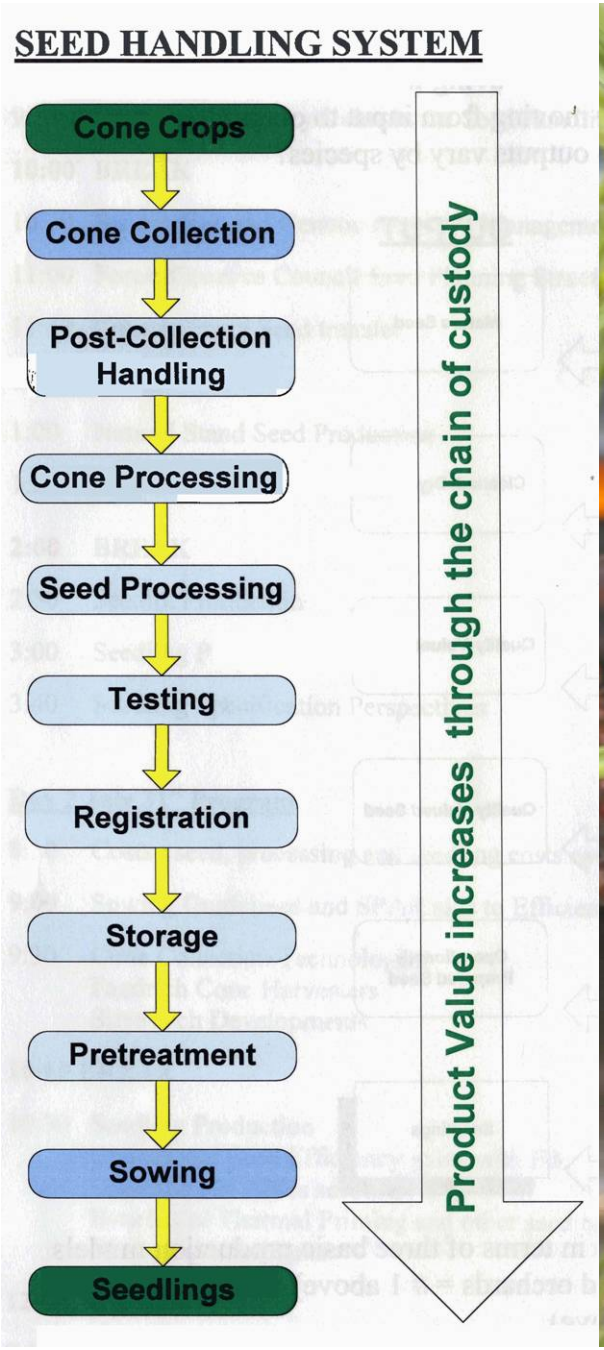
SEED USE EFFICIENCY PROGRAM
JULY 30, 2008
LANGLEY, B.C.

Emile Begin, RPF

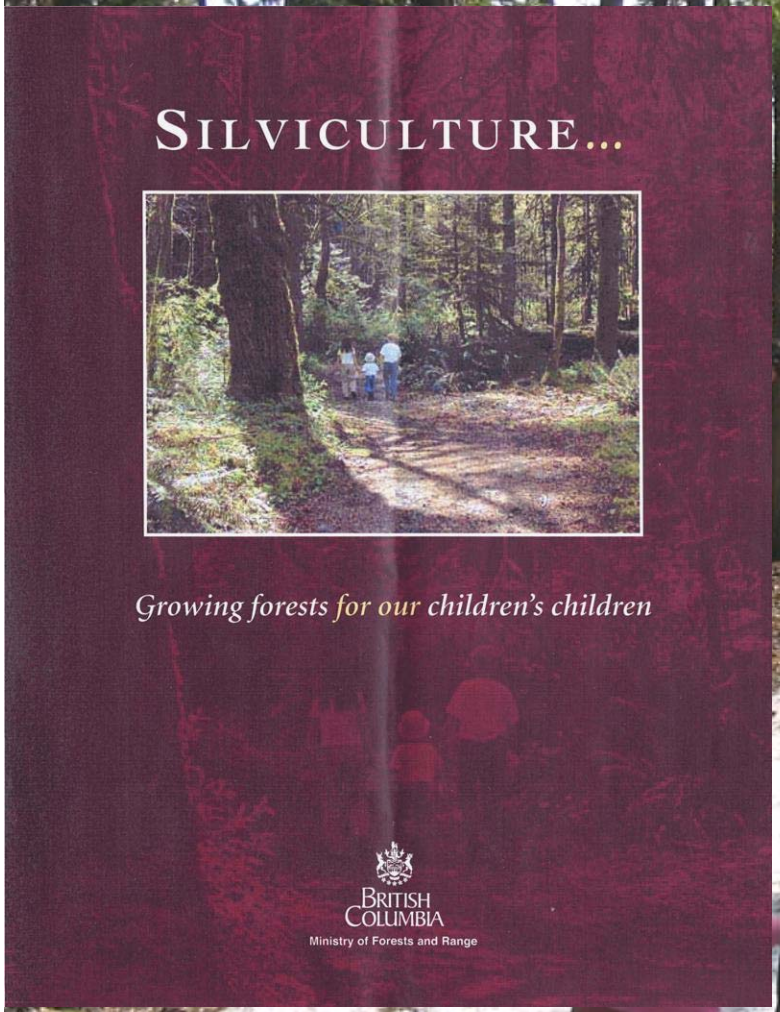
Thanks to Ken Hodges, RPF, Prince George, for photo's and advice.



