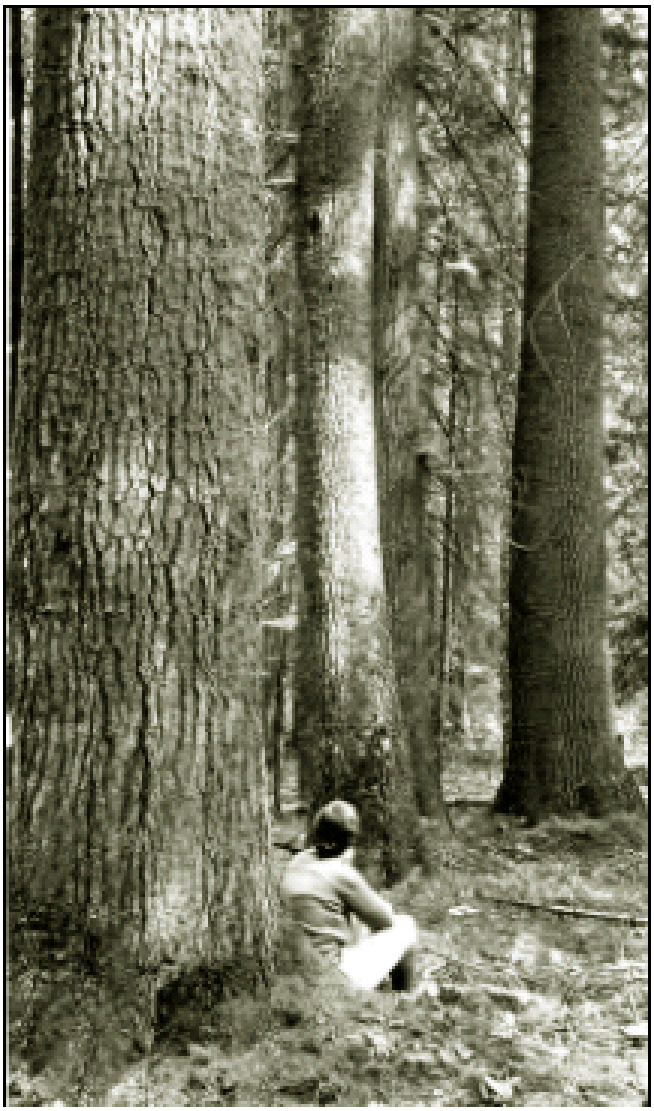
Kootenai & Idaho Panhandle Planning Zone

Construction of Vegetative Yield Profiles for Forest Plan Revision



April
2005

by:

Don Vandendriesche
USDA Forest Service, WOD
Forest Management Service Center
Fort Collins, Colorado

Kootenai & Idaho Panhandle National Forests

Vegetative Yield Profiles

Table of Contents

		Page
I.	Forest Stratification	1
II.	Data Sources	4
III.	Model Calibration	7
IV.	Natural Growth Runs	14
V.	Treatment Prescriptions	21
VI.	Yield Profiles	28
Conclusions		40

Appendix I – Silvicultural Prescriptions 41

Acknowledgements:

- Tom Martin, Silviculturist, Idaho Panhandle NF
- Ellen Frament, Plan Analyst, Kootenai NF
- Kendrick Greer, Spectrum Modeler, MBG

I. Forest Stratification

The Spectrum forest planning model will be used to allocate vegetation treatments on the Kootenai and Idaho Panhandle National Forests Planning Zone (KIPZ). Spectrum aids in determining a schedule of activities to move existing vegetation toward desired future conditions.

Analysis Areas

Traditionally, strategic level planning involves grouping stands of like attributes into stand types or land classes. This approach is referred to as "strata-based" planning and the individual land classes are often called "stratum" or "analysis areas". There were six land stratification layers identified for the KIPZ. They are defined as follows:

Layer 1 – Roadless Status

- Inventoried Roadless Area
- Other

lookup level1		
LEVEL1 Code	**LEVEL1 Description**	**L1_aaname**
ira	Inventoried Roadless Area	I
noira	Not Inventoried Roadless Area	N

Layer 2 – Management Area/Suitability Group

- Not Suited – No management
- Not Suited – Little management
- Suited – High level of management
- Suited – Moderate level of management
- Suited – Low level of management

lookup level2		
LEVEL2 Code	**Description**	**L2_aaname**
NSuitN	Not Suitable – No mgmt ▪ MAs 1a, 1b, 1c, 3, 4a, 4b, or 5a and ▪ All not tentatively suitable lands	N
NSuitL	Not Suitable – Some mgmt ▪ MAs 5b or 7 or ▪ Not suitable lands (but tent suitable) for MAs 6a, 6b, and 6c	O
SuitL	Suitable – Low intensity mgmt ▪ Suitable lands in MA 6a	L
SuitM	Suitable – Moderate intensity mgmt ▪ Suitable lands in MA 6b	M
SuitH	Suitable – High intensity mgmt ▪ Suitable lands in MA 6c	H

Layer 3 – Watershed Condition

- Properly functioning
- Functioning at risk
- Not properly functioning)

lookup level3		
LEVEL3 Code	**Description**	**L3_aaname**
pfcwtr	Properly Functioning watershed Condition	P
farwtr	Functioning At Risk watershed condition	F
npfwtr	Not Properly Functioning watershed condition	N

Layer 4 – Wildlife Condition

- Bear management unit or caribou management unit outside of core
- Lynx denning habitat outside of bear or caribou management unit

lookup level4		
LEVEL4 Code	**Description**	**l4_aaname**
bmucmu	Bear or caribou management unit outside girz core	B
lynxdn	Lynx denning habitat outside bmu or cmu	L

Layer 5 – Cover Type

- Douglas-fir Dry
- Douglas-fir Moist
- Grand Fir Mix
- Western Larch
- Lodgepole Pine
- Subalpine Fir
- Other

lookup level5		
LEVEL5 Code	**Description**	**l5_aaname**
DFdry	Douglas-fir/Ponderosa Pine mix	D
DFmoist	Douglas-fir – moist habitat types	P
GFmix	GF/WRC/WH/WP	C
WL	Western Larch	G
LP	Lodgepole Pine	L
SFmix	SAF/ES/MH	S
Other	Other	N

Layer 6 – Size Class

- Seedlings/Saplings (0”-5”)
- Small (5”-10”)

- Medium (10”-15”)
- Large (15”-20”)
- Very Large (20”+)

lookup level6		
LEVEL6 Code	**Description**	**l6_aaname**
Seedsap	Seedling/Sapling (0” – 5”)	E
Small	Small (5” – 10”)	S
Medium	Medium (10” – 15”)	M
Large	Large (15” – 20”)	L
Very	Very Large (20”+)	V
Other	Other	N

II. Data Sources

Two types of data were used for the KIPZ plan revision project: spatial and temporal. The spatial data was compiled from remote sensed, satellite imagery and the rendering project will be referred to as V-Map. Acreage compilation was accomplished by summing the various analysis areas residing within the V-Map polygons. Temporal data is gathered during a field inventory. Place-in-time attributes are collected to provide an estimate of forest stand conditions. The Forest Service, Forest Inventory and Analysis Unit, is mandated to conducted field inventories of all forested lands within the United States. Data derived from this survey will be referred to as FIA. Per acre inventory values are provided from FIA data. When temporal data is expanded by spatial data, total strata estimates are generated.

FIA Inventory Data

In 2000, the Forest Inventory Analysis Unit transitioned from conducting periodic field measurements to an annual inventory system. Rather than visit a State once every ten years (periodic inventories), a new visitation scheduled was proposed where one-tenth of a State would be measured each year (annual inventory). Undertaken such an endeavor required staggering the initial start-year for the various States within a region.

With respect to the Kootenai National Forest in Montana and the Idaho Panhandle National Forest in Idaho and Washington, the following table describes the FIA sampling scheme:

FIA Design				
National Forest	**Proclaimed State**	**Inventory Method**	**Measurement Years**	**Plot Sample**
Kootenai	Montana	Periodic	1993-1994	365
Idaho Panhandle	Idaho	Periodic	2000-2001	388
Idaho Panhandle	Washington	Periodic	2001	19
Total:				772

Stand Type Delineations

In order to associate V-Map acreage delineations with FIA inventory estimates, a common stand type naming convention needed to be adopted. The following codes convention was used:

Vegetation		
V-Map Code	**Description**	**FIA Code**
DFdry	Douglas-fir/Ponderosa Pine mix	dfd
DFmoist	Douglas-fir – moist habitat types	dfm
GFmix	GF/WRC/WH/WP	gfx

Vegetation		
V-Map Code	**Description**	**FIA Code**
WL	Western Larch	lar
LP	Lodgepole Pine	lpp
SFmix	SAF/ES/MH	saf
Other	Other	xxx

The FIA provides an assessment of the forest cover type, size class, and stocking density of the inventory plot at the time of measurement. This is based on the resident trees as processed through a computer coded algorithm. The FIA recognizes three size classes: 0”-5”, 5”-9”, and 9”+ diameter. To mesh with the V-Map size class breaks, the 9”+ diameter class was further subdivided by: 9”-15”, 15”-20”, 20+” diameter based upon majority of canopy cover (accounting for crown overlap).

Size Class		
V-Map Code	**Description**	**FIA Code**
Seedsap	Seedling/Sapling (0” – 5”)	30
Small	Small (5” – 9”/10”)	20
Medium	Medium (9”/10” – 15”)	13
Large	Large (15” – 20”)	12
Very	Very Large (20”+)	11
Other	Other	50

Prior to assigning the FIA plot sample to their associated vegetation type, Douglas-fir forest cover type needed to be split according to dry and moist regimes. Habitat typing was used to determine the break. The following codes were used to differentiate the Douglas-fir type:

Douglas-fir Assignment	
V-Map Code	**Habitat Codes**
DFdry	210,220,230,250,260,261,262,263,281,283,290,291,292,310,312,313,320, 321,322,323,324,340,350,505,506,507,508,510,511,512,515,523,591,592
DFmoist	517,518,520,521,522,524,530,531,546,555,570,571,572,573,574,576,577, 578,579,620,621,624,640,660,673,686,691,730,792

V-Map cover type, FIA cover type, and FIA size class labels were appended to each FIA plot to enable sorting the data set into their representative vegetative stand type. The following tables depict the sample distribution.

KIPZ FIA Plot Distribution					
		V-Map Strata		FIA Strata	
Cover Type	Size Class	FIA Plots	Stocked Plots	FIA Plots	Stocked Plots
dfd	very	10		13	
	large	12		12	
	medium	30		34	
	small	13		10	
	seedsap	9	74	16	85
	nonstocked	4		4	
dfm	very	15		25	
	large	10		26	
	medium	43		59	
	small	7		13	
	seedsap	13	88	15	138
	nonstocked	6		6	
gfx	very	30		35	
	large	18		21	
	medium	68		62	
	small	22		11	
	seedsap	19	157	19	148
	nonstocked	4		4	
lar	very	18		6	
	large	24		7	
	medium	61		28	
	small	20		10	
	seedsap	30	153	10	61
	nonstocked	3		3	
lpp	very	11		0	
	large	8		3	
	medium	36		35	
	small	16		34	
	seedsap	19	90	14	86
	nonstocked	5		5	
saf	very	21		26	
	large	20		23	
	medium	58		78	
	small	18		18	
	seedsap	12	129	28	173
	nonstocked	1		1	
Subtotal:		714	691	714	691
xxx	nonID	58		58	
Total:		772		772	

III. Model Calibration

An essential step in properly using the Forest Vegetation Simulator is calibration of the model. The FVS geographic variants are comprised of numerous mathematical relationships. In the biological sciences, regression equations at best achieve an r-squared correlation value of 70 to the fitted data. If the results of one regression function provide the input to another, then the resultant error is compounded. Thus, it behooves the user to validate the virtual world estimates generated by FVS versus the real world values obtained from the inventory sample.

Measurement Data

One of the end targets for calibrating the FVS model is the creation of the ReadCorD (Readjust Correction for Diameter) keyword. Input of this keyword alters the baseline estimate for the large-tree diameter growth submodel. For a particular species, the original baseline estimate is multiplied by the value of this keyword, and the result becomes the new baseline estimate. These adjustments are done prior to the model's self calibrating routines. Calculated scale factors derived from FVS self calibrating attenuate toward a value midway between the calculated scale factor and the new baseline estimate at twenty-five year intervals.

```
CALIBRATION STATISTICS
LARGE TREE DIAMETER GROWTH CALIBRATION SUMMARY

GENERATED BY RUNSTREAM : dfd_r_fia

                |          SCALE FACTOR SUMMARY                | TOTAL    MEAN
         MODEL  |                                     STD      | TREE     READCORD
SPECIES  TYPE*  |    N      MIN      MEAN     MAX     DEV.     | RECORDS  MULTIPLIER
-------  -----  |  -----  -------  -------  -------  -------   | -------  ----------
  2  WL    LD   |      8    0.686    1.154    1.783    0.374   |    51       1.149
  3  DF    LD   |     64    0.359    0.978    2.242    0.385   |   663       0.968
  7  LP    LD   |      3    0.440    0.827    1.056    0.337   |    15       0.841
 10  PP    LD   |     10    0.130    0.894    1.627    0.431   |    70       0.943

GENERATED BY RUNSTREAM : dfm_r_fia

                |          SCALE FACTOR SUMMARY                | TOTAL    MEAN
         MODEL  |                                     STD      | TREE     READCORD
SPECIES  TYPE*  |    N      MIN      MEAN     MAX     DEV.     | RECORDS  MULTIPLIER
-------  -----  |  -----  -------  -------  -------  -------   | -------  ----------
  2  WL    LD   |     23    0.623    1.040    2.054    0.351   |   141       1.055
  3  DF    LD   |    107    0.227    0.872    2.000    0.309   |   988       0.880
  4  GF    LD   |     24    0.332    0.942    1.406    0.301   |   173       0.932
  5  WH    LD   |      3    0.804    0.934    1.072    0.134   |    18       0.922
  6  RC    LD   |     10    0.594    1.051    1.409    0.248   |    63       1.038
  7  LP    LD   |      9    0.588    1.226    2.389    0.626   |    58       1.263
  8  ES    LD   |      5    0.276    0.966    1.295    0.411   |    33       0.958
  9  AF    LD   |      3    0.576    0.761    0.990    0.210   |    18       0.724

GENERATED BY RUNSTREAM : gfx_r_fia

                |          SCALE FACTOR SUMMARY                | TOTAL    MEAN
         MODEL  |                                     STD      | TREE     READCORD
SPECIES  TYPE*  |    N      MIN      MEAN     MAX     DEV.     | RECORDS  MULTIPLIER
-------  -----  |  -----  -------  -------  -------  -------   | -------  ----------
  1  WP    LD   |      6    0.398    0.890    1.219    0.287   |    35       0.937
  2  WL    LD   |     11    0.654    1.246    3.321    0.760   |    67       1.235
  3  DF    LD   |     20    0.593    1.121    1.845    0.291   |   122       1.148
```

4	GF	LD	67	0.381	1.042	2.742	0.435	560	1.032
5	WH	LD	54	0.272	0.952	2.153	0.394	431	0.908
6	RC	LD	44	0.229	1.271	3.246	0.664	361	1.371
7	LP	LD	5	0.812	1.409	2.510	0.706	30	1.423
8	ES	LD	3	0.603	1.280	2.255	0.865	18	1.167
9	AF	LD	3	0.513	0.717	0.929	0.208	17	0.656

GENERATED BY RUNSTREAM : lar_r_fia

		SCALE FACTOR SUMMARY					TOTAL	MEAN
SPECIES	MODEL TYPE*	N	MIN	MEAN	MAX	STD DEV.	TREE RECORDS	READCORD MULTIPLIER
2	WL	LD	42	0.360	1.133	2.315	0.369	332	1.154
3	DF	LD	12	0.702	1.039	1.515	0.267	87	1.089
4	GF	LD	9	0.482	0.894	1.285	0.284	70	0.994
5	WH	LD	3	0.849	0.962	1.021	0.098	16	0.950
6	RC	LD	4	0.799	0.958	1.101	0.130	26	0.964
7	LP	LD	7	0.830	1.177	1.777	0.319	46	1.254
8	ES	LD	5	0.762	1.127	1.670	0.365	38	1.100

GENERATED BY RUNSTREAM : lpp_r_fia

LARGE TREE DIAMETER GROWTH CALIBRATION SUMMARY

		SCALE FACTOR SUMMARY					TOTAL	MEAN
SPECIES	MODEL TYPE*	N	MIN	MEAN	MAX	STD DEV.	TREE RECORDS	READCORD MULTIPLIER
2	WL	LD	7	0.393	0.976	1.696	0.402	47	0.894
3	DF	LD	6	0.625	1.289	2.099	0.509	32	1.357
4	GF	LD	2	0.738	0.827	0.915	0.125	17	0.775
7	LP	LD	72	0.420	0.992	2.774	0.393	518	1.000
8	ES	LD	3	1.091	1.165	1.259	0.086	16	1.208
9	AF	LD	3	0.521	0.777	1.115	0.305	16	0.766

GENERATED BY RUNSTREAM : saf_r_fia

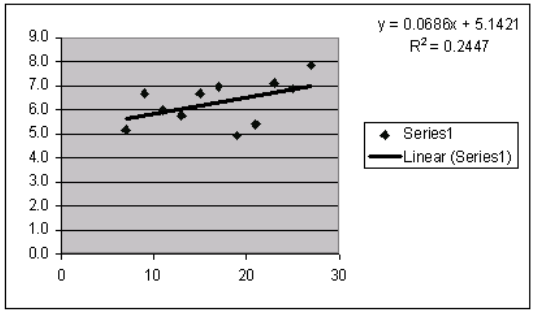
		SCALE FACTOR SUMMARY					TOTAL	MEAN
SPECIES	MODEL TYPE*	N	MIN	MEAN	MAX	STD DEV.	TREE RECORDS	READCORD MULTIPLIER
2	WL	LD	9	0.760	1.071	1.574	0.260	54	1.105
3	DF	LD	6	0.826	1.295	1.965	0.415	37	1.421
5	WH	LD	3	0.757	0.994	1.260	0.253	24	0.949
7	LP	LD	9	0.839	1.077	1.430	0.189	59	1.083
8	ES	LD	51	0.410	0.974	2.101	0.297	436	0.944
9	AF	LD	92	0.289	0.922	2.399	0.350	743	0.927
11	MH	LD	29	0.593	1.004	1.853	0.275	274	0.979
12	WB	LD	2	0.687	0.700	0.712	0.018	16	0.652

Tree Defect

Determining net merchantable volume from gross tree dimensions requires an estimate of tree defect. Values were obtained from recent timber sales from the Forests. Data was extracted from the National Cruise database and arrayed by species, by 5-inch diameter classes to population the FVS Defect keyword.

Idaho Panhandle - Tree Defect

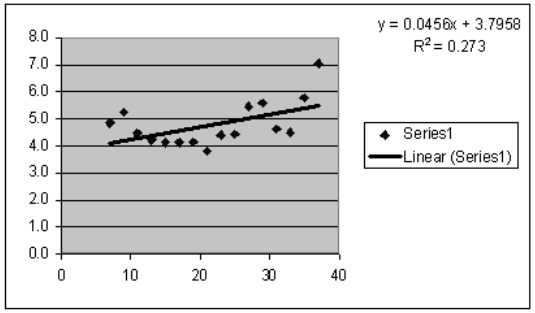
SPECIES	# Trees	Mid Pt Diam Class	Avg Defect
PP	53	5	0.0
PP	178	7	5.2
PP	586	9	6.7
PP	675	11	6.0
PP	572	13	5.8
PP	471	15	6.7
PP	344	17	7.0
PP	253	19	4.9
PP	163	21	5.4
PP	90	23	7.1
PP	46	25	6.9
PP	20	27	7.9
PP	12	29	3.9
PP	9	31	14.8



FVS Defect Specifications

Species	dbh	defect
PP	5	5
PP	10	6
PP	15	6
PP	20	7
PP	25	7
PP	30	7
* PP	35	8
PP	40	8
PP	45	8
PP	50	9

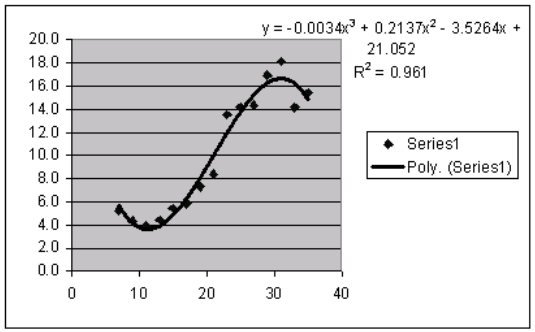
SPECIES	# Trees	Mid Pt Diam Class	Avg Defect
DF	604	5	0.2
DF	1782	7	4.8
DF	4985	9	5.3
DF	5478	11	4.5
DF	5761	13	4.2
DF	5386	15	4.1
DF	4562	17	4.1
DF	4180	19	4.1
DF	3302	21	3.8
DF	2349	23	4.4
DF	1401	25	4.4
DF	783	27	5.5
DF	469	29	5.6
DF	241	31	4.6
DF	107	33	4.5
DF	74	35	5.8
DF	28	37	7.0
DF	32	39	9.4



Species	dbh	defect
DF	5	4
DF	10	4
DF	15	4
DF	20	5
DF	25	5
DF	30	5
DF	35	5
* DF	40	6
DF	45	6
DF	50	6

Idaho Panhandle - Tree Defect

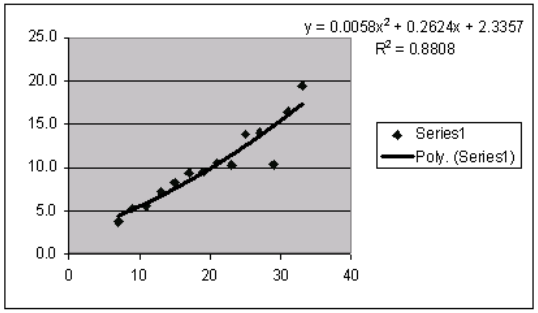
SPECIES	# Trees	Mid Pt Diam Class	Avg Defect
GF	659	5	0.8
GF	2372	7	5.3
GF	4893	9	4.4
GF	4407	11	3.9
GF	3316	13	4.5
GF	2556	15	5.4
GF	1716	17	5.9
GF	1302	19	7.3
GF	876	21	8.4
GF	606	23	13.5
GF	332	25	14.2
GF	209	27	14.4
GF	99	29	17.0
GF	61	31	18.2
GF	27	33	14.2
GF	16	35	15.4
GF	16	37	23.9



FVS Defect Specifications

	Species	dbh	defect
4	GF	5	8
	GF	10	4
	GF	15	5
	GF	20	9
	GF	25	13
	GF	30	16
20	GF	35	14
24	GF	40	4
	GF	45	-15
	GF	50	-46

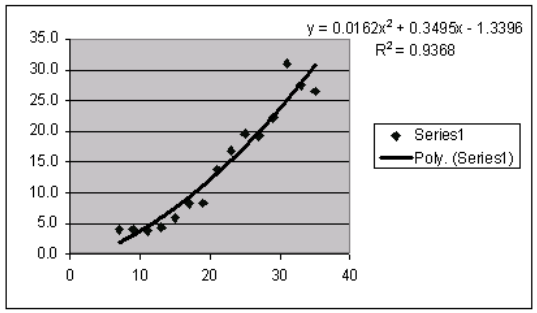
SPECIES	# Trees	Mid Pt Diam Class	Avg Defect
WP	44	5	0.0
WP	307	7	3.7
WP	855	9	5.3
WP	895	11	5.6
WP	865	13	7.2
WP	717	15	8.3
WP	577	17	9.4
WP	461	19	9.5
WP	288	21	10.5
WP	192	23	10.3
WP	90	25	13.8
WP	63	27	14.1
WP	42	29	10.3
WP	13	31	16.5
WP	7	33	19.4



	Species	dbh	defect
	WP	5	4
	WP	10	6
	WP	15	8
	WP	20	10
	WP	25	13
	WP	30	15
*	WP	35	19
	WP	40	22
	WP	45	26
	WP	50	30

