Economic Matrix: Rules of Thumb for Economically Viability

These rules of thumb are intended to help determine when units and a project are economically viable. When volumes fall below these defined thresholds or variables are significantly different from what is outlined in the rules of thumb, the Economics Subgroup (potential bidders) should work with the Forest Service to evaluate the economic viability and, if needed, make recommendations prior to the project being advertised for bid. This document is meant to be a guide, not a rulebook. If units are questionable, be sure to ask a purchaser or logger to review. The intent of this guide is to use it for the UWPP and update as needed from thereon.

Tractor Ground (< 35% slope) Tethered logging allowed on slopes greater than 35%

1. If skidding distance is less than 800 feet
2. If avg size of trees are ≥14" Dbh*
3. If species composition is >50% DF/L
4. If unit size is ≥ 40 acres
5. If distance between tractor units is <2 miles

- Then average volume should be ≥ **4Mbf/acre**
- If any one of the variables are less favorable than shown above, then avg volume needs to be ≥ **6 Mbf/acre**
- If two or more of the variables are less favorable than shown above, then avg volume needs to be ≥ **8 Mbf/acre**

***Note**: If a few units fall slightly below these thresholds but the average volume per acre of the units combined for each harvest method meet these guidelines, the project may still be economically viable. If in doubt, the Economics Subgroup should be invited to assist in evaluating the overall viability. Always consider distance to market, i.e., even if it is 100% ground based but 250 miles from the closest mill may not pencil out.*

Tractor Ground Rationale: 1. Generally, the shorter the skidding distance, the cheaper the skidding cost. Costs for rubber-tire and especially tracked skidding (tractor) typically go up significantly when exceeding 800 feet. (Uphill tractor is usually less productive and more expensive than flatter ground or downhill skidding. This should be taken into account when applying a rule of thumb).

2. *This number may fluctuate, and is meant to describe a perfect world scenario. It is rare to see a USFS sale with an average much larger than this. A lot of USFS sales on the Eastside are 12" to 13" Avg DBH. Tree size is relevant to costs when considering number of logs per tree and handling costs.

Trees 14" DBH and larger generally contain 1 long log (33' or 35') and one short log (16'6" or 17'6") which will be more efficient and yield more volume per tree. Depending on tree taper, trees less than 14" DBH generally contain 1 long or two short logs. The smallest trees may only contain 1 short log and handling costs of small diameter logs are at their highest based on number of logs per MBF.

3. Species composition is relevant to cost based on finished product value. DF/L has higher value for having the highest stress rating for random length lumber and studs, and DF/L is used for manufacturing plywood, which a high value finished product. Lodgepole pine has a decent stress rating but other white

firs and spruce are used for a lower value common grade lumber. Ponderosa pine generally is a lower value species but the large diameter (greater than 12"top diameter logs) can yield a higher price on the market. A stand with more than 50% DF/L or, in other words, the more the DF/L harvested from a unit and a project, the higher the value captured and the greater the harvesting costs are offset by the revenues. However, note that you can have a sale that is 100% Pine. It doesn't have to be 50% DF if other factors help it, i.e., if 100% pine- offset by bigger DBH, bigger units, etc.

4. Unit size is relevant for efficiency of moving in and moving out equipment and personnel. Once moved in, the more production accomplished, the lower the costs of operations and the more the timber volume can offset those costs. As a rule of thumb, small units (under 40 acres) requiring many moves between units are more costly.

5. Distance between units is also relevant when addressing the time it take to move equipment. Sometimes shorter distances between units allows equipment to be "walked" down the road rather than being loaded onto a lowboy and trucked to the more distant units.

