Balancing Nutrition, Utilization and Fire Hazards

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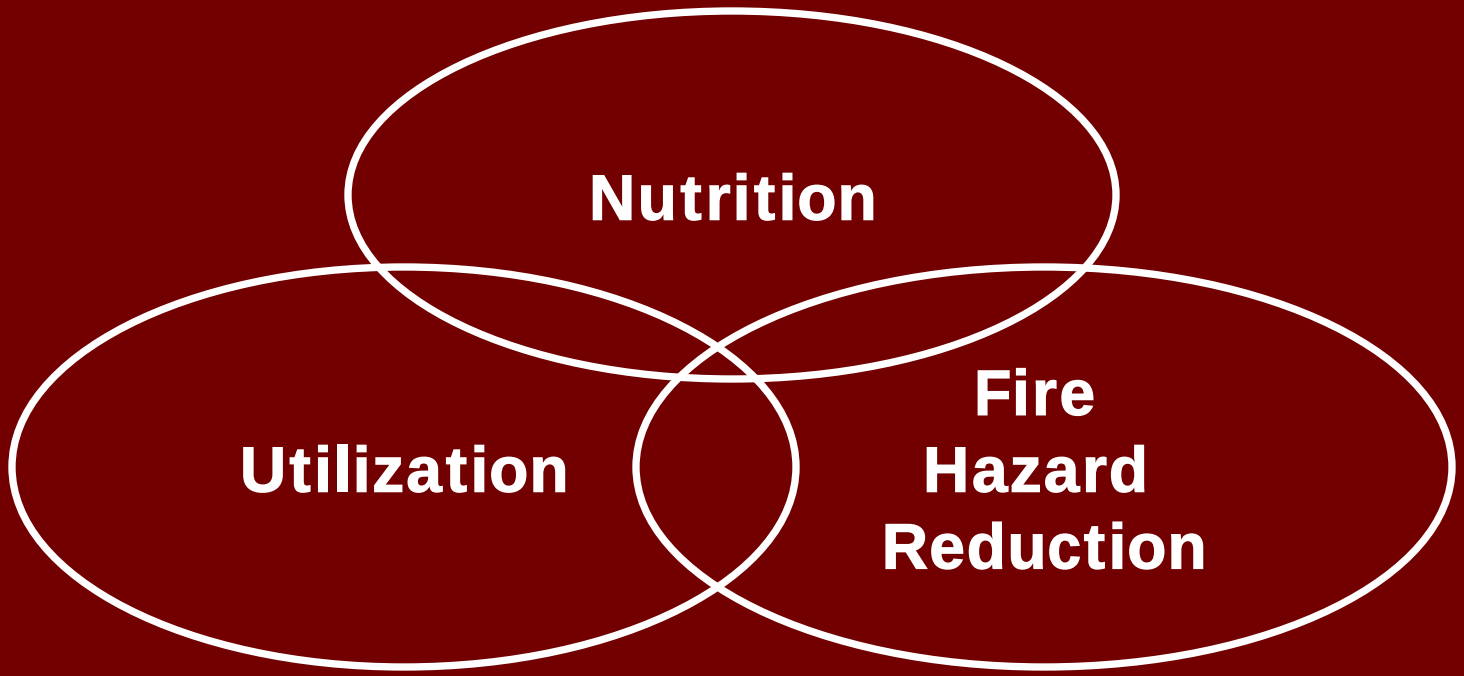
The Challenge .....



What We're Pretty Sure Of .....

- Removing biomass from the site removes nutrients
- The largest portion of nutrients are in the limbs and foliage
- Smoke management issues are resulting in reduced numbers of burning days
- Most logging contractors have invested whole tree harvesting equipment

What We Often Forget ....

- The potential impact of nutrient removals will vary by site – rock type and vegetation series
- There may be harvesting variations between whole tree removal and bole only that can accomplish some of our nutrient objectives
- Prescriptions need to be tailored to the site conditions

First .....

