DETAILED HARVESTER DATA FOR IMPROVED FOREST OPERATIONS AND MANAGEMENT

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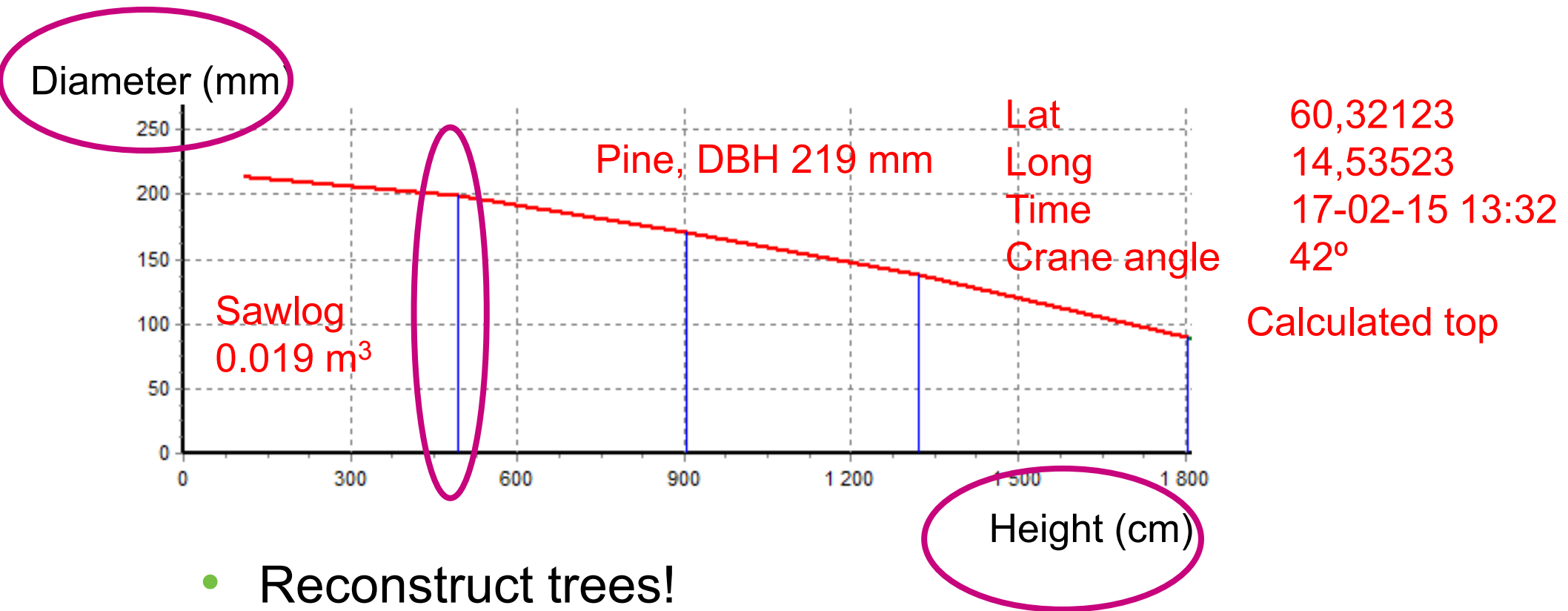
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Detailed production data?
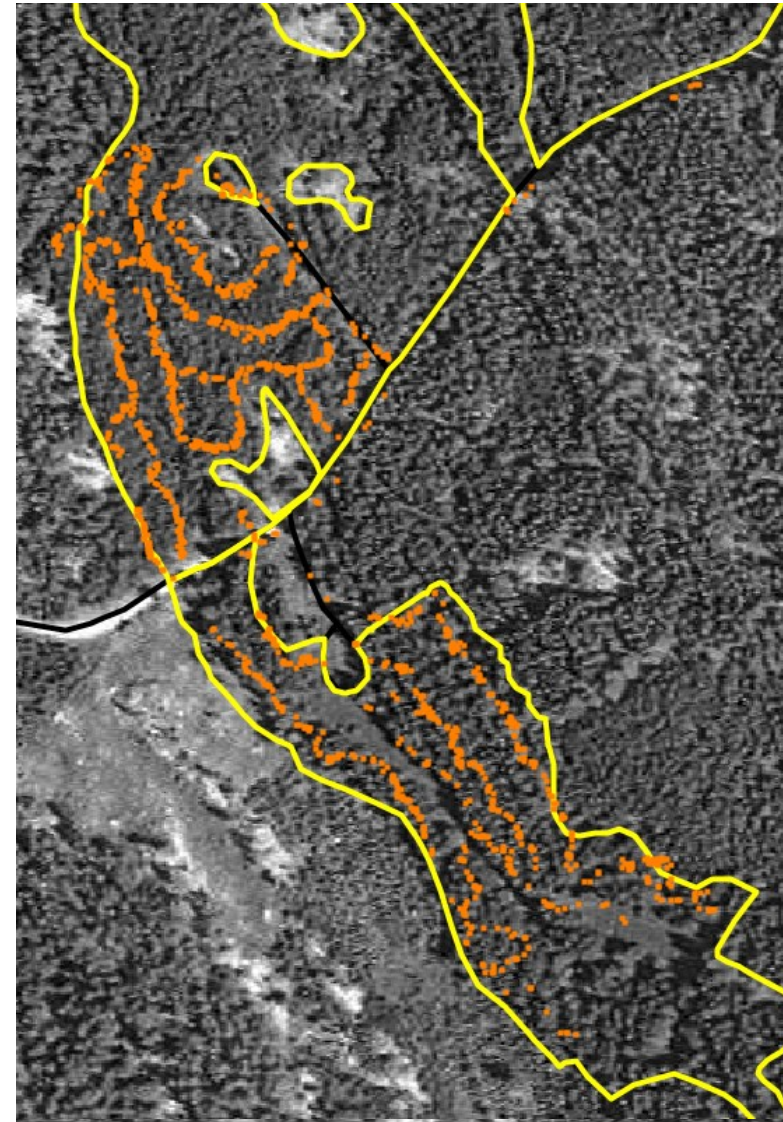
Detailed production data?

