"Using GPS to Generate Forest Management Maps"
A High Value Timber Example

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Situation:

- **Timber Sales of High value timber**

  - **Each Acre worth $15,000 to $40,000**

  - **30 to 120 Acres per timber sale**

  - **1 to 4 Million dollar timber sales are common**

  - **Timber sold "Lump Sum"**

Why Collecting GPS Data Is Hard:

- Tall trees (100' to 160') provide dense canopy cover
- Best timber grows in Canyon Bottoms (steep mountains)
- Brush and lower stand vegetation can block satellite signals
- Bid due date usually only 20 to 30 days out
- It is frequently raining (sometimes very hard)
- Limited Cell Phone Coverage precludes Real Time Corrections except for WAAS

GPS Equipment Used In Big Timber:

- Sub-meter, single frequency receivers
- Receivers must be tuned for use under tree canopy
- Multi-constellation receivers preferable
- Use good GPS Protocol (see last page)
- Laser rangefinders for GPS offsets can be most helpful

Sellers Polygon:

1. **Seller rarely provides boundary data digitally**
2. **Because of high values, sellers acreage is always suspect.**
3. **Seller's advertised acreage is frequently overstated.**

500 ft
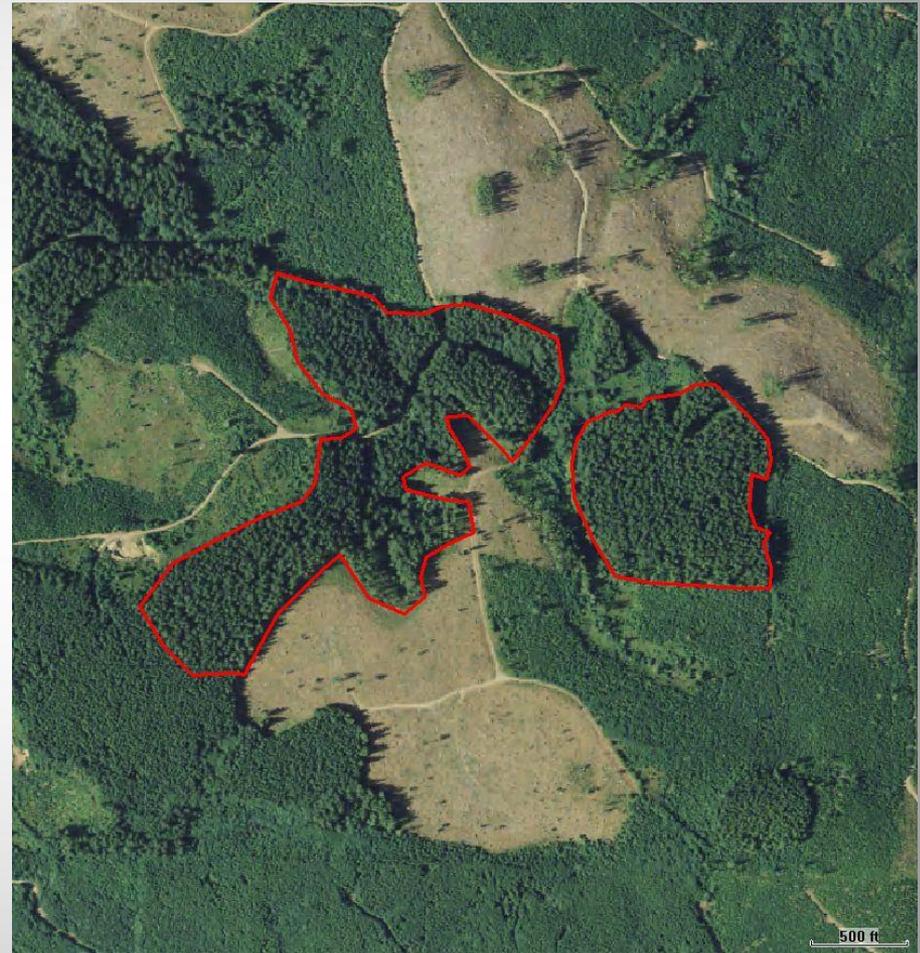
Procedure: Add First Plot Grid

- Plot grids added via ArcGIS/MapInfo
- Grids must evenly cover the sale area
- Foresters navigate from plot to plot with GPS
  - Safer & Faster
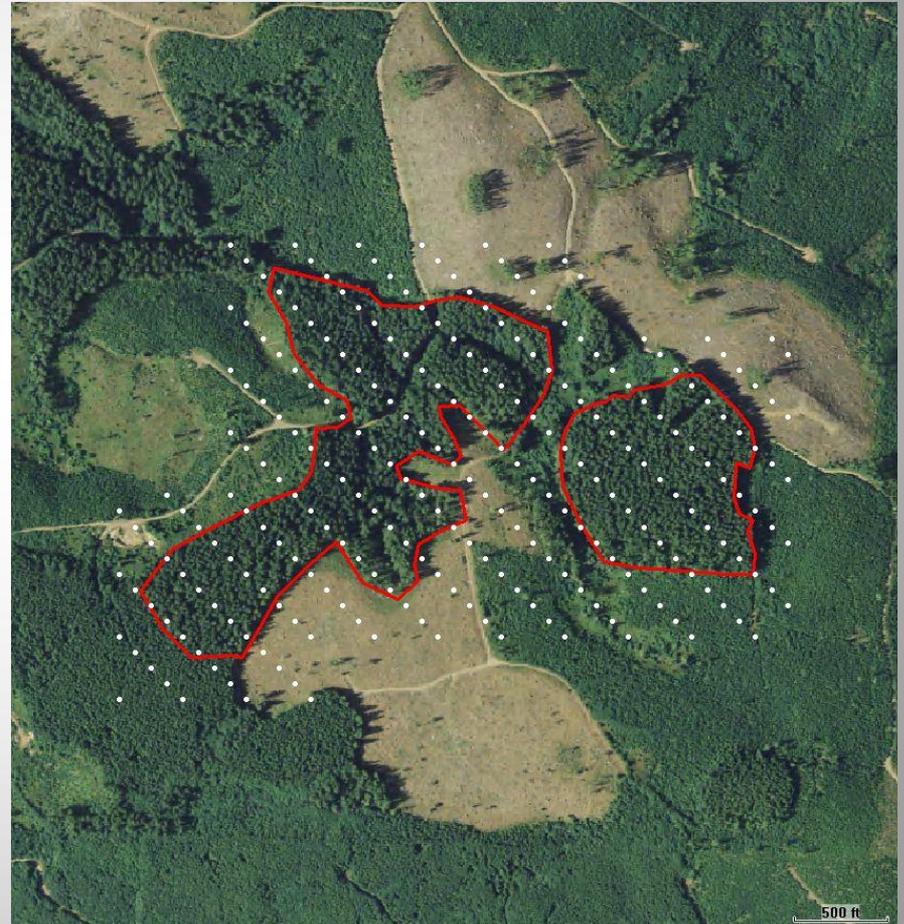
Add Second Plot Grid To Reduce Risk:

