

Hydrology/Water Quality

Affected Environment

The project area has been affected by a history of past fires and historic logging. Currently the Sugar Pine Railroad is active today and serves as a destination for recreation. The current condition of creeks in the project area shows current uses and effects of past activity.

The Sugar Pine Adaptive Management Project is located in the Upper Lewis Creek Watershed and a portion of the Big Sandy Creek watershed. Upper Lewis Creek, Lewis Fork of the Fresno River is tributary to the Fresno River Watershed. Fresno River is tributary to the San Joaquin River, which supplies water to a four billion a year agricultural industry in the Central Valley. All of the discharge from Big Sandy Watershed, White Chief Branch and headwaters to Big Creek at one time flowed into Big Creek, which is tributary to south fork of the Merced River. Big Creek drainage has had up to 6000 acre-feet of water is diverted between December 1st and July 15th into the Lewis Fork of the Fresno River along a ditch located in section 30 just east of the project boundary. This diversion has occurred since the 1870s. Channel conditions have adjusted since the time of diversion to reach equilibrium. Table 21 provides a summary of the affected drainages and associated water bodies in the project area. Map 9, found in the Map Package in Appendix A displays the location of perennial streams and subwatersheds associated with the project.

Table 1. Subwatershed Summaries

Main Stream System(s)	Watershed (HUC 5)	Subwatersheds (HUC 8)	Stream miles			
			Perennial	Intermittent	Ephemeral	Total
Lewis Creek	Fresno River (1804000701)	503.0008	16.6	11.5	112.2	140.3
		503.0009				
		503.0010				
		503.0011				
		503.0055				
		503.3001				
Big Creek	SF Merced (1804000803)	501.5003	17.1	13.5	90.5	121.1
		501.5005				
		501.5006				
		501.5007				
		501.5053				
		501.5054				

Summary of Existing Conditions

Although there is evidence of past logging practices, channels appear to have recovered. Stream Condition Inventories and Channel Stability Analysis were performed in most of the watersheds associated with the project. The locations of these inventories were selected based on their

potential to respond to disturbance. They are by definition “response reaches” and represent the most delicate reach along the drainage surveyed. These areas provide the best locations to monitor as these areas would be the first to change. The current condition for most of the stream reaches is good or fair for channel stability using modified Pfankuch, after Rosgen (2004). The one exception is upper Lewis Creek, which rated a poor.

Alternative 1 – No Action

Direct effects associated with not treating fuels in the project area would result in a lost opportunity to reduce potential for catastrophic fire. This lost opportunity has the potential to affect not only the communities at risk; it also affects the riparian habitat and water quality in the project area. As described in the affected environment, riparian areas have large amounts of organic material throughout the drainages. This material is not lying on the forest floor; it is intermingled with standing material. In the event of a wildfire, riparian habitat, channel characteristics and riparian vegetation would be greatly affected.

Direct Effects

Direct effects of no actions would be continued increase of fuels and potential for catastrophic wildfire.

Indirect Effects

Indirect Effects of no action would be basin wide increases of fuels and potential for catastrophic wildfire.

Cumulative Effects

Cumulative Effects of no action would be displayed under the Pre project condition of the Cumulative Watershed Effects (CWE) analysis described under Best Management Practices (BMP) #7-8. Essentially the only watershed considered at or near CWE prior to field investigations was Lewis-Red Rock (503.0055). Filed investigations indicated that this drainage is predominately bedrock controlled and has little potential to be affected by the project. Additionally SCI investigations indicate Channel Stability using modified Pfankuch (Rosgen, 2001) is good.

Table 2. Activities Proposed under Alternative 1 – No Action Alternative

Subwatershed	501.5003	501.5005	501.5006	501.5007	501.5053	501.5054	503.0008	503.0009	503.001	503.0011	503.0055	503.3001	Total
Commercial or pre-commercial thinning or tractor piling	0	0	0	0	0	0	0	0	0	0	0	0	0
Precommercial Thin	0	0	0	0	0	0	0	0	0	0	0	0	
Mastication	0	0	0	0	0	0	0	0	0	0	0	0	0
Underburn	0	0	0	0	0	0	0	0	0	0	0	0	0
No Treatments	466	2229	638	668	1817	1480	945	2010	1549	645	2564	1381	16392
Subwatershed Acres	466	2229	638	668	1817	1480	945	2010	1549	645	2564	1381	16392

Alternative 2 – Proposed Action

The Proposed Action would reduce fire ladder conditions through removing understory trees (thinning); pile slash for burning; burn slash piles; masticate and/or precommercially thin stands; plant trees; reduce fuel loading through controlled burning; construct handline around jackpot burn areas; and construct and reconstruct road. Proposed treatments by subwatershed are displayed in Table 23.

