Appendix A

Slapjack Project Maps

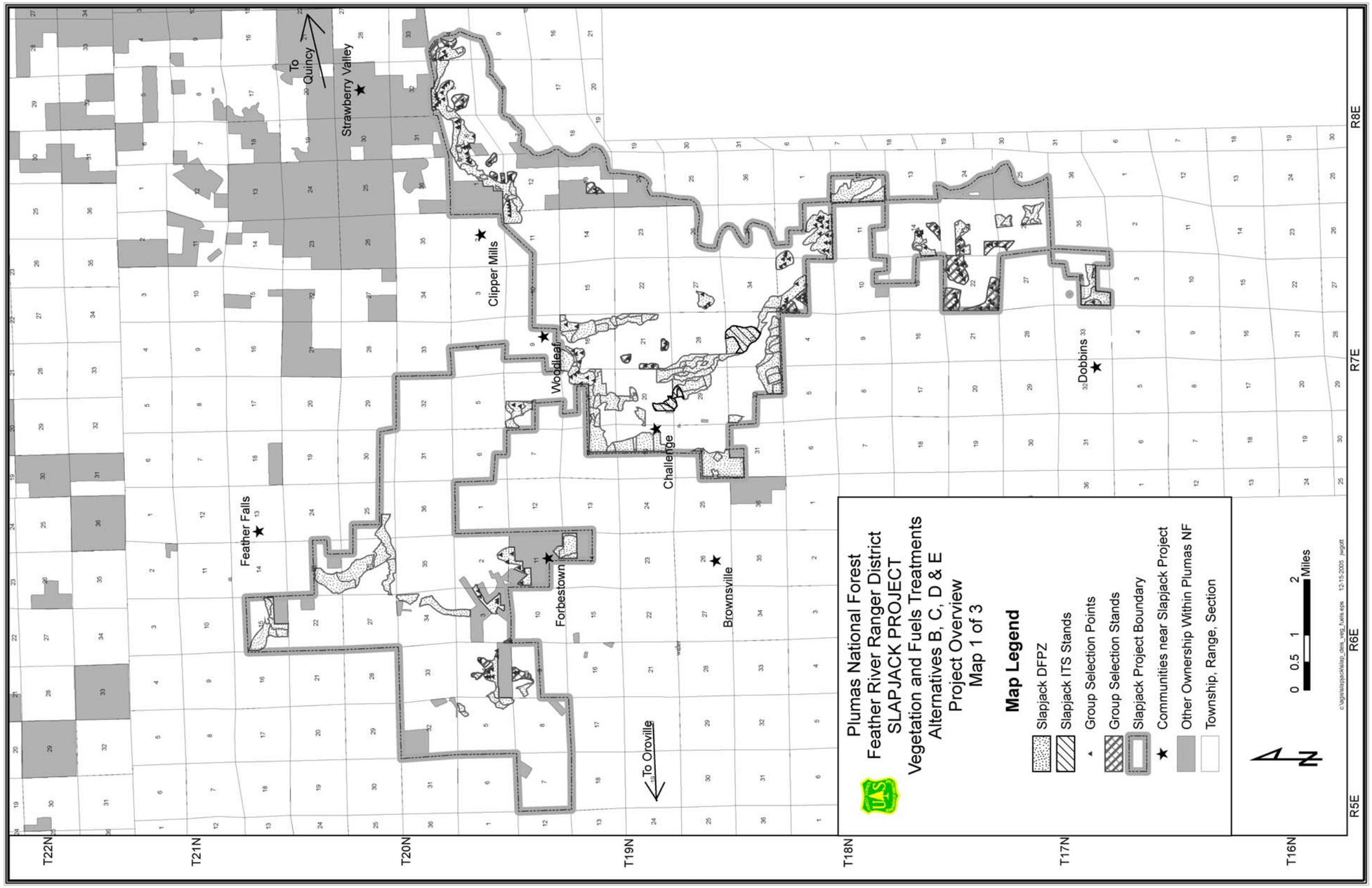

Figure A-1a. Slapjack Project vegetation and fuels treatments for alternatives B, C, D, and E, project overview.

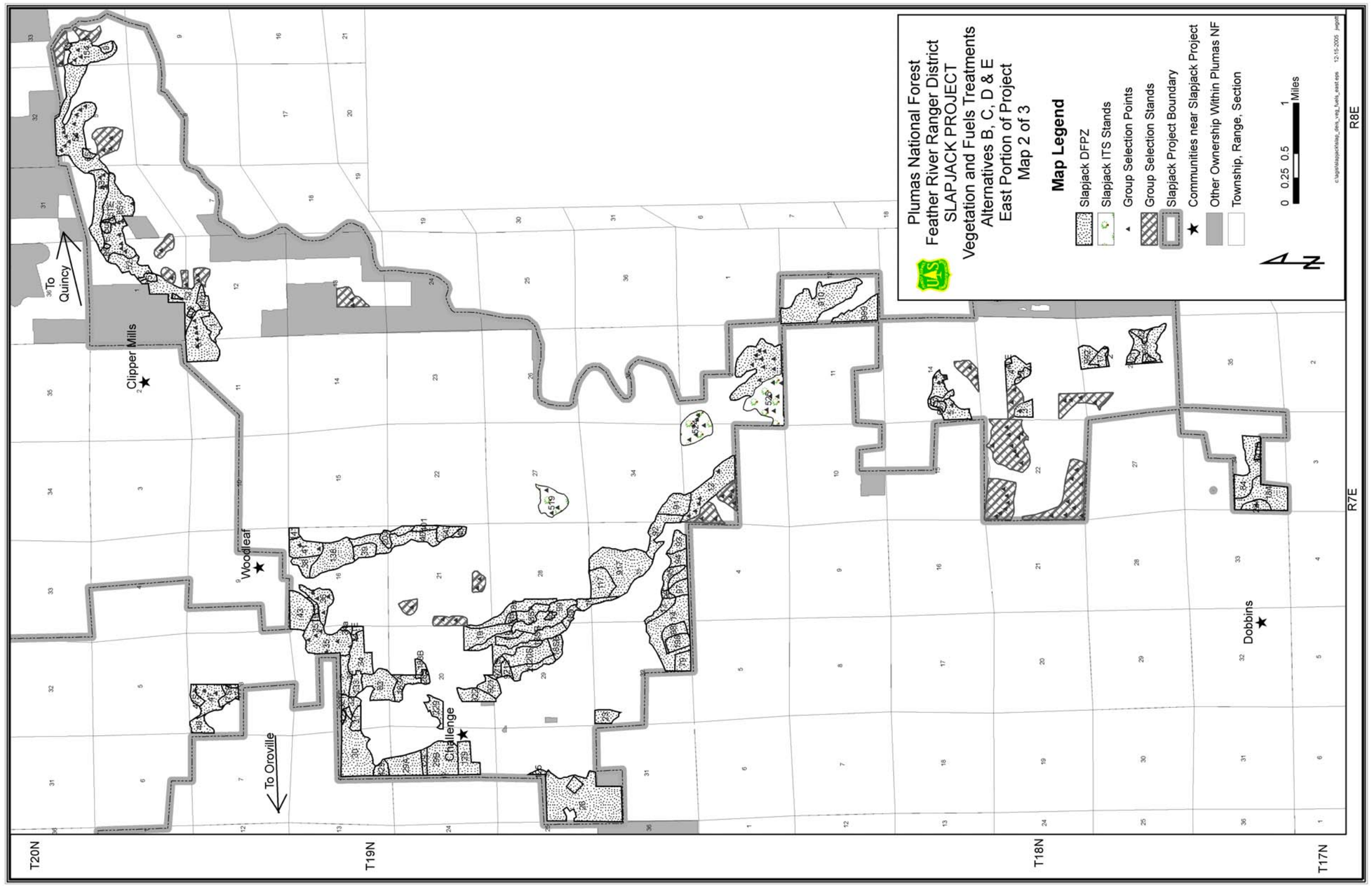

Figure A-1b. Slapjack Project vegetation and fuels treatments for alternatives B, C, D, and E, east portion of the project area.

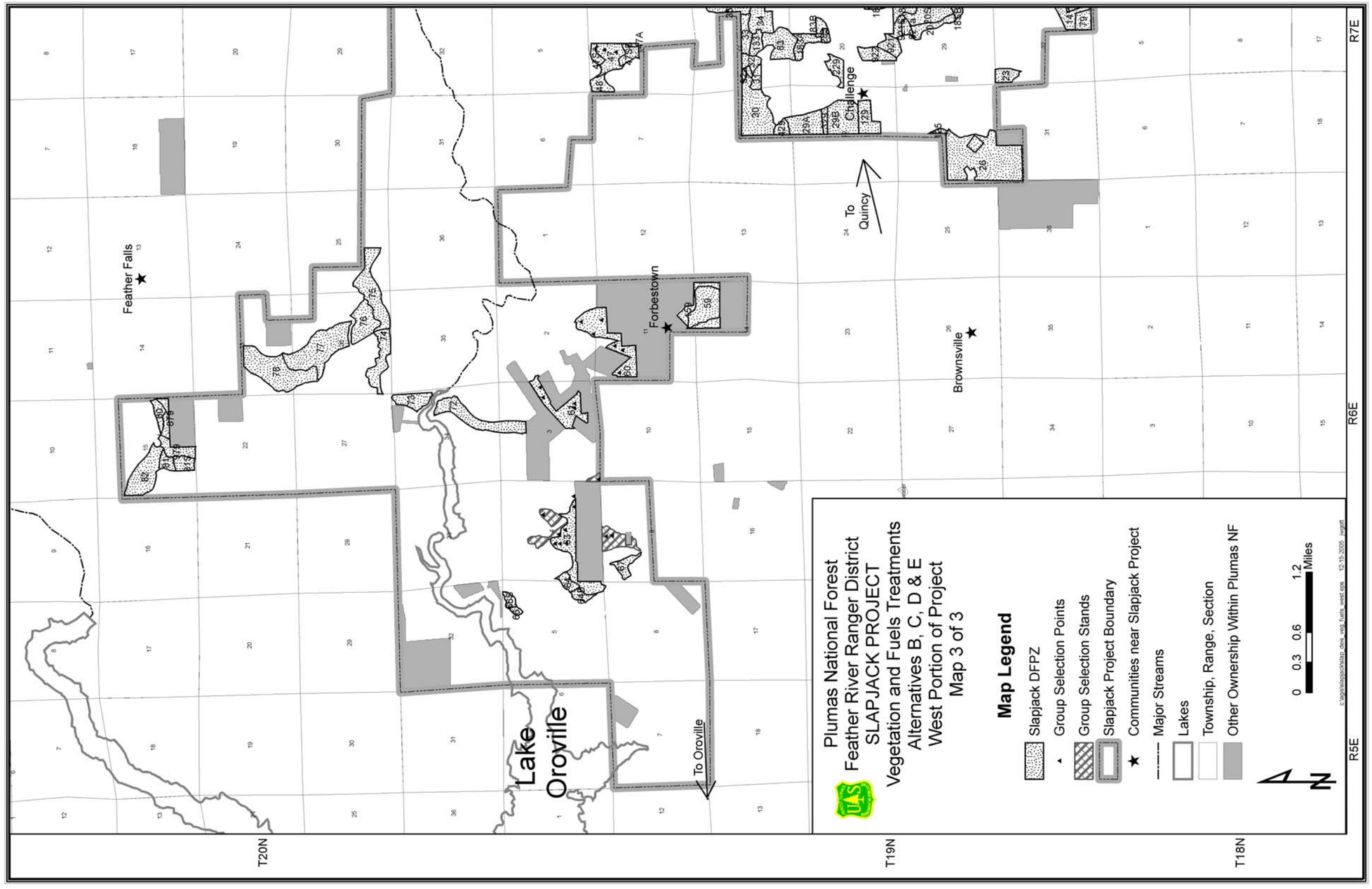

Figure A-1c. Slapjack Project vegetation and fuels treatments for alternatives B, C, D, and E, west portion of the project area.

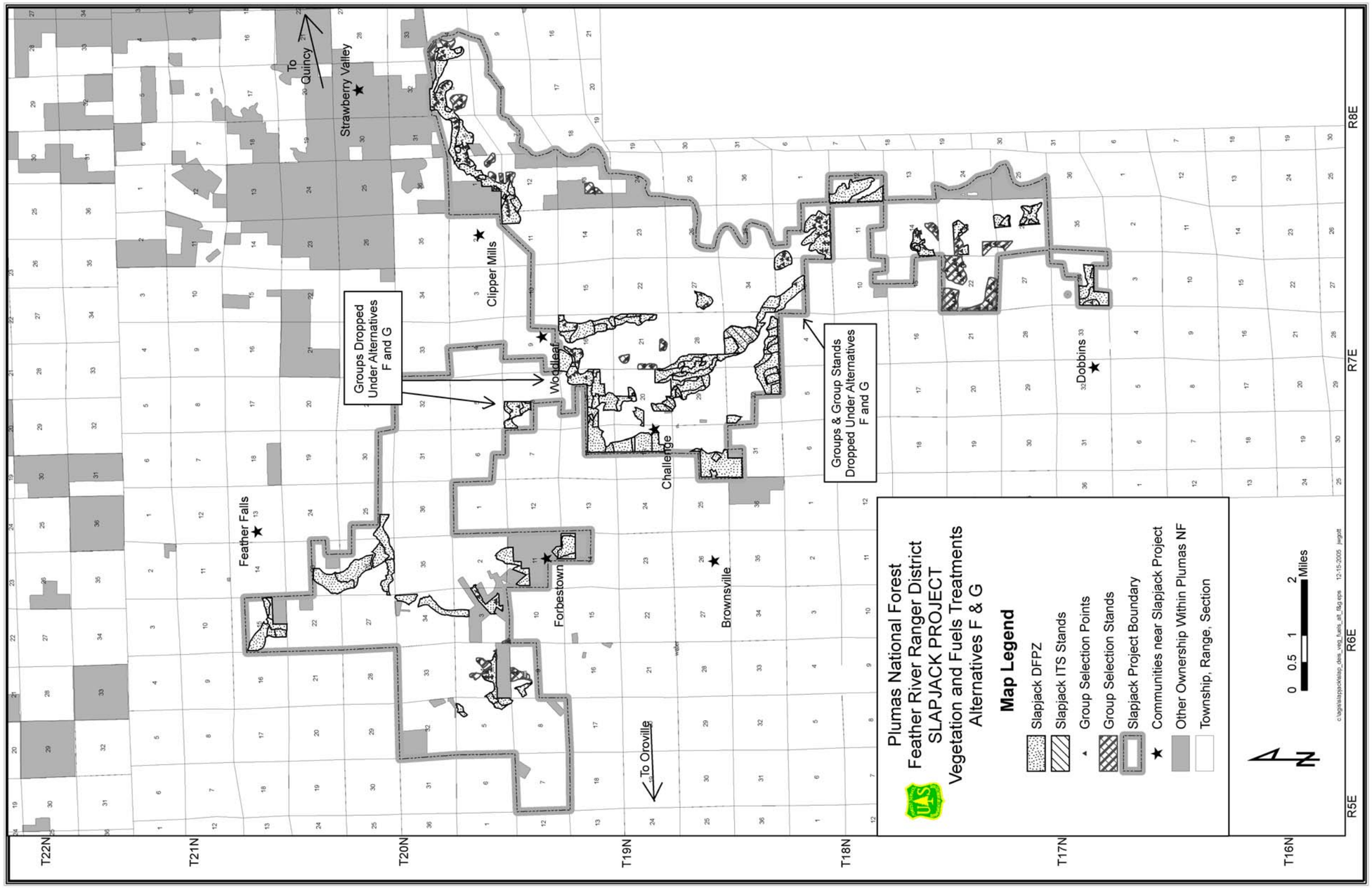

Figure A-1d. Slapjack Project vegetation and fuels treatments for alternatives F and G.

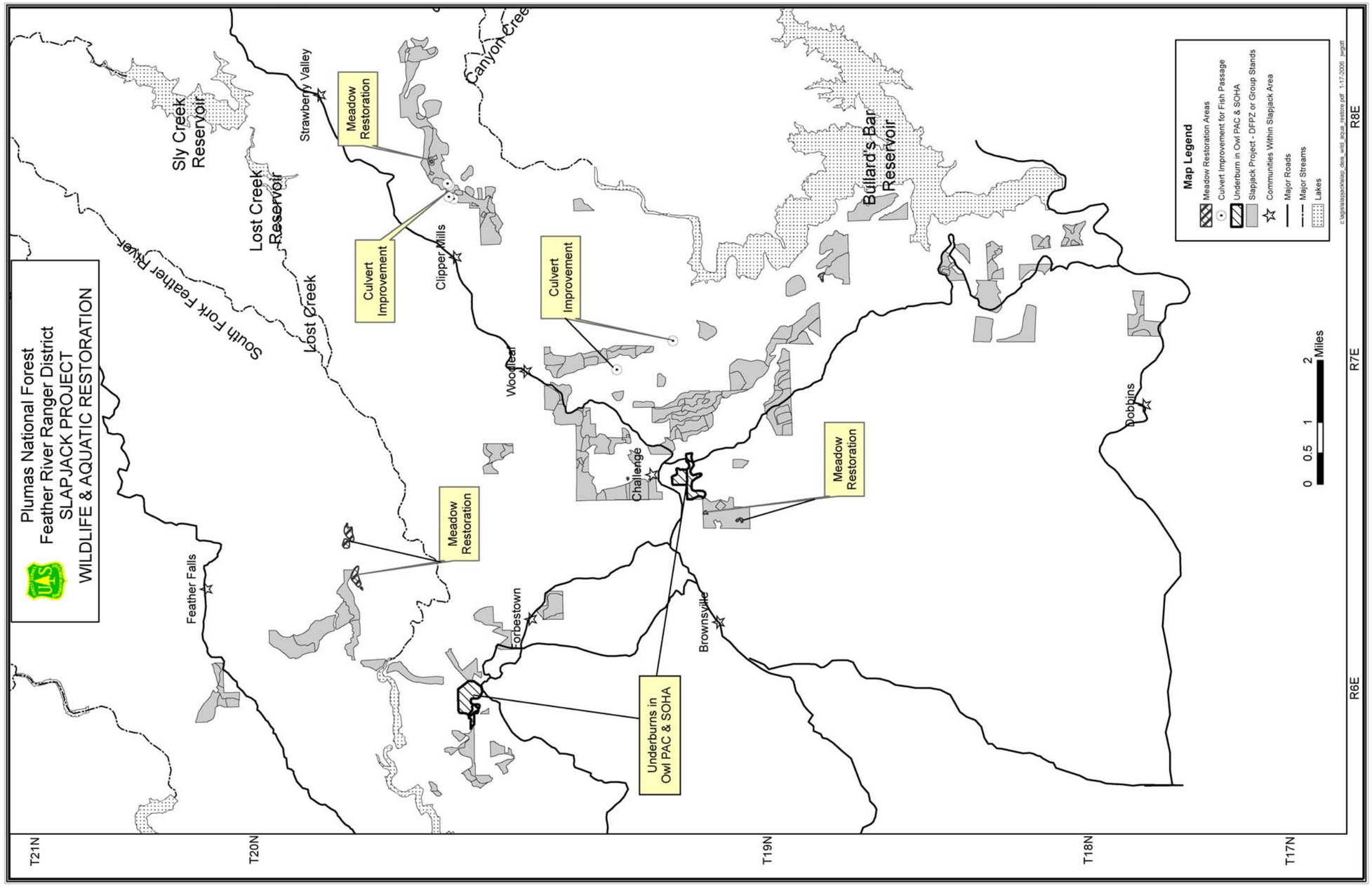

Figure A-1e. Slapjack Project wildlife and aquatic restoration.

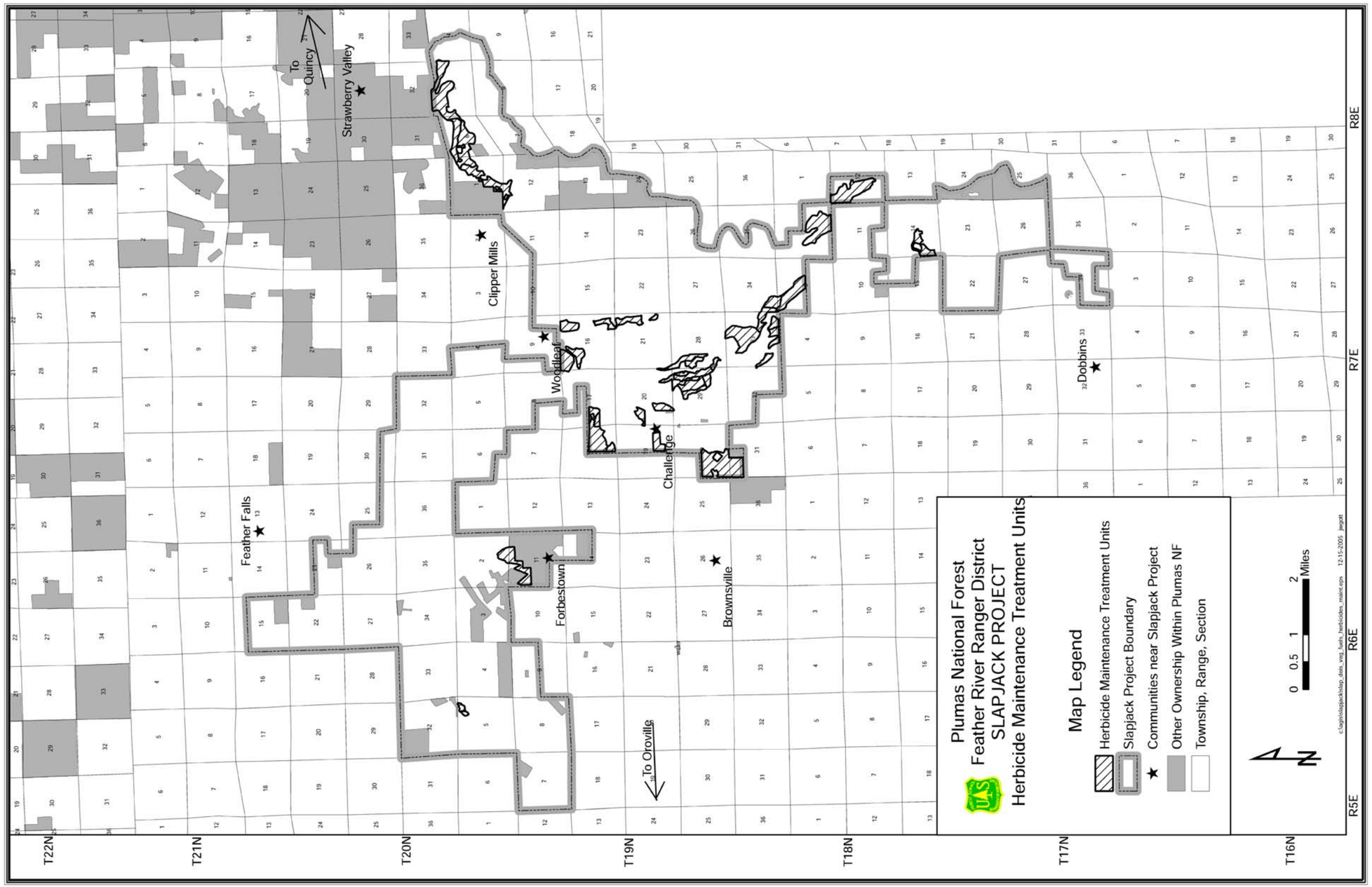

Figure A-2. Slapjack Project herbicide maintenance treatment units.

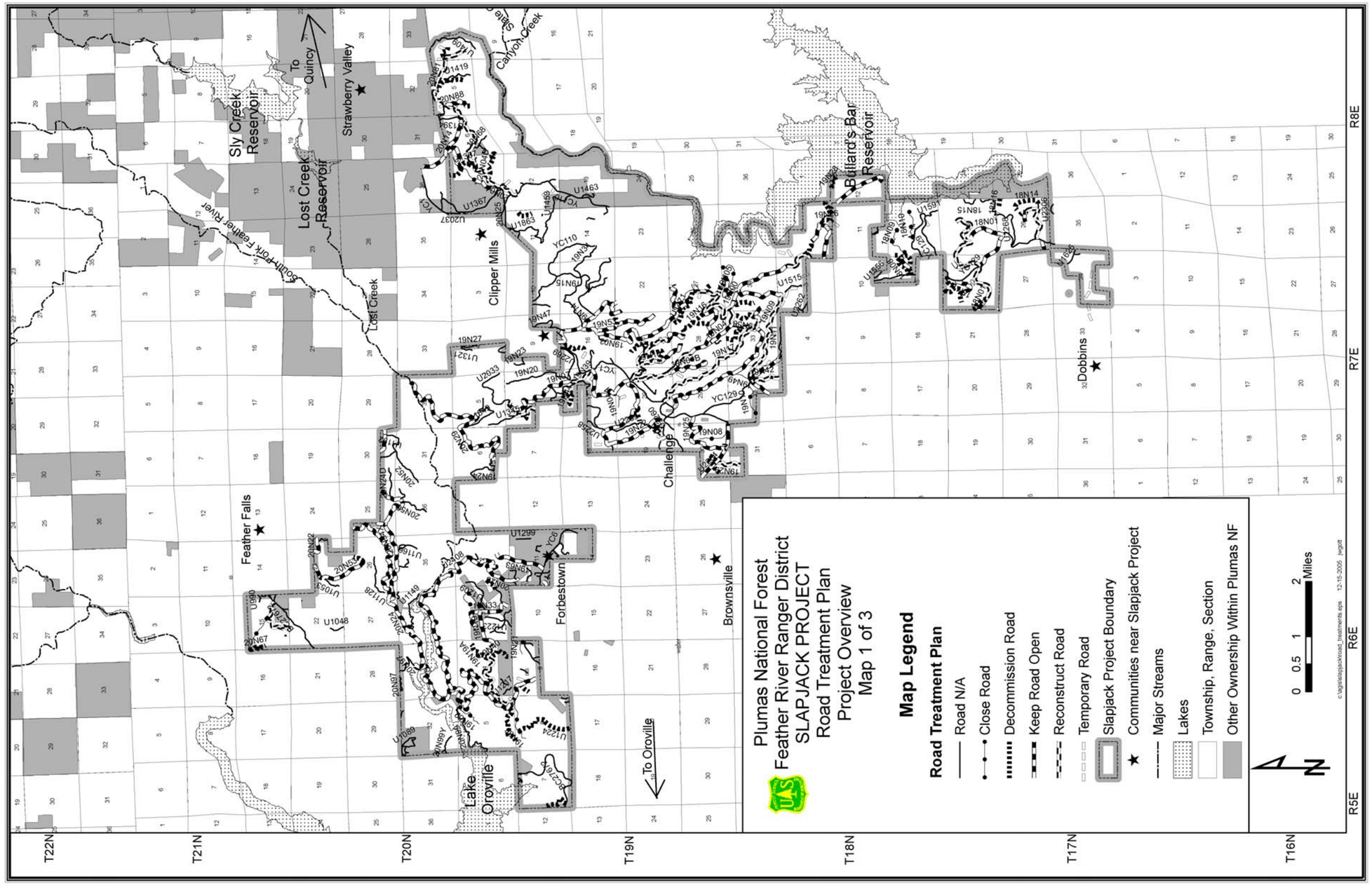

Figure A-3a. Slapjack Project road treatment plan, project overview.

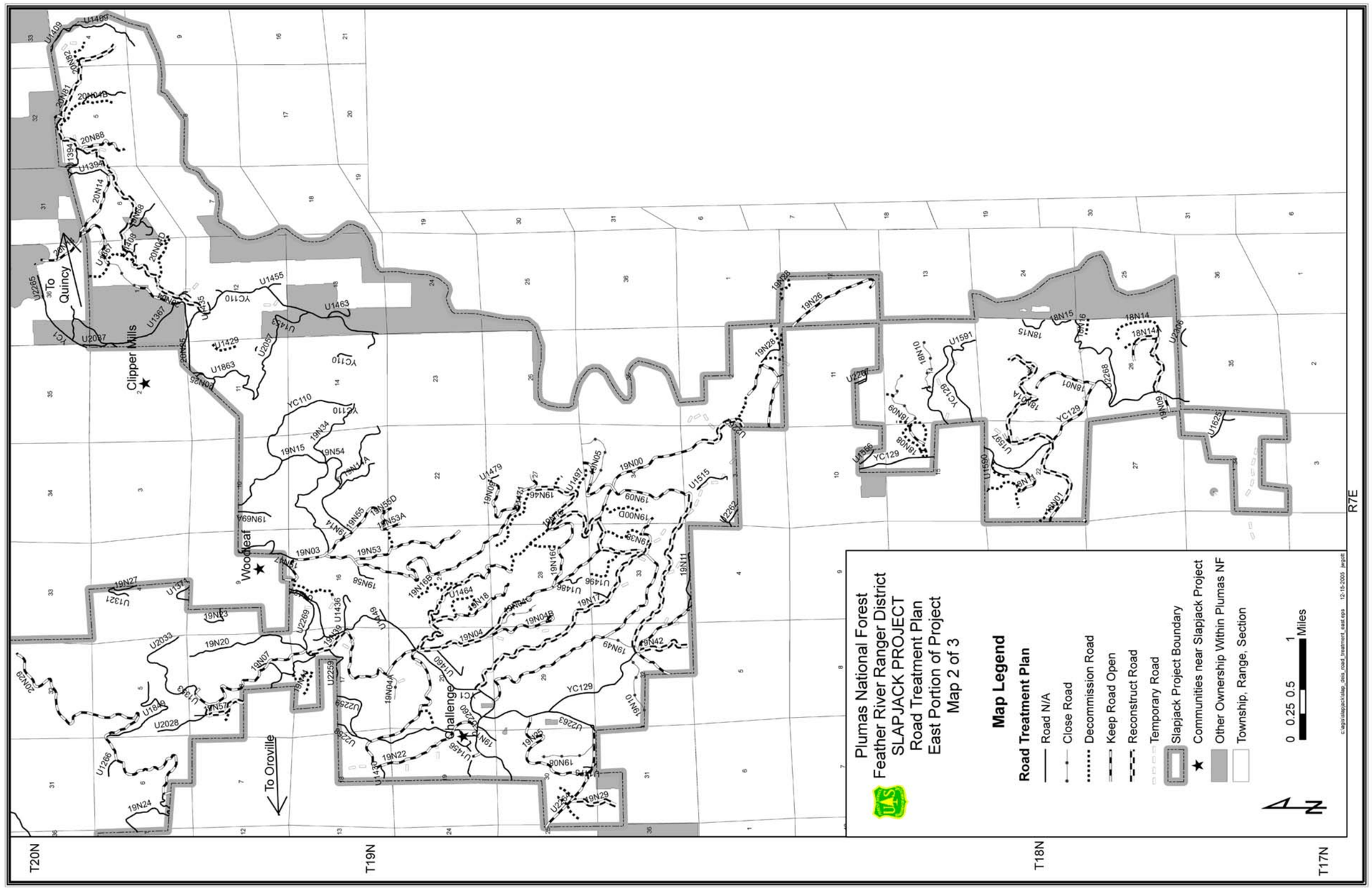

Figure A-3b. Slapjack Project road treatment plan, east portion of the project area.

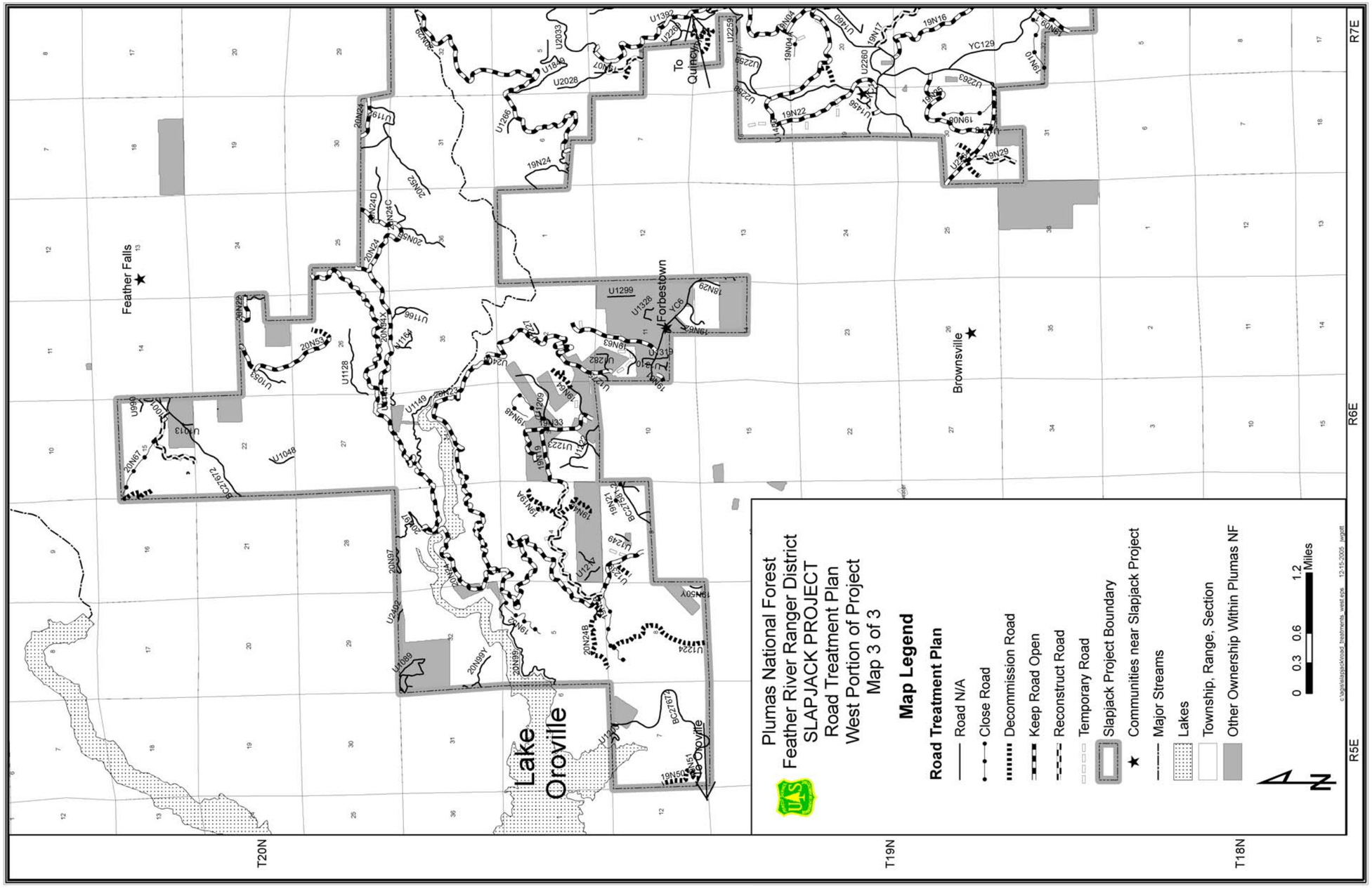

Figure A-3c. Slapjack Project road treatment plan, west portion of the project area.

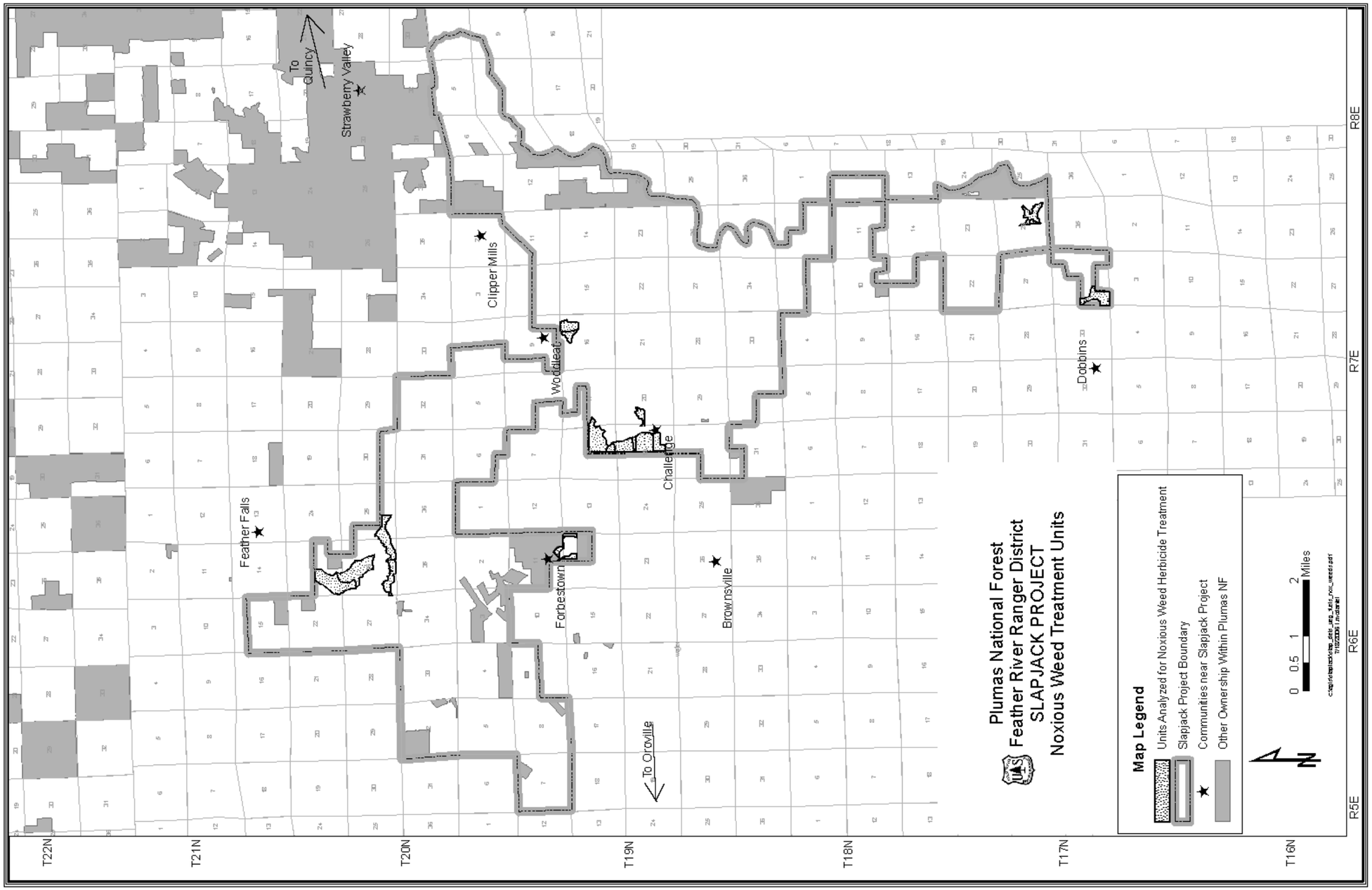

Figure A-4. Slapjack Project noxious weed treatment units.

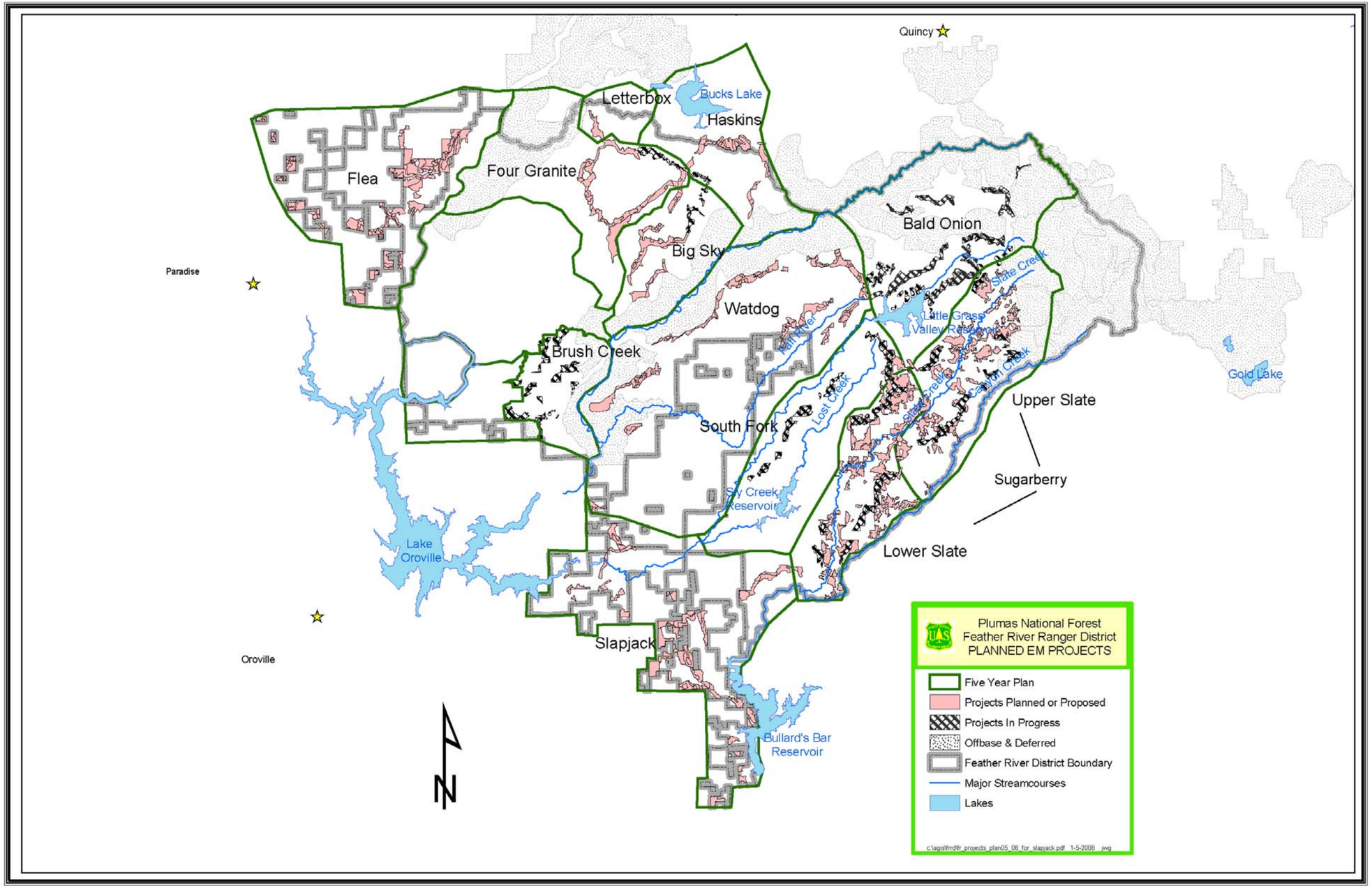

Figure A-5a. Planned and proposed projects on the Feather River Ranger District.

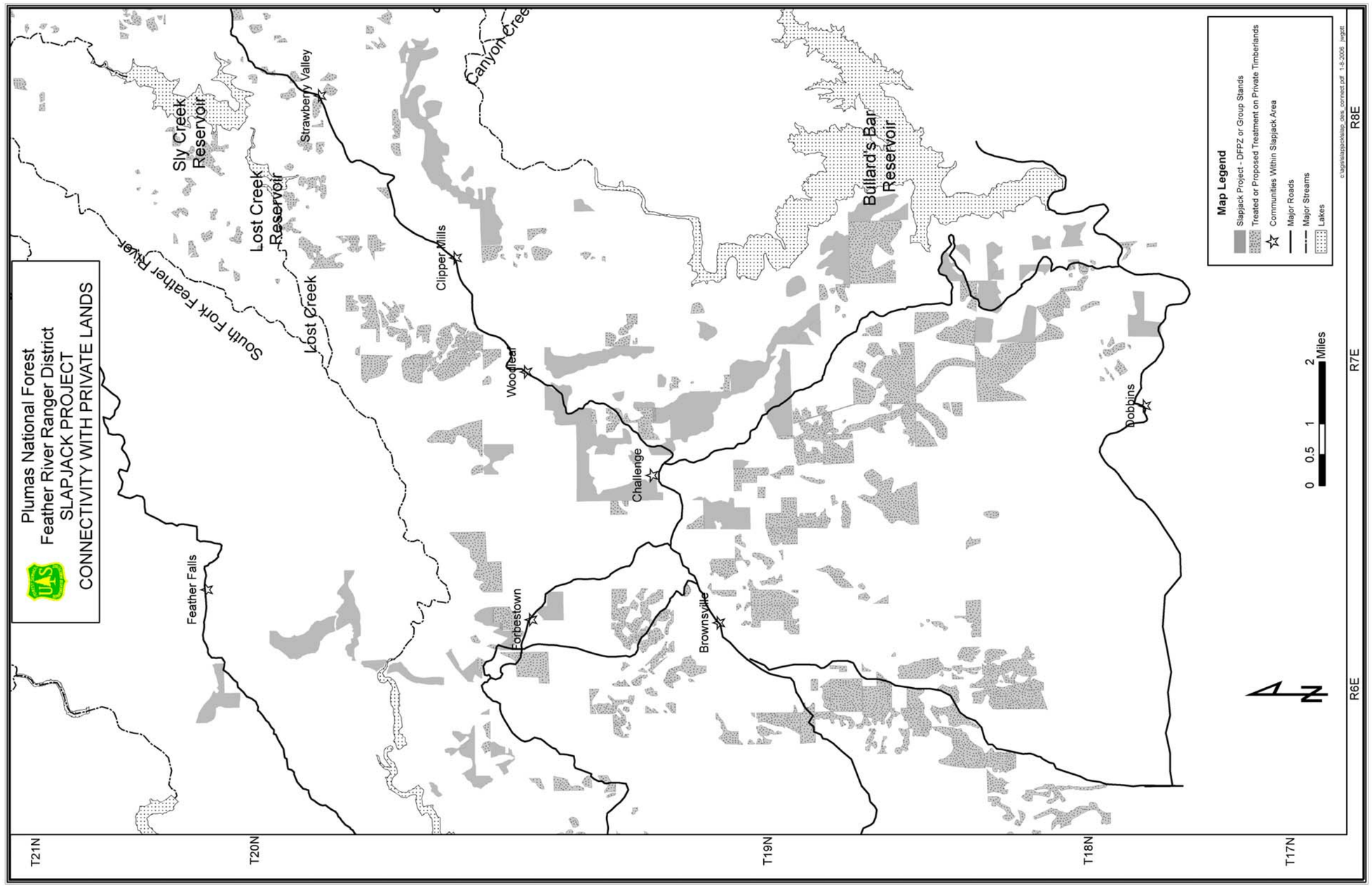

Figure A-5b. Slapjack Project connectivity with private lands.

