

VULNERABILITY TO FLOODS

Flooding is a significant problem in Placer County. The risk potential or likelihood of a flood event occurring in the county increases with the annual onset of heavy rains from November through March. Much of the historical growth in the County occurred adjacent to streams, resulting in significant damages to property, losses from disruption of community activities, and potential loss of life when the streams overflow. Additional development in the watersheds of these streams affects both the frequency and duration of damaging floods through an increase in stormwater runoff. Other problems connected with stormwater runoff include erosion, sedimentation, degradation of water quality, losses of environmental resources, and certain health hazards.

NFIP/CRS Program

Placer County joined the NFIP on 04/18/1983 and entered the CRS program 10/1/1991. The current rating is a Class 6; last assigned on 10/01/2001. The Class 6 rating allows for a 20 percent discount on flood insurance for parcels located within the 100-year mapped floodplain and a 10 percent discount for those parcels located outside of the mapped floodplain. Roseville is the only other communities within Placer County that participates in the CRS program, with a current rating of 5.

The following table and identifies the existing FIRM maps for Unincorporated Placer County.

UNINCORPORATED PLACER COUNTY: NFIP COMMUNITY #06061C0

Map Number	Effective Date
06061C0025F	06/08/1998
06061C0050F	06/08/1998
06061C0057F	06/08/1998
06061C0059F	06/08/1998
06061C0067F	06/08/1998
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06061C0125F	06/08/1998
06061C0150F	06/08/1998
06061C0175F	06/08/1998
06061C0182F	06/08/1998
06061C0184F	06/08/1998
06061C0200F	06/08/1998
06061C0203F	06/08/1998
06061C0211F	06/08/1998
06061C0225F	06/08/1998
06061C0250F	06/08/1998
06061C0275F	06/08/1998
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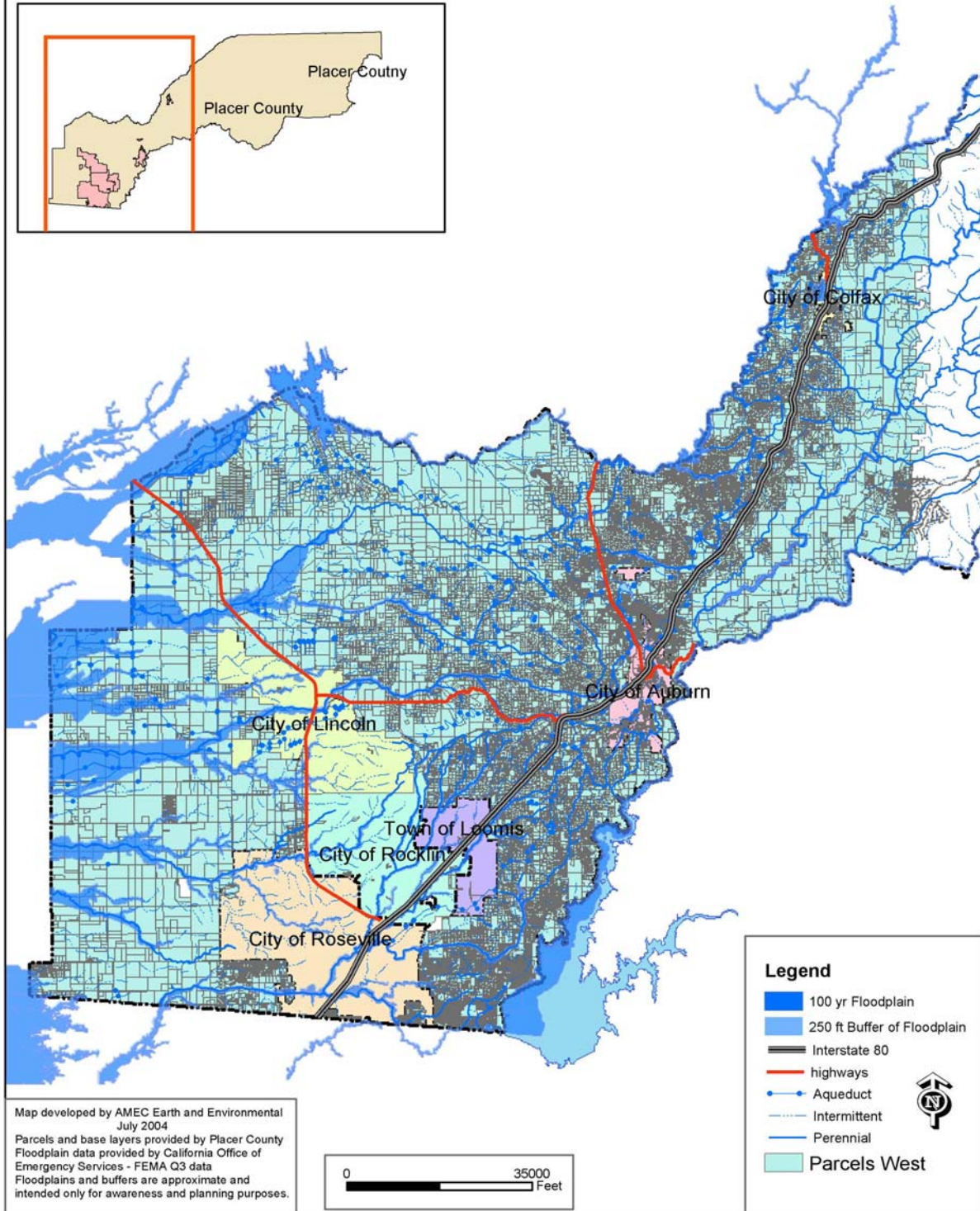
Map Number	Effective Date
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06061C0411F	06/08/1998
06061C0412F	06/08/1998
06061C0413F	06/08/1998
06061C0414F	06/08/1998
06061C0416F	06/08/1998
06061C0417G	11/21/2001
06061C0418F	06/08/1998
06061C0	11/21/2001
06061C0419G	11/21/2001
06061C0425G	06/08/1998
06061C0426F	06/08/1998
06061C0428F	06/08/1998
06061C0450F	06/08/1998
06061C0457F	06/08/1998
06061C0459F	06/08/1998
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06061C0478F	11/21/2001
06061C0479G	11/21/2001
06061C0481G	11/21/2001
06061C0482G	11/21/2001
06061C0483G	06/08/1998
06061C0487F	06/08/1998
06061C0500F	11/21/2001
06061CINDO	11/21/2001

Values at Risk

The HMPC used GIS to model and quantify the potential flood losses to Placer County within the mapped floodplain areas using FEMA’s Q3 100-year floodplain data and overlaying the information on Placer County’s GIS parcel layers.

