

California Cooperative Forest Management Plan

Property Name: San Lorenzo Valley Water District

Property Location Address:

13060 Highway 9

Boulder Creek, CA 95006

Landowner(s) Name (print or type): San Lorenzo Valley Water District

Purpose of this Plan

This Multi-Agency Cooperative Forest Management Plan was developed for use in California by the California Department of Forestry and Fire Protection (CAL FIRE), the United States Forest Service (USFS) and Natural Resources Conservation Service (NRCS) using information from a national joint Forest Stewardship, American Tree Farm System (ATFS), NRCS Planning Process and the California Forest Improvement Act.

This management plan template meets management plan requirements for grant agreements and other provisions available through CAL FIRE, USFS, NRCS, and the ATFS. Signature Pages are provided to document acceptance of this management plan in meeting those requirements. Signatures are only required for that entity providing funding as requested by the landowner.

This management plan is a tool for and belongs to the landowner. This forest management plan outlines the conditions and capability of property resources, documents the landowner's objectives and decisions and identifies potential resource improvement projects. It is meant to be a flexible and educational document that considers a planning horizon of at least five years but may include objectives that require a much longer time frame.

Contents

Certifications	5
Landowner Certification	5
CFIP Certification.....	6
Landowner Information.....	8
Management Plan History	8
Property Facts.....	9
Property History	22
CZU Lightning Complex	22
Fire History.....	23
Current Property Conditions	24
Property Infrastructure	24
Structures.....	24
Roads.....	24
Electrical Improvements.....	25
Water Improvements.....	26
Forest Resource	26
Access and Security	27
Recreation & Aesthetics	28
Soils.....	28
Streams, Wetlands and Ponds	29
Wildlife	29
Fish and Aquatic Species.....	29
Upland Wildlife	30
Threatened or Endangered Species	30
Invasive Species and Pests.....	41
Air Resources	41
Landowner Management Objectives	42
Protect, Maintain, and Enhance Water Quality and Quantity	42
Fire Protection.....	42
Forest Health.....	42
Trespass concerns.....	42

Wildlife	42
Recreation and aesthetics.....	42
Income	42
Family Legacy	43
Livestock	43
Constraints and Proposed Alternatives.....	43
Economic Sustainability	43
No Action Alternative.....	44
Future Property Conditions (Action Alternative)	44
Roads	44
Fire Protection	45
Fuelbreaks	45
Hazard Trees	46
Forest Resource	47
Reforestation.....	47
Vegetation Thinning	48
Access and Security	48
Recreation & Aesthetics	48
Soils.....	48
Streams, Wetlands and Ponds	49
Wildlife	49
Invasive Species and Pests.....	50
Invasive and Non-Native Species	50
Sudden Oak Death.....	50
Air Resources	51
Climate Considerations and Carbon Sequestration	51
Vegetation Unit Descriptions	52
Redwood Forest Type.....	52
Planned Management Activities/Projects	53
Potentially Required Permits	55
California Environmental Quality Act (CEQA) and National Environmental Protection Act (NEPA)	57
Additional Professional Assistance	58

References	60
Appendix 1 – Standards and Specifications	62
Appendix 2 – Taxes and Land Use	67
Property Tax	67
Income Tax.....	67
Estate Tax	67
Record Keeping.....	67
Land Use	67
Appendix 3 – Past Plans and Updates	69
Post Fire Recovery, Critical Asset Hardening, Vegetation, and Fuels Management Plan.....	69
Appendix 4 – Supporting Data	70
Soil Survey Data	70
Notice of Exemption and Project Design and Implementation Features - Critical Water Infrastructure Protection and Wildfire Management Ingress/Egress Improvement Project.....	73
Appendix 5 – Archaeological Addendum.....	74
Appendix 6 – Maps.....	75

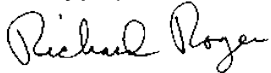
Certifications

Note to the landowner: This Forest Management Plan is provided as a guide to help you accomplish the objectives that you have for your forest. This Forest Management Plan will guide you in achieving the benefits of managing your forest and forest related resources. With this Forest Management Plan, you are eligible to participate in the CAL FIRE's California Forest Improvement Program (CFIP), US Forest Service's Forest Stewardship Program (FSP), the American Forest Foundation's American Tree Farm System (ATFS) and the Natural Resources Conservation Service (NRCS) programs. This plan will need to be reviewed and approved by representatives for each of the programs that are providing funding.

Landowner Certification

"I have reviewed this plan and approve its content."

Name (print or type): Richard M Rogers

Signature: 

Date: 12/10/2021

Mailing Address: 13060 Highway 9, Boulder Creek, CA, 95006

Phone number: 831-338-2153

E-mail: rrogers@slvwd.com

CFIP Certification

Plan Preparing Registered Professional Forester

"I certify that I, or my supervised designee, personally inspected this California Forest Improvement Program (CFIP) plan area, and that the plan fully complies with the CFIP and Professional Foresters Law, and meets Federal Forest Stewardship Management Plan Standards. I further certify that this plan is based upon the best available site and landowner information, and if followed, will not be detrimental to the productivity of the natural resources associated with this property."

Name (print or type): Jason Moghaddas

Signature: 

Date: December 8, 2021

Registered Professional Forester #: 2774

Organization or Company: Spatial Informatics Group

Mailing Address:

2529 Yolanda Ct.

Pleasanton, CA 94566

Phone Number: (530) 927-8009

Name (print or type): Ian Moore, Forester In Training

Signature: 

Date: December 8, 2021

Organization or Company: Spatial Informatics Group

Mailing Address:

2529 Yolanda Ct.

Pleasanton, CA 94566

Phone Number: (415) 244-7459

CAL FIRE Unit

"I certify that I, or my supervised designee, personally inspected this California Forest Improvement Program (CFIP) plan area, and that the plan fully complies with the CFIP and Professional Foresters Law, and meets Federal Forest Stewardship Management Plan Standards."

Forestry Assistance Specialist Name (print or type): *Mayra Negrete*

Signature: *M. Negrete*

Date: *12/14/2021*

Unit & Mailing Address: *SAC HQ / 1234 East Shaw Avenue, Fresno CA. 93710*

CAL FIRE State or Region CFIP Coordinator

"I certify that the plan fully complies with the CFIP and Professional Foresters Law, and meets Federal Forest Stewardship Management Plan Standards."

CFIP Coordinator Name (print or type): *Guy M. Anderson*

Signature: *Guy M. Anderson*

Date: *12/14/2021*

Registered Professional Forester #: *2844*

Landowner Information

Landowner(s) Name: San Lorenzo Valley Water District

Mailing Address:

13060 Highway 9

Boulder Creek, CA 95006

Phone Number: (831) 338-2153

E-mail: rrogers@slvwd.com

Landowner's Representative (if applicable)

Landowner's Representative Name (if applicable): Rick Rogers

Representative's Registered Professional Forester # (if applicable): Jason Moghaddas

Mailing Address:

13060 Highway 9

Boulder Creek, CA 95006

Phone Number: (831) 338-2153

E-mail: rrogers@slvwd.com

Management Plan History

There is no previous forest management plan for the Felton Empire Grade Watershed, Ben Lomond Mountain Watershed, and Zayante properties. A watershed management plan (2009) was developed to evaluate water resources in the San Lorenzo Valley watershed and watershed lands owned by the San Lorenzo Valley Water District (SLVWD). The watershed management plan includes some goals, objectives, and policies for forest and fire management activities on SLVWD-owned lands. The most recent known commercial timber harvesting on SLVWD-owned lands was conducted on the Upper Zayante property in the 1970s. Since the 1970s, limited vegetation treatments have been conducted on the majority of lands owned by SLVWD, consisting primarily of brushing associated with maintaining access roads (Blanchard, 2020). Moderately more intensive land management activities have been conducted on the Olympia watershed property as part of SLVWD's Habitat Management and Monitoring Plan. Within the Olympia watershed property is a 6.3-acre Olympia Conservation Area that supports endangered species and sensitive habitats. Management in this area has been limited to invasive plant removal, erosion control, and protection of habitats via fencing (McGraw, 2020).

A Post Fire Recovery, Critical Asset Hardening, Vegetation, and Fuels Management Plan was developed in May 2021 to reduce the intensity and harmful impacts of wildfire through vegetation and fuels management on SLVWD-owned land. The plan identifies project that were designed to reduce fuel loads, increase fire resiliency, and minimize wildfire impacts on SLVWD-owned critical water infrastructure and vegetation. The plan was approved on June 3, 2021, and implementation is anticipated to begin in Fall 2021. Refer to Appendix 3 for a copy of the Post Fire Recovery, Critical Asset Hardening, Vegetation, and Fuels Management Plan.

Property Facts

Public Land Survey System (PLSS) Description:

The PLSS description for SLVWD-owned properties are shown in Table 1 and Map Book 1 (Appendix 6).

Table 1 PLSS Description

Property APN	Township	Section	Q Section/Lot	Sum of Acres
Ben Lomond Mountain Watershed Property				1,718.19
079-011-01	9S 2W	30	L 4	0.05
			L 1	15.99
		31	NENW	14.16
			NWNE	8.57
	9S 3W	25	SESE	0.02
		36	NENE	1.17
079-011-02	9S 2W	31	L 1	14.78
			NENW	15.48
			NWNE	9.55
	9S 3W	36	NENE	0.35
079-011-22	9S 2W	30	SESE	0.54
			SWSE	0.09
	9S 2W	31	L 1	6.84
			L 2	1.69
			NENE	23.80
			NENW	12.67
			NWNE	24.92
			SENE	21.85

Property APN	Township	Section	Q Section/Lot	Sum of Acres
079-011-26	10S 2W	06	SENE	10.41
			SWNE	22.92
	10S 3W	01	L 3	1.04
			L 4	20.13
	9S 2W	31	NENE	0.02
			L 1	8.65
			L 2	43.63
			L 3	44.18
			L 4	3.92
			NESE	14.80
			NESW	45.02
			NWSE	39.00
			SENE	9.12
			SENE	34.64
			SESW	40.10
			SWNE	21.71
			SWSE	7.68
	9S 3W	36	NENE	2.04
			NESE	3.56
			SENE	4.02
080-021-15	9S 3W	25	NWNW	13.74
			SWNW	1.43
		26	L 1	12.85
			L 2	0.03
			NENE	42.48
080-031-23	9S 3W	25	SENE	4.17
			SESE	0.00
		36	L 1	9.87
			L 2	33.79
			L 3	7.24
			L 4	0.53
			NENE	34.54

Property APN	Township	Section	Q Section/Lot	Sum of Acres
081-011-07	9S 3W	(blank)	NESE	28.31
			SENE	37.17
			L 37	0.56
		23	L 2	4.40
			SESE	40.72
			SWSE	31.99
		24	NWSW	0.00
			SESW	24.46
			SWSE	0.49
			SWSW	41.26
		25	L 1	0.05
			NENE	31.17
			NENW	44.37
			NESE	40.80
			NESW	42.18
			NWNE	28.21
			NWNW	31.02
			NWSE	42.53
			NWSW	3.60
			SENE	42.59
			SENW	43.93
			SESE	0.17
			SESW	0.68
			SWNE	43.77
			SWNW	37.18
			SWSE	1.18
		26	L 1	1.06
			L 3	0.01
			NENE	3.23
			SENE	0.01
081-101-03	9S 2W	30	L 2	0.14
			L 3	0.91

Property APN	Township	Section	Q Section/Lot	Sum of Acres
			NESW	38.64
			NWSE	7.64
			SENW	2.11
081-101-07	9S 2W	30	L 2	2.83
			L 3	44.86
	9S 3W	25	NESE	1.02
			SENE	0.03
081-101-16	9S 2W	30	L 1	7.12
			L 2	45.64
			SENW	8.98
	9S 3W	25	NENE	0.29
			SENE	0.76
081-361-01	9S 3W	25	SESW	5.34
			SWSE	22.75
081-361-02	9S 3W	25	SESW	4.44
			SWSE	15.11
		36	L 1	2.46
			L 2	6.06
081-361-03	9S 3W	25	NESE	0.87
			SESE	21.29
			SWSE	1.78
081-361-04	9S 3W	25	SESE	18.52
			SWSE	1.44
		36	L 2	0.51
			NENE	2.57
081-361-05	9S 2W	30	L 3	2.09
			L 4	21.84
	9S 3W	25	NESE	0.10
			SESE	0.98
081-361-06	9S 2W	30	L 4	23.41
		31	L 1	0.21
	9S 3W	25	SESE	1.54