Diameter (mm)

Lat   60,32123
Long   14,53523
Time   17-02-15 13:32
Crane angle 42º

Pine, DBH 219 mm

Calculated top

Sawlog
0.019 m³

Height (cm)
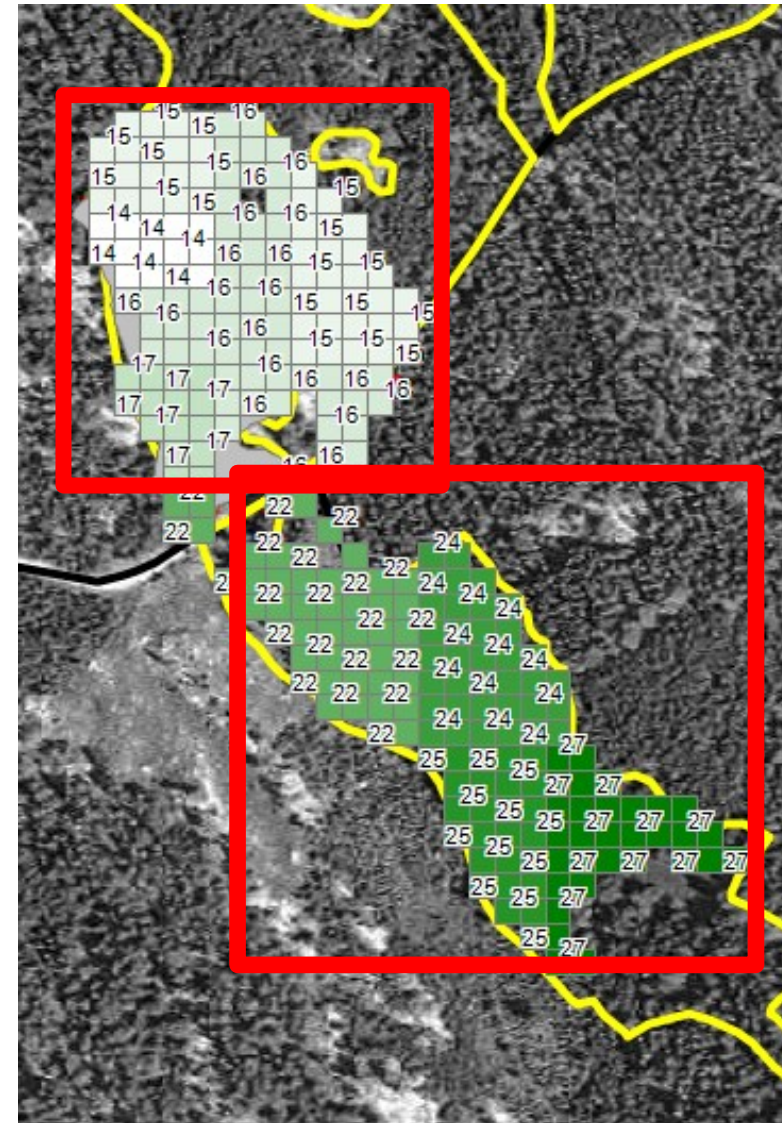
- Reconstruct trees!

