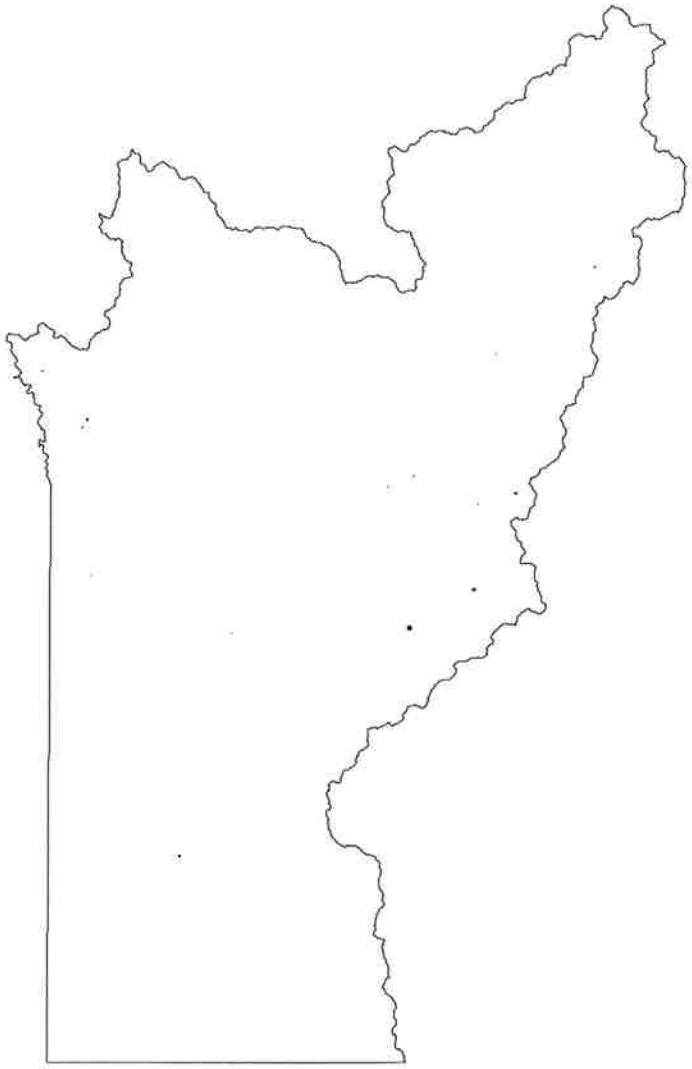
Trinity County General Plan
Safety Element



Adopted
November 12, 2014

Board of Supervisors
Resolution No. 2014-97

Trinity County Planning Department
PO Box 2819
Weaverville CA 96093

Table of Contents

Introduction

California State law requires each city and county to adopt a General Plan for the physical development of the county or city, and any land outside its boundaries, which bears relation to its planning (§ 65300). The general plan acts as a constitution, a basis for rational decisions regarding long-term physical development within a county.

The Safety Element, one of the seven required elements of a General Plan set forth in California government (§ 65302 (g)) is required to identify "any reasonable risk associated with the effects of seismically induced surface rupture, ground shaking, ground failure, tsunami, seiches, and dam failure; slope instability leading to mudslides and landslides, subsidence and other geologic hazards known to the legislative body; flooding; and wildland and urban fires."

The Safety Element of the general plan will help to provide guidelines that promote safety to residents and visitors of Trinity County. The Safety Element is created to reduce the potential risk of death, injuries, property damage, and the economic and social disruption resulting from hazards such as fires, floods, earthquakes, landslides, and other hazards.

Many of the topics discussed in the Safety Element overlap those that are also in the Land Use, Conservation, and Open-Space Elements. This element is a mechanism for defining acceptable risk and the basis for determining the level of mitigation necessary. This element is designed not only to reduce risk, but also to minimize economic disruption and ensure timely recovery following disasters.

This element sets forth goals, objectives, and policies for airport safety, flood risks or dam failures, hazardous materials, seismic or geological hazards, wildfires and structures, air quality, climate change, and military operation area. With regards to wildfire, this element pays special attention to the fact that most of the private lands within the county, which are in the State Responsibility Area (SRA), are classified as being Very High Severity Zones on the Fire Hazard Severity Map (Appendix B) and to the additional guidance provided in Senate Bill 1241 (September 12, 2012) which amended an added sections of the Public resources Code and Government Code regarding the safety element of the general plans.

Airport Safety

Aviation is a vital link in the transportation system. Aviation plays a key role in the economy as businesses use the speed and reliability of air service to achieve operating efficiency. Airports are critical for providing services, such as business travel, tourism, recreation, emergency response, fire suppression, and law enforcement. General aviation airports are any airports that do not have commercial passenger service. Rural general aviation airports are important to community safety because they provide:

- a base for forest fire observations and suppression operations,
- community access to air ambulance services,
- disaster egress and ingress, and
- in mountainous terrain, airports serve as an emergency landing facility for aircraft encountering in-flight difficulties both during the day and night.

Trinity County operates five general aviation airports (Hayfork, Hyampom, Ruth, Trinity Center, and Weaverville). These community airports serve the needs of the general aviation public. The five airports provide critical links to the county's rural areas and access to larger population centers and metropolitan airports.


Trinity Center Airport
Photograph courtesy of the Trinity County Building Department

The airports provide local aviators and community residents with quick access to larger aviation centers with commercial capabilities. The airports also provide critical areas for emergency service operations including fire suppression activities and air evacuation for medical purposes. Highway Patrol and the Sheriff's Office use the airport for law enforcement activities. Local businesses utilize the airports for minor shipping, resource management, and limited commuting purposes. Recreation centers such as Trinity Lake and Ruth Lake benefit from the easy access provided by their airports to tourists, as well as a small community of resident aviators.

Airports located in areas with dwellings in the approach or take-off pattern may cause safety problems for both the airplanes and occupants on the ground. Most of the public safety risk created by airports is borne by pilots and passengers. The primary hazard to the general public is the possibility of being injured on the ground during an aircraft accident. To reduce this risk, the Federal Aviation Administration (FAA) requires runway protective zones and height limits on structures near airports.

The discussion of aviation hazards in this Safety Element of the General Plan is limited. Hazards to aviation flight and people around an airport are fully identified and analyzed in the *Trinity County Airport Land Use Compatibility Plan* (TC ALUCP). The ALUCP sets out policies for land use within

each airport's influence area and was adopted in November 2009. This section of the General Plan provides a summary of the existing conditions that relate to safety at each of these Trinity County airports.

Requirements for creation of airport land use commissions (ALUCs) were first established under the California State Aeronautics Act (Public Utility Code [PUC] Sections 21670 *et seq.*) in 1967. The fundamental purpose of the ALUC is to promote land use compatibility around airports. As expressed in the current statutes, this purpose is: "...to protect public health, safety, and welfare by ensuring the orderly expansion of airports and the adoption of land use measures that minimize the public's exposure to excessive noise and safety hazards within areas around public airports to the extent that these areas are not already devoted to incompatible uses."

Trinity County airport use varies by airport, seasons and years. An indicator of usage can be found in the 2011 data from www.AirNav.com that shows Weaverville (Lonnie Pool Field) airport has 105 aircraft operations per week and Trinity Center Airport 115 aircraft operations per week. There were no data for the county's other three airports, but these two airports represent over 10,000 aircraft operations per year.

Weaverville Airport (Lonnie Pool Field)

Weaverville Airport, located in the county seat of Weaverville (pop. 3,500), is classified as a Community-Recreation Airport. It is situated at the northern edge of Weaverville. The Airport is bounded by Highway 3 to the east, the community of Weaverville to the south, the Weaverville landfill to the west, and a residential area to the north. The facility consists of a 50' X 3380' asphalt surfaced runway. As a General Aviation (GA) facility, Weaverville Airport serves Aircraft Design Group 1, which is defined as airplanes having up to a 49-foot wing span (i.e., most single and some twin engine prop aircraft). The runway is constrained by gradient and obstructions in the approach and departure zones. Terrain to the north and east of the airport penetrates the horizontal and conical surfaces of the runway. The runway is single-directional. Planes must take off to the south and land from the south due to runway gradient and surrounding terrain, although, due to pilot error, flights have taken off to the north sometimes resulting in accidents. The facility has twenty-nine tie-downs and nine hangars. There are no fueling facilities on the site, except for CHP use only.

Given the mountainous terrain of the region, this location serves as an emergency landing facility for aircraft encountering in-flight difficulties, as a base for summertime forest fire observations and suppression operations, and previously as a community and area access for air ambulance services and patient transfers from Trinity Hospital in Weaverville. Improvements at the Weaverville Airport have been limited due to the severe constraints of the current airports. Routine maintenance and upkeep are performed but expansion activities at the airport are not expected.

Hayfork Airport

Hayfork Airport, located in central Hayfork (pop. approx. 2500), is classified as a Community Airport and is visual flight rules (VFR) rated. It is unattended with no fixed-based operator. A single, two-way runway exists, consisting of a 4100 feet x 60 feet physical asphalt surface. The runway and taxiway are equipped with a pilot-keyed, medium intensity lighting system. Approximately 18 chained tie-downs are available for based and transient aircraft on the apron. Two hangars exist and are occupied by lease. There are currently no fueling facilities on the site. As a General Aviation facility, Hayfork Airport serves Aircraft Design Group 1, which is defined as airplanes having up to a 49-foot wing span (i.e., most single and some twin engine prop aircraft). Given the mountainous terrain of the region, this location is valuable as an emergency landing facility for aircraft encountering in-flight difficulties, as a base for summertime forest fire observation and suppression operations, and as community access for air ambulance services.

Hyampom Airport

Hyampom Airport, located within the community of Hyampom (pop. approx 300) is classified as a Community Airport. It is unattended with no fixed-based operator. A single, two-way runway exists, consisting of a 2980 feet x 60 feet physical asphalt surface. Approximately 12 tie-downs are available. Given the mountainous terrain of the region, this location is valuable as an emergency landing facility for aircraft encountering in-flight difficulties, as a base for summertime forest fire observation and suppression operations, and a community access for air ambulance services.

Hyampom Airport has provided impetus for development of a vineyard and winery economy in Hyampom Valley. As the wineries develop, it is envisioned that organized fly-ins and other recreation events will add to the community's economy.

Ruth Airport

Ruth Airport, located in the southern portion of the county near Ruth (pop. approx 400), is unattended with no fixed-based operator. A single, two-way runway exists consisting of a 3500 feet x 50 feet physical asphalt surface. The runway is not lighted. Approximately 10 tie-down spaces are available for based and transient aircraft. Given the mountainous terrain of the region, this location is valuable as an emergency landing facility for aircraft encountering in-flight difficulties, as a base for summertime forest fire observations and suppression operations, and as community and area access for air ambulance services.

Due to its location near Ruth Lake, Ruth Airport provides valuable economic opportunities to the southern portion of Trinity County and serves as a valuable link between other recreation destinations in the north state region.

Trinity Center Airport

Trinity Center Airport, located in Trinity Center (pop. approx. 600), is classified as a Community-Recreation Airport and is visual flight rules (VFR) rated. It is currently unattended with no fixed-based operator. A single, two-way, runway exists, consisting of a 3200 foot physical asphalt surface that includes relocated thresholds of 200 feet on each end (runway width varies between 50 feet and 60 feet). The runway presently is not lighted. Approximately 50 chained tie-downs are available for based and transient aircraft on the apron. Additional aircraft parking is available along the west side, north of the apron. Twenty-two owner-built hangars are occupied by lease. There currently are no fueling, service, or repair facilities on the site Given the mountainous terrain of the region, this location is valuable as an emergency landing facility for aircraft encountering in-flight difficulties, as a base for summertime forest fire observation and suppression operations, and as access for air ambulance service.

Due to its location at Trinity Lake, Trinity Center Airport provides valuable economic opportunities to the county and serves as a link between other recreation destinations in the north state region.

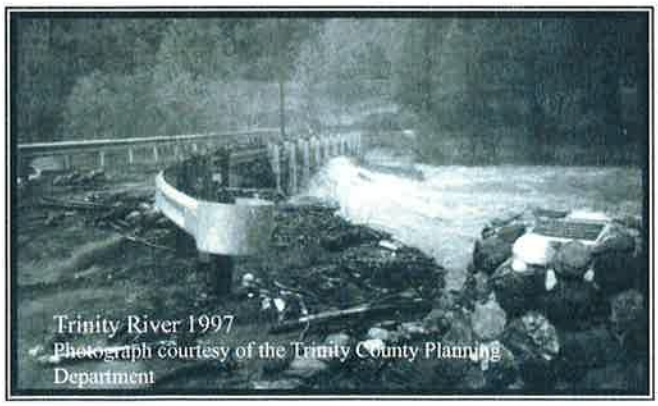
Flood Risks or Dam Failure

Floods are one of the most common and widespread natural disasters, second only to fire, and are rated third in the current county hazard vulnerability assessment. At risk communities are those located in low-lying areas, near water, or downstream from a dam. Dam failures are potentially the worst flood events. A dam failure is usually the result of neglect, poor design, or structural damage caused by a major event such as an earthquake. Flash flooding occurs when an intense storm drops large amounts of rain in a brief period, with little or no warning. "The flood hazard areas of Trinity County are subject to periodic inundation, which can result in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety and general welfare" (Trinity County Zoning Ordinance Sec. 29.4, Flood Hazard).

Trinity River 1997
Photograph courtesy of the Trinity County Planning Department

In 1968, the United States Congress passed the National Flood Insurance Act, and in doing so, created the National Flood Insurance Program (NFIP). The Flood Disaster Protection Act of 1973, which amended the 1968 Act, required that flood-prone communities be notified of their flood hazards to encourage program participation. This act also required the purchase of flood insurance by property owners who were being assisted by Federal programs, or by federally supervised, regulated, or insured agencies or institutions, in the acquisition or improvement of land or facilities located, or to be located in special flood hazard areas. This act also severely limited Federal financial assistance in the flood hazard areas of communities that did not join NFIP.

The primary requirement for community participation in the NFIP is the adoption and enforcement of floodplain management regulations that meet the minimum standards of the NFIP regulations in Title 44 of the Code of Federal Regulations, Section 60.3.


Trinity River 1997
Photograph courtesy of the Trinity County Planning Department

Trinity County has chosen to participate in this program. In 1988, Trinity County adopted its first floodplain ordinance. The ordinance was revised in 1993 and a major amendment was done in

2000 to address growing concerns of development within mapped floodplain areas. This most recent floodplain management ordinance has been included in the Trinity County Zoning Ordinance as Section 29.4.

Dam Failure

There are five managed dams located in Trinity County: Lewiston, Trinity, Buckhorn, Ewing, and Matthews Dams. There also are two managed dams located to the south of Trinity County on the Eel River, which flows through Trinity County: Scott Dam and Cape Horn Dam. A description of each dam is provided in Appendix A

Emergency Action Plans (EAP) have been developed and approved for all of the dams and reviewed annually. These plans are designed to provide specific procedures to be implemented in the event of an impending or actual sudden release of water caused by an accident or the failure of a dam or appurtenant retaining structures. Generally these procedures are guided by the following fundamental priorities:

1. Life Safety
2. Incident Stabilization
3. Preservation of Property and Environment
4. Recovery and Restoration of Facility Operations

Hazardous Materials

The discussion of hazardous materials/waste in this Safety Element of the General Plan is limited. Hazardous materials are more fully identified and analyzed in the *Trinity County Hazardous Materials Area Plan* (TCHMAP). The TCHMAP sets out policies and procedures for the handling of Hazardous Materials and spills in Trinity County. The TCHMAP is to be updated every three years under the auspices of the Trinity County Office of Emergency Services (OES).

This section of the General Plan provides a summary of the existing conditions that relate to safety associated with hazardous materials, but does not supplant or override the TCHMAP. The goal of the TCHMAP is to preserve life, prevent and reduce injuries, and minimize property and environmental damage from a hazardous materials incident. Furthermore the TCHMAP has been developed to enable public and private agencies in Trinity County to better prepare for, and respond to, hazardous materials incidents within the county. The TCHMAP was produced with the help, advice, and assistance of personnel from various departments and agencies within and outside of Trinity County. As such, the TCHMAP is tangible evidence of the public safety partnership in response to the threat of hazardous materials in Trinity County.

The purposes of the TCHMAP are to:

- Meet the requirements of California Code of Regulations, Title 19, Subchapter 3, Article 3 which the County believes are fully met by the TCHMAP.
- Describe an organization for response to a hazardous materials incident occurring in Trinity County.
- Establish roles and responsibilities of federal, state, and local agencies within Trinity County who respond to releases of hazardous materials.
- To serve as a basis for all response organizations in developing their own plans, policies, and standard operating procedures for hazardous materials incident response.
- To incorporate limited information from Business Plans in the jurisdiction.
- In order to meet all of its intended purposes, this document may be produced in three versions:
    - An official version restricted For Official Use Only (FOUO).
    - A public version with confidential and sensitive information redacted.
    - An EOP version for inclusion as an annex to the county's Emergency Operations Plan, and edited to reduce duplication with that plan.

Hazardous materials or hazardous waste accidents can occur anywhere. Hazardous materials and waste are transported on our roadways and waterways daily, so any area is considered

vulnerable to an accident. In Trinity County, such products are transported mainly via roadways. In addition to, and in support of the TCHMAP the County has conducted the *Trinity County Hazardous Materials Commodity Flow Study (*Final Report, September 2011). This Commodities Flow Study Final Report is intended to provide to Trinity County's emergency responders and planners an overview of hazardous materials (hazmat) transportation in their jurisdiction. The report includes:

- What products are commonly transported into, within, and through the jurisdiction,
- What modes of transportation are commonly used,
- What hazards are inherent to those modes,
- A ten-year history of hazmat incidents in the county,
- Agricultural chemicals, including large-scale unreported use.

The Commodity Flow Study Final Report is not intended to stand on its own as an emergency response resource. It is an adjunct to the Trinity County Hazardous Materials Area Plan. It may also provide emergency planners and responders limited information to assist in using recognized planning and response references, such as the current US Department of Transportation's Emergency Response Guidebook, the National Institute for Occupational Safety and Health (NIOSH) Pocket Guide to Chemical Hazards, and other references in print and online. Neither this report nor the references cited are a substitute for effective initial and ongoing training.

The two following definitions from the TCHMAP are useful in setting the boundaries of the discussion:

> **Hazardous Materials**: *Any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the work place or the environment. Hazardous materials include, but are not limited to, hazardous substances, hazardous waste, and any material which a handler or the administering agency has a reasonable basis for believing that it would be injurious to the health and safety of persons or harmful to the environment if released into the work place or environment.*
>
> **Hazardous Materials Incident or Spill**: *Any occurrence which may result in the spill or release of a material which presents a threat to the public, property, or environment is a hazardous material. An occurrence where hazardous materials, as defined in Vehicle Code Section 2402.7, is dispersed in the environment or its container is damaged to such an extent that leakage or spillage can be expected to occur with the potential to cause injury to people or harm to the natural environment. "Release" means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment, unless permitted or authorized by a regulatory agency.*

Hazardous materials and wastes are regulated by federal, state, and local agencies, and are required to be recycled or disposed of properly. However, illegal storage and disposal and unintentional releases of hazardous materials or waste from leaks and accidents can still occur. The Area Plan applies to all political subdivisions, including any State or Federal agency operating within Trinity County, and whose governing body adopts the plan by ordinance, order, resolution, letter, or agreement. This plan covers spills, accidents, releases, or unauthorized dumping of hazardous materials, hazardous wastes, oils, toxic chemicals, pesticides, radioactive materials and other hazardous materials on land, in water, or in the air. Local government involvement in a hazardous materials release is interpreted to continue throughout an incident, and to consist of discovery, notifications, evaluation, mitigation, and recovery as appropriate

The California State Highway Patrol under the CCR sec. 1150-1194, and the Code of Federal Regulations, Title 49 regulates transport of hazardous materials. When a hazardous material/waste spill originates on a highway, the California Highway Patrol is responsible for direction of cleanup and enforcement (CCR §. 2450-2454b).

A highway is defined as a way or place of whatever nature, publicly maintained and open to the use of the public for purposes of vehicular travel. Highways include streets and county maintained roads. A highway does not include a way or place under the jurisdiction of a federal governmental agency, which lies on national forest or private lands, is open to public use, and for which the cost of maintenance of such way or place is borne or contributed to directly by any users thereof.

When a hazardous material/waste spill occurs on public land, it is the managing agency's responsibility to direct cleanup and enforcement. They will initiate all investigations and cleanup, and contact the necessary personnel.

When a hazardous material/waste spill occurs on private land, the property owner is responsible for cleanup. Trinity County Environmental Health is contacted who then ensures that proper cleanup and follow-up is conducted. They will contact the proper personnel and ensure cleanup is completed according to federal, state, and local regulations.

In 1994 State Bill 1082 amended the California Health and Safety Code, establishing a unified program to deal with hazardous waste and materials in California. The program is a consolidation of the following six state environmental programs into one program under the authority of a Certified Unified Program Agency (CUPA):

- Hazardous Materials Release Response Plans and Inventories (Business Plans),
- California Uniform Fire Code: Hazardous Material Management Plans and Inventory Statements (In Trinity County, this is combined with the Business Plan),
- Hazardous Waste Generator and Onsite Hazardous Waste Treatment (Tiered Permitting),
- Underground Storage Tank Program,

- Aboveground Petroleum Storage Act,
- California Accidental Release Prevention (Cal/ARP) Program.

As of November 2013, Trinity County has chosen to not implement its own CUPA. The reasons for deferring to the State, as determined in the 2001-2002 timeframe, were 1) the costs and training required for implementing all of these programs at the local level; and 2) Trinity County has a relatively small business base, and there was concern that the County would not recover the costs of a CUPA with reasonable annual permitting fees. Other reasons that Trinity County has not become a CUPA, as described in the 2002 Safety Element, included:

> 1) *Questions as to the public or environmental health benefit for implementing these programs in rural areas that do not have an industrial base.*
> 2) *The EPA incentive funding, allotted in 2001, to the non CUPA was not guaranteed and was dependent on the annual California budget. However, eligibility for such funding required a full commitment from the county to participate as a CUPA.*
> 3) *The program requires annual reporting and periodic state audits that would total approximately 100 hours of staff time annually, without any direct benefit to public health.*
> 4) *There would be substantial increased county liability from accepting responsibility for enforcing hazardous materials law.*
> 5) *Inspector proficiency would be extremely challenging due to the complexity of the hazardous material laws and the lack of local inspection opportunities. Establishing and maintaining staff proficiency would be a problem and would increase county liability.*
>
> (2002 Safety Element Trinity County General Plan)

Currently, California Department of Toxic Substance Control retains the responsibility for administering any CUPA programs in Trinity County. Since Trinity County has declined to apply for CUPA status, that responsibility will remain with California Environmental Protection Agency until such time that the County assumes CUPA responsibility. CUPA oversees various types of businesses and facilities, such as communication sites, propane distributors, automobile repair facilities, gas stations, power utilities, lumber mills, rock processors and a variety of local government facilities with similar activities as the aforementioned.

While the general impression has been that the CUPA program is an expense that Trinity County cannot afford, the CUPA, as administered by the State, has generated more revenue than expenses in Fiscal Years 2007 – 2011, leaving open the idea that Trinity County should consider investigating the issue.

Seismic or Geologic Hazards

Seismic Safety

A description of the general geological makeup of the County is located in Appendix A and is based on information from the California Division of Mines and Geology (DMG) and its annual reports. It is important to relate this information toward seismic safety measures.

> *In broad overviews, the works of man loom as the principal cause of earthquake hazard. In open country, one should be able to "ride out" a great earthquake in reasonable safety, barring landslides, large-scale liquefaction, and tsunamis. It is primarily the structures built in seismic regions that create the hazard (DMG 1974: 5).*

If this point of view is accepted, then earthquake safety is dependent upon proper land use planning and structural design.

In order to ensure good planning, action must be taken at both the State and local level. While the State is obligated to address the general questions of public health and safety, "most basic zoning controls are lodged at the city and county level, where most [safety] decisions are actually implemented" (DMG 1974: 12).

The state has taken the lead in seismic safety, most notably in the Alquist-Priolo Earthquake Fault Zoning Act, signed into law December 22, 1972, and went into effect March 7, 1973. Under the Act, the State Geologist (Chief of Division of Mines and Geology [DMG]) is required to delineate Earthquake Fault Zones (EFZs) along known active faults in California. The purpose of this Act is to prohibit the location of most structures for human occupancy across the surface traces of active faults and to thereby mitigate the hazard of fault rupture (CCR Sec. 2621.5).

In 1973 a project team was established within the DMG to develop and conduct a program for delineation of the zones. This team produced several series of maps showing fault location within the state. Prior to January 1, 1977 all of the Earthquake Fault Zones maps issued were based almost solely on the mapping of others (DMG 1997:2). Maps created after June 1, 1997 are based extensively on interpretations of the Fault Evaluation and Zoning Program staff of DMG. As of June 1, 1997, 543 Official Maps of Earthquakes Fault Zones have been issued. The maps delineate regulatory zones for the faults in California. Thirty-six (36) counties and 97 cities are affected by the existing Earthquake Fault Zones, and of these 36 counties, Trinity County is not listed as being affected by potentially active faults, therefore does not have a relatively high potential for ground rupture (DMG 1997:3). While Trinity County is not potentially affected by active faults, there are many inactive faults that exist. Even with no active faults, the occasional earthquake can be felt within the County. A map that shows the location of historical earthquakes is located in Appendix B.

It should be noted that the DMG determined that there are so many potentially active (i.e. Quaternary) faults in the state that it would be meaningless to zone all of them. The State Geologist determined to zone only those potentially active faults that have a relatively high potential for ground rupture.