- This is not a new issue
- This presentation will likely develop more questions than answers
- This presentation “borrows” many of the ideas from your questions and statements

A Little History ..... (the late 70's)

Prescriptions involved removal of specified tonnage of residue and broadcast burning of the remaining biomass

Fuel and Fire Incorporated operating in Western Oregon and Washington

More History ..... (UI Forest)

Biomass Recovery Experiments on Steep Slopes on the UI Forest

Effective Whole Tree Hauling in a Truck called “Dumpy”

History ..... (NE Wash)

Hahn Harvester with Centralized Landing

Chipping of Limbs and Tops processed by Hahn Harvester

Harvesting Systems ..... What has changed ??

- Mechanized equipment is capable of operating on wider range of terrain – especially with respect to slope
- Forest management activities generally involve smaller tree sizes
- Mechanized systems are generally well matched to the harvested piece size

Nutrient Studies also began Early For Example .....

- Nutrient Losses from Timber Harvesting in a Larch/Douglas Fir Forest -- Coram Experimental Forest – Montana (1979)
- Symposium on the Impact of Intensive Harvesting on Forest Nutrient Cycling (1978)
- Studies from the Forest Service Research Units (ex: Harvey, Stark, others)
- Others .....

Has There Been an Effect .....

- Results are not consistent
- The results range from no effect to decreased productivity to difficulty in subsequent stand establishment
- The differences seem to relate to site productivity (rock type and vegetation series)
- Many studies are only now considering nutrient status as related to the parent material

Harvesting System Issues ….

- Whole tree systems cost less than cut-to-length or other bole-length systems, but ….
  - Does the area require additional site preparation after treatment ?
  - Can the operation eliminate the need for a subsequent prescribed burn ?
  - Is the area ready for planting without additional site preparation activity ?
  - Does the system provide increased value in product manufacture ?

Burning Issues .....

- Will we be able to find enough burning windows to achieve the goals of the prescribed fire
- Will smoke management regulations completely eliminate burning
- If we don't treat the forest residues with a controlled burn, will they burn anyway

Alternatives to Fire .....

Prototype of Timberjack Slashbundler operating on Western Study Sites with Varied Timing and Prescribed Level of Retention

Alternatives to Fire .....

Spot Site Preparation and Break up of Slash with Rotating Disk Attachments

There are a variety of “second entry” options that could operate with a prescription of the amount of material removed and retained, and the timing of the second entry