Idaho Panhandle - Tree Defect

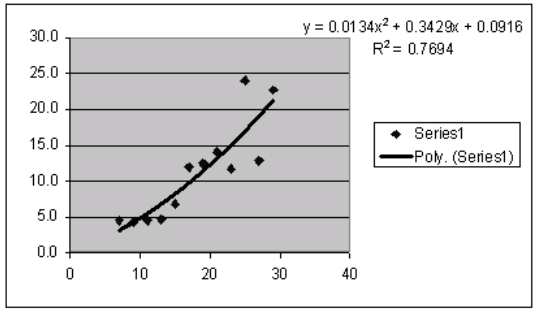
SPECIES	# Trees	Mid Pt Diam Class	Avg Defect
RC	423	5	0.4
RC	1067	7	4.0
RC	2987	9	4.0
RC	2201	11	3.8
RC	1393	13	4.4
RC	835	15	5.9
RC	499	17	8.2
RC	326	19	8.3
RC	228	21	13.8
RC	119	23	16.9
RC	93	25	19.6
RC	68	27	19.2
RC	42	29	22.2
RC	15	31	31.0
RC	17	33	27.5
RC	10	35	26.5



FVS Defect Specifications

	Species	dbh	defect
4	RC	5	1
	RC	10	4
	RC	15	8
	RC	20	12
	RC	25	18
	RC	30	24
	RC	35	31
40	RC	40	39
*	RC	45	47
	RC	50	57

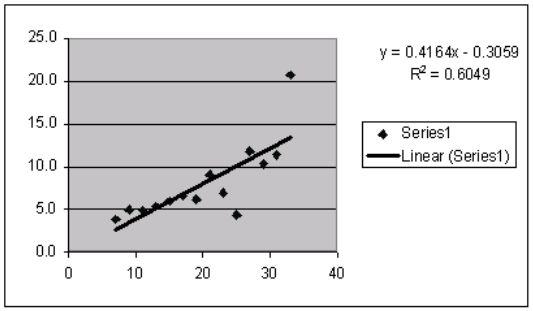
SPECIES	# Trees	Mid Pt Diam Class	Avg Defect
MH	645	5	2.9
MH	1187	7	4.5
MH	1732	9	4.3
MH	1418	11	4.5
MH	890	13	4.7
MH	600	15	6.8
MH	384	17	12.0
MH	267	19	12.5
MH	180	21	14.1
MH	94	23	11.7
MH	65	25	24.1
MH	39	27	12.9
MH	20	29	22.7



	Species	dbh	defect
4	MH	5	2
	MH	10	5
	MH	15	8
	MH	20	12
	MH	25	17
	MH	30	22
*	MH	35	29
	MH	40	35
	MH	45	43
	MH	50	51

Idaho Panhandle - Tree Defect

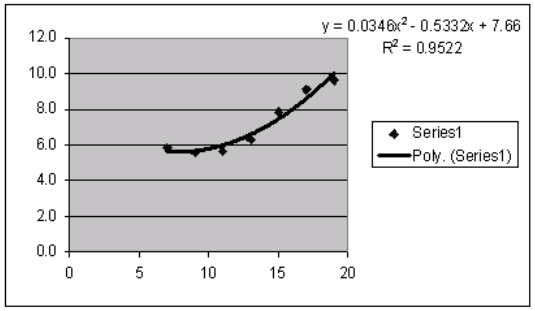
SPECIES	# Trees	Mid Pt Diam Class	Avg Defect
WL	531	5	0.2
WL	1684	7	3.9
WL	2918	9	5.0
WL	2173	11	4.9
WL	1523	13	5.4
WL	1056	15	6.0
WL	639	17	6.6
WL	328	19	6.2
WL	189	21	9.1
WL	94	23	6.9
WL	39	25	4.3
WL	27	27	11.8
WL	16	29	10.3
WL	21	31	11.4
WL	7	33	20.7
WL	8	35	31.0



FVS Defect Specifications

	Species	dbh	defect
4	WL	5	6
	WL	10	5
	WL	15	5
	WL	20	6
	WL	25	9
	WL	30	13
	WL	35	19
	WL	40	26
*	WL	45	34
	WL	50	44

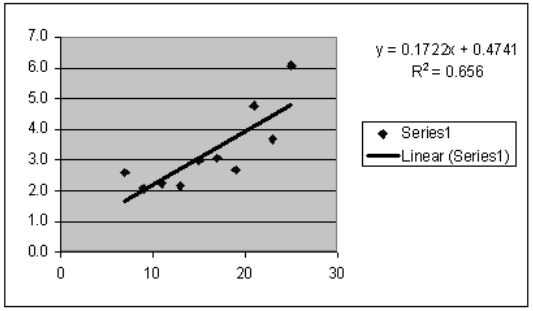
SPECIES	# Trees	Mid Pt Diam Class	Avg Defect
LP	1099	5	1.3
LP	4073	7	5.9
LP	7781	9	5.6
LP	6534	11	5.7
LP	3605	13	6.3
LP	1727	15	7.9
LP	633	17	9.1
LP	227	19	9.6
LP	67	21	15.7
LP	9	23	20.9



	Species	dbh	defect
	LP	5	6
	LP	10	6
	LP	15	7
	LP	20	11
*	LP	25	16
	LP	30	23
	LP	35	31
	LP	40	42
	LP	45	54
	LP	50	68

Idaho Panhandle - Tree Defect

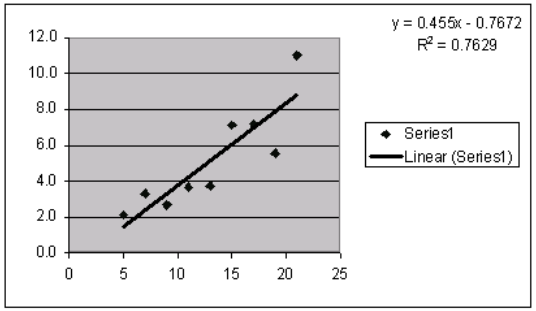
SPECIES	# Trees	Mid Pt Diam Class	Avg Defect
ES	103	5	5.0
ES	358	7	2.6
ES	744	9	2.1
ES	658	11	2.3
ES	476	13	2.2
ES	340	15	3.0
ES	189	17	3.1
ES	133	19	2.7
ES	82	21	4.8
ES	38	23	3.7
ES	25	25	6.1
ES	6	27	11.0
ES	9	29	4.7



FVS Defect Specifications

	Species	dbh	defect
2	ES	5	3
3	ES	10	2
	ES	15	3
	ES	20	4
	ES	25	6
	ES	30	8
	ES	35	12
	ES	40	17
*	ES	45	22
	ES	50	28

SPECIES	# Trees	Mid Pt Diam Class	Avg Defect
AF	148	5	2.1
AF	400	7	3.3
AF	865	9	2.7
AF	705	11	3.7
AF	440	13	3.7
AF	251	15	7.1
AF	147	17	7.2
AF	98	19	5.5
AF	46	21	11.0
AF	20	23	6.9



Species	dbh	defect
AF	5	2
AF	10	4
AF	15	6
AF	20	8
AF	25	11
AF	30	13
* AF	35	15
AF	40	17
AF	45	20
AF	50	22

IV. Natural Growth Runs

What is being asked of forest planners today are estimates of stand development well beyond the existing pool of stand ages. In many situations, simulations of old growth structures are needed. The age range of these stand profiles far exceed inventoried stands. It is tenuous at best to assume exact knowledge of long-term physiological processes. A reasonable assumption would be a 'steady-state' condition extending for some time into the future. As individual trees attain their morphological age, mortality agents will take their toll and the stand will transition back to earlier serial stages. Forests are very dynamic, they are not static.

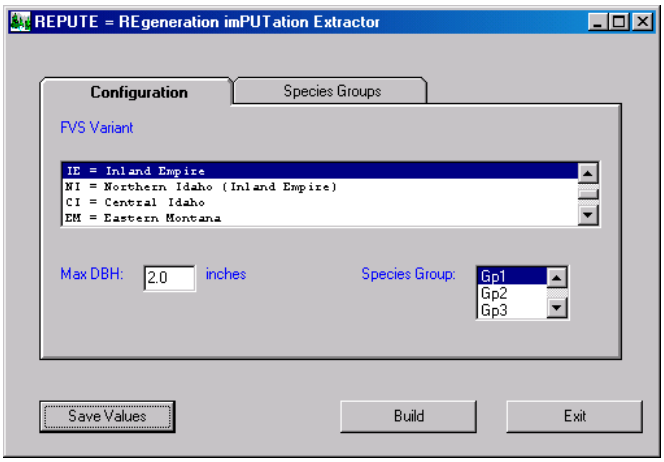
Two of the most difficult aspects to forecast in stand development are regeneration and mortality components. One adds trees to the system, the other subtracts. Both are stochastic (random) events. Normal inventory sampling procedures render high variability regarding seedling recruitment and tree decline. Finding reliable predictor variables from collected data is not easy. Regeneration and mortality responses are weak links in the chain of growth and yield prediction.

Regeneration Imputation

To impute implies the assignment of something to another. With respect to regeneration inferences, imputation procedures examine existing conditions to predict potential conditions in future stands. Basically, the process calls for querying existing data sets for representative *stand types* (stands of similar administrative, vegetative, and developmental characteristics) and tabulating the seedling/sapling component.

REPUTE the Program

REPUTE, a *post* post-processing program, has been written that embodies the concept of Regeneration Imputation. This program reads 'Stand Table' output files from the FVSSTAND Alone post processing program to develop regeneration keyword component files. REPUTE will cycle through the FVSSTAND Alone Stand Table picking out the diameter classes less than the maximum diameter specified on the initial REPUTE screen



Separate lines in the regeneration add-file will be created per species, per diameter, given that there are trees per acre values listed. The final step includes naming the newly created regeneration Keyword Component File.

FVSSTAND Alone: Print Preview

Yield Reports | Stand Tables | Stat Analysis

Type: dbh class / size class

Draw WinSVS

dfd_r_fia00.PT1 | dfd_r_fia01.PT1

---Fvsstand Alone Analysis

DATE RUN - 04/02/2005
PLOT ACRES - 98.00
MEASUREMENT LENGTH - 10.00 YEARS

TABLE 1-1 S T A N D T A B L E

--- (202) Douglas-fir

	:<--------- 1995 M E A S U R E M E N T						---------->:<--------- 2005 M E A S U R E M E N T						---------->:		
DIA. CLASS:	TREES /AC	AVG DBH	AVG HGT	BA /AC	CUBIC CU/AC	BOARD CU/AC	BOARD BD/AC :	TREES /AC	AVG DBH	AVG HGT	BA /AC	CUBIC CU/AC	BOARD CU/AC	BOARD BD/AC :	% CU DEF	% BD DEF
<1. :	2.405	0.82	0.0	0.009	0.00	0.00	0.0 :	910.639	0.14	1.9	0.155	0.00	0.00	0.0 :	0.00	0.00
2. :	17.743	2.19	0.6	0.502	0.00	0.00	0.0 :	98.071	1.91	15.1	2.149	0.00	0.00	0.0 :	0.00	0.00
SUB. :	20.148	2.03	0.5	0.511	0.00	0.00	0.0 :	1008.710	0.31	3.1	2.304	0.00	0.00	0.0 :	0.00	0.00
4. :	24.268	3.91	0.6	2.065	0.00	0.00	0.0 :	67.387	3.86	28.0	5.598	0.00	0.00	0.0 :	0.00	0.00
6. :	20.813	5.97	4.8	4.084	0.00	0.00	0.0 :	30.913	5.89	42.4	5.909	0.00	0.00	0.0 :	0.00	0.00
SUB. :	45.081	4.86	2.5	6.149	0.00	0.00	0.0 :	98.300	4.50	32.5	11.507	0.00	0.00	0.0 :	0.00	0.00
8. :	11.883	7.94	6.6	4.108	8.85	0.00	47.8 :	23.121	7.81	52.2	7.720	125.12	0.00	710.5 :	0.00	0.00
10. :	10.803	9.95	9.1	5.854	17.76	0.00	90.7 :	13.980	9.89	58.4	7.484	139.79	0.00	708.1 :	0.00	0.00
SUB. :	22.686	8.90	7.8	9.962	26.61	0.00	138.5 :	37.101	8.59	54.5	15.205	264.91	0.00	1418.7 :	0.00	0.00
12. :	6.040	11.77	8.0	4.575	12.33	0.00	58.3 :	11.519	11.82	66.7	8.794	192.86	0.00	914.9 :	0.00	0.00
14. :	4.330	13.84	5.1	4.529	7.82	0.00	40.5 :	5.549	13.84	72.5	5.809	136.47	0.00	694.7 :	0.00	0.00
16. :	3.521	15.87	16.0	4.846	25.09	0.00	130.7 :	5.125	15.92	77.9	7.090	178.13	0.00	916.3 :	0.00	0.00
18. :	2.332	17.84	19.5	4.055	25.21	0.00	130.3 :	3.129	17.88	83.3	5.459	145.41	0.00	754.7 :	0.00	0.00
20. :	1.394	19.90	18.2	3.015	16.93	0.00	90.9 :	1.682	19.87	86.2	3.624	98.45	0.00	524.0 :	0.00	0.00
22. :	0.783	21.82	10.1	2.035	6.42	0.00	34.3 :	1.277	22.07	90.3	3.396	95.82	0.00	527.9 :	0.00	0.00
24. :	0.493	23.92	29.3	1.538	14.19	0.00	81.9 :	0.710	23.91	95.5	2.214	65.55	0.00	374.6 :	0.00	0.00
26. :	0.276	26.20	27.0	1.032	8.64	0.00	50.7 :	0.305	26.04	98.0	1.130	34.02	0.00	202.5 :	0.00	0.00
28. :	0.162	28.12	82.1	0.700	17.58	0.00	103.8 :	0.222	27.71	92.1	0.930	25.44	0.00	148.8 :	0.00	0.00
30. :	0.102	29.63	22.6	0.487	3.27	0.00	19.8 :	0.040	30.06	88.9	0.198	5.18	0.00	30.8 :	0.00	0.00
32. :	0.051	31.72	0.0	0.282	0.00	0.00	0.0 :	0.093	31.51	103.6	0.505	15.65	0.00	97.7 :	0.00	0.00
34. :	0.000	0.00	0.0	0.000	0.00	0.00	0.0 :	0.020	33.10	116.0	0.117	4.08	0.00	26.6 :	0.00	0.00
36. :	0.000	0.00	0.0	0.000	0.00	0.00	0.0 :	0.000	0.00	0.0	0.000	0.00	0.00	0.0 :	0.00	0.00
38. :	0.000	0.00	0.0	0.000	0.00	0.00	0.0 :	0.000	0.00	0.0	0.000	0.00	0.00	0.0 :	0.00	0.00
40. :	0.000	0.00	0.0	0.000	0.00	0.00	0.0 :	0.000	0.00	0.0	0.000	0.00	0.00	0.0 :	0.00	0.00
SUB. :	19.484	15.48	12.5	27.095	137.45	0.00	741.2 :	29.672	15.10	75.0	39.265	997.04	0.00	5213.5 :	0.00	0.00
TOTAL:	107.399	7.11	5.1	43.717	164.06	0.00	879.7 :	1173.783	1.29	9.0	68.281	1261.95	0.00	6632.2 :	0.00	0.00
>=5"+:	62.982	9.96	8.2	41.141	164.06	0.00	879.7 :	97.686	9.71	56.9	60.379	1261.95	0.00	6632.2 :	0.00	0.00

Page: 9 of 48 | Zoom: 100% | Print: Document Page | Setup: Printer Page | Finish

UltraEdit-32 - C:\Fvsdata\R1\Kipz\FT_10201.kcp

File Edit Search Project View Format Column Macro Advanced Window Help

rx_dfm

rgn_dfd_r.kcp | FT_10201.kcp

C:\Fvsdata\R1\Kipz\FT_10201.kcp

```
If                  0
SpMcDBH(1,ALL,0,0,2,0,999,0) LT _SEEDSAP*0.95**_AGEINT AND &
_RGN EQ 1 AND EVPHASE EQ 2
Then
Estab
Natural             0    Parms(GF, &
(   40.120-SpMcDBH(1,GF,0,0,2,0,999,0)) &
 *0.95**_AGEINT, 100.00, 0.00,   1.4, 0)
Natural             0    Parms(WL, &
(   31.487-SpMcDBH(1,WL,0,0,2,0,999,0)) &
 *0.95**_AGEINT, 100.00, 0.00,   3.2, 0)
Natural             0    Parms(ES, &
(    6.036-SpMcDBH(1,ES,0,0,2,0,999,0)) &
 *0.95**_AGEINT, 100.00, 0.00,   2.1, 0)
Natural             0    Parms(LP, &
(   42.304-SpMcDBH(1,LP,0,0,2,0,999,0)) &
 *0.95**_AGEINT, 100.00, 0.00,   2.3, 0)
Natural             0    Parms(PP, &
(   65.683-SpMcDBH(1,PP,0,0,2,0,999,0)) &
 *0.95**_AGEINT, 100.00, 0.00,   1.9, 0)
Natural             0    Parms(DF, &
(  910.639-SpMcDBH(1,DF,0,0,2,0,999,0)) &
 *0.95**_AGEINT, 100.00, 0.00,   1.9, 0)
Natural             0    Parms(RC, &
(    5.373-SpMcDBH(1,RC,0,0,2,0,999,0)) &
 *0.95**_AGEINT, 100.00, 0.00,   1.6, 0)
End
EndIf
Compute             1
_SEEDSAP=1200
End
```

C:\Fvsdata\R1\Kipz\rgn_dfd_r.kcp

```
If                  0
SpMcDBH(1,ALL,0,0,2,0,999,0) LT _SEEDSAP*0.95**_AGEINT AND &
_RGN EQ 2 AND EVPHASE EQ 2
Then
Estab
Natural             0    Parms(GF, &
(   67.792-SpMcDBH(1,GF,0,0,2,0,999,0)) &
 *0.95**_AGEINT, 100.00, 0.00,   1.0, 0)
Natural             0    Parms(WL, &
(   33.896-SpMcDBH(1,WL,0,0,2,0,999,0)) &
 *0.95**_AGEINT, 100.00, 0.00,   5.0, 0)
Natural             0    Parms(LP, &
(   31.834-SpMcDBH(1,LP,0,0,2,0,999,0)) &
 *0.95**_AGEINT, 100.00, 0.00,   2.2, 0)
Natural             0    Parms(WP, &
(    3.896-SpMcDBH(1,WP,0,0,2,0,999,0)) &
 *0.95**_AGEINT, 100.00, 0.00,   1.0, 0)
Natural             0    Parms(PP, &
(  465.489-SpMcDBH(1,PP,0,0,2,0,999,0)) &
 *0.95**_AGEINT, 100.00, 0.00,   1.8, 0)
Natural             0    Parms(DF, &
(  249.980-SpMcDBH(1,DF,0,0,2,0,999,0)) &
 *0.95**_AGEINT, 100.00, 0.00,   2.7, 0)
Natural             0    Parms(RC, &
(    3.896-SpMcDBH(1,RC,0,0,2,0,999,0)) &
 *0.95**_AGEINT, 100.00, 0.00,   1.0, 0)
End
EndIf
```

For Help, press F1 | Ln 1, Col. 1, C0 | DOS | Mod: 3/21/2005 12:57:05PM | File Size: 1827 | INS

Mortality Matters

The primary reason for initially producing the natural growth runs for each stand type is to estimate baseline within the realm of reasonableness. FVS does not contain a senescence algorithm. Without this constraint, FVS tends to produce stands with few trees that are very old and very large. Disturbance ecology is not its forte. The best way to establish baseline growth trends is to gleam inferences from the raw inventory data. That is, use non-modeled inventory data as a cross-check.

Average Maximum Size - Data Derived

FIA Code	FVS Spc	FIA Species	DBH	THT
017	GF	Grand fir	35	140
019	AF	Subalpine fir	31	120
064	JU	Western juniper	05	20
072	LL	Subalpine larch	21	60
073	WL	Western larch	41	140
093	ES	Engelmann spruce	43	150
101	WB	Whitebark pine	21	50
108	LP	Lodgepole pine	21	100
119	WP	Western white pine	31	150
122	PP	Ponderosa pine	35	130
202	DF	Douglas-fir	37	130
242	RC	Western redcedar	45	145
263	WH	Western hemlock	37	150
264	MH	Mountain hemlock	31	100
290	OS	Other softwoods	27	100
321	MM	Rocky Mountain maple	13	40
375	PB	Paper birch	13	70
740	CO	Cottonwood sp.	25	110
746	AS	Quaking Aspen	19	100

Average Maximum Densities - Data Derived

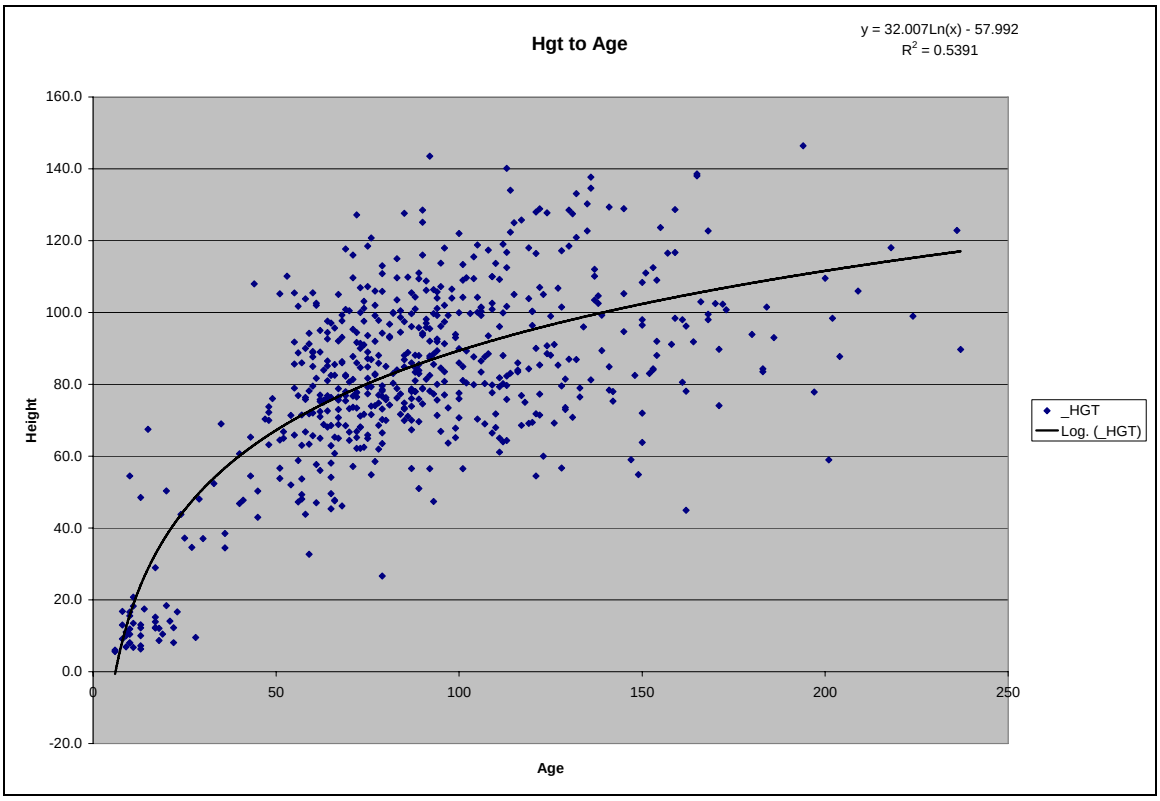
Type	FIA SDIMax	BAMax
dfd	340	140
dfm	470	190
gfx	500	220
lar	410	180
lpp	350	160
saf	510	230

Benchmark Filters

Exclude:		FIA Plots
		772
Cover Type -	NonID	714
Size Class -	Nonstocked	691
Canopy Cover -	Low 0-40%	512
Irregularities -	Size vs Age	422

Irregularities:

