

Riverside's Results-based Approach to Reforestation Obligations



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Outline

- **The motivation**
- **Riverside's proposed system:**
 - **Overview**
 - **Key components of the system**
 - **Work thru a small example**
 - **How system addresses Riverside's issues**
 - **Next steps**
- **Some common questions:**
 - **Relationship between well-spaced/ha and MSQ**
 - **Targets and FG trees/ha and MSQ**
 - **MSQ in stands of 800/ha**
 - **Issues for the future**
- **I focus on the regulation of reforestation obligations.**

Motivation

- TFL 49 Code Pilot so encouraged to propose alternatives
- Riverside wanted a new system for reforestation obligations that:
 - provided an alternative to repeated replanting of small NSR patches
 - supported “best bang for buck” assessments
 - provided incentives for (not just requirements to, or penalties for failing to) use best seed, plant best micro-sites, reforest ASAP, and keep stands growing well.
 - demonstrated a stronger, more obvious tie to the ultimate objective - grow volume for future harvest
 - reduced survey costs and capitalised on benefits of switching to more - but smaller, faster, less detailed plots

Overview - Imagine...

- **100 cutblocks that were harvested 10 years ago.**
- **In them, 2 types occur: pure PI and pure Sx.**
- **We have a set of tables that predict volume/ha 80 years post-harvest from 1) species group, 2) site index, 3) stocking, and 4) height 10-years post-harvest.**
- **We set target (benchmark) levels for predicted volume/ha 80 years post-harvest that define adequate reforestation performance.**

Overview - Imagine (continued)

- We survey all 100 cutblocks and collect the plot data required to use our yield prediction tables.
- After the survey, we pool all the plots in a type and calculate average site index, stocking and height at survey for the type.
- We input these to the yield prediction tables to obtain predicted volume/ha 80 years post-harvest.
- For each type, we also obtain the target volume/ha 80 years post-harvest.

Overview - Imagine (continued)

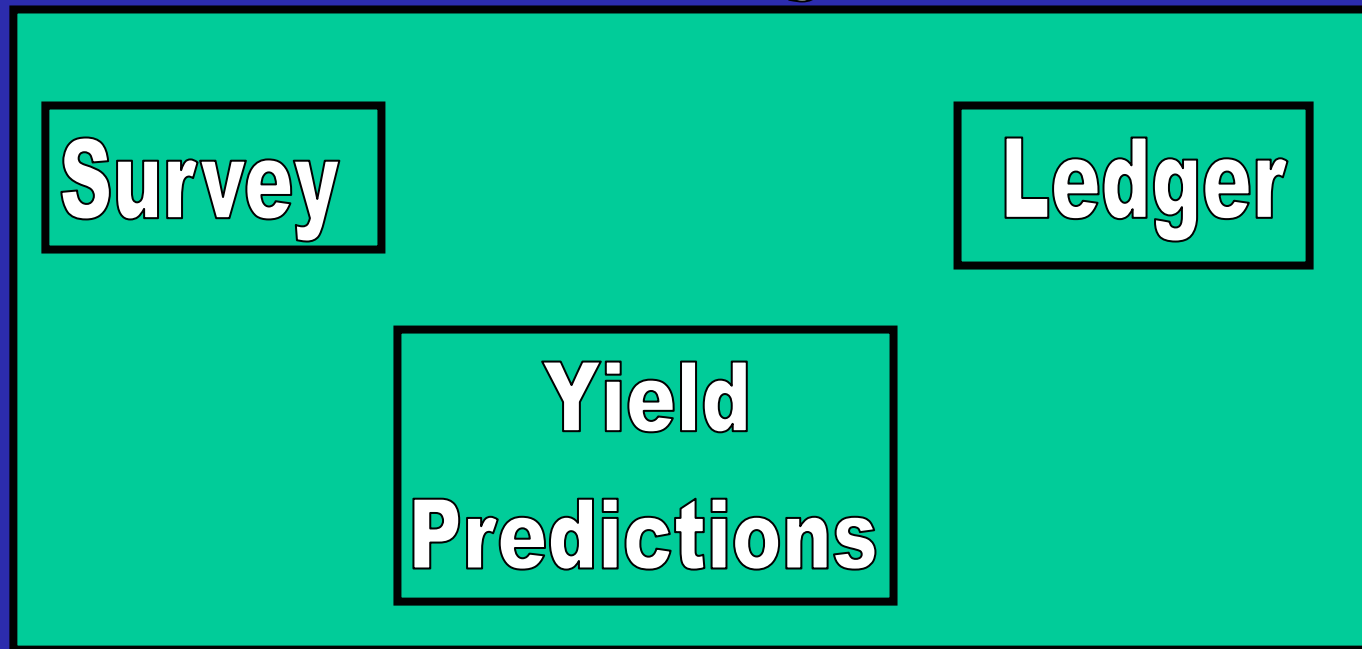
- We enter our values in a ledger, like this:

<u>Stratum</u>	<u>Area (ha)</u>	<u>Target (m³/ha)</u>	<u>Achieved (m³/ha)</u>
PI	500	300	305
Sx	40	350	320
Area weighted average:		304	306

- We conclude that reforestation performance is adequate (reforestation obligations are met) over the entire population because achieved performance exceeds our target.