NATURAL STAND CONE COLLECTION

"B" CLASS SEED

WHY WE COLLECT CONES

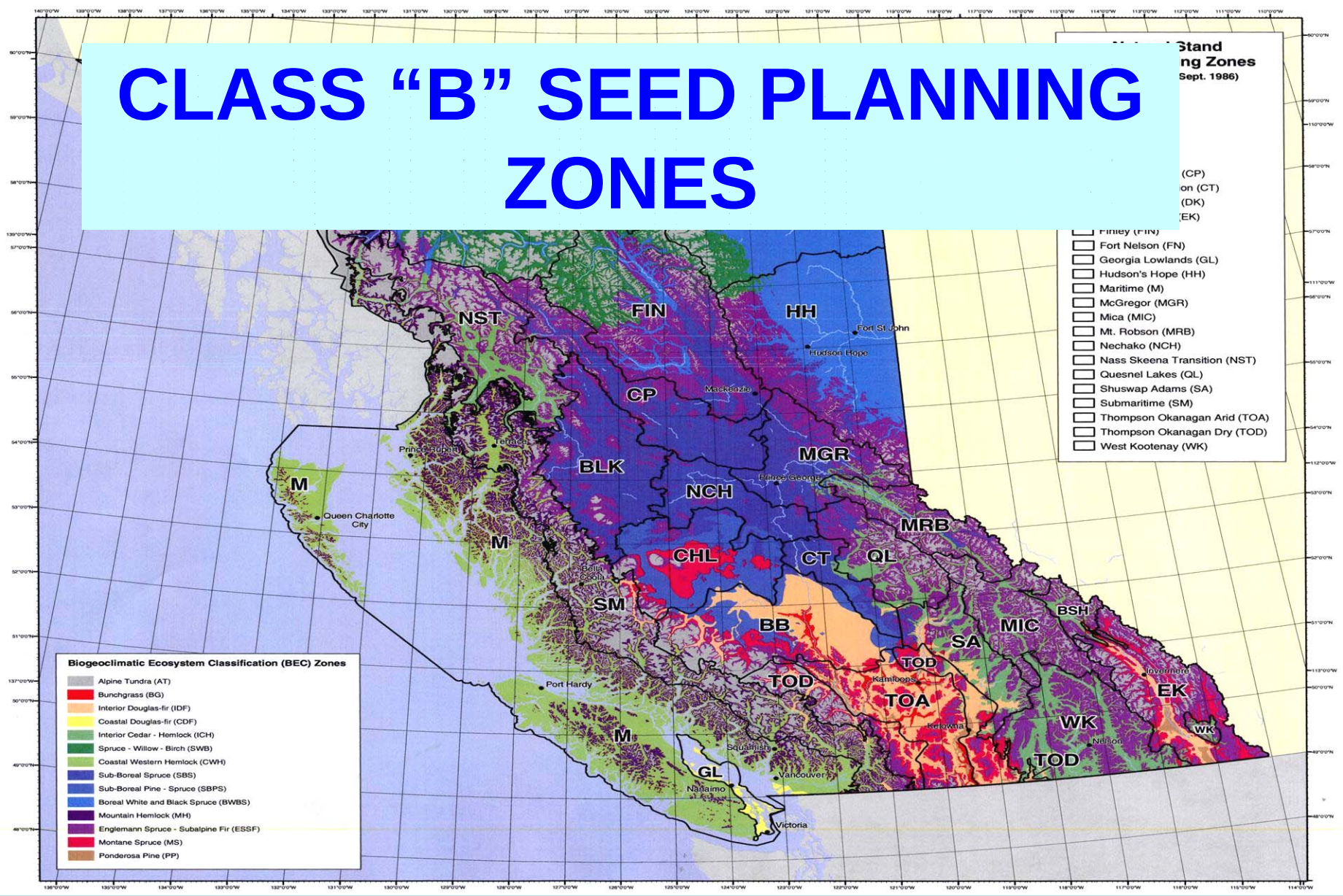


- **Enhance Commercial Timber**
- **Wildlife, Biodiversity**
- **Our Children's Children**
- **Legislation.**
- **Ministry of Forests and Range Act.**
- **Forest Practices Code of B.C. Act 2004**
- **Operational & Site Planning Regs.**
- **Forests and Range Practices Act.**
- **Government Action Regulations (GAR)**
- **Forests Practices and Planning Reg.**
- **Chief Forester Standards for seed use**

Forest and Ranges Practices Act (FRPA)

- **Section 6. The objectives set by government for timber are to:**
- **(a) maintain or enhance an economically valuable supply of commercial timber from British Columbia's forests,**
- **(b) ensure that delivered wood costs, generally, after taking into account the effect on them of the relevant provisions of this regulation and of the Act, are competitive in relation to equivalent costs in relation to regulated primary forest activities in other jurisdictions, and**
- **(c) ensure that the provisions of this regulation and of the Act that pertain to primary forest activities do not unduly constrain the ability of a holder of an agreement under the *Forest Act* to exercise the holder's rights under the agreement.**