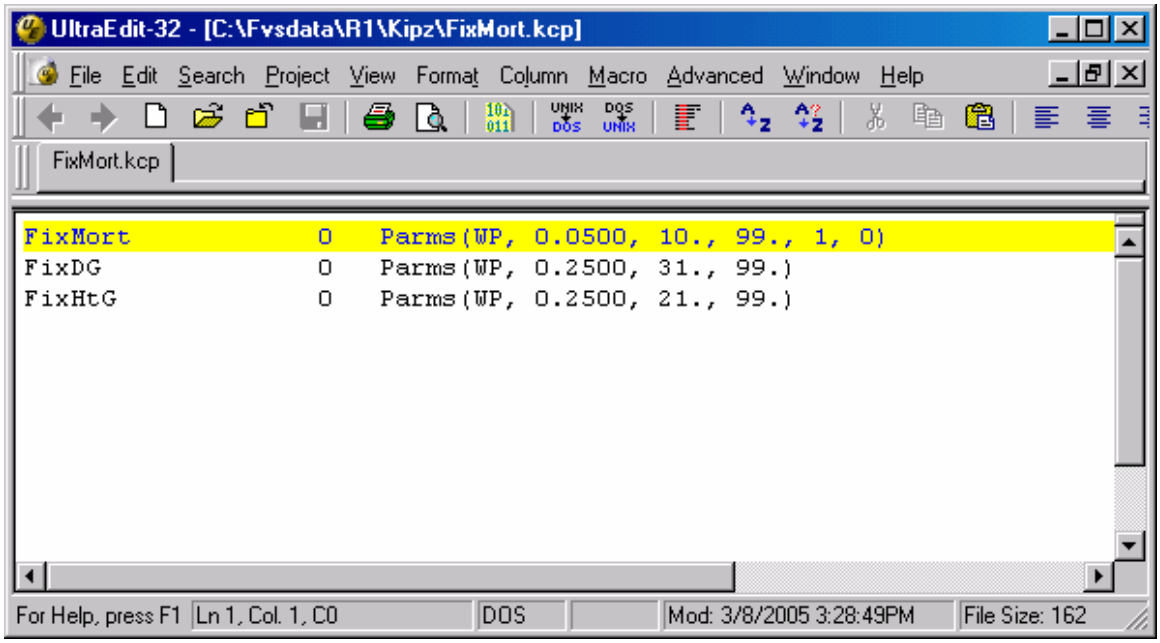
Size Class				Age Class
Large			Very	150+
Large	Medium		Large	100-150
Large	Medium		Medium	70-100
	Medium	Small	Small	30-70
		Small	SeedSap	0-30



Douglas-fir Dry: FIA Forest Type, Measured vs Modeled

	Douglas-fir Dry								
Meas.	Proj. Year.	Stand Age.	Std_Den Index	LiveAllSx Trees/Ac	LiveAllSx Avg_DBH5	LiveAllSx Avg_Hgt5	LiveAllSx BA/Ac	LiveAllSx Cu-A/Ac	LiveAllSx Bd/Ac
	40	33	370	4278.3	6.9	45.8	110.6	582.8	3131.8
	50	43	213	1849.1	7.2	42.9	72.5	722.6	3805.3
	60	52	193	1052.8	7.9	44.7	73.1	879.1	4733.6
	70	65	318	2301.6	7.8	49.4	110.2	1074.4	5623.1
	80	76	320	962.4	9.0	57.4	144.4	2642.4	13938.4
	90	86	298	871.4	10.2	61.9	140.3	3050.5	16369.5
	100	96	255	1205.1	9.7	57.0	96.8	1833.5	9855.5
	110	104	349	1450.7	8.6	57.1	138.5	2368.0	12677.1
	120	113	386	1480.6	8.5	56.1	157.7	2684.4	14225.7
	130	126	303	1296.2	9.5	56.9	118.9	2358.9	12820.5
	140	134	254	767.0	11.3	60.5	108.3	2418.0	13237.0
	150	146	296	1136.3	12.2	63.4	135.7	3101.0	16610.7
	160	159	303	894.1	12.8	65.2	147.2	3496.7	19022.1
Modl.	Proj. Year.	Stand Age.	Std_Den Index	LiveAllSx Trees/Ac	LiveAllSx Avg_DBH5	LiveAllSx Avg_Hgt5	LiveAllSx BA/Ac	LiveAllSx Cu-A/Ac	LiveAllSx Bd/Ac
	40	33	370	4278.3	6.9	45.8	110.6	582.8	3131.8
	50	43	227	2050.4	7.3	43.7	76.2	771.8	4107.1
	60	52	290	2170.7	7.9	45.6	97.5	1056.3	5550.9
	70	64	331	2153.1	8.0	49.1	116.5	1256.8	6506.2
	80	75	335	1263.8	8.9	55.1	142.1	2444.6	12851.4
	90	85	341	1481.8	9.1	55.2	131.9	2470.2	13102.0
	100	95	338	1361.8	9.6	57.1	132.4	2650.2	14162.4
	110	105	350	1279.7	9.6	58.0	140.7	2889.0	15456.9
	120	115	355	1284.6	9.9	59.2	142.7	3122.1	16737.7
	130	125	353	1207.1	10.2	60.2	143.4	3303.9	17960.8
	140	135	350	1091.0	10.7	62.2	144.7	3470.2	18831.7
	150	145	350	1124.5	11.4	64.5	146.7	3634.3	19805.0
	160	155	356	1115.2	11.7	65.7	147.8	3789.3	20858.4
	170	165	354	1055.2	12.2	67.9	148.6	3942.4	21857.6
	180	175	353	1004.3	12.6	69.7	149.6	4108.1	22973.3
	190	185	352	960.3	13.2	72.1	150.1	4247.8	23781.4
	200	195	351	930.7	13.7	74.0	150.7	4379.2	24740.0
	210	205	349	902.4	14.1	75.6	150.9	4502.1	25655.5
	220	215	347	876.2	14.6	77.7	151.1	4598.7	26443.0
	230	225	345	851.0	15.2	80.1	151.2	4670.4	27126.2
	240	235	344	826.6	15.7	82.1	151.2	4769.5	27773.6
	250	245	341	805.6	16.2	83.9	150.8	4843.0	28419.1
	260	255	339	789.0	16.7	85.8	150.4	4874.1	28694.4
	270	266	333	771.8	16.9	86.7	148.0	4840.2	28573.7
	280	275	329	757.9	17.1	87.1	146.0	4811.3	28751.0
	290	285	331	762.8	16.8	86.0	147.4	4721.0	27738.6
	300	295	324	755.8	16.9	86.5	143.6	4619.4	27258.2
	310	305	326	748.6	17.2	88.1	145.2	4675.1	27484.3
	320	316	321	740.3	17.5	86.0	143.0	4575.9	27269.1
	330	326	312	724.3	17.5	85.6	138.3	4353.4	25828.8
	340	336	310	707.4	17.6	86.7	138.1	4381.1	25968.9
	350	349	311	699.3	17.5	86.0	139.3	4496.4	26936.1

Western White Pine Adjustments:



V. Treatment Prescriptions

Management direction suggest action, be it passive or active. In preparation of a land and resource management plan, certain stand level treatments are postulated as potential activities to move the forest toward desired outcomes. For example, it may be proposed to reduce stocking densities to lessen insect impacts. It may also be recommended to provide remedial fuel treatments to minimize wildland fire intensity. It may additionally be advocated to produce a balance of stand size classes throughout the forest to furnish a spectrum of wildlife habitats. For each proposed action, a stand treatment schedule needs to be formulated to achieve the stated goal. The natural growth runs described in the previous section are a de facto prescription option to let stands grow without human intervention.

"Decision Variables" are synonymous with 'supply' and "Accounting Constraints" with 'demand' in resource allocation economics. Decision variables comprise the columns and accounting constraints comprise the rows in most linear programming models. Linear programming techniques have been employed for over two decades to assist solving forest planning problems. A decision variable represents the level of activity that can be undertaken on a given resource. The primary resource of the forest is the land. The primary unit is therefore expressed in terms of acres. The number of acres by stand type that are allocated to each activity renders an efficient solution to the planning problem.

Decision variables are combinations of stand type, silvicultural prescription, and timing option. Stand types identify unique vegetative units within a forest. Basic attributes are used to construct a stand type such as overstory cover, size class, crown density, site productivity, and understory component. The formulation of stand types was presented previously in this text. Associated silvicultural treatments and timing options will be presented in the following section.

Silvicultural Regimes

A silvicultural prescription is a 'blueprint' of recommended activities to be applied throughout the life span of a forest stand. Treatments for existing stands can be quite different than those for future stands. Thus, an activity schedule needs to be developed for each condition. Timing options are composed of timing choices and time periods. To provide flexibility in finding a good solution to the forest allocation problem, several timing choices are often presented. Offsetting the standard series of silvicultural events by plus or minus 10 years provides an expanded decision space. The planning horizon dictates the time periods to be represented in the forest planning model. If stand development needs to be tracked for 300 years (usually, up through rotation age of existing stand plus through the rotation age of the regenerated stands), or 30 10-year decade, then there are 30 time periods to consider per silvicultural treatment per stand type.

Culmination of Mean Annual Increment:

CMAI - FIA Forest Cover Type

		Size Class	CMAI
dfd		11	110
		12	100
	100	13	110
		20	100
		30	70
dfm		11	110
		12	100
	110	13	110
		20	110
		30	60
gfx		11	120
		12	110
	110	13	120
		20	90
		30	80
lar		11	
		12	120
	110	13	110
		20	90
		30	80
lpp		11	
		12	110
	100	13	100
		20	90
		30	70
saf		11	130
		12	140
	130	13	120
		20	120
		30	90

SPECIES PREFERENCE TABLE
KIPZ ZONE

STRATA	PP	DF	WP	GF	WL	WH	RC	LP	ES	MH	AF
DFD	1	2	3	3	2	3	3	3	3	3	3
DFM	2	2	2	3	1	3	3	3	2	3	3
GFX	3	3	1	2	2	2	2	3	2	3	3
LAR	2	2	2	3	1	3	3	3	2	3	3
LPP	3	2	2	3	2	3	3	1	2	3	3
SAF	3	1	2	3	1	3	3	2	2	2	2

1: Preferred (SPECPREF weight of 5 {A preferred species 3” or less in diameter will be favored over an desirable species or favored if 5” or less in diameter over an acceptable species})

2: Desirable (SPECPREF weight of 2 {A desirable species 2” or less in diameter will be favored over an acceptable species})

3: Acceptable (SPECPREF weight of 0)

KIPZ - Base Minimum Timing Option:

Even-Aged Silvicultural Prescription:

Stand Structure	All	dfd/dfm/gfx	lar	lpp	saf	Rx
		(EA)	(EA)	(EA)	(EA)	(EA)
	21-30	21-30	21-30	21-30	21-30	pct
	61-70	61-70	61-70	61-70	61-70	ct
Existing	101-110	101+		101+	101+	rh
	141-150		141-150			ct
	181+		181+			rh
		(EA)	(EA)	(EA)	(EA)	(EA)
	21-30	21-30	21-30	21-30	21-30	pct
	61-70	61-70	61-70	61-70	61-70	ct
Regenerated	101-110			101+		rh
	141-150	141-150	141-150		141+	ct/rh
	181+	181+	181+			rh

Code	Activity
(NG) -	Natural Grow
(EA) -	Even-Aged
(ITS) -	Individual Tre
(GS) -	Group Select
(PB) -	Prescribed B

Individual Tree Selection Silvicultural Prescription:

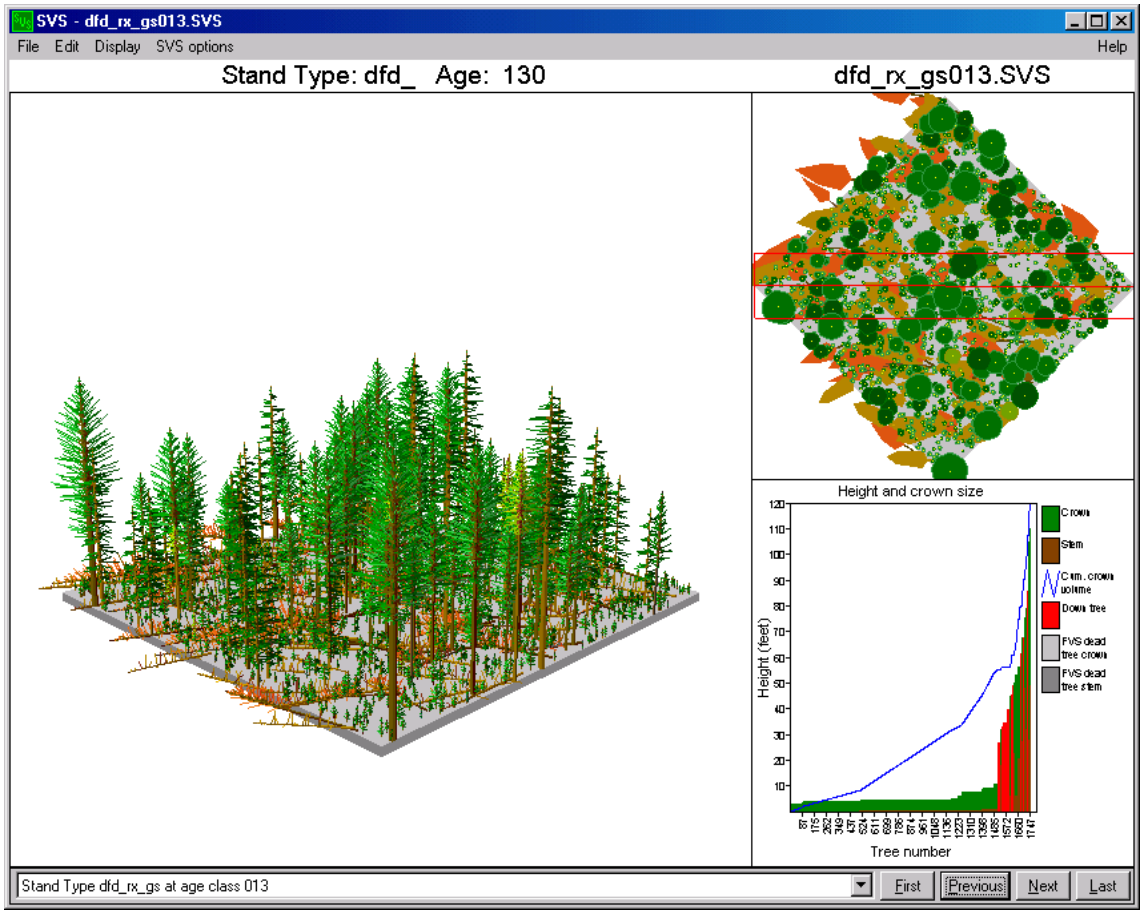
Stand Structure	All	dfd	dfm/lar	gfx	lpp	saf	Rx		
		(EA)	(EA)	(EA)	(EA)	(EA)	(EA)		
	21-30	21-30	21-30	21-30	21-30	21-30	pct		
	61-70			61-70	61-70		ct		
Existing	101-110			101+	101+		rh		
	141-150						ct		
	181+						rh		
		(ITS)	(GS)	(EA)	(EA)	(GS)	(ITS)	(GS)	(EA)
	21-30			21-30	21-30				pct
	61-70	61-70	61-70	61-70	61-70	61-70	its1	gp1	ct
Regenerated	101-110	101-110	101-110		101+	101-110	its2	gp2	rh
	141-150	141-150	141-150	141-150		141-150	its3	gp3	ct
	181-190	181-190	181-190	181+		181-190	its4	gp4	rh
	221-230	221-230	221-230				its5	gp5	

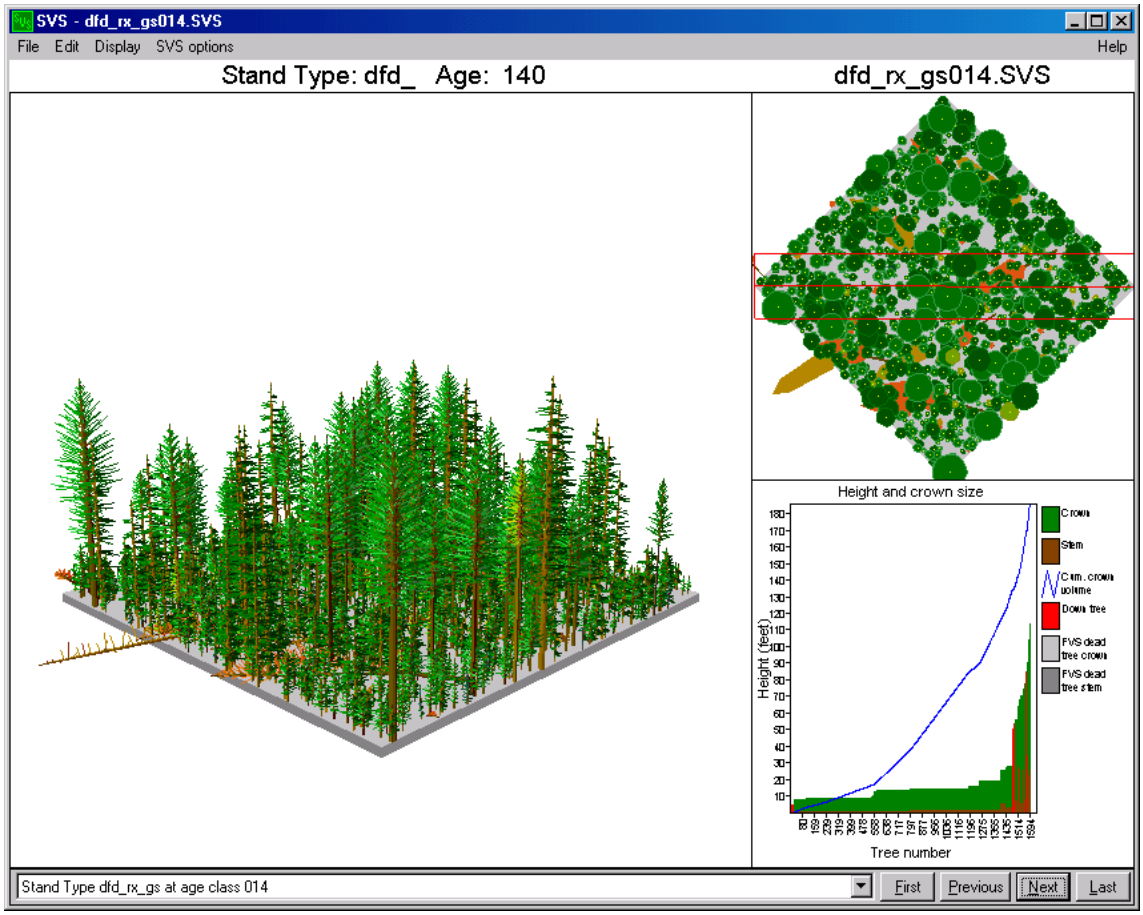
Group Selection Silvicultural Prescription:

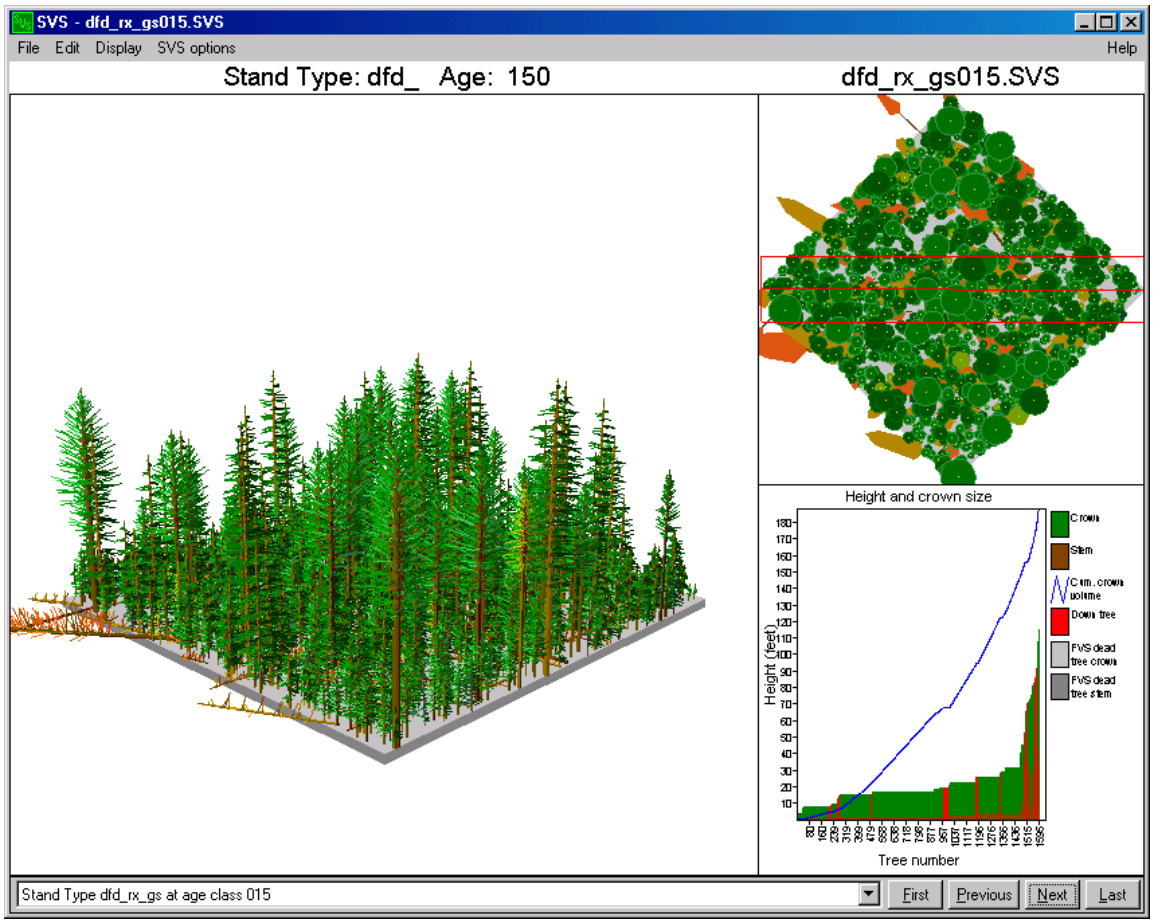
Stand Structure	All	dfd/dfm/lar	gfx	lpp	saf	Rx	
		(EA)	(EA)	(EA)	(EA)	(EA)	
	21-30	21-30	21-30	21-30	21-30	pct	
	61-70		61-70	61-70		ct	
Existing	101-110		101+	101+		rh	
	141-150					ct	
	181+					rh	
		(GS)	(EA)	(EA)	(GS)	(GS)	(EA)
	21-30		21-30	21-30			pct
	61-70	61-70	61-70	61-70	61-70	gp1	ct
Regenerated	101-110	101-110		101+	101-110	gp2	rh
	141-150	141-150	141-150		141-150	gp3	ct
	181-190	181-190	181+		181-190	gp4	rh
	221-230	221-230				gp5	

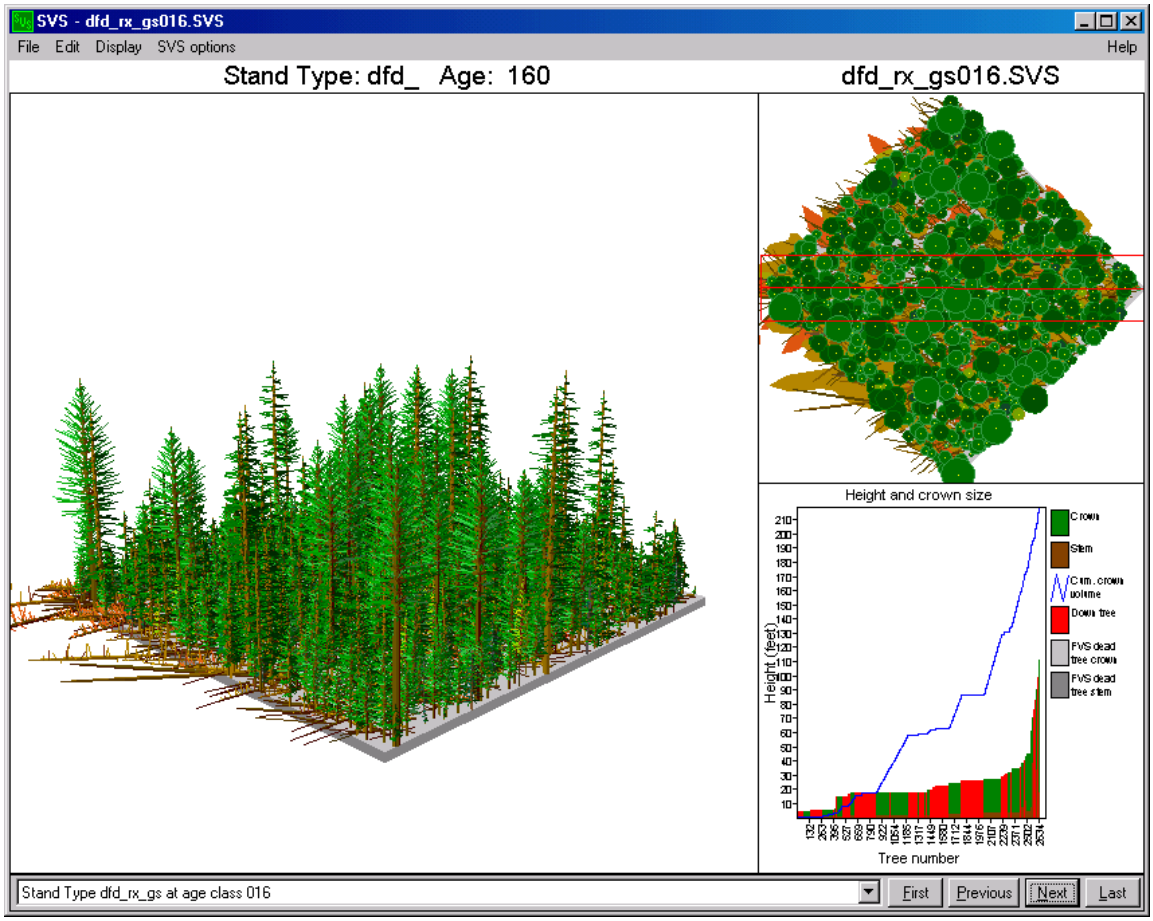
Prescribed Burn Silvicultural Prescription:

