

# Steep slope logging with Harvester - Forwarder systems and combinations

SISCO 2016

# Goals of forest landowners

- Expect their forest to increase their net wealth over time
- secure & grow their investment

# Objectives derived from landowner goals

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## **Secure investment**

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Minimize soil degradation  
Reduce wildfire risk  
Abate pest outbreaks

## **Grow investment**

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Increase timber inventory  
Increase volume of high-value logs  
Manage diameter distribution  
Manage stands on steep slopes

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# Slope Classes in Managed Forest

<b>Erie Creek</b>	<b>Total</b>	<b>Forest</b>	<b>Timber</b>	<b>Coniferous</b>	<b>Distribution of volumes to slope class</b>
<b>Slope class</b>	<b>ha</b>	<b>ha</b>	<b>ha</b>	<b>m<sup>3</sup></b>	<b>%</b>
0 - 34 %	1,104	1,039	902	218,964	25%
34 - 55 %	2,362	2,233	2,016	513,595	60%
55+ %	649	593	515	128,965	15%



24 February 2016

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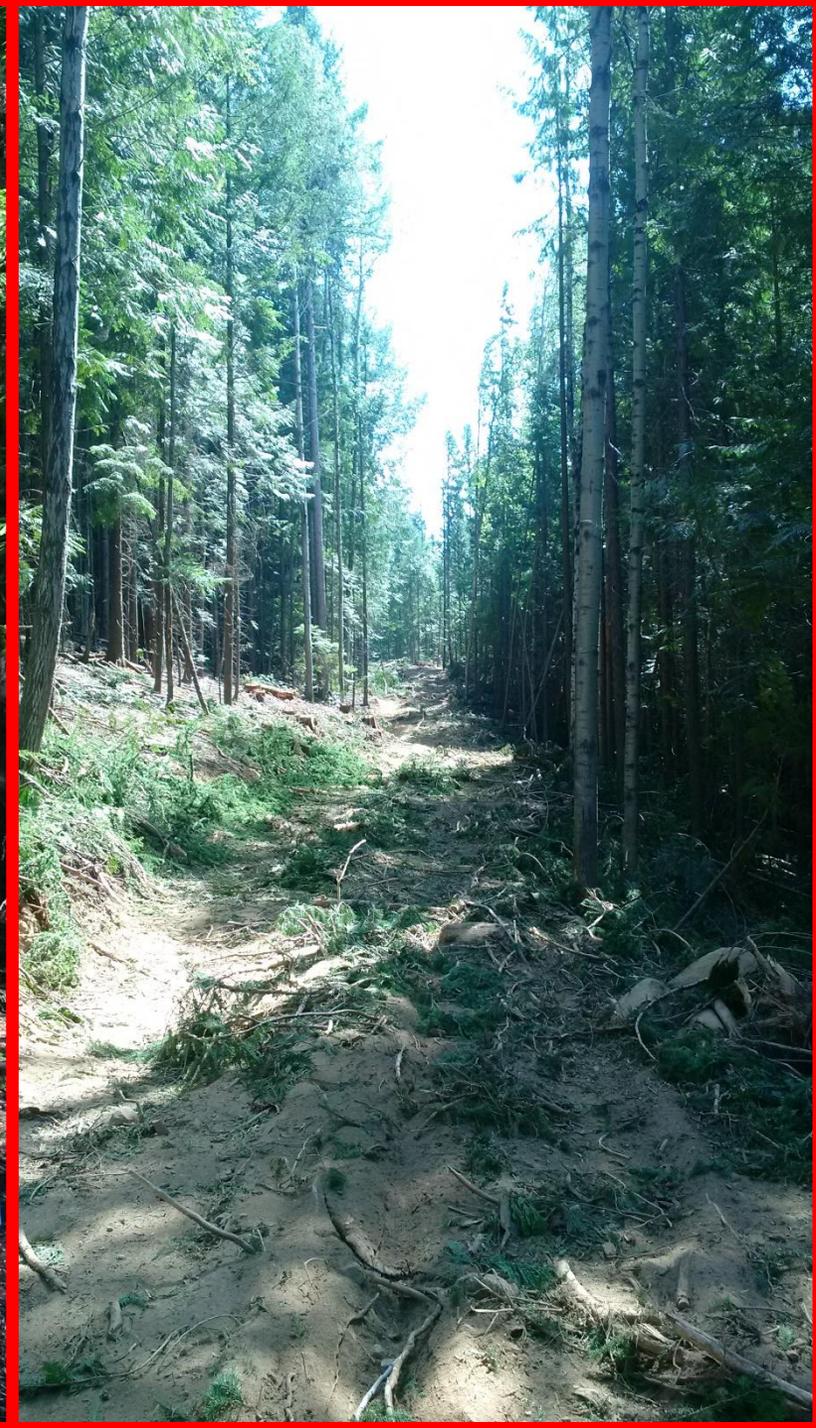
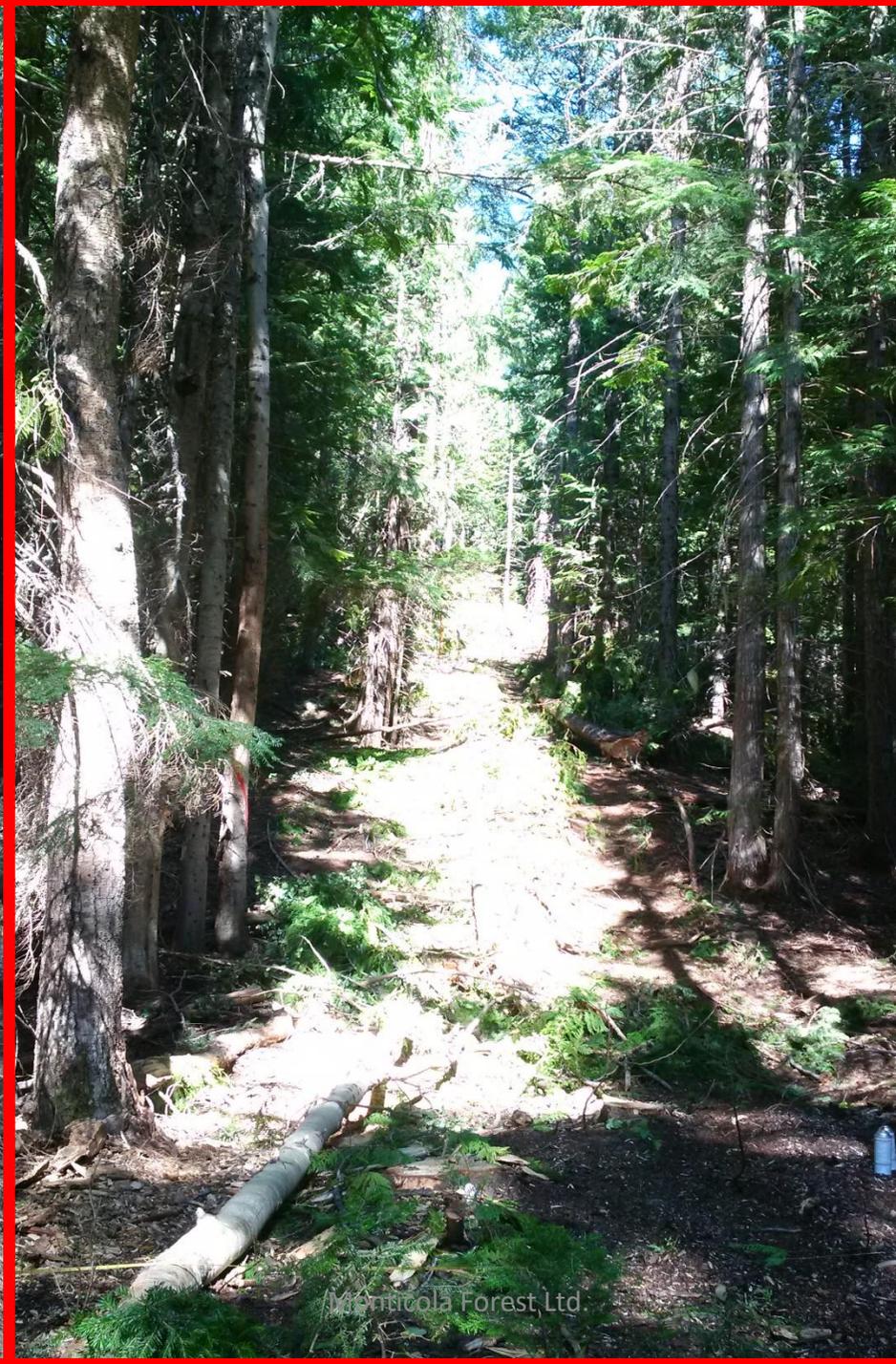
# Strategies to meet the owner's goals