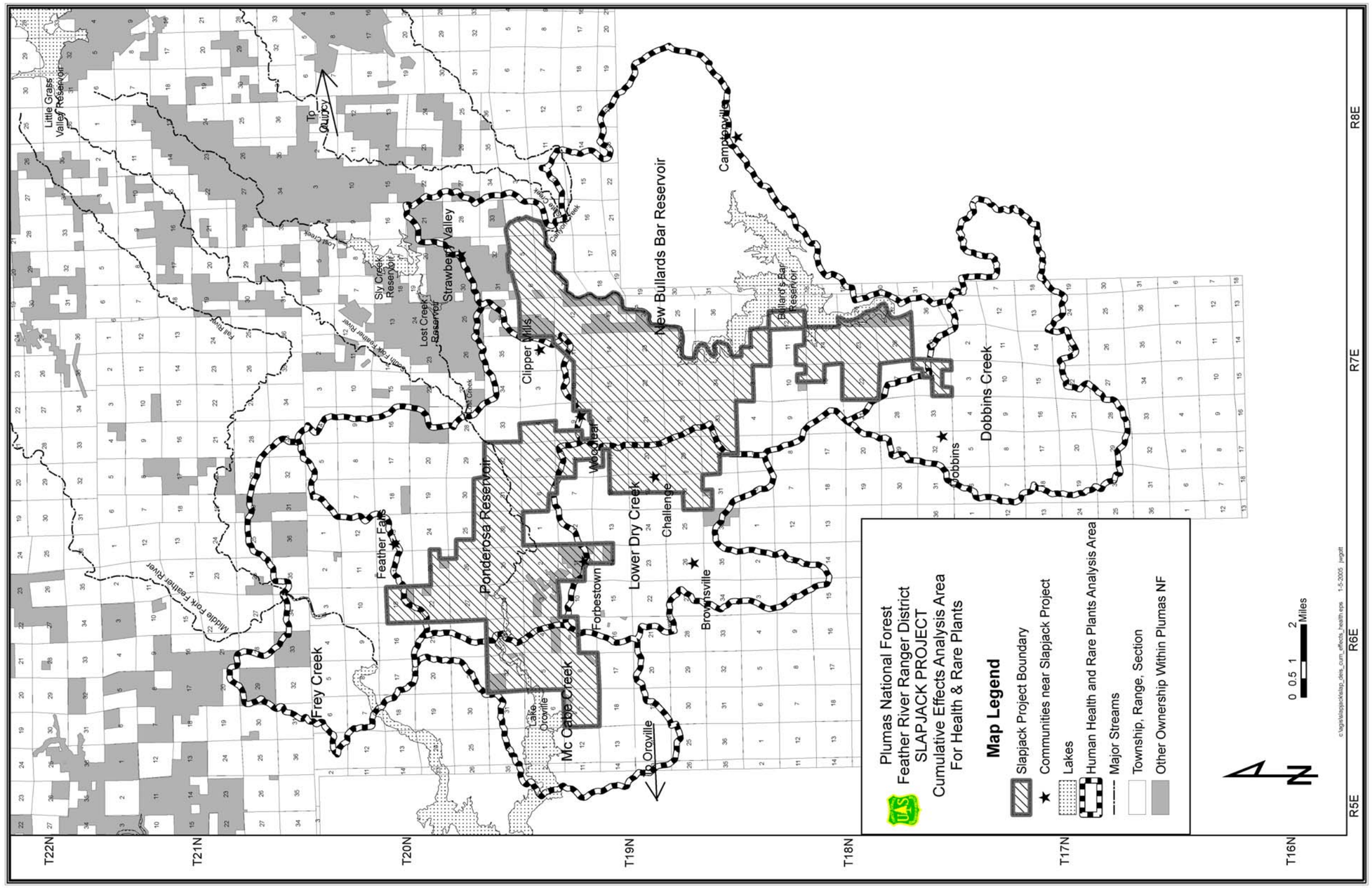

Figure A-6. Cumulative effects analysis area for health and rare plants.

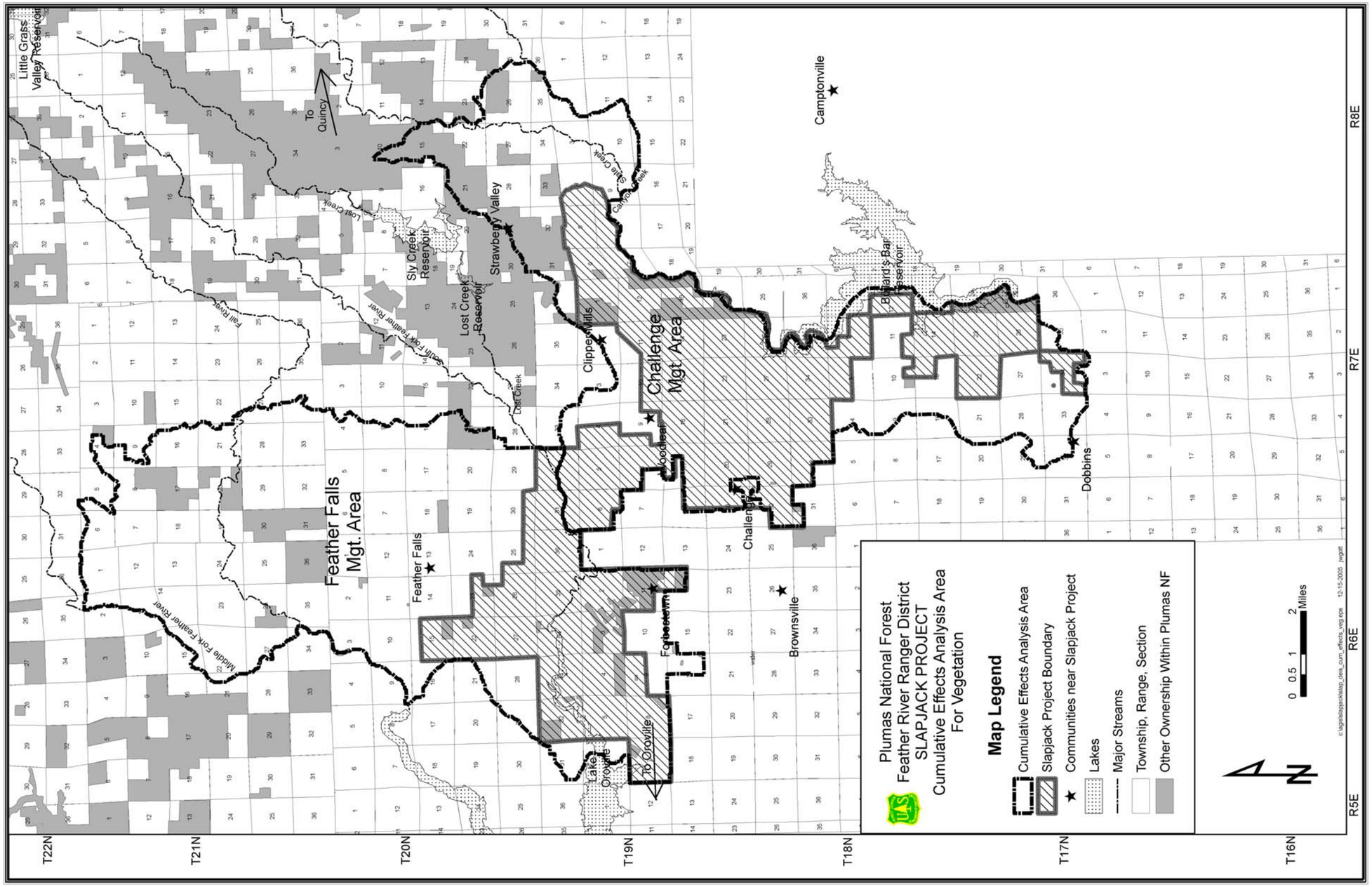

Figure A-7. Cumulative effects analysis area for vegetation.

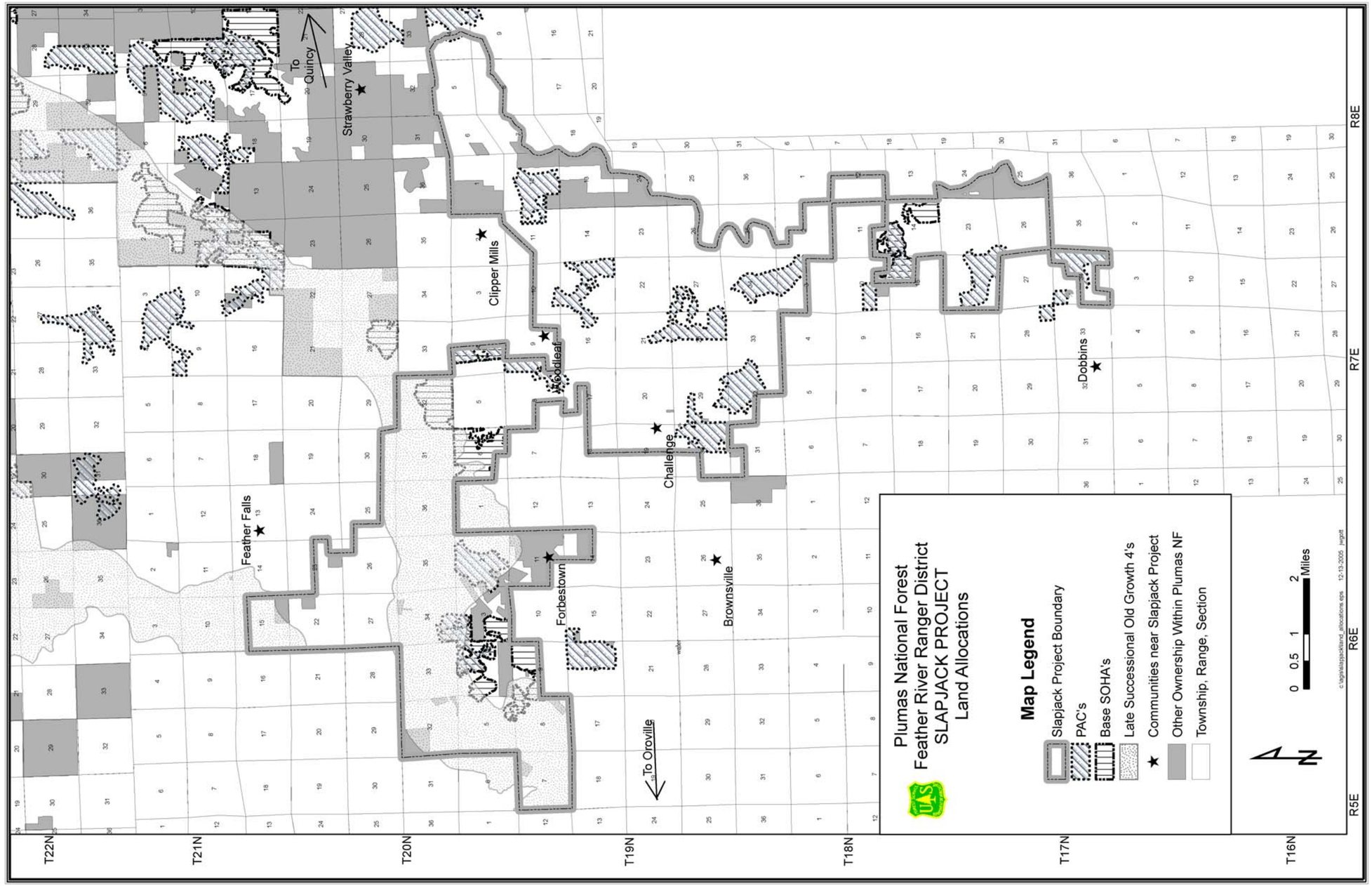

Figure A-8. Slapjack Project land allocations.

Appendix B

Proposed Vegetation Treatment Schedules, Proposed DFPZs by Treatment Unit, Proposed Group Selections Outside of DFPZs, and Proposed Individual Tree Selection Units

Appendix B
Proposed Vegetation Treatment Schedules

Generalized Silvicultural Prescription Schedules

Table B-1 displays an example of a proposed treatment schedule for a typical Defensible Fuel Profile Zone (DFPZ). In general, the first treatment for the DFPZs would be thinning from below through sawlog and biomass whole-tree removal (harvest) or mechanical mastication (nonharvest). After mastication, selected plantations would be pruned to raise the crown height. The next treatment would be to hand cut (thin) and pile the slash, particularly in the steep (greater than 45 percent) slopes and in Riparian Habitat Conservation Areas. Grapple pulling and piling of shrubs would also be completed at this time. After thinning activities have been completed, firelines would be constructed, and the machine and hand piles would be burned. Once all of the piles are burned, the proposed underburn stands would be reevaluated to determine if underburning is necessary to treat any remaining slash and competing vegetation. In addition, approximately five years after mastication, those stands would be reevaluated to determine if an underburn would be necessary to further reduce the fuel loading.

Table B-1. Example of a proposed treatment schedule for a DFPZ.

Defensible Fuel Treatment Zone Proposed Treatment Schedule		
Year	**Activity**	**Method**
1	Harvest – DFPZ	Whole-tree sawlog and biomass removal
1	Nonharvest - DFPZ	Masticate
2	Fuels pre-preatment	Hand cut and pile slash (riparian zones/steep areas)
2	Fuels pre-preatment	Hand prune and pile slash (selected plantations)
2	Fuels pre-preatment	Grapple pull and pile shrubs (selected stands)
3	Fuels pre-preatment	Fireline construction (manual or mechanical)
3	Fuels preatment	Burn piles
4	Fuels preatment	Underburn or masticate to reduce fuels
5–9	Fuels preatment	Underburn mastication units if needed

Table B-2 provides an example of a proposed treatment schedule for a typical group selection harvest. Group selection harvest areas would be harvested or logged in conjunction with the DFPZ in which the group is located. Site preparation would be the next treatment, consisting of grapple piling and burning the piles, followed by underburning or mastication. After site preparation has been completed, reforestation or hand planting of various conifer species would occur. Once the seedlings are established, two release treatments would be implemented to reduce competing vegetation and ensure seedling survival.

Table B-3 provides an example of a proposed treatment schedule for a typical individual tree selection harvest. Individual tree selection harvest areas would be harvested or logged in conjunction with the group selection areas in the stand.

Table B-2. Example of a proposed treatment schedule for a group selection harvest.

Group Selection Harvest Proposed Treatment Schedule		
Year	**Activity**	**Method**
1	Harvest – group selection	Whole-tree sawlog and biomass removal
2	Site preparation	Grapple or hand pile slash or shrubs
3	Site preparation	Burn piles
4	Site preparation	Underburn or masticate to reduce fuels
5	Reforestation	Hand plant and natural regeneration
6	Release (first treatment)	Hand grub – grasses, forbs, and shrubs
8	Release (second treatment)	Hand cut – larger shrubs

Table B-3. Example of a proposed treatment schedule for an individual tree selection stand.

Individual Tree Selection Harvest Proposed Treatment Schedule		
Year	**Activity**	**Method**
1	Harvest – individual tree selection	Whole-tree sawlog
2	Fuels treatment	Grapple pile project-generated slash
3	Fuels treatment	Burn piles

Table B-4. Proposed DFPZ treatments by group selection unit, including proposed herbicide use for DFPZ maintenance and noxious weed control.

Stand Information		Mechanical Treatments						Hand Treatments			Thermal Treatments			Secondary Treatments			Chemical Treatments	
EA Number	Stand Acres (GIS)	DFPZ Harvest CWHR 5	DFPZ Harvest CWHR 4	DFPZ Harvest Plant	Group Selection Removal	Masticate Natural Stands	Masticate Plantations	Handcut and Pile	Group Planting	Group Grub and Release	Hand Pile Burn	Grapple Pile Burn	Primary Underburning	Masticate	Underburning	Underburn or Masticate	DFPZ Preventive Maintenance[a]	Noxious Weed Control[q]
1	19.1			19.1										19.1				
2	2.4						2.4							2.4				
3	16.1	14.6			1.5				1.5	1.5		1.5				16.1		
4	28.7		28.7													28.7		
5	48.1				7.0	28.1	13.0		7.0	7.0		7.0		13.0	28.1		48.1	
6	2.2						2.2							2.2				
7	7.9						7.9							7.9				
9	7.3						7.3							7.3				
10	2						2.0							2.0				
11	111.2	98.7			12.5				12.5	12.5		12.5				111.2	111.2	
12	74.9	67.4			7.5				7.5	7.5		7.5				74.9	74.9	
13	16.8					16.8									16.8		17.0	
14	90.6	90.6														90.6		
16	16.1		16.1													16.1		
17	12.9						12.9							12.9				
18	179.7		179.7													179.7	179.7	
19	43.7		43.8													43.7		
20	68.7		68.7													68.7	68.7	
21	6.8							6.8			6.8							
22	9.2						9.2							9.2				
23	18.2						18.2							18.2				
25	4.6						4.6							4.6				1.0
26	186.7			186.7										186.7			186.7	
27	7.4						7.4							7.4				

Table B-4. Proposed DFPZ treatments by group selection unit, including proposed herbicide use for DFPZ maintenance and noxious weed control (continued).

Stand Information		Mechanical Treatments						Hand Treatments			Thermal Treatments			Secondary Treatments			Chemical Treatments	
EA Number	Stand Acres (GIS)	DFPZ Harvest CWHR 5	DFPZ Harvest CWHR 4	DFPZ Harvest Plant	Group Selection Removal	Masticate Natural Stands	Masticate Plantations	Handcut and Pile	Group Planting	Group Grub and Release	Hand Pile Burn	Grapple Pile Burn	Primary Underburning	Masticate	Underburning	Underburn or Masticate	DFPZ Preventive Maintenance[a]	Noxious Weed Control[q]
30	89.9		89.9													89.9	90.0	2.0
31	12.9	12.9														12.9	13.0	
32	21.7	21.7														21.7	22.0	
33	22.6					22.6									22.6			
34	55.4			55.4										55.4				
35	82.4	74.4			8.0				8.0	8.0		8.0				82.4		
36	33.7	29.2			4.5				4.5	4.5		4.5				33.7	33.7	
38	31					31.0									31.0			1.0
39	19.2		19.2													19.2		
40	63.5					63.5									63.5		64.0	
41	34.6		31.1		3.5				3.5	3.5		3.5				34.6	35.0	1.0
43	48.2	48.2														48.2	48.0	
47	69.2		61.7		7.5				7.5	7.5		7.5				69.2		
48	17.7						17.7							17.7				
51	76.8		66.3		10.5				10.5	10.5		10.5				76.8		
52	35.4					35.4									35.4		35.0	
52	62.3					62.3									62.3		62.0	
53	54.2		49.2		5.0				5.0	5.0		5.0				54.2	54.0	
54	155.6		140.1		15.5				15.5	15.5		15.5				155.6	155.6	
59	59.2							59.2			59.2							
60	89.6	80.6			9.0				9.0	9.0		9.0				89.6	90.0	
61	58.1	52.6			5.5				5.5	5.5		5.5				58.1		
62	8.9	8.1			0.8				0.8	0.8		0.8				8.9	8.9	
62	2.1												2.1					

Table B-4. Proposed DFPZ treatments by group selection unit, including proposed herbicide use for DFPZ maintenance and noxious weed control (continued).

Stand Information		Mechanical Treatments						Hand Treatments			Thermal Treatments			Secondary Treatments			Chemical Treatments	
EA Number	Stand Acres (GIS)	DFPZ Harvest CWHR 5	DFPZ Harvest CWHR 4	DFPZ Harvest Plant	Group Selection Removal	Masticate Natural Stands	Masticate Plantations	Handcut and Pile	Group Planting	Group Grub and Release	Hand Pile Burn	Grapple Pile Burn	Primary Underburning	Masticate	Underburning	Underburn or Masticate	DFPZ Preventive Maintenance[a]	Noxious Weed Control[b]
63	74.2		67.2		7.0				7.0	7.0		7.0				74.2		
64	24.8					24.8									24.8			
66	13.8		13.8													13.8	14.0	
67	18.2						18.2							18.2				
72	71.8												71.8					
73	29.8												29.8					
74	47.3												47.3					1.0
75	75.2												75.2					1.0
76	48.7												48.7					
77	109.8												109.8					10.0
78	109.8					109.8									109.8			1.0
79	18.5						18.5							18.5				
80	15.1					15.1									15.1			
81	31.1	31.1														31.1		
82	66.5					66.5									66.5			
83	50.4					30.4	20.0							20.0	30.4			
84	61.8		61.8													61.8		
85	107.4		96.4		11.0				11.0	11.0		11.0				107.4	107.4	
91	33.6		33.6													33.6	34.0	
92	36.6		36.6													36.6	36.6	
93	18		18.0													18.0	18.0	
94	27.5		27.5													27.5	27.5	
95	15												15.0					
96	5.1						5.1							5.1				

Table B-4. Proposed DFPZ treatments by group selection unit, including proposed herbicide use for DFPZ maintenance and noxious weed control (continued).

Stand Information		Mechanical Treatments						Hand Treatments			Thermal Treatments			Secondary Treatments			Chemical Treatments	
EA Number	Stand Acres (GIS)	DFPZ Harvest CWHR 5	DFPZ Harvest CWHR 4	DFPZ Harvest Plant	Group Selection Removal	Masticate Natural Stands	Masticate Plantations	Handcut and Pile	Group Planting	Group Grub and Release	Hand Pile Burn	Grapple Pile Burn	Primary Underburning	Masticate	Underburning	Underburn or Masticate	DFPZ Preventive Maintenance[a]	Noxious Weed Control[q]
97	16.1						16.1							16.1				
98	19.4						19.4							19.4				
99	54.4												54.4					
117	39.1												39.1					
124	0					0.0									0.0			
125	3.7						3.7							3.7				
129	34.1	34.1														34.1	34.0	1.0
133	16												16.0					
138	53												53.0					
141	7						7.0							7.0				
152	7						7.0							7.0				
154	50	44.5			5.5				5.5	5.5		5.5				50.0		
159	33.2					33.2									33.2			1.0
184	59												59.0					1.0
198	21							21.0			21.0							
203	18						18.0							18.0				
229	20.6	20.6														20.6	20.6	1.0
283	7						7.0							7.0				
284	15		13.5		1.5				1.5	1.5		1.5				15.0		
329	8.8			8.8										8.8				1.0
401	8						8.0							8.0				
402	3						3.0							3.0				
429	12	12.0														12.0	12.0	1.0
542	16						16.0							16.0				

Table B-4. Proposed DFPZ treatments by group selection unit, including proposed herbicide use for DFPZ maintenance and noxious weed control (continued).

Stand Information		Mechanical Treatments						Hand Treatments			Thermal Treatments			Secondary Treatments			Chemical Treatments	
EA Number	Stand Acres (GIS)	DFPZ Harvest CWHR 5	DFPZ Harvest CWHR 4	DFPZ Harvest Plant	Group Selection Removal	Masticate Natural Stands	Masticate Plantations	Handcut and Pile	Group Planting	Group Grub and Release	Hand Pile Burn	Grapple Pile Burn	Primary Underburning	Masticate	Underburning	Underburn or Masticate	DFPZ Preventive Maintenance[a]	Noxious Weed Control[b]
607	5						5.0							5.0				
851	5						5.0							5.0				
879	15.9					15.9									15.9			
910	115					115.0									115.0		115.0	
917	112						112.0							112.0			112.0	
921	40		40.0													40.0		
922	25	25.0														25.0	25.0	
979	25.4					25.4									25.4			
991	44	44.0														44.0		1.0
992	21		21.0													21.0		
999	40												40.0					
9401	13						13.0							13.0				
183n	23		23.0													23.0		
183s	9		9.0													9.0		
29n	45.4			45.4										45.4				5.0
29s	63.1			63.1										63.1				1.0
Totals	**4,418.7**	**810.3**	**1,255.9**	**378.5**	**123.3**	**695.8**	**406.8**	**87.0**	**123.3**	**123.3**	**87.0**	**123.3**	**661.2**	**785.3**	**695.8**	**2,182.4**	**1,953.6**	**31.0**

Notes:

a. "DFPZ Preventive Maintenance" applies to alternatives B, E, and F.

b. "Noxious Weed Control" applies to alternatives B, D, and F. In addition, a maximum of up to 31 acres per year for five years would be chemically treated.

Table B-5. Approximate acres of group selection harvest outside of DFPZs.

Unit Number	Total Unit Acres	Approximate Acres of Group Selection[a]	Unit Number	Total Unit Acres	Approximate Acres of Group Selection[a]
504	14	1.6	527	71	8.1
505	16	1.8	528	106	12.1
506	4	0.5	530	44	5.0
507	32	3.6	531	95	10.8
514	13	1.5	533	19	2.2
515	20	2.3	534	16	1.8
517	15	1.7	536	11	1.2
519[b]	40	4.5	537	17	1.9
522[c]	26	3.0	538	43	1.7
523[c]	22	2.5	542	27	3.1
524[b]	51	5.8	543	10	0.8
525[b]	77	8.8	545	23	2.6
526	23	2.6			
			Total Unit Acres	**886**	**—**
			Total Approximate Acres of Group Selection	**—**	**96**

Notes:

a. Groups would be placed at a rate of about 11.4 percent but could be up to 20 percent of the unit area.

b. Individual tree selection harvest would be conducted on approximately 148 acres in units 519, 524, and 525 in the area surrounding the group selections.

c. Units 522 and 523 are not proposed for group selection under alternatives F and G because of watershed concerns.

Table B-6. Approximate acres of individual tree selection (ITS) harvest by unit.

Unit Number[a]	Approximate Acres of ITS	Total Unit Acres
519	35	40
524	45	51
525	68	77
Total	**148**	**168**

Note:

a. Group selection harvest would be conducted on approximately 20 acres in units 519, 524, and 525.

Appendix C

Human Health Risk Assessment

Appendix C
Human Health Risk Assessment

This appendix is based on those portions of the "Appendix G: Human Health risk Assessment" of the *Herger-Feinstein Quincy Library Group Forest Recovery Act Final Supplemental Environmental Impact Statement* (HFQLG Act final supplemental EIS) that pertain to the proposed use of imazapyr and triclopyr formulations in the project area. This appendix is also based on site-specific information for the Slapjack Project that was used to calculate the risks of herbicide exposure to workers and the public.

Herbicides

The Slapjack Project proposes to use the same application rates of imazapyr and triclopyr (see tables C-1 and C-2) as analyzed in the HFQLG Act final supplemental EIS; therefore, a separate human health risk assessment is not required. The hazard analysis, exposure assessment, dose response assessment, risk characterizations, tables, and worksheets that pertain to imazapyr and triclopyr are hereby incorporated by reference from appendix G of the HFQLG final supplemental EIS.

Table C-1. Chemicals, application rates, and application volumes that would be used for DFPZ Maintenance.

Chemical	Application Rate (ounces / acre)	Acid Equivalents (pounds / acre)	Application Volume Minimum to Maximum (gallons / acre)	Concentration Minimum to Maximum (percent)	Typical Application Volume (gallons / acre)	Typical Concentration (percent)
Imazapyr (Arsenal AC)	8	0.25	5 to 20	0.313 to 1.250	10	0.625
Syl-Tac® (Surfactant)	1.6 to 6.4	NA		0.25		0.25
Hi-Light® Blue (Dye)	1.6 to 6.4	NA		0.25		0.25

Table C-2. Chemicals, application rates, and application volumes that would be used for noxious weed control.

Chemical	Application Rate (ounces / acre)	Acid Equivalents (pounds / acre)	Application Volume Minimum to Maximum (gallons / acre)	Concentration Minimum to Maximum (percent)	Typical Application Volume (gallons / acre)	Typical Concentration (percent)
Triclopyr (Garlon 4™)	48	1.5	10 to 40	0.938 to 3.750	20	1.875
Syl-Tac® (Surfactant)	3.2 to 12.8	NA		0.25		0.25
Hi-Light® Blue (Dye)	3.2 to 12.8	NA		0.25		0.25

Herbicide Overview

There is not sufficient information available to predict conclusively the occurrence of imazapyr in surface water in the HFQLG project area. Although imazapyr often persists in soils, it is typically described as being minimally mobile. Imazapyr breaks down in water into two dozen degradates, none of which are described as being persistent in water. The results from the limited known surface and groundwater monitoring of ground-applied imazapyr suggest that low or nondetectable concentrations of the chemical persist in forest streams with establishment of streamside buffers. Foliar application is the primary mode of treatment.

Triclopyr concentrations in surface waters are typically not detectable in forestry applications with establishment of adequate streamside buffers and absent direct application onto surface waters. Triclopyr appears to be variably persistent in soil, with minimal mobility and minimal leaching evident in field studies. Little is known about triclopyr concentrations in groundwater in forested areas although a recent survey of groundwater in primarily agricultural and urban areas did not detect triclopyr at over 2,600 sites across the United States. Foliar application is the primary mode of treatment. Two formulations of triclopyr are used in commercial herbicides. Triclopyr triethylamine salt (TEA) can be a liquid, a granular or pelleted solid, or a wettable powder. In 1998, the U.S. Environmental Protection Agency (EPA) identified 24 registered TEA products. Triclopyr butoxyethyl ester (BEE) as a liquid was registered as 12 products in 1998 (EPA 1998). Three products are commonly used in forestry: Garlon 4 and Pathfinder, both the ester formulation, and Garlon 3A, the amine formulation. Triclopyr amine salt formulations are more water soluble than the oil-soluble ester formulations and have less of a tendency to bind to organic materials in soils. As a result, amine salts are more mobile in soils than the oil-soluble ester-formulated products.

Disposition in Soil

Imazapyr “is chemically stable in soil and microbial breakdown along with dispersive processes such as percolation and runoff will be the primary mechanisms in the decrease in imazapyr in soil over time” (SERA 1999:4-15). Laboratory studies by McDowell et al. (1997) showed that temperature appreciably affected degradation rates, whereas soil organic matter and pH were less influential.

Imazapyr has been described as a persistent herbicide, with at least one study recording detectable, but low, concentrations of the chemical for one year after treatment. Cox (1996) described imazapyr as, “a persistent herbicide.” Cox noted that persistence ranges from 60 to 436 days (EPA 1984; Coffman et al. 1993; Lloyd et al., all cited in Cox 1996) for studies from southern and northeastern states. “Imazapyr can remain active in the soil for six months to two years” (Information Ventures, Inc. 1995). Residues were “periodically detected (less than 10 parts per billion [ppb]) in lysimeters [an unsaturated soil solution] for one year following application,” although “[N]o detectable imazapyr residues were observed . . . in groundwater approximately two years following application” (Wiley et al. 2000). Cox (1996:18) maintained that half-life measurements for imazapyr might be conservative because the chemical “persisted in most cases, until the last date tested,” implying longer half-lives than those typically quantified.

Sources document variable mobility and leaching of imazapyr in soils, probably because the binding of imazapyr to soil is complexly dependent upon a variety of soil properties. Field measurements showed “no indication of subsurface lateral flow” (Wiley et al. 2000:300) at the interface of sand and clay-enriched soil layers in the Georgia upper-coastal plain. Imazapyr was described as “not as mobile . . . in shallow wells as were hexazinone or picloram” (Wiley et al. 2000:300). In another Georgia upper-coastal plain study, Bush et al. (1995) stated, “imazapyr showed limited potential for lateral movement or movement to the 8-inch perched

water table." Imazapyr was also described as having "a low potential for leaching into ground-water" (Information Ventures, Inc. 1995). On the other hand, Cox (1996:19) stated "[O]ne field study found that between 40 and 70 percent of applied imazapyr leached down to the lowest depth tested (45 cm)" and "[A]nother study found that 'significant' residues of imazapyr leached to a depth of between 1.5 and 3 m depending on application rate" (Rahman et al. 1993, cited in Cox 1996:19). SERA (1999:App. 5-2) noted that binding of soil to imazapyr increases with decreasing pH, increasing iron oxide levels, and elevated organic matter at lower pH levels. Wehtje et al. (1987, cited in SERA 1999:App. 5-2) associated decreased soil water content with enhanced soil binding.

Triclopyr TEA and BEE dissociate in water to triclopyr acid/anion and triethanolamine and triclopyr acid/anion and butoxyethanol respectively. Both triethanolamine and butoxyethanol rapidly dissipate through microbial degradation (Ganapathy 1997). The EPA (1998:51) listed laboratory and field half-lives for terrestrial BEE from two studies as 0.5 and 1.1 days. Triclopyr acid/anion is the predominant compound present in the environment when products containing either triclopyr BEE or triclopyr TEA are used (EPA 1998:50). The following discussion presumes triclopyr acid/anion (labeled triclopyr), unless otherwise noted, as the chemical of interest in environmental fate assessments.

In soil, the predominant degradation pathway for triclopyr is microbial degradation (Ghassemi et al. 1981, cited in Ganapathy 1997:4) to the major metabolite 3,5,6-trichloro-2-pyridinol (TCP). TCP does not appear to form in a 1:1 ratio to the amount of triclopyr applied; EPA (1998:54) reported maximum TCP concentrations of 26 percent of the initial triclopyr acid applied under aerobic soil metabolism conditions. A second metabolite, 3,5,6-trichloro-2-methoxypyridine (TMP) was produced at about one-ninth the rate of TCP in one laboratory study (Ganapathy 1997, citing Lee et al. 1986). Both TCP and TMP eventually convert to carbon dioxide (CO_2) (Ghassemi et al. 1981, cited by Ganapathy 1997).

Triclopyr appears to be variably persistent in soils, with some sources describing it as persistent and others as not persistent. The EPA (1998:50) described triclopyr as "somewhat persistent," although "triclopyr residues did not persist in field dissipation studies." In a lysimeter study at the forested Savannah River Site in Georgia, "[T]riclopyr residues were not persistent and remained below 6 ppb during the study [over 3 years]. The only occurrence of triclopyr in the deep lysimeters [84-109 cm] was at 0.3 ppb 79 days following the first spot application" (Bush 2001). Ghassemi et al. (1981, cited in Ganapathy 1997:4) stated, "Since triclopyr is rapidly degraded by soil microorganisms, there is not enough residue left to injure plants the next growing season." In a differing opinion, Cox (2000:17, citing Norris et al. 1987 and EPA 1978) stated that triclopyr persisted for a year in a field study in western Oregon after treatment with the amine salt and over a year in another field study. Soil half-lives reported for triclopyr generally range between one and three months. Soil half-lives for triethanolamine and butoxyethanol are short. The EPA (1998:52,55) reported half-lives of 5.6–13.7 days for triethanolamine in aerobic soil and 4 and 10 days for butoxyethanol in sandy loam and silt loam, respectively.

Although triclopyr's soil adsorption coefficient is similar in magnitude to that of mobile herbicides, many studies indicate that, operationally, triclopyr experiences minimal mobility and leaching. Ganapathy (1997) noted that triclopyr's sorption to soil increases over time (thereby decreasing its leaching potential) and hypothesized this may be the cause of the differing results.

In process-based simulations using a root zone model for pine forest conditions in the Canary Islands, triclopyr was characterized as being a potential leacher (Diaz and Loague 2001). The EPA (1998:57) described triclopyr as "very mobile"—this is based on adsorption/desorption studies of sand, sandy loam, silt loam, and clay soils, and as having "the potential to leach to ground water."

On the other hand, numerous sources attribute low mobility and leaching potential to triclopyr. Information Ventures, Inc. (1995) stated "[T]riclopyr should not be a leaching problem under normal conditions since it binds to clay and organic matter in soil" and Bush (2001), in concurrent lysimeter monitoring of four herbicides, determined the "relative potentials of herbicides to move into shallow groundwater" as greater for all three other herbicides (picloram, metsulfuron methyl, and clopyralid) than triclopyr. In a different report, Bush et al. (1995:115) reiterated that triclopyr (and imazapyr) were not as mobile or persistent in shallow wells as picloram or hexazinone. A forestry field study stated, "triclopyr remained mainly in the top 6 inches of soil . . . [and] . . . only a fraction of the percent applied was detected at soil intervals below 24 inches at six months after treatment (Cryer et al. 1993, cited in Ganapathy 1997). SERA (1999:4-12) noted that neither BEE nor triclopyr acid is very mobile in loamy soil. Last, Ganapathy (1997, citing Newton et al. 1990), describing results of a southwest Oregon forestry field study, stated, "triclopyr was practically immobile in soil-water and therefore would only move a short distance in forest subsurface flow."

Disposition in Water

SERA (1999:3-15) listed photolysis as the major mechanism for breakdown of imazapyr in water and cited 28 days as the half-life of imazapyr in pond water (American Cyanamid 1991, cited in SERA 1999:3-18). Information Ventures, Inc. (1995) listed about four days as the half-life of imazapyr in water. In their Georgia field study, Wiley et al. (2000) collected both flume and stream samples after aerial application of imazapyr at 2.2 oz active ingredient/acre. Two flume samples from 11 storm events collected over a 7-month period contained "trace levels" of 2.5 to 5.0 ppb; all other flume samples had non-detectable residues (less than 2.5 ppb).

SERA (1999:3-15) noted, "there appear to be at least 25 photolytic breakdown products of imazapyr . . ." but that "these breakdown products . . . are not persistent in water." Major breakdown products include quinolinic acid and a furo (3,4-b) pyridin-5 (7H)-one-7-hydroxy compound (SERA 1999:3-15).

Little field monitoring data exist for imazapyr under operational forestry conditions, although the existing information suggests low or non-detectable concentrations of imazapyr in surface water from application sites with buffer zones (appendix B). Aerial applications at four locations in Alabama and Washington state had stream concentrations of imazapyr varying from no more than 1 µg/l at two buffered sites in Washington (Rashin and Graber 1993, cited in SERA 1999:3-17) to 680 µg/l at an un-buffered Alabama location (Michael and Neary 1993, cited in SERA 1999:3-17). In the Wiley et al. (2000) Georgia study of buffered streams with aerially applied imazapyr, no samples collected between 2 weeks and 10 months post-application contained residues greater than 5 ppb, although one flume sample had imazapyr at 7 ppb. Bush et al. (1995) found no detectable concentrations (at 5 ppb detection limit) of imazapyr in stream samples downstream of their buffered ground application site. One of over 830 samples from wells 4 feet and 8 feet deep had a detectable concentration (8.6 ppb) over a 1.5-year period after imazapyr application at the buffered Bush et al. (1995) coastal plain sites.

Triclopyr is not anticipated to persist in surface water, although it may under flood conditions. The primary degradation pathway for triclopyr in water is photo-degradation (Ganapathy 1997), with half-lives listed as less than 1 day in sterile solutions, approximately 1 day in natural water in laboratory studies, and 0.5–3.5 days in Lake Seminole, Georgia (EPA 1998:51). Similar half-lives were recorded for triclopyr (3.7–4.7 days) and TCP (4.2–7.9 days) for Lake Minnetonka, Minnesota (Getsinger et al. 2000) and ponds in California, Missouri, and Texas (5.9–7.5 days for triclopyr and 4–8.8 days for TCP) (Petty et al. 2001). Triethanolamine is stable (half-life

14–18 days) in aerobic aqueous conditions, but it can persist much longer (half-life greater than 2 years) under anaerobic aquatic conditions (EPA 1998:52).

"Triclopyr and TCP do not adsorb to soil and sediment particles, and may be transported in surface runoff waters. Although triclopyr is not predicted to persist in surface water, information from two aquatic field dissipation studies conducted on rice indicated that following application of triclopyr, TCP could persist in flood waters" (EPA 1998:53). The EPA (1998:42) labeled TCP as persistent in aquatic environments.

With establishment of adequate streamside buffers, and absent direct application onto surface waters, triclopyr concentrations in surface waters are typically not detectable in forestry applications, and "applications of triclopyr could be made without harm to nearby streams" (Ganapathy 1997:14). Two studies in South Carolina (Bush et al. 1995) found no detectable triclopyr. Although 2 mg/l peak concentration of triclopyr was measured in the third study, the buffer, at a 5-meter width, may have been only marginally effective. Data from water quality monitoring in Sierra Nevada and North Coast forestland streams confirm the extremely low likelihood of detectable concentrations of ground-applied triclopyr in adequately buffered streams. In analyzing these data, Bakke (2001) noted:

- The few positive detections in non-accidental or erroneous applications in water monitoring are all at low levels (highest 2.4 ppb).
- The detection that resulted in the highest level of triclopyr (82 ppb) was the result of an absence of an untreated buffer on an ephemeral stream.
- It would appear from these monitoring data that untreated streamside buffers of greater than 15 feet in width reduce risk of water contamination to near zero.

Little is known about triclopyr concentrations in groundwater in forested areas of California. The EPA (1998:63) stated, "To date, there has been limited monitoring for triclopyr in groundwater in the United States." Nevertheless, TCP "has the potential to degrade groundwater (EPA 1998:53)" and "[T] acid and its degradate TCP are of concern in the groundwater assessment (EPA 1998:62)." Hoheisel et al. (1992, cited in EPA (1998:63) noted five detections of triclopyr residues from 379 wells sampled in four states. The maximum reported concentration was 0.58 ppb. It is not known if any of these wells were located in forested environments. In their survey of 20 mostly agricultural and urban study units across the nation, the U.S. Geological Survey (2000) did not detect triclopyr in groundwater at any of over 2,600 individual sites.

Hazard Analysis

Acute and Chronic Exposures

Little information is available on the acute toxicity of imazapyr to experimental mammals. Single oral doses of 5,000 mg/kg of a 2 lbs acid equivalent per gallon (ae/gal) formulation of imazapyr were administered to groups of five male and female rats. Over the 14-day observation period, one male rat died. Abnormal findings in this rat included congestion of liver, kidney, and intestinal tract, as well as hemorrhagic lungs. All surviving rats showed no signs of toxicity. It is unclear if the death of the one male rat was associated with treatment. In a similar study using a mixture of imazapyr and a related herbicide, imazethapyr, at a total dose of 5,000 mg/kg, no effects were noted. A review of unpublished studies of imazapyr indicates that the oral LD_{50} of

unformulated imazapyr is greater than 5,000 mg/kg. No further information on the acute oral toxicity of imazapyr has been encountered in the EPA's files on this compound or other reviews in the published literature.

Triclopyr has a low order of acute lethal potency. Oral LD_{50} values range from 600 to 1,000 mg/kg. The signs and symptoms of acute oral intoxication generally include lethargy, impaired coordination, weakness, labored respiration, and tremors. Anorexia and diarrhea have also been observed in rodents and domestic animals. Similar signs and symptoms are associated with triclopyr acid, triclopyr butoxyethylester (BEE), and triclopyr triethylamine salt (TEA) as the Garlon 3A formulation. The few available studies regarding histopathology and clinical chemistry data on triclopyr suggest that the liver and kidney are the primary target organs in acute intoxication. The other general systemic toxic effects of triclopyr are unremarkable. At high doses, signs of liver damage may be apparent as well as decreases in food consumption, growth rate, and gross body weight.

Effects on the Skin and Eyes

Imazapyr and its formulations can be irritating to the eyes and skin. In a standard assay of skin irritation, an imazapyr formulation was classified as mildly irritating, causing redness in intact or abraded skin and edema (swelling) only in abraded skin. When the formulation was instilled directly into the eyes of rabbits, transient eye irritation was observed with complete recovery by day seven after administration. The extent of irritation was substantially less in eyes that had been rinsed with water one hour after instillation of the imazapyr formulation. Since the acute oral LD_{50} of imazapyr is more than 5,000 mg/kg, the lack of apparent toxicity at dermal doses of up to 2,000 mg/kg/day is to be expected.

