1993

Spruce Weevil

Population Monitoring Plots

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Forest Insect & Disease Survey
Prince George Forest Region

Canadian Forest Service
Pacific Forestry Centre
Victoria, B.C.

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1.0 INTRODUCTION

A cooperative project between the BCFS and Canadian Forest Service (Forest Insect and Disease Survey) was initiated in 1993 to monitor spruce weevil, ***Pissodes strobi,*** populations in the Prince George Forest Region. The objective was to estimate the proportion of weevil infested trees in susceptible spruce stands across different biogeoclimatic subzones (BGCSZ). The stands are to be remeasured (annually) to obtain information on population fluctuations and to determine if there was any differences in susceptibility of attack between spruce in different biogeoclimatic subzones.

2.0 SUMMARY

Parameters for site selection inlcuded stand composition, age, biogeoclimatic subzone and site accesibility. Sites were surveyed between July 15th and September 15th using randomly placed circular plots. Fifteen suitable stands were located in 8 different biogeoclimatic subzones with an additional 4 sites to be added in 1994. An estimated 13% of the white spruce were currently attacked by the spruce leader weevil. The highest level of current attack, 25%, occurred at a site along the McGregor River in the SBSf biogeoclimatic subzone. No attack was found at one site in the SBSk3 or either site in the BWBSa1 biogeoclimatic subzones. It is recommended that surveys continue in 1994 with additional sites placed in biogeoclimatic subzones that were not represented in the 1993 surveys.

3.0 METHODS

3.1 Site Selection

Stands were selected from forest type maps, using tree species, stand composition, stand age, biogeoclimatic subzone and site accessibility as the parameters for selection. While sites were selected at random it was decided that 2 sites in each subzone would be desirable. The preferred stand age was between 10 and 15 years with white spruce the dominant species. Accessibility to sites was also important as the sites are to be remeasured annually for the next 10 years.

3.2 Survey Methodology

The sites were surveyed between July 15th and September 15th by the two Prince George FIDS rangers. All tree species were tallied and current (1993) and old spruce weevil attack were recorded on the white spruce. Other tree species, some not commercial, were included as it is thought that mixed stands or stands with a deciduous overstory are less susceptible to weevil attack. Defects such as major forks, crooks or multiple tops that may have been caused by previous weevil attacks were recorded separately from definite weevil attacks.

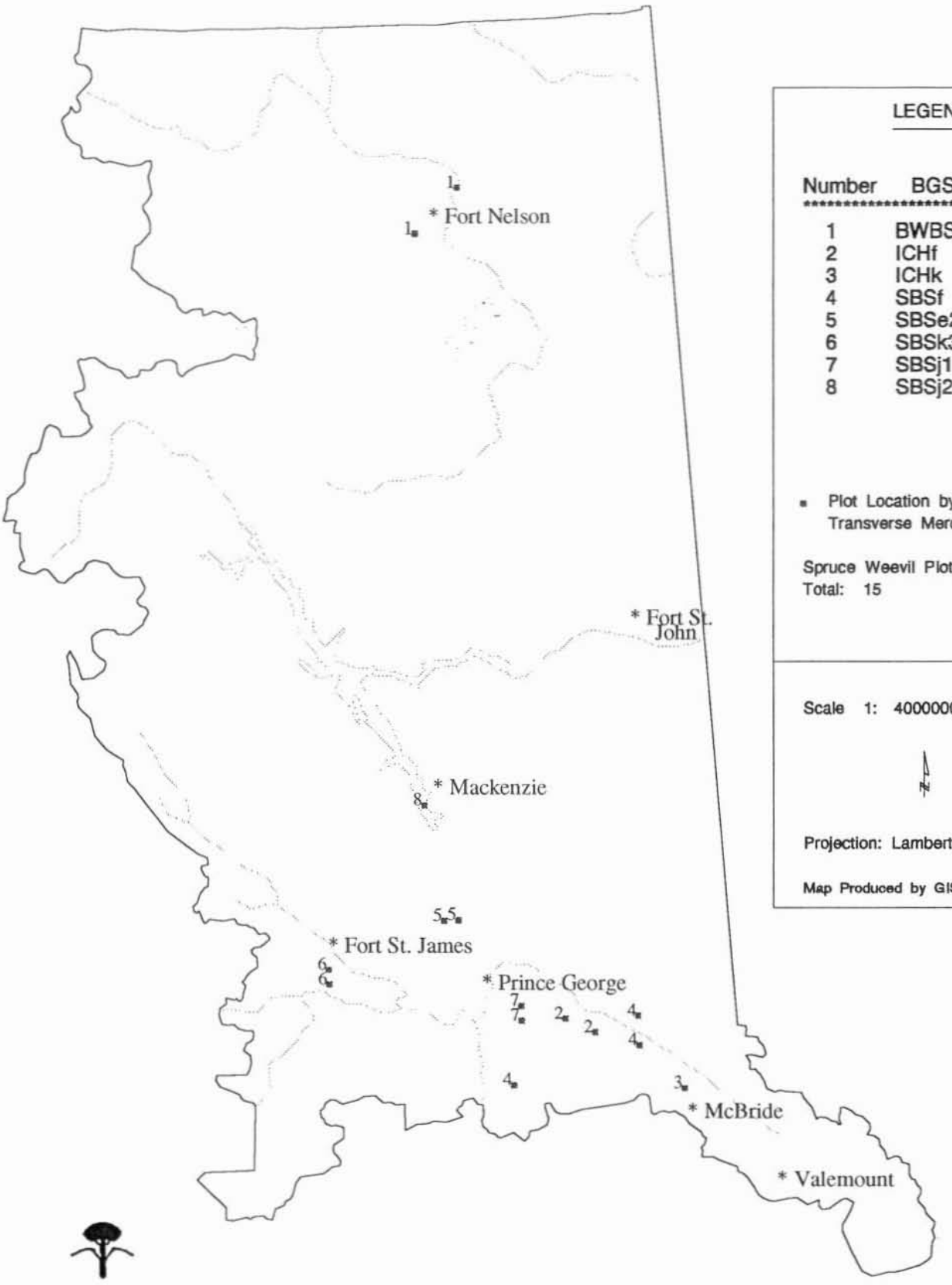
A minimum of 10 stocked, circular plots with a minimum total of 100 trees were established at random at each site. The most common plot radius was 5.64 m but 3.99 m and 4.99 m were also used. The same radius was used for all plots in a stand. The minimum interval between plots was 50 m, but the interval length between stand varied to accommodate opening size. Larger plantations usually required longer plot intervals to ensure that as much of the stand as possible was covered.

