

**KESWICK BASIN
COMMUNITY WILDFIRE PROTECTION PLAN
2009**



**Prepared By
Western Shasta Resource Conservation District**

**Funded by
California Fire Safe Council**

**Funding provided by
Bureau of Land Management**

KESWICK BASIN
COMMUNITY WILDFIRE PROTECTION PLAN

SIGNATURE BLOCK

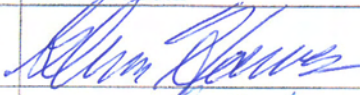
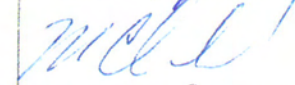
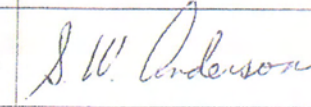
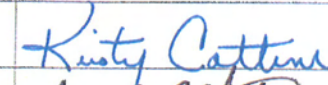
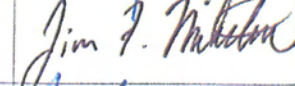
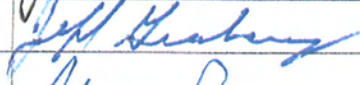
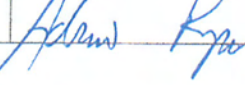
NAME	SIGNATURE	ORGANIZATION	DATE
Glenn Hawes		Chairman, Shasta County Board of Supervisors	11/10/09
Mike Chuchel		Unit Chief, C Shasta-Trinity Unit and County Fire Warden, Shasta County Fire Department	10/5/09
Steve Anderson		Field Manager, Bureau of Land Management, Redding Field Office	9-15-09
Kristy Cottini		District Ranger, U.S.D.A. Forest Service, Shasta Ranger Station	9-29-09
Jim Milestone		Superintendent, National Park Service, Whiskeytown National Recreation Area	9-15-09
Jeff Granberry		Redding Fire Department	9-16-09
Adrian Rogers		Shasta Lake Fire Protection District	9-23-09

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PLANNING PROCESS

This Document shall be known as the **KESWICK BASIN COMMUNITY WILDFIRE PROTECTION PLAN.**

Step 1 – Convene the decision makers for this Community Wildfire Protection Plan:

- Local Government: Shasta County, Shasta Lake Fire Protection District, Redding Fire Department, Shasta County Fire Department (includes Keswick Volunteer Fire Company #53, CSA#1), Shasta Fire Protection District
- CAL FIRE
- Bureau of Land Management
- National Park Service
- USDA Forest Service

The decision makers or their representatives were invited on March 3, 2009 to participate on the Technical Advisory Committee (TAC) in the development of this plan.

Step 2 - Federal Agencies Involved:

Representatives of the Federal agencies managing land or having operations in the vicinity of the communities are:

Agency	Agency Head Invited	Representative	Date Invited to Participate
USDA Forest Service	Kristi Cottini	Ernst L. Little	March 3, 2009
Bureau of Land Management	Steve Anderson	Tim Bradley/Jeremy Strait	March 3, 2009
National Park Service	Jim Milestone	George Chapman	March 3, 2009
US Fish and Wildlife Service	Jim Smith	Miriam Morrill	March 3, 2009
Bureau of Indian Affairs	Director	Did not respond	March 3, 2009
Local Tribal Governments	Mark Franco/Vivian Martinez	Did not respond	March 3, 2009
Bureau of Reclamation	Brian Person	Don Reck	March 3, 2009
Natural Resources Conservation Service	Bob Bailey	Melinda Graves	March 3, 2009
US Fish and Wildlife Service	Meriam Morrill	Dale Shippelhoute	March 3, 2009

Step 3a – State and Local Agencies Involved:

The representatives of the state and local agencies that have jurisdictional responsibilities in the vicinity of the communities are:

Agency	Agency Head Invited	Representative	Date Invited to Participate
Shasta County Supervisors	Glenn Hawes	Leonard Moty	March 3, 2009
California Department of Fish and Game	Daniel Fitzpatrick	Declined	March 4, 2009
CAL FIRE	J.T. Zulliger	Terry Stinson	March 3, 2009
Shasta County Fire Department	Mike Chuchel	Terry Stinson	March 3, 2009
Cal Trans	John Dobson	John Dobson	March 3, 2009
Department of Water Resources	Fraser Sime	Declined	March 3, 2009
Redding FD	Jeff Granberry	Jeff Granberry	March 3, 2009
Shasta Lake Fire Protection District	Adrian Rogers	Adrian Rogers/Charles Dahlen	March 3, 2009
Shasta Fire Protection District	Mark Todd	Mark Todd	March 3 2009

Step 3b – Engage Interested Parties:

The parties from our community that have shown interest in forest/fire management or may be interested in the content of this Strategic Fuels Reduction Plan are:

Interested Parties		Date Invited to Participate
South Lake Shasta Fire Safe Council	Richard van Wyhe, Chairman	March 4, 2009
Shasta County Fire Safe Council	Richard van Wyhe, vice Chairman	March 4, 2009
City of Shasta Lake	Greg Watkins, Councilman	Late March, 2009
PG&E	Declined	March 3, 2009
U.C. Cooperative Extension	Declined	March 3, 2009

Step 4 – Establish a Community Base Map (Map 1):

Detailed on the map are:

- The inhabited areas at potential risk to wildland fire including the communities of Keswick, Northwest Redding, City of Shasta Lake, Buckeye, and numerous individual residences in Shasta County within the planning area boundaries. Natural and man-made features have been used to define the planning area boundary on the map (e.g. highways, streets, ridgelines, rivers, etc.)
- Areas containing critical human infrastructure, such as escape routes, municipal water supplies, power or communication structures including Shasta Dam, WAPA, PG&E, City of Shasta Lake, and Redding Electrical Utility transmission lines and substations, Keswick Community Services District infrastructure, and Toyon Learning Center.
- Areas of community importance include: Whiskeytown National Recreation Area, Old Shasta State Park, Keswick Volunteer Fire Company Station #53, CAL FIRE Station #58, Chappie OHV Areas facilities, and public shooting ranges, Centimudi Bay Marina.

After considering the location of the inhabited areas, the critical human infrastructure, and the risk of wildfire, the community has identified a wildland – urban interface (WUI) zone around the community assets, which in general includes the area within 1 mile from the community or structure. Details can be found on Maps 9-11.

Steps 5 & 6 -- TAC RISK ASSESSMENT RESULTS:

BASIC ASSUMPTIONS	
West of Sacramento River	
People	2.3 per dwelling
Dwellings	154
Property Value (\$130,000 per dwelling)	\$20,200,000
Spring Creek power lines – miles @ \$250,000/mile	\$357,500
BLM boat ramp facilities	\$1,700,000
East of Sacramento River	
People	2.3 per dwelling
Dwellings	895

Property Value (Varies per area) Shasta Co./City of Shasta Lake (96019) -- (\$199,000/dwelling) Shasta Co./Redding (96003) -- (\$207,000/dwelling)	\$180,094,158
Schools (Toyon)	\$20,000,000
WAPA power line – 27.54 miles @ \$250,000/mile	\$6,885,000
City of Shasta Lake power lines – 2.07 miles @ \$518,519/mile	\$1,400,000
City of Shasta Lake substation	\$4,850,000

Following are the Technical Advisory Committee’s Prioritized Areas of Concern and Proposed Solutions. Details can be found on Maps 9-11.

WEST OF THE SACRAMENTO:

- **KESWICK:** Community of Keswick and adjacent area to the Sacramento River and south to the Keswick Dam Road

#1 Concern – Lack of Defensible Space in Keswick community.

Proposed Solution: Encourage the development of a defensible space/Firewise Program for the community of Keswick

Ownership = 99 % private land
 Number of dwellings = 142
 Value of dwellings = \$18,460,000
 Number of people = 327

#2 Concern – Iron Mountain Road

Proposed Solution: Construct shaded fuel breaks along the Iron Mountain Road from Keswick Dam Road north for 1.16 miles to South Spring Creek, 100 ft. on each side of the road = 28.2 ac. treated.

Right of Way Ownership = 99 % private land
 Number of dwellings = 150
 Value of dwellings = \$19,500,000
 Number of people = 345

#3 Concern: Keswick Dam Road

Proposed Solution: Shaded fuel break along Keswick Dam Road from Iron Mountain Road east, 1.1 miles x 100 ft¹. on each side = 26.7 ac. treated.

Right of Way Ownership = 82% Private, 18% Public

Number of dwellings = 150 (#1 above plus 8 scattered along Keswick Dam Road)

Value of dwellings = \$19,500,000

Number of people = 345

#4 Concern: East of Keswick

Proposed Solution: Fuel break from Spring Creek power station east along the powerline to Core Way, then cross country southwesterly to North Street, .20 miles x 300 ft. = 7.28 acres.

Ownership = 99 % private land

Number of dwellings = 142

Value of dwellings = \$18,460,000

Number of people = 327

#5 Concern: North Street

Proposed Solution: Shaded fuel break along North Street from the intersection with the Iron Mountain Road to the intersection with Keswick Dam Road, 1.06 miles x 100 ft. on each side = 25.7 acres.

Ownership = 99 % private land

Number of dwellings = 150

Value of dwellings = \$19,500,000

Number of people = 345

#6 Concern: Market Street

Proposed Solution: Shaded fuel break along California Street south from Wright Street to intersection with North Street, east to Market Street, then south to Iron Mountain Road, .53 miles x 100 ft. on each side = 12.9 acres.

Ownership = 99 % private land

Number of dwellings = 142

Value of dwellings = \$18,460,000

¹ Where access is good for any given shaded fuel break, the width of the shaded fuel break may be more than 100 feet, particularly if meeting other objectives.

Number of people = 327

- **NORTH KESWICK:** Remainder of Keswick Basin west of the Sacramento River.

#1 Concern – Iron Mine Road

Proposed solution: Construct shaded fuel breaks along the Iron Mountain Road from South Spring Creek to Iron Mountain Mine gate, 3.9 miles x 100 feet on each side = 96 acres treated.

Right of Way Ownership = 59% Private, 41% Public

Number of dwellings = 4

Value of Dwellings = \$520,000

Number of people = 9

#2 Concern – BLM boat ramp road

Proposed solution: Construct shaded fuel breaks along BLM boat ramp road, .34 miles X 100 feet on each side = 8.25 acres treated.

Right of Way Ownership – 100% Public

Number of dwellings = 0

Number of people = 0

BLM boat ramp facilities: \$1,700,000

EAST OF THE SACRAMENTO RIVER:

- **AREAWIDE:**

#1 Concern – Lack of defensible space around residences

Proposed Solution: Encourage the development of Firewise Programs/defensible space in the following neighborhoods:

- Toyon: 137 residences
- Buckeye St./Montego: 107
- Flanagan Road: 39 residences
- Yellow Pine Avenue: 20 residences
- Walker Mine Road East: 57 residences
- Walker Mine West: 22 residences
- Williamson Road/Bailey Road: 111 residences
- Mac's Road: 152 residences
- Quartz Hill: 144 residences
- Keswick Dam road: 77 residences

- Eastshore: 29 residences

Right of Way ownership = 100 % private land
 Number of dwellings = 895
 Value of dwellings = \$180,094,158
 Number of people = 2059

- **CENTIMUDI:** Area north and east of Highway 151 to Shasta Lake

#1 Concern – Lake Boulevard north of intersection with Shasta Dam Boulevard.

Proposed Solution: Construct shaded fuel breaks along Lake Boulevard north from Shasta Dam Boulevard, 1.1 miles x 100 feet on each side = 35 acres treated.

Right of Way ownership = 100% Private (Lake Boulevard)
 Number of dwellings = 59
 Number of people = 136
 Value of dwellings = \$11,144,000
 Toyon school structures = \$20,000,000

#2 Concern – Highway 151

Proposed solution: Construct shaded fuel breaks along Highway 151 from intersection with Lake Boulevard to BOR parking lot, 3.8 miles x 100 feet on each side = 93 acres treated.

Right of Way ownership = 26% Private, 74% Public (Hiway 151)
 Number of dwellings = 9
 Number of people = 21
 Value of dwellings = \$1,791,000
 School structures = \$20,000,000

- **FLANAGAN:** Area north from Walker Mine Road and west of Highway 151 to Lake Shasta.

#1 Concern -- Walker Mine Road

Proposed Solution: Construct shaded fuel breaks from the BLM gate east along Flanagan Road to Lake Boulevard, 1.2 miles x 100 feet on each side = 30 acres treated.

Right of Way ownership = 83% Private, 17% BLM

Number of dwellings = 28
Number of people = 65
Value of dwellings = \$5,572,000

#2 Concern – Yellow Pine Avenue

Proposed solution: Construct shaded fuel breaks along Yellow Pine Avenue east to Beltline Road, .6 miles x 100 feet on each side = 15 acres treated.

Right of Way ownership = 100% Private
Number of dwellings = 17
Number of people = 40
Value of dwellings = \$3,383,000

#3 Concern – Glorfield Trail

Proposed solution: Maintain Glorfield Trail for escape and firefighting purposes only from Beltline Road east to Lake Boulevard, .3 miles x 100 feet on each side = 8 acres treated.

Right of Way ownership = 100% Private
Number of dwellings = 3
Number of people = 7
Value of dwellings = \$597,000
Powerline = \$362,250
Substation = \$4,850,000

#4 Concern – Beltline Road

Proposed solution: Construct shaded fuel breaks along Beltline Road from COS powerline to end of road north of Walker Mine Road 1.33 miles x 100 feet on each side = 32.7 acres treated.

Right of Way ownership = 100% Private
Number of dwellings = 20
Number of people = 46
Value of dwellings = \$3,980,000

#5 Concern – Lake Boulevard

Proposed solution: Construct shaded fuel breaks along Lake Boulevard north from the Walker Mine Road to the intersection of Highway 151 and Lake Boulevard 2.02 miles x 100 feet on each side = 49 acres treated.

Right of Way ownership = 100% Private
Number of dwellings = 96
Number of people = 221
Value of dwellings = \$19,104,000

#6 Concern – WAPA powerlines

Proposed solution: There is no proposed solution within the Keswick Basin CWPP. WAPA routinely reduces fuel within the powerline easement commensurate with what the landowner will allow.

Miles of powerline = 12.33
Value of power lines = \$3,082,500

- **WALKER MINE ROAD:** Area from Bailey Road north to Walker Mine Road

#1 Concern – Walker Mine Road

Proposed solution: Construct and maintain shaded fuel breaks along Walker Mine Road from OHV parking area east to Lake Boulevard, 3.1 miles x 100 feet on each side = 75 acres treated.

Right of Way ownership = 63% Private, 37% BLM
Number of dwellings = 44
Number of people = 102
Value of the dwellings = \$8,756,000

#2 Concern – Williamson Road

Proposed solution: Construct shaded fuel breaks along Williamson Road from the Walker Mine Road south to Lake Boulevard, .7 miles x 100 feet on each side = 17 acres treated.

Right of Way ownership = 63% Private, 37% BLM
Number of dwellings = 78
Number of people = 180
Value of the dwellings = \$1,552,200

#3 Concern – Johnson Road

Proposed solution: Construct shaded fuel breaks along Johnson Road from Williamson Road west, .11 miles x 100 feet on each side = 2.7 acres treated.

Right of Way ownership = 100% Private

Number of dwellings = 7
Number of people = 17
Value of the dwellings = \$1,393,000

#4 Concern – Western Way

Proposed solution: Construct shaded fuel breaks along Western Way from Williamson Road west, .22 miles x 100 feet on each side = 5.4 acres treated.

Right of Way ownership = 100% Private
Number of dwellings = 8
Number of people = 19
Value of the dwellings = \$3,781,000

#5 Concern – Lake Boulevard

Proposed solution: Construct shaded fuel break along Lake Boulevard north from Williamson Road to Walker Mine Road, .69 miles x 100 feet = 16.7 acres treated.

Right of Way ownership = 88% Private, 12% BLM
Number of dwellings = 82
Number of people = 189
Value of the dwellings = \$16,318,000

#6 Concern – WAPA Powerlines

Proposed solution: There is no proposed solution within the Keswick Basin CWPP. WAPA routinely reduces fuel within the powerline easement commensurate with what the landowner will allow.

Miles of powerline = 1.74
Value of power lines = \$435,000

- **QUARTZ HILL NORTH:** Area from Quartz Hill Road north to Bailey Road and east of Old Diggins Road.

#1 Concern—Bailey Road

Proposed Solution: Construct shaded fuel breaks from the west end of Bailey Road east to Lake Boulevard, .9 miles x 100 feet on each side = 22 acres treated.

Right of Way ownership = 100 % Private

Number of dwellings = 12
Number of people = 28
Value of dwellings = \$2,484,000

#2 Concern – Mac’s Road

Proposed Solution: Construct shaded fuel breaks from the west end of Mac’s Road east to Lake Boulevard, .6 miles x 100 feet on each side = 15 acres treated.

Right of Way ownership = 100 % Private
Number of dwellings = 57
Number of people = 131
Value of dwellings = \$11,799,000

#3 Concern – WAPA Powerlines

Proposed solution: There is no proposed solution within the Keswick Basin CWPP. WAPA routinely reduces fuel within the powerline easement commensurate with what the landowner will allow.

Miles of powerline = 2.73
Value of power lines = \$682,500

- **QUARTZ HILL SOUTH:** Area south and east of Quartz Hill Road to Keswick Dam Road.

#1 Concern— Quartz Hill Road

Proposed solution: Construct shaded fuel breaks from the Old Diggins road east along the Quartz Hill Road to Lake Boulevard, 1.4 miles x 100 feet on each side = 34 acres treated.

Right of Way ownership = 79% Private, 21% BLM
Number of dwellings = 90
Number of people = 207
Value of structures = \$18,630,000

#2 Concern – Keswick Dam Road

Proposed solution: Construct shaded fuel breaks along Keswick Dam Road from Quartz Hill Road to Lake Boulevard, 1.5 miles x 100 feet on each side = 37 acres treated.

Right of Way ownership = 80% Private, 20% BLM
Number of dwellings = 40
Number of people = 92
Value of structures = \$8,280,000

#3 Concern – WAPA Powerlines

Proposed solution: There is no proposed solution within the Keswick Basin CWPP. WAPA routinely reduces fuel within the powerline easement commensurate with what the landowner will allow.

Miles of powerline = 2.88
Value of power lines = \$720,000

- **EASTSHORE DRIVE:** Area from Keswick Dam Road north to end of Bailey Road and west of Quartz Hill Road

#1 Concern – Macleod Road

Proposed Solution: Construct shaded fuel breaks along McLeod Road to Quartz Hill Road, .3 miles x 100 feet on each side = 8 acres treated.

Right of Way ownership = 100% Private,
Number of dwellings = 6
Number of people = 14
Value of dwellings = \$1,242,000

#2 Concern – Spring Creek Road

Proposed solution: Construct shaded fuel breaks along Spring Creek Road to Quartz Hill Road, .3 miles x 100 feet on each side = 8 acres treated.

Right of Way ownership = 100% Private
Number of dwellings = 14
Number of people = 32
Value of dwellings = \$2,898,000

#3 Concern – Keswick Dam Road

Proposed solution: Construct shaded fuel breaks along Keswick Dam Road, .8 miles x 100 feet on each side = 20 acres treated.

Right of Way ownership = 37% Private, 63% BOR
Number of dwellings = 5

Number of people = 12
Value of dwellings = \$1,035,000

#4 Concern – Dense underbrush between Keswick Lakes subdivision and the Sacramento River.

Proposed Solution: Conduct biomass thinning in the area between Sacramento River and Keswick Estates to reduce fire threat to Keswick Estates. 75 acres treated.

Right of Way Ownership 37% Private, 63% BOR
Number of dwellings = 55
Number of people = 12
Value of dwellings = \$11,385,000

- **KESWICK DAM ROAD SOUTH:** Area south of Keswick Dam Road and west of Buenaventura Boulevard to the Sacramento River.

#1 Concern – Buenaventura Boulevard

Proposed Solution: Construct shaded fuel break on westside of Buenaventura Boulevard south from Keswick Dam Road, .2 miles x 100 feet on each side = 3 acres treated.

Right of Way ownership = 100% BLM
Number of dwellings = 0
Number of people = 0
Value of structures = \$0

#2 Concern – WAPA Powerlines

Proposed solution: There is no proposed solution within the Keswick Basin CWPP. WAPA routinely reduces fuel within the powerline easement commensurate with what the landowner will allow.

Miles of powerline = 7.86
Value of power lines = \$1,965,000

Step 5a – Develop a Community Risk Assessment:

As designated on the base map by the Technical Advisory Committee, the following tables list the associated wildfire risk, as viewed by these committee members. The Fire Hazard Severity Zone Rating column reflects the CAL FIRE statewide rating system.

AREAWIDE:

DEFENSIBLE SPACE AND FIREWISE PROGRAMS

Community, structure or area at risk	Fuel Hazard	Risk of Wildfire Occurrence	Structural Ignitability	Preparedness and Firefighting Capability	Overall Risk	Fire Hazard Severity Zone Rating
Keswick	High	High	High	Low/High	High	Very High
Keswick North	High	High	High	Low/High	High	Very High
Toyon	High	High	High	Low/High	High	Very High
Buck St./Montego	High	High	High	Low/High	High	Very High
Flanagan Road	High	High	High	Low/High	High	Very High
Yellow Pine Avenue	High	High	High	Low/High	High	Very High
Walker Mine Road East	High	High	High	Low/High	High	Very High
Walker Mine Road West	High	High	High	Low/High	High	Very High
Mac's Road	High	High	High	Low/High	High	Very High
Quartz Hill	High	High	High	Low/High	High	Very High
Keswick Dam Road	High	High	High	Low/High	High	Very High
East Shore	High	High	High	Moderate/High	High	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

WEST OF THE SACRAMENTO RIVER:

KESWICK

Community, structure or area at risk	Fuel Hazard	Risk of Wildfire Occurrence	Structural Ignitability	Preparedness and Firefighting Capability	Overall Risk	Fire Hazard Severity Zone Rating
Iron Mtn. Rd.	High	High	High	Low/High	High	Very High
Keswick Dam Road	High	High	High	Low/High	Moderate	Very High
East Keswick	High	High	High	Low/High	High	Very High
North Street	High	High	High	Low/High	High	Very High
Market Street	High	High	High	Low/High	Moderate	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

NORTH KESWICK

Community, structure or area at risk	Fuel Hazard	Risk of Wildfire Occurrence	Structural Ignitability	Preparedness and Firefighting Capability	Overall Risk	Fire Hazard Severity Zone Rating
Iron Mtn. Road	High	High	High	Low/High	High	Very High
BLM boat ramp road	High	Moderate	Low	Low/High	Moderate	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

EAST OF THE SACRAMENTO RIVER:

CENTIMUDI

Community, structure or area at risk	Fuel Hazard	Risk of Wildfire Occurrence	Structural Ignitability	Preparedness and Firefighting Capability	Overall Risk	Fire Hazard Severity Zone Rating
Lake Boulevard	High	High	High	Low/High	High	Very High

Highway 151 shaded fuel breaks	High	Moderate	Low	Low/High	Low	Very High
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Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

FLANAGAN

Community, structure or area at risk	Fuel Hazard	Risk of Wildfire Occurrence	Structural Ignitability	Preparedness and Firefighting Capability	Overall Risk	Fire Hazard Severity Zone Rating
Flanagan Road	High	High	High	Low/Moderate	High	Very High
Yellow Pine Avenue	High	High	High	Low/Moderate	High	Very High
Glorfield Trail ²	High	High	High	Low/High	Moderate	Very High
Beltline Road	High	High	High	Low/High	High	Very High
Lake Boulevard	High	High	High	Low/High	High	Very High
WAPA powerline ³	High	High	Low	Low/High	Low	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

WALKER MINE ROAD

Community, structure or area at risk	Fuel Hazard	Risk of Wildfire Occurrence	Structural Ignitability	Preparedness and Firefighting Capability	Overall Risk	Fire Hazard Severity Zone Rating
Walker Mine Road	High	High	High (east 1/2)/Moderate (west 1/2)	Low/Moderate	High	Very High
Williamson Road	High	High	High	Low/High	High	Very High

² Escape and firefighting purposes only

³ Although there is tremendous value in the power lines, WAPA routinely conducts fuel reduction within their easements.

