Arnold Schwarzenegger
Governor

BIOMASS TO ENERGY:

FOREST MANAGEMENT FOR WILDFIRE REDUCTION, ENERGY PRODUCTION, AND OTHER BENEFITS

APPENDIX 1

PIER FINAL PROJECT REPORT

January 2010
CEC-500-2009-080-AP1

APPENDIX 1:

B2E Landscape Vegetation Changes

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Notice of Change in Scenario Naming Conventions

Key assumptions, modeling structures and terminology were altered and refined to accommodate new thinking during the course of this study. The reader will observe in the appendices that the scenarios are referred to as "Scenarios 1, 2 and 3" or "S1, S2 and S3."

In both the main text of the Final Report and in the Life Cycle Assessment appendix (Appendix 4), the former Scenario 1 (S1) was renamed to the "Reference Case." Scenario 3 (S3) has been renamed the "Test Scenario." Scenario 2 (S2), focused on the relative contributions and impact of Industrial Private Forestry (IPF) has been eliminated from most of the analyses that make up the entire study. These changes better reflect the focus of the study, which is fundamentally about the landscape level changes in wildfire, habitat, and other dynamics. The modification of terminology do not substantively affect the findings or recommendations of the study.

Introduction

The vegetation domain describes changes in vegetation and fuels at a landscape scale resulting from modeled growth, vegetation management treatments, and fire. The key steps conducted in the vegetation domain include the following:

- spatially locating treatment areas across a landscape;
- applying a series of treatments over time to the treatment areas; and
- modeling changes in vegetation and fuels across the landscape over time, accounting for the effects of the treatments as well as wildland fires.

The vegetation domain is integrated with the B2E Project's fire domain. The condition of the vegetation and surface fuels (combined with topological and weather variables) is used to model fire behavior, with the resulting fire effects subsequently fed back and used to modify the vegetation.

The B2E analysis assumes the landscape is a dynamic environment where vegetation is constantly undergoing change through the processes of growth, treatment, and wildland fire. The vegetation domain spatially and tabularly tracks these vegetation changes at multiple scales (from a per-acre scale to an entire landscape scale) over time. The outputs from this domain supply the raw data used by the B2E Project's other domains, which explore how these landscape-scale vegetation changes ultimately affect wildland fire behavior, electricity production, habitat conditions, emissions, carbon cycling, hydrologic conditions, soils, economics, and ecosystem services.

Methodology

For the B2E Project's beta-test, vegetation changes have been modeled across a 2.7 million-acre landscape over a 40-year period (2006 through 2046) under the following three scenarios:

Scenario 1 – No treatment: This baseline scenario assumes no treatments on private or public lands in the beta-test landscape, thereby providing a reference for the interaction of the environment and fire. Vegetation is grown across the beta landscape over the 40-year period, and the changes in vegetation resulting from the effects of modeled wildland fires are tracked. This scenario assumes no salvage harvest or reforestation after wildfires; it does however assume suppression resources respond to wildland fires. Comparing Scenario 1 to Scenario 2 (described below) provides a means for assessing the contribution of private land treatments (including salvage and reforestation) toward modifying large-scale wildland fire behavior.

Scenario 2 – Treatments on privately-owned forest lands only: This scenario assumes treatments only on forested private lands (both industrial and non-industrial); no treatments are assumed for public lands. This scenario assumes that suppression resources respond to wildland fires on both public and private lands. On public lands, vegetation is grown from the present time and the effects of modeled wildland fires are tracked, as under Scenario 1.

Scenario 3 – Treatments on private and public lands: This scenario assumes the overriding goal for treatments on public lands is to achieve fire behavior modification at a landscape scale. Private lands are treated as under Scenario 2. National forest lands are treated using a variety of strategic approaches (including defensible fuels profile zones (DFPZs) and strategically placed area treatments (SPLATS)), consistent with management direction in the applicable national forest land and resource management plans (forest plans) while lands managed by the USDI Bureau of Land Management (BLM) are treated under an uneven-aged management regime.

Each scenario is modeled at 10-year increments, beginning with the initial condition at Year 0 (2006) and the ending condition at Year 40 (2046).

1. Data Sources and Assumptions

As previously described, modeling in the vegetation domain assumes that vegetation change over time is driven by growth, treatments, and wildland fire. The initial starting point is the vegetation inventory. Over time, this inventory is modified by the processes of growth, treatments, and wildland fire.

A. INITIAL VEGETATION INVENTORY

The most critical data source for the vegetation domain is the initial (2006) vegetation inventory, which has two components: (1) a vegetation map and (2) Forest Inventory Analysis (FIA) plot data linked to the mapped vegetation polygons.

Vegetation Map

The vegetation map classifies areas under two categories: (1) inventory unit and (2) strata label. The beta test landscape has the following six inventory units:

6 = Lassen National Forest

11 = Plumas National Forest
17 = Tahoe National Forest
52 = North Interior (non-national forest lands)
52 = Northern Sierra (non-national forest lands)
55 = Central Valley (non-national forest lands)

Each mapped vegetation polygon is assigned a vegetation strata label based on its vegetation type, tree size, and canopy cover. The B2E Project uses the Forest Service Pacific Southwest Region's EVEG (Existing Vegetation) map layer, which assigns vegetation strata labels to each polygon and has been completed to national standards. Detailed information regarding development of the EVEG map layer is available at http://www.fs.fed.us/r5/rsl/projects/mapping/.

Each strata label is comprised of a three-character code, with the first character representing forest type (Table A), the second representing tree size class (Table B), and the third representing tree canopy density (Table C). For hardwood and non-forest vegetation types, the last two characters of the strata label refer to the primary CALVEG type (Table D).

Table A. Regional forest types within the B2E beta test landscape.

Code	Regional Forest Type
A	Alpine
D	Douglas-fir
E	Eastside pine
F	Eastside mixed conifer
H	Hardwoods (productive)
I	Hardwoods (non-productive)
J	Jeffrey pine
K	Knobcone pine
L	Lodgepole pine
M	Westside mixed conifer
N	Pinion-Juniper
P	Ponderosa pine
R	Red fir
U	Non-forest types
W	White fir
Z	Shrub types (non-productive)

Table B. Tree size classes for conifer forest types within the B2E beta test landscape.

Code	Tree Size Description	Average Visible Crown Diameter[1]
N	Non-Stocked	(Areas Not Reforested)
0	Seedlings	(Derived From Plantation Age)
1	Saplings	(Derived From Plantation Age)
2	Poles	Crown Diameter Less Than 12 Feet
3	Small	Crown Diameter From 12 To 24 Feet
4	Medium	Crown Diameter From 24 To 40 Feet
5	Large	Crown Diameter Greater Than 40 Feet
X	Not Determined	

Table C. Tree density groups (conifer forest types only) within the B2E beta test landscape.

Code	Density Group	Percent Crown Closure
O	Non-Stocked	0 - 9 % Cover
S	Sparse	10 - 19 % Cover
P	Light	20 - 39 % Cover
N	Medium	40 - 69 % Cover
G	Heavy	70 - 100 % Cover
X	Not Determined	

[1] The average visible crown diameter is based on the visible crown as viewed from above in an aerial photograph. Crown diameter is used to approximate tree size.

Table D. Primary CALVEG types (for hardwood and non-forest types only) within the B2E beta test landscape.

REGIONAL DOMINANCE TYPE	COVERTYPE	DESCRIPTION
BR	SHB	Shrubs
GR	GR	Grass
NV	NV	Non-Vegetated (barren areas, water, urban, etc)
QC	HDW	Canyon Live Oak
QD	HDW	Blue Oak
QK	HDW	Black Oak
QO	HDW	Willow and Other Riparian Hardwoods

Table 1 displays the 2006 vegetation inventory by the acreages assigned to each strata label within the B2E beta test landscape.

Table 1. Acreages by strata label within the B2E beta test landscape by inventory unit (at year 2006 start-up).

STRATA LABEL	06-Lassen (acres)	11-Plumas (acres)	17-Tahoe (acres)	52-North Interior (acres)	53-North Sierran (acres)	55-Central Valley (acres)	**Total Acres**
A3P					5		**5**
D2N						10	**10**
D3G						185	**185**
D3N						2,044	**2,044**
D3P						2,009	**2,009**
D4G						99	**99**
D4N						378	**378**
D4P						52	**52**
E0X	499	4,181	26,371				**31,051**
E1X	1,574	4,831	1,532				**7,937**
E2N	13,331			9,944			**23,275**
E2P	11,896			8,276	10,023		**30,194**
E2X		1,900	1,376				**3,277**
E3G				2,478			**2,478**
E3N	46,194	59,968	7,715	21,113	44,276		**179,265**
E3P	8,614	41,647	11,851	4,757	6,331		**73,200**
E3S		8,995	5,105				**14,100**
E3X	1,725	1,735	993				**4,453**
E4N					2,493		**2,493**
E4P		15,007	8,693				**23,700**
ENO	301	2,676					**2,978**
F0X	3,860	4,132					**7,991**
F1X	1,493	3,195					**4,688**
F2N	12,271			5,693			**17,965**
F2P				6,506	1,194		**7,700**
F2X	1,342	1,967					**3,309**
F3G	56,908	21,271		20,853	5,394		**104,427**
F3N	61,435	92,603		52,157	70,250		**276,444**
F3P	11,117			5,619	1,621		**18,357**
F3X	3,721	2,044					**5,765**
F4G	33,584	44,336			7,112		**85,031**
F4N		29,099		10,215	3,709		**43,024**
FNO	1,643	3,338					**4,982**
HQK	615	21,404	64	586	10,668	1,421	**34,758**
IQC	42	19,109	64	247	10,500	2,669	**32,630**
IQD				42	10,035	20,977	**31,054**
IQO	954	1,095		712	1,194	2	**3,956**
J1X		217					**217**
J3N		2,689			321		**3,010**
J3P		3,707			67		**3,773**
J4N		3,872					**3,872**

STRATA LABEL	06-Lassen (acres)	11-Plumas (acres)	17-Tahoe (acres)	52-North Interior (acres)	53-North Sierran (acres)	55-Central Valley (acres)	**Total Acres**
K2N		395					**395**
L1X	292						**292**
L3G	8,229			6,951			**15,180**
L3N	10,507	712	89		306		**11,614**
L3P			30				**30**
L4G		437					**437**
M0X	89	4,497	94				**4,680**
M1X	227	8,352	403				**8,982**
M2G		3,934					**3,934**
M2N				1,364			**1,364**
M2P	722			1,144	15,763		**17,628**
M2X	183	1,354					**1,537**
M3G	2,627	43,938		3,941	18,997		**69,503**
M3N	7,727		2,377	28,284	58,374		**96,762**
M3P	986	56,684	1,658	3,333	544		**63,205**
M3X	2,073	2,305					**4,379**
M4G	2,350	89,516			37,441		**129,308**
M4N	1,337	43,182	240	1,544	20,878		**67,181**
M4P			366				**366**
M5G[1]		45,672					**45,672**
MNO	289	4,717					**5,006**
N2P	788			10,855	566		**12,209**
P0X		1,661					**1,661**
P1X		1,730					**1,730**
P2P					628	10	**638**
P2X		1,772					**1,772**
P3G		11,735					**11,735**
P3N		20,132			32,746	4,198	**57,076**
P3P		18,802			23,700	3,734	**46,236**
P3S						3,015	**3,015**
P4G		30,253			8,728	42	**39,023**
P4N		22,996			14,765	1,352	**39,112**
P4P		7,826			7,705	96	**15,627**
PNO		1,927					**1,927**
R0X	751		976				**1,727**
R1X	114		37				**151**
R2P				339			**339**
R2X		786	255				**1,040**
R3N	15,503	23,477	348	4,809	5,335		**49,473**
R3P	5,538		591	3,721			**9,850**
R3X	489						**489**
R4G		6,259					**6,259**
R4N	7,576	15,466	2,693	3,778			**29,514**

STRATA LABEL	06-Lassen (acres)	11-Plumas (acres)	17-Tahoe (acres)	52-North Interior (acres)	53-North Sierran (acres)	55-Central Valley (acres)	**Total Acres**
R4P			1,834				**1,834**
RNO	474	348					**823**
UGR	11,226	26,270	1,025	9,887	42,171	2,916	**93,495**
UNV	5,273	26,816	153	53,785	111,264	10,606	**207,897**
W0X	472	1,549					**2,021**
W1X	292						**292**
W2N		10,116					**10,116**
W2X		5,523					**5,523**
W3G		7,255					**7,255**
W3N	14,498	31,592	4,525	11,846	16,264		**78,725**
W3P			2,884				**2,884**
W3X	400						**400**
W4G		15,919					**15,919**
W4N	5,876	31,138	919	1,982			**39,915**
W4P		2,812					**2,812**
WNO	178	1,752					**1,930**
ZBR	50,869	102,193	9,899	39,413	84,787	2,002	**289,163**
Total	**431,075**	**1,128,817**	**95,160**	**336,175**	**686,152**	**57,815**	**2,735,195**

[1] The M5G strata label was added to distinguish eastside mixed conifer 4G from westside mixed conifer (M4G) within the Plumas National Forest inventory unit.

The entire beta-test landscape is overlaid by a grid comprised of 100 meter^2 cells. Each grid cell is assigned the strata label of the polygon in which it is located (along with a number of other spatial attributes described later in this document). As the simulation progresses through each decade, a grid cell's vegetation undergoes a sequence of treatment activities, wildfire disturbance, and growth such that its assigned strata label is updated to reflect the cell's changed vegetation condition at the end of each decade.

Forest Inventory Analysis Plot Data

The Forest Service periodically collects vegetation inventory data for national forest lands as well as non-national forest lands. Forest Inventory Analysis (FIA) data are gathered over a series of plots located across lands within the beta test landscape. The B2E Project relies on vegetation inventory data provided by the Forest Service Pacific Southwest Region's Remote Sensing Laboratory. Information about the Forest Service Pacific Southwest Region's vegetation inventory program is found at http://www.fs.fed.us/r5/rsl/projects/inventory/.

Linking FIA plot data to the mapped vegetation polygons provides the basis for statistically valid estimates of vegetation change. The vegetation strata labels are the bridge between the mapped vegetation polygons and the FIA plot data. The FIA plot data consist of (a) site reference information (plot location, inventory date, slope, aspect, elevation) and (b) the characteristics (species, size, canopy position, and so forth) of the trees sampled (referred to as the tree list).

Each FIA plot is assigned to a specific vegetation stratum, thereby making it possible to aggregate the tree lists from all the plots assigned to a given vegetation stratum. Hence, the vegetation inventory for a particular stratum is represented by an aggregated tree list, which is comprised of the individual tree lists from each of its plots added together. Each tree in the aggregated tree list represents a certain number of trees per acre, based on the size of the plots and the number of plots assigned to the stratum. For example, if one 20-inch diameter white fir tree is measured on a 1/5-acre plot, it represents five 20-inch white fir trees per acre. However, if the aggregated tree list is comprised of data from 5 plots, each of which has one 20-inch white fir tree on its tree list, the aggregated tree list for the stratum will show one 20-inch white fir tree per acre for that stratum.

Each aggregated tree list comprises the vegetation inventory data for all mapped polygons that have been assigned to the stratum. For example, every polygon (and its associated composite grid cells) that has an F3P strata label has an identical initial aggregated tree list in 2006; however, as the simulation progresses through time, the tree lists diverge, depending on whether a particular polygon is treated, burns, or simply grows in a given decade.

Each tree list is modeled or simulated at the individual plot level. However, at each time step (2006, 2016, 2026, 2036, and 2046), all the plots in the stratum are aggregated to produce the outputs and effects.

The 2006 Vegetation Inventory

Each vegetation stratum is characterized by a specific tree size distribution (numbers of trees in different diameter classes) and species composition, based on an aggregation of FIA plot data for the stratum, as described above. The inventory plot data provide a “snapshot” of stand-level structure on the date the inventory was conducted. In the period since the inventory data were collected, vegetation has grown. To account for vegetation growth, the FIA data has been “grown” to 2006 using the Forest Vegetation Simulator (FVS) Model. The acreages by strata displayed in Table 1 reflect the 2006 projected condition. (*Source: USDA Forest Service FIA Plot Data for the Plumas, Lassen, and surrounding private lands with growth projected to 2006*).

B. METHODOLOGY AND ASSUMPTIONS FOR APPLYING TREATMENTS AND FIRE IN THE BETA-TEST LANDSCAPE

Growth

The Forest Vegetation Simulator (FVS) Model (Stage 1973) is a computer program used to project the development of forest stands. FVS is an individual-tree, distance-independent growth and yield model. It has its structural roots in the Stand Prognosis Model developed by Albert Stage from the Intermountain Research Station. Staff at the Forest Service’s Forest Management Service Center in Fort Collins have calibrated many variants of the model to specific geographic areas throughout the United States. For the B2E Project, growth equations are derived directly from the Inland California Southern Cascades (ICASCA) variant of FVS. Growth of vegetation (in both treated and untreated areas) is projected at 10-year increments from 2006 through 2046.

Treatments

As previously described, the B2E Project beta-test compares three different treatment scenarios: (1) no treatment, (2) treatments on private forest lands only, and (3) treatments on both private and public lands. This section describes how treatment locations and prescriptions are spatially assigned to specific areas in the beta landscape under Scenarios 2 and 3. The foundation for assigning treatment locations and prescriptions lies in the management regime. The B2E Project applies one of the following four management regimes to all lands in the beta-test landscape:

- **Restricted thinning**, which focuses on thinning forest stands to achieve fuels management objectives, with limits placed on removing canopy and larger trees to maintain habitat for wildlife species dependent on these stand elements;
- **Uneven-aged management**, which focuses on selective harvesting (where individual trees or small groups of trees are removed) to produce sustained timber yields while avoiding the need to regenerate, and remove cover over, an entire stand;
- **Even-aged management**, which focuses on regenerating forest stands through a series of treatments, including regeneration harvesting (in the form of clearcutting where all trees in the stand are removed), planting, pre-commercial thinning, and commercial thinning; and
- **No treatment.**

Management regimes are applied to lands based on the following three criteria: (1) land ownership category, (2) slope (slopes less than 50 percent versus slopes greater than 50 percent), and (3) vicinity to streams (150 feet on either side of perennial streams).