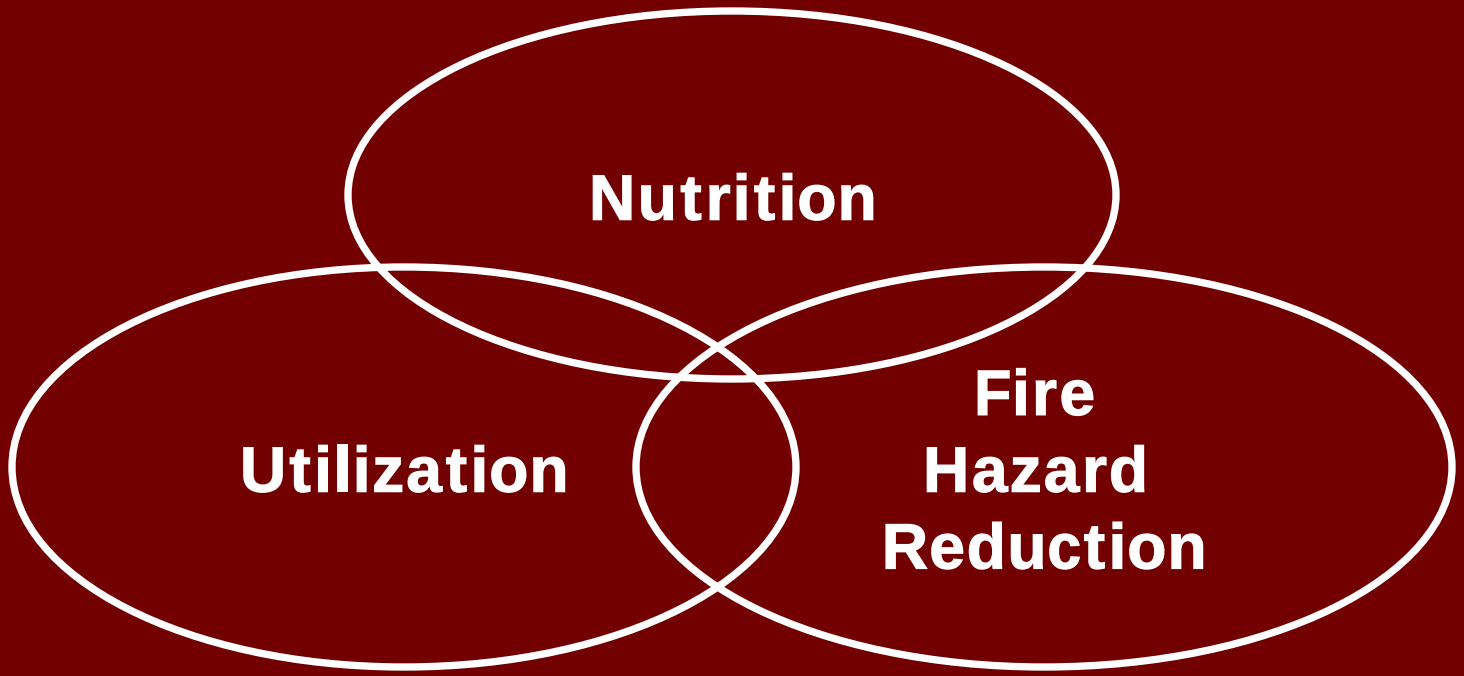
Classic Economic Question:

Immediate cost difference in the harvest system and site preparation costs

VS

The potential of long term loss in forest productivity and value

Where is the Common Ground .....



Utilization and Fire Hazard Reduction

- The more of the cut biomass removed, the lower the immediate fire hazard
- The more of the cut biomass removed, the greater the opportunity for the most effective forest product utilization
- Still an economic issue since higher utilization may cost more than the resulting product value

Nutrition and Fire Hazard Reduction

- A cool prescribed burn can both reduce hazard and release nutrients
- A time delay between harvest and burning may allow leaching of nutrients and a more predictable burn