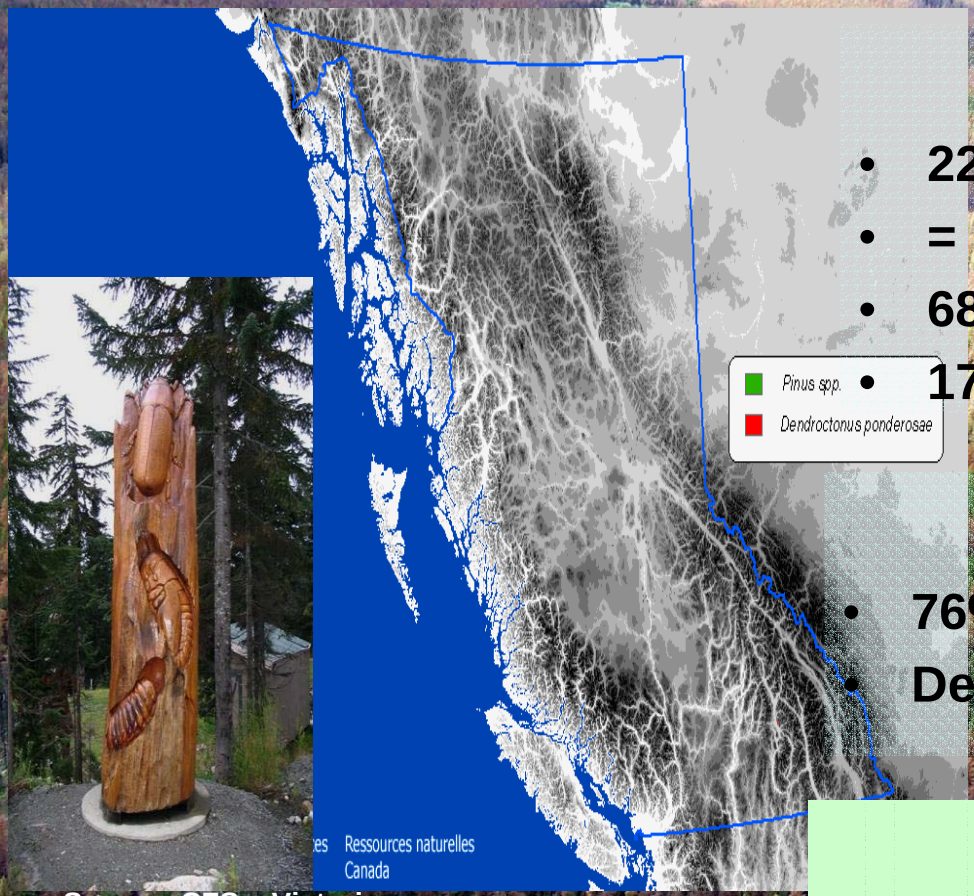
CLASS "B" SEED PLANNING ZONES



COMMERCIAL SPECIES

- <u>Lodgepole Pine</u>, White Pine,
- <u>Douglas-fir</u>, Balsam Fir,
- Spruce, Black Spruce,
- Cedar, Hemlock,
- Larch,
- Birch, Aspen, Cottonwood
- Other?

PINE SEED IMPLICATIONS



2008

- 22 Million Ha Affected by MPB
- = 46% Pine Volume Dead
- 68 - 78 Million m3 annual mortality
- 17 Billion Dead Pine Trees

2015

- 76% Pine Volume Dead
- Dead Pine Trees Make ZERO Cones.

- Source: CFS – Victoria: http://www.pfc.cfs.nrcan.gc.ca/entomology/mpb/historical/index_e.html

THEREFORE

- We have 1 – 10 years to collect

- How much seed do we need operationally?

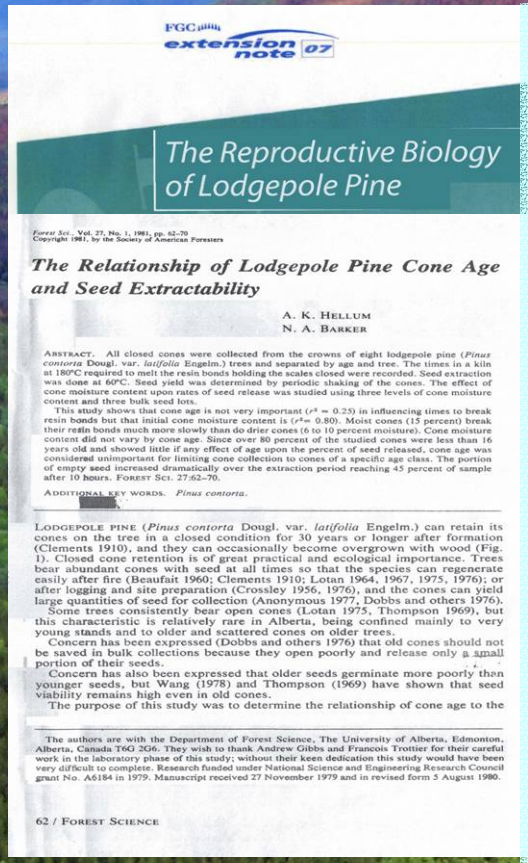
OPERATIONALLY

RESOURCES

COMBINATION OF LIMITED STAFF EXPERIENCE

- **GUIDE BOOKS, LITERATURE, HISTORIC INFO**
- **EXPERIENCED FIELD STAFF**

TREE – CONE – SEED BIOLOGY



FGC extension note 07

The Reproductive Biology of Lodgepole Pine

Forest Sci., Vol. 27, No. 1, 1981, pp. 62–70
Copyright 1981, by the Society of American Foresters