Exposure to triclopyr formulations may cause irritation to the skin and eyes. The irritant potencies for eyes and skin appear to be different for the different formulations. In dermal exposures, triclopyr itself does not cause irritation. Exposure to undiluted triclopyr TEA (Garlon 3A) causes slight reddening; whereas, exposure to undiluted triclopyr BEE (Garlon 4) causes more severe effects, including moderate reddening, slight swelling, and slight to moderate necrosis. Thus, the relative irritant potential for dermal exposures appears to be triclopyr less than Garlon 3A less than Garlon 4. Ocular exposure appears to follow a different pattern, with Garlon 4 causing no irritation, Garlon 3A causing severe irritation and corneal damage, and triclopyr itself causing only mild irritation. Triclopyr is poorly absorbed by skin, and very high doses (greater than 2,000 mg/kg) applied to the skin have not caused death or other signs of toxicity, except weight loss. This result suggests that triclopyr, like many herbicides, is less readily absorbed after dermal exposure than after oral exposure.

Inhalation Exposures

Compared with oral exposure data, data regarding the inhalation toxicity of imazapyr are extremely limited. No toxic effects were observed during or after 4-hour exposures to either imazapyr or imazapyr formulations at aerosol concentrations greater than 5 mg/L. Although inhalation of imazapyr is not a typical route of exposure, it may occur during brown-and-burn operations. The post-treatment burns in brown-and-burn operations are conducted 45–180 days after treatment with the herbicide. One study found no detectable levels of imazapyr in the breathing zone of workers during brown-and-burn operations in plots that had been treated with imazapyr at application rates of up to about 0.77 lb ae/acre.

Two acute inhalation studies have been done with the triclopyr BEE and the triclopyr TEA formulations in rats. The results showed an acute LC_{50} greater than 2.6 mg/L for TEA and greater than 4.8 mg/L for BEE. These levels are considered by the EPA to represent low acute inhalation toxicity. Garlon™ 4 contains kerosene in

sufficient quantities to warrant a cautionary statement on the product label; however, the plausible levels of exposure are far below those of concern. The potential for inhalation exposure to triclopyr from brown-and-burn operations has been assayed directly. For brown-and-burn operations conducted 32–97 days after application, at which time mean triclopyr residues ranged from 9.9 to 21 mg/kg, no triclopyr was detected in the air based on 140 breathing zone samples (detection limit = 0.1–4 $\mu g/m^3$).

Reproductive and Teratogenic Effects

Several studies on the reproductive effects of imazapyr in rats and rabbits have been conducted and submitted to the EPA in support of the registration of imazapyr. All of the studies are essentially negative. In other words, even at dose levels that cause signs of maternal toxicity, imazapyr does not cause adverse reproductive or developmental effects.

Triclopyr has been subject to several teratogenicity studies and two multi-generation reproduction studies. At sufficiently high doses, triclopyr can cause adverse reproductive effects as well as birth defects. A consistent pattern with triclopyr is that adverse reproductive effects, as well as teratogenic effects, occur only at doses that are maternally toxic. At doses that do not cause maternal toxicity, there is not apparent concern for either reproductive or teratogenic effects.

Carcinogenicity and Mutagenicity

The EPA has reviewed a number of assays for mutagenicity, as well as chronic studies in mice and rats, that can be used to assess carcinogenic potential. Two gene mutation studies (*Salmonella typhimurium* / Escherichia coli and Chinese hamster ovary cell gene mutation), as well as one chromosomal aberration study (Chinese hamster ovary cells), were classified as acceptable and negative for potential mutagenic activity. An additional chromosomal aberration study (dominant lethal assay) was also negative but had been classified as inadequate because the complete spermatogenic cycle had not been evaluated. In a re-review of this study, however, the EPA has recommended that the study be upgraded to acceptable. Based on these studies, the EPA has categorized imazapyr as Class E: evidence of non-carcinogenicity for humans.

In 1995, the EPA's Carcinogenicity Peer Review Committee (CPRC) classified triclopyr as a Group D chemical (not classifiable as to human carcinogenicity). This decision was based on increases in mammary tumors in female mice and rats and adrenal tumors in male rats. The CPRC felt that the evidence was marginal (not entirely negative, but yet not convincing), and when combined with lack of genotoxicity and lack of carcinogenicity of structural analogs, supported the Group D classification. The decision by the EPA to classify triclopyr as Group D is accompanied automatically by a decision not to derive a cancer potency factor for triclopyr; hence, in terms of a risk assessment, the potential carcinogenicity of triclopyr is not considered quantitatively.

Other Toxic Endpoints

No specific tests have been conducted with imazapyr to determine whether the chemical may have an effect in humans that is similar to an effect produced by naturally occurring estrogen or other endocrine effects. However, there were no significant findings in other relative toxicity studies; that is, teratology and multi-generation reproductive studies, which would suggest that imazapyr produces endocrine-related effects (EPA 1997).

There is no evidence for triclopyr being a direct neurotoxicant in humans or other species (SERA 2002). Studies designed specifically to detect impairments in motor, sensory, or cognitive functions in mammals or other species exposed subchronically or chronically to triclopyr have not been reported. This is not surprising, since the undertaking of such studies on a substance for which the clinical and experimental toxicology experience provide no reason to suspect a neurotoxicity potential, would be highly unusual. Triclopyr has not undergone evaluation for its potential to interact or interfere with the estrogen, androgen, or thyroid hormone systems (that is, assessments on hormone availability, hormone receptor binding, or post-receptor processing). However, extensive testing in experimental animals provides reasonably strong evidence that triclopyr is not an endocrine disruptor. No epidemiological studies of health outcomes of triclopyr have been reported, and there is no clinical case literature on human triclopyr intoxication.

Dose-Response Assessment

The Office of Pesticide Programs of the EPA has derived an RfD of 2.5 mg/kg/day for imazapyr. The RfD is based on a study in which groups of male and female dogs were administered imazapyr in the diet for one year at concentrations of 0, 1,000, 5,000, or 10,000 parts per million (ppm). No adverse effects attributable to treatment were noted in any treatment group. The highest dietary concentration corresponded to reported daily doses of 262.88 mg/kg/day and 269.80 mg/kg/day in male and female dogs, respectively. These doses were rounded to 250 mg/kg/day. In deriving the RfD, the EPA used an uncertainty factor of 100 (10 for species-to-species extrapolation and 10 for sensitive subgroups in the human population). Because the available data on reproductive toxicity and teratogenicity do not indicate that young animals are more sensitive than adults are to imazapyr, no additional uncertainty factor for infants or children was applied. The dog study is supported by chronic oral toxicity studies in both rats and mice, as well as several studies designed to detect adverse effects on reproduction and development. Because these studies fail to demonstrate any clear dose-response or dose-severity relationships, these data cannot be used to develop a more elaborate dose-response or dose-severity assessment. However, none of the exposure scenarios for imazapyr result in doses that substantially exceed the RfD. Consequently, an elaboration of dose-response or dose-severity relationships is unnecessary.

The EPA (1998) has established an RfD for triclopyr at 0.05 mg/kg/day. The EPA has concluded that the triethylamine acid (TEA) and butoxyethyl ester (BEE) of triclopyr are toxicologically equivalent; thus, this RfD is applicable to both forms of triclopyr. The RfD is based on a two-generation reproduction study in rats, with a NOEL of 5.0 mg/kg/day, the lowest dose tested. At the next dose level (25 mg/kg/day), an increased incidence of proximal tubular degeneration of the kidneys was observed in parental rats. An uncertainty factor of 100 was applied to this NOEL. Under the *Food Quality Protection Act* (FQPA), the EPA is required to evaluate whether or not an additional uncertainty factor is required for the protection of children. The parental NOAEL of 5 mg/kg/day is below any adverse reproductive effects. Consequently, the EPA (1998) determined that no additional FQPA uncertainty factor is required. The acute RfD is not applicable to females between the ages of 13 to 50 years (that is, of childbearing age). For these individuals, the EPA recommends an acute RfD of 0.05 mg/kg/day, equivalent to the chronic RfD.

The doses received under various scenarios are described in the following sections. The doses are evaluated against the reference dose (RfD). If all of the exposures are below the RfD (hazard quotient less than or equal to 1), the assumption is that use of the herbicide presents little risk either the worker or the public. If any exposure exceeds the RfD, a closer examination of various studies and exposure scenarios must be made to determine whether a toxic response is expected from the exposure. Table C-3 displays the acute and chronic RfD used in this analysis.

Table C-3. Reference doses of herbicides.

Herbicide	Reference Dose (mg/kg/day)[a]	
	Acute	Chronic
Imazapyr	2.5	2.5
Triclopyr	0.3	0.05

Note:
a. mg/kg/day = milligram per kilogram per day.

Risk Characterization

A quantitative summary of the risk characterization for workers associated with exposure to these herbicides is presented in the following sections. The quantitative risk characterization is expressed as the hazard quotient, which is the ratio of the estimated exposure doses to the RfD. Like the quantitative risk characterization for workers, the quantitative risk characterization for the general public is expressed as the hazard quotient, which again is the ratio of the estimated exposure doses to the RfD.

The only reservation attached to this assessment is that associated with any risk assessment: Absolute safety cannot be proven and the absence of risk can never be demonstrated. No chemical has been studied for all possible effects and the use of data from laboratory animals to estimate hazard or the lack of hazard to humans is a process that contains uncertainty. Prudence dictates that normal and reasonable care should be taken in the handling of these herbicides.

Worker Exposure and Risk Analysis

Pesticide applicators are likely to be the individuals who are most exposed to a pesticide during the application process. Two types of worker exposure assessments are considered: general and accidental/ incidental. The term *general exposure* assessment is used to designate those exposures that involve estimates of absorbed dose based on the handling of a specified amount of a chemical during specific types of applications. The *accidental/incidental exposure* scenarios involve specific types of events that could occur during any type of application.

Pesticide application involves many different job activities, exposure rates can be defined for two categories: directed foliar applications (including cut surface, streamline, and direct sprays) involving the use of backpacks or similar devices, and broadcast hydraulic spray applications. While these may be viewed as crude groupings, the variability in the available data does not seem to justify further segmenting the job classifications (such as hack-and-squirt or injection bar).

The exposure of workers is based on the number of hours worked per day, acres treated per hour, and the application rates of the various herbicides. Rather than focus on a single value, each of these factors involves a range of values, which create three levels of exposure, referred to as typical, lower, and upper exposure levels. The typical level is based on current experience in forestry application in the Forest Service Pacific Southwest Region. The upper level is a worst-case level, resulting from the highest application rates, the lowest dilution rate, and the largest number of acres treated per day. The lower level is based on application rates that have been used but are considered low. The herbicides and the application rates for Defensible Fuel Profile Zone (DFPZ) maintenance and noxious weed control are shown in table C-4.

Table C-4. Herbicide rates for DFPZ maintenance and noxious weed control.

Herbicide	Application Rate (pounds of active ingredient per acre)		
	Typical Rate	Lower Rate	Upper Rate
Imazapyr	0.25	0.08	2.5
Triclopyr BEE	1.5	0.5	4.0

Occupational exposures may involve multiple routes of exposure (oral, dermal, and inhalation), but dermal exposure is generally the predominant route for herbicide applicators. Typical multi-route exposures are encompassed by the methods used on general exposures. Accidental exposures, on the other hand, are most likely to involve splashing a solution of herbicide into the eyes or through dermal contact.

There are various methods for estimating absorbed doses associated with accidental dermal exposure. Two general types of exposure are modeled: those involving direct contact with a solution of the herbicide and those associated with accidental spills of the herbicide onto the surface of the skin. Any number of specific exposure scenarios could be developed for direct contact or accidental spills by varying the amount or concentration of the chemical on or in contact with the surface of the skin and by varying the surface area of the skin that is contaminated. For this risk assessment, two exposure scenarios are developed for each of the two types of dermal exposure, and the estimated absorbed dose for each scenario is expressed in units of milligrams of chemical per kilograms of body weight (mg chemical/kg body weight).

Exposure scenarios involving direct contact with solutions of the chemical are characterized by immersion of the hands for one minute or wearing contaminated gloves for one hour. Generally, it is not reasonable to assume or postulate that the hands or any other part of a worker will be immersed in a solution of an herbicide for any period of time. On the other hand, contamination of gloves or other clothing is quite plausible. For these exposure scenarios, the key element is the assumption that wearing gloves grossly contaminated with a chemical solution is equivalent to immersing the hands in a solution. In either case, the concentration of the chemical in solution that is in contact with the surface of the skin, and the resulting dermal absorption rate, are essentially constant. Exposure scenarios involving chemical spills on to the skin are characterized by a spill on to the lower legs as well as a spill on to the hands. In these scenarios, it is assumed that a solution of the chemical is spilled on to a given surface area of skin and that a certain amount of the chemical adheres to the skin.

Under typical concentrations, backpack sprayers can apply the proposed herbicides without experiencing exposures for which the hazard quotient exceeds 1 (see table C-5). This implies that a worker could apply herbicides over a long period of time without experiencing toxic effects. For triclopyr, however, the hazard quotient for the upper application rate equals 5. The health consequences of this exposure level are likely to vary with the duration of use. Workers who occasionally apply triclopyr would probably not experience any significant adverse effects. Workers applying triclopyr over a prolonged period (in the course of a single season or multiple seasons) could be at risk for impaired kidney function. At the upper limit of exposure, some impairment of kidney function of workers using triclopyr over a prolonged period is plausible. Triclopyr has been used extensively without reports of acute toxic effects on workers. No epidemiologic studies in workers or other individuals chronically exposed to triclopyr have been conducted that would permit the assessment of potential adverse effects on the kidney.

Table C-5. Hazard quotients (non-cancer) for backpack applicators – general (non-accidental) exposures to herbicides.

Herbicide	Hazard Quotient		
	Typical Rate	Lower Rate	Upper Rate
Imazapyr	0.0006	0.00001	0.08
Triclopyr BEE	0.2	00.4	6.0

Table C-6 displays the hazard quotient for risks to workers from accidents and incidents. As stated earlier, the hazard quotient is based on the RfD (reference dose), which is itself a measure of acceptable chronic exposure. Since accidents would be infrequent events, the use of hazard quotient for accident scenarios is inherently conservative. All accidental exposure of imazapyr would result in hazard quotient less than 1, and the risk of effects would therefore be considered negligible. However, the accidental exposure scenario of wearing gloves contaminated with triclopyr for one hour exceeds the RfD for both the typical and upper application rates. This indicates that even at the typical application rates, it is critical that the workers practice good hygiene of changing contaminated gloves and washing hands. If a worker applies triclopyr BEE often, and does not practice good industrial hygiene, then some adverse kidney effects are plausible. Since triclopyr BEE is not applied at the highest application rate, and appropriate steps (practicing good hygiene) would be taken to ensure workers are not exposed to maximum rates, the risk to workers would be substantially reduced.

Table C-6. Hazard quotient (non-cancer) for backpack applicators, accidental/ incidental exposures for typical and upper application rates of herbicides.

Herbicide	Hazard Quotient							
	Immersion of hands, (1 minute)		Contaminated gloves, (1 hour)		Spill on hands, (1 hour)		Spill on lower legs, (1 hour)	
	Typical	Upper	Typical	Upper	Typical	Upper	Typical	Upper
Imazapyr	0.000005	0.0003	0.0003	0.02	0.00005	0.003	0.0001	0.008
Triclopyr BEE	0.04	0.5	2	30	0.006	0.1	0.02	0.2

Public Exposure and Risk Analysis

Under normal conditions, members of the general public would not be exposed to substantial levels of any of these herbicides. Members of the public would not be in the vicinity of DFPZ treatment units during herbicide applications. In addition, signs would be posted warning the public that an area had been recently treated.

A number of exposure scenarios can be constructed for the general public, depending on various assumptions regarding application rates, dispersion, canopy interception, and human activity. Several highly conservative scenarios are developed for this risk assessment. The two types of exposure scenarios developed for the general public includes acute exposure and longer-term (chronic) exposure. All of the acute exposure scenarios are primarily accidental. They assume that an individual is exposed to the compound either during or shortly after its application. Specific scenarios are developed for direct spray, dermal contact with contaminated vegetation, as well as the consumption of contaminated fruit, water, and fish. Most of these scenarios should be regarded as extreme, some to the point of limited plausibility. The chronic exposure scenarios parallel the acute exposure scenarios for the consumption of contaminated fruit, water, and fish but are based on estimated levels of exposure for longer periods after application.

Direct Spray

Direct sprays involving ground applications are modeled in a manner similar to accidental spills for workers. In other words, it is assumed that the individual is sprayed with a solution containing the compound and that an amount of the compound remains on the skin and is absorbed by first-order kinetics. For direct spray scenarios, it is assumed that during a ground application, a naked child is sprayed directly with the herbicide. The scenario also assumes that the child is completely covered (that is, 100 percent of the surface area of the body is exposed), which makes this an extremely conservative exposure scenario that is likely to represent the upper limits of plausible exposure. An additional set of scenarios are included involving a young woman who is accidentally sprayed over the feet and legs. For each of these scenarios, some standard assumptions are made regarding the surface area of the skin and body weight. Table C-7 displays the hazard quotients for the public direct-spray scenarios.

Table C-7. Hazard quotient (non-cancer) for the public, direct spray scenario.

Herbicide	Hazard Quotient			
	Child (Application Rate)		Woman (Application Rate)	
	Typical	Upper	Typical	Upper
Imazapyr	0.00.	0.1	0.0002	0.01
Triclopyr BEE	0.2	4.0	0.02	0.4

The direct spray of a naked child with triclopyr BEE at the upper application rate results in exposure that exceeds the level of concern (a hazard quotient of 4). As stated in the HFQLG Act final supplemental EIS (section 4 of appendix G), the acute RfD could be considered to be in the range of 0.3 to 1.8 mg/kg. The exposure of a child is within this range (1.2 mg/kg), so adverse effects from this type of accident would not be expected.

Dermal Exposure from Contaminated Vegetation

In this exposure scenario, it is assumed that the herbicide is sprayed at a given application rate and that an individual comes in contact with sprayed vegetation or other contaminated surfaces at some period after the spray operation. For these exposure scenarios, some estimates of dislodgeable residue, and the rate of transfer from the contaminated vegetation to the surface of the skin, must be available. No such data are directly available for these herbicides, and the estimation methods of Durkin et al. (1995, as referenced in SERA 1999a) are used. Table C-8 displays the hazard quotients for the public who may contact sprayed vegetation.

Table C-8. Hazard quotient (non-cancer) for the public – contact with vegetation sprayed with herbicides.

Herbicide	Hazard Quotient	
	Typical Application Rate	Upper Application Rate
Imazapyr	0.0002	0.008
Triclopyr BEE	0.02	0.2

The hazard quotient values for the members of the public who might contact sprayed vegetation for all applications rates and herbicides are less than one; therefore, the risk of effects is considered negligible.

Water Contamination

Water can be contaminated from runoff as a result of leaching from contaminated soil, from a direct spill, or from unintentional contamination from applications. For this risk assessment, the two types of estimates made for the concentration of these herbicides in ambient water are acute/accidental exposure from an accidental spill and longer-term exposure to the herbicides in ambient water that could be associated with the typical application of this compound to a 100-acre treatment area. The acute exposure scenario assumes that a young child (2 to 3 years old) consumes 1 liter of contaminated water (a range of 0.6 to 1.5 liter) shortly after an accidental spill of 200 gallons of a field solution into a pond that has an average depth of 1 meter and a surface area of 1000 square meters, or about one-quarter acre. Because this scenario is based on the assumption that exposure occurs shortly after the spill, no dissipation or degradation of the herbicide is considered. This is an extremely conservative scenario dominated by arbitrary variability. The actual concentrations in the water would depend heavily on the amount of compound spilled, the size of the water body into which it is spilled, the time at which water consumption occurs relative to the time of the spill, and the amount of contaminated water that is consumed. It is also unlikely that ponds would be the water body receiving any herbicides in this project. Flowing streams are the more likely recipients, so dilution would occur. For these reasons, a second scenario is developed in which a stream is contaminated through drift, runoff, or percolation and a child consumes water from that stream. For the level of herbicide in this stream, an assumption of the water contamination rate is developed. The scenario for chronic exposure to these herbicides from contaminated water assumes that an adult (70 kg male) consumes contaminated ambient water for a lifetime. There are some monitoring studies available on various herbicides that allow for an estimation of expected concentrations in ambient water associated with ground applications of the compounds over a wide area.

Table C-9 displays the hazard quotient values for the public drinking contaminated water. These scenarios involve a child drinking from a pond immediately after a spill, from a stream subjected to herbicide drift, and an adult drinking water from the same contaminated pond over a lifetime. The assessment of these scenarios indicates that a spill of herbicide into a water body needs to be strongly avoided by using the management requirements described in chapter 2.

Table C-9. Hazard quotient (non-cancer) for the public – drinking water contaminated by herbicides.

	Hazard Quotient					
	Acute-Spill Scenario		Acute-Stream Scenario		Chronic-Spill Scenario	
Herbicide	Typical application rate	Upper application rate	Typical application rate	Upper application rate	Typical application rate	Upper application rate
Imazapyr	0.03	1	0.0002	0.1	0.0002	0.02
Triclopyr BEE	0.9	10	0.0005	0.008	0.001	0.006

Vegetation Contamination

Under normal circumstances, and in most types of applications, it is extremely unlikely that humans will consume, or otherwise place in their mouths, vegetation contaminated with these herbicides. Nonetheless, any number of scenarios could be developed involving either accidental spraying of crops, the spraying of edible wild vegetation, like berries, or the spraying of plants collected by Native Americans for basket weaving or medicinal use. Again, in most instances, and particularly for longer-term scenarios, treated vegetation would probably show signs of damage from herbicide exposure, thereby reducing the likelihood of consumption that would lead to significant levels of human exposure. Notwithstanding that assertion, it is conceivable that individuals could consume contaminated vegetation.

One of the more plausible scenarios involves the consumption of contaminated berries after treatment along a road or some other area in which wild berries grow. The two accidental exposure scenarios developed for this exposure assessment include one scenario for acute exposure and one scenario for longer-term exposure. In both scenarios, the concentration of herbicide on contaminated vegetation is estimated using the empirical relationships between application rate and concentration on vegetation developed by Hoerger and Kenaga (1972, as referenced in the SERA Risk Assessments). For the acute exposure scenario, the estimated residue level is taken as the product of the application rate and the residue rate. For the longer-term exposure scenario, the duration of 90 days is used, and the dissipation on the vegetation is estimated based on the estimated or established foliar halftimes.

Table C-10 displays the hazard quotient values for the scenarios involving a woman eating contaminated berries shortly after spraying and eating berries daily for 90 days after they were sprayed. The hazard quotients were less than 1 for both the acute and chronic scenario for the typical application rates. However, triclopyr showed hazard quotient values greater than 1 for the upper application rates. These scenarios are conservative in that they do not include the mitigative effects of washing contaminated vegetation. A hazard quotient of 5 indicates some uncertainty regarding effects, but it is unlikely that adverse health effects would result.

Table C-10. Hazard quotient (non-cancer) for the public, ingesting fruit contaminated by herbicides.

Herbicide	Hazard Quotient			
	Acute Exposure		Chronic Exposure	
	Typical Application Rate	Upper Application Rate	Typical Application Rate	Upper Application Rate
Imazapyr	0.001	0.2	0.0004	0.04
Triclopyr BEE	0.04	2	0.1	5

Impurities and Metabolites

Virtually no chemical synthesis yields a totally pure product. Technical grade herbicides, as with other technical grade products, undoubtedly contain some impurities. The EPA defines the term impurity as “any substance . . . in a pesticide product other than an active ingredient or an inert ingredient, including un-reacted starting materials, side reaction products, contaminants, and degradation products” (40 CFR 158.153(d)). To some extent, concern for impurities in technical grade herbicides is reduced by the fact that the existing toxicity studies on these herbicides were conducted with the technical grade product. Thus, if toxic impurities are present in the technical grade product, they are likely to be encompassed by the available toxicity studies on the technical grade product. An exception to this general rule involves carcinogens, most of which are presumed to act by non-threshold mechanisms. Because of the non-threshold assumption, any amount of a carcinogen in an otherwise non-carcinogenic mixture is assumed to pose some carcinogenic risk. As with contaminants, the potential effect of metabolites on a risk assessment is often encompassed by the available in vivo toxicity studies under the assumption that the toxicological consequences of metabolism in the species on which toxicity studies are available will be similar to those in the species of concern, human in this case. Uncertainties in this assumption are encompassed by using an uncertainty factor in deriving the RfD and may sometimes influence the selection of the study used to derive the RfD.

No information has been encountered in the published or unpublished literature on impurities in imazapyr. The metabolism and kinetics of imazapyr has been studied in rats and lactating goats. In rats, 14C-imazapyr was administered to males by gavage at a dose of 4.4 mg/kg. Imazapyr was excreted in the urine and feces, 87.2 percent and 93.3 percent of the administered dose by days 1 and 2, respectively, after dosing.

Approximately 98 percent of the administered dose was recovered in the urine and feces after 8 days—no metabolites were identified. A similar pattern was noted in lactating goats that were administered 14C-imazapyr acid in gelatin capsules in amounts equivalent to dietary exposures of 0, 17.7, or 42.5 ppm for 7 days. Most of the radioactivity, 60-65 percent of the administered dose, was excreted in the urine. The only other metabolism study on imazapyr was conducted on white leghorn chickens. As with the mammalian studies, the only significant component in excreted residues was the parent compound—imazapyr. These studies do not rule out the formation of minor metabolites. Nonetheless, there is no basis for asserting that metabolites may be formed that would have any substantial impact on this risk assessment.

Triclopyr is not extensively metabolized in humans or experimental mammals. In a study involving rats, more than 90 percent of the administered dose of triclopyr acid was recovered in the urine as unmetabolized triclopyr. The remainder was identified as the metabolite 3,5,6-trichloro-2-pyridinol (TCP) and possible conjugates. TCP acute and chronic toxicity is similar to triclopyr. TCP has an acute NOEL of 25 mg/kg/day (compared to 30 mg/kg/day for triclopyr) and a chronic NOEL of 3 mg/kg/day, from a 1-year dog study (compared to a NOEL of 5 mg/kg/day for triclopyr). TCP is also the major metabolite of the insecticide chlorpyrifos.

TCP is of concern because it is a metabolite of triclopyr and because the aggregate risks of exposure to TCP from the breakdown of both triclopyr and chlorpyrifos should be considered. In the Reregistration Eligibility Decision (RED) on triclopyr, the EPA (1998) has considered this issue in some detail. Based on its analysis, the EPA concludes, “the existing uses of triclopyr and chlorpyrifos are unlikely to result in acute or chronic dietary risks from TCP. Based on limited available data and modeling estimates, with less certainty, the Agency concludes that existing uses of triclopyr and chlorpyrifos are unlikely to result in acute or chronic drinking water risks from TCP. Acute and chronic aggregate risks of concern are also unlikely to result from existing uses of triclopyr and chlorpyrifos” (EPA 1998, page 34). Therefore, no additional risk assessment is needed for TCP with regard to human exposures beyond the assessment for triclopyr.

Inert Ingredients

The issue concerning inert ingredients and the toxicity of formulations is discussed in USDA (1989, pages 4-116 to 4-119). The approach used in USDA (1989), the SERA risk assessments, and this analysis to assess the human health effects of inert ingredients and full formulations has been to (1) compare acute toxicity data between the formulated products (including inert ingredients) and their active ingredients alone; (2) disclose whether or not the formulated products have undergone chronic toxicity testing; and (3) identify, with the help of the EPA and the chemical companies, ingredients of known toxicological concern in the formulated products and assess the risks of those ingredients.

Researchers have studied the relationships between acute and chronic toxicity, and while the biological end-points are different, relationships do exist, and the acute toxicity data can be used to give an indication of overall toxicity (Zeise et al. 1984). The court in *NCAP v. Lyng* (844 F.2d 598 [9th Cir 1988]) decided that this method of analysis provided sufficient information for a decision maker to make a reasoned decision. In *SRCC v. Robertson* (Civ. No. S-91-217 [E.D. Cal., June 12, 1992]) and again in *CATs v. Dombeck* (Civ. S-00-2016 [E.D. Cal., August 31, 2001]), the district court upheld the adequacy of the methodology used in USDA (1989) for disclosure of inert ingredients and additives.

The EPA has categorized approximately 1,200 inert ingredients into four lists. Lists 1 and 2 contain inert ingredients of toxicological concern. List 3 includes substances for which the EPA has insufficient information

to classify as either hazardous (List 1 and 2) or nontoxic (List 4). List 4 contains nontoxic substances such as corn oil, honey, and water. The use of formulations containing inert ingredients on List 3 and 4 is preferred on vegetation management projects under current Forest Service policy.

Since most information about inert ingredients is classified as "Confidential Business Information (CBI)," the Forest Service asked the EPA to review the 13 herbicides for the preparation of USDA 1989 (includes glyphosate, hexazinone, picloram, and triclopyr) and the commercial formulations, and advise if they contained inert ingredients of toxicological concern (Inerts List 1 or 2) (USDA 1989, appendix F, attachment B). The EPA determined that there were no inerts on List 1 or 2, with the exception of kerosene in certain formulations of triclopyr. Kerosene has since been moved to List 3. In addition, the CBI files were reviewed in the development of most of the SERA risk assessments. Information has also been received from the companies who produce the herbicides and spray additives.

Comparison of acute toxicity (lethal dose $[LD]_{50}$ values) data between the formulated products (including inert ingredients) and their active ingredients alone show that the formulated products are generally less toxic than their active ingredients (USDA 1989; USDA 1984; SERA 2003, 2004).

While these formulated products have not undergone chronic toxicity testing like their active ingredients, the acute toxicity comparisons, the EPA review, and Forest Service examination of toxicity information on the inert ingredients in each product, has led to the conclusion that the inert ingredients in these formulations do not significantly increase the risk to human health and safety over the risks identified for the active ingredients.

All of the technical formulations of imazapyr involve the isopropyl or isopropanolamine salts of imazapyr. Little toxicity information is available on these compounds. The EPA classifies isopropanolamine as a List 3 inert. These are compounds that the EPA cannot classify as hazardous or nonhazardous based on the available information. Similarly, for some of the other inerts used in imazapyr formulations, the toxicity data are limited. This lack of information adds uncertainty to this risk assessment. The EPA classifies none of the inerts used in any of the imazapyr formulations as hazardous (List 1 or List 2).

Garlon 4 contains the butoxyethyl ester (BEE) of triclopyr (61.6 percent), as well as inerts (38.4 percent), that include deodorized kerosene. Triclopyr BEE hydrolyzes to triclopyr acid and 2-butoxyethanol. There is an extensive database on the toxicity of 2-butoxyethanol. The acute oral Maximum Residue Limit (MRL) for 2-butoxyethanol is 0.4 mg/kg/day, and the intermediate MRL for 2-butoxyethanol is 0.07 mg/kg/day. The acute MRL for 2-butoxyethanol is on the same order as the acute RfD for triclopyr (1 mg/kg/day) and the intermediate MRL for 2-butoxyethanol is similar to the intermediate and chronic RfD for triclopyr (0.05 mg/kg/day). In terms of a practical impact on the risk assessment, the most relevant factor is that 2-butoxyethanol will mineralize very rapidly in the environment—that is, be completely degraded to carbon dioxide (CO_2). This is not the case for triclopyr or TCP, a metabolite of triclopyr. Thus, the uncertainties associated with the toxicity of 2-butoxyethanol to triclopyr have relatively little impact on this risk assessment. Because triclopyr and the TCP metabolite of triclopyr persist in the environment much longer than 2-butoxyethanol, it is triclopyr and the TCP metabolite that are the major quantitative focus of the risk assessment. This approach is identical to the position taken by the EPA.

Like Garlon 3A, Garlon 4 causes substantially less acute toxicity in mammals than does triclopyr (oral LD_{50} values in rats = 2,140–2,460 mg/kg (1,540–1,770 mg ae/kg)). The EPA classifies deodorized kerosene as a List 3 inert. The toxicity of kerosene was reviewed recently by the Agency for Toxic Substances and Disease Registry (ATSDR). At sufficiently high doses, kerosene can cause many gastrointestinal, central nervous system

(CNS), and renal effects. The acute lethal dose of kerosene for humans ranges from approximately 2,000 to 12,000 mg/kg; the acute oral LD_{50} values in experimental mammals range from approximately 16,000 to 23,000 mg/kg. In experimental mammals, acute oral LD_{50} values for triclopyr range from approximately 600 to 1,000 mg/kg. Thus, the acute lethal potency of kerosene is approximately 16 times less than the acute lethal potency of triclopyr. Given the relative potency of kerosene, the acute effects associated with exposure to Garlon 4 are probably attributable to triclopyr and not to kerosene.

In contrast, the material safety data sheet for Garlon 4 specifies that inhalation exposure to Garlon 4 vapors may cause central nervous system (CNS) depression attributable to kerosene. CNS depression is consistent with inhalation exposure to kerosene. No monitoring data are available regarding kerosene levels during the application of Garlon 4. One study monitored triclopyr in air at levels ranging from approximately 5 to 15 µg/m3, based on the personal breathing zone air of workers involved in backpack sprays. If kerosene in Garlon 4 is present at a concentration of less than or equal to 20 percent, the corresponding concentration of kerosene in the air would range from approximately 1 to 3 µg/m3. The NOAEL for neurological effects in experimental mammals after exposure to kerosene, which ranged from 14 days to 1 year, is approximately 100 mg/m3. The National Institute for Occupational Safety and Health (NIOSH) threshold limit value (TLV) for petroleum distillates is 350 mg/m3. Thus, plausible levels of exposure to kerosene during applications of Garlon 4 are approximately 30,000–100,000 below the NOEL for kerosene in experimental mammals and a factor of 120,000–350,000 below the TLV for petroleum distillates. Although some components (such as benzene) of kerosene are known to be carcinogenic to humans, kerosene is not classified as a carcinogen, and quantitative risk assessments have not been conducted on kerosene. Exposure to Garlon 4 may present a hazard, based on the toxicity of triclopyr. Relative to those concerns, the presence of kerosene in Garlon 4 is not toxicologically significant.

Additives

Additives (or adjuvants) to formulations that might be used when herbicides are applied were not considered in detail in “Appendix G: Human Health Risk Assessment” of the HFQLG Act final supplemental EIS, with the exception of surfactants containing nonylphenol polyethoxylate as an active ingredient. Additives might involve surfactants, drift reduction agents, and dyes and colorants. Surfactants increase the ability of the herbicide to be absorbed into plant tissues. Drift reduction agents are sometimes used with aerial application methods to change droplet size quantities and thereby decrease drift. Dyes and colorants are used to indicate that a plant or area has been treated.

Additives are not under the same registration guidelines as are pesticides, and much of the information on the ingredients in additives is considered confidential business information. The EPA *does not* register or approve the labeling of spray adjuvants, but the California Department of Pesticide Regulation *does* require the registration of those adjuvants that are considered to increase the action of the pesticide with which it is used. The additives that would be mixed with the herbicides proposed for the Slapjack Project are not expected to pose an adverse risk to the health and safety of workers or the public. This is based on available information from product labels and an overview by Bakke (USDA 2002) of the various types of additives likely to be used in forest herbicide applications. Bakke includes acute toxicity data for many of the formulations used by the Forest Service.

The following additives have been analyzed for this project. These include the surfactant SYL-TAC® (or equivalent seed oil/silicone blend), which increases the ability of the herbicide to adhere to and penetrate the leaf surface, and the marker dye Hi-Light® Blue or equivalent to indicate where herbicides have been applied.

SYL-TAC®

Vegetable oil plus organosilicone surfactant (SYL-TAC®)—silicone-based surfactants, also known as organosilicones—are increasing in popularity because of their superior spreading ability. This class contains a polysiloxane chain. Oil adjuvants contain vegetable oils plus an emulsifier for dispersion in water. They have been gaining in popularity, especially for the control of grassy weeds. The purpose of oil adjuvants is to increase herbicide absorption through plant tissues and increase spray retention. They are especially useful in applications of herbicides to woody brush or tree stems to allow for penetration through the bark. The methylated seed oils are formed from common seed oils such as canola, soybean, or cotton. They act to increase penetration of the herbicide.

SYL-TAC® has a “Caution” signal word on the label, and it may cause slight skin and eye irritation. SYL-TAC® is a mixture of two other products (Hasten® and Syl-gard® 309).

- Hasten® has a “Caution” signal word on the label, and it may be irritating to the skin and eyes. The main ingredient in Hasten® contained in the SYL-TAC® product is esterified canola seed oil. The Material Safety Data Sheet lists isopropylamine as a hazardous ingredient at levels of 2 percent in the formulation.

- Syl-gard® 309 has a “Warning” signal word on the label. It is considered slightly irritating to the skin and is considered severely irritating to the eyes. It is not a skin sensitizer.

Bakke concludes that acute toxicity testing results on mammalian and aquatic species for SYL-TAC® indicate that SYL-TAC® is no more than slightly toxic when ingested, inhaled, or absorbed through the skin. SYL-TAC® is a non-ionic surfactant, which means it has no electrical charge, and in general, such surfactants have less of an effect on the skin, and hence less absorption than anionic or cationic surfactants (USDA 2002). The signal word on the SYL-TAC ® label is “Caution,” and precautionary statements advise users to avoid contact with eyes and to wash thoroughly with soap and water after handling. None of the ingredients in SYL-TAC® are on the EPA’s Inerts Lists 1 or 2 (USDA 2002).

There has been concern expressed about the toxicity of silicone-based surfactants on terrestrial insects. Based on a review of the current research, it would appear that surfactants have the potential to affect terrestrial insects. However, as is true with many toxicity issues, it would appear that any effect is dose related. The research does indicate that the silicone-based surfactants, due to their very effective spreading ability, may represent a risk of lethality through the physical effect of drowning, rather than through any toxicological effects. Typically, silicone surfactants are used at relatively low rates and are not applied at high spray volumes because they are very effective surfactants. Hence, it is unlikely that insects would be exposed to rates of application that could cause the effects noted in these studies. Other surfactants, which are less effective at reducing surface tension, can also cause the drowning effect; but as with the silicones, exposures have to be high, to the point of being unrealistically high, for such effects.

When considering the need for relatively high doses for a lethal effect, combined with the fact that individuals, not colonies or nests of invertebrates, may be affected, there is little chance that the surfactants could cause widespread effects on terrestrial invertebrates under normal operating conditions. Spills or accidents could result in concentrations sufficiently high to cause effects, depending upon the surfactant.

Hi-Light® Blue

Hi-Light® Blue marker dye shows what areas have been treated, confirms spray patterns, helps avoid skips and overlaps, and enables applicators to detect drift. Hi-Light® Blue is a temporary colorant that breaks down in sunlight and dissipates in rain.

The ingredients in Hi-Light® Blue are considered proprietary, and no reportable quantities of hazardous ingredients are present. No reportable quantities of toxic chemicals subject to reporting requirements of Section 313 of SARA Title III and 40 CFR 372 are present (SERA, Use and Assessment of Marker Dyes Used With Herbicides, December 1997; Material Safety Data Sheet June 2004).

Hi-Light® Blue is mildly irritating to the skin and eyes and is considered no more than slightly toxic when ingested, inhaled, or absorbed through the skin. None of the ingredients in Hi-Light® Blue are on the EPA's Inerts Lists 1 or 2 (USDA 2002). Hi-Light® Blue has no signal word on the label because there is no requirement to register it as a pesticide.

Summary

The primary summary statement that can be made is that the more common risk factors for the use of these additives or adjuvants are through skin or eye exposure. These additives all have various levels of irritancy associated with skin or eye exposure. This shows the need for good industrial hygiene practices, as outlined in the state application rules, while using these products, especially when handling the concentrate during mixing. Chemical-resistant gloves and goggles should be used, especially while mixing.

Synergistic Effects

Synergistic effects are those effects resulting from exposure to a combination of two or more chemicals that are greater than the sum of the effects of each chemical alone (additive). Refer to USDA (1989, pages 4-111 to 4-114) for a detailed discussion on synergistic effects.

Instances of chemical combinations that cause synergistic effects are relatively rare at environmental exposure levels. In reviewing toxicological interactions of agricultural chemicals, Kociba and Mullison (1985) state, that the scientific knowledge of toxicological effects indicates exposure to a mixture of pesticides is more likely to lead to additive rather than synergistic effects. In assessing health risk associated with drinking water, Crouch et al. (1983) reached a similar conclusion when they stated:

> EPA (1986) concludes:
>
> There seems to be a consensus that for public health concerns regarding causative (toxic) agents, the additive model is more appropriate [than a multiplicative model].

Synergism has rarely been observed in toxicological tests involving combinations of these herbicides with other commercial pesticides. The herbicide mixtures proposed for this project have not shown synergistic effects in humans who have used them extensively in forestry and other agricultural applications. However, synergistic toxic effects of herbicide combination, combinations of the herbicides with other pesticides such as insecticides or fertilizers, or combinations with naturally occurring chemicals in the environment are not normally studied. Based on the limited data available on pesticide combinations involving these herbicides, it is possible, but unlikely, that synergistic effects could occur as a result of exposure to the herbicides considered in this analysis.

It is not anticipated that synergistic effects would be seen with the herbicides and the adjuvants that might be added to them. Based on a review of several recent studies, there is no demonstrated synergistic relationship between herbicides and surfactants (Abdelghani et al. 1997; Henry et al. 1994; Lewis 1992; Oakes and Pollak 1999, 2000 as referenced in USDA 2002). However, even if synergistic or additive effects were to occur as a result of the proposed treatment, these effects are dose dependent (Dost 1991). This means that exposures to the herbicide plus any other chemical must be significant for these types of effects to be of a biological consequence. As Dost explains:

> While there is little specific published study of forestry herbicides in this particular regard, there is a large body of research on medical drugs, from which principles arise that govern such interactions. Amplifications of effect are not massive; one chemical cannot change the impact of another by hundreds or thousands of times. Rarely will such change be more than a few fold. This difference can be dangerous when dealing with drugs that are already at levels intended to significantly alter bodily functions, but is insignificant when both compounds are at the very low levels of exposure to be found associated with an herbicide treatment.

Based on the very low exposure rates estimated for this project, any synergistic or additive effects, if any, are expected to be insignificant.

Although the combination of surfactant and herbicide might indicate an increased rate of absorption through the skin, a review of recent studies indicates this is not often true (Ashton et al. 1986; Boman et al. 1989; Chowan and Pritchard 1978; Dalvi and Zatz 1981; Eagle et al. 1992; Sarpotdar and Zatz 1986; Walters et al. 1993, 1998; Whitworth and Carter 1969, as referenced in USDA 2002). For a surfactant to increase the absorption of another compound, the surfactant must affect the upper layer of the skin. Without some physical effect to the skin, there will be no change in absorption as compared to the other compound alone. The studies indicate that general non-ionic surfactants have less of an effect on the skin, and hence absorption, than anionic or cationic surfactants. Compound-specific studies indicate that the alkylphenol ethoxylates generally have little or no effect on absorption of other compounds. In several studies, the addition of a surfactant actually decreased the absorption through the skin. It would appear that there is little support for the contention that the addition of surfactants to herbicide mixtures would increase the absorption through the skin of these herbicides.

Sensitive Individuals

The uncertainty factors used in the development of the RfD takes into account much of the variation in human response. The uncertainty factor of 10 for sensitive subgroups is sufficient to ensure that most people

will experience no toxic effects. “Sensitive” individuals are those that might respond to a lower dose than average, which includes women and children. As stated in National Academy of Sciences (NAS 1993), the quantitative differences in toxicity between children and adults are usually less than a factor of approximately tenfold. An uncertainty factor of 10 for sensitive subgroups may not cover all individuals that may be sensitive to herbicides because human susceptibility to toxic substances can vary by two to three orders of magnitude. Factors affecting individual susceptibility include diet, age, heredity, preexisting diseases, and life style. Individual susceptibility to the herbicides proposed in this project cannot be specifically predicted. Unusually sensitive individuals may experience effects even when the hazard quotient is equal to or less than 1. Further information concerning risks to sensitive individuals can be found in USDA (1989, pages 4-114 through 4-116).

From the risk assessment for imazapyr, “there is no information to suggest that specific groups or individuals may be especially sensitive to the systemic effects of imazapyr . . . Given the very low hazard quotients for imazapyr, there appears to be no basis for asserting that adverse effects in a specific subgroup are plausible. The EPA (1997, 2003) has judged that infants and children are not likely to be more sensitive than adults are to imazapyr. Given the number of studies available on reproductive and developmental effects and the unremarkable findings from these studies, this judgment appears appropriate” (SERA 2004).

Individuals with pre-existing kidney diseases are likely to be at increased risk because triclopyr may impair glomerular filtration (SERA 2003). Women of child-bearing age are an obvious group at increased risk because the chronic RfD for triclopyr is based on reproductive effects (SERA 2003). This group is given explicit consideration and is central to the risk characterization.