1. **Both Grids run same direction**
2. **Same Spacing between plots and plot lines**
3. **Area sampled by two foresters (independently)**
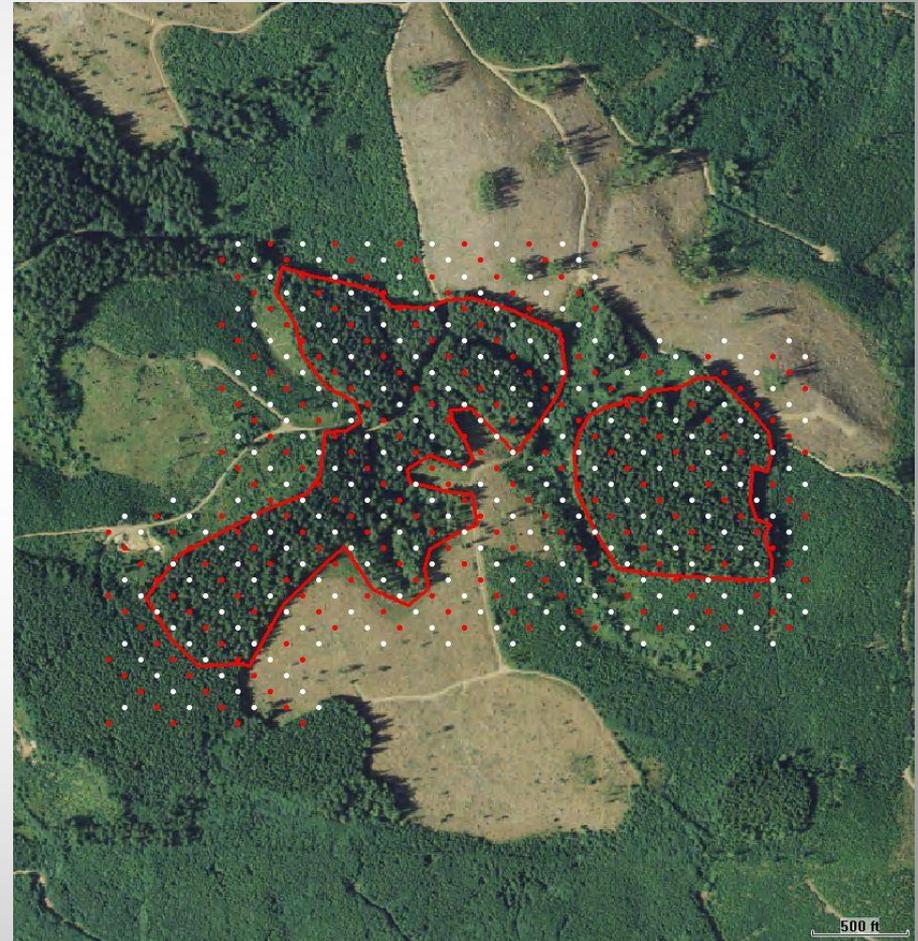
Forester GPS's Boundary in Field

- Forester sets points on boundary with Offset GPS points.

- Forester navigates from plot to plot with GPS unit

- GPS is On all day

- Boundary points made into polygon
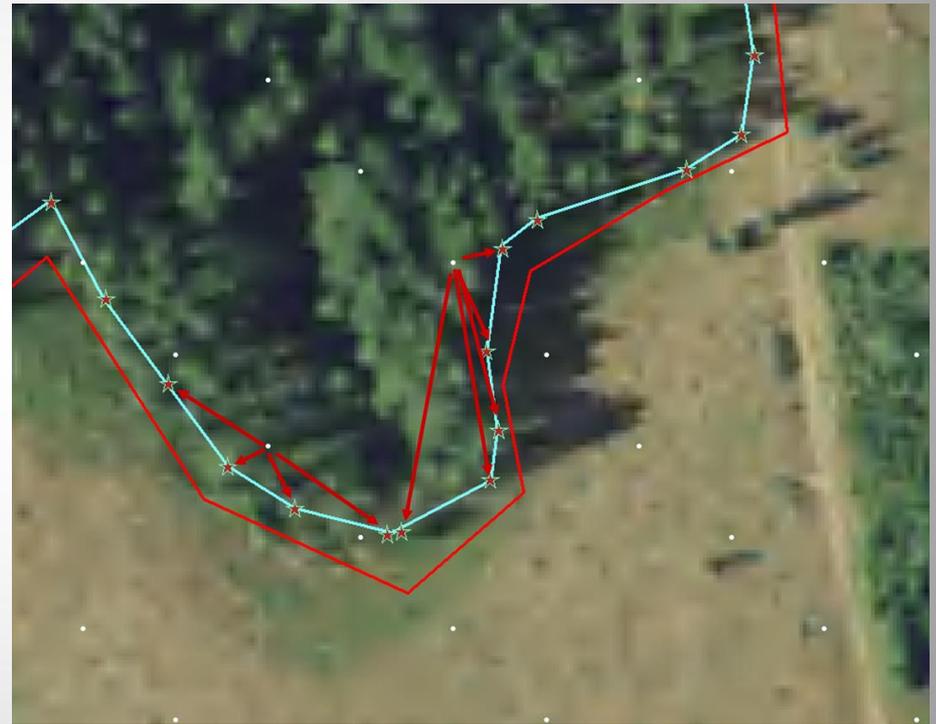
Sellers Polygon - Buyers Polygon