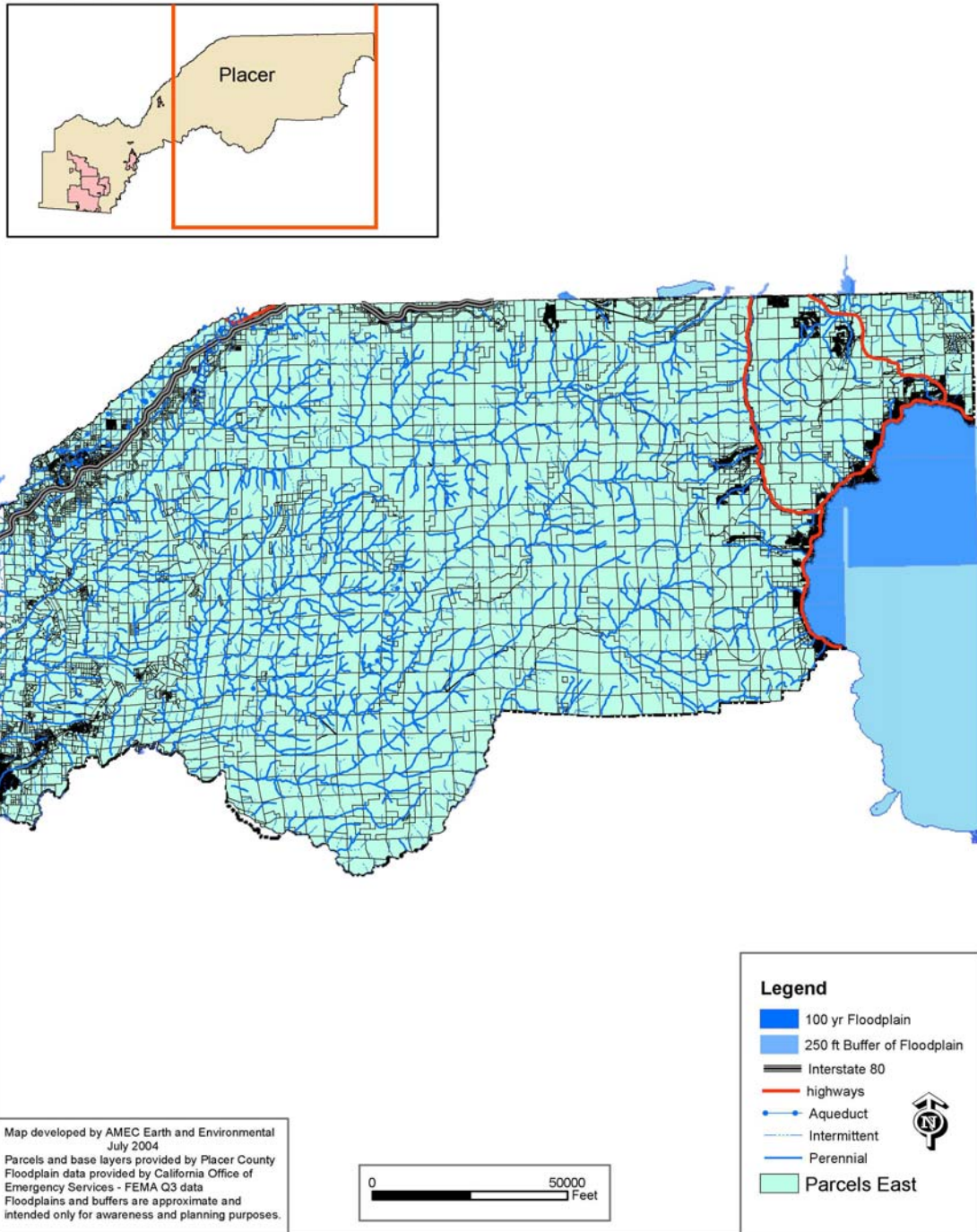
Specifically, the methodology involved intersecting parcels with the current FEMA Q3 100-year floodplain data (with a 250 foot uncertainty buffer). A 250 foot buffer on the 100-year floodplain is recommended when using this data in risk assessments to allow for uncertainty. A list of parcels that intersected the floodplain was generated. All parcels that touched the floodplain are included in the result. This file was linked with the assessor’s data to quantify the value of property that potentially lies in a floodplain. For unincorporated Placer County, the County was divided into west and east segments. The west segment includes the parcels near Colfax to the western County line. The east segment contains the remaining portion of the County east to the California State Boundary. The following two maps show the floodplain, the 250-foot floodplain buffer and parcels for western and eastern Unincorporated Placer County.

Western Placer Parcels and Flood Hazards



(Map Compilation: AMEC Earth & Environmental/ Source Data: Placer County GIS/FEMA Q3)

Eastern Placer Parcels and Flood Hazards



(Map Compilation: AMEC Earth & Environmental/ Source Data: Placer County GIS/FEMA Q3)

The following two tables provides the values of parcels at risk for each of the Flood Hazard areas identified in the above maps for the unincorporated portions of western and eastern Placer County. Due to limitations of available data, there was no way to determine the number of parcels with improvements versus those parcels consisting of just vacant land.

**UNINCORPORATED PLACER COUNTY EAST:
100-YEAR FLOODPLAIN VALUES AT RISK**

Property Type	Parcel Count	Net Value
Residential	3246	1,108,216,150
Commercial	353	127,814,547
Industrial	28	10,854,440
Agricultural	220	5,067,754
Total: Unincorporated Placer East	3,847	1,251,952,891

**UNINCORPORATED PLACER COUNTY WEST:
100-YEAR FLOODPLAIN VALUES AT RISK**

Property Type	Parcel Count	Net Value
Residential	2266	462,092,906
Commercial	109	10,941,585
Industrial	91	54,270,306
Agricultural	575	164,859,048
Total: Unincorporated Placer West	3041	692,163,845

The values of identified parcels at risk for the areas located within the 100-year floodplain for all of Placer County is summarized in the table below. The valuation details for the incorporated communities are discussed in the Community Element sections included at the end of this Section.

**PLACER COUNTY VALUES AT RISK:
100-YEAR FLOODPLAIN VALUES AT RISK**

Community	Parcel Count	Net Value
Unincorporated Placer East	3847	1,251,952,891
Unincorporated Placer West	3041	692,163,845
Auburn	7	230,067
Lincoln	677	174,733,285
Loomis	465	94,724,523
Rocklin	2415	942,719,239
Total: All Placer County	10,452	3,156,523,850

In addition to the parcel information above, the Draft California Multi-Hazard Mitigation Plan estimates that 3.3 percent (or 8,221 people) of the total County population (of 248,399) reside within the 100-year flood plain.

Insurance Coverage, Claims Paid, and Repetitive Losses

NFIP Insurance data indicates that as of August 31, 2004 there are 1,053 flood insurance policies in Placer County, of which 518 are in unincorporated Placer County and the remaining 590 policies in the other incorporated cities. There have been 594 historical claims for flood losses totaling \$14,835,582 in the County. Of these, 187 claims for \$3,793,073 were within the unincorporated areas of the county; the remaining 357 claims for \$10,559,970 occurring in the incorporated areas. Again this data raise the question of how many of the 6,888 parcels following within the 100-year floodplain are improved parcels in order to better determine the possible exposure of uninsured parcels.