Property APN	Township	Section	Q Section/Lot	Sum of Acres
081-361-07	9S 2W	30	L 3	0.09
			L 4	1.31
			NESW	0.61
			NWSE	0.00
			SESW	20.36
			SWSE	0.83
081-361-08	9S 2W	30	L 4	1.10
			SESW	20.39
			SWSE	1.27
		31	L 1	0.03
			NENW	0.97
			NWNE	0.10
Felton Empire Grade Watershed Property				251.34
064-011-01	10S 2W	16	SWSW	0.06
		17	SESE	3.63
			SESW	0.13
			SWSE	3.25
		20	NENE	41.23
			NENW	2.27
			NWNE	41.53
			SENE	16.29
			SENW	1.25
			SWNE	17.05
		21	NWNW	0.10
064-011-02	10S 2W	20	SENE	8.27
			SENW	1.91
			SWNE	21.29
064-021-04	10S 2W	20	NENE	0.12
		21	NWNW	2.63
064-021-07	10S 2W	21	NWNW	0.31
064-021-18	10S 2W	16	SWSW	0.01
		21	NWNW	0.60

Property APN	Township	Section	Q Section/Lot	Sum of Acres
064-021-22	10S 2W	20	NENE	0.00
		21	NWNW	0.81
064-021-23	10S 2W	21	NWNW	0.85
064-201-34	10S 2W	20	SENE	9.37
			SWNE	0.96
064-201-35	10S 2W	20	SENE	0.47
		21	SWNW	4.06
064-381-05	10S 2W	21	SENE	0.50
064-381-06	10S 2W	20	SENE	0.09
			NENW	0.02
			NWNE	0.01
			NWNW	1.33
			SENE	1.33
			SWNE	0.09
			SWNW	0.78
064-381-16	10S 2W	20	NENE	0.31
			SENE	0.30
		21	NWNW	6.92
			SWNW	0.60
064-381-20	10S 2W	20	SENE	0.84
		21	L 4	0.03
			NESW	1.17
			NWNW	0.37
			NWSW	0.03
			SENE	31.59
			SWNE	0.68
SWNW	25.91			
Olympia Property				179.92
071-141-02	10S 2W	11	SWSE	0.24
		14	L 1	9.78
			NWNE	25.37
		(blank)	L 41	1.84

Property APN	Township	Section	Q Section/Lot	Sum of Acres
071-141-14	10S 2W	(blank)	L 41	22.23
073-101-03	10S 2W	11	L 5	20.42
			SWSE	38.75
		14	L 1	0.03
			NWNE	0.00
		(blank)	L 41	2.22
073-101-07	10S 2W	(blank)	L 41	7.33
073-101-08	10S 2W	(blank)	L 41	7.41
073-101-09	10S 2W	(blank)	L 41	2.18
073-101-10	10S 2W	(blank)	L 41	11.89
073-101-11	10S 2W	(blank)	L 41	2.39
073-101-12	10S 2W	(blank)	L 41	27.84
Zayante Property				182.53
074-011-03	9S 1W	31	L 1	0.72
			L 2	0.59
	9S 2W	36	NENE	24.12
			SENE	19.64
093-041-07	9S 1W	31	L 2	1.21
			L 3	0.69
093-041-10	9S 1W	30	L 3	9.48
			L 4	13.81
		31	L 1	1.24
093-041-11	9S 1W	31	L 1	5.46
			L 2	3.09
093-041-12	9S 1W	30	L 3	8.90
			L 4	25.07
			NESW	0.40
			SESW	0.75
		31	L 1	2.52
			NENW	0.06
093-041-13	9S 1W	31	L 1	26.78
			L 2	31.61

Property APN	Township	Section	Q Section/Lot	Sum of Acres
			L 3	3.55
			NENW	0.87
			NESW	0.50
			SEnw	1.30
093-041-14	9S 1W	31	L 1	0.18
Other Property				59.38
021-071-05	10S 2W	(blank)	L 38	0.02
021-101-12	10S 2W	(blank)	L 38	0.25
021-101-13	10S 2W	(blank)	L 38	0.17
021-101-21	10S 2W	(blank)	L 38	0.11
064-031-23	10S 2W	21	SWNE	0.04
064-031-28	10S 2W	21	SWNE	0.10
064-031-37	10S 2W	21	NWNE	0.01
			SWNE	0.04
064-041-18	10S 2W	21	L 3	0.43
		(blank)	L 41	0.08
064-051-03	10S 2W	21	L 3	0.06
			L 4	0.49
064-052-18	10S 2W	(blank)	L 37	0.06
064-083-05	10S 2W	(blank)	L 37	0.40
064-201-22	10S 2W	(blank)	L 37	0.20
065-013-12	10S 2W	(blank)	L 41	1.30
065-013-34	10S 2W	(blank)	L 41	0.17
065-234-16	10S 2W	(blank)	L 37	0.17
065-281-03	10S 2W	(blank)	L 41	2.07
067-531-31	10S 2W	(blank)	L 38	0.03
067-532-30	10S 2W	(blank)	L 38	0.05
071-031-03	10S 2W	16	NWNE	0.03
071-131-03	10S 2W	(blank)	L 41	0.28
071-161-16	10S 2W	(blank)	L 41	0.13
072-042-43	10S 2W	09	SEnw	0.04
072-241-23	10S 2W	(blank)	L 41	0.05

Property APN	Township	Section	Q Section/Lot	Sum of Acres
072-242-09	10S 2W	(blank)	L 41	0.05
072-262-07	10S 2W	(blank)	L 41	0.06
072-262-08	10S 2W	(blank)	L 41	0.04
072-272-01	10S 2W	(blank)	L 41	0.23
072-331-14	10S 2W	10	L 3	0.05
		(blank)	L 41	0.84
072-331-15	10S 2W	(blank)	L 41	0.20
072-331-16	10S 2W	(blank)	L 41	0.42
072-331-17	10S 2W	(blank)	L 41	0.57
072-331-22	10S 2W	(blank)	L 41	0.09
072-331-38	10S 2W	10	L 3	0.25
		(blank)	L 41	1.77
072-354-13	10S 2W	(blank)	L 41	0.01
072-431-04	10S 2W	(blank)	L 41	0.01
072-431-05	10S 2W	(blank)	L 41	0.09
073-031-01	10S 2W	(blank)	L 41	0.72
073-071-29	10S 2W	(blank)	L 41	0.65
074-071-06	10S 2W	02	L 1	1.01
074-111-02	10S 2W	02	SWNE	0.76
074-131-11	10S 2W	02	NESW	0.01
			NWSE	0.13
074-261-09	9S 2W	35	SWSE	1.05
075-042-15	9S 2W	35	SWNE	0.10
075-062-04	9S 2W	35	SENE	0.12
075-072-14	9S 2W	35	SENE	0.52
075-172-28	9S 2W	35	NESW	0.34
075-173-01	9S 2W	35	NESW	0.04
075-311-04	10S 2W	03	L 1	0.50
075-311-06	10S 2W	03	L 1	0.16
	9S 2W	35	SWSW	0.04
075-321-02	9S 2W	34	SESE	0.06
		35	SWSW	0.65

Property APN	Township	Section	Q Section/Lot	Sum of Acres
075-361-09	9S 2W	35	NWNE	0.27
075-361-10	9S 2W	35	NWNE	0.15
075-361-11	9S 2W	35	NWNE	0.32
075-361-12	9S 2W	35	NWNE	0.19
076-301-02	9S 2W	34	NESE	0.50
076-301-06	10S 2W	03	L 1	0.56
077-062-15	10S 2W	04	L 2	0.16
			SWNE	0.07
077-062-30	10S 2W	04	SWNE	0.04
077-141-13	10S 2W	04	NESW	0.28
			NWSW	2.76
077-361-03	10S 2W	10	L 4	0.11
078-011-20	10S 2W	06	L 3	0.00
	9S 2W	31	SESW	0.20
078-041-15	10S 2W	05	L 1	0.02
078-201-03	10S 2W	08	NENE	0.31
078-201-04	10S 2W	08	NENE	0.06
078-201-20	10S 2W	08	NENE	0.12
078-201-22	10S 2W	08	NENE	0.49
			NWNE	0.02
078-236-01	10S 2W	09	NWNW	0.18
078-236-23	10S 2W	08	NENE	0.10
078-251-07	10S 2W	09	NENW	0.13
078-252-01	10S 2W	09	NENW	0.22
078-252-07	10S 2W	04	SESW	0.05
		09	NENW	0.06
078-252-13	10S 2W	04	SESW	0.18
078-261-07	10S 2W	09	NWNW	0.14
079-291-17	9S 2W	32	NESE	1.59
			SENE	1.44
079-341-02	9S 2W	32	NWSW	0.00
			SWSW	0.52

Property APN	Township	Section	Q Section/Lot	Sum of Acres
081-125-05	9S 2W	30	SWNE	0.35
081-132-09	9S 2W	30	SWNE	0.13
081-204-01	9S 2W	30	NESE	0.32
081-204-03	9S 2W	30	NESE	0.32
081-204-04	9S 2W	30	NESE	0.33
081-204-06	9S 2W	30	NESE	0.33
081-204-07	9S 2W	30	NESE	0.32
081-233-02	9S 2W	30	SENE	0.03
081-241-08	9S 2W	30	NWSE	0.05
			SWSE	21.65
		31	NWNE	0.36
082-021-08	9S 3W	24	SENE	0.04
082-021-13	9S 3W	24	NESE	0.05
			SENE	0.03
082-211-39	9S 2W	19	SESW	0.13
082-241-13	9S 2W	19	SESE	0.02
082-241-20	9S 2W	19	NESE	0.01
082-331-05	9S 2W	19	SENE	0.02
082-401-07	9S 2W	19	NESE	0.68
			SENE	0.26
			SWNE	0.01
083-073-21	9S 3W	13	SENE	0.03
084-061-17	9S 2W	18	L 2	0.23
084-091-13	9S 2W	18	L 2	0.46
084-131-06	9S 2W	18	L 3	0.01
084-131-10	9S 2W	18	L 3	0.38
084-261-13	9S 2W	18	L 2	0.09
084-261-14	9S 2W	18	L 2	0.24
085-041-18	9S 3W	01	SESW	0.08
			SWSE	0.04
085-121-03	9S 3W	12	SWSE	0.07
085-291-05	9S 3W	01	SWSW	0.23

Property APN	Township	Section	Q Section/Lot	Sum of Acres
087-111-17	8S 3W	36	NWSE	0.00
			SWNE	0.16
089-121-63	9S 2W	21	SEnw	0.94
089-201-08	9S 2W	20	NESW	0.05
089-211-46	9S 2W	20	NWSE	0.01
089-261-05	9S 2W	21	NENW	0.66
089-282-14	9S 2W	21	NENW	0.08
089-291-09	9S 2W	16	SESW	0.17
090-041-15	9S 2W	29	SEnw	0.29
090-064-02	9S 2W	29	SWNW	0.01
090-194-16	9S 2W	29	NWSE	0.20
Total				2,391.36

Note:

Other Property refers to smaller parcels owned by SLVWD that are not the four main properties.

Nearest City or Town: Boulder Creek

County: Santa Cruz County

Assessor's Parcel Number(s): Please refer to Table 1 and Map Book 1 (Appendix 6) for Assessor's Parcel Numbers (APN).

GPS Coordinates: -37.110W, 112.115N

Total Ownership Acreage: 2,391.36 acres

Total Forested Acreage: 2,314.89 acres

Does the Landowner reside on the property? Yes or No: No

Describe the overall character of the topography including aspect and elevation range:

The Ben Lomond Mountain Watershed and Felton Empire Grade Watershed properties are predominantly east facing and characterized by steep slopes with deep drainages. The Ben Lomond Mountain Watershed property has several ridge systems extending off the eastern slope which create hillsides with north and south aspects. Elevation ranges from 600 to 2,400 feet. Elevation at the Felton Empire Grade Watershed property ranges from 800 to 1,600 feet. The Olympia property is predominantly southwest facing and ranges in elevation from 400 to 1,000 feet. A ridgeline and steep upper slope at the Olympia property give way to more moderate slopes at lower elevation. The Zayante

property is east facing on the western half of the property and west facing on the eastern half of the property. Both slopes are relatively steep and drain towards Zayante Creek which flows through the center of the property. Elevation ranges from 500 to 900 feet at the Zayante property.

Describe the overall slope of the property by percent of land in each of the following categories:

- Flat (grade less than 5%)
- Gentle (grade 6% to 35%)
- Steep (grade greater than 35%)

The slope of the property by percent of land is shown in Table 2 and Map Book 2 (Appendix 6).

