COST IMPLICATIONS OF MANAGING A DECK FOR A SMALL STRAIGHT TOWER YARDER

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For the

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By

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Introduction

As timber sizes decrease, and logging costs increase, logging companies are finding they must move more logs at less cost to stay in business. Loggers are also finding themselves working under more constraints in the types of cuts they harvest and where they place roads and skid trails. These conditions are likely to continue in the future. If loggers are to stay in business over the long term, they must adjust their operations to comply with silvicultural and environmental constraints and still remain profitable.

Small cable yarders are a fairly inexpensive way of moving a relatively large number of logs over rough terrain. Most have yarding distance capabilities of 1,000 feet or more and can work on convex slopes with little site damage through the use of intermediate supports. If used with a clamping carriage, small yarders are nearly ideal for partial cuts ranging from light commercial thinnings to seed tree cuts. With the ease of mobility, relative low initial cost, maintenance, and labor needs, these machines can be very attractive to logging companies.

One of the major drawbacks of small cable yarders is the fact that they can become deckbound very quickly. Since the tower is fixed and fairly short, crews can rarely skid a full shift in one setting without the chute, for log entry to the deck, becoming plugged. The situation can be alleviated somewhat, especially in small timber, if the yarder operator, chaser, or both continuously spread the deck with pevees. In many cases, however, the deck still becomes plugged and the yarder must be moved out of the way so the logs can be loaded and hauled out. This is usually with a self-loading log truck. This can be a frustrating and costly drawback to the small yarder system.

Olsen, LeDoux, and McIntire (1983), assumed in their paper, “Determining Deck Size Limitations For Small Cable Yarders”, that log loaders and skidders would not be cost effective for keeping the chute clean for this type of operation. Experience at the University of Idaho with a small yarder indicates that the assumption may not be valid in all cases. The object of this analysis is to provide a method to determine the point where

swinging logs awat from the yarder with the skidder or hot loading with a separate loader becomes less expensive than continually trying to rearrange a deck manually during yarding.

A Koller Model K300 yarder with a Koller Model SKA1 carriage was made available to the University of Idaho, College of Forestry, Wildlife and Range Sciences in June of 1984, by the Koller USA Corporation. The yarder was loaned to the college for use in teaching, research, and as a demonstration tool. In the summer of 1984 the Koller yarder was used by the Experimental Forest Logging crew on several cut units with varying site and harvesting conditions. While the yarding capabilities of the machine were excellent, one major drawback to the small tower yarder became apparent. A full setting could rarely be yarded without becoming deckbound.

The Koller Model K300 is a trailer mounted, stationary tower yarder. The effective tower height of the yarder is twenty-three feet. Early models, such as the one used here are powered by a fifty horsepower, Ford, gasoline engine. Newer models are powered by a 65.5 horsepower Perkins diesel engine and are available with an optional haulback drum. The yarder has a mainline drum capacity of 1,150 feet of 3/8 inch cable and skyline drum capacity of 1,150 feet of 5/8 inch cable. A schematic of the machine is illustrated in Figure 1 and further yarder specifications are contained in Appendix A.

The carriage, a Koller Model SKA1, is a hydraulic, self-clamping carriage. It can be locked at any position along the skyline with a clamping system powered by an internal hydraulic pump. The carriage also has the capability of utilizing intermediate supports. This allows more flexibility in the location of sets and permits larger turns because of greater clearance of the logs and shorter span segments.

Summary

The analysis performed here demonstrates a use of breakeven analysis in decision making. For the case being studied it also established the economic feasibility of using a separate loader or swing skidder to clear the yarder deck. This does not exclude other mechanisms for accomplishing the same landing clearing function. Some of these could be more cost effective than hot-loading. Specific conclusions are valid only for the turn time, machine cost and turn volumes tested, but the process could be applied to a variety of settings.

As efficiency in logging operations becomes more important, loggers will no longer be able to manage to as much of their operations by guess and intuition. The loggers that remain in business will be the ones who have good knowledge of the cost and time components of their operations and use a variety of analysis techniques to guide them in their purchasing and operating decisions.