Repetitive loss (RL) refers to those properties insured by the NFIP that received a claim payment greater than \$1000 twice in any ten-year period since the community joined the program (or 1978). Repetitive damage refers to those properties damaged more than once from a flood event, whether or not the property is located in a floodplain or carries NFIP insurance. This Section focuses on the RL properties in the County.

According to the Draft California Multi-Hazard Mitigation Plan, historically there are 51 RL properties within the County. Of those, 16 are within the unincorporated areas; 27 were within the City of Roseville; and the remaining 8 within the other incorporated communities. In the past ten years alone, the state plan shows Placer County with a total of 38 losses associated with the 16 RL properties, with building and contents payments totaling \$1,480,370.49. According to the Placer County Certified Floodplain Manager, the County has presently reduced the number of RL properties in the unincorporated County from 16 to 3 and Roseville has reduced their 27 RL properties to 3. Of the 8 remaining historical RL properties, it is unknown how many remain.

Critical Facilities at Risk

As described earlier, critical facilities are located throughout the County. Placer County does not have a current mapped inventory of these facilities; therefore, the HMPC was unable to conduct an accurate analysis of critical facilities located within the mapped floodplain areas.

Cultural and Natural Resources at Risk

Placer County has substantial cultural and natural resources located throughout the County as previously described. However, the County does not currently have this information readily available in GIS format to support further analysis of identified cultural and natural resources located within the mapped floodplain areas.

Overall Community Impact

The overall impact to the community from a devastating flood includes:

- Potential for loss of life and disruption of infrastructure;
- Commercial and residential structural damage;
- Damages to road/bridges resulting in loss of mobility;
- Possible damage/loss of sewer and drinking water treatment plants;
- Significant economic impact (jobs, sales, tax revenue) upon the community with the loss of commercial structures;
- Negative impact upon commercial and residential property values;
- Damage to churches would severely impact the social fabric of the community;
- Damage to schools would severely impact the entire school system, with significant disruption to families and teachers as temporary facilities and relocations would be likely; and
- Major flooding within the community would have a significant impact on the overall mental health of the community.

Development Trends

With the exception of the Truckee River Watershed, most notable for the 1997 floods, flooding and drainage issues in eastern Placer County are generally not substantial due to well-defined, deeply incised, channels and steep channel slopes with limited potential for significant development. Therefore, the greatest concern is the flood issue in western Placer County. It is western Placer that is also seeing the greatest increase in population and development.

According to the Placer County General Plan, 2004, and various watershed studies, the Dry Creek Watershed (which includes the Town of Loomis and the City of Rocklin) is located in western Placer in an area of rapid urbanization and population growth. The Cross Canal Watershed (which includes the City of Lincoln and portions of the Cities of Auburn, Rocklin, and Roseville) in western Placer, made up of five subwatersheds, varies with respect to existing build-out, from areas with almost nonexistent development to larger pockets of fairly well developed areas. The Auburn/Bowman area is a largely rural area located in the Sierra Foothills of Placer.

As previously described in this Section, the western portion of Placer (also known as “The Valley”) has seen significant development over the last 14 years. The population alone increased by 60.7 percent in The Valley area from 1990 to 2000. Development is also occurring to meet the increased population demands. Growth projections for the area are significant. Increased stormwater runoff (which is a significant contributor to flooding problems) is a major issue with respect to new development. As a result, without proper mitigation efforts, all three major watersheds/drainage areas, Dry Creek, Cross Canal, and Auburn/Bowman area are likely subject to increased flooding due to additional development in and around the County.

VULNERABILITY TO DAM FAILURES

Dam failure flooding can occur as the result of partial or complete collapse of an impoundment. Dam failures often result from prolonged rainfall and flooding. The primary danger associated with dam failure is the high velocity flooding of those properties downstream of the dam. The National Inventory of Dams database provided with HAZUS was used to identify dams that could potentially impact Placer County. This includes dams (identified on the map in the Hazard ID section) that may lie in neighboring counties that drain into Placer County. The area roughly includes the entire American River, Upper Bear River, and North Tahoe watersheds and portions of the Truckee River watershed.

Based on information in the dams database there are 90 dams rated as “high” or “significant” hazard that could potentially impact Placer County should a failure occur. The failure of a dam with a high hazard rating could result in loss of life and property. A significant hazard dam failure would impact property. 37 of the 90 dams are classified as high hazard. 53 are rated as a significant hazard.

According to the 1994 Placer County General Plan Background Report, only four dams within Placer County are considered to have the potential to threaten more than 100 persons. The most significant inundation hazard is associated with Folsom Dikes 5 & 6. Folsom Lake Dikes 5 & 6 could threaten 25,352 people in an inundation area that extends generally along Linda Creek, Cirby Creek, and Dry Creek within the City of Roseville and into Sacramento County as far as Elverta and Rio Linda, and possibly could cause failure of the levees of the Natomas East Main Drainage Canal.

Lake Tahoe Dam, located at the outlet of the lake on the Truckee River, could threaten 1,000 people but is expected to be contained generally within the Truckee River floodway to Nevada County and beyond.

Camp Far West Dam could threaten 470 people along the Bear River southwest to Sheridan and could inundate State Highway 65, numerous local roads, and the Southern Pacific Railroad tracks.

Lake Combie Dam, also on the Bear River, could threaten 200 people downstream to Camp Far West Reservoir and could inundate State Highway 49.

Other major reservoirs in Placer County have the potential to threaten 100 or fewer persons. The most significant inundation hazard of these reservoirs is associated with Lake Valley Dam.

Lake Valley Dam built in 1911 and owned by Pacific Gas and Electric (PG&E) is located on the North Fork American River. A failure of this dam could threaten up to 100 persons in an inundation area that would include the PG&E Lodgepole Campground and small developments along the North Fork of the American River. Failure of the dam could cause the North Fork Dam to spill an estimated 32,200 cubic feet per second.

Values at Risk

As the map above does not reflect the actual inundation maps on file for each of the dams and a dam failure can range from a small, uncontrolled release to a catastrophic failure, no further analyses were done with respect to potential values at risk in the inundation zones. However, based on this planning level analysis, the mapped inundation zones generally follow the existing streams and drainage areas, and areas subject to flooding from a dam failure would primarily be those areas located along streams and drainages.

Critical Facilities at Risk

As described earlier, critical facilities are located throughout the County. Placer County does not have a current mapped inventory of these facilities; therefore, the HMPC was unable to conduct an accurate analysis of critical facilities located within the dam inundation areas.

Cultural and Natural Resources at Risk

Placer County has substantial cultural and natural resources located throughout the County as previously described. However, the County does not currently have this information readily available in GIS format to support further analysis of identified cultural and natural resources located within the dam inundation areas.