> *Sufficiently Active*—A fault is deemed sufficiently active if there is evidence of Holocene surface displacement along one or more of its segments or branches. Holocene surface displacement may be directly observable or inferred; it need not be present everywhere along a fault to qualify that fault for zoning. The Holocene is the geological epoch which began about 12,000 years ago and continues to the present day.
>
> *Well-defined*—A fault is considered well-defined if its trace is clearly detectable by a trained geologist as a physical feature at or just below the ground surface. The fault may be identified by direct observation or by indirect methods. The critical consideration is that the fault, or some part of it, can be located in the field with sufficient precision and confidence to indicate that the required site-specific investigations would meet with some success.

Because Trinity County was not determined to be affected by existing Earthquake Fault Zones under the Alquist-Priolo Earthquake Fault Zoning Act, and does not have a relatively high potential for ground rupture, local government must take the next step in promoting public safety.

According to the Bureau of Reclamation, Trinity County is located in a region of low historical seismicity and little known Quaternary faulting. However, the region may be subjected to low to moderate levels of ground shaking from nearby or distant earthquakes. Preliminary MCE's (maximum credible earthquake) were determined for potentially significant faults including Likely, Hat Creek, Freshwater, Mendocino, and San Andreas. The MCE's for these faults range from 7 to 8-1/2 Ms. A ML (Mercalli Level) of = 6-1/2 was also estimated for local seismicity. Surface faulting beneath the county has only a remote probability of occurring because no Quaternary faults have been recognized. Also, horizontal earthquake activity in the area has been very low. Volcanic activity at Mt. Shasta and Lassen Peak poses a very slight hazard to the area. Ashfalls of 2 to 12 inches are possible following large eruptions in the Cascade Range. Volcanic earthquakes could cause ground shaking, but the severity would be less than that caused by a local earthquake.

Indirect effects of earthquakes could be an issue for Trinity County, as identified in the Trinity County Emergency Operations Plan (2012).

> *Trinity County has not been historically active, but settlement has been very recent in geologic terms. The North Coast is seismically active, and has experienced recent activity that caused considerable structural damage and displacement of small numbers of citizens. The Cascadia Subduction Zone is at risk of severe activity, with potentially high damage, casualties and population displacement. Trinity County could be directly*

impacted by an earthquake of significant magnitude, or could be inundated by North Coast evacuees or those seeking refuge.

A seismic event that doesn't cause damage in Trinity County could still generate large numbers of casualties and evacuees from coastal areas, as Trinity is both inland and high ground compared to Humboldt County. Unreinforced masonry and frame buildings could sustain moderate to severe damage. Pipelines, including natural gas transmission, water and sewage lines, could fail. Dams could sustain structural damage, including damage that could impede outflows, require unplanned increase in outflows and/or disrupt power generation and distribution. Utilities and communications are likely to be compromised. Key people in government and in key private sector partners could be unable to report for work. Depending on the locations, nature, and extent of effects, these numbers could be large.

Earthquakes can be mitigated for through land use planning and building codes. Retrofitting of infrastructure can significantly reduce vulnerability.

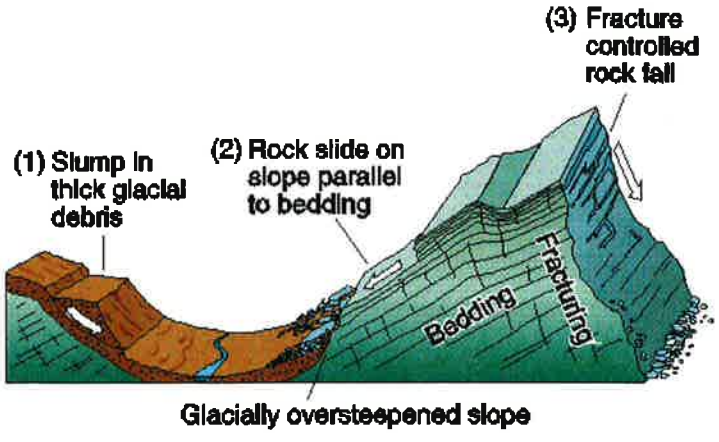
Landslides

Landslides create a threat that is multifaceted; they create a serious threat to highways and structures that support fisheries, tourism, timber harvesting, mining, and energy production as well as general, commercial and emergency resource transportation.

Landslides are common in regions that are mountainous, with weathered shale and other clay-rich rocks, and particularly where there are steep slopes, periodic rains, and vegetation loss has occurred after wildfires or as a result of clear-cut logging.

Five major categories of active and inactive landslides are normally discussed. They include debris slides, translational/rotational slides, earth flows, and debris flows and torrent tracks. Two other features that are formed by landslides are also important to study, debris slide amphitheaters and slopes and inner gorges.

The term landslide refers to the down slope movement of masses of rock and soil. Landslides are caused by one or a combination of the following factors: change in slope gradient, increasing the load the land must bear, shocks and vibrations, change in water content, groundwater movement, frost action, weathering of rocks, and removal or changing the type of vegetation covering slopes.



Landslide hazard areas occur where the land has certain characteristics, which contribute to the risk of the downhill movement of material. These characteristics include:

- A slope greater than 15 percent.
- Landslide activity or movement occurred during the last 10,000 years.
- Stream or wave activity that has caused erosion, undercut a bank or cut into a bank to cause the surrounding land to be unstable.
- The presence or potential for snow avalanches.
- The presence of an alluvial fan, which indicates vulnerability to the flow of debris or sediments.
- The presence of impermeable soils, such as silt or clay, which are mixed with granular soils such as sand and gravel.

Commonly, down-slope movement is only considered a hazard when it threatens people and property. Therefore, this discussion focuses on landslides that occur in areas affecting human life or property; rather than landslides that occur in wilderness areas.

Typical effects of these down-slope movements (landslides) include damage or destruction of portions of roads and railroads, sewer and water lines, homes and public buildings. Disruption of shipping and travel routes result in losses to commerce. Many of the losses due to landslides may go unrecorded because no claims are made to insurance companies, of a lack of coverage by the press, or the fact that transportation network landslides may be listed in records simply as "maintenance."


Deerlick Springs Rd.
Photograph courtesy of the Trinity County

Even small-scale landslides are expensive due to clean up costs that may include debris clearance from streets, drains, streams and reservoirs; new or renewed support for road and rail embankments and slopes; minor vehicle and building damage; personal injury; livestock, timber, crop and fencing losses and damaged utility systems. Landslides are often secondary hazards related to other natural disasters. Rainstorms triggering landslides may also produce damaging floods. Earthquakes often induce landslides that can cause additional damage. The identification of areas susceptible to landslides is necessary to support grading, building, foundation design, housing density, and other land development regulations to reduce the risk of property damage and personal injury.

In the early 1980s, the Department of Water Resources conducted a study that mapped the geology, landslides, instability and erosion hazard areas for two watersheds in Trinity County; the

South Fork of the Trinity River and the mainstem of the Trinity River. Maps are available for earthquake, fault line, and landslide locations for Trinity County and are located in Appendix B. Larger, more detailed maps are located at the Trinity County Planning Department.

Wildfire and Structures

In much of the Western United States including California, fire is a natural disturbance regime that functions to cycle nutrients, reduce surface and ladder fuels, and renew ecosystems. This understanding of fire's role in nature, long a minority perspective, has only recently gained ground and begun to broadly influence land management. Historically, beginning in the early 20th century, fire suppression to protect forest and other resource values has been the dominant approach to managing fire on public lands and in private forests.

The climate of Trinity County is classified as Mediterranean. Such areas typically have certain common characteristics:

- warm to hot summers and mild winters,
- a moderate marine influence throughout the year, more impacting in coastal areas,
- most of the year's precipitation is concentrated during winters, whereas summers in lower elevations are nearly or completely dry, and
- extended periods of sunny weather and few clouds.

Fire is a natural component of Mediterranean ecosystems. On most days, the sea breeze blowing onshore produces a marine influence. Fires that start under these circumstances can usually be controlled. Under certain conditions, however, brush and forest fires can turn into disastrous conflagrations that ravage wide areas.

Hot, dry summers reduce fuel moisture and increase the potential for fires. Most fires in California occur during late summer and early fall, but the fire season is getting longer and more extreme. Wind affects fire behavior and the dispersal of smoke produced by fires. Along with the major seasonal Pacific westerlies, winds also follow daily patterns that play an important role in the mountain regions, like Trinity County. These patterns result from air density differences brought about by solar heating during the day and radiative cooling at night. Two types of diurnal cycle winds are land-to-sea breezes and mountain-to-valley winds.

Land-to-sea breezes occur because land heats and cools more quickly than water. Onshore breezes typically occur during the daytime when the warm air over the land mass rises and cool

ocean air moves onshore to replace it. At night, the situation reverses and the breeze moves offshore, from the cooling land to the warmer ocean.

Mountain-to-valley breezes form in a similar way. Solar heating of the higher elevation land during the day creates a rising mass of warm air, which tends to move upslope following the terrain. At night, the air flow is reversed as radiation cools the land and chills the air above it. This cooled air drops down into the lowlands from the higher slopes.

Wind direction and intensity during prescribed burns and wildfires are important because air quality is poorest immediately adjacent to and downwind of such fires. Fires near populated areas may pose an increased risk of air quality–related health problems. Mountain-to-valley breezes may also distribute smoke. At night, the air drains down-slope, but during the day winds reverse and blow upslope, carrying the polluted air. Mountain areas may become smoky in late afternoon or early evening for this reason. By morning, however, cold, dense nighttime air has traveled down-slope and polluted valleys and mountain basins. This may cause ground-level inversions to form as the land radiates heat. Mountain basins or valleys, such as the Weaverville Basin, have high smoke impact potential.

Wildfires are now often of a scale and intensity beyond the range of historic variability (Agee, 1993; Weatherspoon and Skinner, 1996; Skinner, Taylor and Agee, 2006). The regional and landscape scale impacts of these fires include changes in vegetation patterns, loss of remaining old growth forest in reserves, adverse impacts to air quality and its associated effects on public health, economic losses and danger to human life. Trinity County has been no exception. According to CAL FIRE and their Fire and Resource Assessment Program (FRAP) 105 wildfires occurred between 1999 and 2009 with approximately 433,835 acres burned. The 2008 fire season alone resulted in 265,000 acres affected, including about 94,000 acres within the Wildland-Urban Interface (WUI), around 17 weeks of severe smoke impacts, and 10 lives lost.

Under higher fire danger conditions, forests in Trinity County and the entire Western United States are burning with extreme severity and scale. A significant component of this increase in fire activity has, ironically, been the success of fire exclusion. As we continue to improve our ability to suppress wildfires, the wildfire problem worsens (Brown and Arno, 1991).

There has been a significant amount of research surrounding fuels treatments in mixed conifer forests of the western US, like those that dominate the landscape in Trinity County. The Forest Guild and US Forest Service published *Comprehensive Fuels Treatment Practices Guide for Mixed Conifer Forests: California, Central and Southern Rockies and the Southwest* in May 2011. (Evans, et al. 2011), which is a compilation of the science and a resource for guiding future treatments. The result of successful fire suppression and past forest management practices such as logging, plantings of single species of economically valuable trees and failure to adequately manage such plantations is an unnaturally high accumulation of fuels, which in turn can increase the severity of wildfires.

Lightning caused fires are a natural phenomenon of ecological renewal in these landscapes. However, where fires encounter unnaturally high fuels in landscapes that have already lost a large proportion of their more fire-resistant old growth forest, the impacts on forests and watersheds fall beyond the natural range of historic variability and begin to threaten ecosystem functions. The regional and landscape scale impacts of these fires include changes in vegetation patterns, loss of remaining old growth forest in reserves, growing concerns about air quality, climate change, economic losses and danger to human life.

In addition to social ramifications of fires burning with extreme severity and scale are ecological ripple effects. Fuels build up after a fire severely burns and kills trees, which may fall to become fuel for the next fire event. Soils denuded of protective vegetation cover can erode into fish bearing streams and further threaten already endangered salmon and steelhead trout runs.

Much of the Wildland Urban Interface in Trinity County is within forests that have long dry seasons each year and have heavy concentrations of fuels on the forest floors, such as ponderosa pine, mixed conifer, and drier Douglas-fir forests where the types of fires occurring today are very uncharacteristic of historic fires (Agee and Skinner, 2005). Historically, fire activity did occur in these forest types, but not with the severity that exists today. There is broad consensus on the need for active fuels management, including continued maintenance of fuels treatments. (Allen, et al., 2002; McKelvey, et al., 1996).

Trinity County is classified as mixed interface, because of the dispersed nature of dwellings in small, scattered communities in flammable wildland vegetation (CDF, 2002). Private lands within the county are in State Responsibility Areas (SRA) and almost all have been classified as within Very High Severity Zones (Fire Hazard Severity Map, Appendix B). Major suppression efforts in response to wildfire in the wildland-urban interface (WUI) have occurred in recent times. These wildfires have affected large portions of the county resulting in the loss of both natural resources and homes. As people continue to move into low-density housing at the edges of communities, the wildland-urban interface will simultaneously grow.

Recognizing the negative impacts of historical fire suppression, past forest management practices, and subsequent effects on communities within the WUI, residents of Trinity County joined together to develop a community wildfire protection plan under the guidance of the Healthy Forest Restoration Act.

In 2001, the National Fire Plan directed federal agencies to "work directly with communities to ensure adequate protection from wildfires, and to develop a collaborative effort to attain the desired future condition of the land."[1] The key wildland fire management agencies in California have chosen to accomplish this effort through the California Fire Alliance (the Alliance). To this end the Alliance, on its website[2], encourages the development of Community Wildfire Protection

[1] http://www.cafirealliance.org/organization_history/

[2] http://www.cafirealliance.org

Plans (CWPP), as defined by the Healthy Forests Restoration Act (HFRA). A community wildfire protection plan, as defined by the HFRA, means a plan for an at risk community that fulfills the following criteria:

Collaboration

A) The plan is developed within the context of the collaborative agreements and the guidance established by the Wildland Fire Leadership Council and agreed to by the applicable local government, local fire department, and State agency responsible for forest management, in consultation with interested parties and the Federal land management agencies managing land in the vicinity of the at-risk community.

Trinity County's CWPP was collaboratively developed. Significant efforts were made throughout the planning process to collaborate with local, state, and federal land and fire management agencies. Leadership and guidance were provided by the Trinity County Resource Conservation District and Watershed Research and Training Center. CAL FIRE, USFS, Trinity County Volunteer Fire departments, and BLM managers were represented and provided presentations at the community meetings. Officials from both the Six Rivers and Shasta-Trinity National Forests were engaged in the collaboration. In addition, special efforts were made to gain experience and insight from professional foresters, both active and retired. Meetings were designed and conducted to maximize community input into the planning process.

Prioritized Fuel Reduction

B) The plan identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment on Federal and non-Federal land that will protect one or more at-risk communities and essential infrastructure.

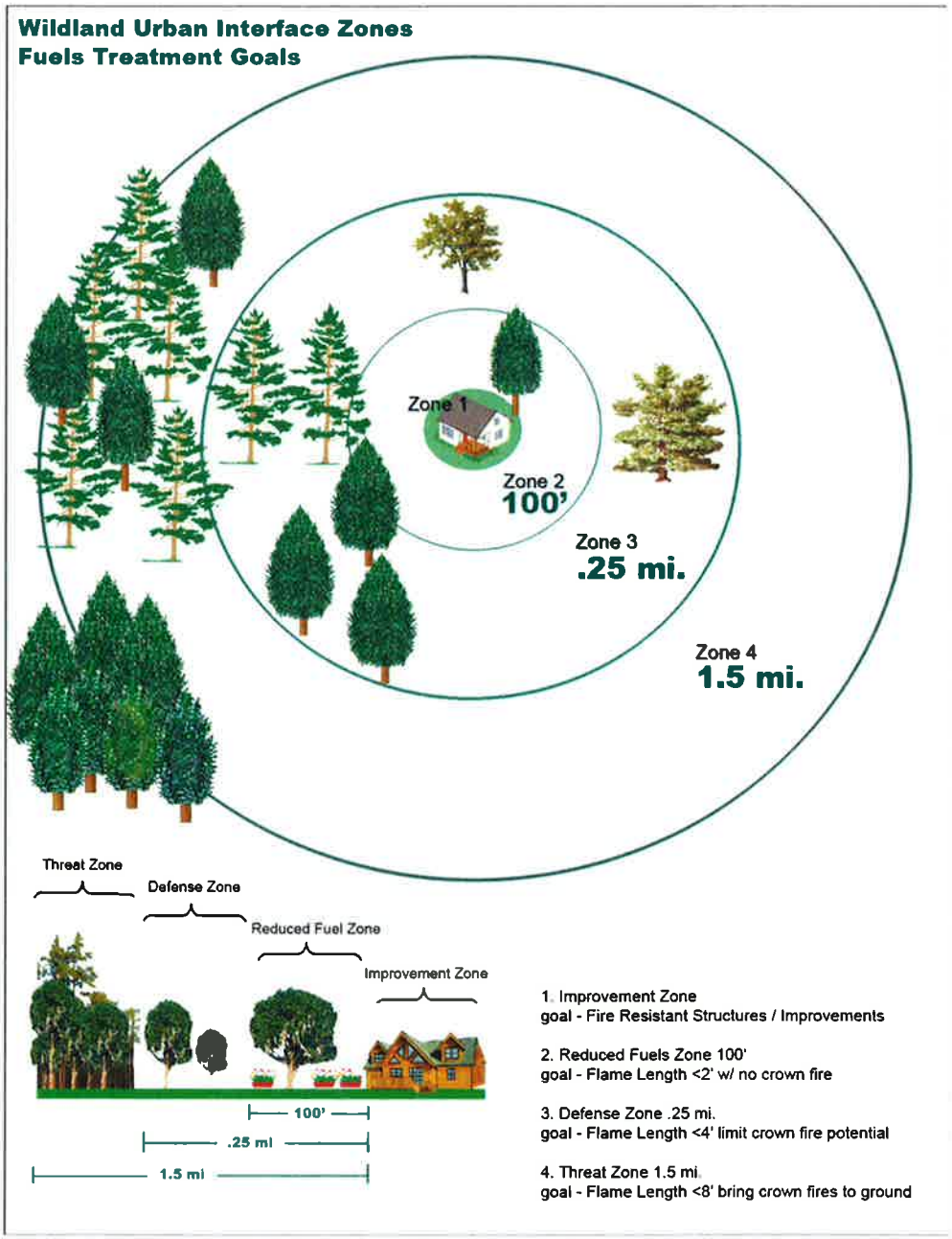
Trinity County's CWPP identifies areas for hazardous fuel reduction treatments and prioritizes them using a ranking system. This plan also recommends the types and methods of treatment to reduce the risk of wildfire to communities and resources within the planning area.

Trinity County's Community Wildfire Protection Plan (CWPP) is a plan developed by the communities in areas at-risk from wildfire. The CWPP process involves collaboration between communities and agencies interested in reducing wildfire risk. The CWPP enables a community to plan how it will mitigate the risk of wildfire. The plan identifies strategic sites and methods for fuel reduction projects across the landscape and jurisdictional boundaries. Benefits of having a CWPP include National Fire Plan funding priority for projects identified in a CWPP. The USFS and the Bureau of Land Management (BLM) can expedite the implementation of fuel treatments identified in a CWPP through alternative environmental compliance options offered under the Healthy Forest Restoration Act (HFRA).

Trinity County's plan was developed by the Trinity County Fire Safe Council. It is a collaborative, ongoing process, using input from interested parties, CAL FIRE and federal land management agencies throughout the County. The original plan was developed in the 2000 – 2005 timeframe and an update was completed in 2010. The plan identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will protect

land throughout Trinity County. The plan also recommends measures to reduce the ignitability of structures throughout the area addressed by the plan.

The CWPP (2005 and 2010) gave a new focus to pre-fire treatments emphasizing strategic locations – the prevailing strategy to implement projects adjacent to communities at risk and within the Wildland Urban Interface (WUI) and the 2010 update adopted WUI boundaries for the county's communities at risk.



Resources for pre-fire treatments are scarce and it is important to use them as effectively as possible and to focus efforts on protecting those values of greatest interest to the community. As fires do not stop at property boundaries, this means that such a coordinated effort should involve all who have an interest in local land management including federal, state and local government agencies, private landowners and the general public. While industrial forest landowners and government agencies have worked on fire management planning to varying degrees within their own jurisdictions, there was not a comprehensive coordination effort across boundaries in Trinity County until recently. In response to requirements of the Federal Land Assistance, Management, and Enhancement (FLAME) Act of 2009, the Wildland Fire Leadership Council (WFLC) directed the development of the National Cohesive Wildland Fire Management Strategy (Cohesive Strategy). An emerging trend, known as the "All Lands" approach, is identified in the Cohesive Strategy. The Trinity County Fire Safe Council has been working to use this in pilot projects in Burnt Ranch, Coffee Creek and Hayfork since 2011.

Local, State and Federal agencies have unique responsibilities for wildland fire protection. The delivery of wildland fire protection services in Trinity County, and throughout California relies on an integrated, multi-agency effort to maximize the use of firefighting resources. This integration, typically referred to as "mutual aid," is authorized by statute and is guided by interagency agreements.

Despite well-developed systems for responding to wildfire, some fires will continue to escape control efforts. Extreme weather conditions, such as high wind and/or hot, dry weather or when significant fire activity stretches available suppression resources, a small percentage of wildland fires will become large and damaging. Therefore efforts should be taken to increase fire resiliency in the landscape and develop policies and procedures that promote fire-adapted communities.

Individual landowners, homeowners and communities share wildland fire protection responsibilities with federal, state and local agencies. Homeowners and landowners should work together to plan and implement fire protection measures, from education programs to defensible space and fuels treatments. The Firewise Communities Recognition Program (firewise.org) of the National Fire Protection Association (NFPA) provides a template for homeowners taking some responsibility for creating and maintaining fire-adapted communities in concert with the agencies. As of December 2012, Trinity County Fire Safe Council has assisted 13communities to enroll in the Firewise Program.

The California Department of Forestry and Fire Protection (CAL FIRE) and the State Board of Forestry and Fire Protection adopted a *Strategic Fire Plan for California* in 2010. The 2010 Strategic Fire Plan is a strikingly different fire plan than those developed in the past. This Plan recognizes that fire will occur in California and works to answer the question of "how do we utilize and live with that risk of wildfire?" It is useful to Trinity County to frame the wildfire section of the Safety Element of the General Plan with CAL FIRE's vision, goals and objectives to guide the County in answering that question. This, in combination and through implementation, will help

Trinity County become more resistant and resilient to the damaging effects of catastrophic wildfire while recognizing fire's beneficial aspects.

Fire Hazard Planning – Governor's Office of Planning and Research

This update of the Safety Element was reviewed in the context of the 2003 edition of Fire Hazard Planning, General Plan Technical Advice Series prepared by The Governor's Office of Planning and Research (OPR), as directed in Senate Bill 1241. The OPR encourages using local fire safe councils as a resource *"...in the development of the fire protection and prevention policies and implementation measures in the General Plan. OPR encourages the use of the Councils for both their expertise and as a means for expanding public participation in the General Plan Process."* The County not only turned to the expertise of the Trinity County Fire Safe Council, but also its partner, the Trinity County Chiefs' Association to review the background data and in the development of locally important objectives, goals and policies in the Safety Element as well as the County's Community Wildfire Protection Plan.

Coordination with CalFire

Senate Bill 1241 also requires coordination with CalFire on the development of policies regarding wildfire and the Safety Element. CalFire is an integral member of the Trinity County Fire Safe Council and the Trinity County Chiefs' Association. As such, CalFire has been engaged in the development and review of these policies as well as having reviewed and approved the Trinity County Community Wildfire Protection Plan.

Fire Protection

Trinity County fire protection needs are currently provided by 14 volunteer fire service organizations located throughout the county, California Department of Forestry and Fire Protection (CAL FIRE), and the US Forest Service (USFS). By law, CAL FIRE is responsible for wildland fire protection on all private lands within Trinity County and USFS is responsible for wildland fire protection on all federal National Forest lands. Consequently, CAL FIRE and USFS fire stations are staffed only during the summer fire season, which normally lasts from May to November. Local government (in this case the Trinity County volunteer fire departments) and some non-governmental fire companies are responsible for structural fire protection and rescue services in Trinity County at all times during the year. The 14 volunteer fire departments and fire companies are Coffee Creek, Douglas City, Down River, Hawkins Bar, Hayfork, Hyampom, Junction City, Kettenpom-Zenia, Lewiston, Post Mountain, Salyer, Southern Trinity, Trinity Center, and Weaverville. The volunteer fire departments currently have a membership of approximately 150 volunteers (November 30, 2012). Maintaining adequate membership in all of the departments is a constant struggle. Two non-profits, Trinity County Life Support Ambulance and Southern Trinity Area Rescue (STAR), provide ambulance services. The Trinity County Sheriff's Office maintains an active Search and Rescue Team. The Trinity County Chiefs' Association serves as a coordinating organization for fire protection and emergency services organizations within the County.

Of the 14 volunteer fire departments and fire companies, only Trinity Center, Hayfork, Lewiston, and Weaverville derive limited tax revenues. Volunteer fire departments/companies are funded primarily through local fundraising activities and continually experience funding shortages. Grant programs, which come and go over time, such as the Rural Communities Fire Protection program, Emergency Services Foundation, Title III of the Secure Rural Schools and Community Self Determination Act and other grant programs have helped, including for the purchase vitally needed fire equipment.

The governing entities for the volunteer fire departments vary from Special Districts (e.g.: Community Service District, Public Utility District, Fire District) to unincorporated volunteer fire companies. The volunteer fire departments have legal district boundaries; however, if the volunteer fire departments only responded to emergencies within those boundaries much of Trinity County would be unprotected from fire and rescue services. The volunteer fire departments routinely respond outside of their legal boundaries to any emergency as dispatched by the 9-1-1 center maintained by the Trinity County Sheriff's Office.