Detailed production data

- Reconstruct the forest
  - Calculate area

Detailed production data

- Reconstruct the forest
  - Calculate area
- Segmenting logging sites into homogenous sub-areas based on the dominant height.

Detailed production data

- Reported by all modern CTL harvester (StanForD).
    - Hpr-files
- Can be utilized in order to improve
    - forest management and operations,
    - feedback to operators and forest owners

New fields of application

- Two examples:
    - Pre-harvest assessment (yield prognosis)
    - Monitoring of harvester operator quality

Pre-harvest assessment

- Objectives
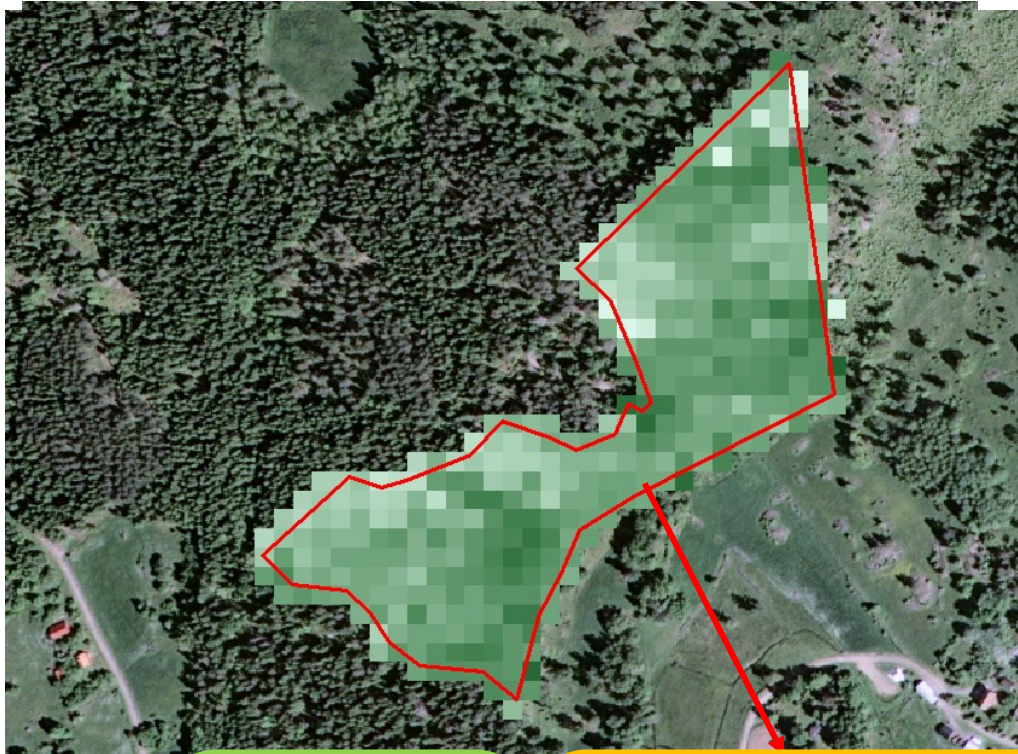   - Logging
    - Transportation
    - Industrial production
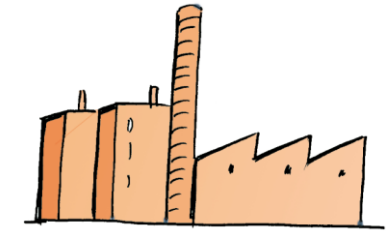
- Assessment based on:
    - Harvester data
    - National ALS / traditional forest inventory data
    - Imputation

Database with detailed harvesting data

Planned harvesting site

- Manual inventory
- National ALS or manual inventory

	Pine	Spruce	Basal area	Height	DBH	Pine saw logs	Pine Pulp wood	Spruce saw logs	Spruce Pulp wood
Harvesting site	4	88	33,0	23,4	30,6	?	?	?	?

