- **At low to mid-elevations** in southwest Oregon, Douglas-fir is more tolerant than some of its associates, notably ponderosa pine, and will regenerate in partial shade. Thus, Douglas-fir can probably be perpetuated by individual tree selection or other stand management practices that retain higher densities through time. Regeneration and maintenance of pines and oaks will require both creating sufficiently large openings initially and maintaining lower stand densities over time.
- **A more rapid conversion** to uneven-aged management might have been possible in this case, but lacking investment capital, the Mains sought to defray costs through maximizing utilization of small-diameter material produced by thinning. This operational reality, necessitated by their insistence on retaining more valuable larger conifers, resulted in repeated but lighter entries and subsequent retention of higher stand densities over a longer time than might otherwise have occurred.
- **Utilization of traditionally unmarketable by-products** (e.g., poles and conifer firewood) generated meaningful revenue for the owner, although it was very labor intensive. Costs were kept low by using "low tech" approaches and reducing move-in costs for larger equipment, such as yarding scattered small logs close to roads with a pickup truck. Intensive utilization helped reduce slash and surface fuel loads, a key consideration in this fire-prone environment, and helped offset costs that would have been incurred with other slash disposal methods, such as piling and burning.
- **The economic challenges** of converting a dense, mixed-conifer forest in southwest Oregon to a vigorous, mixed species, multi-aged stand are daunting. The initial series of entries to reduce stand density is potentially very expensive, as the material is mostly small and not marketable as sawlogs. On adjacent public lands, similar treatments involving cutting, piling, and burning often cost $1,000 to $1,500 per acre, a cost out of reach of most small woodland owners. Owners are often faced with four not very attractive options:
  1. Make a significant up-front investment with no immediate return.
  2. Remove only the large, commercially valuable material from the stand (i.e., high grading), which reduces the future growth and potential of the forest.
  3. Do the work themselves (the average age of small woodland owners in Oregon is 59).
  4. Do nothing.

This case study shows the potential for reducing the costs of Option 1 through aggressive utilization of thinning by-products. It should be noted that the viability of this option was improved by taking advantage of cost-share funding for stand improvement activities through various programs administered by the Oregon Department of Forestry, and by selling relatively small quantities of timber when markets were strong. Like the Mains, forest landowners should be aware of timber markets and take advantage of them when they are favorable to help boost potential income and defray management costs.

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