During the fire season, all fire agencies in Trinity County respond to any reported fire, regardless of legal jurisdiction. CAL FIRE and USFS are legally and financially responsible to manage wildland fires within their jurisdiction; however, the volunteer fire departments, by virtue of their dispersion through the county, are often first to arrive on the scene of a spreading wildfire, especially in the WUI. CAL FIRE and USFS depend upon the volunteer fire departments to provide initial attack to wildfires until augmented reinforcements can be mustered. CAL FIRE and USFS have agreements with the volunteer fire departments to reimburse the departments for their assistance on wildfires.

Trinity County Board of Supervisors authorized the formation of Local Area Advisors in 2009. (Resolution 2009-058, August 4, 2009). The Local Area Advisors (LAA) are recommended by the Director of Emergency Services and appointed by Trinity County Board of Supervisors (BOS) and serve at the pleasure of the BOS on behalf of the Citizens of Trinity County. The LAA is available to assist local, USFS Ranger Districts and Incident Management Teams (IMT) in providing local knowledge, landscape overviews, historical perspectives, social dynamics, political realities and ramifications, economic implications, and local area citizens' concerns of an incidents' effect on Trinity County and population of affected communities. The LAA will remain independent of the IMT and will serve to represent the citizens of affected communities. Details of the role of LAA can be found in the Trinity County Emergency Operation Plan.

Transportation Network Critical To Public Safety

Trinity County has widely dispersed communities embedded in a forested landscape that is mostly federally-managed lands and the County's road network is critical to public safety. There are three (3) state highways that form the backbone of the transportation network in Trinity County. The two west-east highways are Highways 299 and 36 and the only south-north route is Highway 3. All of the rest of the roadway system is a mix of county roads and streets, private roads and an extensive network of roads that have been built over time to provide access to the

forestlands in the county (both on public and private lands). These roads provide primary and alternate emergency evacuation routes for the public, emergency access for firefighters, law enforcement and other emergency responders. Protecting and maintaining this road network is an essential component of the wildfire and fire protection component of the Safety Element.

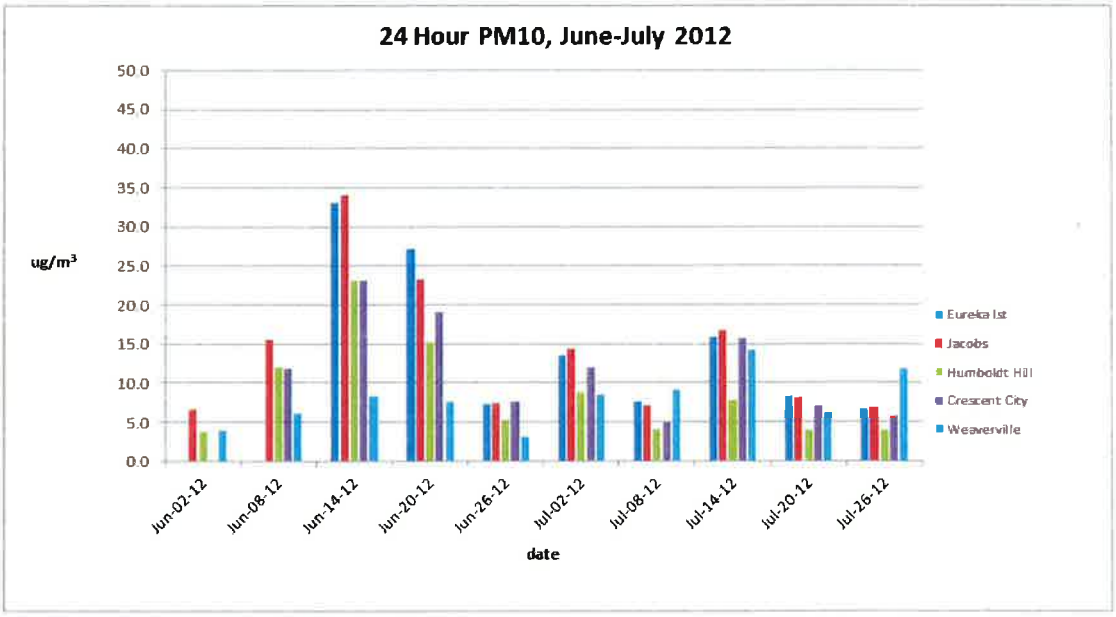
Air Quality

Trinity County is located in the North Coast Unified Air Quality Management District within the North Coast Air Basin. The North Coast Air Quality Management Board monitors airborne particulates within Trinity County, but has limited monitoring stations established in the County. The low population density, limited number of industrial and agricultural installations, and minimal problems with traffic congestion all contribute to Trinity County's generally good air quality. Particulate matter (PM) is the class of air pollution that is of primary concern in Trinity County. The other area of concern is naturally occurring asbestos (NOA), which has localized impacts. The California Air Resources Board (CARB), which oversees both state and federal air pollution control programs in California, has divided the state into air basins. Authority for air quality management within each basin has been given to local air pollution control districts, which regulate stationary source emissions and develop local nonattainment plans within their jurisdiction.

Air Basins within California

The air in Trinity County is considered to be in "attainment" of state and federal ambient air quality standards except for the State's 24-hour PM_{10} standard (www.ncuaqmd.org). According to the *California Air Pollution Control Officers Association (CAPCOA) State of the Air Report – April 2012*, Trinity County had not had an exceedence of the $PM_{2.5}$ standard during the preceding 11 years. The primary sources of pollutants contributing to the non-attainment designation for PM_{10} and $PM_{2.5}$ are wood stoves, wind-blown dust from dirt roads and agriculture, open burning from backyard burns, prescribed fires and, with an ever-increasing level of concern, catastrophic wildfires. For health reasons, particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) is of greatest concern. Particles of this size and smaller can permanently lodge in the deepest, most sensitive areas of the lungs, and cause respiratory and other health problems. The CARB recently concluded that $PM_{2.5}$ is

far more hazardous than previously estimated (California Air Pollution Control Officers Association [CAPCOA] State of the Air Report, 2012).



24-Hour California AAQS is 50 *ug*/m3, Federal AAQS is 150 *ug*/m3
(NCUAQMD Air Monitoring Report September, 2012).

The effect of wildfire on ambient air quality, through smoke production, can be dramatic. The Air Quality section in Appendix A has a detailed discussion of air quality issues in Trinity County as does the section of this document that describes Climate Change, with a special focus on the episodic effects of wildland fire smoke on air quality and public health and safety.

California Health and Safety Code section 39607(e) requires the CARB to establish and periodically review area designation criteria which provide the basis for the CARB to designate areas of the State as under "attainment", "nonattainment", or "unclassified" for the State standards. Nonattainment areas are then given a ranking of severe, serious or moderate.

The following categories are used for both State and Federal designations:

- **Unclassified**–a pollutant is designated unclassified if the data are incomplete and do not support a designation of attainment or nonattainment;
- **Attainment**–a pollutant is designated attainment if the State standard for that pollutant was not violated at any site in the area during a three-year period;
- **Nonattainment**–a pollutant is designated nonattainment if there was at least one violation of a State standard for that pollutant in the area; and
- **Nonattainment/transitional**–is a subcategory of the nonattainment designation. An area is designated nonattainment/transitional to signify that the area is close to attaining the standard for that pollutant.

The CARB has delegated much of its air pollution control authority to local air pollution control districts and air quality management districts.

Pollutants of Concern for Trinity County

Ozone

Ozone (O_3) is a colorless gas with a pungent odor. High ozone concentrations exist naturally in the stratosphere. Ozone forms in the atmosphere when hydrocarbon and oxides of nitrogen (NO/NO_2), pre-cursor emissions, react in the presence of sunlight. Ozone within the stratosphere is considered beneficial as it filters ultraviolet radiation; it is also a highly reactive oxidant that has damaging effects upon materials, plants, and human health at the earth's surface.

Ozone is a regional pollutant, influenced primarily by meteorology and terrain for its formation. It is the chief component of urban smog. Low wind speeds or stagnant air, coupled with warm temperatures and cloudless skies provide for the optimum conditions for O_3 formation. As a result, summer is generally the peak O_3 season.

Ambient ozone concentrations are known to cause adverse health effects. Ozone enters the human body through the respiratory system causing irritation and discomfort, making breathing more difficult and reduces the respiratory ability to remove inhaled particles and fight infection. Ozone has also been known to cause significant damage to crops, forestland and other ecosystems.

Inhalable Particulate Matter (PM_{10} and $PM_{2.5}$)

Particulate matter (PM) can be directly emitted or can be formed in the atmosphere when gaseous pollutants such as sulfur and nitrogen oxides undergo chemical reactions in the atmosphere. Primary PM consists of carbon (soot) — emitted from cars, trucks, heavy equipment, forest fires, and burning waste — and crustal material from unpaved roads, stone crushing, construction sites, and metallurgical operations.

Secondary PM forms in the atmosphere from gases. Some of these reactions require sunlight and/or water vapor. Secondary PM includes:

- Sulfates formed from sulfur dioxide emissions from power plants and industrial facilities
- Nitrates formed from nitrogen oxide emissions from cars, trucks, and power plants
- Carbon formed from reactive organic gas emissions from cars, trucks, industrial facilities, forest fires, and biogenic sources such as trees.

PM_{10} refers to particles with an aerodynamic diameter ten microns or smaller. PM_{10} is a major air pollutant that consists of tiny solid or liquid soot, dust, smoke, fumes, or mist particles that is a known cause of visibility reduction. The size of the particles allows them to enter the air sacs deep in the lungs where they may be deposited, and can be especially harmful to people with existing

vascular or respiratory illness, the aged and the very young. The PM_{10} data are reported as 24-hour average concentrations in ug/m3 (microns per cubic meter).

PM_{10} includes a subgroup of finer particles, $PM_{2.5}$ (particulate matter 2.5 microns or smaller). $PM_{2.5}$ particles pose an increased health risk because they can deposit deep in the lungs and contain substances that are particularly harmful to human health. The EPA created national $PM_{2.5}$ standards in 1997. The standards include an annual standard set at 15 micrograms per cubic meter, based on the 3-year average of annual mean $PM_{2.5}$ concentrations and a 24-hour standard of 65 micrograms per cubic meter, based on the 3-year average of the 98th percentile of 24-hour concentrations.

The primary source of air quality emissions of concern in Trinity County are smoke from wildfires, prescribed fire or pile burning. Fuel combustion results in emissions of gaseous air pollutants, such as Carbon Monoxide (CO), Reactive Organic Gases (ROGs), sulfur dioxide (SO_2), and oxides of nitrogen (NOx). Emissions from fire result in particulate matter (PM_{10} and $PM_{2.5}$) and gaseous emissions, although PM_{10} emissions have the most significant effect. The chemistry of the fuel as well as the efficiency of combustion governs the physical and chemical properties of the resulting smoke from fire. Air quality impacts due to fire emissions are affected more by weather patterns than by quantities of fuel consumed.

Naturally Occurring Asbestos

Information on Naturally Occurring Asbestos (NOA) provided by the California Air Resources Board notes that asbestos is a term used for several types of naturally-occurring fibrous minerals found in many parts of California, including areas of Trinity County (California Department of Conservation ftp://ftp.consrv.ca.gov/pub/ dmg/pubs/ofr/ofr_2000-019.pdf). The most common type of asbestos is chrysotile, but other types are also found in California. Serpentine rock often contains chrysotile asbestos. Serpentine rock, and its parent material, ultramafic rock, is abundant in the Sierra foothills, the Klamath Mountains, and Coast Ranges. Serpentine rock is typically grayish-green to bluish-black in color and may have a shiny appearance.

Asbestos is commonly found in ultramafic rock, including serpentine, and near fault zones. The amount of asbestos that is typically present in these rocks range from less than 1% up to about 25%, and sometimes more. Asbestos is released from ultramafic and serpentine rock when it is broken or crushed. This can happen when cars drive over unpaved roads or driveways which are surfaced with these rocks, when land is graded for building purposes, or at quarrying operations. It is also released naturally through weathering and erosion. Once released from the rock, asbestos can become airborne and may stay in the air for long periods of time.

All types of asbestos are hazardous and may cause lung disease and cancer. Health risks to people are dependent upon their exposure to asbestos. The longer a person is exposed to asbestos and the greater the intensity of the exposure, the greater the chances for a health problem. Asbestos-related disease, such as lung cancer, may not occur for decades after breathing asbestos fibers. Cigarette smoking increases the risk of lung cancer from asbestos exposure.

The California Air Resources Board adopted two statewide control measures which prohibit the use of serpentine or ultramafic rock for unpaved surfacing and controls dust emissions from construction, grading, and surface mining in areas with these rocks.

The Asbestos Airborne Toxic Control Measure (Asbestos ATCM) is generally designed to regulate use of materials that contain or may contain NOA. Some activities are exempt under various conditions.

One section of the ATCM targets "restricted material" that "includes ultramafic rock and serpentine rock; any material extracted from a region defined on geologic maps as an ultramafic rock unit, and any material that has been tested and found to have an asbestos content of 0.25 percent or greater." This section of the rule applies to "any person who sells, supplies, offers for sale or supply, transports, or applies 'restricted material'."

Another section of the ACTM regulates the use of NOA material for "any construction, grading, quarrying, or surface mining operation on any property that meets any of the following criteria:

> (1) Any portion of the area to be disturbed is located in a geographic ultramafic rock unit; or
>
> (2) Any portion of the area to be disturbed has naturally-occurring asbestos, serpentine, or ultramafic rock as determined by the owner / operator, or the Air Pollution Control Officer (APCO); or
>
> (3) Naturally-occurring asbestos, serpentine, or ultramafic rock is discovered by the owner / operator, a registered geologist, or the APCO in the area to be disturbed after the start of any construction, grading, quarrying, or surface mining operation."

Disturbance, construction, and maintenance of roads, depending on the type of activity and location, are also regulated. For non-road construction and grading activities, generally those with a disturbance area of one acre or less may only occur if several mitigation measures are implemented and those activities with a disturbance area of more than one acre must have an approved dust mitigation plan.

Climate Change

Assembly Bill 32 (AB 32), the California Global Warming Solutions Act of 2006, recognizes that California is the source of substantial amounts of greenhouse gas (GHG) emissions which influences climate change (www.arb.ca.gov/cc/ab32/ab32.htm).

Climate change refers to any significant change in measures of climate, such as average temperature, precipitation, or wind patterns, over a period of time. Climate change may result from natural factors, natural processes, and human activities that change the composition of the atmosphere and later the surface and features of the land. Significant changes in global climate patterns have recently been associated with global warming, an average increase in the temperature of the atmosphere near the Earth's surface, attributed to accumulation of greenhouse gas (GHG) emissions in the atmosphere. Greenhouse gases trap heat in the atmosphere, which in turn heats the surface of the Earth. Some GHGs occur naturally and are emitted to the atmosphere through natural processes while others are created and emitted solely through human activities. The emission of GHGs through the combustion of fossil fuels (i.e. fuels containing carbon) in conjunction with other human activities, appears to be closely associated with global warming.

State law defines GHG to include the following: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrochlorofluorocarbons (HFFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), ozone (O_3) and sulfur hexafluoride (SF_6) (Health and Safety Code, Section 38505(g)). The most common GHG that results from human activity is carbon dioxide, followed by methane and nitrous oxide.

AB 32 establishes a state goal of reducing GHG emissions to 1990 levels by the year 2020 (a reduction of approximately 25 percent from forecast emission levels) with further reductions to follow. The law requires the Air Resources Board to establish a program to track and report GHG emissions, approve a scoping plan for achieving the maximum technologically feasible and cost effective reductions from sources of GHG emissions, adopt early reduction measures to begin moving forward, and adopt, implement and enforce regulations – including market mechanisms such as "cap-and-trade" programs – to ensure the required reductions occur.

Each public agency that is a lead agency for complying with the California Environmental Quality Act (CEQA) needs to develop its own approach to performing a climate change analysis for projects that generate GHG emissions. A consistent approach should be applied for the analysis of all such projects and the analysis must be based on best available information. For these projects, compliance with CEQA entails three steps: identify and quantify the GHG emissions, assess the significance of the impact on climate change, and if the impact is found to be significant, identify alternatives and/or mitigation measures that will reduce the impact below significance.

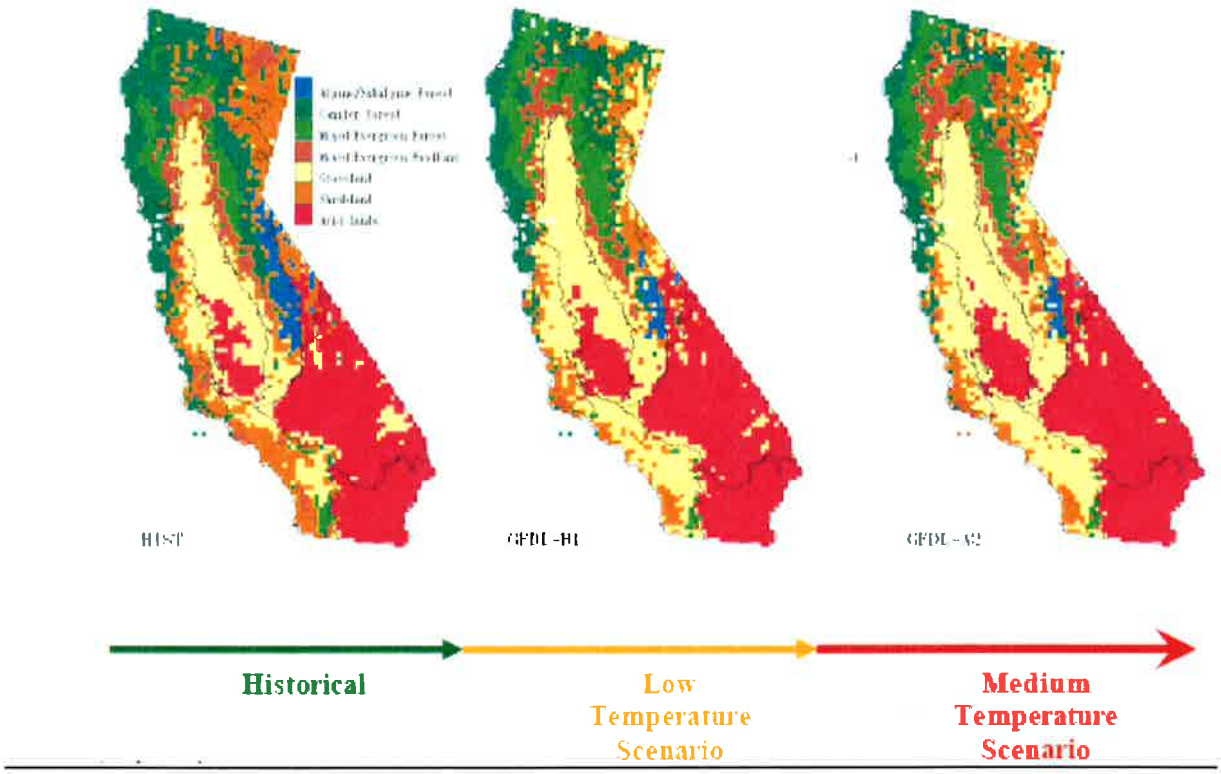
Some cities and counties have adopted general plans and policies that encourage the development of compact, mixed-use, transit-oriented developments, which reduce vehicle miles traveled, encourage alternative fuel vehicle use, conserve energy and water usage, and promote carbon sequestration. Adoption of general plan policies and certification of general plan environmental impact reports that analyze broad jurisdiction-wide impacts of GHG emissions is a strategy to address cumulative impacts and to streamline later project-specific CEQA reviews.

Because the majority of land in Trinity County is forestland, it is important to address keeping forestland healthy. Forests absorb GHGs like carbon dioxide whereas catastrophically burning forests release tremendous amounts of carbon and other pollutants in large outbursts. According to the US Environmental Protection Agency, managed forests in the US absorb about 17 percent of total annual US greenhouse gas emissions – equivalent to removing the carbon dioxide emissions from 235 million automobiles annually. With careful management of forests, the threat of wildfire goes down and the carbon originally trapped in the forest by healthy growing trees stays in the wood. Replanting forestland continues the cycle of carbon storage. Thus Trinity County may play a large role in reducing global warming due to its largely forested land area.

Wildfire

Indirect effects of the trend in climatic change include an increase in the frequency and intensity of wildfires in several vegetation types, which is likely to play a role in the expansion of grasslands. A warmer, drier climate will likely increase the number of days of severe fire danger. The fire season in California and elsewhere seems to be starting sooner and lasting longer, with climate change being suspected as a key mechanism in this trend. The rolling five-year average for acres burned by wildfires on all jurisdictions of California increased in the past two decades from 250,000 to 350,000 acres (1987–1996) to 400,000 to 600,000 acres (1997–2006) (California Wildfire Activity Statistics, 2006). In addition, the three largest fire years since 1950 have occurred this decade, with both 2007 and 2008 exceeding the previous five-year average.

Wildfire risk will continue to be highly variable across the state. Research suggests that large fires and burned acreage will increase throughout the century, with some declines after mid-century due to vegetation type conversions. Recent research estimates that the wildfire area burned is expected to increase by at least 100 percent in the forests of northern California. This is likely to have adverse effects on air quality, especially during summer and fall months. Another study used data from three CAL FIRE ranger units (Santa Clara, Amador, and Humboldt) to model potential effects to vegetation and wildfire under differing climate change scenarios (Fried et al., 2004). When interpolated to most of northern California's wildlands, these results translate to an average annual increase of 5,000 hectares (12,355 acres) burned by contained fires. Fire suppression was simulated using California Fire Economics Simulator (CFES). Across all State Responsibility Area (SRA) lands in northern California the model predicted 114 additional escapes per year. This is roughly a doubling of the number of escapes under current conditions.



Vegetation distribution under current conditions and under two different climate change scenarios (Source: Lenihan et al., 2003)

Military Operation Area

Portions of Trinity County are within established Military Operation Areas (MOA) comprised of Military Training Routes (MTRs). An MTR is a three dimensional airspace designated for military training and transport activities that has a defined floor (minimum altitude) and ceiling (maximum altitude). Due to the mountainous terrain, portions of Trinity County provide good locations for low-level training for military aircraft flying in mountain valleys. Construction of tall buildings, towers, antennae, or other man-made objects could be a hazard to military aircraft using these routes. New power lines or other cables crossing valleys well above the valley floor are also potential hazards to aircraft transiting the valleys.

Trinity County MTR boundaries and minimum altitudes or floor elevations are depicted in the Military Operation Areas map (Appendix B). The MTR is applied to protect the public safety of persons residing under the MTR by ascertaining that all new development is compatible with military operations within the MTR. New development would be incompatible with military operations if the development could penetrate the defined floor elevation of the MTR and pose hazards to aircraft and military operations and; therefore, the public.

The operational use of the MTR mandates that incompatible uses within it be minimized, such as:

i. Uses that release into the air any substance which would impair pilot visibility or interfere with onboard radar or radio communications;

ii. Uses that produce light emissions, glare or distracting lights which could interfere with pilot vision or be mistaken for airfield lighting;

iii. Uses that physically obstruct any portion of the MTR due to relative height above ground level.

For the purposes of determining whether a project penetrates the defined floor elevation of the MOA, a "penetration" means physical obstructions from a structure or object, and/or a visual obstruction such as steam, dust, and smoke.

Airport Safety Goals/Objectives/Policies

S.1 Airport Safety Goal

Minimize the possibility of the loss of life, injury, or damage to property as a result of airport hazards as identified in the *Trinity County Airport Land Use Compatibility Plan* (TC ALUCP) November, 2009.

S.1.1 Objective—Land Use Compatibility

The Airport Land Use Compatibility Plan for each county airport shall guide all development around airports and said development must be consistent with the guidelines contained within the Plan(s).

Policies

(A) Comprehensive Land Use Plans (CLUPs) shall be developed for each county airport, in compliance with state regulations.

(B) Adopt appropriate zoning for properties near airports or within the safety zones established in the CLUPs that provides activities and purposes compatible with airport operations.

(C) Prevent creation of hazards to flight. Reduce obstructions to airspace required for flight to, from, and around airports, consider wildlife hazards and other forms of interference with safe flight, navigation, or communication.

(D) Airport Regulations. Airport Land Use Compatibility Plans and County Airport Regulations shall be updated as necessary, maintained and enforced.

S.1.2 Objective—Airport Design

Ensure all airports are designed in compliance with adopted federal and state safety standards.

Policies

(A) Airports shall be designed in compliance with the FAA Airport Design Advance Circular (150/5300-most current edition) and FAR Part 77 to the extent possible given the local circumstances at each airport, such as terrain and pre-existing development.

(B) Airport development shall include measures to minimize wildlife intrusion and unauthorized public access to airport operational areas and airspace.

S.1.3 Objectives—Airport Safety

Daily operational activities in and around airports shall promote safety.

Policies

(A) Fuels and other hazardous materials used or stored at airport facilities shall be contained and managed to ensure compliance with federal, state and local regulations.

(B) Maintain useful open land as described in the Trinity County Airport Landuse Compatibility Plan to minimize the severity of injury to aircraft occupants in the event of an off-airport emergency landing.

Flood Risks or Dam Failure Goals/Objectives/Policies

S.2 Flood Hazard Goal

To protect life and property while also protecting and managing natural drainage ways, floodplains and flood retention basins thereby reducing hazards within Trinity County resulting from floods.

S.2.1 Objective

Reduce loss of life and property by establishing development standards for areas subject to flooding.

Policies

(A) Require all development to meet federal, state and local regulations for floodplain management protection; including the encouragement of upgrading existing structures to meet adopted standards.

(B) Require all development to meet the development standards of the National Flood Insurance Act regulations in Title 44 of the Code of Federal Regulations, Section 60.3, as implemented through the County Zoning Ordinance section 29.4.

(C) Prohibit the creation of new parcels that have no building sites outside of the 100-year floodplain, except for the creation of open space parcels.

(D) The County's Emergency Operations Plan shall include procedures for responding to natural disasters, including flooding hazards.