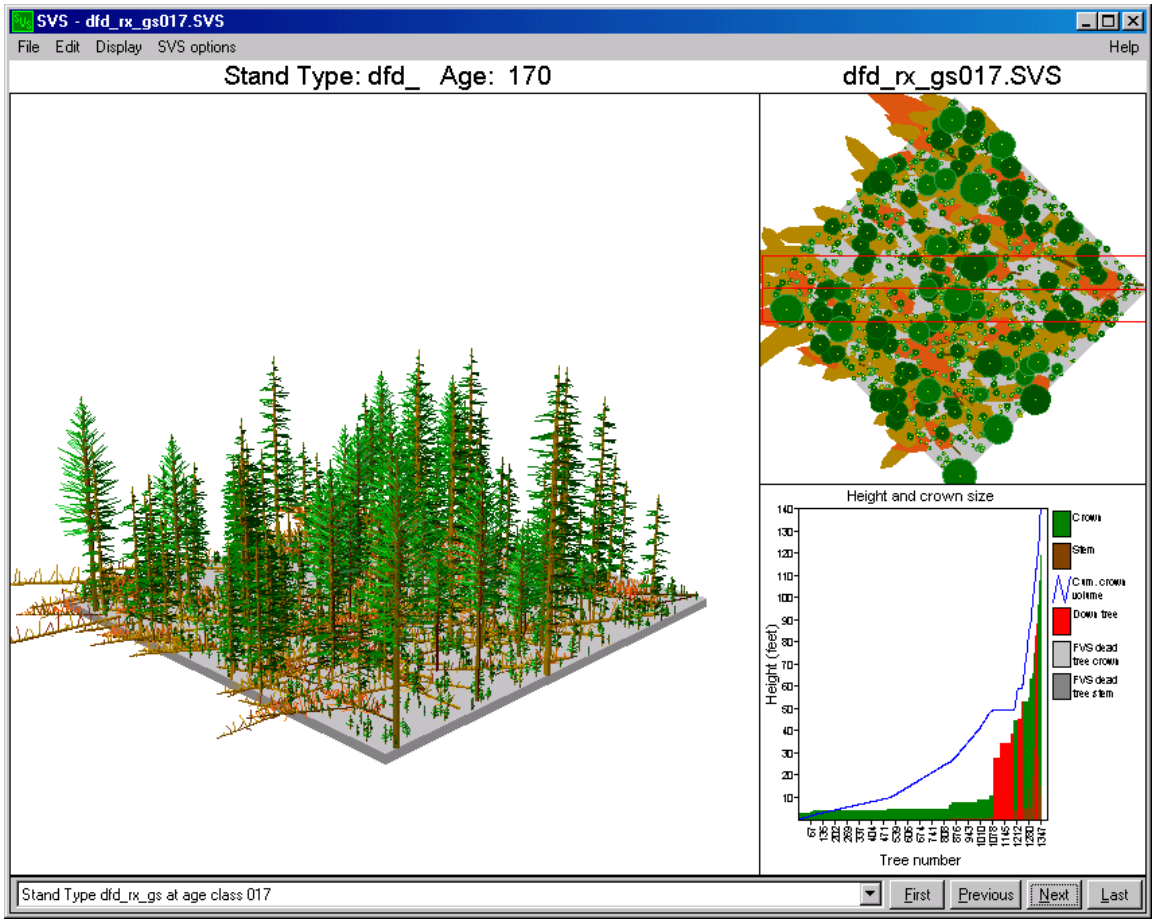
Stand Structure	All	dfd	dfm/lar	gfx	lpp	saf	Rx
		(EA)	(EA)	(EA)	(EA)	(EA)	(EA)
	21-30	21-30	21-30	21-30	21-30	21-30	pct
	61-70						ct
Existing	101-110						rh
	141-150						ct
	181+						rh
		(PB)	(PB)	(NG)	(NG)	(NG)	(PB)
	21-30						
	61-70	61-70	61-70				pb1
Regenerated	101-110	101-110	101-110				pb2
	141-150	141-150	141-150				pb3


SVS - dfd_rx_gs013.SVS
File Edit Display SVS options
Help
Stand Type: dfd_ Age: 130
dfd_rx_gs013.SVS
Height and crown size
Height (feet)
Tree number
Crown
Stem
Cum. crown volume
Down tree
FVS dead tree crown
FVS dead tree stem
Stand Type dfd_rx_gs at age class 013
First
Previous
Next
Last


SVS - dfd_rx_gs014.SVS
File Edit Display SVS options
Help
Stand Type: dfd_ Age: 140
dfd_rx_gs014.SVS
Height and crown size
Height (feet)
Tree number
Crown
Stem
Cum. crown volume
Down tree
FVS dead tree crown
FVS dead tree stem
Stand Type dfd_rx_gs at age class 014
First
Previous
Next
Last


SVS - dfd_rx_gs015.SVS
File Edit Display SVS options
Help
Stand Type: dfd_ Age: 150
dfd_rx_gs015.SVS
Height and crown size
Height (feet)
Tree number
Crown
Stem
Cum. crown volume
Down tree
FVS dead tree crown
FVS dead tree stem
Stand Type dfd_rx_gs at age class 015
First
Previous
Next
Last


SVS - dfd_rx_gs016.SVS
File Edit Display SVS options
Help
Stand Type: dfd_ Age: 160
dfd_rx_gs016.SVS
Height and crown size
Height (feet)
Tree number
Crown
Stem
Cum. crown volume
Down tree
FVS dead tree crown
FVS dead tree stem
Stand Type dfd_rx_gs at age class 016
First
Previous
Next
Last


SVS - dfd_rx_gs017.SVS
File Edit Display SVS options
Help
Stand Type: dfd_ Age: 170
dfd_rx_gs017.SVS
Height and crown size
Height (feet)
Tree number
Crown
Stem
Cum. crown volume
Down tree
FVS dead tree crown
FVS dead tree stem
Stand Type dfd_rx_gs at age class 017
First
Previous
Next
Last

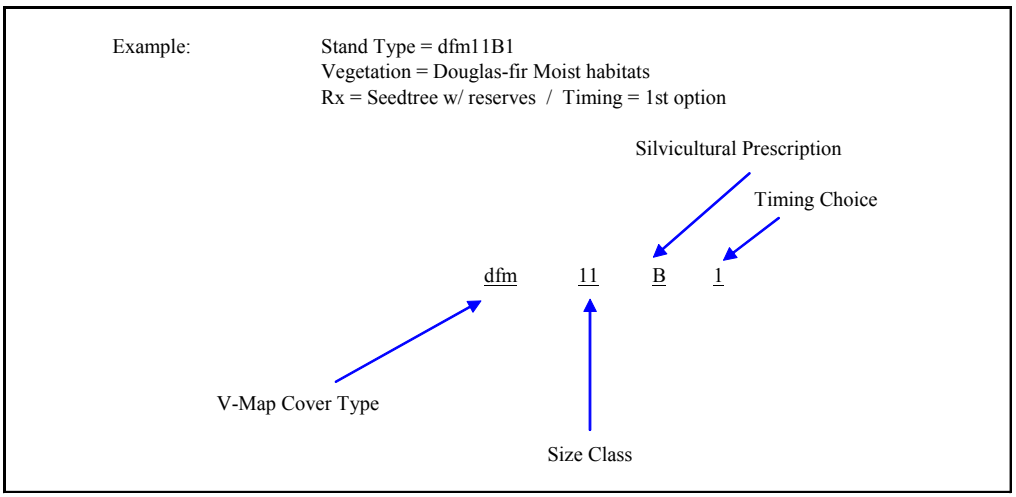
VI. Yield Profiles

As the name implies, the Forest Vegetation Simulator is much more than a timber tracking tool. Forest plan revision efforts are embroiled with contemporary issues such as forest structure (wildlife habitat and cover type transition), forest health (insect and disease impacts), and forest disturbance (wild fires and catastrophic wind events). The FVS model has evolved with time. Model Extensions have been added to address a myriad of concerns. Beyond reporting commodity production, ecosystem components are forecast. FVS is truly a full-scale vegetation projection model.

A fundamental step in forest planning is the analysis of the management situation. Various alternatives are proposed to guide future programmatic direction. Inherent to the analysis process is the gathering of inventory data and the projection of potential outcomes. Computer models play an important role in the projection process and formulation of management alternatives. Generally, two types of computer programs are used for forest planning. They are a yield forecasting model and a decision support system. An analogy could be drawn to a mechanized vehicle. The yield model is akin to the motor. It powers current and future developments by providing value estimates. The decision support model is analogous to the chassis. It pulls together the resource supply and user demand components of forest planning. Coefficients computed by the yield model are keyed into the decision support model to drive allocation decisions.

Accounting Variables

A list of output variables was developed that would be comprised of yield estimates. These values would be input into the forest planning model to aid in solving for the best combination of activities subject to resource constraints.



```
*Base Model Output Variables: Fvsstand Alone Post Processor
1  - Strata    = Stand Type/Rx/Timing Choice Label
1  - Proj_Year = Projection Cycle Year
1  - St_Age/10 = Stand Age/10 years
1  - Stand_Age = Stand Age
1  - StDnIndex = Stand Density Index
1  - CulmMAI-A = Culmination Mean Annual Increment - Merchantable Cubic Feet, All Trees
1  - Qd_Mn_Dia = Quadratic Mean Diameter
1  - Plt_Acres = Plot Acres (Count)
1  - Trt_Acres = Treatment Acres (Count)
1  - LTr.AllSx = Live/Trees per Acre/All Species/All Size Classes                                  ----------------------------
1  - LAD.AllSx = Live/Average DBH/All Species/All Size Classes                                     |
1  - LAH.AllSx = Live/Average Height/All Species/All Size Classes                                  |
1  - LBA.AllSx = Live/Basal Area per Acre/All Species/All Size Classes                             |
1  - LCA.AllSx = Live/Cubic Feet per Acre/All Species/All Size Classes, All Trees - Cubic Top       |
1  - LBd.AllSx = Live/Board Feet per Acre/All Species/All Size Classes                             | All Species
1  - HTr.AllSx = Harvest/Trees per Acre/All Species/All Size Classes                               | - Sx = All Size Classes
1  - HAD.AllSx = Harvest/Average DBH/All Species/All Size Classes                                  |
1  - HAH.AllSx = Harvest/Average Height/All Species/All Size Classes                               |
1  - HBA.AllSx = Harvest/Basal Area per Acre/All Species/All Size Classes                          |
1  - HCA.AllSx = Harvest/Cubic Feet per Acre/All Species/All Size Classes, All Trees - Cubic Top    |
1  - HBd.AllSx = Harvest/Board Feet per Acre/All Species/All Size Classes                          |
1  - LTr.Gp1Xx = Live/Trees per Acre/All Species/Mature Size Classes                               ----------------------------
1  - LAD.Gp1Xx = Live/Average DBH/All Species/Mature Size Classes                                  |
1  - LAH.Gp1Xx = Live/Average Height/All Species/Mature Size Classes                               |
1  - LBA.Gp1Xx = Live/Basal Area per Acre/All Species/Mature Size Classes                          |
1  - LCA.Gp1Xx = Live/Cubic Feet per Acre/All Species/Mature Size Classes, All Trees - Cubic Top    |
1  - LBd.Gp1Xx = Live/Board Feet per Acre/All Species/Mature Size Classes                          | All Species
1  - HTr.Gp1Xx = Harvest/Trees per Acre/All Species/Mature Size Classes                            | - Xx = Mature Size Classes
1  - HAD.Gp1Xx = Harvest/Average DBH/All Species/Mature Size Classes                               |
1  - HAH.Gp1Xx = Harvest/Average Height/All Species/Mature Size Classes                            |
1  - HBA.Gp1Xx = Harvest/Basal Area per Acre/All Species/Mature Size Classes                       |
1  - HCA.Gp1Xx = Harvest/Cubic Feet per Acre/All Species/Mature Size Classes, All Trees - Cubic Top |
1  - HBd.Gp1Xx = Harvest/Board Feet per Acre/All Species/Mature Size Classes                       |
1  - LTr.Gp2Mm = Live/Trees per Acre/All Species/Mid-Age Size Classes                              ----------------------------
1  - LAD.Gp2Mm = Live/Average DBH/All Species/Mid-Age Size Classes                                 |
1  - LAH.Gp2Mm = Live/Average Height/All Species/Mid-Age Size Classes                              |
1  - LBA.Gp2Mm = Live/Basal Area per Acre/All Species/Mid-Age Size Classes                         |
1  - LCA.Gp2Mm = Live/Cubic Feet per Acre/All Species/Mid-Age Size Classes, All Trees - Cubic Top   |
1  - LBd.Gp2Mm = Live/Board Feet per Acre/All Species/Mid-Age Size Classes                         | All Species
1  - HTr.Gp2Mm = Harvest/Trees per Acre/All Species/Mid-Age Size Classes                           | - Mm = Mid-Age Size Classes
1  - HAD.Gp2Mm = Harvest/Average DBH/All Species/Mid-Age Size Classes                              |
1  - HAH.Gp2Mm = Harvest/Average Height/All Species/Mid-Age Size Classes                           |
1  - HBA.Gp2Mm = Harvest/Basal Area per Acre/All Species/Mid-Age Size Classes                      |
1  - HCA.Gp2Mm = Harvest/Cubic Feet per Acre/All Species/Mid-Age Size Classes, All Trees - Cubic Top |
1  - HBd.Gp2Mm = Harvest/Board Feet per Acre/All Species/Mid-Age Size Classes                      |
1  - LTr.Gp3Yy = Live/Trees per Acre/All Species/Young Size Classes                                ----------------------------
1  - LAD.Gp3Yy = Live/Average DBH/All Species/Young Size Classes                                   |
1  - LAH.Gp3Yy = Live/Average Height/All Species/Young Size Classes                                |
1  - LBA.Gp3Yy = Live/Basal Area per Acre/All Species/Young Size Classes                           |
1  - LCA.Gp3Yy = Live/Cubic Feet per Acre/All Species/Young Size Classes, All Trees - Cubic Top     |
1  - LBd.Gp3Yy = Live/Board Feet per Acre/All Species/Young Size Classes                           | All Species
1  - HTr.Gp3Yy = Harvest/Trees per Acre/All Species/Young Size Classes                             | - Yy = Young Size Classes
1  - HAD.Gp3Yy = Harvest/Average DBH/All Species/Young Size Classes                                |
1  - HAH.Gp3Yy = Harvest/Average Height/All Species/Young Size Classes                             |
1  - HBA.Gp3Yy = Harvest/Basal Area per Acre/All Species/Young Size Classes                        |
1  - HCA.Gp3Yy = Harvest/Cubic Feet per Acre/All Species/Young Size Classes, All Trees - Cubic Top  |
1  - HBd.Gp3Yy = Harvest/Board Feet per Acre/All Species/Young Size Classes                        |
1  - LTr.Gp4Ss = Live/Trees per Acre/All Species/Young Size Classes                                ----------------------------
1  - LAD.Gp4Ss = Live/Average DBH/All Species/Sapling Size Classes                                 |
1  - LAH.Gp4Ss = Live/Average Height/All Species/Sapling Size Classes                              |
1  - LBA.Gp4Ss = Live/Basal Area per Acre/All Species/Sapling Size Classes                         |
1  - LCA.Gp4Ss = Live/Cubic Feet per Acre/All Species/Sapling Size Classes, All Trees - Cubic Top   |
1  - LBd.Gp4Ss = Live/Board Feet per Acre/All Species/Sapling Size Classes                         | All Species
1  - HTr.Gp4Ss = Harvest/Trees per Acre/All Species/Sapling Size Classes                           | - Ss = Sapling Size Classes
1  - HAD.Gp4Ss = Harvest/Average DBH/All Species/Sapling Size Classes                              |
1  - HAH.Gp4Ss = Harvest/Average Height/All Species/Sapling Size Classes                           |
1  - HBA.Gp4Ss = Harvest/Basal Area per Acre/All Species/Sapling Size Classes                      |
1  - HCA.Gp4Ss = Harvest/Cubic Feet per Acre/All Species/Sapling Size Classes, All Trees - Cubic Top |
1  - HBd.Gp4Ss = Harvest/Board Feet per Acre/All Species/Sapling Size Classes                      |
1  - PCA.AllSx = Proportion Cut/Cubic Feet per Acre/All Species/All Size Classes, All Trees - Cubic Top  ----------------------------
1  - PBd.AllSx = Proportion Cut/Board Feet per Acre/All Species/All Size Classes                     | - Sx = All Size Classes
1  - PCA.Gp1Xx = Proportion Cut/Cubic Feet per Acre/All Species/Mature Size Classes, All Trees - Cubic Top  ----------------------------
1  - PBd.Gp1Xx = Proportion Cut/Board Feet per Acre/All Species/Mature Size Classes                  | - Xx = Mature Size Classes
1  - PCA.Gp2Mm = Proportion Cut/Cubic Feet per Acre/All Species/Mid-Age Size Classes, All Trees - Cubic Top  ----------------------------
1  - PBd.Gp2Mm = Proportion Cut/Board Feet per Acre/All Species/Mid-Age Size Classes                 | - Mm = Mid-Age Size Classes
1  - PCA.Gp3Yy = Proportion Cut/Cubic Feet per Acre/All Species/Young Size Classes, All Trees - Cubic Top  ----------------------------
1  - PBd.Gp3Yy = Proportion Cut/Board Feet per Acre/All Species/Young Size Classes                   | - Yy = Young Size Classes
1  - PCA.Gp4Ss = Proportion Cut/Cubic Feet per Acre/All Species/Sapling Size Classes, All Trees - Cubic Top  ----------------------------
1  - PBd.Gp4Ss = Proportion Cut/Board Feet per Acre/All Species/Sapling Size Classes                 | - Ss = Sapling Size Classes
                                                                                                     ----------------------------
```

```
*Structure Variables: Compute Post Processor
2  - _STNDAGE  = Stand Age
2  - _AGEINT   = Stand Age Interval - 10 years
2  - _FORTYP   = Forest Cover Type (FIA Algorithm)
2  - _CMPSC    = Computed Stand Size Class (FIA Algorithm)
2  - _CC00P    = Canopy Cover 0" plus
2  - _CC09P    = Canopy Cover 9" plus
2  - _CC15P    = Canopy Cover 15" plus
2  - _CC20P    = Canopy Cover 20" plus
2  - _LYNX     = Lynx Habitat

*Fire Variables: Compute Post Processor
3  - _CRBD     = Crown Bulk Density
3  - _TRIDX    = Torching Index - Severe Fire
3  - _CRIDX    = Crowning Index - Severe Fire
3  - _FIRE     = Fire Hazard Rating - Torching x Crowning Index Matrix
3  - _SNAG10T  = Snags 10"-20"
3  - _SNAG20P  = Snags 20" plus


*Pest Variables: Compute Post Processor
4  - _ESBTL    = Spruce Beetle
4  - _DFBTL    = Douglas-fir Beetle
4  - _PPBTL    = Ponderosa Pine (MPB/WPB)
4  - _WPBTL    = Western White Pine (MPB)
4  - _LPBTL    = Lodgepole Pine (MPB)
4  - _HZBTL    = Composite Beetle Hazard
4  - _BDWTSM   = W. Spruce Budworm/DF Tussock Moth
```

Timing Option:

Code -	Description -
0	Base Minimum
1	Offset 1
2	Offset 2
3	Offset 3
4	Offset 4
5	Offset 5

KIPZ FIA Forest Types

V-Map	FIA-FT	Existing Stands	FIA-FT	Regenerated Stands
dfd	201	Douglas-fir		
	221	Ponderosa Pine	221	Ponderosa Pine
dfm	201	Douglas-fir	321	Western Larch
gfx	241	W. White Pine	241	W. White Pine
	267	Grand Fir		
	301	Western Hemlock		
	304	Western Redcedar		
	902	Paper Birch		
lar	321	Western Larch	321	Western Larch
lpp	281	Lodgepole Pine	281	Lodgepole Pine
saf	265	Engelmann Spruce	201	Douglas-fir
	266	Engelmann Spruce-Subalpine Fir	321	Western Larch
	268	Subalpine Fir		
	270	Mountain Hemlock		
	367	Whitebark Pine		
	368	Misc. Western Softwoods		
	901	Aspen		
non	999	Nonstocked	999	Nonstocked

Predicted 10-year Average IPNF Fuel Moisture Percentage and Temperature Measurements (1994-2003) from Fire Family Plus (RAWS)

June 1 - October 31

Fuel Class	**Percentile**		
	80th	90th	97th
1 Hour	5	4	3
10 Hour	6	5	4
100 Hour	10	9	8
1000 Hour	13	12	11
Duff*	75	40	20
Live	95	86	78
Wind Speed**	10	12	15
Temperature	80	85	90