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Appendix D

Slapjack Defensible Fuel Profile Zone Monitoring and Maintenance Guidelines

Appendix D
Slapjack Project Defensible Fuel Profile Zone Monitoring and Maintenance Guidelines

Defensible Fuel Profile Zone Monitoring

A. Short-term (Foreseeable) Defensible Fuel Profiles Zone (DFPZ) Maintenance

The Record of Decision for the HFQLG final supplemental EIS calls for "consideration of all practicable methods of vegetation control for site-specific projects, including the use of herbicides." As pointed out in the that EIS (page 22), herbicides have to be used within approximately two years of the initial treatment to be most efficient and effective in delaying or preventing the buildup of understory fuels, since they change vegetation from shrubs to grasses, forbs, or ferns. If alternative B, E, or F is selected, approximately 1,954 acres of the DFPZ would be treated with herbicides. By not proposing the use of herbicides on the other units at this time (within two years of DFPZ construction) for the Slapjack Project, herbicide use is essentially precluded for use under alternatives C, D, and G. In the short term, where DFPZ objectives are not met with mastication, an underburn would be the final treatment. Based on site-specific analysis of land allocations, slopes, vegetation types, and previous underburning treatments in the Slapjack Project area, the foreseeable maintenance of the DFPZ would consist of prescribed fire, mechanical (mastication, grapple pulling) treatments, and hand treatments.

B. Long-Term (Future) DFPZ Maintenance

Given the fact that this DFPZ project is part of a five-year pilot project, it is uncertain if the Forest Service will decide to maintain these DFPZs (except if the decision to use herbicides on certain units is made at this time). Decisions regarding long-term DFPZ maintenance would be made when the time for maintenance of the natural stands is reached (approximately 10–20 years after initial treatment). By that time, the DFPZ prescription may be modified or even discontinued. If the Forest Service wishes to maintain these DFPZs in the future, sufficient funding and staffing may not be available, or other Forest Service priorities may prevent maintenance projects from being completed. Even if funding and staffing are available, it is not clear which method would be used—brush cutting by hand or heavy equipment, mastication of brush and down woody material with heavy equipment, livestock treatment, prescribed burning, or herbicide treatment. Because there are no specific plans for long-term maintenance at this point, and many questions as to the timing, extent, and method of maintenance remain open, no specific DFPZ maintenance project is reasonably foreseeable and further analysis at this time is not practical, other than for the units proposed for herbicide treatment under alternatives B, E, and F. The Forest Service will fully comply with Council on Environmental Quality requirements prior to conducting any further maintenance activities. Hence, decisions about further maintenance for a specific DFPZ would only be made at the time DFPZ maintenance is actually necessary (HFQLG final supplement EIS, Record of Decision, page 3).

C. No DFPZ Maintenance

The DFPZs should be effective for many years even if no maintenance is conducted in the future. In the natural stands, DFPZ effectiveness should not be seriously reduced for 10 to 20 years. DFPZ effectiveness in the plantations should not be reduced for approximately 5 years. After these periods, the DFPZs would retain many of their beneficial characteristics for fighting fire and reducing fire intensity. For example, even if significant amounts of understory vegetation grow in the treated stands over the next several years,

the proposed action would remove a significant amount of ladder fuel, such that the net amount of fuel would be reduced over time. Additionally, should there be a situation where a DFPZ has not been maintained for several years, but the Forest Service determines that the DFPZ would provide a safe position from which to fight an oncoming wildfire, Forest Service staff could conduct emergency maintenance at the time of the wildfire, such that the DFPZ would regain full effectives by the time the fire reaches the area.

Appendix E

Economic Analysis

Appendix E
Economic Analysis

Table E-1. Slapjack Economic Analysis for Service Contracts alternatives B–G.

Harvest		**Total Acres = 1,558 acres**				
Value – Groups		**Total Acres = 1 Low mbf/ac deduction ($25)**				
All 10 inch–22.9 inch sawtimber**	0.09%	16 mbf × ($160/mbf + ($25)/mbf)				$2,160
Value – DFPZ		**Total Acres = 1,558 Low mbf/ac deduction ($25)**				
PP 23 inch–29.9 inch sawtimber*	4.0%	72 mbf × ($400/mbf + ($25)/mbf)				$26,940
SP 23 inch–29.9 inch sawtimber*	0.0%	2,134 mbf × ($210/mbf + ($25)/mbf)				$0
WF 23 inch–29.9 inch sawtimber*	3.0%	1,036 mbf × ($420/mbf + ($25)/mbf)				$9,429
DF 23 inch–29.9 inch sawtimber*	15.0%	722 mbf × ($440/mbf + ($25)/mbf)				$103,719
IC 23 inch–29.9 inch sawtimber*	1.0%	18 mbf × ($460/mbf + ($25)/mbf)				$7,813
All 10 inch–22.9 inch sawtimber**	80.0%	1,437 mbf × ($130/mbf + ($25)/mbf)				$150,864
		1,796 mbf1.2 mbf/acre				
Biomass value when removed		1,558 acres × 9.6 tons/acre × $15.00 / ton =				$224,352
Total Harvest Value	**1,796 mbf**					$525,277
Costs	(Assumes Harvesting Sawtimber and Biomass in One Operation)					
	Average Unit Size	=	25 acres $25 / acre			
	Contract Length	=	3 years ($51) / acre			
	Months Operation	=	6 months $0			
Acres of 3 inch–8.9 inch biomass-tractor		1,447 acres × ($292/acre + ($25)/acre)				$386,349
Acres of 5 inch–8.9 inch biomass-skyline		111 acres × ($1,200/acre + ($25)/acre)				$130,425
	1,558 Biomass Acres					
No. of sawtimber loads		1,796 mbf / 4 mbf/truck = 449				
Additional haul cost (4 hr avg)		1 hour / trip × $50 / hour × 449 trips				$22,450
No. of biomass loads		1,558 acres × 10.0 tons / acre / 25 tons/truck = 623				
Haul cost biomass		5.5 hours / trip × $50 / hour × 623 trips				$171,325
Surface Replacement-sawtimber		1,796 mbf × $6.00 / mfb =				$10,776
Surface Replacement-biomass		1,558 acres × 29.0 tons/acre × 0.67 / ton =				$30,272
Subsoiling costs		109 acres × $230 / acre				$25,084
BD costs		1796 mfb × $2.00 / mbf				$3,592
Road construction-reconstruction		4.6 miles × $5,000 / mile				$23,000
Advertised rate-sawtimber		1796 mbf × $115.00 / mbf				$26,940
Advertised rate-biomass		1,558 acres × 10.0 tons/acre× $0.20 / ton				$3,116
Yield Tax		$525,277 × 2.9%				$15,233
Scaling sawtimber		449 trips $17 / trip				$7,633
Scaling biomass		623 trips $3 / trip				$1,869
					Total Harvest Value	**$858,064**
					Net Harvest Value	**($322,787)**
					Percent Above Value	**-63%**
Other DFPZ Service Contracts						
Mastication						$555,000
Grapple pile						$108,000
Hand pile and burn						$56,550
Hand prune and pile						$0
Underburn						$165,250
Hand line						$58,175
Dozer line						$4,875
Pile Burning						$48,000
Other HFQLG Contracts						
Road Decommissioning		19.1 miles x $5,000 mile	40	0	1	$95,650
Harvest biomass-jobs created				20	20	
Total Non-Harvest Cost						**-$1,091,500**
Total Jobs Created				39	46	
Total Full-time Jobs						**85**
Total Employee-Related Income						**$3,652,738**

Assumptions:

* Harvest Value Schedules, CA State Board of Equalization, Table 4, Area 7, Tractor, 23 inch–29.9 inch dbh

** Harvest Value Schedules, CA State Board of Equalization, Misc. Harvest Values, Small Sawlogs, 14 inch–22.9 inch dbh

*** Timber values for 10 inch–13.9 inch are $25.00/mbf

Deduction if average volume per acre under 5 mbf/ac - $25

Skyline Yarding $30/mbf for 23 inch–29.9 inch (25% of volume) $80/mbf for 14 inch–22.9 inch (75% of volume)

Cost/ac for unit size increases 0% for 400 ac to 20% for 5 ac.

Cost/ac for contract length decreases 10% every year after one year on historical relationships between employment and harvest in California during the 1980s, each million board feet harvested supports 6.5 year-around jobs (1 in logging, 4 in sawmill, and 1.5 in U.S. Forest Service employment). In regional economic models of employment for California and the Pacific Northwest, and estimate of one indirect or induced job for every direct timber job is added. All jobs are equivalent to year-around employment.

There will be additional costs for follow up underburn or mastication and for DFPZ maintenance. Up to 2,561 acres of harvested areas and 1,110 acres of mastication would receive follow up treatment.

Table E-2. Slapjack Economic Analysis for timber sale alternatives B–E.

Value	**Total Acres = 1,369 acres Low mbf/ac deduction $0 mbf/ac**	
PP 23 inch–29.9 inch sawtimber*	555 mbf × ($400 /mbf + $0 / mbf)	$222,000
SP 23 inch–29.9 inch sawtimber*	45 mbf × ($400 / mbf + $0 / mbf)	$18,000
WF-RF 23 inch–29.9 inch sawtimber*	466 mbf × ($200 / mbf + $0 / mbf)	$93,200
DF 23 inch–29.9 inch sawtimber*	2,201 mbf × ($410 / mbf + $0 / mbf)	$902,410
IC 23 inch–29.9 inch sawtimber*	166 mbf × ($460 / mbf + $0 / mbf)	$76,360
Total 23 inch–29.9 inch sawtimber	3,433	
ALL 10 inch–22.9 inch sawtimber**	8,849 mbf × ($160 / mbf + $0 / mbf)	$1,415,840
Biomass Value when Removed	1,151 acres × 16.6 tons/acre × $11.50 /ton =	$219,726
Total Value	**12,282 mbf 9.0 mbf / acre**	**$2,947,536**
Costs	(Assumes Harvesting Sawtimber and Biomass in One Operation)	
Additional Move in/out Costs		$25,000
Add sawtimber skyline cost	700 mbf × $76 / mbf =	$53,217
	0 acres × $0 / acre	$0
	Average Unit Size = 25 acres $31 / acre	
	Contract Length = 3 years ($62) / acre	
	Months Operation = 5 months $0/ acre	
Acres of 3 inch–9.9 inch biomass-tractor	1,071 acres × ($352 / acre + ($31) / acre)	$344,219
Acres of 5 inch–8.9 inch biomass-skyline	80 acres × ($1,200 / acre + ($31) / acre)	$93,520
	1,151 Biomass Acres	
No. of sawtimber loads	12,282.0 mbf / 4 bf/truck = 3071	
No. of biomass loads	1,151 acres × 16.6 tons/acre / 25 tons/truck =	764
Haul Cost Biomass	4 hours/trip × $75 / hour × 764 trips	$229,200
Surface Replacement-sawtimber	12,282 mbf × $6.00 / mbf =	$73,692
Surface Replacement-biomass	1,151 acres × 16.6 tons/acre × $0.67 /ton =	$12,801
Subsoiling Costs	200 acres × $230 / acre	$46,000
BD Costs	12,282 mbf × $8.18 / mbf	$100,467
Road Construction	17.0 miles × $14,600 / mile	$248,200
Advertised Rate-sawtimber	12,282 mbf × $49.89 /mbf	$612,771
Advertised Rate-biomass	1,151 acres × 16.6 tons/acre × $0.20 / ton	$3,821
Yield Tax	$2,947,536 × 2.9%	$85,479
Scaling Sawtimber	3,071 trips $17 / trip	$52,207
Scaling Biomass	764 trips $3 / trip	$2,292
	Total Cost	$1,982,886
	Net Value	$964,649
	Percent Above Value	33%
Groups:		
Plant	219 acres × $650 / acre	$142,350
Site Preparation	219 acres × $800 / acre	$175,200
Manual Release	219 acres × $1,320 /acre	$289,080
Reforestation Costs		$606,630
Harvest/Biomass Jobs	Direct Job 91 Indirect jobs 91	
Total Full Time Jobs		**182**
Total Employee-Related Income		**$7,824,152**

Assumptions:

* Harvest Value Schedules, CA State Board of Equalization, Table 4, Area 7, Tractor, 23 inch–29.9 inch dbh

** Harvest Value Schedules, CA State Board of Equalization, Misc. Harvest Values, Small Sawlogs, 14 inch–22.9 inch dbh

*** Timber Values for 10 inch–13.9 inch are $25.00/mbf

Deduction if average volume per acre under 5mbf/ac -$25

Skyline Yarding $30/mbf for 23 inch–29.9 inch (25% of Volume) $100/mbf for 14 inch–22.9 inch (75% of Volume)

Cost/ac for unit size increases 0% for 400 ac to 20% for 5 ac

Cost/ac for contract length decreases 10% every year after one year

Cost/ac for months of operation decreases 10% for 10 months or more and increases 10% for 4 months or less

Each million board feet harvested supports 6.5 year-around jobs (1 in logging, 4 in sawmill, and 1.5 in US Forest Service employment). In regional economic models of employment for California and the Pacific Northwest, an estimate of one indirect or induced job for every direct timber job is added. All jobs are equivalent to year-around employment.

Table E-3. Alternatives F and G timber sale – drop GS in WS over Threshold of Concern (service contract economics for alternatives F and G are the same as for alternatives B–E).

Value	**Total acres = 1,342 acres Low mbf/ac deduction $0 mbf / ac**	
PP 23 inch–29.9 inch sawtimber*	536 mbf × ($400 / mbf + $0 / mbf)	$214,400
SP 23 inch–29.9 inch sawtimber*	44 mbf × ($400 /mbf + $0 / mbf	$17,600
WF-RF 23 inch–29.9 inch sawtimber*	450 mbf × ($200 /mbf + $0 / mbf)	$90,000
DF 23 inch–29.9 inch sawtimber*	2,126 mbf × ($410 /mbf + $0 / mbf)	$871,660
IC 23 inch–29.9 inch sawtimber*	160 mbf × ($460 /mbf + $0 / mbf)	$73,600
Total 23 inch–29.9 inch sawtimber	3,316	
ALL 10 inch–22.9 inch sawtimber**	88,49 mbf × ($160 / mbf+ $0 / mbf)	$1,415,840
Biomass value when removed	1,151 acres × 16.6 tons / acre × $11.50 / ton =	$219,726
Total Value	**12,165 mbf 9.1 mbf/acre**	**$2,902,826**
Costs	(Assumes Harvesting Sawtimber and Biomass in One Operation)	
Additional move in/out costs		$25,000
Add sawtimber skyline cost	700 mbf × $76 / mbf =	$53,460
Additional Cost - Helicopter Logging	0 mbf x $180.0 / mbf	$0
Additional Cost	0 acres × $0 / acre	$0
	Average Unit Size = 25 acres $31 / acre	
	Contract Length = 3 years ($62) / acre	
	Months Operation = 5 months $0 / acre	
Acres of 5 inch–8.9 inch biomass-tractor	0 acres × ($309 / acre + ($31) / acre)	$0
Acres of 3 inch–8.9 inch biomass-tractor	1,071 acres × ($352 /acre + ($31) /acre)	$344,219
Acres of 5 inch–8.9 inch biomass-skyline	80 acres × ($1,20 /acre + ($31) /acre)	$93,520
Acres of 3 inch–9.9 inch biomass-skyline	0 acres × ($2,000 /acre + ($31) /acre)	$0
	1,151 Biomass Acres	
No. of sawtimber loads	12,165.0 mbf / 4 mbf/truck = 3,041	
Additional Haul Cost (4 hr avg)	0 hours/trip × $75 /hour × 3,041 trips	$0
No. of biomass loads	1,151 acres × 16.6 tons/acre / 25 tons/truck =	764
Haul Cost Biomass	4 hours/trip × $75 /hour × 764 trips	$229,200
Surface Replacement-sawtimber	12,165 mbf × $6.00 /mbf =	$72,990
Surface Replacement-biomass	1151 acres × 16.6 tons/acre × $0.67 /ton =	$12,801
Subsoiling Costs	200 acres × $230 /acre	$46,000
BD Costs	12165 mbf × $8.18 /mbf	$99,510
Road Construction	17.0 miles × 14,600 /mile	$248,200
Advertised Rate-sawtimber	12165 mbf × $43.99 /mbf	$535,153
Advertised Rate-biomass	1151 acres × 16.6 tons/acre × $0.20 /ton	$3,821
Yield Tax	$2,902,826 × 2.9%	$84,182
Scaling Sawtimber	3,041 trips $17 / trip	$51,697
Scaling Biomass	764 trips $3 / trip	$2,292
	Total Cost	**$1,902,045**
	Net Value	**$821,570**
	Percent Above Value	**34%**
Groups:		
Plant	191 acres × $650 / acre	$124,150
Site Preparation	191 acres × $800 / acre	$152,800
Manual Release	191 acres × $1,320 / acre	$252,120
Reforestation Costs		$529,070
Harvest/Biomass Jobs	Direct Job 90 Indirect Jobs 90	
Total Full-time Jobs		180
Total Employee-related Income		**$7,758,749**

Assumptions:

* Harvest Value Schedules, CA State Board of Equalization, Table 4, Area 7, Tractor, 23 inches–125 29.9 inches dbh

** Harvest Value Schedules, CA State Board of Equalization, Misc. Harvest Values, Small Sawlogs, 14 inches–22.9 inches dbh

*** Timber Values for 10 inches–13.9 inches are $25.00/mbf

Deduction if average volume per acre under 5 mbf/ac -$25

Skyline Yarding $30/mbf for 23 inches–29.9 inches (25% of Volume) $100/mbf for 14 inches–22.9 inches (75% of Volume)

Cost/ac for unit size increases 0% for 400 ac to 20% for 5 ac

Cost/ac for contract length decreases 10% every year after one year

Cost/ac for months of operation decreases 10% for 10 months or more and increases 10% for 4 months or less

Each million board feet harvested supports 6.5 year-around jobs (1 in logging, 4 in sawmill, and 1.5 in US Forest Service employment). In regional economic models of employment for California and the Pacific Northwest, an estimate of one indirect or induced job for every direct timber job is added. All jobs are equivalent to year-around employment.

Table E-4. Cost of DFPZ maintenance treatments over time at a 4 percent interest rate, including cost of herbicide application at $300 per acre.

Present Value for Treatment	Year in Future of Treatment										
	2	10	12	20	22	30	32	40	42	50	52
Herbicide	$300.00		$300.00		$300.00		$300.00		$300.00		$300.00
$773.65	$277.37		$187.38		$126.59		$85.52		$57.77		$39.03
Mastication		$600.00		$600.00		$600.00		$600.00		$600.00	
$1,073.56		$405.34		$273.83		$184.99		$124.97		$84.43	
Underburning		$250.00		$250.00		$250.00		$250.00		$250.00	
$447.32		$168.89		$114.10		$77.08		$52.07		$35.18	
Interest Rate Annual (percent) = 4%		FSM 1900 - Planning, 1971.21 Discount Rates									

Notes:

Present Net Value = Future Value / (1 + Interest Rate per Period in decimal) to the Nth power) where “N” is the number of periods in future.

Treatments regimes are from HFQLG FSEIS

Herbicide Cost is the $250 per acre from HFQLG FSEIS inflated by 20% for cost increases which would equal to $300.00 per acre.
Other costs are based on FSEIS and experienced local rates.

Table E-5. Cost of DFPZ maintenance treatments over time at a 4 percent interest rate.

Present Value for Treatment	Year in Future of Treatment										
	2	10	12	20	22	30	32	40	42	50	52
Herbicide	$250.00		$250.00		$250.00		$250.00		$250.00		$250.00
$644.71	$231.14		$156.15		$105.49		$71.26		$48.14		$32.52
Mastication		$600.00		$600.00		$600.00		$600.00		$600.00	
$1,073.56		$405.34		$273.83		$184.99		$124.97		$84.43	
Underburning		$250.00		$250.00		$250.00		$250.00		$250.00	
$447.32		$168.89		$114.10		$77.08		$52.07		$35.18	
Interest Rate Annual (percent) = 4%		FSM 1900 - Planning, 1971.21 Discount Rates									

Notes:

Present Net Value = Future Value / (1 + Interest Rate per Period in decimal) to the Nth power) where “N” is the number of periods in future.

Treatments regimes are from the HFQLG final supplemental EIS.

Herbicide cost is from the HFQLG final supplemental EIS. Other costs are based on final supplemental EIS and experienced local rates.

Table E-6. Cost of DFPZ maintenance treatments over time at a 7.25 percent interest rate.

Present Value for Treatment	Year in Future of Treatment										
	2	10	12	20	22	30	32	40	42	50	52
Herbicide	$250.00		$250.00		$250.00		$250.00		$250.00		$250.00
$425.29	$217.34		$107.94		$53.60		$26.62		$13.22		$6.57
Mastication		$600.00		$600.00		$600.00		$600.00		$600.00	
$574.07		$297.97		$147.98		$73.49		$36.50		$18.13	
Underburning		$250.00		$250.00		$250.00		$250.00		$250.00	
$239.19		$124.16		$61.66		$30.62		$15.21		$7.55	
Interest Rate Annual (percent) = 7.25%	Current Prime Rate for Comparison										

Notes:

Present Net Value = Future Value / (1 + Interest Rate per Period in decimal) to the Nth power, where "N" is the number of periods in future.

Treatments regimes are from the HFQLG final supplemental EIS.

Herbicide cost is from the HFQLG final supplemental EIS. Other costs are based on final supplemental EIS and experienced local rates.

Table E-7. Cost of DFPZ maintenance treatments over time at a 3.1 percent interest rate.

Present Value for Treatment	Year in Future of Treatment										
	2	10	12	20	22	30	32	40	42	50	52
Herbicide	$250.00		$250.00		$250.00		$250.00		$250.00		$250.00
$750.80	$235.19		$173.31		$127.72		$94.12		$69.35		$51.11
Mastication		$600.00		$600.00		$600.00		$600.00		$600.00	
$1,315.38		$442.14		$325.82		$240.10		$176.93		$130.38	
Underburning		$250.00		$250.00		$250.00		$250.00		$250.00	
$548.07		$184.23		$135.76		$100.04		$73.72		$54.33	
Interest Rate Annual (percent) = 3.10%	OMB Circlar No. A-94										

Notes:

Present Net Value = Future Value / (1 + Interest Rate per Period in decimal) to the Nth power, where "N" is the number of periods in future.

Treatments regimes are from the HFQLG final supplemental EIS.

Herbicide cost is from the HFQLG final supplemental EIS. Other costs are based on final supplemental EIS and experienced local rates.

Table E-8. Estimated noxious weed cost comparison for French and Scotch broom seedlings.*

Treatment Method	Cost
Hand-pull one acre (4 days) of broom seedlings with 25% cover.	• GS 5 @ $114/day • $114 × 4 days = $456/acre
Cover could be much higher in some areas.	• 25% broom cover = $114 × 4 days = $456/acre • 50% broom cover = $114 × 8 days = $912/acre • 100% broom cover = $114 × 16 days = $1,824/acre
Cost to treat 33 acres	• 25% cover = $456 × 33acres = $15,048 • 100% cover = $1,824 × 33 acres = $60,192
Chemical Control Assumptions	• 1 day to chemically treat 2.5 acres. • GS 9 @ $220/day • $88/acre (not including the cost of the material)
Mechanical (brush cutters) Control Assumptions	• 3 Brush cutters have been purchased and are at FRRD
	• 1 day to treat 0.5 acres • GS 5 @ $114 / day • 50% cover • $230 / acre
Back-pack Flamer Control Assumptions	• 3 backpack flamers have been purchased by the PNF. A Burn Boss needs to be present during treatment. • GS 5 @ $114 / day • 50% cover • $114 / acre • These cost estimates do not include travel time and vehicle expenses. A 20% multiplier will be applied to cover these costs.

For alternatives B, D, F the following estimates were made:

Acres Treated per year	Treatment Method	Cost ($)
11	Mechanical	2,530
9	Chemical	800
10	Backpack Flamer	1,140
1	Hand Pulling	1,000
	Total 33 per year	**$5,470**

To cover travel time a 20% multiplier was applied

(5,470 + 1,134 = $6,604 / year)

Estimated cost per acre for alternatives B, D, F with the above treatment methods

= $200.12 / acre

For alternatives C, E, G the following estimates were made:

Acres Treated per year	Treatment Method	Cost ($)
16	Mechanical	3,680
0	Chemical	0
15	Backpack Flamer	1,710
2	Hand Pulling	1,800
	Total 33 per year	**$7,190**

To cover travel time a 20% multiplier was applied

(7,190 + 1,438 = $8,628 / year)

Estimated cost per acre for alternatives B, D, F with the above treatment methods

= $261.45 / acre

Note: Prepared by: Chris Christofferson for the Slapjack Project. Manual control assumptions are based on observations made over the past three field seasons on the Feather River Ranger District. Backpack control assumptions are based on a conversation with Botanist Jim Belscher-Howe on 12/9/05.

Appendix F

Mitigation Measures and Monitoring Strategy

Appendix F
Mitigation Measures and Monitoring Strategy

Table F-1. Slapjack Project design features and mitigation measures.

Resource	Applicable Units	Brief Description	Type of Direction (BMP, S&G, MM, DF)	Source of Direction (LRMP, SNFPA, HFQLG, FSM, FSH, NHPA)	Applicable Timber Sale Provisions B&C	Contract Type (Timber Sale, Service, Construction)	Limited Operating Periods (LOPs)	Applicable Action Alternatives
Botany	All units	Cleaning of equipment coming from off forest to prevent the introduction of noxious weeds.	BMP	HFQLG, FSM	B6.35, C6.343	All		All
Botany	All units	Weed free mulch to prevent the introduction of noxious weeds.	FSM Policy	HFQLG, FSM	C6.349	All		All
Botany	138	Limited operating period to allow Layne's ragwort to set seed prior to underburning.	FSM Policy	HFQLG, FSM	C6.313, B6.24, C6.24, SAM	All	2/1-7/1	All
Botany	4,11,19, 26, 32, 34, 36, 41, 45, 60, 61, 63, 81, 84, 198, 505, 506, 531	Controlled Areas to prevent pile burning on rare plants.	BMP	HFQLG, FSM	B6.24, C6.24, C6.624, SAM	All		All
Botany	6,11, 13, 26, 32, 36, 38, 41, 80, 91, 879	Controlled Areas to prevent herbicide spray from DFPZ maintenance from contacting rare plants.	BMP	HFQLG, FSM	N/A	Service		B & F
Botany	13, 78, 129, 138, 184	Controlled Areas to prevent herbicide spray from noxious weed control from contacting TES plants.	BMP	HFQLG, FSM	N/A	Service		D
Botany	30	Controlled Area to protect Mutant tanoak.	BMP	HFQLG, FSM	B6.24, C6.24, SAM	All		All
Botany	25, 29B, 38, 77, 78, 80, 81S, 81, 82,129, 229, 329, 879, 991	These units are known to contain high concentrations of noxious weeds or they are adjacent to known infestations. To prevent the spread of noxious weeds to uninfested units Off-Road Equipment operating in these units will be cleaned prior to moving to any other unit that is indicated on Sale Area Map as being free of invasive species of concern, Purchaser shall again take reasonable measures to make each such piece of equipment free of soil, seeds, vegetative matter, or other debris that could contain or hold seeds.	BMP	HFQLG, FSM	B6.35, C6.343, SAM	All		All
Botany	29A, 29B, 80, 979	These units contain Controlled Areas to prevent equipment from entering known high infestation areas and spreading weed seed within the unit.	BMP	HFQLG, FSM	B6.24, C6.24, SAM	All		All

Table F-1. Slapjack Project design features and mitigation measures (continued).

Resource	Applicable Units	Brief Description	Type of Direction (BMP, S&G, MM, DF)	Source of Direction (LRMP, SNFPA, HFQLG, FSM, FSH, NHPA)	Applicable Timber Sale Provisions B&C	Contract Type (Timber Sale, Service, Construction)	Limited Operating Periods (LOPs)	Applicable Action Alternatives
Fire and Fuels	21, 59, 198	Hand piling with fireline construction and covering.	DF	HFQLG LMRP	C6.7, C6.723, B6.65	Service Contract		All
Fire and Fuels	All harvest units	Hand and machine fireline construction for machine piles and road side hand piles include lines and covering. Hand pile activity slash that exceeds 5 tons per acre.	DF	HFQLG LMRP	C6.7, C6.723, B6.65	Timber sale & Service Contract		All
Fire and Fuels	Underburn units	Under burning or slash disposal.	BMP S&G	FSM FSH HFQLG LMRP	N/A	Force account		ALL
Fire and Fuels	All harvest units	Slash treatment.	DF	LRMP	C6.7	Timber Sale		All
Fire and Fuels	All harvest units	Fire plan (PAL).	DF	FSM	C7.2	Timber Sale & Service Contract		All
Fire and Fuels	All burn units	Prescribed burn plan.	DF, BMP & MM	FSM, FSH, SNFPA	N/A	Force account		All
Fire and Fuels	All burn units	Smoke management plan.	DF & MM	FSM, FSH, SNFPA	N/A	Force account		All
Fire and Fuels	All harvest units	Dust abatement plan.	S&G	LRMP	B6.33, C5.33	Timber Sale		All
Heritage Resources	11,14,26,99,229,29A,40,9401, 85,74B,67,63	Standard resource protection measures for cultural resources.	N/A	NHPA, Regional PA	C6.411,C6.24, B6.24, SAM	All		All
Hydrology/ Fisheries	All treatment units	Standard resource protection measures for hydrology and fisheries resources.	S&G, BMPs 1-3, 1-6, 1-8, 1-18, 1-19, 1-20, 1-21, 2-12, 5-1, 5-2, 7-3, and 7-4	HFQLG FSEIS, Scientific Analysis Team (SAT) Guidelines, PNF LRMP, Water Quality Management for National Forest System Lands in CA, BMPs (2000)	A2, B6.34, B6.341, B6.342, B6.5, B6.65, C2.11, F2, C6.411, C6.5, C6.6, C6.65 and C6.601	All	N/A	All

Table F-1. Slapjack Project design features and mitigation measures (continued).

Resource	Applicable Units	Brief Description	Type of Direction (BMP, S&G, MM, DF)	Source of Direction (LRMP, SNFPA, HFQLG, FSM, FSH, NHPA)	Applicable Timber Sale Provisions B&C	Contract Type (Timber Sale, Service, Construction)	Limited Operating Periods (LOPs)	Applicable Action Alternatives
Hydrology/ Fisheries	Treatment units identified as plantations	**RHCA Treatments in Plantation Units on slopes less than 35 percent with stable channels:** (a) 50-foot buffer or extent of riparian vegetation, which ever is greatest, applied on each side of fish-bearing streams and (b) 25-foot buffer or extent of riparian vegetation, which ever is greatest, applied on each side of non-fish bearing streams. In harvest units, equipment may reach into the no-tractor equipment zone. Retain trees along streambank.	RMO, BMP 1-8, BMP 1-19	Riparian Management Objectives (RMO) objectives of the HFQLG FSEIS and Water Quality Management for National Forest System Lands in CA, BMPs (2000)	B6.5 and C6.5	All	N/A	All
Hydrology/ Fisheries	Treatment units identified as plantations	**RHCA Treatments in Plantation Units on slopes less than 35 percent with unstable channels:** (a) 150-foot buffer or extent of riparian vegetation, which ever is greatest, applied on each side of fish-bearing streams and (b) 50-foot buffer or extent of riparian vegetation, which ever is greatest, applied on each side of non-fish bearing streams. In treatment units, equipment may reach into RHCAs in the no-tractor equipment zone. Retain trees along streambanks.	BMP 1-8, BMP 1-19	Riparian Management Objectives (RMO) objectives of the HFQLG FSEIS and Water Quality Management for National Forest System Lands in CA, BMPs (2000)	B6.5 and C6.5	All	N/A	All
Hydrology/ Fisheries/Fire/ Fuels	Treatment units identified as plantations	**For RHCA enhancement in non-plantation treatment units:** hand cutting and under burning may be conducted. During implementation of under burning, no ignition shall occur within RHCAs. Fire shall be allowed to back into an RHCA to achieve low intensity burning. All burning shall be conducted on permissive burn days, within air quality constraints. Fire lines (control lines) include roads, skid trails, natural barriers and hand or machine lines (ATV or tractor). Hand line construction will occur within RHCAs, where it is necessary to enter the RHCA to provide for logistical boundaries in underburning the DFPZ.	RMO, BMP 1-8, BMP 1-19	Riparian Management Objectives (RMO) objectives of the HFQLG FSEIS and Water Quality Management for National Forest System Lands in CA, BMPs (2000)	None	Service Contract	N/A	All

Table F-1. Slapjack Project design features and mitigation measures (continued).

Resource	Applicable Units	Brief Description	Type of Direction (BMP, S&G, MM, DF)	Source of Direction (LRMP, SNFPA, HFQLG, FSM, FSH, NHPA)	Applicable Timber Sale Provisions B&C	Contract Type (Timber Sale, Service, Construction)	Limited Operating Periods (LOPs)	Applicable Action Alternatives
Hydrology/ Fisheries	Treatment units identified as natural stands	**For RHCA enhancement in non-plantation treatment units:** All DFPZ prescription and follow-up treatments within RHCAs by Fuel Specialist determination and approval. Methods include hand cutting and under burning (no ignition within RHCAs). Fire may only back into an RHCA. All burning shall be conducted on permissive burn days, within air quality constraints. Hand line construction allowed within RHCAs only where necessary.	RMO, BMP 1-8, BMP 1-19	Riparian Management Objectives (RMO) objectives of the HFQLG FSEIS and Water Quality Management for National Forest System Lands in CA, BMPs (2000)	none	Service Contract	N/A	All
Hydrology/ Fisheries	Temporary road locations, Haul Routes, Road Reconstruction, Road Decommissioning, and Stream Crossing Upgrade or Removals	Standard resource protection measures for hydrology and fisheries resources.	S&G, BMP 2-1, 2-2, 2-3, 2-22	HFQLG FSEIS and Water Quality Management for National Forest System Lands in CA, BMPs (2000)	B5.12, B6.312	All	N/A	All
Hydrology/ Fisheries	Temporary road locations, Haul Routes, Road Reconstruction, Road Decommissioning, and Stream Crossing Upgrade or Removals	Standard resource protection measures for hydrology and fisheries resources as part of the road package in the contract.	S&G, BMPs 2-4, 2-5, 2-6, 2-7, 2-9, 2-10, 2-11, 2-13, 2-14, 2-17, 2-19, 2-20, 2-21, 2-23, 2-24, 2-26	HFQLG FSEIS and Water Quality Management for National Forest System Lands in CA, BMPs (2000)		All	N/A	All
Hydrology/ Fisheries	Temporary road locations	**Stream Crossings on Temporary Roads** - protection of stream channels and fish passage by stream crossing structures. COR approval with hydrologist review.	BMP 2-16	HFQLG FSEIS and Water Quality Management for National Forest System Lands in CA, BMPs (2000)	B6.63, B6.65, and C6.65	All	N/A	All

Table F-1. Slapjack Project design features and mitigation measures (continued).

Resource	Applicable Units	Brief Description	Type of Direction (BMP, S&G, MM, DF)	Source of Direction (LRMP, SNFPA, HFQLG, FSM, FSH, NHPA)	Applicable Timber Sale Provisions B&C	Contract Type (Timber Sale, Service, Construction)	Limited Operating Periods (LOPs)	Applicable Action Alternatives
Hydrology/ Fisheries	Road Decommissioning of 19N00 AND 20N25	Closure and decommissioning using standard resource protection measures.	MM and BMP 2-26	HFQLG FSEIS and Water Quality Management for National Forest System Lands in CA, BMPs (2000)		N/A	N/A	All
Hydrology/ Fisheries	Road Decommissioning of 20N04B (see Fig A-3.a)	After completion of treatments decommission using standard resource protection measures.	MM and BMP 2-27	HFQLG FSEIS and Water Quality Management for National Forest System Lands in CA, BMPs (2000)		N/A	N/A	All
Hydrology/ Fisheries/ Soils	Meadow Restoration, Streambank Stabilization, Fish Barrier Removals, Road Decommissioning (see Fig A-1.e. and Fig A-3.a for roads)	Standard resource protection measures for hydrology, fisheries and soil resources.	BMP 7-1	HFQLG FSEIS and Water Quality Management for National Forest System Lands in CA, BMPs (2000)	N/A	N/A	N/A	All
Hydrology/ Soils	Harvest, Group Selection, and ITS Treatment Units	Standard resource protection measures for hydrology and soil resources.	BMPs 1-9, 1-10, 1-11, 1-12, 1-13, 1-15, 1-16, 1-17, 1-21	HFQLG FSEIS and Water Quality Management for National Forest System Lands in CA, BMPs (2000)	B6.6422, B6.65, B 6.67, C4.222, C6.36, C6.425, C6.427, C6.5, C6.601, and C6.65	Timber Sale	N/A	All
Hydrology/ Soils	64g	Do not sub-soil landing next to stream used for group selection number 64g; seed and mulch and allow natural regeneration.	MM, BMP 1-14, and BMP 1-16	HFQLG FSEIS and Water Quality Management for National Forest System Lands in CA, BMPs (2000)	C6.601	Timber Sale	N/A	All

Table F-1. Slapjack Project design features and mitigation measures (continued).

Resource	Applicable Units	Brief Description	Type of Direction (BMP, S&G, MM, DF)	Source of Direction (LRMP, SNFPA, HFQLG, FSM, FSH, NHPA)	Applicable Timber Sale Provisions B&C	Contract Type (Timber Sale, Service, Construction)	Limited Operating Periods (LOPs)	Applicable Action Alternatives
Hydrology/ Soils	All treatment units	Standard resource protection measures for hydrology and soil resources.	BMP 1-18, 1-20, 5-3, 5-4, 5-6, 7-3	HFQLG FSEIS and Water Quality Management for National Forest System Lands in CA, BMPs (2000)	B6.61, B6.67, C6.62, C6.313, C6.411, C6.601, C6.62, SAM	All	N/A	All
Hydrology/ Soils	Units with underburn or pile burn treatments	Standard resource protection measures for hydrology and soil resources for prescribed burning treatments.	BMP 6-1, 6-2, 6-3, 6-4, 6-5	HFQLG FSEIS and Water Quality Management for National Forest System Lands in CA, BMPs (2000)	N/A	Service Contract	N/A	All
Soils	All treatment units	Standard resource protection measures for soil resources.	S&G, MM	PNF LRMP, Soil Management Handbook FSH 2509.18, and Soil Management Handbook FSH 2509.18-95-1		C6.705, Leave 5 logs per acre that are 12 (prefer 20) inches or greater in small end diameter and 10 feet or longer.		All

Table F-1. Slapjack Project design features and mitigation measures (continued).

Resource	Applicable Units	Brief Description	Type of Direction (BMP, S&G, MM, DF)	Source of Direction (LRMP, SNFPA, HFQLG, FSM, FSH, NHPA)	Applicable Timber Sale Provisions B&C	Contract Type (Timber Sale, Service, Construction)	Limited Operating Periods (LOPs)	Applicable Action Alternatives
Soils	Group Selections Located in DFPZ Treatment Unit 5: 33g, 34g, 35g, 36g, and 37g	Reduce increased soil erosion from proposed treatments, seed and mulch disturbed bare ground.	S&G, MM, and BMP 1-14	PNF LRMP and Water Quality Management for National Forest System Lands in CA, BMPs (2000), Soil Management Handbook FSH 2509.18, and Soil Management Handbook FSH 2509.18-95-1	C6.601	Timber Sale	N/A	All
Soils	Harvest, Group Selection, and ITS Treatment Units	Use existing temporary roads, landings, and skid trails to minimize additional detrimental soil compaction and limit skid trails and landings to no more than 15 percent of the treatment unit. Where conditions unfavorable for implementation of this mitigation measure COR (in consultation with soil scientist) to prescribe alternative treatment consistent with standard resource protection measures.	S&G, MM	PNF LRMP, Soil Management Handbook FSH 2509.18, and Soil Management Handbook FSH 2509.18-95-1	B6.422	Timber Sale	N/A	All
Soils	Harvest, Group Selection, and ITS Treatment Units	Subsoil all landings, 200 feet of the main skid trail approach to the landing, and all temporary roads. On skid trails, limit subsoiling to a maximum slope of 25 percent. Areas to be subsoiled must be approved by the COR upon recommendation by silviculturists and soil scientist. Apply treatment slash, debris and mulch, wood chips, or straw to disturb sites after subsoiling to reduce soil erosion potential (COR determination in consultation with soil scientist).	MM	Soils Management Handbooks, LRMP	C6.606,C6.607,C6.608	Timber Sale	N/A	All

Table F-1. Slapjack Project design features and mitigation measures (continued).

Resource	Applicable Units	Brief Description	Type of Direction (BMP, S&G, MM, DF)	Source of Direction (LRMP, SNFPA, HFQLG, FSM, FSH, NHPA)	Applicable Timber Sale Provisions B&C	Contract Type (Timber Sale, Service, Construction)	Limited Operating Periods (LOPs)	Applicable Action Alternatives
Soils	DFPZ Treatment Units 53, Group Selection Treatment Units 504, 505, 507, 515, 517, 527, and 537, and ITS Treatment Unit 525	In addition to standard subsoiling practices, subsoil entirety of main skid roads with the exception of slopes greater than 25 percent. Areas to be subsoiled must be approved by the COR upon recommendation by silviculturists and hydrologist or soil scientists.	MM	PNF LRMP, Soil Management Handbook FSH 2509.18, and Soil Management Handbook FSH 2509.18-95-1	C6.607,C6.608	Timber Sale	N/A	All
Soils	All Treatment Units	Ground based operations to occur only in following conditions at approval of COR in consultation with soil scientist: upper 8 inches of soil is dry, the ground is frozen to a depth of 5 inches, or snow depth is at least 18 inches or "machine compacted" to 8 inches.	MM	PNF LRMP, Soil Management Handbook FSH 2509.18, and Soil Management Handbook FSH 2509.18-95-1	N/A	All	N/A	All
Soils	Harvest, Group Selection, and ITS Treatment Units	Restrict ground based logging operations on slopes greater than 35 percent.	MM	PNF LRMP, Soil Management Handbook FSH 2509.18, and Soil Management Handbook FSH 2509.18-95-1	N/A	Timber Sale	N/A	All
Soils	DFPZ Mastication Treatment Units	Prime power unit — tracked unit specifications: maximum 5–8 psi ground pressure; masticating or mulching head with an articulating boom of 20 feet or greater from center of machine. Capable of working on slopes continuously on 0 to 45 percent slopes. Limit the number of passes the machine makes for soil compaction concerns. Soil compaction should not exceed 15 percent. Limit traveling along the sideslope to reduce soil displacement. Soil displacement should not exceed 15 percent.	MM	PNF LRMP, Soil Management Handbook FSH 2509.18, and Soil Management Handbook FSH 2509.18-95-1	N/A	Service Contract	N/A	All
Wildlife – California Spotted Owl	Unit 531, affects Group 12g, and part of Road 18N01, PAC YU004,	Apply Standard and Guidelines HFQLG FEIS page 2-7 and 2-8.	BMP 1.5 FSM 2670.32 LRMP [p. 4-14, 4-15,	SNFPA FSEIS/ROD 2004,		All	March 1 through August 31	All

Table F-1. Slapjack Project design features and mitigation measures (continued).

Resource	Applicable Units	Brief Description	Type of Direction (BMP, S&G, MM, DF)	Source of Direction (LRMP, SNFPA, HFQLG, FSM, FSH, NHPA)	Applicable Timber Sale Provisions B&C	Contract Type (Timber Sale, Service, Construction)	Limited Operating Periods (LOPs)	Applicable Action Alternatives
Spotted Owl	T18N R6E Sec. 22 Unit 527, affects part of Road 18N11, PAC YU004, T18N R6E Sec. 22 Unit 524, affects Group 162g, and affects part of Road 19N00, PAC YU003, T18N R7E Sec. 3 Unit 542, affects Groups 102g and 103g, and part of Road YC110, PAC YU009, T19N R 7E Sec. 13 Unit 542, affects Groups 102g and 103g, and part of Road YC110, PAC YU009, T19N R 7E Sec. 13 Unit 517, affects Groups 61g and 62g, and part of Road 19N16, PAC YU0014, T18N R6E Sec. 21 Unit 60 affects Group 81g, and part of Road 20N24, PAC BU0019 T 18N. R7E. Sec. 2 Unit 125 is partially in a Protected Activity Center. Treatment: Mastication (4 acres), PAC YU0024, T18N R6E Sec. 30		&4-19]	HFQLGFRA FEIS/ROD 1998 HFQLGFRA FSEIS/ROD 2003.				

Table F-1. Slapjack Project design features and mitigation measures (continued).