(E) Maintain open space lands in areas identified to be in areas of flood hazard.

(F) To the maximum extent practical, avoid constructing critical facilities within designated 100-year flood plain area(s).

(G) Continue participation in the Federal Emergency Management Agency's (FEMA's) National Flood Insurance Program, which includes the Community Rating System Program.

(H) Collaborate with Federal Emergency Management Agency and other relevant agencies to update National Flood Insurance Program Hazard maps.

(I) Work with local, state and federal agencies to implement site-specific flood hazard planning, forecasting, and flood mitigation measures.

(J) The County shall follow the Federal Emergency Management Agency promoted No Adverse Impact (NAI) Policy and encourage the following items:

i. Flood studies prepared using build-out conditions,
ii. Allow no rise in floodway elevation from new development or infrastructure,
iii. Allow no increase in flood velocity from new development or infrastructure, and
iv. Allow no loss in floodplain storage from new development or infrastructure.

S.2.2 Objective

Reduce the potential for the loss of life and property from dam failure inundation.

Policies

(A) Dam Failure Inundation Maps shall be maintained by the County to aid in the project review process.

(B) Discourage high-density development in areas that lay within the area of inundation for any of the dams: Lewiston, Buckhorn, Trinity, Matthews, Ewing and Scott and Cape Horn (Potter Valley).

(C) When development is proposed in areas adjacent to or downstream from an existing dam, the area affected by dam failure inundation shall be identified as part of the application.

(D) Trinity County Office of Emergency Services shall maintain coordination with dam managers to assure quick and efficient coordination consistent with each dam's Emergency Action Plan (EAP) in the event of dam failure.

(E) The County should participate when involved agencies meet, as prescribed in each dam's EAP, to review each dam's EAP. Included in the review should be a "table-top" exercise simulating dam failure to allow each agency to critique its departmental function within the planned response.

(F) When feasible avoid constructing critical facilities within areas potentially susceptible to inundation by dam failures.

(G) The County shall continue to work with FEMA, and other agencies of interest, on maintaining the accreditation of the levee system in Weaverville to the extent practical.

Hazardous Materials Goals/Objectives/Policies

S.3 Hazardous Materials Safety Goal

Minimize the threats to the public health, the environment and property caused by the use, storage, and transportation of hazardous materials and hazardous waste.

S.3.1 Objective
Proper regulation of transportation and storage.

Policies

(A) Transport of hazardous materials shall be regulated by the California State Highway Patrol under the California Code of Regulations, Title 13:1150-13:1194, and the Code of Federal Regulations, Title 49.

(B) Any proposal for development of a disposal site for hazardous materials generated in Trinity County shall be reviewed to ensure that no significant environmental impacts will result from the project.

(C) Discourage the development of hazardous waste disposal facilities for hazardous waste originating outside of Trinity County.

(D) Trinity County should investigate and evaluate the efficacy of its participation as CUPA (Certified Unified Program Agency).

S.3.2 Objective
Promote adequate collection and cleanup of hazardous materials and hazardous waste.

Policies

(A) The County should encourage cooperation between all agencies involved in the cleanup and regulation of hazardous materials and direct the Trinity County Department of Environmental Health and Solid Waste to develop and maintain a public education program that explains proper handling and disposal of hazardous materials. This program should include, but not be limited to the following:

i. The County of Trinity should pursue methods of collecting (on a regular basis) household hazardous materials.

ii. Encourage residents of Trinity County to be responsible in the handling of household hazardous materials by properly storing and disposing of them.

(B) Trinity County Office of Emergency Services Hazardous Materials Area Plan shall be updated regularly to include appropriate contacts and procedures for emergency response and control of hazardous materials/waste cleanup.

S.3.3 Objective
Ensure water quality.

Policies

(A) Trinity County should implement and maintain a water quality monitoring program, including the monitoring of swimming holes, failing sewage treatment systems, herbicides monitoring, mine runoff, and baseline monitoring.

(B) Trinity County, through its Office of Emergency Services shall periodically update the *Trinity County Hazardous Materials Commodity Flow Study*.

(C) Involved agencies should meet to review the *Trinity County Hazardous Materials Action Plan* on an annual basis. Included in the review should be a "table-top" exercise simulating a hazardous material incident to allow each agency to critique their departmental function within the planned response.

Seismic or Geologic Hazards Goals/Objectives/Policies

S.4 Seismic Safety Goal

Reduce the threat to life and property from seismic or geologic hazards.

S.4.1 Objective

Promote safety from seismic or geologic hazards.

Policies

(A) Geotechnical reports and/or related studies shall be required for all subdivision proposals in areas of known landslides or other geologic instability.

(B) Geologic hazards and seismic safety shall be considered in the preparation of environmental documents as required by the California Environmental Quality Act.

(C) Building design and construction shall promote seismic safety and structural integrity.

(D) Areas in excess of 30 percent slope shall require submittal of engineered plans for all construction and grading, at the discretion of the Trinity County Planning Department. These plans shall address roads, utility corridors, and similar off-site improvements, as well as erosion control.

(E) Geotechnical studies by a California Registered Geologist, Civil Engineer or Soils Engineer shall be required prior to issuance of a building permit in all identified landslide areas.

(F) Construction and grading activities shall be done in a manner that minimizes adverse effects on the stability of any slope.

(G) The County shall not allow development on existing unconsolidated landslide debris.

(H) Building design and construction shall consider soil conditions prior to development.

Wildfire and Structures Goals/Objectives/Policies

S.5 Structural and Wildland Fire Safety Goal

Reduce fire hazards in wildland, wildland/urban interface and developed areas through a comprehensive program that encourages the development and maintenance of fire adapted communities and a more fire-resilient landscape.

S.5.1 Objective—Accessibility

Ensure emergency accessibility to development through proper road construction, maintenance and signage.

Policies

(A) Roads shall be constructed to provide adequate width, grade, and turn-around space for emergency vehicles by complying with appropriate federal, state and local adopted standards. Construction of roads shall protect water quality, slope stability and threat to natural and cultural resources.

(B) Encourage owners of existing public and private roads to provide identification signage for emergency access purposes.

(C) Subdivisions creating new development shall place signage as set forth in the Trinity County Subdivision Ordinance, Fire Safe Ordinance and additional local ordinances.

(D) Coordinate across land ownerships to encourage the protection and maintenance of the County's transportation network to provide adequate access for emergency response and fire suppression, as well as emergency ingress and egress.

(E) A priority shall be give the implementation and maintenance of fuel management zones along heavily traveled roads.

(F) Encourage that strategic roadside defensible fuel management zones are constructed and maintained on level 1 and 2 roadways and strategic local roadways as identified in the Trinity County Community Wildfire Protection Program.

S.5.2 Objective—Fire Adapted Communities

Prevent structure damage and protect the public and emergency responders through proper defensible space, management of transportation network and forest management within the Wildland Urban Interface.

Policies

(A) Adequate clearances of fuels surrounding structures shall be maintained as required by federal, state and local adopted standards and regulations.

(B) The General Plan land use maps shall allow development commensurate with wildland fire hazards and development densities and type consistent with the state wildfire rating system and general guidelines with regards to weather, fuel loads, slope and aspect, available water and the development's mitigation measures.

(C) Use both public and private land in designated Wildland Urban Interfaces, when applicable, as buffer zones around communities and greenbelts to establish regional fuel breaks and landscape-scale forest fuel modifications consistent with the most current Trinity County Community Wildfire Protection Plan.

(D) Participate with the Trinity County Fire Safe Council and Trinity County Chiefs' Association to educate the public on the importance of establishing and maintaining defensible space and other fire safe standards (e.g. access adequate for emergency vehicles and water supply) as a part of a cohesive wildfire management strategy for Trinity County.

(E) Encourage communities to participate in Firewise Communities recognition program (or its functional equivalent) through the Trinity County Fire Safe Council and emphasize the importance of individual landowner responsibility.

S.5.3 Objective—Fire Adapted Communities and Fire Resilient Landscapes

Promote practices and procedures that improve fire-resiliency of the landscape and reduce the impacts of catastrophic wildfires on the assets at risk in Trinity County through the implementation of management strategies.

Policies

(A) Develop and maintain a Local Hazard Mitigation Plan(s) for all of Trinity County's Communities at Risk that includes, but is not limited to:

i. Identify and publicize, for each community, potential safety zones, evacuation routes and potential emergency shelter locations.

ii. Evacuation routes and safety zone location shall be kept at the Office of Emergency Services, which is responsible for the evacuation process.

(B) Support and participate in the collaborative development and implementation of wildland fire protection plans and other local, county and regional plans that address fire protection and landowner objectives.

(C) Address post-fire responsibilities for natural resource recovery, including watershed protection, fuel load management, reforestation, ecosystem restoration and resistance to control factors over time that affect future risk and hazard.

S.5.4 Objective—Fire Protection Standards

Ensure appropriate fire protection standards for all development that emphasizes fire resiliency.

Policies

(A) Development shall be located, designed and managed to reduce fire risks to life, property and natural resources and incorporate adequate fire protection consistent with the General Plan and adopted regulations. New Development shall incorporate the following in a manner consistent with local and state regulations, including necessary off-site improvements proportional to the new development:

i. Fuelbreaks or greenbelts and access to them consistent with topography.

ii. Adequate and accessible defensible space.

iii. At least two (2) ingress-egress routes to a public roadway, if practicable or alternative routes accessible to emergency response equipment.

iv. Access routes sufficient to accommodate evacuating civilian vehicles and emergency response equipment.

v. Adequate water supply, including fire hydrants where appropriate, for fire suppression shall be provided for all new developments, as determined by the local fire district, California Department of Forestry and Fire Protection, Trinity County Subdivision Ordinance, and the Trinity County Fire Safe Ordinance.

vi. New development shall meet all federal, state and local regulations for fire protection; including the encouragement of upgrading existing structures to adopted standards.

vii. Development of property not served by a community water system shall maintain sufficient water supplies on site to be used for fire protection consistent with local and state regulations.

(B) Encourage the establishment of a water source identification system (signage and mapping).

(C) Fire Resistant Building Materials. The exterior of residential units shall be composed of fire resistant materials and designed to reduce fire vulnerability within high and very high fire hazard areas as required by state and local building codes.

(D) Support effective and economically viable fire protection and emergency response provided by fire protection agencies.

i. Encourage fire protection organizations to determine and report capabilities to adequately serve existing and potential development

ii. Work with fire protection providers (i.e. CAL FIRE, USFS, BLM) and local fire protection organizations to ensure development is compatible with fire protection capabilities.

iii. Work with fire protection organizations to achieve funding stability necessary to maintain adequate fire protection services. Collaborate with fire protection organizations, land managers, private landowners and others to improve fire management strategies for reducing the impacts of wildfires on communities and natural resources.

iv. Work with fire protection providers (i.e. CalFire, USFS, BLM) and local fire protection organizations to ensure that fire personnel can communicate effectively across multiple frequency bands and work to update and expand current handheld and mobile radios used on major mutual aid incidents.

(E) Amendments to the County Fire Safe Ordinance shall be submitted for approval to the Board of Forestry prior to final adoption of said amendments.

S.5.5 Objective—Pre- and Post-Fire Fuels Treatment
Reduce potential impact of catastrophic fire through fuels reduction programs.

Policies

(A) Encourage agencies, landowners and land managers to coordinate with the Trinity County Fire Safe Council to implement the strategies and projects identified in the Trinity County Community Wildfire Protection Plan (CWPP).

(B) Consider visual and economic impacts of fuel breaks and hazard fuels reduction projects.

(C) Coordinate with Federal, State, and local agencies and other partners to develop a long-term plan to maintain the CWPP-identified fuel breaks and fuels reduction projects.

(D) Collaborate with the Trinity County Fire Safe Council to identify, develop, and secure funding to implement the CWPP for neighborhood fire/fuel reductions programs and landscape-scale fuels treatments.

(E) The County shall assert its legal standing and formally request coordination with all federal and state agencies on matters pertaining to forest health and; therefore, public safety associated with catastrophic wildfire pursuant to Trinity County Board of Supervisors Resolution 2009-058 and federal laws governing land management, including the Federal Land Policy and Management Act, 43 USC§ 1701, and 43 USC § 1712, regarding the coordinate status of a county engaging in the land use planning process.

(F) The County recognizes that excess vegetation is a public nuisance and should coordinate with landowners and land managers to reduce concentrations of vegetation to levels that reduces the public nuisance in accordance with county codes. (Title 8 County Code, Chapter 8.68) pertaining to Health and Safety for Vegetation.

Air Quality Goals/Objectives/Policies

S.6 Air Quality Goal

Continue to maintain a high standard of air quality in Trinity County and ensure that air quality that meets state and federal ambient air quality standards including successful attainment of California Ambient Air Quality Standards for particulate matter.

S.6.1 Objective

Ensure prescribed burning projects will not diminish air quality.

Policies

(A) The burning of any material shall be in compliance with burning permits, conditions and/or standards established by the North Coast Air Quality Management District (NCAQMD).

S.6.2 Objective

Manage forest lands to reduce the adverse effects of wildfire on air quality.

Policies

(A) Support and encourage programs such as fuel reduction, prescribed fires, and landscape-scale vegetation management as recommended in the Trinity County Community Wildfire Protection Plan to reduce air quality impacts of wildfires.

(B) Support and encourage fire suppression of wildfires that may have an acute air quality health impact on local population centers and recreation areas.

S.6.3 Objective

Land development and earth-moving activities do not diminish air quality.

Policies

(A) The County shall require an analysis of potential air quality impacts associated with significant new developments as required by CEQA, including appropriate mitigation measures prior to approval of the project development.

(B) Ground disturbing construction and grading shall employ fugitive dust control strategies to prevent visible emissions from exceeding NCAQMD regulations and prevent public nuisance.

(C) The County shall encourage that all projects requiring earth-disturbing activities or a building permit that would result in earth disturbance, in areas likely to contain naturally occurring asbestos to have a California-registered geologist knowledgeable about asbestos-containing formations inspect the project for asbestos hazards.

S.6.4 Objective—Air Quality Monitoring

Develop and maintain effective air quality monitoring to ensure compliance with applicable County, State and Federal air quality regulations and standards.

Policies

(A) Point Source Monitoring: New and existing point sources of air pollution should be monitored for compliance with State and Federal air quality regulations and standards.

(B) The County shall consult and cooperate with other agencies in developing an effective approach to regional air quality planning management, including "event-based" monitoring of air quality (e.g. monitoring effects of wildfire and prescribed fire on ambient air quality).

Climate Change Goals/Objectives/Policies

S.7 Climate Change Goal

Successful mitigation of greenhouse gas (GHG) emissions associated with this Plan to levels of non-significance as established by the Global Warming Solutions Act (AB 32) and subsequent implementing legislation and regulations.

S.7.1 Objective

Actions taken to implement the Policies of the Safety Element have no significant impact on greenhouse gas emissions.

Policies

(A) County Climate Action Plan: Develop and implement a multi-jurisdictional Climate Action Plan as required by state law to achieve reductions in greenhouse gas emissions consistent with the state Global Warming Solutions Act (AB32) and subsequent implementing legislation and regulations.

(B) Review of Projects for Greenhouse Gas Emission Reductions: The County should evaluate the GHG emissions of projects implemented to meet the intent of the Safety Element, and require feasible mitigation measures to minimize GHG emissions.

(C) Forest Sequestration and Biomass Energy: The County should provide incentives for increased carbon sequestration on forest lands and encourage the reduction of smoke production through the utilization use of excess forest biomass for sustainable energy generation and other uses.

(D) Programs to Reduce Air Quality Impacts of Wildland Fire: Support and encourage programs such as fuel reduction, prescribed fires, landscape-scale vegetation management and sustainable silvicultural practices as recommended in the Trinity County's Community Wildfire Protection Plan to reduce air quality impacts of wildfires.

(E) The county shall encourage commercial hydro-electric power production as a carbonless energy source.

Military Operation Area Goals/Objectives/Policies

S.8 Military Training Route (MTR) Overlay Zone Goal

To protect the public safety of persons residing under Military Operations Areas (MOA) and military personal operating within that area.

S.8.1 Objective--Compatibility

Ascertain that new development is compatible with military operations within the MOA.

Policies

(A) To protect the public safety, the County shall adopt implementing ordinances for all areas where a MTR is designated to include notification to the military of the proposed development and adoption of standards for new land uses and development to ensure that it is compatible with military operations.

(B) All new construction of any type shall be in compliance with the Airport Land Use Compatibility Plan (ALUCP) to ensure that the Federal Aviation Administration (FAA) is notified of any proposed construction that could penetrate navigable airspace.

Appendix A

Dams

Trinity Dam

Trinity Dam is located approximately nine miles upstream from the town of Lewiston and about 8 miles upstream from Lewiston Dam. The Bureau of Reclamation manages and operates Trinity Dam. Completed in 1962, Trinity Dam is a zoned earth-fill embankment type dam containing roughly 29,251,000 cubic yards of earth, sand, gravel, and rock, with a structural height of 538 feet and a crest elevation of 2,395 feet above sea level. The crest width is 40 feet wide and the crest length is 2,450 feet long. The water that the dam impounds creates Trinity Lake. With a maximum capacity of 2,447,650 acre-feet, Trinity Lake is the third largest fresh-water lake in California, located about 50 miles west of Redding in Northern California. The lake offers recreation facilities for camping, boating, water skiing, swimming, fishing, and hunting.

This dam was originally constructed primarily for regulation of flows and storage of water for irrigation. The reservoir also serves as a water source for hydroelectric energy generated at the Trinity Power Plant, which is located at the toe of Trinity Dam. Downstream, Lewiston Dam diverts water from the Trinity River, through the Lewiston Power Plant, into Clear Creek Tunnel for the eleven-mile trip through the Trinity Mountains.

Trinity Dam`s hydroelectric power plant began operation in 1964 with a current total capacity of 140,000 kW. The power that is generated is dedicated first to meeting the requirements of the project facilities, with the remaining energy marketed to various preference customers (Trinity County has first preference) in Northern California.

The spillway, located on the left abutment, consists of a 54-foot diameter uncontrolled glory-hole concrete crest structure, a concrete-lined 20-foot diameter inclined shaft and tunnel, a concrete chute, and a concrete flip bucket. The tunnel exits to the concrete chute that ends at the concrete flip bucket at the Trinity River. The auxiliary outlet works discharges into the spillway tunnel approximately 1,000 feet upstream from the lower portal of the spillway tunnel. The spillway has a design capacity of 22,400 cubic feet per second at reservoir elevation 2387 feet.

A copy of Bureau of Reclamation's Emergency Action Plan for Northern California Area Office Facilities is located at the Trinity County Office of Emergency Services (OES), Trinity County Sheriff's Office and Emergency Operations Center in Weaverville.

Lewiston Dam

The Bureau of Reclamation owns and operates Lewiston Dam located roughly 8 miles below Trinity Dam. The dam is part of the Central Valley Project, Trinity River Division. Construction of the dam began in 1961 and was completed in 1963. Lewiston Dam is a zoned earth-fill embankment type dam with a structural height of 91 feet and a crest elevation of 1,910 feet above sea level. The crest width is 25 feet wide and the crest length is 745 feet long. A 65-foot wide, concrete chute-type spillway structure with a discharge capacity of 30,000 cfs is located on

the right abutment of the dam and water releases through the spillway are regulated by two "radial arm" gates.

The primary function of Lewiston Dam is to regulate flows to the Trinity River. The dam captures water released from nearby Trinity Dam, located upstream (to the north) creating a manmade reservoir known as Lewiston Lake, a reservoir with a capacity of 14,660 acre-feet.

The lake provides a buffer zone for water releases between Trinity Dam and Lewiston Dam, allowing for lake fluctuations while keeping flows to the Trinity River stable.

Lewiston Dam creates an after-bay for Trinity Power Plant and diverts water by means of the Clear Creek Power Tunnel to Carr Power Plant and Whiskeytown Lake. Lewiston Dam also maintains appropriate tail-water elevations for Trinity Dam Power Plant as well as providing a point of release for Trinity River flows.

The dam also provides water to Lewiston Power Plant, which began operation in 1964, and is a `run-of-the-river` plant which provides station service to the Trinity Power Plant and to the Trinity River Fish Hatchery which is operated by the California Department of Fish and Wildlife.

A Probable Maximum Flood (PMF) study dated 1996 and prepared by the Technical Services Center, Denver, Colorado, uses a PMF resulting in a general storm that includes the concurrent precipitation for Lewiston Dam.

The study uses a peak inflow of 19,100 cubic feet per second and a 3-day volume of 35,000 acre-feet. Lewiston Dam PMF was routed through most of the appurtenant structures of Trinity Dam and over Trinity Dam, assuming no failure of the dam. Both Trinity Lake and Lewiston Lake are assumed to be at the top of active conservation for the purposes of the study. Lewiston Dam uses Clear Creek Power Tunnel, river outlet works and the spillway for releases during a flood. Assuming no failure, Lewiston Dam is overtopped 15.8 feet during the general storm PMF. Floods greater than 62 percent of the general storm PMF will overtop the dam, and a minimum freeboard of 3.0 feet occurs during a flood equal to 60.5 percent of the general storm PMF. The report shows that the local Lewiston PMF can be safely controlled.

While the Bureau of Reclamation is responsible for timely and effective notification of emergency events, warning and evacuation planning and implementation are the responsibility of the city, county, state, or federal authorities having jurisdiction in areas that will be inundated by releases or impacted by other events related to Trinity or Lewiston Dams, or in other events that could present a hazard.

Control operators, who are stationed at the Shasta Dam Control Center, perform routine inspections at Lewiston Dam, approximately three times per week, and a specific dam inspection is completed once a week. Communication capabilities include commercial telephones, two-way radios, cellular telephones, and satellite phones.

A copy of Bureau of Reclamation's Emergency Action Plan for Northern California Area Office Facilities is located at the Trinity County Office of Emergency Services (OES), Trinity County Sheriff's Office and Emergency Operations Center in Weaverville.

Buckhorn Dam

Buckhorn Dam is located on Grass Valley Creek, 20 miles east of Weaverville (25 miles west of Redding), and is part of the Central Valley Project. It is managed and operated by the Bureau of Reclamation. Construction began in 1988 and was completed in 1991. Buckhorn Dam has a structural height of 90 feet and a crest elevation of 2,815 feet and a drainage area of 9.3 square miles. The dam is a part of the Trinity River Restoration Program, which was developed for restoration of the Trinity River to the quality that was present prior to the construction of Trinity Dam. Buckhorn Dam was not built for water storage purposes, but is a debris and sediment trapping facility. It is designed to trap decomposed granite from the upper one-third of the Grass Valley Creek Watershed, which flows to the Trinity River near Lewiston and downstream from Lewiston Dam. If Buckhorn Dam were to fail or make unusually high discharges, human lives and /or property downstream would be endangered according the Bureau of Reclamation's Emergency Action Plan for Buckhorn Dam.

A copy of Bureau of Reclamation's Emergency Action Plan for Northern California Area Office Facilities is located at the Trinity County Office of Emergency Services (OES), Trinity County Sheriff's Office and Emergency Operations Center in Weaverville

Matthews Dam

Construction on Matthews Dam ended in 1962, providing a water supply for the Humboldt Bay and Eureka area. Humboldt Bay Municipal Water District (HBMWD) owns and operates Matthews Dam and the hydroelectric plant. The dam is located on the Mad River approximately 80 miles upstream from the mouth of the river (Sec. 19, T. 1 S. R. 7 E. H. B. & M.). Matthews Dam is a zoned, earth-fill dam, with an un-gated spillway, and a maximum height above the streambed of approximately 150 feet. On the basis of the dam's height, reservoir capacity and downstream damage potential, the dam would be rated "large" in size and "high" in hazard potential, according to the "Recommended Guidelines for Safety Inspection of Dams" (HBMWD, 1990: 2-1). The dam is rated high-hazard, not because it is at risk for failing, but because of the number of people that could be impacted downstream in the event of failure (HBMWD, 1990:2-1).

If Matthews Dam were to fail, it would most likely be caused by:

a. Flooding which exceeds the capability of the spillway which then causes overtopping and subsequent erosion and failure of the dam.

b. Earthquake, which could cause immediate failure of the dam through slumping, sliding or shear, or which could cause sufficient damage to some part of the dam, or its spillway or outlet works, to subsequently lead to failure.

c. Foundation or embankment failure caused by uneven or excessive settlement, internal erosion, or other unknown internal condition.

d. Penstock rupture caused by critical surges or water hammer due to failure of hydraulic systems/penstock valves and surge relief mechanisms.

e. Criminal or terrorist acts.

Emergency Action Plans (EAPs) for dam failure are maintained at the County of Emergency Services, Trinity County Sheriff's Office, Southern Trinity Area Rescue, USFS Mad River Ranger District, Ruth Lake Community Services District, and the Humboldt Bay Municipal Water District

Ewing Reservoir

Ewing Reservoir is located in Hayfork (Sec. 1, T. 31 N., R. 11 W., MD. B. & M.). Prior to the construction of the dam, an inundation study and map were prepared for Ewing Reservoir. Even in the event of complete dam failure at Ewing Reservoir (i.e. a 45 degree breach of both sides of the dam) the volume and velocity of floodwaters will not pose a significant threat to people or property (Hayfork Community Plan, 1996:7.12).

Griffith and Associates: Surveyors and Engineers prepared the inundation study and map. The Map was reviewed and approved by the Office of Emergency Services in February, 1976. An inspection of the dam was completed in 2008. Trinity County Waterworks District #1 has an evacuation plan on file that outlines: (1) responsibilities of various personnel in the event of dam failure; (2) the location of temporary gathering points for food and shelter, and; (3) sources of emergency food, water and other assistance. The Trinity County Waterworks District #1 office is located in Hayfork. A copy of the study is also located at the Office of Emergency Services in Weaverville.