Lake Boulevard	High	High	High	Low/High	Moderate	Very High
Johnson Road	High	High	Moderate	Low/High	Low	Very High
Western Way	High	High	Moderate	Low/High	Low	Very High
WAPA powerlines	High	High	Low	Low/High	Low	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

QUARTZ HILL NORTH

Community, structure or area at risk	Fuel Hazard	Risk of Wildfire Occurrence	Structural Ignitability	Preparedness and Firefighting Capability	Overall Risk	Fire Hazard Severity Zone Rating
Bailey Road	High	High	High	Low/Moderate	High	Very High
Mac's Road	High	High	High	Low	High	Very High
Lake Boulevard	High	High	High	Low/High	Moderate	Very High
WAPA powerlines	High	High	Low	Low/High	Low	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

QUARTZ HILL SOUTH

Community, structure or area at risk	Fuel Hazard	Risk of Wildfire Occurrence	Structural Ignitability	Preparedness and Firefighting Capability	Overall Risk	Fire Hazard Severity Zone Rating
Old Diggins/Quartz Hill	High	High	High	Low/High	High	Very High
Keswick Dam Road	High	High	High	Low/High	High	Very High
WAPA Powerlines	High	High	Low	Low/High	Low	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

EASTSHORE DRIVE

Community, structure or area at risk	Fuel Hazard	Risk of Wildfire Occurrence	Structural Ignit-ability	Preparedness and Firefighting Capability	Overall Risk	Fire Hazard Severity Zone Rating
McLeod Road	High	Moderate	High	Low/High	Moderate	Very High
Spring Creek Road	High	Moderate	High	Low/High	Moderate	Very High
Keswick Dam Road	High	Moderate (west ½)/ High (east ½)	High	Low/High	Moderate	Very High
Lake Keswick Estates	High	High	moderate	Moderate/ High	High	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

KESWICK DAM ROAD SOUTH

Community, structure or area at risk	Fuel Hazard	Risk of Wildfire Occurrence	Structural Ignit-ability	Preparedness and Firefighting Capability	Overall Risk	Fire Hazard Severity Zone Rating
Westside Buenaventura Boulevard	High	Low	Low	High/High	Low	Very High
WAPA power lines	High	Low	Low	High	Low	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

Step 5b – Develop overall community priority:

Community priorities were assessed by the Keswick TAC based on local knowledge of the area.

AREAWIDE:

DEFENSIBLE SPACE AND FIREWISE PROGRAMS

Community, structure, or area at risk	Overall Risk	Structures at risk	Cultural Value	Overall Priority	Fire Hazard Severity Zone Rating
Keswick/Keswick North	High	High	low	High	Very High
Toyon	High	High	High	High	Very High
Buckeye St./Montego	High	High	Low	Moderate	Very High
Flanagan Road	High	High	High	High	Very High
Yellow Pine Avenue	High	High	Low	High	Very High
Walker Mine Road East	High	High	High	High	Very High
Walker Mine Road West	High	High	High	Moderate	Very High
Williamson Road/Bailey Road	High	High	Low	Moderate	Very High
Mac's Road	High	High	Low	High	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

WEST OF THE SACRAMENTO RIVER:

KESWICK

Community, structure, or area at risk	Overall Risk	Structures at risk	Cultural Value	Overall Priority	Fire Hazard Severity Zone Rating
Iron Mtn. Road	High	High	Low	High	Very High
Keswick Dam Road	High	High	Low	Moderate	Very High

East Keswick	High	High	High	High	Very High
North Street	High	High	High	High	Very High
Market Street	High	High	High	Moderate	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

NORTH KESWICK

Community, structure, or area at risk	Overall Risk	Structures at risk	Cultural Value	Overall Priority	Fire Hazard Severity Zone Rating
Iron Mtn. Rd.	High	Moderate	Low	High	Very High
BLM boat ramp and trail	High	Low	Low	Low	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

EAST OF THE SACRAMENTO RIVER

CENTIMUDI

Community, structure, or area at risk	Overall Risk	Structures at risk	Cultural Value	Overall Priority	Fire Hazard Severity Zone Rating
Lake Boulevard	High	High	High	High	Very High
Highway 151 shaded fuel breaks	Moderate	Low	Low	Low	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

FLANAGAN

Community, structure or area at risk	Overall Risk	Structures at risk	Cultural Value	Overall Priority	Fire Hazard Severity Zone Rating
Flanagan Road	High	High (east end)/Moderate (west end)	High east end	High east ½/Moderate west ½	Very High
Yellow Pine Avenue	High	High	Low	High	Very High
Glorefield Trail ⁴	High	High	Low	High	Very High
Beltline Road	High	Moderate	Low	High	Very High

⁴ Escape and firefighting purposes only

Lake Boulevard	High	High	Low	Moderate	Very High
WAPA powerlines ⁵	High	High	High	Low	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

WALKER MINE ROAD

Community, structure or area at risk	Overall Risk	Structures at risk	Cultural Value	Overall Priority	Fire Hazard Severity Zone Rating
Walker Mine Road	High	High (east end)/Moderate (west end)	Low	High east ½/Moderate west ½)	Very High
Williamson Road	High	Moderate	Low	Moderate	Very High
Lake Boulevard	High	High	Low	Moderate	Very High
Johnson Road	High	High	Low	Low	Very High
Western Way	High	High	Low	Low	Very High
WAPA powerlines	High	High	High	Low	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

QUARTZ HILL NORTH

Community, structure or area at risk	Overall Risk	Structures at risk	Cultural Value	Overall Priority	Fire Hazard Severity Zone Rating
Bailey Road	High	High	Low	Moderate	Very High
Mac's Road	High	High	Low	High	Very High
Lake Boulevard	High	High	Low	Low	Very High
WAPA powerlines	High	High	High	Low	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

⁵ Although there is tremendous value in the WAPA powerlines, overall priority was rated low for this plan because WAPA routinely conducts fuel reduction within their easements.

QUARTZ HILL SOUTH

Community, structure or area at risk	Overall Risk	Structures at risk	Cultural Value	Overall Priority	Fire Hazard Severity Zone Rating
Old Diggins/Quartz Hill Road	High	High	Low	High	Very High
Keswick Dam Road	High	High	Low	Moderate	Very High
WAPA powerlines	High	High	High	Low	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

EASTSHORE DRIVE

Community, structure or area at risk	Overall Risk	Structures at risk	Cultural Value	Overall Priority	Fire Hazard Severity Zone Rating
McLeod Road	Moderate	Moderate	Low	Moderate	Very High
Spring Creek Road	Moderate	Moderate	Low	Moderate	Very High
Keswick Dam Road	Moderate	Moderate	Low	High	Very High
Lake Keswick Estates biomass thinning	High	High	Low	High	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

KESWICK DAM ROAD SOUTH

Community, structure or area at risk	Overall Risk	Structures at risk	Cultural Value	Overall Priority	Fire Hazard Severity Zone Rating
Buenaventura Blvd.	Moderate	Low	Low	Low	Very High
WAPA Powerlines	High	High	High	Low	Very High

Rating: High, Medium, Low

Fire Hazard Severity Zone ratings: Very High, High, Moderate

Step 6a – Community Hazard Reduction Priorities:

Based on the results of the community risk assessments, priority ratings have been determined for the communities and areas of community importance. The community recommendations for the type of treatment for the surrounding vegetation are listed in the following table.

AREAWIDE:

DEFENSIBLE SPACE AND FIREWISE PROGRAMS

Community, Structure, or Area at Risk	Type of Treatment	Method of Treatment	Overall Priority
Keswick	Hand Labor	Brush and tree removal, pruning	High
Keswick North	Hand Labor	Brush and tree removal, pruning	High
Toyon	Hand Labor	Brush and tree removal, pruning	High
Buckeye St./Montego	Hand Labor	Brush and tree removal, pruning	Moderate
Flanagan Road	Hand Labor	Brush and tree removal, pruning	High
Yellow Pine Avenue	Hand Labor	Brush and tree removal, pruning	High
Walker Mine Road East	Hand Labor	Brush and tree removal, pruning	High
Walker Mine Road West	Hand Labor	Brush and tree removal, pruning	Moderate
Williamson Road/Bailey Road	Hand Labor	Brush and tree removal, pruning	High
Mac's Road	Hand Labor	Brush and tree removal, pruning	High
Quartz Hill	Hand Labor	Brush and tree removal, pruning	High
Keswick Dam Road	Hand labor	Brush and tree removal, pruning	Moderate
East Shore	Hand Labor	Brush and tree removal, pruning	Low

Type of Treatment: Fire, Mechanical (tractor, cable, helicopter), Hand Labor, Chemical, Other.

Method of Treatment: Prescribed Fire, Thinning From Below, Commercial Thinning, Sanitation-Salvage, Biomass, Brush Removal, Other.
 Overall Priority: High, Medium, Low.

WEST OF THE SACRAMENTO RIVER:

KESWICK

Community, Structure, or Area at Risk	Type of Treatment	Method of Treatment	Overall Priority
Iron Mtn. Road	Hand labor or mechanical	Brush and tree removal, pruning	High
Keswick Dam Road West	Hand labor or mechanical	Brush and tree removal, pruning	Moderate
East Keswick	Hand labor or mechanical	Brush and tree removal, pruning	High
North Street	Hand labor or mechanical	Brush and tree removal, pruning	Moderate
Market Street	Hand labor or mechanical	Brush and tree removal, pruning	Low

Type of Treatment: Fire, Mechanical (tractor, cable, helicopter), Hand Labor, Chemical, Other.

Method of Treatment: Prescribed Fire, Thinning From Below, Commercial Thinning, Sanitation-Salvage, Biomass, Brush Removal, Other.

Overall Priority: High, Medium, Low.

KESWICK NORTH

Community, Structure, or Area at Risk	Type of Treatment	Method of Treatment	Overall Priority
Iron Mtn. Rd.	Hand labor or mechanical	Brush and tree removal, pruning	High
BLM boat ramp road	Hand labor or mechanical	Brush and tree removal, pruning	Moderate

Type of Treatment: Fire, Mechanical (tractor, cable, helicopter), Hand Labor, Chemical, Other.

Method of Treatment: Prescribed Fire, Thinning From Below, Commercial Thinning, Sanitation-Salvage, Biomass, Brush Removal, Other.

Overall Priority: High, Medium, Low.

EAST OF THE SACRAMENTO RIVER

CENTIMUDI:

Community, Structure, or Area at Risk	Type of Treatment	Method of Treatment	Overall Priority
Lake Boulevard	Hand Labor	Brush and tree removal	High
Highway 151 shaded fuel breaks	Hand Labor	Brush and tree removal	Low

Type of Treatment: Fire, Mechanical (tractor, cable, helicopter), Hand Labor, Chemical, Other.

Method of Treatment: Prescribed Fire, Thinning From Below, Commercial Thinning, Sanitation-Salvage, Biomass, Brush Removal, Other.

Overall Priority: High, Medium, Low.

FLANAGAN

Community, Structure, or Area at Risk	Type of Treatment	Method of Treatment	Overall Priority
Flanagan Road	Hand Labor	Brush and tree removal	High
Yellow Pine Avenue	Hand Labor	Brush and tree removal	High
Glorfield Trail ⁶	Hand Labor/Mechanical	Brush and tree removal	High
Beltline Road	Hand Labor	Brush and tree removal	Moderate
Lake Boulevard	Hand Labor	Brush and tree removal	Moderate
WAPA powerlines ⁷	Mech./Hand Labor	Brush and tree removal	Low

Type of Treatment: Fire, Mechanical (tractor, cable, helicopter), Hand Labor, Chemical, Other.

Method of Treatment: Prescribed Fire, Thinning From Below, Commercial Thinning, Sanitation-Salvage, Biomass, Brush Removal, Other.

Overall Priority: High, Medium, Low.

⁶ Escape and firefighting purposes only

⁷ Although there is tremendous value in the WAPA powerlines, overall priority was rated low for this plan because WAPA routinely conducts fuel reduction within their easements.

WALKER MINE ROAD

Community, Structure, or Area at Risk	Type of Treatment	Method of Treatment	Overall Priority
Walker Mine Road	Hand Labor	Brush and tree removal	High (east ½)/ Low (west ½)
Williamson Road	Hand Labor	Brush and tree removal	Moderate
Lake Boulevard	Hand Labor	Brush and tree removal	Moderate
Johnson Road	Hand Labor	Brush and tree removal	Low
Western Way	Hand Labor	Brush and tree removal	Low
WAPA powerlines	Mechanical/Hand Labor	Brush removal/other	Low

Type of Treatment: Fire, Mechanical (tractor, cable, helicopter), Hand Labor, Chemical, Other.

Method of Treatment: Prescribed Fire, Thinning From Below, Commercial Thinning, Sanitation-Salvage, Biomass, Brush Removal, Other.

Overall Priority: High, Medium, Low.

QUARTZ HILL NORTH

Community, Structure, or Area at Risk	Type of Treatment	Method of Treatment	Overall Priority
Bailey's Road	Hand Labor	Brush and tree removal	High
Mac's Road	Hand Labor	Brush and tree removal	High
Lake Boulevard	Hand Labor	Brush and tree removal	Moderate
WAPA Powerlines	Hand/Mechanical	Brush and tree removal/other	Low

Type of Treatment: Fire, Mechanical (tractor, cable, helicopter), Hand Labor, Chemical, Other.

Method of Treatment: Prescribed Fire, Thinning From Below, Commercial Thinning, Sanitation-Salvage, Biomass, Brush Removal, Other.

Overall Priority: High, Medium, Low.

QUARTZ HILL SOUTH

Community, Structure, or Area at Risk	Type of Treatment	Method of Treatment	Overall Priority
Old Diggins/Quartz Hill road east	Hand Labor	Brush and tree removal	Moderate
Keswick Dam Road	Hand Labor	Brush and tree removal	High
WAPA powerlines	Mechanical/Hand labor	Brush and tree removal/other	Low

Type of Treatment: Fire, Mechanical (tractor, cable, helicopter), Hand Labor, Chemical, Other.

Method of Treatment: Prescribed Fire, Thinning From Below, Commercial Thinning, Sanitation-Salvage, Biomass, Brush Removal, Other.

Overall Priority: High, Medium, Low.

EASTSHORE DRIVE

Community, Structure, or Area at Risk	Type of Treatment	Method of Treatment	Overall Priority
McLeod Road	Hand Labor	Brush and tree removal	Low
Spring Creek Road	Hand Labor	Brush and tree removal	Low
Keswick Dam Road	Hand Labor	Brush and tree removal	Moderate
Lake Keswick Estates	Biological	Biomass	High

Type of Treatment: Fire, Mechanical (tractor, cable, helicopter), Hand Labor, Chemical, Biological, Other.

Method of Treatment: Prescribed Fire, Thinning From Below, Commercial Thinning, Sanitation-Salvage, Biomass, Brush Removal, Other.

Overall Priority: High, Medium, Low.

KESWICK DAM SOUTH

Community, Structure, or Area at Risk	Type of Treatment	Method of Treatment	Overall Priority
Westside Buenaventura Boulevard	Mechanical/ Hand Labor	Brush and tree removal, pruning	Low
WAPA substation	Hand/Mechanical	Brush and tree removal/other	Low

Type of Treatment: Fire, Mechanical (tractor, cable, helicopter), Hand Labor, Chemical, Other.

Method of Treatment: Prescribed Fire, Thinning From Below, Commercial Thinning, Sanitation-Salvage, Biomass, Brush Removal, Other.

Overall Priority: High, Medium, Low.

Step 6b – Recommendations to Reduce Structural Ignitability:

Individuals and community members can reduce structural ignitability throughout the Keswick Basin planning area by implementing defensible space/Firewise Programs to include the following.

- Assess risk/structure ignitability.
- Upgrade existing structures to fire safe building codes.
- Replace wood roofs with approved fire safe roofing.
- Consider fire resistant exterior siding.
- Maintain a minimum 100-foot defensible space around structures.
- Clean roofs and gutters annually.
- Develop a community phone tree in case of a fire emergency.
- Develop agreements with the County to use the reverse 911 system.
- Remove ladder fuels.
- Clean and screen chimney.
- Maintain green grass and fire resistant plants within 30 feet of house.
- Move all flammable material at least 30 feet from house.
- Remove dead, dying, or diseased shrubs trees, dried grass, fallen branches and dried leaves 100 feet around house.
- Attach a hose that can reach to all parts of the house.

Step 7 – Develop an Action Plan and Assessment Strategy:

The Technical Advisory Committee in collaboration with agencies and private landowners in the Keswick Basin Planning area, have submitted projects that provide protection and reduce risk.

A. Proposed Management Actions:

- Develop a Fire Safe Council for that portion of the Keswick Basin planning area west of the Sacramento River. This FSC boundary could approximate the Keswick Utilities District boundary and would include a portion of the current Shasta West FSC area.
- Develop an education/outreach program specific to the Keswick Basin CWPP area.

- Seek funding to identify absentee landowners and work with them to reduce fuels on undeveloped parcels.
- Develop a Wildland Fire Evacuation Plan for that portion of the Keswick Basin planning area outside of the current City of Shasta Lake Wildland Fire Evacuation Plan.
- Encourage and participate in the formation of defensible space/Firewise Program neighborhoods throughout the planning area.

B. Projects:

The following table displays a list of projects submitted the TAC and the community recommendations.

Area at Risk	Project Name	Agency/ Landowner	Funding Needs (\$) ⁸	Time Table	Community Recommendation
Eastside Defensible Space			(\$3100/ Dwelling)		
	Toyon	Private – 137 dwellings	\$424,700	208 days	High
	Buckeye St./Montego	Private – 107 dwellings	\$331,700	160 days	High
	Flanagan Road	Private -39 dwellings	\$120,900	52 days	High
	Yellow Pine Avenue	Private – 20 dwellings	\$62,000	30 days	High
	Walker Mine Road East	Private – 57 dwellings	\$176,700	89 days	
	Walker Mine Road West	Private – 22 dwellings	\$68,200	33 days	
	Williamson Road/Bailey Road	Private – 111 dwellings	\$344,100	158 days	High
	Mac’s Road	Private – 152 dwellings	\$471,200	228 days	High
	Quartz Hill	Private – 144	\$446,400	216 days	High

⁸ Projected costs for planning only. More precise costs will be determined when grant applications are prepared.

		dwelling			
	Keswick Dam Road	Private – 77 dwellings	\$238,700	117 days	High
	Eastshore	Private – 29 dwellings	\$89,900	44 days	
Westside Defensible Space			\$3100/dwelling		
	Keswick	1 % Public 99 % Pvt - 150 dwellings	Hand = \$465,000	225 days	High
	Keswick North	100% Pvt 4 dwellings	Hand = \$12,400	10 days	High
Shaded fuel breaks					
Keswick					
	Iron Mtn. Road	100% Pvt	Hand = \$86,000	14.75 mos.	High
	Keswick Dam Road West	55 % Private 45 % Public	Hand = \$86,200	14 mos	High
	East Keswick	100% Pvt.	Hand = \$52,000	11 days	High
	North Street	100% Pvt.	Hand = \$79,300	45 days	Moderate
	Market Street	100% Pvt.	Hand = \$64,500	25 days	Low
Keswick North					
	Iron Mtn. Road 1 (3 – 32 acre sections)	60 % Private 25% Public	Hand = Each segment = \$63500x3 = \$190,500	16 mos.	High
	BLM boat ramp road	100% public	Hand = \$48,100	5.5 months	Low
Centimudi					
	Lake Blvd. North	100% Private	Hand = \$63,800	17.25 mos.	High
	Highway 151	100 % Private	Hand = \$41,400	1 month	Moderate

Flanagan					
	Flanagan Road East	39% Private 61% Public	Hand = \$63400	10 mos.	High
	Flanagan Road West	87% Private 13% Public	Hand = \$62700	10 mos.	Moderate
	Yellow Pine Ave.	100% Private	Hand = \$63400	10 mos	High
	Glorfield Trail ⁹	100% Private	Hand = \$39000	5 months	High
	Beltline Road	100% Private	Hand = \$83900	15 months	High
	Lake Blvd	100% Private	Hand = \$127200	22 months	High
Walker Mine Road					
	Walker Mine Road East	75% Private 25% Public	Hand = \$114300	19 months	High
	Walker Mine Road West	86% Private 14% Public	Hand = \$69700	11 months	Moderate
	Lake Blvd	100% Private	Hand = \$53600	9 months	High
	Johnson Road	100% Private	Hand = \$22000	4 months	Moderate
	Western Way	100% Private	Hand = \$22800	4 months	Moderate
Quartz Hill North					
	Bailey Road	100% Private	Hand = \$78300	11 months	High
	Mac's Road	100% Private	Hand = \$50600	7 months	High
Quartz Hill South					
	Old Diggins/Quartz Hill road east	79% Private 21% Public	Hand = \$99,600	17 months	High
	Keswick Dam Road	80% Private 20% Public	Hand = \$104,700	18 months	High

⁹ Escape and firefighting purposes only

Eastshore Drive					
	McLeod Road	100% Private	Hand = \$40,300	5 months	Moderate
	Spring Creek Road	100% Private	Hand = \$40,300	5 months	Moderate
	Keswick Dam Road	37% Private 63% Public	Hand = \$68,900	11 months	High
	Keswick Estates Biomass Thinning	100% Public	Sheep or goats = 25 days = \$12,500	6 months	High
Keswick Dam Road South					
	Buenaventura Blvd.	100% Public	Hand = \$22,100	4 months	Low

STRATEGIC COMMUNITY WILDFIRE PROTECTION PLAN UPDATES:

The Fire Agencies of the Keswick Basin planning area intend to assess progress annually and invite agencies and landowners to submit additional projects that provide community protection. Additional (new) projects will be displayed in an update appendix to this plan.

APPENDICES

A.	KESWICK BASIN COMMUNITY WILDFIRE PROTECTION PLAN STRATEGY	A1
B.	GLOSSARY	B1
C.	TECHNICAL ADVISORY COMMITTEE	C1
D.	DEFENSIBLE SPACE GUIDELINES	D1
E.	CITY OF SHASTA LAKE EVACUATION PLAN	E1

APPENDIX A

KESWICK BASIN COMMUNITY WILDFIRE PROTECTION PLAN STRATEGY

I. EXECUTIVE SUMMARY

The *Keswick Basin Community Wildfire Protection Plan* has been prepared by the Western Shasta Resource Conservation District under a grant through the California Fire Safe Council, with funding provided by the USDI Bureau of Land Management (BLM). The planning area has a population of approximately 2,100 permanent residents in the communities of Keswick, northwest Redding, City of Shasta Lake and the intermingled Shasta County areas.

The intermingled private and public lands in the planning area make it imperative to develop a complementary fuel reduction strategy. Using stimulus funds, BLM will implement several biomass thinnings on public land within the planning area. The purpose of this plan is to identify construction of shaded fuel breaks and other community activities that complement the fuel reduction plans of BLM. These combined projects are designed to increase protection for those living in the area, protect values at risk, provide firefighter safety when containing a blaze, allow residents safe transportation routes away from a wildfire, and encourage a maintenance plan to protect and to update this fuel reduction plan.

Wildfire plays a natural part in the evolution of vegetation in the 30,814-acre Keswick Basin planning area, located northwest of Redding, California. Vegetation in the area is characterized by eight vegetative communities: blue oak and foothill pine, knobcone pine, ponderosa pine, chaparral, various hardwoods, various hardwoods and deciduous trees, herbaceous plants, and urban. Elevation for these vegetation types ranges between 600 feet at the Sacramento River on the valley floor and 3,913 feet at Sugar Loaf Mountain. A large portion of the area suffered from historic mining activities which resulted in massive vegetative type conversion from conifer dominated vegetative communities to a highly flammable chaparral vegetative community dominated by manzanita and toyon. Highly flammable non-native species such as brooms and tree-of-heaven are also conspicuous throughout the area. Fire suppression activities combined with historic fuel modification for the past eighty years have significantly increased the volume of highly flammable vegetation across the landscape, resulting in a Very High Fire Hazard Severity Rating for the entire area by CAL FIRE.

The number and size of devastating wildfires impacting the Western United States over the past ten years resulted in the creation of a National Fire Plan for the U. S. Departments of Interior and Agriculture. Funding is made available through the

National Fire Plan, California Fire Plan, the 2003 Healthy Forests Initiative, and other programs to assist local communities and watershed groups in identifying/planning and implementing fuel reduction programs.

This plan is not a static document. Information contained is the best currently available. Present on-going research, the next fire season, or a change in the community may require updates and changes to this Community Wildfire Protection Plan necessary.

II. BACKGROUND

A. INTRODUCTION

In 2009 the California State Fire Safe Council awarded the Western Shasta Resource Conservation District (WSRCD) a grant funded by the USDI Bureau of Land Management. The purpose of the grant was to prepare a Community Wildfire Protection Plan for the Keswick Basin, which includes the communities of Keswick, portions of the Cities of Redding and Shasta Lake, and residences in intermingled Shasta County areas. The City of Shasta Lake and some of the intermingled Shasta County areas lie within the boundaries of the South Lake Shasta Fire Safe Council.