Resource	Applicable Units	Brief Description	Type of Direction (BMP, S&G, MM, DF)	Source of Direction (LRMP, SNFPA, HFQLG, FSM, FSH, NHPA)	Applicable Timber Sale Provisions B&C	Contract Type (Timber Sale, Service, Construction)	Limited Operating Periods (LOPs)	Applicable Action Alternatives
Wildlife – California Spotted Owl (continued)	Unit 26 (Experimental Forest), affects part of Road 19N25, going through PAC YU0024, T18N R6E Sec. 30 Unit 47, Affects part of Road 19N07, going through PAC BU039, T19N R6E Sec. 8. Road 19N42, T18N R6E Sec. 32, LOP applies for reconstruction Move boundary for PAC YU003 west of Road 19N00 and add suitable habitat west of Road 19N09 (T18N R7E, Sec 3) to allow reconstruction of Road 19N00 (T18N R7E Sec. 3 and Sec. 34)							
Wildlife – California Red-legged Frog	This includes a 500-foot buffer around known California red-legged frog populations (No treatments are planned in this area) and a 300-foot buffer around streams within the dispersal area of known site (No herbicides are planned in these treatment units), and a 150-foot buffer in the watershed of the known population. LOP applies to units that fall within the 1-mile dispersal area.	Apply Standard and Guidelines HFQLG FEIS amended by the SNFPA.	BMP 1.5 FSM 2670.31 LRMP [p. 4-14, 4-15, &4-19]	SNFPA FSEIS/ROD 2004, HFQLGFRA FEIS/ROD 1998, HFQLGFRA FEIS/ROD 2003		All	October 15 through April 15 or the first wetting rain greater than 0.25 inch.	All

Table F-1. Slapjack Project design features and mitigation measures (continued).

Resource	Applicable Units	Brief Description	Type of Direction (BMP, S&G, MM, DF)	Source of Direction (LRMP, SNFPA, HFQLG, FSM, FSH, NHPA)	Applicable Timber Sale Provisions B&C	Contract Type (Timber Sale, Service, Construction)	Limited Operating Periods (LOPs)	Applicable Action Alternatives
Wildlife-Western Pond Turtle	LOPs include; The pond with a known western pond turtle population would have a 300-foot buffer restricting activities except hand treatments. The 3 ponds directly to the south would have a 150-foot buffer with hand treatments and the remaining 4 ponds would have a 50-foot buffer with hand treatments. Road (20N67A) parallel to the ponds would have limited access to prevent disturbance. Equipment would be diverted at the point where Road 20N67and 20N67A fork. The only expected usage of the road once the LOP is lifted is a truck that would shuttle fuel for the mastication equipment. A basking log will added to the first pond.	Apply Standard and Guidelines HFQLG FEIS amended from the SNFPA.	FSM 2670.32 NFMA LRMP [p. 4-14, 4-15, &4-19]	SNFPA FSEIS/ROD 2004, HFQLGFRA FEIS/ROD 1998, HFQLGFRA FEIS/ROD 2003		All	LOP June 1 through July 31 [400-meter buffer around the pond]. LOP March 1 through April 31 [400-meter buffer around the pond]	All
Wildlife – Foothill-yellow-legged Frog	Appropriate LOPs would apply if species is detected	N/A	N/A	N/A	N/A	N/A	Appropria te LOPs if needed	N/A
Wilflife – Northern Goshawk	Appropriate LOPs would apply if species is detected	N/A	N/A	N/A	N/A	N/A	Appropria te LOPs if needed	N/A

Table F-1. Slapjack Project design features and mitigation measures (continued).

Resource	Applicable Units	Brief Description	Type of Direction (BMP, S&G, MM, DF)	Source of Direction (LRMP, SNFPA, HFQLG, FSM, FSH, NHPA)	Applicable Timber Sale Provisions B&C	Contract Type (Timber Sale, Service, Construction)	Limited Operating Periods (LOPs)	Applicable Action Alternatives
Wildlife – Pacific Fisher	Appropriate LOPs would apply if species is detected	N/A	N/A	N/A	N/A	N/A	Appropria te LOPs if needed	N/A
Wildlife - Bats	Appropriate LOPs would apply if species is detected	N/A	N/A	N/A	N/A	N/A	Appropria te LOPs if needed	N/A
Wildlife- California Spotted Owl	Unit 24, PAC YU024 and Unit 925, PAC YU024 and Unit 62 SOHA B1	Standard and Guidelines HFQLG FEIS and HFQLG ACT.	BMP 1.5 FSM 2670.32 LRMP [p. 4-14, 4-15, &4-19]	SNFPA FSEIS/ROD 2004, HFQLGFRA FEIS/ROD 1998, HFQLGFRA FEIS/ROD 2003		All	March 1 through August 31	All

Table F-2. Best Management Practices for herbicide use (alternatives B, D, E, and F).

BMP 5-7	**Pesticide Use Planning Process**
	The ID Team identified sensitive soils, potential and active unstable slope areas and streamside buffer zones. They evaluated soil and watershed responses to the proposed herbicide application and provided criteria for identifying sensitive areas to be avoided or needing additional protection. Specific mitigation measures for these areas are documented in the following BMPs. They have also developed site-specific monitoring plans for soil and water quality. The interdisciplinary process has allowed the team to assess the practicality of treatments, assess the degree of risk involved and set forth means of avoiding adverse effects.
BMP 5-8	**Pesticide Application According to Label Directions and Applicable Legal Requirements**
	Label directions would be followed on all herbicides, dyes, colorants, and adjuvants. Label directions would be followed for application rates, mixing, application methods, rinsing, and disposal of containers. All herbicide applications would follow applicable state laws and California EPA regulations, including safety regulations. All Forest Service personnel in charge of herbicide application would be certified as a Qualified Applicator (Certificate). All contract applicators would be appropriately licensed by the state. These actions would effectively avoid the misuse of the herbicides used in this project and thus decrease the risk of contaminating water or non-target areas.
BMP 5-9	**Pesticide Application Monitoring and Evaluation**
	Soil, ground water, and water monitoring plans have been developed for this project. These plans would be implemented prior to application to determine baseline conditions. The Soil, Ground Water, and Water Quality Monitoring Plans are located in appendix F of this EIS. The forest hydrologist, soil scientist, and silviculturist would evaluate the results of the monitoring. This monitoring would determine if herbicides have moved off-site into water after application, through overland flow, leaching, or substrate flow and would determine the amount of herbicide residue reaching water. Additional protection measures would be implemented if needed. Post-project monitoring (DFPZ) would determine the effectiveness of treatment in meeting the project objectives. The DFPZ Monitoring Strategy is located in appendix F of this EIS.
BMP 5-10	**Pesticide Spill Contingency Planning**
	A Spill Plan would be prepared for this project that details containment and notification measures should a spill occur. If a spill occurs, action would be taken immediately by the contractor to contain the spill. The contractor would notify the Contracting Officer, Representative or Forest Dispatcher immediately. These actions would reduce the risk of contamination of water by accidental herbicide spills.
BMP 5-11	**Cleaning and Disposal of Pesticide Containers**
	All herbicide and adjuvant containers would be triple rinsed, with clean water, at a site approved by the Contracting Officer or Representative. Used containers would be punctured on the top and bottom to render them unusable, unless said containers are part of a manufacturer's container recycling program, in which case the manufacturer's instructions would be followed. Disposal of non-recycled containers would be at legal dump sites. Equipment would not be cleaned in a manner that allows contaminated water to enter any body of water on the national forest. These actions would effectively prevent water contamination and risk to humans from herbicide containers.

Table F-2. Best Management Practices for herbicide use (alternatives B, D, E, and F) (continued).

BMP 5-12	Streamside Wet Area Protection During Pesticide Spraying
	To minimize the risk of herbicides inadvertently entering waters or unintentionally altering the riparian area, streamside buffer zones (table F-4) would be established adjacent to surface water, riparian areas, stream channels, or wetlands. SAT Guidelines Table 5-4 (also HFQLG FRA FEIS Table 2.15) defines how to delineate interim boundaries of RHCAs for different water bodies on the Lassen, Plumas, and Tahoe National Forests. These guidelines are included in the Streamside Management Zone Plan (Appendix A of the Slapjack Hydrology Report), and would be used to define no-spray areas for herbicide application for DFPZ maintenance, as follows: For natural stands, herbicide applications for DFPZ maintenance would be limited to areas outside of the riparian buffers as defined in the SAT guidelines.
	For plantations, DFPZ construction would be allowed within the RHCAs. However, herbicide applications for DFPZ maintenance would be restricted to areas outside RHCAs as defined by SAT guidelines. For ephemeral swales where buffers for mechanical activity during DFPZ construction were established, no herbicide application buffers will be applied. Application would be limited to dry periods of the year, as defined below for noxious weed eradication. For noxious weed control projects that would enhance riparian habitat conservation objectives, herbicide applications may be allowed within the RHCAs and application limitations will be determined as follows: 50 feet – Perennial Streams 50 feet – Flowing Intermittent and Ephemeral Streams during the wet season 0 feet – Dry Intermittent and Ephemeral Streams during the dry season (August and September)
BMP 5-13	**Controlling Pesticide Drift During Spray Application**
	To reduce off-site and off-target drift, environmental factors must be addressed when developing the project proposal and contract language. The spray application of herbicides would be accomplished according to a prescription which accounts for terrain, and that specifies the following: spray exclusion areas, buffer areas, and factors such as formulation, equipment, droplet size, spray height, application pattern, flow rate, and the limiting factors of wind speed and direction, temperature, and relative humidity. If the following weather parameters are exceeded then herbicide applications would cease: A. Sustained wind velocity exceeding 5 miles per hour. B. Raining or rain imminent. C. Air temperature exceeding 85 degrees Fahrenheit if the labels requires it or to prevent worker heat stress. D. Temperature inversions that could lead to off-site movement of herbicide spray.

Table F-3. Management requirements for herbicide use related to worker and public safety (alternatives B, D, E, and F).

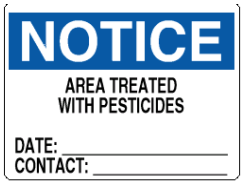
1	Require the use of coveralls by all contract workers in addition to PPE required by product label, when handling herbicides or adjuvants, including loading, mixing, application, and disposal of containers.
2	All Forest Service workers (such as inspectors) are required to: meet the Federal Worker Protection Standard and State regulations; wear coveralls; use personal protective clothing required by product labels: wash their clothes daily; and change clothes when not on the project site.
3	Provide clean water and soap for routine washing of hands and face and for emergency washing per State regulations.
4	Restrict worker access into units following label directions (restricted entry interval). In general, worker access to the treated areas is restricted until after the spray solution has dried and the following restricted entry intervals for specific pesticides: Imazapyr REI = 12 hours. Triclopyr REI = 12 hours.
5	Post weatherproof pesticide warning signs at areas of common public access that alert the public that herbicide application is taking place, as required by State regulations (California Code of Regulations; Division 6. Pesticides and Pest Control Operations; 6776. Field Postings). Information to be posted on the pesticide warning signs include the pesticide applied, date of application, and the date the restricted entry interval expires. The signs shall: a) Be posted before the application begins but shall not be posted unless a pesticide application is scheduled within the next 24 hours; b) Remain posted and clearly legible throughout the application and the restricted entry interval; and c) The signs would be removed 3 days after the end of the restricted entry interval. Sample pesticide warning sign:
6	A general public notice sign would be posted after the removal of the pesticide warning sign to inform potential forest users that the area has been treated with pesticides. Information that would be posted on the public notice sign includes: date of pesticide application and contact phone number. The sign would remain posted for approximately threes months after pesticide application. This should be sufficient time for herbicide-treated vegetation to exhibit signs of chlorosis and tissue necrosis (leaf discoloration – yellow to brown) and eventual death. Sample public notice sign. 

Table F-4. Buffer width designations for herbicide use, by resource.
Buffers would be applied under alternatives B, D, E, and F.

Buffer Width	Resource
500 feet	Around known occupied amphibian Threatened, Endangered or Sensitive species site, such as California red-legged frog, Mountain yellow legged frog, Foothill yellow legged-frog, Cascade frog and Northern leopard frog (HFQLG FEIS; SNFPA FS EIS ROD, page 63).
300 feet	Perennial streams and ephemerals within the sub-watershed of a known California red-legged frog. On perennial streams or ponds for reptiles under Threatened, Endangered or Sensitive species. (HFQLG FSEIS chapter 3 page 230). On aquatic features (lakes, meadows, bogs, fens, wetlands, vernal pools) following RCA widths for aquatic and riparian associated species (HFQLG Act FSEIS BA/BE).
100 feet	Known Native American Gathering Sites (CDPR 2001) Botanical Threatened and Endangered Species
50 feet	Archaeology: Pre-Historic and Historic Sites Botanical Sensitive Species Property Boundary – Private
25 feet	25 feet - Property Boundary – Commercial, State, Federal 25 feet – Buffer around designated PACs, SOHAs, Territories, Den sites or Bat roosts of Threatened, Endangered, or Sensitive Species (i.e., PACs buffer 300 feet + 25 feet) (HFQLG Act FSEIS BA/BE).
	Buffer widths are based on the following: • 25 feet buffer – SERA Risk Assessment for Imazapyr (page 4-14) predicts drift of 23 feet from 5 mph winds and 68 feet for 15 mph winds. • 50 feet buffer – Minimal drift; would not adversely affect resource. • 70 feet buffer – Offsite movement occurred mostly within 70 feet (California Department of Pesticide Regulation Study).

Monitoring Strategy for the Slapjack Project

Two stages of monitoring are discussed in this appendix: implementation and effectiveness. Implementation monitoring determines the degree and extent to which application of standards and guidelines and mitigation measures meets management direction and intent. Effectiveness monitoring is used to determine the degree to which implemented resource management activities met objectives. The effectiveness of standards, guidelines, or mitigations cannot be assessed without first confirming that those standards and guidelines were actually implemented. Information from monitoring will help guide future activities and/or adjust current management practices.

Overall goals of monitoring activities will be to

1. Provide information useful to managers applying the principles of adaptive management.

2. Assist the public in gauging the success of implementing the resource management activities as designed.

3. Assess the effectiveness of the resource management activities in achieving resource objectives.

The following monitoring activities address the purpose and need of the Slapjack Project. In order to do so, post-implementation assessment will be project specific. In addition, programmatic HFQLG monitoring will occur concurrently (HFQLG final EIS 1999), testing the effectiveness of the entire *Herger-Feinstein Quincy Library Group Forest Recovery Act* (HFQLG Act) Pilot Project, of which the Slapjack Project is only one project. Since the main HFQLG monitoring sites are determined randomly, it is not known yet how many of these sites will be included in the Slapjack Project area. The following efforts will take place during project implementation and after completion of project activities.

Botanical Resources Monitoring

Implementation Monitoring

Implementation monitoring will begin in the year following project implementation. The objective will be to answer the following two questions from the HFQLG Monitoring Plan (1999):

- Were Threatened, Endangered, and Sensitive (TES) plants surveyed and protected?
- Were noxious weed introductions prevented and existing infestations suppressed?

Effectiveness Monitoring

Effectiveness monitoring will begin three years after project implementation. The objective will be to answer the following four questions from the HFQLG Monitoring Plan (1999):

- How do TES plant species respond to resource management activities? Randomly selected units without TES plants will also be selected to determine if any new TES plant occurrences have occurred in response to management activities.
- Were existing infestations of noxious weeds eliminated or contained?
- Were all new infestations of noxious weeds eliminated or did some become established?
- Did new infestations of noxious weeds occur during or following project implementation?

A sample pool of botanical sites will be developed to address each of the above questions. The number of sites in each sample pool would be limited to 30, and if that limit is exceeded, then the sites to be monitored will be chosen randomly. If the limit is not reached, then every site in the pool will be monitored. The monitoring will be done by forest service botanists who will conduct field visits, and record and analyze the results.

Sampling will consist of photo plots established to monitor mastication, thinning, and prescribed fire in areas with botanical concerns. These will be established with fuels and botany personnel and reread jointly.

This monitoring plan follows the direction of the HFQLG Act. Monitoring requirements are detailed in chapter 6, Monitoring Strategy, of the HFQLG Act final environmental impact statement (EIS).

Implementation Monitoring for Canopy Cover Retention

Canopy cover (CC) plays a vital role in ecosystem processes and wildlife habitat. The HFQLG standard and guidelines require specific CC management objectives. A CC implementation monitoring program will

address the needs for guiding adaptive management action. CC monitoring will attend to the following concerns and needs:

- CC will be measured during project implementation (sale administrator or harvest inspector) to confirm a minimum of 40 percent CC in Defensible Fuel Profile Zones (DFPZs) (CWHR size classes 5M, 5D, and 6) and 50 percent CC in individual tree selection areas (CWHR size classes 4D, 4M, 5D, 5M, and 6).
- Provide information useful to managers applying the principles of adaptive management.
- Assess the effectiveness of silvicultural activities in achieving CC objectives.

CC sampling will be done using the GRS densitometer. This common CC sampling tool is also used by the California Department of Fish and Game. Since Forest Service management direction measures wildlife in terms of CWHR specifications set by the California Department of Fish and Game, application of the densitometer will lend to overall consistency in management.

Depending upon the size of the area being surveyed, the number of sample points may vary. The goal of sampling will be to cover an area thoroughly without over-sampling. CC will be calculated using the following formula:

(canopy hits / sample points) × 100 = percent canopy cover

where:

"canopy hits" is the vertical interception of crown cover with the crosshairs as viewed through the densitometer.

Defensible Fuel Profile Zone Monitoring

A. Forestwide DFPZ Monitoring

The HFQLG Act final supplemental EIS Record of Decision (pages 13–14) outlines the monitoring strategy for the HFQLG Pilot Project. This monitoring strategy will apply to all DFPZ maintenance projects, so no additional monitoring strategies would be required (page 3).

B. Project-level DFPZ Monitoring

DFPZ monitoring will not begin for about 5 years after construction has been completed, depending upon funding (see "C. No DFPZ Maintenance" under the "DFPZ Maintenance" section below), because DFPZ effectiveness will not be seriously reduced for approximately 5 to 10 years in plantations and 10 to 20 years in natural stands.

A DFPZ monitoring program will be completed at 2- to 3-year intervals for the Slapjack Project area until the DFPZ is no longer needed or funding is no longer available (see "B. Long-Term (Future) DFPZ Maintenance" under the "DFPZ Maintenance" section below). The Forest Service will fully comply with the Council on Environmental Quality (CEQ) regulations for implementing the *National Environmental Policy Act* requirements prior to conducting any maintenance activities.

C. DFPZ Site-Specific Monitoring Criteria

The objectives for DFPZs include retaining surface fuels less than 3 inches in diameter and around 5 tons per acre and retaining large down woody material, where available, at 10 to 15 tons per acre, after treatment.

When both surface fuels (needles, twigs, branches) and fuel ladders (shrubs, brush, understory trees) exceed predetermined levels (see table F-1), then DFPZ maintenance treatments may be evaluated and scheduled (see "Short- or Long-Term DFPZ Maintenance" under the "DFPZ Maintenance" section below) on a site-specific basis. The priorities for DFPZ treatment are (1) stands that meet both surface fuels and fuel ladder criteria, (2) stands that meet the surface fuel criteria, and (3) stands that meet the fuel ladder criteria.

Table F-5. DFPZ monitoring criteria.

Surface Fuels	Treat If Surface Fuels Exceeds:	Retain After Treatment
0–3 inch diameter	Greater than (>) 7 tons per acre	Around 5 tons per acre
Large down wood	> 15 tons per acre	10–15 tons per acre
Fuel Ladder	**Treat if Fuel Ladder Exceeds:**	**Fuel Height**
Shrubs/brush	> 25 percent ground cover	> 5 feet
Understory trees	> 15 percent canopy cover	> 8 feet

Implementation and Effectiveness Monitoring for Prescribed Fire

Photo plot implementation and effectiveness monitoring

Some plots will be placed in RHCAs and near areas of special botanical resource concern. The remaining plots will be placed in random areas in units with high fuel loading to show fire behavior, consumption, and retention. Plots will also be established in random units throughout the DFPZ to show effectiveness of all the different fuel treatments and mastication. Different treatments include, thinning /underburn, handcut/pile and burn.

The Fuels Officer will determine the photo plot location before burn plan development. GPS will be used to mark and establish plots for photo monitoring. Photos will be taken as the flaming front is passing through the plot area. Different angles might be taken to best illustrate fire behavior. Plots will be revisited one to two days after ignition to compare and contrast consumption and scorch. Revisits to plots will occur one, three, and five years after ignition. Photos will be taken to illustrate scorch, mortality, and regeneration.

Features that will be recorded with photos:

1. Pre-burn – to show existing fuel conditions.
2. Photos during ignition - to show fire intensity/behavior.
3. Postburn – taken 1-2 days post ignition to show burn accomplishments (consumption, scorch).
4. Postburn – taken 1, 3, 5 years post ignition to show accomplishments and effects of fire behavior. (scorch, mortality, regeneration).

Heritage Resources Monitoring

Monitoring during project implementation, in conjunction with other measures, may be used to enhance the effectiveness of the protection measures summarized below.

- All proposed activities, facilities, improvements, and disturbances shall avoid heritage resource sites. Avoidance means that no activities associated with the project that may affect heritage resource sites shall occur within a site's boundaries, including any defined buffer zones. Portions of the project may need to be modified, redesigned, or eliminated to properly avoid heritage resource sites.

- All heritage resource sites within the area of potential effect shall be clearly delineated prior to implementing any associated activities that have the potential to affect heritage resource sites.

- Buffer zones may be established to ensure added protection where the Forest or District Archaeologist determines that they are necessary. The size of buffer zones needs to be determined by the Forest or District Archaeologist on a case-by-case basis.

- When any changes in proposed activities are necessary to avoid heritage resource sites (e.g., project modifications), these changes shall be completed prior to initiating any activities.

Roads and Logging Systems Monitoring

This monitoring plan follows the direction of HFQLG final EIS. Monitoring implementation and effectiveness requirements are detailed in Chapter 6, Monitoring Strategy. Logging Systems activities fall under the Best Management Practices Evaluation Process.

The goals of this monitoring plan are as follows:

1. Collect information to help guide future harvest implementation and adjust current management requirements, if needed.

2. Assist the public in gauging the success of Forest Service management requirements in reducing the erosion impacts to the environment.

3. Assess the effectiveness of resource planning to achieve minimal soil erosion.

Implementation monitoring measures the degree or extent the standard management requirements meet the specified direction. Best Management Practices (BMPs) and "B" and "C" timber sale contract provisions are the mitigation requirement tools used to ensure soil erosion is kept to a minimum. BMP standards for implementation are to be compared to on-the-ground results with an ultimate objective of 100 percent attainment. Results for any BMP that fall below 85 percent will trigger an activity review. The items to be evaluated for Logging Systems are as follows:

1. SMZs = BMPs 1.8 and 1.19.
2. Skid Trails = BMPs 1.9, 1.10, 1.11, 1.12, 1.13, 1.17, 1.20 and 1.21.

3. Landings = BMPs 1.12, 1.13, 1.14, 1.16, 1.20 and 1.21.
4. Temporary Roads = BMPs 1.13, 1.14, 1.20 and 1.21.
5. Road Decommissioning = BMP 2.26.

Effectiveness Monitoring: Measures the degree to which the resource activities (harvesting near Streamside Management Zones (SMZs), building or using existing skid trails, landings, temporary roads and road decommissioning) will meet the BMP erosion control features. The tilling machine that travels over the top of the constructed water bars can seriously affect the long term effectiveness. Water bars need to be constructed to a height sufficient to survive the tilling process and still function properly.

Locations and Frequency: At the implementation monitoring stage, a random sample of units will be developed at the end of each year. From these samples, a representative number of units will be selected for evaluation.

At the effectiveness monitoring stage, an assessment will follow one to three years behind the implementation monitoring at the same site location to assure the erosion control features will continue to function for the long term.

Monitoring for Cumulative Watershed Effects

Implementation and effectiveness monitoring for cumulative watershed effects are currently accomplished through the Best Management Practice Effectiveness Evaluation Process.

Sampling Design

Sites to be evaluated are identified by random or non-random sampling selection procedures. The random selection process for monitored sites involves looking at projects in the Feather River Ranger District. Within the selected project, randomly selected units that meet certain issues deemed appropriate by the hydrologist are then designated for monitoring. If the unit does not require monitoring, another is chosen within the project area. Randomly identified sites are very important for drawing statistical conclusions on the implementation and effectiveness of BMPs. Non-randomly selected sites allow for direct monitoring of management practice effectiveness within an area that may have an elevated level of Threshold of Concern. Non-random selected sites are clearly identified and kept separate from the randomly selected sites by the Forest Hydrologist during data storage and analysis.

Non-random selected sites are identified in various ways:

- Identified as part of a monitoring plan prescribed in an environmental assessment, environmental impact statement, or a land and resource management plan.
- Identified as part of a settlement or negotiated agreement.
- Part of a routine site visit.
- Sites that are of particular interest to site administrators, specialist and/or management due to their sensitivity, uniqueness, and so forth.

- Selected for a particular reason specific to local needs.

Wildlife Adaptive Management and Monitoring

Implementation monitoring will occur in a prescribed light underburn in a Protected Activity Center (PAC) and a Spotted Owl Habitat Area (SOHA). Effectiveness monitoring will examine the ability of fire and resource managers to predict the outcome of fire-related effects and will enable land management agencies to more predictably apply prescribed natural fire as a tool to enhance owl habitat.

Monitoring will occur by (1) surveys to protocol the following year to confirm any single/pair detections and/or reproductive success – measure of success is rated by how habitat changes caused by the underburn affected owl productivity; (2) field reviews and photo points of the area to compare and evaluate light underburn – measure of success is through photo comparison; (3) drawing conclusions from the relationship between reproductive success and implementation of the treatment.

The monitoring frequency will be (1) visual monitoring at the time of treatment, (2) field surveys for owl presence the following year, (3) productivity and owl use over a three-year period.

Herbicide Monitoring

Draft herbicide monitoring plans have been developed for surface water and streambeds, groundwater, and soil. The draft monitoring plans represent protocols that will be followed if alternatives are chosen that include herbicide application. If such alternatives are adopted for the project, detailed monitoring plans based on these protocols will be developed.

Surface Water and Streambed Monitoring Plan

Since 1988, water quality monitoring has been required for all projects, which include the use of herbicides in Forest Service Region 5. In that year, the Region adopted the Final Environmental Impact Statement: Vegetation Management for Reforestation (1988) and the Record of Decision, which required the monitoring.

The treated area could be as large as 1,989 acres and could be carried out for up to five years. If any action alternative that proposes the use of any herbicide is approved, a site-specific monitoring plan amendment will be prepared each year by the water-quality monitoring specialist. It will specify units and streams to be monitored and will give a schedule of monitoring by herbicide.

The overall objective of this plan is to assess the effectiveness of project BMPs and other mitigations in protecting beneficial uses of water in and downstream of the project area. Specific objectives are to

1. determine if an applied herbicide has moved off-site into water through overland flow, leaching through the soil into groundwater, or attached to sediments;

2. determine the amount of herbicide residue reaching water;

3. determine if herbicide residue has entered the water, to determine how long it continues to enter the water;

4. assess project compliance with state of California water quality standards as described in the Central Valley Regional Water Quality Control Board Basin Plan (CVRWQCB 1989).

This monitoring plan assumes that all mitigation measures outlined in the EIS, including streamside and riparian buffers and Limited Operating Periods, will be followed. These measures have been designed based on data gathered on similar projects on other National Forests in California. The intent of the design is to ensure extremely high confidence levels that no herbicide residues will be detected in the water.

Beneficial uses of water that could be potentially impacted by this project are identified in the EIS in both the "Soils" and "Hydrology" sections in chapter 3. Because stream classes are based on beneficial uses of water, and generally correspond to flow conditions and size of channel, selection of highest priorities for monitoring purposes will use those criteria. The priorities in table F-3 will be used to select monitoring locations:

Table F-6. Priorities for monitoring locations.

Priority	Stream Class	Description	Beneficial Uses	Treatment
I (Highest)	Class 1	Perennial	Domestic, Fishery	Imazapyr
II	Class 1	Perennial	Domestic, Fishery	Triclopyr
III	Class 2-3	Intermittent or ephemeral	Aquatic life, Non-contact Recreation	Imazapyr
IV	Class 2-3	Intermittent or ephemeral	Aquatic life, Non-contact Recreation	Triclopyr

Because one of the purposes of monitoring is to test the effectiveness of BMPs, including stream protection buffers, the prioritization of units should not consider the effective distance of the actual sprayed area from the water body. The ranking is only based on whether a unit includes or is proximal to surface water, springs, or wells. The assignment of priorities is for the purpose of allocating monitoring resources and is not a statement of any actual probability of herbicides reaching water. A minimal number of monitoring stations will be selected regardless of the number of units falling into the higher priority categories.

The majority of monitoring stations will be located on perennial or intermittent, first or second-order streams draining not more than 1,000 acres. Average base (summer) flow will be less than 1 cubic foot per second. The drainage area upslope of the sample station will generally contain at least 25 percent treated area for DFPZ units. These guidelines are intended to limit the distance downstream from the treated area that most sampling stations will be located. A limited number of downstream monitoring stations will also be established to monitor for cumulative effects and as a realistic test of compliance with numerical water quality criteria.

Each monitoring point will be identified on the ground with a code number. Each station location will be recorded using a code number on a USGS Quadrangle or similar map. The monitoring location maps will be kept on file by the water-quality monitoring manager at the Feather River District Office and become part of the project file. For each station, the project file will also include a narrative description of the exact station location, the units monitored, the herbicides monitored, and documentation of all samples collected. Because of security concerns, the information in this project file will not be made available to the general public until after

the monitoring for each year's project is complete, in order to protect the integrity of the data. This stipulation has been part of the Region 5 Water Quality Monitoring Plans for herbicide projects since 1990.

Early warning monitoring will not be necessary for this project because the following measures will be taken to reduce the probability of herbicides entering water during application: (1) herbicide application will be by backpack sprayers or other ground-based methods and will be under restricted weather conditions to minimize drift; (2) colorant will be added to the spray formulation to track drift; and (3) untreated buffer strips will be established between surface water and treatment units.

Surface water and streambed sediment samples will be collected before and after herbicide application. Pretreatment samples will serve as control samples. The timing of post-treatment samples will be determined by storm events and snowmelt runoff periods. Sampling frequency for each location will depend on the herbicide monitored and time of application.

Personnel trained in sample collection by an experienced sample collector will collect samples. Sample collectors will not have been involved in herbicide application within two weeks of the event that triggers sample collection. Extreme care will be taken to prevent sample contamination. The collectors will not have any herbicide or other contaminant on clothing, hands, or boots. Sample containers will not be transported or stored with herbicides or herbicide application equipment or in vehicles used to transport the herbicides. A sample documentation form will be filled out at each collection station. Each sample bottle will be clearly identified as follows: (1) monitoring station ID number; (2) date and time of sample collection; (3) name of person collecting sample; (4) sample matrix; and (5) herbicide to be analyzed. This information as well as weather conditions and an estimate of stream discharge will also be recorded on the form, which will be kept in the project file.

After collection, the monitoring manager, who will coordinate transport to the laboratory, will receive samples. Samples will be transported in an ice-filled cooler and delivered to the laboratory within 72 hours of collection. A chain of custody form will accompany each sample.

Water samples will be collected so as to be representative of the total volume of water passing the monitoring station at any moment. Samples will be collected at the lower end of a straight riffle section of channel near the fastest moving portion of the stream at a time when the runoff from treated areas is expected to pass the station. Sample locations may be sited to facilitate access during winter conditions as necessary.

In past herbicide monitoring in Region 5, composite sampling has not been shown to be more effective in detecting herbicide residues than the simpler grab sampling. It has not been shown that the added expense, opportunities for contamination, and risk to personnel is justified for composite sampling. Therefore, all samples will be 1-liter grab samples.

Streambed sediments will be sampled to monitor for possible herbicide accumulations and cumulative watershed effects. Streambed deposits can act as a chemical sink as herbicide residue in the water adsorbs to suspended sediments or sediment particles. This herbicide residue can go undetected by sampling water above the streambed.

Streambed sediment samples will be collected following the first runoff-producing event after application. A composite sample of approximately 50 grams of fine material will be collected, if present, in the surface 1 cm (centimeter) from depositional areas. These areas will be in the stream channel near where the water samples are collected. It is not practicable to collect sediment if sufficient quantities of fine sediments are not present

over a reasonably contiguous section of the stream. If there is no suitable location near a sampling station to collect a sediment sample, no sample will be collected. The monitoring specialist may assign an alternative sediment sampling location if there is no suitable location close to the water monitoring station. If a sample contains herbicide residue, additional samples will be collected as discussed above.

Public involvement will be an important part of the monitoring plan. Public involvement objectives are to provide an open and informative monitoring process and to promote trust and understanding of project implementation and progress. A format will be developed to invite public comment and input regarding the monitoring protocol and results, and to present monitoring results in a timely and transparent manner.

A California state-certified laboratory using methods developed and approved by the California Department of Food and Agriculture, the U.S. Food and Drug Administration, or the U.S. Environmental Protection Agency will analyze samples. The laboratory may use methods developed for analysis of drinking water or wastewater, but should do so in consultation with the monitoring manager, and must report the method used. Detection limits for the various herbicides will be included in the cost bid provided by the lab. Some flexibility may be allowed in detection limits, depending on the quality and volume of the sample provided. Sample containers will be provided by the analyzing laboratory, and will be certified as residue-free by the lab.

For quality assurance (QA), blank and spiked samples will be sent to the lab with selected sample batches. Because field samples are collected on an irregular schedule and often without prior notice, it may be unnecessarily difficult to provide blanks and spikes with every sample batch. The primary purpose of this QA program is to ensure the reliability of the lab's conduct, not to provide a statistical measure of the lab's accuracy. Before any samples are submitted, the lab will be notified that quality control (QC) samples may be submitted with any or all samples. Under no circumstances will the lab be informed when QC samples are included in a batch, and QC samples will not be identifiable by the lab.

To provide a measure of the lab's accuracy, the lab may be requested to provide its QC data sheets. These and a record of results from analysis of the submitted QC samples will be kept in the project record.

Spike samples or standard dilutions may be prepared by Forest Service personnel or purchased from an analytical lab. If purchased from a lab, they should not be submitted for quality control to the same lab. A qualified expert will train any Forest Service personnel preparing standards or QC samples in laboratory procedures. Excess standard solution should be disposed of properly, which, in the case of dilute herbicides, means used in a manner consistent with the approved purpose. A detailed record will be kept of the procedures followed in preparing all spikes, concentrations submitted to labs, and results reported by the labs.

The monitoring record discussed above will include maps, field notes, and all records of correspondence with the laboratory, organizations, groups, and individuals concerning results of the water and sediment monitoring. The monitoring station records will include the complete record of the sample station, remarks on any unusual occurrence that might affect water analysis results, and a description of the treatment units within the drainage area of the sample point. In addition, the water-monitoring file will include information by unit on the following:

1. Type of herbicide, formulation, and manufacturer.
2. Application formula and rate.
3. Method of application.

4. Weather conditions during spraying and monitoring.

As results of monitoring are received from the lab, the monitoring manager will notify the project manager of any results, which suggest changes in preventive measures are needed during project implementation.

An annual summary report will be prepared that will contain analysis results and a narrative of the effectiveness of the BMPs implemented in order to protect water quality. This report will be kept on file in the Feather River District Office and with the District Hydrologist. Copies will be sent to the California Central Valley Regional Water Quality Control Board and circulated to appropriate line officers and to any other person requesting the report.

Groundwater Monitoring Plan

The objective of groundwater monitoring is to meet the goal of protecting beneficial uses of water. Groundwater monitoring is required when herbicides that can be transported in solution are used. Groundwater monitoring is important to avoid aquifer contamination. The three objectives of groundwater monitoring include: (1) early warning of any contamination in order to warn potentially affected users in a timely manner; (2) detection of off-site migration of herbicides associated with uncertainty related to groundwater conditions and climatic events; and (3) determining the persistence of any potential contamination.

Beneficial uses of groundwater, including domestic water supplies and uses associated with natural discharge points such as springs and seeps and groundwater discharge to streams, will be evaluated. Monitoring will ensure that beneficial uses are protected above and beyond the protective and mitigation measures specified in the EIS, such as riparian buffers and limited operating periods.

It is unclear that either of the herbicides proposed for use (imazapyr and triclopyr) poses any substantial risk of groundwater contamination. Leaching potential for both chemicals under the conditions prevalent in the project area (soils with high clay content and high organic matter content) is described as low. Monitoring will be used to ensure the safety of application and negate any risk to beneficial uses and users.

Groundwater monitoring locations will be identified by a qualified geologist, and will be chosen based on the location of beneficial uses, the local hydrogeologic conditions, and the objectives described above. Monitoring wells constructed to meet the monitoring objectives and conditions and accepted standards for sampling will be installed. Pre-, during, and post-application sampling will be performed to establish baseline conditions, provide early warning as needed, and document any persistence and off-site migration. Post-treatment sampling will continue as determined by hydrogeology, climatic events and herbicide chemistry. Pre-treatment monitoring will determine if there is any existing herbicide load in groundwater, and help evaluate the possibility of cumulative effects.

Sample handling and analysis protocols will follow the procedures outlined for surface water monitoring.

Soil Monitoring Plan

The objectives of soil monitoring are parallel to those for surface water and groundwater monitoring, in order to protect beneficial uses. Herbicide retention in soils is of interest where erosion potential or leaching potential may transport chemicals retained in soil to surface water bodies or ground water and potentially impact beneficial uses of water. Soil monitoring will be performed to ensure that beneficial uses are protected

above and beyond the protective and mitigation measures specified in the EIS, such as riparian buffers and Limited Operating Periods. Specific soils that have a high potential for herbicide persistence or leaching will be targeted for monitoring. These will include soils with high surface clay percentage, sandy soils where herbicides will likely be mobile, and poorly or excessively drained soils near stream channels or other riparian features. The focus of soil monitoring would be persistence of imazapyr, since it can remain active in soil for long periods. However, since repeated application of triclopyr is proposed for noxious weed control, monitoring would be established for its presence where weed control with herbicides is proposed.

Soil sampling will include the litter layer where present and the surface 3 inches of soil. Pre- and immediate post-treatment sampling would be performed to determine baseline conditions and establish concentrations resulting from spraying. Follow-up sampling three or more months after application would be performed and repeated as needed to track any persistence.

Sample handling and analysis protocols will follow the procedures outlined for surface water monitoring. Clean core samplers that have not previously been in contact with herbicide or possibly contaminated soil will be used for each sample taken.

Appendix G

National Forest Management Act Findings for the Slapjack Project

Appendix G
National Forest Management Act Findings for the Slapjack Project

V. FINDINGS REQUIRED BY OTHER LAWS AND REGULATIONS

Based on the analysis and prescriptions for stands in the Slapjack Project area, the following finding of facts pursuant to the *National Forest Management Act* (NFMA) (16 USC 1604), are as follows:

A. The minimum specific management requirements to be met in carrying out projects and activities for the National Forest System are set forth in this section. Under 16 U.S.C. 1604 (g)(3)(E) a Responsible Official may authorize project and activity decisions on NFS lands to harvest timber only where:

1. Soil, slope, or other watershed conditions will not be irreversibly damaged.

The Plumas National Forest Land and Resource Management Plan (LRMP) Forest-wide Standards and Guidelines as amended by Herger-Feinstein Quincy Library Group Forest Recovery Act (HFQLG FRA) and the Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement Record of Decision (SNFPA FS EIS ROD) relating to soil cover, water quality, and riparian system protection, along with Scientific Assessment Team (SAT) guidelines and Best Management Practices (BMPs) would be implemented to protect and mitigate potential impacts to soil and water quality.

The District Hydrologist has determined through a Cumulative Watershed Effects (CWE) Analysis that no irreversible or irretrievable commitments of soils, riparian, or water resources are expected for any alternative (See Hydrology and Soils Reports).

2. There is assurance that such lands can be adequately restocked within five years after harvest.

All trees proposed for removal under the Slapjack Project would be by thinning from below for the DFPZs and individual tree selection or by group selection, which is an unevenage method.. Therefore, no regeneration harvests are proposed under this project. However, the areas proposed for harvest under group selections can be regenerated using standard reforestation techniques.

3. Protection is provided for streams, streambanks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment, where harvests are likely to seriously and adversely affect water conditions or fish habitat.

The Plumas National Forest Land and Resource Management Plan Forest-wide Standards and Guidelines as amended by Herger-Feinstein Quincy Library Group Forest Recovery Act (HFQLG FRA) and the Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement Record of Decision (SNFPA FS EIS ROD) relating to soil cover, water quality, and riparian system protection, along with Scientific Assessment Team (SAT) guidelines and Best Management Practices

(BMPs) would be implemented to protect and mitigate potential impacts to soil and water quality.

4. **The harvesting system to be used is not selected primarily because it will give the greatest dollar return or the greatest unit output of timber.**

   Trees proposed for removal under this project are in segments of Defensible Fuel Profile Zones (DFPZs) called for by Herger-Feinstein Quincy Library Group Forest Recovery Act (HFQLG FRA) or in units that lend themselves to individual tree and group selection. The purpose of removing trees is to reduce ladder fuels and crown density. Harvest and treatment methods are used to implement this direction within the limits imposed by SNFPA FS EIS ROD. In those areas where trees are removed for commercial purposes, the primary silvicultural method is intermediate harvest (thinning from below) and utilizes ground-based equipment. In the units of group and individual tree selection a commercial sale is likely. Even aged management would give higher outputs and value, but is not proposed.

   It is likely there would be an economic timber sale with this proposal, but there would also be a service contracts with an embedded timber sale. Wood products would be removed from the area for use in local mills or energy plants but not in the quantities anticipated with HFQLG FRA.

   SNFPA FS EIS ROD standards and guides reduce opportunities for an economical return and produce nominal timber outputs. The various treatment methods and systems were prescribed to provide a viable method of meeting a wide variety of resource management objectives without optimizing one resource at the expense of another.

B. A Responsible Official may authorize project and activity decisions on National Forest System lands using clearcutting, seed tree cutting, shelterwood cutting, and other cuts designed to regenerate an even-aged stand of timber as a cutting method only where:

Even-aged management would not be applied to the stands at this time.

1. **For clearcutting, it is determined to be the optimum method, and for other such cuts it is determined to be appropriate, to meet the objectives and requirements of the relevant land management plan (16 U.S.C. 1604 (g)(3)(F)(i));**

   Group selection harvests (0.5 – 2.0 acres) are an uneven age management method and are allowed by SNFPA FS EIS ROD, Table 2, page 68.

2. **The interdisciplinary review as determined by the Secretary has been completed and the potential environmental, biological, esthetic, engineering, and economic impacts on each advertised sale area have been assessed, as well as the consistency of the sale with the multiple use of the general area (16 U.S.C. 1604 (g)(3)(F)(ii));**

   The ID team used a systematic, interdisciplinary approach to analyze the affected area and estimate the environmental effects. The analysis included input through public involvement. The ID analysis was based on LRMP direction, as amended by HFQLG FRA and SNFPA FS EIS ROD of 2004.

3. **Cut blocks, patches, or strips are shaped and blended to the extent practicable with the natural terrain (16 U.S.C. 1604 (g)(3)(F)(iii));**

   Even-aged management would not be applied to the stands at this time. However, group selection areas are dispersed, and the shapes are, indeed, naturally appearing.

4. **There are established according to geographic areas, forest types, or other suitable classifications the maximum size limits for areas to be cut in one harvest operation, including provision to exceed the established limits after appropriate public notice and review by the responsible Forest Service officer one level above the Forest Service officer who normally would approve the harvest proposal; provided, that such limits shall not apply to the size of areas harvested as a result of natural catastrophic conditions such as fire, insect and disease attack, or windstorm (16 U.S.C. 1604 (g)(3)(F)(iv)); and**

   The Slapjack Project is designed to fulfill the management direction specified in the Plumas National Forest Land and Resource Management Plan, as amended by the HFQLG ROD (1999) and the SNFPA FS EIS ROD (January 21, 2004).

   To implement group selection harvest from 0.5 to 2.0 acres in size, as directed in the HFQLG Act (Section 401 (b) (1) and (d) (2)) and the HFQLG Forest Plan Amendment, to test the effectiveness of an uneven-aged silvicultural system in achieving an all-aged, multi-story, fire resilient forest; provide an adequate timber supply that contributes to the economic stability of rural communities; and promote ecological health of the forest.

   The HFQLG Forest Recovery Act specifies treating annually 0.57% of the pilot project acreage with group selection harvests. In Appendix E – Group Selection Analysis in the HFQLG EIS there is a calculation of 8,700 acres being treated annually over the pilot project land base. The proposed group selection harvests (219 acres) are within the calculated 20-year re-entry levels (1228 acres) of group selection targets for the Slapjack Project area.

5. **Such cuts are carried out in a manner consistent with the protection of soil, watershed, fish, wildlife, recreation, and esthetic resources, and the regeneration of the timber resource (16 U.S.C. 1604 (g)(3)(F)(v)).**

   No harvest cuts are designed to regenerate even-aged stands. However, soil, watershed, fish and wildlife, recreation, and aesthetic resources would be protected. Also, as stated above all areas can be regenerated using standard methods.