Potter Valley Project (Scott Dam and Cape Horn Dam)

Scott Dam is located on the Eel River in Lake County, approximately 30 miles northeast of Ukiah, California. The lake impounded by Scott Dam is known as Lake Pillsbury and has a useable storage capacity of 80,556 acre-feet (2,280 surface acres). Scott Dam is a concrete gravity dam. The dam is 122.5 feet high from the foundation to the spillway crest and the dam is 805 feet long. The spillway has a net length of 402 feet. The drainage area above the dam is 289 square miles of mountainous and moderately forested terrain. The highest elevation above the dam is 7,000 feet, so precipitation in the upstream drainage is a mix of rain and snow. The average annual runoff at the dam site is approximately 412,000 acre-feet, equivalent to an average of 26.6 inches of runoff.

Scott Dam is a part of the Potter Valley Project, which is owned and operated by PG&E. This dam serves as a storage reservoir for carry-over storage and has no powerhouse. Cape Horn Dam, 11

miles downstream from Scott Dam, diverts water through a tunnel to the Potter Valley Powerhouse on the Russian River. However, the reservoir is considered a multi-purpose project in that it provides recreational needs, power production at Potter Valley Powerhouse, domestic water supply and non-scheduled flood control.

Cape Horn Dam is a composite structure on the Eel River in Mendocino County, about 23 miles northeast of Ukiah (11 miles downstream from Scott Dam). It was constructed in 1907. The left part of the dam is a gravity overflow section with a stepped downstream face. The maximum height of this section is 63.5 feet. Flashboards are used to increase the height by 4 feet on April 1 of each year. The right part of the dam is a hydraulic fill embankment with a concrete corewall. The top of the embankment has a height of 60 feet. The total length of the dam is 520 feet. The reservoir impounded by Cape Horn Dam is known as Van Arsdale Reservoir. It originally had a capacity of 1,140 acre-feet. However, this capacity has been reduced by siltation so that it provides no more than 390 acre-feet of storage. It serves as a forebay for diversion of water (up to 331 cubic feet per second (cfs)) to the Potter Valley Powerhouse. Normal releases down the Eel River are controlled primarily to satisfy downstream interests and to manage for fisheries in the river. These releases are about 100 cfs, including 12 cfs down a fish ladder.

The Eel River flows into far southwestern Trinity County approximately 40 miles downstream of the Scott Dam and 30 miles downstream of the Van Horn Dam in a very remote, lightly populated area. Trinity County Office of Emergency Services maintains a copy of the Emergency Action Plan for these two dams

Wildfire in Trinity County

Fire is a natural disturbance in California and Trinity County is no exception. Fire provides beneficial functions to cycle nutrients, reduce surface and ladder fuels, and renew ecosystems. Historically, beginning in the early 20th century, fire suppression to protect forest and other resource values has been the dominant approach to managing fire on public lands and in private forests. Only recently has management shifted to recognize the role of fire in the landscape.

The climate of Trinity County is classified as Mediterranean. Such areas typically have certain common characteristics:

- warm to hot summers and mild winters,
- a moderate marine influence throughout the year, more impacting in coastal areas,
- most of the year's precipitation is concentrated during winters, whereas summers in lower elevations are nearly or completely dry, and
- extended periods of sunny weather and few clouds.

Fire is a natural component of Mediterranean ecosystems. On most days, the sea breeze blowing onshore produces a marine influence. Fires that start under these circumstances can usually be controlled. Under certain conditions, however, brush and forest fires can turn into disastrous conflagrations that ravage wide areas.

Hot, dry summers reduce fuel moisture and increase the potential for fires. Most fires in California occur during late summer and early fall, but the fire season is getting longer and more extreme. Wind affects fire behavior and the dispersal of smoke produced by fires. Along with the major seasonal Pacific westerlies, winds also follow daily patterns that play an important role in the mountain regions, like Trinity County. These patterns result from air density differences brought about by solar heating during the day and radiative cooling at night. Two types of diurnal cycle winds are land-to-sea breezes and mountain-to-valley winds.

Land-to-sea breezes occur because land heats and cools more quickly than water. Onshore breezes typically occur during the daytime when the warm air over the land mass rises and cool ocean air moves onshore to replace it. At night, the situation reverses and the breeze moves offshore, from the cooling land to the warmer ocean. Mountain-to-valley breezes form in a similar way. Solar heating of the higher elevation land during the day creates a rising mass of warm air, which tends to move upslope following the terrain. At night, the air flow is reversed as radiation cools the land and chills the air above it. This cooled air drops down into the lowlands from the higher slopes.

Wind direction and intensity during prescribed burns and wildfires are important, because air quality is poorest immediately adjacent to and downwind of such fires. Fires near populated areas may pose an increased risk of air quality–related health problems. Mountain-to-valley breezes may also distribute smoke. At night, the air drains down-slope, but during the day winds reverse and blow upslope, carrying the polluted air. Mountain areas may become smoky in late afternoon or early evening for this reason. By morning, however, cold, dense nighttime air has traveled down-slope and polluted valleys and mountain basins. This may cause ground-level

inversions to form as the land radiates heat. Mountain basins or valleys, such as the Weaverville Basin, have high smoke impact potential.

A significant shift in the way in which we manage wildfire includes the realization that wildfires are now often of a scale and intensity beyond the range of historic variability (Agee, 1993; Weatherspoon and Skinner, 1996; Skinner, Taylor and Agee, 2006). The regional and landscape scale impacts of these fires include changes in vegetation patterns, loss of remaining old growth forest in reserves, adverse impacts to air quality and its associated effects on public health, economic losses and danger to human life. Trinity County has been no exception. According to CAL FIRE and their Fire and Resource Assessment Program (FRAP) 105 wildfires occurred between 1999 and 2009 with approximately 433,835 acres burned. The 2008 fire season alone resulted in 265,000 acres affected, including about 94,000 acres within the Wildland-Urban Interface (WUI), around 17 weeks of severe smoke impacts, and 10 lives lost.

Under higher fire danger conditions, forests in Trinity County and the entire Western United States are burning with extreme severity and scale. A significant component of this increase in fire activity has, ironically, been the success of fire exclusion. As we continue to improve our ability to suppress wildfires, the wildfire problem worsens (Brown and Arno, 1991).

The *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (USDA, USDI, 1994) includes an attachment titled "Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl". The subsection on Fire and Fuels Management states,

> *In Adaptive Management Areas, fire managers are encouraged to actively explore and support opportunities to research the role and effects of fire management on ecosystem functions. Cooperation across agency and ownership boundaries should be emphasized. The standards and guidelines in current plans and draft plan preferred alternatives for hazard reduction should be followed until approved Adaptive Management Area plans are established. Fire management experts will participate on the local Interdisciplinary Technical Advisory Panel on all Adaptive Management Areas. Management of Adaptive Management Areas is intended to be innovative and experimental. Wildfire suppression actions, however, should use accepted strategies and tactics, and conform with specific agency policy.*

Fire behavior is a function of temperature, terrain, wind and fuels. Since people cannot control the weather or terrain, reducing fuel loading through pre-fire treatments is the most promising area in which people may influence wildland fire behavior (Agee, 1993). A range of methods for fuels reduction has been developed including systematic slash disposal after logging, thinning overly dense stands from below, construction of shaded fuel breaks and fuel management zones and prescribed burning. All of these methods have been applied repeatedly with success in Trinity County. Further, per acre costs for treatments are increasingly quantifiable, making advance planning more feasible.

Still, pre-fire treatments are expensive. These up-front costs function as an insurance policy with many associated questions: what type of insurance do we need; where shall we apply it; which methods shall we apply and how intensively; how much are we willing to pay; and who will pay? Until the adoption of the CWPP most fuels reduction treatments in Trinity County were opportunistic e.g. a shaded fuel break constructed on USFS managed lands in conjunction with a timber sale, or a 10-acre trial small diameter thinning from below followed by an understory burn. While a small area treated is thus made ready to meet a wildfire and we have much to learn from the implementation of such projects, the overall effect is a random scattering of resources across the forest.

As a result of the 2005 Trinity County Community Wildfire Protection Plan, three preferred treatments were expressed by citizens for dealing with wildfire in Trinity County:

1. Fuels Reduction
2. Shaded Fuel Break Maintenance or Construction
3. Stand/Plantation Thinning

The 2010 Update added two additional factors to the prioritization:

1. A project's relationship to the Wildland Urban Interface
2. A project's relationship to a previous wildland fire

Agee and Skinner (Agee and Skinner, 2005) developed four main principles of fire resistance for dry forest such as those in the Wildland Urban Interface of Trinity County. These principles applied on a watershed basis will help to reduce the effects of catastrophic wildfire on natural resources as well as reduce the effects to homes in Trinity County.

Principle	Effect	Advantage	Concerns
Reduce surface fuels	Reduces potential flame length	Control easier; less chance of crown fire	Surface disturbance less with fire than other techniques
Increase height to live crown	Requires longer flame length to begin torching	Less torching	Opens understory; may allow surface winds to increase
Decrease crown density	Makes tree-to-tree crown fire less probable	Reduces crown fire potential	Surface wind may increase and surface fuels may be drier
Keep big trees of resistant species	Less mortality for same fire intensity	Generally restores historic structure	Less economical; may keep trees at risk of insect attack

Fuel load within the forests in Trinity County is a long-standing concern. Trinity County's Vegetation Ordinance (1300) has set a goal of no more than 20 tons per acre of fuel. After an event (e.g. wildfire, blow-down, insect infestation) the fuel loading issue does not go away. It has been estimated that these conditions often result in expansive areas of fuel loads at, or exceeding, 150 tons per acre. The *Comprehensive Fuels Treatment Practices Guide for Mixed Conifer Forests: California, Central and Southern Rockies and the Southwest* (Evans et al., 2011) describes this issue and has the following recommended management targets for downed dead wood based on literature cited in the *Guide* to include "...eight to 16 tons per acre (USDA Forest Service, 1999), five to ten tons per acre for the warm–dry ponderosa pine and Douglas-fir forest types... and ten to 20 tons per acre for cool Douglas-fir types (Brown, et al., 2003)."

The *Strategic Fire Plan for California* states:

> ***Vision***
> *A natural environment that is more resilient and man-made assets which are more resistant to the occurrence and effects of wildland fire through local, state, federal and private partnerships.*

The central goals that are critical to reducing and preventing the impacts of fire revolve around both suppression efforts and fire prevention efforts. Major components of this Element's Goals are:

- *Improved availability and use of information on hazard and risk assessment. Land use planning: including general plans, new development, and existing developments.*
- *Shared vision among communities and the multiple fire protection jurisdictions, including county-based plans and community-based plans such as Community Wildfire Protection Plans (CWPP).*
- *Establishing fire resistance in assets at risk, such as homes, neighborhoods, and critical infrastructure such as communications and utility facilities.*
- *Shared vision among multiple fire protection jurisdictions and agencies.*
- *Levels of fire suppression and related services.*
- *Post fire recovery.*

The central policies that are critical to reducing and preventing the impacts of fire also revolve around both suppression efforts and fire prevention efforts. Major components of these policies can be summarized as follows:

- *Land use planning that ensures increased fire safety for new development.*

- *Creation of defensible space for survivability of established homes and neighborhoods.*
- *Improving fire resistance of homes and other constructed assets.*
- *Fuel hazard reduction that creates resilient landscapes and protects the wildland and natural resource values.*
- *Adequate and appropriate levels of wildland fire suppression and related services.*
- *Commitment by individuals and communities to wildfire prevention and protection through local fire planning.*
- *Coordination between local, regional, state and federal agencies responsible for fire prevention treatments and fire suppression.*

GOALS AND POLICIES (of Strategic Fire Plan of California)

Goals

Through government and community collaboration, the following goals will enhance the protection of lives, property and natural resources from wildland fire, as well as improve environmental resilience to wildland fire across the landscape. Community protection includes promoting the safety of the public and emergency responders, as well as protection of property and other improvements. Each goal and accompanying policy(ies) listed here is meant to work in concert with the other goals and policies. Although full attainment of a goal is ultimately dependent upon the success of other goals, any of the goals can be worked on at any given time based on available funding and other opportunities.

1. *Identify and evaluate wildland fire hazards and recognize life, property and natural resource assets at risk, including watershed, habitat, social and other values of functioning ecosystems. Facilitate the sharing of all analyses and data collection across all ownerships for consistency in type and kind.*
2. *Articulate and promote the concept of land use planning as it relates to fire risk and individual landowner objectives and responsibilities.*
3. *Support and participate in the collaborative development and implementation of wildland fire protection plans and other local, county and regional plans that address fire protection and landowner objectives.*
4. *Increase awareness, knowledge and actions implemented by individuals and communities to reduce human loss and property damage from wildland fires, such as defensible space and other fuels reduction activities, fire prevention and fire safe building standards.*

5. *Develop a method to integrate fire and fuels management practices with landowner priorities and multiple jurisdictional efforts within local, state and federal responsibility areas.*

6. *Determine the level of fire suppression resources necessary to protect the values and assets at risk identified during planning processes.*

7. *Address post-fire responsibilities for natural resource recovery, including watershed protection, reforestation and ecosystem restoration.*

In addition to the above-stated goals from the *Strategic Fire Plan for California (2010),* the following considerations have been made in the development of the Wildfire section of the Safety Element:

Climate Change and Emerging Science Related to Wildfire

Many scientists have generally agreed that the Earth's climate is changing, though there is less agreement on the causes and in response the State of California adopted a Climate Change strategy with AB 32 (2006). Although the far-reaching implications of these changes are still unknown, they may have impacted weather patterns, resulting in longer fire seasons and a greater probability of intense fires in western forests. In addition, the cumulative effects of multiple years of drought along with overstocked vegetation conditions have increased fire hazards in many forests of California that prehistorically experienced frequent, low-severity fires. The reduced moisture content of drought-stressed vegetation increases flammability over a longer period of the year, resulting in an active burning period that starts earlier and lasts longer than historical patterns. Drought-stressed vegetation is more susceptible to insects and diseases, resulting in high mortality in trees and shrubs, leaving Trinity County's wildlands with high levels of tinder-dry, dead woody material ready to ignite and burn with great intensity. There is ongoing research regarding the impact of uncharacteristically severe fires in California's forests as a result of climate change and past fire suppression efforts. Concurrently, some research indicates that many chaparral shrub-land ecosystems may be affected by a too-frequent fire interval. Though this is more significant in Southern California, it may be applicable in parts of Trinity County. As a result, these areas may be at risk of conversion from native to invasive species, which can pose an increased fire threat.

There is also an emerging view among scientists that fire hazard mitigation through vegetation treatments or prescribed fire may play a beneficial role in long-term forest carbon sequestration, emissions reductions and climate change mitigation. Similarly, more is being learned about the positive and negative impacts of wildfire on air and water quality, wildlife habitat, forest and range health and nutrient cycling. For instance the 2008 firestorm in California released more than 70 million metric tons of carbon into the atmosphere (an amount equal to approximately 11 million passenger cars operating for a year). This highlights the continued need for integration between resource management and fire suppression activities. As science moves forward on these issues, the management of Trinity County's fire-prone landscapes will progress accordingly.

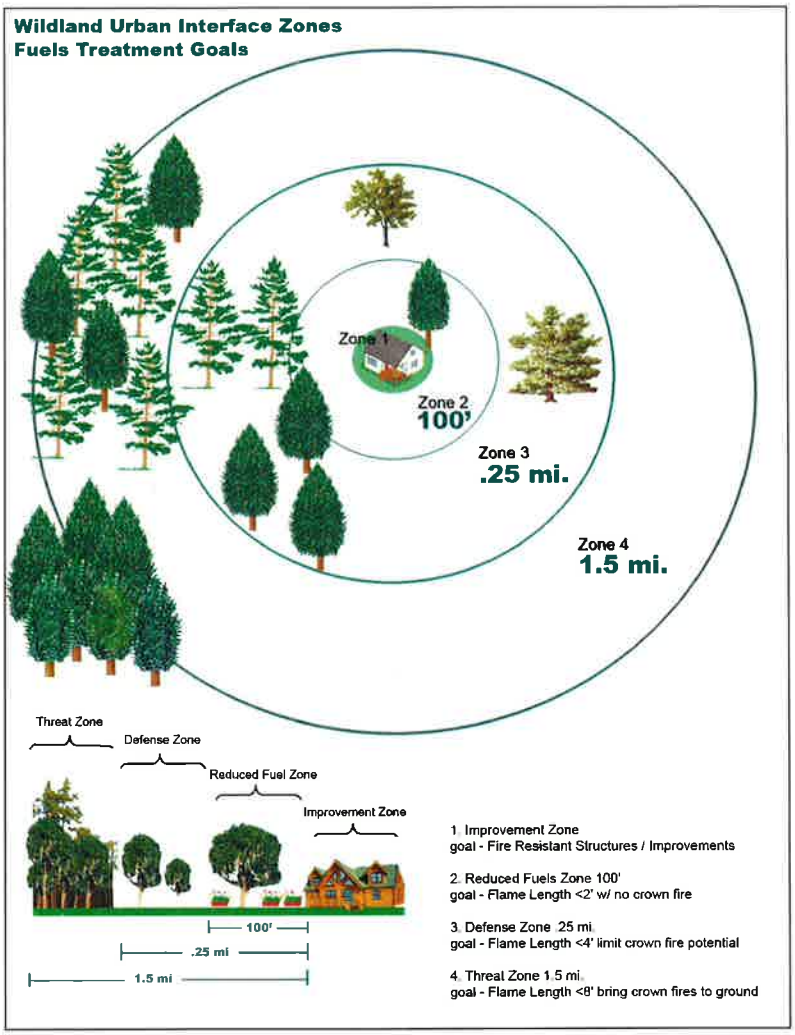
Fire ignores jurisdictional and land ownership boundaries. Therefore, the best and most current science should guide coordinated planning across the administratively complex landscapes, eventually moving toward coexistence with fire through fire-resilient ecosystems and fire-resistant communities.

Wildland Urban Interface Caveats (Trinity County CWPP 2010 Update)

- The WUI boundaries defined in the Trinity County CWPP are to be used for assistance in planning for forest health related projects and fire safe activities.
- The WUI boundaries are based on current conditions (circa 2010) and land use and should be updated as needed, using community input and the most current science.
- The boundaries are not intended to be used for community planning such as zoning, building codes and subdivision requests.
- The boundaries are not intended to be used by insurance agencies as a means for determining rates.

The following description is important to keep in mind when discussing any WUI boundary:

> *The Wildland Urban Interface (WUI) is a general term derived from the Healthy Forest Restoration Act (HFRA) to describe the area where homes and wildland meet. The Federal Register (Region 5. January 4, 2001. Vol. 66, No.3. Pp. 751-754) defines the WUI as the "line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuel." The WUI boundaries established in this Trinity County CWPP Update were developed to help prioritize project planning and funding for pre-fire (prevention) projects to help aid in protecting communities at risk for wildfire. These boundaries and the progress in implementing priority projects will be reviewed regularly, and no less frequently than every 5 years, and the WUI boundaries amended as needed to reflect changes in conditions (e.g. new land development, recent wildfires, and new infrastructure such as community water systems).*



Impacts of Historic Catastrophic Fires

The Trinity County CWPP (2010 Update) noted the importance of taking a landscape scale view of fire hazard and the importance of maintaining existing fuel breaks. It was also noted that large accumulations of standing dead fuel exist on past burns and that fuels treatments in those areas should be considered a priority, especially near communities. These areas pose an increased resistance to control (How much time and effort will it take to control a fire) that will persist for decades if left untreated. A critical aspect of understanding these accumulations of standing dead fuel requires a mapping and analysis effort that accomplishes the following:

- Working with US Forest Service to establish a protocol for grouping vegetation and stocking datasets to allow for analysis of fuel conditions.

- Develop a methodology for field-validation of existing data and oversee field validation.

- Designing parameters for spatial analysis of grouped datasets with fire severity for burns from 1987 - present (and develop a protocol for updating into the future).

- Assist in photo-interpretation and field validation of outputs from spatial analysis for interpretation of data outputs.

Available fuel hazard mapping created by the US Forest Service and CAL FIRE provides valuable data for planning purposes. However, neither fuel mapping methodology adequately characterizes the risk posed by high concentrations of large dead fuels, either standing or on the ground. This is largely an artifact of dead fuel's lack of contribution to direct fire spread. However, dead fuels provide a unique challenge for fire suppression, as they make direct attack and line construction both extremely hazardous and slow. These two characteristics of dead fuels contribute to what is known as "resistance to control." In Trinity County, there are many locations where dead fuels are concentrated adjacent to critical community assets at-risk from wildfire, including lives and property.

To better characterize the safety hazard posed by wildland vegetation in relation to communities and other assets at risk, we conducted an analysis grounded in wildland fire trends over a 22 year period (1987 – 2009) in Trinity County. The analysis looked at patterns of burn severity in relation to vegetation characteristics (plant community composition, density and height characteristics), creating a foundation for understanding and mapping the probability that various plant communities will pose a hazard across a range of experienced wildfire scenarios. Analysts created a hazard ratings system based upon the findings. The resulting Potential Burn Severity Rating map thus provides a predictive model of fire hazard based upon actual fire severity trends over the last two decades. The resulting maps provide a basis for helping to identify the spatial extent and locations of hazards in the county and can help to inform fuel hazard reduction, residential, commercial and infrastructure development, and emergency response.

Air Quality

The California Air Resources Board (CARB) oversees state and federal air pollution control programs in California and has divided the state into air basins. Authority for air quality management within each basin has been given to local air pollution control districts, which regulate stationary source emissions and develop local nonattainment plans within their jurisdiction.

Regulatory Framework Associated with Particulate Material

Federal

Federal Clean Air Act

The Federal Clean Air Act of 1963 (amended several times, most recently in 1990) requires the Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for air pollutants or air pollutant groups that pose a threat to human health or welfare.

The federal standards are two tiered; primary standards – designed to protect public health; and secondary standards – designed to protect the environment, such as visibility, damage to property, soil, vegetation, etc. The EPA has established NAAQS for six criteria pollutants: ozone, sulfur dioxide (SO_2), nitrogen dioxide (NO_2), lead, particulate matter, and carbon monoxide (CO). Two separate standards have been set for particulate matter, one for particulate matter 10 microns or less in diameter (PM_{10}), the other for particulate matter 2.5 microns or less in diameter ($PM_{2.5}$).

Ambient air quality standards are set to address both short-term and long-term air quality impacts on human, animal, and other biotic and abiotic receptors. They are applied to measurements of ambient air quality; that is, the combination of all pollutants from all sources found at monitoring points. Given these considerations, ambient air quality standards can be considered benchmarks for significant adverse cumulative effects of air pollutants.

Air basins that have not violated an ambient air quality standard are considered to be in "attainment" for that standard. Conversely, air basins with recorded violations of an NAAQS are classified as "nonattainment" areas for that pollutant. For certain pollutants such as PM_{10}, California has more stringent standards than those set by EPA. Consequently, an air basin may be classified as a "nonattainment" area for the state PM_{10} standard while it is in "attainment" for the federal PM_{10} standard.

EPA Interim Air Quality Policy on Wildland and Prescribed Fires

The EPA does not directly regulate the use of fire within a State. The EPA's authority is to enforce the requirements of the Clean Air Act (CAA). In 1998, the EPA issued an interim policy addressing public health and welfare impacts caused by wildland and prescribed fires that are managed for resource benefits.

The policy recommends that states develop a voluntary Smoke Management Program (SMP), which must be certified by the EPA. Once an SMP is certified and implemented, the EPA will allow two days per year in excess of the NAAQS for $PM_{2.5}$ attributable to prescribed burning without declaring the airshed "nonattainment." On the third violation, the area will be designated "nonattainment", the Smoke Management Program will become mandatory, and a State Implementation Plan (SIP) must then be prepared.

Smoke Management Programs (SMPs)

The purpose of SMPs is to mitigate the nuisance and public safety hazards posed by smoke intrusions into populated areas; to prevent deterioration of air quality and NAAQS violations; and to address visibility impacts in mandatory Class I Federal areas. Some strong indications that an area needs a SMP are: (1) citizens increasingly complain of smoke intrusions; (2) the trend of monitored air quality values is increasing (approaching the daily or annual NAAQS for $PM_{2.5}$ or PM_{10}) because of significant contributions from fires managed for resource benefits; (3) fires cause or significantly contribute to monitored air quality that is already greater than 85 percent of the daily or annual NAAQS for $PM_{2.5}$ or PM_{10}; or (4) fires in the area significantly contribute to visibility impairment in mandatory Class I Federal areas.

If a smoke management plan is not developed, and burning activities are found to contribute to particulate concentrations above the NAAQS, EPA will force development and implementation of a mandatory SMP and may re-designate these areas as "nonattainment", which then imposes requirements for emission reductions.

State

California Clean Air Act

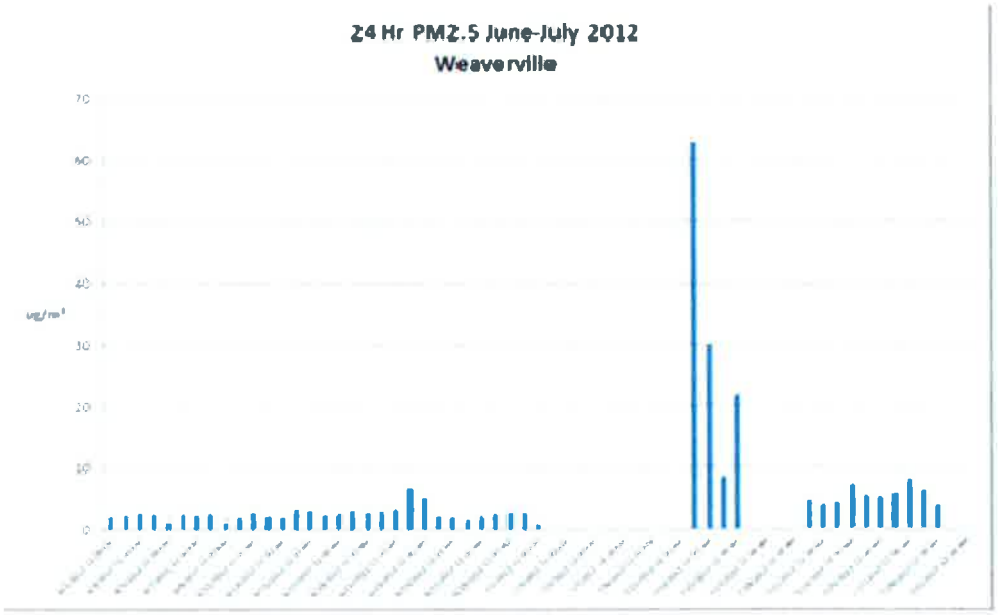
The California Clean Air Act of 1988 differs from the Federal Clean Air Act in that no sanctions or specific timelines for attainment of the California Ambient Air Quality Standards (CAAQS) have been established. The CAAQS were enacted in response to the need for new air quality requirements which are more protective of public health. California has also set standards for some pollutants that are not addressed by federal standards. This act requires air quality attainment at the earliest practicable date, and reasonable progress must be made each year. Similar to the Federal Clean Air Act, the California Clean Air Act requires that attainment plans be prepared for designated "nonattainment" areas.