This plan supports the goals and objectives of the BLM Redding Field Office. The WSRCD has also completed other strategic fuels reduction plans in Shasta County for the Lower Clear Creek Watershed, Upper Clear Creek Watershed, Cottonwood Creek Watershed, Shingletown Ridge Area, Shasta West Watershed, Lakehead area, Backbone Ridge area, and Cow Creek Watershed. .

The topography of the Keswick Basin planning area varies from steep to valley floor, with elevations from 3,913 feet at Sugar Loaf Mountain to 600 feet at the Sacramento River. The land ownership in the area is intermingled public lands (BLM, BOR, NPS and USFS) and private lands. Ownership is roughly 54% private and 46% public. The area west of the Sacramento River is largely undeveloped. During the late 1800's and early 1900's, mining dominated the activity in the area; however, there are no active mines today. The area contains a large relic of the mining era as a Superfund site, Iron Mountain Mine.

Fuels reduction projects for the Keswick Basin planning area are a high priority because the area is:

- Concentrated populations with high value dwellings and infrastructure.
- Prone to at least one major fire annually.
- Dominated by vegetation that has the highest fire hazard risk rating given by CAL FIRE.

B. STATEMENT OF NEED

When reviewed together, the Keswick Basin has an area that has an extremely high potential for catastrophic wildfire. History (**Map 7**) supports this characterization. In 2008, a massive lightning storm started the Motion Fire (26,824 acres), which began within the planning area near Shasta Dam, the Moon Fire (29,031 acres), and the Deer Lick Fire (12,701 acres). These fires burned for weeks and consumed a total of 68,556 acres in Western Shasta County. These fires were part of the larger Shasta-Trinity Lightning Complex of 158 fires which burned a total of 86,500 acres.

- **Fire Hazard Severity Zone Rating¹⁰ (MAP 6)**

California law requires CAL FIRE to identify areas based on the severity of fire hazard that is expected. These areas, or “zones,” are based on factors such as fire history, existing, and potential fuel, flame length, wind conditions that blow embers, terrain, weather and the likelihood of buildings ignition.

There are three zones based on increasing fire hazard: medium, high and very high. In wildland areas, expected fire behavior is based on typical intensity on a severe fire weather day. The local responsibility area hazard rating reflects flame and ember intrusion from adjacent wildlands and from flammable vegetation in the urban area.

Using the latest fire science, CAL FIRE has developed and field tested a model that serves as the basis of zone assignments. The model evaluates properties using characteristics that affect the probability of a burn and potential fire behavior in the area. The calculation also incorporates the potential for vegetation to be ignited by an ember and expectations based on fire history over the last 50 years.

Based on the analysis of the above factors, CAL FIRE has designated state responsibility lands in the Keswick Basin planning area as Very High Severity Zone Rating. CAL FIRE has also recommended a Very High Severity Zone Rating for adjacent lands under other fire agency responsibility, i.e. Federal, County.

- **Demographics**

West of the Sacramento River, the population is concentrated in the community of Keswick with an estimated population of 327 residents. The

¹⁰ California Department of Forestry and Fire Protection, May 2007, FREQUENTLY ASKED QUESTIONS ABOUT: *Fire Hazard Severity Zoning and New Building Codes for California's Wildland-Urban Interface*

remainder of the area is sparsely populated with 9 residents. Higher population densities exist east of the Sacramento River within the planning area. Population densities vary from scattered in rural areas to high in neighborhoods within the cities of Redding and Shasta Lake and intermingled areas of Shasta County. Population for the eastside of the planning area is estimated to be 1,730 residents.

- **Topography and Climate¹¹**

The topography of the Keswick Basin planning area varies from steep to valley floor, with elevations from 3,913 feet at Sugar Loaf Mountain to 600 feet at the Sacramento River.

Northern California has a Mediterranean climate characterized by long, dry, hot summers and wet winters. Mean annual precipitation ranges from 25 inches in the valley to 40 inches in the higher elevations, some of this coming as snow. The mean annual air temperature ranges from 57 to 65 degrees Fahrenheit.

- **Plants and Wildlife¹² (MAPS 3 and 4)**

The area is uniquely situated at the intersection of three ecological regions: the Sacramento Valley, the Klamath Mountains, and the southern extent of the Cascade Range. This results in very diverse flora and fauna regimes. Vegetative elements include wild herbaceous plants, shrubs, riparian shrubs and trees, and coniferous trees, which include ponderosa pine, gray pine, California black oak, with a mixed understory of ceanothus, toyon, manzanita and various invasive species. A large portion of the planning area west of the Sacramento River underwent a massive vegetative type conversion in the 1800's because of historic mining and associated smelters. During processing of the mined ore, toxic fumes destroyed much of the conifer dominant species. Native shrubs, toyon, and manzanita, then occupied and now dominate the barren areas, converting the conifer vegetation to highly flammable shrub dominated communities. Additionally, many highly flammable non-natives, such as broom and tree-of-heaven are present.

The area may support 200 to 300 species of terrestrial vertebrates and fish and avian species. Trees and rock outcrops provide important perching, roosting, and nesting habitat for birds of prey, including northern goshawk, golden eagle, bald eagle, and numerous hawks and owls. Various mammals inhabit

¹¹ USDA Soil Conservation Service and US Forest Service, *The Soil Survey of Shasta County Area, California 1974*.

¹² Western Way Shasta Resource Conservation District, *Shasta West Watershed Assessment, 2005*; *Stillwater-Churn Creek Watershed Assessment, 2007*

the area, including black tail deer, mountain lion, and black bear. The Sacramento River provides crucial habitat for Chinook salmon and steelhead which are listed species. Based on the current conditions in this area and on the compounded hazardous fuels situation, it is anticipated that highly destructive fires will again occur and will result in extensive loss of vegetative communities and associated wildlife habitat. Extensive erosion will more than likely occur and affect water quality in the Sacramento River and habitat for Chinook salmon and steelhead which are listed species.

- **Listed Species:** Most species are associated with the Sacramento River including (See Map 6):

The bald eagle (*Haliaeetus leucocephalus*) – Once federally threatened and state endangered, now delisted in 2007

The northwestern pond turtle which is listed as a species of special concern by the California Department of Fish and Game
Foothill yellow legged frog which is a federally designated species of concern and a California DFG designated species of special concern/protected.

Sacramento anthicid beetle which is federally designated as endangered.

There is a known bald eagle nest just north of the planning area. Bald eagles were previously designated as federally threatened and as California state endangered species but were delisted in 2007.

- **Fisheries:** The Sacramento River is regarded as one of the best large recreational fisheries in California. Species of note include Chinook salmon and steelhead.

C. GOALS AND OBJECTIVES OF THE PLAN

The purpose of this Community Wildfire Protection Plan is to provide the framework for prevention and suppression of wildfire in the Keswick Basin planning area. This plan was completed in partnership with CAL FIRE, BLM, NPS, Shasta County Fire Department, Shasta Lake Fire Protection District, Redding Fire Department, and many other individuals, businesses, and agencies that have an interest in or jurisdiction in the planning area.

The goals and objectives of this plan are to:

- Provide for personal safety and minimize property loss.

- Create fire safe corridors along Iron Mountain Road, Keswick Dam Road, Lake Boulevard, Highway 151, Quartz Hill Road, and several one-way escape routes on the eastside of the Sacramento River.
- Partner with the BLM and private landowners on strategic fuels reduction projects.
- Develop neighborhood fuel reduction projects.
- Protect ecological and landscape values through reduced ladder fuels so that large trees or other valued landscape vegetation can survive a low intensity fire.
- Minimize the risk of wildfire starts.
- Encourage safe burning practices for the reduction of fuels.
- Identify agency and landowner fire prevention responsibilities.
- Encourage and maintain multi-agency and landowner responsibilities in the implementation and maintenance of this plan.

D. METHODOLOGY

The activities necessary for the development of the Keswick Basin Community Wildfire Protection Plan are:

- Meet with community members, landowners and stakeholders.
- Evaluate values at risk, such as structures and natural resources.
- Present data to the Keswick Basin Technical Advisory Committee, which includes BLM, CAL FIRE, Redding Fire Department, NPS, Shasta County Fire Department, Shasta Lake Fire Protection District, USFS and local residents for review and assistance in prioritization.
- Coordinate with agencies on the management objectives in the area.
- Identify long-term maintenance options for shaded fuel breaks.
- Identify potential mechanical treatments and possible uses for excess fuels.
- Develop a priority list of recommendations and potential funding sources.
- Complete a draft Keswick Basin Community Wildfire Protection Plan for review by TAC.
- Present a draft Keswick Basin Community Wildfire Protection Plan to the community.
- Incorporate recommendations and issue a final Keswick Basin Community Wildfire Protection Plan for inclusion in the Shasta County Wildfire Protection Plan.

III. SUPPORTING PLANS, ORGANIZATIONS AND AGENCIES

A. NATIONAL FIRE PLAN

In 2001, the Chief of the USDA Forest Service published a *National Fire Plan* (U.S. Department of Interior and U.S. Department of Agriculture, 2001), which is a cohesive

strategy for improving the resilience and sustainability of forests and grasslands at risk, for conserving priority watersheds, species and biodiversity, reducing wildland fire costs, losses and damages, and to better ensure public and firefighter safety. To achieve these goals, work began to improve firefighting readiness, prevention through education, rehabilitation of watershed functions, hazardous fuel reduction, restoration, collaborative stewardship, monitoring jobs, and applied research and technology transfer.

The objective of the National Fire Plan is to describe actions that could restore healthy, diverse, and resilient ecological systems to minimize the potential for uncharacteristically intense fires on a priority basis. Methods include removal of excessive vegetation and dead fuels through thinning, prescribed fire and other treatment methods. The focus of the strategy is on restoring ecosystems that evolved with frequently occurring, low intensity fires. These fires typically occurred at intervals of between 1-35 years and served to reduce the growth of brush and other understory vegetation while generally leaving larger, older trees intact. The report is based on the premise that sustainable resources depend on healthy, properly functioning, resilient ecosystems. The first priority for restoration is the millions of acres of already roaded and managed landscapes that are in close proximity to communities. More information about the National Fire Plan is available on the Internet at www.fireplan.gov.

B. THE CALIFORNIA FIRE PLAN

The California Fire Plan has five strategic objectives:

- Create wildfire protection zones that reduce risks to citizens and firefighters.
- Assess all wildlands (not just state responsibility areas) to identify high risk, high-value areas and determine who is responsible, who is responding, and who is paying for wildland fire emergencies.
- Identify and analyze key policy issues and develop recommendations for changes in public policy.
- Develop a strong fiscal policy focus and monitor wildland fire protection in fiscal terms.
- Translate the analyses into public policies.

A key product of the Fire Plan is the identification and development of shaded fuelbreaks as wildfire safety zones and escape routes to reduce citizen and firefighter risks from future large wildfires. Initial attack success is measured by the percentage of fires that are successfully controlled before unacceptable costs are incurred. Assets at risk are identified and include citizen and firefighter safety, watersheds, water, timber, wildlife, habitat, unique areas, recreation, range structures, and air quality. Air quality is a factor based on the annual average acres burned by wildfires from 1985-1994. CAL FIRE calculates wildfires emit almost 600,000 tons of air pollutants each year.

The safety and asset assessments in the plan enable fire service managers and stakeholders to set priorities for prefire management project work. Prefire management includes a combination of fuels reduction, ignition management, fire-safe engineering activities, and improvements to forest health to protect public and private assets. CAL FIRE finds there is a direct relationship between reduced expenditures for prefire management and suppression and increased emergency fund expenditures, disaster funding, and private taxpayers' expenditures and losses.

In 2000, the State Board of Forestry and CAL FIRE completed a comprehensive update of the state fire plan for wildland fire protection in California. The overall goal of the plan is to reduce total costs and losses from wildland fire by protecting assets at risk through focused prefire management prescriptions and increasing initial attack success. CAL FIRE's statewide Initial Attack Fire Policy is to aggressively attack all wildfires, with the goal of containing 95% of all fire starts to 10 acres or less.

The area has a mosaic of fire protection responsibility with the several agencies having first response responsibility. In the Keswick Basin planning area, BLM, CAL FIRE, and the USFS have the primary responsibility for wildland fire protection. On the westside, the community of Keswick is under CAL FIRE/Shasta County Fire Department for suppression of structural fires. On the eastside of the Sacramento, the area north of Yellow Pine Avenue to Shasta Lake is the responsibility of the Shasta Lake Fire Protection District for wildland and structural fires. The Redding Fire Department has the responsibility for structural and vegetative fire suppression in the Redding city limits and structural fire suppression within the Buckeye Fire District. CAL FIRE has the responsibility for vegetative fire suppression within the Buck Eye Fire District. The Bureau of Land Management, Forest Service, Shasta Lake Fire Protection District, and CAL FIRE have a cooperative agreement for dispatching and resource sharing on all wildland fires occurring in mutual threat zones.

In summary, all of the involved fire suppression agencies believe that cooperative fire protection, fuels reduction, and fire prevention must be linked in order to have future success in dealing with wildfire problems within the Keswick Basin planning area.

C. SHASTA COUNTY FIRE SAFE COUNCIL

The Shasta County Fire Safe Council (SCFSC) was formed in May 2002 as part of a statewide effort that began in 1993 to form area Fire Safe Councils across the state to educate and encourage Californians to prepare for wildfires before they occur. (See www.firesafecouncil.org for more information.) The mission of the Shasta County Fire Safe Council is to be a framework for coordination, communication, and support to decrease catastrophic wildfire throughout Shasta County. The group meets quarterly to discuss projects, share information, schedule speaking engagements, develop educational opportunities, and update maps showing fuels reduction projects and

maintenance throughout the county. SCFSC has a public outreach element in the form of an educational exhibit housed in a trailer designed specifically for that purpose. The trailer is available for use by fire safe councils throughout the county, at schools, fairs, and other civic gatherings. For more information check out SCFSC on the web at www.westernshastarc.org.

D. PUBLIC LAND MANAGEMENT AGENCIES (See Map 2)

The Bureau of Land Management administers about 8,875 acres or 29% of the planning area. The Bureau of Reclamation administers about 3,531 acres or 11.5% of the area. The USDA Forest Service administers about 1826 acres or 6% of the area, and the National Park Service administers about 79 acres or .25% of the area.

E. TIMBER PRODUCTION ZONES¹³

The forest soils (**Map 5**) in the Keswick Basin are the least productive of all the forest soils in western Shasta County. The hazard of erosion is high or very high in most situations. The denuding of the hills by the smelter fumes, and the subsequent erosion, has rendered the naturally marginal forest lands sub-marginal. As a result, tree and brush species are knobcone pine, manzanita, toyon, interior live oak, California black oak, and an occasional ponderosa pine. Only such practices as fuel reduction, protection from pests, disease, over grazing, and erosion are practical. Improvements for recreation or wildlife habitat warrant more intensive management practices. In addition, equipment limitations are severe.

Typically, all contractors and employees permitted on public and private forest land are required to take all precautions necessary to prevent fires. A sufficient supply of hand tools are maintained on a job site at all times for fire fighting purposes only. Tools include shovels, axes, saws, backpack pumps, and scraping tools. Each forest worker, employee, or person permitted on private forest land is required to take immediate action to suppress and report any fire on or near the property.

On all fires, a sufficient number of people stay on a fire until it is known that adequate action has been taken to suppress the fire. All people and equipment remain until released by the agency in charge, or for a longer period, if considered necessary by the land manager. During fire season, most companies conduct daily aerial patrols covering their forest operations and pay special attention to those areas where work is being conducted, even hours after workers have left the area.

Specific treatments are required for limbs and other woody debris (often called slash) created by harvest operations in order to minimize fire hazards in areas with public

¹³ USDA Soil Conservation Service and USDA Forest Service, *The Soil Survey of Shasta County Area, California 1974*.

access. It includes piling and burning slash no later than April 1 of the year following its creation, or within a specified period of time after fire season, or as justified in the associated Timber Harvest Plan. Within 100 feet of the edge of the traveled surface of public roads, and within 50 feet of the edge of the traveled surface of permanent private roads open for public use where permission to pass is not required, slash and any trees knocked down by road construction or timber operations are typically lopped for fire hazard reduction, then piled and burned, chipped, buried or removed from the area. Lopping is defined as severing and spreading slash so that no part of it remains more than 30" above the ground. All woody debris created by harvest operations greater than one inch (1") and less than eight inches (8") in diameter within 100 feet of permanently located structures maintained for human habitation are removed or piled and burned. All slash created between 100-200 feet of permanently located structures maintained for human habitation are usually lopped (cut) for fire hazard reduction, removed, chipped or piled and burned. Lopping may be required between 200-500 feet from a structure if an unusual fire risk or hazard has been determined.

F. PRIVATE LAND – OTHER (Map 2)

Private lands total about 15,407 acres or 54% of the Keswick Basin planning area. Private land use varies from large blocks of vacant land to residences, businesses, and recreation facilities in and around the communities of Keswick, the Cities of Redding and Shasta Lake and the intermingled areas in Shasta County.

G. PARTNERS

A strong interest has been expressed to form a Fire Safe Council for the Keswick Basin. The Shasta County Fire Safe Program Manager, WSRCD, can assist in the formation and development of a Keswick Basin FSC. The goals and objectives of a Keswick Basin FSC are proposed as:

- Assume a leadership role in the implementation of the Keswick Basin CWPP;
- Assume the leadership role in the identification of local fire dangers;
- Partner with the local fire agencies to develop Fire Safety education specific to the Keswick Basin planning area;
- Demonstrate different fuel reduction techniques to local residents and agency members;
- Develop evacuation procedures; and
- Continue expansion of guidelines for future Keswick Basin planning area projects.

Following is a list of partner organizations for implementing the Keswick Basin Community Wildfire Protection Plan:

- USDA Forest Service

- USDA Natural Resources Conservation Service (NRCS)
- USDI Bureau of Land Management (BLM)
- USDI National Park Service (NPS)
- USDI Fish and Wildlife Service (USFWS)
- California Department of Fish and Game (DFG)
- California Department of State Parks (DSP)
- CAL FIRE
- California Highway Patrol (CHP)
- CalTrans
- Local Native American Tribes
- UC Cooperative Extension Service (UCCE)
- Shasta County Board of Supervisors
- Shasta County Fire Department
- Shasta County Fire Safe Council (SCFSC)
- Shasta County Sheriff's Department
- Shasta County Road Department
- South Lake Shasta Fire Safe Council
- Keswick Basin Fire Safe Council
- The communities of: Keswick, Redding and City of Shasta Lake
- Western Shasta Resource Conservation District

IV. ANALYSIS OF FUEL INVENTORY AND CONDITIONS

A. RECENT HISTORY OF MAJOR FIRES (Map 7)

Shasta County has a long history of small to very large fires. Several large catastrophic fires that resulted in extensive property loss have occurred in the last two decades. The Fountain Fire near Round Mountain (1992) burned 63,960 acres. The Canyon Fire near Happy Valley burned (2001) burned 2,580 acres. The Jones Fire near Bella Vista (2001) burned 26,020 acres and most of it reburned in the Bear Fire. In 2008, a massive lightning storm ignited 158 fires in Western Shasta County that merged into the Motion Complex (26,824 acres), the Moon Complex (29,031 acres), and the Deer Lick Fire (12,701 acres).

In summary, with heavy fuel loading, hot temperatures, critically low humidity, and strong hot - dry winds, a major wildfire potential exists in the Keswick Basin planning area.

B. AGENCY LARGE FIRE DATABASES

CAL FIRE and USDA FS maintain databases and GIS layers on large fires and fire starts within and around their Forest Protection Zones. The C database also includes fires recorded within the NPS Forest Protection Zones. Both databases include the

year of fire start, large fires, and total fire acreage, but cause of fire is included only on C fire start data and USFS large fire data.

USFS records were made only of those fires that received some type of fire suppression action; fires that had no suppression activity or that went out due to natural causes were not recorded. The C database does not contain fire starts prior to 1985.

C. WILDLAND FIRE ENVIRONMENT

The three major components of the wildland fire environment are fuels, weather, and topography (National Wildland Coordination Group, 1994). Weather is a major factor and local weather conditions are important in predicting how a fire will behave.

The climate¹⁴ in the Keswick Basin planning area is typically Mediterranean with wet, cool winters and dry, warm summers. Three types of fire weather conditions that occur during the dry period of the year (fire season) are important factors when considering Western Shasta County weather. These types of weather conditions are: 1) Pacific High – Post Frontal (Post-Frontal), 2) Pacific High-Pre Frontal (Pre-Frontal), and 3) Subtropical High Aloft (Subtropical High). The Cone Fire in September 2002 that burned 2006 acres, mostly in the Blacks Mountain Experimental Forest, is an example of a major fire that burned under Post-Frontal conditions. The Lost Fire in the Hat Creek Valley that burned more than 24,000 acres in September 1987 and the Fountain Fire of August 1992 that burned more than 63,960 acres on Hatchet Mountain are examples of fires driven by Pre-Frontal conditions. An example of a Subtropical High type fire is the Bolam Fire that burned approximately 960 acres on the north side of Mt. Shasta in August 1970.

Lightning¹⁵ strikes are a common source of ignition wildfires ignition in the mountains and hills of Western Shasta County. Occasionally incursions of subtropical moisture that moves north from the eastern Pacific and the Gulf of California produce widespread thunderstorms that result in numerous fires. Hundreds of lightning fires can be ignited over short periods during these events. The occurrence of widespread, simultaneous, lightning ignitions has contributed to fires that burn for weeks and cover very large areas as in 1977, 1987, 1990, and 1999. Topography can affect the direction and the rate of fire spread. Topographic factors important to fire behavior are elevation, aspect, steepness, and shape of the slope. When fire crews are

¹⁴University of California Press, 2006. *Fire in California's Ecosystems*

¹⁵ California Department of Forestry and Fire Protection, May 2007, FREQUENTLY ASKED QUESTIONS ABOUT: *Fire Hazard Severity Zoning and New Building Codes for California's Wildland-Urban Interface*

considering fire suppression methods, the topography is always critical in determining the safest and most effective plan of attack. When accessible, ridge lines are very important features from which to conduct fire suppression activities and can be a strategic area from which to conduct fuels management activities.

Fuel factors that influence fire behavior are: fuel moisture, fuel loading, size, compactness, horizontal continuity, vertical continuity, and chemical content. (National Wildfire Coordinating Group 1994)

Fuel moisture is the amount of water in a fuel, expressed as a percentage of the oven dry weight of that fuel. For example, a fuel sample can be found to have 20- 60% moisture content. Moisture content can range from as low as 5% to a high of 260+%.

Fuel loading is the oven dry weights of fuels in a given area, usually expressed in bone dry tons. For example, an area can be calculated to have 20 bone dry tons per acre of fuel. A bone dry ton is 2000 pounds of vegetation when rated at 0% moisture content.

Size refers to the dimension of fuels and compactness refers to the spacing between fuel particles.

Continuity is defined as the proximity of one type of fuel to the other, vertically or horizontally, that governs the fire's capability to spread and sustain itself.

Chemical content in fuels can either retard or increase the rate of combustion. All of these factors will influence the quantity of heat delivered, the duration, flame length and the rate of spread of any given fire, and should be considered prior to considering pre-fire projects or initiating fire suppression activities.

D. FUEL INVENTORY

Fuels are made up of the various components of vegetation, live and dead, that occur on a given site. Fuels have been classified into four groups – grasses, brush, timber, and slash. The differences in fire behavior among these groups are basically related to the fuel load and its distribution among the fuel diameter-size classes. In 1982, 13 mathematical behavior models or Fuel Models were developed by Hal Anderson to be utilized in fire behavior predictions and applications for every vegetation type. These Fuel Models represent the types of fuel most likely to support a wildfire.

TABLE 1 – FUEL MODEL TYPES
(ANDERSON, 1982)

Fuel Model	Fuel Complex
	Grass and Grass-Dominated
M1	Short Grass (1 foot)
M2	Timber (grass and understory)
M3	Tall Grass (2.5 feet)
	Chaparral and shrub fields
M4	Chaparral (6 feet)
M5	Brush (2 feet)
M6	Dormant brush, hardwood slash
M7	Southern rough
	Timber litter
M8	Closed timber litter
M9	Hardwood litter
M10	Timber (litter and understory)
	Slash
M11	Light logging slash
M12	Medium logging slash
M13	Heavy logging slash

The fuel models were designed to estimate fire behavior during severe fire hazard conditions when wildfires pose greater control problems and severely impact natural resources. Fuel models are simply tools to help the user realistically estimate fire behavior. The criteria for choosing a fuel model includes the assumption that fire burns in the fuel stratum best conditioned to support the fire. This means that situations will occur where one fuel model will represent the rate of spread most accurately, while another best depicts fire intensity. In other situations, two different fuel conditions may exist, so the spread of fire across the area must be weighed by the fraction of the area occupied by each fuel type.