- Increase productivity in age class 4
  - 50 % of harvest will be commercial thinnings in 55- 75 year old stands
  - Minimize soil degradation
- Mechanize selective harvest on steep slopes
- Accelerate growth in high site index plantations

# Maintain soil productivity

- Ground-based harvesting and skidding
  - Roads, landings and skid trails
  - Displacement and compaction
- Minimize soil degradation
  - Keep skid trail width below 4m
  - Minimize rutting
  - Minimize number of passes
  - Switch to short log processing at the stump (less landing space)

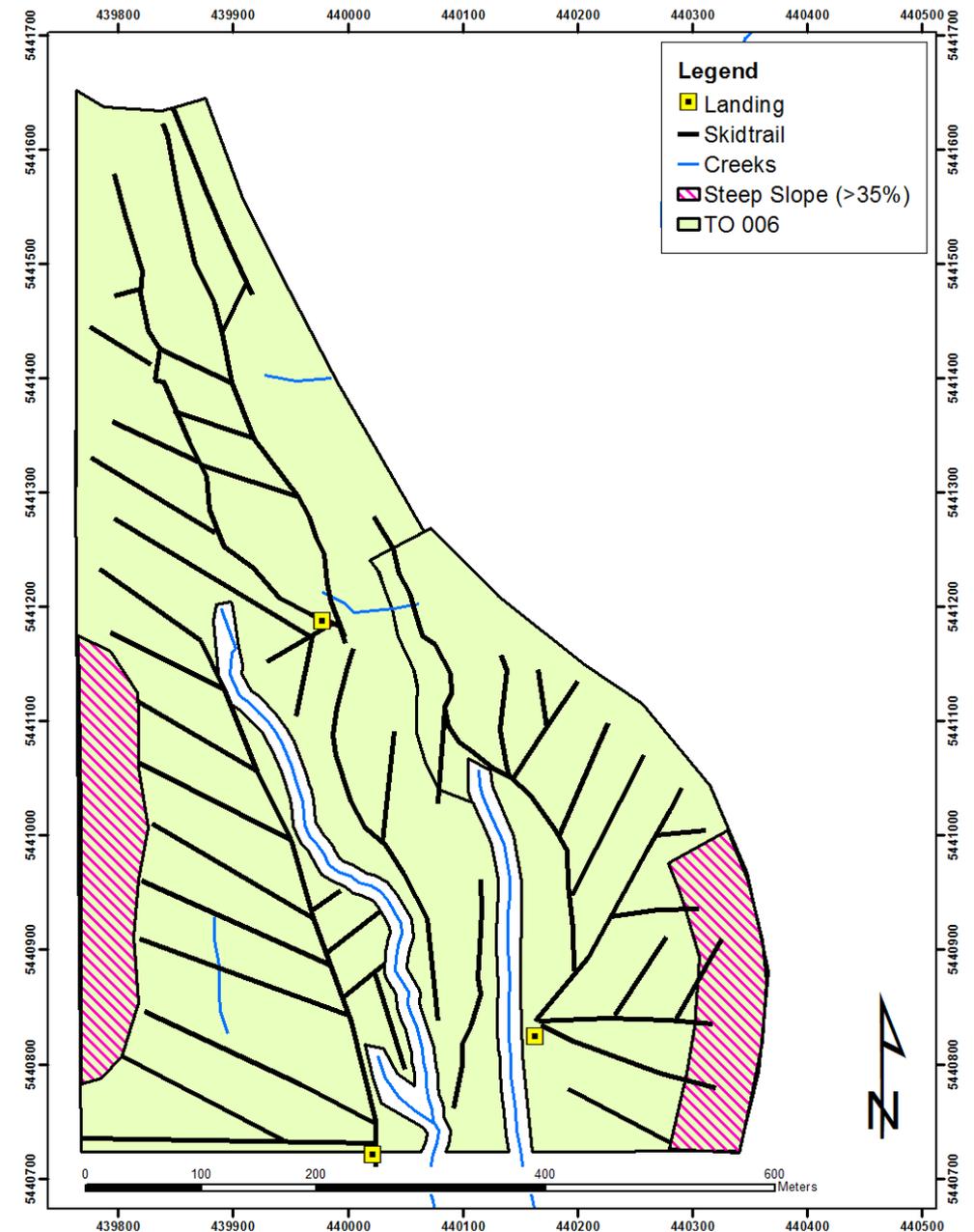


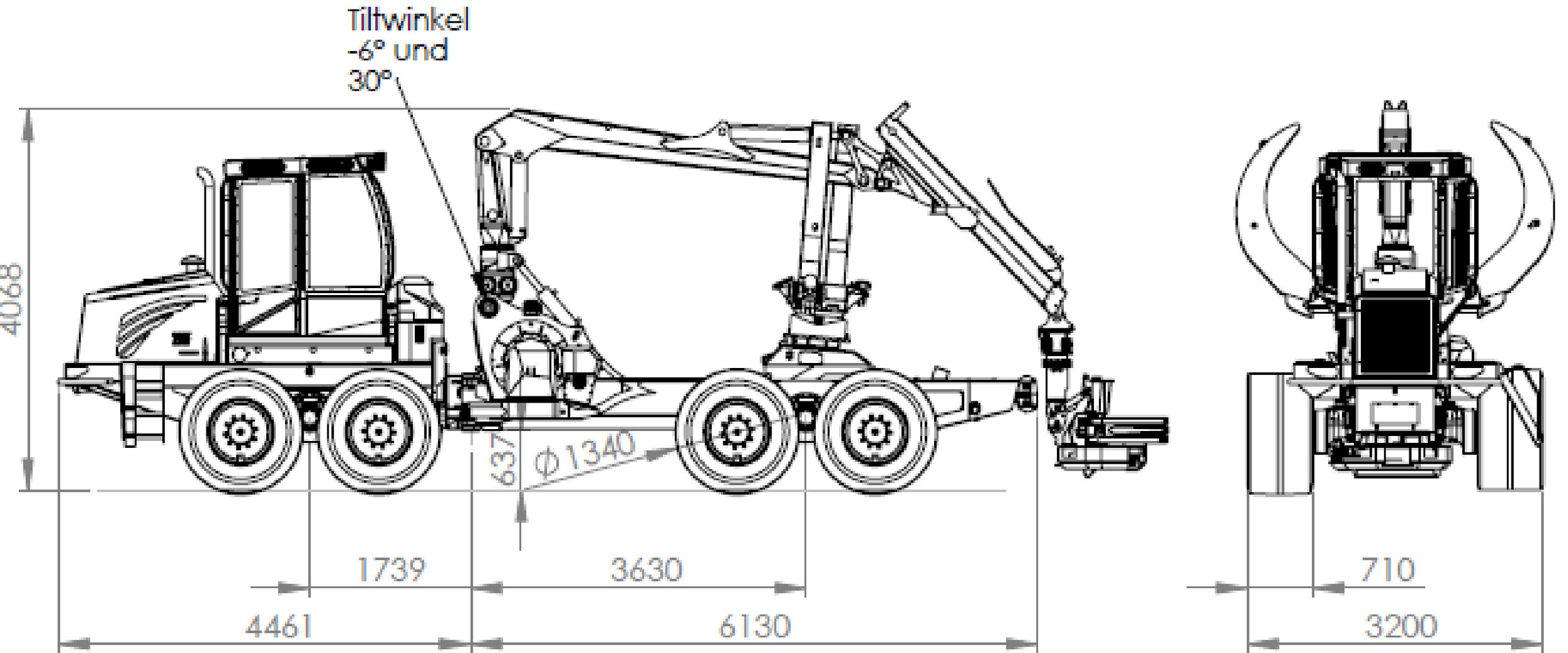


# Minimize soil degradation

- Block Area: 34 ha
- North of City of Rossland

Skid trail length (m)	Skid trail width (m)	Area (ha)	% of block area
7,150	3	2.1	6.3
	6	4.3	12.6
	8	5.7	16.8
	10	7.2	21.0