Overall Community Impact

The overall impact to the community from a dam failure includes those previously identified for flood events. The biggest difference is that a catastrophic dam failure has the potential to result in a much greater loss of life and destruction to property and infrastructure due to the lack of early warning and potential speed of onset.

Development Trends

Given that the dam inundation maps show flooding in existing stream and floodplain areas, the development trends for this hazard are likely similar to those identified for flooding.

VULNERABILITY TO WILDFIRES

Risk and vulnerability to the Placer County planning area from wildfire is of significant concern. High fuel loads (from dense vegetation) in Placer County, along with geographical and topographical features of the area, create the potential for both natural and human-caused fires resulting in loss of life and property. These factors combined with natural weather conditions common to the area, including periods of drought, high temperatures, low relative humidity, and periodic high wind conditions can result in frequent and sometimes catastrophic fires. Even the relatively flat, highly urbanized western portion of the County is not immune, as was shown by

the 2002 Sierra Fire and 2004 Wells Fire near Loomis. During the May to October fire season, the dry vegetation and hot and often windy weather combined with the high-density population results in an increase in the number of ignitions. Any fire, once ignited, has the potential to quickly become a large, out-of-control fire.

The Draft Community Wildfire Protection Plan for the California Portion of the Lake Tahoe Basin, indicates that the area is highly susceptible to a large, crown-type fire due to historical forest management practices and the nature of existing fuel conditions. The plan estimates that the Basin lower montane forests have four times the density of trees and upper montane forests have twice the density of trees when compared to forest conditions prior to 1870. In addition, current forest stands exhibit a 70 percent higher disease incidence and a five percent greater mortality than remnant old growth stands in the basin. According to this community plan, recent estimates indicate that if a fire escaped initial control, at least 50 percent of the burned area would probably occur as a crown fire, with overstory tree mortality exceeding 50 percent. Further, locations that exhibit pronounced levels of drought-, insect-, and pathogen-related mortality would increase fire line construction times and reduce suppression effectiveness.

As required by federal Law creating the National Fire Plan, CDF generated a list of communities at risk for wildfire. Specifically, the intent was to evaluate the risk to a given area from fire escaping off federal lands. Three main factors were used to determine wildland fire threat in the WUI areas of California. These include, 1) Ranking fuel hazards, 2) Assessing the probability of fire, and 3) Defining areas of suitable housing density that could create wildland-urban interface fire protection strategy situations. The preliminary criteria and methodology for evaluating wildfire risk to communities is published in the Federal Register, January 4, 2001, Volume 66, Number 3. The communities in Placer County and the identified risk to these communities from fire escaping off federal lands are listed in the following table.

PLACER COUNTY COMMUNITIES AT RISK OF WILDFIRE

	PLACE NAME	COUNTY NAME	FED THREAT	HAZARD LEVEL
18	Alpine Meadows (Rampart)	PLACER	F	3
19	Alta	PLACER	F	3
55	Auburn	PLACER	F	3
68	Baxter	PLACER	F	3
98	Big Bend	PLACER	F	3
133	Bowman	PLACER	F	3
184	Cape Horn	PLACER	F	3
193	Carnelian Bay	PLACER	F	3
197	Casa Loma	PLACER	F	3
224	Christian Valley (Nielsburg)	PLACER	F	3
243	Colfax	PLACER	F	3
311	Dollar Point	PLACER	F	3
328	Dutch Flat	PLACER	F	3
353	Emigrant Gap	PLACER	F	3
387	Foresthill	PLACER	F	3
431	Gold Hill	PLACER	F	3
432	Gold Run	PLACER	F	3

	PLACE NAME	COUNTY NAME	FED THREAT	HAZARD LEVEL
478	Heather Glen - Applegate	PLACER	F	3
498	Homewood	PLACER	F	3
525	Iowa Hill	PLACER	F	3
561	Kings Beach	PLACER	F	3
628	Lincoln	PLACER		3
650	Loomis	PLACER		3
670	Magra	PLACER	F	3
695	Meadow Vista	PLACER		3
702	Michigan Bluff	PLACER	F	3
765	Newcastle	PLACER	F	3
774	North Auburn	PLACER	F	3
807	Ophir	PLACER	F	3
846	Penryn	PLACER		3
943	Rocklin	PLACER		3
953	Roseville	PLACER		3
1016	Secret Town	PLACER	F	3
1021	Shady Glen	PLACER	F	3
1068	Squaw Valley	PLACER	F	3
1086	Sunnyside-Tahoe City	PLACER	F	3
1097	Tahoe Pines	PLACER	F	3
1098	Tahoe Vista	PLACER	F	3
1132	Truckee	NEVADA & PLACER	F	3
1142	Twin Pines - Weimar	PLACER	F	3
1173	Virginiatown	PLACER		3

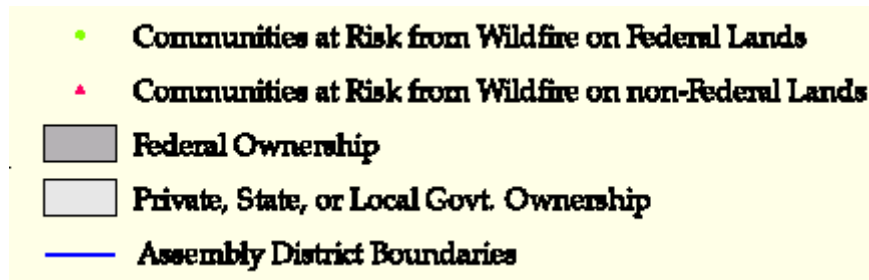
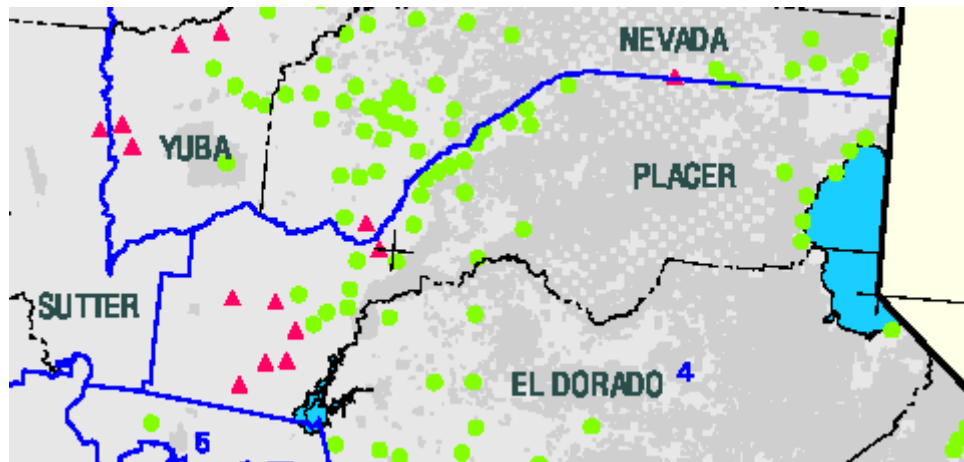
40 = number of communities

F indicates "in the vicinity of Federal lands"

3 is the maximum hazard level rating

(Source: California Fire Alliance, www.cafirealliance.org)

The map that follows, published in 2004 by CDF, show those communities designated as at risk from wildfire within Placer County and surrounding counties.