The California Air Resources Board (CARB), which oversees both state and federal air pollution control programs in California, has divided the state into air basins. Authority for air quality management within each basin has been given to local air pollution control districts, which regulate stationary source emissions and develop local nonattainment plans within their jurisdiction.

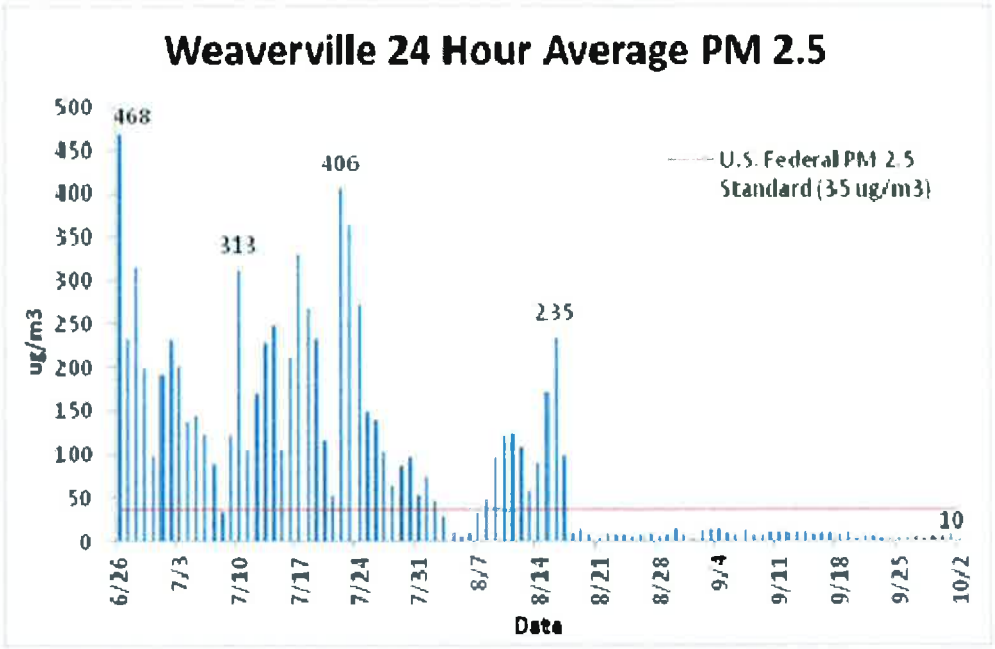
CARB is also responsible for the regulation of air toxins and developed a comprehensive California Air Toxics Program (CATP) in the early 1980s, guided by the Toxic Air Contaminant Identification and Control Act (AB1807). The CATP establishes the process for the identification and control of toxic air contaminants and includes provisions to make the public aware of significant toxic exposures and for reducing risk. The primary regulatory mechanisms are "airborne toxic control measures" (ATCMs). Each ATCM is codified under Title 17 of the California Code of Regulations (17 CCR).

The CARB is also responsible for specifying each day of the year as a permissive burn day, or a no-burn day for each air basin or other specified area. These decisions determine when agricultural and prescribed wildland burning may occur based on weather and air quality conditions. For permission to burn, however, individuals are required to contact their local air quality management district, which has information on local conditions, including fire danger.

The following graphs illustrate just such impacts from wildfire -- the 2012 Flat Fire near Del Loma and the 2008 wildfires for Weaverville with regards to $PM_{2.5}$.



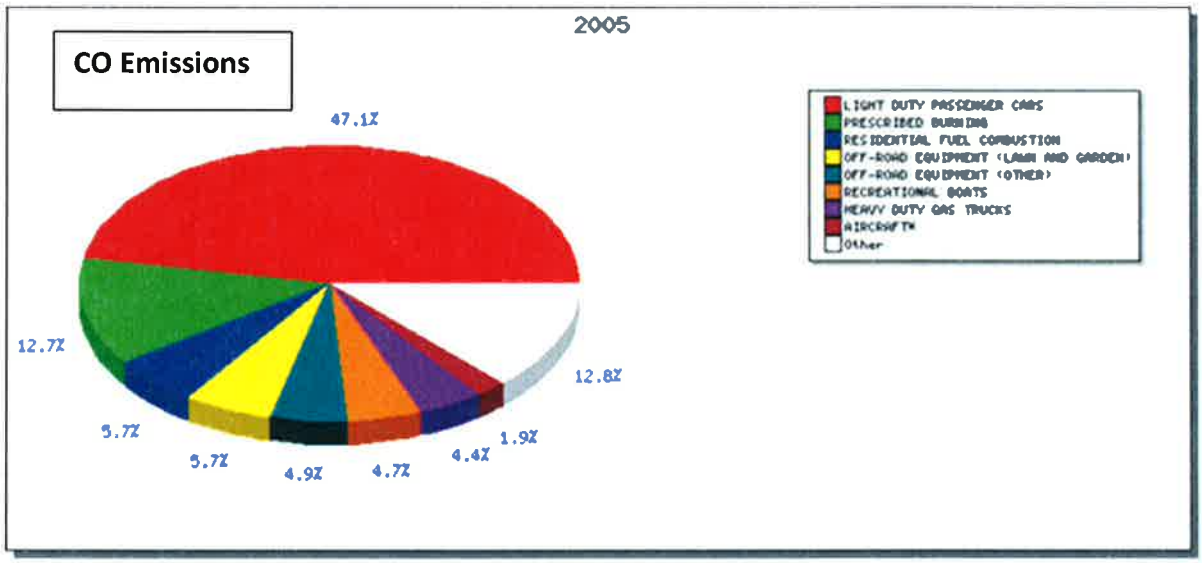
2012 Flat Fire (NCUAQMD Air Monitoring Report, September 2012)



2008 Wildfires (Martin, 2012)

The following table breaks down the average annual emissions due to wildfire within the North Coast Air Basin for 2008 (CARB, 2008). The North Coast Air Basin experiences its most heavily impacted air quality due to wildfire. Wildfire season is predominantly late summer and early fall during which air quality already experiences increased ground level ozone pollution. Dense smoke from wildfires during this time can exacerbate the problem.

Average annual emissions from wildfires in the North Coast Basin (2008) in tons/yr.								
	Total Organic Gases	Reactive Organic Gases	Carbon monoxide	Oxides of Nitrogen	Sulfur Oxides	Particulate Matter	PM_{10}	$PM_{2.5}$
NORTH COAST AIR BASIN	15,764	3,424	143,314	5,004	1,544	15,491	14,885	12,633



Earthquakes

The earth's surface is broken up into plates, and it is the movement of these plates that causes earthquakes. The plates move under, over, or slide past each other. Another way to describe the different types of movement of the plates is to delineate between spreading zones, transform faults, and subduction zones.

At spreading zones, molten rock rises, the two plates are pushed apart and new material is added at their edges. This type of seismic activity is usually found in oceans. An example of this is the North American and Eurasian plates that are spreading apart along the mid-Atlantic ridge. Spreading zones usually have earthquakes at shallow depths, within 30 kilometers of the surface.

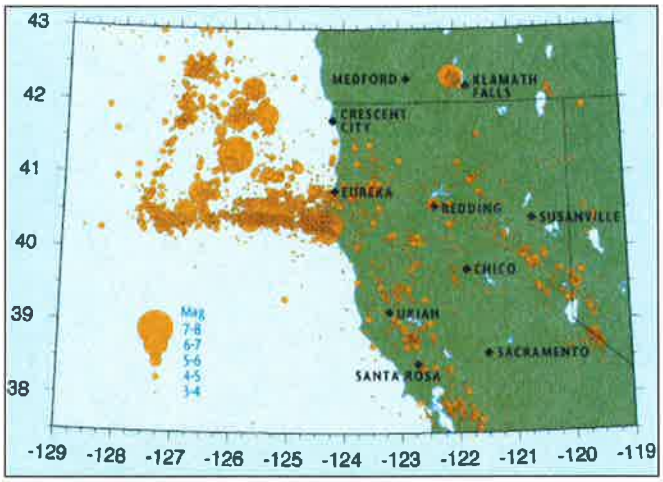
Transform faults are areas where plates slide past one another. The San Andreas Fault is an example of this type of fault. Earthquakes at transform faults are shallower in depths and form fairly straight linear patterns. An earthquake that is shallower will cause more damage, as it is closer to the earth's surface.

Subduction zones are found when one plate overrides another, or when one subducts another, pushing it downward into the mantle where it melts. Along the northwest coast of the United States, western Canada, southern Alaska and the Aleutian Islands are areas where subduction-zone plates are found. Deep-ocean trenches, shallow to deep earthquakes and mountain ranges containing active volcanoes characterize subduction zones.

The source for the following text and maps is http://www.humboldt.edu/shakyground.

California's most damaging earthquakes of the past 150 years, such as the 1906 "San Francisco" earthquake, have occurred on faults in the San Andreas fault system. While we are at risk of future San Andreas tremors, there are many other seismic zones, some capable of producing earthquakes as large or larger as the one in 1906. North of the Mendocino triple junction lies the 700 mile long Cascadia subduction zone, believed capable of producing magnitude (M) 9 earthquakes. Faults in northeastern California show evidence of past earthquakes in the M 7 range.

The world's largest faults are associated with subduction zones and have produced earthquakes in the magnitude (M) 9 range. The last great earthquake on the Cascadia subduction zone occurred in 1700, a little over 300 years ago. Geologists have found evidence for at least 13 great Cascadia earthquakes during the past 7,000 years—and estimate they occur irregularly at intervals anywhere between 200 and 800 years. The next Cascadia earthquake may be similar to the earthquake that set off the 2004 Indian Ocean tsunami. It could cause strong ground shaking from Northern California to southern Canada lasting for five minutes or longer. It will also produce a tsunami that could affect not only our coast, but other countries throughout the Pacific basin.



Northern California Earthquakes 1970-2009

Three Plates on Northern California Coast – Mendocino Triple Junction

Most earthquakes occur along plate-boundaries, with less than 10 percent of all earthquakes occurring within plate interiors. However, as plates continue to move and plate boundaries change over geologic time, weakened boundary regions become part of the interiors of the plates. These zones of weakness within the continent can cause earthquakes in response to stresses that originate at the edges of the plate or in the deeper crust. Both the New Madrid earthquakes of 1811-1812 and the 1886 Charleston earthquakes occurred within the North American plate.

A number of terms are used when discussing earthquakes, they include:

- *Fault*- a fracture in the earth's crust along which two blocks of the crust have slipped with respect to each other.
  - *Normal faults*- occur in response to pulling or tension; the overlying block moves down the dip of the fault plane.
  - *Thrust (reverse) fault*- occurs in response to squeezing or compression; the overlying block moves up the dip of the fault plane.
  - *Strike-slip (lateral) faults*- occurs in response to either type of stress; the blocks move horizontally past one another.

- *Focal depth*- the depth from the earth's surface to the region where an earthquake's energy originates (the focus).
- *Epicenter*- the point on the earth's surface directly above the focus.
- *Liquefaction*- happens when loosely packed, waterlogged sediments lose their strength in response to strong shaking, causing major damage during earthquakes. Many times landslides that are triggered by earthquakes are often more destructive that the earthquake itself.

Measuring Earthquakes

Using a seismograph the vibrations produced by earthquakes are detected, recorded, and measured. Seismographs produce a zigzag line that is a reflection of the changing intensity of the vibrations by responding to the motion of the ground surface beneath the instrument. From data expressed in the seismograms, it is possible to determine the time, epicenter, focal depth, and type of faulting of an earthquake. It is also possible to estimate how much energy was released.

The severity of an earthquake can be expressed in more than one way. The Richter scale is used to express the magnitude of an earthquake. The magnitude is a measure of the amplitude of the seismic waves, which are measured using a seismograph. To measure the amount of energy released the moment magnitude is used, which is an estimation of seismograph readings, giving the magnitude at any given moment. The Richter scale is logarithmic so that a recording of 7 indicates a disturbance with ground motion 10 times as large as a recording of 6. A quake magnitude 2 is the smallest quake normally felt by people. Earthquakes with a Richter value of 6 or more are commonly considered major; great earthquakes have magnitude of 8 or more on the Richter scale.

The Modified Mercalli Intensity (MMI) scale is used to express the intensity of an earthquake. It is a subjective measure that describes how strong a shock was felt at a particular location. The Modified Mercalli scale expresses the intensity of an earthquake's effect in a given locality in values ranging from I to XII. The most commonly used adaptation covers the range of intensity from the condition of "I—Felt by a very few and only under especially favorable conditions" to "XII—Damage total. Lines of sight and level are distorted. Objects thrown upward into the air".

Trinity County Geology

The following is a discussion of the geology of Trinity County. According to the California Division of Mines and Geology (DMG 1965), Trinity County lies in portions of two geomorphic provinces, and these are in sharp contrast with each other in topography, geology and mineral resources. The northeastern part, which covers nearly two-thirds of the county, is in the Klamath Mountains province where flat-topped ridges and glaciated peaks rise to elevations ranging from 6,000 to above 9,000 feet (DMG 1965:9). The southwestern part of the county is in the Coast Ranges province, with a top elevation of about 6,800 feet (DMG 1965:9). The ridge of South Fork Mountain marks the division between the two provinces.

W.P. Irwin (1960) noted two different provinces that create two distinct drainage patterns, with the northeastern part draining generally westward, while the southwestern portion drains northwest. Another distinguishing feature of the two provinces is the fact that the principal rock units of the Klamath Mountains are older than Cretaceous (for explanation of the different ages see Table A below) and are intruded by granite rocks. The rock of the Coast Ranges is mostly Late Jurassic and Cretaceous in age and is not intruded by granite. Many rock units of both provinces have been invaded by ultramafic intrusives and some of the latter have subsequently been altered to serpentine.

Irwin reported (Irwin 1960) that proceeding westward through the Klamath Mountains province along Highway 299, four concentric belts of rocks, concave eastward, are encountered.

The first is the Eastern Paleozoic belt, about 5 to 8 miles wide, consisting of rocks ranging in age from Mississippian to Devonian. The Bragdon Formation of Mississippian age consists of a well-bedded sequence of shale, sandstone, and siltstone and conglomerates as much as 6,000 feet in total thickness. In eastern Trinity County, the Bragdon Formation rests unconformably on the Copley greenstone, which crops through the Bragdon in small portions. The Copley greenstone is formed of inter-bedded volcanic rocks with some chert and shale. According to the Divisions of Mines and Geology, the Copley is believed to be middle Devonian in age and its base is not exposed in the area (DMG 1965: 11).

The second belt is the Central Metamorphic belt, about 12 miles wide, and is made up of Salmon and Abrams Formations of pre-Silurian age. These formations are considered the oldest formations in northwestern California (DMG 1965:11). The Salmon portion consists of hornblende and chlorite schists formed from basic volcanic flows and pyroclastic rocks. The Division of Mines and Geology estimates that the Salmon Formation lies conformably over the Abrams Formation. Abrams Formation consists of gray quartz mica schist with inter-beds of quartzite and marble and is 1,000 feet thick at its locality in upper Coffee Creek (DMG 1965: 11).

The third belt is the Western Paleozoic/Triassic belt about 20 miles wide. It consists of slightly metamorphosed shale, sandstone, chert, greenstone and limestone. Slate and chert are the two most abundant rock types, while long lenses of limestone have been noted near Hayfork Valley and Junction City (DMG 1965:11).

The fourth concentric belt is the Western Jurassic belt of rocks and includes the Galice Formation of middle Late Jurassic age as well as the Weitchpec and Kerr Ranch schists and schists of South Fork Mountain. According the Division of Mines and Geology, these schists are considered to be metamorphic equivalents of the Galice Formation of Oregon. In the northeastern part of the Willow Creek quadrangle, slate and phyllites appear to be over 2,500 feet thick. The western border of this fourth belt is marked by the Klamath Mountain province, and consists of a narrow band of schist, which has been traced from South Fork Mountain to Weitchpec. "These rocks usually are dark gray quartz sericite schist, but occasional green schists are encountered" (DMG 1965: 11).

The Coast Range province in the southwest one-third of Trinity County consists of rocks of the Franciscan Formation. It contains such variations as marine sandstones (graywacke), shale, some conglomerate, alternating thin beds of chert and shale, sparsely distributed thin lenses of limestone, volcanic rocks consisting of andesite, basalt, and pyroclastics of similar composition, and small amounts of blue glaucophane schist. In general, these rocks are sheared and deformed, and tend to be invaded by mafic and ultra intrusives now commonly altered to serpentine (DMG 1965:11). In the southeastern part of the county, the Franciscan rocks are flanked on the east by a wedge of slates and phyllites that seem to be correlated with the Franciscan Formation (DMG 1965: 13).

Southeast of the Weaverville-Hayfork areas are located relatively small erosional remnants of marine conglomerate and shale of the Shasta series of Cretaceous age rock that rest on the older rocks. Small areas of non-marine sedimentary rocks of Eocene or Oligocene age overlie the older rocks in the vicinity of Weaverville, Hayfork, and Hyampom and at a few other localities. These rocks have been termed the Weaverville Formation and consist of fine-grained detrital rocks, lignite beds, tuff, and conglomerate. The thickness of the Weaverville Formation ranges from a few feet to 2,000 feet.

Granite rocks that range in makeup from granite to diorite are exposed over large parts of Trinity County, and are found in nearly all areas of stratified pre-Cretaceous rocks. There is a granite chain that extends irregularly through the central metamorphic belt of rocks. The chain extends in a northerly direction from the junction of Highway 299 and the eastern border of Trinity County (near the Shasta Bally batholith), to the northeast corner of the county. Northeast of Hayfork Valley a long narrow body of granitic rock continues 50 miles northwestward beyond the county boundary to Ironside Mountain. These rocks are mainly hornblende diorite, in contrast to those in the eastern chain, which are mainly quartz diorite and granodiorite.

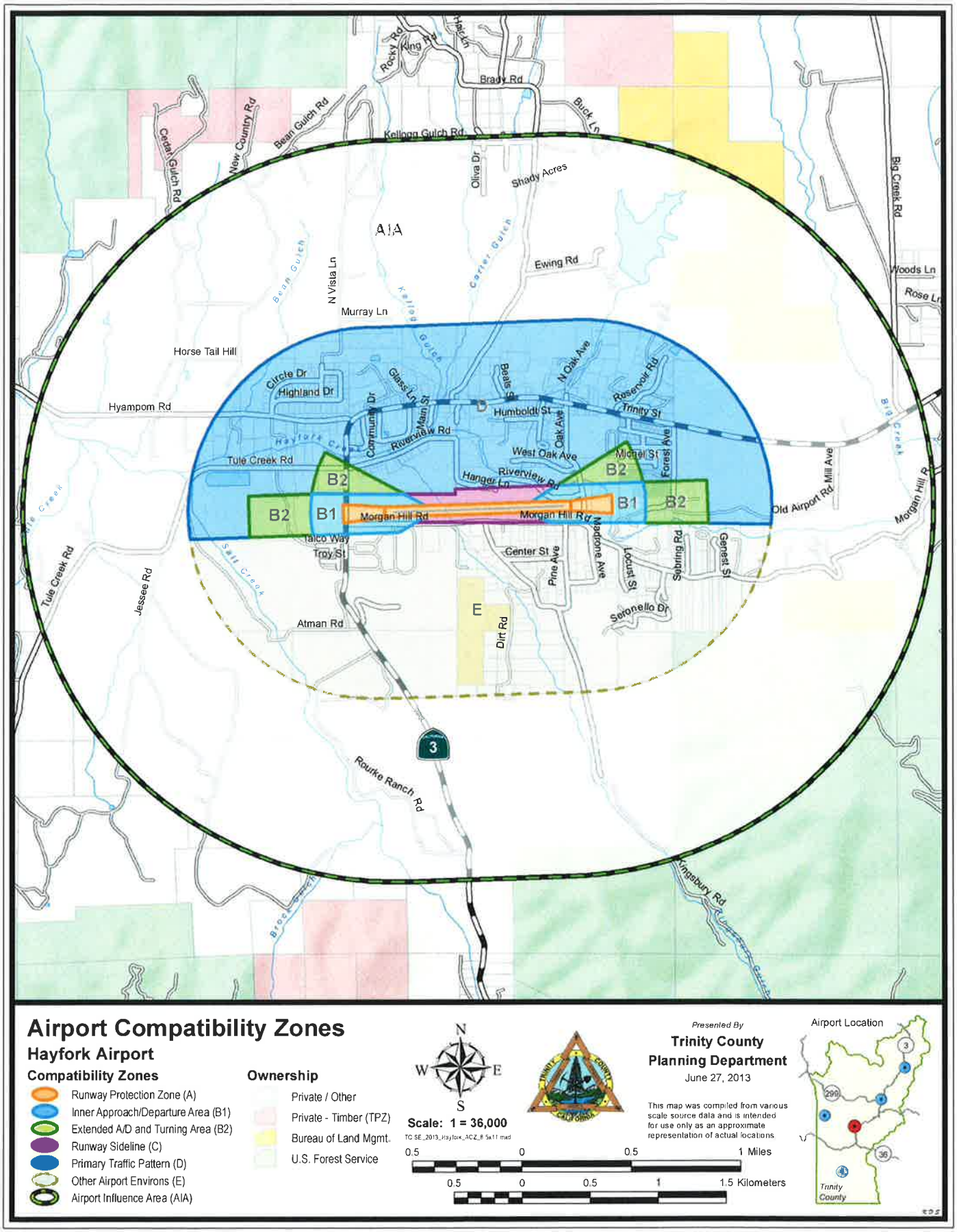
Ultramafic rocks are distributed in the northeast corner of the county, with intrusions by granitic rocks; but they also occur as discontinuous chains along the eastern and western margins of the Western Paleozoic and Triassic belt of rocks as small bodies in the Coast Ranges province. Peridotite is the most common rock type, and though mostly altered to serpentine still contains relic textures of the original rock. It is also believed that in the Klamath Mountains province the intrusion of ultramafic rocks preceded that of the granitic rocks, but that both were emplaced during the same time interval (DMG 1965: 14).

Geologic Time Scale

Reproduced from University of California Museum of Paleontology, *www.ucmp.berkeley.edu*.