6. **Under 16 U.S.C. 1604 (m) even-aged stands of trees scheduled for regeneration harvest generally have reached culmination of mean annual increment of growth, unless the purpose of the timber cutting is excepted in the land management plan (FSM 1921.17f).**

   Even-aged management would not be applied to the stands at this time. Group selection harvests (0.5 – 2.0 acres) are an uneven age management method.

Appendix H

Agency and Public Comments on the Slapjack Project Draft EIS and Forest Service Reponses to Comments

Appendix H
Agency and Public Comments on the Slapjack Project Draft EIS and Forest Service Reponses to Comments

This section of the final environmental impact statement (EIS) on the proposed Slapjack Project provides grouped responses to the 51 agency and public comment letters received on the draft EIS. The letters received from the agencies are reproduced in this appendix. All letters from the public are available **upon** request. The original letters are located with the individual comment review documents in the project record file. Table H-1 lists the agencies, organizations, and individuals who submitted comments.

Nearly half of the letters received addressed public concerns over the potential effects on health and human safety, wildlife and botanical species, soils, and watersheds related to the proposed use of herbicides for noxious weed abatement and Defensible Fuel Profile Zone (DFPZ) treatments. Most of the concerns raised repeated those brought forward during the public scoping period for the Slapjack Project. The majority of the letters expressing concern over the use of herbicides, but otherwise noted support for the rest of the project's proposed actions. The majority of the letters expressed strong support for the DFPZ aspects of the project and the project as a whole, withstanding potential herbicide application. Three letters raised specific concerns related to potential project effects on the California spotted owl and its habitat, soil compaction, and concerns about potential project activity in watersheds above the Threshold of Concern. Almost half of the comment letters stated public support for the project and the Forest Service preferred alternative (alternative D).

Table H-2 is organized by headings of the key public concerns and Forest Service responses. These headings are as follows:

A. General

B. Herbicides – Drift And Buffers

C. Herbicides – Human Health And Safety

D. Noxious Weed And Botanical Concerns

E. Wildlife Concerns
   - Wildlife – Herbicides
   - Wildlife – General
   - Wildlife – Amphibian
   - Wildlife – Fisheries
   - Wildlife – California Spotted Owl
   - Wildlife – Management Indicator Species

F. Soils and Hydrology Concerns (Including Herbicides)

G. Fire Resiliency Related Concerns (Including Herbicides)

H. Socio-Economic Concerns

I. Group Replacement Concerns

J. Traditional Indian Cultural Concerns

K. NEPA and Regulatory Compliance Concerns

The following submitted comments on the draft EIS (also see table H-1 below).

Native American Tribes

- California Indian Basketweavers Association (CIBA)
- Tyme Maidu Tribe Berry Creek Rancheria

Federal Agencies

- U.S. Environmental Protection Agency, Region IX
- U.S. Department of the Interior, Office of Environmental Policy and Compliance

State of California Agencies

- No letters received

Local Agencies

- Butte County Fire Safe Council
- Yuba Watershed Protection and Fire Safe Council
- Yuba County Rural Fire Joint Powers Agency
- County of Yuba, office of the Board of Supervisors
- Counties of Lassen, Plumas, Shasta, Sierra and Tehama QLG Forester

Nongovernmental Organizations

- American Forest Resource Council (AFRC)
- Californians for Alternatives to Toxics (CATS)
- Dobbins/Oregon House Action Committee (DOACT)
- John Muir Project
- Lake Francis Grange #745
- Lassen Forest Preservation Group
- South Feather Water and Power
- Sierra Nevada Forest Protection Campaign
- Sierra Pacific Industries

Individuals (in alphabetical order, by last name)

- Ashmore, Julie
- Banzaf, Joyce
- Bault, William
- Black, Stephen
- Buschman, Sarah
- Cook, Rikki
- Davis, Carrol
- Doner, Marc
- Frederickson, Lana
- Furnee, Mariele
- Hai, XiangShu
- Heming, Charles
- Holcomb, Charles and Liz
- Holmes, Wendy
- Hoskins, Phil and Jean
- Kellerman, Larry
- Kennedy, Ashley
- Mathiessen, Dougan and Bernie
- Meyer, Ken
- Middlebrook, John
- Murphy, Robin
- Murphy, Tony
- Olson, Laura
- Pugh, Roger and Helen
- Richardson, Steffanie
- Schroeder, Fred
- Silvan, Sean
- Steele, Don
- Steidl, Bruce and Leslie
- Wright, Alton

Table H-1. List of agencies, organizations, businesses, and individuals who provided comments on the Draft EIS during the Public Comment Period (*Federal Register*, February 24–April 10, 2006).

Letter Number	Agency, Organization, Business, or Individual
1.	Laura R. Olson, Challenge CA. (2/24/06)
2.	Alton Wright, Brownsville, CA (2/27/06)
3.	Pete Hammontre, Dobbins/Oregon House Fire Protection District, Oregon House, CA (3/8/06)
4.	Charles Heming, No Address, Oral Comment (3/13/06)
5.	XiangShu Hai, Cerritos, CA (3/13/06)
6.	Marc Doner, Challenge, CA (3/7/06)
7.	South Feather Water and Power, Oroville, CA (3/15/06)
8.	John Middlebrook, No address, (3/17/06)
9	Glen Nader, Yuba Watershed Protection and Fire Safe Council Yuba County, CA (3/12/06)
10.	Joyce Banzaf, Grass Valley, CA (3/24/06)
11.	Richard Dahms, Lake Francis Grange #745, Dobbins, CA (3/24/06)
12.	Greg Compton, Dobbons/Oregon House Action Committee (DOACT), Oregon House, CA 3/24/06)
13.	Peter Harrison, Patricia Clary, Californians for Alternatives to Toxics (CATS), Eureka, CA (3/28/06)
14.	Bill Wickman, American Forest Resource Council, no address, (3/29/06)
15.	The County of Yuba, Office of the Board of Supervisors, Marysville, CA (3/28/06)
16.	Jim Brobeck, Lassen Forest Preservation Group, Chico, CA (4/3/06)
17.	Stephan Black, Oregon House, CA (4/3/06)
18.	Chad Hansen, John Muir Project, Cedar Ridge, CA (4/3/06)
19.	Jean Pierson, Yuba County Rural Fire Joint Powers Agency, Oregon House, CA (3/29/04)
20.	Larry Kellerman, Forbestown, CA (3/30/06)
21.	William Bault, Nevada City, CA (4/6/06)
22.	Julie Ashmore, Brownsville, CA (4/6/06)
23.	Bill Wickman, American Forest Resource Council, no address, (4/7/06)
24.	Ken Meyer, Brownsville, CA (4/7/06)
25.	Lana Fredrickson, no address (4/7/06)
26.	Charles and Liz Holcomb, Challenge, CA (4/7/06)
27.	Fred Schroeder, Oregon House, CA (4/8/06)
28.	Rikki Cook, Challenge, CA (4/7/06)
29.	Sean Silvan, Forbestown, CA (4/10/06)
30.	Robin Murphy, Challenge, CA (4/5/06)
31.	Ashley Kennedy, Forbestown, CA (4/10/06)
32.	Sarah Buschman, Forbestown, CA (4/7/06)
33.	Steffanie Richardson, Brownsville, CA (4/7/06)
34.	Bruce and Leslie Steidl, Oroville, CA (4/10/06)
35.	Darrel Wilson, Butte County Fire Safe Council, Paradise, CA (4/10/06)
36.	David Edelson, Sierra Nevada Forest Protection Campaign, Berkeley, CA (4/10/06)
37.	Wendy Holmes, no address, (4/10/06)
38.	Tony Murphy, Challenge CA (4/10/06)
39.	Chad Hansen, John Muir Project, Cedar Ridge, CA (4/10/06)
40.	Dougan and Bernie Matthiessen, no address, (4/10/06)
41.	Vivian Parker, CIBA, Woodland, CA (4/10/06)
42.	Mariele Furee, Oregon House, CA (4/13/06), received after close of comments but considered
43.	Jim Edwards, Tyme Maidu Tribe, Oroville, CA (4/10/06)

Table H-1. List of Agencies, Organizations, Businesses, and Individuals Who Provided Comments on the Draft EIS During the Public Comment Period (*Federal Register*, February 24–April 10, 2006) (continued).

Letter Number	Agency, Organization, Business, or Individual
44.	Don Steele, Magalia, CA (4/13/06), received after close of comments but considered
45.	Kenneth Wilde, Sierra Pacific Industries, Lincoln CA (4/13/06), received after close of comments but considered
46.	Patricia Sanderson Port, Department of the Interior, Oakland, CA (4/13/06,) received after close of comments but considered
47.	Frank Stewart, QLG Counties Forester, Chico, CA (4/13/06), received after close of comments but considered
48.	Phil and Jean Hoskins, no address, (4/20/06), received after close of comments but considered
49.	Carol Davis, Oregon House, CA (4/20/06), received after close of comments but considered
50.	Diane James, Environmental Protection Agency Region IX, San Francisco, CA (4/26/2006), received after close of comments but considered
51.	Roger and Helen Pugh, Oregon House, CA (4/27/06), received after close of comments but considered

Note:

a. The initial Scoping Letter was mailed to agencies, tribal governments, groups, and individuals on February 16, 2006. The Notice of Availability was published in the *Federal Register* on February 24, 2006; this date began the public comment period, which closed on April 10, 2006. In addition, the USDA Forest Service, Plumas National Forest, sent press releases to numerous local newspapers and radio media outlets.

Table H-2. Comments on the draft EIS and Forest Service responses to comments.

Comment Letter	Comment / Concern Statement	Forest Service Response
CATEGORY A: GENERAL		
1, 2, 4, 5, 10, 13, 16, 17, 21, 22, 25, 26, 27, 28, 29, 30, 31, 32, 33, 37, 38, 40, 41	**Public Concern:** Opposed to using herbicides for Defensible Fuel Profile Zone (DFPZ) maintenance and noxious weed control. Opposed to any herbicide spraying that is conducted in the Slapjack Project area. Do not spray herbicides near the Leaves of Learning Family Literacy Center in Challenge. Do not use herbicides around the following communities: Brownsville, Bullard's Bar Dam, Clipper Mills, Challenge, Dobbins, Feather Falls, Forbestown, Strawberry Valley, and Woodleaf. Herbicides are not necessary to meet the Slapjack Project's purpose and need for action. Consider other (nonherbicide) alternatives that are less harmful to the environment and human health to control brush and noxious weeds. There is no safe tolerance level for the use of herbicides in our environment.	Thank you for providing comments on the Slapjack Project EIS. The Forest Service acknowledges your opposition to herbicide spraying on National Forest System lands. The appropriateness of considering the use of manual, mechanical, thermal, or chemical (herbicides) methods as a part of Integrated Pest Management (IPM) on National Forest System lands is based on legal, regulatory, and policy requirements. In addition, the 1988 *Plumas National Forest Land and Resource Management Plan* (the "Forest Plan"), as amended by the HFQLG final supplement EIS, calls for the consideration of all practicable methods of vegetation control for site-specific projects, including the use of herbicides.
3, 7, 9, 11, 12, 15, 19, 20, 24, 34, 35	**Public Concern:** Supports the Slapjack Project and the treatment methods that would be used to maintain DFPZs and control noxious weeds. Supports the Forest Service in its efforts to protect our communities and watersheds from fire through the creation of DFPZs. Supports the continued maintenance of DFPZs in the future and endorses vegetation management for their upkeep. Supports the goal to create fire-resistant, resilient, ecologically healthy forest stands. The Slapjack Project is of major importance to our communities as we have seen the environmental effects of both the Williams and Pendola fires. We who live in forested areas understand the need for projects like Slapjack and deeply appreciate your efforts to protect us. Considering all factors, we believe the benefits of the Slapjack Project are substantial and by far outweigh any possible negative environmental impacts. The proposal has more than adequately addressed the potential impacts of using herbicides for vegetation management and that such use is the most economical and effective means available. We also praise the forest for incorporating the public's concern for herbicide use in the forest by limiting herbicide use to only 31 acres for noxious weed control.	Thank you for providing comments on the Slapjack Project draft EIS. The Forest Service acknowledges your support of the Slapjack Project in creating and maintaining DFPZs, controlling noxious weeds, and creating fire-resistant, resilient, and ecologically healthy forest stands.

Comment Letter	Comment / Concern Statement	Forest Service Response
6	**Public Concern:** Herbicides are not being used for DFPZ maintenance. Alarmed to find that the Forest Service preferred alternative (alternative D) excludes the use of herbicides for maintenance on 1,954 DFPZ acres. Need to consider the economic factor of not using herbicides.	Thank you for providing comments on the Slapjack Project draft EIS. The Forest Service acknowledges your concern about not using herbicides for DFPZ maintenance. Under the 1988 *Plumas National Forest Land and Resource Management Plan*, as amended by the HFQLG final supplement EIS, there are two strategies for controlling or maintaining vegetation in DFPZs. One strategy is to prevent or delay the build up of woody vegetation, such as shrubs and small hardwood trees, by using herbicides (as proposed in Slapjack Project EIS alternatives B, E, and F). The other strategy is to maintain DFPZs by repeated use of prescribed burning, manual, or mechanical methods (as proposed in Slapjack Project EIS alternatives C, D, and G) when woody vegetation reaches a specific threshold (as detailed in appendices D and F of the Slapjack Project EIS). The "Economics" section (3.4.5) of the Slapjack Project EIS and appendix E analyze the economic impacts of the various proposed treatment methods that would be used for DFPZ maintenance.
CATEGORY B: HERBICIDES – DRIFT AND BUFFERS		
37, 41	**Public Concern:** Drift from imazapyr can damage nontarget plants from great distances. Drift of small amounts of herbicide can severely damage valuable plants, since imazapyr is a potent herbicide. Imazapyr is exceptionally toxic to plants and long lived in the environment, and should not be considered for use on national forest lands. Imazapyr products are among the most toxic herbicides to plants, and drift can inflict damage at great distances.	Management requirements are in place to control herbicide drift during herbicide application. These include consideration of factors such as equipment, spray nozzle size, wind speed and direction, humidity and temperature (Slapjack EIS, appendix F, table F-2, BMP 5-13). In addition, buffer widths are established to protect and minimize herbicide effects on various resources (Slapjack EIS, appendix F, table F-4). Aerial and broadcast (low boom ground spray) herbicide application methods are not proposed for use in the Slapjack Project area because the drift potential is greater with these two methods than using backpack spray equipment. The drift potential is expected to be less than 25 feet with when using backpack spray equipment and applying herbicides when the wind speed is 5 miles per hour or less. According to the human health and ecological risk assessment for imazapyr (SERA, 2004, pages 4-13 to 4-14), "drift associated with backpack (directed foliar applications) is likely to be much less than low boom ground spray, although studies quantitatively assessing drift after backpack applications have not been encountered. In typical backpack ground sprays, droplet sizes are greater than 100 microns, and the distance from the spray nozzle to the ground is 3 feet or less. For most applications, the wind velocity will be no more than 5 miles per hour. Assuming a wind direction perpendicular to the line of application, a 100 micron particle falling from 3 feet above the surface could drift as far as 23 feet. At wind speeds up to 15 miles per hour, a 100 micron droplet can drift as far as 68 feet." Consequently, the Slapjack Project proposes to limit herbicide applications to a wind speed of 5 miles per hour or less to minimize drift.

Comment Letter	Comment / Concern Statement	Forest Service Response
CATEGORY C: HERBICIDES – HUMAN HEALTH AND SAFETY		
13, 41	**Public Concern:** Lack of herbicide toxicity information for the Slapjack Project on active ingredients, adjuvants, inert ingredients, surfactants, colorants, and known degradates. A deficiency found in the DEIS is its lack of analysis of potential negative effects from all toxic substances proposed for use in this project. The substances in need of analysis include all components of the final tank mixture that is then applied into the environment. The analysis should also include all active ingredients (imazapyr, triclopyr), inerts, adjuvants (Syl-Tac), colorants (Hi-Light Blue), and any known degradates (TCP) or contaminants that could cause negative impacts.	The Slapjack Project proposes to use the same application rates of imazapyr and triclopyr (see tables B-1 and B-2) as analyzed in the HFQLG Act final supplemental EIS; therefore, a separate human health risk assessment is not required. Since the Slapjack Project tiers to the HFQLG final supplemental EIS, a summary of imazapyr and triclopyr toxicity, active ingredients, inert ingredients, and known degradates have been incorporated into the Slapjack final EIS. A discussion of imazapyr and triclopyr can be found in the following HFQLG final supplemental EIS appendices: **Chemical** / **Appendix** / **Pages** **Imazapyr** – Appendix E – 3 Appendix F – 12–14 Appendix G – 17–19; 57; 69–71 **Triclopyr** – Appendix E – 5 Appendix F – 24–28 Appendix G – 26–30; 59; 77–81 The HFQLG final supplemental EIS can be viewed at the following web site: http://www.fs.fed.us/r5/hfqlg/publications/index.shtml In addition, for a more detailed discussion of the proposed herbicides, the Syracuse Environmental Research Associates, Inc. (SERA) human health and ecological risk assessments for imazapyr (Dec 2004), triclopyr (Mar 2003), and marker dyes (Dec 1997) can be found at the following web site: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml
13, 37	**Public Concern:** Lack of analysis related to worker safety, worker herbicide exposure, and the use of personal protective equipment. The DEIS fails to adequately address worker health risks associated with the proposed herbicide applications for the applicators. The potential for leaks of herbicides onto the clothing and skin of applicators is a concern because of previously under appreciated dermal absorption (i.e., measured by urinary triclopyr) that must be addressed. The EIS fails to analyze the effectiveness of any chemical barrier personal protective clothing or the likely exposure with and without such clothing. Chemicals are damaging and corrosive to the eyes. The use of protective gloves is another concern that must be analyzed.	The concern regarding dermal absorption of triclopyr has been addressed in the HFQLG final supplemental EIS, chapter 7, page 343, which highlighted that high and low exposures of triclopyr were congruent with poor and good work habits and that there would be no additional restrictions on the use of triclopyr. The formulations of imazapyr and triclopyr that the Slapjack Project proposes to use display the “Caution” signal word on the label, and corrosion to the eyes is not an issue. There are no requirements for wearing gloves listed under the imazapyr label.

Comment Letter	Comment / Concern Statement	Forest Service Response
		• In response to analyzing the use of protective clothing, pesticide exposures, and determining health risks, the U.S. Environmental Protection Agency (EPA) and the California Department of Pesticide Regulation determine the appropriate types of protective equipment needed for each herbicide that is used. EPA does conduct detailed risk assessments for effects on both human health and the environment. EPA divides worker activities into distinct categories based on typical or proposed pesticide use patterns. For each activity, three scenarios of exposure are addressed with regard to protective clothing and equipment: • Baseline, such as long pants, long-sleeved shirt, no gloves; • Additional personal protective equipment, such as double layer of clothing (i.e., coveralls) and gloves; and • Engineering Controls, such as closed application and mixing systems, enclosed cabs, and low exposure formulations. In the Slapjack Project EIS, appendix F, table F-3 lists the management requirements for worker (and public) safety. According to the table, coveralls are required for use by all contract workers, as is the use of personal protective equipment (PPE) required by product label, when handling herbicides or adjuvants, including loading, mixing, application, and disposal of containers. Requiring coveralls in addition to the PPE required by the label would reduce herbicide exposure. The Human Health Risk Assessment in appendix C of the Slapjack EIS does discuss worker exposure to herbicides, especially wearing contaminated gloves, immersion of hands in herbicides, and spill of herbicides on hands and lower legs.
1, 13, 33, 42, 43, 49, 51	**Public Concern:** Effects of pesticides on health of pregnant women, fetuses, infants (including potential birth defects). There is concern that pesticides cause cancer, birth defects, miscarriages, tumors, respiratory diseases, asthma and other lung diseases. Some studies were cited that found elevated risks of particular kinds of birth defects among women using pesticides for gardening and for those living within a quarter mile of agricultural crops; and pesticide applicators have a higher risk of having children with birth defects. The Forest has a duty to engage in as thorough a study as possible concerning the impacts on pregnant women, fetuses, and infants in order to disclose the true cumulative effects of the proposed pesticide use to the public.	Implementing the various herbicide Best Management Practices (refer to table F-2 in appendix F of this final EIS), such as drift control, buffer width establishment, public notification, and posting of signs would reduce exposure and minimize the risk to the public from herbicide applications. A review of the references that were cited from the comment letters (Farr et al. 2004; Foster et al. 2000; Schreinemacher 2003; Sandra Steingraber 2000) or from the studies conducted in Finland and Denmark (Chia et al. 2002), Spain (Garcia et al. 1999), Netherlands (Blatter et al. 1997), California (Bell et al. 2001; Shaw et al. 1999); and Minnesota (Garry et al. 2002) were either not relevant (i.e., banned pesticides, restricted use pesticides, or other toxic chemicals that are not considered pesticides), lack information on the specific pesticides used, or did not provide any new information about the herbicides being proposed for the Slapjack Project. The Slapjack Project is not proposing to use any banned or restricted-use pesticides.

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		According to the human health and ecological risk assessment for imazapyr (SERA 2004, pages 27–32), "an adequate number of multi-generation reproductive and developmental studies have been conducted on imazapyr and no adverse effects on reproductive capacity or normal development have been demonstrated. Even at dose levels that cause signs of maternal toxicity (including death); imazapyr does not cause adverse reproductive or developmental effects." According to the human health and ecological risk assessment for triclopyr (SERA 2003, pages 3-1 to 3-8), "there is no information suggesting that triclopyr causes direct adverse effects on the nervous system, endocrine system, or immune function. At doses that do not cause maternal toxicity, there is not apparent concern for either reproductive or teratogenic effects. At substantially higher doses that are maternally toxic, triclopyr has been shown to result in birth defects. Most of the abnormalities have been indicative of delayed growth and have been associated with maternal toxicity."
13, 22, 29, 30, 31, 33, 40, 42, 43, 49, 51	**Public Concern:** Chemically sensitive people and exposure to herbicides. Exposure to herbicides is especially magnified for sensitive populations, including those with compromised immune systems, children, and the elderly. I am concerned with the health of the children near the Challenge area. Many seem to have weakened immune systems and are often sick with respiratory illnesses. I believe the use of herbicides in this area will add another health risk for these children, as well as their parents. Most of the children and parents and pregnant mothers are at a greater health risk and suffer from low immune and respiratory systems. One person indicated that they had eye problems and the herbicides would not help this matter.	Since the Slapjack Project tiers to the HFQLG final supplemental EIS, a summary about chemically sensitive individuals regarding imazapyr and triclopyr has been incorporated into the Slapjack final EIS. The uncertainty factors used in the development of the reference does (RfD) take into account much of the variation in human response. The uncertainty factor of 10 for sensitive subgroups is sufficient to ensure that most people will experience no toxic effects. "Sensitive" individuals are those that might respond to a lower dose than average, which includes women and children. As stated in National Academy of Sciences (NAS 1993), the quantitative differences in toxicity between children and adults are usually less than a factor of approximately 10-fold. An uncertainty factor of 10 for sensitive subgroups may not cover all individuals that may be sensitive to herbicides because human susceptibility to toxic substances can vary by two to three orders of magnitude. Factors affecting individual susceptibility include diet, age, heredity, preexisting diseases, and life style. Individual susceptibility to the herbicides proposed in this project cannot be specifically predicted. Unusually sensitive individuals may experience effects even when the hazard quotient (HQ) is equal to or less than 1. From the human health and ecological risk assessment for imazapyr, "there is no information to suggest that specific groups or individuals may be especially sensitive to the systemic effects of imazapyr . . . Given the very low hazard quotients for imazapyr, there appears to be no basis for asserting that adverse effects in a specific subgroup are plausible. The U.S. EPA (1997, 2003) has judged that infants and children are not likely to be more sensitive to imazapyr than adults. Given the number of studies available on reproductive and developmental effects and the unremarkable findings from these studies, this judgment appears appropriate" (SERA 2004).

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		Individuals with a preexisting kidney disease are likely to be at increased risk (SERA 1996) because triclopyr may impair certain kidney functions. Women of child-bearing age are an obvious group at increased risk (SERA 2003) because the chronic RfD for triclopyr is based on reproductive effects. This group is given explicit consideration in the Slapjack Project and is central to the risk characterization. Implementing the various herbicide Best Management Practices (such as drift control, buffer width establishment, public notification, and posting of signs) would reduce exposure and minimize the risk to the public from herbicide applications.
22, 30, 31.	**Public Concern:** One of the noxious weed treatment areas is adjacent to the Leaves of Learning Center. Herbicide use will expose children to toxic chemicals.	The play area appears to be approximately 50–100 feet from the Forest Service property boundary. There would be a 50-foot buffer between any herbicide applications and the property boundary. Consequently, there would be at least a 100- to 150-foot buffer between the play area and application site. There should be no spray drift beyond 40 feet. The rationale for this is discussed in detail in section 3.3.8.3 of the Slapjack Project draft and final EISs. Also, prior to herbicide application, adjacent landowners would receive notification.
CATEGORY D: NOXIOUS WEED AND BOTANICAL CONCERNS		
13	**Public Concern:** There is general concern regarding the incorporation of Integrated Pest Management (IPM) practices and the consideration of weed biology in the development of the noxious weed control strategy.	The noxious weed control strategy is based on an Integrated Pest Management (IPM) approach that seeks to use all available and appropriate tools and tactics. The Plumas National Forest adheres to the direction put forth in the *National Strategy and Implementation Plan for Invasive Species Management* and the *Regional Noxious Weeds Management Strategy*. Detailed knowledge of weed biology and system ecology is crucial to the success of an IPM program. This information was considered in the NEPA analysis but not clearly disclosed. Weed biology information for target species has been added to the final EIS.
13	**Public Concern:** The forest has failed to discuss and disclose established weed treatment threshold levels for this project. The forest needs to demonstrate that other control tactics are not working before using herbicides because chemicals could exacerbate the problem.	Objective 5 in the "Purpose and Need" section for the Slapjack Project (refer to chapter 1 of the draft EIS and this final EIS) is to control the introduction and spread of noxious weeds (specifically Scotch, French, and Spanish brooms) that could compromise the effectiveness of DFPZs. Also, the Sierra Nevada Forest Plan Amendment and the HFQLG final supplemental EIS do not establish noxious weed treatment thresholds prior to the application of herbicides. The proposed use of herbicides is based on professional judgment and the underlying premise of IPM that promotes multiple control tactics and tools.
13	**Public Concern:** The forest needs to monitor chemical treatments for efficacy.	The forest is required to monitor the efficacy (effectiveness) of chemical treatments used on noxious weed control. Also, the Feather River Ranger District plans to establish permanent monitoring plots in selected treatment areas.

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13	**Public Concern:** The forest has failed to discuss how past vectors have influenced the current noxious weed infestation and the ways that project-related vectors will be mitigated. Past actions that contributed to the current infestation should be identified so that they can be avoided. Also, reduction of the noxious weed seed bank is essential for success.	The draft EIS does not specifically mention past vectors as they pertain to the current infestation. However, they have been considered in the analysis and the management design. A discussion on past vectors has been added to the final EIS. It appears that off-road timber harvest equipment is responsible for much of the infestation. Also, vehicle traffic may be responsible for dispersing seeds along roadways. Although identification of vectors is important to the understanding of the movement of these weeds, the consideration of affecting these vectors (such as road closures, grazing allotment closures, trail closures) is outside the scope of this document. These are questions that the Forest Plan should address. Although past vectors were not specifically mentioned, current and future vectors are considered in the analysis. This is discussed in the draft EIS under standard noxious weed management (3.3.2.2) "Prevention / Cleaning: Require off-road equipment and vehicles (both Forest Service owned and contracted) used for project implementation to be weed free. Clean equipment and vehicles of all attached mud, dirt, and plant parts." Also, on page 3-40 of the draft EIS, vectors are addressed again. "1. Broom and other noxious weed infestations will be identified on the ground with orange noxious weed flagging prior to equipment entering the infested units. 2. Broom infestations will be considered controlled areas that will exclude equipment. These areas will be treated with hand equipment only to prevent the spread of seeds. 6. Units with any amount of broom within or immediately adjacent to the unit are considered infested. Any equipment operating within an infested unit shall be cleaned prior to leaving that unit and entering an un- infested unit. 7. No mechanical fire-lines shall be constructed in an infested unit." The Washington office provides invasive plant management direction. The four primary components are • Prevention • Early detection and rapid response • Control and management • Rehabilitation and restoration Specifically, the Slapjack Project EIS recognizes that past timber activities likely contributed to some of the infestations. Consequently, these areas are designated as controlled areas that would exclude equipment. Seed bank reduction is very important to the long-term control of broom. Consequentially, treatments are planned that will encourage and/or kill portions of the seed bank. These include controlled burns and pile burning on infestations.

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13, 16	**Public Concern:** Pre-fire fuel reduction projects have been shown to increase noxious weed invasions both in fuel breaks and the adjacent wildlands. Also, the proposed actions associated with any fuels reduction efforts will disturb the soil and increase light availability providing an optimum medium for noxious and invasive species.	The work by Merriam et al. (2005) does suggest that fuel breaks can increase nonnative species. The degree of infestation depends on the type of fuel break and the way that the fuel break is constructed. According to Merriam, "These findings suggest that fuel break construction and maintenance strategies that retain some over-story canopy and ground cover may reduce the establishment and widespread invasion of nonnative plants." Merriam also goes on to disclose, "We found that fuel breaks constructed by mechanical thinning had significantly lower nonnative cover than those constructed by bulldozers in all vegetation types. Mechanical thinning retains over-story canopy which we found was associated with a decrease in nonnative abundance." The DFPZs in the Slapjack project would retain at least 40 percent canopy cover, which would provide shade and reduce the likelihood of invasive plant establishment (see the Noxious Weed Risk Assessment in appendix C of the Botany Report). Also, none of the DFPZs would be constructed with bulldozers. As discussed in the noxious weed risk assessment, this project could create conditions favorable to the establishment of some noxious weeds. However, this fuels reduction project, will also reduce the risk of a stand replacing wildfire. Such a fire would remove canopy and ground cover and create conditions favorable to noxious weed invasion.
13	**Public Concern:** Disturbed areas need to be revegetated with native plant materials.	Approximately 10 acres would be revegetated due to the proximity of disturbed areas to riparian areas (Bob Loudermilk, personal communication, 3/30/2006). Appendix F of the draft EIS (and final EIS) lists revegetation standards (CT6.601). Blue wild rye (*Elymus glaucus*), a native perennial bunch grass, would be used for revegetation purposes. It is unlikely that other, non-revegetated areas would become dominated by nonnative annual grasses because of the high levels of annual rainfall, fertile soils, and the high levels of shrub and tree competition. This area receives some of the highest rainfall totals in the Sierra Nevada. It averages 80 inches a year. There would be sufficient regeneration of native material without active revegetation.
13	**Public Concern:** The EIS should discuss realistic goals for noxious weed management.	Noxious weed management goals are described in section 3.3.15 of the draft and final EISs.
13	**Public Concern:** This project will create conditions that will require the use of chemicals to control invasive species in areas that were not analyzed for chemical treatment in the DEIS.	No herbicides would be used for noxious weed control outside of the areas that were analyzed. The use of herbicides in any new areas would require NEPA documentation.
13, 16	**Public Concern:** This project will create conditions that will result in widespread cheatgrass and Scotch broom invasion.	Cheatgrass (*Bromus tectorum*) is a serious wildland weed in many western states. However, it is unlikely to become so in the Slapjack Project area. According to Bossard, "Cheatgrass grows in many climatic areas. It is found primarily in locations that receive 6–22 inches' of rain annually." This area receives 60–80 inches of rain a year, on average, and there are no known cheatgrass infestations within the Slapjack Project area—this area is simply too wet.

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		The Forest Service is aware of the broom species within and around the Slapjack Project area. Infestations in the project area have been identified through extensive botanical surveys. The project has been designed with broom control in mind. The project design incorporates controlled areas to keep equipment out of areas infested with broom. Also, unit treatments have been designed to treat existing infestations with prescribed fire and hand tools. The Forest Service has developed an integrated management plan for the long-term control of broom and the other invasive species in this project. Page 3-40 of the draft EIS addresses specific components of the management plan: "1. Broom and other noxious weed infestations will be identified on the ground with orange noxious weed flagging prior to equipment entering the infested units. 2. Broom infestations will be considered controlled areas that will exclude equipment. These areas will be treated with hand equipment only to prevent the spread of seeds. 6. Units with any amount of broom within or immediately adjacent to the unit are considered infested. Any equipment operating within an infested unit shall be cleaned prior to leaving that unit and entering an un-infested unit. 7. No mechanical firelines shall be constructed in an infested unit." Fuel breaks have been shown to be avenues of nonnative plant invasion. The presence of nonnative plants is most pronounced in nonshaded fuel breaks, constructed with bulldozers (Merriam et al.). All of the fuel breaks / DFPZs would maintain at least 40 percent canopy cover—this would provide shade and reduce the potential for invasive species. Also, the DFPZs would not be constructed with bulldozers.
22, 30, 31	**Public Concern:** Chemically sensitive individuals and exposure to herbicides. One of the noxious weed treatment areas is adjacent to the Leaves of Learning Center. Herbicide use will expose children to toxic chemicals.	A comprehensive analysis of potential adverse health effects on workers and the public is included in appendix F of the Forest Service Region 5 final EIS on vegetation management (USDA Forest Service 1998), the SERA risk assessments for imazapyr and triclopyr (SERA 2003, 2004b), the HFQLG final supplemental EIS (USDA Forest Service 2003a), and the surfactant assessment Risk Assessment (USDA Forest Service 2002a). Also, multiple herbicide exposure / spray scenarios were examined in the draft DEIS (refer to "Appendix C: Human Health Risk Assessment"). Also, a 50-foot "no spray" buffer would be applied to the property boundary. According to information presented in the SERA risk assessments, there should be no drift beyond 23 feet from the application source in a 5 mph wind. Herbicide application requirements for this project would prohibit herbicide applications when winds exceed 5 mph. Signs would be posted in the areas treated with herbicides to alert the public (appendix D, California Code of Regulations: Division 6). Also, all persons within 0.25 miles of the application would be notified prior to the application (refer to the "Human Health Risk Assessment," appendix C of the draft EIS).

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34	**Public Concern:** Perceived discrepancies with the number of acres potentially treated with herbicides under alternative D.	A total of 31 acres were analyzed for herbicide treatment on Scotch broom seedlings. The units along Lumpkin Road were dropped from analysis for chemical use for noxious weed control. The Scotch and French broom in these units would be controlled with other tools.
41	**Public Concern:** The use of triclopyr will promote annual grass regeneration which will create a fire hazard when the grass dies.	Triclopyr may promote grass regeneration in some instances. However, it is unlikely that this would constitute an increased risk of fire damage or "FDC"—*Fire Damage Class* is described in the Weatherspoon and Skinner (1995) article. The small amount of herbicide use proposed for the project would not result in a "continuous" fuel bed. The treated areas may total up to 31 acres; however, these treated areas are dispersed over 850 acres—they are widely scattered. Treated acres would likely be closer to 9 acres per year. Also, through time, the grasses would be replaced by native shrubs, such as manzanita species and *Ceanothus* species, which are not considered to be an easily ignitable fuel.
CATEGORY E: WILDLIFE CONCERNS – HERBICIDES		
13, 27	**Public Concern:** Concern regarding the proposal of using toxins/herbicides, including their breakdown products, and harmful effects resulting to wildlife.	The analysis for the Slapjack Project was designed to comply with the Record of Decision for the 2004 SNFPA final supplemental EIS and the 1988 *Plumas National Forest Land and Resource Management Plan*, as amended by the HFQLG Act final EIS (1999) and Record of Decision and the final supplemental (2003) EIS and Record of Decision. Decisions were made to meet the legal requirements of the HFQLG Act Pilot Project (1998). The Slapjack Project complies with the Standard and Guideline for Noxious Weed Management (pages 54 and 55), and Standard and Guideline (#98) in the 2004 SNFPA Record of Decision. The HFQLG final supplemental EIS and Record of Decision (2003) analyze the potential effects on wildlife species as a result of herbicide use.
13, 27, 37, 41	**Public Concern:** Consideration of an alternative that does not include herbicides.	The Slapjack draft (and final) EIS considers two nonherbicide alternatives: alternative C for long-term DFPZ maintenance and alternative G, which does not propose the use of herbicides for DFPZ maintenance or noxious weed abatement.
37	**Public Concern:** Concern regarding the proposal of using triclopyr BEE, and its breakdown products, and harmful effects on wildlife and/or their habitats.	This response does not disregard any concerns raised; however, based on the following factors, the proposed application of triclopyr BEE on 31 acres of noxious weeds is expected to have minimal effects on wildlife and fish species. Aquatic and riparian habitat would be avoided and have "no-spray" buffers; ephemeral drainages would have 50-foot buffers; sensitive sites would have additional "no-spray" buffer distances, such as for the California red-legged frog, and the application would be a direct (targeted) spray; the amount of area treated is very small (31 acres per year for 5 years), and the sites proposed for treatment are in concentrated patches located outside of aquatic zones. Also, treatment would be limited to noxious weeds, which can have short- and long-term effects on wildlife species and their habitats. These buffers comply with Standard and Guideline #98 (for the California red-legged frog) in the 2004 SNFPA Record of Decision.

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16	**Public Concern:** Residues can persist in the soil for over a year. Imazapyr moves readily in soil and can hence contaminate surface and ground water. It is also toxic to wildlife and, even though it may take a fairly large amount to kill an animal, toxic effects have been observed in studies.	The analysis for the Slapjack Project was designed to comply with the Record of Decision for the 2004 SNFPA final supplemental EIS and the 1988 *Plumas National Forest Land and Resource Management Plan*, as amended by the HFQLG Act final EIS (1999) and Record of Decision and the final supplemental (2003) EIS and Record of Decision. Decisions were made to meet the legal requirements of the HFQLG Act Pilot Project (1998). The Slapjack Project complies with the Standard and Guideline for Noxious Weed Management (pages 54 and 55), and Standard and Guideline (#98) in the 2004 SNFPA Record of Decision. The HFQLG final supplemental EIS and Record of Decision (2003) analyze the potential effects on wildlife species as a result of herbicide use. The HFQLG final supplemental EIS and Record of Decision analyze potential effects on wildlife species as a result of herbicide use.
CATEGORY E: WILDLIFE CONCERNS – GENERAL		
1	**Public Concern:** The EIS should have considered alternatives with higher canopy cover and lower diameter limits, including an alternative based upon the 2001 Framework. Also, leave and protect, medium and large trees.	The analysis for the Slapjack Project was designed to comply with the Record of Decision for the 2004 SNFPA final supplemental EIS and the 1988 *Plumas National Forest Land and Resource Management Plan*, as amended by the HFQLG Act final EIS (1999) and Record of Decision and the final supplemental (2003) EIS and Record of Decision. Decisions were made to meet the legal requirements of the HFQLG Act Pilot Project (1998). The 2001 SNFPA Record of Decision (page 4), HFQLG final EIS, and HFQLG BE/BA (Criterion #6, page 20), define a large tree as “a tree equal to or greater than 30 inch dbh.” Table 2 of the SNFPA final supplemental EIS states, “Design projects to retain all live trees greater than or equal to 30 inches dbh, except to allow for operations/operability. Minimize impacts to greater than or equal to 30 inch trees as much as practicable.” An estimate of 1.6 percent of the existing numbers of trees greater than or equal to 30 inches dbh would be removed for operability (new temporary and reconstructed roads, and new and reconstructed landings) within the project area. This is a high estimate based on vegetation modeling; however, based on forest inventory plots, it is expected that the percentage of the equal to or greater than 30-inch dbh trees removed would be lower than the model estimate (Slapjack Project final EIS, section 3.12.9). Section 2.3 of the final EIS provides information on “Alternatives Considered but Eliminated from Detailed Study.” These alternatives are “Use of Alternative Herbicides;” “Alternative with 50 Percent Canopy Cover Retention and a Removal Limit of 20 Inches DBH and Below;” Alternative that Considered Different Treatments in DFPZs to Address Watershed Effects;” Alternative Consistent with the 2001 Sierra Nevada Forest Plan Amendment;” and “Alternative That Reduces Canopy Cover to 30 Percent in Treatment Units within the Wildland Urban Interface.” The consideration of these alternatives was included in the draft EIS, and they are included, in compliance with NEPA, as part of a reasonable range of alternatives as defined in 36 CFR 1502.14. The alternatives considered and studied in detail met the purpose and need for action and responded to significant issues.

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CATEGORY E: WILDLIFE CONCERNS – AMPHIBIAN		
13	**Public Concern:** Concerned about applying buffers for the red-legged frog and the spotted owl and not for private land owners.	Table F-4 on page F-17 of the draft EIS does not list a buffer for the spotted owl, but it does propose a 500-foot buffer for the California red-legged frog (CRLF). "Amphibians have highly permeable skin, and they breathe through their skin, making them exceptionally vulnerable to chemicals in their environment" (draft EIS page 3-223). The CRLF is a federally listed species. The 500-foot buffer is proposed for a known CRLF population within an aquatic zone; this is in consultation with the U.S. Fish and Wildlife Service and in compliance with Standard and Guideline #98 of the 2004 SNFPA Record of Decision.
13	**Public Concern:** There is concern regarding amphibian population declines with pesticides as one likely cause.	The articles referenced discuss insecticides. The application of insecticide is not proposed under any alternative for the Slapjack Project.
13	**Public Concern:** Amphibians are especially vulnerable to anthropocentric habitat influences, like those caused by timber harvest operations, and have been suggested for use as bio-indicator species to monitor ecosystem health (Welsh and Droege 2001). Amphibians have very permeable skins which they use to obtain both oxygen and water. These permeable skins also allow other substances to move easily into their bodies, making them especially susceptible to toxins in the environment. Amphibians reproduce in wet, aquatic environments (Center for Global Environmental Education). While aquatic areas often have forestry herbicide buffer zone, Relyea, a researcher at the University of Pittsburgh, points out that most amphibians actually breed in small pools and other unprotected, and often seasonally, wet areas (2005).	Refer to response to comment #1 and comment #13 under the" Wildlife – Herbicides" section.
CATEGORY E: WILDLIFE CONCERNS – FISHERIES		
13	**Public Concern:** The EPA has labeled Garlon 4 and other butoxyethly ester forms of triclopyr as moderately to highly toxic to fish and aquatic invertebrates. The agency recognizes the threat posed by triclopyr to various listed species, and states that it is awaiting further limitations on the chemicals' use (EPA 1998).	There is no aerial application of herbicides proposed. Herbicide treatments for noxious weed control would be performed by manual ground application of triclopyr BEE (Garlon 4™) using backpack sprayers. As with imazapyr, the triclopyr BEE formulation would also include Syl-Tac® and Hi-Light® Blue, although at double the application rate as for imazapyr. The proposed rates and volumes for each chemical for each application type are listed in "Appendix C: Human Health Risk Assessment" of this EIS. Approximately 31 acres would be treated seasonally with triclopyr BEE over the next five years to control infestations of noxious weeds (such as French, Spanish, and Scotch brooms) found along roadsides.
		Triclopyr BEE could be applied in close proximity to a very limited length of intermittent stream channels. Approximately 2.9 acres of French broom would be treated in RHCAs. All proposed riparian spray areas would be a minimum of 0.25 mile upstream of perennial streams. Broom plants would be treated by direct spray, and the expected herbicide drift would be 50 feet by backpack application.