Road Removed

Non-Stocked Areas Removed

Boundary Set at Tree Boles, not Drip Line.
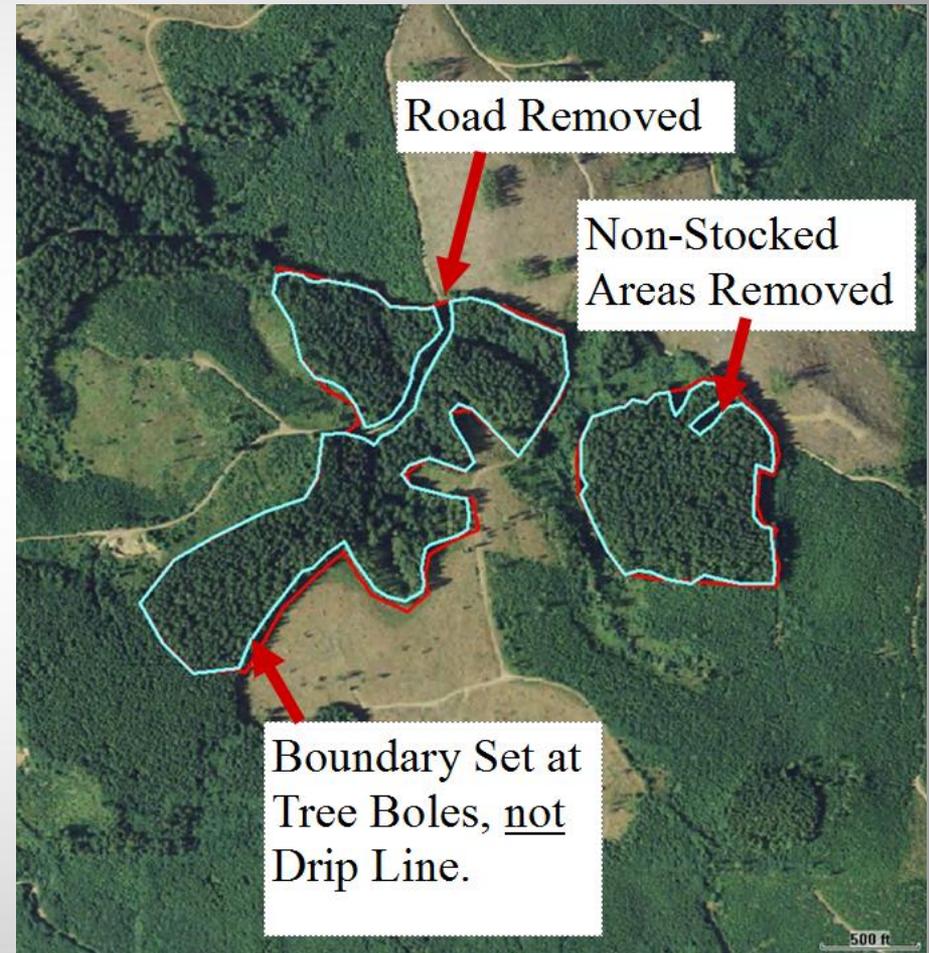
Acreage Difference Seller/Buyer

TMS Timber Sale

Unit 1	Seller Acreage	Buyer Acreage	Dif.
	42.7	32.2	
		8.9	
	--------------	--------------	
	42.7	41.1	1.6
Unit 2			
	19.7	18.8	0.9
Totals	62.4 Acres	59.9 Acres	2.5 Acres

2.5 acres X 50 MBF/Ac. X $405/MBF = $50,625.00

"State of the Art" GPS/GNSS

- Sub-Meter GPS unit
  - (GPS + GLONASS + Galileo)
  - Tuned for use under canopy
- TruPulse 360B Laser Rangefinder
  - Includes compass and tilt sensor
  - One shot gives Slope Distance, Azimuth, and inclination
- Mobile GIS Software

Conclusion

- Acreage errors can be very costly
- Acreage determination is easy to do with GPS when done properly
- Using GPS to navigate to plots saves time and energy.
- GPS acreage accuracy is usually within 1 to 2% of total station traverse. (GPS takes 1/4 the time)

GPS Protocol For Best Accuracy

- Update almanac (track continuously 15 min)
  - Do this twice a month at least
- Track 2 to 5 minutes in <u>open</u> before start
- Keep GPS unit on at all times
- Use averaging (10 to 60 readings/point)
- Hold em high (for best satellite view)
- Use external antenna if appropriate
- Take GPS offsets if appropriate

Thanks!

For all your GPS work, may your:

- **PDOPS be low**

- **Satellites be High in the Sky**

- **Batteries last all day**

Miles "the GPS Dog"

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