Table 2 Slope of SLVWD Property

Property	Sum of Acres	Percent of Land (%)
Ben Lomond Mountain Watershed Property	1,718.19	72
Flat (grade less than 5%)	1.90	0
Gentle (grade 6% to 35%)	415.50	24
Steep (grade greater than 35%)	1,300.79	76
Felton Empire Grade Watershed Property	251.34	11
Flat (grade less than 5%)	4.51	2
Gentle (grade 6% to 35%)	120.73	48
Steep (grade greater than 35%)	126.10	50
Olympia Property	179.92	72
Flat (grade less than 5%)	17.18	10
Gentle (grade 6% to 35%)	112.89	63
Steep (grade greater than 35%)	49.85	28
Zayante Property	59.38	2
Flat (grade less than 5%)	1.41	2
Gentle (grade 6% to 35%)	30.31	51
Steep (grade greater than 35%)	27.67	47
Other Property	182.53	8
Flat (grade less than 5%)	7.40	4
Gentle (grade 6% to 35%)	125.79	69
Steep (grade greater than 35%)	49.34	27

Property	Sum of Acres	Percent of Land (%)
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Note:
Other Property refers to smaller parcels owned by SLVWD that are not the four main properties.

Road System

The percentage of accessible property varies within each unit. The Olympia and Zayante properties are the most accessible with roughly 65 percent of each property falling within 500 feet of a road. Most of the road system within the Zayante property is comprised of the County-owned and paved East Zayante Road. The Ben Lomond Mountain Watershed property is the least accessible with less than 15 percent of the property falling within 500 feet of a road. Among all the properties, there are 3.7 miles of improved (rock or paved) road and 6.0 miles of unimproved road. Most road access is gated by SLVWD-owned gates.

Watershed Information

What is the CALWATER 2.2 planning watershed number and name?

Subarea (RBUAS) “330412”, Watershed Name “San Lorenzo”

Is there a 303d listing on the watershed?

The San Lorenzo River and tributaries are listed as an impaired water under section 303(d) of the federal Clean Water Act due to sediment, nutrients, and pathogens affecting drinking water, fisheries, and recreational beneficial uses.

Property History

SLVWD was established in 1941 as an independent special district. SLVWD is governed by a five-member Board of Directors, elected at-large from within SLVWD’s service area. SLVWD service area comprises approximately 60 square miles in San Lorenzo Valley in Santa Cruz County. SLVWD owns approximately 2,300 acres of land and also owns and operates water extraction, conveyance, and storage facilities, much of which are located on easements. Water service is currently provided to approximately 7,900 residential, commercial, and institutional connections. Both surface water and groundwater resources are depended upon by SLVWD, including nine currently active stream diversions, one groundwater spring, and eight active groundwater wells. SLVWD owns, operates, and maintains two water systems from separate water sources. All water sources are derived solely from rainfall within the 138-square-mile San Lorenzo River watershed. A wastewater system in Boulder Creek’s Bear Creek Estates, is also owned, operated, and maintained by SLVWD, which serves approximately 56 homes.

CZU Lightning Complex

On August 16, 2020, the CZU Lightning Complex (CZU Complex) began burning in Santa Cruz County. The wildfire spread eventually ended up burning over 86,000 acres, destroying hundreds of structures, and the majority of SLVWD lands west of the Highway 9 corridor. The CZU Complex burned 80 percent of SLVWD-owned properties and destroyed or damaged 50 percent of the critical water infrastructure, resulting in interrupted supply of water to customers and substantial repair costs. The fire resulted in direct damage to SLVWD infrastructure, immediate and potential delayed vegetation mortality, hazard trees, and created potential erosion issues.

Fire History

Prior to the CZU Complex, Santa Cruz County experienced three moderately sized wildfires resulting in approximately 5,400 acres burned and numerous homes destroyed (2008). Again, in 2009, Santa Cruz County experienced two large wildfires resulting in approximately 8,500 acres burned, damaging, and destroying numerous homes and structures. In 2016, the Loma Fire burned 4,500 acres along the crest of the Santa Cruz Mountains adjacent to the Santa Clara/Santa Cruz border. In 2017, the Bear Fire burned under 400 acres, destroyed seven structures, and threatened hundreds in communities adjacent to Castle Rock State Park (CalFIRE and RCD, 2018).

The San Lorenzo River watershed contains substantial areas of fire-adapted vegetation, reported to burn at historical intervals of typically 40 to 80 years. Prior to the CZU Complex that impacted part of the San Lorenzo River Watershed, no major wildfires occurred in the watershed in the last three decades (SLVWD, 2009).

Current Property Conditions

Property Infrastructure

Structures

Water infrastructure and structures on SLVWD lands include wells, pipelines, pump stations, water tanks, water treatment plants, and water gages (refer to Map Book 4 in Appendix 6). SLVWD owns and operates water extraction, conveyance, and storage facilities consisting of 190 miles of pipelines (both above and below ground). On SLVWD-owned lands, there are 4 municipal buildings, 46 water tanks, 9 water intakes, 4 wells, and 13 pumping stations. SLVWD owns, operates, and maintains two water systems from separate water sources. Water intakes are located near the headwaters of creeks on SLVWD lands. A wastewater system in Boulder Creek's Bear Creek Estates, is also owned, operated, and maintained by SLVWD.

Roads

Approximately 9 miles of improved and unimproved roads exist on all four SLVWD-owned properties (i.e., Ben Lomond, Felton, Olympia, and Zayante). Road conditions vary and include areas of decomposed granite bedrock.

On the Ben Lomond property, the unimproved road along Peavine Creek is accessible to 37.131830, -122.152213 from the east. Beyond that point, the roadbed has eroded considerably and is overgrown. The road contains some waterbars and rolling dips, although areas with the highest erosion potential contain no erosion control measures. A side ditch exists along most of the road along Peavine Creek but has not been maintained in recent years and is shallow due to sloughing on the uphill bank. This road is likely undrivable during the wet season. The road along Foreman Creek contains an adequate side ditch which drains into a heavily vegetated sump, about half-way along the length of the road. A 10-inch diameter culvert drains from this sump. This road is likely drivable in all seasons. Currently an adjacent landowner is constructing berms on the property along the Foreman Creek road without SLVWD consent to direct water flow. These efforts could lead to sediment flow during the wet season. Harmon road is heavily waterbarred from the H1 gate (37.1212838 -122.1252388; Map Books 1 and 8 in Appendix 6) to the 3-poles area (37.113718, -122.137853; Map Books 1 and 8 in Appendix 6). A quarter mile of road beginning at the H1 gate has recently had gravel added. Beyond that, the road is dirt and loosely packed. The western portion (past 3-poles) is impassible due to vegetation and downed debris, but the roadbed is in good condition and has experienced little erosion. Past the H5 gate (37.116686, -122.128650; Map Books 1 and 8 in Appendix 6) the road is only drivable by all-terrain vehicle (ATV) and then by foot only. The Harmon road system is likely undrivable during the wet season.

The Felton property contains two road systems: a drive through loop on the eastern end of the property and an unimproved road extending from Felton Empire Road to the western portion of the property. The eastern loop was used as a holding line during the CZU Complex. The road is in good condition and contains two culverts of 12-inch diameter Polyvinyl chloride (PVC) piping and cement piping, respectively. This road is likely drivable during the wet season. The unimproved road is within the burn perimeter and is currently impassible due to vegetation and downed wood. The roadbed appears to be in good condition.

The Olympia property contains one main road with several spur roads. The main road is in good condition and is likely drivable in all seasons. The road contains three large culverts. Two of the culverts were replaced with High Density Poly Ethylene (HDPE) pipes from galvanized steel several years ago and contain elevated trash racks to prevent clogging.

The Zayante property is bisected by East Zayante Road a paved, two-lane road that runs north to south. East Zayante Road is owned and maintained by Santa Cruz County.

The few culverts that are currently present on SLVWD-owned properties are primarily in good condition (Map Books 1 and 8 in Appendix 6). It is unknown whether the culverts are adequately sized for 100-year storm events, though they have functioned without failure for years, including during major storm events. Culverts on Santa Cruz County roads are maintained by the County, and the remaining culverts on SLVWD-owned property are maintained by SLVWD staff. SLVWD is considering replacing some existing culverts on the property with dry water crossings to limit sediment and debris blockage. SLVWD plans to convert many culverts to dry water crossings to limit issues with sediment and debris blockage and reduce annual maintenance needs. The specifics of this activity are beyond the scope of this document but if they are implemented, care should be taken to ensure emergency vehicles are able to adequately pass over these features without difficulty, as and where appropriate.

Electrical Improvements

Some of SLVWD's electrical systems were damaged by the CZU Complex. Solar panels and electrical connections associated with the water system were burned along a 5-mile-long pipeline on the Ben Lomond property. The solar panels and electrical connections are not anticipated to be replaced. Most of SLVWD's facilities (i.e., water treatment plants and pump houses) have some power and Supervisory Control and Data Acquisition (SCADA), except for any raw water pipelines. In addition, each well has a power drop. Pacific Gas and Electric (PG&E) powerlines cross through many of SLVWD's properties, including a high voltage power line at the Felton Empire Grade property. At the Olympia property, there is PG&E power at the Olympia Well One that is distributed to the other wells on the property. Underground SCADA and 440 kilovolt transmission lines are present at Wells Two and Three on the Olympia property. Future electrical connections

on SLVWD-owned lands include a connection between the Lyon Water Treatment Plant and the Foreman Intake.

Water Improvements

SLVWD provides water to two separate drinking water systems: The San Lorenzo Valley Water District and The San Lorenzo Valley Water District-Felton. Each of these two drinking water systems have their own separate source of drinking water supply. The San Lorenzo Valley Water District and San Lorenzo Valley Water District -Felton systems have an interconnection, which allows for the transfer of water between the two systems on an emergency basis.

The San Lorenzo Valley Water District system service area includes the communities of: Boulder Creek, North of Boulder Creek, Brookdale, Ben Lomond, Quail Hollow, Glen Arbor, Zayante, Lompico and the Scotts Valley areas of Hidden Glenn, Lockwood Lane, Pasatiempo Pines, Whispering Pines, Manana Woods and both Spring Lakes and Vista Del Lago Mobile Home Parks. Water Supply for the San Lorenzo Valley Water District system primarily utilizes surface water during the months of November to May. During periods of high stream flow, surface water can provide up to 100% of the drinking water in the San Lorenzo Valley Water District system.

The San Lorenzo Valley Water District-Felton system service area includes the town of Felton, Highway 9 south to Big Trees, San Lorenzo Avenue, Felton Empire Grade, Felton Grove, and El Solyo Heights. Customers in the San Lorenzo Valley Water District -Felton system are supplied water from Bennett Springs, Bull Springs and Fall Creek. Drinking water treatment for these sources is provided at a conventional surface water treatment plant.

Forest Resource

Dominant forest vegetation types within proposed treatment sites include redwood forest, coastal oak woodland, mixed hardwood, and mixes of conifer (redwood trees and scattered Douglas-fir trees) and hardwood (tan oak and madrone) as shown in Map Book 5 (Appendix 6). The age of the forest that survived the CZU Complex on SLVWD lands is approximately 100 to 150 years, with portions of the forest likely harvested beginning in the late 1800's, with lumber transported by rail and flume to Felton and beyond (Whaley, 2017). The CZU Complex directly impacted SLVWD infrastructure and vegetation, burning approximately 1,840 acres or 80 percent of SLVWD-owned lands.

Table 3 Vegetation Communities Present on SLVWD-owned Lands and Forest Productivity

Vegetation Community	Forest Productivity (Cubic Feet per Year)	Sum of Acres
Ben Lomond Mountain Watershed Property	157	1,718.19
Conifer Forest	157	1,634.96

Vegetation Community	Forest Productivity (Cubic Feet per Year)	Sum of Acres
Hardwood Woodland	157	60.99
Shrub	157	18.52
Urban	157	3.72
Felton Empire Grade Watershed Property	168	251.34
Conifer Forest	168	250.63
Hardwood Woodland	96.5	0.71
Olympia Property	214.5	179.92
Conifer Forest	214.5	91.33
Hardwood Woodland	214.5	43.35
Herbaceous	214.5	15.48
Shrub	214.5	29.38
Urban	114	0.37
Zayante Property	214.5	182.53
Conifer Forest	214.5	150.65
Hardwood Woodland	214.5	29.19
Herbaceous	168	1.86
Shrub	168	0.83
Other Property	236	59.38
Conifer Forest	236	48.52
Hardwood Woodland	236	4.56
Shrub	114	0.82
Urban	236	5.48
Grand Total	236	2,391.36

Note:

Other Property refers to smaller parcels owned by SLVWD that are not the four main properties.

For a detailed discussion of individual forest stands please see the Vegetation Unit Descriptions section of this plan.

Access and Security

The roads accessing SLVWD-owned lands are gated. SLVWD does not have a survey of boundary property corners. Some of SLVWD-owned lands are fenced with the most substantial fencing on the Olympia property.

SLVWD-owned land is closed to the public except for the Santa Cruz County Horseman's Association (SCCHA). The SCCHA allows equestrian activities on the Olympia Property. People infrequently enter SLVWD property, but some trespassing occurs. Trespassing from cyclists occurs on the Olympia Property and Harmon properties. Most trespassing ingress occurs from the northwest corner of the Olympia property (SLVWD, 2020). Erosion has occurred on the Olympia Property from people using trails perpendicular to the slope and gullies have formed. Recent gate and fence repairs at the Olympia property has reduced trespassing on the property.