The Relationship of Lodgepole Pine Cone Age and Seed Extractability

A. K. Hellum
N. A. Barker

Abstract. All closed cones were collected from the crowns of eight lodgepole pine (*Pinus contorta* Dougl. var. *latifolia* Engelm.) trees and separated by age and tree. The times in a kiln at 180°C required to melt the resin bonds holding the scales closed were recorded. Seed extraction was done at 60°C. Seed yield was determined by periodic shaking of the cones. The effect of cone moisture content upon rates of seed release was studied using three levels of cone moisture content and three bulk seed lots.

This study shows that cone age is not very important (r^2 = 0.25) in influencing times to break resin bonds but that initial cone moisture content is (r^2 = 0.80). Moist cones (15 percent) break their resin bonds much more slowly than do drier cones (6 to 10 percent moisture). Cone moisture content did not vary by cone age. Since over 80 percent of the studied cones were less than 16 years old and showed little if any effect of age upon the percent of seed released, cone age was considered unimportant for limiting cone collection to cones of a specific age class. The portion of empty seed increased dramatically over the extraction period reaching 45 percent of sample after 10 hours. Forest Sci. 27:62–70.

Additional key words. *Pinus contorta*.

Lodgepole pine (*Pinus contorta* Dougl. var. *latifolia* Engelm.) can retain its cones on the tree in a closed condition for 30 years or longer after formation (Clements 1910), and they can occasionally become overgrown with wood (Fig. 1). Closed cone retention is of great practical and ecological importance. Trees bear abundant cones with seed at all times so that the species can regenerate easily after fire (Beaufait 1960; Clements 1910; Lotan 1964, 1967, 1975, 1976); or after logging and site preparation (Crossley 1956, 1976), and the cones can yield large quantities of seed for collection (Anonymous 1977, Dobbs and others 1976).

Some trees consistently bear open cones (Lotan 1975, Thompson 1969), but this characteristic is relatively rare in Alberta, being confined mainly to very young stands and to older and scattered cones on older trees.

Concern has been expressed (Dobbs and others 1976) that old cones should not be saved in bulk collections because they open poorly and release only a small portion of their seeds.

Concern has also been expressed that older seeds germinate more poorly than younger seeds, but Wang (1978) and Thompson (1969) have shown that seed viability remains high even in old cones.