3.3 Plot Location and Biogeoclimatic subzone

A total of 15 suitable sites were located in 8 different biogeoclimatic subzones in 5 different Forest Districts (Map). It was attempted to have at least 2 sites in each biogeoclimatic subzone, this was accomplished in all but the SBSj2 and the ICHk subzones, where only one site each was located. An additional site will hopefully be added to these subzones in 1994.

Three locations were surveyed in the SBSf mainly because of ease of access, one of these locations may be deleted in 1994. The two locations in the BWBSa1 subzone are helicopter accessed. Due to inaccessibility no suitable sites were located in the BWBSc subzone, attempts will be made in 1994 to establish 2 helicopter accessed sites in this area.

PRINCE GEORGE - SPRUCE WEEVIL PLOTS



LEGEND:

Number	BGSZ
1	BWBSal
2	ICHf
3	ICHk
4	SBSf
5	SBSe2
6	SBSk3
7	SBSj1
8	SBSj2

▪ Plot Location by 10 km Universal Transverse Mercator Cell

Spruce Weevil Plots:
Total: 15

Scale 1: 4000000

Projection: Lambert Conformal Conic

Map Produced by GIS: 27 Oct 93

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4.0 RESULTS

An estimated average 13% (range 0 - 23%) of the white spruce were attacked by the spruce leader weevil in the 15 stands in 1993 (Table). Old attack(pre-93) was recorded on an average 9% (range 0 - 16%) of the stems and 3% of the trees had both old and new attacks. Defects representing possible previous attacks were noted on an average 4% (range 0 - 20%) of the white spruce. Attacks varied widely between biogeoclimatic subzone and even between stands within subzones.

4. 1 Very Wet Cool Sub-Boreal Spruce (SBSf)

The highest level of current attack occurred in this subzone with 25% of the spruce attacked at a site along the McGregor River, average old attack was 18% in the 3 stands. The second highest level of old attack 21% and stem defects 19% were reported at a site on the Bowron RD. Levels of current attack at the Humbug Cr. and Bowron Rd. sites were very similar at 15% and 14% respectively. Tree species composition varied widely with white spruce only making up 29% of the trees at Humbug Cr. compared with 100% at Bowron RD.

4.2 Mossvale-Moist Cool Sub-Boreal Spruce (SBSe2)

Weevil attacks at the Davie Lake RD location were estimated at 21% for current attack and 34% for both old and new attacks. Current attack at the Davie Muskeg site was considerably less with only 11% of the leaders currently infested. Again species composition varied at the two sites with only 64% of the trees white spruce at Davie Lk. compared with 92% at Davie-Muskeg. The total weevil attack showed an even greater difference with 34% of the trees attacked at Davie Lk. and 14% at Davie Muskeg.

4.3 Finlay/Peace Wet Cool Sub-Boreal Spruce (SBSj2)

The one site in this subzone had 20% of the leaders currently attacked and 32% of all stems had either current, old or both attacks. Spruce made 77% of the stand composition only slightly more than the 74% average for the fifteen stands.

4.4 Slim - Very Wet Cool Interior Cedar Hemlock (ICHf)

Current and old attack were less in the stand with the higher spruce composition in this subzone. Total attack was 33% at Lunate Creek which had 47% white spruce stems and 26% at Sugarbowl Cr. where spruce was 80% of the stand.