Phanerozoic (542.0 mya to present)	Cenozoic (65.5 mya to present)	Quaternary (2.588 mya to present) • Holocene (11,700 yrs to present) • Pleistocene (2.588 mya to 11,700 yrs)
		Neogene (23.03 to 2.588 mya) • Pliocene (5.332 to 2.588 mya) • Miocene (23.03 to 5.332 mya)
		Paleogene (65.5 to 23.03 mya) • Oligocene (33.9 to 23.03 mya) • Eocene (55.8 to 33.9 mya) • Paleocene (65.5 to 55.8 mya)
	Mesozoic (251.0 to 65.5 mya)	Cretaceous (145.5 to 65.5 mya)
		Jurassic (199.6 to 145.5 mya)
		Triassic (251.0 to 199.6 mya)
	Paleozoic (542.0 to 251.0 mya)	Permian (299.0 to 251.0 mya)
		Carboniferous (359.2 to 299.0 mya) • Pennsylvanian (318.1 to 299.0 mya) • Mississippian (359.2 to 318.1 mya)
		Devonian (416.0 to 359.2 mya)
		Silurian (443.7 to 416.0 mya)
		Ordovician (488.3 to 443.7 mya)
		Cambrian (542.0 to 488.3 mya)
Precambrian (4600 to 542.0 mya)	Proterozoic (2500 to 542.0 mya)	Neoproterozoic (1000 to 542.0 mya)
		Mesoproterozoic (1600 to 1000 mya)
		Paleoproterozoic (2500 to 1600 mya)
	Archean (4000 to 2500 mya)	Neoarchean (2800 to 2500 mya)
		Mesoarchean (3200 to 2800 mya)
		Paleoarchean (3600 to 3200 mya)
		Eoarchean (4000 to 3600 mya)
	Hadean (4600 to 4000 mya)	

Appendix B



Airport Compatibility Zones

Hayfork Airport

Compatibility Zones

- Runway Protection Zone (A)
- Inner Approach/Departure Area (B1)
- Extended A/D and Turning Area (B2)
- Runway Sideline (C)
- Primary Traffic Pattern (D)
- Other Airport Environs (E)
- Airport Influence Area (AIA)

Ownership

- Private / Other
- Private - Timber (TPZ)
- Bureau of Land Mgmt.
- U.S. Forest Service

N W E S

Scale: 1 = 36,000

TC SE_2013_Hayfork_ACZ_8 5x11.mxd

0.5 0 0.5 1 Miles

0.5 0 0.5 1 1.5 Kilometers

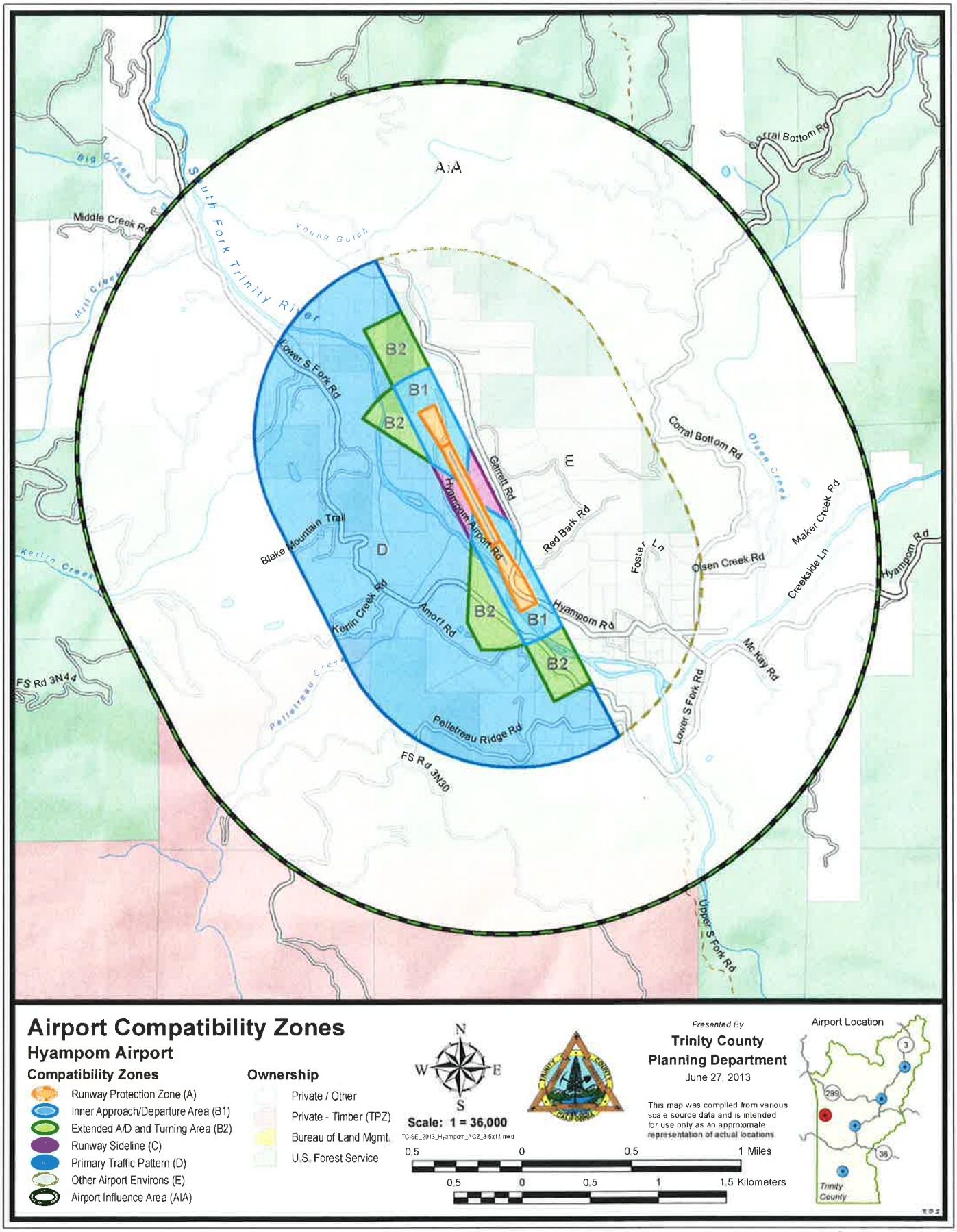
Presented By

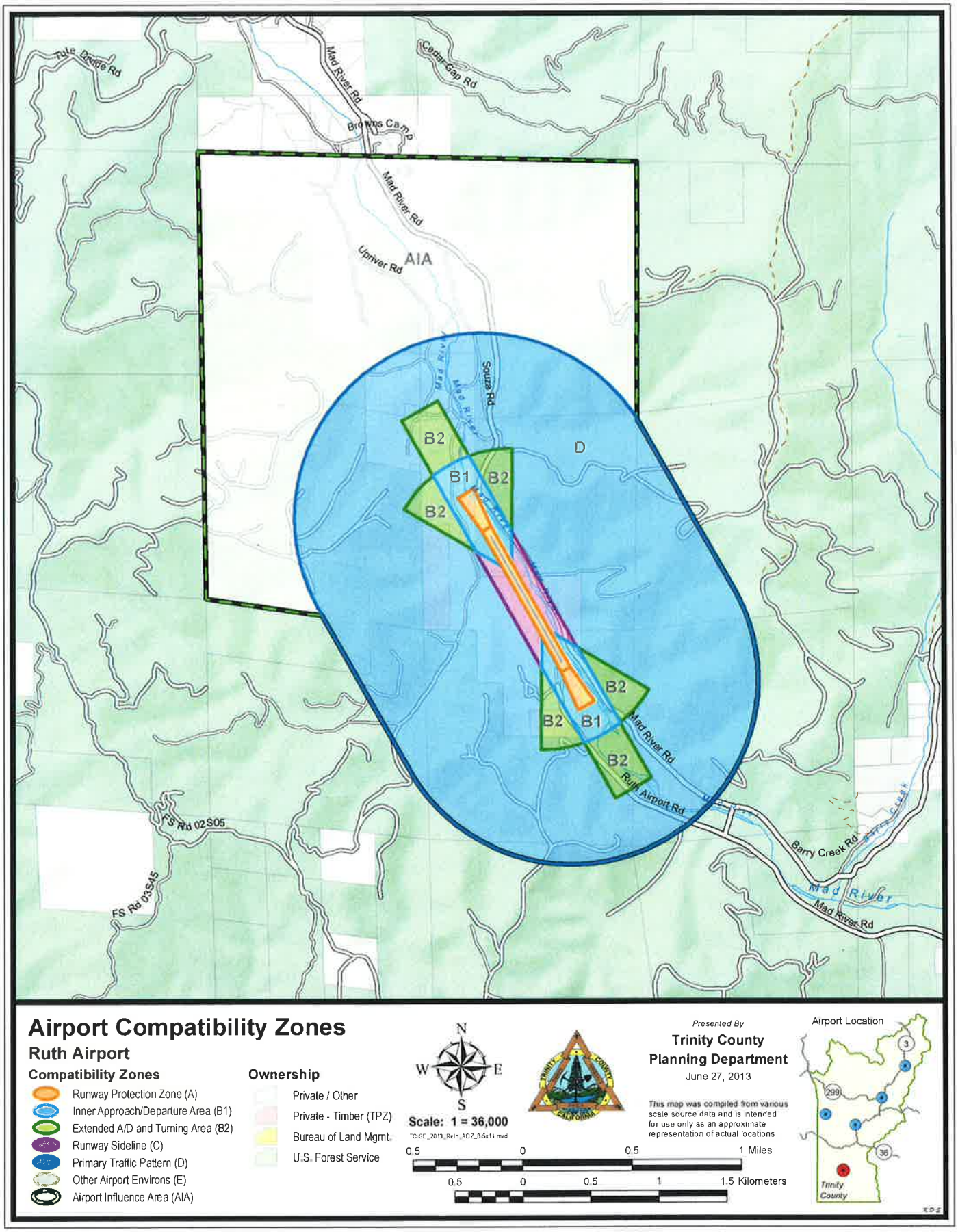
Trinity County Planning Department

June 27, 2013

This map was compiled from various scale source data and is intended for use only as an approximate representation of actual locations.

Airport Location


AIA
B2
B1
B2
E
D
B2
B1
B2
Middle Creek Rd
South Fork Trinity River
Young Gulch
Big Creek
Mill Creek
Lower S Fork Rd
Corral Bottom Rd
Olsen Creek
Garrett Rd
Hyampom Airport Rd
Red Bark Rd
Blake Mountain Trail
Foster Ln
Olsen Creek Rd
Maker Creek Rd
Creekside Ln
Hyampom Rd
Kerlin Creek
Kerlin Creek Rd
Amorf Rd
Hyampom Rd
Mc Kay Rd
FS Rd 3N44
Pelletreau Creek
Pelletreau Ridge Rd
FS Rd 3N30
Lower S Fork Rd
Upper S Fork Rd
Airport Compatibility Zones
Hyampom Airport
Compatibility Zones
Runway Protection Zone (A)
Inner Approach/Departure Area (B1)
Extended A/D and Turning Area (B2)
Runway Sideline (C)
Primary Traffic Pattern (D)
Other Airport Environs (E)
Airport Influence Area (AIA)
Ownership
Private / Other
Private - Timber (TPZ)
Bureau of Land Mgmt.
U.S. Forest Service
N
W
E
S
Scale: 1 = 36,000
TC-SE_2013_Hyampom_ACZ_8-5x11.mxd
0.5 0 0.5 1 Miles
0.5 0 0.5 1 1.5 Kilometers
Presented By
Trinity County
Planning Department
June 27, 2013
This map was compiled from various scale source data and is intended for use only as an approximate representation of actual locations.
Airport Location
3
299
36
Trinity County



Airport Compatibility Zones

Ruth Airport

Compatibility Zones

- Runway Protection Zone (A)
- Inner Approach/Departure Area (B1)
- Extended A/D and Turning Area (B2)
- Runway Sideline (C)
- Primary Traffic Pattern (D)
- Other Airport Environs (E)
- Airport Influence Area (AIA)

Ownership

- Private / Other
- Private - Timber (TPZ)
- Bureau of Land Mgmt.
- U.S. Forest Service

N W E S

Scale: 1 = 36,000

TC:\SE_2013_Revh_ACZ_8.5x11.mxd

0.5 0 0.5 1 Miles

0.5 0 0.5 1 1.5 Kilometers

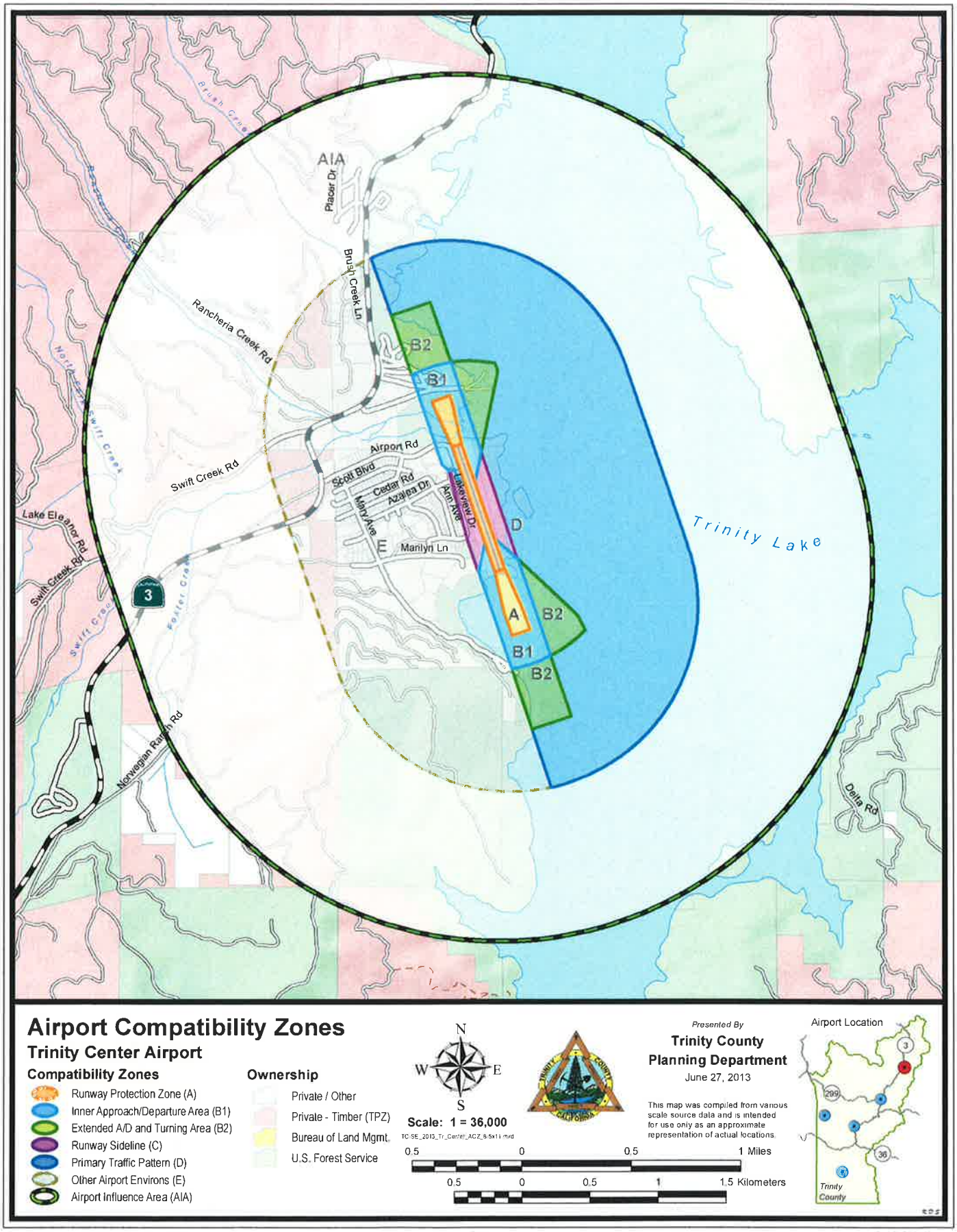
Presented By

Trinity County Planning Department

June 27, 2013

This map was compiled from various scale source data and is intended for use only as an approximate representation of actual locations

Airport Location



Airport Compatibility Zones

Trinity Center Airport

Compatibility Zones

- Runway Protection Zone (A)
- Inner Approach/Departure Area (B1)
- Extended A/D and Turning Area (B2)
- Runway Sideline (C)
- Primary Traffic Pattern (D)
- Other Airport Environs (E)
- Airport Influence Area (AIA)

Ownership

- Private / Other
- Private - Timber (TPZ)
- Bureau of Land Mgmt.
- U.S. Forest Service

N W E S

Scale: 1 = 36,000

TC-SE_2013_Tr_Center_ACZ_8-5x11.mxd

0.5 0 0.5 1 Miles

0.5 0 0.5 1 1.5 Kilometers

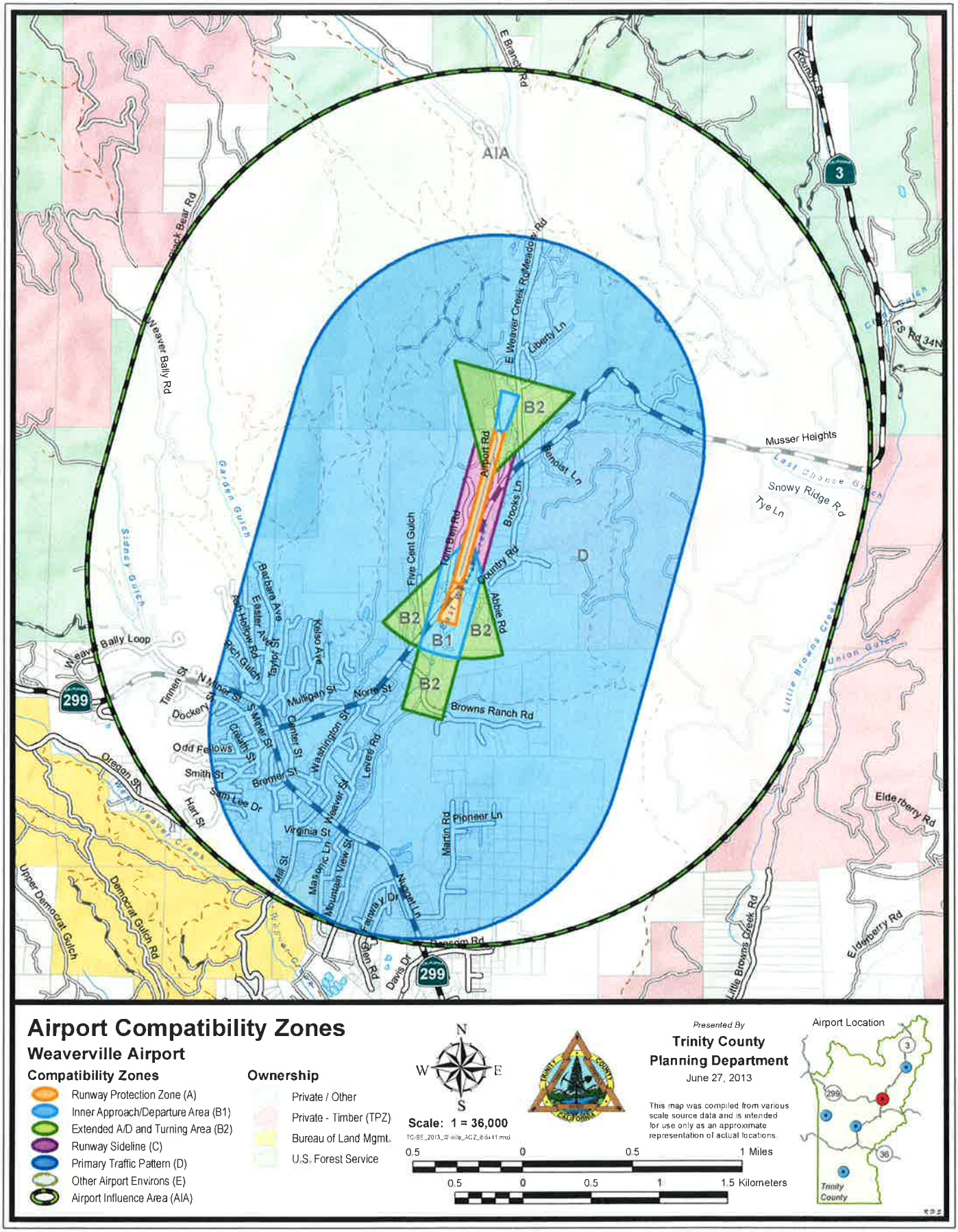
Presented By

Trinity County Planning Department

June 27, 2013

This map was compiled from various scale source data and is intended for use only as an approximate representation of actual locations.

Airport Location



Airport Compatibility Zones

Weaverville Airport

Compatibility Zones

- Runway Protection Zone (A)
- Inner Approach/Departure Area (B1)
- Extended A/D and Turning Area (B2)
- Runway Sideline (C)
- Primary Traffic Pattern (D)
- Other Airport Environs (E)
- Airport Influence Area (AIA)

Ownership

- Private / Other
- Private - Timber (TPZ)
- Bureau of Land Mgmt.
- U.S. Forest Service