The purpose of this study was to determine the relationship of cone age to the

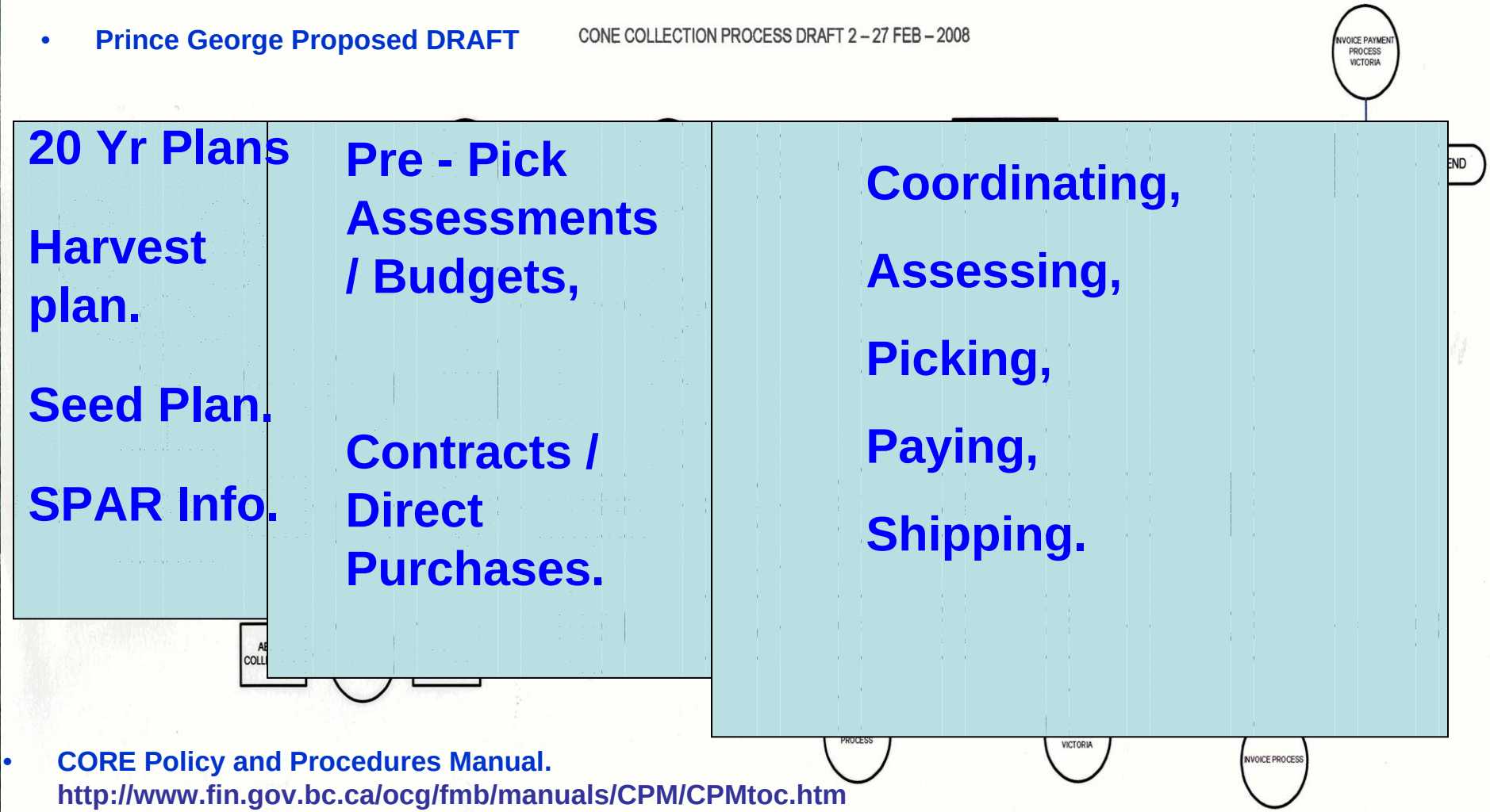
The authors are with the Department of Forest Science, The University of Alberta, Edmonton, Alberta, Canada T6G 2G6. They wish to thank Andrew Gibbs and Francois Trottier for their careful work in the laboratory phase of this study; without their keen dedication this study would have been very difficult to complete. Research funded under National Science and Engineering Research Council grant No. A6184 in 1979. Manuscript received 27 November 1979 and in revised form 5 August 1980.

- Cone production begins @ 10 – 15 years
- Pine Cones take 2 years to mature,
- **MPB KILLS THE TREE WITHIN 3 WEEKS.**
- Reproductive success 25% - 35%,
- (15 – 25 seed per cone)
- Collectable quantities become available around 40 yrs.
- Seed extraction increasingly difficult with cone age.
- Collect Pine cones, Class 1, 2, & 3
- Collect cones between 1 - 10 years after cone maturity.
- Check Class 3 Cones for each site.

• How much Pine seed do you need to collect before it's all gone?

COLLECTION PROCESS

- Prince George Proposed DRAFT



20 Yr Plans

Harvest plan.

Seed Plan.

SPAR Info.

Pre - Pick Assessments / Budgets,

Contracts / Direct Purchases.

Coordinating,

Assessing,

Picking,

Paying,

Shipping.

- CORE Policy and Procedures Manual.
  http://www.fin.gov.bc.ca/ocg/fmb/manuals/CPM/CPMtoc.htm

20 YEAR HARVEST PLAN

- Harvesting Data
  - How many:
    - Hectares being harvested?
    - Years to harvest?
    - Trees do I need to plant of what species?
- What Seed Zone am I harvesting in?
- ARE THERE ANY TREES TO COLLECT CONES FROM?
- HOW MUCH MONEY DO I HAVE TO SPEND?
- IS ANYONE LOGGING ?

20 YEAR SEED PLAN

Key Seed Information SPAR, Harvest Plans, Calculations

1. Seed by species -

   Class "A" and "B" seed
   How many seeds do we have and will we need?
   - Germination rate?
   - How many seedlings will this produce?
   - BEC Zone?
   - Elevation?
   - Lat/long?

2. Available seed to purchase?

   - Who has seed available?
   - What are the expected costs?
   - Who is willing to sell their seed?

SPAR INFORMATION

AVAILABLE SEEDLINGS PRINCE GEORGE

- Annual Planting of 3,500 ha (average)
- Plant 5.6 million trees all species
- 50% Lodgepole Pine (assumed)

SPAR - YEARS OF LODGEPOLE PINE SEED IN STORAGE - PLANTING 3,500 HA / YEAR @ 50%

20 June 2008 BCTS OWNER

SEED ZONE	CLASS "A"	FIN	HH	CP	MGR	NCH	MRB	CHL	QL
1200 St/Ha	9.5	12.2	7.4	14.5	19.4	35.1	0.0	26.1	0.5
1400 St /Ha	8.1	10.5	6.4	12.4	16.7	30.1	0.0	22.4	0.5
1600 St / Ha	7.1	9.2	5.6	10.9	14.6	26.3	0.0	19.6	0.4

kg (seed) ? = hectolitres (cones) to collect?