Recreation & Aesthetics

As stated above, SLVWD does not actively manage their lands for recreational uses, except for a written agreement with the SCCHA that permits the use of the Olympia property for equestrian recreation on marked trails with permission (SLVWD, 2009). SLVWD lands are heavily vegetated with redwood forests, chaparral, the rare sandhills, grassland, oak woodland, and riparian woodland. While the CZU Complex burned 80 percent of SLVWD-owned properties resulting in a visual change from dense forest to burnt and dead or dying trees, vegetation, particularly redwood, various shrubs, and hardwoods are sprouting back. The overall visual characteristics of SLVWD lands are natural and generally undeveloped, except for some water infrastructure interspersed among the properties. SLVWD lands provide forest views to the public while driving along Empire Grade Road, Highway 9, and to a lesser extent, East Zayante Road.

Soils

Prominent soil types present on SLVWD lands include the Catelli-Sur complex (sandy loam from sandstone or granitic bedrock), Lompico-Felton complex (sandy loam and loam from sandstone, siltstone, or shale bedrock), Nisene-Aptos complex (fine sandy loam to clay loam from sandstone, siltstone, or shale bedrock), and the Zayante complex (coarse sand from marine sediment or sandstone) (see Appendix 6). These soils are deep and well-drained except for the Zayante complex which is very deep and excessively drained. All soils occur on hills and mountain sides.

The 50-year site index, a measure of height, in feet, dominant trees will attain in the given time period, for these soils range from 107 (Zayante soils) to 180 (Nisene soils) with most soil site indexes ranging between 130 and 150 (refer to Map Book 6 in Appendix 6). Potential soil productivity, measured in added wood volume per year, ranges from 114 ft³/ac for the Zayante soils to 300 ft³/ac for the Nisene soils with redwoods generally being the most productive across soil types (refer to Table 3 and Map Book 7 in Appendix 6).

In drainages with steep slopes and granitic soils, some dry ravelling and increased erosion has been observed following the CZU complex due to reduced ground cover and vegetation. Equipment is currently limited to chippers towed along some roadways, where accessible, since no timber harvests are currently planned and slopes are steep across most of SLVWDs properties.

Streams, Wetlands and Ponds

SLVWD's surface water supply flows primarily from creeks on the western side of the 138-square-mile San Lorenzo River watershed (refer to Map Book 3 in Appendix 6). Together, these creeks, which are tributaries to the San Lorenzo River, provide approximately half of SLVWD's total water supply. SLVWD's groundwater sources come primarily from the Santa Margarita Sandstone and Lompico Sandstone formations, on the eastern side of the watershed.

The Ben Lomond property partially encompass SLVWD's water supply streams, which are tributaries of the San Lorenzo River: Clear Creek, Sweetwater Creek, Peavine Creek, Foreman Creek and Silver Creek. The streams receive significant groundwater recharge from the headwaters areas surrounding them. Ephemeral streams on the Olympia and Zayante properties drain into the Zayante Creek which flows west into the San Lorenzo River. The Bennett Creek and Bull Creek tributaries flow east in the Felton Empire Grade property to the San Lorenzo River.

Wildlife

Fish and Aquatic Species

The creeks and tributaries of the San Lorenzo River are home to many aquatic species including invertebrates, fish, reptiles and amphibians, and other aquatic organisms. The San Lorenzo River and its estuary are inhabited by at least 25 different species of native fish. These include salmonids and other anadromous fish, which spend part of their lives in the ocean and part in freshwater. Approximately 26 miles of the San Lorenzo River, and at least nine of its major tributaries support federally threatened steelhead (*Oncorhynchus mykiss*). Historically, the San Lorenzo River supported the largest coho salmon (*Oncorhynchus kisutch irideus*) and steelhead fishery south of San Francisco Bay, and the fourth largest steelhead fishery in California (SLVWD, 2009). Critical habitat for the coho salmon and steelhead overlaps with portions of SLVWD lands (NOAA, 2021) (refer to Map Book 9 in Appendix 6). Coho salmon rarely reproduce successfully any longer in the watershed. Both the steelhead and coho salmon have the potential to occur within streams on SLVWD-owned land.

SLVWD's lands and water supply creeks on Ben Lomond Mountain are generally too steep to allow passage of anadromous salmonids, with the exception of Clear Creek and Fall Creek. Clear Creek has a moderate intrinsic potential to support juvenile steelhead, but no intrinsic potential to support coho salmon. Clear Creek has a limited anadromous

salmonoid value and is considered a low priority stream for fish passage enhancement (Podlech, 2019). In Fall Creek, Coho salmon juveniles were only detected in 1981. Steelhead in Fall Creek are limited by poor pool development, a highly sedimented streambed, and heavy shading. The California American Water fish ladder and water diversion structure on Fall Creek may cause difficulties for steelhead passage if the fish ladder is damaged by high flows (SLVWD, 2009). Barriers to fish passage below SLVWD's lands further restrict salmonid access to these areas.

Upland Wildlife

The Santa Cruz Mountains are one of the more biologically diverse areas in California. The biological diversity of the Santa Cruz Mountains characterizes the San Lorenzo River watershed. The watershed contains overlapping habitats of terrestrial, aquatic, and marine species, including 55 species of mammals, 33 species of reptiles and amphibians, and more than 200 species of birds (SLVWD, 2009).

Threatened or Endangered Species

SLVWD-owned lands are home to many of these species, including some of the rarest inhabitants of the sandhills communities. The Santa Cruz Mountains support some of California's rarest plants and animals including fourteen plants listed as State or Federally threatened or endangered. Santa Cruz County has been identified as one of the five most important locations in the U.S. for rare and endangered species. Several species are listed as rare, endemic, threatened or endangered under the federal Endangered Species Act (ESA), the California Endangered Species Act (CESA) (SLVWD, 2009).

Biological database searches for the vicinity of SLVWD-owned lands were conducted (CDFW, 2021; CNPS, 2021). Of the species identified during the database search, species were determined to have potential to occur within the work areas if the species is known to occur in the vicinity of the work areas and if the work areas or immediate vicinity contains suitable habitat to support these species. Approximately, 59 special-status plant species and 32 special-status wildlife species have the potential to occur within 3 mile of SLVWD-owned lands as shown in Table 4 (refer to Map Book 10 in Appendix 6). Riparian, wetland, sandhill, or other sensitive habitats may occur within SLVWD lands. Maritime Coast Range Ponderosa Pine Forest and Northern Maritime Chaparral (rank of S1) vegetation communities have a high potential to occur in some of the areas. The CZU Lightning Complex has altered the habitats within the burn perimeter. The level to which the wildfire affected special-status species is unknown and can vary.

Sandhill habitat is located on the Olympia property, which is a community found nowhere else on earth. Many of the plant species composing the sandhills community are disjunct coastal species, isolated in the sandhills miles from the coast. These disjunct coastal species often exert different morphologies from their coastal counterparts. The sandhills also contain forms of species that are common elsewhere in the state but have strikingly different forms or habits in the San Lorenzo River watershed. Sandhills chaparral

communities have undergone the most dramatic shift in structure due to plant succession in the absence of fire, attributed to increased canopy closure. Invasive plants like broom and acacia are converting open canopy habitat into shrublands. Canopy gaps important for maintaining plant diversity are likely also important for the unique sandhills fauna, which is impacted by canopy closure due to fire exclusion (SLVWD, 2009). Invasive and non-native species like European annual grasses and herbs are abundant in the sandhill habitats and are out competing native plants. The nearby Olympia quarry has contributed to the invasion of non-native plants. Woody invasive species, such as French broom, Portuguese broom, and silver wattle have a significant negative effect on the sandhill habitat and associated endemic plants and animals (McGraw, 2020).

The Mount Hermon June beetle and Zayante bandwinged grasshopper occur in sandhill habitats. Critical habitat for the Zayante bandwinged grasshopper overlaps with areas of the Olympia Property and between the town of Ben Lomond, Felton, and Scotts Valley (USFS, 2021). Designated critical habitat covers approximately 11,100 acres of land within and adjacent to SLVWD lands and assets (refer to Map Book 9 in Appendix 6). The primary threat to this species is habitat loss as well as conversion of vegetation communities. Invasive plants like broom and acacia are converting open canopy habitat into shrublands. Canopy gaps important for maintaining plant diversity are likely also important for the unique sandhills fauna, which is impacted by canopy closure due to fire exclusion (SLVWD, 2009). Invasive and non-native species like European annual grasses and herbs are abundant in the sandhill habitats and are out competing native plants. Woody invasive species, such as French broom, Portuguese broom, and silver wattle have a significant negative effect on the sandhill habitat and associated endemic plants and animals.

Table 4 Special-Status Species with Potential to Occur on or Adjacent to SLVWD Lands

Scientific Name	Common Name	Sensitive Status	Habitat Types
Sensitive Plants			
<i>Agrostis blasdalei</i>	Blasdale's bent grass	CRPR 1B.2 S2	Coastal bluff scrub; coastal dunes
<i>Amsinckia lunaris</i>	Bent-flowered fiddleneck	CRPR 1B.2 S3	Grassland, scrub
<i>Arctostaphylos andersonii</i>	Santa Cruz manzanita	CRPR 1B.2 S2	Broadleaf upland forest, chaparral, coniferous forests; open sites
<i>Arctostaphylos glutinosa</i>	Schreiber's manzanita	CRPR 1B.2 S1	Chaparral; closed cone pine forest
<i>Arctostaphylos ohloneana</i>	Ohlone manzanita	CRPR 1B.1 S1	Closed cone pine forest; coastal scrub
<i>Arctostaphylos regismontana</i>	Kings Mountain manzanita	CRPR 1B.2 S2	Broadleafed upland forest; chaparral; north coast coniferous forest Granite, sandstone
<i>Arctostaphylos silvicola</i>	Bonny Doon manzanita	CRPR 1B.2 S1	Chaparral; closed cone pine forest; Zayante sands
<i>Arenaria paludicola</i>	Marsh sandwort	CE FE CRPR B.1 S1	Marshes and swamp
<i>Calyptridium parryi</i> var. <i>hesseae</i>	Sant Cruz Mountains pussypaws	CRPR 1B.1 S2	Pine forest
<i>Campanula californica</i>	Swamp harebell	CRPR 1B.2 S3	Marshes and swamps; closed-cone pine forest; coastal prairie; meadows and seeps; north coast coniferous forest
<i>Carex comosa</i> ^a	Bristly sedge	CRPR 2B.1	Wet places, including meadows and many types of wetlands

Scientific Name	Common Name	Sensitive Status	Habitat Types
<i>Carex saliniformis</i>	Deceiving sedge	CRPR 1B.2 S2	Mesic sites in coastal prairie
<i>Centromadia parryi</i> ssp. <i>congdonii</i>	Congdon's tarplant	CRPR 1B.1 S2	Mesic valley and foothill grassland (alkaline)
<i>Chorizanthe pungens</i> var. <i>hartwegiana</i>	Ben Lomond spineflower	FE CRPR 1B.1 S1	Maritime chaparral and ponderosa pine forest; Zayante sandhills
<i>Chorizanthe pungens</i> var. <i>pungens</i>	Monterey spineflower	FT CRPR 1B.1 S2	Sandy areas in chaparral (maritime); cismontane woodland; coastal dunes; coastal scrub; valley and foothill grassland
<i>Chorizanthe robusta</i> var. <i>hartwegii</i>	Scotts Valley spineflower	FE CRPR 1B.1 S1	Valley and foothill grassland (mudstone, Purisima outcrops)
<i>Chorizanthe robusta</i> var. <i>robusta</i>	Robust spineflower	FE CRPR 1B.1 S1	Sandy areas in chaparral (maritime); cismontane woodland (openings); coastal dunes; coastal scrub
<i>Cirsium andrewsii</i>	Franciscan thistle	CRPR 1B.2 S3	Mesic areas (sometimes serpentine) in broadleafed upland forest; coastal bluff scrub; coastal prairie; coastal scrub
<i>Cirsium fontinale</i> var. <i>campylon</i>	Mt. Hamilton thistle	CRPR 1B.2 S2	Seeps, mesic sites in creeks; woodland; grassland; serpentine
<i>Collinsia multicolor</i>	San Francisco collinsia	CRPR 1B.2 S2	Moist shady areas in closed-cone pine forest; coastal scrub; woodland
<i>Dacryophyllum falcifolium</i>	Tear drop moss	CRPR 1B.3 S2	Redwood forest on limestone outcrops
<i>Dirca occidentalis</i>	Western leatherwood	CRPR 1B.2 S2	Mesic areas in broadleafed upland forest; closed-cone pine forest; chaparral; redwood forest; riparian woodland