The B2E Project defines land ownership in the following five categories:

1. ***public multiple use (PMU) lands*** includes all national forest lands [except administratively withdrawn areas (wilderness areas, wild and scenic rivers, special interest areas, and research natural areas)] and lands managed by the USDI Bureau of Land Management (BLM);
2. ***public conservation and recreation (PCR) lands*** includes national parks and administratively withdrawn areas on national forest lands;
3. ***industrial private forest (IPF) lands*** includes privately-owned industrial timberlands;
4. ***non-industrial private forest (NIPF) lands*** includes privately-owned forest lands, primarily in smaller ownerships; and
5. ***urban and other (UCO) lands*** includes all lands not covered by the four categories above.

The four management regimes are applied to forested lands as follows:

- *Restricted Thinning* – applies to treatment areas on national forest lands with slopes less than 50 percent and to streamside management zones (SMZs) on private industrial forest lands managed under the even-aged management regime
- *Uneven-aged management* – applies to: (1) 50 percent of the lands classified as industrial private forest lands; (2) industrial private forest lands initially slated for even-aged management with slopes greater than 50 percent; (3) all non-industrial forest lands with slopes less than 50 percent; and (4) lands managed by the BLM on slopes less than 50 percent.

- *Even-aged management* – applies to 50 percent of the lands classified as industrial private forest lands, provided that slopes are less than 50 percent
- *No treatment* – applied to: (1) public conservation and recreation (PCR) lands, (2) urban and other lands, (3) lands outside treatment areas on national forest lands; and (4) public multiple use (PMU) lands and non-industrial private forest (NIPF) lands on slopes greater than 50 percent.

Locating Treatment Areas

The key criteria for determining the size, shape, and spatial location of treatment areas are land ownership category and management regime.

No treatment areas are located on PCR lands or UCO lands. For national forest lands, two types of treatment areas are spatially located across the beta-test landscape: (1) defensible fuels profile zones (DFPZs), or shaded fuelbreaks, and (2) strategically placed area treatments (SPLATs). The DFPZs are located as mapped for the *Final Environmental Impact Statement for the Herger-Feinstein Quincy Library Group Forest Recovery Act Pilot Project* (USDA Forest Service 1999). The SPLATs are located using a conceptual herringbone pattern of area treatments distributed across landscapes, based on the premise that disconnected fuel treatment areas overlapping across the general direction of fire spread are theoretically effective in changing fire spread (Finney 1999). Each 150-acre rectangular treatment area is oriented based on prevailing wind direction. A total of 30 percent of the national forest lands is overlain by treatment areas (either SPLATs or DFPZs). The remaining 70 percent of national forest lands do not receive treatment.

All (100 percent) of the forested IPF lands in the beta-test landscape are overlaid with treatment areas. While the placement of treatment areas may contribute toward modifying wildland fire behavior, treatment areas on private forest lands (both industrial and non-industrial) are not intentionally located with the objective of modifying wildland fire behavior. Each treatment area is defined initially as a 20-acre hexagon. Fifty percent of these 20-acre treatment hexagons are treated under an uneven-aged management regime while the remaining fifty percent are assigned to an even-aged management regime. Under the even-aged management regime, the 20-acre hexagons are placed into groupings of seven adjacently-located hexagons (assuming a 70-year harvest rotation), and each 20-acre hexagon within each grouping is assigned to treatment in a particular decade based on the objective of meeting the California Forest Practice Rules “greening up” requirements where no two regeneration harvest areas can be adjacent to one another (share a common boundary) in a given decade. The other 50 percent of IPF lands are combined into larger 140-acre treatment areas (sets of seven 20-acre hexagons) and assigned to the uneven-aged management regime. The research team developed the assumptions for treatments on IPF lands in consultation with representatives from the local timber industry. The treatments were generalized across all IPF lands to preserve the confidentiality of individual corporate forestry practices.

Forested BLM lands with slopes less than 50 percent are assigned to the uneven-aged management regime with treatment areas arranged in larger 140-acre treatment areas (sets of seven 20-acre hexagons).

Uneven-aged treatment areas are overlaid across all forested NIPF lands that have slopes less than 50 percent. Each treatment area is a 20-acre hexagon.

Figures 1a and 1b below are examples of graphically displayed treatment patterns on national forest lands and private forest lands in the beta-test landscape.

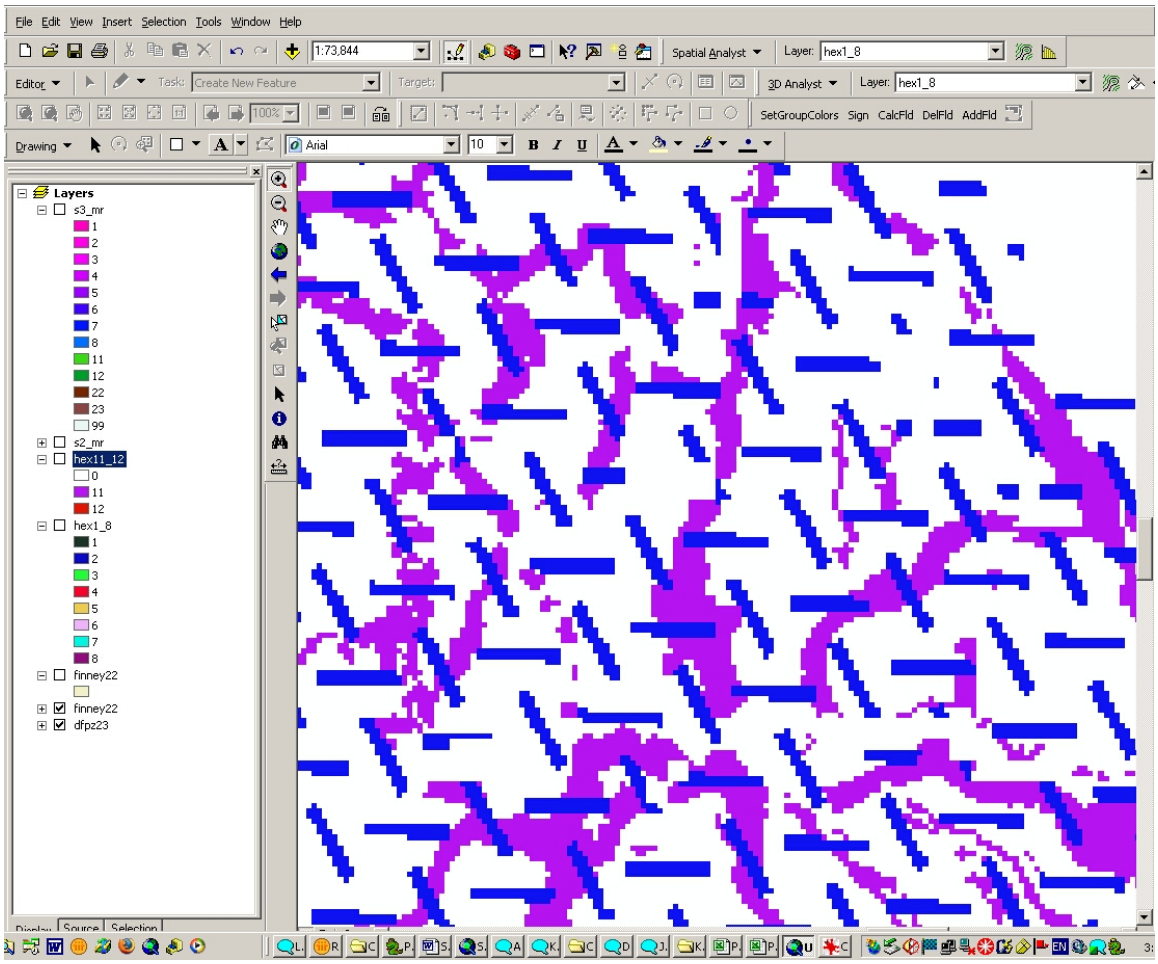

Figure 1a. Example of treatment area locations (SPLATs and DFPZs) on national forest lands. The purple-shaded polygons are DFPZs and the blue-shaded rectangular polygons are SPLATs.

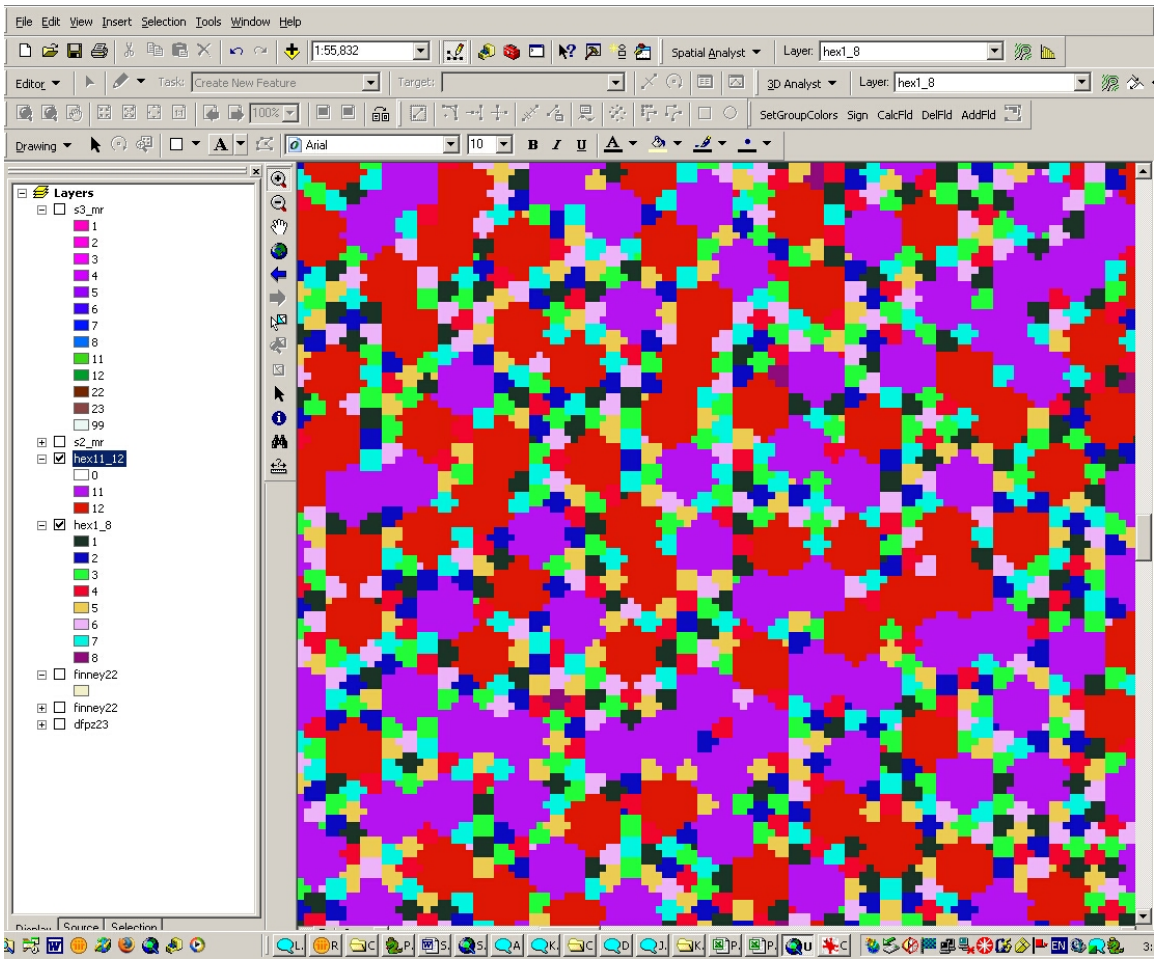

Figure 1b. Example of treatment area locations (20-acre hexagons and 140-acre polygons) on private forest lands. The larger red- and purple-shaded polygons are 140-acre treatment areas managed under the uneven-aged management regime, with each color representing a different treatment decade. The smaller areas are the 20-acre hexagons assigned to the even-aged management regime, with each color representing a different treatment decade.

Assigning Treatment Prescriptions

Types of treatment activities range from thinning, selective harvest, and clearcut harvest (referred to as 'regeneration harvest' later) on private lands to thinning on national forest lands. Regardless of ownership or type of treatment activity, all treatments are followed by prescribed burning (broadcast burning, understory burning, or slash pile burning) to remove the slash created by harvesting activities.

Treatment prescriptions are comprised of a series of discrete treatment activities applied over the 40-year beta-test timeframe to a specific piece of ground. Hence, each area has a prescription sequence consisting of a series of treatment activities assigned by time period. In certain time periods, no treatments are assigned and the growth of the vegetation is simply tracked. For example, on private industrial forest land, a 20-acre hexagon may be assigned an even-aged regeneration harvest in the first period (2006), followed by pre-commercial thinning in the second period (2016), and then a commercial thinning 20 years later (2036). Table 2 displays the management regime-based approach for locating treatment areas and assigning treatment prescriptions in the beta-test landscape.

Table 2. Logic for assigning treatment locations and prescription sequences based on management regime and land ownership category.

Management Regime	Lands Applied to:	Treatment Cycle	Treatment Units	Regime Code or ID[2]	Period 1 (2006)	Period 2 (2016)	Period 3 (2026)	Period 4 (2036)	Salvage following wildfire?[3]
Restricted Thinning[4]	national forest lands (slopes less than 50%)	20 years	150-acre SPLATs	21	Initial Fuels Reduction Treatment		Maintenance Fuels Treatment		yes
				22		Initial Fuels Reduction Treatment		Maintenance Fuels Treatment	
			DFPZs (as mapped for HFQLG)	23	Initial Fuels Reduction Treatment		Maintenance Fuels Treatment		
	SMZs[5] on IPF lands managed under the even-aged management regime	treated along with intersecting treatment area	150 feet each side of perennial streams (300 feet total)	n/a	Initial Fuels Reduction Treatment		Maintenance Fuels Treatment		yes
				n/a		Initial Fuels Reduction Treatment		Maintenance Fuels Treatment	

[2] The prescription sequence associated with each regime code or ID is described in Tables 3 and 4.
[3] Following a lethal or mixed lethal fire, 50 percent of the merchantable trees killed by the fire are salvaged. A “yes” in this column indicates lands where this salvage is possible.
[4] Limits are placed on the amount of tree canopy and the minimum size of trees that must be retained.
[5] An SMZ on IPF lands receives treatment at the same time as the larger treatment area in which it is located. However, it receives a different (less intensive) treatment prescription than that of the larger treatment area.

Management Regime	Lands Applied to:	Treatment Cycle	Treatment Units	Regime Code or ID[2]	Period 1 (2006)	Period 2 (2016)	Period 3 (2026)	Period 4 (2036)	Salvage following wildfire?[3]
Uneven-aged	50% of IPF lands and IPF lands slated for even-aged mgmt with slopes over 50%	20 years	140 acres	11	Selective Harvest[6]		Selective Harvest		yes
				12		Selective Harvest		Selective Harvest	
	All NIPF lands with slopes less than 50%	20 years	20 acres	11	Selective Harvest		Selective Harvest		no
				12		Selective Harvest		Selective Harvest	
	BLM lands with slopes less than 50 percent	20 years	140 acres	11	Selective Harvest		Selective Harvest		yes
				12		Selective Harvest		Selective Harvest	
Even-aged	50% of IPF lands (slopes less than 50%): *mature stand conditions*	70 years	20 acres	1	Regeneration Harvest	Pre-commercial thin		Commercial Thin	yes
				2		Regeneration Harvest	Pre-commercial thin		
				3	Commercial Thin		Regeneration Harvest	Pre-commercial thin	
				4		Commercial Thin		Regeneration Harvest	

[6] In selective harvest, individual trees or small groups of trees are removed in a treatment; however, overstory canopy at the stand scale is retained (as opposed to clearcutting where all the trees in a stand are removed).

Management Regime	Lands Applied to:	Treatment Cycle	Treatment Units	Regime Code or ID[2]	Period 1 (2006)	Period 2 (2016)	Period 3 (2026)	Period 4 (2036)	Salvage following wildfire?[3]
				5[7]	Selective Harvest		Selective Harvest		yes
				6[7]	Selective Harvest		Selective Harvest		
				7[7]	Selective Harvest		Selective Harvest		
	50% of IPF lands (slopes less than 50%): *plantations less than 15 years old*	70-years	as mapped	8	Pre-commercial thin		Commercial Thin		no
No treatment	All lands not covered above	NA	NA	99	NA	NA	NA	NA	Yes (on burned lands that are not PCR)[8]

[7] Since the analysis period is only 40 years, the areas within the even-aged management regime assigned to regime codes 5, 6, or 7 are not regenerated (clearcut) within the analysis period; however, they are selectively harvested every 20 years during the analysis period.
[8] On public multiple use lands, salvage harvest is applied only to the treatment areas that burn. Salvage harvest is not applied to burned areas on public multiple use lands outside treatment areas.

Timing and Sequence of Treatment Activities

A sequence of treatment activities is assigned to each management regime code, as indicated in Table 2 above. Table 3 below provides detailed information relative to the timing and pace of treatments under each management regime.

Assumptions relative to the amount of treatment area acreage assigned to treatment activities in a given time period include the following:

- All treatment areas located on national forest lands receive initial fuels reduction treatments (restricted thin followed by prescribed burning to treat surface fuels) by the end of the second time period (Decade 2). Half of the national forest treatment area acreage undergoes initial treatment in decade 1 and half in decade 2. Because defensible fuels profile zones have highest priority for treatment, and their acreage comprises more than 50 percent of the total acreage of national forest treatment areas, only DFPZs are treated in the first time period (Decade 1). The remaining DFPZs and all of the SPLATs receive initial treatment in the second time period.
- As previously described under "Locating Treatment Areas," 50 percent of the IPF lands are assigned to the even-aged management regime. On IPF lands assigned to this management regime, each grouping of seven 20-acre hexagons receives treatment during its assigned decade (from Decade 1 through Decade 7), based on an assumed 70-year rotation. The assigned decades are based on the objective of ensuring that the regeneration harvests (clearcuts) applied in any one decade are not located adjacent to one another.
- The remaining 50 percent of IPF lands are assigned to the uneven-aged management regime, arranged in 140-acre treatment areas (comprised of groupings of seven 20-acre hexagons). The 140-acre treatment areas are interspersed with the 20-acre even-aged management regime hexagons. Half of these larger hexagons are treated in the first period and half in the second period, with the treatment schedule alternating time periods so that any given treatment area receives treatment every other time period. The uneven-aged treatments are randomly assigned across the beta-landscape in each decade.
- All forested NIFL with slopes less than 50 percent are overlaid with 20-acre treatment area hexagons. As with IPF lands, half of the acreage in these treatment area hexagons is treated in the first time period (Decade 1) and half in the second time period (Decade 2), with an alternating treatment schedule so that each treatment area receives a treatment (selective harvest) every other decade. The decade in which treatment is initiated is randomly assigned across the beta-landscape.