*FOFEM inputs for IPNF moist site forests
** 97th percentile default from NRO. 80th and 90th percentile estimated by Fuel Management Specialist, IPNF.

```
*******************************************************************************
* Fire.kcp -- Fire Model Output Variables (Severe Fire)            01/19/2005 *
*  _CRBD   =Crown Bulk Density                                                *
*  _CRBHT  =Crown Base Height                                                 *
*  _FLGTH  =Flame Length                                                      *
*  _TRIDX  =Torching Index                                                    *
*  _CRIDX  =Crowning Index                                                    *
*  _FIRE   =Fire Hazard Rating                                                *
*  _SNAGS  =Number of hard and Soft Snags per Acre                            *
*                                                                             *
*  Fire Hazard Rating: Calculated from Torching and Crowning Index            *
*   - Hazard Matrix developed by Paul Langowski & Eric Twombley {INFORMS}     *
*                                                                             *
*                       Crowning Index                                        *
*                       Low  Med  High                                        *
*                                                                             *
*              Low       L    M    M          L = Low                        *
*                        --------------        M = Moderate                   *
*    Torching  Med       M    H    VH         H = High                       *
*    Index               --------------       VH = Very High                  *
*              High      H    VH   E          E = Extreme                    *
*             ============================                                    *
*                                                                             *
*                Torching         Crowning                                    *
*                 Index            Index                                      *
*                                                                             *
*    High         15 mph-          15 mph-                                   *
*                                                                             *
*    Medium     >=16-39<=        >=16-39<=                                   *
*                                                                             *
*    Low          40 mph+          40 mph+                                   *
*    ====================================                                     *
*                                                                             *
*  Low(1), Moderate(2), High(3), VeryHigh(4), Extreme(5),                     *
*  Undefined(0) = canopy fuels so sparse, canopy base hgt undefined. CI&TI=-1  *
*******************************************************************************
```

```
*******************************************************************************
* Pest.kcp -- Forest Health Hazard Rating System                  (03/22/2005) *
* ========                                                                     *
*                                                                              *
*  Spruce Beetle:                                                              *
*  --------------                                                              *
*                              Low     Moderate     High       Multiplicative   *
*  QMD ES >=10″ dbh          <12                   >=16          L=   <2       *
*  Stand Basal Area          <100                  >=150         M=  2-17      *
*  % BA: ES >=10"            <50                   >=65          H=  >=18      *
*                                                                              *
*  Douglas-fir Beetle:                                                         *
*  -------------------                                                         *
*                              Low     Moderate     High       Multiplicative   *
*  QMD DF >= 9″ dbh          <10                   >=14          L=   <2       *
*  Stand Basal Area          <100                  >=250         M=  2-17      *
*  % BA: DF >=9"             <50                   >=50          H=  >=18      *
*                                                                              *
*  Ponderosa Pine (MPB/ WPB):                                                  *
*  --------------------------                                                  *
*                              Low     Moderate     High       Multiplicative   *
*  QMD PP >= 5″ dbh          <6                    >=10          L=   <2       *
*  Stand Basal Area          <80                   >=120         M=  2-17      *
*  % BA: PP >=5"             <40                   >=65          H=  >=18      *
*                                                                              *
*  White Pine (MPB):                                                           *
*  -----------------                                                           *
*                              Low     Moderate     High       Multiplicative   *
*  QMD WP >= 5″ dbh          <8                    >=12          L=   <2       *
*  Stand Basal Area          <80                   >=120         M=  2-17      *
*  % BA: WP >=5"             <25                   >=50          H=  >=18      *
*                                                                              *
*  Lodgepole Pine (MPB):                                                       *
*  ---------------------                                                       *
*                              Low              Moderate         High          *
*  QMD LP >= 5″ dbh          <7                                >=8             *
*  Stand Basal Area          <80 or >=250                      >=120 and <250  *
*  % BA: LP >=5"             <25                               >=50            *
*  Trees per acre >= 3″ dbh  <100 or >=800 100-300 or 600-800  >=300 and < 600 *
*  Elevation {feet}          >=7,500          5,000-7,500      <5,000          *
*                            {Multiplicative: L= <3 / M= 3-107 / H= >=108}     *
*                                                                              *
*  Western Spruce Budworm/Douglas-fir Tussock Moth:                            *
*  ------------------------------------------------                            *
*                               Low     Moderate     High      Multiplicative   *
*  Stand Basal Area            <80                   >=100        L=   <2       *
*  % BA: ES, AF, GF, DF        <50                   >=80         M=  2-17      *
*  Trees per acre >= 5″ dbh    <50                   >=100        H=  >=18      *
*                                                                              *
* ============================================================================ *
*  Hazard Ratings: No Host (0), Low(1), Moderate(2), High(3)                   *
*******************************************************************************
```

Combinations of Hazard Rating System for Primary Change Agents

	Criteria			Rating			Hazard				
Rating	C1	C2	C3	R1	R2	R2	HZ		Rank	Counts	Percent
	L	L	L	0.5	0.5	0.5	0.125		0.125		
			M	0.5	0.5	2.0	0.500		0.500		
			H	0.5	0.5	3.0	0.750		0.500		
		M	L	0.5	2.0	0.5	0.500		0.500		
			M	0.5	2.0	2.0	2.000		0.750		
			H	0.5	2.0	3.0	3.000		0.750		
		H	L	0.5	3.0	0.5	0.750		0.750	7	0.26
			M	0.5	3.0	2.0	3.000		2.000		
			H	0.5	3.0	3.0	4.500		2.000		
									2.000		
	M	L	L	2.0	0.5	0.5	0.500		3.000		
			M	2.0	0.5	2.0	2.000		3.000		
			H	2.0	0.5	3.0	3.000		3.000		
		M	L	2.0	2.0	0.5	2.000		3.000		
			M	2.0	2.0	2.0	8.000		3.000		
			H	2.0	2.0	3.0	12.000		3.000		
		H	L	2.0	3.0	0.5	3.000		4.500		
			M	2.0	3.0	2.0	12.000		4.500		
			H	2.0	3.0	3.0	18.000		4.500		
									8.000		
	H	L	L	3.0	0.5	0.5	0.750		12.000		
			M	3.0	0.5	2.0	3.000		12.000		
			H	3.0	0.5	3.0	4.500		12.000	16	0.59
		M	L	3.0	2.0	0.5	3.000		18.000		
			M	3.0	2.0	2.0	12.000		18.000		
			H	3.0	2.0	3.0	18.000		18.000		
		H	L	3.0	3.0	0.5	4.500		27.000	4	0.15
			M	3.0	3.0	2.0	18.000				
			H	3.0	3.0	3.0	27.000				

KIPZ - FIA Plot Distribution per Hazard Rating

	Haz Rating	Plt Count	Rating %
Spruce Beetle	High	6	0.8
	Moderate	110	14.2
	Low	203	26.3
	No Host	453	58.7
		772	100.0

	Haz Rating	Plt Count	Rating %
Douglas-fir Beetle	High	38	4.9
	Moderate	262	33.9
	Low	217	28.1
	No Host	255	33.0
		772	100.0

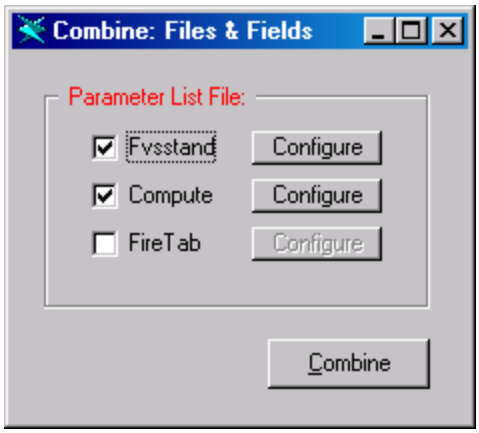
	Haz Rating	Plt Count	Rating %
Ponderosa Pine (MPB)	High	1	0.1
	Moderate	52	6.7
	Low	32	4.1
	No Host	687	89.0
		772	100.0

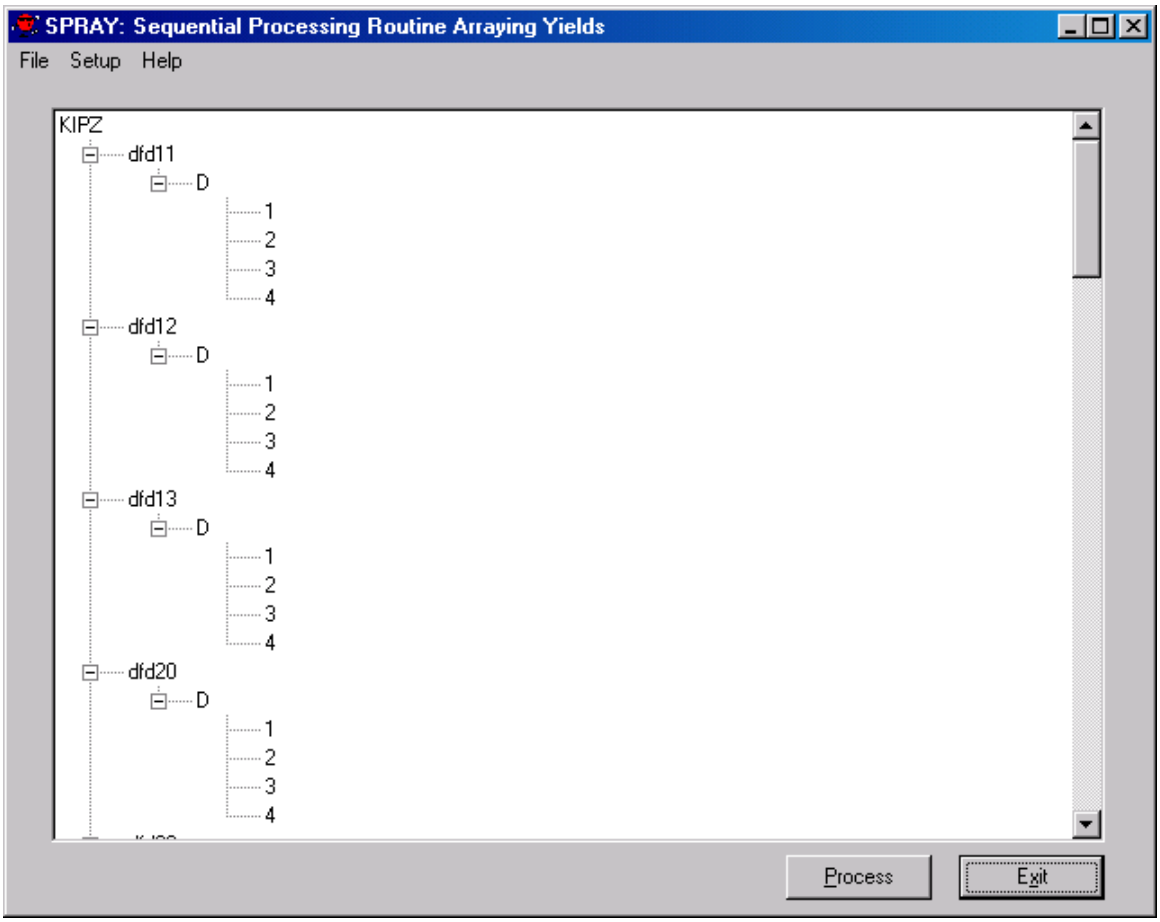
	Haz Rating	Plt Count	Rating %
White Pine (MPB)	High	2	0.3
	Moderate	62	8.0
	Low	158	20.5
	No Host	550	71.2
		772	100.0

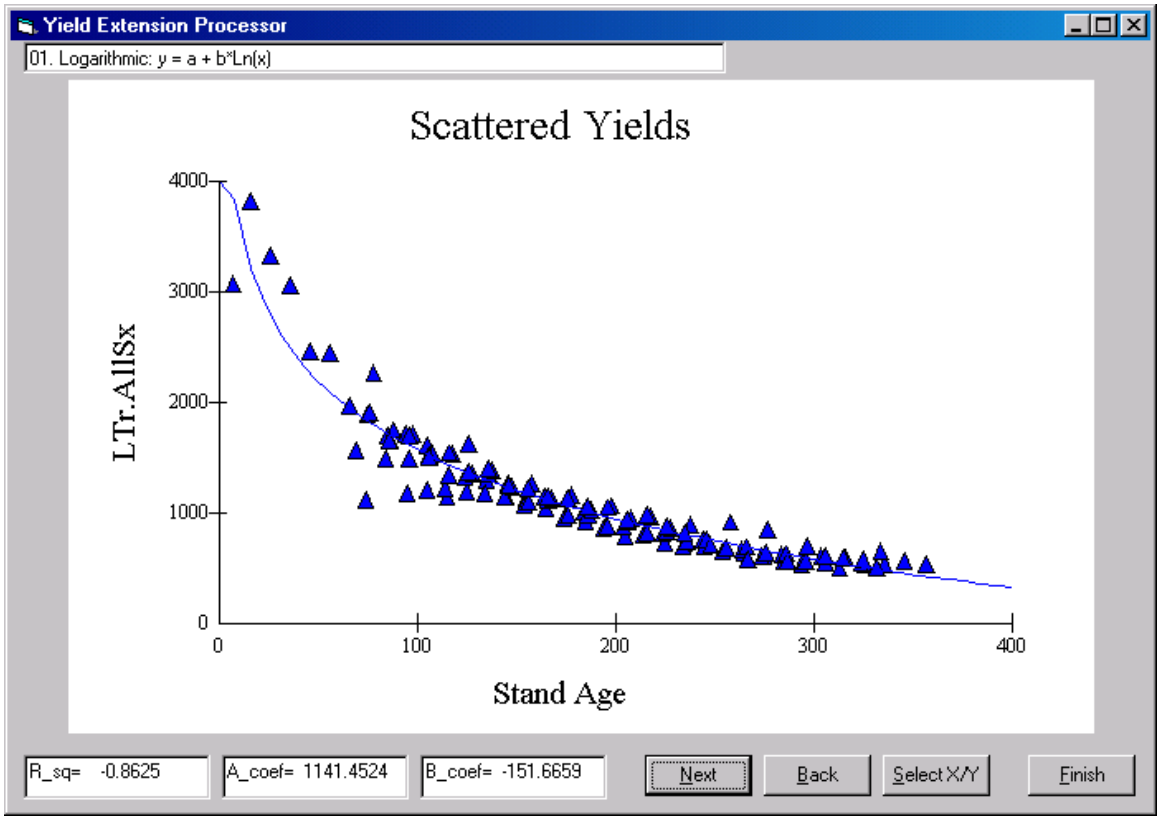
	Haz Rating	Plt Count	Rating %
Lodgepole Pine (MPB)	High	46	6.0
	Moderate	209	27.1
	Low	62	8.0
	No Host	455	58.9
		772	100.0

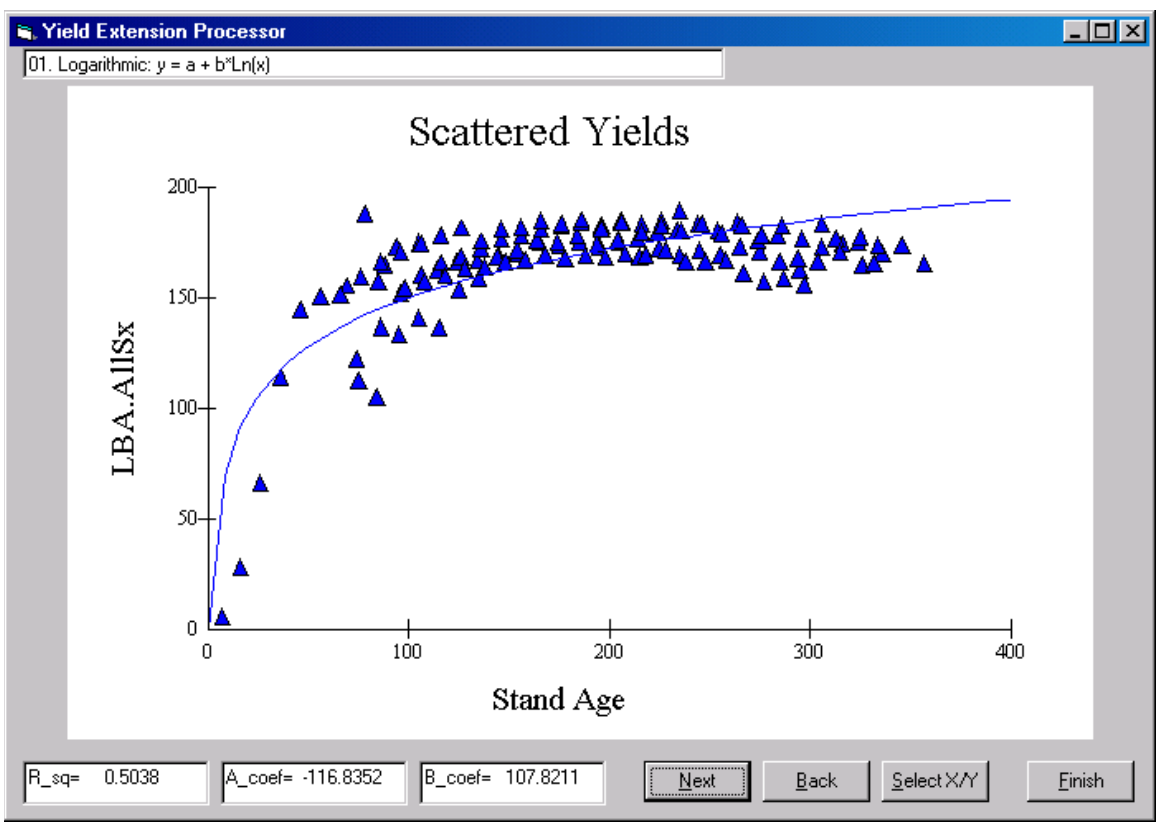
	Haz Rating	Plt Count	Rating %
All Beetles	High	93	12.0
	Moderate	424	54.9
	Low	182	23.6
	No Host	73	9.5
		772	100.0

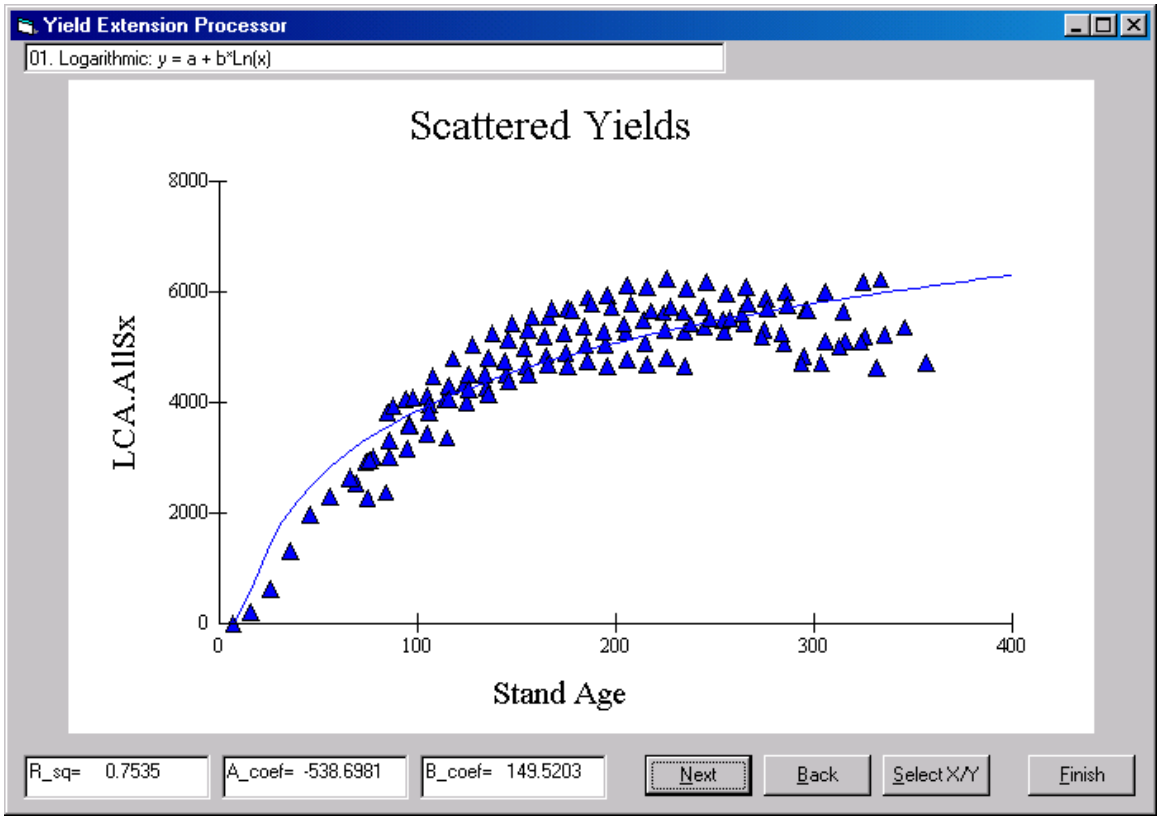
	Haz Rating	Plt Count	Rating %
W. Spruce Budworm/ DF Tussock Moth	High	214	27.7
	Moderate	346	44.8
	Low	168	21.8
	No Host	44	5.7
		772	100.0

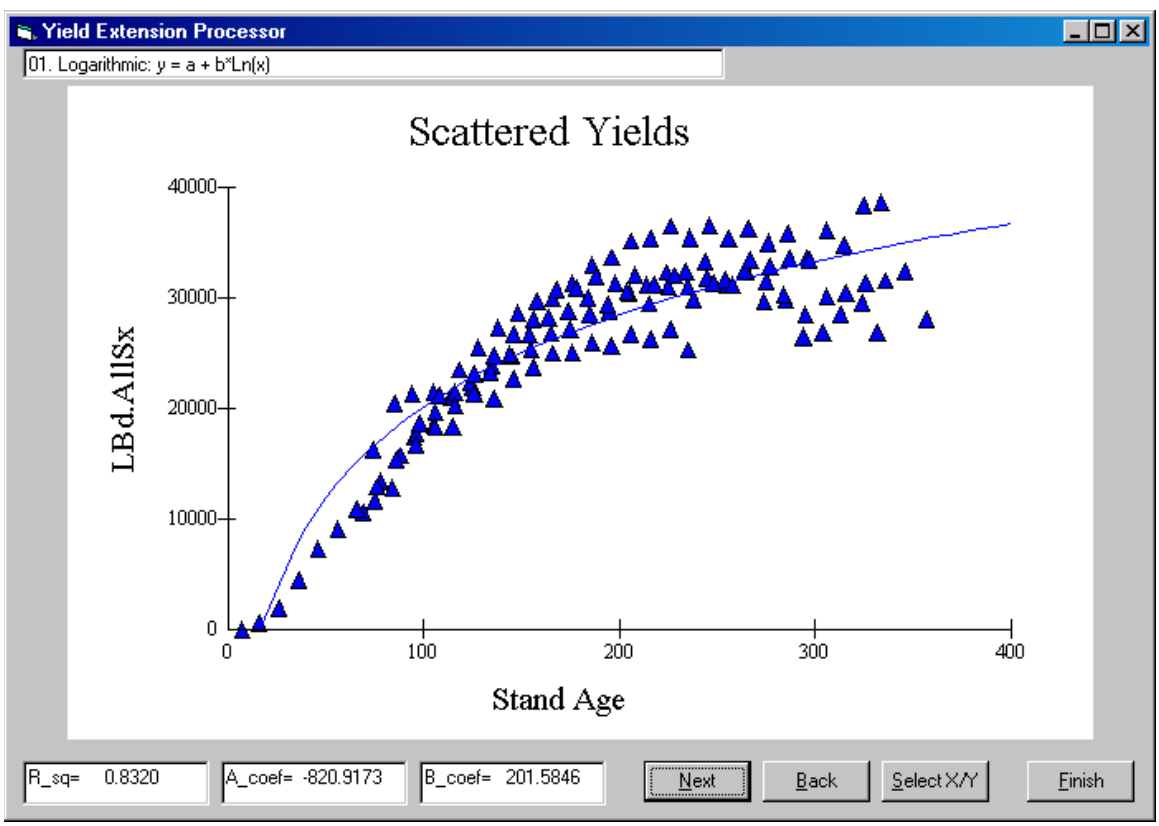

Combine: Files & Fields
Parameter List File:
Fvsstand
Configure
Compute
Configure
FireTab
Configure
Combine

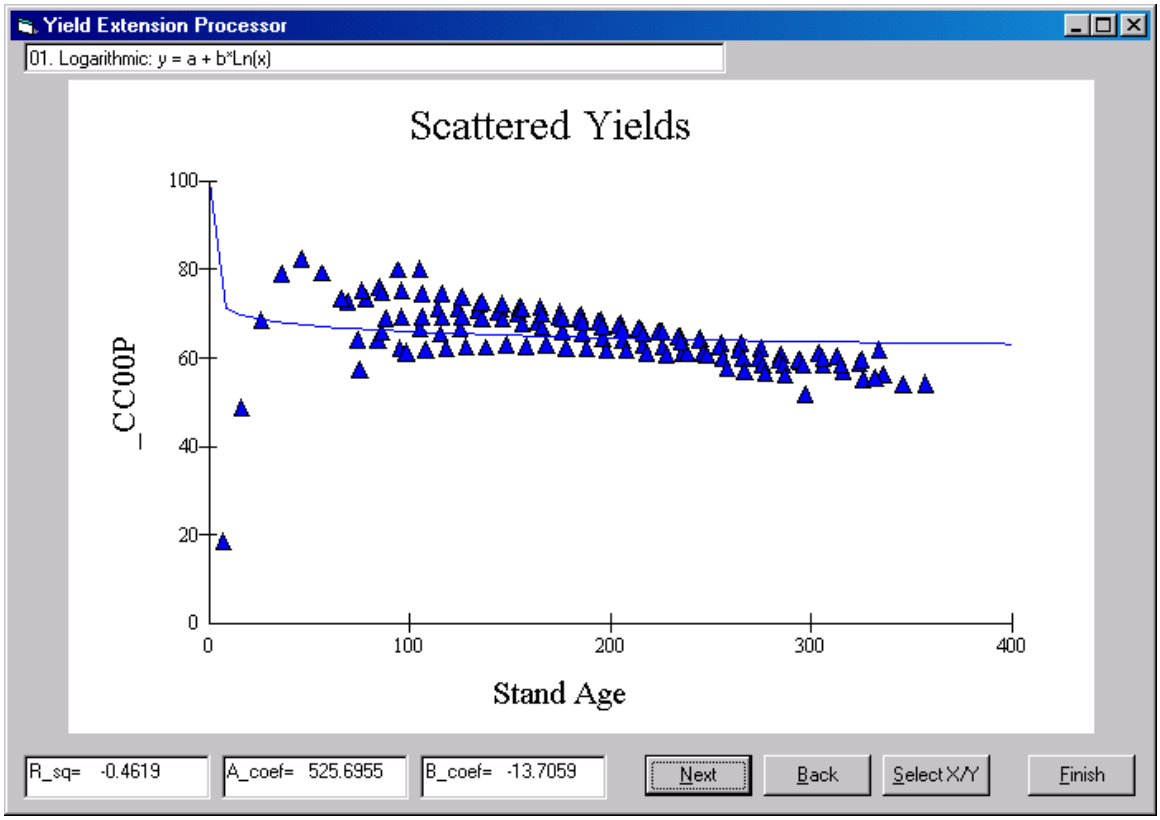

SPRAY: Sequential Processing Routine Arraying Yields
File
Setup
Help
KIPZ
dfd11
D
1
2
3
4
dfd12
D
1
2
3
4
dfd13
D
1
2
3
4
dfd20
D
1
2
3
4
Process
Exit