Scientific Name	Common Name	Sensitive Status	Habitat Types
<i>Dudleya abramsii</i> ssp. <i>setchellii</i>	Santa Clara Valley dudleya	FE CRPR 1B.1 S2	Serpentine outcrops in woodland and grassland
<i>Eriogonum nudum</i> var. <i>decurrens</i>	Ben Lomond buckwheat	CRPR 1B.1 S1	Maritime chaparral and ponderosa pine forest; Zayante sandhills
<i>Eriophyllum latilobum</i>	San Mateo woolly sunflower	FE CE CRPR 1B.1 S1	Cismontane woodland (often serpentinite, roadcuts); coastal scrub; coniferous forest
<i>Erysimum ammophilum</i>	Sand-loving wallflower	CRPR 1B.2 S2	Openings in chaparral, sand dunes; sand substrate
<i>Erysimum teretifolium</i>	Santa Cruz wallflower	FE CE CRPR 1B.1 S1	Openings in chaparral, ponderosa pine forest; Zayante sands
<i>Fissidens pauperculus</i>	Minute pocket moss	CRPR 1B.2 S2	Redwood forest on limestone outcrops
<i>Fritillaria liliacea</i>	Fragrant fritillary	CRPR 1B.2 S2	Ultramafic talus in chaparral and foothill woodland
<i>Grimmia torenii</i>	Toren's grimmia	CRPR 1B.3	Openings, rocky, boulder and rock walls, carbonate, in chaparral; cismontane woodland; coniferous forest
<i>Grimmia vaginulata</i>	Vaginulate grimmia	CRPR 1B.1 S1	Rocky, boulder and rock walls, carbonate in chaparral
<i>Hesperevax sparsiflora</i> var. <i>brevifolia</i>	Short-leaved evax	CRPR 1B.2 S3	Coastal bluff scrub (sandy); coastal dunes; coastal prairie

Scientific Name	Common Name	Sensitive Status	Habitat Types
<i>Hesperocyparis abramsiana</i> var. <i>abramsiana</i>	Santa Cruz cypress	FT CE CRPR 1B.2 S1	Coniferous forest and chaparral on sandstone and granitic derived soils
<i>Hesperocyparis abramsiana</i> var. <i>butanoensis</i>	Butano Ridge cypress	FT CE CRPR 1B.2 S1	Coniferous forest and chaparral on sandstone
<i>Hoita strobilina</i>	Loma Prieta hoita	CRPR 1B.1 S2	Chaparral, cismontane woodland, riparian woodland with serpentine soils and mesic conditions
<i>Horkelia cuneata</i> var. <i>sericea</i>	Kellogg's horkelia	CRPR 1B.1 S1	Openings on old dunes and coastal sandhills
<i>Horkelia marinensis</i>	Point Reyes horkelia	CRPR 1B.2 S2	Coastal dunes, prairies, scrub
<i>Legenere limosa</i>	Legenere	CRPR 1B.1 S2	Vernal pools
<i>Lessingia micradenia</i> var. <i>glabrata</i>	Smooth lessingia	CRPR 1B.2 S2	Serpentine soils in chaparral and grasslands
<i>Limnanthes douglasii</i> ssp. <i>sulphurea</i>	Point Reyes meadowfoam	CRPR 1B.2 S1	Mesic areas in coastal prairie; meadows and seeps; marshes and swamps; vernal pools
<i>Malacothamnus arcuatus</i>	Arcuate bush-mallow	CRPR 1B.2 S2	Serpentine chaparral
<i>Microseris paludosa</i>	Marsh microseris	CRPR 1B.2 S2	Coastal grassy habitats (mesic)

Scientific Name	Common Name	Sensitive Status	Habitat Types
<i>Monardella sinuata</i> ssp. <i>nigrescens</i>	Northern curly-leaved monardella	CRPR 1B.2 S2	Openings in chaparral, ponderosa pine forest; Zayante sands
<i>Monolopia gracilis</i>	Woodland Woollythreads	CRPR 1B.2 S3	Openings in redwood and mixed evergreen forests
<i>Orthotrichum kellmanii</i>	Kellman's bristle moss	CRPR 1B.2 S1	Sandstone, carbonate in chaparral and montane woodland
<i>Pedicularis dudleyi</i>	Dudley's lousewort	CR CRPR 1B.2 S2	Redwood forest, moist areas near streams
<i>Penstemon rattanii</i> var. <i>kleei</i>	Santa Cruz Mountains beardtongue	CRPR 1B.2 S2	Sandy shale slopes in chaparral, coniferous forests
<i>Pentachaeta bellidiflora</i>	White-rayed pentachaeta	FE CE CRPR 1B.1 S1	Valley and foothill grassland, open dry rocky slopes, often on serpentine bedrock
<i>Pinus radiata</i>	Monterey pine	CRPR 1B.1 S1	Closed-cone pine forest; cismontane woodland (native stands)
<i>Piperia candida</i>	White-flowered rein orchid	CRPR 1B.2 S3	North coast coniferous forest, lower montane coniferous forest, broadleaved upland forest, on serpentine, mossy banks, rock outcrops
<i>Plagiobothrys chorisianus</i> var. <i>chorisianus</i>	Choris's popcorn flower	CRPR 1B.2 S1	Chaparral, coastal scrub, coastal prairie (mesic areas)
<i>Plagiobothrys diffusus</i>	San Francisco popcorn flower	CE CRPR 1B.1 S1	Grassland, coastal prairie (mesic areas)
<i>Polygonum hickmanii</i>	Scotts Valley polygonum	FE	Grassland with sandstone or mudstone outcrops

Scientific Name	Common Name	Sensitive Status	Habitat Types
		CE CRPR 1B.1 S1	
<i>Sanicula saxatilis</i>	Rock sanicle	CRPR 1B.2 S2	Serpentine; rocky, talus in chaparral; woodland, grassland
<i>Senecio aphanactis</i> ^a	Chaparral ragwort	CRPR 2B.2	Occurs in dry coastal areas, particularly coastal sage scrub, foothill oak woodland, and alkali flats
<i>Stebbinsoseris decipiens</i>	Santa Cruz microseris	CRPR 1B.2 S2	Open areas, sometimes serpentine in broadleafed upland forest; closed-cone pine forest; chaparral; coastal prairie; coastal scrub; valley and foothill grassland
<i>Streptanthus albidus</i> ssp. <i>albidus</i>	Most beautiful jewelflower	CRPR 1B.2 S2	Serpentine soils in chaparral and grasslands
<i>Trifolium buckwestiorum</i>	Santa Cruz clover	CRPR 1B.1 S2	Moist areas in broadleafed upland forest; cismontane woodland; coastal prairie;
<i>Trifolium polyodon</i>	Pacific Grove clover	CR CRPR 1B.1 S1	Mesic areas in closed-cone pine forest; coastal prairie; meadows and seeps; valley and foothill grassland
Sensitive Wildlife			
<i>Polyphylla barbata</i>	Mount Hermon June beetle	FE	Sparsely vegetated ponderosa pine and chaparral habitat with sandy soils in the Zayante Sandhills
<i>Trimerotropis infantilis</i>	Zayante bandwinged grasshopper	FE	Open sandy ridges and hills with sparse, low, annual and perennial herbs and open ponderosa pine, within the Zayante Sandhills
<i>Oncorhynchus kisutch</i>	Coho Salmon–Central California Coast ESU	FT/CT	Rivers and creeks with abundant, deep woody debris pools.

Scientific Name	Common Name	Sensitive Status	Habitat Types
<i>Oncorhynchus mykiss irideus</i>	Steelhead– Central California Coast DPS	FT	Rivers and creeks, downstream of migration barriers.
<i>Lavinia symmetricus subditus</i>	Monterey Roach	SSC	Found in drainages of the Monterey Bay. Tolerant of warm waters and low oxygen content.
<i>Dicamptodon ensatus</i>	California giant salamander	SSC	Larvae are found in perennial and intermittent drainages with cool, flowing water. Adults occur under cover in adjacent forests.
<i>Aneides niger</i>	Santa Cruz black salamander	SSC	Non-aquatic, but adults/juveniles often found adjacent to drainages. Found under cover and in small mammal burrows
<i>Rana boylei</i>	Foothill yellow- legged frog	CE	Inhabits drainages with riffles, cobble substrate and open/broken canopy to allow for sunlight penetration. Adults and juveniles mostly found in the vicinity of drainages, but overland movement known to occur during the rainy season.
<i>Rana draytonii</i>	California red- legged frog	FT	Breeds in upland ponds, freshwater marshes and off-channel pools. Non-breeding adults and subadults may be found along streambanks outside of the breeding season. Known to move overland great distances during dispersal and migration.
<i>Emys marmorata</i>	Western pond turtle	SSC	Inhabits upland perennial ponds and deep pools of drainages. Nests in open, sparsely vegetated uplands, such as grasslands. May be found in uplands during nesting and dispersal/migration.
<i>Phrynosoma blainvillii</i>	Coast horned lizard	SSC	Occurs in a variety of habitats with open vegetation, sandy soils and native ant populations.
<i>Anniella spp.</i>	California legless lizard	SSC	Occurs in a variety of habitats with open vegetation and sandy/sandy loam soils and alluvial deposits. Largely fossorial, but sometimes found under rocks, boards, woody debris and leaf litter.
<i>Aquila chrysaetos</i>	Golden eagle	FP	Nests in secluded trees, on cliff faces and occasionally on transmission towers.
<i>Elanus leucurus</i>	White-tailed kite	FP	Nests in oak woodlands and riparian forests in the vicinity of open foraging habitat (e.g., grasslands and agricultural fields). Generally absent as a nester in highly urbanized situations

Scientific Name	Common Name	Sensitive Status	Habitat Types
<i>Haliaeetus leucocephalus</i>	Bald eagle	CE, FP	Populations in California are recovering. Bald eagles select nest sites near aquatic foraging habitat but secluded from human activities. Nests are built in tall trees and pairs exhibit very high site fidelity
<i>Falco peregrinus anatum</i>	American peregrine falcon	FP	Nests on secluded cliff faces, sometimes on bridges and tall buildings.
<i>Brachyramphus marmoratus</i>	Marbled murrelet	FT, CE	Seabird that forages and rests offshore, but nests on large platform limbs in old-growth and mature second-growth redwood forests.
<i>Asio otus</i>	Long-eared owl	SSC	Nests in conifer-hardwood forests, dense live oak woodlands and riparian, in close proximity to open meadows for foraging.
<i>Chaetura vauxi</i>	Vaux's Swift	SSC	Mainly nests in large snags of old-growth and mature second-growth redwood forests.
<i>Contopus cooperi</i>	Olive-sided flycatcher	SSC	Nests along forest edges, interior of broken stands and eucalyptus groves. Uses tall trees as singing posts to attract mates and defend territories.
<i>Progne subis</i>	Purple martin	SSC	Nests in snags of upper elevation coniferous forests (e.g., knobcone pine, Douglas fir).
<i>Antrozous pallidus</i>	Pallid bat	SSC	Roosts in snags, tree cavities, rock outcrops, abandoned buildings, under bridges. Occurs in a variety of habitats.
<i>Corynorhinus townsendii</i>	Townsend's big-eared bat	SSC	Typically roosts in secluded caves, large snags and buildings.
<i>Lasiurus blossevillii</i>	Western red bat	SSC	Locally, a coastal winter migrant that roosts in the foliage of trees and shrubs. Prefers inland regions of the Central Valley during the breeding season.
<i>Neotoma fuscipes annectens</i>	San Francisco dusky-footed woodrat	SSC	Occurs in a variety of wooded habitats with dense understory. Typically builds stick houses, but will den in rubble.
<i>Taxidea taxus</i>	American badger	SSC	Most abundant in grasslands and drier, open stages of shrub and forest, with friable soils and abundant prey (small burrowing mammals).
<i>Bassariscus astutus</i>	Ringtail	FP	Occurs in a variety of habitats including oak woodland, scrub and conifer forests, where prey (rodents) is abundant. Dens in rock piles, hollow trees and mammal burrows.
<i>Coturnicops noveboracensis</i> ^a	Yellow Rail	SSC	Breeds in freshwater grass or sedge marshes and wet meadows, but also may use brackish wetlands, particularly the drier margins.

Scientific Name	Common Name	Sensitive Status	Habitat Types
<i>Euphilotes enoptes smithi</i> ^a	Smith's blue butterfly	FE	Occurs in and around coastal dunes, inland sand dunes, cliff-side coastal scrub and chaparral, and grassland habitats. It can be found only in association with coast and seacliff buckwheat plants.

Notes:

^a The specified special-status species were not evaluated in the Critical Water Infrastructure Protection and Wildfire Management Ingress/Egress Improvements Project Notice of Exemption as they were outside of the treatment area.

