial patterns,
- Utilizing management strategies that that can create different levels of edge or interior patches,
- Considering spatial patterns within the prevailing physical template, and
- Considering important locations such as special soils, riparian areas, wetlands, cliffs, talus, caves, and others (Spies and Turner 1999).

VEGETATION MAPPING

Forested Vegetation Mapping

Forested vegetation is described using habitat types, which use potential climax vegetation as an indicator of environmental conditions. Individual habitat types are named according to the dominant climax overstory species in conjunction with the dominant understory species. At the level of the Forest Plan, forested habitat types have been further grouped into potential vegetation groups (PVGs) that share similar environmental characteristics, site productivity, and disturbance regimes. The purpose of these groupings is to simplify the description of vegetative conditions for use at the broad scale. For additional details on the specific habitat types and groupings into PVGs, see Mehl et al. (1998) and Steele et al. (1981).

Forested PVGs were mapped using a modeling process. The Forest was divided into groupings of 5th field HUs that shared similar larger scale environmental characteristics, such as climate and geology. Each one of these 5th field HU groups was modeled separately. Models were based primarily on slope, aspect, elevation and land type association groups. Other information was brought into developing modeling rules within a 5th field HU group depending upon vegetation present in these groups and the availability of information. This additional information included forest inventory information, forest timber strata, cover type information, existing habitat type mapping, cold air drainage models and any other information that may have assisted with the development of modeling rules. Where necessary, some field verification did take place. Modeling rules were developed and processed in Arc Grid. Draft maps were sent to District personnel knowledgeable with the area for review, and refinements made as necessary.

Non-Forested Vegetation Mapping

Existing vegetation or cover type is a seral stage to a climax plant community, and generally results from some form of disturbance. The dominant overstory can vary with this successional change. Cover type classifications typically describe the current dominant vegetative cover or species occupying a site. Cover types can be used to describe seral stage species composition in relation to climax species composition or historical conditions. Existing non-forested vegetation groups or cover types may approximate the dominant climax vegetation, or in other situations, display variations from past use, management, and/or disturbance. This form of classification recognizes ecological influences that contribute to broad-scale cover type extent and future development. Unlike forested vegetation, shrubland and woodland successional change is not likely to be fully detected at the broad scale using only cover types. This is because the same overstory species may occur as part of several successional stages for the vegetative community. However, a cover type's density or canopy cover can be used as a complimentary indicator to define, in part, successional change, ecological condition, and disturbance regime influence. Similar to forest canopies, shrub or woodland overstories exert a competitive influence on herbaceous understory composition and productivity.

Cover types representing shrublands, grasslands, meadows, etc. were mapped as existing vegetation cover types using a remote sensing classification of LANDSAT developed at the University of Montana (Redmond et al. 1998) or in areas not covered by this project, with the Idaho/Western Wyoming Land Cover Classification developed by Utah State University (Edwards and Homer 1996). Riparian life forms were also determined from the Utah State University data. A more detailed classification of riparian types is not available at the broad-scale.

VEGETATION CLASSIFICATION

Forest Vegetation - Potential Vegetation Groups

PVG 1 - Dry Ponderosa Pine/Xeric Douglas-fir

This group represents the warm, dry extreme of the forested zone. Typically this group occurs at lower timberline down to 3,000 feet and up to 6,500 feet on steep, dry, south-facing slopes. Ponderosa pine is a dominant cover type that historically persisted due to frequent nonlethal fire. Under such conditions, open park-like stands of large, old ponderosa pine dominated the area, with occasional Douglas-fir, particularly at higher elevations. Understories are sparse and consist of low to moderately dense perennial grasses such as bluebunch wheatgrass and Idaho fescue. In some areas, shrubs such as mountain snowberry and bitterbrush dominate. This group is found scattered throughout the Payette National Forest. .

PVG 2 - Warm, Dry Douglas-fir/Moist Ponderosa Pine

This group represents warm, mild environments at low-to-middle elevations, but may extend upward to 6,500 feet on dry, southerly slopes. Ponderosa pine, particularly at lower elevations, or large ponderosa pine mixed with smaller size classes of Douglas-fir, are the dominant cover types in this group. Historically, frequent nonlethal fire maintained stands of large, park-like ponderosa pine. Douglas-fir would occur on moister aspects, particularly at higher elevations. Understories are mostly graminoids such as pinegrass and elk sedge, with a cover of shrubs such as common snowberry, white spirea, and mallow ninebark. This group is found in many places on the Payette National Forest.

