Ponderosa Pine Restoration Treatments, Long John Sale Area, Pike-San Isabel National Forest

Objectives/Justification

Manage individual ponderosa pine and dry mixed conifer (frequent-fire forest types) stands based on five key restoration objectives:

(1) an uneven-aged forest mosaic comprised of
(2) tree groups,
(3) open grass-forb-shrub interspaces between tree groups,
(4) scattered individual trees between tree groups, and
(5) well-distributed large diameter snags and logs, and woody debris.

To incorporate the site-specific variability in biophysical conditions resulting from differences in soils, slopes, aspects, elevations, climate, use existing old trees (>150-yrs-old), stumps, and logs as guides for a site's potential to support site-specific sizes of tree groups, number of trees/group, and spacing of groups. To achieve these objectives on the Long John sale area, initial tree marking focused on older tree groups. Size (area/group, trees/group) and spacing of existing old tree groups provide a natural template for how and where to retain groups of younger trees. Depending on the current site conditions, an initial older-tree-group focus may result in an abundance of mature and old trees. If moving toward a balance of age classes is desired for sustainability, then the initial mark may be revisited to regenerate a select number of leave mature and old groups to establish younger age classes at a site's appropriate spacing of groups.

Restoration of the species composition and structure on a biophysical site basis will improve the (1) resiliency and sustainability of ponderosa pine forests by restoring the (1) natural ecological processes and functions including the (2) natural fire regime (low vs. high severity), (3) plant and animal habitats, and thereby (4) biodiversity.

Key elements

- **Tree groups**
  - Groups have two or more trees with interlocking or nearly interlocking crowns when in the mid-age to old- structural stages. Manage within-group tree densities in the younger structural stages such that large diameters (dbh) are achieved by a plurality of trees when in the mid-aged to old structural stages.
  - Variable sizes; between 0.01 acres to 1+ acre, but generally less than 0.75 acres, 2-44 trees per group in the mid-aged to old structural stages, with an approximate mean of 6-8 trees per group.
  - Variable tree spacing within groups, i.e. "clumps" within groups.
  - Thin young tree-groups to facilitate development of desired mid- and old-aged structural characteristics.
  - Maintain interlocking crowns, clumped trees, and other within-group structure in mid- and old-aged groups; consider whole-group regeneration.
- **Open grass-forb-shrub interspaces**
  - Variable sized interspaces between tree groups may range from 20 – 200 feet, but generally 40 – 100 feet, from outer drip-line to outer drip-line of tree groups.

- Supports grass-forb-shrub vegetation communities and provides rooting areas for the tree groups.
- Does not include natural meadows, grasslands, and other non-forested areas (i.e., inclusions in forested landscapes).

- **Scattered individual trees**
  - May be scattered in the open grass-forb-shrub interspaces between tree groups.
  - May be of any age.
  - Manage to mimic or maintain on-site variability—use pre-settlement evidence to guide variability, work with what is present.
- **Snags, logs, and woody debris**
  - Manage for large diameter snags and logs, and woody debris amounts appropriate for forest type and tree-group structural stage.
  - Variably distributed across the landscape.
- **Arrangement of the above elements in space and time**
  - Manage for a high interspersion of tree groups of different age classes.
  - Sustain the desired uneven-aged conditions at the mid-scale (≤100 ac).

Prescription development:

- Embrace the natural variability contained in a forested landscape and apply a view of desired forest structure that accommodates spatial and temporal heterogeneity. Design treatments using local site conditions (soils, elevation, aspect, productivity, plant community associations, local climate, and pre-settlement evidence such as old trees, stumps, snags, and logs) to guide residual group sizes and spacing, numbers and locations of single trees, and sizes of openings. This prescription is a reference condition approach in which reference conditions are used as guides. This approach provides a framework for evaluating current conditions relative to past conditions and establishes ecologically justifiable restoration goals; it provides a robust estimate of what conditions are ecologically attainable and sustainable on sites.
- Manage where possible for high interspersion of tree groups of different ages or vegetation structural stages (VSS). This interspersion provides for plant and animal habitat adjacency and sustainability at smaller (<10 ac) spatial scales. The desired mix of structural stages may not always be achieved in one treatment.
- Manage for desired quantities of snags, logs, and woody debris
  - 5 to 16 tons per acres in the dryer ponderosa pine and pine-oak types lower-end of the range and in the more productive ponderosa pine grass types, in the upper-end of the range;
  - 8 to 16 tons per acres of coarse woody debris in dry mixed-conifer forests; and
  - Approximately 2 to 3 snags and logs per acre.
  - Logs and snags of varying decay should be distributed throughout the landscape especially large and old logs and snags due to their wildlife habitat benefits.
- Restore fire wherever possible. If fire cannot be used to maintain the desired conditions, mechanical treatments are recommended.
- Manage for early successional tree species; those species more shade intolerant and fire-adapted. Interruption of natural fire frequency in these forests has often allowed the invasion of shade tolerant, fire sensitive species (= site conversion).