FE	Federally Endangered	CC	California State Candidate
FT	Federally Threatened	FP	Fully Protected
FC	Federal Candidate	SSC	California State Species of Special Concern
CE	California State Endangered	CRPR	California Rare Plant Ranks
CT	California State Threatened	S	State Rank

Source: (CDFW, 2021; CNPS, 2021; CDFG, 2003; Hickman, 1993; Stebbins, 2003)

Invasive Species and Pests

According to invasive plant removal specialist Ken Moore, the invasive populations of French broom (*Genista monspessulana*) on SLVWD property at the Olympia property have increased the risk of catastrophic fire (McGraw, 2020). The remainder of SLVWD-owned lands have not been surveyed for invasive species such as French broom (SLVWD, 2009). Eucalyptus (*Eucalyptus globulus*) is present on SLVWD lands, notably some stands on the Olympia property and Ben Lomond Mountain Watershed property (refer to Figure 1 and Figure 2 in Appendix 6), and known to increase fire hazard, particularly where growing in close proximity to each other, particularly where shed bark and foliage has accumulated beneath established trees and stands (Coats, 2014). Invasive and non-native species like European annual grasses and herbs are abundant in the sandhill habitats and are out competing native plants. The nearby Olympia quarry has contributed to the invasion of non-native plants. Woody invasive species, such as French broom, Portuguese broom, and silver wattle have a significant negative effect on the sandhill habitat and associated endemic plants and animals (McGraw, 2020).

Current eradication measures of invasive plants include the removal of vegetation around SLVWD water tank sites. Vegetation maintenance occurs annually or semiannually for SLVWD's water tank sites. The Olympia Conservation Area Habitat Management and Monitoring Plan outlines current eradication measures for non-native, invasive species on the Olympia property to protect the sensitive Sandhill vegetation communities and wildlife species (SLVWD, 2020). Numerous vegetation species were identified in the plan for control and/or eradication including Ornamental Pine (*Pinus cf. contorta*), French and Portuguese Broom, Velvet Grass, Italian and Bull thistle (*Carduus pycnocephalus*; *Cirsium vulgare*), poison wild lettuce (*Lactuca virosa*), Spring vetch (*Vicia sativa*), Periwinkle (*Vinca minor*), and exotic annual grasses and forbs. Treatment methods described in the Olympia Conservation Area Habitat Management and Monitoring Plan vary depending on type of invasive vegetation but generally include cutting, hand pulling, weed whacking, and burning (i.e., blanching using fire from a butane torch).

Air Resources

As stated previously, limited vegetation treatments have been conducted on SLVWD-owned lands since the 1970s and has primarily consisted of brushing to maintain access roads on the properties. Land management activities have been conducted on the Olympia watershed property and largely consists of invasive plant removal, erosion control, and habitat protection through fencing. Pile burning has been conducted by SLVWD on the Olympia property within the last 10 to 20 years for the removal of the invasive Acacia tree species.

Landowner Management Objectives

Protect, Maintain, and Enhance Water Quality and Quantity

The focus of SLVWD's vegetation and road management effort is to continue to protect and enhance water quality. Over the long term, reducing impacts on water quality due to erosion and wildfire, and protection of SLVWD infrastructure from wildfire provides immediate and long-term financial benefits to SLVWD and its customers.

Fire Protection

Wildfires could disrupt SLVWD's ability to achieve their mission through loss of water infrastructure and degradation of watershed health and water quality. The primary need for vegetation and fuels management is to lessen the presence of unnaturally high fuel loads on SLVWD-owned lands and around SLVWD-owned assets to reduce the intensity and harmful impacts of wildfires.

Forest Health

A primary objective of the plan is to reforest and revegetate areas of the forest that sustained high and moderate burn severity from the CZU Complex. Hazardous trees caused by Sudden Oak Death (SOD) or the CZU Complex that pose a direct threat to SLVWD infrastructure or other healthy trees will be removed. The plan aims to increase the health and vigor of residual trees and reduce vertical and horizontal crown spacing through pre-commercial thinning and pruning. Remove non-native trees (e.g., eucalyptus) and vegetation (e.g., scotch broom), and replant with native trees and vegetation.

Trespass concerns

Reduce impacts from trespass, particularly from unauthorized off-highway vehicle (OHV) use.

Wildlife

Restore and improve habitat for wildlife species, including fish and other aquatic species, through forest restoration and revegetation.

Recreation and aesthetics

Restore the aesthetics of the SLVWD properties to pre-wildfire conditions through reforestation and revegetation.

Income

Protect and enhance lands for continued reliable and clean supply of domestic drinking water which is purchased directly by SLVWD customers.

Family Legacy

SLVWD is a public agency, therefore this is not considered an objective of the landowner.

Livestock

Livestock is not present on SLVWD property and is not considered an objective of the landowner.

Constraints and Proposed Alternatives

The primary constraints on management on SLVWD lands are access, due to limited number of roads and steep terrain, and existing deed restrictions. Much of the ownership, including all of the lands on the Felton Empire Grade Watershed property, and portions of the Ben Lomond Mountain Watershed property have deed restrictions that limit all commercial timber harvesting (refer to Figure 3 and Figure 4 in Appendix 6). Given that no commercial timber harvesting is proposed, there has not been a detailed timber inventory or forest simulation/modeling conducted for SLVWD owned lands.

With respect to non-commercial treatments such as pre-commercial thinning, prescribed fire, reforestation, and pruning, there is limited road access to steeper areas of the SLVWD ownership-this generally constrains these activities to within 500 to 1,000 feet of the existing road network. Prescribed fire does have potential to be used over a larger portion of the landscape with additional fire line construction, but significant challenges still exist related to smoke management impacts to the communities of Boulder Creek and Felton.

Economic Sustainability

The primary revenue source for SLVWD-owned properties is the sale of water collected, transported across, and treated from those properties to local residents. The focus of SLVWD's vegetation and road management effort is to continue to protect and enhance water quality over the long term, reducing impacts on water quality due to erosion and wildfire, and protection of SLVWD infrastructure from wildfire to provide immediate and long term financial benefits to SLVWD and its customers.

No Action Alternative

The “no action” alternative involves continued management of forested areas in the same manner as has been performed for the past 25 years with exception of needed hazard tree removal, removal of trees for infrastructure repair/maintenance, and limited reforestation. Continued management will involve minimal to no vegetation management, with primary management actions consisting primarily of removal of fallen trees and debris on water related infrastructure. This option may generally result in lowest overall costs over time, but also provides no noted future revenue from forest management activities and does not mitigate wildfire risk, which may increase future costs due to loss and damage of infrastructure. No actions related to forest health will be made under this alternative.

Future Property Conditions (Action Alternative)

Roads

On the Ben Lomond property, improvements could be made to all three road systems. Improvements along the Peavine Creek road include minor improvements to the dry water crossing, installation of a dry water crossing (37.132334, -122.152441), road grading along the drivable road within the property, and deepening of the side ditch that has been impacted by sloughing from the uphill bank. The improvements can be addressed during replacement of the Peavine Creek pipeline. The Foreman Creek road is not in need of any immediate or specific repairs, although continued inspection and maintenance to the surface and drainage system (i.e., side ditch, sump, pipe) is recommended due to the proximity to the creek. It is recommended that the Harmon road system is reopened from the 3-poles area (Map Book 1 in Appendix 6; 37.113718, -122.137853) to the western end of the property which will require vegetation removal and light grading. Reopening the road from the H5 gate to Malosky Street will require vegetation removal and substantial road reconstruction. Deconstruction of several water bars from the H1 gate (Map Book 1 in Appendix 6; 37.1212838 -122.1252388) to 3-poles is recommended to improve drivability. Adequate drainage could be achieved with fewer water bars than are currently in place.

On the Felton property, reopening Culvert 1 (Map Book 1 in Appendix 6; 37.047592, -122.096185) is recommended to reduce erosion and potential damage to the road. In addition, reopening the interior road with vegetation removal and road grading is recommended to improve access for future restoration treatments and wildland fire operations.

The Olympia road system is in good condition. Removal of fallen logs is recommended to maintain access. Road clearing (e.g., limbing trees) and cleaning up to 30 feet from the

road edge is recommended beginning at gate O-13 (Map Book 1 in Appendix 6; 37.0677190 -122.0522915) and continuing up to the fuel break. Vegetation thinning and removal will also be needed to maintain ingress and egress, as described in detail below.

Fire Protection

Fuelbreaks

While natural ignitions from lightning do occur in the Santa Cruz region, most ignitions are human caused (Keeley & Syphard, 2018). These human ignitions are predominately from vehicles and equipment. Surface fuel loads in the region's redwood forest type are high (17 dry short tons per acre) in addition to high tree density and vertical continuity of fuels. The ability to avoid and manage the negative effects and damage from wildfire will depend on proper treatment of forest land on SLVWD property, in addition to the road maintenance and improvements discussed above. Fuel reduction should be completed around roads (for suppression access and evacuation), along property boundaries adjacent to residential communities, and around water infrastructure (refer to the SLVWD Board approved "Post-Fire Recovery, Critical Asset Hardening, Vegetation, and Fuels Management Plan" Appendix D¹). Defensible space around water related infrastructure is covered under the SLVWD Board approved "Post-Fire Recovery, Critical Asset Hardening, Vegetation, and Fuels Management Plan" (Panorama Environmental and SIG, 2021). Shaded fuel breaks can reduce wildfire intensity and rate of spread in the event of ignition in the wildland and improve safety for firefighting and emergency personnel while engaged in fire suppression during a wildfire.

Vegetation along roads on SLVWD-owned land will be treated and maintained to improve ingress/egress and access for fire engine or wildfire emergency personnel in the event of wildfire ignition. Treatment along roadways will include reducing flammable live and dead vegetation at least 100 feet from road edge, up to 300 feet where feasible, on roads located on lands owned by SLVWD that are adjacent to known potential ingress/egress routes. Construction of fuel breaks along roadways will generally be focused along the 2.2 mile road through the Ben Lomond property, the 0.6 mile road through the Felton property, and the 1.3 mile road through the Olympia property. Vegetation thinning and maintenance along East Zayante Road is also recommended to reduce fuel loading along the road and improve ingress/egress during wildland fire suppression efforts. Alba Road on the Ben Lomond property also would benefit from roadside vegetation thinning. Responsibility for the right-of-way along this road where it parallels SLVWD property needs to be determined. The County, local Resource Conservation District (RCD), and other stakeholders will need to coordinate hazardous tree removal and fuel reduction along this road.

¹ This map book is confidential. Refer to the San Lorenzo Valley Water District for further information.

In addition to along roadsides, shaded fuelbreaks are recommended between the border of the Ben Lomond property and neighboring residential community to the west and between the border of the Felton property and neighboring residential community to the southwest. The Lockhart Shaded Fuel Break extends across the Olympia property into neighboring properties. On the Olympia property, the Lockhart Shaded Fuel Break should be maintained regularly through vegetation thinning and brushing. SLVWD should partner with neighboring landowners along the Lockhart Shaded Fuel Break and other proposed fuel reduction projects to improve the utility of the treatments.

Treatment will consist of thinning the understory vegetation and ladder fuels to create a stand structure that will help slow fire spread and reduce flame lengths (fire intensity). Vegetation removal will include pre-commercial thinning of small diameter trees. Pruning (limbing) will be conducted on larger trees or remaining smaller trees. Slashed vegetative debris, downed dead trees, and some logs will be removed and cleared. Standing dead vegetation will be removed and cleared, leaving mature, healthy trees. Hazard trees will be identified and removed. For specifications on vegetation and tree thinning and pruning, please refer to the Forest Resource section below.

Methods of treatment will consist primarily of manual and mechanical treatments (e.g., hand thinning, chipping, mastication). Vegetation removal will be conducted using hand crews due to the steep slopes. A mini excavator may be used along roads or flat areas near water facilities to remove downed logs and aid in hazard tree removals, depending upon site constraints. Along roadside and the property boundary fuelbreak, treatments will be performed with a combination of heavy equipment with cutting or masticating heads mounted on articulating arms and with power tools including chainsaws and brushcutters. Herbicide use may only be permitted on SLVWD-owned land if the contractor receives explicit permission from the SLVWD Board of Directors, which depends on type and method of application (SLVWD, 2021).

Hazard Trees

Hazardous trees that have any portion directly fall onto, roll onto, or drop branches onto SLVWD or other public or private infrastructure, access roads, trails, turnouts, gates, or roads. The general approach presented below may be considered for SLVWD to manage other hazard trees on the lands it owns in the future.

1. Retain services of a Licensed Timber Operator (LTO) who can safely fall, limb, buck, and remove (if necessary) hazard trees.
2. For trees near SLVWD and other private land boundaries, request landowner permission to enter property to assess hazard trees and their locations relative to property lines.
3. Use SLVWD owned GPS to establish property lines to degree possible given GPS accuracy and local signal.
4. Work with (local) RPF to determine if trees are considered a hazard in areas where trees may fall on SLVWD, public, or private infrastructure, trails, and roads.