Table 3. Timing and sequence of treatment activities by management regime. The shaded columns (decades 1 through 4) indicate the four decades modeled for the B2E beta-test. While not modeled for the beta-test, decades 5 through 8 are displayed to show the complete set of harvests through the assumed 70-year rotation for even-aged management areas.

	Decade							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Management Regime Code	**Even-aged Management**							
1	h	p	g	c	g	c	g	h
2	g	h	p	g	c	g	c	g
3[9]	s	g	h	p	g	c	g	c
4	g	s	g	h	p	g	c	g
5	s	g	s	g	h	p	g	c
6	g	s	g	s	g	h	p	g
7	s	g	s	g	s	g	h	p
8[10]	p	g	c	g	c	g	h	p
	Uneven-aged Management							
11	s	g	s	g	s	g	s	g
12	g	s	g	s	g	s	g	s
	Thinning							
21	m	g	m	g	m	g	m	g
22	g	m	g	m	g	m	g	m
23	m	g	m	g	m	g	m	g
	No Treatment							
99	g	g	g	g	g	g	g	g

Index to Table 3 Treatment Activity Codes

g	let grow [no treatment or disturbance]
s	selective harvest (uneven-aged management)
m	thinning to a level that maintains 40% residual canopy cover – referred to as restrictive thinning
h	clearcut (regeneration harvest method) and plant
p	pre-commercial thinning follow planting
c	commercial thinning (applies to stands that have been regenerated under the even-aged management regime)

[9] Treatment hexagons assigned to regeneration harvest (clearcut and plant) beyond Period 1 or 2 receive a selective harvest treatment every 2 time periods (20 years) until the regeneration harvest is applied.

[10] Management regime code 8 applies to plantations less than 15 years old in 2006. This code automatically overrides the randomly assigned management regime code for industrial private forest lands.

Each treatment activity has specifications as shown in Table 4 below. The specifications provide the rules for removing trees from the tree lists linked to the strata labels assigned to each 100-meter^2 grid cell that comprises each treatment area. Table 4 provides a description of each treatment type (or non-treatment in the case of "grow") with the specifications used to remove trees from the tree lists.

Table 4. Descriptions and specifications for treatments assigned to treatment areas in the B2E beta-test landscape.

Activity Code	Name	Description	Specifications
g	grow (letgrw)	no treatment – assume low level ingrowth of shade tolerant trees	Add 25 incense cedar and 25 white fir seedlings. Allow 3 year delay between prior treatment and ingrowth. For areas receiving planting, assume a 4-foot tree height 5 years after planting
h	clearcut (ccplnt)	clearcut	Remove all trees.
		plant trees	Tree species composition and numbers of trees planted depends on vegetation type.
p	pre-commercial thin (pct)	Thin from below	Target is to retain approximately 225 trees per acre. Commercial conifers are favored for retention.
c	commercial thin (comth2)	Thin to Stand Density Index (SDI) target	Thin to 30% of FVS' maximum SDI setting, which depends on species mix.
s	selective harvest (hirisk)	Thin from below by canopy position, reducing basal area by 25% at each sample point[11]	Remove trees in lower canopy classes first. Within each canopy class, remove smallest diameter trees first.
m	(restricted thinning) (matthn2)	ladder fuel reduction and constrained canopy thinning	Thin lower canopy (trees 0 to 6" dbh) to 2% cover and mid canopy (trees 6 to 20" dbh) to 5% cover. Thin upper canopy (20 to 30" dbh) subject to the following constraints: (1) post-treatment canopy cover for entire stand is 40% or more and (2) reduction in canopy cover is 40% or less. Do not remove trees 30" or larger. Note that if existing canopy cover is below 40% for a particular grid cell, that cell will not receive a restricted thinning treatment, but a prescribed burn treatment instead.

[11] Each FIA cluster plot consists of five sample points. Basal area is reduced by 25 percent for the tree lists associated with each sample point, with the total basal area removed being the sum of that removed from the five points. This approach captures the typically high levels of heterogeneity found in forest stands in the beta-test landscape.

Activity Code	Name	Description	Specifications
		some disturbance induced regeneration	Seedlings added as function of vegetation type at 50 percent of the standard FVS default regeneration rate.

All treatments (except pre-commercial thinning) assume that initial treatment (clearcutting, thinning, selective harvest) are followed-up with treatment of surface fuels. The surface fuels treatment component of each treatment type is designed to reduce flame length and fire rate of spread. Pre-commercial thinning is the exception where lopping and scattering of thinned material results in short-term increases in flame length and rate of spread.

Wildland Fire Effects

Wildland fire behavior is spatially modeled in the fire domain; however, the *effects* of wildland fire behavior on vegetation are tracked in the vegetation domain. A piece of land is allowed to burn in a wildfire during just one of the 4 decades of the analysis period. Most land, however, is not exposed to wildfire disturbance at any time in the 40-year period. When wildfire burns a given area in one of the time periods, the severity of wildfire is assigned to one of three classes (non-lethal, mixed lethal, or lethal effects) depending on the flame length and fire type (ground fire, passive crowing fire, or active crowing fire) occurring on each 100-meter^2 grid cell. (Refer to Table 5 below as well as the methodology and metadata for the B2E Project fire domain.) Table 6 displays the assumptions for fire effects of modeled wildfires in the B2E beta-test landscape.

Table 5. Fire severity classes based on the combined effects of flame length and fire type.

Flame Length	Ground	Passive Crown	Active Crown
1-4 feet	N: Non-L: Lethal	X: Mix Lethal	L: Lethal
4-8 feet	X: Mix Lethal	X: Mix Lethal	L: Lethal
8-12feet	X: Mix Lethal	L: Lethal	L: Lethal
12+ feet	L: Lethal	L: Lethal	L: Lethal

Table 6. Wildland fire effects applied in the B2E beta-test landscape.

Code	Name	Description	Details	Mortality
l	lethal fire	fire with severe effects	13-foot flame length, very dry moisture[12]	90% of canopy burned
x	mixed-lethal	fire with serious effects	7-foot flame length, very dry moisture[12]	50% of canopy burned
n	non-lethal	fire with moderate effects	4-foot flame length, dry conditions[12]	25% of canopy burned

Fire severity determines the numbers of trees killed and the quantity of vegetation consumed by fire on a given grid cell. The First Order Fire Effects Model (FOFEM) (Reinhardt and Keane 2003) is used to estimate tree mortality based on flame lengths associated with each fire severity class and tree list data. FOFEM predicts fire-caused tree mortality using bark thickness (based on tree species and diameter) and crown volume scorched (based on scorch height, tree height, and canopy base height).

Interactions of Wildland Fire and Treatments

Where a modeled wildland fire and treatment occur within the same grid cell during the same decade, the fire event and treatment activities are assumed to occur in the same year as FVS models multiple treatments as well as disturbance events all in one year. Hence, for a given forest stand that is treated and then burns in the same decade, FVS assumes the following sequence of events in the first year of the decade: (1) initial treatment (which includes follow-up surface fuels treatment), (2) wildland fire (with associated consumption of woody material), and (3) salvage harvest, in some cases followed by artificial regeneration, as assigned (Table 8).These events are then followed by growth for the remaining nine years of the decade (Figure 2).

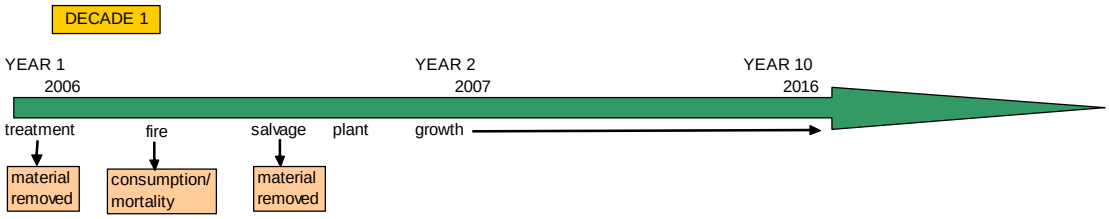

Figure 2. Sequence of treatment, fire, salvage, planting, and growth in a decade.

[12] Fuel moisture is an input parameter for the fire behavior models (FLAMMAP and FARSITE). Refer to the B2E fire domain documentation for specific fuel moisture inputs.

Salvage and Reforestation Following Wildland Fire

Assumptions related to salvage and reforestation following wildland fire include the following:

- Salvage and reforestation is applied following lethal and mixed-lethal wildfires on the following lands only:
    - burned PMU lands with less than 50 percent slope, and
    - burned IPF lands (including SMZs), regardless of slope (with the exception of plantations less than 15 years old).
- Treatment areas that intersect with a non-lethal fire do not receive a salvage treatment. Treatment areas that burn in a non-lethal fire are assigned to "no treatment" (growth) in the decade immediately following the non-lethal fire decade, after which time, they return to their scheduled management regime prescription sequence. For example, if a treatment area assigned to the prescription sequence "gmgm" receives a non-lethal burn in the first decade, its prescription sequence becomes "ngmg" for the 40-year period.
- On all managed areas (public multiple use lands, private industrial forest lands, and non-industrial private forest lands), planting following lethal burns is assumed to occur in the same decade as the fire.
- Salvage is only applied to the areas burned in simulated wildland fires. It is not applied to capture other causes of mortality (which are or are not modeled in this work).

Table 7 shows the treatment descriptions for salvage and Table 8 displays the approach used to model multiple treatments and wildfire disturbance within a single time period (decade).

Table 7. Description of salvage harvest specifications for the B2E beta-test landscape.

Code	Name	Description	Specifications
v	Salvage harvest following wildfire (salv-3: salvage with artificial regeneration (planting); salv-1: salvage without artificial regeneration (planting)	Removal of merchantable trees killed by lethal and mixed-lethal fire. Salvage harvest is not applied to areas that burn under a non-lethal fire.	Remove 50 percent of the merchantable sawlog trees killed (but not consumed) by the fire.

Table 8. Codes used in modeling multiple treatments, combined with fire effects, within a single time period in the beta-test landscape.

Key Code	Multiple Events (Treatment and Fire) in a Single Time Period	Series of Treatment and Fire Effects Codes that Comprise Key Code[13]
a	Regeneration harvest followed by any fire effect [l,x,n], and subsequent planting. (Note: Planting is assigned to any fire effect that occurs in a newly established stand.)	h/l, h/x, or h/n
b	Pre-commercial thinning followed by any fire effect [l,x,n], and subsequent planting. (Note: Planting is assigned to any fire effect that occurs in a recently established stand.)	p/l, p/x, or p/n

[13] Refer to Tables 4 and 5.

Key Code	Multiple Events (Treatment and Fire) in a Single Time Period	Series of Treatment and Fire Effects Codes that Comprise Key Code[13]
e	Commercial thin of a plantation followed by non-lethal fire. (Note: No salvage is assigned)	c/n
z	Selective harvest followed by non-lethal fire (private lands). (Note: No salvage is assigned)	s/n
z	Restricted thinning followed by non-lethal fire (NF lands). (Note: No salvage is assigned)	m/n
d	Commercial thin of a plantation followed by lethal or mixed lethal fire and subsequent salvage w/o planting.	c/l/v or c/x/v
q	Selective harvest followed by lethal or mixed lethal fire and subsequent salvage (private lands) w/o planting	s/l/v or s/x/v
q	Restricted thinning followed by lethal or mixed lethal fire and subsequent salvage harvest (NF lands) w/o planting	m/l/v or m/x/v
k	Lethal fire followed by salvage harvest and planting	l/v
f	Mixed lethal fire followed by salvage w/o planting	x/v

Table 9 shows the specifications used when multiple treatments and wildfire disturbance are applied to the same grid cell in a single time period. The specifications provide the rules for removing trees from the tree lists linked to the strata labels assigned to each 100-meter^2 grid cell that comprises each treatment area.

Table 9. Descriptions and specifications for multiple treatments and disturbance applied in a single time period.

Code	Name	Description (in sequence)	Specifications
a	clearcut followed by lethal fire	clear cut	Remove all trees.
		plant trees (regen post clear-cut)	Species mix and numbers depend on vegetation type.
		fire burns with severe effects	13-foot flame length; very dry moisture; 90% of canopy burned
		plant trees (regen post fire)	Species mix and numbers depend on vegetation type.
b	pre-commercial thin followed by lethal fire	thin from below	Target is 225 trees per acre. Favor commercial conifers for retention.
		fire burns with severe effects	13-foot flame length; very dry moisture; 90% of canopy burned
		plant trees	Species mix and numbers depend on vegetation type.
d	commercial thin followed by mixed-lethal fire	thin to SDI target	Thin to 30% of FVS' maximum SDI setting, which depends on species mix.
		fire burns with serious effects	7-foot flame length; very dry moisture; 50% of canopy burned

Code	Name	Description (in sequence)	Specifications
		salvage	Harvest 50% of the merchantable sawlog trees killed by the fire.
e	commercial thin followed by non-lethal fire	thin to SDI target	Thin to 30% of FVS' maximum SDI setting, which depends on species mix.
		fire burns with moderate effects	4-foot flame length; dry conditions; 25% of canopy burned
z (NF Lands)	restricted thinning followed by a non-lethal fire	ladder fuel reduction and constrained canopy thinning	Thin lower canopy (trees 0 to 6" dbh) to 2% cover and mid canopy (trees 6 to 20" dbh) to 5% cover. Thin upper canopy (20 to 30" dbh) subject to the following constraints: (1) post-treatment canopy cover for entire stand is 40% or more and (2) reduction in canopy cover is 40% or less. Remove no trees 30" dbh or larger. Note that if existing canopy cover is below 40% for a particular grid cell, that cell will not receive a restricted thinning treatment, but instead a prescribed burn treatment.
		fire burns with moderate effects	4-foot flame length; dry conditions; 25% of canopy burned
z (Private Lands)	selective harvest followed by non-lethal fire	thin from below by canopy position, reducing basal area by 25% at each sample point	Remove trees in lower canopy classes first. Within each canopy class, remove smallest diameter trees first.
		fire burns with moderate effects	4-foot flame length; dry conditions; 25% of canopy burned
f	mixed-lethal fire followed by salvage harvest and no artificial regeneration	fire burns with serious effects	7-foot flame length; very dry moisture; 50% of canopy burned
		salvage	Harvest 50% of the merchantable sawlog trees killed by the fire.
		natural regeneration	Species mix and numbers depend on vegetation type. Number of seedlings regenerated is assumed to be 25% of the standard FVS default regeneration amount.
k	lethal fire followed by salvage harvest with artificial	fire burns with severe effects	13-foot flame length; very dry moisture; 90% of canopy burned

Code	Name	Description (in sequence)	Specifications
	regeneration		
		salvage	Harvest 80% of the merchantable sawlog trees killed by the fire.
		plant trees	Species mix and numbers depend on vegetation type.
q (NF Lands)	restricted thinning followed by mixed-lethal fire and salvage harvest	ladder fuel reduction and constrained canopy thinning	Thin lower canopy (trees 0 to 6" dbh) to 2% cover and mid canopy (trees 6 to 20" dbh) to 5% cover. Thin upper canopy (20 to 30" dbh) subject to the following constraints: (1) post-treatment canopy cover for entire stand is 40% or more and (2) reduction in canopy cover is 40% or less. Remove no trees 30" dbh or larger. Note that if existing canopy cover is below 40% for a particular grid cell, that cell will not receive a restricted thinning treatment, but instead a prescribed burn treatment.
		fire burns with serious effects	7-footflame length; very dry moisture; 50% of canopy burned
		salvage	Harvest 50% of the merchantable sawlog trees killed by the fire.
q (Private Lands)	Selective harvest followed by mixed-lethal fire and salvage harvest	thin from below by canopy position, reducing basal area by 25% at each sample point	Remove trees in lower canopy classes first. Within each canopy class, remove smallest diameter trees first.
		fire burns with serious effects	7-foot flame length; very dry moisture; 50% of canopy burned
		salvage	Harvest 50% of the merchantable sawlog trees killed by the fire.

Following a non-lethal or mixed lethal fire (combined with applicable subsequent treatments, such as salvage and planting), the affected grid cell's scheduled treatment (based on its assigned management regime) is delayed for a decade. Hence, a grid cell initially assigned the "mgmg" prescription sequence that burns in a non-lethal fire in the first decade would be assigned the "zgmg" sequence for modeling. Lethal fires are assumed to result in "plantations less than 15 years old;" hence, grid cells burned in a lethal fire are assigned to a pre-commercial thinning in the decade following the fire, followed by a decade of growth, and then a commercial thinning in the third decade following the fire (as accommodated by the 40-year period, as shown in Table 2), unless the grid cell falls within an area where "no treatment" is applied, for example public conservation and recreation (PCR) lands. In this case, the prescription sequence would remain "gggg."

2. Analysis Procedure

The B2E vegetation analysis procedure consists of matching vegetation strata labels with applicable change data (growth, some type of treatment prescription, and/or fire severity) to modify the vegetation inventory data (tree lists) for each time period within each scenario. The resulting inventory information (reported on a per acre basis) is subsequently joined with spatial data (which includes the locations of treatments and fires, both of which sometimes overlap) to model changes in vegetation and fuels conditions (reported on a total acres basis) across the landscape. The results of this analysis provide two key pieces of information:

(1) quantities of live and dead vegetative material that have been removed from the landscape (either sent as biomass to the power plant or sawlogs to the mill, or consumed in a wildland fire and released as smoke emissions) and
(2) quantities of live and dead vegetation that have remained on the landscape to provide habitat, carbon storage, and ecosystem services.

A. CROSS-WALKING ASSUMPTIONS RELATED TO GROWTH, TREATMENTS, AND FIRES TO A SPATIAL ENVIRONMENT

The assumptions related to vegetation growth, treatments, and wildland fire sequences described in the preceding sections are linked spatially to the beta-test landscape. Each 100-meter^2 grid cell in the beta-landscape is assigned the attributes displayed in Table 10 for each of the five time periods (2006, 2016, 2026, 2036, and 2046) within each of the three scenarios. Grid cells with the same attributes are grouped together. Hence, each group, or set of, grid cells is tracked 15 different times. Note that treatments and wildfire disturbances are applied in 2006, 2016, 2026, and 2036, with a final vegetation inventory projected in 2046, a decade beyond the last application of the treatments and wildfire disturbance to the landscape.

Table 10. Attributes assigned to each 100-meter^2 grid cell in the beta-landscape for each of three scenarios and five time periods within each scenario.