Key components of the system

Policy

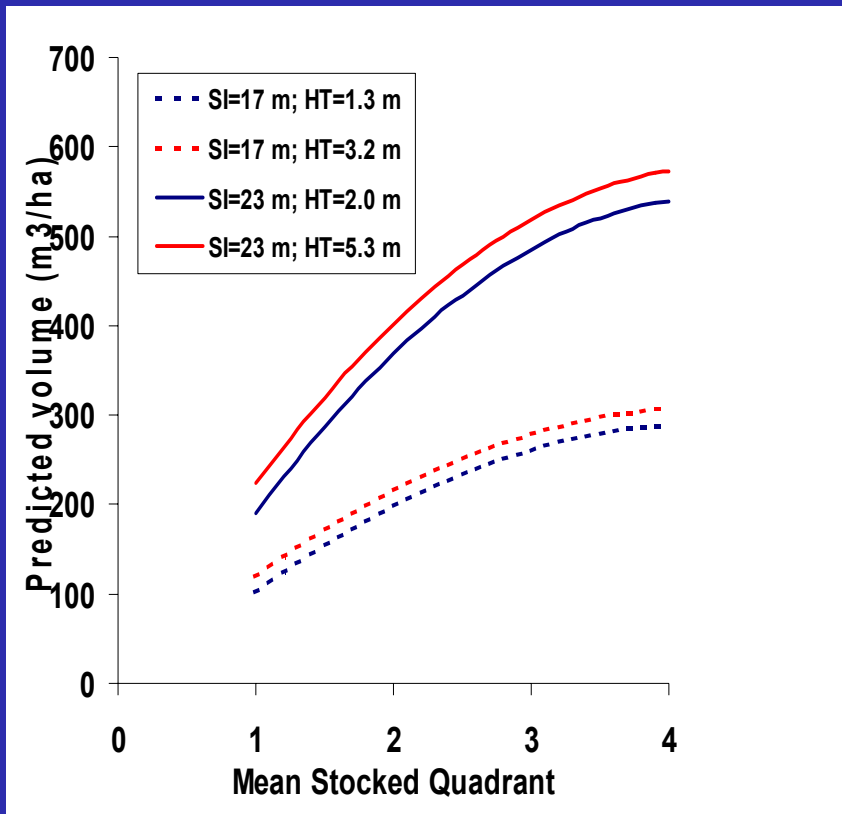


Key components (continued)

Policy

- **Multi-block targets**
- **Definition of target as 90% of maximum possible**
- **Performance indicator is predicted volume/ha at 80**
- **Process when population fails**
- **Reporting requirements**
- **C&E**

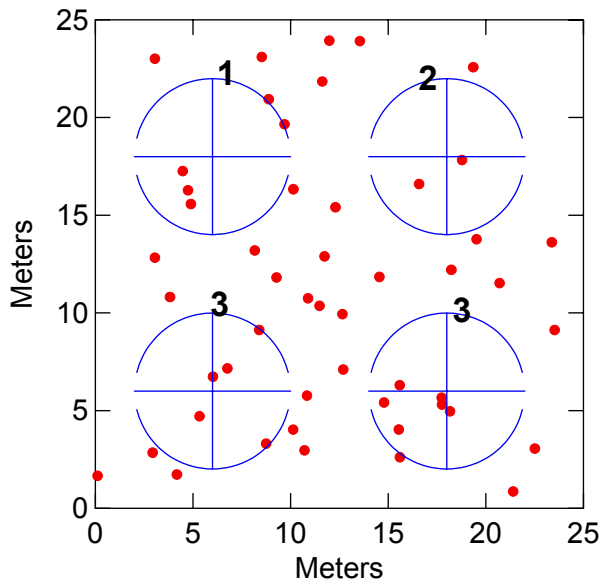
Key components (continued)



Yield prediction system

- Set of tables plus calculation rules
- Uses survey data: site index, stocking, and height 10 yrs post-harvest
- Example: PI species group

Key components (continued)

