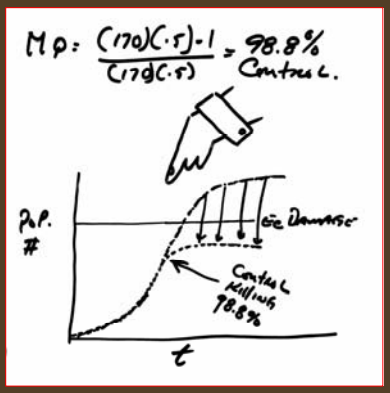
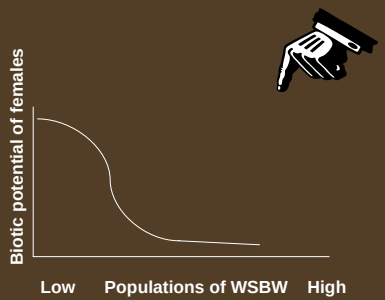
Management of WSBW Outbreaks

In the early days of budworm control the control tactic was to achieve the Mq by spraying vast areas of defoliation. DDT was, of course, the earliest pesticide used, but since then many others have been used.



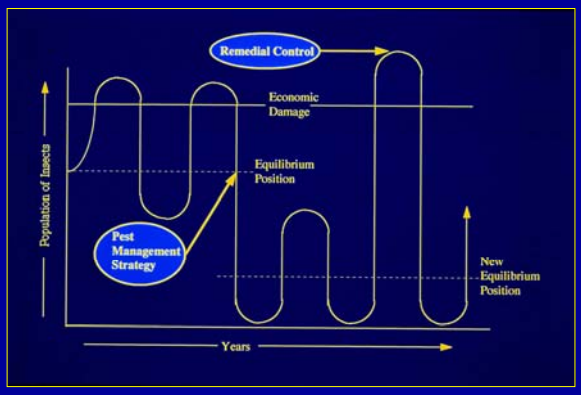
Spraying alone really didn't work for many important reasons. One of the fundamental reasons:



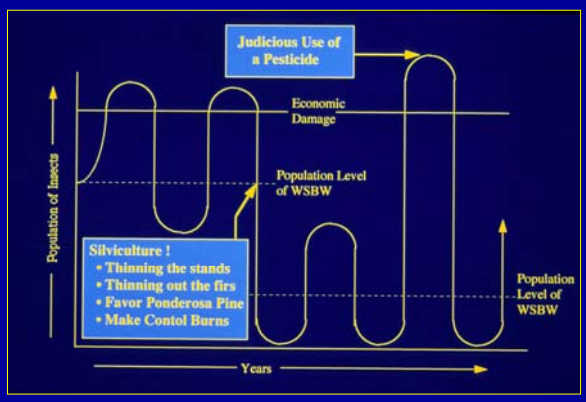
The WSBW problem simply couldn't be "sprayed away!"

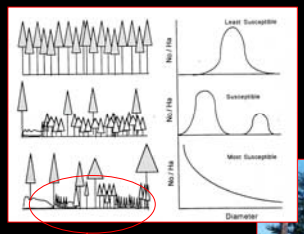
In all likelihood, an IPM approach is the answer!

An IPM Approach to Managing the WSBW



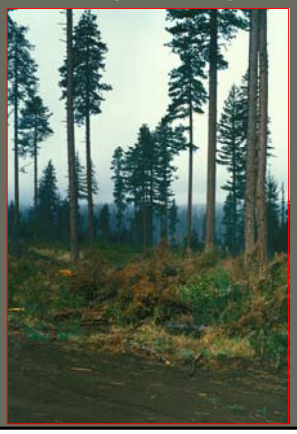
This, then, would be the IPM Scheme





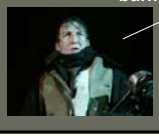
1. remove the multiple layered fir understory…
2. go for an even-aged forest structure…

Favor the ponderosa pine and good quality Douglas-firs

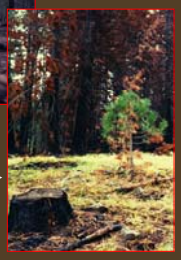


Thin out the true firs and favor ponderosa pine!

"Out Out brief firs, you should have burnt up long ago…"



Once the landscape is thinned and fuel loads have been decreased, use prescribed fires.

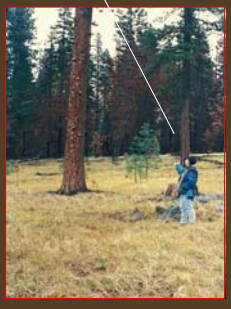


Heavy fir mortality

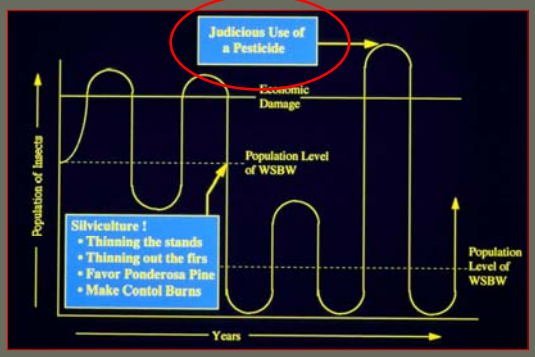
Bring fire back into the pine ecosystem and restore the forest structure and composition we had before intense fire suppression.