Limited or no treatment would occur in SMZs. Direct treatments would be excluded from SMZs; in general, all vegetation and fuel treatments conducted in RCAs would focus on improving forest health, enhancing or maintaining hydrologic function and maintaining or enhancing the key attributes of riparian habitats. Attributes comprise cool, moist soil conditions; high water quality; retention of large snags and down logs in sufficient quantities to provide habitat and woody debris recruitment in stream channels; and retention of woody material to provide stability to riparian and aquatic habitats. Well-functioning channels have good riparian vegetation, good sediment transport, and stable streambanks. These characteristics work together to maintain channel function and stability.

A wide range of activity-specific BMPs are designed to minimize detrimental soil disturbance, protect water quality, maintain physical stability, and hydrologic connectivity of riparian and aquatic habitats. There is little potential for the Proposed Action to adversely affect the geomorphic, hydrologic, or riparian characteristics and aquatic habitats in affected watersheds because of the low-impact characteristics of the proposed stand treatments, the limitations that would be imposed on operations within RCAs and SMZs, and the use of activity-specific BMPs.

The greatest potential for the Proposed Action to affect the hydrologic connectivity of streams and aquatic habitat exists at stream crossings. To minimize the potential for project-related effects on hydrologic connectivity, existing crossings would be used whenever possible. In the event that it is necessary to construct a temporary crossing, the methods used for construction would be selected to avoid or minimize detrimental soil and vegetation disturbance and to maintain hydrologic connectivity between upstream and downstream features. All temporary crossings would be removed following the completion of project-related activities and would be treated as necessary to restore pre-project conditions. Implementation of the activity-specific BMPs would further ensure that hydrologic connectivity in streams and special aquatic features is not adversely affected by the Proposed Action.

Table 3. Activities Proposed within Project Area Subwatersheds under Alternative 2 (Acres Generated by GIS)

Subwatershed	501.5003	501.5005	501.5006	501.5007	501.5053	501.5054	503.0008	503.0009	503.0010	503.0011	503.0055	503.3001	Total
Commercial/pre-commercial thinning or tractor piling	0	5	194	132	124	11	297	323	627	33	162		1908
Mastication	19	8	79	0	34	18	110	294	3	139	80	14	797
Underburn	0	9	15	0	21	22	15	113	22	0	0		215
No Treatments	447	2207	352	536	1638	1429	524	1280	897	473	2322	1367	13472
Subwatershed Acres	466	2229	638	668	1817	1480	945	2010	1549	645	2564	1381	16392
% Subwatershed treated	4%	1%	45%	20%	10%	4%	45%	35%	42%	27%	9%	1%	18%

Direct Effects

Direct effects are those occurring at the same time and place as the triggering action. The Proposed Action could directly affect aquatic resources, primarily as a result of vegetation removal, road construction, slash piling, and prescribed fire immediately following treatment; such activities could lead to soil disturbance and its associated effects on aquatic habitats (e.g., accelerated erosion and sedimentation). Any soil displacement, compaction, or change in ground cover would cause a direct effect on watershed condition and aquatic habitat. Most treatment units have avoided crossing stream channels. The exception is 4th order ephemeral draws. Fuels treatments have been laid out to utilize designated and/or existing crossings. Figure 1, located on page 15, displays SMZs assigned to streams in the Sugar Pine project. Streamcourses are to be protected under C6.5 of the Timber Sale Contract. Any additional streams identified during operations will receive protection appropriate for the stream and the treatment.

Subwatershed 503.0008

There are approximately 3.8 miles of NFTS road currently in need of maintenance or reconstruction to reduce sediment. Lower gradient reaches are sensitive and have the potential to be affected by units T4 and M8. The main channel draining the 503.0008 subwatershed is a Class I perennial creek that begins in unit RX3 and runs adjacent to M7, T4, and through M8. There is a 100 foot SMZ assigned to this section of the drainage. Road 6S90 intersects the headwaters of the creek. There are no small tributaries to the main drainage of this watershed affected by road 5S18 as drainages were not noticed above this road. Other tributaries to the main stem channel in the watershed have SMZs that range from 25 to 75 feet.