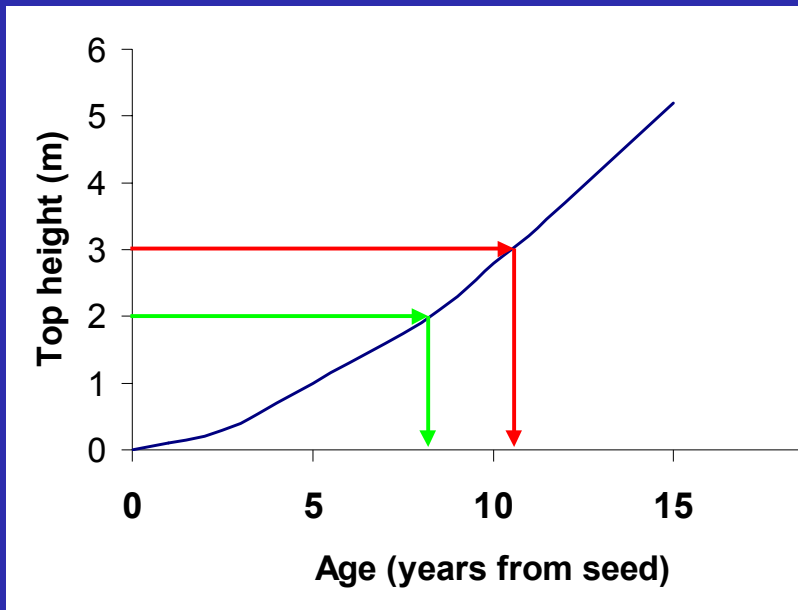


Survey

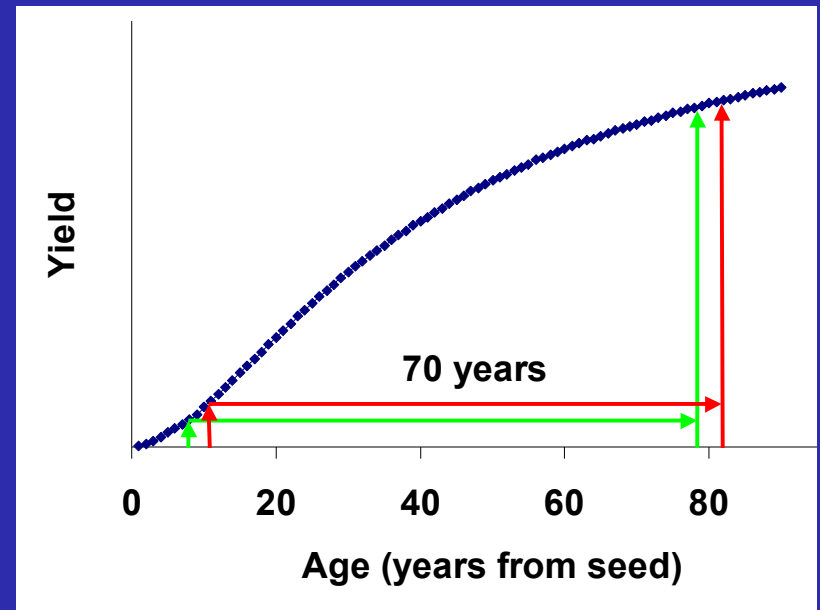
- Linked to yield prediction system
- Stocked quadrants not well-spaced
- Local SIBEC tables
- Effective age

MSQ=2.25

Key components (continued)

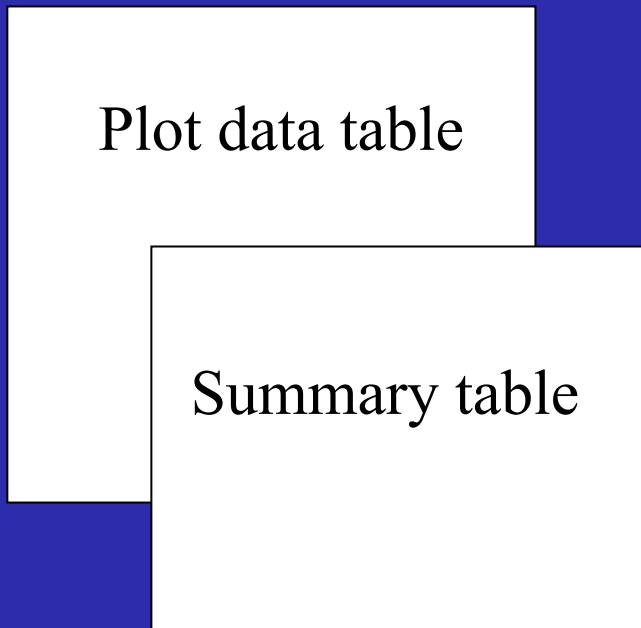


Height 10 years post-harvest is translated to effective age



Effective age determines end-point on yield curve

Key components (continued)



Ledger

- Database to house plot data
- Sorts data into strata
- Compiler to automate yield prediction
- Summary table for the comparison of achieved and target volumes