Study Site

This research was conducted on the University of Idaho Experimental Forest.

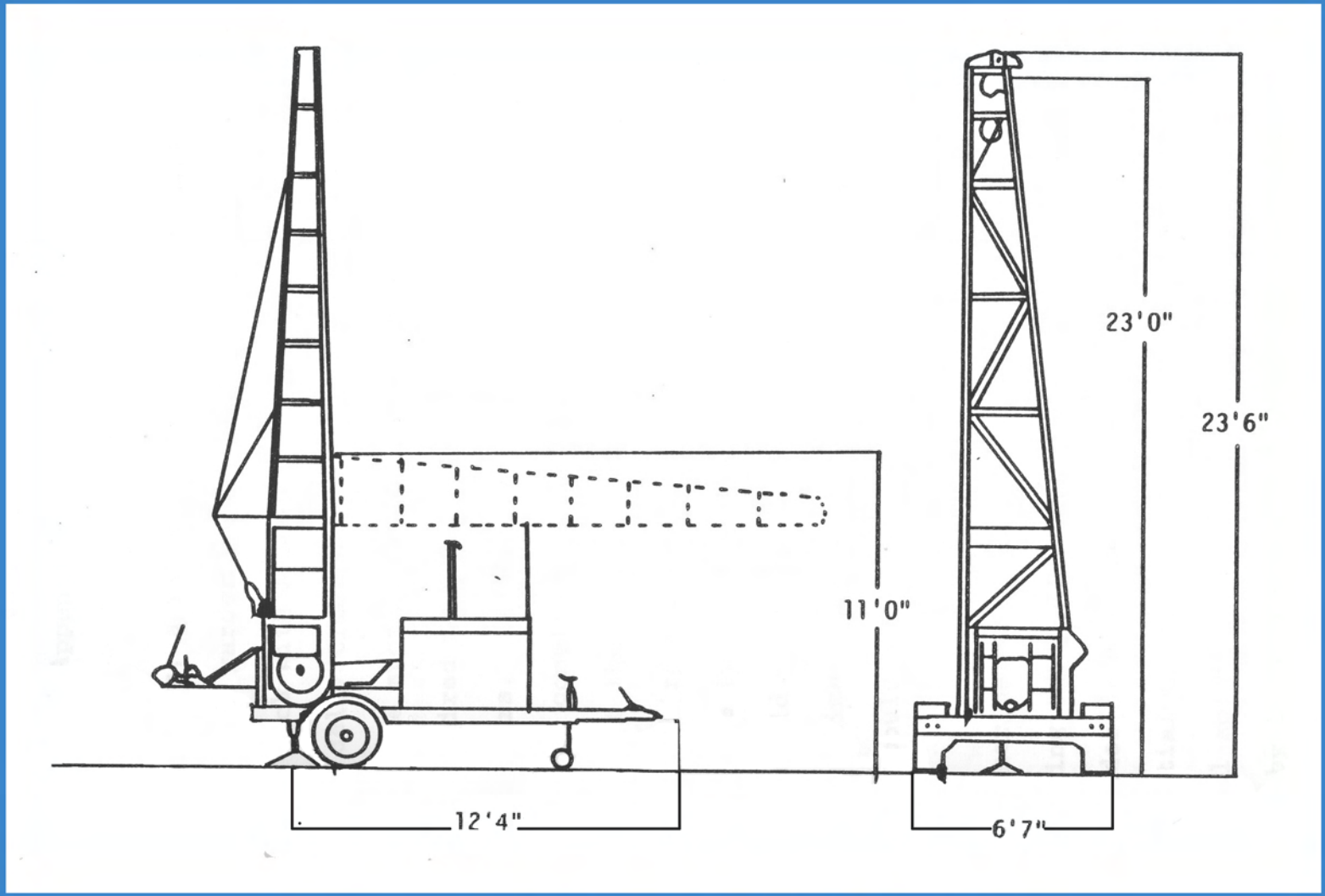


Figure 1: Koller Model K300 Yarder

APPENDIX C

Site Information on Koller Units

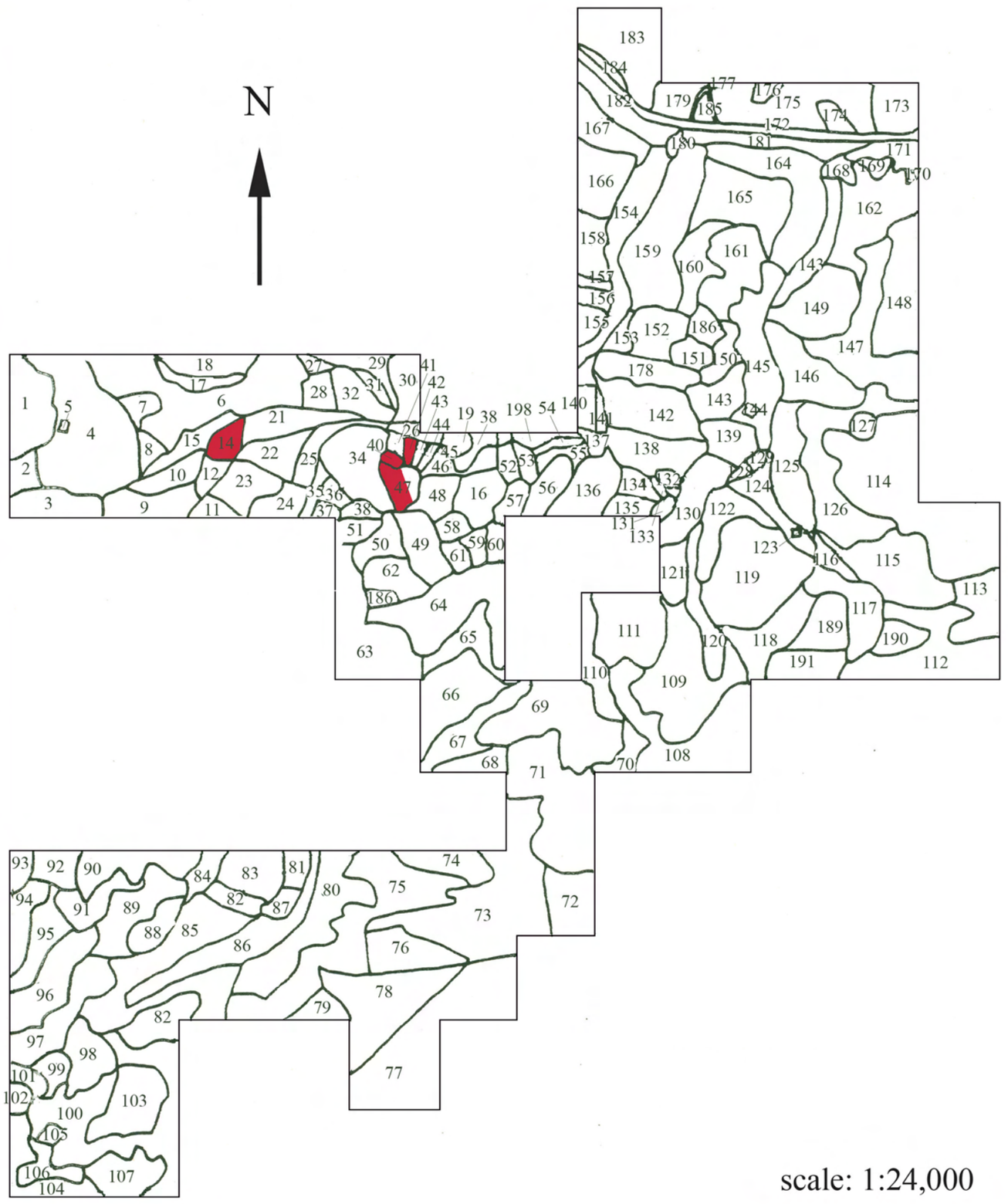
	1-07-18	1-4-25	1-4-27	1-4-28
Acres	5.1	2.0	1.3	4.2
Slope	20-40%	20-60%	20-36%	20-35%
Aspect	N-NW	N	N	N
Cut Type	CC	Strip CC	Strip CC	Shelterwood
EYD	300'-475'	550'	575'	425'-500'
IS used	NO	YES	YES	YES
Topo pos.	Lower	Lower	Lower	Lower