Imputation

	Pine	Spruce	Basal area	Height	DBH	Pine saw logs	Pine Pulp wood	Spruce saw logs	Spruce Pulp wood
Planned	4%	88%	33,0	23,4	30,6	?	?	?	?

Imputation

	Pine	Spruce	Basal area	Height	DBH	Pine saw log	Pine Pulp	Spruce saw log	Spruce Pulp
Harvested area 1	17%	81%	32,0	23,8	31,1	40	8	172	56
Harvested area 2	17%	82%	31,6	23,7	30,7	37	9	181	44
Harvested area 3	0%	97%	31,1	24,0	30,4	0	0	205	55
Harvested area 4	11%	85%	30,8	24,7	31,5	26	5	192	54
Harvested area 5	9%	90%	35,2	24,0	31,2	21	7	216	78

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Pre-harvest assessment

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Planned	4%	88%	33,0	23,4	30,6	24,8	5,8	193,2	57,4

Results, total commercial volumes
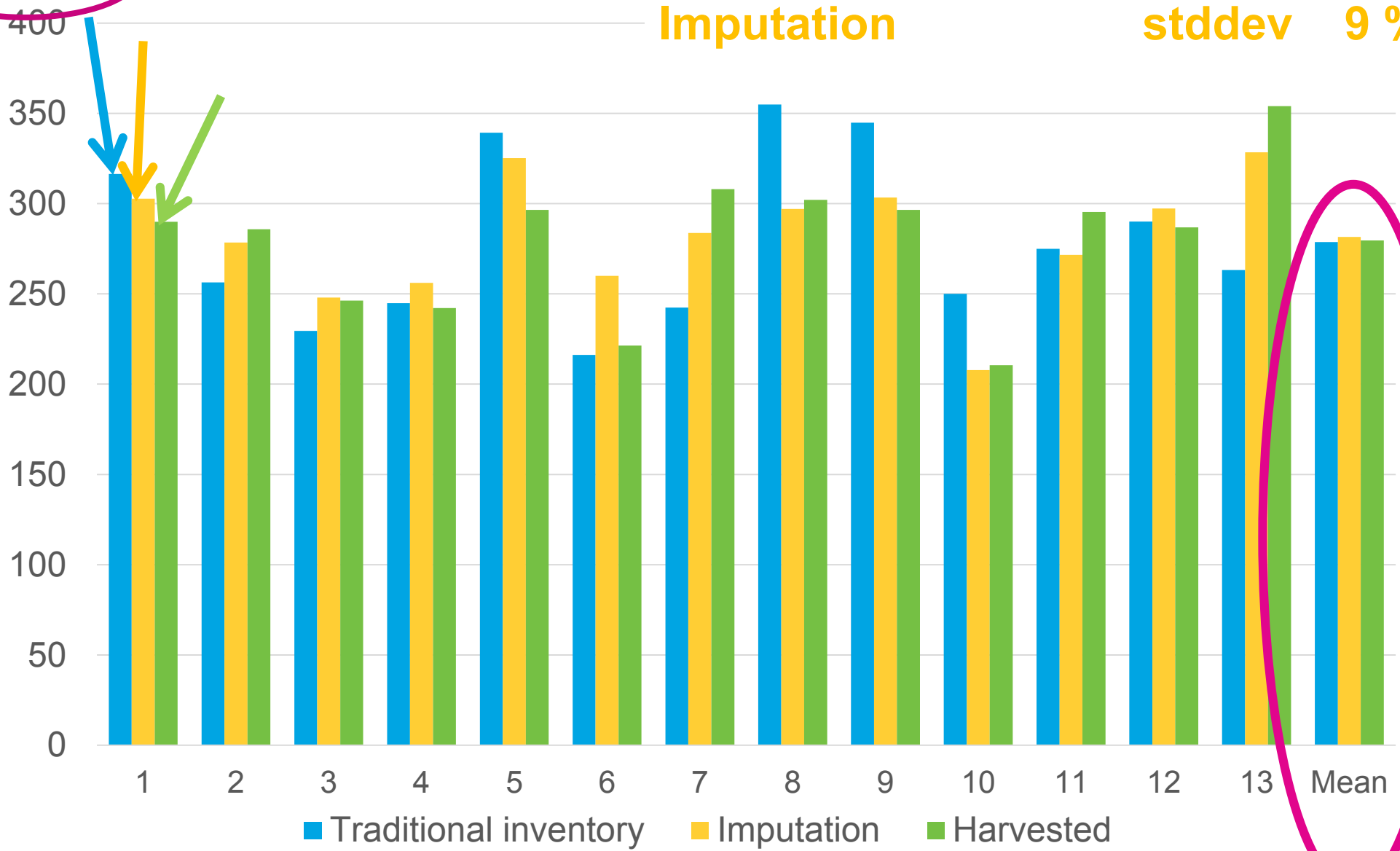
Results, total saw log volume