Item	Attribute Name	Attribute Description	Code	Code Description
1	**Inv_Unit**	Regions/Forests		
			6	Lassen…..National Forest ONLY
			11	Plumas National Forest
			17	Tahoe National Forest
			52	Northern Interior[14]
			53	Northern Sierra[8]
			55	Central Valley[8]
2	**Strata**	Forest Type, Size, and Density Classes		
		Example	*M4G*	Regional Vegetation Type - Size Class - Canopy Density Class
3	**Owner**	Ownership-Use Classes		
			1	PMU- Public Multiple Use [National Forest minus withdrawn lands; Bureau of Land Management lands]
			2	PCR- Public Conservation and Recreation
			3	IPF- Industrial Private Forest Lands
			4	NIFL - Non-Industrial Private Forest Lands
			5	UCO - Urban and other lands

[14] These areas are based on a tiling system currently being used by the Forest Service's Pacific Southwest Region Remote Sensing Lab to tile the existing vegetation dataset and to serve out logical portions of vegetation data for use in land and resource management, such as forest-wide planning efforts, wildlife habitat mapping, and fire risk assessment.

Item	Attribute Name	Attribute Description	Code	Code Description
4	**Regime Code**	Treatment Unit Type and Entry Period		
			1	Clearcut in period 1 - 20-acre hexagons
			2	Clearcut in period 2
			3	Clearcut in period 3
			4	Clearcut in period 4
			5	Clearcut in period 5
			6	Clearcut in period 6
			7	Clearcut in period 7
			8	Existing plantations [as mapped]
			11	Selective Harvest - 1st 10-yr cycle - 140-acre hexagons (industrial), 20-acre hexagons non-industrial private
			12	Selective Harvest - 2nd 10-yr cycle (with details as above)
			21	Restricted Thinning - 20 year cycle staring period 1
			22	Restricted Thinning - 20 year cycle start in period 2
			23	DFPZ under HFQLG [as mapped by forest] - completed in period 1
			99	No treatment planned
5	**Slope**	Slope Class		
			1	Slopes less than 35 percent
			2	Slopes 35 to 50 percent
			3	Slopes greater than 50 percent
6	**SMZ**	Streamside Zone - [Calif. Forest Practice Rules] extra protection		
			1	Streamside Management Zone -150-ft each side of perennial streams
			0	No SMZ

Item	Attribute Name	Attribute Description	Code	Code Description
7	**Past_Dist**	Past disturbances (occurring after the most recent vegetation inventory and prior to 2006). Source for prescription codes: *Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement* (2004), Appendix B		
			0	none (used for non-vegetated areas, e.g. water, rocks)
			1	let grow
			4	past fire…..model as mixed lethal
			31	light thin
			35	light thin for forest health
			41	thin and maintain 50% canopy cover
			63	medium thin for forest health
			65	CASPO thin
8	**Fire_Type**	Wildfire Severity Type		
			L	Lethal
			X	Mixed Lethal
			N	Non-Lethal
			0	No Wildfire occurred
9	**Fire_Year**	Year of the Fire:		
		(only 1 year at most allowed)	0	No Wildfire occurred
			2006	
			2016	
			2026	
			2036	

Item	Attribute Name	Attribute Description	Code	Code Description
10	**Rx_Link**	Prescription sequence linked with Vegetation Simulator (FVS Model)		Treatment activity assigned in each of the 4 time periods.
		Example	gggg	See Tables 4, 7, and 9.
11	**EC_Link**	Harvest-Treatment Equipment Configuration (used in the LCA for the B2E Project)		
			0	No harvest treatment planned.
			1	CC 0-35
			2	CC 36-50
			3	PCT 0-35
			4	PCT 36-50
			5	CT 0-35
			6	CT 36-50
			7	SAL 0-35
			8	SAL 36-50
			9	SH 0-35
			10	SH 36-50
			11	SH 50+ (only on Industrial Forest Lands)
			12	RT 0-35
			13	RT 36-50

The combination of each management regime (item #4 in Table 10 above), fire severity type (item #8 in Table 10) by time period of the fire (item #9 in Table 10), and series of treatment activities (prescription sequence) over the four time periods (item #10 in Table 10) provides the link that joins the treatment/disturbance assumptions with the spatial vegetation layer. There are a total of 92 different possible management regime/fire/treatment combinations for the B2E beta-test as shown in Table 11 below.

Table 11. All possible management regime/fire/treatment activity combinations for the beta-test landscape. These items are used to link the fire/treatment assumptions with the spatial vegetation layer. Note that the left side of the table lists all possible combinations by management regime while the right side of the table displays the same information with identical combinations grouped together. Blue color-coding indicates management regimes with selective harvest during the 40-year beta-test period (regimes 5 – 7 and 11 – 12); bright green indicates management regimes with regeneration (clearcut) harvest (regimes 1 – 4 and 8); light green indicates regimes with thinning (regimes 21 – 23); and brown indicates no treatment (regime 99).

Management Regime-	Fire Year	Fire Type	2006	2016	2026	2036	Rx Link
1	0	0	**h**	**p**	**g**	**c**	**hpgc**
1	2006	l	a	p	g	c	**apgc**
1	2006	x	a	p	g	c	**apgc**
1	2006	n	a	p	g	c	**apgc**
1	2016	l	h	b	p	g	**hbpg**
1	2016	x	h	b	p	g	**hbpg**
1	2016	n	h	b	p	g	**hbpg**
1	2026	l	h	p	l	p	**hplp**
1	2026	x	h	p	l	p	**hplp**
1	2026	n	h	p	l	p	**hplp**
1	2036	l	h	p	g	d	**hpgd**
1	2036	x	h	p	g	d	**hpgd**
1	2036	n	h	p	g	e	**hpge**
2	0	0	**g**	**h**	**p**	**g**	**ghpg**
2	2006	l	k	p	g	c	**kpgc**
2	2006	x	f	h	p	g	**fhpg**
2	2006	n	n	h	p	g	**nhpg**
2	2016	l	g	a	p	g	**gapg**

Management Regime-	Fire Year	Fire Type	2006	2016	2026	2036	Rx Link	No of Unique Rx's
1	2006	l	a	p	g	c	**apgc**	1
1	2006	x	a	p	g	c	**apgc**	1
1	2006	n	a	p	g	c	**apgc**	1
8	2006	l	b	p	g	c	**bpgc**	2
8	2006	x	b	p	g	c	**bpgc**	2
8	2006	n	b	p	g	c	**bpgc**	2
22	2006	x	f	g	m	g	**fgmg**	3
6	2006	x	f	g	s	g	**fgsg**	4
12	2006	x	f	g	s	g	**fgsg**	4
4	2006	x	f	g	s	h	**fgsh**	5
2	2006	x	f	h	p	g	**fhpg**	6
2	2016	l	g	a	p	g	**gapg**	7
2	2016	x	g	a	p	g	**gapg**	7
2	2016	n	g	a	p	g	**gapg**	7
99	0	0	**g**	**g**	**g**	**g**		8
99	2036	n	g	g	g	n		9
99	2036	x	g	g	g	x		10
99	2026	l	g	g	l	g		11

Management Regime-	Fire Year	Fire Type	2006	2016	2026	2036	Rx Link
2	2016	x	g	a	p	g	**gapg**
2	2016	n	g	a	p	g	**gapg**
2	2026	l	g	h	b	p	**ghbp**
2	2026	x	g	h	b	p	**ghbp**
2	2026	n	g	h	b	p	**ghbp**
2	2036	l	g	h	p	l	**ghpl**
2	2036	x	g	h	p	l	**ghpl**
2	2036	n	g	h	p	l	**ghpl**
3	0	0	**s**	**g**	**h**	**p**	**sghp**
3	2006	l	q	g	h	p	**qghp**
3	2006	x	q	g	h	p	**qghp**
3	2006	n	z	g	h	p	**zghp**
3	2016	l	s	k	p	g	**skpg**
3	2016	x	s	f	g	h	**sfgh**
3	2016	n	s	n	h	p	**snhp**
3	2026	l	s	g	a	p	**sgap**
3	2026	x	s	g	a	p	**sgap**
3	2026	n	s	g	a	p	**sgap**
3	2036	l	s	g	h	b	**sghb**
3	2036	x	s	g	h	b	**sghb**
3	2036	n	s	g	h	b	**sghb**
4	0	0	**g**	**s**	**g**	**h**	**gsgh**
4	2006	l	k	p	g	c	**kpgc**

Management Regime-	Fire Year	Fire Type	2006	2016	2026	2036	Rx Link	No of Unique Rx's
99	2026	n	g	g	n	g		12
99	2026	x	g	g	x	g		13
2	2026	l	g	h	b	p	**ghbp**	14
2	2026	x	g	h	b	p	**ghbp**	14
2	2026	n	g	h	b	p	**ghbp**	14
2	0	0	**g**	**h**	**p**	**g**	**ghpg**	15
2	2036	l	g	h	p	l	**ghpl**	16
2	2036	x	g	h	p	l	**ghpl**	16
2	2036	n	g	h	p	l	**ghpl**	16
22	2026	x	g	m	f	g	**gmfg**	17
22	0	0	**g**	**m**	**g**	**m**	**gmgm**	18
22	2036	l	g	m	g	q	**gmgq**	19
22	2036	x	g	m	g	q	**gmgq**	19
22	2036	n	g	m	g	z	**gmgz**	20
22	2026	l	g	m	k	p	**gmkp**	21
22	2026	n	g	m	n	g	**gmng**	22
99	2016	n	g	n	g	g		23
4	2016	l	g	y	g	h	**gygh**	24
4	2016	x	g	y	g	h	**gygh**	24
22	2016	l	g	q	g	m	**gqgm**	25
22	2016	x	g	q	g	m	**gqgm**	25
6	2016	l	g	q	p	g	**gqpg**	26
6	2016	x	g	q	p	g	**gqpg**	26

Management Regime-	Fire Year	Fire Type	2006	2016	2026	2036	Rx Link
4	2006	x	f	g	s	h	**fgsh**
4	2006	n	n	g	s	h	**ngsh**
4	2016	l	g	y	g	h	**gygh**
4	2016	x	g	y	g	h	**gygh**
4	2016	n	g	z	g	h	**gzgh**
4	2026	l	g	s	k	p	**gskp**
4	2026	x	g	s	f	g	**gsfg**
4	2026	n	g	s	n	h	**gsnh**
4	2036	l	g	s	g	a	**gsga**
4	2036	x	g	s	g	a	**gsga**
4	2036	n	g	s	g	a	**gsga**
5	0	0	**s**	**g**	**s**	**g**	**sgsg**
5	2006	l	q	g	s	g	**qgsg**
5	2006	x	q	g	s	g	**qgsg**
5	2006	n	z	g	s	g	**zgsg**
5	2016	l	s	k	p	g	**skpg**
5	2016	x	s	f	g	s	**sfgs**
5	2016	n	s	n	g	s	**sngs**
5	2026	l	s	g	y	g	**sgyg**
5	2026	x	s	g	y	g	**sgyg**
5	2026	n	s	g	z	g	**sgzg**
5	2036	l	s	g	s	k	**sgsk**
5	2036	x	s	g	s	f	**sgsf**

Management Regime-	Fire Year	Fire Type	2006	2016	2026	2036	Rx Link	No of Unique Rx's
12	2016	l	g	q	p	g	**gqpg**	26
12	2016	x	g	q	p	g	**gqpg**	26
4	2026	x	g	s	f	g	**gsfg**	27
6	2026	x	g	s	f	g	**gsfg**	27
12	2026	x	g	s	f	g	**gsfg**	27
4	2036	l	g	s	g	a	**gsga**	28
4	2036	x	g	s	g	a	**gsga**	28
4	2036	n	g	s	g	a	**gsga**	28
4	0	0	**g**	**s**	**g**	**h**	**gsgh**	29
6	2036	l	g	s	g	q	**gsgq**	30
6	2036	x	g	s	g	q	**gsgq**	30
12	2036	l	g	s	g	q	**gsgq**	30
12	2036	x	g	s	g	q	**gsgq**	30
6	0	0	**g**	**s**	**g**	**s**	**gsgs**	31
12	0	0	**g**	**s**	**g**	**s**	**gsgs**	31
6	2036	n	g	s	g	z	**gsgz**	32
12	2036	n	g	s	g	z	**gsgz**	32
4	2026	l	g	s	k	p	**gskp**	33
6	2026	l	g	s	k	p	**gskp**	34
12	2026	l	g	s	k	p	**gskp**	34
6	2026	n	g	s	n	g	**gsng**	35
12	2026	n	g	s	n	g	**gsng**	35
4	2026	n	g	s	n	h	**gsnh**	36

Management Regime-	Fire Year	Fire Type	2006	2016	2026	2036	Rx Link
5	2036	n	s	g	s	n	**sgsn**
6	0	0	**g**	**s**	**g**	**s**	**gsgs**
6	2006	l	k	p	g	c	**kpgc**
6	2006	x	f	g	s	g	**fgsg**
6	2006	n	n	g	s	g	**ngsg**
6	2016	l	g	q	p	g	**gqpg**
6	2016	x	g	q	p	g	**gqpg**
6	2016	n	g	z	g	s	**gzgs**
6	2026	l	g	s	k	p	**gskp**
6	2026	x	g	s	f	g	**gsfg**
6	2026	n	g	s	n	g	**gsng**
6	2036	l	g	s	g	q	**gsgq**
6	2036	x	g	s	g	q	**gsgq**
6	2036	n	g	s	g	z	**gsgz**
7	0	0	**s**	**g**	**s**	**g**	**sgsg**
7	2006	l	q	g	s	g	**qgsg**
7	2006	x	q	g	s	g	**qgsg**
7	2006	n	z	g	s	g	**zgsg**
7	2016	l	s	k	p	g	**skpg**
7	2016	x	s	f	g	s	**sfgs**
7	2016	n	s	n	g	s	**sngs**
7	2026	l	s	g	y	g	**sgyg**
7	2026	x	s	g	y	g	**sgyg**

Management Regime-	Fire Year	Fire Type	2006	2016	2026	2036	Rx Link	No of Unique Rx's
99	2016	x	g	x	g	g		37
4	2016	n	g	z	g	h	**gzgh**	38
22	2016	n	g	z	g	m	**gzgm**	39
6	2016	n	g	z	g	s	**gzgs**	40
12	2016	n	g	z	g	s	**gzgs**	40
1	2016	l	h	b	p	g	**hbpg**	41
1	2016	x	h	b	p	g	**hbpg**	41
1	2016	n	h	b	p	g	**hbpg**	41
1	0	0	**h**	**p**	**g**	**c**	**hpgc**	42
1	2036	l	h	p	g	d	**hpgd**	43
1	2036	x	h	p	g	d	**hpgd**	43
1	2036	n	h	p	g	e	**hpge**	44
1	2026	l	h	p	l	p	**hplp**	45
1	2026	x	h	p	l	p	**hplp**	45
1	2026	n	h	p	l	p	**hplp**	45
99	2036	l	g	g	g	l		46
2	2006	l	k	p	g	c	**kpgc**	47
4	2006	l	k	p	g	c	**kpgc**	47
6	2006	l	k	p	g	c	**kpgc**	47
12	2006	l	k	p	g	c	**kpgc**	47
22	2006	l	k	p	g	c	**kpgc**	47
99	2006	l	l	g	g	g		48
99	2016	l	g	l	g	g		49

Management Regime-	Fire Year	Fire Type	2006	2016	2026	2036	Rx Link
7	2026	n	s	g	z	g	**sgzg**
7	2036	l	s	g	s	k	**sgsk**
7	2036	x	s	g	s	f	**sgsf**
7	2036	n	s	g	s	n	**sgsn**
8	0	0	**p**	**g**	**c**	**g**	**pgcg**
8	2006	l	b	p	g	c	**bpgc**
8	2006	x	b	p	g	c	**bpgc**
8	2006	n	b	p	g	c	**bpgc**
8	2016	l	p	l	p	g	**plpg**
8	2016	x	p	l	p	g	**plpg**
8	2016	n	p	l	p	g	**plpg**
8	2026	l	p	g	d	g	**pgdg**
8	2026	x	p	g	d	g	**pgdg**
8	2026	n	p	g	e	g	**pgeg**
8	2036	l	p	g	c	k	**pgck**
8	2036	x	p	g	c	f	**pgcf**
8	2036	n	p	g	c	n	**pgcn**
99	0	0	**g**	**g**	**g**	**g**	**gggg**
99	2006	l	l	g	g	g	**lggg**
99	2006	x	x	g	g	g	**xggg**
99	2006	n	n	g	g	g	**nggg**
99	2016	l	g	l	g	g	**glgg**
99	2016	x	g	x	g	g	**gxgg**

Management Regime-	Fire Year	Fire Type	2006	2016	2026	2036	Rx Link	No of Unique Rx's
21	2016	x	m	f	g	m	**mfgm**	50
23	2016	x	m	f	g	m	**mfgm**	50
21	2036	x	m	g	m	f	**mgmf**	51
23	2036	x	m	g	m	f	**mgmf**	51
21	0	0	**m**	**g**	**m**	**g**	**mgmg**	52
23	0	0	**m**	**g**	**m**	**g**	**mgmg**	52
21	2036	l	m	g	m	k	**mgmk**	53
23	2036	l	m	g	m	k	**mgmk**	53
21	2036	n	m	g	m	n	**mgmn**	54
23	2036	n	m	g	m	n	**mgmn**	54
21	2026	l	m	g	q	g	**mgqg**	55
21	2026	x	m	g	q	g	**mgqg**	55
23	2026	l	m	g	q	g	**mgqg**	55
23	2026	x	m	g	q	g	**mgqg**	55
21	2026	n	m	g	z	g	**mgzg**	56
23	2026	n	m	g	z	g	**mgzg**	56
21	2016	l	m	k	p	g	**mkpg**	57
23	2016	l	m	k	p	g	**mkpg**	57
21	2016	n	m	n	g	m	**mngm**	58
23	2016	n	m	n	g	m	**mngm**	58
99	2006	n	n	g	g	g		59
22	2006	n	n	g	m	g	**ngmg**	60
6	2006	n	n	g	s	g	**ngsg**	61