RESULTS OF THE FUEL INVENTORY

Using LANDFIRE procedures, the BLM Redding Field Office developed the following fuel models for this plan. LANDFIRE procedures integrate relational databases, geo-referenced field plots, remote sensing, systems ecology, gradient modeling, predictive landscape modeling, vegetation disturbance dynamics, and peer-reviewed fire science to create a state-of-the-art scientific analysis of the landscape.

TABLE 2 – FUEL MODEL TYPE, EXTENT, AND CHARACTERISTICS

Fuel Model Type	Extent (Acres)	Characteristics
M1	4980	Short Grass (1 foot)
M2	6999	Timber (grass and understory)
M4	7212	Chaparral (6 feet)
M5	2984	Brush (2 feet)
M8	737	Closed timber litter
M9	3699	Hardwood litter
M10	2525	Timber (litter and understory)
Urban	1210	
Barren	414	
Water	54	
Total	30814	

To understand the current fuel loading conditions, it is important to understand past fuel loading conditions. Local fire history is shown on Map 3. Due to the historic regime, overall plant densities were most likely lower than those of today. Frequent fires would have drastically reduced vegetation densities and accumulated fuels. Due to the 2008 Motion Fire, most of the planning area west of the Sacramento River more than likely resembles historical conditions. In the remainder of the Keswick Basin planning area, it is also very likely that the species composition is much different today due to fire suppression. Fire-adapted species, which thrived in re-occurring fire environments, have declined due to competition from non-fire dependent species. Whatever the cause of the fuel modification, the resulting danger from wildfire is critical. Those areas in the wildland urban interface are graphically represented as the High rating areas.

E. OTHER WILDFIRE PROTECTION PLANS

Whiskeytown National Recreation Area:

The Whiskeytown National Recreation Area is contiguous to the west side of the Keswick Basin CWPP planning area with a very small portion of the WNRA within the planning area.

The Whiskeytown Fire Management Plan has a specific goal relating to fuels management. The goal is:

- Reduce hazard fuels adjacent to developed areas, urban interface boundaries, and cultural/historical sites.

The Whiskeytown Resource Management Plan provides three management objectives which relate to fire management:

- Protect the diversity of natural ecosystems, which are found within the Whiskeytown Unit
- Restore and maintain natural processes in areas of Whiskeytown affected by past and present human-caused impacts.
- Reduce hazardous fuel accumulations throughout Whiskeytown through the use of ecologically sound techniques, and restore fire to the ecosystem through prescribed fire.

The five year objective is to reduce hazard fuels in developed areas, urban interface boundaries, and cultural/historic zones to a level where at 90th percentile weather conditions, average flame lengths would be four feet or less. The desired outcome is that the fuel conditions in strategic areas adjacent to urban interface boundaries, developed areas, and cultural/historic sites are maintained at a level such that the values-at-risk are adequately protected from wildland fire.

Strategies to attain this are:

- Establish shaded fuelbreaks based on fire risk and maintain existing fuelbreaks as needed.
- Use mechanical treatments to reduce hazard fuels in areas directly adjacent to Whiskeytown facilities and inholdings.
- Use prescribed fire and mechanized hazard fuel reduction in strategic urban interface boundary areas to reduce the threat of wildland fire spreading outside the boundaries of Whiskeytown.
- Apply mechanical hazard fuel reduction adjacent to targeted significant cultural and historic sites to protect from fire damage.
- Monitor the effects of prescribed fire and mechanical fuel reduction treatments so that their effectiveness and resource impacts are identified and incorporated into future planning.

Bureau of Land Management:

A large portion of the planning area is composed of public lands managed by the BLM. Fuels management on these lands is guided by the Bureau of Land Management, Redding Field Office, *Fire Management Plan (FMP)* (12/2004). This plan is a general guide that covers all facets of fire management. Specific to fuels management, it sets objectives for focusing work on the WUI and recognized Communities at Risk, and identifies a range of treatment options that could be utilized, consisting of prescribed fire along with non-fire fuels treatments (mechanical, chemical and biological). The FMP identifies six distinct Fire Management Units (FMU), with the Keswick Basin a subsection of the Shasta FMU. BLM lands in the Shasta FMU are about 56,000 acres.

Targets are to treat 1/100 to 1/50 of the land base every ten years with prescribed fire and to treat 3/100 to 3/50 of the land base every ten years with a non fire fuels treatment.

Shasta-Trinity National Forest:

Shasta-Trinity National Forest lands are adjacent to and within the northeastern portion of the Keswick Basin planning area.

The goals related to fire management within the Shasta-Trinity National Forest (STNF), pursuant to the Shasta-Trinity Fire Management Plan (STNF 2001), are as follows:

- Restore fire to its natural role in the ecosystem when establishing the desired future condition of the landscape.
- Achieve a balance of fire suppression capability and fuels management investments that are cost effective and able to meet ecosystem objectives and protection capabilities.

To meet those goals, fire management direction in the Shasta-Trinity Land & Resource Management Plan states:

- Wildland fires will receive an appropriate suppression response that may range from confinement to control. Unless a different response is authorized in this plan or subsequent approved plans, all suppression response will have an objective of control.
- All wildland fires, on or threatening private land protected by agreement with the state of California, will receive a control suppression response.
- Activity fuels that remain after meeting wildlife, riparian, soil, and other environmental needs, will be considered surplus and a potential fire hazard. The amount and method of disposal will be determined in the ecosystem analysis, a project level decision.
- Plan and implement fuels treatments emphasizing those treatments that replicate fire's natural role in the ecosystem.
- Natural fuels will be treated in the following priority:
 - 1) Public safety
 - 2) High investment situations (structural improvements, power lines, plantations, etc.)
 - 3) Known high fire occurrence areas
 - 4) Coordinated resource benefits, i.e. ecosystem maintenance for natural fire regimes
- Consider shaded fuel break construction investments when they compliment forest

health/biomass reduction needs, when very high and extensive resource values are at risk and to protect forest communities

- Design fire prevention efforts to minimize human-caused wildfires commensurate with the resource values-at-risk
- Assess brushfields for multi-resource management opportunities, and develop project plans for treatment. Selection of the treatment methods used will produce multi-resource benefits through modification of the specific vegetation associations
 - 1) The effectiveness of producing multi-resource benefits modification of the specific vegetative associations.
 - 2) The cost effectiveness of the project.
 - 3) The degree of fire protection provided by conversion.
 - 4) The risk in watersheds.
 - 5) The natural fire regime.

Western Shasta Resource Conservation District:

- **French Gulch Area Fuels Reduction and Management Plan:**

This plan covers the Upper Clear Creek watershed which is contiguous to the northwest corner of the Keswick Basin CWPP planning area. The purpose of the plan is to identify and layout a network for the construction of shaded fuel breaks and ridgetop shaded fuel breaks, to identify other community activities that can increase protection for those living in the French Gulch area, protect values at risk, provide firefighter safety when containing a blaze, allow residents safe transportation routes away from a wildfire, and encourage a plan to maintain shaded fuel break effectiveness and to continue to implement the plan.

- **Shasta West Watershed Strategic Fuels Management Plan:**

The Shasta West Watershed is contiguous to the southwest corner of the Keswick Basin CWPP planning area. The purpose of the plan is to identify and layout a network for the construction of shaded fuel breaks and ridgetop shaded fuel breaks, to identify other community activities that can increase protection for those living in the Shasta West Watershed area, protect values at risk, provide firefighter safety when containing a blaze, allow residents safe transportation routes away from a wildfire, and encourage a plan to maintain shaded fuel break effectiveness and to continue to implement the plan.

V. VALUES AT RISK

A. RESIDENCES AND MAJOR STRUCTURES

About 954 homes are found within the Keswick Basin planning area. Major structures include stores, schools, powerlines, substations, and fire stations.

COMMUNITY INFRASTRUCTURE:



Toyon Learning Center



Baptist Church



WAPA Powerlines



**City of Shasta Lake
Substation**



**City of Shasta Lake
Powerlines**



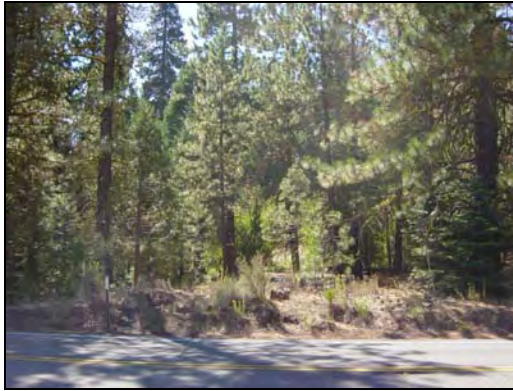
SLFPD Fire Station



Antiques Business

B. TIMBERLANDS

Timber production zones occur in the higher elevations west of the Sacramento River (MAP 3).



Typical Forested Lands

C. FISH AND WILDLIFE

The Keswick Basin has a typical distribution of wildlife species for the forests, woodlands, and brushlands of northern California. Elevation and exposure are primary influences on the distribution of these forest habitats. Douglas fir is found on north and east slopes in the western portion of the planning area at elevations over 3,000 feet, but can also be found where the exposure is slightly warmer or elevations lower. The driest habitat types occur on the south exposures of the valleys. These areas are often vegetated by brushfields and gray pine. Ponderosa pine also occurs in these areas, but is more prevalent on east and north facing slopes. California black oak occurs as a minor species in all forest types. The California black oak is an important source of mast for wildlife. Mast is the fruit of oaks and other trees, particularly where considered food for wildlife and domestic livestock.

- **Listed Species:** Most species are associated with the Sacramento River including (**MAP 4**):

The Bald Eagle (*Haliaeetus leucocephalus*) – There is a known bald eagle nest just north of the planning area. Bald eagles were previously designated as Federally threatened and as a California state endangered species but were delisted in 2007.

The Northwestern pond turtle, which is listed as a species of special concern by the California Department of Fish and Game (CDFG).

Foothill yellow legged frog, which is a Federally designated species of concern and a CDFG designated species of special concern/protected.

Sacramento anthicid beetle, which is Federally designated as endangered.

- **Fisheries:** The Sacramento River is regarded as one of the best large recreational fisheries in California. Species of note include Chinook salmon

(*Oncorhynchus tshawytscha*) and steelhead (*Oncorhynchus mykiss*) which are both Federally and California State listed as endangered.

VI. FUEL TREATMENTS

A. INTRODUCTION

Reducing fuel loads is one of the most effective elements of any fire prevention and protection program. Although fire is an integral component of the California ecosystem, managing fire by managing fuel loading is critical to maintaining communities, ranches, forest land, grazing lands, riparian areas, and the overall health and function of a watershed. The ability to implement fuel reduction projects typically comes down to the source of funds available, the cost of labor, the permitting process to implement the project, and landowner cooperation.

B. SHADED FUEL BREAKS

Shaded fuel breaks are constructed to create defensible space where firefighters can conduct relatively safe fire suppression activities. Shaded fuel breaks may also slow a wildfire's progress enough to allow supplemental attack by firefighters. The main goal behind shaded fuel break construction is to break up fuel continuity to prevent a fire from reaching the treetops, thus forcing the fire to stay on the ground where it can be more easily and safely extinguished. Shaded fuel breaks may also be utilized to replace flammable vegetation with less flammable vegetation that burns less intensely. A well-designed shaded fuel break also provides an aesthetic setting for people and a desirable habitat for wildlife. The California Board of Forestry has addressed the needs to strengthen community fire defense systems, improve forest health and provide environmental protection. The Forest Practice Rules allow a Registered Professional Forester (RPF) to use a special silviculture prescription when constructing or maintaining a community shaded fuel break, exempts community shaded fuel breaks from an assessment of maximum sustained production requirements, and allows defensible space prescriptions to be used around structures.

The WSRC, through consultation with its agency partners, has developed the following Shaded Fuel break Standards:

- The typical minimum width of a shaded fuel break is 100 feet, but can be up to 300 feet wide or more. The appropriate width is highly dependent on the slope, fuel density, fuel type, fuel arrangement, and landowner cooperation.
- Shaded fuel breaks should be easily accessible by fire crews and equipment at several points. Rapid response and the ability to staff a fire line is very important for quick containment of a wildfire. The edges of a shaded fuel break are varied to create a mosaic or natural look. Where possible, shaded fuel

breaks should compliment natural or man-made barriers such as meadows, rock outcroppings, and roadways.

- Ground cover, such as grass or prostrate shrubs, should be maintained throughout the shaded fuel break to protect the soil from erosion. The establishment of a shaded fuel break can lead to erosion if not properly constructed.
- A maintenance plan should be developed before construction of a shaded fuel break. Although a shaded fuel break can be constructed in a matter of a few weeks, maintenance must be conducted periodically to keep the shaded fuel break functioning properly.



Demonstration Shaded fuel break at Toyon in City of Shasta Lake

A properly treated area should consist of well-spaced vegetation with little or no ground fuels and no understory brush. Tree crowns should be approximately 10-15 feet apart. The area should be characterized by an abundance of open space and have a 'park like look' after treatment.

In areas where privacy is a concern, islands of brush may be left in strategic positions. CAL FIRE recommends that brush left in place be limited to islands having a diameter two times the height of the brush, and a distance three times the height of the brush between the islands. If the islands of brush are strategically placed, a homeowner can achieve a reasonable amount of defensible space, and retain the privacy most people are seeking when they move to the wildland – urban interface (WUI).

The Pile and Burn method is most commonly utilized when constructing shaded fuel breaks. Material is cut and piled in open areas to be burned. Burning takes place under permit on appropriate burn days. Burn rings can be raked out after cooling as a means to decrease their visual effect and seeded with native wildflowers to regain some ground cover and discourage non-native weeds from occupying the site.

C. MECHANICAL TREATMENT

Using mechanized equipment for reducing fuels loads on suitable topography and in certain fuel types can be very effective. Depending on the use of the equipment, it may require environmental review and documentation. Using equipment to remove excess vegetation may enable the landowner to process the debris to a level where it can be marketed as a product for use in power generation. The debris then becomes labeled as “biomass” and is further explained in Section IX of this report.

Mechanical methods to remove fuels include, but are not limited to, the utilization of bulldozers with or without brush rakes, excavators, chainsaws or mechanized falling machines, masticators, chippers, and grinders. Mechanical treatments are typically conducted with some type of masticator, which grinds standing brush into shred, which are typically left on the ground. Brush may also be mechanically removed and fed into a grinder for biomass. Mechanical treatments are also utilized on industrial and non-industrial timberlands in which trees are thinned by mechanized tree cutting or falling machines. In most cases, stands of trees are thinned from below as a means to eliminate the fuels that can take a fire into the tree canopy (ladder fuels). However, stands of trees may also be thinned from above to eliminate crown continuity.

Mechanical treatments can be used successfully on stable ground up to 50% slope, but should only be conducted during dry periods when soils are not saturated in order to minimize erosion and compaction. The drastic visual impacts should be considered when planning projects so that all parties are aware of how the area will look when the project is completed. Initial planning should address mitigation for erosion potential, using measures such as waterbars, ditching, and mulching in critical areas. Furthermore, the impacts on wildlife and archaeological resources must be addressed.

Due to air quality concerns, mechanical treatment method is a more acceptable method of fuels reduction in WUI areas despite its higher cost. Compared to prescribed fire, mechanical treatment involves less risk, produces less air pollutants, is more aesthetically pleasing, and allows landowners to leave desirable vegetation.

Mechanical treatment usually necessitates a cultural resource survey, CEQA/NEPA documentation and compliance, a Natural Diversity Database search, and the preparation of water quality documents. The cost of these tasks must be included in the budget for any projects using mechanical methods.

D. MAINTENANCE

Maintenance plans for all existing shaded fuel breaks, as well as a maintenance strategy for all planned shaded fuel breaks need to be formulated as funding is available. Maintenance needs to be added to all planned shaded fuel breaks. Scrub oak re-sprouts and manzanita seedlings on disturbed areas are typical of vegetation needing control. Control can take many forms including chemical control, mechanical control, or grazing by livestock (primarily goats).

The timeframe for maintenance is typically two years, five years, and ten years after initial construction of the shaded fuel break. Treatment with livestock needs to be repeated more frequently (See #2 below).

Periodic maintenance of a shaded fuel break sustains its effectiveness. Seeding the shaded fuel break with annual grass cover immediately following its construction helps reduce brush and conifer invasion, but grass cover will not eliminate invading plants for an extended period of time. The species of grass must be selected with care. A mature stand of tall grass presents a flashy fuel hazard that may be almost bad as the brush re-sprouts.

Shade is another method for controlling the re-growth of vegetation. The shade in shaded fuel breaks is a two-fold benefit. Not only does it make the shaded fuel break more aesthetically palatable, the shade also limits the re-growth of shade intolerant species like manzanita and toyon.

Following are several methods to maintain shaded fuel breaks:

- **Herbicides**

The use of herbicides is a very effective and inexpensive method of eliminating unwanted vegetation, but there are many restrictions. Some herbicides are species specific, which means they can be used to eliminate brush species and not harm grass species.

- **Manual Treatment**

Manual treatment is a very effective means to eliminate invading vegetation, but is very labor intensive. The cost of shaded fuel break maintenance must be balanced with its degree of effectiveness.

- **Herbivores**

Herbivore (goat) grazing is a means of maintaining shaded fuel breaks, since goats will eat brush and weeds. Browse makes up about 60% of a goat's diet, but only about 10-15% of a cow's diet.

Goats used for fuel load reduction are managed to remove dense understory, including brush, shrubs, forbs, and lower branches to remove ladder fuels. It may require giving goats supplements of protein, depending on the class of goats used and the time of year. The choice must be balanced with the type of soil, vegetation, and livestock analysis. Monitoring herbivore grazing is critical since over-grazing can lead to erosion problems.

As goats work through an area they also work on the understory, old pine needles and leaves, break lower branches, and split apart old downed branch material. Once an area has been "brushed" by goats, it can be maintained as a living green belt. Fire control or containment with goats takes coordination of the stock owner, land steward, local fire patrol, professional fire abatement teams, CAL FIRE, DFG, and others.

According to a report published by the North Carolina Cooperative Extension Service, grazing goats have been observed to select grass over clover, prefer browsing over grazing pastures, prefer foraging on rough and steep land than over flat, smooth land, graze along fence lines before grazing the center of a pasture, and graze the top of the pasture canopy fairly uniformly before grazing close to the soil level.

Herbivore grazing has been done in the Sierra Foothills by Goats Unlimited, Rickerby, CA. They report the vegetation in the Sierra foothills grazing area consists of woody plants, shrubs, forbs and grasses. Before entering a new area, the herder develops a landscape goal, completes a vegetative survey and identifies toxic plants. They identify the growth habit and adaptation of each plant species, especially those that are toxic. The objective is to control the invasion of unwanted species and encourage perennial grasses to return. In a report published by Langston University, goats improve the cycling of plant nutrients sequestered in brush and weeds, enabling the reestablishment of grassy species. Portable electric fencing with solar energizers can be used to control the goats' foraging area.

A “Rule of Thumb” for the cost of using goats for fuels reduction projects was found in a report on the Internet. A minimum effective goat herd has 500 animals, which will remove fuel from about 3 acres per day at a cost of \$1.00 per day per goat. The cost includes the goats, portable fencing, a goat herder, water and all transportation and daily supervision.



Herbivores Used In Fuel Reduction

- **Converting Brush Land to Forest Land**

Brush land frequently occurs on soils that are best suited for growing brush. Brushland soils are sloping to very steep loams and are gravelly, stony, or rocky. These soils are usually shallow to bedrock, and available water capacity is low or very low. Vegetation is generally chaparral, which includes such species as chamise, Lemmon ceanothus, buckbrush, toyon, poison-oak, whiteleaf manzanita, and western mountain mahogany. There are few trees occurring on the sites, such as interior live oak and gray pine. At least 80 percent of the surface cover is woody vegetation. With one notable exception most of the brushy sites are naturally occurring, and represent the native vegetative community. The exception is forest soils that have been burned and converted to brush communities.

Conversion from brushland to forestland entails a thorough investigation of the site by a qualified forester. Soil depth, type, aspect, and exposure will all determine the success or failure of an attempted conversion.

Natural regeneration of coniferous species after a burn is very difficult to accomplish. A conversion from brush to forest land should begin with a thorough investigation of the capability of the site to support coniferous trees. The next steps would be securing a reliable source of climatically adapted seedlings, developing a planting plan, and a cost estimate before the existing brush cover is removed.

VII. SOILS¹⁶ (MAP 5)

Soil associations in the planning area are grouped as mountains, foothills, or terraces, valley bottom, and floodplains based on physiographic characteristics. The soils vary from nearly level to very steep, well drained to excessively drained, gravelly or cobbly sandy and clay loams which are undrelain by sedimentary and metamorphic rocks.

Fuels management activities located on unstable soils or on slopes greater than 40 percent can stimulate erosion processes or exacerbate existing erosion problems; therefore, prior to any fuels management activities, all soil types within any future project area should be identified and evaluated to determine the erosion hazard. Projects should be designed to prevent or minimize erosion by reducing soil disturbance, maintaining vegetation where appropriate, avoiding steep and unstable slopes if possible, and incorporating the use of grass seed or fire resistant vegetation as a means to provide soil stabilization. Detailed soil mapping information should be examined once project boundaries have been established.

High intensity wildfire can also damage soil by incinerating roots and the humus layer (organic portion of soils) that holds soils together and provides energy dissipation. In addition, the loss of large areas of vegetation can reduce evapotranspiration and increase peak flow, which can result in augmented erosion potential, adversely affecting watershed resources. Many life forms, including invertebrates of Arthropoda Phylum that are essential for cycling plant material and fixing atmospheric gases, are unknowingly destroyed. These invertebrates eventually re-establish their populations, but time is lost in maintaining and building up the soils. Over time, continual burning will result in soil depletion, much the same as continual plowing and crop harvesting will deplete mineral nutrients and negatively affect the soil structure. Fortunately in this area of California, there exist relatively young volcanic soils in the mountains and recent alluvial soils in the valleys that can tolerate fire without immediately showing negative effects. Continued burning though can have long-term negative effects (National Park Service, 2002).

Low intensity prescribed fires in light to medium fuels seldom produce enough heat to significantly damage soil or increase the erosion potential within a given watershed.

¹⁶ USDA Soil Conservation Service and US Forest Service, *The Soil Survey of Shasta County Area, California 1974*.

The chemical and physical properties of soil change dramatically after a high intensity fire. Loss of organic matter causes the soil structure to deteriorate, and both the water-storing and transmitting properties of soils are reduced. The living tissues of microorganisms and plants can be damaged by fire if the temperatures are above 1200 degrees F (DeBano 1970).

VIII. FIRE ACCESS AND ESCAPE ROUTES (MAPS 8-8c)

Roads are an essential part of any fire and fuels management plan, providing the principal access to the communities, homes and wild places in the watershed. Additionally, roads may offer a defensible space from which firefighters can conduct direct attack on wildfires and also provide strategic locations for roadside shaded fuel breaks. Roadside shaded fuel breaks provide not only defensible space for firefighters, but also a safe escape route for residents in the event of a wildfire.

Iron Mountain Road, Keswick Dam Road, Highway 151, and Lake Boulevard are the primary routes within the plan area. Roads in the Keswick Basin plan area typically intersect Iron Mountain road on the west and Lake Boulevard on the east. The area can be accessed from I-5 by Highway 151, Pine Grove, Oasis Road, and Highway 299, which are the major east and west connection routes in the area.

All roads are important for providing fire protection access. This plan will not attempt to identify and map all paved or improved roads. Roads that are vital to future projects will be included in treatment options. **Table 3** depicts the most important fire access/escape roads.

TABLE 3 – KESWICK BASIN PLANNING AREA
FIRE ACCESS AND ESCAPE ROADS

	Sub Unit	Road/Street
West of the Sacramento River	Keswick	Iron Mountain Road Keswick Dam Road North Street Market Street
	North of Keswick	Iron Mountain Road
East of the Sacramento River	Centimudi	Lake Boulevard Highway 151
	Flanagan	Lake Boulevard Flanagan Road Yellow Pine Avenue Beltline Road Glorfield Trail

	Walker Mine Road	Walker Mine Road Lake Boulevard Williamson Road Johnson Road Western Way
	Quartz Hill North Road	Bailey Road Mac's Road Lake Boulevard
	Quartz Hill South Road	Old Diggins/Quartz Hill Keswick Dam Road
	Eastshore Road	Eastshore Road McLeod Road Spring Creek Keswick Dam Road
	South Keswick Dam Road	Buena Ventura Boulevard

IX. BIOMASS ANALYSIS

For thousands of years, people have been taking advantage of the earth's vegetation, also called biomass, to meet their energy needs (www.epa.gov, 2002). Technologies for using biomass continue to improve and today biomass fuels can be converted into alternative fuels (biofuels), such as ethanol, methanol, biodiesel, and as boiler fuel for use in industrial heating and power generation.