5. For trees deemed a hazard by an RPF, and clearly on SLVWD lands, designate with paint and number tree, and have LTO fall/remove/process as appropriate so tree does not roll/slide from felled position in the future.
6. For trees deemed a hazard by RPF, and “borderline” in terms of location on SLVWD or private lands, obtain landowner permission/agreement to designate/mark/fell/remove/process the tree. For landowners who do not wish to have the tree removed, have prepared document they sign declining removal and indemnifying SLVWD, staff, board from all future damages from the tree falling.
7. For hazard trees identified by landowners in the future via phone, letter, email, or other communications, repeat steps 2 through 6 as needed.
8. For hazard trees on SLVWD lands that do fall and impact roadways or other infrastructure, utilize LTO obtained in step 1 to remove in coordination with local county or Caltrans resources.
9. Inspect areas of concern annually giving enough time to remove any designated hazard trees, until there are no longer any trees deemed a hazard.

Forest Resource

Reforestation

Reforestation efforts should be focused on areas of forest that were completely killed (high and moderate severity burn areas) and that will not resprout. Fire damaged Redwoods are also likely to resprout, even with near 100 percent crown scorch, as long as they do not incur substantial basal damage (Auten & Hamey, 2012). Redwood forest on SLVWD lands will likely resprout, as such stands of Douglas fir are recommended for reforestation on SLVWD lands. Areas that were dominated by tan oak that burned with high severity may be reforested, but efforts will be needed to control resprouting tan oak following replanting to allow seedlings to successfully establish. Successful and feasible reforestation will depend upon the site class, slope, and access. Refer to Figure 5 and Figure 6 (Appendix 6) for areas that could be suitable for reforestation rated by ease of reforestation based on the burn severity, slope, and forest type. Additional suitable locations for reforestation are areas that are currently forested with eucalyptus. A forester or ecologist is recommended to identify specific sites that are suitable for reforestation using the seedlings. SLVWD has ordered 500 Redwood seedlings to be used for reforestation, which will be available for planting in 2022. SLVWD land falls within California seed zone 097² (Buck, et al., 1970). These trees can be used to spot plant in areas that were burned with high severity and have high probability for planting success and survival.

² Seed zones are regions delineated by similar physiographic and climatic attributes to determine suitability of seed for a planting area. Seed zone 097 refers to North Coast Redwood series, zone 7.

The primary objective of reforestation on SLVWD lands is to maintain forest cover or reforest areas of high severity fire, as opposed to maximizing stocking density. Seedlings will generally be planted 15 to 20 feet apart at a density of approximately 100 trees per acre. Site preparation will not be utilized due to equipment limitations on steep slopes within the watershed. Areas identified as having a high probability of plant survival after planting will be preferred for reforestation. Additional areas in the CZU Complex with potential for reforestation have been identified, but need to be evaluated for current brush growth and site preparation needs.

Vegetation Thinning

Vegetation thinning will be conducted to improve stand conditions and aid in fire protection measures as described above. For details on methods and general locations of vegetation thinning, refer to the Fire Protection section above. Treatment in these areas will include thinning small diameter trees (less than 10-inches diameter at breast height (DBH) to reduce fuel loads and vertical continuity. Horizontal spacing for retention of small diameter trees should be approximately 25 feet. Given the spacing, tree density, and size class distribution of this forest type, vegetation thinning is expected to remove approximately 170 trees per acre (TPA) on average (380 TPA pre-treatment, 210 TPA post-treatment). Trees limbs will be pruned 10 feet above ground (or higher if safe and doable with equipment available) for large diameter trees (greater than 10 inches DBH) to reduce vertical fuel continuity. Given the typical tree density and size class distribution for this forest type, pruning is expected to treat approximately 110 trees per acre on average. Slashed vegetative debris will be reduced by chipping and removed. In cases where treatment extends beyond 100 feet from the road edge, slash may be piled although removal of cut material is desired. Treatments should be conducted every 12 to 15 years following initial treatment to maintain fuel break efficacy.

Access and Security

A locking access system, such as the Knox Rapid Access System (<https://www.knoxbox.com/>) or other similar type of system, will be installed for gate access to allow easier emergency access to SLVWD lands without requiring keys or cutting locks. Local fire entities will be made aware of upgrades to roads and gate access.

Recreation & Aesthetics

The aesthetic quality of fire-damaged areas will be improved through forest restoration. Forest restoration and revegetation will help restore the natural characteristics of the area with the planting of native trees and vegetation. The long-term effects of vegetation management and forest restoration will benefit the growth of healthy, native vegetation and improve the aesthetics of SLVWD-owned lands.

Soils

Soils will be conserved following the CZU Complex fire and maintained generally through various practices. Forest restoration and revegetation will reduce flood runoff risk and stabilize soils in severely burned areas. Retention of some woody debris during thinning operations will promote nutrient cycling and also serve to stabilize soils and reduce surface runoff. Enhancement of existing roads by grading and drainage improvements should limit erosion due to vehicle traffic and weather.

Streams, Wetlands and Ponds

Streams, wetlands, and ponds are maintained in their current condition or restored with the primary objectives of maintaining and improving water quality and aquatic habitats.

Wildlife

Several special-status wildlife species have a moderate potential to occur on SLVWD lands (refer to Table 4). Project activities will generally be conducted August to February avoiding nesting birds and roosting bats. If activities must occur from February to August appropriate nesting bird and/or bat surveys will be conducted (NB-1, NB-2, NB-3, NB-4, RB-1, RB-2, RB-3³; refer to Appendix 4 for the project design and implementation features). Training will include identification for avoidance of sensitive communities that provide habitats for several special-status species, such as wetlands (BIO-1⁴; refer to Appendix 4). The Mount Hermon June beetle and Zayante bandwinged grasshopper occur in sandhill habitats (Olympia property). Activities will be conducted by hand in these sandhill habitat areas based on the sensitive communities and special-status plants that have a potential to occur (BIO-2⁵; refer to Appendix 4).

Vegetation treatment and removal will target invasive, non-native, and fire-hazardous vegetation and accumulative dead biomass along the roads. Small trees and hazard trees will be removed as part of vegetation thinning and ladder fuel removal. This vegetation will grow back and be retreated as needed. Given the work will be focused on vegetation thinning and invasive plant removal, the work will not be considered major habitat alteration for the Zayante bandwinged grasshopper, and may benefit the species.

Project activities will not typically reduce ground cover to the extent that erosion and sedimentation of streams could occur. For the instances where erosion could occur, erosion control measures will be implemented (GEO-1⁶; refer to Appendix 4). Any streams that may intersect with the work areas will be avoided. Riparian woodlands may

³ Applies to fuel and vegetation treatment activities within 100-foot fuelbreaks and around water infrastructure addressed in the Notice of Exemption (refer to Appendix 4). Similar measures are anticipated to apply to other activities covered in this plan.

⁴ Ibid.

⁵ Ibid.

⁶ Ibid.

be encountered but any vegetation trimming, or thinning, will be conducted by hand and alteration to and deposition of debris avoided within the bed, channel, or bank of a waterway (BIO-2⁷; refer to Appendix 4). Reforestation is expected to reduce sedimentation into streams by capturing some rainfall from becoming surface runoff as well as limiting direct rainfall onto damaged and exposed soils. In addition, reforestation may provide habitat for terrestrial wildlife including small mammals and birds, and could increase connectivity between forested areas on SLVWD lands.

Water quality and quantity for fish and other aquatic species is expected to be enhanced through road improvements and reforestation. Road improvements will indirectly reduce or minimize the risk of sedimentation into streams through proper road construction that limits sloughing and degradation from vehicle traffic. Drainage improvements will also reduce the erosive capacity of surface runoff. Shade cover along streams will not be altered by project activities. Due to the scale and scope of the project activities, major habitat alteration of coho salmon or steelhead habitat will not occur. Significant impacts on special-status wildlife species are not anticipated.

Invasive Species and Pests

Invasive and Non-Native Species

Manual and mechanical methods will be used for the removal of non-native, invasive species throughout SLVWD-owned lands. Primary species of interest for removal are Eucalyptus (*Eucalyptus globulus*) and French broom (*Genista monspessulana*). Herbicide use may only be permitted on SLVWD-owned land if the contractor receives explicit permission from the SLVWD Board of Directors, which depends on type and method of application (SLVWD, 2021). Herbicides may be applied for spot treatments or on cut stumps and in accordance with the SLVWD Integrated Pest Management Policy (IPMP) (SLVWD, 2021). SLVWD has banned the use of glyphosate on SLVWD-owned lands. Herbicide treatment would require approval from the SLVWD Board of Directors prior to application.

Sudden Oak Death

Sudden Oak Death (SOD) is a prevalent disease within forested lands. SOD has killed over one million native oak and tan oak trees and infests many other forest species in one Oregon and 15 coastal California counties. SOD is confirmed to be present with the Santa Cruz mountains as shown in (COMTF, 2019). A comprehensive survey for SOD has not been conducted in Santa Cruz County, but small, local surveys have been conducted referred to as SOD blitzes. Based on recent data collected in 2020 in Santa Cruz County and across California, levels of SOD infections in coastal, cooler areas in

⁷ Ibid.

Santa Cruz County are remaining stable, whereas SOD is spreading more than predicted based on rainfall in warmer slightly inland areas (UC Berkeley, 2021).

SLVWD-owned lands have not been surveyed for SOD (SLVWD, 2009). SOD is present at several of the sites on SLVWD land that were visited in 2020 and 2021. The disease was most evident in tan oak (*Notholithocarpus densiflorus*) individuals less than 6 inches in diameter. Some standing dead trees greater than 12 inches in diameter may be present on the proposed treatment sites as a result of SOD.

The latest appropriate standard measures recommended by the California Oak Mortality Task Force will be implemented during treatments to prevent the spread of SOD. In addition, in areas of SLVWD-owned lands that burned in the CZU Complex, smaller trees including SOD-affected oak and bay trees, experienced high mortality. Studies are underway regarding to what extent SOD survives wildfire.

Air Resources

SLVWD-owned lands burned by the CZU Complex may be treated using prescribed burning to maintain low surface fuels over time. For lands owned by SLVWD outside of the CZU Complex, such as the sandhills area, prescribed fire may be used in collaboration with CAL FIRE, in a manner consistent with existing management guidelines (McGraw, 2020).

Pile burning may be used for disposal of cut material depending upon the conditions of the work area. A permit for pile burning of vegetative debris disposal will be obtained from CAL FIRE. Burning will emit air pollutants including particulate matter. No more than 20 piles of debris⁸ will be burned in a single day, which will ensure that the pile burning and any ongoing treatment activities will not exceed the Monterey Bay Air Resources District (MBARD) significance thresholds. Prescribed burning and pile burning will be conducted by a qualified professional in accordance with the burn permit and standard industry practices including the California Forest Practice Rules. In addition, prescribed burning will require SLVWD Board of Director approval prior to burning.

Climate Considerations and Carbon Sequestration

The majority of SLVWD lands within the CZU Complex generally burned with low severity, though portion of the CZU complex resulted in high severity fire and high tree mortality, particularly of Douglas-fir and tan oak stands. Reforestation of these areas using locally derived seed from native conifer and hardwood species may enhance long term carbon sequestration.

⁸ Assuming 10-foot-wide by 6-foot-high parabolic piles of shrub/hardwood vegetation or equivalent (Urbanski, 2014; USFS, 2021).

Long term fuels reduction on the property, including the use of density reduction, surface fuel cleanup, prescribed fire, pruning, and chipping may mitigate future wildfire carbon emissions.

Vegetation Unit Descriptions

Four distinct vegetation units are present on SLVWD lands: redwood/Douglas-fir forest (3,262 acres), hardwood woodland (195 acres), shrub (40 acres), and herbaceous (2 acres). The properties are predominantly conifer forests, although the Olympia property has a more even mix of hardwoods, shrubs, and herbaceous cover. The conifer forest type is almost exclusively dominated by redwood with some small patches where Douglas-fir is more common. Given the prevalence of this forest type, available data, and requirements of the plan, the redwood forest vegetation type is described in further detail below. Hardwood woodlands include mostly oak, tan oak, and madrone and shrublands are predominately manzanita. Much of these vegetation units are recently burned with mixed severity. In high severity areas on steep slopes, there is potential for erosion. Shrub and herbaceous vegetation units within the Olympia property may contain sensitive species due to underlying Zayante sand soil. Vegetation units are managed for production of reliable and clean drinking water.