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# Reduce soil compaction

Comparison of slope restriction and machine weight

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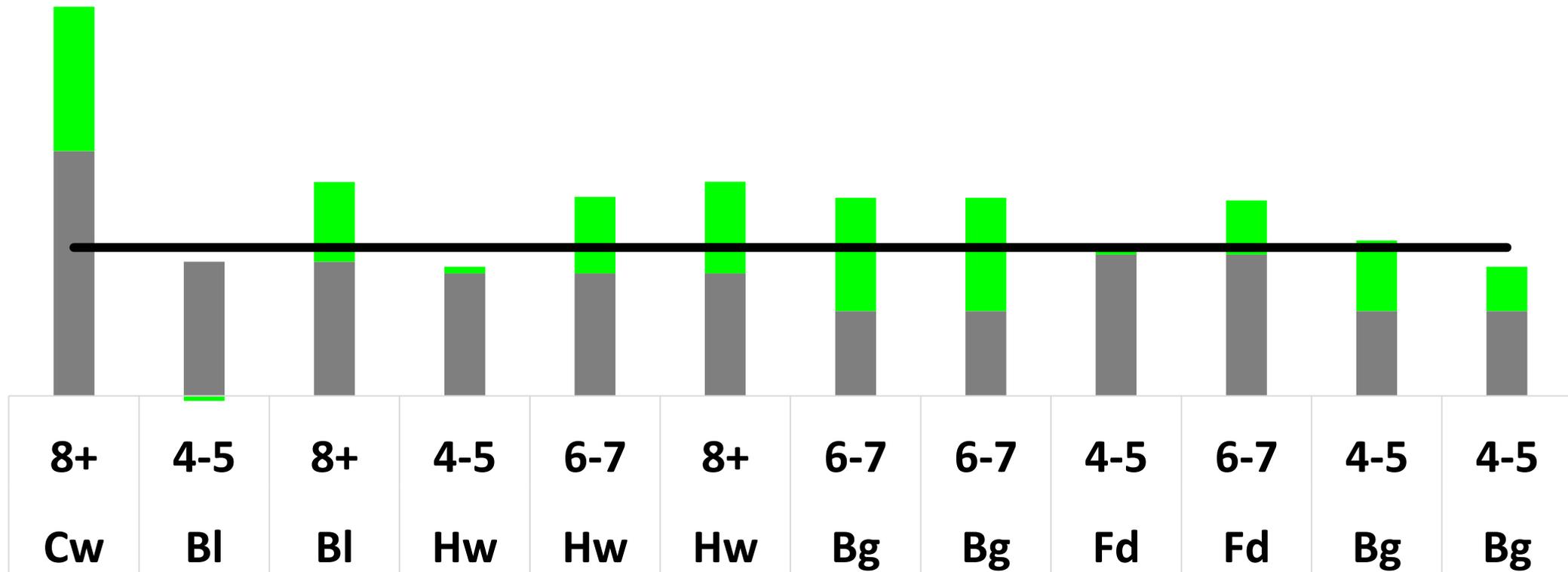
<b>Equipment</b>	<b>John Deere 953M</b>	<b>Tiger Cat L830C</b>	<b>ClimbMAX</b>	<b>HSM 208</b>
Slope Restriction (%)	40	40	45	65
Weight (t)	33.2	34.7	42.0	19.2