When used for generating electricity, biomass is typically burned to transform water into steam, which is used to drive a turbine and attached generator (www.epa.gov, 2002). Although a majority of the biomass market is associated with energy production, biomass offers a wide variety of uses such as fiber-reinforced composites, fiber-filled thermoplastics, high performance fiberboard, cement board, mulch for landscaping and soil amenities, chips for curing, chips for pulp and paper, and flavoring meat and bio-oils which are used as asphalt additives or adhesives. Potential markets continue to be explored and developed by the private sector. The Federal government has also interest in the biomass industry by the release of Executive Order 13134, on August 12, 1999, by President Clinton, designed to stimulate the creation and early adoption of technologies needed to make biobased products and bioenergy cost-competitive in the large national and international markets (www.bioproducts-bioenergy.gov, 1999).

The utilization and development of biomass technology offers many economic and socioeconomic benefits. However, one of the most widely acknowledged benefits is the development and utilization of biofuels as a means to reduce the world's dependency on non-renewable fossil fuels. Presently, a majority of the electricity in

the U.S. is generated by burning fossil fuels such as coal, natural gas, and oil. On the local level, the development of biotechnology also offers both economic and socioeconomic benefits. The Keswick Basin planning area contains thousands of acres of forest and brush land, which produce a substantial amount of renewable biomass each year. The biomass market associated with wood products production has long been developed, and biomass harvesting for fuel reduction is a common practice within managed forestlands in northern California. Biomass production not only provides economic support at the local, state, and Federal levels, but also reduces the nation's dependency of fossil fuels. The watershed also contains thousands of acres of brushland, which produce a significant amount of renewable biomass, although only a small portion of the biomass produced from chaparral landscapes is utilized for biofuels.

The potential for biomass production within the Keswick Basin is good given that the area contains a substantial amount of raw material (brushland and forest land species). The closest wood-fired power plant is approximately 30 road miles away in Anderson, California. It is a 50 megawatt biomass-fired power plant.

The feasibility of any biomass operation depends on the market price of biomass, (also commonly called hogged fuel or hog fuel if it is processed through a hammer hog) the density or amount of fuel on the ground, and transportation costs. Processing can include harvesting and chipping or hogging and costs are directly correlated with the species, age, size, and density of the vegetation being processed as well as the topography of the area. The transportation cost from the project area to the nearest wood-fired power plant is directly related to the size of the vehicle, loading time, the road system and distance to the plant.

The price a power plant is willing to pay for a ton of biomass vs. the processing and transportation costs determines the economic feasibility of an operation. However, the value of fuel reduction to the landowner should be included in this calculation to determine the true feasibility of a biomass operation.

Harvesting is usually accomplished with an excavator and/or a bulldozer tractor, which is utilized to remove and pile the brush. Processing can be accomplished with a hammer hog, tub grinder, drum chipper or some other type of industrial type chipper or grinder fed by an excavator or other mechanical means.



Biomass Collection in Action
Tub grinder on right, conveyor moves biomass
into the van.

Pursuant to the California Forest Practice Rules, if biomass operations involve the harvest of commercial species, the project requires a permit issued by C. Biomass operations not involving the harvest of commercial species are not subject to the California Forest Practice Rules, but are subject to water quality rules, and may require county permits or other agency review depending on the physical characteristics of the project area. A Registered Professional Forester should be involved prior to commencement of any biomass operation in order to determine what permits might be required and to estimate the cost and timing to obtain the permits.

Although the biomass for energy industry is the most developed market in northern California, other markets are currently in the developmental stage and may become a commercially viable option for biomass products in the future. These markets are far from becoming a significant force in the market place, but may provide alternative utilization methods and future marketing opportunities.

X. POTENTIAL COST-SHARE FUNDING SOURCES

The following table is a list of cost-share programs provided by the University of California Cooperative Extension Service (UCCE).

TABLE 4 – FUNDING SOURCES AND COST-SHARE PROGRAMS

Program	Goals	Services	Will Fund	Agency	Who	Limitations
Emergency Watershed Protection	Safeguard people and property following natural disasters.	Technical and financial assistance	Up to 75%	NRCS	Public agencies, non-profits, community groups	25% cost-share. Must obtain necessary permits
Environmental Quality Incentives Program	Address significant natural resource needs and objectives	Cost sharing, technical and educational assistance	Up to 75% set by local working group	NRCS, FSA	Agricultural producers having significant natural resource needs	Approved practices up to \$10,000 per producer per year. Must have Conservation Plan approved by RCD.

Hazard Mitigation Grant Program	Hazard mitigation to reduce risk from future disasters	Cost-share	Up to 75%	FEMA	Agencies, governments, non-profits, tribes	Federal Disaster Areas
Vegetation Management Program	Provide incentives for using fire as a tool to control unwanted brush, and other vegetation, which creates wildfire hazards?	Covers liability, conducts prescribed burn	Up to 90% cost-share	CAL FIRE	Landowners, individual or group	Agreement to sign, plan required
California Forest Improvement Program	Forestry, watershed and riparian protection and enhancement	Reforestation, site prep, land conservation, and fish & wildlife habitat improvements	75% up to \$30,000 per contract, rehab after natural disaster up to 90%	CAL FIRE	Landowners	Plan (can be cost-shared) required, 20-50,000 acres of forestland

Additional funding sources include:

- California Department of Conservation, RCD Grant Assistance Program
- U. S. Forest Service, Forest Service Community and Private Land Fire Assistance Grant Program
- Shasta County Resource Advisory Committee, Title II Funds, Secure Rural Schools and Community Self-Determination Act of 2000
- Sacramento Regional Foundation (for the Bureau of Land Management), Community-Based Wildfire Prevention Program
- California State Fire Safe Council, Clearing house for sources of funding for fuel reduction projects

XI. FUNDING SHADED FUEL BREAK MAINTENANCE

Since grant funds are often available only to construct the shaded fuel break, maintenance efforts are often left to the landowner. Unfortunately, some landowners do not have the physical or financial means to do maintenance. If a shaded fuel break is not properly maintained in its entirety, it will not provide adequate fire protection in the long run. Therefore, in some situations it is often best for fire safe councils, watershed groups, and other conservation organizations to seek funding for maintenance as a means to ensure fire protection for a given area. The Keswick Basin Cooperative Wildfire Protection Plan was developed as a result of the USFS National Fire Plan. This plan provides grant funding for fuel reduction projects on private lands. In addition, many of the programs listed in Table 5 above also provide funding opportunities for fuels reduction and maintenance. Future legislation may also provide funding for fuels reduction projects.

In addition, many private sector programs are available. Information on private sector funding can be found at the following **Internet sites**:

www.fdncenter.org
www.ice.ucdavis.edu/
www.tpl.org/tpl/about/

www.ceres.ca.gov/foreststeward/funding.html
www.teleport.com/~rivernet/general.htm
www.ufe.calpoly.edu/data/news/grants.html

Funding programs can assist in the development of shaded fuel breaks, defensible space around structures, roadside fuel reduction, and community fire safe projects.

XII. KESWICK BASIN COMMUNITY WILDFIRE PROTECTION PLAN **ACTION ITEMS**

A. INTRODUCTION:

Action items described in this plan have been proposed by the Keswick Basin Technical Advisory Committee. All action items are an integral part of any plan to manage the fuels in the Keswick Basin plan area. Funding for these action items, as well as others that may arise in the future, is discussed in a separate section of this plan. A priority list of fuel reduction projects was developed by the Technical Advisory Committee. Factors considered in developing this project list include:

- Fire history for the area, both lightning caused and human-caused fires.
- Heavy fuel loading conditions with closed canopies.
- Assets at risk.
- Common wind directions and speed.
- Roadsides overgrown with vegetation.
- Major topographical features important to fire control and weather patterns which influence fire behavior.
- Road access for firefighters.

B. POTENTIAL PROJECTS:

After several meetings to review the assets at risk, fire safe practices, Bureau of Land Management project plans and funding opportunities, the Technical Advisory Committee recommended to seek funding and/or agency support for the following:

- Develop an Emergency Evacuation Plan for that portion of the Keswick Basin planning area that lies outside the Shasta Lake Fire Protection District.
- Develop comprehensive road maps of the area to assist emergency response agencies.
- Locate emergency Landing Zones for helicopters in neighborhoods.
- Develop a citizen's alert system for residents and businesses to provide notification in the event of an emergency.

- Reduce hazardous fuels along side roads to provide safe and efficient ingress and egress for citizens and firefighters in the event of a wildland fire.
- Assist residents unable to meet the challenge of reducing the fuel load on their property.

**C. CONSTRUCT SHADED FUEL BREAKS AND DEFENSIBLE SPACE
(MAPS 9-11):**

Sites for shaded fuel breaks and defensible space have been identified by members of the TAC and citizens at public review meetings. Locations of the proposed shaded fuel breaks are focused on a combination of neighborhood protection and the desire for safer escape routes and safer areas for firefighters to operate from to suppress wildfires. New shaded fuel breaks should be constructed as funding becomes available, and/or as partnerships can be formed to benefit a larger part of the community. The following list is arranged by planning sub unit, and prioritized by the Technical Advisory Committee.

BASIC ASSUMPTIONS	
Areawide	All state road easements are owned by Cal Trans. All county road easements are owned by Shasta County
West of Sacramento River	
People	2.3 per dwelling
Dwellings	154
Property Value (\$ 130,000per dwelling)	\$20,200,000
Spring Creek transmission lines	\$357,500
BLM boat ramp facilities	\$1,700,000
East of Sacramento River	
People	2.3 per dwelling
Dwellings	895
Property Value (Varies per area) Shasta Co./City of Shasta Lake (96019) -- (\$199,000/dwelling) Shasta Co./Redding (96003) – (\$207,000/dwelling)	\$180,094,058
Schools (Toyon)	\$20,000,000
WAPA transmission lines	\$6,885,000
City of Shasta Lake transmission lines	\$362,250
City of Shasta Lake substation	\$4,850,000

WEST OF THE SACRAMENTO (MAP 9):

➤ **KESWICK**

#1 Concern – Lack of Defensible Space in Keswick community.

Proposed Solution: Encourage the development of a defensible space/Firewise Program for the community of Keswick

Ownership = 99 % private land
Number of dwellings = 142
Value of dwellings = \$18,460,000
Number of people = 327

**Keswick #1 Concern
Home needing defensible space**



#2 Concern –Iron Mountain Road

Proposed Solution: Shaded fuel break along the Iron Mountain Road from Keswick Dam Road north for 1.16 miles to South Spring Creek x 100 ft. on both sides of the road = 28.2 ac. treated

Ownership – 99 % private land
Number of dwellings = 150
Value of dwellings = \$19,500,000
Number of people = 345

**Keswick #2 Concern Iron Mountain Road
Note dense brush and trees up to road
edge**



#3 Concern: Keswick Dam Road

Proposed Solution: Shaded fuel break along Keswick Dam Road from Iron Mountain Road east for 1.1 miles, 100 ft. on both sides of the road = 26.7 ac. treated

Right of Way Ownership – 82% Private, 18% Public
Number of dwellings = 150 (#1 above plus 8 scattered along Keswick Dam Road)
Value of dwellings \$19,500,000
Number of people = 345

Keswick Concern #3 Keswick Dam Road
Note tree overstory to edge of road



#4 Concern: East of Keswick

Proposed Solution: Fuel break east from the Spring Creek power house along the power line to Core Street then southwesterly cross country to North Street, .20 miles x 300 ft. = 7.28 acres.

Ownership = 99 % private land
Number of dwellings = 150
Value of dwellings = \$19,500,000
Number of people = 345
Spring Creek Power Lines = \$357,500

Keswick #4 Concern East of Keswick
Note dense brush up to road edge



#5 Concern: North Street

Proposed Solution: Shaded fuel break along North Street from the intersection with the Iron Mountain Road to the intersection with Keswick Dam Road, 1.06 miles x 100 ft. on each side = 25.7 acres.

Ownership = 99 % private land
Number of dwellings = 150
Value of dwellings = \$19,500,000
Number of people = 345

**Keswick #5Concern North Street
Note dense brush and trees up to
road edge**



#6 Concern: Market Street

Proposed Solution: Shaded fuel break along California Street south from Wright Street to intersection with North Street, then east to Market Street, then south to Iron Mountain Road, .53 miles x 100 ft. on each side = 12.9 acres.

Ownership = 99 % private land
Number of dwellings = 142
Value of dwellings = \$19,500,000
Number of people = 345

**Keswick #6 Concern Market Street
Note dense brush and trees up to
road edge**



- **KESWICK NORTH**: Remainder of Keswick Basin west of the Sacramento River

#1 Concern –Iron Mountain Road

Proposed solution: Construct shaded fuel break along the Iron Mountain Road from South Spring Creek to Iron Mountain Mine gate, 3.9 miles x 100 feet each side of Iron Mountain Road = 96 acres treated.

Right of Way Ownership – 59% Private, 41% Public

Number of dwellings = 4

Value of Dwellings = \$520,000

Number of people = 9

Keswick North #1 Concern Iron Mountain Road

Note dense brush up to road edge



#2 Concern—BLM boat ramp road

Proposed solution: Construct shaded fuel breaks along BLM boat ramp road, .34 miles X 100 feet on each side = 8.25 acres treated

Right of Way Ownership – 100% Public

Number of dwellings = 0

Number of people = 0

BLM boat ramp facilities: \$1,700,000

Keswick North #2 Concern BLM Boat Ramp Road

Note dense brush to road edge



EAST OF THE SACRAMENTO RIVER (MAPS 10 & 11):

➤ **AREAWIDE:**

#1 Concern – Lack of defensible space around residences

Proposed Solution: Encourage the development of Firewise Programs/defensible space in the following neighborhoods:

- Toyon: 137 residences
- Buckeye St./Montego: 107
- Flanagan Road: 39 residences
- Yellow Pine Avenue: 20 residences
- Walker Mine Road East: 57 residences
- Walker Mine West: 22 residences
- Williamson Road/Bailey Road: 111 residences
- Mac's Road: 152 residences
- Quartz Hill: 144 residences
- Eastshore: 29 residences
- Keswick Dam road: 77 residences

Right of Way ownership = 100 % private land
Number of dwellings = 895
Value of dwellings = \$180,094,158
Number of people = 2059

East Areawide #1 Concern Defensible Space
Note home barely visible in left center



➤ **CENTIMUDI:** Area north and east of Highway 151 to Shasta Lake

#1 Concern –Lake Boulevard north of Highway 151

Proposed Solution: Construct shaded fuel breaks along Lake Boulevard north from Shasta Dam Boulevard, 1.1 miles x 100 feet on each side = 35 acres treated.

Right of Way Ownership – 100% Private (Lake Boulevard)

Number of dwellings = 59
Number of people = 136
Value of dwellings = \$11,144,000
School structures = \$20,000,000

Centimudi #1 Concern Lake Boulevard north of Highway 151
Note dense brush and trees up to edge of pavement



#2 Concern—Highway 151

Proposed solution:

Construct shaded fuel breaks along Highway 151 from intersection with Lake Boulevard to BOR parking lot, .42 miles x 100 feet on each side = 10 acres treated.

Right of Way Ownership – 100% Private
Number of dwellings = 20
Number of people = 46
Value of dwellings = \$3,980,000

Centimudi #2 Concern Highway 151
Note dense vegetation



-
- **FLANAGAN:** Area north from Walker Mine Road and west of Highway 151 to Lake Shasta.

#1 Concern—Flanagan Road

Proposed Solution: Construct shaded fuel breaks from the BLM gate east along Flanagan Road to Lake Boulevard, 1.2 miles x 100 feet on each side = 30 acres treated.

Right of Way Ownership – 83% Private, 17% BLM

Number of dwellings = 28
Number of people = 65
Value of dwellings = \$5,572,000
City of Shasta Lake powerline = \$1,400,000
City of Shasta Lake sub station = \$4,800,000

Flanagan #1 Concern Flanagan Road
Note dense brush and trees up to edge of pavement



#2 Concern—Yellow Pine Avenue

Proposed solution: Construct shaded fuel breaks from the end of Yellow Pine Avenue east to Beltline Road, .6 miles x 100 feet on each side = 15 acres treated.

Right of Way Ownership – 100% Private
Number of dwellings = 17
Number of people = 40
Value of dwellings = \$3,383,000

Flanagan #2 Concern Yellow Pine Avenue
Note trees and brush up to edge of pavement



#3 Concern – Glorfield Trail

Proposed solution: Maintain Glorfield Trail from Beltline Road for escape and firefighting purposes only east to Lake Boulevard, .3 miles x 100 feet on each side = 8 acres treated.

Right of Way Ownership – 100% Private
Number of dwellings = 3
Number of people = 7
Value of dwellings = \$597,000
Powerline = \$1,400,000

**Flanagan #3 Glorfield Trail
Keep maintained to allow escape**



#4 Concern— North Beltline Road/Beltline Road

Proposed solution: Construct shaded fuel breaks from the north end of North Beltline Road north of Flanagan Road to the end of Beltline Road at Walker Mine Road, 1.33 miles x 100 feet on each side = 32.7 acres treated.

Right of Way Ownership – 80% Private, 20% BLM
Number of dwellings = 20
Number of people = 46
Value of dwellings = \$3,980,000

**Flanagan #4 Concern North Beltline
Road/Beltline Road Note tree
overstory over pavement**



#5 Concern – Lake Boulevard

Proposed solution: Construct shaded fuel breaks along Lake Boulevard north from the Walker Mine Road to the intersection of Highway 151 and Lake Boulevard 2.02 miles x 100 feet on each side = 49 acres treated.

Right of Way Ownership – 100% Private
Number of dwellings = 96
Number of people = 221
Value of dwellings = \$19,104,000

Flanagan #5 Concern Lake Boulevard
Note dense brush and trees up to pavement edge



➤ **WALKER MINE ROAD:** Area from Bailey Road north to Walker Mine Road

#1 Concern—Walker Mine Road

Proposed solution: Construct and maintain shaded fuel breaks along Walker Mine Road from OHV parking area east to Lake Boulevard, 3.1 miles x 100 feet on each side = 75 acres treated.

Right of Way Ownership – 63% Private, 37% BLM

Number of dwellings = 44

Number of people = 102

Value of the dwellings = \$8,756,000

Walker Mine Road #1 Concern Walker Mine Road
Note dense brush and trees up to edge of road



#2 Concern—Williamson Road

Proposed solution: Construct shaded fuel breaks along Williamson Road from the Walker Mine Road south to Lake Boulevard, .7 miles x 100 feet on each side = 17 acres treated.

Right of Way Ownership – 63% Private, 37% BLM

Number of dwellings = 78

Number of people = 180

Value of the dwellings = \$1,552,200

Walker Mine Road #2 Concern Williamson Road
Note dense brush and trees up to road edge



#3 Concern—Lake Boulevard

Proposed solution: Construct shaded fuel break along Lake Boulevard north from Williamson Road to Walker Mine Road, .69 miles x 100 feet = 16.7 acres treated.

Right of Way Ownership – 88% Private, 12% BLM
Number of dwellings = 82
Number of people = 189
Value of the dwellings = \$16,318,000

Walker Mine Road #3 Concern Lake Boulevard
Note dense brush and trees to pavement edge



#4 Concern – Johnson Road

Proposed solution: Construct shaded fuel breaks along Johnson Road from Williamson Road west for .08 miles x 100 feet on each side = 1.9 acres treated.

Right of Way Ownership – 100% Private
Number of dwellings = 7
Number of people = 17
Value of the dwellings = \$1,393,000

Walker Mine Road #4 Concern Johnson Road
Note dense vegetation to edge of pavement



#5 Concern – Western Way

Proposed solution: Construct shaded fuel breaks along Western Way from Williamson Road west for .18 miles x 100 feet on each side = 4.4 acres treated.

Right of Way Ownership – 100 Private
Number of dwellings = 8
Number of people = 19
Value of the dwellings = \$1,520,000

Walker Mine Road #5 Concern Western Way
Note dense vegetation up to edge of pavement



-
- **QUARTZ HILL NORTH:** Area from Quartz Hill Road north to Bailey Road and east of Old Diggins Road.

#1 Concern—Bailey Road

Proposed Solution: Construct shaded fuel breaks from the west end of Bailey Road east to Lake Boulevard, .9 miles x 100 feet on each side = 22 acres treated.

Right of Way Ownership – 100 % Private
Number of dwellings = 12
Number of people = 28
Value of dwellings = \$2,484,000

Quartz Hill North #1 Concern Bailey Road
Note dense brush and trees to pavement



#2 Concern – Mac’s Road

Proposed Solution: Construct shaded fuel breaks from the west end of Mac’s Road east to Lake Boulevard, .6 miles x 100 feet on each side = 15 acres treated.

Right of Way Ownership – 100 % Private
Number of dwellings = 57
Number of people = 131
Value of dwellings = \$11,799,000

Quartz Hill North #2 Concern Mac’s Road
Note dense brush and trees up to single lane road edge



➤ **QUARTZ HILL SOUTH**: Area south and east of Quartz Hill Road to Keswick Dam Road.

#1 Concern— Quartz Hill Road

Proposed solution: Construct shaded fuel breaks from the Old Diggings road east along the Quartz Hill Road to Lake Boulevard, 1.4 miles x 100 feet on each side = 34 acres treated.

Ownership – 79% Private, 21% BLM
Number of dwellings = 90
Number of people = 207
Value of structures = \$18,630,000

Quartz Hill South #1 Concern Quartz Hill Road
(east of Old Diggings)
Note dense brush and trees up to road edge



#2 Concern – Keswick Dam Road

Proposed solution: Construct shaded fuel breaks along Keswick Dam Road from Quartz Hill Road to Lake Boulevard, 1.5 miles x 100 feet on each side = 37 acres treated.

Ownership – 80% Private, 20% BLM

Number of dwellings = 40

Number of people = 92

Value of structures = \$8,280,000

Quartz Hill South #2 Concern Keswick Dam Road
Note dense brush and trees up to edge of road



➤ **EASTSHORE DRIVE**: Area from Keswick Dam Road north to end of Bailey Road and west of Quartz Hill Road

#1 Concern – Keswick Dam Road

Proposed solution: Construct shaded fuel breaks along Keswick Dam Road, .8 miles x 100 feet on each side = 20 acres treated.

Right of Way Ownership – 37% Private, 63% BOR

Number of dwellings = 5

Number of people = 12

Value of dwellings = \$1,035,000

Eastshore Drive #1 Concern Keswick Dam Road
Note brush up to edge of road



#2 Concern – Keswick Lake Biomass project

Proposed Solution: Conduct biomass thinning in the area between Sacramento River and Keswick Estates to reduce fire threat to Lake Keswick Estates = 75 acres treated.

Ownership – 37% Private, 63% BOR
Number of dwellings = 55
Number of people = 1265
Value of dwellings = \$11,385,000

Eastshore Road #2 Concern Keswick Lakes Estates Biomass Project
Note extremely dense understory and overstory



#3 Concern – Macleod Road

Proposed Solution: Construct shaded fuel breaks along McLeod Road to Quartz Hill Road, .3 miles x 100 feet on each side = 8 acres treated.

Ownership – 100% Private,
Number of dwellings = 6
Number of people = 14
Value of dwellings = \$1,242,000

Eastshore Road #3 Concern Macleod Road
Note dense vegetation up to road edge



#4 Concern – Spring Road

Proposed solution: Construct shaded fuel breaks along Spring Creek Road to Quartz Hill Road, .3 miles x 100 feet on each side = 8 acres treated.

Ownership – 100% Private
Number of dwellings = 14
Number of people = 32
Value of dwellings = \$2,898,000

Eastshore Road #4 Concern Spring Road
Note dense vegetation up to road edge



-
- **KESWICK DAM ROAD SOUTH**: Area south of Keswick Dam Road and west of Buenaventura Boulevard to the Sacramento River.

#1 Concern— Buenaventura Boulevard

Proposed Solution: Construct shaded fuel break on westside of Buenaventura Boulevard south from Keswick Dam Road, .2 miles x 100 feet on each side = 3 acres treated.

Ownership – 100% BLM
Number of dwellings = 0
Number of people = 0
Value of structures = \$0

Keswick Dam Road South #1 Concern
Buenaventura Boulevard
Note dense brush and trees up to road edge on left side



E. UNDEVELOPED LOTS

There are many undeveloped lots scattered throughout the local sub-divisions in the area. Many of these landowners live outside Shasta County. Fuel build-up on these vacant parcels is dangerous for the rest of the homes in the area. A management guideline of the Keswick Basin CWPP will be to seek funding to identify absentee landowners and work with them to reduce fuels on undeveloped parcels.