Management Regime-	Fire Year	Fire Type	2006	2016	2026	2036	Rx Link
99	2016	n	g	n	g	g	gngg
99	2026	l	g	g	l	g	gglg
99	2026	x	g	g	x	g	ggxg
99	2026	n	g	g	n	g	ggng
99	2036	l	g	g	g	l	gggl
99	2036	x	g	g	g	x	gggx
99	2036	n	g	g	g	n	gggn
11	0	0	**s**	**g**	**s**	**g**	sgsg
11	2006	l	q	g	s	g	qgsg
11	2006	x	q	g	s	g	qgsg
11	2006	n	z	g	s	g	zgsg
11	2016	l	s	k	p	g	skpg
11	2016	x	s	f	g	s	sfgs
11	2016	n	s	n	g	s	sngs
11	2026	l	s	g	y	g	sgyg
11	2026	x	s	g	y	g	sgyg
11	2026	n	s	g	z	g	sgzg
11	2036	l	s	g	s	k	sgsk
11	2036	x	s	g	s	f	sgsf
11	2036	n	s	g	s	n	sgsn
12	0	0	**g**	**s**	**g**	**s**	gsgs
12	2006	l	k	p	g	c	kpgc
12	2006	x	f	g	s	g	fgsg

Management Regime-	Fire Year	Fire Type	2006	2016	2026	2036	Rx Link	No of Unique Rx's
12	2006	n	n	g	s	g	ngsg	61
4	2006	n	n	g	s	h	ngsh	62
2	2006	n	n	h	p	g	nhpg	63
8	2036	x	p	g	c	f	pgcf	64
8	0	0	**p**	**g**	**c**	**g**	pgcg	65
8	2036	l	p	g	c	k	pgck	66
8	2036	n	p	g	c	n	pgcn	67
8	2026	l	p	g	d	g	pgdg	68
8	2026	x	p	g	d	g	pgdg	69
8	2026	n	p	g	e	g	pgeg	70
8	2016	l	p	l	p	g	plpg	71
8	2016	x	p	l	p	g	plpg	71
8	2016	n	p	l	p	g	plpg	71
3	2006	l	q	g	h	p	qghp	72
3	2006	x	q	g	h	p	qghp	72
21	2006	l	q	g	m	g	qgmg	73
21	2006	x	q	g	m	g	qgmg	73
23	2006	l	q	g	m	g	qgmg	73
23	2006	x	q	g	m	g	qgmg	73
5	2006	l	q	g	s	g	qgsg	74
5	2006	x	q	g	s	g	qgsg	74
7	2006	l	q	g	s	g	qgsg	74
7	2006	x	q	g	s	g	qgsg	74

Management Regime-	Fire Year	Fire Type	2006	2016	2026	2036	Rx Link
12	2006	n	n	g	s	g	**ngsg**
12	2016	l	g	q	p	g	**gqpg**
12	2016	x	g	q	p	g	**gqpg**
12	2016	n	g	z	g	s	**gzgs**
12	2026	l	g	s	k	p	**gskp**
12	2026	x	g	s	f	g	**gsfg**
12	2026	n	g	s	n	g	**gsng**
12	2036	l	g	s	g	q	**gsgq**
12	2036	x	g	s	g	q	**gsgq**
12	2036	n	g	s	g	z	**gsgz**
21	0	0	**m**	**g**	**m**	**g**	**mgmg**
21	2006	l	q	g	m	g	**qgmg**
21	2006	x	q	g	m	g	**qgmg**
21	2006	n	z	g	m	g	**zgmg**
21	2016	l	m	k	p	g	**mkpg**
21	2016	x	m	f	g	m	**mfgm**
21	2016	n	m	n	g	m	**mngm**
21	2026	l	m	g	q	g	**mgqg**
21	2026	x	m	g	q	g	**mgqg**
21	2026	n	m	g	z	g	**mgzg**
21	2036	l	m	g	m	k	**mgmk**
21	2036	x	m	g	m	f	**mgmf**
21	2036	n	m	g	m	n	**mgmn**

Management Regime-	Fire Year	Fire Type	2006	2016	2026	2036	Rx Link	No of Unique Rx's
11	2006	l	q	g	s	g	**qgsg**	74
11	2006	x	q	g	s	g	**qgsg**	74
3	2016	x	s	f	g	h	**sfgh**	75
5	2016	x	s	f	g	s	**sfgs**	76
7	2016	x	s	f	g	s	**sfgs**	76
11	2016	x	s	f	g	s	**sfgs**	76
3	2026	l	s	g	a	p	**sgap**	77
3	2026	x	s	g	a	p	**sgap**	77
3	2026	n	s	g	a	p	**sgap**	77
3	2036	l	s	g	h	b	**sghb**	78
3	2036	x	s	g	h	b	**sghb**	78
3	2036	n	s	g	h	b	**sghb**	78
3	0	0	**s**	**g**	**h**	**p**	**sghp**	79
5	2026	l	s	g	y	g	**sgyg**	80
5	2026	x	s	g	y	g	**sgyg**	80
7	2026	l	s	g	y	g	**sgyg**	80
7	2026	x	s	g	y	g	**sgyg**	80
11	2026	l	s	g	y	g	**sgyg**	80
11	2026	x	s	g	y	g	**sgyg**	80
5	2036	x	s	g	s	f	**sgsf**	81
7	2036	x	s	g	s	f	**sgsf**	81
11	2036	x	s	g	s	f	**sgsf**	81
5	0	0	**s**	**g**	**s**	**g**	**sgsg**	82

Management Regime-	Fire Year	Fire Type	2006	2016	2026	2036	Rx Link
22	0	0	**g**	**m**	**g**	**m**	**gmgm**
22	2006	l	k	p	g	c	**kpgc**
22	2006	x	f	g	m	g	**fgmg**
22	2006	n	n	g	m	g	**ngmg**
22	2016	l	g	q	g	m	**gqgm**
22	2016	x	g	q	g	m	**gqgm**
22	2016	n	g	z	g	m	**gzgm**
22	2026	l	g	m	k	p	**gmkp**
22	2026	x	g	m	f	g	**gmfg**
22	2026	n	g	m	n	g	**gmng**
22	2036	l	g	m	g	q	**gmgq**
22	2036	x	g	m	g	q	**gmgq**
22	2036	n	g	m	g	z	**gmgz**
23	0	0	**m**	**g**	**m**	**g**	**mgmg**
23	2006	l	q	g	m	g	**qgmg**
23	2006	x	q	g	m	g	**qgmg**
23	2006	n	z	g	m	g	**zgmg**
23	2016	l	m	k	p	g	**mkpg**
23	2016	x	m	f	g	m	**mfgm**
23	2016	n	m	n	g	m	**mngm**
23	2026	l	m	g	q	g	**mgqg**
23	2026	x	m	g	q	g	**mgqg**
23	2026	n	m	g	z	g	**mgzg**

Management Regime-	Fire Year	Fire Type	2006	2016	2026	2036	Rx Link	No of Unique Rx's
7	0	0	**s**	**g**	**s**	**g**	**sgsg**	82
11	0	0	**s**	**g**	**s**	**g**	**sgsg**	82
5	2036	l	s	g	s	k	**sgsk**	83
7	2036	l	s	g	s	k	**sgsk**	83
11	2036	l	s	g	s	k	**sgsk**	83
5	2036	n	s	g	s	n	**sgsn**	84
7	2036	n	s	g	s	n	**sgsn**	84
11	2036	n	s	g	s	n	**sgsn**	84
5	2026	n	s	g	z	g	**sgzg**	85
7	2026	n	s	g	z	g	**sgzg**	85
11	2026	n	s	g	z	g	**sgzg**	85
3	2016	l	s	k	p	g	**skpg**	86
5	2016	l	s	k	p	g	**skpg**	86
7	2016	l	s	k	p	g	**skpg**	86
11	2016	l	s	k	p	g	**skpg**	86
5	2016	n	s	n	g	s	**sngs**	87
7	2016	n	s	n	g	s	**sngs**	87
11	2016	n	s	n	g	s	**sngs**	87
3	2016	n	s	n	h	p	**snhp**	88
99	2006	x	x	g	g	g		89
3	2006	n	z	g	h	p	**zghp**	90
21	2006	n	z	g	m	g	**zgmg**	91
23	2006	n	z	g	m	g	**zgmg**	91

Management Regime-	Fire Year	Fire Type	2006	2016	2026	2036	Rx Link		Management Regime-	Fire Year	Fire Type	2006	2016	2026	2036	Rx Link	No of Unique Rx's
23	2036	l	m	g	m	k	**mgmk**		5	2006	n	z	g	s	g	**zgsg**	92
23	2036	x	m	g	m	f	**mgmf**		7	2006	n	z	g	s	g	**zgsg**	92
23	2036	n	m	g	m	n	**mgmn**		11	2006	n	z	g	s	g	**zgsg**	92

For each scenario, the 92 feasible regime/treatment/fire/grow combination sequences for the 4 decades are simulated on each vegetation stratum on the six forest inventory units: three national forest inventories (Plumas, Lassen, and Tahoe national forests) and three private land inventories. To accomplish this task in a limited amount of time, a Windows application, B2EVeg (Forest Service Pacific Southwest Region Stewardship and Fireshed Assessment toolbox), was written (using VB.Net) to automate the process of setting up and running the Forest Vegetation Simulator-Fire and Fuels Extension (FVS-FFE) program (Reinhardt and Crookston 2004), calculating the output attributes, and updating the main output file. It typically requires 8 to 10 hours of computer time to process one inventory unit for one time period (decade) in a given scenario, resulting in approximately 1 gigabyte of data.

The B2E beta test uses the inland California southern cascades (ICASCA) variant of FVS-FFE. Input and output of data between FVS and B2EVeg is accomplished using DbFVS, a database connectivity technology available in the FVS system.

B. VEGETATION MODELING PROCESS

The B2EVeg simulation modeling process is table driven. The list of vegetation strata is in one table (R5IIStrata) and the list of combined management regime/treatment/fire/grow sequences to be run in another table (RxLinkInfo; refer to Table 11). During execution, each stratum in the R5IIStrata Table is matched with each management regime/treatment/fire/grow sequence in the RxLinkInfo Table appropriate for each land ownership class. During this step, all possible management regime/treatment/fire/grow sequence combinations are run, making them ready for integration with the spatial data described below by simply using the prescription sequence. The bulk of these combinations are not used because the modeled wildfires do not burn in all possible combinations.

Stand and tree initialization data are transferred to the database designated for input using DbFVS functionality. A standard FVS keyword set containing projection control information, output variable definitions (COMPUTE keyword), fuel and snag initialization keywords, and fire simulation and thinning keywords is generated by B2EVeg, which then initiates an FVS-FFE run. When FVS is done, B2EVeg gathers data from several tables which are output from FVS, and appends one row of data for each time period of the projection to the B2E main output table.

The B2EVeg outputs are presented on a per acre basis. These outputs are then linked to the acreages provided by the spatial vegetation data to derive various output totals for the beta-test landscape, including wood products (biomass and sawlogs), forest stand structure attributes, habitat elements, and fuels conditions.

Figure 3 (below) provides a graphic illustration of the B2E Project's key vegetation modeling process steps, including the relationship between the project's vegetation and fire domains. The left-hand side of the diagram shows the tabular data processing steps described in the preceding paragraphs while the right hand side shows the spatial processing steps. (Note that steps S2, S3, and part of S4 are conducted in the fire domain.)

The vegetation and fire domains use identical assumptions regarding how treatment activities change the vegetation in each grid cell for each decade. To facilitate a consistent set of vegetation condition assumptions between the two domains, GIS layers that indicate the spatial distribution of post-treatment (including no treatment) inventory status in each grid cell across the landscape for each time period are passed from the

vegetation domain to the fire domain for wildfire modeling. Then, subsequent wildfire behavior modeling results (in the form of a GIS layer for each decade, indicating fire year and fire severity for each grid cell) are used to modify the prescription sequence (based on management regime and fire severity). Figure 4 shows how the prescription sequences are passed from the vegetation domain to the fire domain and back to the vegetation domain to model vegetation changes. The prescription sequences linked to the vegetation strata grids are used to establish a spatially explicit post-treatment, wildfire-disturbed, and subsequently grown inventory across the landscape for each time step (decade). Acreages of grid cells with the same prescription sequence are matched up with their appropriate relevant vegetation inventory data to project the inventory status and biomass changes across the landscape for a given time period.

To simplify the modeling of wildfire under the time and resource constraints of the beta test, wildfires are assumed not to overlap during the 40-year analysis period. This is not a major distortion as only 10 percent of the beta test landscape burns in modeled wildfires over the 40-year period.

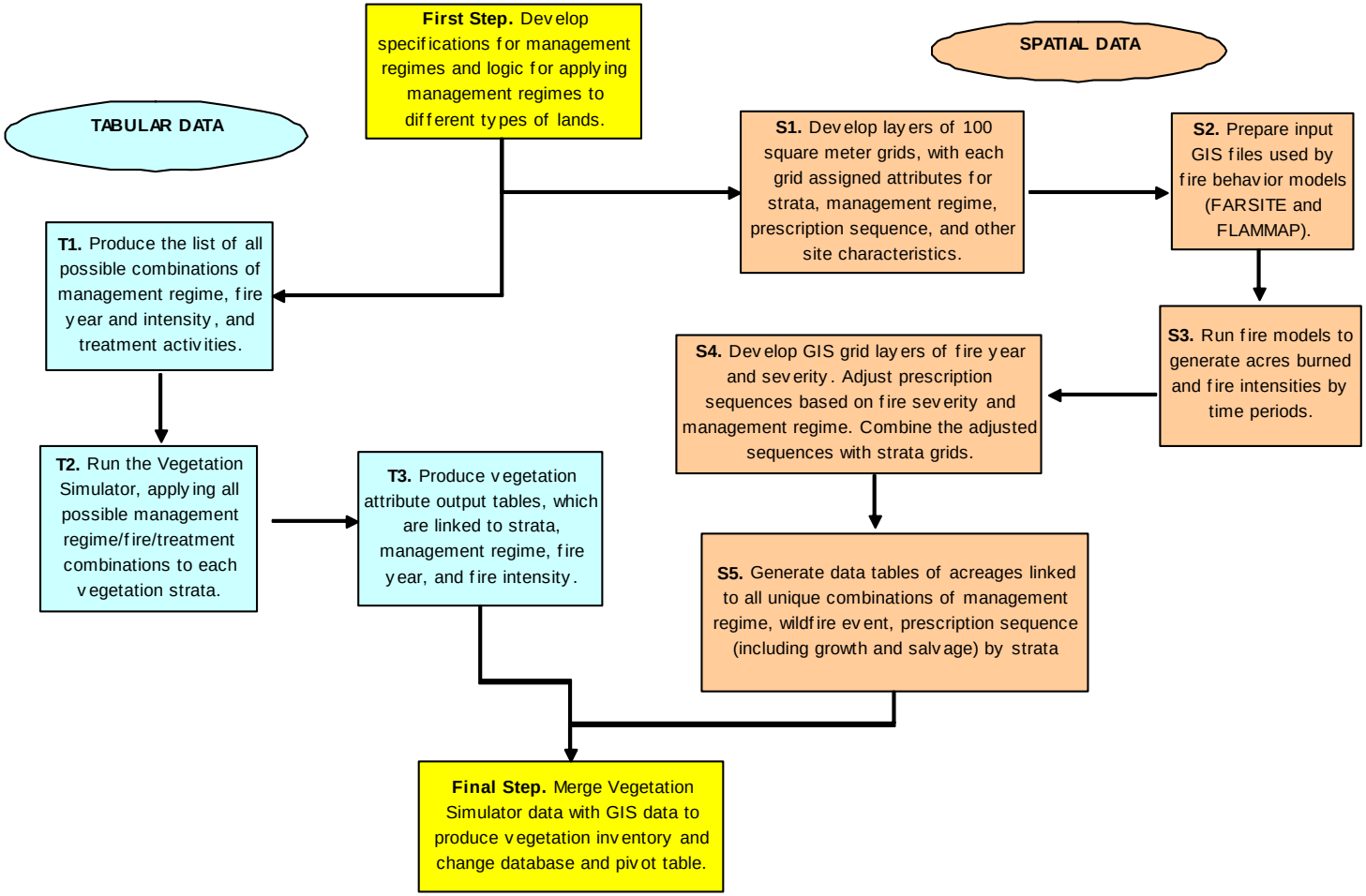

Figure 3. B2E Project vegetation and fire domain key modeling process steps. Note that steps T1, T2, and T3 are completed only once. Subsequently, the appropriate strata/management regime/fire year/ fire type/ prescription sequence combinations and their associated vegetation inventory data are applied to the correct grid cells for each decade within each scenario. The spatial data processing steps are run for each decade in each scenario.

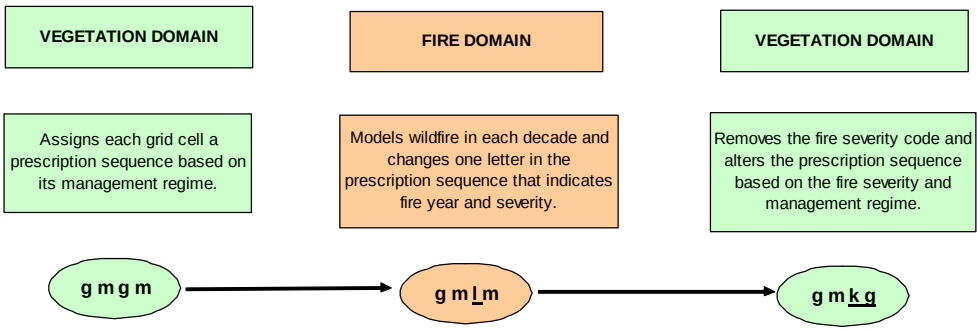

Figure 4. An example of how a prescription sequence is modified and passed between the vegetation and fire domains. In this example, the prescription sequence "gmgm" represents a prescription sequence within Management Regime Code 22 "Restricted Thinning" (See Table 2) assigned to a specific grid cell. A lethal fire modeled in this grid cell in the third decade has the fire domain team modifying the code to "gmlm." (The "l" represents lethal fire and its placement in the sequence indicates that the fire occurs in the third decade.) This modified code is then passed back to the vegetation domain, where based on its management regime, a lethal fire results in an assignment of the "k" code, whereby the cell is assigned a lethal fire, followed by salvage and planting. In the subsequent decade (Decade 4), the vegetation in this grid cell is grown with no further treatments assigned. Hence, the final prescription sequence for modeling this grid cell is "gmkg."

Outputs/Products

The vegetation domain provides both tabular and spatial data to the B2E Project's other domains, which allows interpretation of how vegetation changes across the landscape impact fire behavior, electricity production, habitat, emissions, economic values, and so forth. The tabular data are provided in 10-year increments, or time steps (at year 0, 10, 20, 30, and 40 years) and consist of projections related to: (a) the vegetation and fuels conditions that remain on the landscape (residual vegetation and fuels) and (b) woody material that is removed either through treatments, fire, salvage, or a combination of these processes.

