

Research Branch
 British Columbia Ministry of Forests
 Report Title and Approval

634.909711/BCMF RES/EP 975
 GOUDIE, JAMES W.
 DEVELOPMENT AND
 APPLICATION OF THE WHITE
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Report • WORKING PLAN

Project # • E.P. 975

Project Title • Development and Application of the white spruce growth model (TASS-Sw)

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Coding

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RESEARCH PROPOSAL

Submitted to

Research Branch
Ministry of Forests
Victoria, B.C.

by

James W. Goudie

May 1984

FIRST APPROXIMATION MANAGED STAND YIELD TABLES FOR WHITE SPRUCE

BACKGROUND

The research described in this proposal is an extension of projects completed by Kenneth J. Mitchell and Ian R. Cameron (MOF), and James W. Goudie (Contractor) as outlined below:

<u>Year</u>	<u>Project</u>	<u>Agency</u>	<u>Scientist</u>
1963-67	Construction of TASS I (now obsolete)	CFS	KJM
	Parameterization for white spruce	CFS	KJM
1968-76	Construction of TASS II	CFS	KJM
	Evaluation of site curves for Douglas-fir	CFS	KJM
	Parameterization for Douglas-fir	-	KJM
1977-84	Preparation of yield tables for Douglas-fir	MOF	KJM/IRC
	Parameterization for lodgepole pine	MOF	JWG/KJM
	Construction of site curves for lodgepole pine	MOF/AFS/CFS	JWG
	Preparation of yield tables for lodgepole pine	MOF	JWG/IRC
	Construction of site curves for white spruce	MOF/AFS/CFS	JWG

OBJECTIVES

The purpose of this project is to produce first approximation managed stand yield tables for plantations of white spruce established at various densities. These tables will show the impact of initial stocking on the growth and final yield of spruce stands. This information will be used to plan, evaluate and implement important components of future backlog planting programs.

PROCEDURE

I LITERATURE REVIEW

Review all literature relevant to the growth and yield of white spruce in British Columbia.

II REMEASURED PLOT DATA

- A. Acquire all available permanent sample plot data with particular reference to known sources of information in B.C., Alberta, Saskatchewan, Manitoba and Ontario (specifically Petawawa).
- B. Construct a database which complies with the international COSMADS standards.
- C. Prepare graphical displays of the following variables to Research Branch standards.
 1. Height/Age
 2. Volume/Age
 3. Volume/Height
 4. Stem count/Height
 5. Basal area/Height
 6. DBH/Height

III ASSESSMENT OF SPRUCE PLANTATION AND BACKLOG SITES

- A. Plantations
 1. Examine intensively managed spruce plantations at Petawawa, and operationally planted stands in British Columbia and Alberta.
 2. Provide qualitative documentation pertaining to spatial distribution, mortality, height growth, advanced regeneration, natural fill in, brush competition and other factors germane to Item V.
- B. Backlog
 1. Examine representative backlog sites recommended by regional staff.
 2. Provide qualitative documentation of current conditions e.g. advanced regeneration, brush.

IV CONSTRUCTION METHODOLOGY

- A. Evaluate each of the following methods for constructing first approximation yield tables for managed stands.
 1. Redesign the managed stand yield tables for Douglas-fir(Fd) to conform with the yield relationships prepared in Item II C.
 - a. Develop age tables which corresponds to the heights in the Fd Tables and the range of sites encountered in B.C. using the site curves constructed by J.W. Goudie (1983/84)
 - b. Employ the age table to convert the yield/height relationships in the Fd tables to yield/age relationships for spruce.
 - c. Compare the simulated yield relationships with those prepared in Item II C.
 - d. Assess the accuracy of this approach for producing first approximation yield tables.
 2. Recalibrate TASS II for white spruce
 - a. Review the data collected (CFS/KJM) during the construction of TASS I (1963-67)
 - b. Determine additional data requirements of TASS II
 - c. Collect the necessary field data
 - d. Derive process coefficients for white spruce (i.e. parameterize TASS II for white spruce)
 - e. Calibrate TASS II to conform with the yield relationships prepared in II C.
 - f. Assess the accuracy of this approach for producing first approximation yield tables.