1/2 - THE ANSWER

Planted Pine	50%
St / Ha	800
Nursery Seeds / Tree	2.0
Seeds / Cone	18
Cones / HL	1,700
Ground ($283 - $890)	$542 / Hl
Aerial ($917 - $1650)	$1,203 / Hl

	ANNUAL CONE COLLECTION COSTS					
	Block Ha	# Seed	# Cones	Hl	Ground	Aerial
Block	36	57,600	3,200	1.88	$1,451	$2,447
Landscape	3,500	5.6 M	311,111	183	$142,000	$238,000
Provincial	22 M	35.2 B	3.9 B	1.15 M	$886 M	$1.5 B

WHERE DO THE REST OF THE SEEDLINGS COME FROM?

OPERATIONALLY - BLOCK

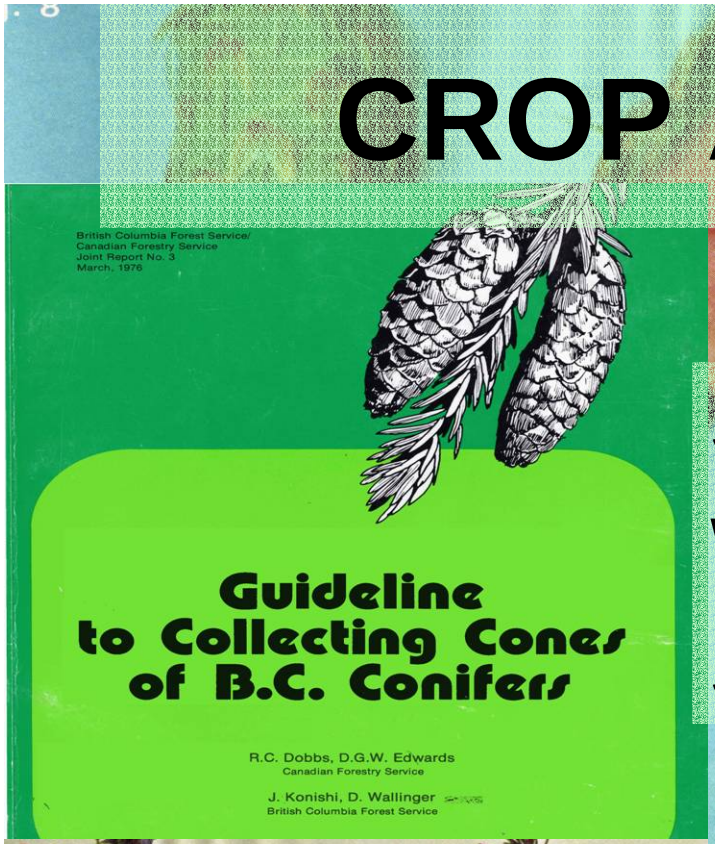
- Average Block Size = 36 ha. @ 280 m^3/ha = 10, 080 M^3
- CONE COLLECTION COSTS PER M^3
  - Ground = $0.14
  - Aerial = $ 0.24
- CONE COLLECTION COSTS PER Ha
  - Ground = $40.31
  - Aerial = $67.97

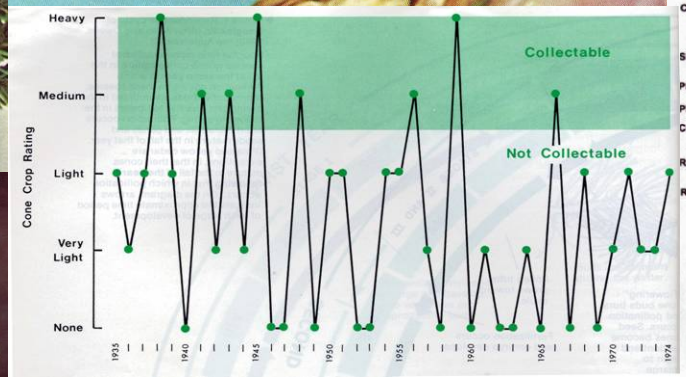
OTHER 1/2 OF THE ANSWER

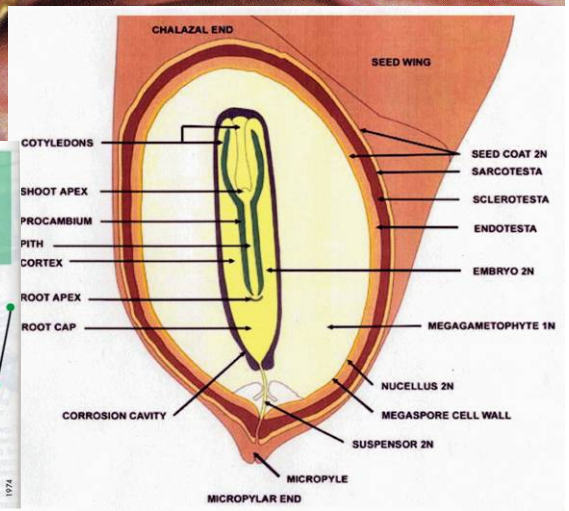
- OTHER SPECIES
- CLASS “A” SEED (PLANTED ON BEST SITES)
- NATURALS,
- CLIMATE CHANGE
- OTHER ALTERNATIVES