- Right now testing imputation on large no of harvested sites
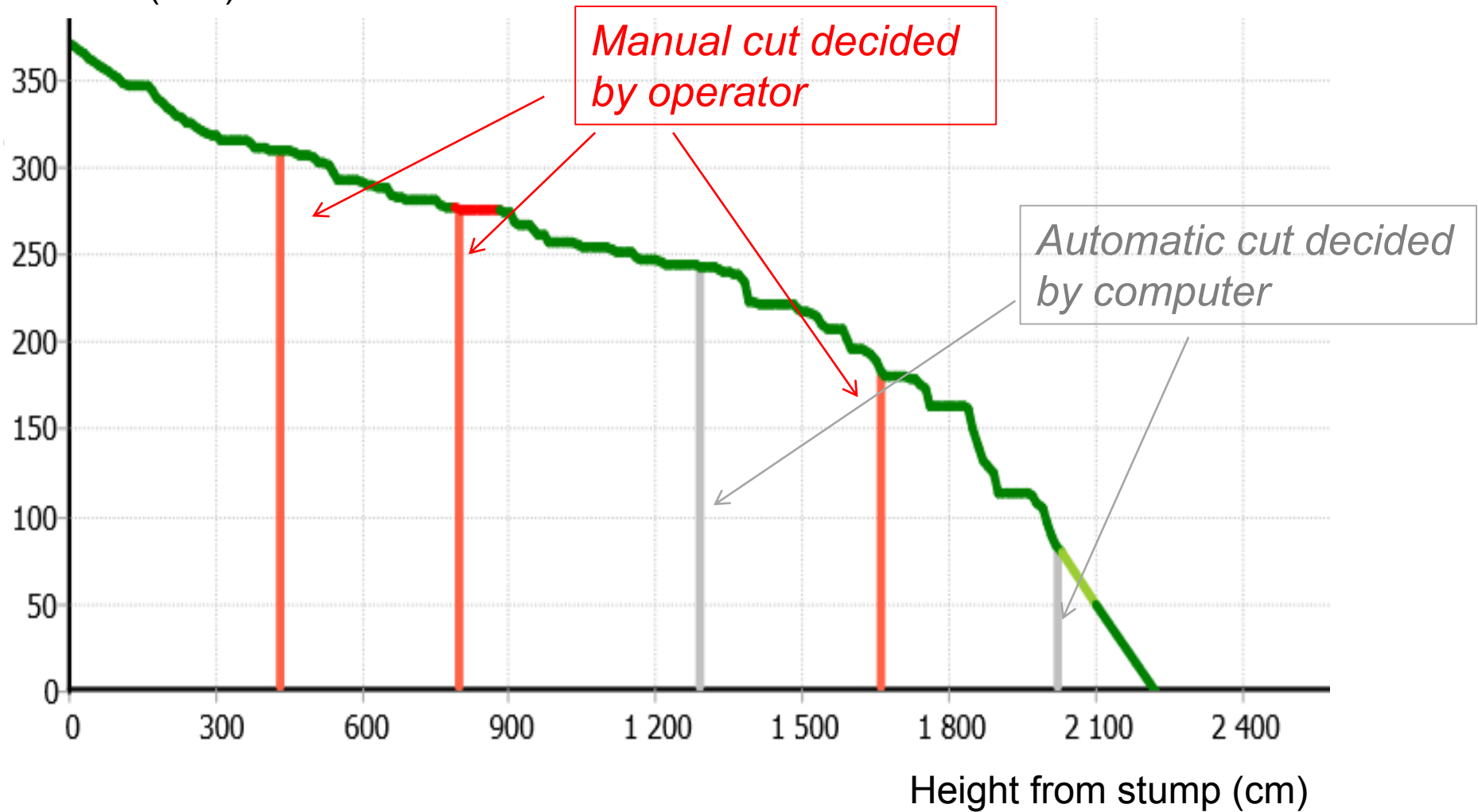   - E.g. 