Residual Vegetation and Fuels Data

- Forest inventory (basal area, quadratic mean diameter, and tree volume by various species, products, and size classes)
- Habitat conditions (such as indicated by California Wildlife Habitat Relationships (CWHR) type based on vegetation type, tree size, and canopy closure)
- Quantities of surface, ladder, and crown fuels (which are inputs to the fire behavior models, FARSITE and FLAMMAP)

Removed Vegetation and Fuels Data

- Amount of woody material removed by treatments (a combination of sawlogs and biomass)

- Amount of trees killed by fire (a portion of which may be salvaged, depending on the scenario)
- Amount of woody material consumed by fire (and used to estimate emissions)
- Salvage quantities

Output from the vegetation simulation model is linked to a fire simulation model as illustrated in Figure 2 and described in detail in the B2E fire domain. The vegetation model output is in the form of three data files: (1) main vegetation output file, (2) habitat summary table, and (3) fuel summary table.

The *main vegetation output file* includes data on 83 forest biomass quantities and characteristics that describe the vegetation inventory at the beginning of each decade as well as changes in the inventory resulting from any treatment, wildfire, and salvage harvest. These variables and their calculation are described in the next section. The primary key fields are: inventory unit, vegetation stratum, prescription (Rx) link, and year. In other words, one row of data is printed for each unique combination of inventory unit, stratum, prescription sequence (see Table 11), and time period (year). The second output file is a *habitat summary table* which presents inventory data for key habitat attributes following application of growth, treatment, and/or fire for each of the five time periods. The third output file is a *fuels summary table.* It has the same primary key fields as the main vegetation output file and presents fuel conditions at the beginning of each decade immediately following application of treatment (or "no treatment") but before modeled wildfire is applied. The fuels summary data are used to model fire behavior in the fire domain. A set of the three tables (main vegetation, habitat, and fuels) is produced for each time period for each of the three scenarios.

Main Vegetation Output Files

Table 12 below provides a detailed breakdown of the data generated for each set of grid cells (cells having common "area" attributes) for each scenario and time period. The table is organized into the following seven sections:

1. *Area*: This section shows the spatial attributes of the grid cell, for example ownership and slope as well as assigned attributes, for example management regime.
2. *Inventory:* This section displays the vegetation inventory at the beginning of the time period.
3. *Treatments:* This section of the output table presents the amounts of woody material removed through any treatments and identifies sawlog and biomass components
4. *Wildfire:* This section displays the amount of woody material killed by wildfire. Of the material killed by wildfire, a portion is consumed by the fire, another portion is removed by salvage harvest, and the remainder of dead woody material remains on site. Material killed by wildfire is derived after accounting for vegetation changes from any treatment in that decade have been applied, but prior to accounting for growth to the end of the decade.
5. *Consumption:* This section presents the type and amount of material consumed by wildfire which is subsequently used to calculate wildfire emissions. The quantities presented in this section are a subset of the quantities killed by wildfire.
6. *Salvage:* This section shows the amount of trees killed (but not consumed) by wildfire that are removed through salvage harvest.

7. *Change in Stand Attributes:* The final section of the table shows stand-level attributes, for example basal area and canopy cover, at the beginning of the time period prior to treatment or wildfire and 1 year following treatment and/or wildfire, which are assumed to occur at the immediate beginning of the time period.

Table 12. List of variables generated by the vegetation domain for each unique combination of inventory unit, stratum, and prescription sequence (Rx link) for each of five time periods under three different scenarios. These data are displayed in the main vegetation output file.

	Key	Item	Description	Unit of Measure[15]	Remarks
	1	**Scenario**	**Scenario Code**		
	2	**Year**	**2006,2016,2026,2036,2046**		
1. Area					
	1	Inventory (Inv) Unit	regions/national forests		
	2	Strata	forest type, tree Size, and density classes		
	3	Owner	ownership classes		
	4	Regime Code	treatment regime and entry period		
	5	Slope	slope classes		
	6	SMZ	Streamside Management Zone		
	7	Past_Dist	past disturbances		
	8	Fire_Type	lethal, mixed lethal, or non-lethal		
	9	Fire_Date	Year of the Fire: 2006,2016,2026,2036		
	10	Rx_Link	Prescription (Rx) Sequence with Vegetation Simulator		
	11	Equip_Link	Harvest/Treatment Equipment		
	12	Acres	Acres	acres	
2. INVENTORY: Standing Vegetation Inventory at the Start of the Period					
	1	P10_15Inv	Commercial pine species 10 -14.9 inches dbh	cubic feet	
	2	F10_15Inv	Commercial firs 10 -14.9 inches dbh	cubic feet	
	3	D10_15Inv	Douglas -Fir 10 -14.9 inches dbh	cubic feet	
	4	I10_15Inv	Incense cedar 10 -14.9 inches dbh	cubic feet	

[15] All units of measure are presented at a per acre scale.

	Key	Item	Description	Unit of Measure[15]	Remarks
	5	O10_15Inv	All other commercial species 10 -14.9 inches dbh	cubic feet	
	6	P15_25Inv	Commercial pine 15-24.9 inches dbh	cubic feet	
	7	F15_25Inv	Commercial firs 15-24.9 inches dbh	cubic feet	
	8	D15_25Inv	Douglas-Fir 15-24.9 inches dbh	cubic feet	
	9	I15_25Inv	Incense cedar 15-24.9 inches dbh	cubic feet	
	10	O15_25Inv	All other commercial species 15-24.9 inches dbh	cubic feet	
	11	P25Inv	Commercial pine 25 + inches dbh	cubic feet	
	12	F25Inv	Commercial firs 25 + inches dbh	cubic feet	
	13	D25Inv	Douglas-Fir 25 + inches dbh	cubic feet	
	14	I25Inv	Incense Cedar 25 + inches dbh	cubic feet	
	15	O25Inv	All other commercial species 25+ inches dbh	cubic feet	
	16	WJInv	Western juniper greater than 3 inches dbh	cubic feet	
	17	ConiferInv	Commercial conifers 3 to 10 inches and non-commercial conifers greater than 3 inches dbh	cubic feet	
	18	HwdInv	Hardwoods greater than 3 inches dbh	cubic feet	
	19	Material 0-3Inv	Material less than 3-inches dbh	cubic feet	
	20	BrushInv	Brush	BDT	
3. TREATMENTS: Amount of Woody Material Removed through Treatment Activities					
	1	P10_15Trt	Commercial pine species 10 -14.9 inches dbh	cubic feet	sawlog volume
	2	F10_15Trt	Commercial firs 10 -14.9 inches dbh	cubic feet	sawlog volume
	3	D10_15Trt	Douglas -Fir 10 -14.9 inches dbh	cubic feet	sawlog volume
	4	I10_15Trt	Incense cedar 10 -14.9 inches dbh	cubic feet	sawlog volume
	5	O10_15Trt	All other commercial species 10 -14.9 inches dbh	cubic feet	sawlog volume
	6	P15_25Trt	Commercial pine 15-24.9 inches dbh	cubic feet	sawlog volume
	7	F15_25Trt	Commercial firs 15-24.9 inches dbh	cubic feet	sawlog volume
	8	D15_25Trt	Douglas-Fir 15-24.9 inches dbh	cubic feet	sawlog volume
	9	I15_25Trt	Incense cedar 15-24.9 inches dbh	cubic feet	sawlog volume

	Key	Item	Description	Unit of Measure[15]	Remarks
	10	O15_25Trt	All other commercial species 15-24.9 inches dbh	cubic feet	sawlog volume
	11	P25Trt	Commercial pine 25 + inches dbh	cubic feet	sawlog volume
	12	F25Trt	Commercial firs 25 + inches dbh	cubic feet	sawlog volume
	13	D25Trt	Douglas-Fir 25 + inches dbh	cubic feet	sawlog volume
	14	I25Trt	Incense Cedar 25 + inches dbh	cubic feet	sawlog volume
	15	O25Trt	All other commercial species 25+ inches dbh	cubic feet	sawlog volume
	16	WJTrt	Western juniper greater than 3 inches dbh	cubic feet	biomass volume
	17	ConiferTrt	Commercial conifers 3 to 10 inches and non-commercial conifers greater than 3 inches dbh	cubic feet	biomass volume
	18	HwdTrt	Hardwoods greater than 3 inches dbh	cubic feet	biomass volume
	19	Material 0-3Trt	Material less than 3-inches dbh	cubic feet	
	20	Tops-LimbsTrt	Tops and limbs of all trees removed	BDT	
	21	BrushTrt	Brush	BDT	
4. WILDFIRE: Amount of Woody Material Killed by Wildfire					
	1	P10_15Fire	Commercial pine species 10 -14.9 inches dbh	cubic feet	
	2	F10_15Fire	Commercial firs 10 -14.9 inches dbh	cubic feet	
	3	D10_15Fire	Douglas -Fir 10 -14.9 inches dbh	cubic feet	
	4	I10_15Fire	Incense cedar 10 -14.9 inches dbh	cubic feet	
	5	O10_15Fire	All other commercial species 10 -14.9 inches dbh	cubic feet	
	6	P15_25Fire	Commercial pine 15-24.9 inches dbh	cubic feet	
	7	F15_25Fire	Commercial firs 15-24.9 inches dbh	cubic feet	
	8	D15_25Fire	Douglas-Fir 15-24.9 inches dbh	cubic feet	
	9	I15_25Fire	Incense cedar 15-24.9 inches dbh	cubic feet	
	10	O15_25Fire	All other commercial species 15-24.9 inches dbh	cubic feet	
	11	P25Fire	Commercial pine 25 + inches dbh	cubic feet	
	12	F25Fire	Commercial firs 25 + inches dbh	cubic feet	
	13	D25Fire	Douglas-Fir 25 + inches dbh	cubic feet	

	Key	Item	Description	Unit of Measure[15]	Remarks
	14	I25Fire	Incense Cedar 25 + inches dbh	cubic feet	
	15	O25Fire	All other commercial species 25+ inches dbh	cubic feet	
	16	WJFire	Western juniper greater than 3 inches dbh	cubic feet	
	17	ConiferFire	Commercial conifers 3 to 10 inches and non-commercial conifers greater than 3 inches dbh	cubic feet	
	18	HwdFire	Hardwoods greater than 3 inches dbh	cubic feet	
	19	Material 0-3Fire	Material less than 3-inches dbh	cubic feet	
5. CONSUMPTION: Material Consumed by Wildfire					
		LitrCnsm	Litter consumed	BDT	
		DuffCnsm	Duff consumed	BDT	
		0-3Cnsm	Material 0 to 3 inches diameter	BDT	
		3-6Cnsm	Material 3 to 6 inches diameter	BDT	
		6-12Cnsm	Material 6 to 12 inches diameter	BDT	
		12Cnsm	Material larger than 12 inches diameter	BDT	
		HbSbCnsm	Herbs and shrubs	BDT	
		CrwnCnsm	Crowns	BDT	
		BrushCnsm	Brush		
6. SALVAGE: Volume of Trees Killed (but not consumed) by Wildfire and Removed by Salvage Harvest					
	1	P10_15Salv	Commercial pine species 10 -14.9 inches dbh	cubic feet	sawlog volume
	2	F10_15Salv	Commercial firs 10 -14.9 inches dbh	cubic feet	sawlog volume
	3	D10_15Salv	Douglas -Fir 10 -14.9 inches dbh	cubic feet	sawlog volume
	4	I10_15Salv	Incense cedar 10 -14.9 inches dbh	cubic feet	sawlog volume
	5	O10_15Salv	All other commercial species 10 -14.9 inches dbh	cubic feet	sawlog volume
	6	P15_25Salv	Commercial pine 15-24.9 inches dbh	cubic feet	sawlog volume
	7	F15_25Salv	Commercial firs 15-24.9 inches dbh	cubic feet	sawlog volume
	8	D15_25Salv	Douglas-Fir 15-24.9 inches dbh	cubic feet	sawlog volume

	Key	Item	Description	Unit of Measure[15]	Remarks
	9	I15_25Salv	Incense cedar 15-24.9 inches dbh	cubic feet	sawlog volume
	10	O15_25Salv	All other commercial species 15-24.9 inches dbh	cubic feet	sawlog volume
	11	P25Salv	Commercial pine 25 + inches dbh	cubic feet	sawlog volume
	12	F25Salv	Commercial firs 25 + inches dbh	cubic feet	sawlog volume
	13	D25Salv	Douglas-Fir 25 + inches dbh	cubic feet	sawlog volume
	14	I25Salv	Incense Cedar 25 + inches dbh	cubic feet	sawlog volume
	15	O25Salv	All other commercial species 25+ inches dbh	cubic feet	sawlog volume
7. CHANGES IN STAND-LEVEL ATTRIBUTES FOLLOWING TREATMENT AND/OR WILDFIRE					
		BasalInv	Basal area at the beginning of the period	square feet	
		BasalAft	Basal area 1 year following treatment and/or fire	square feet	
		QmdInv	Quadratic mean diameter at the beginning of the period	inches	
		QmdAft	Quadratic mean diameter 1 year following treatment and/or fire	inches	
		Qd75Inv	Quadratic mean diameter of the trees in the top 75% of the stand's BA at the beginning of the period	inches	
		Qd75Aft	Quadratic mean diameter of the trees in the top 75% of the stand's BA 1 year following treatment and/or fire	inches	
		CwhrInv	CWHR size and canopy closure class at the beginning of the period	class	
		CwhrAft	CWHR size and canopy closure class 1 year following treatment and/or fire	class	
		CanClosureInv	Canopy closure at the beginning of the period	percentage	
		CanClsoureAft	Canopy closure 1 year following treatment and/or fire	percentage	
		SdiInv	Reineke Stand Density Index (SDI) at the beginning of the period	index	
		SdiAft	Reineke Stand Density Index (SDI) 1 year following treatment and/or fire	index	

Tree Stems

Most of the data fields in the main vegetation output file represent total cubic feet (main stem volume) per acre, by species and diameter (dbh) classes. The table presents five species groupings as follows:

- P (Pine) – ponderosa, Jeffery, sugar, lodgepole, western white
- F (Fir) – white, red, shasta
- D – Douglas fir
- I – incense cedar
- - other commercial species (While there are no species in this group for the beta-test landscape, this category has been retained for possible use in future analyses.)

The three diameter classes for tracking the above species groups are: (1) 10 to 15 inches dbh, (2)15 to 25 inches dbh, and (3) 25 inches dbh and larger.

Total cubic feet is defined as main stem volume, from stump to the tip of the tree.

Total cubic feet in current year's inventory (Inv) and removed by treatment (Trt) are retrieved from FVS-FFE directly by setting up COMPUTE variables using the SPMCDBH function. Deriving tree volume killed by fire and volume salvaged requires an indirect method, as FFE does not provide a direct way to retrieve them. First, diameter classes used by FFE's mortalilty report are set up which coincide with B2E's diameter classes. Then, the percentages of trees in the three diameter classes killed by fire are retrieved from FFE's mortality report. The tree volume killed by fire is obtained by multiplying the volume after treatment (Inv-Trt) by the proportion killed by fire. This equates to the volume killed by fire, not including any trees removed earlier in the year by thinning. As previously described, the percent salvaged is based on the fire severity (refer to Table 7). To calculate salvage amounts, the percent salvaged is applied to the cubic feet killed by fire, by species group and diameter class.

In addition to the major species/diameter class breakdowns described above, volume (total cubic feet) for inventory and treatment are calculated for: (1) western juniper larger than 3 inches dbh (WJInv and WJTrt), (2) commercial conifers 3 to 10 inches dbh and noncommercial conifers greater than or equal to 3 inches dbh (ConiferInv and ConiferTrt), (3) hardwoods greater than or equal to 3 inches dbh (HwdInv and HwdTrt), and (4) all species less than 3 inches dbh (Material_0_3Inv and Material_0_3Trt). Note that the "Material_0_3" class represents *trees* with dbh less than 3 inches, not all stem and limb material smaller than 3 inches diameter.

Tops and Limbs

Tops and limbs are tracked by weight in bone dry tons per acre. "Tops" refers to the section of the stem less than 6 inches diameter. This is calculated as the difference between total cubic feet and merchantable cubic feet. For this calculation, all species are deemed merchantable, and the top diameter is set to 6 inches. Conversion from volume to weight is based on the specific gravity values published in the variant documentation for ICASCA FVS.

FVS calculates the weight of limbs in several size classes for fire modeling purposes, but does not provide limb weights as a separate output. The FVS fuel report combines limbs and tops in two size classes: (1) less than 3 inches diameter and (2) greater than

or equal to 3 inches diameter. In order to generate data for limbs, a routine was written to process FVS tree list output. Crown weights are calculated for each tree, using the FFE-FVS equations. Foliage and twig weights are not included.

Brush

BrushInv (brush amount before treatment), BrushTrt (amount of brush removed by treatment), and BrushFire (amount of brush removed by fire) is measured in tons per acre. For the B2E beta-test vegetation simulations, brush data were derived from FVS. Brush is modeled quite simply in FVS. Brush weight is derived from the fuel model assignment, which is done automatically in FVS-FFE, calculated from CWHR classification and canopy cover. One result of this approach is that any treatment that reduces canopy cover in one decade will result in an increase in brush loading in the following cycle. Brush weight is provided as a constant based on the fuel model; hence, FVS does not account for variability in brush weight due to different species, age, and so forth.

Woody Material Consumed by Fire

The Fire and Fuels Extension (FFE) of FVS was used to simulate the effects of wildfire on vegetation in terms of the amount of woody material consumed by fire. FVS-FFE assumes that fire consumes only the duff and litter and 50 percent of the woody material up to 3 inches in diameter. In addition, for the tree canopy, the model assumes only the foliage and 50 percent of the twigs are consumed during crown fire. The end result is that vegetation consumption for lethal fires is substantially underestimated, and this will affect smoke emissions outputs.

The FVS-FFE default equations were utilized for the beta-test; customized brush simulation models were not developed for this effort. Brush inventory and treatment amounts are read from the FVS-FFE All Fuels Report. The amount reported includes herbs and shrubs. Brush reduction due to fire is read from the FVS-FFE consumption report, which reports herb and shrub consumption in one combined field.

As evident in the Appendix A table titled “Woody Material Consumed by Wildfire,” for many strata/prescription sequence combinations, these fields are all filled with zero, because a wildfire event does not occur in these combinations at any time during the 40 year simulation.

Stand Structure

The following stand-level attributes are calculated at the beginning of each time period, before any treatments or fire disturbances, and 1 year following treatments and/or wildfire:

California Wildlife Habitat Relationship size and density classes (CWHR-size-den) are calculated from the FVS tree list (individual tree records) based on the same algorithms long used by Forest Service Pacific Southwest Region planning analysts.