Sawlog Information on Koller Units

	1-07-18	1-4-25	1-4-27	1-4-28
Gross vol.(MBF)	77.525	19.890	18.805	*
Net vol. (MBF)	70.999	18.050	11.901	
Net saw (MBF)	71.226	18.190	12.007	
Defect (MBF)	6.299	1.700	6.798	
Total pieces	1020	195	188	
Net pieces/MBF	13.34	10.72	14.24	
Grs. pieces/MBF	12.33	9.80	10.26	
Ave. lbs./piece	867	1,047	829	
Gross BF/piece	81	102	97	
Net BF/piece	76	94	73	

*Incomplete information on unit 1-4-28 at this time.

Stand Map of the
Flat Creek Unit,
College of Forestry,
Experimental Forest
1986



By finding the stand number, (given by John Fabricius in appendix c), on the table for the map, you are able to then find the stand number on the map an see where the research took place on the experimental forest. This map and table came from

A Combined Report For Fiscal Years 1980 Through 1986

By
Forest Manager,
Harold Osborne
The maps were edited by
Rachel Voss

Table 6-1. Continued

STAND #	MAP #	STAND DESCRIPTION	HARVEST ACRES	HARVEST ACTIVITY CODE	FY HARVEST	SLASH/ SITE PREP CODE	FY PREP	REFOREST CODE	FY REFOREST	LOGGING METHOD
10315	157	HOWARD SMALL CLEARCUT	1.7	CC	85	DP&B	85	NR	85	G
10317	155	LPP SHELTERWOOD	6.2	SHWD	85	DP&B	85	NR	85	G
10319	140	POPLAR PLANTATION	1		85					
10423	44	KOLLER STRIP CC #1	2	CC	85	BB	85	NR	88	C
10425	42	KOLLER STRIP CC #2	2	CC	85	BB&DP	85	NR	88	C
10427	40	KOLLER STRIP CC #3	2	CC	85	BB&DP	85	NR	88	C
10428	47	KOLLER SHELTERWOOD	7	SHWD	85	HP&B	85	NR	88	C
10712	28	OVERSTORY REMOVAL	6	SHWD-OR	85	DP&B	85			G
10713	32	SEED TREE	11	ST	85	DP&B	85	NR	88	G
10714	15	COMM THIN / OR	9	T/OR	85		85			G
10715	21	IMPROVEMENT CUT	14	IMP	85		85			G
10718	14	KOLLER DEMO	6	CC	85	BB	85	P	85	C

TABLE 6. AN EXPLANATION OF CODES USED IN TABLES 6-1 AND 6-2.

HARVEST ACTIVITY CODES

CC - CLEARCUT
SHWD - SHELTERWOOD
ST - SEEDTREE
SE - SELECTION
T - THINNING
LT - LOW THINNING
N - NO HARVESTING
IMP - IMPROVEMENT CUT
P - CUT PRIOR TO FY80

REFORESTATION CODES

P - PLANTED
NR - NATURAL REGENERATION
IP - INTERPLANT

SITE PREPARTAION CODES

BB - BROADCAST BORD
DP&B - DOZER PILE AND BURN
L&S - LOP AND SCATTER
JPB - JACKPOT BURN
HPB - HAND PILE AND BURN

LOGGING METHOD CODES

C - CABLE LOGGING
G - GROUND SKIDDING
H - HORSE LOGGING

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Location of Complete Research:

Author & Title: Fabricius, Jon M.
Cost Implications of Managing a Deck for a Small Straight Tower Yarder

University of Idaho Library:

Call Number- Not found in the Library's data base.

College of Natural Resources:

Department- Forest Products

Other Sources: University of Idaho Experimental Forest