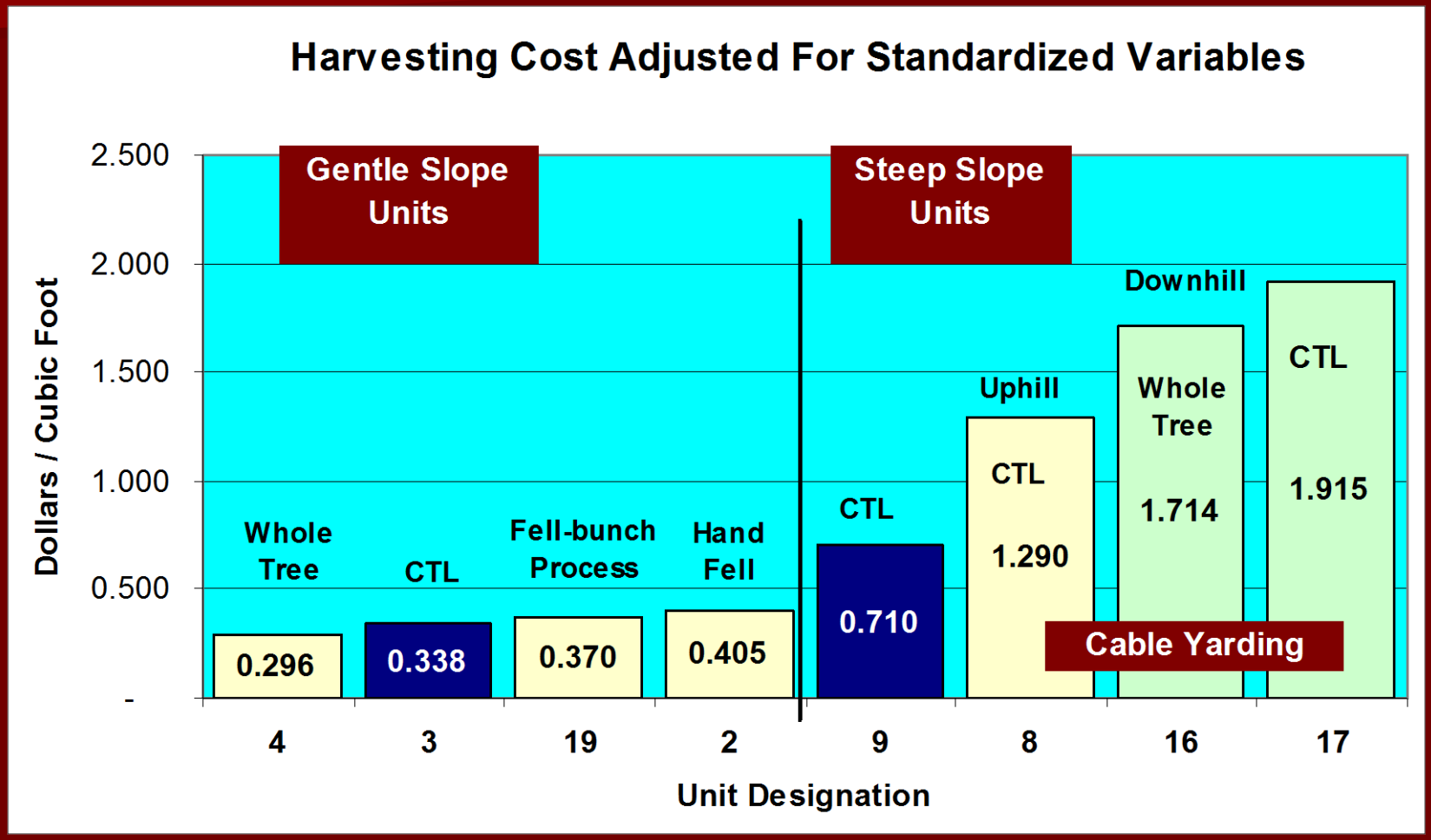
Nutrition and Utilization

- Limbs and needles have high cost of transport and processing with very low value
- Limbs and needles cause problems in most processing systems and most feedstock streams
- Little disagreement between nutrition and utilization on where the limbs and needles are best utilized
- There may be disagreement on where the limbs and needles are best removed
- Current systems just move limbs and needles to a convenient and economic point for removal

Limbs: How and Where

Whole Tree and Cut-to-Length

Total Costs of all Options



Whole Tree Harvest Questions ..

- What is actually removed from the site and what is left due to the prescription or breakage
- How does season of the year affect the amount left on the site
- What are the components that break from the stem in handling

Harvesting System Variations ..

- By Prescription, can we leave certain size classes in the woods
- Can the mechanized system be a adapted to delimb and cut tree length in the woods
- Can we manually fall and top in woods, and leave remaining limbing for the landing
- ……

Taking Processing to the Trail .....