CROP ASSESSMENTS

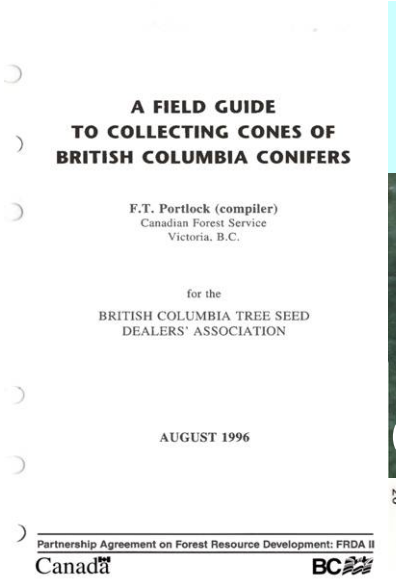
SPRING ASSESSMENT
WHEN I CAN PICK
SEED DEVELOPMENT







THINGS TO WATCH FOR



A FIELD GUIDE
TO COLLECTING CONES OF
BRITISH COLUMBIA CONIFERS

F.T. Portlock (compiler)
Canadian Forest Service
Victoria, B.C.

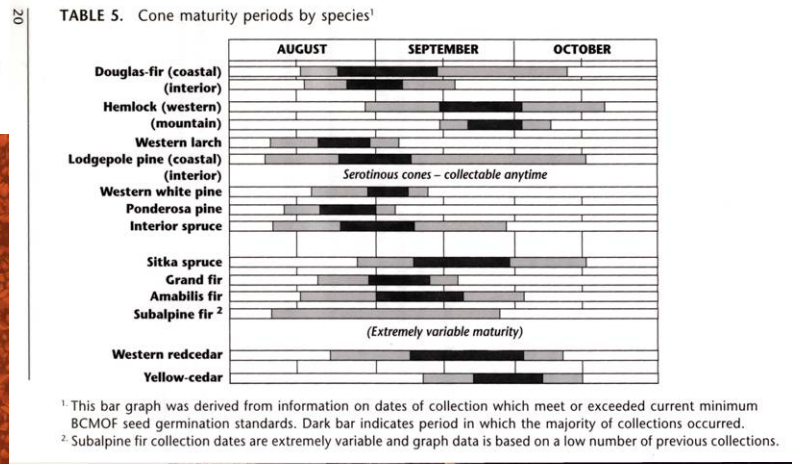
for the

BRITISH COLUMBIA TREE SEED
DEALERS' ASSOCIATION

AUGUST 1996

Partnership Agreement on Forest Resource Development: FRDA II
Canada BC

CONE & SEED DEVELOPMENT



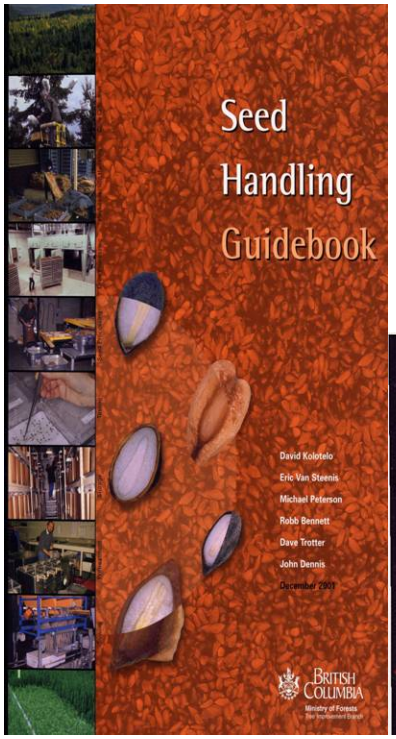
20

TABLE 5. Cone maturity periods by species[1]

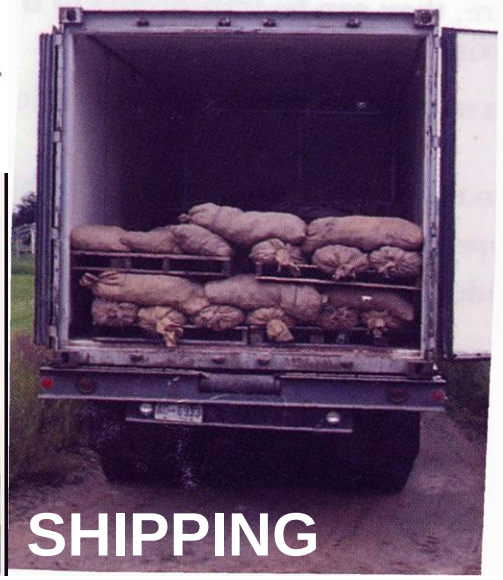
[1] This bar graph was derived from information on dates of collection which meet or exceeded current minimum BCMOF seed germination standards. Dark bar indicates period in which the majority of collections occurred.
[2] Subalpine fir collection dates are extremely variable and graph data is based on a low number of previous collections.