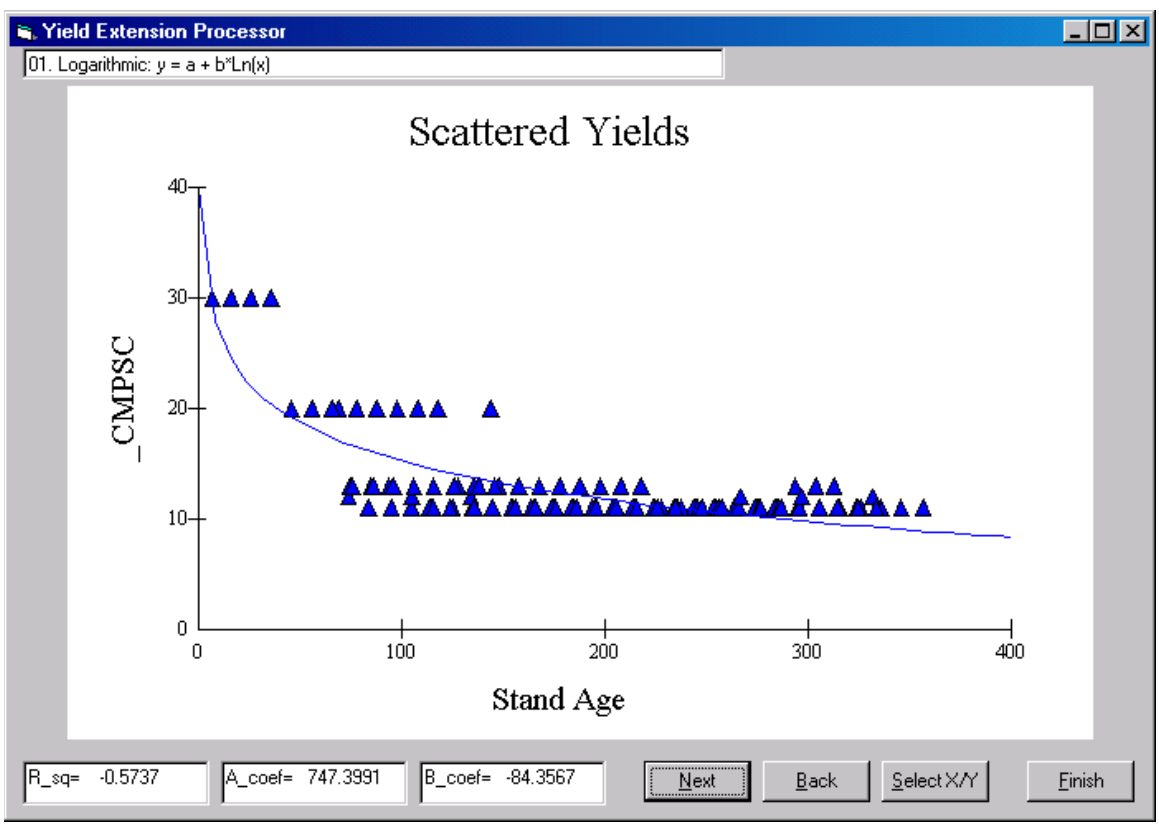

Yield Extension Processor
01. Logarithmic: y = a + b*Ln(x)
Scattered Yields
LTr.AllSx
Stand Age
4000
3000
2000
1000
0
0
100
200
300
400
R_sq= -0.8625
A_coef= 1141.4524
B_coef= -151.6659
Next
Back
Select X/Y
Finish

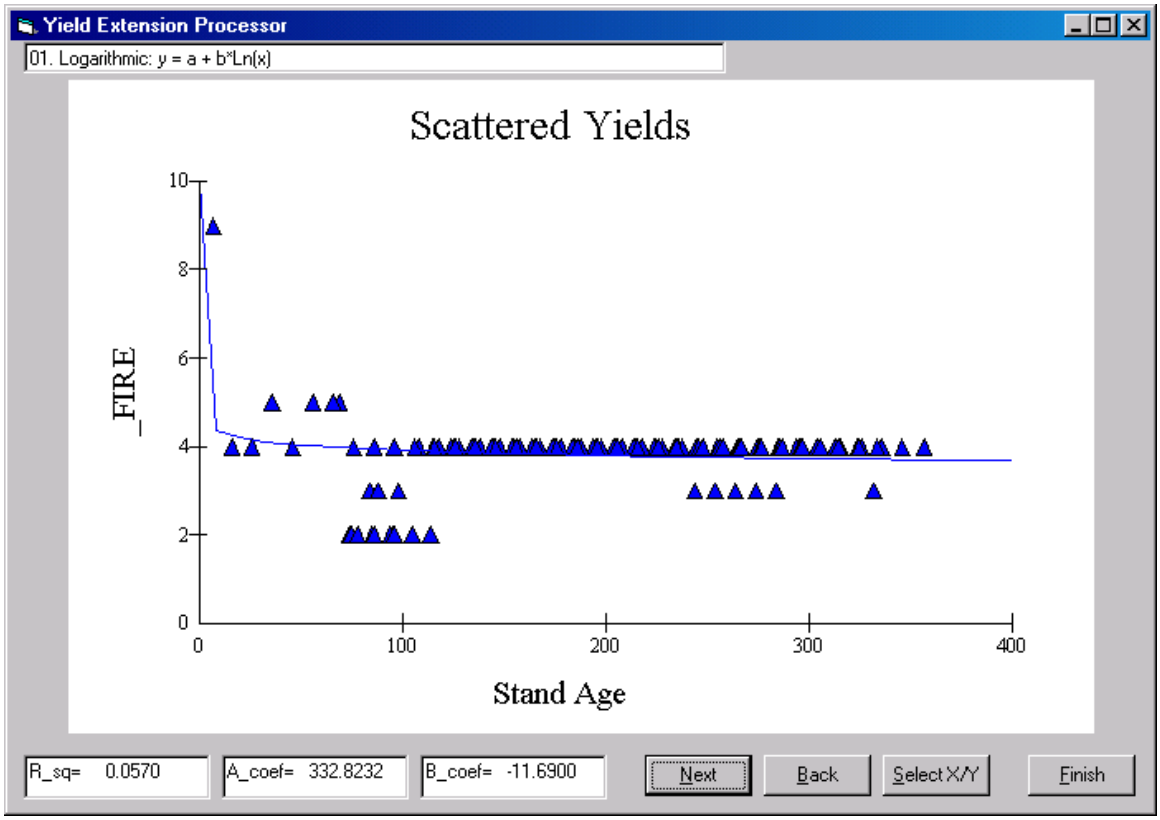

Yield Extension Processor
01. Logarithmic: y = a + b*Ln(x)
Scattered Yields
LBA.AllSx
Stand Age
200
150
100
50
0
0
100
200
300
400
R_sq= 0.5038
A_coef= -116.8352
B_coef= 107.8211
Next
Back
Select X/Y
Finish

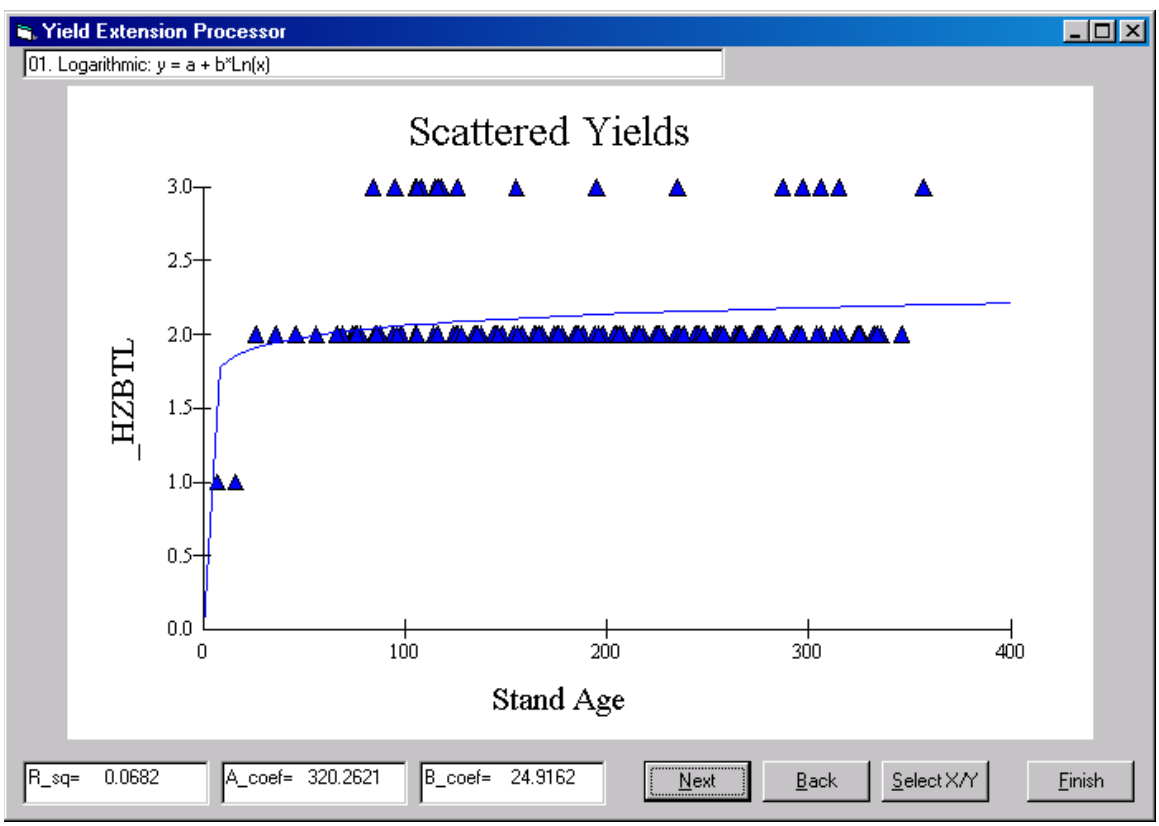

Yield Extension Processor
01. Logarithmic: y = a + b*Ln(x)
Scattered Yields
LCA.AllSx
Stand Age
8000
6000
4000
2000
0
0
100
200
300
400
R_sq= 0.7535
A_coef= -538.6981
B_coef= 149.5203
Next
Back
Select X/Y
Finish


Yield Extension Processor
01. Logarithmic: y = a + b*Ln(x)
Scattered Yields
LBd.AllSx
Stand Age
40000
30000
20000
10000
0
0
100
200
300
400
R_sq= 0.8320
A_coef= -820.9173
B_coef= 201.5846
Next
Back
Select X/Y
Finish


Yield Extension Processor
01. Logarithmic: y = a + b*Ln(x)
Scattered Yields
_CC00P
Stand Age
R_sq= -0.4619
A_coef= 525.6955
B_coef= -13.7059
Next
Back
Select X/Y
Finish

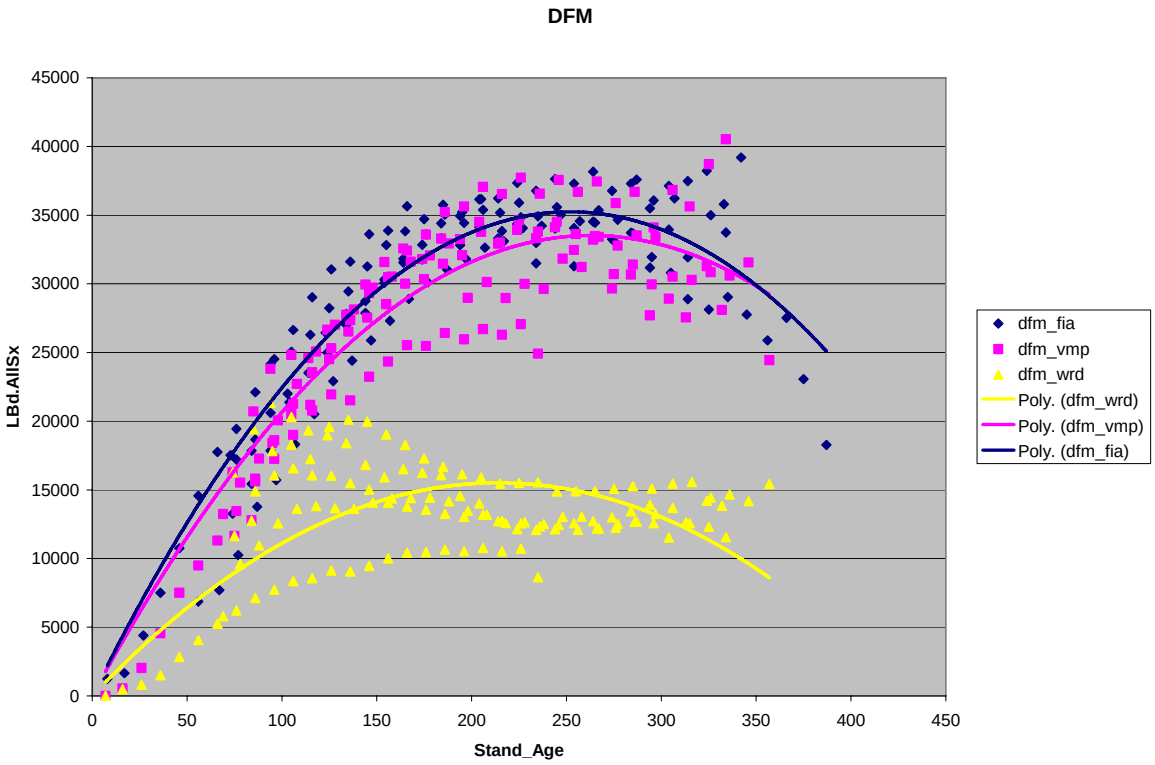

Yield Extension Processor
01. Logarithmic: y = a + b*Ln(x)
Scattered Yields
_CMPSC
Stand Age
R_sq= -0.5737
A_coef= 747.3991
B_coef= -84.3567
Next
Back
Select X/Y
Finish


Yield Extension Processor
01. Logarithmic: y = a + b*Ln(x)
Scattered Yields
_FIRE
Stand Age
0
2
4
6
8
10
0
100
200
300
400
R_sq= 0.0570
A_coef= 332.8232
B_coef= -11.6900
Next
Back
Select X/Y
Finish


Yield Extension Processor
01. Logarithmic: y = a + b*Ln(x)
Scattered Yields
_HZBTL
Stand Age
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
100
200
300
400
R_sq= 0.0682
A_coef= 320.2621
B_coef= 24.9162
Next
Back
Select X/Y
Finish

Conclusions

Preparing yield tables in support of forest planning efforts is not akin to processing inventory data through developed software. You can not simply feed data in one end and produce meaningful output reports at the other end. The professional talents required to construct relevant vegetative trends include that of a mensurationist, silviculturist, forest analyst, forest planner, technical writer, and computer scientist. This is not a complete list of specialty skills. Possessing these abilities does not ensure proper integration of tasks. Formal experience on several projects aids in solidifying the corporate memory to conduct such analyses. There is as much art as science that goes into the process.



Appendix I
Silvicultural Prescriptions

	Page
Even-Aged Method:	
- Douglas-fir Dry: Existing Stands	42
- Douglas-fir Dry: Regenerated Stands	43
- Douglas-fir Moist: Existing Stands	45
- Douglas-fir Moist: Regenerated Stands	46
- Grand Fir Mix: Existing Stands	48
- Grand Fir Mix: Regenerated Stands	49
- Western Larch: Existing & Regenerated Stands	51
- Lodgepole Pine: Existing & Regenerated Stands	53
- Subalpine Fir: Existing Stands	54
- Subalpine Fir: Regenerated Stands	55
Individual Tree Selection Method:	
- Douglas-fir Dry: Regenerated Stands	56
Group Selection Method:	
- Douglas-fir Dry: Regenerated Stands	58
- Douglas-fir Moist: Regenerated Stands	61
- Western Larch: Regenerated Stands	63
- Subalpine Fir: Regenerated Stands	65
Prescribed Burn Method:	
- Douglas-fir Dry: Existing & Regenerated Stands	67
- Douglas-fir Moist: Existing & Regenerated Stands	70
- Western Larch: Existing & Regenerated Stands	72

Rx EA - Douglas-fir Dry: Existing Stands

II. *FOREST PLAN PRESCRIPTION SUMMARY*

ACTION	CODE	YEAR	SPECIFICATIONS
Precommercial thinning	4521 THINBTA	20-30	Thin if stand density exceeds 1000 tpa at age 20-30. Thin from below to 300 tpa, exclusive of trees 10" DBH or greater (surviving reserve structure from regeneration period). Favor PP and or WL if in codominant size class. (Use THINBTA Keyword with condition class statement for age).
Commercial Thinning	4220 THINBTA	60-100	**Schedule commercial thinning where stand density exceeds 120 sq. ft. of ba, average stand diameter for trees greater than 5" DBH is 8" DBH or larger and minimum harvest level of 500 cu. ft./acre. Target Condition is 80 sq. ft. for trees 8" and larger. Maintain at least 50% of stand composition as PP.** Thin from below starting at the 6" diameter class.
Slashing	4465	60-100	Slash smaller diameter size class (less than 6"DBH) to create fuel loading and reduce latter fuels in preparation of prescribed burning.
Underburning	4980 SIMFIRE	60-100	Underburn after completion of commercial thin for fuel management purposes. Use FFE extension to predict mortality. Mortality objective is not to exceed 10% of stand as measured by ba.
Prescription for Shelterwood seed cut with reserves	4133 THINBTA Or THINBBA	120+	**From this point on –follow DF//PP regeneration Rx:** The objective is to remove the majority of the overstory trees, providing for openings sufficient to regenerate PP and associated species by planting. Retain 30-40 sq. ft. of BA, mostly in the dominant and codomiant size classes (usually 12-14" DBH or larger). Assume that from 30-50% mortality occurs within th eoverwood during the regeneration phase. Select sprecies preference from the species preference table.
Regeneration		1-5	Prepare site for artificial regeneration, by primarily underburning. Planting of PP will be necessary to assure target objectives will be met. Plant 300-400 tpa of PP, at year 5 after harvest. Anticipate the following natural regeneration fill-in on site at these densities: DF 200 tpa; GF 100 tpa; PP 50 tpa; WL 50 tpa. Minimum certification at the end of the regeneration period (5 years after harvest) is 150 tpa on 80% of the stockable ground. PP should be approximately 50% of the stand composition.

Rx EA - Douglas-fir Dry: Regenerated Stands

II. *FOREST PLAN PRESCRIPTION SUMMARY*

ACTION	CODE	YEAR	SPECIFICATIONS
Prescription for Shelterwood seed cut with reserves	4133 THINBTA Or THINBBA	0	The objective is to remove the majority of the overstory trees, providing for openings sufficient to regenerate PP and associated species by planting. Retain 30-40 sq. ft. of BA, mostly in the dominant and codomiant size classes (usually 12-14" DBH or larger). Assume that from 30-50% mortality occurs within th eoverwood during the regeneration phase. Select sprecies preference from the species preference table.
Regeneration		1-5	Prepare site for artificial regeneration, by primarily underburning. Planting of PP will be necessary to assure target objectives will be met. Plant 300-400 tpa of PP, at year 5 after harvest. Anticipate the following natural regeneration fill-in on site at these densities: DF 200 tpa; GF 100 tpa; PP 50 tpa; WL 50 tpa. Minimum certification at the end of the regeneration period (5 years after harvest) is 150 tpa on 80% of the stockable ground. PP should be approximately 50% of the stand composition.
Precommercial thinning	4521 THINBTA	20-30	Thin if stand density exceeds 600 tpa at age 20-30. Thin from below to 200 tpa, exclusive of trees 10" DBH or greater (surviving reserve structure from regeneration period), maintaining PP as a minimum of 50% of dominance type. (Use THINBTA Keyword with condition class statement for age).
Underburning	4980 SIMFIRE		Underburn after completion of precommercial thin for fuel management purposes. Objective is reduce surviving lower strata in the sub-merchantible class. Use FFE extension to predict mortality. Mortality objective is not to exceed 10-20% of stand as measured by ba, so that **80- 90% of stand density that existed after thinning is maintained.**
Commercial Thinning	4220 THINBTA	60-100	**Schedule commercial thinning where stand density exceeds 120 sq. ft. of ba, average stand diameter for trees greater than 5" DBH is 8" DBH or larger and minimum harvest level of 500 cu. ft./acre. Target Condition is 80 sq. ft. for trees 8" and larger. Maintain at least 50% of stand composition as PP.** Thin from below starting at the 6" diameter class.
Slashing	4465	60-100	Slash smaller diameter size class (less than 6"DBH) to create fuel loading and reduce latter fuels in preparation of prescribed burning.

ACTION	CODE	YEAR	SPECIFICATIONS
Underburning	4980 SIMFIRE	60-100	Underburn after completion of commercial thin for fuel management purposes. Use FFE extension to predict mortality. Mortality objective is not to exceed 10% of stand as measured by ba.
Underburning	4980	120+	Underburn to maintain single strata and open grown conditions. Mortality should be limited to trees that have established during understory re-initiation (less than 6" DBH). Use FFE extension to predict mortality. Mortality objective is not to exceed 10% of stand as measured by ba.
Commercial Thinning	4220 THINBTA TINBBA	140+	**Schedule commercial thinning where stand density exceeds 140** sq. ft. of ba, and minimum harvest level of 500 cu. ft./acre. Target Condition is **100** sq. ft. of trees 8" and larger. Maintain at least 50% of stand composition as PP. Thin from below starting at the 6" diameter class. Commercial Thinning should occur at least 20 years or more from regeneration harvest (See below)
Underburning	4980 SIMFIRE		Underburn after completion of commercial thin for fuel management purposes. Use FFE extension to predict mortality. Mortality objective is not to exceed 10% of stand as measured by ba.
Underburning	4980	160+	Underburn to maintain single strata and open grown conditions. There should be at least 20 years between underburning events, and at least 20 years or more prior to the regeneration harvest. Mortality should be limited to trees that have established during understory re-initiation (less than 6" DBH). Use FFE extension to predict mortality. Mortality objective is not to exceed 10% of stand as measured by ba.
Shelterwood seedcut w/reserves	4133 THINBTA	200+	No regeneration harvest will occur in the this dominance type until the DFC for old growth conditions is achieved on a forest-wide basis. Regeneration Harvest should occur at a minimum of 200 years. Go to begininning of prescription for regeneration specifications.