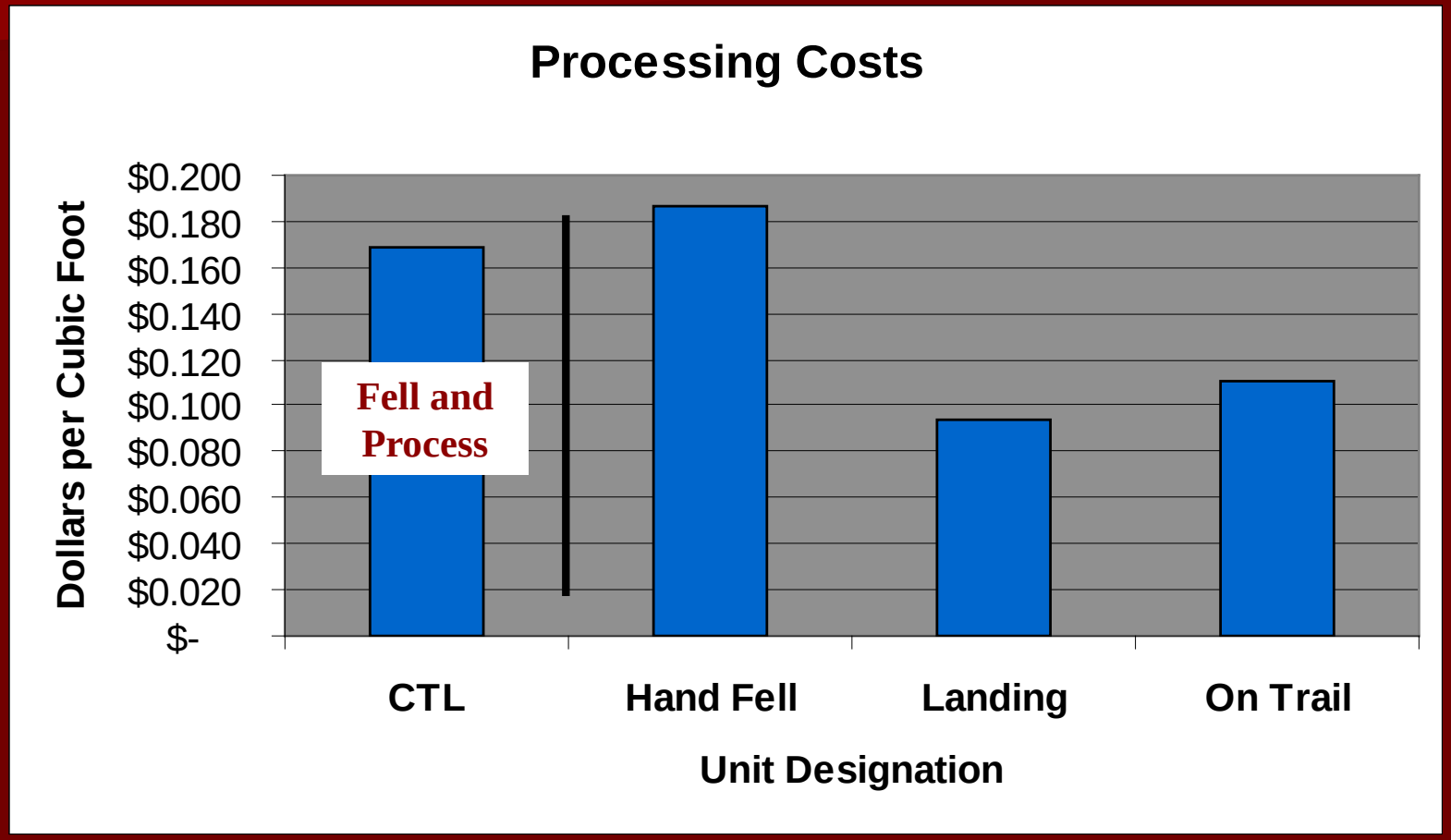
Working Feller Buncher Piles

At the Landing

Processing off the Landing .....