(Source: California Department of Forestry and Fire Protection 2004)

The HMPC has also recommended the following communities to be added to the list of Communities at Risk in Placer County:

**PLACER COUNTY COMMUNITIES AT RISK OF WILDFIRE
HMPC RECOMMENDED ADDITIONS**

PLACE NAME	COUNTY NAME	FED THREAT	HAZARD LEVEL
Andover	Placer	TNF	3
Blue Canyon	Placer	TNF	3
Cisco	Placer	TNF	3
Cisco Grove	Placer	TNF	3
Eder	Placer	TNF	3
Granite Bay	Placer	BLM	3
Horseshoe Bar	Placer	BLM	3
Nyack	Placer	TNF	3
Sheridan	Placer		2
Todd Valley	Placer	BLM/TNF/ENF	3

NOTE: **Bolded** entries are major communities

In addition, CDF, in conjunction with CA-OES, has created a Fuels Ranking Map for Placer County to identify those areas at greatest risk from wildfire. This Fuels Ranking Map was created using various risk factors such as weather, topography and fuel loads.

Specifically, the methodology used in developing this map considered the following:

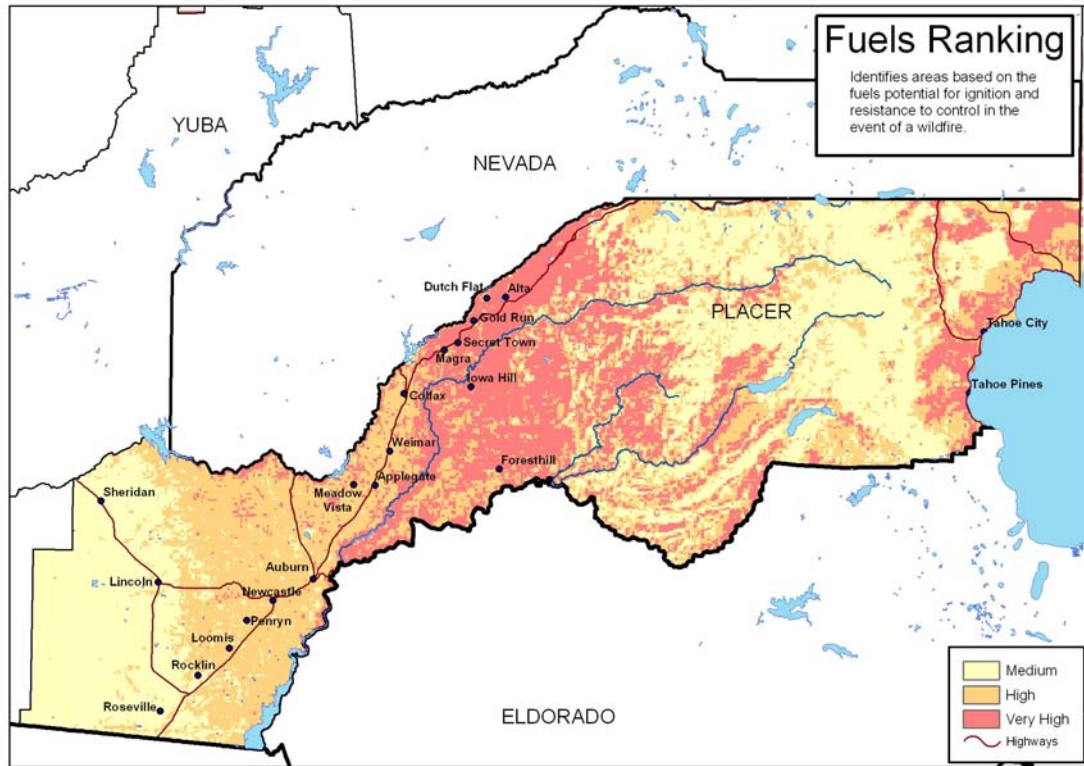
- 1) development of a detailed surface fuel mapping model by assessing the vegetative composition and structure information (using vegetation data from a variety of sources) to produce a fine-grained portrayal of surface fuel conditions. This method also considers changes in surface fuel characteristics that result from past fires, and to account for fuel changes as burned areas re-grow;

- 2) consideration of additional crown and ladder fuel characteristics to the surface fuel model to account for the relative abundance of these fuels. This assists in understanding the probability that torching and crown fire would occur if the stand were subjected to a wildfire under adverse environmental conditions;

- 3) a hazard ranking by quad 81st (i.e., uses 450 acre cells formed from a 9-by-9 partitioning of 7.5 min quad sheets as the minimum unit for spatial analysis) is applied to portray hazard in terms of moderate, high or very high hazard. This aspect of the model also includes an analysis of fire behavior under six slope classes and combines this information with the fuel model to derive the associated hazard ranking. Total fire hazard includes not only hazard posed by surface fire, but also hazard posed by involvement of canopy fuels; and

- 4) once the hazard ranking is determined as above, CDF field staff will validate the hazard ranking by comparing the quad 81st hazard rank with field knowledge of actual conditions.