Cable Ground (>35% slope)

1. If uphill yarding distance is less than 800 feet
2. If avg size of trees are $\geq$ 14" DBH*
3. If species composition is >50% DF/L
4. If unit size is $\geq$ 40 acres
5. If avg volume removed from each corridor is $\geq$ 10Mbf
6. If distance between cable units are < 2 miles

- Then avg volume should be $\geq$ **6 Mbf/acre**
- If any one of the variables are less favorable than shown above, then avg volume should be $\geq$ **8 Mbf/acre**
- If two or more of the variables are less than favorable than shown above, then avg volume should be $\geq$ **10 Mbf/acre**

***Note**: If a few units fall slightly below these thresholds but the average volume per acre of the units combined for each harvest method meet these guidelines, the project may still be economically viable. If in doubt, the Economics Subgroup should be invited to assist in evaluating the overall viability.*
Downhill cable yarding is not recommended unless there is ample runout room. It is extremely expensive due to production, and layout considerations, and much less safe. There are a limited amount of contractors who can or will perform downhill yarding. The potential for residual damage is also higher.

Cable Ground Rationale: 1. The rationale for tractor skidding for 1, 2, 3, and 4 still apply for uphill cable yarding. However, it is more amplified since uphill cable yarding is significantly more expensive than tractor skidding and therefore, more volume per acre must be produced to offset the higher costs. Downhill cable yarding has even higher costs than those with uphill cable yarding. In

addition, environmental concerns and crew safety become additional factors that need to be considered.

2. *This number may fluctuate, and is meant to describe a perfect world scenario. It is rare to see a USFS sale with an average much larger than this. A lot of USFS sales on the Eastside are 12" to 13" Avg DBH. Tree size is relevant to costs when considering number of logs per tree and handling costs.

5. Cable corridors are unique from tractor skidding in that corridors are a narrow clearing width that span downhill on steeper slopes (>35%) in which logs are skidded up hill. These corridors are generally equidistant apart, (70' apart) and the costs are mostly generated by set up and tear down of the equipment for each corridor. The more volume harvested per corridor, the more revenue to offset the costs. A general rule of thumb is 25MBF or 5 truckloads per corridor would offset the costs.

6. Again, similar to distance between units for tractor skidding. However, cable yarding equipment transporting is a higher cost than tractor equipment. If cable skidding equipment can be "walked" down the road to the next unit rather than being loaded onto a lowboy, costs can be reduced. The more units there are and the closer the units are together, the more efficient the operation and the lower the costs. "Walking" equipment down the road more than 2 miles may break even with the cost of loading on a lowboy and trucking the equipment. Often F.S roads are paved, additional cost is incurred if logging off paved roads to avoid bituminous damage.

Helicopter Ground*
***Extremely cost prohibitive**

1. If turn distance is less than ¼ mile
2. If avg size of trees are $\geq$ 14" DBH
3. If species composition is 100% DF or Cedar
4. If unit size is > 40 acres
5. If total volume of helicopter units combined $\geq$ **400 Mbf** (due to move-in costs).

   - Then avg volume should be $\geq$ **8 Mbf/acre**
   - If one of the variables are less than favorable than shown above, then the volume should be $\geq$ **12 Mbf/acre**
   - If two or more of the variables are less than favorable than shown above, then the volume should be **16 Mbf/acre**

***Note**: End product markets will generally not cover the cost of helicopter logging therefore other units in the planning area will need to make up the cost impact for use of this system. Consult the Economics Subgroup to evaluate overall viability.*

Helicopter Ground Rationale: 1. Turn distance is the distance the helicopter (ship) must travel (as the crow flies) between picking up the logs from the unit, flying logs to the landing, and returning again to the logs in the unit. Turn time is the time it takes for the ship to make a roundtrip for landing to the logs and back again. As a rule of thumb, log landings within ¼ mile of the furthest away logs is

considered the most efficient configuration. Greater than ¼ mile will take more turn time and costs increase significantly from there.

2, 3 and 4 are the same rationale as tractor and cable but is more amplified because costs are higher than cable and much higher than tractor. Therefore, volumes per acre must be higher than cable and tractor to offset costs.

5. Since helicopter logging personnel and ships are so expensive and in demand, a minimum total volume for projects to be viable must be met. A rule of thumb is 400 MBF total for this harvesting method but is contingent upon all the other variables addressed above.