Maintenance difficulties off trail

Processing Costs



Cut-to-Length …

Highest Nutrient Components in Woods

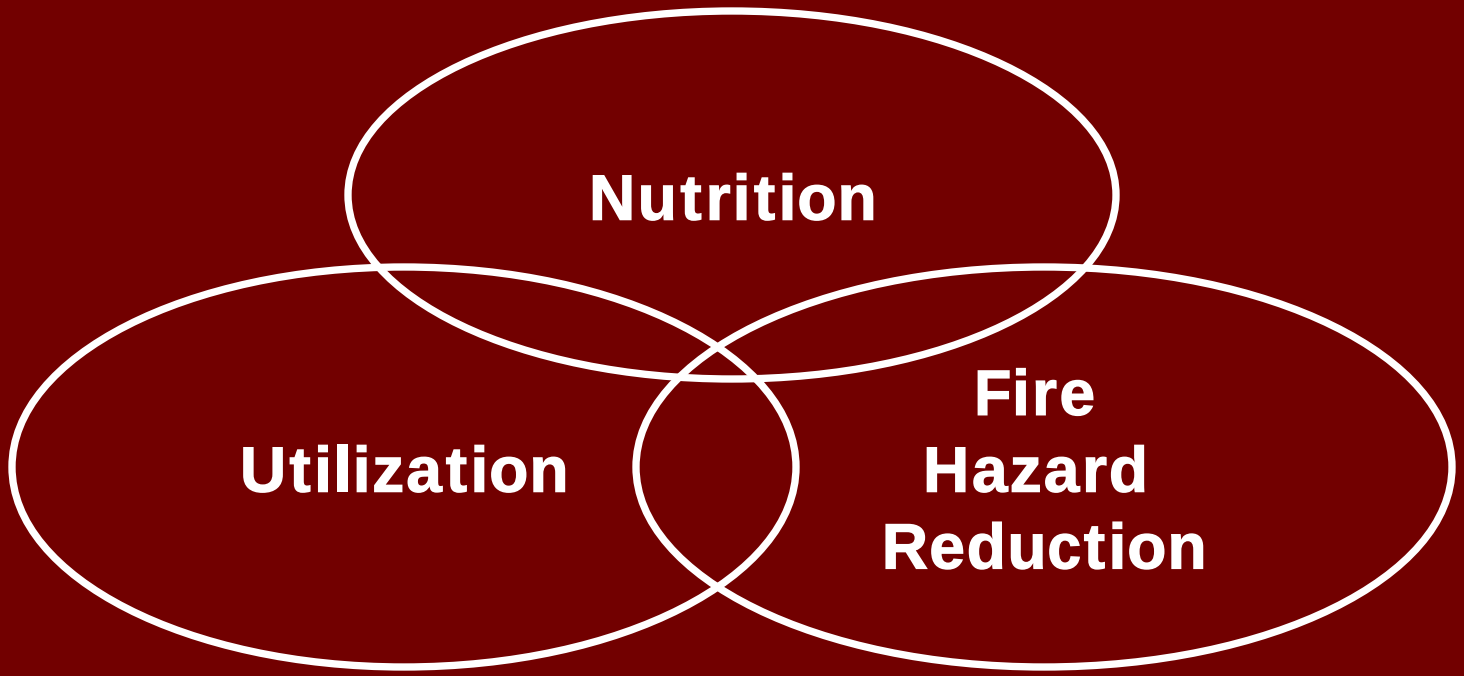
Limbs and Tops on Site but are Usually Compacted

Bole only to Landing but Cut to a Product Sort in Woods

Bole Only Harvest …

Limbs and Tops on Site but NOT Compacted

What are the Questions .....



Residue Vs Fertilization .....

- How do the nutrients cycle from forest residues back to the soil
- How quickly do the nutrients from residues become available to the residual stand
- Can the nutrients and other benefits of forest residues be replaced through fertilization

Thinning Vs Final Harvest ...

- The smaller trees harvested in thinning involve a greater utilization challenge
- Thinning prescriptions – especially for fire hazard reduction – may have different constraints from other prescriptions
- What are the nutrient characteristics of the understory vegetation and suppressed trees
- Is the site as sensitive to nutrient removals during a thinning activity

Thinning Questions .....

- Can a prescription be developed to guide the level of removal and retention on the site
- Will merchantability standards guide the level of removal and retention
- Can there be an effective time delay between thinning and removal of the thinned material