Subwatershed 503.0010

Upper Lewis Creek forms the west fork to Lewis Fork Creek. This channel has low to moderate gradients below road 5S17 and steeper gradients upstream of the road. Above the road the channel exhibits a marshy character suggestive of past logging practices when streamside zones were not protected as they are today. This thick, very wet accumulation of organic and sedimentary debris has been downcut 2+ feet. The channel flows in this downcut reach. The downcut reach has a very wide flood plain. The riparian area should be avoided by management activity because it is easily damaged due to its wet character.

The only units that propose to have new road construction are units T-7 and T16 (Section 26). There are two possible routes that could be constructed: an east-west route that would connect FS road 6S07 to State Highway 41; and a roughly north-south road connecting FS road 5S17 to State Highway 41. The possible east-west route crosses a Class II stream with an SMZ of 75 feet; the possible north-south route crosses a Class I stream with an SMZ of at least 100 feet. The location of these potential crossings would be done in close coordination with aquatics and earth science to alleviate any concerns relative to riparian dependent species and follow applicable Standards and Guides (100, 101) in accordance with RCO#2. Moreover, any effects from the crossings would be mitigated by applicable BMPs for road and building site construction (in USDA-FS 2000a p. 53-81).

Tributary drainages in subwatershed 503.0010 are Class I to Class IV drainages. The drainage in unit T8 paralleling road 5S79, sec. 35/36, was closely evaluated. At the creek crossing along this road a culvert is non functional and water is concentrating along the roadbed. This is causing rilling down the road and should be fixed during road reconstruction. This area is recovering from past logging and is currently stable, but very delicate. Crossing this channel has the potential to affect the stability of the channel. Unit T-11 is proposed adjacent to a stream channel that is

currently in poor condition, within a subwatershed (503.0010) that is considered sensitive to disturbance. Project design criteria have been developed to protect the channel from further degradation. Thinning trees is not expected to have much effect on annual yield or increase peak flows.

Indirect Effects

Indirect effects are those that occur at a later time or at a distance from the triggering action. Indirect effects are expected to be minor. Conservation measures incorporated into the project would be implemented to control erosion and sedimentation. The implementation of BMPs would avoid or minimize potential increases in sediment loads to streams during project implementation such that prescribed fires are not expected to affect aquatic habitats. Over the longer term, potential adverse effects on water and soils from implementing the Proposed Action are expected to be minor, and substantially less than if an uncontrolled wildfire were to occur.

Cumulative Effects

Based on field investigations and level of protection provided by BMPs, specifically SMZ width and associated treatment prescribed in RCAs in addition to wildlife considerations, it is not expected that any CWE would occur.

The only watershed considered being at or near CWE prior to field investigations was Lewis-Red Rock (503.0055). Field investigations indicated that this drainage is predominately bedrock controlled and has little potential to be affected by the project.

Alternative 3

Under Alternative 3, the main focus would continue to be on the development of Strategically Placed Landscape Area Treatments (SPLATs) and creating defensible fuel profiles near key transportation corridors and in the defensive zone of the wildland urban intermix (WUI), similar to Alternative 2 (proposed action). Alternative 3 would differ from the proposed action in that fisher den sites would be buffered and a Limited Operating Period (LOP) implemented. Treatment within the dens site would include ladder and surface fuels (within the lower and mid-canopy levels) needed to achieve fuels objectives within the WUI zones. If a new den site(s) were located during implementation, a 700-acre buffer and LOP would be established. Treatments outside the buffer would remain the same as Alternative 2. Table 24 shows a comparison of acreage between Alternative 2 and 3. The mastication and Rx burn methodologies would not change within the buffer, but the thinning treatment would differ as described above.