INSECTS

CONE PICKERS



STORAGE / HANDLING

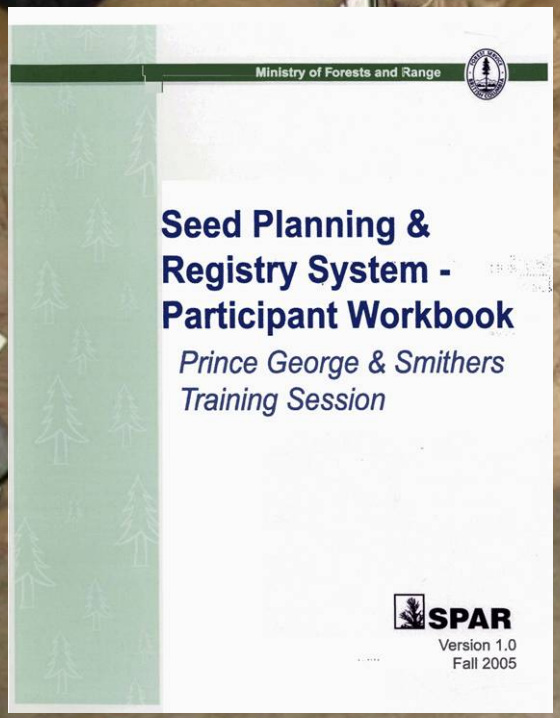


SHIPPING

HOW WE PICK CONES

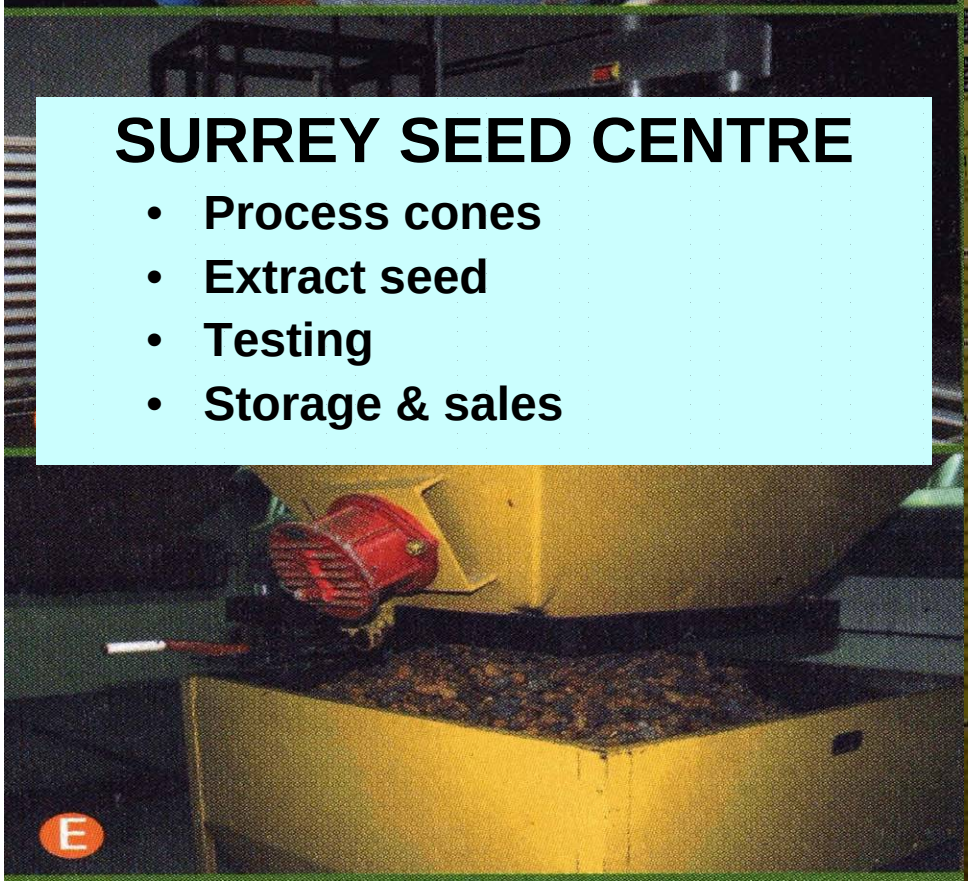
- Source: Fandrich Cone Harvesters.
- http://www.coneharvesters.com/ibgen.html

DATA – STORAGE - SHIPPING



- WHERE DID THE CONES COME FROM? (TSL NO.)
- LATITUDE / LONGITUDE?
- WHAT ELEVATION?
- WHAT BIOGEOCLIMATIC?
- WHAT SPECIES?
- WHAT CLASS?
- WHO OWNS THEM?
- HOW WERE THEY STORED / SHIPPED?

CONE / SEED PROCESSING



SURREY SEED CENTRE

- Process cones
- Extract seed
- Testing
- Storage & sales

ORCHARDS

- CLASS “A” SEED
  - Grow
  - Collect
  - Sell

NURSERIES

- Grow new trees
- Trees make cones.

THE VALUE OF NATURAL STAND CLASS “B” CONE COLLECTING

ONE HELICOPTER $1,300 / HR

PLUS FUEL AT $380.00 / HOUR

ONE CONE PICKER $180.00 / DAY

ONE BAG OF CONES $1,203.00

HAND PICKED

ONE BAG OF SEED $1,482.00 / KG

ONE VALUED, NATURAL FOREST…

PRICE LESS!!