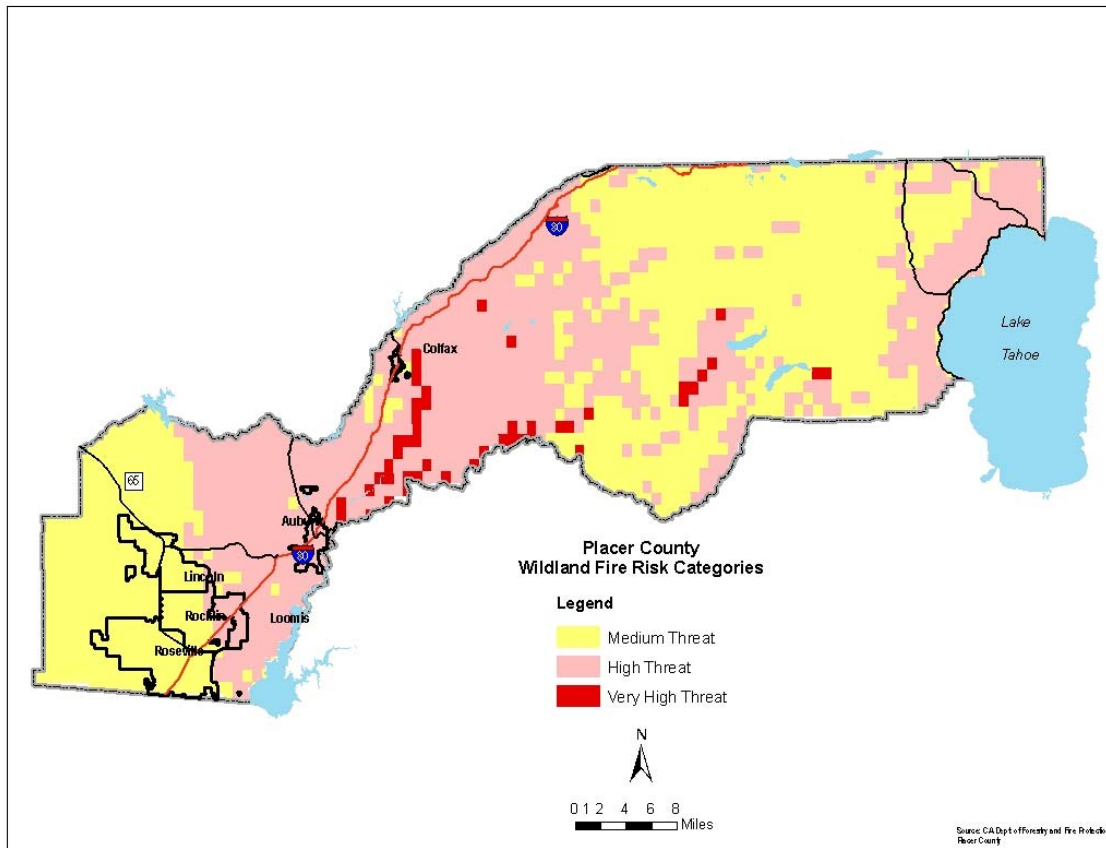
Unlike, the Communities at Risk determination previously described, which looks at risk from fire escaping off federal lands, this analysis looks at the risk of fire occurring in a given area, based on conditions specific to that area. The Fuels Ranking map is provided on the following page.



(Source: CDF)

Utilizing this Fuels Ranking Map, the HMPC created a Wildland Fire Risk Map by overlaying the Fuel's map on the Placer County GIS parcel layer in order to quantify potential losses from fire.

Based on this analysis, the County's risk to Wildland fires ranges from Medium, to High to a Very High Threat. Due to its rugged terrain, highly flammable timber and brush-covered lands, combined with long dry summers, a large portion of Placer County has been designated high to very high risk. The far western portion of the County; however, is relatively flat with lighter fuel loading and is consequently designated as a medium risk. The Wildland Fire Risk map is provided on the following page.



(Source: CDF/Placer County GIS)

Values at Risk

Using the Wildland Fire Risk Map, the HMPC conducted additional analyses to determine values of identified parcels at risk. GIS was used to model and quantify the potential wildfire losses to Placer County by generating a list of parcels that intersected each of the risk categories and then linking the parcel data with the assessor's data to quantify the value of property that potentially lies within each identified risk category.

The results are included in the following two tables. The first table includes data for unincorporated Placer County. The second table summarizes total values at risk for Wildfire Risk Categories for all of Placer County. The valuation details for the incorporated communities are discussed in the Community Element sections included at the end of this Section.

UNINCORPORATED PLACER COUNTY: VALUES AT RISK TO WILDFIRE

Fire Risk	Medium		High		Very High	
	Parcel #	Value	Parcel #	Value	Parcel #	Value
Residential	16,999	4,213,417,037	51,428	11,451,944,156	579	29,812,338
Commercial	884	588,533,812	2,270	962,560,024	1	115,878
Industrial	366	371,191,011	358	123,092,993	12	2,150,604
Agricultural	2,668	722,903,360	2,261	193,352,921	32	2,150,604
Misc.	1	0	1	545,700	0	0
Total	20,918	5,896,045,220	56,318	12,731,495,794	624	32,279,213

PLACER COUNTY: TOTAL VALUES AT RISK TO WILDFIRE

Fire Risk	Medium		High		Very High	
	Parcel #	Value	Parcel #	Value	Parcel #	Value
Unincorp. Placer	20,918	5,896,045,220	56,318	12,731,495,794	624	32,279,213
Auburn	0	0	5,983	1,247,244,272	5	785,044
Colfax	2	0	917	147,951,738	0	0
Lincoln	11,098	3,611,496,636	17	43,949,110	0	0
Loomis	0	0	2,971	641,694,081	0	0
Rocklin	15,394	5,116,047,853	1,962	758,610,013	0	0
Total: All Placer	46,692	14,623,589,709	68,168	15,570,945,008	629	33,064,257

Critical Facilities at Risk

As described earlier, critical facilities are located throughout the County. Placer County does not have a current mapped inventory of these facilities; therefore, the HMPC was unable to conduct an accurate analysis of critical facilities located within the wildfire hazard areas.

Cultural and Natural Resources at Risk

Placer County has substantial cultural and natural resources located throughout the County as previously described. However, the County does not currently have this information readily available in GIS format to support further analysis of identified cultural and natural resources located within the wildfire hazard areas.

In addition to previously identified wetlands and threatened and endangered species, there are other natural resources at risk when wildland-urban interface fires occur. The first is the watershed and ecosystem losses that occur from wildland fires. The second is the timber and ground cover assets that make up the life style and some commercial aspects of living in the area. The last is the aesthetic value of the area. Major fires that result in visible damage detract from that value. Tourism is a major attraction in Placer County. Because many Placer County communities border Tahoe National Forest, the issues of watershed, forest products, wildlife, and recreation tourism are all critical elements to the County and surrounding areas and are all at risk from wildfire hazards.

Overall Community Impact

The overall impact to the community from a wildfire includes:

- Potential for injury and loss of life;
- Commercial and residential structural damage;
- Impact on the water quality of watersheds located within the county;
- Impact to natural resource habitats and other resources such as timber;
- Loss of water, power, roads, phones, and transportation could impact ability to sustain life for those with certain medical conditions;
- Significant economic impact (jobs, sales, tax revenue) upon the community with the loss of commercial structures;
- Negative impact upon commercial and residential property values;
- The loss of churches would severely impact the social fabric of the community;
- The loss of schools would severely impact the entire school system, with significant disruption to families and teachers as temporary facilities and relocations would be likely; and
- Major wildland fires within the community would have a significant impact on the overall mental health of the community.

Development Trends

Population growth and development in Placer County is on the rise. Much of this growth is occurring in previously undeveloped wildland interface areas. As long as the County continues to expand into these areas, the County's vulnerability to wildfires will increase proportionately.