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		Aquatic habitat would be avoided. Perennial fish-bearing streams would have a 300-foot RHCA buffer, and perennial and intermittent streams would have a minimum of 150-foot buffer with no application. However, triclopyr has a rapid degradation rate in water, and with the very limited application of triclopyr in riparian areas, it is unlikely to persist in aquatic ecosystems for sufficient periods to cause harm to sensitive organisms.
	Public Concern: Triclopyr can also adversely impact insects. Aquatic insects *(Isogenoides* and *Dolophil* Triclopyr BEE could be applied in close proximity to a very limited length of *odes* species) are adversely affected at concentrations less than 80 ppm (80 mg/Liter). Direct studies of triclopyr applications to stream channels showed clear cut evidence of toxicity from drift exposure as low as 3.2 mg/Liter for *D. distinctus* (Kreutzweiser et al. 1992). Triclopyr also poses well known dangers to salmonid species. Garlon 4 reached lethal concentrations as low as 84 ppb (0.84 mg/Liter) (Johansen and Green 1990).	Special-status fish species could be adversely affected if their invertebrate or vegetative food sources are adversely affected. Studies on aquatic invertebrates, primarily daphnia (water flea), resulted in no LC_{50} below expected exposure rates. Exposure rates for triclopyr BEE exceeded observable effect levels; however, the effects analysis resulted in overall low levels of effects. With full implementation of all protection measures, such as 300–foot perennial buffers and following Best Management Practices (BMPs) and herbicide mitigations, there is no indication that aquatic plants or invertebrates would be exposed to harmful levels of herbicides, including imazapyr, and triclopyr BEE. Herbicide drift is another concern. Factors to consider would include wind speed and direction, slope, humidity, and so forth. The expected drift for triclopyr is 50 feet By following the BMPs, it is expected that these factors would be minimized, and herbicide drift would not reach streams. Overall, indirect effects would be minimal, and adverse indirect effects are not expected to occur. This conclusion is based on minimal data, none of which are from the Sierra Nevada. However, since imazapyr is minimally mobile in soils and breaks down rapidly in water to nonpersistent degradates, the assumption of low likelihood of detection is probably valid. As stated in the Slapjack Project BA/BE: At a typical application rate of 1.5 lbs/acre, the estimated acute and chronic concentration of triclopyr BEE in water is 0.135 and 0.045 mg/L, respectively, while a spill could result in 5.45 mg/L. These concentrations are below the LC_{50} for fathead minnows (2.31 ppm), rainbow trout (0.65 ppm), and bluegill (0.36 ppm). However, the exposure rate from the spill scenario exceeds the acute and chronic NOEC of less than or equal to 0.25 mg/L. A spill involving triclopyr BEE appears to have a potential to cause adverse effects in fish species.
13	**Public Concern:** The EPA labels the butoxyethyl ester form (includes Garlon 4) as slightly toxic to birds. The EP A acknowledges that triclopyr's primary breakdown product, TCP, is as toxic to birds, fish, and invertebrates as triclopyr itself, and exhibits similar persistence, mobility, and potential for groundwater contamination (U.S. EPA 1998). Therefore, the additional action of the degradate could greatly extend the toxicity of the parent compound. This must be included in the analysis for the proposed actions.	Triclopyr BEE is proposed to control 33 acres of noxious weeds (several species of broom). The acres proposed for treatment are not within aquatic habitat. Broom plants are in dense clumps and do not provide hardhead habitat. Broom plants would be treated by direct spray, and the expected herbicide drift is 50 feet. Aquatic and riparian habitat would be avoided. Perennial fish-bearing streams would have 300-foot buffers, and perennial nonfish-bearing and intermittent streams would have a minimum 150-foot buffer with no application. Direct, indirect, and cumulative effects are not expected.

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		Herbicide treatments (ground and aerial) have the potential for affecting the aquatic environment and aquatic species through misapplication (directly onto the water surface or individual), spray drift, precipitation-related overland flow, and/or leaching or percolation into groundwater (Norris et al. 1991). Proper operational procedures during application, riparian buffers, and adherence to BMPs, as detailed in Chapter II, Management Requirements (page II-29), would minimize the potential for direct application and drift. Timing the application of herbicide to coincide with the onset of the dry season would reduce the possibility of herbicide being washed from the vegetation and soil and into streams. The potential for leaching is reduced by selecting an herbicide with regard to site-specific conditions.
13	**Public Concern:** Water Quality Contamination - logging activities are renowned for their impacts on water quality, particularly through inputs of excessive rain event discharge, and sediment and nutrients, which move off site following silvicultural and/or road building/maintenance disturbance. Watersheds in the Sierra Nevada have long been recognized as significant contributors of sediment due to their steep topography, unstable soils, and intensive land use by the timber industry, and their extensive road systems. There is a strong potential for sediment and/or soil solutions to carry residual pesticides into the stream systems. The Forest Service and timber industry use large amounts of herbicides that are characterized as binding to soil particles and remaining on site. The concern then is based on the premise that forests can exhibit a high volume of sedimentation. By using pesticides that adhere to soil particles or dissolve into the soil solution, the transport of sediment provides a suitable means for pesticide movement directly into stream systems.	The District Hydrologist determined that erosion rates should not increase from herbicide application, if Best Management Practices (BMPs) are applied. Therefore, sediment production from treated areas should not increase, and detrimental water quality impacts from sedimentation or turbidity should not increase if herbicides are applied as proposed for the Slapjack Project. Consequently, no Equivalent Roaded Area (ERA) is applied in the cumulative watershed effects model for proposed herbicide application. Herbicide treatments (ground and aerial) have the potential for affecting the aquatic environment and aquatic species through misapplication (directly onto the water surface or individual), spray drift, precipitation-related overland flow, and/or leaching or percolation into groundwater (Norris et al. 1991). Proper operational procedures during application, riparian buffers, and adherence to BMPs, as detailed in Chapter II, Management Requirements (page II-29), would minimize the potential for direct application and drift. Timing the application of herbicide to coincide with the onset of the dry season would reduce the possibility of herbicide being washed from the vegetation and soil and into streams. The potential for leaching is reduced by selecting an herbicide with regard to site-specific conditions.
13	**Public Concern:** Advocates of pesticides claim that the toxic chemicals do not persist onsite long enough to affect stream systems. This is simply not the case. One modest rain event provides enough surface and sub-surface flow to transport enormous amounts of matter from areas of recent silvicultural disturbance. The most benign chemicals exhibit half-lives of at least several weeks to several months in duration. Obviously, the potential for off site movement of pesticides exists.	The HFQLG final supplemental EIS and Record of Decision (2003) acknowledge potential affects on fish species as a result of herbicide use. This response does not disregard any concerns raised; however, based on the following factors, the proposed application of triclopyr BEE on 31 acres of noxious weeds is expected to have minimal effects on wildlife and fish species: Aquatic and riparian habitat will be avoided and have “no-spray” buffers, ephemeral drainages will have 50 foot buffers, sensitive sites will have additional “no-spray” buffer distances such as for the California red-legged frog; the application will be a direct (targeted) spray, the amount of area treated is very small (31 acres per year for 5 years), and the sites proposed for treatment are in concentrated patches located outside of aquatic zones. Also, treatment is limited to noxious weeds which can have short- and long-term effects on wildlife species and their habitats.

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		Herbicide treatments (ground and aerial) have the potential for affecting the aquatic environment and aquatic species through misapplication (directly onto the water surface or individual), spray drift, precipitation-related overland flow, and/or leaching or percolation into groundwater (Norris et al. 1991). Proper operational procedures during application, riparian buffers, and adherence to BMPs, as detailed in Chapter II, Management Requirements (page II-29), would minimize the potential for direct application and drift. Timing the application of herbicide to coincide with the onset of the dry season would reduce the possibility of herbicide being washed from the vegetation and soil and into streams. The potential for leaching is reduced by selecting an herbicide with regard to site-specific conditions. The following effect is a quote from the HFQLG final supplemental EIS (USDA Forest Service 2003) – Slapjack Project BA/BE: Table 33 below illustrates the typical herbicide application rates, exposure rate, No Observable Effect Concentrations (NOECs), and Lethal Concentrations (LC_{50}) for a variety of fish species. Exposure rate estimates for fish species are based on a water contamination rates. Three exposure scenarios presented are (1) acute exposure in a stream contaminated by runoff and/or percolation; (2) chronic exposure in a stream contaminated by runoff and/or percolation; and (3) acute exposure in a small pond after a spill of 200 gallons of an herbicide mixture. These three scenarios are based on the typical application and dilution rates as displayed in the risk assessment worksheets (project file). NOEC and LC_{50} values for fish species were taken from SERA (1996-2001 and 2003 and USDA Forest Service 2003), and the Re-registration Eligibility Decisions (1993, 1995, and 1998). Exposure numbers are from the project file worksheets. Additional references not included in these documents are identified. Soil or organic matter absorption, transport through soil, water dilution, degradation or dispersion, etc., are considered. Formulations different than the ones noted below, may have different effects on individuals and/or a different LC_{50}.

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	Table 33. Expected herbicide exposure rates to surrogate fish species from typical application rates and central /typical water contamination rates.	

Herbicide	Application Rate	Test Species	LC_{50} (mg/L = ppm)	Exposure Rate	NOEC Effect Level or Concentrations
Imazapyr	0.25 lbs/ac.	Rainbow trout	>100 mg/L	0.005 mg/L (acute)	43.1 mg/L
		Bluegill	>100 mg/L	0.0205 mg/L (chronic)	(acute and chronic)
		Channel catfish	>100 mg/L	0.9084 mg /L (spill)	
Triclopyr BEE	1.5 lbs/ac.	Fathead minnow	2.31 ppm	0.135 mg/L (acute)	0.6 mg/L
		Rainbow trout	0.65 ppm	0.045 mg/L (chronic)	(acute and chronic)
		Bluegill	0.36 ppm	5.45 mg/L (spill)	

Sources: SERA 1996–2001 and 2003, USFS 2003, and Re-registration Eligibility Decisions 1993, 1995, and 1998.

*Tests were not conducted above NOECs

		At the typical application rate of 0.25 lb/acre, the estimated acute and chronic concentration of imazapyr in water as a result of percolation and runoff would be 0.005 mg/L and 0.0205 mg/L, respectively. For a spill of imazapyr, an exposure rate of 0.9084 mg/L could occur. LC_{50} values were not seen at the highest doses tested (i.e., the LC_{50} is greater than 100 mg/L). The acute and chronic NOEC would be 43.1 mg/L. For imazapyr, the line between initiation of adverse effects and mortality is fine. However, both LC_{50} and NOEC values would be well above expected exposure rates for the runoff and percolation or spill scenario. No adverse effects on fish are expected from the application of imazapyr. At a typical application rate of 1.5 lbs/ac, the estimated acute and chronic concentration of triclopyr BEE in water would be 0.135 and 0.045 mg/L, respectively, while a spill could result in 5.45 mg/L. These concentrations are below the LC_{50} for fathead minnows (2.31 ppm), rainbow trout (0.65 ppm), and bluegill (0.36 ppm). However, the exposure rate from the spill scenario would exceed the acute and chronic NOEC of less than or equal to 0.25 mg/L. A spill involving triclopyr BEE appears to have a potential to cause adverse effects in fish species.
13	**Public Concern:** Typically, and unfortunately, the adverse effects of sedimentation are only considered based on occurrences of high turbidity, loss of spawning habitat, increased stream volume, and loss of upland productivity, among other impacts. Few, if any, agencies have regarded the capacity of discharged sediment to carry pesticides into bodies of water.	The District Hydrologist determined that erosion rates would not increase from herbicide application, if Best Management Practices (BMPs) are applied. Therefore, sediment production from treated areas would not increase, and detrimental water quality impacts from sedimentation or turbidity would not increase if herbicides are applied as proposed for the Slapjack Project. Consequently, no Equivalent Roaded Area (ERA) was applied in the cumulative watershed effects model for proposed herbicide application.

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		CUMULATIVE EFFECTS and OWL STRATEGY: The SNFPA final supplemental EIS (2004) provides the new "strategy" for the owl. The SNFPA final supplemental EIS provides a cumulative effects consideration, including population trends and viability of implementing HFQLG Pilot Projects on the California spotted owl and/or their habitats for the range of the owl in the Sierra Nevada. This document provided a determination of "may effect but not likely lead to a trend toward listing" for the California spotted owl. Herbicide treatments (ground and aerial) have the potential for affecting the aquatic environment and aquatic species through misapplication (directly onto the water surface or individual), spray drift, precipitation-related overland flow, and/or leaching or percolation into groundwater (Norris et al. 1991). Proper operational procedures during application, riparian buffers, and adherence to BMPs, as detailed in Chapter II, Management Requirements (page II-29), would minimize the potential for direct application and drift. Timing the application of herbicide to coincide with the onset of the dry season would reduce the possibility of herbicide being washed from the vegetation and soil and into streams. The potential for leaching is reduced by selecting an herbicide with regard to site-specific conditions.
13	**Public Concern:** According to the 1998 US EPA Re-registration Eligibility Decision, "While triclopyr TEA and BEE are the forms applied, both readily form the acid. The acid and its degradate, TCP, are of concern in the ground water assessment. Triclopyr acid is somewhat persistent, with persistence increasing as it reaches deeper soil levels, where there are anaerobic conditions; it is also very mobile. TCP is both mobile and persistent. Pesticides with similar properties have been found in ground water. Due to the environmental fate characteristics of triclopyr acid, the Agency believes this chemical has a potential to leach to ground water."	Herbicide treatments (ground and aerial) have the potential for affecting the aquatic environment and aquatic species through misapplication (directly onto the water surface or individual), spray drift, precipitation-related overland flow, and/or leaching or percolation into groundwater (Norris et al. 1991). Proper operational procedures during application, riparian buffers, and adherence to BMPs, as detailed in Chapter II, Management Requirements (page II-29), would minimize the potential for direct application and drift. Timing the application of herbicide to coincide with the onset of the dry season would reduce the possibility of herbicide being washed from the vegetation and soil and into streams. The potential for leaching is reduced by selecting an herbicide with regard to site-specific conditions.
CATEGORY E: WILDLIFE CONCERNS – CALIFORNIA SPOTTED OWL		
36	**Public Concern:** Commenter provided many general references and statements where no issues were raised. Many comments with issues were repeats or rewording of similar concerns and are therefore grouped together. **Public Concern:** Concern regarding the California spotted owl viability in terms of effects on the species and its habitat.	COMPLIANCE: The analysis for the Slapjack Project was designed to comply with the Record of Decision on the 2004 Sierra Nevada Forest Plan Amendment (SNFPA) final supplemental EIS and the 1988 *Plumas National Forest Land and Resource Management Plan*, as amended by HFQLG Act final EIS (1999) and Record of Decision and final supplemental EIS (2003) and Record of Decision. The Decisions were made to meet the legal requirements of the HFQLG Act Pilot Project (1998).

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		CUMULATIVE EFFECTS: The HFQLG final EIS (1999) provides a cumulative effects consideration of implementing DFPZs, group selection, and individual tree selection on the California spotted owl and/or their habitats for the Plumas and Lassen National Forests. This document provided a determination of "may effect and likely lead to a trend toward listing for the California spotted owl." The HFQLG Record of Decision (page 7) included the following: "By applying the supplemental mitigation, no resource management activities, except riparian restoration, will be permitted in suitable California spotted owl habitat unless and until a new "California spotted owl strategy" for the Sierra Nevada is released that allows such activity." The 2005 HFQLG Act - Annual Report that showed approximately a 1.6 percent cumulative effect on old-growth habitat for HFQLG Pilot Project forests. ADMINISTRATIVE STUDY: The Plumas-Lassen Administrative Study (PLAS 2003) was designed to evaluate the response of key forest elements to land management strategies for reducing wildland fire hazard, promoting forest health, and providing economic benefits across a managed forest landscape. The impetus for these studies comes from the Records of Decision for both the SNFPA (2001) and the HFQLG Act (1999) Pilot Project. The HFQLG Pilot Project is designed to demonstrate how fuel breaks, group selection, individual tree selection, avoidance or protection of sensitive areas, and riparian restoration can be applied to promote healthy forests that provide both suitable habitat conditions for an array of wildlife species, as well as a sustainable local economy. The SNFPA Record of Decision (January 2001) establishes a comprehensive adaptive management strategy to investigate uncertainties regarding these and similar management approaches; the Record of Decision specifically calls for a study related to the HFQLG Pilot Project to examine the effects of management-caused changes in vegetation (including group selection silviculture) on California spotted owls and their habitat. The SNFPA sets forth direction for an integrated management strategy for Sierra Nevada national forests to protect and enhance old-forest habitat conditions while reducing fuel conditions that pose significant fire hazards.
36	**Public Concern:** DEIS fails to consider whether the Forest Service's fuels objectives can be attained with fewer adverse impacts to owl habitat such as: large (and medium) tree retention, higher canopy levels, lower log diameter limits, and higher snag retentions.	COMPLIANCE: The analysis for the Slapjack Project was designed to comply with the Record of Decision on the 2004 Sierra Nevada Forest Plan Amendment (SNFPA) final supplemental EIS and the 1988 *Plumas National Forest Land and Resource Management Plan*, as amended by HFQLG Act final EIS (1999) and Record of Decision and final supplemental EIS (2003) and Record of Decision. The Decisions were made to meet the legal requirements of the HFQLG Act Pilot Project (1998).

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		CUMULATIVE EFFECTS: The HFQLG final EIS (1999) provides a cumulative effects consideration of implementing DFPZs, group selection, and individual tree selection on the California spotted owl and/or their habitats for the Plumas and Lassen National Forests. This document provided a determination of "may effect and likely lead to a trend toward listing for the California spotted owl." The HFQLG Record of Decision (page 7) included the following: "By applying the supplemental mitigation, no resource management activities, except riparian restoration, will be permitted in suitable California spotted owl habitat unless and until a new "California spotted owl strategy" for the Sierra Nevada is released that allows such activity." The 2005 HFQLG Act - Annual Report that showed approximately a 1.6 percent cumulative effect on old-growth habitat for HFQLG Pilot Project forests. CUMULATIVE EFFECTS and OWL STRATEGY: The SNFPA final supplemental EIS (2004) provides the new "strategy" for the owl. The SNFPA final supplemental EIS provides a cumulative effects consideration, including population trends and viability of implementing HFQLG Pilot Projects on the California spotted owl and/or their habitats for the range of the owl in the Sierra Nevada. This document provided a determination of "may effect but not likely lead to a trend toward listing" for the California spotted owl. ADMINISTRATIVE STUDY: The Plumas-Lassen Administrative Study (PLAS 2003) was designed to evaluate the response of key forest elements to land management strategies for reducing wildland fire hazard, promoting forest health, and providing economic benefits across a managed forest landscape. The impetus for these studies comes from the Records of Decision for both the SNFPA (2001) and the HFQLG Act (1999) Pilot Project. The HFQLG Pilot Project is designed to demonstrate how fuel breaks, group selection, individual tree selection, avoidance or protection of sensitive areas, and riparian restoration can be applied to promote healthy forests that provide both suitable habitat conditions for an array of wildlife species, as well as a sustainable local economy. The SNFPA Record of Decision (January 2001) establishes a comprehensive adaptive management strategy to investigate uncertainties regarding these and similar management approaches; the Record of Decision specifically calls for a study related to the HFQLG Pilot Project to examine the effects of management-caused changes in vegetation (including group selection silviculture) on California spotted owls and their habitat. The SNFPA sets forth direction for an integrated management strategy for Sierra Nevada national forests to protect and enhance old-forest habitat conditions while reducing fuel conditions that pose significant fire hazards.

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36	**Public Concern:** DEIS fails to consider whether the Forest Service's fuels objectives can be attained with fewer adverse impacts to owl habitat such as: large (and medium) tree retention, higher canopy levels, lower log diameter limits, and higher snag retentions.	Section 2.3 of the final EIS provides information on "Alternatives Considered but Eliminated from Detailed Study." These alternatives are "Use of Alternative Herbicides;" "Alternative with 50 Percent Canopy Cover Retention and a Removal Limit of 20 Inches DBH and Below;" Alternative that Considered Different Treatments in DFPZs to Address Watershed Effects;" Alternative Consistent with the 2001 Sierra Nevada Forest Plan Amendment;" and "Alternative That Reduces Canopy Cover to 30 Percent in Treatment Units within the Wildland Urban Interface." The consideration of these alternatives was included in the draft EIS, and they are included, in compliance with NEPA, as part of a reasonable range of alternatives as defined in 36 CFR 1502.14. The alternatives considered and studied in detail met the purpose and need for action and responded to significant issues. HABITAT COMPONENTS: This issue is addressed in the "Notice of 12-month Petition Finding" published in the *Federal Register* on May 24, 2006 (Volume 71, Number 100).
36	**Public Concern:** Concern that the Slapjack draft EIS does not fully disclose other available information such as the Lassen study area and the Meta-analysis (Blakesley 2006) and its implications on the survival of the California spotted owl.	DEMOGRAPHICS: California spotted owl surveys conducted for the Slapjack Project were not designed to be a *demographic study* but were to determine locations of activity centers (nest, pair, young, etc.) and reproductive success for the three years surveyed. Demographic studies are being conducted for the California spotted owl in the Sierra Nevada—the studies are looking at demographic parameters including age-specific nesting and nest success rates, age-specific fecundity, age- and sex-specific survival rates, the finite rate of population change, and sex and age class structure of the population. META-ANALYSIS: This issue is addressed in the "Notice of 12-month Petition Finding" published in the *Federal Register* on May 24, 2006 (Volume 71, Number 100, pages 13-16), which states, "Our analysis of more recent data up through 2005 (Blakesley et al. 2006) indicates more-positive trends for spotted owls in the Sierra and is discussed at length below." The Draft 2006 Meta analysis, "Demography of the California Spotted Owl in the Sierra Nevada: Report to the US Fish and Wildlife Service on the January 2006 Meta-Analysis," has been reviewed by the Pumas National Forest. The 2006 meta-analysis was similar to the 2001 meta-analysis (Franklin et al. 2004) but included five years of additional data (2001-2005), excluded the San Bernardino study, and included a population viability analysis. This 2006 meta-analysis indicates that (1) demographic studies show lambda (rate of population change) was either relatively stationary for the Lassen and Sierra studies (Lambda below 1), or increasing on the El Dorado and Sequoia-Kings Canyon Studies (lambda above 1); (2) only the Lassen population decreased significantly based on the 95 percent confidence interval with steady decreases from 1995-1998 and 2002-2004, suggesting the Lassen owl population may be declining; (3) the population viability analysis (PVA) indicated two of the four study areas (Lassen and Sierra) are likely to experience population declines within seven years and very unlikely to experience population increases under current population

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		trends, but there was great uncertainty in the PVA analysis for time intervals of greater than 10 years; (4) positive trend in adult survival in all studies and estimates of apparent survival increased with time; (5) spotted owl management needs to maintain a high survival rate of territorial owls in order to maintain spotted owl populations, but that management directed at increasing reproductive output and subsequent recruitment may be the most successful way to maintain or increase spotted owl populations in the Sierra Nevada, as long as these actions do not decrease adult survival. Population growth rate (lambda) can be viewed as the sum of apparent survival probability and the per capita recruitment rate. The study indicates high adult survival and that the majority of immigrating owls onto the study areas considered in the meta-analysis "were likely natal dispersers rather than breeding dispersers." These lambda figures are, therefore, good for the populations being studied. Applying such information to other owl populations in a general context is appropriate, but it cannot be said that the Plumas National Forest owl population is similar to the Lassen or the El Dorado population. The 2006 meta-analysis concludes that the potential consequences of the Forest Service management plan to spotted owls are unknown because (1) the extent of vegetation manipulations is largely under the control of local managers and will likely vary across the Sierra Nevada; and (2) threshold levels of quality habitat necessary to maintain individual pairs of spotted owls on a site are largely unknown. The recommendations from the meta-analysis are to develop well-designed experimental studies coupled with the spotted owl demographic studies. The Plumas-Lassen Administrative Study is mentioned as quasi-experimental, limiting the scope of the results of the studies.
36	**Public Concern:** Concerns regarding the potential of the California spotted owl to warrant listing.	On May 23, 2006, the U.S. Fish and Wildlife Service provided a news release stating "LISTING OF CALIFORNIA SPOTTED OWL FOUND NOT WARRANTED - *Service finds most owl populations stable or increasing in the Sierra Nevada" (*see *Federal Register*, May 24, 2006, Volume 71, Number 100). The U.S. Fish and Wildlife Service has concluded that most owl populations in the Sierra Nevada are stable or increasing and is denying a petition to list the California spotted owl under the *Endangered Species Act*. In responding to a second petition to list the species in three years, the U.S. Fish and Wildlife Service conducted a comprehensive study of California spotted owl populations. It assessed the best scientific and commercial information available; reviewed comments and information received during two public-comment periods; and consulted with recognized spotted owl experts and federal and state resource agencies, including an Interagency Science Team. The Service concluded that the California spotted owl should not be listed as a threatened or endangered species under the *Endangered Species Act*.

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		The following are among the Service's conclusions: The best available data indicate most California spotted owl populations in the Sierra Nevada are stable or increasing, and adult survival rates show an increasing trend. The San Bernardino population in southern California does show a statistically nonsignificant decline. But in light of the health of all California spotted owl populations, this decline does not warrant a listing of the California spotted owl. Forest fuels reduction activities, notably those provided for in the Sierra Nevada Forest Plan Amendment of 2004, may have a short-term impact on owl populations. But fuels reduction will have a long-term benefit to California spotted owls by reducing the risk of catastrophic wildfires that pose a major threat to California spotted owl habitat. Barred owls, which have had an adverse impact on northern spotted owls in Washington and Oregon, have not been detected in the mountains of Southern California and have moved into the Sierra Nevada at much slower rates than they did in other parts of western North America. The largest private landowner in the Sierra Nevada, Sierra Pacific Industries (SPI), has outlined strategies that provide certain owl protections on their land. SPI conducts surveys for spotted owls before timber harvests, buffers nest centers from disturbances, and protects forest units with nesting spotted owls from harvest altogether. According to documents the company submitted to California forestry officials, the company estimates that, as its forests mature, habitat with nest-site characteristics will more than double during the next 100 years.
21	**Public Concern:** The DEIS fails adequately to analyze the project's impacts on the OWL and its habitat in particular territories and Home Range Core Areas (HRCAs).	A Home Range Core Area (HRCA) is established surrounding each territorial spotted owl activity center (Protected Activity Center [PAC]) detected after 1986. The HRCAs total 1,000 acres on the Pumas National Forest. The HRCA includes the 300-acre PAC, as well as 700 acres of foraging habitat, where available (SNFPA Record of Decision, page 39). The SNFPA owl strategy includes the implementation of the HFQLG as directed on pages 66-69 (including Table 2) of the 2004 Record of Decision. In accordance with that direction, the Plumas National Forest will only consider owl PACs, Spotted Owl Habitat Areas, Offbase and Deferred Lands, late-succession old-growth size 4 and 5 stands, and other HFQLG Act land allocations in project design and implementation of HFQLG vegetation projects. The SNFPA standards and guidelines for HRCAs do not apply to the Pilot Project area and vegetation projects (HFQLG / SNFPA Implementation Consistency Crosswalk - SNFPA final EIS direction (June 4, 2001).

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		Additional discussion regarding California spotted owl HRCAs (in particular the foraging habitat), similar to the Basin Project EIS, has been included in the Slapjack Project final EIS and BA/BE. The BA/BE for Slapjack reached a determination of "May Affect, Not Likely to Adversely Affect individuals or lead towards a trend to listing." This determination for the owl includes all direct, indirect, and cumulative effects as a result of the analysis for the Slapjack Project.
21	**Public Concern:** Concerned that spotted owls would not return to their territory after the proposed underburning in the owl PAC is completed. The commenter doesn't want the underburn to drive the owls out of the area.	The Slapjack Project draft EIS, page 3-233, states "Limited Operating Periods (no activity) would be implemented within 0.25 mile of treatment units for active nests identified during current and future surveys or incidental detections." As a result of researching your comment, it was evident that a bullet identifying LOPs for the three proposed underburns (Units 22, 65 and 925) in PAC YU024 and Base SOHA B1 were inadvertently omitted. Also, the Slapjack Project draft EIS (appendix F, page F-11) should have noted the necessary LOPs as well. This has been corrected in the Slapjack Project final EIS.
CATEGORY E: WILDLIFE CONCERNS – MANAGEMENT INDICATOR SPECIES		
36	**Public Concern:** Concern that the MIS analysis in the Slapjack draft EIS is inadequate. The Slapjack draft EIS fails to meet Forest Plan requirements that there be annual monitoring of the population and distribution of MIS. There is no evidence in the record showing that the region, forest, or district has met the annual population monitoring requirement. Revise the draft EIS to describe in detail all available population and demographic monitoring information for MIS, including the year such information was gathered, areas within the project area or the Plumas National Forest where the data was gathered, and the results of such monitoring, including presence/absence of species, individuals detected, and estimated population numbers and trend. **Public Concern:** Concern that the DEIS fails to include a detailed assessment of these impacts and ignores substantial evidence that adverse impacts on some MIS, such as pileated woodpecker and woodpeckers more generally, may be significant. By further reducing large snags, the Slapjack project will adversely affect the pileated woodpecker and its habitat. The Forest Service should include a detailed analysis of the project's impacts on the pileated woodpecker (such as snags numbers) and its habitat in a revised DEIS.	Plumas National Forest: The Plumas National Forest signed a Record of Decision on its Land Resource Management Plan (Forest Plan) in 1988. The Record of Decision for the Forest Plan states that viability of species not on the Federal Endangered Species List will be maintained if adequate quality habitat is provided. In addition, the Record of Decision states that the Plumas National Forest will conduct selected species surveys, if needed, to establish background population levels on those species where information is lacking. Appendix G of the Plumas Forest Plan lists 20 Management Indicator Species (MIS) for the forest. Refer to the letter dated May 30, 2006, "Clarification on Plumas National Forest MIS List/" The Plumas National Forest has provided a summary document for analysis of MIS habitat and population trends. Refer to appendix B of the Slapjack Project BA/BE "Plumas National Forest Management Indicator Species Report, June 2006." Data used in this MIS analysis come from Forest files, cooperating agencies, and contract surveys conducted on the Forest (see references). A habitat rating can be found for MIS in table 3-40 (page 3-98) of the HFQLG Act final EIS (USDA Forest Service 1999a). That document indicates which MIS species could benefit from Pilot Project treatment activities, which species could experience a loss of habitat values, and which species' habitat value would remain the same. In the HFQLG Act final EIS (see table AA-3.25 in appendix AA of that document), numerical California Wildlife Habitat Relationship (CWHR) values that existed prior to group selection harvest were compared to expected changes in

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		habitat following group selection harvest. The comparison generated two sets of information when compared to current conditions: the comparative trend in habitat value (expressed here as the percent change in habitat value) and whether there are any changes in the habitat rating (low, moderate, or high). This information is also given for pre- and post-DFPZ construction. Hardwood retentions as per the HFQLG final EIS are "Where oak is present, retain a minimum of 25 to 35 square feet basal area per acre of oaks over 15 inches dbh." Forest Service Region 5 Office: The Regional Office MIS inputs are incorporated into the Plumas MIS Report analysis by reference, and the information contained in those appendices were reviewed and considered as part of this analysis. The MIS CWHR accounts in this document are based on the best-known current information on habitat relationships and past and present suitable habitat. To be biologically meaningful, this information is discussed at a variety of spatial scales, including the range of the species, state (California), province (Sierra Nevada), and Forest. The habitat relationship model used for each terrestrial MIS is from the CWHR System. Details of this System are discussed below. In addition, the methodology for how this model is applied to determine habitat status and trend is also discussed below. Refer also to a draft Responsible Official direction letter, "MIS Analysis and Documentation in Project-Level NEPA -R5 Environmental Coordination," dated May 23, 2006. This letter states "while MIS population data is useful in determining effects to MIS, it is not the only way to analyze impacts to these species. Current science confirms that other information, such as habitat conditions, can be used as a sound scientific basis for assessing project impacts on species diversity, including MIS." Thus, regional clarification supports the concept that habitat can be used in lieu of population information that may be lacking. The Regional Forester states in the 2004 SNFPA Record of Decision, "Based on my review of the record, including the final supplemental EIS, Biological Assessment (BA), Biological Evaluation (BE), and Biological Opinion (BO), I believe that the management approach embodied in this Record of Decision represents a balance of wildlife conservation measures that consider the available science and the risks associated with wildfires. It will provide the fish and wildlife habitat and other ecological conditions necessary to maintain well-distributed viable populations of vertebrate species in the planning area, and maintain the diversity of plants and animals." The 2004 SNFPA final supplemental EIS (table 2) direction regarding snags, down wood, and large trees is as follows: Snags. During project-level planning, consider the following guidelines for large-snag retention: In Westside mixed conifer and ponderosa pine, four of the largest snags per acre. In the red fir forest types, six of the largest snags per acre. In Westside hardwood ecosystems, four of the largest snags per acre (hardwood or conifer). Down Wood. Within Westside vegetation types, generally retain an average over the treatment unit of 10-15 tons of large down wood per acre.

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		Large Tree. Design projects to retain all live trees equal to and greater than 30 inches dbh; exceptions allowed for operability. Minimize impacts to equal to and greater than 30-inch trees as much as practicable. Slapjack Project: The "Project-level MIS Selection and Effects Analysis for the Slapjack Project" is based on the Pacific Southwest Region (Region 5), May 23, 2006, draft letter "Draft – MIS Analysis and Documentation in Project-Level NEPA, R5 Environmental Coordination." A forest-scale examination of habitat, population attributes, and trend for each selected project-level MIS, documented in the June, 2006, Plumas National Forest Management Indicator Species Report, has been incorporated into the Slapjack Project analysis. Selected project-level MIS reflect the May 30, 2006, Plumas National Forest letter "Clarification on Plumas National Forest MIS List," and the MIS identified in the 1988 Plumas National Forest Land and Resource Management Plan ("Forest Plan"), appendix G. The Plumas National Forest MIS that are non-TES species are addressed individually in the Slapjack Project BA/BE appendices. For the Slapjack Project MIS analysis, habitat and population information was gathered from several sources, including Plumas National Forest monitoring records, databases, GIS coverages, deer herd plans, California Department of Fish and Game publications, and trends identified in the SNFPA. Appendix A of the Slapjack BA/BE provides additional discussion about MIS species. The pileated woodpecker and gray squirrel are not Plumas National Forest MIS species (refer to the letter dated May 30, 2006, "Clarification on Plumas National Forest MIS List"); however, these species were discussed in a separate document as an appendix to the Slapjack Project BA/BE. Cumulative effects on MIS were concentrated on those activities that impacted the habitat for which the MIS is an indicator, including impacts on early seral habitat (deer), black oaks (gray squirrel), snags (woodpeckers), RHCA, grazing, mining (trout and willow/alder), and openings in forested stands (Neotropical migrants). Habitat components important to woodpeckers and gray squirrel, such as snags and oaks, are considered as part of the Slapjack Project analysis. For the terrestrial analysis area, less than 20 percent of the 22,939 acres of National Forest land or less than 13 percent of the 34,725 acres of National Forest and private land would be treated, meaning approximately 80 percent or 87 percent, respectively, would not be treated, and thus not subject to snag, oak, or large-tree reduction. For the aquatic analysis area, less than 18 percent of the 25,174 acres of National Forest or less than 7 percent of the 66,247 acres of National Forest and private land would be treated, meaning approximately 80 percent or 93 percent, respectively, would not be treated, and thus not subject to snag, oak, or large-tree reduction. Large woody material, where deficit the 10–15 tons per acre, would be recruited as part of the project mitigations.

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		Snags greater than 15 inches are proposed to be retained for all treatments with the exception of "operability and safety." Within the 4,419 acres of treatment (DFPZ, group selection, and individual tree selection) units snag retention would be four snags per acre. Although four snags per acre is allowed for retention in group selections, possibly no snags in the 219 acres (123 within DFPZs + 96 outside of DFPZs) of group selections units would be retained due to "operability and safety." Thus, snags could be reduced on the 4,419 acres of treated area, but standards and guidelines provided by the 2004 SNFPA would be implemented for snag retention. The snag levels in National Forest habitat capable of supporting snags in the terrestrial and aquatic analysis area, that would not be treated, would fluctuate above and/or below existing levels as snags fall and trees die over time. Large woody material would be retained at 10-15 tons per acre. Large live trees equal to and greater than 30 inches dbh would be retained except to allow for operability. Where oak is present in DFPZ and individual tree selection units, a minimum of 25 to 35 square feet basal area per acre of oaks over 15 inches dbh would be retained. Hardwoods 30 inches dbh and greater would be retained within group selections.
CATEGORY F: SOILS AND HYDROLOGY CONCERNS (INCLUDING HERBICIDES)		
5, 33, 37, 41	**Public Concern:** Soil and water quality standards are not being met in herbicide applications.	The HFQLG Act standard riparian buffers would be employed for the DFPZ treatments, and no herbicides would be used within the buffered areas. Imazapyr is minimally mobile in soils and breaks down rapidly in water to nonpersistent degradates. There is a low likelihood of detection in water. Refer to the effects sections in the draft and final EISs—chapter 3 "Hydrology" section (3.8) and "Soils" section (3.10). For weed control, 50-foot buffers would be applied to perennial streams. There would be no buffers on intermittent and ephemeral streams, but a Limited Operating Period would be imposed to restrict spraying to the driest portion of the year when these streams are not flowing. Spraying would not occur if precipitation is forecasted. With the establishment of adequate streamside buffers and ground application, and absent direct application onto surface waters, triclopyr concentrations in surface waters are typically not detected in forestry applications. Triclopyr is also described as variably persistent in soil, with minimal mobility and leaching. Triclopyr groundwater concentrations in forested areas are not well known, but surveys of groundwater in urban and agricultural areas did not detect triclopyr. Refer to the effects sections in the draft and final EISs—chapter 3 "Hydrology" section (3.8) and "Soils" section (3.10).
36, 50	**Public Concern:** Level of information missing in the draft EIS for hydrology.	The following information has been clarified and included in the final EIS ("Hydrology" section 3.8): clarification and rationale of analysis area, timeframe for analysis, rationale for treatments needed in the subwatersheds over threshold, and conclusions of cumulative off-site watershed effects). Cumulative off-site watershed effects analysis methodology, rationale, and limitations are explained in detail in appendix E of the Slapjack Hydrology Report.

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36, 41, 50	**Public Concern:** Entering subwatersheds above the Threshold of Concern (TOC). Apply hand treatments in stands in the watersheds now over TOC. The disturbance coefficient for hand treating is zero. Hand treatments would reduce the fuel hazard and subsequently the stands could be treated with prescribed burning. This might require more frequent treatments over time, but the alternative should not be dismissed because of this. Employ practices that reduce the level of ground disturbance, e.g,. complete harvest during winter when ground is covered by snow. This is a common practice in the Tahoe Basin. Defer activities until the watershed condition has improved or recovered.	This practice is not practical in the Slapjack Project area due to the relatively low elevation of the area—no more than 20 percent of the annual precipitation falls as snow. Refer to the "Overview of the Existing Condition" in section 3.8 of the final EIS. Subwatersheds in the analysis area are highly impacted due to private land timber harvesting and urban development. The proposed treatments in the Slapjack Project area would add a short-term adverse effect on the cumulative effects within the subwatersheds, and provide long-term benefits to the subwatersheds. The rationale for the need for treatment on public land, and an explanation of short-term adverse effects and long-term benefits, are explained in the final EIS section 3.8 ("Hydrology") and the Slapjack Hydrology Report. Appendix F of the final EIS includes mitigation measures and Best Management Practices that would be used to reduce the short-term adverse effects on subwatershed condition. Alternatives F and G include a reduction of group selection treatments in subwatersheds over the Threshold of Concern. There is no measurable difference in these alternatives compared to the other action alternatives.
36, 50	**Public Concern:** DFPZ treatments in Riparian Habitat Conservation Areas (RHCAs). Reduce impact by limiting treatments in the riparian habitat conservation areas (RHCAs) and streamside management zones (SMZs) to hand treatments. This would reduce the level of disturbance near to streams.	The rationale for DFPZ treatments in RHCAs is included in section 3.8 ("Hydrology") of the final EIS and the Hydrology Report. In accordance with the HFQLG final EIS, treatments must meet or exceed Riparian Management Objectives (RMOs) in the RHCAs. Appendix A of the Slapjack Hydrology Report includes an RMO report. The rationale for not deferring activities until the subwatershed conditions have improved or recovered in discussed in the alterative A (no-action alternative) section 3.8 of the final EIS.
14, 36	**Public Concern:** The existing condition does not meet soil standards (including woody debris).	Soil productivity standards and guidelines have been redefined and clarified in the final EIS and Soils Report. Refer to section 3.10 ("Soils") of the final EIS, or for more detailed information, refer to the Slapjack Soils Report.
14, 36	**Public Concern:** Unsupported mitigation measures.	New mitigation measures have been created, and previously mentioned mitigation measures have been clarified in the final EIS. These mitigation measures are used when the existing condition of soil productivity is not meeting standards and guidelines, or cumulative effects could adversely affect soil productivity. Appendix F of the EIS contains a list of all mitigation measures that apply to treatment units or types of treatments.
14, 36	**Public Concern:** Level of information missing in the draft EIS.	The following information is now included in the final EIS: clarification and rationale of analysis area (section 3.10) timeframe for analysis (cumulative effects of soil productivity and changes to the analysis of Indicator 2 – Soil Hydrological Function. More detailed information of the soil condition analysis is included in the Slapjack Soils Report.

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CATEGORY G: FIRE RESILIENCY RELATED CONCERNS (INCLUDING HERBICIDES)		
16, 41	**Public Concern:** Impacts of planting groups were not analyzed and the creation of groups would not contribute to the fire resiliency of the area. Impacts of replanting groups were not fully addressed. We believe that neither the planting nor the release is necessary or justified. We are concerned that the 219 acres of small groups will become plantations, resulting in reinstallation of the very same fire hazard conditions that the project seeks to address. The preferred alternative calls for the creation of 219 acres of Group Selection (GS) even-aged plantations scattered throughout the project will not contribute to the fire resilience of the area.	The impacts of replanting groups were addressed in the direct and indirect (3.12.5.3), and cumulative effects (3.12.16.2) of group selection treatments. While shade-tolerant, fire-prone species such as incense-cedar and true firs may regenerate naturally within the group selection areas, the main emphasis is to regenerate the group selection areas with shade-intolerant, fire- resilient species such as ponderosa pine and sugar pine. Artificial regeneration and proposed release treatments would accelerate the establishment and development of the shade-intolerant, fire-resistant species, enabling them to supplement the natural regeneration of incense-cedar and true firs. The fire resiliency of groups is discussed in the cumulative effects section (3.12.16.2). Group selection harvest would not immediately change the forest structure of a stand from a high fire risk into a fire-resilient one, but would occur on an approximately 150- to 200-year rotation. The Slapjack Project is just the beginning phase of converting high fire-risk stands into more fire-resilient stands. Over time, implementation of group selection on a landscape-scale would maintain a wide range of tree ages and size classes from seedlings to large-diameter trees.
		Long-term fire resilience of forested landscapes can be maintained by small group selections conducive to regeneration of fire-resistant and shade-intolerant ponderosa pine. Group selections permit the maintenance of single-canopy layers in any given location, thereby discouraging crown fires (Weatherspoon 1996; Weatherspoon and Skinner 1996).
7	**Public Concern:** Power lines, worker safety, and prescribed burning. It is important to note that Units 72 and 73, which are designated for underburn, are located under high voltage power lines (12,000 volts and 115,000 volts) in the vicinity of our Forbestown Powerhouse. Heavy smoke under the lines has the potential to cause an arc and potential phase-to-phase or line-to-ground discharge, which could injure workers. As we discussed with Plumas National Forest representatives in 2003, and commented in our September 2005 letter, we recommend that you work with us and with PG&E to de-energize the power lines for safety in the area of the underburn to prevent arcing in the event that smoke becomes heavy.. Heavy smoke under the lines has the potential to cause an arc and potential phase-to-phase or line-to-ground discharge, which could injure workers. We also request notification five days in advance of any underburn of units 72 and 73 in order to have standby power available for Forbestown Powerhouse.	The comment has been noted, and the Plumas National Forest will be working with the South Feather Water and Power and PG& E to address the issues raised and firefighter safety. This will be included in the Burn Plan and under the Burn Plan notification section.
9	**Public Concern:** Adoption of an alternative that will ensure that initial fuel reduction does occur and that the proper and necessary maintenance will follow.	The comment has been noted and the Plumas National Forest will make all efforts to maintain the DFPZ in the future.

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6, 13	**Public Concern:** Adequate DFPZ maintenance strategies. The EIS should include evaluation of a maintenance strategy, founded on prescribed burning, into the proposed Slapjack action plan. The restoration of a site to pre-historically natural conditions is unlikely to be achieved with the omission of a reoccurring fire regime. We fear that negligence of future maintenance could lead to circumstances where the Forest incorrectly feels that chemical treatment of vegetation would be the only viable solution. We are opposed to any land management actions that will likely lead to future vegetation management strategies dependent upon herbicides.	The Forest Service agrees that burning is an integral part of maintenance under all action alternatives. The preferred alternative (alternative D) does propose the use of herbicides for DFPZ maintenance. For all alternatives, the maintenance plans call for underburning and mastication. New NEPA analysis would be required for any maintenance that calls for any herbicide applications in the DFPZ if they were not analyzed under the selected alternative.
13	**Public Concern:** Concern over use of herbicides for DFPZ maintenance. Inevitably, the proposed actions associated with any fuels reduction efforts will disturb the soil and increase light availability providing an optimum medium for noxious and invasive species and even a dense accumulation of native shrubs. In such an instance, undesired vegetation, or early seral species, are typically represented by annual grasses and weeds, and woody shrubs. All of which, over time, will create a situation likely exhibiting fuel levels similar to or even higher than currently exist. Depending on vegetation types, this high fuel load could reoccur within as little as three to five years. This could lead to a situation where the Forest is, as proposed for this project, unwisely and unnecessarily dependent on a chemical-based vegetation management strategy, something CATs is very much against.	New NEPA analysis would be required for any maintenance that calls for any herbicide applications in the DFPZ if they were not analyzed under the selected alternative. The Forest Service preferred alternative (alternative D) does not propose the use of herbicides for DFPZ maintenance.
14	**Public Concern:** Marking crews are overly conservative, and as a result, final fuels objectives for stands are not being met.	Based on fire behavior modeling, the prescription is adequate to reduce fire behavior in the stands.
16, 18	**Public Concern:** Failure to analyze an adequate range of alternatives for fuel treatments and responsiveness to recent scientific information in the analysis. Your analysis of fuels issues in the DEIS does not accurately represent the current science and fails to consider a wider range of logging prescriptions that could achieve the project's purpose and need. The DEIS must respond to scientific information and opinion indicating that the agency's fuels reduction goals can be achieved while maintaining higher canopy cover suitable for wildlife and utilizing a lower logging diameter limit (I recommend 8-20 inches depending on stand characteristics).	The Plumas National Forest did extensive fire behavior models for the Watdog DFPZ and Empire DFPZ that included runs on canopy cover and the relationship to fire behavior entering the DFPZ from outside. The fire behavior models showed that 40 percent canopy is adequate to the stands in the Slapjack Project area. The commenter should remember this is a fuel treatment that will reduce fire behavior entering the DFPZ. The design of the DFPZ is based on fire behavior modeling on the site-specific conditions—it is focused on treating just the DFPZ, not the entire landscape. The canopy surrounding the DFPZ ranges 50 plus percent cover and would sustain crown fire which could enter the DFPZ. Sprouting of vegetation is an important component that will be assessed during monitoring. The maintenance burning would reduce the sprouting that would occur.