1000 sites in northern region
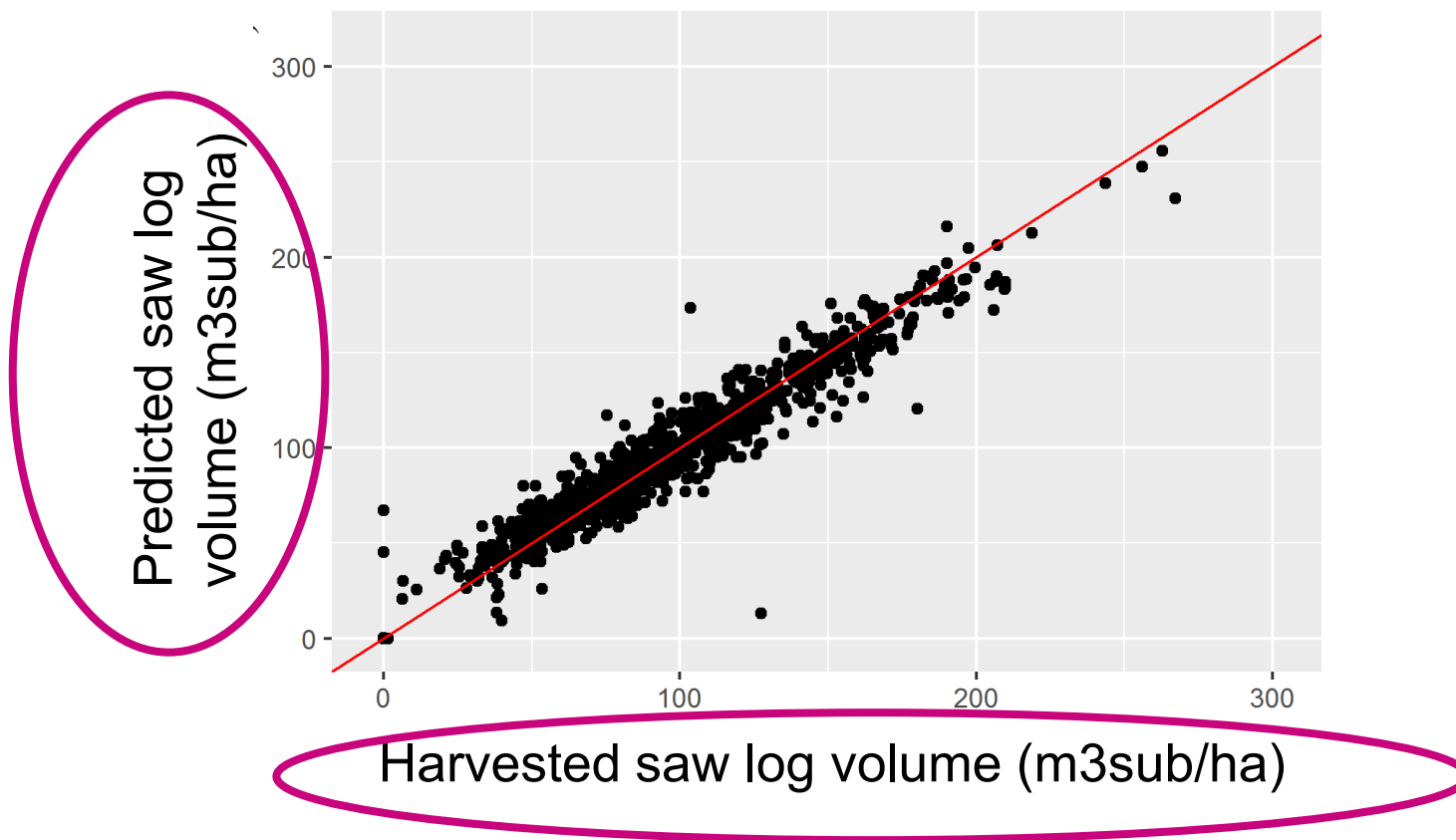
Monitoring of harvester operator quality