Other Identified Hazards: Severe Weather, Landslides, Avalanches, Earthquakes, Volcanoes, Agricultural Disasters, West Nile Virus

For the other hazards identified in the Hazard Identification section, information is available where the potential impacts can be developed or inferred, although it is not tied to a county-specific location. For these other identified hazards, the entire County is at risk. In some cases, certain hazard characteristics suggest varying degrees of risk within different areas of Placer County. For example:

- In earthquakes, certain soils are more susceptible to shaking than others, and certain types of building construction are more likely to sustain damage than others. Thus, in areas with higher concentrations of these types of soils or these types of buildings, greater damages can be expected. Any area that included *both* risky soils and vulnerable construction would be most likely to incur the greatest level of damage and disruption.
- West Nile Virus is spread through mosquito bites. Thus, people and livestock frequenting areas with the greatest concentration of mosquitoes, and during the times of greatest concentration, are most likely to become infected. Areas with standing water are

where mosquitoes breed, and therefore are an area of higher risk. Standing water can be found along the river and creek areas of the County as well as in swimming pools, ponds, birdbaths, ditches, and old spare tires – so the risk areas could be in many locations and in differing concentrations.

VULNERABILITY TO SEVERE WEATHER

The severe weather evaluated as part of this risk assessment included: Heavy Rains/Thunderstorms/Wind/Lightning; Fog; Snow; Tornadoes; and Drought.

Heavy Rains/Thunderstorms/Wind/Lightning

Looking at historical hazard data for Placer County, severe weather is an annual occurrence in Placer County; damages and disaster declarations related to severe weather events have occurred and will continue to occur in the future. However, the damages associated with the primary effects of severe weather have been limited. It is the secondary effects of weather such as flood, fire, and agricultural losses that have had the greatest impact on the County. The risk and vulnerability associated with these secondary impacts are discussed in these other sections.

Snow

Impacts to Placer County as a result of winter snow storms include damage to infrastructure, frozen pipes, utility outages, road closures, traffic accidents, interruption in business and school activities. Also of concern is the impact to populations with special needs such as the elderly and those requiring the use of medical equipment. Delays in emergency response services can be of significant concern. Further, there are economic impacts associated with areas prone to heavy snow. Depending on the nature of a given storm, the eastern portion of Placer County is the most vulnerable to effects of snow. However, snowfall in the lower elevations can create significant issues, as they are usually not as prepared for heavy snows.

Like most weather events, periods of heavy snow occur on an annual basis. School and business closures occur annually, but are usually short-lived. Damages to infrastructure also occur annually; much of this is covered through private insurance policies. The economic impact for increased manpower and efforts for manning road closures, responding to traffic accidents, and for general snow-removal efforts is usually included in annual budgets.

Tornadoes

Based on information provided by the HMPC, tornadoes do occur, but are of limited concern to the County. Given the topography of the area, the valley area or western portion of the county is most vulnerable to tornado occurrences. Of the four identified tornadoes in the County since 1972, three of them were an F0 magnitude and only two resulted in reportable damages. Of the two resulting in damages, only one was significant at \$250,000 while the other was only at \$3,000.

Fog

Fog is an issue in Placer County; although, information on injuries or damages caused by fog incidents in the County were limited. According to information provided by the Auburn Area, CHP, from January 2000, through June 2004, traffic on I-80 was severely affected due to dense fog approximately five times. Although fog is an issue, due to the lack of injuries and damages associated with fog events, the HMPC concluded that the vulnerability to the County from fog is low.

Drought

Drought is different than many of the other natural hazards in that it is not a distinct event, and usually has a slow onset. Drought can severely impact a region both physically and economically. A drought's effects impact various sectors in different manners and with varying intensity. Adequate water is the most critical issue; Agricultural, manufacturing, tourism, recreation, and commercial and domestic use all require a constant, reliable supply of water. As the population in the area continues to grow, so will the demand for water.

Based on historic information, the occurrence of drought in California, including Placer County is cyclical, driven by weather patterns. Drought has occurred in the past and will continue to occur in the future. The periods of actual drought with adverse impacts can vary from short to long term; often the period between droughts is extended. Although an area may be under an extended dry period, defining when a drought occurs is a function of drought impacts to individual water users. Since 1850, there have been 11 documented droughts in California. The HMPC identified three droughts impacting Placer County in the last 27 years. The vulnerability to Placer County from drought is usually county-wide and depending on the area includes reduction in water supply, agricultural losses, and an increase in dry fuels and beetle kill. It is this last drought affect, increase in dry fuels and beetle kill, that will also leave the county more vulnerable to damaging wildfires.

VULNERABILITY TO LANDSLIDES

Landslides are a documented hazard in the County. Impacts from landslides primarily involve damage to infrastructure, utility systems, and roads. Road closures can further impact emergency response efforts and interrupt business and school activities. Historically landslides resulting in significant losses have been limited within the County

VULNERABILITY TO AVALANCHES

Avalanches following snowstorms often occur and have historically resulted in both injuries and fatalities. This hazard is primarily limited to the eastern portion of the County in sloped areas and generally affects only a small number of people - mostly recreational users of backcountry areas.

VULNERABILITY TO EARTHQUAKES

Based on scientific and historic information, while the risk to Placer County from earthquakes is moderate, the vulnerability is low. Earthquake vulnerability is primarily based upon population and the built environment. Urban areas in high hazard zones are the most vulnerable, while uninhabited areas are less vulnerable. According to the California Draft Multi-Hazard Mitigation Plan, zero percent of Placer County's population is located in a High Seismic Hazard Zone.

Ground shaking, the principal cause of damage, is the major earthquake hazard. The California Geological Survey and the U.S. Geological Survey have estimated earthquake probabilities and associated ground motions for future events. The recently published (Spring 2003) California Geological Survey map notes that the Placer County area "will experience lower levels of shaking less frequently" (than other areas), but "very infrequent earthquakes could still cause strong shaking here."

Many factors affect the potential damageability of structures and systems from earthquake-caused ground motions. Some of these factors include proximity to the fault and the direction of rupture, epicentral location and depth, magnitude, local geologic and soils conditions, types and quality of construction, building configurations and heights, and comparable factors that relate to utility, transportation, and other network systems. However, ground motions become structurally damaging when average peak accelerations reach 10 percent to 15 percent of gravity, average peak velocities reach 8 to 12 centimeters per second, and when the Modified Mercalli Intensity Scale is about VII where:

Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving cars. (Bolt, 203)

The California Geological Survey Shaking Potential map shown in Section 4.1 is a 10 percent probability over 50 years of shaking intensity. Shaking is measured in a variety of ways, including peak ground acceleration, peak ground velocity, and spectral acceleration. This map is spectral acceleration, at one second frequency. The reason for looking at different frequencies is due to building response. In general, taller buildings may experience more damage by energy released in longer waveforms due to the harmonics of building sway, and ground shaking.

Natural or artificially filled areas, such as the Marina District in San Francisco, tend to experience amplified motions, liquefaction, and associated ground failures that can cause extensive damage.