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	The DEIS fails to identify a broad enough range of alternatives and implies that either a "No Action" or Alternatives that create open canopy DFPZs, thinnings and Group Selections are within the scope of reality. By failing to acknowledge extensive evidence that fuels reduction goals can be achieved with less intensive logging, and by failing to consider in detail alternatives utilizing less intensive logging, the DEIS falls short of NEP A's requirements. These deficiencies should be corrected in a revised or supplemental DEIS to allow an opportunity for public comment on alternatives that acknowledge the emerging fire/fuels science of Stephens and Moghaddas as I mentioned in my scoping comments. It is generally recognized by fire/fuel scientists that forest resiliency to wildfire is achieved by removing surface fuels and small diameter material. The purpose and need for the Slapjack project is to implement the QLG pilot project in a way that will reduce the risk of catastrophic wildfire, promote fire resilient forests, and improve forest health. (DEIS, pp. 1-4 to 1-6).	Options for greater canopy cover and less intensive fuel management strategies were considered but eliminated from alternatives because they would not achieve fuel reduction objectives. Under all the alternatives, the Slapjack Project would reduce surface, ladder, and canopy fuels, and the maintenance plan would reduce the effect of the regrowth of brush or ladder fuels and accumulations of surface fuels. Small planted trees in plantations in group selection units would remain vulnerable to scorch-related mortality due to their small size. This is true of small trees outside of plantations, as well. On wildfires on the Plumas National Forest, plantations do not typically burn under high severity because they have reduced surface fuels resulting from past site preparation and planting activities.
16, 18	**Public Concern:** Failure to analyze a broad enough range of logging prescriptions that would protect medium and large trees. The Slapjack DEIS fails to comply with these requirements by failing to analyze and consider alternatives including less intensive logging prescriptions that would protect medium and large trees and maintain higher levels of canopy cover. There is substantial evidence that alternatives that would protect trees greater than 20" diameter and maintain canopy cover at 50 percent or greater would meet the project's fire behavior goals. Yet all of the alternatives in the DEIS involve the same logging prescriptions and the identical acreage of DFPZs, and fail to analyze fire behavior in stands that have a 20" UDL.	At 50 percent canopy in DFPZs would not be as effective at slowing an oncoming crown fire. The potential for the crown fire continuing across the canopy is still real at 50 percent canopy. The Forest Service has observed this behavior in Plumas National Forest stands that have 50 percent or more canopy. The canopy cover outside the DFPZ is over 50 percent, and with the surface fuels, could sustain a crown fire. The Slapjack EIS follows standard and guidelines set forth in the HFQLG Pilot Project area and on page 68, table 2 of the 2004 Sierra Nevada forest Plan Amendment. This includes establishing fuel treatments that maintain less than 50 percent canopy cover and an upper diameter limit of less than 30 inches. The canopy cover has been analyzed, and in the judgment of fire management personnel, 40 percent would be the best canopy cover to slow the fire progression in the canopy.
16	**Public Concern:** The Forest Service must examine land management policies that allow for the return of fire to the landscape in order to reverse the damage done by 100 years of indiscriminate fire suppression. Concern was also raised for an adequate cumulative effects analysis boundary to be used in assessing the effectiveness of the DFPZ.	The Slapjack Project is using policies and treatments that will help with fire suppression and will help change the condition class of the Slapjack stands back towards historical ranges of variability (refer to "Fire Regimes and Condition Classes" in the "Fire and Fuels" section of chapter 3). Private land management was looked at in the Slapjack Project EIS for all of the private timber industry lands within the 1-mile geographical boundary described in the chapter 3 "Fire and Fuels" section of the EIS. Many of the private landowners are working in collaboration with the Slapjack Project and have or will be treating their lands to adhere to the DFPZ. Some of these individual landowners have received grant dollars to treat the private lands to help with the potential fire problems in the area. Private landowners management policies have not driven the Forest Service decisions for public lands. The Slapjack Project was conceived by Forest Service personnel with input from fire safe councils and private individuals at public meetings to conform to the HFQLG Pilot Project management direction.

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16, 18, 36	**Public Concern:** Consider, in detail, an alternative with a 20-inch diameter limit and 60% canopy cover retention in dominant and codominant trees (and 50-60% canopy cover retention in dominants and codominants where the current condition is 50-60%). Please run such an alternative through your fire/fuels modeling and compare it with the other alternatives. For your conversion from 20- foot wind speeds to mid-flame wind speeds, you should use .15 for the stands thinned as described above, since Rothermel (1983) recommends .1 for closed canopied forest that is more dense, and .2 for closed-canopied forest that is more open.	The 20-inch diameter was looked at with fire behavior analysis, but was not adequate to slow an oncoming passive or active crown fire entering the DFPZ. The 40 percent canopy was the best alternative to halt the fire running through the crowns and across the DFPZ, which is only approximately 0.25 mile wide. The mid-flame wind speed under 90th percentile weather was only 2 mph. The wind factor stated by the commenter would only reduce it by less than 1 mph, which would not change the fire behavior in the model runs. It is not the wind that is driving the fire behavior; it is the fuels and topography that are untreated outside the DFPZ. The conversion factor for wind under 60 percent canopy would be 0.3. This is still partially sheltered as there is 40 percent opening in the stand that the commenter is describing. The canopy cover for the Slapjack Project is 40 percent not 30 percent. The conversion factor of 0.3 was used because it best describes the area inside and outside the DFPZ, which is consistent with Rothermel's recommendations. The Forest Service is not modeling just the fire inside the DFPZ, but is also modeling the untreated area outside the DFPZ because this is the fire that would enter the DFPZ. The 90th percentile weather wind at 20 feet is 7 mph with the conversion of 0.3. This is a 2.1 mph mid-flame wind. It is not the wind causing the fire behavior, it is the fuels and topography. Using the commenter factor of 0.15 would only reduce the wind less than 1 mph, which does not change the fire behavior at all. The basic principles of fuel reduction, including thinning from below and prescribed burning studied in the Perry et al. (2004) paper, would be implemented in fuel treatments in the Slapjack Project. The Perry et al. (2004) paper does not specify or recommend a diameter limit of any size to be implemented for fuel reduction in the Sierra Nevada. This study occurred in eastside pine types of eastern Oregon on the Deschutes National Forest. Direct extrapolation of all results of the Perry et al. (2004) study to westside mixed conifer types found in the Slapjack Project area in the Sierra Nevada of California would be inappropriate due to differences in vegetation type, site, and management history. The vegetation, fire, and fuels analysis for the Slapjack Project are based on site-specific vegetation data taken within forest types in the Slapjack Project area.
20	**Public Concern:** We are contacting you to request your assistance and cooperation in helping us secure crucial defensible fire space around our property and the Bootjack Mine. We hope you will find this proposal acceptable but also understand your need for detailed information.	The property mentioned is surrounded by California spotted owl habitat. The fuels department did want to work on this property, but it is in a Protected Activity Center (PAC) for the owl, which greatly limits the amount of treatment that can be done. Future treatments in light of owl PAC issues could be considered but were not possible within the scope of the proposed action due to the time needed to adequately analyze and propose treatments in Owl PACs. The project does not propose any activity within owl PACs in compliance with the SNFPA and HFQLG plan direction for the Plumas National Forest.

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20	**Public Concern:** While the Slapjack DEIS asserts that analyses for the Empire and Watdog project reached different conclusions, the DEIS fails to take a hard look at whether fuels reduction goals for this project can be met with less intensive logging, as required by NEPA.	Fuels objectives for 20-inch trees and 50 percent canopy were considered but eliminated. The potential of a crown fire crossing through the top of the canopy was still evident at a 50 percent canopy in the fire models.. Section 2.3 of the draft EIS provides information on "Alternatives Considered but Eliminated from Detailed Study." These alternatives are "Use of Alternative Herbicides;" "Alternative with 50 Percent Canopy Cover Retention and a Removal Limit of 20 Inches DBH and Below;" Alternative that Considered Different Treatments in DFPZs to Address Watershed Effects;" Alternative Consistent with the 2001 Sierra Nevada Forest Plan Amendment;" and "Alternative That Reduces Canopy Cover to 30 Percent in Treatment Units within the Wildland Urban Interface." The consideration of these alternatives was included in the draft EIS, and they are included, in compliance with NEPA, as part of a reasonable range of alternatives as defined in 36 CFR 1502.14. The alternatives considered and studied in detail met the purpose and need for action and responded to significant issues.
CATEGORY H: SOCIO-ECONOMIC CONCERNS		
14	**Public Concern:** Concern that marking is too conservative and thus making sales uneconomical.	Marking in the Slapjack Project area is being inspected by Forest Service contract inspectors. If for some reason contracted marking does not meet prescription, contract inspectors note the mistake, and the mark is corrected. The Slapjack Project is designed to treat a large area for fuels and other objectives. Not all acres needing treatment for these objectives have sufficient conifer sawlog volume to make the entire project a positive timber sale. Thus, the timber sale portion of the Slapjack Project would consist of areas with sufficient conifer sawlog volume, and a service or stewardship contract would be required to treat less economical areas. One difficulty in making the entire Slapjack Project a timber sale, even if marking were increased, is its large hardwood sawlog component. The sawlog market at this time accepts primarily conifer species, thus making very little value in hardwoods.
14	**Public Concern:** Concern about soils management practices causing unnecessary uneconomical impact.	The temporary economic cost is paid for by the long-term soil productivity regained by tillage and adequate skid trail spacing.
16	**Public Concern:** Concern that group selection harvesting is not an appropriate technique to provide economic stability to rural communities because of potential fire hazards and ecological impacts.	The HFQLG Pilot Project, under which lies the Slapjack Project, is designed to test and demonstrate the effectiveness of certain fuels and vegetation management activities in meeting ecologic, economic, and fuel-reduction objectives. The proposed group selection prescriptions for the Slapjack Project would contribute toward achieving this goal. Group selection has not been widely used on government lands in the northern Sierra Nevada and thus is being tested on lands guided by the HFQLG Act, both for its contribution toward ecological fire reduction and economic stability objectives. Monitoring would occur pre- and post-project implementation.

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		It should be noted that the ecological goals of group selection, including reintroduction of a more fire-resilient forest, may not occur at first entry. Group selection implies long-term uneven-aged management and conversion to the specified desired condition (such as structural diversity, shade-intolerant species, and so forth). Finally, fire-resilient species, such as pine, are shade intolerant and therefore require regeneration cuts to be propagated. Group selection is the only option given under the HFQLG Act at this time for such management.
23	**Public Concern:** Clarification of prescription and suggestion on equipment (self-leveling mechanical harvester or portable pre-bunching machine) to be used for biomass removal on skyline ground (slopes greater than 35 percent).	Biomass material between 5.0 to 8.9 inches dbh would be hand felled on skyline harvesting units because of soil concerns. Costs of moving this material is considered in the economic analysis and is estimated to be $1,200 per acre under all action alternatives (refer to tables E-1, E-2, and E-3 in appendix E of the final EIS). This is a generalized cost of biomass removal in skyline harvesting systems, including pre-bunching of material, regardless of method. The Logging Systems Specialist Report, on file at the Feather River Ranger District, makes the following recommendations: ground profiles were run to determine the yarding feasibility of the skyline areas. The skyline areas were based on using a 42-foot-tall tower with a 14 hp motorized carriage that weighs 1,200 lbs. This medium-sized yarding system was suggested because of its capability of yarding both biomass-sized stems and larger logs. It is more economical than using larger yarders because it eliminates costs of transporting additional machinery to the work site.
30, 33	**Public Concern:** Concern that the Forest Service is not addressing the issue of local employment, particularly in the form of hand crews. Concern that locally employed hand crews are available in the Slapjack Project area and a better alternative than using herbicides.	The contracts have not yet been advertised; thus, it is unknown at this time who would operate on these service contracts and timber sale. While it is assumed that locals have a bidding advantage for service and timber contracts due to the geographic location, there is no enabling legislation that limits bidding strictly to local communities. Regardless of the final purchaser, local employment opportunities may emerge due to hiring of local personnel needed for contract completion, local purchase of supplies, and the use of local services (such as lodging, food, and gas). The Slapjack Project would employ some hand crews through DFPZ construction (for manual treatments, hand lines, and hand piling/burning for thermal treatments) and group selection (tree planting, hand-cutting, and grubbing). Unfortunately, hand work is the most expensive option, and finding a balance between machine work and handwork assists in keeping the project economical.

Comment Letter	Comment / Concern Statement	Forest Service Response
CATEGORY I: GROUP REPLACEMENT CONCERNS		
16, 41	**Public Concern:** Impacts of planting groups were not analyzed, and the creation of groups would not contribute to the fire resiliency of the area. Impacts of replanting groups were not fully addressed. We believe that neither the planting nor the release is necessary or justified. We are concerned that the 219 acres of small groups will become plantations, resulting in reinstallation of the very same fire hazard conditions that the project seeks to address. The preferred alternative calls for the creation of 219 acres of Group Selection (GS) even-aged plantations scattered throughout the project will not contribute to the fire resilience of the area.	The impacts of replanting groups were addressed under direct and indirect effects (section 3.12.5.3), and cumulative effects (section 3.12.16.2) of group selection treatments. While shade-tolerant, fire-prone species, such as incense-cedar and true firs, may regenerate naturally within the group selection areas, the main emphasis is to regenerate the group selection areas with shade-intolerant, fire-resistant species such as ponderosa pine and sugar pine. Artificial regeneration and proposed release treatments would accelerate the establishment and development of the shade-intolerant, fire-resistant species. enabling them to supplement the natural regeneration of incense-cedar and true firs. The fire resiliency of groups is discussed in the cumulative effects section (3.12.16.2). Group selection harvest would not immediately change the forest structure of a stand from a high fire risk into a fire-resilient one, but would occur on an approximate 150- to 200-year rotation. The Slapjack Project is just the beginning phase of converting high fire risk stands into more fire-resilient stands. Over time, implementation of group selection on a landscape scale would maintain a wide range of tree ages and size classes from seedlings to large diameter trees. Long-term fire resilience of forested landscapes can be maintained by small group selections conducive to regeneration of fire-resistant, shade-intolerant ponderosa pine. Group selections permit the maintenance of single canopy layers in any given location, thereby discouraging crown fires (Weatherspoon 1996; Weatherspoon and Skinner 1996).
CATEGORY J: TRADITIONAL INDIAN CULTURAL CONCERNS		
41	**Public Concern:** Cultural burning for the benefit of traditional Indian cultural uses; inventory and monitoring. We are disappointed that the project did not include enhancement opportunities for cultural purposes for the benefit of Indian people. The Sierra Nevada Forest Plan Amendment (2001 and 2004) directs the FS to include inventory and monitoring of traditional plant resources and to include burning of culturally important plants for the benefit of Indian cultural use, during the planning and implementation of forest projects whenever it is feasible to do so. See 2004 SNFPA ROD, pp. 25-26. Monitoring requirements for culturally important plant resources are discussed in the 2001 SNFPA FEIS, Appendix E, pp. E-118-123. These monitoring requirements are affirmed in the 2004 ROD, p. 70.	Enhancement (for example, burning) of traditional cultural plant resources were not included in the proposed project because traditional users and/or tribal representatives did not identify any areas that contain desirable species. Overall, due to the extensive tanoak environment, desirable plant species are not common in the Slapjack Project area.

Comment Letter	Comment / Concern Statement	Forest Service Response
CATEGORY K: NEPA AND REGULATORY COMPLIANCE CONCERNS		
36	**Public Concern:** Concern that the DEIS should have included an alternative based upon the 2001 Framework.	Section 2.3 of the draft EIS provides information on "Alternatives Considered but Eliminated from Detailed Study." These alternatives are "Use of Alternative Herbicides;" "Alternative with 50 Percent Canopy Cover Retention and a Removal Limit of 20 Inches DBH and Below;" Alternative that Considered Different Treatments in DFPZs to Address Watershed Effects;" Alternative Consistent with the 2001 Sierra Nevada Forest Plan Amendment;" and "Alternative That Reduces Canopy Cover to 30 Percent in Treatment Units within the Wildland Urban Interface." The consideration of these alternatives was included in the draft EIS, and they are included, in compliance with NEPA, as part of a reasonable range of alternatives defined in 36 CFR 1502.14. The alternatives considered and studied in detail met the purpose and need for action and responded to significant issues.
		In response to public comment, an additional alternative was considered but eliminated from detailed study to address issues of canopy cover retention and removal limits. A canopy cover of 60 percent was considered but eliminated from detailed study due to issues relating to DFPZ efficacy and is discussed in chapter 2 of the final EIS.
36	**Public Concern:** The DEIS lacks any analysis of the environmental impacts of the project, including the "quantified assessment" of combined environmental impacts' required by NEPA.	An Interdisciplinary Team (ID Team) was formed at the direction of the Forest Supervisor for this project. The ID Team worked on each aspect of the project, from the development of the purpose and need for action through the environmental effects analysis, including defining effects boundaries in both short- and long-term contexts once alternative development had begun. Each team member prepared a specialist report in accordance with their resource area direction and guidelines. The team then reconvened on several occasions in an interdisciplinary environment to discuss their findings, and refined the alternatives under consideration for the Responsible Official. In order to streamline the EIS document, many of the particular findings were incorporated by reference. These specialist reports provide additional detail regarding the concerns raised here by the public and are compliant with both Forest Service and NEPA regulation and policies. The boundary for the effects (including cumulative effects) analysis area for each resource is described in chapter 3 of the final EIS in the methodology section.
36	**Public Concern:** The DEIS and the proposed action fail to comply with the National Forest Management Act, the National Environmental Policy Act, and other federal laws. The DEIS should be revised to comply with NEPA, and the revised DEIS should be re-circulated for additional public comment.	The draft EIS is compliant with the *National Forest Management Ac*t and *National Environmental Policy Act*. The final EIS, in particular, provides additional information to clarify and assist the public in reviewing the proposed action and its associated effects (such as effects on MIS). The Responsible Official will provide a Record of Decision to describe the rationale behind the decision made and any additional requirements or changes to the proposed action as a result of a review of the analysis by the Interdisciplinary Team, as well as comments received from the public throughout the process.

DOBBINS/OREGON HOUSE FIRE PROTECTION DISTRICT

P.O. BOX 164
Oregon House, CA 95962
Tax I.D. #94-2532180

#3

March 8, 2006

James M. Pena, Forest Supervisor
Plumas National Forest
P.O. Box 11500, 159 Lawrence Street
Quincy, CA 95971

MAR e 8 2006

Ref: Slapjack Project DEIS

Dear Mr. Pena,

Our all volunteer fire district is in receipt of the draft EIS related to the Slapjack Project. This project is of major importance to our communities as we have seen the effect of both the Williams and Pendola fires. While we are very much aware of the need to create the proposed fire breaks, we strongly support the continued maintenance of them in the future and endorse any form of brush management your organization proposes for their upkeep.

We would like to endorse this effort and declare our wholehearted support of the Slapjack Project.

The devastation associated with these two fires in the last decade has not only destroyed homes and property but it also created havoc with our watershed and economic structure. Our board of directors greatly appreciates this Forest Service project and feels that, when all aspects are considered, our local residents as well as the entire state of California will be the beneficiaries of your efforts.

If there is any way in which we can help this effort please feel free to contact us.

Sincerely,

Pete Hammontre
District Chairman, DOHFPD

C:/fire deptlslapjackl.doc

S-1-1

9
DEIS

Yuba Watershed Protection & FireSafe COUNCIL

James Pena
Forest Supervisor
Plumas National Forest
P.O. Box 11500
Quincy, Ca. 95971

Received
MAR 24 2006
District

March 12, 2006

Dear Mr. Pena,

I am writing you today to extend the support of the Yuba Watershed Protection and Fire Safe Council (YWP&FSC) for the US Forest Service efforts to protect our communities from fire through the creation of its Defensible Fuel Profile Zones (DFPZ's). The YWP&FSC views your Slapjack Project as a unique opportunity to implement a long term comprehensive and well designed collaborative effort that will integrate private and public lands to optimize the protection of communities and watersheds. Our council has made an outward demonstration of its commitment to that effort through its past and pending work on fuels reduction on numerous private parcels that augment the Forest Service network of DFPZs in our area. Most recently, we have secured funding for treatment of two project sites involving 109 acres, have just received grant funds to treat two additional projects this year involving an additional 198 acres, and have developed a preliminary forward looking community wide fuel treatment strategy as part of our involvement in Yuba County's current DMA 2000 planning effort. It is our sincere hope that our level of commitment to this process will enhance your efforts and help to rapidly move the Slapjack Project forward after the EIS process is completed.

We believe that it is crucial for you to adopt an alternative that will assure that the initial fuel reduction does occur and that the proper and necessary maintenance will follow. As you are most certainly aware, that maintenance is the weakest link in the full and successful execution of any fuels treatment project. Your commitment to this portion of the process is essential to secure and not squander the initial investment of the treatment. Maintenance procedures must be low in cost and simple to implement. This will ensure that required maintenance actually occurs in the future.

We look forward to working with you on current and future efforts to protect Yuba County, its residents and watersheds, from devastating wildfire.

Sincerely,

Glenn Nader
Council Facilitator

Yuba County Board of Supervisors #15

This Yuba County Board of Supervisors wishes to convey its support of the proposed Forest Service Slapjack Project. The proposal has more than adequately addressed the potential impacts of using herbcides for vegetation management and that such use if the most economical and effective means available.

The need for continued fuels reduction is a vitally important element in wildfire mitigation and will protect the communities in the Yuba Foothills from severe wildfires. The importance of fuels treatment to reduce the potential for devastating wildfires and the resulting impacts of destroyed habitat and the consequential reduction in environmental quality of the forest are of prime consideration.

The Board of Supervisors looks forward to the implementation of the project

S- I-I #19

ICI IEI5

YUBA COUNTY RURAL FiRE JOINT POWERS AGENCY

Box 164

OREGON HOUSE, CALIF. 95962

Telephone 530-743-2529

Fax: 530-743-2953

Email: jpierson@acess4less.net

March 29,2006

Iames M. Pefia, Porest Supervisor Plumas National Forest

P.O. Box 11500, 159 Lawrence Street QUincy~CA 95971- -- --

Ref: Slapjack Project DEIS

Dear Mr. Pefia,

Our Joint Powers Agency is comprised of the five volunteer fire departments located in the rural p0l1ion of Yuba County. Each member the fire district board of directors is an elected county official. The boards, in turn, send a member to the JP A to represent their organization. No one single group within Yuba County's rural area is more representative of the population.

With the history of fire ever present in our daily lives, we, the members of the *IP* A, representing the communities of the foothills of Yuba County, would like to whole heartedly support the Slapjack Project as presently proposed.

We are aware of a small group within our area that appears to not understand the necessity of management of a cleared area after the brush removal has been completed. However, all of us who deal with fire suppression on a daily basis feel strongly that the after clearir management of re-growth is absolutely essential and feel that the professionals within your organization are those who are best qualifie to address these] ssues.

If there is any way we can be of any additional support, please feel free to contact me.

Sincerely,

~*p*~

Jean Pierson, Chairman

Yuba County Rural Fire Joint Powers Agency

cc. C:IJPNSlapjack.doc

35 DAYS

#35

Butte County FireSafe COUNCIL

Ved

APR 1 0 2006

eathff River R P!umu~ rt>l

District ct/r;;t

Butte County Fire Safe **Council** 767 Birch Street, Paradise, Ca., 95969 (530) 877-0984 (530) 877-0986 Fax buttefirecouncil@yahoo.com

James Pena

Forest Supervisor Plumas National Forest P.O. Box 11500 Quincy, Ca. 95971

April 10,2006

Dear Mr. Pena,

The Butte County Fire Safe Council (BCFSC) is very supportive of US Forest Service efforts to protect our communities from fire through the creation of Defensible Fuel Profile Zones (DFPZ's). We view your Slapjack Project as a comprehensive and well designed collaborative effort that will integrate private and public lands to optimize the protection of communities and watersheds. We have received a grant to construct a fuel break on Lumpkin Rd. in the community of Feather Falls which will eventually tie to the Slapjack Project.

We believe that it is critical that you adopt an alternative that will assure that the initial fuel reduction does occur and further that proper maintenance will follow. Maintenance is the weakest link in any fuels treatment project. A commitment to this portion of the process is essential to securitize the initial investment in the treatment. Maintenance procedures must be low in cost and simple to implement. You may want to consider the use of animals i.e. goats and sheep as a maintenance tool.

This will ensure that required maintenance actually occurs in the future.

We look forward to working with you on current and future efforts to protect Butte County, its residents and watersheds, from devastating wildfire.

Sincerely,

Darrel Wilson

Chairman of the Board of Directors

T-1-1

43
DEIS

TYME MAIDU TRIBE
BERRY CREEK RANCHERIA
5 Tyme Way
Oroville, CA 95966
(530) 534-3859 – FAX (530) 534-1151

Berry Creek Rancheria Tyme Maidu Tribe endeavoring to keep the unity of the spirit in the bond of peace

Received
APR 13 2006
Feather River Ranger District
Plumas National Forest

April 5, 2006

James M. Pena, Forest Supervisor
159 Lawrence Street
P.O. Box 11500
Quincy, CA 95971-6925

Dear Mr. Pena

It has been brought to the attention of the Tribal Council and the General Membership of Berry Creek Rancheria that you plan to spray the herbicide TRICLOPYR BEE in the following areas: Strawberry Valley, Clipper Mills, Woodleaf, Challenge, Forbestown, Bullards Bar Dam, Brownsville, Dobbins and Feather Falls.

We are adamantly opposed to this decision by the Forest Service, after hearing that similar spraying was done in Mendocino County in 2002, and the areas sprayed are still contaminated and toxic to wildlife and habitat.

Berry Creek Rancheria, Tyme Maidu Tribe wishes to go on record in OPPOSITION of this decision and ask that you PLEASE RECONSIDER your plan to spray and contaminate the Plumas National Forest. We as residents and neighbors to these affected areas wish the land to remain toxic and chemical free,

Sincerely,

Jim Edwards
Tribal Chairman

G-1-1

46
DEIS

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
1111 Jackson Street, Suite 520
Oakland, CA 94607

April 10, 2006

ER 06/175

Received
APR 13 2006
Feather River Ranger District
Plumas National Forest

James M. Peña
Plumas National Forest Supervisor
157 Lawrence St.
P.O. Box 11500
Quincy, CA 95971-6025

Subject: Review of the Draft Environmental Impact Statement (EIS) for the Slapjack Project, Plumas National Forest, Butte and Yuba Counties, California

Dear Mr. Peña,

The U.S. Department of the Interior has received and reviewed the subject document and has no comments to offer.

Thank you for the opportunity to review this project.

Sincerely,

Patricia Sanderson Port
Regional Environmental Officer

cc: OEPC, HQ,
FWS, Portland, OR

S-1-1

47
DEIS

Frank Stewart
Counties' QLG Forester

Lassen, Plumas, Shasta, Sierra, Tehama Counties

18 Premier Court
Chico, California 95928

Phone/Fax 530-345-3876
rpf235@digitalpath.net

Received
APR 17 2006
Feather River Ranger District
Plumas National Forest

Jim Pena, Forest Supervisor
USDA Forest Service
Plumas National Forest
159 Lawrence Street
P.O. Box 11500
Quincy, CA 95971-6925

April 10, 2006

Dear Supervisor Pena:

Thank you for the opportunity to comment on the Draft Environmental Impact Statement (DEIS) for the Slapjack Project that is being implemented under the Herger-Feinstein Quincy Library Group Forest Recovery Act Pilot Project. Please accept these comments in support of Alternative - C because it provides urgently needed social, economic, fire protection and environmental benefits for the citizens, businesses and local governments in Butte, Yuba and the other counties involved in the QLG Pilot Project without the political conflicts of utilizing herbicides:

- What is your reason for attaching the utilization of herbicides to this project when you know that the CAT's and other environmental organization will file numerous appeals and lawsuits to stop the use of herbicides? Since all QLG projects that involve harvesting trees over a certain political diameter limit are being stalled through frivolous appeals and lawsuits, why would you add additional fuel to the forthcoming political fires?

- In your March 2nd cover letter to the DEIS you mention that you "have identified Alternative D as the Agency Preferred Alternative". Why would you select this alternative when it contains the use of herbicides on 33 acres and jeopardizes the 4,786 acres of urgently needed fuel reduction and forest restoration treatments called for under the Act?

- In the Record of Decision for this project it is critical that you <u>not select</u> an alternative that involves the use of herbicides for either DFPZ maintenance or weed eradication. If the agency wants to push the use of herbicides, then do it with other non QLG projects that will not further the delay in implementation of the urgently needed resource management activities of the Act.

- Alternative C is the only alternative that meets the intent of the Act and provides the maximum social, economic, fire protection and environmental benefits without the use of the herbicides and should be selected for implementation.

- Table 2-1 on page 2-4 needs to have WUI and non-WUI acres included under the DFPZ portion to show the immediate impact and protection of the various at-risk communities associated with this project.

- Page 2-8 1st paragraph: Establishing 40% canopy cover targets for DFPZ's is smart and will take away one argument of the obstructionists when they file their frivolous appeals against this project.

- On page 2-14, what are the types and cost of the culvert replacements? Are they bottomless arch culverts?

- Page 3-57, Fire and Fuels: the associated project maps in Appendix A must be improved to show the exterior boundaries of the various communities at-risk and their subsequent WUI's as designated in the Butte and Yuba County Fire Plans. The current designation of the community with just a "star" is inadequate and misrepresents the collaborative efforts that have been taking place with county Fire Safe Councils and Community Wildfire Protection Plans. When you make the appropriate designations on your maps, you will find that portions of the DFPZ fall within the WUI's and additional fuel reduction opportunities exist.

- Page E-3: What units contain the 80 acres of cable yarding? Are the units DFPZ's, Group Selection or ITM units? Need to show the cable area on the maps.

- In the development of the final EIS, please consider the concerns that I presented in my September 25th, 2005 scoping letter comments. The issues are still valid and need to be addressed to improve the final product.

- What opportunities are being explored for implementing this project through the new 10 year authorities associated with Stewardship Contracting? The values associated with the proposed sawlog and biomass volumes would support collaborative efforts in community fuel reduction, fire protection and local watershed and stream restoration projects. The current collaborative efforts with both the Butte and Yuba County Fire Safe Councils provide a unique opportunity to work with adjoining industrial timberland owners and manufacturing facilities to utilize the sawlog and biomass volumes. I encourage you to take this project to the next level in Stewardship development and explore this option with local interests.

Again, thanks for the opportunity to comment on this project and please keep me informed on further developments.

Cordially,

Frank Stewart

QLG Pilot Project

Reality Check (where we are)

FY-2000 thru FY-2005 (6 years)

Logs imported from Arizona & Lake Arrowhead

3 sawmills have closed

Activity	Should Be Here		We Are Here		% Accomplished
	Total	Annual	Total	Annual	
Acres (m)	300	60/yr	157	26/yr	52%
Saw Log Vol (mm bdft)	1,432	286/yr	274	46/yr	19%
Bio-Mass Vol (m bdts)	1,385	277/yr	710	118/yr	51%
Economic Act ($mm)	$2,104	$421/yr	$403	$67/yr	19%

G-1-2

50 hard copy of 4/18 email

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

April 19, 2006

James Pena, Forest Supervisor
159 Lawrence Street
P.O. Box 11500
Quincy, CA 95971-6025

Received
APR 26 2006
Feather River Ranger District
Plumas National Forest

Subject: Draft Environmental Impact Statement for Slapjack Project, Butte and Yuba Counties, California (CEQ# 20060053)

Dear Mr. Pena,

The U.S. Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) for the above project. Our review and comments are pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), and Section 309 of the Clean Air Act. Thank you for the informal EPA-specific extension to the comment period for this DEIS (communication between Laura Fujii and Susan Joyce, Planning, Feather River Ranger District, April 4, 2006).

Based on our review, we have rated the proposed Phase 1 of the Kings River Project as Environmental Concerns – Insufficient Information (EC-2). A *Summary of EPA Rating Definitions* is enclosed. We are concerned with the cumulative watershed effects of the project, the use of herbicides within the Wildland Urban Interface, and potential impacts to late-successional forest species.

We commend the proposed road and restoration projects, especially the closure and decommissioning of roads and restoration projects that will reduce sediment sources and benefit fish and aquatic systems. We recommend consideration of Alternative F or G which eliminate group selection harvests in watersheds that exceed the Threshold of Concern for cumulative watershed effects.

We appreciate the opportunity to review this DEIS. We are available to discuss our comments. When the Final EIS is released for public review, please send one copy to the above address (mail code: CED-2). If you have any questions, please call me at 415-972-3988 or Laura Fujii, of my staff, at 415-972-3852 or fujii.laura@epa.gov.

Sincerely,

Duane James, Manager
Environmental Review Office
Communities and Ecosystems Division

Printed on Recycled Paper

Enclosures:
Summary of EPA Rating Definitions
Detailed Comments

2

SUMMARY OF EPA RATING DEFINITIONS

This rating system was developed as a means to summarize EPA's level of concern with a proposed action. The ratings are a combination of alphabetical categories for evaluation of the environmental impacts of the proposal and numerical categories for evaluation of the adequacy of the EIS.

ENVIRONMENTAL IMPACT OF THE ACTION

"LO" (Lack of Objections)

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

"EC" (Environmental Concerns)

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

"EO" (Environmental Objections)

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

"EU" (Environmentally Unsatisfactory)

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

ADEQUACY OF THE IMPACT STATEMENT

Category 1" (Adequate)

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

"Category 2" (Insufficient Information)

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analysed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

"Category 3" (Inadequate)

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analysed in the draft EIS, which should be analysed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640, "Policy and Procedures for the Review of Federal Actions Impacting the Environment."

EPA DETAILED COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE SLAPJACK PROJECT, APRIL 19, 2006.

Cumulative Watershed Effects

Avoid additional adverse Cumulative Watershed Effects. Eleven subwatersheds in the Slapjack Project area exceed the Threshold of Concern (TOC) for the level of disturbance that a watershed can tolerate without incurring a cumulative watershed effect (CWE) response. A CWE response has the potential to adversely affect water quality to the extent that the water source is no longer available for established beneficial uses (e.g., municipal and domestic water supplies, hydropower generation, cold freshwater habitat).

Five of the subwatersheds exceed their TOC by 130%. The proposed action, combined with future foreseeable private timber harvests, would increase the level of disturbance to 146% to 170% of the TOC. These subwatersheds, totaling 7271.3 acres, pose a risk of affecting downstream beneficial uses in the South Fork Feather River upstream of Ponderosa Reservoir, and Lake Merle Collins and the Yuba River downstream of Englebright Reservoir (pps. 3-116 to 3-117). In addition, eight other subwatersheds are approaching the TOC (p. xvi).

Recommendations:
The Final EIS (FEIS) should include a detailed description and evaluation of the need for forest management treatment within these highly disturbed subwatersheds. For example:

- Describe whether existing beneficial uses of these watersheds are already adversely affected under pre-project conditions,
- Describe the ability to modify the Defensible Fuel Profile Zone (DFPZ) design to avoid additional disturbance,
- Evaluate less disturbing logging methods, such as endlining off existing roads, helicopter logging, and limiting the number of harvest landings; and
- Describe mitigation measures to minimize impacts of unavoidable disturbance.

We urge the Forest Service to consider Alternative F or G which eliminate 19 group selection harvests in watersheds over the TOC. Although the proposed Slapjack Project activities would contribute only 1% of the total CWE risk (p. 3-129), Alternative F and G represent an opportunity to avoid additional adverse effects in these already highly disturbed sensitive watersheds.

The DEIS states that most of the CWE risk is due to the existing highly disturbed landscape and future foreseeable disturbance from private timber operations (p. 3-129). We encourage the Forest Service to work with private landowners to implement improvements on adjacent private lands to reduce adverse CWE (e.g., road maintenance, culvert replacements, streamside restoration projects). The FEIS should describe these efforts, if any.

1

The DEIS states there would likely be minimal or no risk to domestic and municipal water supplies, agricultural uses, hydropower generation, and water contact recreation (p. 3-117). However, the five highly disturbed watersheds drain into reservoirs, lakes, and streams. The FEIS should include more detailed information on the location of domestic, municipal and agricultural water diversions; hydropower generation, and water contact recreation. Evaluate the amount of potential direct and cumulative sedimentation and water quality effects at these locations from the proposed Slapjack Project activities and reasonably foreseeable actions.

Provide a more detailed cumulative impact analysis of Slapjack Project, within the context of the HFQLG Pilot Project. The Slapjack Project is part of the Herger-Feinstein Quincy Library Group Forest Recovery Act Pilot Project (HFQLG Pilot Project). The HFQLG Act EIS and SEIS provided programmatic guidance for DFPZ construction and maintenance. EPA expressed concerns with the HFQLG Pilot Project due to concerns with the cumulative impacts of DFPZ maintenance, water quality impacts from road construction, increased habitat fragmentation, and the potential for noxious weed proliferation.

Recommendation:
The FEIS should include a more detailed evaluation of the cumulative impacts of DFPZ construction and maintenance, road construction, and timber harvests over the entire HFQLG Pilot Project area. Of specific interest are potential cumulative impacts to water quality, habitat fragmentation, and noxious weed proliferation.

Close and decommission problem roads as soon as possible. We commend the Forest Service for the closure of 7 miles of roads, decommissioning of 19 miles of road, and habitat restoration projects to improve fish passage, stream conditions, and California spotted owl habitat. These projects have the potential to reduce existing adverse water quality and habitat impacts from sedimentation, erosion, and wildfire.

Recommendations:
Given the highly disturbed watersheds, we urge closure and decommissioning of the roads as soon as possible, instead of waiting until completion of project (p. 3-165) or for completion of the Off-Highway Vehicle (OHV) designation process (p. 6-168). At a minimum, we recommend closure and decommissioning of roads that are unlikely to be designated in the OHV network or are causing significant impacts. The FEIS should describe and commit to the schedule for road closure and decommissioning.

The FEIS should provide information on road and restoration work being done by local communities and on private land within or adjacent to the Slapjack Project area. Describe how these projects are integrated or complement the Slapjack Project objectives.

2

Herbicide Use

Evaluate impacts on soil microorganisms, children, workers, sensitive species and species diversity. The Slapjack Project proposes to use herbicide to control brush re-growth in the constructed DFPZs and for control of noxious weeds.

Recommendations:
The FEIS should evaluate in more detail the impacts of herbicide use on soil microorganisms, children, workers, sensitive species and species diversity. We recommend both the parent and breakdown products be included in the water quality and drift monitoring plans.

The FEIS should state the EPA Registration Number of any products anticipated to be used for the project. The pesticides used must be registered with EPA and the California Department of Pesticide Regulation and used according to the label directions and Federal and State pesticide laws (Executive Order 12088).

Since the regulatory status of chemicals can constantly change, a review of the current status of all herbicides considered for use should be conducted prior to each application season.

Use of imazapyr. The Proposed Action, Alternative B, proposes short-term maintenance of 1,954 acres (out of 5,612 acres) of DFPZ using the herbicide imazapyr. The Forest Service has identified Alternative D, which would not apply herbicide for DFPZ short-term maintenance, as the Agency Preferred Alternative (letter from James Pena, Forest Supervisor, March 2, 2006).

Recommendations:
EPA supports the decision not to use herbicides to control brush re-growth on 1,954 acres of the DFPZ, especially given the proximity to rural communities. Imazapyr is toxic to non-target species of grasses and trees and must be applied to dry ground. In addition, the DEIS states that not much information is available on the potential effects of imazapyr on amphibian species; thus, it is not possible to assess the full risks of application at this time (p. 3-223).

The DEIS references the HFQLG Final Supplemental EIS review of the application and effects of imazapyr (p. 3-220). We recommend the FEIS include a summary of this information in an appendix.

Use of triclopyr BEE. The Slapjack Project proposes to use the herbicide triclopyr BEE (Garlon 4) to control noxious weeds. There may be limited use in close proximity to intermittent stream channels (p. 3-119), 500 feet of a 550-foot perennial channel to treat 2.9 acres in a Riparian Habitat Conservation Area (RHCA), and other riparian areas along roads (p. 3-125).

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The triclopyr ester (TBEE) in triclopyr BEE/Garlon 4 may be chronically toxic to fish and aquatic invertebrates at low levels and has a higher propensity to adhere to soil and sediment which can then be delivered into sensitive aquatic ecosystems through erosion. Although the risk of exposure to triclopyr may be low due to proposed buffer zones and limited operating periods, EPA is concerned with use of this herbicide due to potential human health and environmental impacts.

Recommendations:
We recommend the Forest Service reconsider the use of triclopyr BEE, especially within the RHCA or near perennial or intermittent stream channels. Where feasible, we recommend use of hand pulling or other non-chemical methods. If this is not feasible, we recommend use of a different herbicide such as glyphosate which is not as toxic to fish and aquatic invertebrates, and extra-wide no treatment buffer zones.

Under federal law, when products are mixed, the most restrictive label must be followed. The FEIS should state whether the proposed products would be mixed with others. Also, please note that the Garlon 4 label contains the following Environmental Hazard Statement, "Do not apply directly to water, to areas where surface water is present." Garlon 4 is registered and Federally allowed uses include "noncrop areas" and control of unspecified broadleaved weeds.

Impacts to Late-Successional Forest Species

Avoid and minimize adverse impacts to late-successional forest species. EPA commends the Forest Service for developing the forest carnivore network that would eventually provide continuous habitat corridors between the Plumas, Tahoe, and Lassen National Forests (p. 3-244). However, we are concerned with the potential impacts to late-successional forest species in light of the existing high road density, need for additional suitable habitat and canopy cover of 50%, and the cumulative effects of habitat alteration from other HFQLG projects.

The Slapjack Project, in conjunction with the other proposed HFQLG projects, could reduce 123,500 acres of stands with more than 50% canopy cover to 40% canopy cover during the HFQLG Pilot Project period (p. 3-237). Group and Individual tree selection harvests would also create 1-2 acres openings across the landscape. It is our understanding that the habitat preferences of late-successional forest species is a minimum canopy cover of 50%. Implementation of any of the action alternatives could affect 1,597 acres of potential Pacific fisher denning and resting habitat to below suitability and 1,828 acres of foraging and travel habitat (p. 3-245). The Slapjack Project would also propose treatment in 1,987 acres of California spotted owl Home Range Core Areas (HRCAs) (p. 3-234).

Recommendations:
We recommend reconsideration of the 50% canopy cover retention alternative, especially for locations critical for late-successional forest species. The FEIS should provide specific information that demonstrates that the 40% canopy cover

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objective is essential to achieve project goals and would not result in significant reductions in suitable habitat for late-successional forest species.

General Comments

Evaluate effects of group selection and recreation on noxious weed spread. The Slapjack Project proposes 219 acres of group selection harvest (p. vi) in an area with increasing OHV use (p. 3-132). The DEIS does not appear to evaluate the establishment and treatment of noxious weeds in the group selection units or the cumulative effects on noxious weed spread from other activities such as OHV recreation.

Recommendation:
The FEIS should evaluate the establishment and treatment of noxious weeds in the group selection units. Expand the noxious weed evaluation to describe the cumulative effects on noxious weed spread from other activities, such as OHV recreation. We recommend describing mitigation measures to counter the spread of noxious weeds via recreational activities.

Provide internet access or CD ROM of referenced reports. The DEIS refers to a number of reports and memoranda that are incorporated by reference. Although a CD containing these reports was theoretically distributed with the DEIS, such a CD was never received. Nor were these reports available upon the Forest Service's publications website.

Recommendation:
We recommend the FEIS include key reports, such as the Hydrology Report and Fire and Fuels Report, as appendices. At a minimum, all the referenced reports should be made available on the Forest Service's publications website.

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