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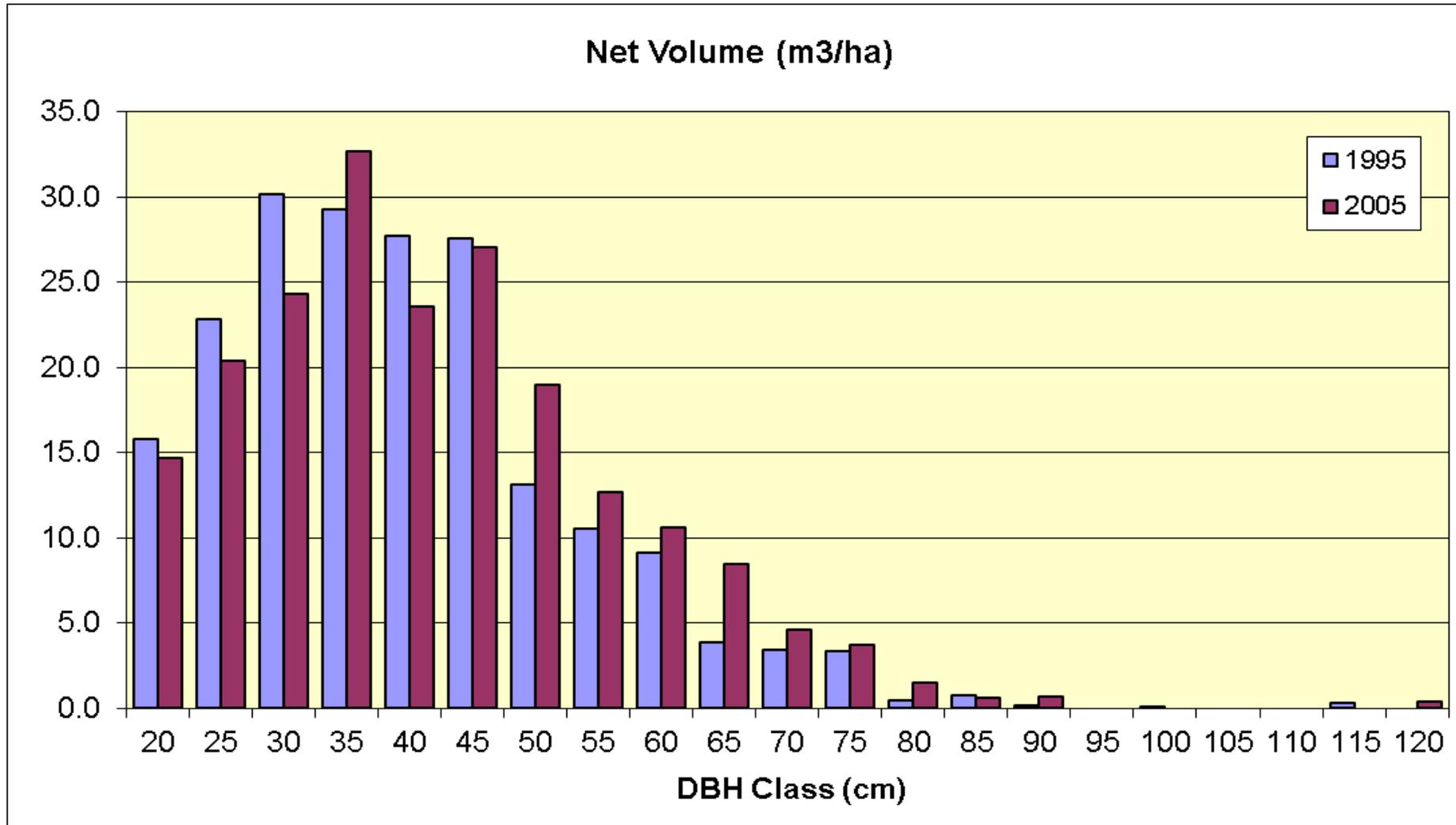
# Increase volume of valuable logs