The western portion of the County is located on alluvial deposits, which are characterized by soft, moist, and relatively unconsolidated materials that tend to amplify ground motions. Some communities, such as the City of Colfax, are located on firmer materials that tend to dampen ground motions, resulting in less damage. Historical earthquakes in the area have had limited impacts on Placer County. There is new evidence, however, that the potential for a damaging earthquake is more likely to occur in the eastern portion (i.e., Tahoe region) of the County.

Fault rupture itself contributes very little to damage unless the structure or system element crosses the active fault. In general, newer construction is more earthquake resistant than older construction because of improved building codes and their enforcement. Manufactured housing is very susceptible to damage because rarely are their foundation systems braced for earthquake motions. Locally generated earthquake motions, even from very moderate events, tend to be more damaging to smaller buildings, especially those constructed of unreinforced masonry, such as was seen in the Oroville, Coalinga, Santa Cruz, and Paso Robles earthquakes. Further in places like Auburn, many houses constructed prior to 1960 did not have adequate anchorage to their foundations. Other, newer houses lacked adequate bracing of walls that form crawl spaces below first floors. Water heaters in older homes and those replaced by homeowners often are not braced or anchored to resist earthquakes.

Common impacts from earthquakes include damages to infrastructure and buildings (e.g., unreinforced masonry [brick] crumbling; architectural facades falling; underground utilities breaking, gas-fed fires; landslides and rock falls; and road closures). Earthquakes also frequently trigger secondary effects, such as dam failures, explosions, and fires that become disasters themselves.

HAZUS-MH Earthquake Scenarios

HAZUS-MH was utilized to model earthquake losses for Placer County. Two different scenarios were chosen to represent two vary distinct differences in earthquake hazards and vulnerabilities between eastern and western Placer County based on current and historic data. The division between eastern and western Placer County is not based on any identifiable boundary between the eastern and western portion of the County, but utilizes the faults with the greatest potential for a damaging earthquake in the County. For western Placer, the epicenter was located on a Late Quaternary age fault located in Auburn. For eastern Placer, the epicenter was located on a Holocene age fault submerged under Lake Tahoe. These scenarios are arbitrary “what if” events defined by the HMPC based on historical earthquake data in and around Placer County. Specifically, the probable magnitude used for western Placer County utilized the 5.7 magnitude of the Oroville Earthquake, which had the greatest historical impact to the western portion of the County. The probable magnitude used for eastern Placer County was based on recent (1999) data on earthquake hazards in the Lake Tahoe basin. Level 1 analyses were run, meaning that only the default data was used and not supplemented with local building inventory or hazard data. There are certain data limitations when using the default data, so the results should be

interpreted accordingly; this is a planning level analysis. The two scenarios were defined as follows:

Eastern Placer County Scenario

- * Epicenter located on Holocene age (200-10,000 years old) fault submerged under Lake Tahoe (Lat: 39.15; Long: -120.05)
- * 6.9 Magnitude at 32 km (20miles) depth

According to HAZUS this moderate sized event in Eastern Placer County could induce significant economic loss in the vicinity of \$125.40 million.

Western Placer County Scenario

- * Epicenter located on a Late Quaternary age (10,000-700,000 years old) fault located in Auburn (Lat: 38.89; Long: -121.08)
- * 5.7 Magnitude at 8km (5 miles) depth

According to HAZUS this moderate sized event could induce significant economic loss in the vicinity of \$217.81 million.

The following table summarizes these results.

HAZUS-MH EARTHQUAKE SCENARIO RESULTS

Impacts/Earthquake	Eastern Placer County M5.7/ Depth 5 miles	Western Placer County M6.9/ Depth 20 miles
Residential Bldgs. Damaged <i>(Based upon buildings)</i>	Slight: 4,640 Moderate: 1,585 Extensive: 130 Complete: 28	Slight: 9,264 Moderate: 2,641 Extensive: 304 Complete: 22
Injuries <i>(Based upon 2pm time of occurrence)</i>	Without requiring hospitalization: 31 Requiring hospitalization: 6 Life Threatening: 1 Fatalities: 2	Without requiring hospitalization: 35 Requiring hospitalization: 5 Life Threatening: 1 Fatalities: 1
Displaced Households	36	78
Economic Loss	Property and Lifeline Damage: \$125.40M	Property and Lifeline Damage: \$217.81M
Damage to Schools <i>(Based upon 26 buildings)</i>	None with at least moderate damage	None with at least moderate damage
Damage to Hospital	None with at least moderate damage	None with at least moderate damage
Damage to Transportation Systems	None with at least moderate damage	None with at least moderate damage
Households w/out Power & Water Service <i>(Based upon 7,211 households)</i>	No loss of power Water loss @ Day 1: 126 Water loss @ Day 3: 0 Water loss @ Day 7: 0 Water loss @ Day 30: 0	No loss of power No loss of water

VULNERABILITY TO VOLCANOES

Although volcanoes are identified as one of the hazards adversely impacting California, Placer County's location relative to the two nearest active Volcanoes limits both the County's risk and vulnerability to this hazard. The County's vulnerability from renewed volcanic activity from either the Long Valley Caldera or Lassen Peak would be limited to ashfall associated with large or very large explosive eruptions. Lessons learned from the 1980 Mt. St. Helens eruption demonstrate that the impact of distant ashfall is primarily clogging of motor air filters, difficulties with breathing in certain individuals, and resulting sediment issues.

VULNERABILITY TO AGRICULTURAL HAZARDS

Given the importance of agriculture to Placer County, agricultural disasters continue to be an ongoing concern. The primary causes of agricultural losses are insect infestations and severe weather events, such as drought and freeze. According to the HMPC, agricultural losses occur on an annual basis throughout the County and are usually associated with these severe weather events.

VULNERABILITY TO WEST NILE VIRUS

Both the risk and vulnerability to California from WNV is considered low, based on the percentage of total population that actually comes down with the disease. The first appearance of WNV in North America occurred in 1999. As of August 2003, WNV has been documented in 46 states and the District of Columbia. In California, WNV was detected on a very limited basis in both horses and humans in 2003.

According to the CDC, even though last years outbreak was the largest in the country, fewer people died or had serious brain damage from it compared to 2002. The 9006 cases of the virus last year were more than double the 4,156 cases in 2002; however, there were only 220 deaths and 2,695 cases of sever brain damage in 2003, compared to 228 deaths and 2,944 cases of severe neurological disease in 2003. Researchers think that the larger number of confirmed cases in 2003, could be due to an increase in testing and reporting compared to 2002.

Although the potential for exposure does exist in Placer County in the 2004 season, the risk should be considered in terms of adverse effects due to exposure. The county already has an active vector control program in place for mosquitoes due to the past concern with equine encephalitis. And most important, protective measures to prevent exposure are relatively simple and cost effective. Given the nature of protective measures, such as wearing long sleeved clothing and using bug spray, the responsibility for protection can and should be an individual responsibility. Placer County's current public education program should give the community both the knowledge as well as access to resources to effectively counter the risk and impact from WNV.