Rx EA - Douglas-fir Moist: Existing Stands

II. *FOREST PLAN PRESCRIPTION SUMMARY*

ACTION	CODE	YEAR	SPECIFICATIONS
Precommercial thinning	4521 THINBTA	20-30	**For stands ouside of Lynx habitat (less than 4,000 feet in elevation, or in a DF habitat type series):** Thin if stand density exceeds 800 tpa at age 20-30. Thin from below to 400 tpa, exclusive of trees 10" DBH or greater (surviving reserve structure from previous stand). It is assumed that DF will be the plurality of the residual species composition, however codominants and dominants of other preferred species (see species preference table. (Use THINBTA Keyword with condition class statement for age). **For stands within Lynx habitat (greater than 4,000 feet in elevation, all habitat types other than DF series): No precommercial thinning allowed.**
Commercial Thinning			**No commercial thinning is schduled for existing DF dominance types (indicates problems with thinning and mortality through root diseases due to increase in dead organic matter provided by stumps).**
Seedtree w/reserves	4134 THINBTA Or THINBBA	100-110+	Regeneration should commence once CMAI is achieved. CMAI for the DF Moist strata is estimated at stand age of 110 years. The objective is to remove the majority of the overstory trees providing for openings sufficient to regenerate WL and associated species by planting. **Retain 30 Sq. ft. of BA, in the dominant or codominant crown classes (usually 12-14" DBH or larger). Assume that approximately 50% mortality occurs with the overwood during the regeneration phase.** Select species from the species preference table
Regeneration	4473 or 4471 and 4431 PLANT Year 5	110-115	Prepare site for artificial regeneration, by primarily underburning or mechanical means. Plant 300-400 tpa of WL, at year 5 after final harvest. Anticipate the following species will also regenerate on site at these densities: **DF: 400 tpa; GF 400 tpa; WH 100 tpa**. Minimum certification at the end of the regeneration period (5 years after harvest) is 400 tpa on 80% of the stockable ground. WL should be approximately 50% of the stand composition. **At this time, this stand should be managed under the DF Moist Regeneration prescription**.

Rx EA - Douglas-fir Moist: Regenerated Stands

II. *FOREST PLAN PRESCRIPTION SUMMARY*

ACTION	CODE	YEAR	SPECIFICATIONS
Prescription for Seedtree with reserves **(from the DF Existing prescription)**	4134 THINBTA or THINBBA	0	The objective is to remove the majority of the overstory trees providing for openings sufficient to regenerate WL and associated species by planting. **Retain 30 Sq. ft. of BA, in the dominant or codominant crown classes (usually 12-14" DBH or larger). Assume that approximately 50% mortality occurs with the overwood during the regeneration phase.** Select species from the species preference tables.
Regeneration **(from the DF Existing prescription)**	4473 or 4471 and 4431 PLANT Year 5	1-5	Prepare site for artificial regeneration, by primarily underburning or mechanical means. Plant 300-400 tpa of WL, at year 5 after final harvest. Anticipate the following species will also regenerate on site at these densities: **DF: 400 tpa; GF 400 tpa; WH 100 tpa**. Minimum certification at the end of the regeneration period (5 years after harvest) is 400 tpa on 80% of the stockable ground. WL should be approximately 50% of the stand composition
Precommercial thinning	4521 THINBTA	20-30	**For stands ouside of Lynx habitat (less than 4,000 feet in elevation, or in a DF habitat type series at any elevation):** Thin if stand density exceeds 800 tpa at age 20-30. Thin from below to 300 tpa, exclusive of trees 10" DBH or greater (surviving reserve structure from regeneration period), maintaining WL as a minimum of 40% of dominance type. (Use THINBTA Keyword with condition class statement for age). **For stands within Lynx habitat (greater than 4,000 feet in elevation, all habitat types other than DF series): No precommercial thinning allowed.**
Commercial Thinning	4220 THINBTA TINBBA	60-100	**Schedule commercial thinning where stand density exceeds** 150 sq. ft. of ba, average stand diameter for trees greater than 5" DBH is 8" DBH or larger and minimum harvest level of 500 cu. ft./acre. Target Condition is 100 sq. ft. of trees 7" and larger. Maintain at least 40% of stand composition as WL. Thin from below, removing shade tolerant species as a priority (DF, GF, WH, C) starting at the 6" diameter class.
Underburning	4980		Underburn after completion of commercial thin for fuel management purposes. Objective is reduce surviving lower strata in the sub-merchantible class. Use FFE

			extension to predict mortality. Mortality objective is not to exceed 10% of stand as measured by ba, mortality should be aimed at 6" diameter class and less.
Commercial Thinning	4220 THINBTA TINBBA	140+	**Schedule commercial thinning where stand density exceeds 150** sq. ft. of ba, and minimum harvest level of 500 cu. ft./acre. Target Condition is **100** sq. ft. of trees 8" and larger. Maintain at least 40% of stand composition as WL.. Commercial Thinning should occur at least 20 years or more from Seedtree regeneration harvest (See below)
Underburning	4980		Underburn after completion of commercial thin for fuel management purposes. Objective is reduce surviving lower strata in the sub-merchantible class. Use FFE extension to predict mortality. Mortality objective is not to exceed 10% of stand as measured by ba, mortality should be aimed at 6" diameter class and less.
Seedtree w/reserves	4134 THINBTA	200+	No regeneration harvest will occur in the WL dominance type until the DFC for old growth conditions is achieved on a forest-wide basis. Regeneration Harvest should occur at a minimum of 200 years. Retain 10-15 seedtrees per acre for natural regeneration. Following this regeneration harvest, this stand should follow the WL strata prescription.

Rx EA - Grand Fir Mix: Existing Stands

II. *FOREST PLAN PRESCRIPTION SUMMARY*

ACTION	CODE	YEAR	SPECIFICATIONS
Precommercial thinning	4521 THINBTA	20-30	**For stands ouside of Lynx habitat (less than 4,000 feet in elevation, or in a DF habitat type series):** Thin if stand density exceeds 1000 tpa at age 20-30. Thin from below to 400 tpa, exclusive of trees 10" DBH or greater (surviving reserve structure from previous stand). It is assumed that GF/C/WH will be the plurality of the residual species composition, however codominants and dominants of other preferred species (see species preference table) should be retained if possible. **For stands within Lynx habitat (greater than 4,000 feet in elevation, all habitat types other than DF series): No precommercial thinning allowed.**
Commercial Thinning			**No commercial thinning is schduled for existing GF/Mix dominance types (indicates problems with thinning and mortality in predominantly shade tolerant species).**
Prescription for Clearcut with reserves	4114 THINBTA THINBBA	0	Regeneration should commence once CMAI is achieved. CMAI for the GF Mix strata is estimated at stand age of 90 years. The objective is to remove the majority of the overstory trees providing for openings sufficient to regenerate WP and associated species by planting. **Retain 20 Sq. ft. of BA, in the dominant or codominant crown classes (usually 12-14" DBH or larger). Assume that approximately 50% mortality occurs with the overwood during the regeneration phase.** Select species from the species preference table
Regeneration		1-5	Prepare site for artificial regeneration, by primarily underburning or mechanical means. Plant 450 tpa of WP/WL, at year 5 after final harvest. Anticipate the following species will also regenerate on site at these densities: **DF: 400 tpa; GF 400 tpa; WH 300 tpa, WRC 200, Spruce: 50**. Minimum certification at the end of the regeneration period (5 years after harvest) is 400 tpa on 80% of the stockable ground. WP should be approximately 50% of the stand composition at the time of certification . Follow GF Mix Regen from this point on.

Rx EA - Grand Fir Mix: Regenerated Stands

II. *FOREST PLAN PRESCRIPTION SUMMARY*

ACTION	CODE	YEAR	SPECIFICATIONS
Prescription for Clearcut with reserves	4114 THINBTA THINBBA	0	The objective is to remove the majority of the overstory trees providing for openings sufficient to regenerate WP and associated species by planting. **Retain 20 Sq. ft. of BA, in the dominant or codominant crown classes (usually 12-14" DBH or larger). Assume that approximately 50% mortality occurs with the overwood during the regeneration phase.** Select species from the species preference tables.
Regeneration		1-5	Prepare site for artificial regeneration, by primarily underburning or mechanical means. Plant 450 tpa of Wp/WL, at year 5 after final harvest. Anticipate the following species will also regenerate on site at these densities: **DF: 400 tpa; GF 400 tpa; WH 300 tpa, WRC 200, Spruce: 50**. Minimum certification at the end of the regeneration period (5 years after harvest) is 400 tpa on 80% of the stockable ground. WP should be approximately 50% of the stand composition at the time of certification .
Precommercial thinning	4521 THINBTA	20-30	**For stands ouside of Lynx habitat (less than 4,000 feet in elevation, or in a DF habitat type series at any elevation):** Thin if stand density exceeds 1000 tpa at age 20-30. Thin from below to 500 tpa, exclusive of trees 10" DBH or greater (surviving reserve structure from regeneration period), maintaining WP/WL as a minimum of 80% of dominance type. Objective is to maintain as much WP in the stand as possible. (Use THINBTA Keyword with condition class statement for age). **For stands within Lynx habitat (greater than 4,000 feet in elevation, all habitat types other than DF series): No precommercial thinning allowed.**
Commercial Thinning	4220 THINBTA	60-100	**Schedule commercial thinning where stand density exceeds 170 sq. ft. of ba, average stand diameter for trees greater than 5" DBH is 8" DBH or larger and minimum harvest level of 500 cu. ft./acre. Target Condition is 120 sq. ft. for trees 8" and larger. Maintain at least 50% of stand composition as WL/WP/PP.** Thin from below, removing shade tolerant species as a priority (DF, GF, WH, C) starting at the 6"

			diameter class.
Commercial Thinning	4220 THINBTA	140+	**Schedule commercial thinning where stand density exceeds 170 sq. ft. of ba, average stand diameter for trees greater than 5" DBH is 8" DBH or larger and minimum harvest level of 500 cu. ft./acre. Target Condition is 120 sq. ft. for trees 8" and larger. Maintain at least 50% of stand composition as WL/WP.** Thin from below starting at the 6" diameter class.. Commercial Thinning should occur at least 20 years or more from Seedtree regeneration harvest (See below)
Clearcut w/reserves	4114 THINBTA	200+	No regeneration harvest will occur in the this dominance type until the DFC for old growth conditions is achieved on a forest-wide basis. Regeneration Harvest should occur at a minimum of 200 years. At the time of regeneration harvest, regenerate stand with a clearcut w/reserves regeneration regime.

Rx EA - Western Larch: Existing & Regenerated Stands

II. FOREST PLAN PRESCRIPTION SUMMARY

ACTION	CODE	YEAR	SPECIFICATIONS
Prescription for Seedtree seed cut w/reserves	4134 THINBTA	0	The objective is to remove the majority of the overstory trees providing for natural regeneration of WL. Associated species will be obtained through natural regeneration fill-in. Retain 10-15 tpa of WL greater than or equal to 14" DBH. Retain WL overwood throughout rotation.
Regeneration		1-5	Prepare site for natural regeneration, by either underburning or mechanical means. Minimum certification at the end of the regeneration period (5 years after harvest) is 300 tpa on 80% of the stockable ground. WL should be approximately 50% of the stand composition.
Precommercial thinning	4521 THINBTA	20-30	**For stands ouside of Lynx habitat (less than 4,000 feet in elevation, or DF habitat type series):** Thin if stand density exceeds 800 tpa at age 20-30. Thin from below to 300 tpa, exclusive of trees 10" DBH or greater (surviving reserve structure from regeneration period), maintaining WL as a minimum of 40% of dominance type. (Use THINBTA Keyword with condition class statement for age). **For stands within of Lynx habitat (greater than 4,000 feet in elevation, all other habitat types): No precommercial thinning allowed.**
Commercial Thinning	4220 THINBTA	60-100	**Schedule commercial thinning where stand density exceeds** 150 sq. ft. of ba, average stand diameter for trees greater than 5" DBH is 8" DBH or larger and minimum harvest level of 500 cu. ft./acre. Target Condition is 100 sq. ft. of trees 8" and larger. Maintain at least 50% of stand composition as WL. Thin from below, removing the shade tolerant species (GF, WH), and also give preference to remove LP. Commercial thinning should start at the 6" diameter class.
Underburning	4980		Underburn after completion of commercial thin for fuel management purposes. Objective is to maintain XX to xx tons/acre of CWD. Use FFE extension to predict mortality. Mortality objective is not to exceed 10% of stand as measured by ba, mortality should be aimed at 6" diameter class and less.
Commercial	4220	140+	**Schedule commercial thinning where stand density**

Thinning	THINBTA TINBBA		**exceeds 150** sq. ft. of ba, and minimum harvest level of 500 cu. ft./acre. Target Condition is **100** sq. ft. of trees 8" and larger. Maintain at least 50% of stand composition as WL. Thin from below starting at the 6" diameter class. Commercial Thinning should occur at least 20 years or more from Seedtree regeneration harvest (See below)
Underburning	4980		Underburn after completion of commercial thin for fuel management purposes. Objective is to maintain XX to xx tons/acre of CWD. Use FFE extension to predict mortality. Mortality objective is not to exceed 10% of stand as measured by ba, mortality should be aimed at 6" diameter class and less.
Seedtree seed cut w/reserves	4134 THINBTA	200+	No regeneration harvest will occur in the WL dominance type until the DFC for old growth conditions is achieved on a forest-wide basis. Regeneration Harvest should occur at a minimum of 200 years. Retain 10-15 seedtrees per acre for natural regeneration. Following this regeneration harvest, this stand should follow the WL strata prescription.

Rx EA - Lodgepole Pine: Existing & Regenerated Stands

II. *FOREST PLAN PRESCRIPTION SUMMARY*

ACTION	CODE	YEAR	SPECIFICATIONS
Prescription for clearcut with reserves	4114 THINBBA	0	The objective is to remove the majority of the overstory trees providing for the natural regeneration of primarily LP through serotinous cones. Other species may regenerate on the site, but LP will maintain dominance over the rotation. Retain 10% of existing stand BA in trees greater than or equal to 10" DBH of all species for snag recruitment and other ecosystem functions. Assume 80% plus mortality over the rotation.
Regeneration		1-5	Prepare site for natural regeneration, by either underburning or mechanical means. Minimum certification at the end of the regeneration period (5 years after harvest) is 250 tpa on 80% of the stockable ground. LP should be approximately 80% of the stand composition.
Precommercial thinning	4521 THINBTA	20-30	**For stands ouside of Lynx habitat (less than 4,000 feet in elevation, or DF habitat type series):** Thin if stand density exceeds 800 tpa at age 20-30. Thin from below to 360 tpa, exclusive of trees 10" DBH or greater (surviving reserve structure from regeneration period), maintaining LP as 80% of dominance type. (Use THINBTA Keyword with condition class statement for age). **For stands within of Lynx habitat (greater than 4,000 feet in elevation, all other habitat types): No precommercial thinning allowed.**
Commercial Thinning	4220 THINBTA THINBBA	60-80	**Schedule commercial thinning where stand density exceeds** 120 sq. ft. of ba, average stand diameter for trees greater than 5" DBH is 8" DBH or larger and minimum harvest level of 500 cu. ft./acre. Target Condition is 80 sq. ft. of trees 8" and larger. Give preference to retain larger diameter WL and DF. Retain larger diameter LP to assist in meeting target density of 80 sq. ft.
Clearcut w/reserves	4114 THINBBA	80-100	Regeneration Harvest should occur at CMAI or at least 20 years after a commercial thin is completed (if scheduled). Retain 10% of existing stand BA in trees greater than or equal to 10" DBH of all species for snag recruitment and other ecosystem functions. Assume 80% plus mortality over the rotation.

Rx EA - Subalpine Fir: Existing Stands

II. *FOREST PLAN PRESCRIPTION SUMMARY*

ACTION	CODE	YEAR	SPECIFICATIONS
Precommercial thinning	4521 THINBTA	20-30	(Only thin if plot location is under 4000 feet in elevation): Thin if stand density exceeds 800 tpa at age 20-30. Thin from below to 360 tpa, exclusive of trees 10" DBH or greater (surviving reserve structure from regeneration period), maintaining L/DF as a minimum of 40% of dominance type. See species preference table for species selection.
Commercial Thinning	4220 THINBTA	60-100	**Schedule commercial thinning where stand density exceeds** 150 sq. ft. of ba, average stand diameter for trees greater than 5" DBH is 8" DBH or larger and minimum harvest level of 500 cu. ft./acre. Target Condition is 100 sq. ft. of trees 8" and larger. Objective is to improve stand composition to L/DF and S: targeting the removal of LP and AF. Commercial thinning should start at the 6" diameter class. Commercial thinning should occur at least 20 years prior to scheduled regeneration harvest.
Clearcut w/reserves	4114 THINBTA	100+	Regeneration Harvest should occur at a minimum of 110 years (estimated CMAI). At the time of regeneration harvest, regenerate stand with a Seedtree regeneration regime, by retaining 10-15 tpa of WL/DF, 12" DBH and larger if available. If not available, retain other species from the prefered species table. Assume 50% mortality of overwood over the rotation period
Regeneration		1-5	Prepare site for planting, by primarily underburning or mechanical means. Plant on approximately 300 tpa of WL and DF. Minimum certification at the end of the regeneration period (5 years after harvest) is 300 tpa on 80% of the stockable ground. Assume natural fill-in of 500 LP, 300 AF and 100 S, 100 DF. This reflects the long regeneration period normally associated with these lower subalpine sites. L/DF should be approximately 40% of the stand composition. Other associated species include S,LP and AF. **At this time, this stand should be managed under the SAF Regeneration prescription**.

Rx EA - Subalpine Fir: Regenerated Stands

II. *FOREST PLAN PRESCRIPTION SUMMARY*

ACTION	CODE	YEAR	SPECIFICATIONS
Prescription for Seedtree with reserves	4134 THINBTA	0	The objective is to remove the majority of the overstory trees providing for the openings sufficient to regenerate Larch/Douglas-fir by planting. Other species will regenerate on the site, but Larch/DF will maintain dominance over the rotation. Retain 20-30 sq. ft. ba of trees greater than or equal to 12" DBH of L/DF for snag recruitment and other ecosystem functions. Assume 50% mortality of overwood over the rotation period.
Regeneration		1-5	Prepare site for natural regeneration, by primarily underburning or mechanical means. Plan on approximately 300 tpa of WL and 500 tpa of DF. Minimum certification at the end of the regeneration period (5 years after harvest) is 300 tpa on 80% of the stockable ground. Assume natural fill-in of 500 LP, 300 AF and 100 S, 100 DF. This reflects the long regeneration period normally associated with these lower subalpine sites. L/DF should be approximately 40% of the stand composition. Other associated species include S,LP and AF.
Precommercial thinning	4521 THINBTA	20-30	(Only thin if plot location is under 4000 feet in elevation): Thin if stand density exceeds 800 tpa at age 20-30. Thin from below to 360 tpa, exclusive of trees 10" DBH or greater (surviving reserve structure from regeneration period), maintaining L/DF as a minimum of 40% of dominance type. See species preference table for species selection.
Commercial Thinning	4220 THINBTA	60-100	**Schedule commercial thinning where stand density exceeds** 150 sq. ft. of ba, average stand diameter for trees greater than 5" DBH is 8" DBH or larger and minimum harvest level of 500 cu. ft./acre. Target Condition is 100 sq. ft. of trees 8" and larger. Maintain at least 50% of stand composition as WL/DF. Thin from below, removing the shade tolerant species (AF), and also give preference to remove LP. Commercial thinning should start at the 6" diameter class.
Prescription for Seedtree with reserves	4134 THINBTA	150+	Regeneration Harvest should occur at a minimum of 150 years. At the time of regeneration harvest, regenerate stand with a Seedtree regeneration regime.

Rx ITS - Douglas-fir Dry: Regenerated Stands

II. *FOREST PLAN PRESCRIPTION SUMMARY*

<table>
<tr><th>ACTION</th><th>CODE</th><th>YEAR</th><th>SPECIFICATIONS</th></tr>
<tr><td>Prescription for Individual Tree Selection</td><td>4151
THINDBH
THINBTA</td><td>0</td><td>The objective is to regulate for 4 distinct age classes, (0-5, seed/sap); (5-10, small); (10-15, large); 15-20, very large). Additionally, a minimum of 15 tpa of 21”+ diameter trees should be reserved for ecosystem functions and to meet old growth criteria. The estimated attributes by Cohort (Diameter Class) at the end of each cutting cycle are:

<table>
<tr><th colspan="3">Target Stand Table</th></tr>
<tr><td>Diameter Class</td><td>TPA</td><td>Basal Area</td></tr>
<tr><td>0-5</td><td>24</td><td>3</td></tr>
<tr><td>5-10</td><td>20</td><td>11</td></tr>
<tr><td>10-15</td><td>17</td><td>20</td></tr>
<tr><td>15-20</td><td>14</td><td>30</td></tr>
<tr><td>21+</td><td>10-15</td><td>25-30</td></tr>
</table>

Residual Stand Density: The regulated stand density is 65 Sq. ft. of ba. Total stand density, with reserve trees is 90-95 sq. ft. ba.

Maximum Tree Size: Maximum tree size in the regulated component is 20”, exclusive of the reserve tree component (old growth trees).

Diameter Distribution: The regulated component is based on a q-ratio of 1.2.

Cutting Cycle: Cutting Cylce is estimated at 40-50 years.

Underburning: Simulate underburning after each cutting cycle to: prepare site for regeneration and, reduce fuel loadings. Use SIMFIRE keyword. Mortality should be contained in the 0-5” class, but minimum densities in the target stand table should be retained.

Species Composition: The majority of the species composition should be PP (60%+), providing for long-lived serals, and shelter for artificial regeneration.</td></tr>
</table>

			Natural fill-in is expected, but will likely consist predominantly of DF. **Planting** of 100 tpa of PP will be necessary to assure target objectives will be met.
Precommercial thinning	4521 THINBTA	1-3	Thin existing 5" DBH class to target trees/acre as displayed in target stand table, maintaining PP as a minimum of 60% of dominance type. (Use THINBTA Keyword with condition class statement for age).
Regeneration	4431 PLANT ESTAB?	1-5	Plant 150 tpa of PP. Minimum certification at the end of the regeneration period (5 years after harvest) is 100 tpa on 80% of the stockable ground. PP should be approximately 60%+ of the stand composition. Assume 200 tpa of DF is established during this period.
Individual Tree Selection	4151 THINDBH THINBTA	40-50	Initial next cutting as described as above, following same sequence of events. Continue each cutting cycle at 40-50 year intervals.