V PREPARATION OF YIELD TABLES

- A. Evaluate the relative effectiveness of each of the approaches investigated in IV and, in consultation with the Research Branch, select the most promising procedure for producing first approximation yield tables.
- B. Generate yield estimates for fully stocked plantations covering the range of initial densities observed in Item III A.
- C. Provide Research Branch with a draft copy of the spruce yield tables and a tape containing the entries by March 31, 1985. The Research Branch will be responsible for preparing tables in a format that is consistent with those developed for Douglas-fir and lodgepole pine.
- D. Recommend adjustments to managers who must adapt these tables to local areas where mortality, brush competition pest damage etc. (Item III A) impact the number and distribution of trees when the "free-to-grow" stage is achieved.

VI YIELD FROM UNTREATED BACKLOG AREAS

- A. If the conditions observed on backlog areas (Item III B) are amenable to simulation:
 - 1. Design several scenarios representative of backlog sites.
 - 2. Modify TASSII, if necessary, to emulate special conditons (e.g. natural and advanced regeneration) observed on backlog sites.
 - 3. Simulate the future yields in terms of volume, DBH, crown dimensions and inferred quality.
- B. Summarize the hypothetical backlog yields in tabular and graphical formats.

VII RECOMMENDATIONS

- A. If feasible, recommend procedures for approximating site specific increases in yield due to backlog planting

- B. Recommend stocking strategies for dealing with conditions observed in backlog areas (Item III B) when the availability of spruce seedlings is limited e.g. minimum stocking levels, proximity to established natural regenerations.

END PRODUCTS

- I First approximation yield tables for planted stands of white spruce established at various densities.

- II A tape containing:
 - A. Remeasured plot data in COSMADS format

 - B. Entries for the yield tables.

- III A report including:
 - A. A literature review

 - B. Graphs of permanent sample plot data

 - C. A description of representative spruce plantations and backlog sites.

 - D. An outline of the construction methodology and rationale, a table of derived coefficients, and a listing of all field data.

 - E. Yield estimates for untreated backlog sites (if feasible).

 - F. Recommendations for applying the yield tables and adjusting the estimates to local conditions.

BUDGET

Salaries:

Goudie	- basic salary 10 months @ \$2990 ¹	\$29,900	
	- benefits @ 22%	6,578	
Assistant	- basic salary 3 months @ 1894 ²	5,682	
	- benefits @ 22%	<u>1,250</u>	
			43,410

Travel:

Vehicle rental	- 5000 km @ \$0.24/km	1,200	
Living costs			
	Goudie - 20 days @ \$56/day	1,120	
	Assistant - 15 days @ \$56/day	840	
Air Travel		<u>450</u>	
			3,610

Materials & Supplies 300

Computing Costs

Processing Charges	6,000	
Terminal rental - 10 months @ \$165/mo.	<u>1,650</u>	
		7,650

Overhead @ 19% 10,444

TOTAL \$65,414

¹LSO 2/4 rate (1982) + 5%

²LSO 1/1 rate

CHARGE-OUT RATES

Goudie	- Salary	\$ 136.00	
	- Benefits @ 22%	30.00	
	- Overhead @ 19%	<u>31.00</u>	\$197/day
Assistant	- Salary	86.00	
	- Benefits @ 22%	19.00	
	- Overhead @ 19%	<u>20.00</u>	\$125/day
Travel	- Meals		
	@ \$26.00/day + 19%	31.00	
	- Room		
	@ \$30.00/day + 19%	<u>36.00</u>	\$ 67/day
	- Vehicle rental		
	@ \$0.24/km + 19%		\$ 0.29/km

TIME AND COST ALLOCATION

MAN-DAYS		SCHEDULE											COSTS				
Goudie (Assistant)		A	M	J	J	A	S	O	N	D	J	F	M	Salaries \$	Travel \$	Other \$	Total \$
		Man-days/Month															
220 (66)				22 (10)	22 (20)	22 (20)	22 (10)	22 (6)		22	22	22	22	43,400 (8,200)	3,000 (1,300)	9,500	55,900 (9,500)
Total	286			32	42	42	42	28	22	22	22	22	22	51,600	4,300	9,500	65,400

SCHEDULE OF PAYMENTS

June 1, 1984	\$25,000
September 1, 1984	20,000
December 1, 1984	<u>20,414</u>
	65,414