Canopy Closure (percent canopy closure) is estimated using the PcNetAvg method, which accounts for overlap of tree crowns, but does not assume trees of all sizes are randomly spaced. (Refer to the *Sierra Nevada Forest Plan Amendment Draft Supplemental Environmental Impact Statement* 2003, page 317 (Appendix B) for a description of the PcNetAvg methodology). This attribute is calculated from tree list data.

The average diameter of the largest trees comprising 75 percent of the stand's basal area (QMD-Inv) is calculated from tree list data.

Reineke Stand Density Index (SDI-Inv) is retrieved directly from FVS-FFE.

Appendix A provides an example of actual output values from the main vegetation output file.

Habitat Summary Table

Table 13 below provides a detailed breakdown of the data generated for each grid cell for each scenario and time step for the habitat summary table. The table is organized into the following four sections:

1. *Area*: This section shows the spatial attributes of the grid cell, for example ownership and slope as well as assigned attributes, such as management regime.
2. *Changes in Stand-Level Attributes Following Treatment and/or Wildfire:* This section displays stand-level attributes, for example basal area and quadratic mean diameter, at the beginning of the time period and at 1 year following treatment and/or wildfire.
3. *Pre-Disturbance Inventory:* This section of the output table presents the distributions of hardwoods, conifers, and snags by diameter class at the beginning of the time period.
4. *Post-Disturbance Inventory*: This section displays the distributions of hardwoods, conifers, and snags by diameter class 1 year following treatments and/or wildfire.

Table 13. List of variables generated by the vegetation domain for each unique combination of inventory unit, stratum, and prescription (Rx) sequence for each of five time periods under three different scenarios. These data are displayed in the habitat output file.

	Key	Item	Description	Unit of Measure[16]	Remarks
	1	**Scenario**	**Scenario Code**		
	2	**Year**	**2006,2016,2026,2036,2046**		
1. Area					
	1	Inventory (Inv) Unit	regions/national forests		
	2	Strata	forest type, tree Size, and density classes		
	3	Owner	ownership classes		
	4	Regime Code	treatment regime and entry period		
	5	Slope	slope classes		
	6	SMZ	Streamside Management Zone		
	7	Past_Dist	past disturbances		
	8	Fire_Type	lethal, mixed lethal, or non-lethal		
	9	Fire_Date	Year of the Fire: 2006,2016,2026,2036		
	10	Rx_Link	Prescription (Rx) Sequence with Vegetation Simulator		
	11	Equip_Link	Harvest/Treatment Equipment		
	12	Acres	Acres	acres	
2. CHANGES IN STAND-LEVEL HABITAT ATTRIBUTES FOLLOWING TREATMENT AND/OR WILDFIRE					
		BasalInv	Basal area at the beginning of the period	square feet	
		BasalAft	Basal area 1 year following treatment and/or fire	square feet	
		QmdInv	Quadratic mean diameter at the beginning of the period	inches	

[16] All units of measure are presented at a per acre scale.

	Key	Item	Description	Unit of Measure[16]	Remarks
		QmdAft	Quadratic mean diameter 1 year following treatment and/or fire	inches	
		Qd75Inv	Quadratic mean diameter of the trees in the top 75% of the stand's BA at the beginning of the period	inches	
		Qd75Aft	Quadratic mean diameter of the trees in the top 75% of the stand's BA 1 year following treatment and/or fire	inches	
		CwhrInv	CWHR size and canopy closure class at the beginning of the period	class	
		CwhrAft	CWHR size and canopy closure class 1 year following treatment and/or fire	class	
		CanClosureInv	Canopy closure at the beginning of the period	percentage	
		CanClosureAft	Canopy closure 1 year following treatment and/or fire	percentage	
		LgTreeCoverInv	Number of trees 30 inches dbh and larger at the beginning of the period		
		LgTreeCoverAft	Number of trees 30 inches dbh and larger 1 year following treatment and/or fire		
		Logs>12TonsInv	Number of logs 12 inches diameter or larger at the beginning of the period		
		Logs>12TonsAft	Number of logs 12 inches diameter or larger 1 year following treatment and/or fire		
		Logs>12CuFtInv	Volume of logs 12 inches diameter or larger at the beginning of the period	cubic feet	
		Logs>12CuAft	Volume of logs 12 inches diameter or larger 1 year following treatment and/or fire	cubic feet	
3. PRE-DISTURBANCE INVENTORY: Habitat Attribute Inventory at the Start of the Period					
		Htpa_6-11Inv	Number of hardwood trees 6.0 to 10.9 inches dbh		
		Htpa_11-24Inv	Number of hardwood trees 11.0 to 23.9 inches dbh		
		Htpa_24-30Inv	Number of hardwood trees 24.0 to 29.9 inches		

	Key	Item	Description	Unit of Measure[16]	Remarks
			dbh		
		Htpa_30-40Inv	Number of hardwood trees 30.0 to 39.9 inches dbh		
		Htpa_>40Inv	Number of hardwood trees greater than or equal to 40 inches dbh		
		Ctpa_6-11Inv	Number of conifer trees 6.0 to 10.9 inches dbh		
		Ctpa_11-24Inv	Number of conifer trees 11.0 to 23.9 inches dbh		
		Ctpa_24-30Inv	Number of conifer trees 24.0 to 29.9 inches dbh		
		Ctpa_30-40Inv	Number of conifer trees 30.0 to 39.9 inches dbh		
		Ctpa_>40Inv	Number of conifer trees greater than or equal to 40 inches dbh		
		Snag_6-11Inv	Number of snags 6.0 to 10.9 inches dbh		
		Snag_11-24Inv	Number of snags 11.0 to 23.9 inches dbh		
		Snag_24-30Inv	Number of snags 24.0 to 29.9 inches dbh		
		Snag_30-40Inv	Number of snags 30.0 to 39.9 inches dbh		
		Snag_>40Inv	Number of snags greater than or equal to 40 inches dbh		
4. POST-DISTURBANCE INVENTORY: Habitat Attribute Inventory 1 year following treatment and/or wildfire					
		Htpa_6-11Aft	Number of hardwood trees 6.0 to 10.9 inches dbh		
		Htpa_11-24Aft	Number of hardwood trees 11.0 to 23.9 inches dbh		
		Htpa_24-30Aft	Number of hardwood trees 24.0 to 29.9 inches dbh		
		Htpa_30-40Aft	Number of hardwood trees 30.0 to 39.9 inches dbh		
		Htpa_>40Aft	Number of hardwood trees greater than or equal to 40 inches dbh		

	Key	Item	Description	Unit of Measure[16]	Remarks
		Ctpa_6-11Aft	Number of conifer trees 6.0 to 10.9 inches dbh		
		Ctpa_11-24Aft	Number of conifer trees 11.0 to 23.9 inches dbh		
		Ctpa_24-30Aft	Number of conifer trees 24.0 to 29.9 inches dbh		
		Ctpa_30-40Aft	Number of conifer trees 30.0 to 39.9 inches dbh		
		Ctpa_>40Aft	Number of conifer trees greater than or equal to 40 inches dbh		
		Snag_6-11Aft	Number of snags 6.0 to 10.9 inches dbh		
		Snag_11-24Aft	Number of snags 11.0 to 23.9 inches dbh		
		Snag_24-30Aft	Number of snags 24.0 to 29.9 inches dbh		
		Snag_30-40Aft	Number of snags 30.0 to 39.9 inches dbh		
		Snag_>40Aft	Number of snags greater than or equal to 40 inches dbh		

Appendix B provides an example of actual output values for the habitat summary table.

Fuels Summary Table

The fuel summary table provides data on stand conditions at the beginning of the decade immediately following any treatments, but before modeled wildfire is applied. The fuels summary table data are used in the fire domain to model wildfire behavior. The key fields are identical to the main output table: inventory unit, vegetation stratum, prescription code, and year. As shown in Table 14 below, the output variables include the following:

- *Canopy:* percent canopy cover, based on all trees with adjustment for crown overlap calculated using the PCNetAvg method
- *DomHt:* dominant height, the average height of the 40 tallest trees per acre
- *Qd75:* quadratic mean diameter (dbh) of trees in the top 75 percent of the stand's basal area
- *CBH:* canopy base height, calculated using FVS-FFE methodology based on trees greater than or equal to 6 feet in height, with all species included
- *CBD:* canopy bulk density, calculated using FVS-FFE methodology.

Table 14. List of variables generated by the vegetation domain for each unique combination of inventory unit, stratum, and prescription (Rx) sequence for each of five time periods under three different scenarios. These data are displayed in the fuels output file.

	Key	Item	Description	Unit of Measure[17]	Remarks
	1	**Scenario**	**Scenario Code**		
	2	**Year**	**2006,2016,2026,2036,2046**		
1. Area					
	1	Inventory (Inv) Unit	regions/national forests		
	2	Strata	forest type, tree Size, and density classes		
	3	Owner	ownership classes		
	4	Regime Code	treatment regime and entry period		
	5	Slope	slope classes		
	6	SMZ	Streamside Management Zone		
	7	Past_Dist	past disturbances		
	8	Fire_Type	lethal, mixed lethal, or non-lethal		
	9	Fire_Date	Year of the Fire: 2006,2016,2026,2036		
	10	Rx_Link	Prescription (Rx) Sequence with Vegetation Simulator		
	11	Equip_Link	Harvest/Treatment Equipment		
	12	Acres	Acres	acres	
2. CHANGES IN STAND-LEVEL FUEL CONDITIONS FOLLOWING TREATMENT					
		CanopyInv	Canopy cover at the beginning of the period	percent	
		CanopyAft	Canopy cover 1 year following treatment and/or fire	percent	
		DomHtInv	Dominant tree height at the beginning of the period	feet	

[17] All units of measure are presented at a per acre scale.

	Key	Item	Description	Unit of Measure[17]	Remarks
		DomHtAft	Dominant tree height 1 year following treatment and/or fire		
		Qd75Inv	Quadratic mean diameter of the trees in the top 75% of the stand's BA at the beginning of the period	inches	
		Qd75Aft	Quadratic mean diameter of the trees in the top 75% of the stand's BA 1 year following treatment and/or fire	inches	
		CBHInv	Canopy base height at the beginning of the period	feet	
		CBHAft	Canopy base height 1 year following treatment and/or fire	feet	
		CBDInv	Canopy bulk density at the beginning of the period	kg/cubic meter	
		CBDAft	Canopy bulk density 1 year following treatment and/or fire	kg/cubic meter	

Since most of the ouputs are not available from the FVS-FFE model, the data values are calculated based on a post treatment and fire treelist. FVS does not generate a single treelist depicting current trees, trees removed by thinning, and trees killed by fire. In fact, a listing of trees killed by fire is not available. The most detailed data FVS provides on trees killed by fire is a mortality report that lists percentage of trees killed by species and 7 dbh classes. For each record in the post treelist, post- trees per acre (tpa) is calculated as tpa at the beginning of the cycle minus the tpa from the cut treelist (trees removed by harvest or thinning), the resulting value is further reduced by the percentage killed by fire, read from the mortality report. The resulting treelist is then passed through algorithms that compute the output variables.

Appendix C provides an example of actual output values for the fuel summary table.

Summary

The vegetation domain provides first order outputs and effects for all of the B2E Project's other domains. The data generated in this domain is an accounting, or tracking, of the vegetation inventory across the landscape through time under different management scenarios and wildfire disturbances. As such, these raw data are further analyzed and interpreted by the Project's other domains, including fire behavior, harvest-to-power plant, habitat, emissions, carbon cycling, hydrology and soils, economics, and ecosystem services. For example, the vegetation domain projects the quantity of snags that would be generated across the beta landscape under different scenarios; however, the fire behavior, habitat, carbon cycling, and ecosystem services domains assess the role and effect of these snags. The vegetation domain projects the amount of biomass produced through time under different scenarios: these data provide the inputs to the harvest-to-power plant LCA as well as the economics domains. The quantities of surface, ladder, and crown fuels derived in the vegetation domain are used by the fire domain to model wildland fire behavior. These wildland fire modeling results are then integrated back into the vegetation accounting to track wildfire effects on vegetation inventory. Changes in vegetative structure under different scenarios and disturbances are used by the habitat domain to model changes in habitat over time. The vegetation domain ultimately produces a pivot table, access database, and spatial data grids, which are used by (and with, in the case of wildland fire) the B2E Project's other domains to determine scenario outcomes.

The vegetation modeling could be enhanced by using more varied treatment prescriptions and by more specifically locating treatment areas as well as the timing of treatments. The modeling is also limited by having to average data for industrial private forest lands so that no inventory or removal can be attributed to any one owner.

The model was unable to test the efficacy of the treatments in modifying landscape-scale fire behavior because a significant portion of the modeled fires did not overlap with the treatment areas . Because fire ignitions were based on past ignitions very little fire occurred on private lands and most fires burned on lands not specifically managed to meet fire and fuels objectives.

APPENDIX A. Vegetation Output Data

Standing Vegetation Inventory at the Start of the Period

Forest	Strata	RxLink	Year	P10_15Inv	F10_15Inv	D10_15Inv	I10_15Inv	O10_15Inv	P15_25Inv	F15_25Inv	D15_25Inv	I15_25Inv	O15_25Inv	P25Inv	F25Inv	WJInv	ConiferInv	HwdInv	Material 0 - 3Inv	BrushInv
6	F3G	lpgc	2006	224	694	4	49	0	519	1,710	5	98	0	859	1,225	0	702	0	22	0
6	F3G	lpgc	2016	0	1	0	0	0	7	7	0	1	0	78	66	0	1	0	0	2
6	F3G	lpgc	2026	0	1	0	0	0	3	5	0	1	0	42	70	0	330	0	4	1
6	F3G	lpgc	2036	426	0	0	0	0	1	5	0	0	0	44	73	0	572	0	0	1
6	F3G	lpgc	2046	940	0	0	0	0	227	0	0	0	0	5	0	0	192	0	3	1
6	F3G	fgmg	2006	224	694	4	49	0	519	1,710	5	98	0	859	1,225	0	702	0	22	0
6	F3G	fgmg	2016	29	34	0	1	0	208	618	0	21	0	518	740	0	5	0	0	2
6	F3G	fgmg	2026	23	21	0	1	0	185	628	0	21	0	613	940	0	32	0	2	2
6	F3G	fgmg	2036	27	14	0	0	0	190	558	0	16	0	690	1,208	0	39	0	2	2
6	F3G	fgmg	2046	23	7	0	0	0	200	442	0	10	0	774	1,503	0	126	0	8	1
6	F3G	gmfg	2006	224	694	4	49	0	519	1,710	5	98	0	859	1,225	0	702	0	22	0
6	F3G	gmfg	2016	193	803	0	61	0	572	1,998	13	92	0	999	1,561	0	780	0	20	0
6	F3G	gmfg	2026	135	736	0	39	0	305	1,264	14	54	0	755	1,113	0	448	0	1	1
6	F3G	gmfg	2036	25	66	0	3	0	168	617	4	15	0	386	571	0	7	0	0	2
6	F3G	gmfg	2046	11	43	0	1	0	220	696	5	19	0	405	673	0	37	0	3	2
6	F3G	mfgm	2006	224	694	4	49	0	519	1,710	5	98	0	859	1,225	0	702	0	22	0
6	F3G	mfgm	2016	146	628	0	47	0	232	1,164	11	43	0	679	963	0	407	0	1	1
6	F3G	mfgm	2026	24	60	0	2	0	134	527	2	14	0	350	496	0	5	0	0	2
6	F3G	mfgm	2036	10	46	0	1	0	180	609	2	17	0	369	593	0	38	0	3	2
6	F3G	mfgm	2046	11	20	0	0	0	212	544	2	18	0	395	843	0	50	0	2	2

Amount of Woody Material Removed through Treatment Activities

Forest	Strata	RxLink	Year	P10_15Trt	F10_15Trt	D10_15Trt	I10_15Trt	O10_15Trt	P15_25Trt	F15_25Trt	D15_25Trt	I15_25Trt	O15_25Trt	P25Trt	F25Trt	D25Trt	I25Trt	O25Trt	WJTrt	ConiferTrt	HwdTrt	Material 0 - 3Trt	Tops-LimbsTrt	BrushTrt
6	F3G	lpgc	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	lpgc	2016	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	lpgc	2026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	lpgc	2036	142	0	0	0	0	1	3	0	0	0	15	26	0	4	0	0	190	0	0	1	0
6	F3G	lpgc	2046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	fgmg	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	fgmg	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	fgmg	2026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0	2	0	0
6	F3G	fgmg	2036	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	fgmg	2046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	gmfg	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	gmfg	2016	45	187	0	14	0	366	1225	3	58	0	276	516	0	44	0	0	291	0	18	5	0
6	F3G	gmfg	2026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	gmfg	2036	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	gmfg	2046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	mfgm	2006	60	184	1	13	0	385	988	1	60	0	211	330	0	25	0	0	284	0	20	4	0
6	F3G	mfgm	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	mfgm	2026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	mfgm	2036	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	2	0	0
6	F3G	mfgm	2046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Amount of Woody Material Killed by Wildfire

Forest	Strata	RxLink	Year	P10_15Fire	F10_15Fire	D10_15Fire	I10_15Fire	O10_15Fire	P15_25Fire	F15_25Fire	D15_25Fire	I15_25Fire	O15_25Fire	P25Fire	F25Fire	D25Fire	I25Fire	O25Fire	WJFire	ConiferFire	HwdFire	Material 0 - 3Fire
6	F3G	lpgc	2006	224	693	4	49	0	507	1,703	5	97	0	792	1,164	0	421	0	0	690	0	22
6	F3G	lpgc	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	lpgc	2026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	lpgc	2036	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	lpgc	2046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	fgmg	2006	179	624	4	48	0	304	1,146	4	76	0	440	654	0	226	0	0	687	0	22
6	F3G	fgmg	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	fgmg	2026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	fgmg	2036	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	fgmg	2046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	gmfg	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	gmfg	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	gmfg	2026	97	632	0	37	0	182	819	11	40	0	385	576	0	227	0	0	430	0	1
6	F3G	gmfg	2036	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	gmfg	2046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	mfgm	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	mfgm	2016	110	547	0	45	0	142	773	9	31	0	346	501	0	220	0	0	391	0	1
6	F3G	mfgm	2026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	mfgm	2036	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	mfgm	2046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Woody Material Consumed by Wildfire