Typical undeveloped lot

F. GRANT FUNDING OPPORTUNITIES

Funding sources are as varied as the projects listed above. There are several sources of funding available through the agencies in the area. Historically, funding sources have been CalFed, BLM, C, National Park Service (NPS), USFS, U. S. Fish and Wildlife Service (USFWS), and California Department of Conservation (DOC).

Programs that have funded fuel reduction projects in the past include:

- USDA Forest Service – Community Protection Grants Program
- USDA Forest Service – National Fire Plan Community and Private Land Fire Assistance Program
- California Department of Conservation – RCD Grant Assistance Program.
- USDI Bureau of Land Management – Community Based Wildfire Prevention Grants Program
- USDI Bureau of Land Management – Jobs In The Woods Program Grants
- USDI Fish and Wildlife Service – Jobs In The Woods Program Grants
- California Department of Forestry and Fire Protection
- National Park Service – Community Assistance Grants
- Shasta County – Secure Rural Schools & Community Self-Determination Act of 2000.

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APPENDIX B

GLOSSARY

BehavePlus – A computer program used for predicting fire behavior.

Chain – A unit of measurement equal to 66 feet.

Fuel Characteristics – Factors that make up fuels such as compactness, loading, horizontal continuity, vertical arrangement, chemical content, size and shape, and moisture content.

Fuel Ladder – Fuels which provide vertical continuity between strata. Fire is able to carry from ground, to surface, to crown.

Fuel Moisture Content – The amount of water in a fuel, expressed as a percentage of the oven-dry weight of that fuel.

Fuels – Any organic material, living or dead, in the ground, on the ground, or in the air, that will ignite and burn. General fuel groups are grass, brush, timber and slash.

Mast – Fruit of oaks and other trees, particularly where considered food for wildlife and domestic livestock.

Mechanical Treatment – Using mechanized equipment including but not limited to bulldozers with or without brush rakes, excavators, rubber tired skidders, mechanized falling machines, chippers and grinders.

Pile and Burn – Material is cut and piled in open areas to be burned. Burning takes place under permitting environmental conditions.

Prescribed Burning – The burning of forest or range fuels on a specific area under predetermined conditions so that the fire is confined to that area to fulfill silvicultural, wildlife management, sanitary or hazard reduction requirements, or otherwise achieve forestry or range objectives.

Rate of Speed – It is expressed as rate of forward spread of the fire front, usually is expressed as chains per hour.

Seral Vegetation – A series of plant communities that follow another over time on a specific site.

Shaded Fuel break – A wide strip or block of land on which the vegetation has been modified by reducing the amount of fuel available, rearranging fuels so that they do

not carry fire easily, and replacing particularly flammable fuels with others that ignite less easily and burn less intensely.

Surface Fire – A fire that burns surface litter, debris, and small vegetation.

Topography – The configuration of the earth's surface, including its relief and the position of its natural and manmade features.

Wildland Urban Interface (WUI) – Areas where urban fuels directly meet forest fuels, primarily within 66 to 200 feet of houses, but may extend as far as 1 ½ mile.

Wildland Urban Intermix (WUI) – Areas where urban fuels and structures are intermixed.

APPENDIX C

TECHNICAL ADVISORY COMMITTEE

Greg Watkins –Councilman, City of Shasta Lake
Leonard Moty –Supervisor, Shasta County
Terry Stinson –Batallion Chief, CAL FIRE
Tim Bradley – Bureau of Land Management, Fire Management Officer
George Chapman – National Park Service, Fire Management Officer
Ernst Little – USDA Forest Service, Fire Mangement Officer
Sandy Young – Keswick Volunteer Fire Company 53, Chief
Jeff Granberry – Redding Fire Department
Adrian Rogers – Shasta Lake Fire Protection District, Chief
Melinda Graves – Natural Resources Conservation Service, Soil Conservationist
Lee Delaney – Western Shasta RCD, Project Coordinator
Jack Bramhall – Western Shasta RCD, Project Manager

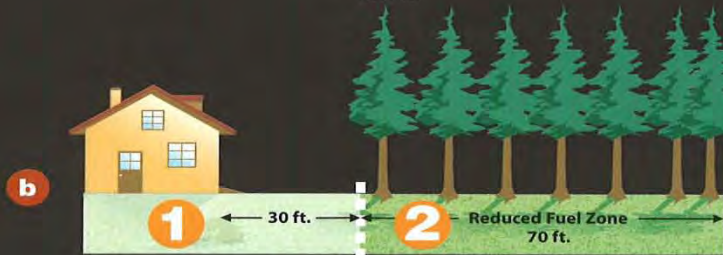
APPENDIX D

DEFENSIBLE SPACE GUIDELINES

100' DEFENSIBLE SPACE Make Your Home FIRE SAFE



or



Contact your local CDF office, fire department,
or Fire Safe Council for tips and assistance.

www.fire.ca.gov

Why 100 Feet?

Following these simple steps can dramatically increase the chance of your home surviving a wildfire!

A **Defensible Space** of 100 feet around your home is required by law.¹ The goal is to protect your home while providing a safe area for firefighters.

1 "Lean, Clean and Green Zone."

– Clearing an area of 30 feet immediately surrounding your home is critical. This area requires the greatest reduction in flammable vegetation.

2 "Reduced Fuel Zone."

– The fuel reduction zone in the remaining 70 feet (or to property line) will depend on the steepness of your property and the vegetation.

Spacing between plants improves the chance of stopping a wildfire before it destroys your home. You have two options in this area:

- a** Create horizontal and vertical spacing between plants. The amount of space will depend on how steep the slope is and the size of the plants.
- b** Large trees do not have to be cut and removed as long as all of the plants beneath them are removed. This eliminates a vertical "fire ladder."

When clearing vegetation, use care when operating equipment such as lawnmowers. One small spark may start a fire; a string trimmer is much safer.

Remove all build-up of needles and leaves from your roof and gutters. Keep tree limbs trimmed at least 10 feet from any chimneys and remove dead limbs that hang over your home or garage. The law also requires a screen over your chimney outlet of not more than ½ inch mesh.

¹ These regulations affect most of the grass, brush, and timber-covered private lands in the State. Some fire department jurisdictions may have additional requirements. Some activities may require permits for tree removal. Also, some activities may require special procedures for, 1) threatened and endangered species, 2) avoiding erosion, and 3) protection of water quality. Check with local officials if in doubt. Current regulations allow an insurance company to require additional clearance. The area to be treated does not extend beyond your property. The State Board of Forestry and Fire Protection has approved Guidelines to assist you in complying with the new law. Contact your local CDF office for more details.



April 2006

APPENDIX E

CITY OF SHASTA LAKE
EVACUATION PLAN



**WILDLAND FIRE
EVACUATION PLAN
City of Shasta Lake**



Printing provided by the above sponsors.

Are you prepared?

WILDLAND FIRE EVACUATION PLAN© CITY OF SHASTA LAKE

Pre-Fire Preparation

- ❑ Have adequate clearance around structures of all flammable material. Minimum of 100 feet in areas designated "Very High Fire Danger", (includes wood piles). (Greater distance may be required based on slope).
- ❑ Clear pine needles and leaves from gutters and roof. Trim back overhanging branches at least 10 feet from the outlet of any chimney or stovepipe.
- ❑ Replace roofing and siding with nonflammable or fire resistive materials.
- ❑ Reduce or remove flammable vegetation, including landscape plants, and replace with less flammable plants.
- ❑ Maintain greenbelt modification around developed areas.
- ❑ Install and maintain strategic fuel breaks.
- ❑ Have means of transporting pets readily available.
- ❑ Collect valuables, important documents, medications and other personal items in one place and be ready to evacuate if necessary. Maintain a mobile survival kit.
- ❑ Local Disaster Volunteers or Neighborhood Watch groups should conduct data collection on homeowners by neighborhood. Shasta County Social Services has information regarding medically fragile persons.
- ❑ Local groups should establish alternative communications and alerting methods such as phone trees.
- ❑ Preplan and prepare for a local disaster coordination point to be known as "Evacuee Collection Points" (ECP).

Public Agencies will carry out duties and functional responsibilities to the best of their ability, considering the extent of the emergency and available resources.

What to do if a Wildfire is Approaching

- ❑ Park your vehicle facing out. Put your valuables in the car. Place the car keys where you can find them.
- ❑ Secure pets and prepare them to be transported. **If you have livestock or large animals that you have no means of removal, contact the Sheriff's Office at 245-6540, with the number and type of animals.**
- ❑ Close shutters and heavy drapes.
- ❑ Leave your electricity on and leave some inside lights on. Leave doors unlocked.

What Would Happen in the Case of an Evacuation

- ❑ **Emergency Response Personnel (Fire Department/ Sheriff's Office) will decide the areas to be evacuated and notify the occupants.** The area to be evacuated will depend upon where the fire is, wind and fire behavior. Fixed evacuation plans will not work due to the variability of fire spread.
- ❑ **Law Enforcement agencies are responsible for carrying out the evacuation.** They will use deputies, officers, Search and Rescue, and citizen volunteer patrols (CVP). Law Enforcement agencies are responsible for the security of areas that are evacuated. Sheriff officers will be placed at road blocks to obtain information regarding people that may still be in an evacuated area.
- ❑ **The Local Community Disaster Rep. Or Neighborhood Watch Chairperson** will work closely with the Sheriff's Office in the Command Post to ensure that local needs are communicated.
- ❑ **Red Cross/Sheriff's Office will decide where people will be relocated for short-term relocation.** Red Cross will have a representative in the Command Post.
- ❑ **California Highway Patrol (CHP) and the Shasta County Sheriff's Office (SCSO), CalTrans/County Public Works will control traffic flow** and maintain access for emergency equipment. CHP and SCSO will have a representative in the Command Post. CHP and SCSO may utilize CVP, Search and Rescue, or Mutual Aid Law Enforcement Officers.

Three Levels of Shelter/Evacuation

❑ Evacuation Notification:

First notification may come in the form of an advisory. Residents will be advised of potential hazards and the possibility of future mandatory evacuation. Residents should prepare for the following alternatives and will be given instructions as to travel routes and Evacuee Collection Points. Second notification will be an evacuation order.

❑ Shelter in Place:

This would be for a low intensity fire where the structures have good clearance and are made of fire resistant materials and the Fire Department felt it was safe to stay.

❑ Evacuee Collections Points (ECP):

Temporary holding areas for smaller groups of people until shelter locations can be established. These locations are identified throughout the community to provide collection points that are a relatively short distance from their homes. A map of established Evacuee Collection Points and a list describing their location is attached. Not all Evacuee Collection Points may be available based on the location of the fire.

❑ Evacuation:

When an evacuation order is given, residents should leave immediately. Red Cross establishes shelters for the short-term housing and care of evacuated residents during an evacuation order.

Alternative Locations:

Residents who do not wish to use Red Cross shelters should consider determining in advance alternative housing locations. Access to these locations may be restricted due to the road closures resulting from the incident.

To assist in reuniting families, have an alternate out-of-the-area telephone contact point. If unable to make contact, call the Red Cross at (530) 243-3021.

❑ Planning Your Evacuation Route:

The direction of your evacuation will be dictated by the location of the fire in relation to your home and the direction and speed it is spreading. The following concepts will help you determine the safest travel route.

Single fixed routes will not work in a fire situation!

❑ Evacuee Collection Point:

Know the location of **all Evacuee Collection Points** in your area.

Primary Travel Routes

- ❑ Know the primary travel routes to get to the Evacuee Collection Points.
- ❑ Be prepared to be directed by Public Safety or traffic control personnel. You must follow their directions.
- ❑ Drive the routes, in advance, so that you will be prepared before the confusion of an actual emergency.

During Evacuation

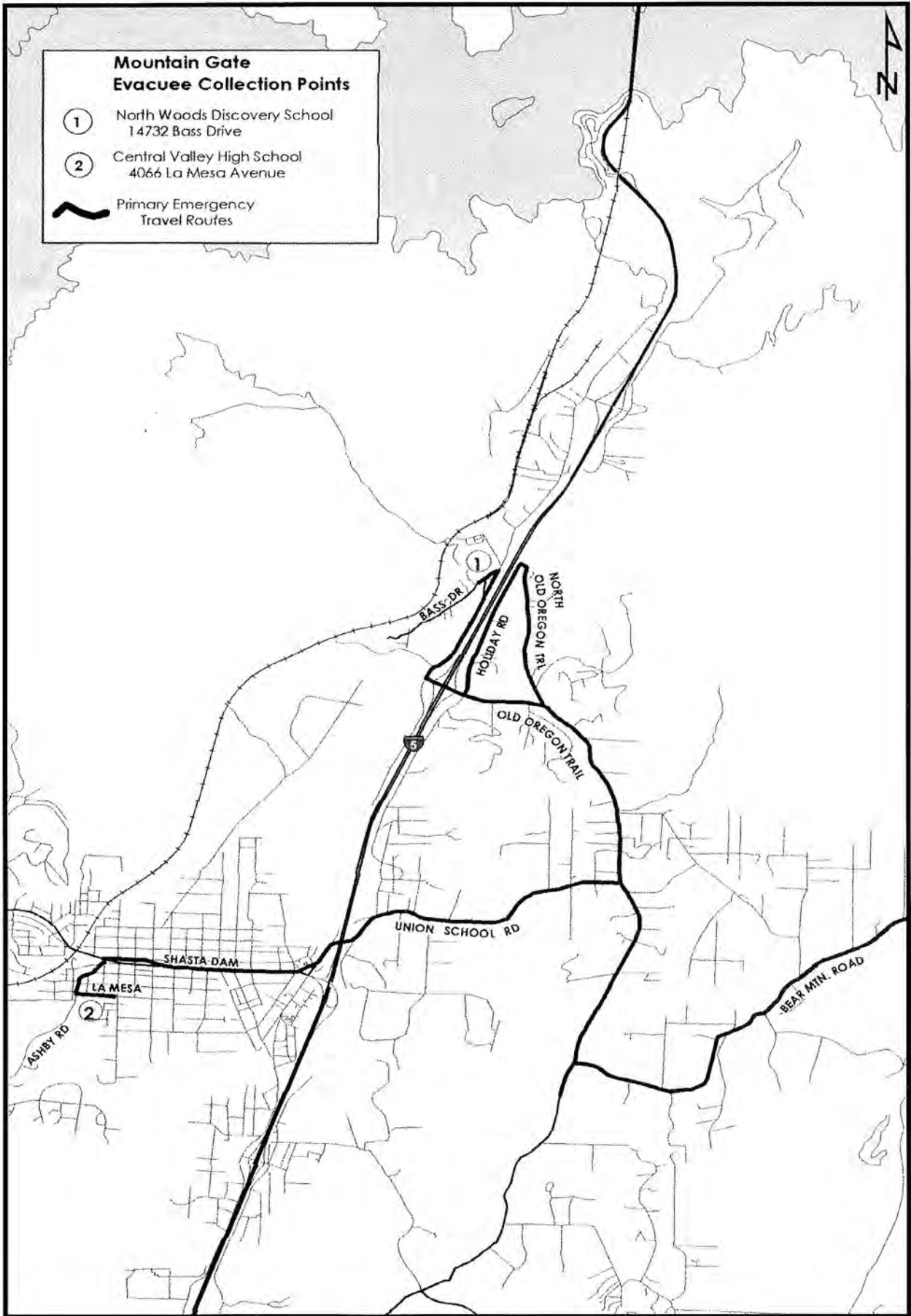
- ❑ Have checklist and map ready with all the actions you will take prior to and during evacuation.
- ❑ If you become trapped by fire while evacuating in your car, park in an area clear of vegetation, close all vehicle windows and vents, cover yourself with a blanket or jacket and lie on the floor. If you are trapped by fire while evacuating on foot, select an area clear of vegetation and lie face down.
- ❑ Watch for downed power lines.

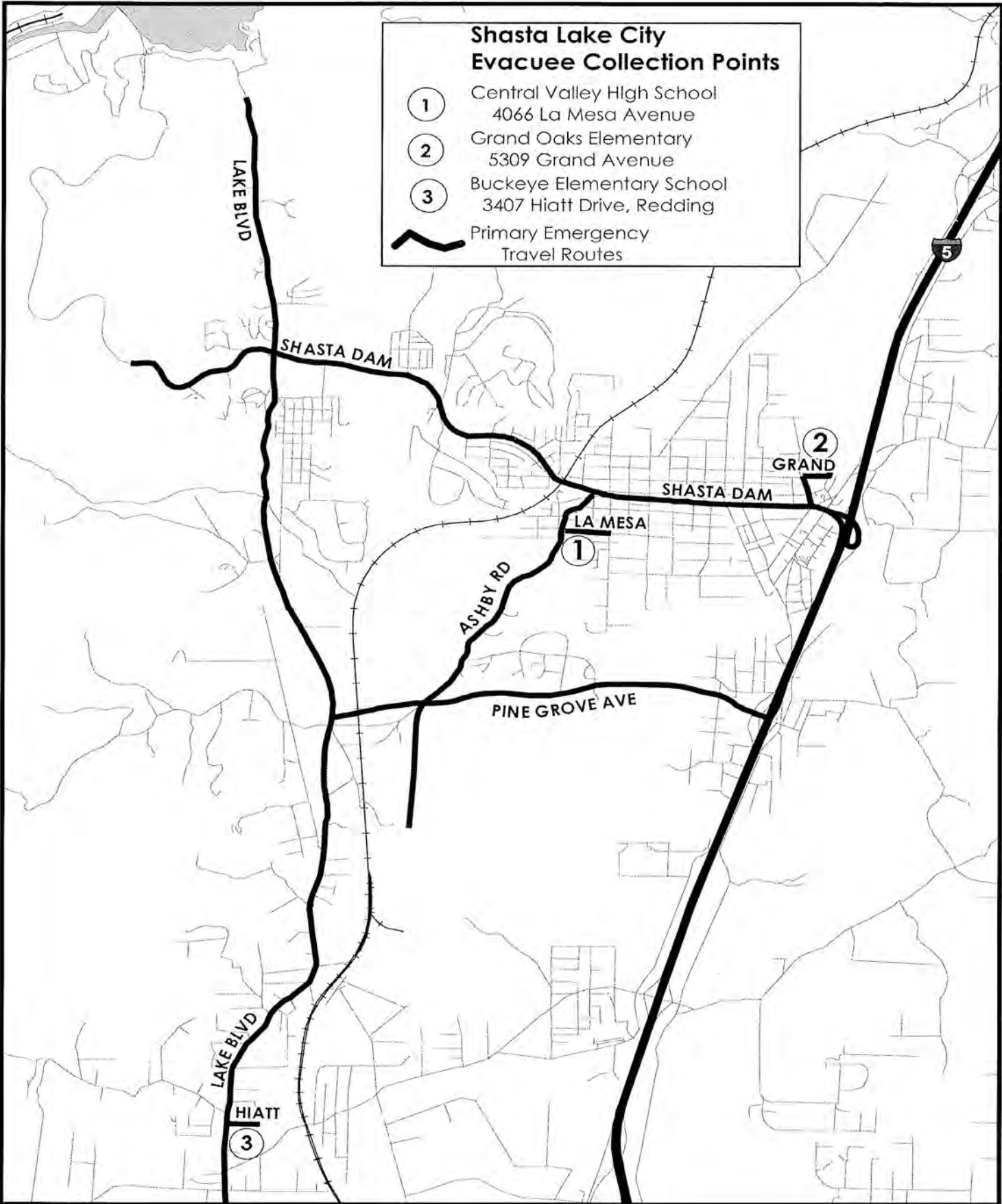
If You Are Unable to Evacuate When a Fire Approaches:

- ❑ Stay inside your house away from outside walls.
- ❑ Keep all doors closed but leave them unlocked.
- ❑ Keep your entire family together and **REMAIN CALM**. Remember if it gets hot in the house, it is four to five times hotter and more dangerous outside.

After the Fire Passes

- ❑ Check the exterior and roof immediately, extinguish all sparks and embers. If you must climb on the roof, use caution.
- ❑ Check inside the attic and underneath decks for hidden burning embers.
- ❑ Check your yard for burning woodpiles, trees, fence posts or other materials.





How Will Citizens Be Notified?

- | | |
|---|---|
| <input type="checkbox"/> Neighborhood Communication and Alerting Systems (phone trees) | <input type="checkbox"/> Local Radio Stations |
| <input type="checkbox"/> Emergency Alert System (EAS), alerting on radio and TV | KNNN 99.3 (FM) |
| <input type="checkbox"/> Fire Personnel | KQMS 1400 (AM) |
| <input type="checkbox"/> Home-to-home by the Sheriff's Office, their volunteers or other public safety personnel. | KSHA 104.3 (FM) |
| | KEGR 102.7 (FM) |
| | KEWB 94.7 (FM) |
| | KNCQ 97.3 (FM) |
| | KVIP 98.1 (FM) |
| | KVIP 540 (AM) |

When Can People Come Back Into Their Homes?

The Fire Department will determine when it is safe for citizens to move back into their homes. This will be done just as soon as possible. Please do not attempt to return to your house until Public Safety personnel have advised you that it is safe to do so. When safe, the evacuation area may be re-opened to residents only. A form of identification showing residential address may be required to allow access. Areas may remain closed to vehicle traffic for firefighter & public safety.

This will be announced through the media as well as on the California Department of Forestry and Fire Protection's information line (225-2510), at roadblocks, Evacuee Collection Points, information points, and Red Cross shelters.

For more information, contact the California Department of Forestry & Fire Protection office at (530) 225-2418. Contact the Red Cross at (530) 243-3021 for disaster preparedness information.

Be alert for downed power lines and contact your gas and electric company before turning utilities back on.