- Harvester control system tries maximize the stem value.

- Operator can override the optimization, e.g. due to stem defects or quality breaks.

- Registered if a log was cut based on:

  - optimization
  - manual decision by operator.

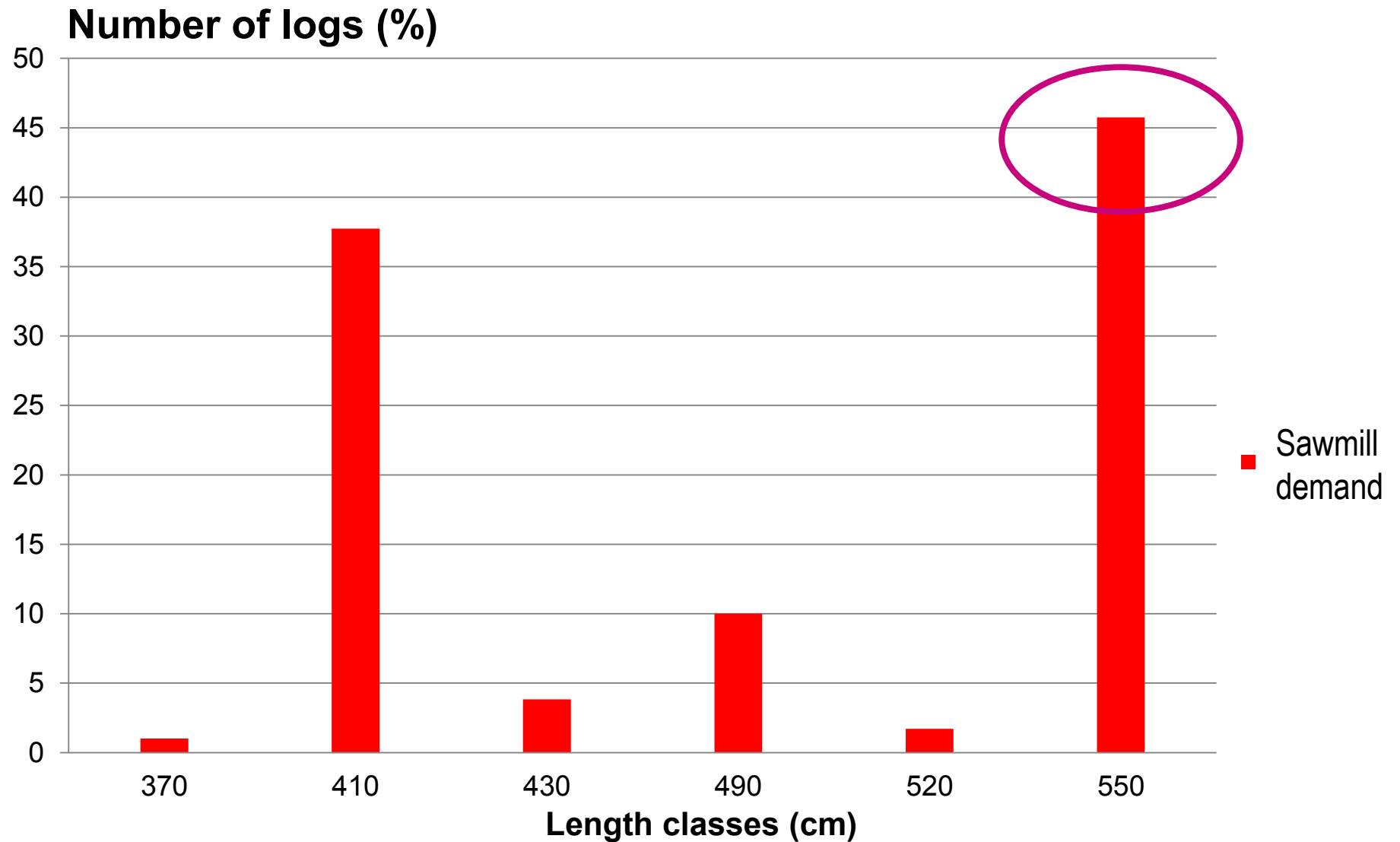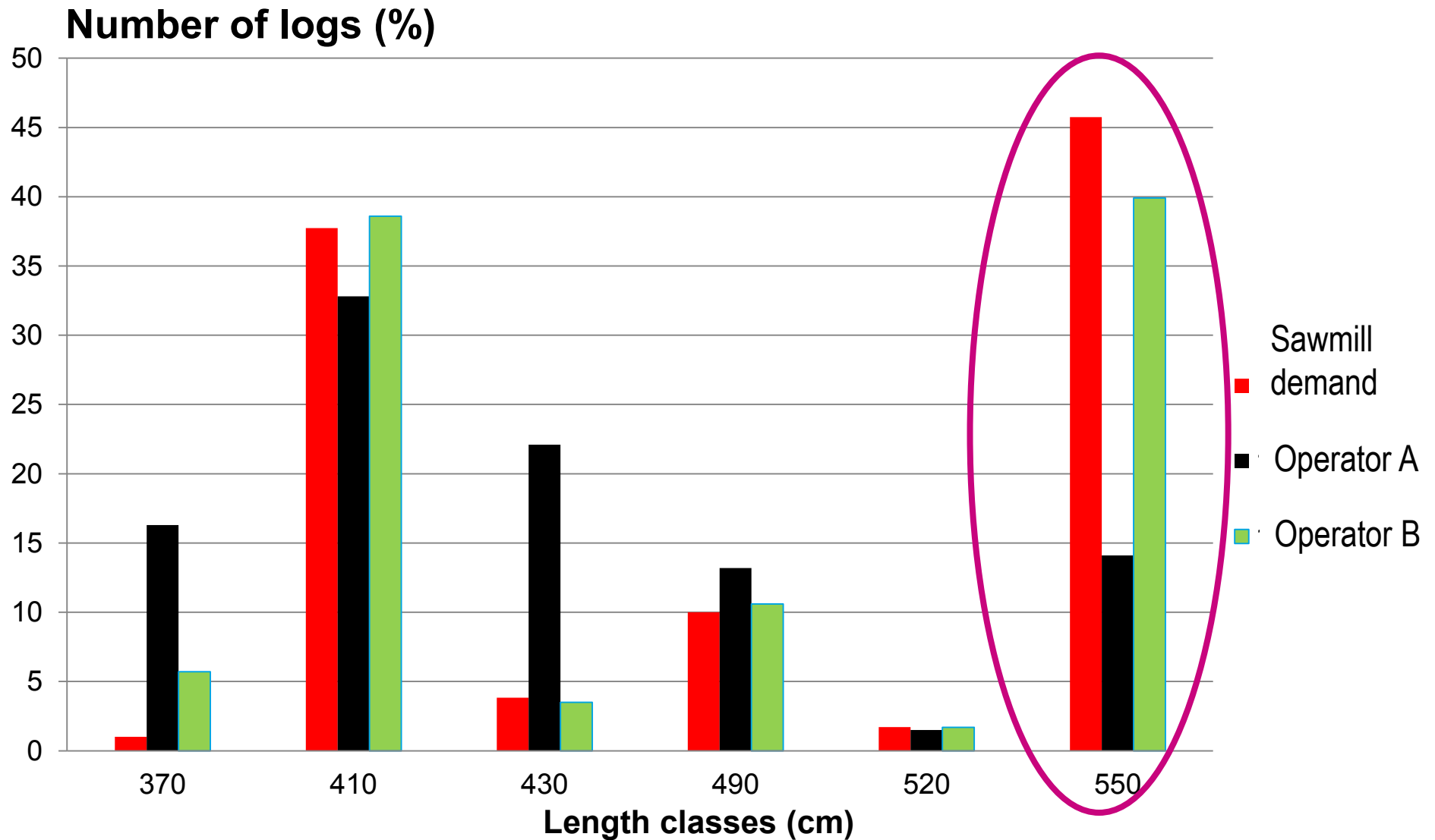JD1470E   JD1170E

Length distribution

Length distribution

Operator	Mean stem volume (m3sub)	Mean length saw logs (cm)	Relative volume of saw logs (%)	Manual cuts (% of saw logs)
A	0.281	441	56.1	60.2
B	0.292	476	68.8	0.3

- Monitor the operators!
- Train operators correctly!
- Give the operators the right incentives!

Summary!

- Detailed production data (StanForD hpr-file):
    - Maximum flexibility since we report what is measured.
    - Only time that we measure each individual stem and log.

- Several new tools are under implementation

- Important factors to be considered:
    - Measuring system controlled & calibrated
    - Operator skills
    - Machine softwares updated
    - Communication solutions