Table 4. Activities Proposed within Project Area Subwatersheds under Alternative 3

HUC8 Subwatershed	501.5003	501.5005	501.5006	501.5007	501.5053	501.5054	503.0008	503.0009	503.0010	503.0011	503.0055	503.3001	Total
Commercial/pre-commercial thinning or tractor piling	0	5	194	132	124	11	119	181	627	33	99	0	1525
Lower canopy treatment/pre-commercial thinning or tractor piling	0	0	0	0	0	0	178	142	0	0	63	0	383
Mastication	19	8	79	0	34	18	110	294	3	138	80	14	797
Underburn	0	9	13	0	21	22	15	113	22	0	0		215
No Treatments	447	2207	352	536	1639	1429	523	1280	897	474	2322	1367	13473
Subwatershed Acres	466	2229	638	668	1817	1480	945	2010	1549	645	2564	1381	16392
% Subwatershed treated	4%	1%	45%	20%	10%	3%	45%	36%	42%	27%	9%	1%	18%

Direct Effects

Direct effects are those occurring at the same time and place as the triggering action. The direct effects would be similar to those described under Alternative 2, except in subwatersheds 503.0008, 503.0009, 503.0055 in that there would be less impact because the thinning methodology would only concentrate on ladder and surface fuels (within the lower and mid-canopy levels).

Indirect Effects

Indirect effects are those that occur at a later time or at a distance from the triggering action. Like Alternative 2, indirect effects are expected to be minor. Conservation measures incorporated into the project would be implemented to control erosion and sedimentation. The implementation of BMPs would avoid or minimize potential increases in sediment loads to streams during project implementation such that prescribed fires are not expected to affect aquatic habitats. Over the longer term, potential adverse effects on water and soils from implementing the Alternative 3 are expected to be minor, and substantially less than if an uncontrolled wildfire were to occur.

Cumulative Effects

Based on field investigations and level of protection provided by BMPs, specifically SMZ width and associated treatment prescribed in RCAs in addition to wildlife considerations, it is not expected that any CWE would occur.

The only watershed considered being at or near CWE prior to field investigations was Lewis-Red Rock (503.0055). Alternative 3 has less ground disturbing activities and field investigations indicated that this drainage is predominately bedrock controlled and thus has little potential to be affected by the project.

Alternative 4

Under Alternative 4, the main focus would continue to be on the development of Strategically Placed Landscape Area Treatments (SPLATs) and creating defensible fuel profiles near key transportation corridors and in the defensive zone of the wildland urban intermix. Treatments in these areas would include only those needed to reduce ladder and surface fuels (within the lower and limited mid-canopy levels) needed to achieve fire and fuels objectives, and no additional treatments (i.e., additional thinning in the mid-level canopy) would occur.

Gross acres of proposed treatments by subwatershed are displayed in Table 25. The actual area treated is expected to be less (approximately 85%) similar to Alternatives 2 and 3.

Table 5. Activities Proposed within Project Area Subwatersheds under Alternative 4 (Acres Generated By GIS)

HUC8 Subwatershed	501.5003	501.5005	501.5006	501.5007	501.5053	501.5054	503.0008	503.0009	503.0010	503.0011	503.0055	503.3001	Total
Biomass/mastication/pre-commercial thinning or tractor piling	0	5	194	132	124	11	297	323	627	33	162		1908
Mastication	19	8	79	0	34	18	110	294	3	138	80	14	797
Underburn	0	9	13	0	21	22	15	113	22	0	0		215
No Treatments	447	2207	352	536	1638	1429	523	1280	897	474	2322	1367	13472
Subwatershed Acres	466	2229	638	668	1817	1480	945	2010	1549	645	2564	1381	16392
% Subwatershed treated	4%	1%	45%	20%	10%	3%	45%	36%	42%	27%	9%	1%	18%

Direct Effects

Direct effects are those occurring at the same time and place as the triggering action. The direct effects would be less than those described under Alternative 2, in that there would be less impact because the thinning methodology would only concentrate on ladder and surface fuels within the lower and mid-canopy levels.

Indirect Effects

Indirect effects are those that occur at a later time or at a distance from the triggering action. Like Alternative 2, indirect effects are expected to be minor. Conservation measures incorporated into the project would be implemented to control erosion and sedimentation. The implementation of BMPs would avoid or minimize potential increases in sediment loads to streams during project implementation such that impacts to aquatic habitats are not expected. Over the longer term, potential adverse effects on water and soils from implementing Alternative 4 are expected to be minor, and substantially less than if an uncontrolled wildfire were to occur.

Cumulative Effects

Based on field investigations and level of protection provided by BMPs, specifically SMZ width and associated treatment prescribed in RCAs in addition to wildlife considerations, it is not expected that any CWE would occur.

The only watershed considered being at or near CWE prior to field investigations was Lewis-Red Rock (503.0055). Alternative 3 has less ground disturbing activities and field investigations indicated that this drainage is predominately bedrock controlled and thus has little potential to be affected by the project.