- When threatened and endangered, sensitive, and focal species are a consideration, additional recommendation may be preferable (e.g., goshawk nest areas and post-fledging family areas (PFAs) contain 10 to 20 percent higher density in mid-aged to old tree groups than in the forest landscape).

Management feasibility

- It may be operationally infeasible to exactly mimic natural processes and structural reference conditions (e.g., tree age and size) at the fine-scale.
    - Socio-economic constraints (e.g., smoke, operational capacity, and public safety) may limit the use and frequency of managed fire, and may require silvicultural treatments to maintain desired conditions.
    - In landscapes maintained by fire alone, groups may be uneven-aged and/or even-aged as occurred naturally.
    - When the use of fire is restricted, two silvicultural methods for uneven-aged regeneration are available: group and single-tree selection. In order to establish and maintain tree groups with interlocking crowns in the mature to old structural stages, group selection may be preferred as crown interconnectivity may be lost with single-tree selection.
- Depending on existing conditions, the achievement and maintenance of desired conditions may require multiple treatments (e.g., silviculture and managed fire) over periods of time.
- Minimize mechanical disturbance of soils to minimize compaction, water erosion, stream sedimentation, disruption of surface runoff, and other detrimental ecological effects.

Unit 2 (north of Red Rocks Group Campground):

Current conditions: Approximately 16 ac of nearly pure ponderosa pine with a mixture of mid-aged-to-old trees. Mid-aged trees occur at a high density and have filled-in the natural open grass-forb-shrub interspaces. Due to high tree densities, little regeneration (VSS 1, 2, and 3) is available. Past thinning, as evidenced by large tree stumps, reduced the density of old (yellow-barked) trees, and resulted in some lack of interlocking crowns due to the thinning of older tree groups. Considerable evidence of long-past low severity fire: charred stumps and old cat faces.

Desired conditions: Take trees (marked with blue paint) were marked to maintain mature and old tree groups (with interlocking crowns) where available. It is strongly encouraged that future marking focus on leave tree marking, as it is more easily assessed what management is leaving versus what it is taking. These groups served as site indicators of the sizes (numbers of component trees) and spacing of trees within groups and among groups on the unit. Many mature/old trees that once were members of groups (evidenced by stumps) were flagged as single trees. Mid-aged tree groups were flagged in a manner to create groups with variable tree spacing (some equally spaced others tightly spaced as in the existing mature/old tree groups) and to create open grass-for-shrub interspaces between groups. Attempts were made while creating young and mid-aged groups to flag trees with deeper, fuller crowns. All attempts were made to have variably-sized tree groups; estimated residual group sizes ranged from 2 to about 44 trees and averaged about 6-8 trees/group. Nest (with nests and/or cavities) and feeding (tree squirrel)

trees were favored where possible. Snags and coarse woody debris >10" throughout the unit are protected and therefore not flagged.

Unit 4 (east Red Rocks Group Campground):

Current conditions: Approximately 16 ac of ponderosa pine succeeding to a blue spruce type due to lack of recent fire. Young-to-mature blue spruce trees occur at a high density, especially on the lower portions of slopes, and have throughout filled-in the natural open grass-forb-shrub interspaces between ponderosa pine trees, almost all of which were old and yellow-barked. Due to high tree densities, little regeneration (vegetation structural stages, VSS 2 and 3), especially of ponderosa pine, is available. Past thinning of ponderosa pine, as evidenced by large tree stumps, reduced the density of old (yellow-barked) pine trees, and resulted in some lack of tree groups with interlocking crowns due to the past thinning within older tree groups. Considerable evidence of long-past low severity fire…charred stumps and old cat faces.

Desired conditions: Take trees (marked with blue paint) were marked to maintain mature and old tree groups (with interlocking crowns) of ponderosa pine where available. These groups served as site indicators of the sizes (numbers of component trees) and spacing of ponderosa pine trees within groups and among groups on the unit. Many mature/old ponderosa pine trees that once were members of groups (evidenced by stumps) were flagged as single trees. Where available mid-aged ponderosa pine tree groups were flagged in a manner to create groups with variable tree spacing (some equally spaced others tightly spaced as in the existing mature/old tree groups) and to create open grass-for-shrub interspaces between groups by removing typically young trees that have established in these historical openings. Attempts were made while creating young and mid-aged groups to flag trees with deeper, fuller crowns. Attempts were made to have variably-sized tree groups; estimated residual group sizes ranged from 2 to about 44 trees and averaged about 6-8 trees/group. The leave tree mark very much favored ponderosa pine at the expense of blue spruce. Nest (with nests and/or cavities) and feeding (tree squirrel) trees were favored where possible. Snags and coarse woody debris >10" throughout the unit are protected and therefore not flagged.