Where To Keep This Plan:

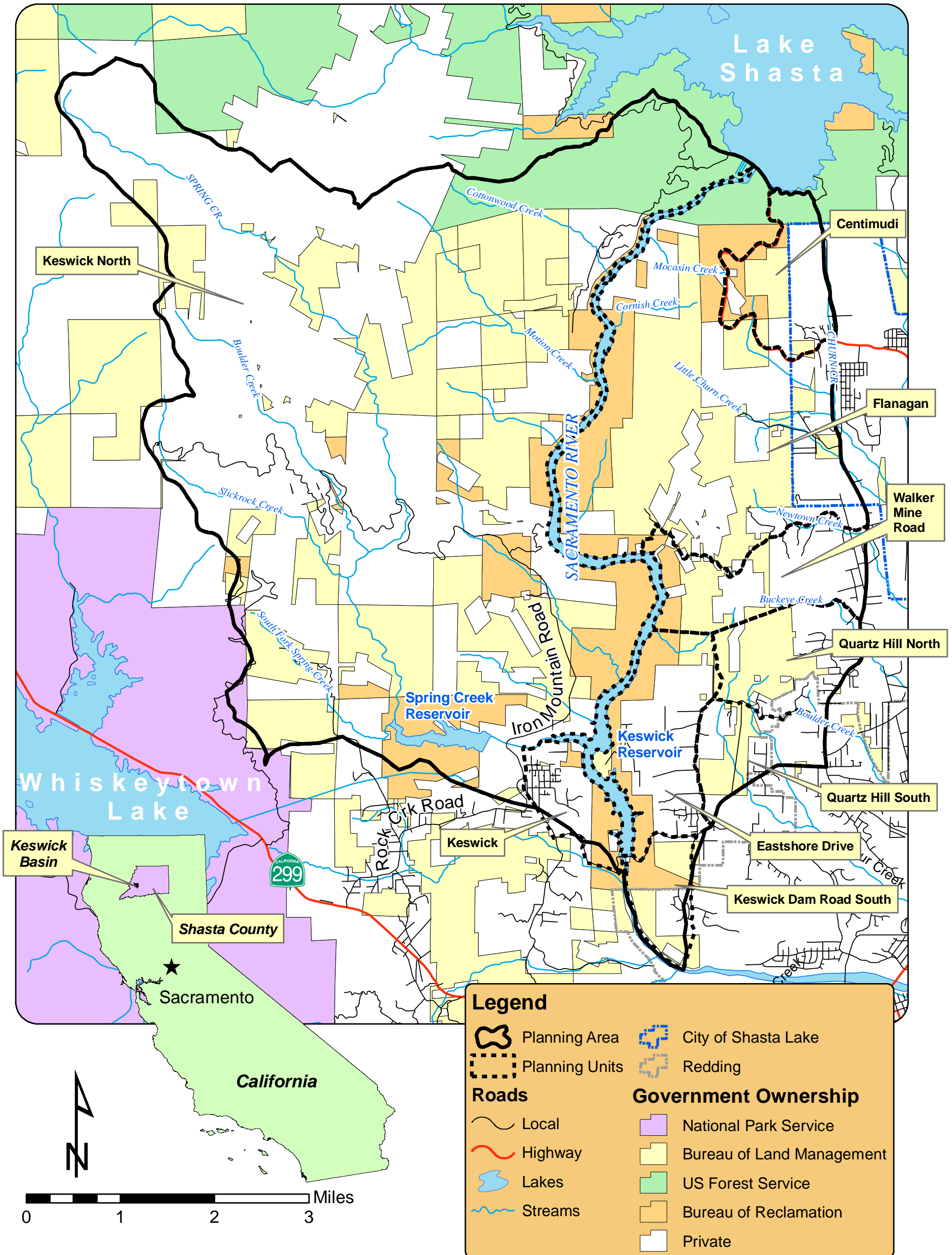
A few suggestions on locations for keeping and maintaining your escape plan:

- Refrigerator Door
- Home Bulletin Board

Shasta Lake Fire District
4126 Ashby Court
City of Shasta Lake, CA 96019
Info Only (530) 275-7474

MAPS

MAP 1 Keswick Basin Planning Area/Planning Subunits

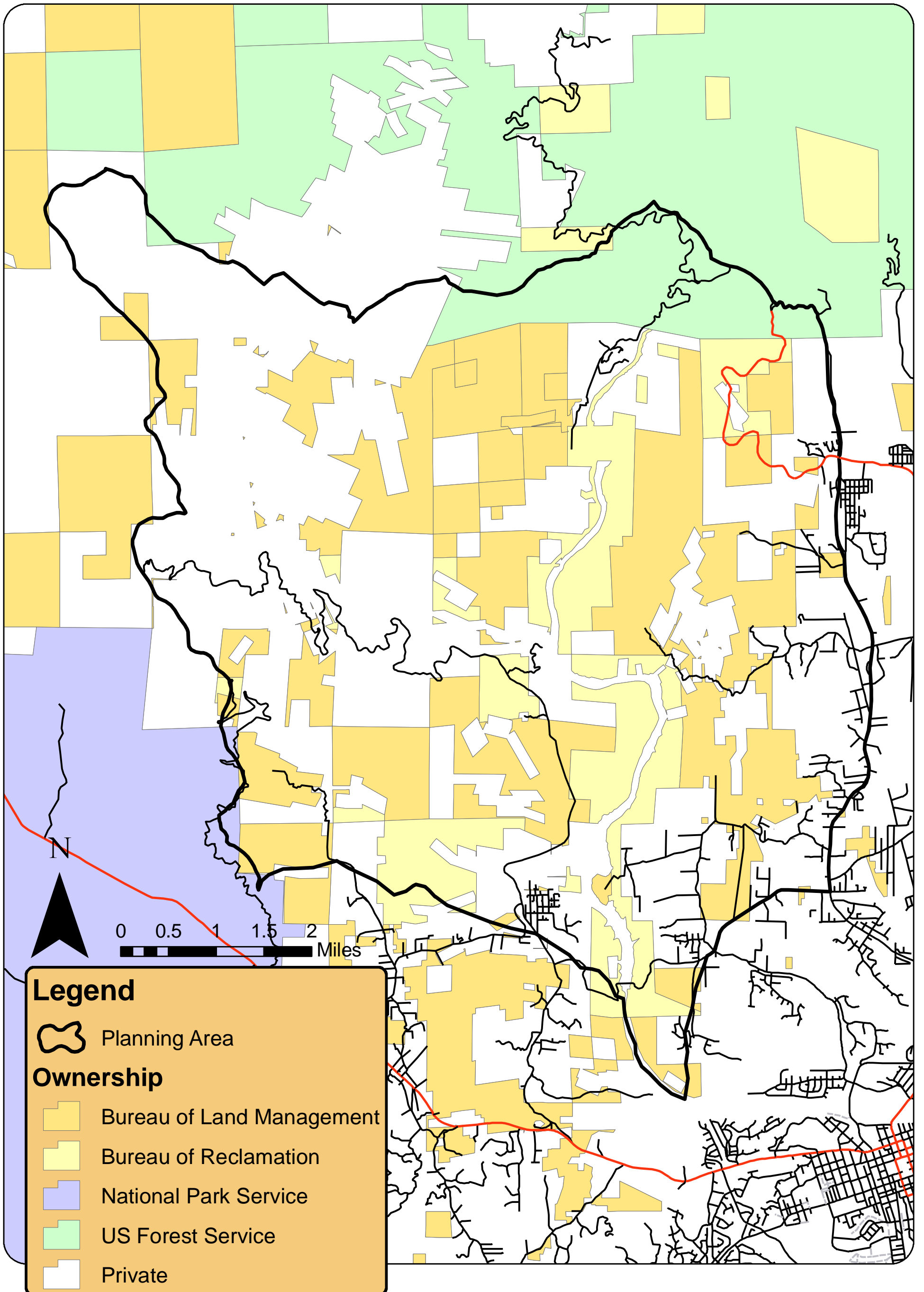


Legend

Planning Area	City of Shasta Lake
Planning Units	Redding
Roads	
Local	National Park Service
Highway	Bureau of Land Management
Lakes	US Forest Service
Streams	Bureau of Reclamation
	Private

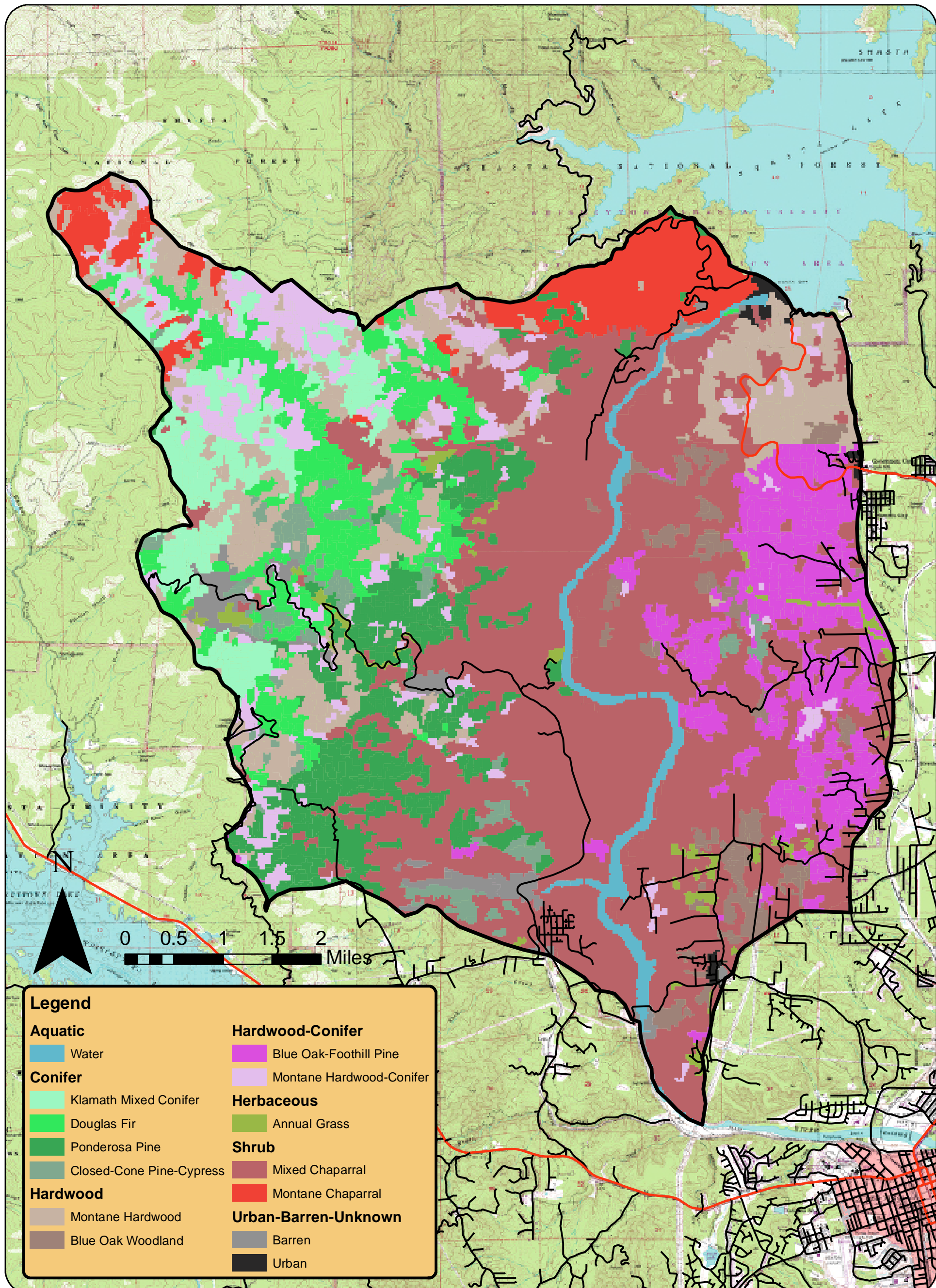
MAP 2

Keswick Basin - Land Ownership



MAP 3

Keswick Basin - General Vegetation



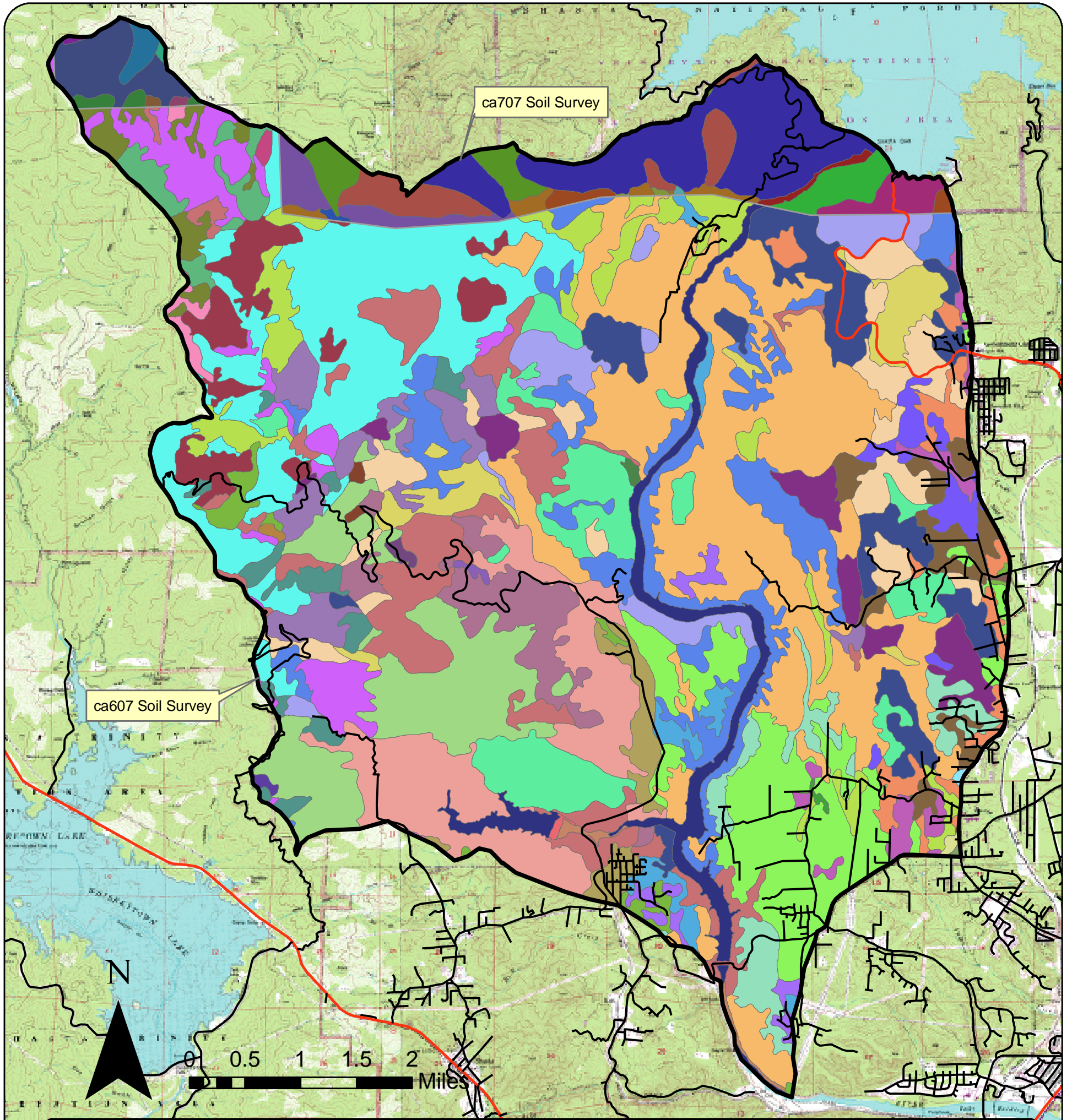
MAP 4

Keswick Basin - CNDDDB



MAP 5

Keswick Basin - Soils



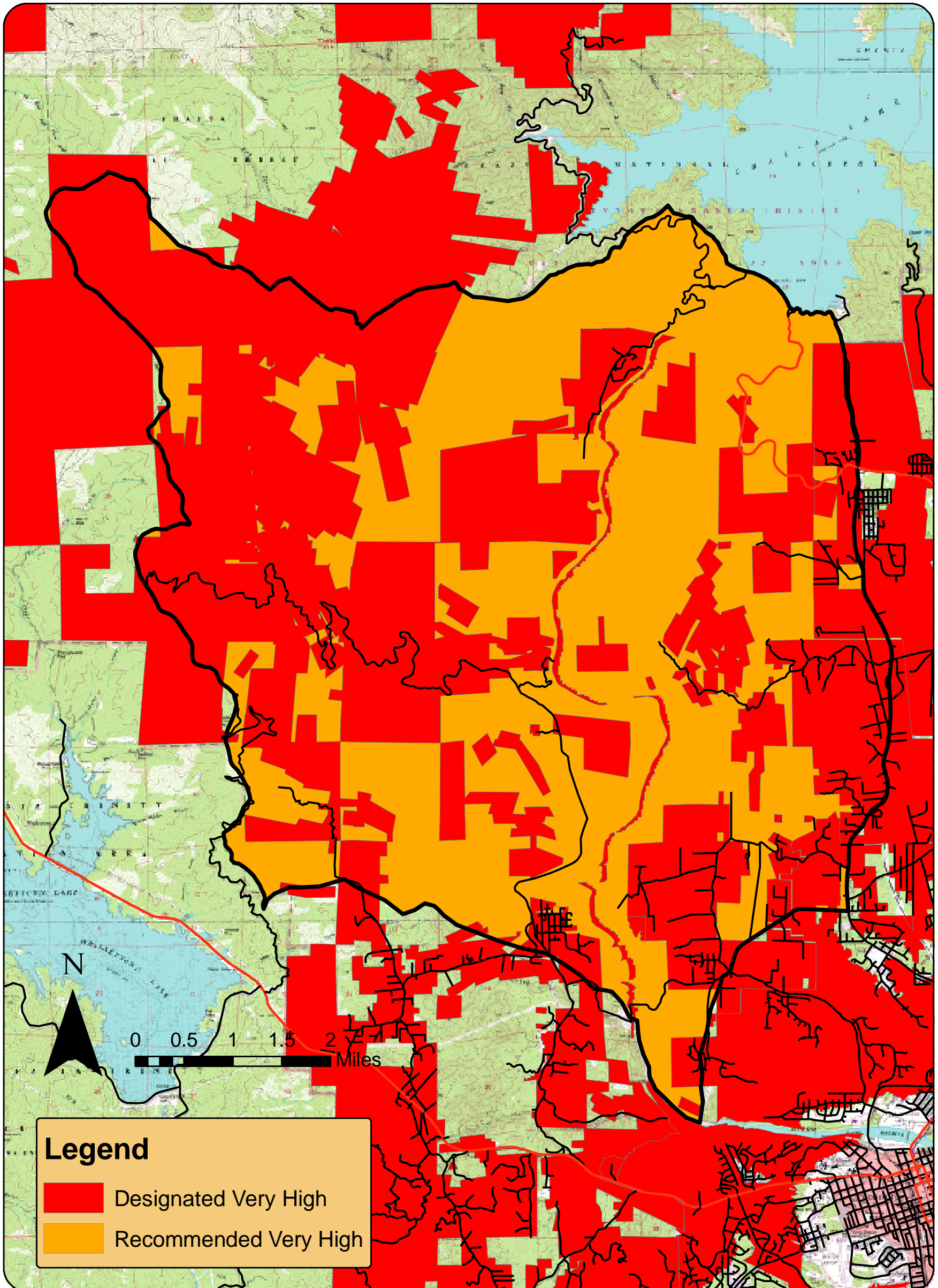
Legend - musym

ca607					ca707				
BkC	CbF	JdE	RbA	ArDsh	GeF2sh				
Ad	BkD	CfA	RbB	177	AtE2sh	KgF2sh			
AnB	BkE	CsF	MaE	183	BeE2sh	MaEsh			
AnD	BIF	DAM	MaG	203	BhF2sh	MbG2sh			
ArD	BoE3	DfD2	MbG2	259	BoF3sh	RxFsh			
AsD2	BoF3	DgE2	MeD	33	CsFsh	W			
AtE2	CaE3	DgE3	NdE	80	GeE2sh				
AuF2	CaF3	GdD	NdG	TcE					
BeE2	CbD2	GeE2	NeD	W					
BhF2	CbE	GeF2	PcD						

ca607 : Shasta County Soil Survey
ca707 : Shasta-Trinity Soil Survey

MAP 6

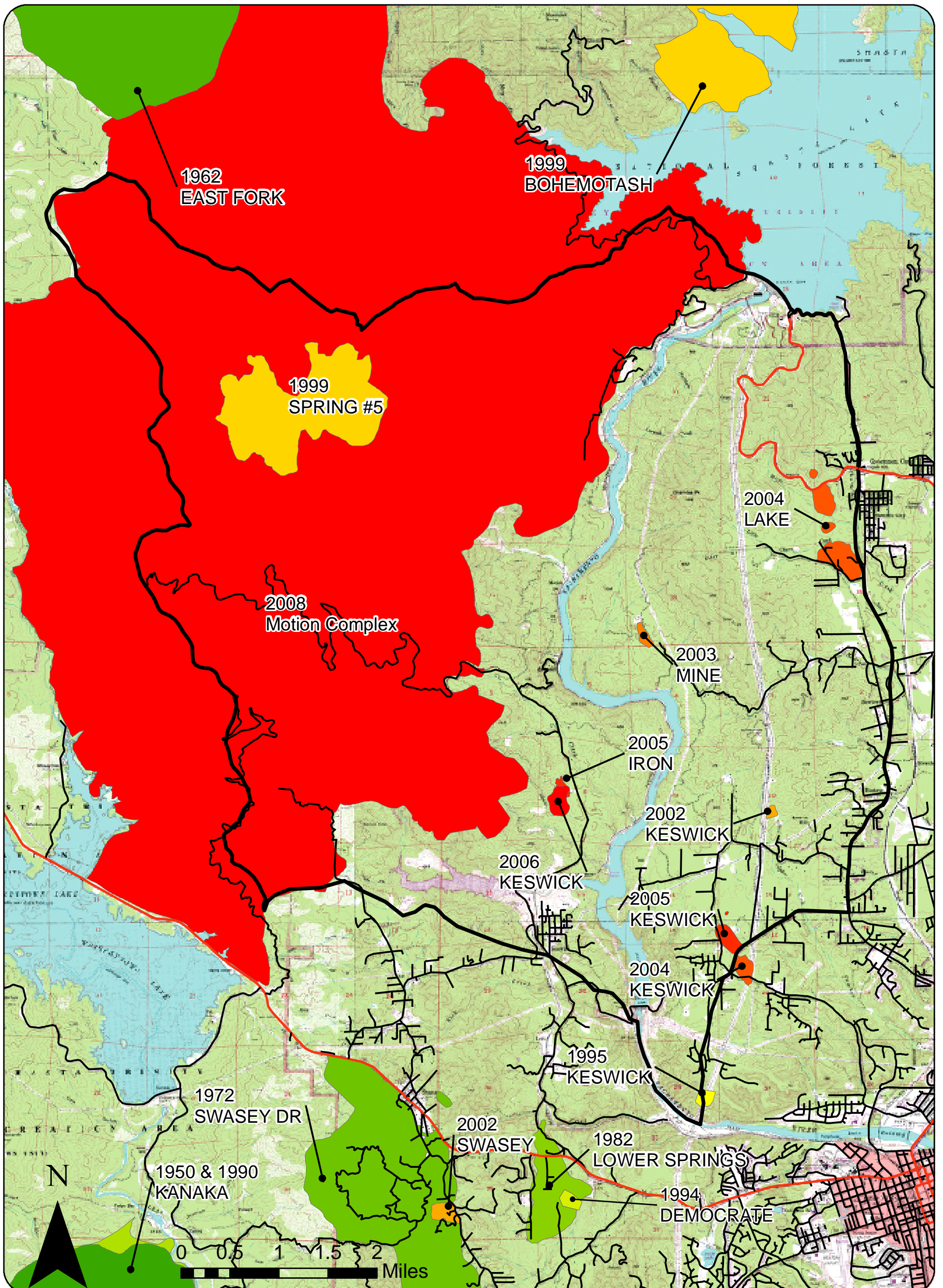
*Keswick Basin - Fuel Hazard Severity Zone Rating**