## Contribution Margin

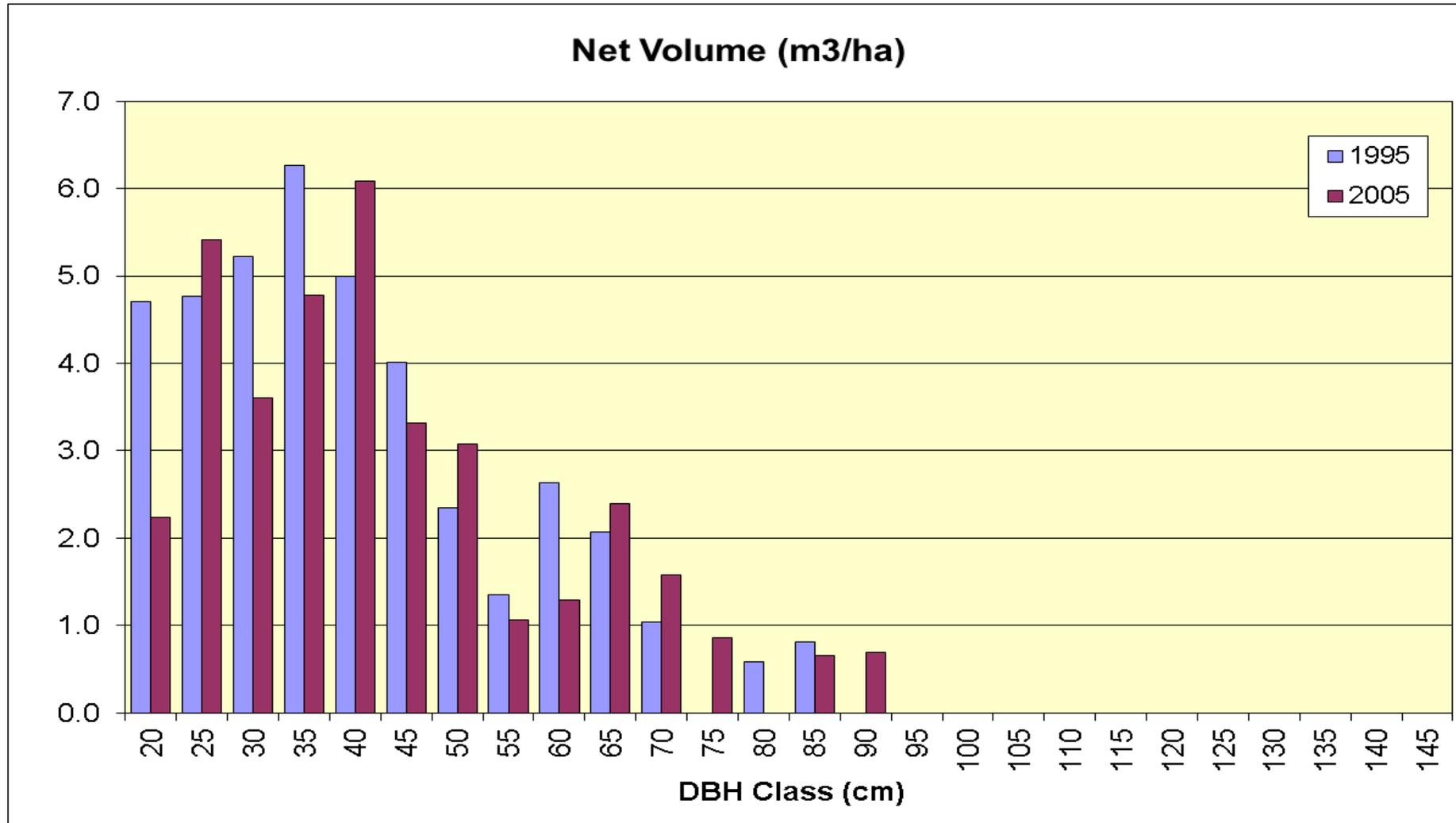
■ Transfer Price (domestic sales price) ■ Contribution Margin — cost



# Manage diameter distribution - Almforest



# Manage diameter distribution - Texada



# Ground-based steep slope logging

## Cost effective access to stands on steep slopes

- Cable yarding Vs. ground – based logging
- Slopes between 35% to 65%

## Commercial thinning operations

- Highly mechanized timber harvesting
- Increasing volume of valuable logs
- Managing diameter distribution

# Equipment choice

<b>Equipment</b>	<b>Clear Cut</b>	<b>Thinning</b>
Forwarders + Harvesters with winches	+	+
Combination machines with winches	+	+
Cable yarders	+	+
Trailing for Hoe chucking	+	-
Longlining with remote controlled winches	+	+
Tethered harvesters	+	-

# Summary

## **Advantages of ground-based steep slope equipment**

- Winch-assisted machines focus on “slope gap” of 35 to 65%
- Cost effective logging of steep slopes
- Fully mechanized thinning operations/ selective cutting
- Increasing the volume of high-value logs
- Minimizing soil compaction and degradation

# Conclusion

- Best strategy to protect productivity & increase value
- Harvester + Forwarder with:  
**light footprint & high productivity**

# Questions ?



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