4.5 Willow - Wet Cool Sub-Boreal Spruce (SBSj1)

Spruce weevil populations were relatively constant in both stands in this area with current attack at 16% Vama Vama #1 and 14% at #2. Total weevil attack was the same at both sites with 30% of the stems affected. Spruce composition was also relatively constant between stands with only a 4% difference noted.

4.6 Goat - Wet Cool Interior Cedar-Hemlock (ICHk)

Current attack in the one stand surveyed in this subzone was recorded at 12%. While approximately half the trees in this stand were hemlock or cedar, these species were naturally regenerated and less than half the height of the spruce.

4.7 Stuart - Dry Warm Sub-Boreal Spruce (SBSk3)

Weevil attack levels were very low at the two sites in this subzone with no attacks recorded at the #2 site at Jack Pine Alley and only 3% current attack at the #1 site. White spruce was more than 50% of the stand at both locations. The other tree species matched the spruce in height and may have contributed to the lower levels of attack often associated with mixed stands.

4.8 Fort Nelson - Moist Warm Boreal White and Black Spruce (BWBSa1)

No weevil attacks were recorded during the weevil surveys of these two stands. Further assessments were able to determine that spruce weevil were present in the stands but at such low levels that it was not detected during original survey. The low level of weevil attack could be lack of suitable host, extreme climate and/or fluctuations in populations.

Table: Location, biogeoclimatic subzone, stand composition, weevil attack and defect in spruce weevil monitoring plots, Prince George Forest Region, FIDS, 1993.

Location	*Biogeoclimatic subzone*	*Tree Species[1] % of stand*	*% Spruce Weevil Attack Old*	*New*	*Both*	*%Defect[2]*
McGregor R	SBSf	wS -83 alF-17	9	23	2	3
Humbug Cr.	"	wS -29 wB -32 wrC-32 alF- 7	4	13	2	0
Bowron Rd	"	wS -100	15	8	6	19
Davie Lk Rd	SBSe2	wS -64 tA -12 sA -11 lP -11 bCo- 2	13	14	7	4
Davie-Muskeg	"	wS -92 lP - 8	3	10	1	0
Gagnon Cr.	SBSj2	wS -77 tA -18 lP - 5 wB - 8	12	16	4	1
Lunate Cr.	ICHf	wS -47 wB -31 alF-11 wrC-10 wH - 1	13	16	4	0
Sugarbowl Cr.	"	wS -80 tA - 7 wrC- 7 bCo- 5 Df - 1	9	15	2	3

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Location	*Biogeoclimatic subzone*	*Tree Species[1] % of stand*	*% Spruce Weevil Attack Old*	*New*	*Both*	*%Defect[2]*
Vama Vama Cr. 1	SBSj1	wS -82 wB -15 lP - 3	14	12	4	0
Vama Vama Cr. 2	"	wS -86 wB -12 lP - 1 alF- 1	16	6	8	5
Goat R	ICHk	wS -54 wrC-42 wH - 4	16	8	4	3
Jackpine Alley 1	SBSk3	wS -54 sA -15 lP - 8 alF- 8 tA - 5	4	3	0	20
Jackpine Alley 2	"	wS -57 lP -36 tA - 7	0	0	0	0
Ft. Nelson R	BWBSa1	wS -100	0	0	0	0
Muskwa R	"	wS -100	0	0	0	0
AVERAGE			**9**	**10**	**3**	**4**

[1] wS - white spruce
alF - alpine fir
wrC - western red cedar
wH - western hemlock
Df - Douglas fir
lP - lodgepole pine
tA - trembling aspen
wB - white birch
bCo - black cottonwood
sA - Sitka alder

[2] Defect is forks, crooks or multiple tops that may be caused by spruce weevil attack.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 The surveys should be expanded to include 2 additional stands in the BWBSc and one each in the SBSj2 and ICHk biogeoclimatic subzones.

5.2 That height of competing tree species be recorded during surveys to enable a better analysis of the effects of mixed stands on level of weevil attacks.

5.3 Continued weevil surveys are important to monitor the level of weevil attacks with in the region by biogeoclimatic subzone.

5.4 Funding by the BCFS for the surveys be continued with the Canadian Forest Service supplying the personnel to ensure continuity of sampling methods and surveys.

5.5 Other cooperators, with interests in spruce weevil, should be encouraged to participate in the surveys with input on data collection, survey methodology or additional experiments or trials be carried out at these sites.

5.6 These stands could also be used as damage appraisal sites to monitor the level of weevil damage to stands and how the trees recover from attacks. The effects of weevil attacks on growth and yield.

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ACKNOWLEDGMENTS

We thank Stuart Taylor of the the B.C. Forest Service, Prince George Regional office, for providing funding, helicopters, maps and assistance in planning this survey. We also thank Bruce Doerkson, Chris Broster, Dave Crabbe, Steve Lindsay, Neil Edwards, Sherilyn Smith and Dave Banham of the B.C. Forest Service for assistance in obtaining maps for site locations.

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