Redwood Forest Type

Redwood vegetation units are predominantly composed of redwood with tan oak, Douglas fir, and madrone often present. Trace presence of big-leaf maple, California live oak, and California laurel also occur in this forest type. Due to logging in the 19th and early 20th century, redwood stands on SLVWD property are around 100 years in age. Additional harvests were conducted up until the 1970's. Within the SLVWD owned properties, this vegetation unit occurs mostly on moderate to steep (>35%) slopes at elevations ranging from 600 to 2,400 feet. Site index in these stands range from 127 to 180. Typical tree density is around 380 trees per acre, ranging from 120 to 500 trees per acre. Average basal area of these stands is 380 ft²/acre with a range of 70 to 570 ft²/acre between poorly stocked and overstocked stands. Size class distribution follows a standard J-shape distribution with a long right tail. Over 50 percent of all trees in these stands are in the smallest diameter classes (1 to 4.9 inches DBH) and nearly 2 percent are greater than 41 inches DBH. In general, these stands could be improved through understory thinning either by mechanical and/or prescribed fire methods. Redwoods can regenerate from basal sprouts and, when damaged from fire, from epicormic sprouts as well. Estimates of stand density were obtained from the PNW-FIA database (USDA Forest Service, 2021).

Planned Management Activities/Projects

Treatment of post-fire environments, particularly areas that burned with high severity, can greatly influence the trajectory of the vegetation and landscape. In addition, delayed action can increase costs of management activities as heavy fuel load and shrub cover increase (Collins and Roller 2013). Conifer forests that experience moderate to high severity fire are also at a greater risk of high severity fire during a subsequent reburn due to an increase in standing snags and shrub vegetation (Coppoletta et al. 2016). Given the increasing incidence of large fires in the western U.S. (Dennison et al. 2014), SLVWD lands are at risk of reburning at high severity. Preparations for a subsequent fire, including fuel breaks and improved ingress/ egress for emergency vehicles, can help limit the extent and damage to SLVWD lands. Conducting these treatments in a timely manner can lower the overall cost of the operations. The following projects summarized in Table 5 were selected to limit the damage caused by the CZU Complex and prepare for future wildfire while meeting other management objectives and constraints of SLVWD.

SLVWD partnered with the RCD of Santa Cruz County to begin reforestation on portions of the high burn severity areas as well as remove and reforest some areas of eucalyptus on SLVWD lands starting in 2022. These reforestation actions will be funded by the CAL FIRE Forest Health Grant. SLVWD also ordered 500 Redwood seedlings to be used for reforestation. Additional reforestation efforts are anticipated to be needed to complete these two projects (numbers 4 and 5 in Table 5).

Projects may be completed sooner than listed depending on staffing, contractors, funding availability, and limited operating periods (LOPs). Cost estimates assume treatment costs of up to \$5,000 per acre for roadside and property-line fuelbreak creation and may be higher or lower based on contractor bids. Costs do not account for any permitting, environmental resource surveying, or environmental review that may be needed. Potential funding sources include the CAL FIRE CFIP and Fire Prevention Grant for fuelbreak projects, the CAL FIRE CFIP and Forest Health Grant for reforestation projects, and the NRCS Environmental Quality Incentives Program (EQIP) for roadbed and culvert improvement projects.

Table 5 Higher Priority Projects for the Next 5 Years

Description	Acres	Start Date	End Date	Estimated Project Cost
1. Ben Lomond Mountain Watershed Property Roadway Fuelbreak				
Creation of a 100-foot-wide fuelbreak along either side of the 2.2-mile road through the Ben Lomond Mountain Watershed Property.	33.4	~2021	~2024	\$167,000.00
2. Felton Empire Grade Watershed Property Roadway Fuelbreak				
Creation of a 100-foot-wide fuelbreak along either side of the 0.6-mile road through the Felton Empire Grade Watershed Property.	12.7	2021	~2024	\$64,100.00
3. Olympia Property Roadway Fuelbreak				
Creation of a 100-foot-wide fuelbreak along either side of the 1.3-mile road through the Olympia Property.	20.0	2021	~2024	\$105,000.00
4. Reforestation of High Burn Severity Areas				
Reforest areas that suffered high burn severity with native trees and species	170	2022	2022	\$357,000.00
5. Eucalyptus Removal/Limbing and Reforestation				
Remove eucalyptus from SLVWD-owned lands and reforest with native trees and species	12	2022	2025	\$48,000.00
6. Ben Lomond Mountain Watershed Property Roadbed Improvement				
Grading and waterbar removal on the 2.2-mile road through the Ben Lomond Mountain Watershed Property. Grading and drainage improvements on Peavine and Foreman Creek roads	2.6 mi	2022	2023	\$12,000
7. Felton Empire Grade Property Drainage Improvements				
Reopen Culvert 1 on Felton Empire Grade Watershed property	1 Unit	2022	2022	\$1000

Potentially Required Permits

The following table provides the potential approvals and permitting requirements that could be required for the vegetation management and infrastructure projects proposed in this plan. Vegetation management may require compliance with various environmental requirements, particularly pertaining to natural resources and water quality protection. At the federal and State levels, the vegetation and fuels treatments may require compliance with the Clean Water Act, and the Endangered Species Act, for example. At the local level, the treatments included in this plan may need to comply with local policies and regulations.

Agency	Approval or Notification	Specific Activity
U.S. Army Corps of Engineers	Clean Water Act, Section 404, Nationwide Permit 14	Impacts to jurisdictional waters of the U.S., such as for stream crossings for equipment or infrastructure.
U.S. Fish and Wildlife Service	Endangered Species Act Biological Opinion and Take Authorization	If any activities could result in take of a threatened, endangered, or candidate species.
California Department of Fish and Wildlife	1602 Streambed Alteration Agreement	For impacts to riparian areas or any stream crossings.
	2081 Incidental Take Permit or Consistency Determination	If any activities could result in the death of a state listed species.
California Department of Transportation	Encroachment permits	For encroachment on Caltrans right-of-way (e.g., vegetation removal adjacent to Highway 9).
California Department of Forestry and Fire Protection	Burn Permit	For any prescribed burn activities.
Monterey Bay Air Resources District	Smoke Management Plan and Smoke Management Permit	For any prescribed burn activities over 10 acres.
	For any prescribed or pile burn activities.	Prescribed Burn Permit
San Francisco Regional Water Quality Control Board or Monterey Regional Water Quality Control Board	Section 401 Water Quality Certification	If a Section 404 permit is needed.
	National Pollutant Discharge Elimination System (NPDES) General Permit	For ground disturbing impacts over 1 acre in size.
	Waste Discharge Requirement	For impacts to waters of the state that are not waters of the U.S.

Agency	Approval or Notification	Specific Activity
Santa Cruz County Public Works and Planning Departments	Significant Tree Removal Permit	For impacts on trees, sprout clump, or group of trees

California Environmental Quality Act (CEQA) and National Environmental Protection Act (NEPA)

Forest management activities including conservation practices may impact special environmental and/or cultural values such as threatened or endangered species and archaeological sites. Landowners need to know their locations and what they can do to protect them. Environmental and cultural reviews by regulatory agencies are required when a ground practice is proposed, and a permit and/or government assistance becomes part of the project. A Notice of Exemption (NOE) was prepared for a selection of fuel and vegetation thinning projects on SLVWD-owned and easement lands. Refer to Appendix 4 for the NOE.

Additional CEQA/NEPA Notification for Ground Practices

Any future ground practice to implement this plan using public entity reimbursement funds requires a signed CAL FIRE CFIP Environmental Checklist, to comply with CEQA, to comply with NEPA. The checklist must be filled out by an RPF or Certified Planner.

Along with this checklist a process of “discovery” or survey for unknown values along with a discussion of possible mitigations is required. The site specific environmental/cultural documentation will need to be completed with the schedule of activities, project map and project specifications.

As part of the above process, project notification must be provided to the following Agencies:

- County Planner
- CA Department of Fish and Wildlife
- Regional Water Quality Control Board
- If the project adjoins public land (for example, the US Forest Service, US Fish and Wildlife Service, BLM, National, State, or local parks, etc.) notify that agency
- If the project adjoins a State Highway, notify CALTRANS
- If the project is in the Coastal Zone, notify the Coastal Commission

If the project will cause ground-disturbance, notification must also be provided to:

- Native American Heritage Commission
- Tribal contacts
- Local Historical Society

Additional Professional Assistance

Several agencies and individuals were consulted during identification of recommendations for SLVWD lands.

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References

- Auten, S. R., & Hamey, N. (2012). Damage and mortality assessment of redwood and mixed conifer forest types in Santa Cruz County following wildfire. Forest Service, Pacific Southwest Research Station. Albany, CA: US Department of Agriculture.
- Blanchard, C. (2020, July 10). Environmental Planner. (C. Gilleran, Interviewer)
- Buck, J. M., Adams, R. S., Cone, J., Conkle, T. M., Libby, W. J., Eden, C. J., & Knight, M. J. (1970). California Tree Seed Zones.
- CAL FIRE. (1981). Chaparral Management EIR.
- CalFIRE and RCD. (2018, April). Santa Cruz county. San Mateo County Community Wildfire Protection Plan.
- CDFG. (2003). List of California Terrestrial Natural Communities.
- CDFW. (2021, June). California Natural Diversity Database (CNDDB) Rarefind Program. Sacramento, CA: California Department of Fish and Wildlife.
- CNPS. (2021). Electronic Inventory of Rare and Endangered Vascular Plants of California, Database search for Marin County and surrounding quadrangles. C. Sacramento CA: CNPS.
- Collins, B. M., & Roller, G. B. (2013). Early forest dynamics in stand-replacing fire patches in the northern Sierra Nevada, California, USA. *Landscape Ecology*, 28(9), 1801-1813.
- Coppoletta, M., Merriam, K. E., & Collins, B. M. (2016). Post-fire vegetation and fuel development influences fire severity patterns in reburns. *Ecological applications*, 26(3), 686-699.
- Coats, W. (2014). UC Cooperative Extension Centennial: Eucalyptus fuel dynamics, and fire hazard in the Oakland hills. *California Agriculture*, 63(3), 91-91.
- COMTF. (2019). Sudden Oak Death Maps. Retrieved from Retrieved from California Oak Mortality Task Force: <http://www.suddenoakdeath.org/maps-media/maps/>
- Dennison, P. E., Brewer, S. C., Arnold, J. D., & Moritz, M. A. (2014). Large wildfire trends in the western United States, 1984–2011. *Geophysical Research Letters*, 41(8), 2928-2933.
- Hickman, J. (1993). *The Jepson Manual Higher Plants of California*. Berkeley: University of California Press.
- Keeley, J. E., & Syphard, A. D. (2018). Historical patterns of wildfire ignition sources in California ecosystems. *International Journal of Wildland Fire*, 27, 781-799.
- Kerchner, C. D., & Keeton, W. S. (2015). California's regulatory forest carbon market: Viability for northeast landowners. *Forest Policy and Economics*, 70-81.
- McGraw, J. (2020, June). Olympia Conservation Area Habitat Management and Monitoring Plan.
- NC State. (2019, July). An Introduction to Forest Carbon Offset Markets. Retrieved from <https://content.ces.ncsu.edu/an-introduction-to-forest-carbon-offset-markets>
- NOAA. (2021). Essential Fish Habitat Online Mapper.
- NPS. (2021, July 1). Exploring the Fire and Archaeology Interface. Retrieved from <https://www.nps.gov/archeology/sites/npsites/fire.htm>

- Panorama Environmental and Spatial Informatics Group (SIG). 2021. The Post-Fire Recovery, Critical Asset Hardening, Vegetation, and Fuels Management Plan. 82 pages
- Podlech, M. (2019). Fisheries Resource Considerations for the San Lorenzo River Watershed Conjunctive Use Plan.
- SLVWD. (2009, May 11). San Lorenzo Valley Water District. Watershed Management Plan.
- SLVWD. (2020, June). Olympia Conservation Area. Habitat Mangement and Monitoring Plan.
- SLVWD. (2021). San Lorenzo Valley Water District Integrated Pest Management Policy.
- Stebbins, R. (2003). A field guide to western reptiles and amphibians. Third edition. New York, New York: Houghton Mifflin Company.
- UC Berkeley. (2021). SOD Blitz 2021 Results and Map. Retrieved from <https://nature.berkeley.edu/matteolab/?pageid=148>
- Urbanski, S. (2014). Wildland fire emissions, carbon and climate: Emission factors.
- USDA Forest Service. (2021, November). Forest Inventory and Analysis Program. Retrieved from Forest Inventory EVALIDator web application Version 1.8.0.01: <https://apps.fs.usda.gov/Evalidator/evaluator.jsp>
- USFS. (2021, May). Final Critical Habitat for Threatened and Endangered Species online mapper.
- USFS. (2021). Fuel and Fire Tools (FFT). Retrieved from <https://www.fs.usda.gov/pnw/tools/fuel-and-fire-tools-fft>
- Whaley, D. R. (2017). From Flume to Rails, The Early Years of The Boulder Creek Branch, 1875 to 1906. Presentation hosted by the San Lorenzo Valley Museum. Retrieved from The Early Years of The Boulder Creek Branch, 1875 1906.: <https://www.youtube.com/watch?v=Dhu6U9soOlo>