Grow ponderosa pine in a sustainable system & use fire as a tool.

You see!



If need be: the WSBW is threatening to climb above the EcDamage level



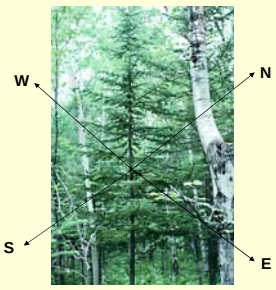
Determining the percent control using a pesticide

$$\% \text{ control} = \frac{(\text{pre-spray counts}) - (\text{post-spray counts})}{\text{pre-spray counts}}$$

Example:

- Make a 10% cruise of an infested area;
- Count larvae on 45cm-long branches taken from cardinal directions of the sampled trees.
- You would do this before and after the spray operation, i.e. pre-spray vs. post-spray.

1st Step



Sample, mid-crown at cardinal directions

Sampling for larval population before and after spraying Bt.

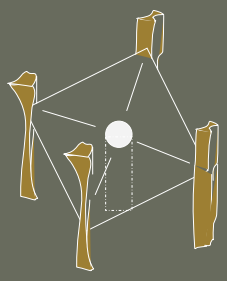
Count WSBW larvae on the 45cm branches, *e.g.* 28.2/45cm sample.

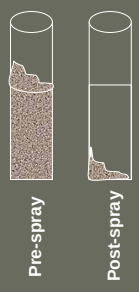
Spray

Count larvae again, e.g. 0.4 larvae/45cm.

$$\% \text{ control} = \frac{(28.2) - (0.4)}{28.2} = 98.6 \% \text{ mortality}$$

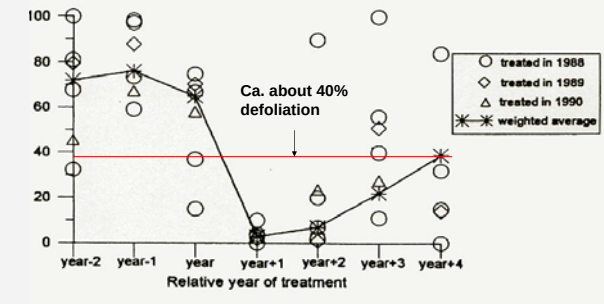
Frass-traps work well also





Judicious spraying: ”a surgical strike.”

Experiments that determined how long it would take for a WSBW to recover after spraying with Bt and other pesticides.



<u>A word of caution</u>:

When applied control is done, the appropriate silvicultural tactics must be accelerated.

It is, after all, the silvicultural plan that will permanently reduce the WSBW populations!

Without silvicultural treatments after Bt spraying -- there will be NO spraying in the first place.

Monitoring the WSBW population in late spring.

This is what IPM is about. The "take home message" is that IPM has rules. Rules that must be followed!

Life Table Analysis: A Canadian Approach to Budworm Management.

Life table for the spruce budworm based on mean values obtained in Area 1 during the outbreak

x	N_x	M,F	M_x	100 M/N	S_x
Age interval	No.[1] alive at beginning of x	Factor responsible for M_x	No.[1] dying during x	M_x as percentage of N_x	Survival rate within x
Eggs (to Instar I)	200	Parasites	18.0	9	
		Predators	12.0	6	
		Other	8.0	4	
		Total	38.0	19	.81
Instar I	162	Fall and spring dispersal, etc.	132.8	82	.18
Instar III	29.2	Parasites	11.7	40	
		Disease	6.7	23	
		Other[2]	6.7	23	
		Total	25.1	86	.14
Pupae	4.10	Parasites	0.53	13	
		Predators	0.16	4	
		Other[2]	0.70	17	
		Total	1.39	34	.66
Moths	2.71	Sex (46.5% females)	0.19	7	.93
Females × 2	2.52	Reduction in fecundity	0.50	20	.80
'Normal' females × 2	2.02	(No adult mortality or dispersal)			
GENERATION	–	–	197.98	98.99	.010
'Normal' females × 2	2.02	Adult mortality ± dispersal	0.99	49	.51
Actual females[3] × 2	1.03	–			
GENERATION	–	–	198.97	99.49	.005

[1]Number per 10 square feet of foliage
[2]Minus interaction among all factors
[3]Actual egg density of 103 eggs in generation n+1 divided by 200