Rx GS - Douglas-fir Dry: Regenerated Stands

II. *FOREST PLAN PRESCRIPTION SUMMARY*

ACTION	CODE	YEAR	SPECIFICATIONS
Prescription for Group Selection Harvest	4152 THINBTA	0 1st Group	• The objective is to remove the majority of the overstory trees providing for artifical regeneration of PP on **20%** of the stand acres every **40** years. • Groups should be between **2-3 acres** in size • Retain **4-8** tpa of **PP** overwood greater than or equal to **14"** DBH. Retain PP overwood throughout rotation.
Underburning for site preparation and fuel reduction	4980 SIMFIRE	3 1st Group	Underburn group to reduce fuels generated by harvest, preparing site for artifical regeneration. • **Acceptable mortality should be less than or equal to 10%** of reserve overwood within group. • Underburning can also be applied on a stand-wide basis to assist in the management of ladder fuels throughout remaining stand (the portion of the stand that is not within the group selection harvest). o In the remainder of the stand, from **30-80%** mortality would be acceptable in the **less than 7" DBH size class**. **Larger size classes should have less than 10% mortality.**
Regeneration	4431 PLANT	5 1st Group	• Plant **250 tpa** of PP • Minimum certification at the end of the regeneration period **(5 years after harvest)** is **150 tpa on 80%** of the stockable ground. • **PP** should be **approximately 60%** of the stand composition at the time of certification (60% of the 150 tpa of crop trees). • Assume **500 tpa of DF** will regenerate naturally during regeneration period.
Precommercial thinning	4521 THINBTA	40 1st Group	• Thin if stand density **exceeds 300 tpa** at age 20-30. • Thin from below to **150 tpa**, exclusive of trees 14" DBH or greater (surviving reserve structure from regeneration period), maintaining PP as a minimum of **60%** of dominance type. (Use THINBTA Keyword with condition class statement for age).
Underburning	4980	43	• **Underburn group after thinning** to reduce fuels

For fuel reduction after precommercial thinning	SIMFIRE	1st Group	generated by activity. o Acceptable mortality within the group should be **less than or equal to 10%** of reserve **overwood** within group. o Mortality in the **sapling size** component **within the group should be less than 25%.** Mortality should be equally divided between the PP/DF. • Underburning can also be applied on a stand-wide basis in assiting in the management of ladder fuels throughout stand (the portion of the stand that has not been regenerated harvested by Group Selection**)**. o In the remainder of the stand, **from 30-80% mortality would be acceptable in the less than 7" DBH size class**. **Larger size classes should have less than 5% mortality outside of the group.**
Understory re-initiation	4431	45 1st Group	• **To simulate additional regeneration due to burning activity, assume 200 tpa of DF, and 50 tpa of PP regenerate within 5 years after underburn.**
Commercial Thinning	4220 THINBTA	80 1st Group	• **Schedule commercial thinning where stand density exceeds 120 sq. ft. of ba,** • **average stand diameter for trees greater than 5" DBH is 8" DBH or larger and** • **minimum harvest level of 500 cu. ft./acre,** • **Target Condition is 80 sq. ft. for trees 8" and larger. Maintain at least 50% of stand composition as PP.** Thin from below starting at the 6" diameter class.
Underburning For fuel reduction	4980 SIMFIRE	83 1st Group	• **Acceptable mortality within previously established groups** (in this case, group 1 consisting of the 80 year old age class) should be incidental (<1%). • Trees that were regenerated during the understory regeneration should have between 80-100% mortality
Understory re-initiation	4431	85 1st Group	• **To simulate additional regeneration due to burning activity, assume 200 tpa of DF, and 50 tpa of PP regenerate within 5 years after underburn.**
Underburning For fuel	4980 SIMFIRE	123 1st Group	• **Acceptable mortality within previously established groups** (in this case, group 1

reduction			consisting of the 120 year old age class) should be incidental (<1%). • Trees that were regenerated during the understory regeneration should have between 80-100% mortality
Understory re-initiation	4431	125 1st Group	• **To simulate additional regeneration due to burning activity, assume 200 tpa of DF, and 50 tpa of PP regenerate within 5 years after underburn.**
Commercial Thinning	4220 THINBTA	160 1stGroup	• **Schedule commercial thinning where stand density exceeds 140** sq. ft. of ba, and minimum harvest level of 500 cu. ft./acre. Target Condition is **100** sq. ft. of trees 8" and larger. Maintain at least 50% of stand composition as PP. Thin from below starting at the 6" diameter class. Commercial Thinning should occur at least 20 years or more from regeneration harvest (See below)
Underburning For fuel reduction	4980 SIMFIRE	163 1stGroup	• **Acceptable mortality within previously established groups** (in this case, group 1 consisting of the 160 year old age class) should be incidental (<1%). • Trees that were regenerated during the understory regeneration should have between 80-100% mortality
Understory re-initiation	4431	165 1st Group	• **To simulate additional regeneration due to burning activity, assume 200 tpa of DF, and 50 tpa of PP regenerate within 5 years after underburn.**
Prescription for Group Selection Harvest	4152 THINBTA	200	• **Begin regeneration sequence as described above**

Rx GS - Douglas-fir Moist: Regenerated Stands

II. *FOREST PLAN PRESCRIPTION SUMMARY*

ACTION	CODE	YEAR	SPECIFICATIONS
Prescription for Group Selection	4152 THINBTA	0	• The objective is to remove the majority of the overstory trees providing for regeneration of WL on **20% of the stand acres every 40 years,** • Groups should be between 3-5 acres in size**.** • Retain 5-10 tpa of WL greater than or equal to 14" DBH. Retain WL overwood throughout rotation.
Underburning for site preparation and fuel reduction	4980 SIMFIRE	3	Underburn group to reduce fuels generated by harvest, preparing site for artifical regeneration. • **Acceptable mortality should be less than or equal to 10%** of reserve overwood within group. • Underburning can also be applied on a stand-wide basis to assist in the management of ladder fuels throughout remaining stand (the portion of the stand that is not within the group selection harvest). In the remainder of the stand, from **30- 80%** mortality would be acceptable in the **less than 7" DBH size class**. **Larger size classes should have less than 10% mortality.**
Regeneration	PLANT 4431	5	• Plant 450 tpa of WL • Minimum certification at the end of 5 years should be 300 tpa. • WL should be approximately 60% of the stand composition at the time of certification. • Assume 800 DF/GF and WH will regenerate naturally during this regeneration period.
Precommercial thinning	4521 THINBTA	40	**For stands ouside of Lynx habitat (less than 4,000 feet in elevation):** Thin if stand density exceeds 800 tpa at age 40. Thin from below to 200 tpa, exclusive of trees 10" DBH or greater (surviving reserve structure from regeneration period), maintaining WL as a minimum of 40% of dominance type. (Use THINBTA Keyword with condition class statement for age). **For stands within Lynx habitat (greater than 4,000 feet in elevation, all habitat types other than DF series): No precommercial thinning allowed.**
Commercial	4220	80	• Schedule commercial thinning where stand

Thinning	THINBTA		density exceeds 140 sq.ft. of ba. • Average stand diameter for trees greater than 5" DBH is 8" DBH or larger and • Mimimum harvest level of 500 cu.ft./acre, • Target Condition is 90 sq. ft. for trees 8" DBH and larger. • At least 40% of species composition should be WL
Commercial Thinning	4220 THINBTA	160	• Schedule commercial thinning where stand density exceeds 150 sq.ft. of ba. • Average stand diameter for trees greater than 5" DBH is 8" DBH or larger and • Mimimum harvest level of 500 cu.ft./acre, • Target Condition is 100 sq. ft. for trees 8" DBH and larger.
Prescription for Group Selection	4152 THINBTA	200	• Return to regeneration sequence as described above.

Rx GS – Western Larch: Regenerated Stands

II. *FOREST PLAN PRESCRIPTION SUMMARY*

ACTION	CODE	YEAR	SPECIFICATIONS
Prescription for Group Selection	4152 THINBTA	0	• The objective is to remove the majority of the overstory trees providing for natural regeneration of WL on 20% of the stand acres every 40 years. • Groups should be 3-5 acres in size. • Retain 10-15 tpa of WL greater than or equal to 14" DBH. Retain WL overwood throughout rotation.
Underburning for site preparation and fuel reduction	4980 SIMFIRE	3	Underburn group to reduce fuels generated by harvest, preparing site for artifical regeneration. • **Acceptable mortality should be less than or equal to 10%** of reserve overwood within group. • Underburning can also be applied on a stand-wide basis to assist in the management of ladder fuels throughout remaining stand (the portion of the stand that is not within the group selection harvest). In the remainder of the stand, from **30- 80%** mortality would be acceptable in the **less than 7" DBH size class**. **Larger size classes should have less than 10% mortality.**
Regeneration	PLANT 4431	5	• Plant 450 tpa of WL • Minimum certification at the end of 5 years should be 300 tpa. • WL should be approximately 60% of the stand composition at the time of certification. Assume 800 DF/GF and WH will regenerate naturally during this regeneration period.
Precommercial thinning	4521 THINBTA	40	**For stands ouside of Lynx habitat (less than 4,000 feet in elevation, or DF habitat type series):** Thin if stand density exceeds 800 tpa at age 40. Thin from below to 200 tpa, exclusive of trees 10" DBH or greater (surviving reserve structure from regeneration period), maintaining WL as a minimum of 40% of dominance type. (Use THINBTA Keyword with condition class statement for age). **For stands within of Lynx habitat (greater than 4,000 feet in elevation, all other habitat types): No precommercial thinning allowed.**

Commercial Thinning	4220 THINBTA	80	• density exceeds 140 sq.ft. of ba. • Average stand diameter for trees greater than 5" DBH is 8" DBH or larger and • Mimimum harvest level of 500 cu.ft./acre, • Target Condition is 90 sq. ft. for trees 8" DBH • At least 40% of species composition should be WL
Commercial Thinning	4220 THINBTA	160	• Schedule commercial thinning where stand density exceeds 150 sq.ft. of ba. • Average stand diameter for trees greater than 5" DBH is 8" DBH or larger and • Mimimum harvest level of 500 cu.ft./acre, Target Condition is 100 sq. ft. for trees 8" DBH and larger.
Prescription for Group Selection	4152 THINBTA	200	• Return to regeneration sequence as described above.

Rx GS - Subalpine Fir: Regenerated Stands

II. *FOREST PLAN PRESCRIPTION SUMMARY*

(For Regenrated stands within the SAF strata)

ACTION	CODE	YEAR	SPECIFICATIONS
Prescription for Group Selection	4152 THINBTA	0	• The objective is to remove the majority of the overstory trees providing for the openings sufficient to regenerate Larch/Douglas-fir by planting. • Groups should be 2-3 acres in size • Cutting cylcle should be 30 years with 5 distinct groups produced over 150 years • Other species will regenerate on the site, but Larch/DF will maintain dominance over the rotation. • Retain 4-8. tpa of trees greater than or equal to 12" DBH of L/DF for snag recruitment and other ecosystem functions. Retain WL overwood throughout rotation.
Underburning for site preparation and fuel reduction	4980 SIMFIRE	3	Prepare site for artificial regeneration, by underburning. Mortality in overwood component should be less than or equal to 10%.
Regeneration	4431 PLANT	5	• Plant 300 tpa of WL • Minimum certification at the end of the regeneration period (5 years after harvest) is 200 tpa on 80% of the stockable ground. This reflects the long regeration period normally associated with these lower subalpine sites. WL/DF should be approximately 40% of the stand composition.
Precommercial thinning	4521 THINBTA	30	**For stands ouside of Lynx habitat (less than 4,000 feet in elevation):** Thin if stand density exceeds 800 tpa at age 30. • Thin from below to 200 tpa, exclusive of reserve trees (surviving reserve structure from regeneration period), maintaining WL as a minimum of 30% of dominance type. (Use THINBTA Keyword with condition class statement for age). **For stands within Lynx habitat (greater than 4,000 feet in elevation, all other habitat types): No precommercial thinning allowed.**
Commercial Thin	4220 THINBTA	90	• Schedule commercial thin where stand density exceeds 140 sq. ft. ba.

			• Target Condition is 90 sq.ft. ba. • Minharvest is at least 500 cu.ft. • WL should be maintained at least at 40% of the species composition.
Group Selection	4152	150	• Schedule regeneration of 1st group. Follow same sequence as above.

Rx PB - Douglas-fir Dry: Existing & Regenerated Stands

II. *FOREST PLAN PRESCRIPTION SUMMARY*

<table>
<tr><th>ACTION</th><th>CODE</th><th>YEAR</th><th>SPECIFICATIONS</th></tr>
<tr><td>Precommercial thinning</td><td>4521 THINBTA</td><td>20-30</td><td>When stand density exceeds 1000 tpa in the seed/sap class, reduce stand density at age 20-30:

Thin from below to 400 tpa, exclusive of trees 10” DBH or greater (surviving reserve structure from regeneration period). Favor PP and or WL if in codominant size class. (Use THINBTA Keyword with condition class statement for age). PP should be a minimum of 40% of std after completion of thinning.</td></tr>
<tr><td>Underburning</td><td>4980 SIMFIRE</td><td>23-33</td><td>Underburn stand within 2-3 years of thinning operation to reduce surface, ladder fuels and to lift lower tree crowns. Acceptable mortality should be less than or equal to the following percentages by size class:
<table>
<tr><th>Size Class</th><th>Mortality Limit</th><th>Residual Target TPA</th></tr>
<tr><td>≤ 10’ in height</td><td></td><td></td></tr>
<tr><td>1-5</td><td>0-20%</td><td>320-400</td></tr>
<tr><td>5-10</td><td><10%</td><td>0-20</td></tr>
<tr><td>10-15</td><td>1%</td><td>0-10</td></tr>
<tr><td>15+</td><td>Incidental</td><td>0-5</td></tr>
</table>
PP should be maintained at a minimum of 30% of stand composition of codominant/domiant classes after completion of burning.</td></tr>
<tr><td>Regeneration</td><td>4431 PLANT or ESTAB</td><td>28-38</td><td>Invoke regeneration model to natural ingression of conifer seedlings as result of the prescribe burn. Anticipate regeneration of 100-300 tpa, 90% of which will be DF within 5 years of burn activity. Remaining 10% may be PP, WL or LP.</td></tr>
<tr><td>Slashing</td><td>4465</td><td>50-70</td><td>As std. progresses into small (pole) or medium (immature) size classes, slash understory (trees ≥ 10’ in height and no more</td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>than 3” DBH) when the following conditions are met or exceeded:
• Total Stand basal area is ≥ 120 sq. ft.;
• Average Stand Diameter is ≥ 8” DBH for trees greater than 5” DBH;
• At least 200 tpa are ≥ 5” DBH</td></tr>
<tr><td>Underburning</td><td>4980 SIMFIRE</td><td>53-73</td><td>Underburn stand within 2-3 years of slashing operation to reduce surface/ladder fuels and to lift lower tree crowns, and create horizontal diversity within existing stand structure (small gaps in main canopy). Acceptable mortality by underburning should be ≤ by size class:
<table>
<tr><th>Size Class</th><th>Mortality Limit</th><th>Residual Target TPA</th></tr>
<tr><td>≤ 10’ in height</td><td>90%+</td><td>≤25</td></tr>
<tr><td>3-5</td><td>70%+</td><td>0-50</td></tr>
<tr><td>5-15</td><td>10-30%</td><td>140-180</td></tr>
<tr><td>15+</td><td><1%</td><td>0-20</td></tr>
</table>
PP should be maintained at a minimum of 30% of stand composition of codominant/domiant classes after completion of underburing.</td></tr>
<tr><td>Regeneration</td><td>4431 PLANT or ESTAB</td><td>58-68</td><td>Invoke regeneration model to simulate ingression of nautural conifer seedlings as a result of the prescribe burn. Anticipate regeneration of 100-1000 tpa, 90% of which will be DF within 5 years of burn activity. Remaining 10% may be PP, WL or LP.</td></tr>
<tr><td>Underburning</td><td>SIMFIRE</td><td>80-100+</td><td>As std. progresses within medium size class, underburn stand when the following conditions are met or exceeded:
• A minimum of 30 years has occurred since last underburing
• Total Stand basal area is ≥ 120 sq. ft.;
• At least 100 tpa are ≥ 10” DBH

Continue to underburn stand on approximately 30 year cycle. Acceptable mortality and residual target TPA are</td></tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td></td>
<td>included in the table below:

PP should be maintained at a minimum of 30% of stand composition of codominant/domiant classes

<table>
<tr><th>Size Class</th><th>Mortality Limit</th><th>Residual TargetTPA</th></tr>
<tr><td>≤ 10’ in height</td><td>90%+</td><td>≤25</td></tr>
<tr><td>1-5</td><td>90%+</td><td>≤50</td></tr>
<tr><td>5-10</td><td>10-30%</td><td>≤50</td></tr>
<tr><td>10-15</td><td><1%</td><td>75-125</td></tr>
<tr><td>15”+</td><td>trace</td><td>≤25</td></tr>
</table>

Residual basal area after burning should be between 80-100 sq. ft. and should be contained in the larger size classes (10” DBH and larger)</td>
</tr>
<tr>
<td>Regeneration</td>
<td>4431 PLANT or ESTAB</td>
<td>85-105</td>
<td>Invoke regeneration model to simulate ingression of natural conifer seedlings as result of the prescribe burn. Anticipate regeneration of 100-1000 tpa, 90% of which will be DF within 5 years of burn activity.</td>
</tr>
<tr>
<td>Underburning</td>
<td>SIMFIRE</td>
<td>115-135+ continue burning every 30 years.</td>
<td>Burning should on a 30 year cycle and should be invoked when ba exceeds 150 sq. ft.:

At maturity, mortality limits by Rx and target distribution by size class is as follows for maturity and beyond
<table>
<tr><th>Size Class</th><th>Mortality Limit</th><th>Residual TargetTPA</th></tr>
<tr><td>0-5</td><td>90%+</td><td>0-200</td></tr>
<tr><td>5-15</td><td>10-30%</td><td>25-60</td></tr>
<tr><td>15+</td><td><1%</td><td>20-50</td></tr>
<tr><td>20+</td><td>trace</td><td>10-15</td></tr>
</table>
PP should be maintained at a minimum of 30% of stand composition of codominant/domiant classes

Residual basal area should not exceed 150 sq. ft. after underburning.</td>
</tr>
</table>

Rx PB - Douglas-fir Moist: Existing & Regenerated Stands

II. *FOREST PLAN PRESCRIPTION SUMMARY*

<table>
<tr><th>ACTION</th><th>CODE TSMRS/ FVS</th><th>YEAR</th><th>SPECIFICATIONS</th></tr>
<tr><td>Precommercial thinning</td><td>4521 THINBTA</td><td>20-30</td><td>For stands ouside of Lynx habitat (less than 4,000 feet in elevation, or in a DF habitat type series):

Reduce stand density to 500 tpa. Thin from below, exclusive of trees larger than 10” DBH or greater (surviving reserve structure, if any). Favor PP and WL in the codominant and dominant size classes if avialable. Otherwise, use species preference table. PP/WL should be a minimum of 30% of stand if available.

For stands within Lynx habitat (greater than 4,000 feet in elevation, all habitat types other than DF series): No precommercial thinning allowed and defer treatment until next scheduled activity.</td></tr>
<tr><td>Slashing</td><td>4465 THINDBH</td><td>50-60</td><td>Slash smaller diameter size classes (less than 5” DBH) to create fuel loading and reduce ladder fuels in preparation of prescribed burning</td></tr>
<tr><td>Underburning</td><td>4980 SIMFIRE</td><td>53-63</td><td>Underbrurn stand within 2-3 years of slashing operation to reduce surface fuels, ladder fuels and to lift lower tree crowns.

Target conditions after underburning is complete:

PP/WL should be maintained at a minimum of 30% of the codominant/dominants if possible.
<table>
<tr><th>Size Class</th><th>Mortality limit</th><th>Residual Target TPA</th></tr>
<tr><td>0-5</td><td>30-90%</td><td>0-100</td></tr>
<tr><td>5-15</td><td>10-30%</td><td>100-250</td></tr>
<tr><td>15+</td><td><1%</td><td>0-20</td></tr>
</table></td></tr>
<tr><td>Regeneration</td><td>4431 PLANT or Estab</td><td>58-68</td><td>Invoke regeneration model to simulate ingression of nautural conifer seedlings as result of the prescribe burn. Anticipate regeneration of 100-500 tpa, mostly of shade-tolerant and mid-tolerant species (GF/DF/WH).</td></tr>
<tr><td>Underburning</td><td>4980 SIMFIRE</td><td>110-120 years</td><td>Repeat underburning to the above parameters. Underburning should be repeated on a 60 year cycle. Target Conditions at maturity and beyond should be in the following ranges after each underburning event.</td></tr>
</table>

<table>
<tr><td></td><td></td><td>170-180 years

230-240 years</td><td>PP/WL should be maintained at a minimum of 30% of the codominant/dominants if possible.
<table><tr><th>Size Class</th><th>Mortality Limit</th><th>Residual Target TPA</th></tr><tr><td>0-5</td><td>50-90%</td><td>50-200</td></tr><tr><td>5-15</td><td>10-30%</td><td>50-150</td></tr><tr><td>15+</td><td><1%</td><td>10-60</td></tr></table></td></tr>
<tr><td>Regeneration</td><td>4431 PLANT or Estab</td><td>5 years after each under burning event</td><td>Invoke regeneration model to simulate ingression of nautural conifer seedlings as result of the prescribe burn. Anticipate regeneration of 100-800 tpa, mostly of shade-tolerant and mid-tolerant species (GF/DF/WH).</td></tr>
</table>

Rx PB – Western Larch: Existing & Regenerated Stands

II. *FOREST PLAN PRESCRIPTION SUMMARY*

<table>
<tr><th>ACTION</th><th>CODE TSMRS/ FVS</th><th>YEAR</th><th>SPECIFICATIONS</th></tr>
<tr><td>Precommercial thinning</td><td>4521 THIMBTA</td><td>20-30</td><td>For stands ouside of Lynx habitat (less than 4,000 feet in elevation, or DF habitat type series):

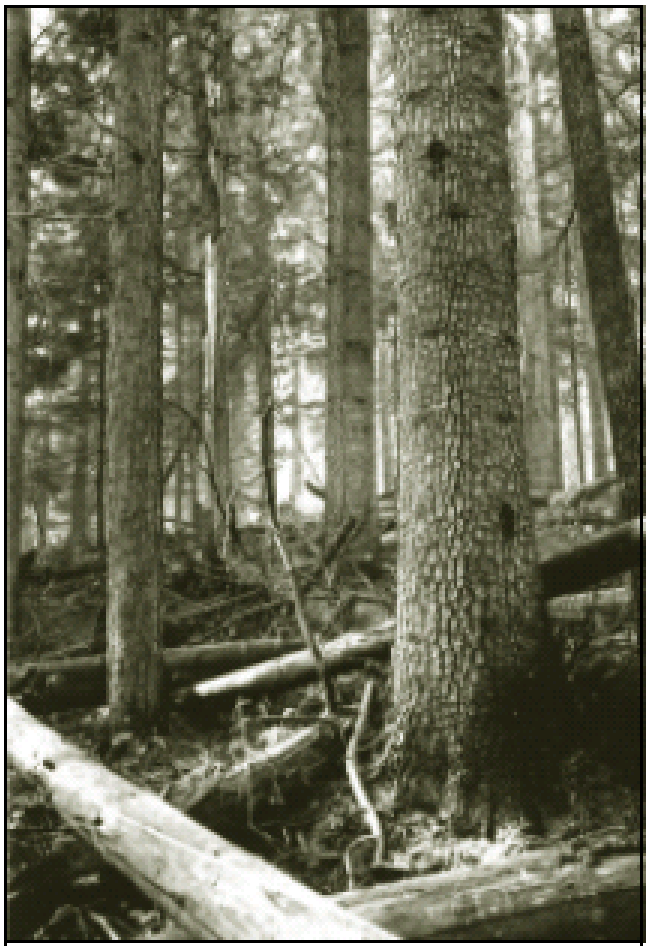
Reduce stand density at age 20-30. Thin from below to 400 tpa, exclusive of trees 10” DBH or greater. (surviving reserve structure from regeneration period). WL should be a minimum of 40% of stand after thinning

For stands within Lynx habitat (greater than 4,000 feet in elevation, all habitat types other than DF series): No precommercial thinning allowed and defer treatment until next scheduled activity..</td></tr>
<tr><td>Slashing</td><td>4465</td><td>50-60</td><td>Slash smaller diameter size class (less than 5”DBH) to create fuel loading and reduce ladder fuels in preparation of prescribed burning.</td></tr>
<tr><td>Underburning</td><td>4980 SIMFIRE</td><td>53-63</td><td>Underbrurn stand within 2-3 years of slashing operation to reduce surface fuels, ladder fuels and to lift lower tree crowns.

Target conditions after underburning is complete:
<table>
<tr><th>Size Class</th><th>Mortality Limit</th><th>Residual Target TPA</th></tr>
<tr><td>0-5</td><td>30-90%</td><td>0-100</td></tr>
<tr><td>5-15</td><td>10-30%</td><td>100-300</td></tr>
<tr><td>15+</td><td><1%</td><td>0-20</td></tr>
</table>
WL should be maintained at a minimum of 30% of the resulting stand composition in the codominant and dominant classes.</td></tr>
<tr><td>Regeneration</td><td>4431 PLANT or Estab</td><td>58-68</td><td>Invoke regeneration model to simulate ingression of nautural conifer seedlings as result of the prescribe burn. Anticipate regeneration of 100-500 tpa, mostly of shade-tolerant and mid-tolerant species (GF/DFWH).</td></tr>
<tr><td>Underburning</td><td>4980 SIMFIRE</td><td>110-120+ years</td><td>Repeat underburning as stated above every 60 years.

Target conditions and acceptable estimated mortality limits after underburning for mature stands is complete:</td></tr>
</table>

<table>
<tr><td></td><td></td><td>170-180 years

230-240 years</td><td>
<table>
<tr><td>Size Class</td><td>Mortality Limit</td><td>Residual Target TPA</td></tr>
<tr><td>0-5</td><td>50-90%+</td><td>50-500</td></tr>
<tr><td>5-15</td><td>10-30%</td><td>40-100</td></tr>
<tr><td>15+</td><td><1%</td><td>10-60</td></tr>
</table>
WL should be maintained at a minimum of 30% of the resulting stand composition in the codominant and dominant classes.
</td></tr>
<tr><td>Regeneration</td><td>4431 PLANT or Estab</td><td>115-125+ years</td><td>Invoke regeneration model to simulate ingression of nautural conifer seedlings as result of the prescribe burn. Anticipate regeneration of 200-1000 tpa, mostly of shade-tolerant and mid-tolerant species (GF/DFWH). Continue to invoke model every 5 years after subsequent burns.</td></tr>
</table>

Notes: