SPECTRUM Model Formulation for the Clearwater/Nez Perce Planning Zone

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The Spectrum model is a harvest-scheduling tool that will be used by the Clearwater/Nez Perce Planning Zone (CNPZ) to calculate allowable sale quantity (ASQ) and long-term sustained yield (LTSY). The CNPZ will also use the Spectrum model to estimate harvest from lands classified as unsuitable for timber production where timber removal may be used to achieve other resource objectives. The Planning Zone is planning to use a Spectrum model formulation similar to the model used by the Kootenai/Idaho Panhandle Zone (KIPZ) and the Western Montana Planning Zone (WMPZ). The CNPZ work will be done by Mason Bruce and Gerard under an existing Regional contract to construct the model and run any alternatives. CNPZ team members will evaluate the model results.

Management Questions

The Spectrum model formulation on the Clearwater/Nez Perce Planning Zone (CNPZ) is designed to provide replies to the following questions:

1. What vegetative treatments are selected and how should they be scheduled to move us towards the DFC for vegetation?
2. What is the sustainable level of harvest (both regulated and unregulated) from these treatments?
3. How can we reduce fire hazard?
4. What is the level of vegetative treatments, with and without budget limitations?
5. What are the LTSY and TSPQ? What is the regulated volume anticipated for offer?

Vegetation Management Strategy

The vegetation management strategy for the zone is to manage our landscapes toward the range of desired conditions. Some species and size classes are more abundant than desired, while others are less abundant. Management to move towards desired conditions will also provide for conditions that are sustain wildlife.

Planning Horizon

Because of long rotation periods and the desire to model sustainability, the planning horizon is 250 years.

Analysis Areas

Analysis Areas in the Spectrum model are composed of six layers of information. Superimposed on each other, the combination of classes in each layer creates a repeatable land unit with unique characteristics. Each analysis area may have a different suite of management actions available for application within the model that yield a variety of outputs.

1. **Vegetation Desired Future Condition Areas**

The CNPZ has been delineated into six (6) Landtype Association Groups or Ecosection settings. These will be included as a layer that defines our desired future conditions.

(Spectrum identifier – 6 characters)	**DFC Area**	**L1_aaname**
B333	Bitterroot Mtns. (M333D) Breaklands	B
U333	Bitterroot Mtns. (M333D) Uplands	U
S333	Bitterroot Mtns. (M333D) Subalpine	S
B332	Idaho Batholith (M332A) Breaklands	K
U332	Idaho Batholith (M332A) Uplands	R
S332	Idaho Batholith (M332A) Subalpine	C

2. Roadless Status

Roadless lands are expected to be of great interest to many people throughout the revision process. Including inventoried roadless areas as a layer in the Spectrum model will simplify reporting of outputs. It will also facilitate model changes in response to changing management direction concerning roadless areas.

Management costs will be increased in roadless areas to reflect the additional costs of helicopter logging or road construction.

Spectrum Identifier	**Description**	**L2_aaname**
rdls	Roadless and undeveloped	R
nrdls	Roaded and developed	N

3. Timber Suitability

Management areas will be grouped into classes with similar timber production objectives. Four classes are anticipated as follows:

Spectrum Identifier	**Management Area Class**	**L3_aaname**
NSNMgt	Not Available or Not Suited; No Timber Harvest Allowed Selway-Bitterroot Wilderness Gospel Hump Wilderness River of No Return Wilderness Non-forest Research Natural Areas Wild River corridors	N
SRipNo	Generally Suitable for Timber Harvest for Other Resource Objectives, no scheduled	O

	output Riparian conservation areas Pilot Knob special interest area East Meadow Creek (Nez Perce NF) Recommended wilderness (Clearwater NF) Rapid River drainage (Nez Perce NF)	
SNProd	Generally Suitable for Timber Harvest, for other resource objectives Scenic and Recreational Rivers Landslide prone lands Most inventoried roadless lands due to low economic viability without road construction National Historic Landmark Developed Recreation Areas Administrative Sites	P
STProd	Suited for Timber Production All other lands	S

4. Resource Condition Zones

Resource condition zones will be identified to reflect specific areas where resource objectives would be used to modify timber harvest schedules. Anticipated resource condition zones include the following:

Lynx Analysis Units – silvicultural prescription mix
Conserve/Restore Watersheds – timing, dispersion, rate of harvest

Spectrum Identifier	**Description**	**L4_aaname**
Lcons	Lynx habitat – conserve watershed	L
Lrest	Lynx habitat – restore watershed	H
Cons	Conserve watershed outside of lynx habitat	C
Rest	Restore watershed outside of lynx habitat	R

Riparian conservation areas (RCA) have been removed from the tentatively suitable timber base, so they will not be included in the ASQ calculations. A resource condition zone for riparian areas is not needed.

5. **Cover Type**
   The following vegetation cover types will be used to model the timber strata. Spatial data from R1VMP and the regional PVT map will be used to identify the strata. These are also the groups for which yield tables are developed.

Spectrum Identifier	Prescription Group	VMP Timber Strata	SIMPPLLE HTGs	L5_aaname
WDI	Ponderosa pine	PP, IMXS	A2, B1, B2, B3, C1A	P
WDT	Dry DF/GF	TGCH, DF, GF	A2, B1, B2, B3, C1A	D
MI	Mesic DF mix	DF, L, WP, IMXS	C2, C3, D1, E1	W
MT	Grand fir/Cedar	TGCH, GF, C	C2, C3, D1, E1	C
SI	Cold DF mix	IMXS, DF, L	C1B, D3, E2, F1, F2, G1, G2	I
ST	Subalpine fir mix	TASH, AF, ES	C1B, D3, E2, F1, F2, G1, G2	A
LP	Lodgepole pine	LP	Any	L

The SIMPPLLE habitat type groups are used primarily to classify the mixed species types – IMXS, TGCH, and TASH. There are minor inclusions of TASH in the warm/dry and mesic groups, and of TGCH in the subalpine group. There are also small inclusions of ES and AF in the warm/dry and mesic groups, as well as GF in the subalpine group.

6. **Size Class**
   Timber size classes will be used to model vegetation structure. The same size classes will be used in Spectrum as used in SIMPPLLE. Size classes are derived from R1VMP spatial data.

Spectrum Identifier	Size Classes	L6_aaname
sdsp	Seed/Sap (0-5”)	S
small	Small (5-10”)	P
med	Medium (10-15”)	M
large	Large (15”+)	L
nfor	none	N

NOTE: Since the input files were run, size classes small and medium have been combined for desired condition descriptions.

Management Actions

Management actions describe the series of silvicultural steps that would be available by analysis area that lead to specific yield tables from which outputs are estimated. Kris Hazelbaker will develop the management actions (silvicultural prescriptions) to be used in the model by strata.

Natural disturbance events (fire, insects, and pathogens) would be estimated from historic data. Salvage of dead trees from natural disturbance events will be estimated outside the model based on these estimated acres of natural disturbance. Salvage harvest will not be tracked in the Spectrum model as a management action.

	Even-aged		**Uneven-aged**			
Prescriptions Group	**CC**	**SW/ST**	**ITS**	**GS**	**IMPR**	**RXBO**
Ponderosa pine		X		X	X	X
Dry DF/GF		X		X	X	X
Mesic Intolerants		X		X	X	X
Grand fir/Cedar		X		X	X	X
Cold Intolerants		X		X	X	X
Subalpine fir mix		X	X	X	X	X
Lodgepole pine	X				X	X

CC = clearcut with reserves; SW/ST = shelterwood or seed tree with reserves; GS = Group Selection; IMPR = any type of intermediate harvest such as commercial thin or improvement cut; RXBO = prescribed burn only

Yield Tables

The Forest Vegetation Simulator (FVS variant NI-15) was used on Forest Inventory and Analysis (FIA) tree data and permanent growth plot information to estimate timber stand growth and yield. The Forest Management Service Center constructed the yield tables used in the Spectrum model with the assistance of Kris Hazelbaker. The following attributes were tracked in the yield tables:

- Merchantable cubic foot volume – National Policy to use this measure to calculate TSPQ, LTSY, and non-declining flow.
- Merchantable board feet (Scribner) – This will be a conversion from cubic foot volume.
- Diameter of removal and residual stand
- Fire risk from the Fire and Fuels Extension
- Cover type and size class
- Insect risk

Objective Functions
Objective functions drive the model towards a specified end result. They typically are expressed as to maximize or minimize a specified parameter. Examples of objective functions that will likely be useful include the following:

- Present net value (PNV) with associated costs and revenues
- Volume, mortality
- Fire risk
- Structural stage
- Desired future condition (DFC)

Resource Objectives (constraints)
Resource objectives will be used to direct the model behavior. Examples of resource objectives that might be appropriate include the following:

- Non-declining yield
- Long-term sustained yield
- Budget limited to average annual timber, reforestation, watershed rehab budgets for the past five years
- Snags
- Watershed restoration concurrent with harvest in restore watersheds
- Roadless
- Dispersion
- Rate of harvest (area)
- Vegetation composition

Costs for Management Activities

Costs were developed for sale prep and sale admin (lumped), reforestation, TSI, prescribed burn, and road construction and reconstruction. A cost for watershed restoration was also developed to track restoration activities in certain watersheds.

Costs for the Spectrum Model

Activity	Units	Clw NF Cost	Clw NF Production Coefficient	NP NF Cost	NP NF Production Coefficient	Timing
Sale Prep and Admin 1/	ccf	$68.36	1 per ccf harvest	$68.36	1 per ccf harvest	With harvest
Reforestation 2/	Acre	$1077	1 per acre regen harvest, 0.2 per acre select harv	$1024	1 per acre regen harvest, 0.2 per acre select harv	With harvest
TSI (pre-commercial thin) 3/	Acre	$329	0.35 per acre regen harv, 0.2 per acre select harv	$237	0.35 per acre regen harv, 0.2 per acre select harv	2 decades after regen harv or 2 decades after selection harv
Prescribed Burn 4/	Acre	$200	1 per acre burned	$200	1 per acre burned	Timing for Presc. Burn rx

Activity	Units	Clw NF Cost	Clw NF Production Coefficient	NP NF Cost	NP NF Production Coefficient	Timing
Road cons/recons 5/	Miles	$25,000	.008 per acre harvest	$15,000	.008 per acre harvest	With harvest
Watershed Restoration 6/	Acres	$50	1 per acre harvest	$160	0.09 per acre harvest	With harvest

1/ from Mike McGee/Larry Whitehead based on 5 year average (includes cost pools, NEPA, and litigation) – NFTM and SSSS unit costs averaged.
2/ from 4/02 Gary Dickerson cost comparison spreadsheet (includes cost pools) – includes only NFVW costs.
3/ from 4/02 Gary Dickerson cost comparison spreadsheet (includes cost pools) – include only NFVW costs.
4/ from Bill Wilkinson, based on last year or 4 year average (includes cost pools).
5/ ClwNF - from Chuck Fowlds, based on recent timber sales; NPNF – from Joe Bonn, based on typical recent projects.
6/ from Nick Gerhardt (Nez Perce N.F.) and Anne Connor (Clearwater N.F.)

All costs except prescribed burn are part of the budget constraint.

Watershed restoration activity only applies to level4 id of Lrest or Rest.

All activity costs except road construction/reconstruction within IRA (level2 id of rdls) were increased by 20%, due to increased access and analysis costs. Timber stumpage values reduced to the helicopter logging value (see stumpage value table)

Values

Stumpage values for timber were developed by Mike Niccolucci and Don McKinnon in the Region One Regional Office by species group, diameter class, and logging system. The stumpage value species group was cross-walked to spectrum species strata. Values by logging system were then averaged for the amount of tractor, cable, and helicopter logging that has occurred on the forests over the past several years. The following table displays the average stumpage value for all logging systems and for helicopter logging only (for use in inventoried roadless areas) for each forest.

Clearwater National Forest - Average Stumpage Value ($ per CCF) for all Logging Systems (averaged) 1/

	Average Diameter			
Spectrum Species Strata	**< 7"**	**7 - 9.9"**	**10 - 16"**	**> 16"**
PPmix	$1.00	$140.18	$140.55	$124.87
Dry DF/GF	$1.00	$118.02	$126.89	$136.74
LP	$1.00	$115.51	$119.94	$124.87
DF/L	$1.00	$118.02	$126.89	$136.74
GFmix	$1.00	$116.54	$121.09	$126.14
SFmix	$1.00	$116.54	$121.09	$126.14
Cedar	$1.00	$218.69	$244.63	$273.45

Clearwater National Forest - Average Stumpage Value ($ per CCF) for Helicopter Only Logging Systems

	Average Diameter			
Spectrum Species Strata	**< 7"**	**7 - 9.9"**	**10 - 16"**	**> 16"**
PPmix	$1.00	$41.66	$42.03	$42.43
Dry DF/GF	$1.00	$57.14	$63.84	$71.30
LP	$1.00	$55.72	$60.15	$65.07
DF/L	$1.00	$46.67	$55.54	$65.40
GFmix	$1.00	$67.60	$72.14	$77.19
SFmix	$1.00	$55.72	$60.15	$65.07
Cedar	$1.00	$107.93	$133.87	$162.69

Nez Perce National Forest - Average Stumpage Value ($ per CCF) for all Logging Systems (averaged) 1/

	Average Diameter			
Spectrum Species Strata	**< 7"**	**7 - 9.9"**	**10 - 16"**	**> 16"**
PPmix	$1.00	$180.26	$180.62	$181.03
Dry DF/GF	$1.00	$105.86	$114.73	$124.59
LP	$1.00	$92.52	$96.95	$101.88
DF/L	$1.00	$105.86	$114.73	$124.59
GFmix	$1.00	$93.54	$98.09	$103.14
SFmix	$1.00	$93.54	$98.09	$103.14

Nez Perce National Forest - Average Stumpage Value ($ per CCF) for Helicopter Only Logging Systems

	Average Diameter			
Spectrum Species Strata	**< 7"**	**7 - 9.9"**	**10 - 16"**	**> 16"**
PPmix	$1.00	$91.42	$91.79	$92.20
Dry DF/GF	$1.00	$45.47	$52.18	$59.63
LP	$1.00	$38.61	$43.04	$47.96
DF/L	$1.00	$41.54	$50.41	$60.26
GFmix	$1.00	$49.41	$53.96	$59.01
SFmix	$1.00	$38.61	$43.04	$47.96

From spreadsheet titled 'clear_nez_stumpage_values_by_species.xls'
1/ The average amounts of tractor, skyline, and helicopter logging on the ClwNF and NPNF were determined by Mike Niccolucci, based on by volume average for '01-'05.

Transition Pathways

Transition pathways were developed for each cover type/prescription combination, and for natural growth. The following table summarizes the transitions that are included. There are separate documents for each transition.

Spectrum Cover Type Transition Changes

Treatment	Spectrum Species
Natural Growth	PP mix
	Warm DF/GF
	Mesic intolerants
	GF/C
	Cold tolerants
	Cold intolerants
	LP
Even-aged Harvest	PP mix
	Warm DF
	Mesic DF
	GF/C
	Cold tolerants
	Cold intolerants
	LP
Prescribed Burn	PP
	Dry DF
	GF/C
	Mesic intolerants
	AF mix
	Cold intolerants
	LP
Uneven-aged Mgt	PP
	Dry DF
	GF (Nez)
	C (Clw)
	Mesic intolerants
	AF mix
	Cold intolerants

* for prescribed burn, pathways are after burning sequence has been initiated; use natural growth pathways prior to burning sequence

Management Requirements and Objectives

Harvest Policy

Non-declining yield, long term-sustained yield and ending inventory constraints. Ensures that the timber yield is sustainable and need not decline in any decade.

Level id 3 of STProd will go towards TSPQ, have Non-Declining Yield applied and LTSY calculated. All other level 3 id go to the LTSY (long term sustained yield).

Budget Constraint
To assess effects under current budget levels, each alternative will be run with a budget constraint. At the experienced budget level, the constrained budget varies by alternative, based on the theme. The model will be run with this constraint to determine the estimated volume offer. The model will also be run without the budget constraint to determine the LTSY.

Budget constraints

Alternative	**ClwNF**	**NPNF**
Current Management		
Preferred Option	3450 M$	4000 M$

Snag Retention
Snag retention will be provided through the silvicultural prescriptions for the regeneration prescription. Reserves of trees will be required and the amount of snags tracked in the yield tables.

Number of snags will be tracked for 2 diameter classes (10-19.9" and 20"+).

Watershed Objectives
Watershed management requirements will be defined by watershed condition (the level 4 identifier).

Wildlife Objectives
For lynx habitat (level4 id of Lcons or Lrest), limit all veg treatment to no more than 15% over a decade.

Mix of Silvicultural Prescription by Management Area

Limit acres going to uneven-aged management to no more than 5000 acres per decade for all decades.

Natural disturbance
The amount of natural disturbance was determined using average fire return intervals for typical fire regimes in each setting. Disturbance levels will be input into the Spectrum model, requiring a certain number of acres to undergo natural disturbance every decade. The amount varies by level id 5 and 6.

The following acres will have underburns, mixed severity fire, or stand-replacing fire each decade.

Level 1 Identifier - B333 or B332

Strata – Level 5	ClwNF acres per decade	NPNF acres per decade
Ponderosa pine	3,000 mixed	3,000 mixed
Dry DF/GF	12,000 mixed severity 6,000 stand replacing	6,000 stand replacing 12,000 mixed severity
Mesic intolerants		
Grand fir/Cedar	14,000 mixed severity 7,000 stand replacing	7,000 stand replacing 14,000 mixed severity
Cold intolerants		
Subalpine fir mix	1,000 stand replacing	
Lodgepole pine		1,000 stand replacing
Non-forest		
Strata – Level 6		
Non-forest		
sdsp	1,000 stand replacing	1,000 stand replacing
Small/medium	7,000 stand replacing 3,000 mixed severity	7,000 stand replacing 3,000 mixed severity
large	26,000 mixed severity 6,000 stand replacing	26,000 mixed severity 6,000 stand replacing

Level 1 Identifier - U333 or U332
50% mixed severity, 50% stand-replacing for each cover type or size class

Strata – Level 5	ClwNF acres per decade	NPNF acres per decade
Ponderosa pine		
Dry DF/GF		
Mesic intolerants	1,000 mixed severity	3,000 mixed severity
Grand fir/Cedar	3,000 stand replacing 4,000 mixed severity	8,000 mixed severity 5,000 stand replacing
Cold intolerants		
Subalpine fir mix	2,000 stand replacing	2,000 stand replacing
Lodgepole pine		14,000 stand replacing
Non-forest		
Strata – Level 6		
Non-forest		
sdsp	1,000 stand replacing	1,000 stand replacing
Small/medium	1,000 stand replacing 1,000 mixed severity	4,000 mixed severity 15,000 stand replacing
large	4,000 mixed severity 3,000 stand replacing	7,000 mixed severity 5,000 stand replacing

Level 1 Identifier - S333 or S332

Strata – Level 5	ClwNF acres per decade (S333/S332)	NPNF acres per decade
Ponderosa pine		
Dry DF/GF		
Mesic intolerants		

Grand fir/Cedar		
Cold intolerants	3,000/2,000 mixed severity 2,000/1,000 stand replacing	3,000 mixed severity 2,000 stand replacing
Subalpine fir mix	17,000/12,000 mixed severity 17,000/12,000 stand replacing	17,000 mixed severity 17,000 stand replacing
Lodgepole pine	9,000/10,000 stand replacing 2,000/2,000 mixed severity	16,000 stand replacing 2,000 mixed severity
Non-forest		
Strata – Level 6		
Non-forest		
sdsp	1,000/1,000 stand replacing	1,000 stand replacing
Small/medium	1,000/1,000 stand replacing	6,000 mixed severity 14,000 stand replacing
large	26,000/21,000 stand replacing 22,000/16,000 mixed severity	16,000 mixed severity 20,000 stand replacing

Goal for attaining DFC
DFC will be defined by cover type and size class and goals will be set to achieve DFC. Following are the goals for the ClwNF and NPNF models.

Level 1 identifier – B333 (ClwNF)
ClwNF Species Composition – Percent of forested Bitterroot breaklands

Veg Type	Minimum %	Maximum %
WDI	9	19
WDT	9	17
LP	0	0
MT	9	19
MI	37	67
ST	0	0
Grass/Shrub	8	15

ClwNF Size Class - Bitterroot breaklands

Size Class	Minimum %	Maximum %
Non-stocked	8	17
Sd/sp	6	13
Small/Medium	17	36
Large	33	66

Level 1 identifier – U333 (ClwNF)
ClwNF Species Composition – Percent of forested Bitterroot uplands

Veg Type	Minimum %	Maximum %
WDT	5	10
MI	5	15
LP	3	7
MT	16	26
MI	27	55
ST	1	1
Grass/Shrub	3	7

ClwNF Size Class - Bitterroot uplands

Size Class	Minimum %	Maximum %
Non-stocked	3	7
Sd/sp	6	13
Small/Medium	21	41
Large	36	72

Level 1 identifier – S333 (ClwNF)
ClwNF Species Composition – Percent of forested Bitterroot subalpine

Veg Type	Minimum %	Maximum %
WDT	0	0
SI	4	10
LP	20	29
WT	0	0
MI	0	0
ST	24	50
Grass/Shrub	9	20

ClwNF Size Class – Bitterroot subalpine

Size Class	Minimum %	Maximum %
Non-stocked	11	23
Sd/sp	3	5
Samll/Medium	39	79
Large	14	28

Level 1 identifier – S332 (ClwNF)
ClwNF Species Composition – Percent of forested Batholith subalpine

Veg Type	Minimum %	Maximum %
WDI	0	0
SI	7	14
LP	13	24
MT	0	0
MI	0	0
ST	34	68
Grass/Shrub	12	24

ClwNF Size Class - Batholith subalpine

Size Class	Minimum %	Maximum %
Non-stocked	14	28
Sd/sp	13	25
Small/Medium	29	59
Large	10	20

Level 1 identifier – B332 and B333 (NPNF)
NPNF Species Composition – Percent of forested breaklands

Veg Type	Minimum %	Maximum %
WDI	21	41
WDT	21	44
LP	3	7
MT	11	21
ST	2	4
Grass/Shrub	6	15

NPNF Size Class – Batholith breaklands

Size Class	Minimum %	Maximum %
Non-stocked	6	15
Sd/sp	3	7
Small/Medium	25	49
Large	21	43

Level 1 identifier – U332 and U333 (NPNF)
NPNF Species Composition – Percent of forested uplands

Veg Type	Minimum %	Maximum %
WDI	11	23
MI	14	30
LP	15	29
MT	21	41
ST	2	4
Grass/Shrub	3	7

NPNF Size Class – Batholith uplands

Size Class	Minimum %	Maximum %
Non-stocked	3	7
Sd/sp	6	13
Small/Medium	21	41
Large	36	72

Level 1 identifier – S332 (NPNF)
NPNF Species Composition – Percent of forested subalpine

Veg Type	Minimum %	Maximum %
WDT	0	0
SI	7	13
LP	12	23
MT	0	0
ST	29	58
Grass/Shrub	3	6

NPNF Size Class – Batholith subalpine

Size Class	Minimum %	Maximum %
Non-stocked	3	6
Sd/sp	10	20
Small/Medium	23	47
Large	8	16

Reporting Requirements

Work Products and Timeline

The following table outlines the work products and timeline needed to support the construction of the Spectrum model:

Product	Description	Responsible	Timeframe	Status
Veg Layer with labels & attributes	Intersect FIA plot data with R1VMP	Renate	August 04	Done
HRV & DFC	Percentages of cover types and sizes by DFC group.	Kris	Aug/Sept 04	In progress
Analysis Areas	Compile the six layers into a single layer and create a table of analysis areas	Colleen	Aug 04	Done
1. Vegetation DFC Areas	Vegetative Response Units/Landtype Association Groups	Colleen	Aug 04	Done
2. Roadless	Roadless and Undeveloped Layer	Colleen	July 04	Done
3. Resource Condition Zones	Identify areas of resource concern	Kris/Alan/Kurt	June 04	Done
4. Cover Type	R1VMP cover type	Kris, Colleen	Aug 04	Done
5. Size Class	R1VMP size classes	Kris, Colleen	Aug 04	Done
Pathways	Simplified successional pathways	Kris/Jimmie	Sept 04	Done
Management Activities	Silvicultural Prescriptions	Kris	April 05	Done
Management Costs	Cost of implementing	Kris, Bill	April 05	Done

and Values	Management Activities and wood product values	Wilkinson, Mike McGee, Mike Niccolucci, Tam White, Larry Whitehead, Joe Bonn, Chuck Fowlds		
Yield Tables	Yield Tables for each Management Act.	Ft. Collins group, Kris	May 05	Done
Resource Objectives	Identify Specific Resource Objectives	Kris/Core Team	May 05	
CNPZ Spectrum Model	Meet with Kendrick Greer to design model	Kris, Colleen	May/June 05	
Run Spectrum Model	Run model and evaluate outputs	Team	June 05	

Reports
A standard set of Spectrum reports will be used to evaluate alternatives. Custom reports are not anticipated at this time; however, comma delimited or .dbf files may be requested. CNPZ team members will evaluate the model results.

Link between Spectrum and SIMPPLLE models
The SIMPPLLE and Spectrum models will be used interactively to evaluate relationships between harvest scheduling, natural disturbance events, and natural succession. Spectrum is a non-spatial model while SIMPPLLE displays spatial relationships. The CNPZ is planning to use the two models as follows:

1. Run SIMPPLLE model for a long time period without fire suppression to help estimate historic range of variability (HRV). Run it with fire suppression to estimate fire/insect/pathogen levels.
2. Run Spectrum to estimate LTSY and TSPQ with forest goals for value and desired conditions.
3. Rerun SIMPPLLE with fire suppression for 50 years using harvest schedules from Spectrum to check feasibility of harvest.
4. Adjust TSPQ levels as needed.