PVG 3 - Cool, Moist Douglas-fir

This group represents the cooler extremes in the Douglas-fir zone. The group can extend from 6,800 feet down to 4,800 feet following cold air. Adjacent sites are often subalpine fir. Some areas support grand fir. Ponderosa pine occurs as a major seral species only in the warmest extremes of the group. In cold air areas, particularly where cold air accumulates to form frost pockets, lodgepole pine may dominate. In some areas, Douglas-fir is the only species capable of occupying the site. The conifer cover types that historically dominated are a combination of several factors including fire frequency and intensity, elevation, and topography. Understories in this group are primarily shrub species including mountain maple, mountain ash, and blue huckleberry. Several other species, including scouler willow, thimbleberry, and chokecherry, may occur from disturbance, depending on its severity. Historical fire regimes were mixed (generally mixed1 where ponderosa pine occurs and mixed2 where other species dominate), creating a diversity of vegetative combinations. Very little of this PVG occurs on the Payette National Forest; what does occur is found in isolated cool-air drainages.

PVG 4 - Cool, Dry Douglas-fir

Douglas-fir is the only species that occurs throughout the entire range of the group. Lodgepole pine may be found in areas with cold air. Quaking aspen is also a common early seral species. Understories are sparse due to the cool, dry environment, and often support pinegrass and elk sedge. Understories of low shrubs, such as white spirea, common snowberry, Oregon grape, and mallow ninebark, occur in some areas that represent slightly different environments across the group. The historical fire regime was primarily mixed1-mixed2, depending on the fuels present at the time of ignition. Organic matter accumulates slowly in this group; so fire effects depend on the interval between fires, stand density and mortality, and other factors. This group may be found in minor amounts at higher elevations in the Douglas-fir zone in other parts of the Forest. In these cases, it is usually found above 6,000 feet on sites that are too cool to support ponderosa pine. Where it is common, it occurs at lower elevations in areas that are beyond the extent of ponderosa pine.

PVG 5 - Dry Grand Fir

The Dry Grand Fir Group is found throughout the distribution of grand fir. It ranges from 4,300 to 6,400 feet in elevation, often on drier upper slopes and ridges. Ponderosa pine and Douglas-fir are common cover types that appear to have been maintained by fire regimes that were historically nonlethal to mixed1. In many areas this group may have resembled PVG 1 and PVG 2, with open park-like stands of large ponderosa pine. Mixed species stands were likely restricted to small micro-sites that burned less frequently. Understories are similar to PVG 2 in that pinegrass, elk sedge, and white spirea are common.

PVG 6 - Moist Grand Fir

This group ranges in elevation from 3,400 to 6,500 feet and represents more moist environments in the grand fir zone. It often occurs adjacent to dry grand fir, and the two may intermix with each other, depending on topography. Ponderosa pine is common at the drier extremes of the group, and lodgepole pine occurs in colder areas. Western larch may also be present as an early seral species. Cover types of Douglas-fir and Engelmann spruce also occur in this group. Understories in this group are shrubby and include blue huckleberry, mountain maple, mountain ash, mallow ninebark, and occasionally pachistima. A conspicuous herb layer is also common, particularly following disturbance. Historical fire regimes were mixed, ranging from mixed1 to mixed2, in part due to the wide environment represented by this group. Where ponderosa pine was maintained as a common seral species, it appears that fires were more often mixed1 because ponderosa pine produces a heavy seed that generally disperses only short distances. In other areas where western larch or Douglas-fir were maintained as common seral species, mixed2 fire may have been more common. Douglas-fir and larch produce lighter seed that can disperse much farther than ponderosa pine.

PVG 7 - Warm, Dry Subalpine Fir

This group is common on the Forest. It represents warmer, drier environments in the subalpine fir zone. Elevations range from 4,800 to 7,500 feet. At lower elevations, this group is found on steep, north-to-east aspects, but shifts to south-to-west aspects as elevation increases. Adjacent sites at lower elevations are Douglas-fir or grand fir, and these commonly intermix where topography controls cold air flow. Douglas-fir is the most common cover type throughout the group. Ponderosa pine may be found at the warmest extremes, particularly where this group grades into the Douglas-fir or grand fir zone. Lodgepole pine or Engelmann spruce may occur at cool, moist extremes, but these cover types rarely dominate. Understories are commonly shrubby and include mountain maple, mountain ash, serviceberry, and scouler willow. Historical fire regimes were generally mixed2, though mixed1 fires may have occurred where ponderosa pine was maintained.

PVG 8 - Warm, Moist Subalpine Fir

This group occurs mainly north of Cascade, primarily on the Payette National Forest and as a relatively minor PVG on the Boise National Forest. It becomes better represented on the Nez Perce National Forest. Elevations range from 5,000 to 7,200 feet but may follow cooler air down to 4,500 feet. This group occurs on moist, protected areas such as stream terraces, toe slopes, and steep, northerly aspects. Cover types include lodgepole pine, western larch, Douglas-fir, and Engelmann spruce. The presence of these and combinations depend on site conditions and past disturbances. Dense shrubs are common in the understory and include Sitka alder, menziesia, blue huckleberry, Utah honeysuckle, mountain maple, mountain ash, and serviceberry. Historical fire in this group was more commonly lethal, though underburns may have occurred occasionally. Ignitions likely occurred in adjacent areas due to the location of this group. Whether these areas burned or not may have depended on weather prior to and at the time of the ignition.

PVG 9 - Hydric Subalpine Fir

Seasonally high water tables control this group, and the extent may be small in some areas depending on the presence of these conditions. Elevations range from 9,000 to as low as 4,500 feet in frost pockets and along cold air drainages. This group most commonly occurs on wet toe slopes, stream terraces, seep areas, and old bogs. Cover types are lodgepole pine, followed by Engelmann spruce and subalpine fir. Early seral conditions usually support lodgepole pine because this species can tolerate intermittent high water tables and cold air that often accumulates. In severe frost-prone areas, lodgepole pine can persist for long periods. In other areas with better cold air drainage, Engelmann spruce and subalpine fir rapidly establish under the lodgepole pine. Understories in this group are primarily dominated by herbs and grasses that require the seasonal influence of a high water table. Shrubs are sparse, though Labrador tea can dominate some sites. Historically, fire was lethal in this group. Like PVG 8, ignitions more likely occurred on adjacent drier slopes, and burning in this group likely depended on weather conditions before and at the time of the ignition.

PVG 10 - Persistent Lodgepole Pine

This group is common throughout the subalpine fir zone. It represents cold, dry subalpine fir sites that range in elevation from over 9,200 down to 5,200 feet in frost-pockets. Lodgepole pine is the dominant cover type, though small amounts of other species may occasionally occur. Understories can be sparse. Generally, grasses and scattered forbs are the most common understory components. Shrubs are sparse and consist mainly of low-growing huckleberries, including dwarf huckleberry and grouse whortleberry. Historically, this group experienced lethal fire, though nonlethal fires may have occurred during stand development. Lodgepole pine is more often non-serotinous in western portions of the Forest and appears to become more serotinous moving easterly. Within the Forest, lodgepole pine may reproduce in areas that experience nonlethal fires. The result is more vertical stand diversity in some areas than is often found where lodgepole pine is mostly serotinous. Over time, the combinations of these low-intensity events, subsequent reproduction, and mountain pine beetle mortality would have created fuel conditions that allowed lethal fires to occur under the right weather conditions.

PVG 11 - High Elevation Subalpine Fir (with whitebark pine)

This group occurs at the highest elevations of the subalpine fir zone and generally represents the upper timberline conditions. It often grades into krummholz or alpine communities. Whitebark pine is a major seral species in this group. Engelmann spruce and subalpine fir are the climax co-dominates. In some areas, whitebark pine serves as a cover for Engelmann spruce-subalpine fir establishment. Understories are primarily forbs and grasses tolerant of freezing temperatures that can occur any time during the growing season. Shrubs are sparse due to the cold, harsh conditions. Historically, the fire regime in this group is characterized as mixed2, though the effects of fires were highly variable. Ignitions are common due to the high elevation, however fuel conditions were historically sparse due to the cold growing conditions and shallow soils. Therefore, fire effects were patchy. Fire regimes are mixed2 with whitebark pine being a major seral component.

Old Forest

“Old forest” is a component of the large tree size class, whereas “old growth” is typically described as a set of characteristics associated with the late successional stage of forested vegetation groups or types. Based on recent research encompassing the central Idaho batholith, old growth late successional stage characteristics were important, but not extensive on the historic landscape (Morgan and Parsons, 2001). However, the large tree component was common (Morgan and Parsons, 2001; Wisdom et al. 2000). Table A-12 (Morgan and Parsons 2001) shows the estimated percent of forested landscapes in the central Idaho batholith that were historically occupied by stands in the large tree size class (medium tree size class for PVG 10, persistent lodgepole pine), and by stands with late successional old growth characteristics. Estimates were developed for each of the 11 potential vegetation groups on the Ecogroup.

The main reason for the large differences between Large Tree percent and Old Growth percent is that vegetation structural conditions in central Idaho developed in conjunction with disturbance processes (fire, insect, disease, wind, etc.) and climate variations. Conversely, late successional old growth characteristics develop in the absence of frequent disturbances (Hamilton et al. 1993). In central Idaho, disturbance is a common occurrence. Historically, forested stands in lower-elevations vegetation groups likely developed large trees and relatively open canopies during mid-successional stages, and these conditions were maintained over time by frequent low-intensity fire disturbance. Dense stands and decadence typically associated with late successional stage conditions (old growth) rarely, if ever, occurred. Thus, historical stands dominated by large and old seral trees like ponderosa pine could be considered old forest, but not as "old growth" under any definition that incorporates a full set of late successional conditions.

Table A-12. Historic Levels Of Central Idaho Stands Occupied By Large Tree Size Classes And Stands With Late Successional Old Growth Characteristics
(From Morgan and Parsons, 2001)

	PVG 1	PVG 2	PVG 3	PVG 4	PVG 5	PVG 6	PVG 7	PVG 8	PVG 9	PVG 10	PVG 11
Percentage of PVG historically in the large tree size class (mean value)	91	80	41	34	84	56	21	21	37	19	27
Percentage of PVG estimated to represent old-growth	0	0	8.5	8.4	0.4	2.5	4	5.5	26	0	1.2

Note: Large tree size class refers to stands where the overstory trees average 20 inches diameter or greater. Medium tree size class refers to stands where the overstory trees average between 12 and 19.9 inches diameter.

The threshold to meet viability for large-tree-dependent terrestrial species has been determined to be 20 percent of the forest stands classified as being in the large tree size class. The 20 percent threshold has been adopted based on several references concerning viability and biodiversity needs for goshawk and other forest-dependent wildlife species that require one or more components of the large tree size class (Fahrig 1997, Graham et al. 1997, Graham et al. 1999, Graham and Jain 1998, Reynolds et al. 1992, Wisdom et al. 2000). This threshold has been incorporated into the desired conditions for forested vegetation PVGs found in this appendix, and into Forest Plan management direction (Wildlife Resources) through the following standard:

> Maintain at least 20 percent of the acres within each forested PVG found in a watershed (5th field HU) in large tree size class (medium tree size class for PVG 10, persistent lodgepole pine). Where analysis of available datasets indicates that the large tree size class (medium tree size class in PVG 10) for a potential vegetation group in a watershed (5th field HU), is less than 20 percent of the total PVG acres, management actions shall not decrease the current area occupied by the large tree size class, except when:
>
> > a) Fine or site/project scale analysis indicates the quality or quantity of large tree size class for a PVG within the 5th field HU would not contribute to habitat distribution or connective corridors for TEPCS and MIS species in short or long-term, <u>and</u>

b) Management actions that cause a reduction in the area occupied by the large tree size class would not degrade or retard attainment of desired vegetation conditions in the short or long-term as described in Appendix A, including snags and coarse woody debris.

Other Forested/Woodland Vegetation Types

Aspen

Aspen covers a broad environmental range across the Intermountain Region (Mueggler and Campbell 1982). It grows at elevations as low as 5,000 and as high as 11,000 feet. Aspen occurs both as a seral and climax tree species within its range (Mueggler 1985). Where it is seral, it is an early seral stage of forested PVGs. Throughout these areas, individual stands are relatively small, seldom exceeding 5 acres (Mueggler 1985). Where aspen is seral, it is maintained on the landscape by disturbance. Historically, fire is considered a primary disturbance agent (Jones and DeByle 1985). Fires result in single-aged stands that develop from root suckering. Fire frequencies vary greatly and severities range from low to high. Aspen does not burn readily. However, all but the lowest severity fires kill aspen because of its thin, uninsulated bark. Therefore, most fire effects in aspen are lethal.