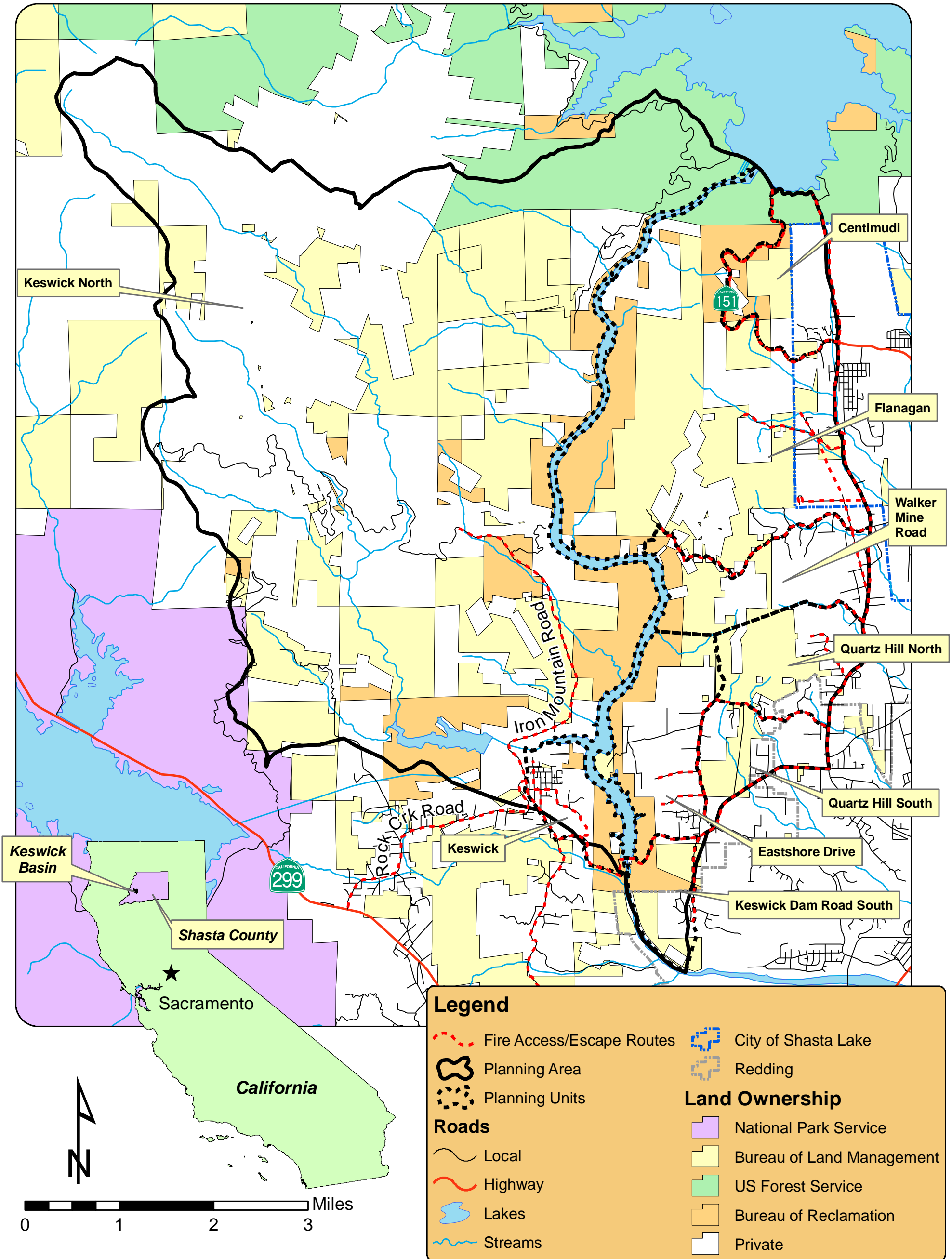
* Cal Fire Rating

MAP 7

Keswick Basin - Fire History



MAP 8 Keswick Basin Fire Access/Escape Routes

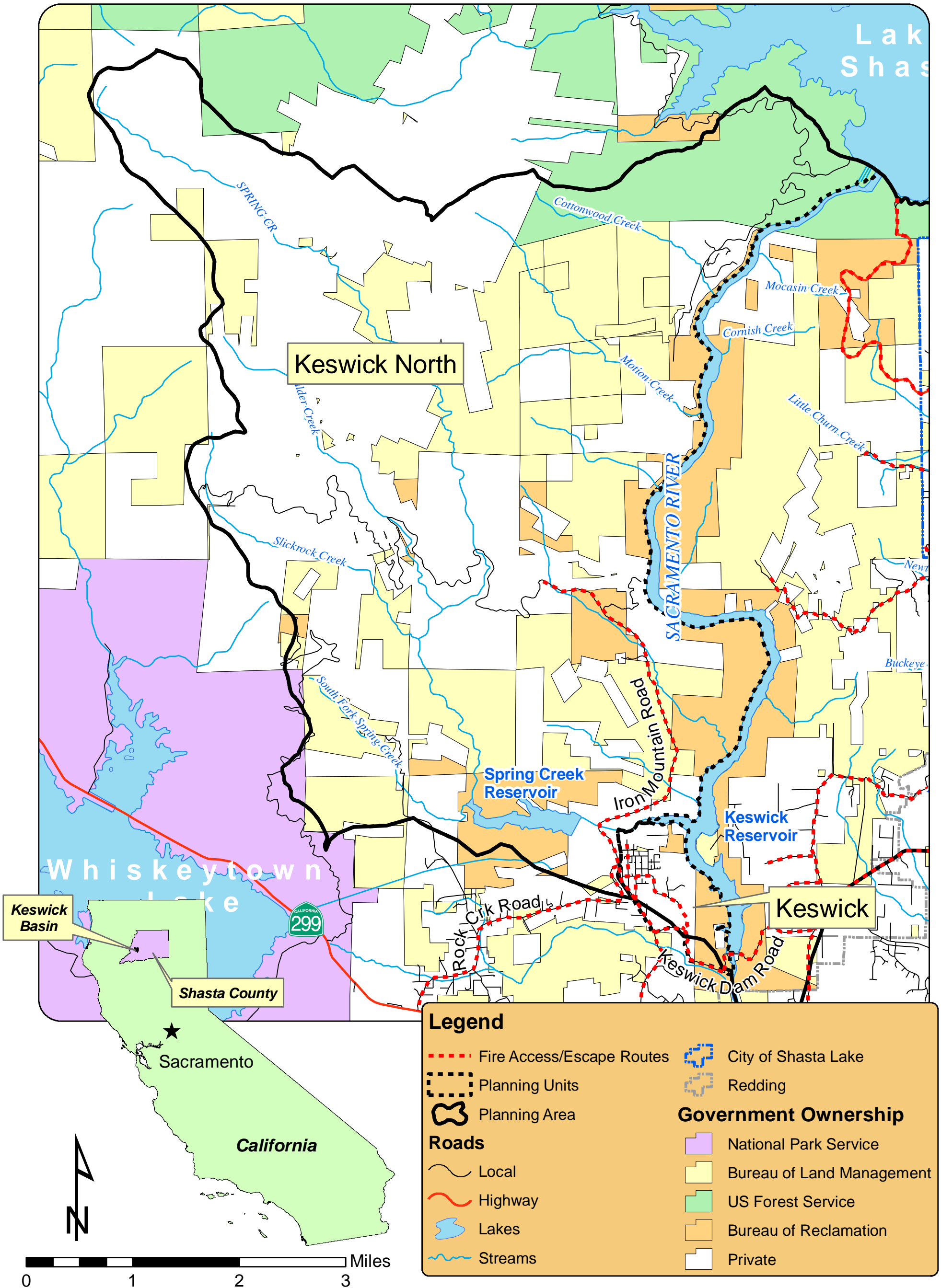


Legend

- Fire Access/Escapes Routes
- City of Shasta Lake
- Redding
- Planning Area
- Planning Units
- Roads**
- Local
- Highway
- Lakes
- Streams
- Land Ownership**
- National Park Service
- Bureau of Land Management
- US Forest Service
- Bureau of Reclamation
- Private

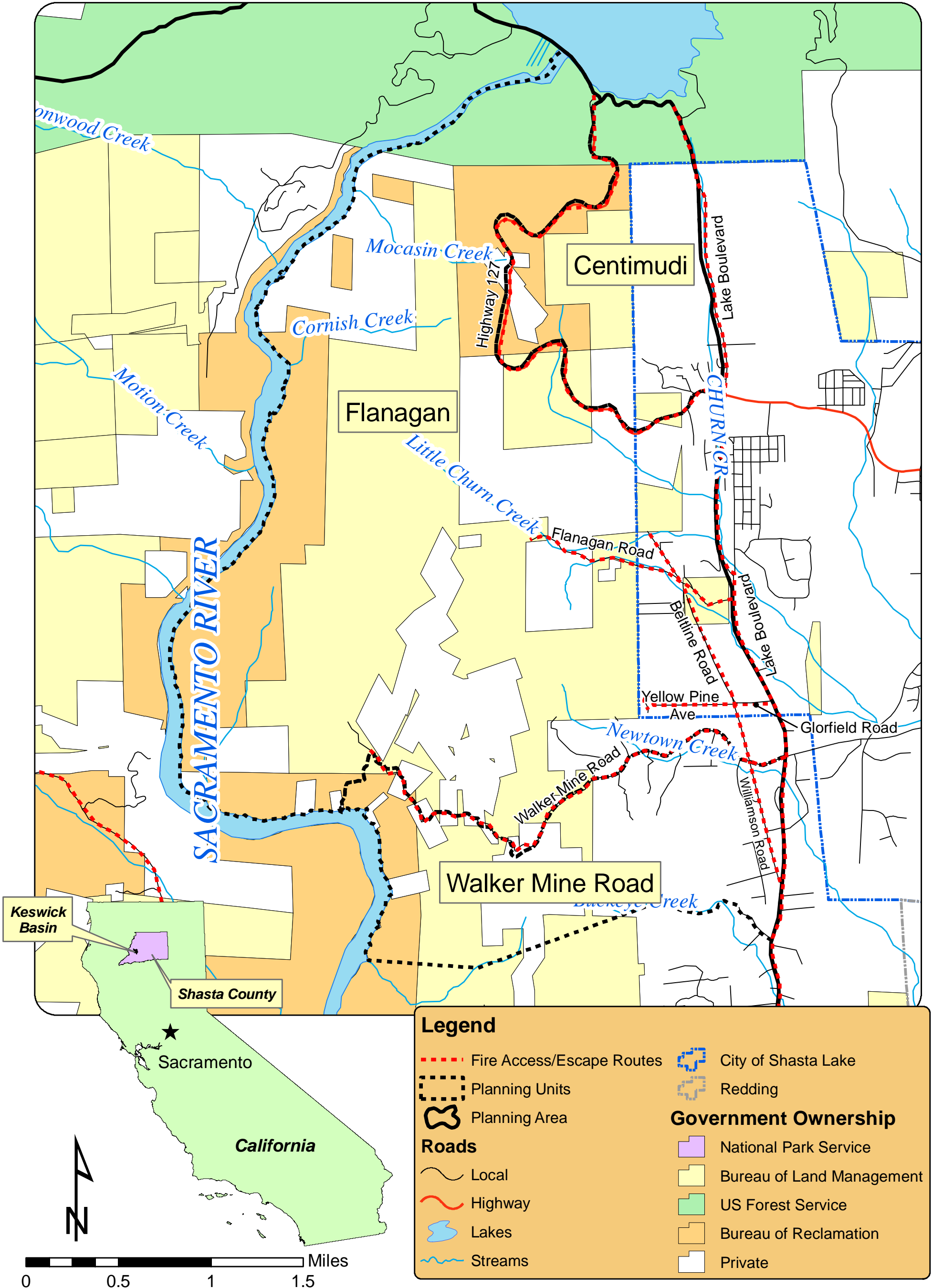
MAP 8a

Keswick & Keswick North Planning Unit's Fire Access/Escape Routes



MAP 8b

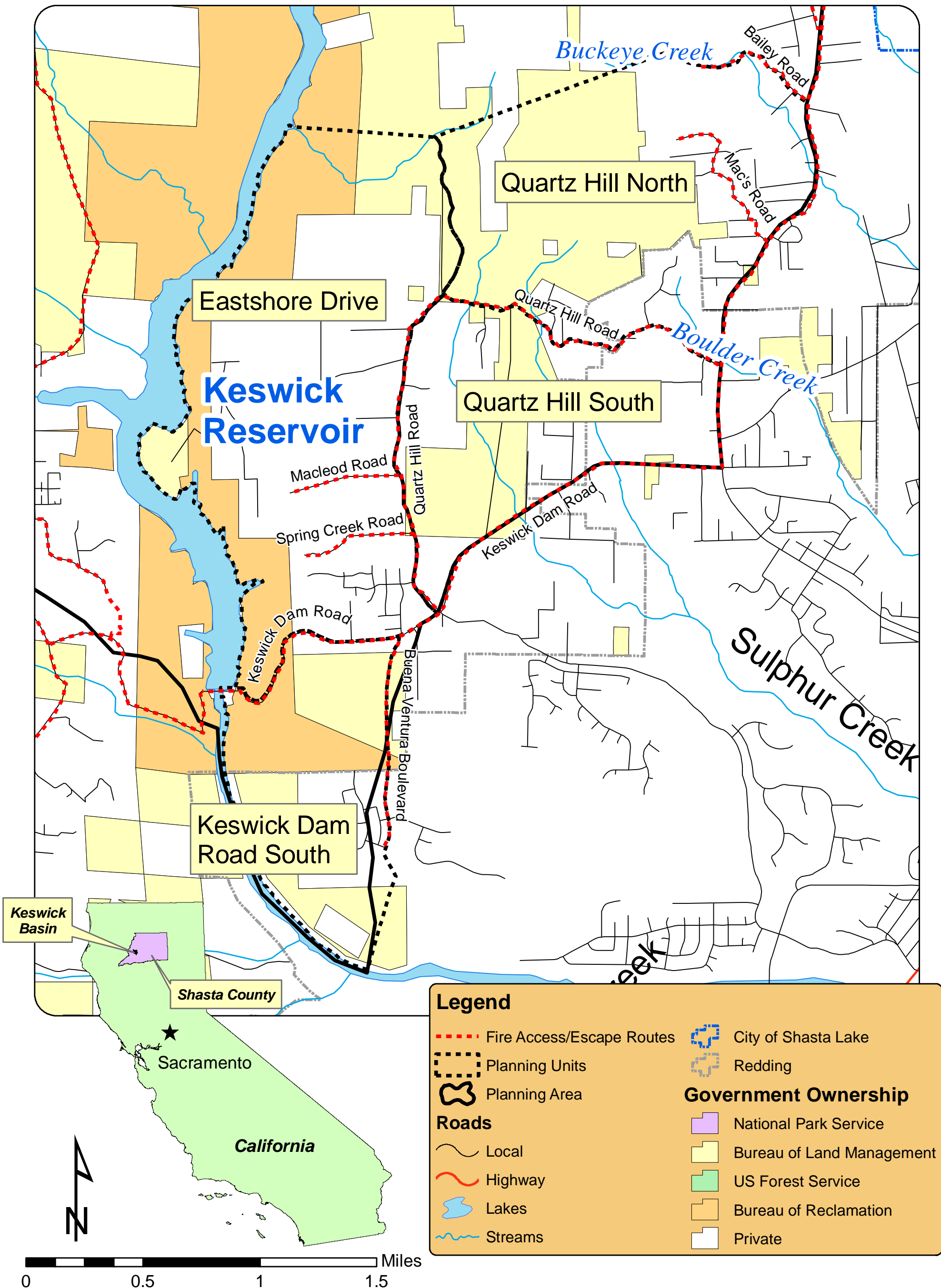
Centimudi, Flanagan & Walker Mine Road Fire Access/Escape Routes



MAP 8c

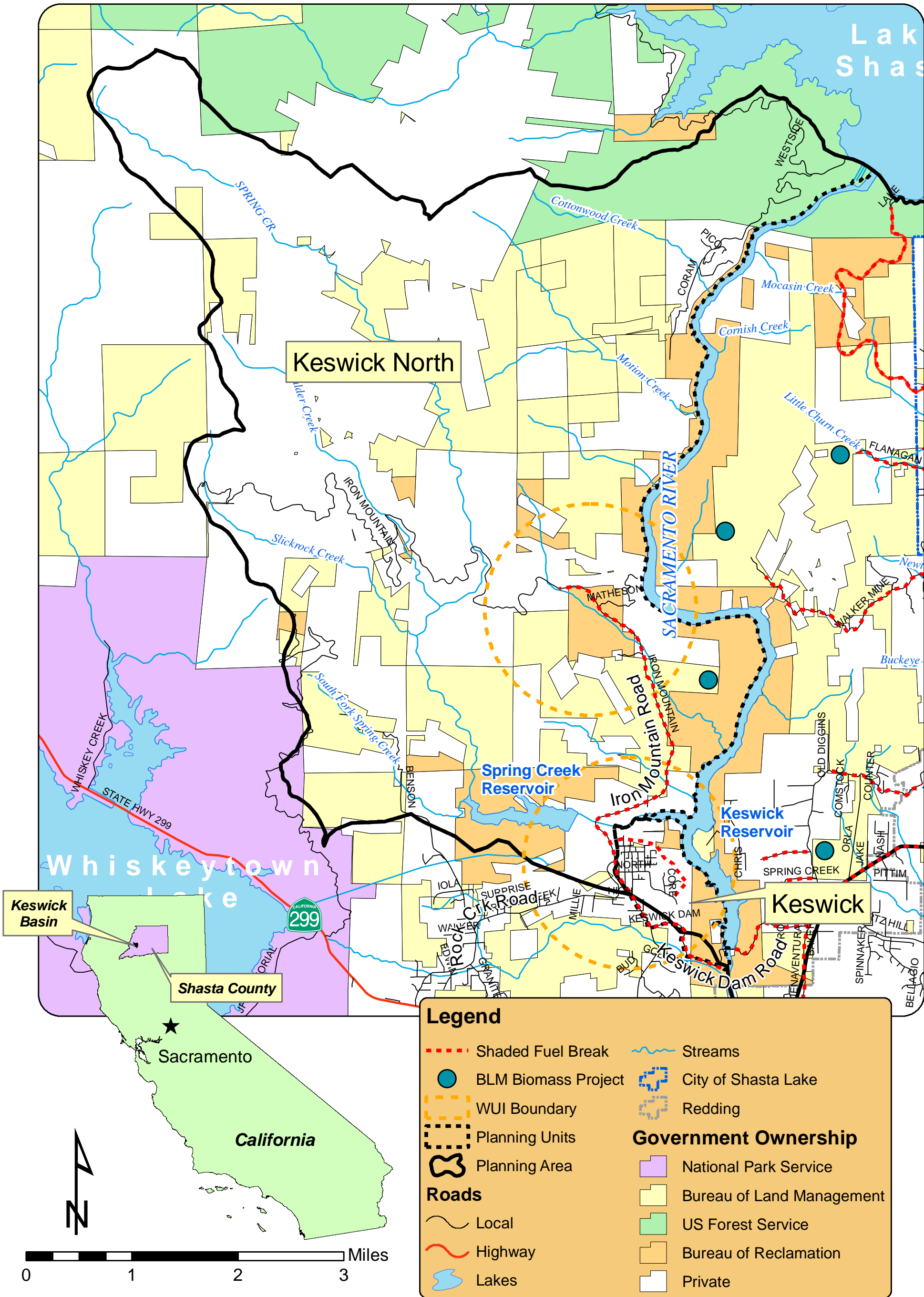


Quartz Hill North, Quartz Hill South, Eastshore Drive & Keswick Dam South Fire Access/Escape Routes



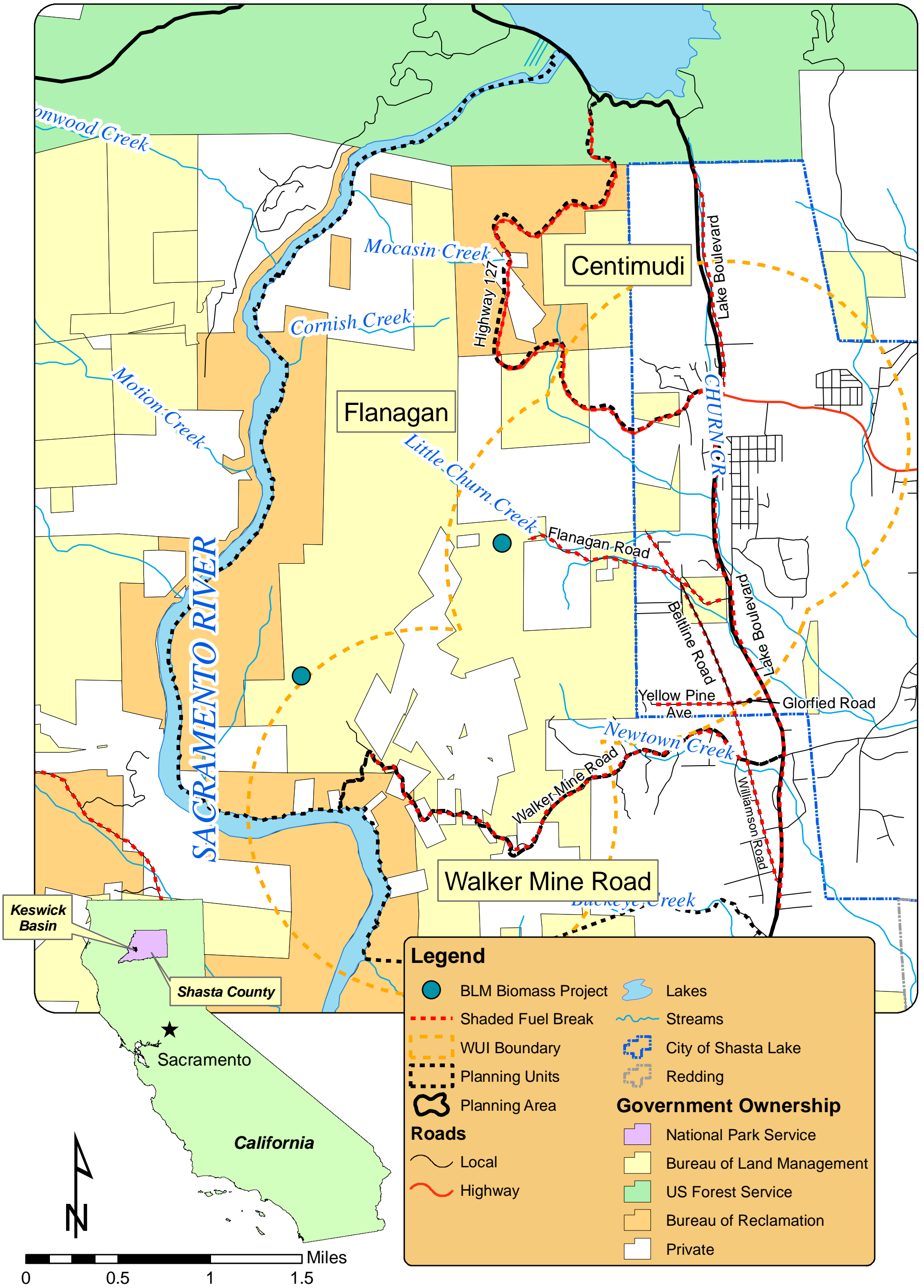
MAP 9

Keswick & Keswick North Planning Unit's WUI's/Fuel Reduction Projects



MAP 10

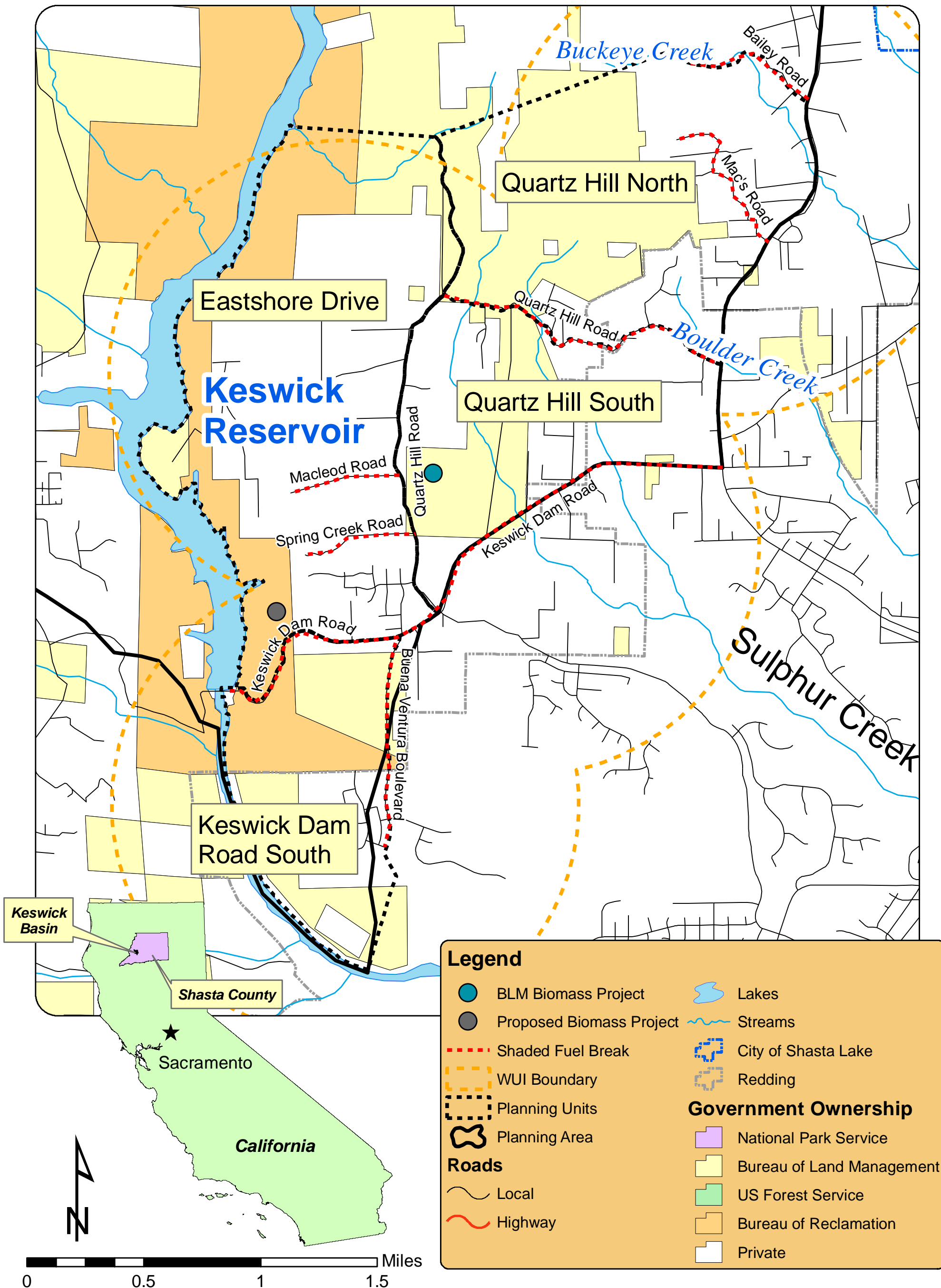
Centimudi, Flanagan & Walker Mine Road Planning Unit's WUI's/Fuel Reduction Projects



MAP 11



Quartz Hill North, Quartz Hill South, Eastshore Drive & Keswick Dam South Planning Unit's WUI's/Fuel Reduction Projects



Legend

- BLM Biomass Project
- Proposed Biomass Project
- - - Shaded Fuel Break
- - - WUI Boundary
- - - Planning Units
- ⬭ Planning Area
- ⬭ Roads
 - Local
 - Highway
- ⬭ Lakes
- ⬭ Streams
- ⬭ City of Shasta Lake
- ⬭ Redding

Government Ownership

- ⬭ National Park Service
- ⬭ Bureau of Land Management
- ⬭ US Forest Service
- ⬭ Bureau of Reclamation
- ⬭ Private