Forest	Strata	RxLink	Year	LitrCnsm	DuffCnsm	0-3Cnsm	3-6Cnsm	6-12Cnsm	12Cnsm	HbSbCnsm	CrwnCnsm
6	F3G	lpgc	2006	1	17	4	2	1	2	0	15
6	F3G	lpgc	2016	0	0	0	0	0	0	0	0
6	F3G	lpgc	2026	0	0	0	0	0	0	0	0
6	F3G	lpgc	2036	0	0	0	0	0	0	0	0
6	F3G	lpgc	2046	0	0	0	0	0	0	0	0
6	F3G	fgmg	2006	1	17	4	2	1	2	0	12
6	F3G	fgmg	2016	0	0	0	0	0	0	0	0
6	F3G	fgmg	2026	0	0	0	0	0	0	0	0
6	F3G	fgmg	2036	0	0	0	0	0	0	0	0
6	F3G	fgmg	2046	0	0	0	0	0	0	0	0
6	F3G	gmfg	2006	0	0	0	0	0	0	0	0
6	F3G	gmfg	2016	0	0	0	0	0	0	0	0
6	F3G	gmfg	2026	1	17	16	5	6	10	0	7
6	F3G	gmfg	2036	0	0	0	0	0	0	0	0
6	F3G	gmfg	2046	0	0	0	0	0	0	0	0
6	F3G	mfgm	2006	0	0	0	0	0	0	0	0
6	F3G	mfgm	2016	1	17	12	5	5	9	1	6
6	F3G	mfgm	2026	0	0	0	0	0	0	0	0
6	F3G	mfgm	2036	0	0	0	0	0	0	0	0
6	F3G	mfgm	2046	0	0	0	0	0	0	0	0

Volume of Trees Killed (but not consumed) by Wildfire and Removed by Salvage Harvest

Forest	Strata	RxLink	Year	P10_15Salv	F10_15Salv	D10_15Salv	I10_15Salv	O10_15Salv	P15_25Salv	F15_25Salv	D15_25Salv	I15_25Salv	O15_25Salv	P25Salv	F25Salv	D25Salv	I25Salv	O25Salv
6	F3G	lpgc	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	lpgc	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	lpgc	2026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	lpgc	2036	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	lpgc	2046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	fgmg	2006	89	312	2	24	0	152	573	2	38	0	220	327	0	113	0
6	F3G	fgmg	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	fgmg	2026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	fgmg	2036	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	fgmg	2046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	gmfg	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	gmfg	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	gmfg	2026	48	316	0	18	0	91	410	5	20	0	192	288	0	113	0
6	F3G	gmfg	2036	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	gmfg	2046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	mfgm	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	mfgm	2016	55	274	0	22	0	71	387	5	16	0	173	250	0	110	0
6	F3G	mfgm	2026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	mfgm	2036	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	F3G	mfgm	2046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Changes in Stand-Level Attributes following Treatment and/or Wildfire

Forest	Strata	RxLink	Year	BasalInv	BasalAft	QmdInv	QmdAft	Qd75Inv	Qd75Aft	CwhrInv	CwhrAft	CanClosureInv	CanClosureAft	SdiInv	SdiAft
6	F3G	lpgc	2006	271	5	10	30	20	30	4D	XX	72	1	499	5
6	F3G	lpgc	2016	11	11	3	3	5	5	2S	2S	14	12	34	32
6	F3G	lpgc	2026	46	46	6	6	8	8	3P	3P	27	27	102	102
6	F3G	lpgc	2036	102	102	8	8	11	11	3M	3M	45	45	200	200
6	F3G	lpgc	2046	108	108	11	11	13	13	4M	4M	44	44	193	193
6	F3G	fgmg	2006	271	71	10	22	20	28	4D	4S	72	17	499	95
6	F3G	fgmg	2016	80	80	12	12	29	29	5S	5S	21	21	136	136
6	F3G	fgmg	2026	91	88	11	16	30	29	5S	5S	25	22	164	135
6	F3G	fgmg	2036	100	100	9	9	31	31	5S	5S	29	29	189	189
6	F3G	fgmg	2046	116	116	9	9	31	31	5P	5P	35	35	222	222
6	F3G	gmfg	2006	271	271	10	10	20	20	4D	4D	72	72	499	499
6	F3G	gmfg	2016	305	178	10	13	21	20	6	4M	75	48	552	292
6	F3G	gmfg	2026	206	63	11	21	21	28	4M	4S	55	15	368	86
6	F3G	gmfg	2036	71	71	11	11	28	28	4S	4S	19	19	123	123
6	F3G	gmfg	2046	81	81	10	10	29	29	4S	4S	23	23	149	149
6	F3G	mfgm	2006	271	159	10	13	20	20	4D	4M	72	45	499	264
6	F3G	mfgm	2016	188	55	10	21	20	28	4M	4S	52	13	340	75
6	F3G	mfgm	2026	62	62	11	11	29	29	4S	4S	17	17	110	110
6	F3G	mfgm	2036	73	70	10	15	29	30	4S	4S	22	18	136	110
6	F3G	mfgm	2046	81	81	8	8	30	30	5S	5S	25	25	159	159

APPENDIX B. Habitat Summary Table

Changes in Stand-Level Habitat Attributes following Treatment and/or Wildfire

Forest	Strata	RxLink	Year	BasalInv	BasalAft	QmdInv	QmdAft	Qd75Inv	Qd75Aft	CwhrInv	CwhrAft	CanClosureInv	CanClosureAft	LgTreeCoverInv	LgTreeCoverAft	Logs>12TonsInv	Logs>12TonsAft	Logs>12CuFtInv	Logs>12CuFtAft
6	E0X	lpgc	2006	95	0	6.7	16.4	13.8	8.6	4P	XX	43.0	0.1	1.3	0.1	2.2	1.4	178.4	111.2
6	E0X	lpgc	2016	7	7	2.1	2.4	2.6	2.7	2S	2S	13.4	11.3	0.1	0.1	3.2	3.4	257.5	272.4
6	E0X	lpgc	2026	38	38	5.6	5.6	6.2	6.2	2S	2S	23.5	23.5	0.0	0.0	5.1	5.1	408.0	408.0
6	E0X	lpgc	2036	78	78	7.4	7.4	9.0	9.0	3P	3P	39.4	39.4	0.0	0.0	6.2	6.2	493.4	493.4
6	E0X	lpgc	2046	94	94	9.2	9.2	11.2	11.2	4M	4M	42.7	42.7	0.0	0.0	6.0	6.0	480.8	480.8
6	E0X	fgmg	2006	95	7	6.7	19.0	13.8	20.2	4P	XX	43.0	2.4	1.3	0.6	2.2	1.4	178.4	111.2
6	E0X	fgmg	2016	9	9	4.6	4.6	20.5	20.5	XX	XX	6.0	6.0	0.9	0.9	2.8	2.8	227.1	227.1
6	E0X	fgmg	2026	17	12	5.0	7.3	9.0	17.5	2S	XX	10.6	5.6	1.5	1.5	3.4	3.3	268.3	267.1
6	E0X	fgmg	2036	20	20	4.4	4.4	12.4	12.4	2S	2S	14.2	14.2	1.8	1.8	3.2	3.2	253.1	253.1
6	E0X	fgmg	2046	38	38	5.5	5.5	9.3	9.3	2S	2S	22.5	22.5	2.2	2.2	3.0	3.0	238.5	238.5
6	E0X	gmfg	2006	95	95	6.7	6.7	13.8	13.8	4P	4P	43.0	43.0	1.3	1.3	2.2	2.2	178.4	178.4
6	E0X	gmfg	2016	130	117	7.5	11.7	15.1	15.8	4M	4P	51.1	39.5	1.9	1.9	2.1	2.0	164.8	163.7
6	E0X	gmfg	2026	148	10	9.5	20.7	17.6	22.9	4M	XX	48.3	3.3	2.9	1.2	1.9	1.2	154.3	96.6
6	E0X	gmfg	2036	12	12	5.3	5.3	22.5	22.5	XX	XX	6.6	6.6	1.8	1.8	4.9	4.9	394.2	394.2
6	E0X	gmfg	2046	19	19	5.2	5.2	10.8	10.8	2S	2S	10.7	10.7	1.8	1.8	6.8	6.8	546.4	546.4
6	E0X	mfgm	2006	95	88	6.7	10.1	13.8	14.5	4P	4P	43.0	33.8	1.3	1.3	2.2	2.2	178.4	177.0
6	E0X	mfgm	2016	117	8	8.4	19.9	16.5	23.0	4M	XX	43.4	3.0	1.9	0.9	2.1	1.3	164.9	102.9
6	E0X	mfgm	2026	11	11	5.0	5.0	23.4	23.4	XX	XX	6.4	6.4	1.3	1.3	3.8	3.8	306.1	306.1
6	E0X	mfgm	2036	18	13	5.1	7.5	10.3	22.0	2S	XX	10.7	6.1	2.2	2.2	5.0	4.9	396.6	394.7
6	E0X	mfgm	2046	22	22	4.5	4.5	13.3	13.3	2S	2S	14.6	14.6	2.5	2.5	4.7	4.7	374.2	374.2

Habitat Attribute Inventory at the Start of the Period

Forest	Strata	RxLink	Year	Htpa_6-11Inv	Htpa_11-24Inv	Htpa_24-30Inv	Htpa_30-40Inv	Htpa_>40Inv	Ctpa_6-11Inv	Ctpa_11-24Inv	Ctpa_24-30Inv	Ctpa_30-40Inv	Ctpa_>40Inv	Snag_6-11Inv	Snag_11-24Inv	Snag_24-30Inv	Snag_30-40Inv	Snag_>40Inv
6	E0X	lpgc	2006	0.0	0.0	0.0	0.0	0.0	69.0	53.1	0.7	0.2	0.0	1.5	1.2	0.2	0.0	0.0
6	E0X	lpgc	2016	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	30.2	30.2	30.1	0.7	0.2
6	E0X	lpgc	2026	0.0	0.0	0.0	0.0	0.0	59.3	0.0	0.0	0.0	0.0	12.4	12.4	12.3	0.5	0.2
6	E0X	lpgc	2036	0.0	0.0	0.0	0.0	0.0	197.1	5.3	0.0	0.0	0.0	7.1	1.5	1.0	0.3	0.1
6	E0X	lpgc	2046	0.0	0.0	0.0	0.0	0.0	124.8	39.9	0.0	0.0	0.0	8.7	6.0	0.4	0.2	0.1
6	E0X	fgmg	2006	0.0	0.0	0.0	0.0	0.0	69.0	53.1	0.7	0.2	0.0	1.5	1.2	0.2	0.0	0.0
6	E0X	fgmg	2016	0.0	0.0	0.0	0.0	0.0	0.3	2.3	0.5	0.1	0.0	6.6	6.6	6.6	0.2	0.1
6	E0X	fgmg	2026	0.0	0.0	0.0	0.0	0.0	5.3	1.9	1.0	0.1	0.0	0.3	0.2	0.2	0.1	0.0
6	E0X	fgmg	2036	0.0	0.0	0.0	0.0	0.0	19.9	1.6	1.0	0.4	0.0	1.2	0.4	0.2	0.1	0.0
6	E0X	fgmg	2046	0.0	0.0	0.0	0.0	0.0	19.1	10.3	1.3	0.4	0.0	0.8	0.6	0.2	0.1	0.1
6	E0X	gmfg	2006	0.0	0.0	0.0	0.0	0.0	69.0	53.1	0.7	0.2	0.0	1.5	1.2	0.2	0.0	0.0
6	E0X	gmfg	2016	0.0	0.0	0.0	0.0	0.0	58.5	65.3	1.1	0.2	0.0	6.1	4.0	0.7	0.0	0.0
6	E0X	gmfg	2026	0.0	0.0	0.0	0.0	0.0	26.1	97.7	2.4	0.2	0.0	6.3	4.9	1.7	0.1	0.0
6	E0X	gmfg	2036	0.0	0.0	0.0	0.0	0.0	0.1	2.5	1.1	0.4	0.0	11.5	11.5	11.5	0.6	0.1
6	E0X	gmfg	2046	0.0	0.0	0.0	0.0	0.0	3.1	2.4	1.1	0.3	0.0	1.4	1.4	1.4	0.3	0.1
6	E0X	mfgm	2006	0.0	0.0	0.0	0.0	0.0	69.0	53.1	0.7	0.2	0.0	1.5	1.2	0.2	0.0	0.0
6	E0X	mfgm	2016	0.0	0.0	0.0	0.0	0.0	53.4	64.9	1.2	0.2	0.0	5.9	5.4	1.2	0.0	0.0
6	E0X	mfgm	2026	0.0	0.0	0.0	0.0	0.0	0.3	2.4	0.9	0.1	0.0	9.2	9.2	9.2	0.3	0.1
6	E0X	mfgm	2036	0.0	0.0	0.0	0.0	0.0	5.8	1.7	1.6	0.2	0.0	0.6	0.6	0.5	0.1	0.0
6	E0X	mfgm	2046	0.0	0.0	0.0	0.0	0.0	20.6	1.6	1.8	0.2	0.0	1.6	0.8	0.5	0.1	0.1

Habitat Attribute Inventory 1 Year following Treatment and/or Wildfire

Forest	Strata	RxLink	Year	Htpa_6-11Aft	Htpa_11-24Aft	Htpa_24-30Aft	Htpa_30-40Aft	Htpa_>40Aft	Ctpa_6-11Aft	Ctpa_11-24Aft	Ctpa_24-30Aft	Ctpa_30-40Aft	Ctpa_>40Aft	Snag_6-11Aft	Snag_11-24Aft	Snag_24-30Aft	Snag_30-40Aft	Snag_>40Aft
6	E0X	lpgc	2006	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	193.2	123.9	48.2	0.9	0.2
6	E0X	lpgc	2016	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	28.3	28.3	28.3	0.7	0.2
6	E0X	lpgc	2026	0.0	0.0	0.0	0.0	0.0	59.3	0.0	0.0	0.0	0.0	12.4	12.4	12.3	0.5	0.2
6	E0X	lpgc	2036	0.0	0.0	0.0	0.0	0.0	197.1	5.3	0.0	0.0	0.0	7.1	1.5	1.0	0.3	0.1
6	E0X	lpgc	2046	0.0	0.0	0.0	0.0	0.0	124.8	39.9	0.0	0.0	0.0	8.7	6.0	0.4	0.2	0.1
6	E0X	fgmg	2006	0.0	0.0	0.0	0.0	0.0	0.3	2.5	0.3	0.1	0.0	120.9	60.6	22.7	0.2	0.1
6	E0X	fgmg	2016	0.0	0.0	0.0	0.0	0.0	0.3	2.3	0.5	0.1	0.0	6.6	6.6	6.6	0.2	0.1
6	E0X	fgmg	2026	0.0	0.0	0.0	0.0	0.0	5.3	1.9	1.0	0.1	0.0	0.3	0.2	0.2	0.1	0.0
6	E0X	fgmg	2036	0.0	0.0	0.0	0.0	0.0	19.9	1.6	1.0	0.4	0.0	1.2	0.4	0.2	0.1	0.0
6	E0X	fgmg	2046	0.0	0.0	0.0	0.0	0.0	19.1	10.3	1.3	0.4	0.0	0.8	0.6	0.2	0.1	0.1
6	E0X	gmfg	2006	0.0	0.0	0.0	0.0	0.0	69.0	53.1	0.7	0.2	0.0	1.5	1.2	0.2	0.0	0.0
6	E0X	gmfg	2016	0.0	0.0	0.0	0.0	0.0	58.5	65.3	1.1	0.2	0.0	5.8	3.9	0.7	0.0	0.0
6	E0X	gmfg	2026	0.0	0.0	0.0	0.0	0.0	0.1	3.0	0.9	0.1	0.0	67.1	64.1	51.8	0.8	0.1
6	E0X	gmfg	2036	0.0	0.0	0.0	0.0	0.0	0.1	2.5	1.1	0.4	0.0	11.5	11.5	11.5	0.6	0.1
6	E0X	gmfg	2046	0.0	0.0	0.0	0.0	0.0	3.1	2.4	1.1	0.3	0.0	1.4	1.4	1.4	0.3	0.1
6	E0X	mfgm	2006	0.0	0.0	0.0	0.0	0.0	68.8	53.1	0.7	0.2	0.0	1.6	1.2	0.2	0.0	0.0
6	E0X	mfgm	2016	0.0	0.0	0.0	0.0	0.0	0.3	2.9	0.5	0.1	0.0	66.5	60.8	32.0	0.4	0.1
6	E0X	mfgm	2026	0.0	0.0	0.0	0.0	0.0	0.3	2.4	0.9	0.1	0.0	9.2	9.2	9.2	0.3	0.1
6	E0X	mfgm	2036	0.0	0.0	0.0	0.0	0.0	5.8	1.7	1.6	0.2	0.0	0.6	0.5	0.5	0.1	0.0
6	E0X	mfgm	2046	0.0	0.0	0.0	0.0	0.0	20.6	1.6	1.8	0.2	0.0	1.6	0.8	0.5	0.1	0.1

APPENDIX C. Fuels Summary Table

Stand-Level Fuels Conditions Immediately Following Treatment								
Forest	Strata	Rx	Year	Canopy	DomHt	Qd75	CBH	CBD
6	E0X	lpgc	2006	0.11	46	8.61	-1	0.0000
6	E0X	lpgc	2016	11.33	11	2.69	2	0.0200
6	E0X	lpgc	2026	23.46	19	6.22	5	0.0800
6	E0X	lpgc	2036	39.44	27	9.01	6	0.0900
6	E0X	lpgc	2046	42.72	35	11.15	6	0.1000
6	E0X	fgmg	2006	2.4	61	20.2	45	0.0030
6	E0X	fgmg	2016	5.95	14	20.49	4	0.0086
6	E0X	fgmg	2026	5.56	16	17.53	6	0.0097
6	E0X	fgmg	2036	14.16	23	12.43	2	0.0200
6	E0X	fgmg	2046	22.49	30	9.33	4	0.0500
6	E0X	gmfg	2006	42.98	50	13.83	4	0.1300
6	E0X	gmfg	2016	39.52	52	15.8	7	0.1200
6	E0X	gmfg	2026	3.3	61	22.86	46	0.0044
6	E0X	gmfg	2036	6.61	14	22.53	44	0.0097
6	E0X	gmfg	2046	10.71	21	10.8	4	0.0200
6	E0X	mfgm	2006	33.8	50	14.48	6	0.0900
6	E0X	mfgm	2016	2.95	61	22.97	45	0.0039
6	E0X	mfgm	2026	6.44	14	23.37	45	0.0085
6	E0X	mfgm	2036	6.11	18	22	6	0.0092
6	E0X	mfgm	2046	14.63	24	13.27	2	0.0200