A worked example

- Switch to handout

How system addresses Riverside's issues

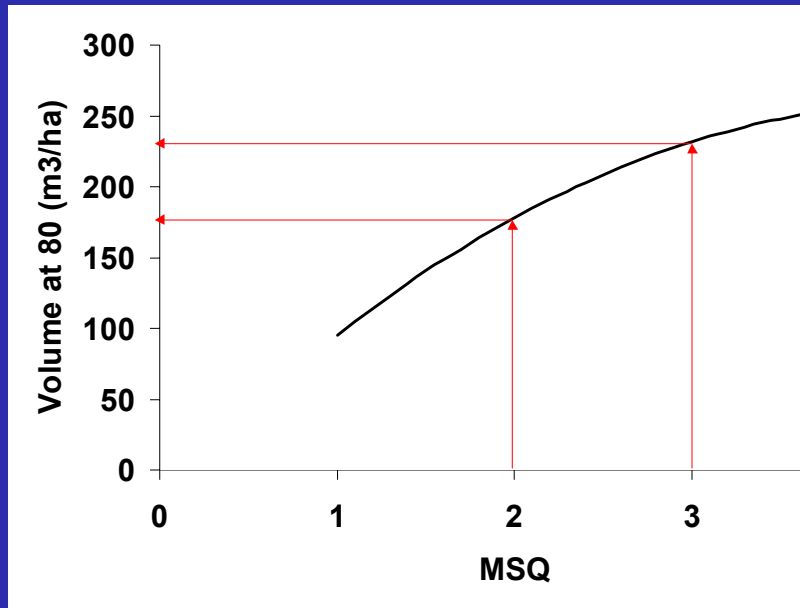
Small NSR patches

- **System specifies one target for a group of blocks (not a target for each individual block).**
- **Obligations are met on all blocks when aggregate performance exceeds target level; though performance on some blocks or parts of blocks may be below target levels.**

System based on incentives

- **The system recognises and rewards superior reforestation through increased predicted yield.**
- **Survey measures achieved stocking and height. Yield tables designed to accept these are inputs.**

How system addresses Riverside's issues (continued)



Best bang-for-buck assessment

- Yield prediction tables and targets for population allow the silviculturist to identify those treatments and TUs that increase predicted volume/ha at minimum cost
- Example: PI species group, SI=16 m, Eage=10 years

How system addresses Riverside's issues (continued)

Stronger tie to ultimate objective

- Rather than specify targets in terms of numbers of WS or FG trees/ha, the target is formulated as future harvestable volume/ha

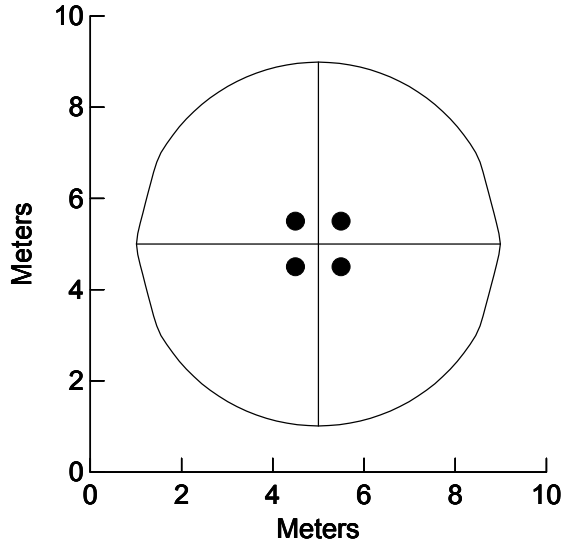
Reduce survey costs

- Jury is still out on this

A work in progress

- **Additional performance indicator - predicted log size distribution**
- **Process when population fails**
- **Link to AAC determination**
- **Integrate long-term monitoring**
- **Process for handling improved stock**
- **Add partial cutting, more species**
- **Test system this fall/winter**

Questions: MSQ and ws tph

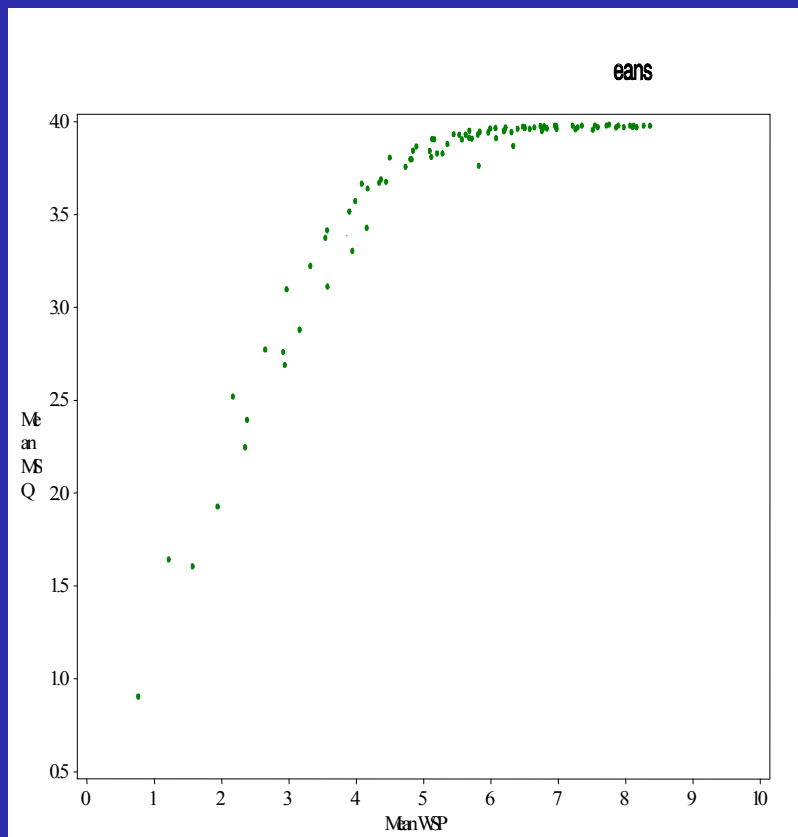


- How does MSQ relate to well-spaced trees/ha?
- Individual plot, large samples, small samples.

Individual plot

- In an individual plot, weird combinations can occur of the stocked quadrant tally and the well-spaced tally: but these situations are rare.

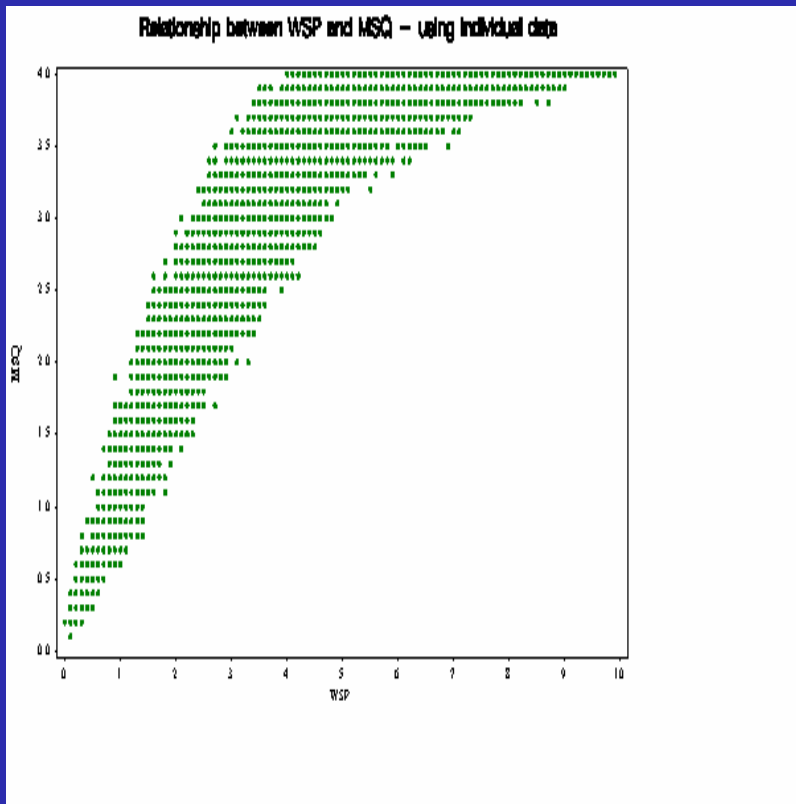
Questions: MSQ and ws tph (continued)



Large samples

- TASS runs used to build tables for PI
- Simulated surveys at 10 years.
- Both MSQ (with no minimum height) and mean well spaced trees/plot (with no “M” cap and a 1.5 m minimum height) were estimated.

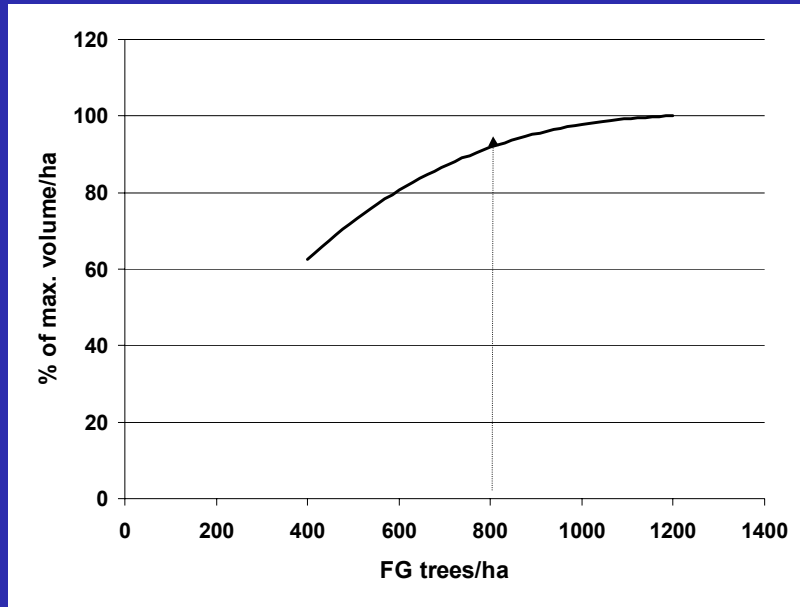
Questions: MSQ and ws tph (continued)



Small samples

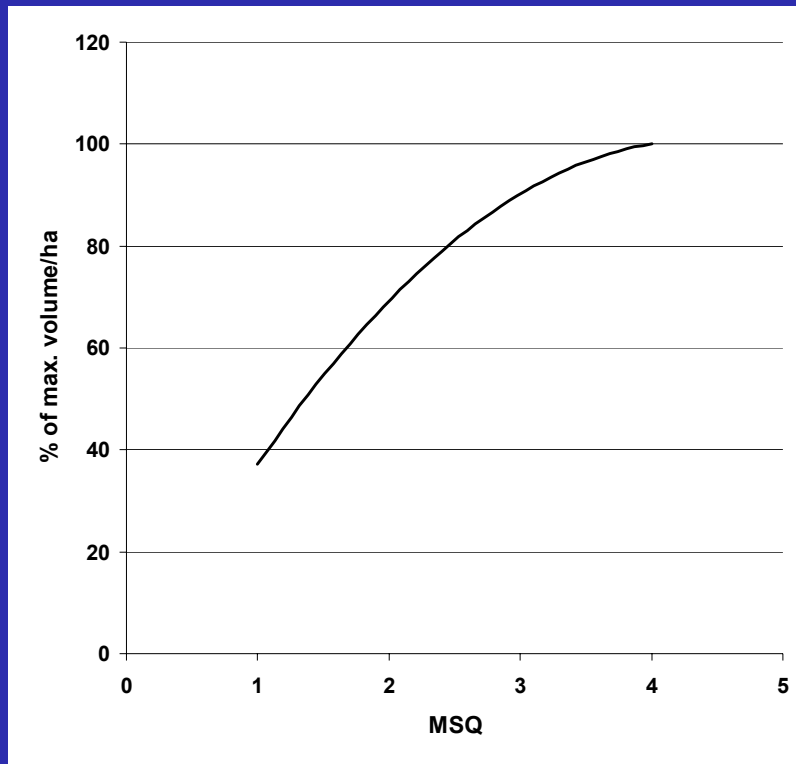
- With only 10 plots per stratum, the sample estimates of MSQ and well-spaced/ha are both imprecise - thus the 2 sample estimates are weakly correlated.
- Small samples that estimate 800 well-spaced/ha can estimated MSQs of 2.5-4.0.

Question: Targets and FG trees/ha



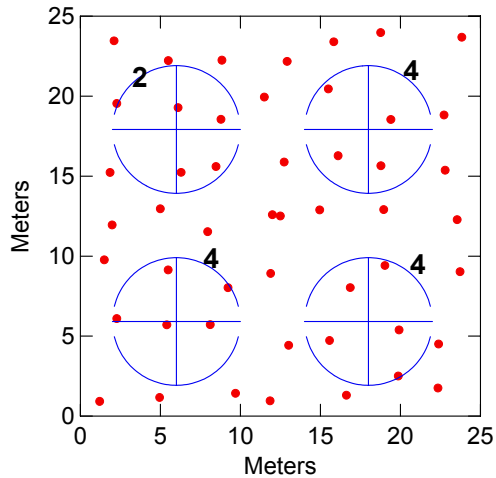
- How does a target based on 90% of max vol/ha production relate to FG trees/ha?
- Max merch vol/ha achieved at 1200 fg tph.
- 90% of max achieved at approx. 800 fg tph.
- Source: LMH50 Fig 9, PI, SI=18, age=67 years. Varies with species, site, rotation age, spatial pattern, etc.

Question: Targets and MSQ

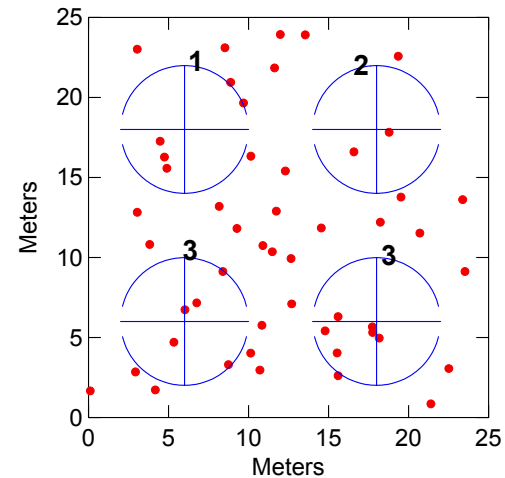


- What MSQs yield approx. 90% of max vol/ha production?
- Where TSS=1200/ha, max merch vol/ha achieved at MSQ of 4.
- 90% of max achieved at MSQ of 3.0 - 3.3, depending on achieved height at survey (effective age).

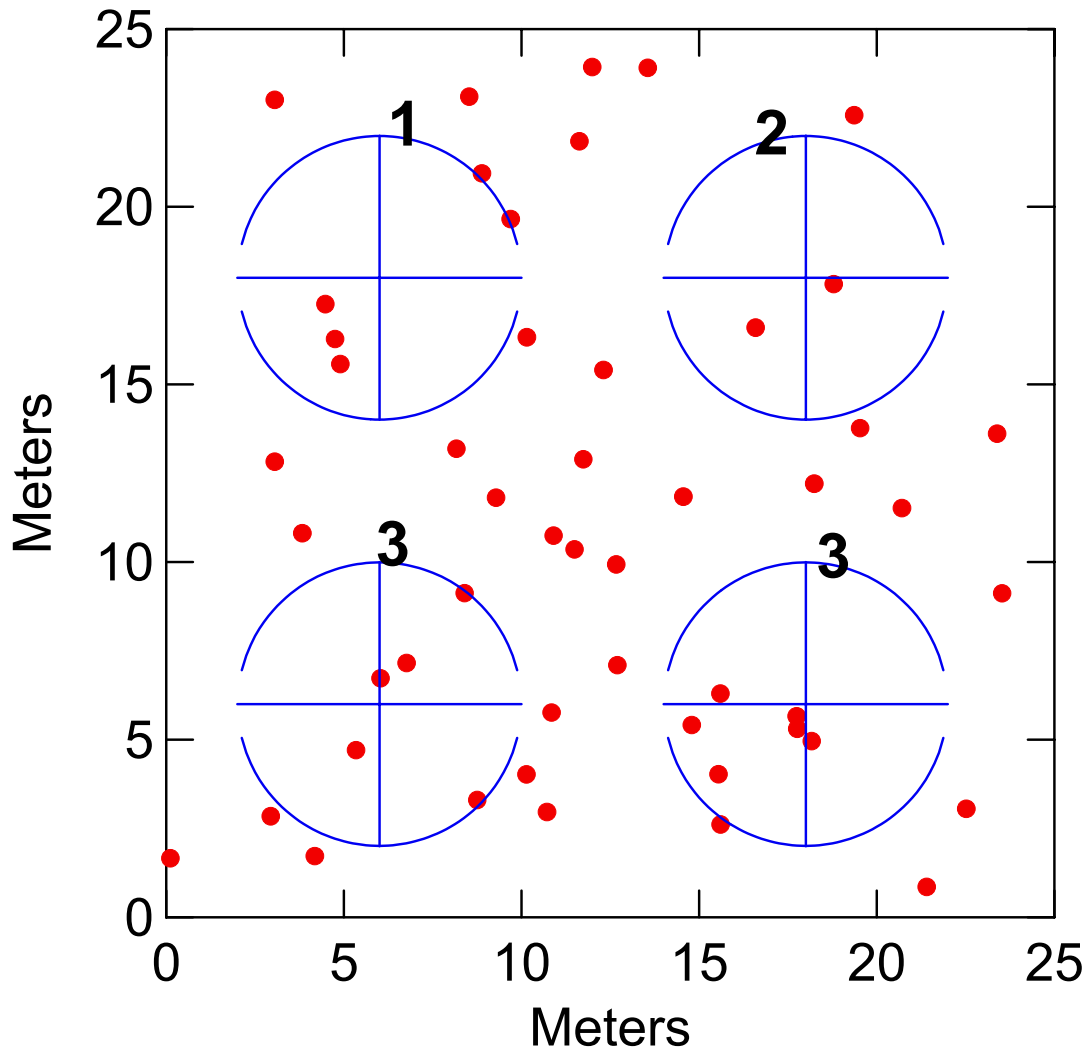
Question: Does 800/ha = MSQ of 4?



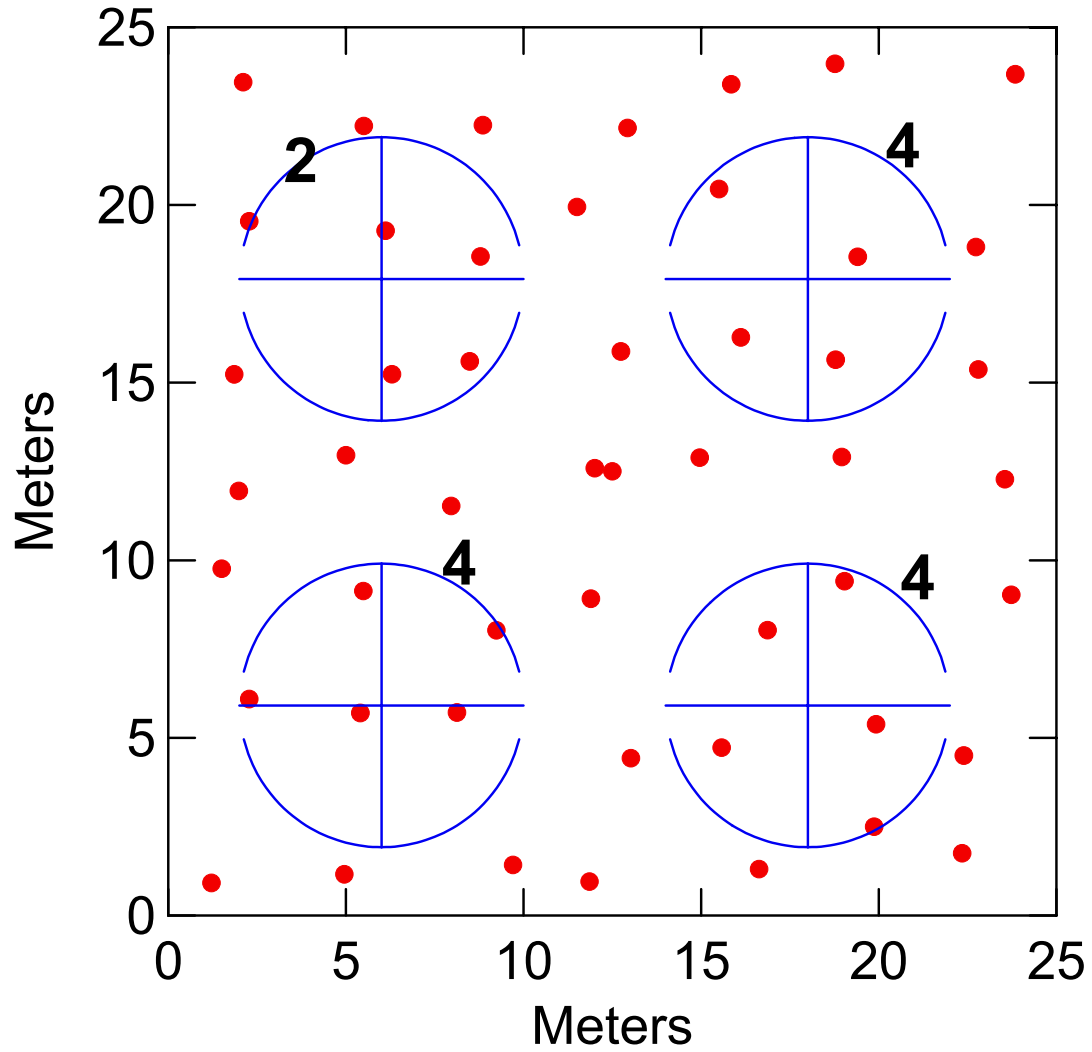
MSQ=3.5



MSQ=2.25

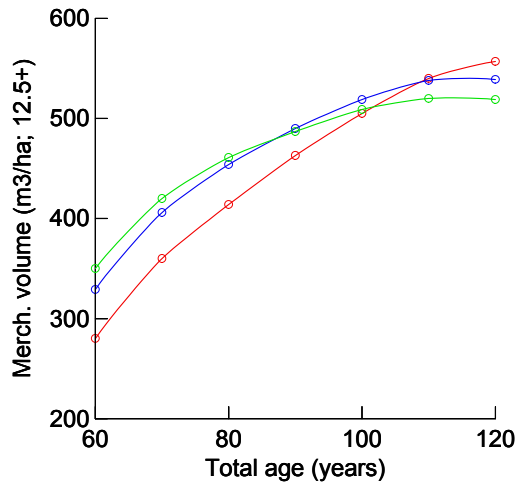


MSQ=2.25



MSQ=3.5

Some issues for the future - rotation age



- Yields vary with rotation length - both in absolute amount and in ranking of alternative regimes.
- Silviculture also should vary with rotation length.
- The ideal system would be sensitive to this factor.
- Source: TIPSy, SI=23 m, Sx, IDENS=700, 1200, 1600; planted.