Grassland And Shrubland Vegetation

Grassland Cover Types

Perennial Grass Slopes - This cover type connects with the dry forested cover types, mountain big sagebrush, and bitterbrush groups, and is more prevalent in the north and northwestern foothills and canyonlands of the Ecogroup. It usually occurs between the 10-to-18 inch precipitation zone, on southern and western aspects. The group is predominantly made up of bluebunch wheatgrass. Perennial grasses are dominant on the sites, composing 80 to 90 percent of production. Sandberg bluegrass is a lesser but constant associate. The forb component contains a large number of species, few of which are common throughout. The most common forbs are Indian wheat, shining chickweed, salsify, yarrow, lupine, balsamroot, biscuit root, hawksbeard, fleabane, milkvetch, and phlox. Ground cover is typically greater than 65 percent. This vegetation group can be susceptible to damage under very hot and dry conditions. Stand recovery is very difficult and slow in the Idaho Batholith. Historic fire intervals are frequent (20 years), with typically a mixed1 to mixed2 fire regime, depending upon the amount of Idaho fescue present. This group is highly susceptible to several invaders including annual bromes, rush skeletonweed, yellow starthistle, several knapweeds, dyer's woad, and Dalmatian toadflax.

Perennial Grass Montane - This cover type connects with numerous forested cover types, mountain big sagebrush and bitterbrush groups, and bluebunch communities. It is very highly rated, in terms of ecotone diversity. It usually occurs between the 18-to-30 inch precipitation zone on southern aspects, and 14 to 30 inches on northern aspects. Ground cover is usually greater than 80 percent. Idaho fescue is the predominant grass in this group. Other grass species that occur are slender wheatgrass, sedges, intermediate oatgrass, western needlegrass, and Richardson needlegrass. Forbs compose 40 to 65 percent of overall production. Common forbs are yarrow, bessaya, geum, Indian paintbrush, lupines, phlox, and balsamroot. Historic fire intervals are frequent (20 years) in typically nonlethal to mixed1 regimes. Certain species within the community are susceptible to fire damage under very hot and dry conditions, but recovery occurs in a few years. Trampling damage is minimal to nonexistent and primarily occurs at the higher elevations. Bluegrass is a common invader. This group is highly susceptible to several invaders including annual bromes, rush skeletonweed, yellow starthistle, several knapweeds, dyer's woad, and Dalmatian toadflax.

<u>Shrubland Cover Types</u>
Mountain Big Sagebrush - This cover type connects with the greatest number of other forest, non-forest, and riparian cover types. This type consists of large blocks with a wide range of distribution. This group occurs in the 14-to-18+ inch precipitation zone, on well-drained sites and on soils with a high content of rock or gravel. Structural stage ranges are typically balanced, with high ground cover and few cryptogams. Fire intervals can be frequent, ranging from 20-60 years, with a mixed2 fire regime. Historic vegetation disturbances were related to ungulate grazing of southern exposures, due to less snow and early green-up. Understory forb and grass species can be variable and diverse. Bitterbrush, grey horsebrush, and green rabbitbrush are frequently present. Snowberry is present on moister sites.

Montane Shrub - This cover type is usually interspersed as stringers and patches within the mountain big sagebrush, aspen, and conifer cover types. Its patchiness is strongly related to mesic soils with high water-holding capacity and/or northerly exposures. Typically this group has multiple vegetation layers that are dominated by sprouting species. Species include chokecherry, snowberry, serviceberry, and wild rose. Several other browse species may occur. This group usually has a rich and diverse herbaceous component. These conditions provide extremely diverse wildlife habitats and an important watershed group. Fire intervals are typically 20 to 40 years, with a mixed2 fire regime. Ungulate and grazing disturbance are not uncommon components. Insect and disease may be common, with occasional outbreaks.

Bitterbrush - This type is usually associated with southern to western exposures. Soils tend to be shallow (10 to 20 inches), with stony or rocky loams tending towards sandy textures. Typically bitterbrush occurs in small patches interspersed with the lower ecological thresholds of ponderosa pine and with all the sagebrush types except Wyoming Big Sagebrush. Older stands have a variety of age classes, while younger stands are typically homogeneous in age. In some sites sagebrush may appear as a co-dominant. Fire intervals are seldom, usually greater than 40 years, with a mixed1 fire regime. This group is highly susceptible to cheatgrass and diffuse knapweed invasion. Common understory species are bluebunch wheatgrass, Sandberg bluegrass, junegrass, needle and thread, and Idaho fescue. Perennial grasses make up the largest portion of the composition. Common forbs include yarrow, lomatium, lupine, arrowleaf balsamroot, and milkvetch.

Riparian Vegetation

There are no comprehensive riparian classifications or vegetative community descriptions for the Ecogroup. Hall and Hansen (1997) have developed a riparian habitat type classification for Bureau of Land Management Districts in Southern and Eastern Idaho that includes portions of the South Hills on the Sawtooth. Riparian community type classifications have been developed by Youngblood et al. (1985) for eastern Idaho-western Wyoming, and by Padgett et al. (1989) for Utah and Southeastern Idaho. Due to the lack of comprehensive classification information for our area, the Forest Plan Revision Team chose to use the Utah LANDSAT cover types to describe these communities.

<u>Riverine Riparian</u>
This cover type consists of vegetative communities dominated by conifer species and shrubs. The primary conifers are subalpine fir, Engelmann spruce, limber pine, and Douglas-fir, with some aspen. Other trees and shrubs include Rocky Mountain maple, serviceberry, chokecherry, thinleaf alder, currants, and willows. These communities generally occur on steep slopes and occupy edges of riparian zones with A and B stream channel types. Padgett et al. (1989) and Youngblood et al. (1985) stated that these community types in their areas likely represent successional stages within described forested communities. For this reason, Padgett et al. recommended consulting available forest habitat type classifications for additional information.

Deciduous Tree

This cover type consists of a dominant overstory of black or narrowleaf cottonwood. Associated tree species include thinleaf alder, Rocky Mountain maple, water birch, and aspen. Primary shrub species include chokecherry and willows. Location is generally below 5,500 feet along stream channels in lower canyons. This cover type usually requires a moist and coarse substrate.

Shrub Riparian

This cover type is dominated by willow species. Primary associated tree and shrub species include cottonwoods, swamp birch, thinleaf alder, Rocky Mountain maple, shrubby cinquefoil, and chokecherry. Grasses and forbs include sedges, tufted hairgrass, Geranium, louseworts, and American bistort. This type is found in mid to upper elevations in broad wet meadows and alluvial terraces on relatively low gradients (1 to 3 percent).

Herbaceous Riparian

This cover type is typically found in mountain meadows where soil moisture is abundant throughout the growing season. Principle species include sedges, woodrush, reedgrass, pinegrass, timothy, bluegrass, tufted hairgrass, saxifrage, and fireweed. This type has a wide range of occurrence, typically found in broad flat meadows.

Other Vegetation

Wetlands

Wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, wet meadows, seeps, and similar areas. These lands are transitional between terrestrial and aquatic systems. Vegetative species found in wetlands are heavily influenced by local site conditions.

Marshes - This cover type is permanently or semi-permanently flooded and dominated by hydric species located adjacent to small streams, beaver ponds, lakes, and meadows. Sedges are the most common species. This type usually occurs around the 7,000-foot elevation level. Sites are dominated or co-dominated by bulrushes, cattails, woodrushes, or sedges.

Bogs, Fens, and Peatlands – These are wetlands that typically have sub-irrigated cold waters sources. Peatlands are generally defined as wetlands with waterlogged substrates and at least 30 centimeters of peat accumulation (Moseley et al. 1994). The vegetation is often dense and dominated with low-growing perennial herbs (Skinner and Pavlick 1994).

Wet Meadows and Seeps – These are wet openings that contain grasses, sedges, rushes and herbaceous forbs that thrive under saturated moist conditions. These habitats can occur on a variety of substrates and may be surrounded by grasslands, forests, woodlands, or shrublands (Skinner and Pavlick 1994).

Alpine

Alpine habitats are defined as the area above treeline in high mountains. Rocky or gravelly terrain is generally prevalent. Grasses and sedges often form thick sod-like mats in meadows. Most alpine plant species have unique adaptations to survive the harsh conditions of this habitat (Billings 1974). Many plants grow in mats or cushions. Perennials predominate in the alpine floras, as the growing season is often too short for annuals to complete their life cycles (Strickler 1990).

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