N W E S

Scale: 1 = 36,000

TC-SE_2013_Weaverville_ACZ_8.5x11.mxd

0.5 0 0.5 1 Miles

0.5 0 0.5 1 1.5 Kilometers

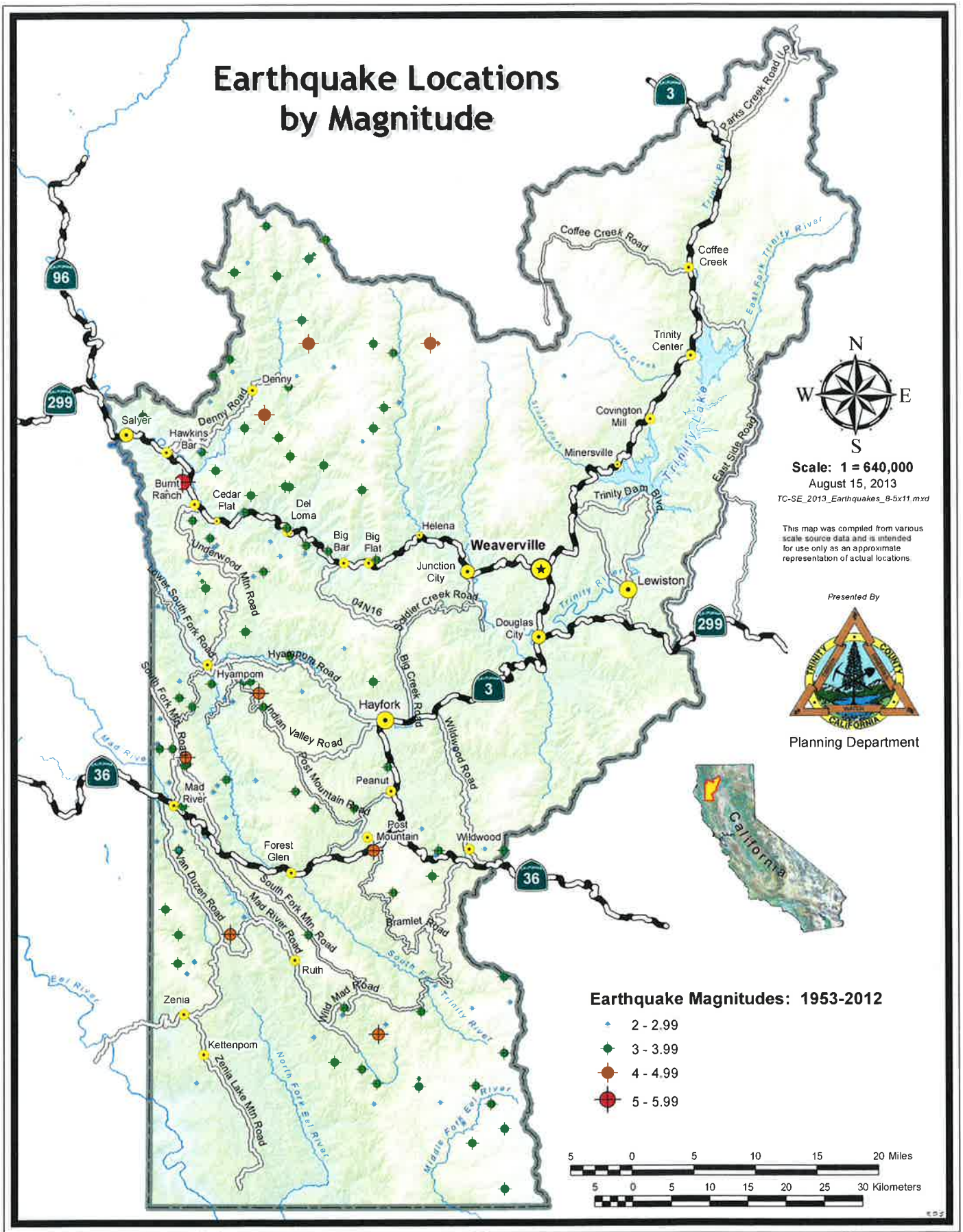
Presented By

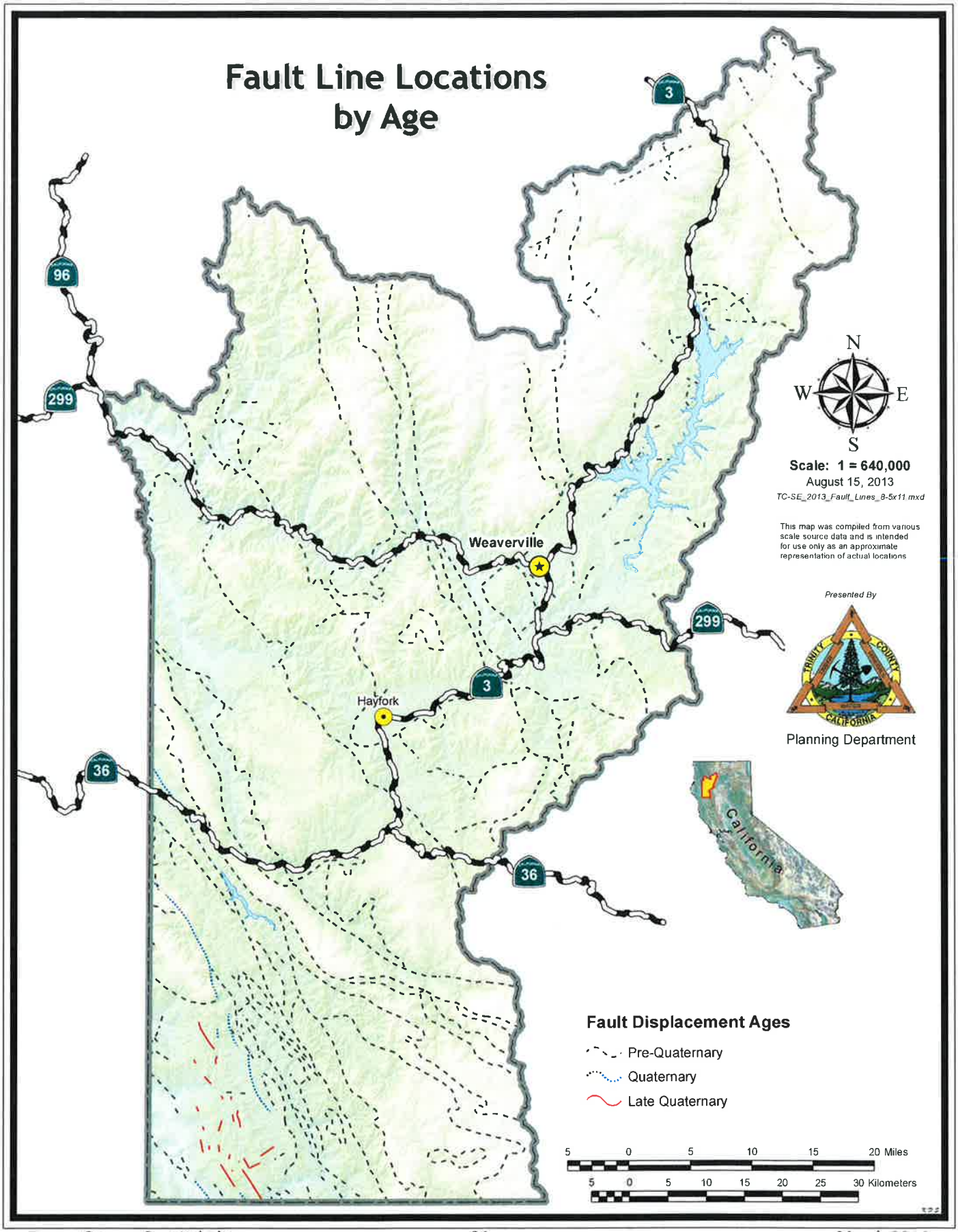
Trinity County Planning Department

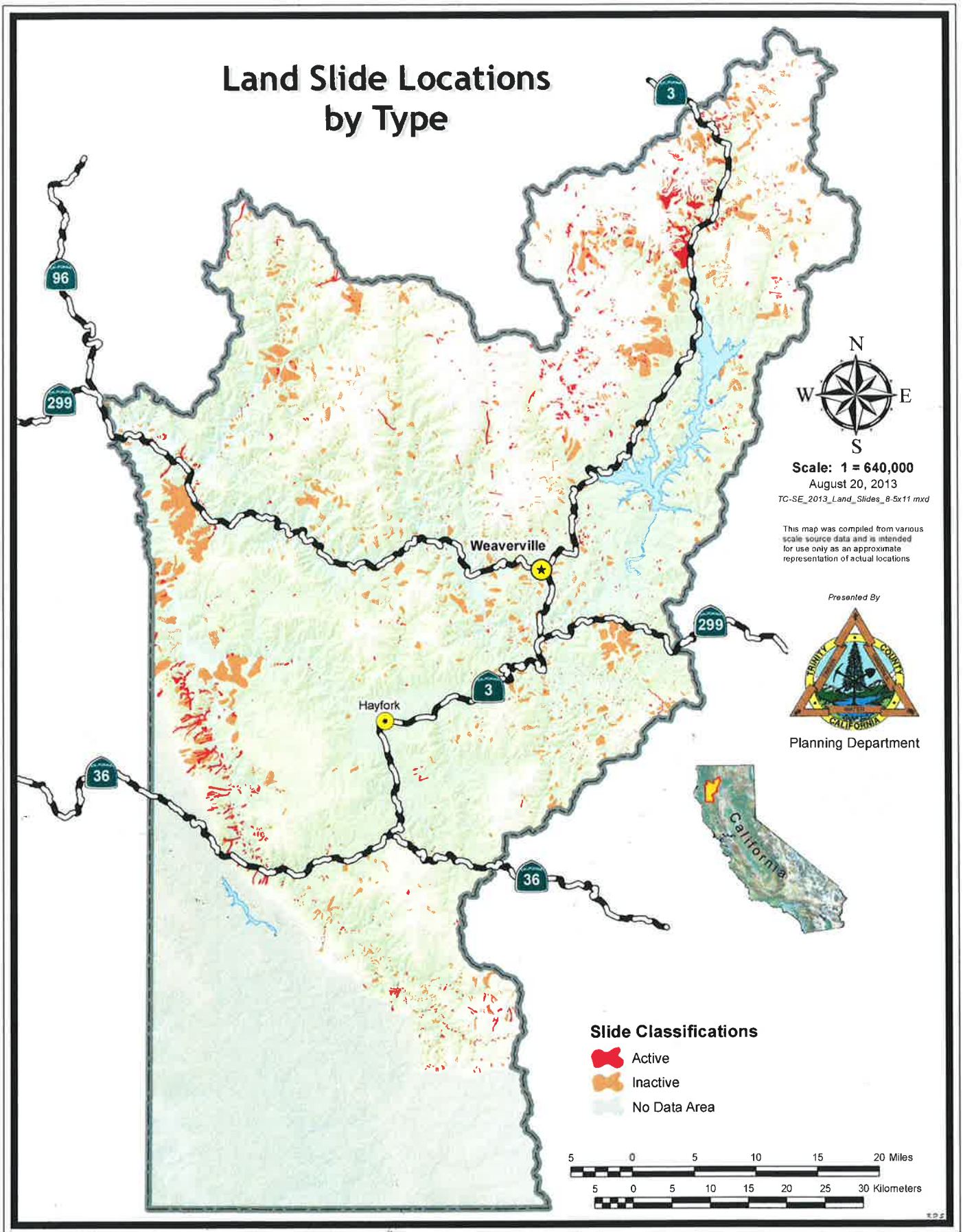
June 27, 2013

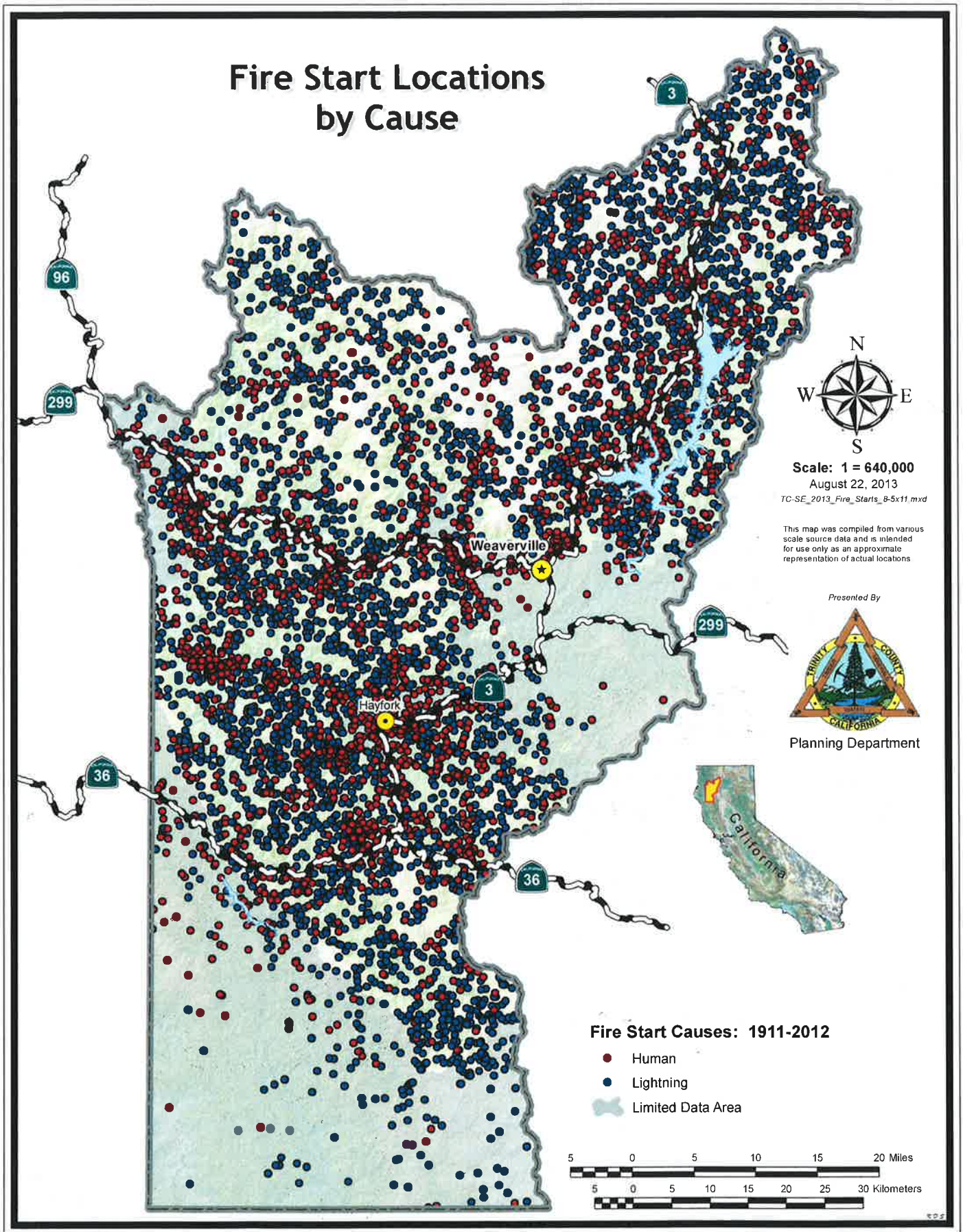
This map was compiled from various scale source data and is intended for use only as an approximate representation of actual locations.

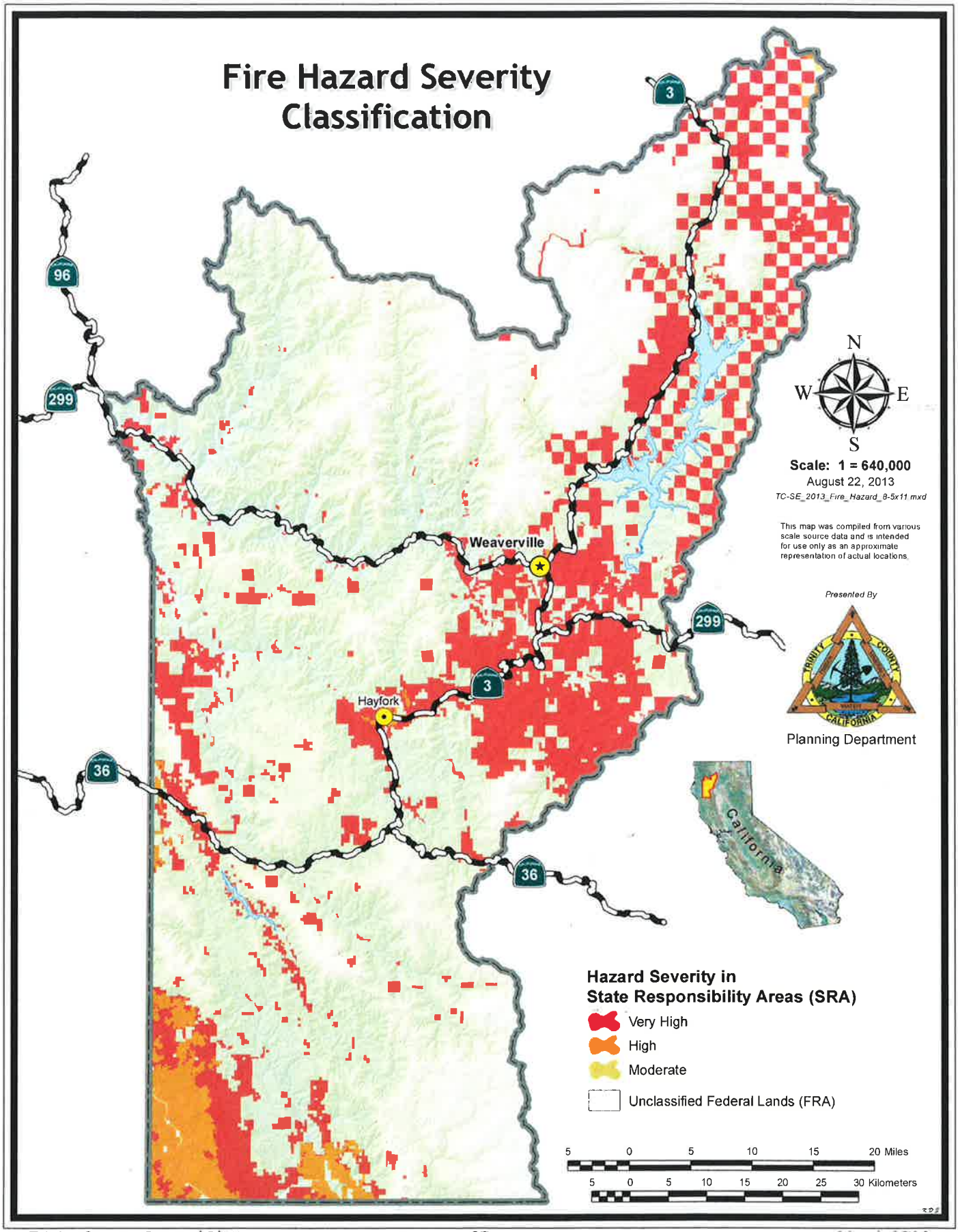
Airport Location

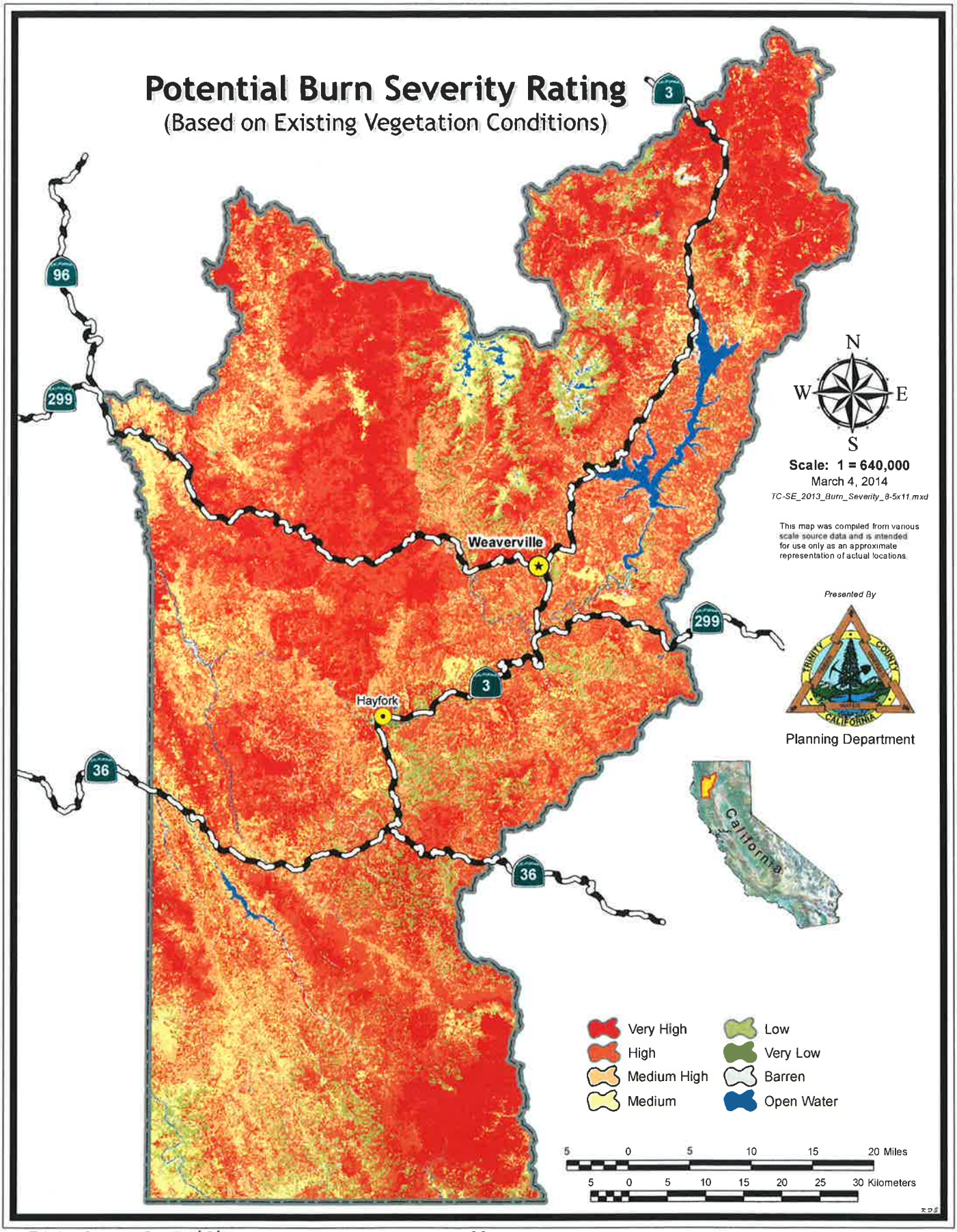

Earthquake Locations by Magnitude
N
W
E
S
Scale: 1 = 640,000
August 15, 2013
TC-SE_2013_Earthquakes_8-5x11.mxd
This map was compiled from various scale source data and is intended for use only as an approximate representation of actual locations.
Presented By
Planning Department
Earthquake Magnitudes: 1953-2012
2 - 2.99
3 - 3.99
4 - 4.99
5 - 5.99
20 Miles
30 Kilometers
Weaverville
Hayfork
Lewiston
Trinity Center
Coffee Creek
Douglas City
Junction City
Helena
Big Bar
Big Flat
Burnt Ranch
Cedar Flat
Del Loma
Denny
Salyer
Hawkins Bar
Hyampom
Peanut
Post Mountain
Wildwood
Forest Glen
Mad River
Ruth
Zenia
Kettenpom
Minersville
Covington Mill
Trinity Dam Blvd
East Side Road
Parks Creek Road
Coffee Creek Road
Denny Road
Underwood Mtn Road
Lawyer-South Fork Road
Soldier Creek Road
Big Creek Road
Wildwood Road
Indian Valley Road
Post Mountain Road
South Fork Mtn Road
Hyampom Road
Van Duzen Road
Mad River Road
Bramlet Road
Wild Mad Road
Zenia Lake Mtn Road
California
3
96
299
36
04N16


Fault Line Locations by Age
3
96
299
Weaverville
299
3
Hayfork
36
36
N
W
E
S
Scale: 1 = 640,000
August 15, 2013
TC-SE_2013_Fault_Lines_8-5x11.mxd
This map was compiled from various scale source data and is intended for use only as an approximate representation of actual locations
Presented By
TRINITY COUNTY CALIFORNIA
Planning Department
California
Fault Displacement Ages
Pre-Quaternary
Quaternary
Late Quaternary
5 0 5 10 15 20 Miles
5 0 5 10 15 20 25 30 Kilometers

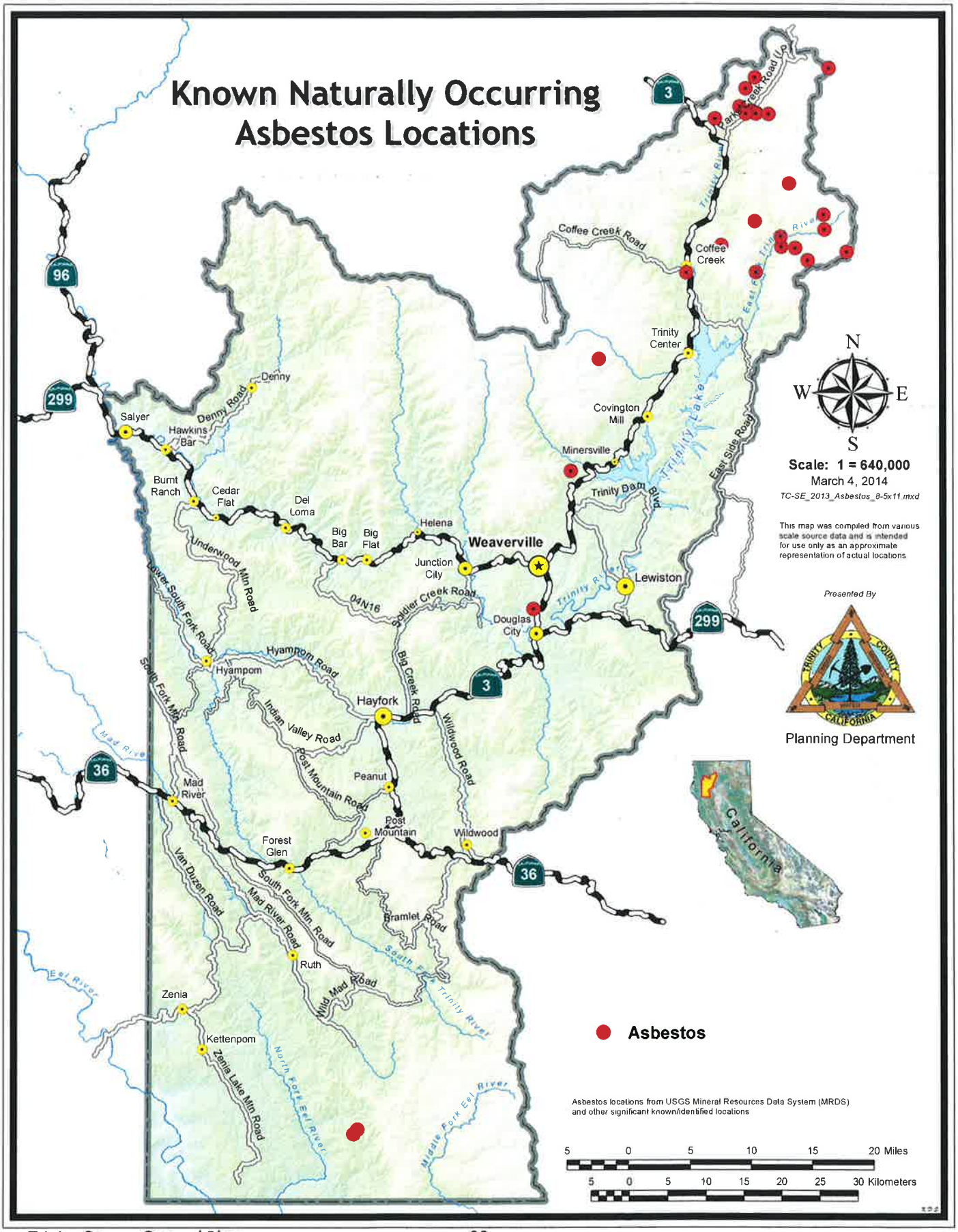

Land Slide Locations
by Type
96
299
3
Weaverville
Hayfork
36
N
W
E
S
Scale: 1 = 640,000
August 20, 2013
TC-SE_2013_Land_Slides_8-5x11.mxd
This map was compiled from various scale source data and is intended for use only as an approximate representation of actual locations
Presented By
Planning Department
California
Slide Classifications
Active
Inactive
No Data Area
5 0 5 10 15 20 Miles
5 0 5 10 15 20 25 30 Kilometers

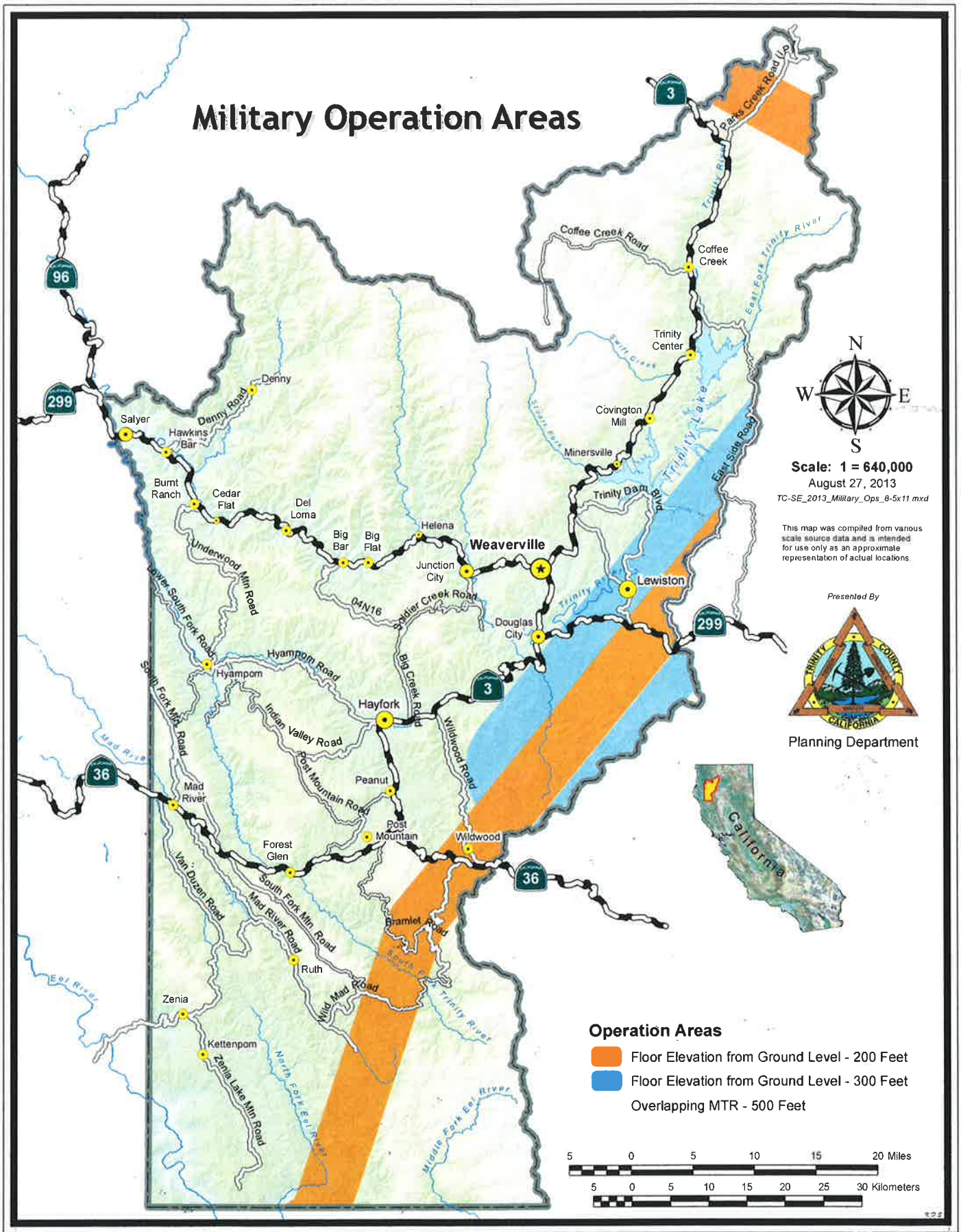

Fire Start Locations
by Cause
3
96
299
36
Weaverville
Hayfork
N
W
E
S
Scale: 1 = 640,000
August 22, 2013
TC-SE_2013_Fire_Starts_8-5x11.mxd
This map was compiled from various scale source data and is intended for use only as an approximate representation of actual locations
Presented By
TRINITY COUNTY CALIFORNIA
Planning Department
California
Fire Start Causes: 1911-2012
Human
Lightning
Limited Data Area
5 0 5 10 15 20 Miles
5 0 5 10 15 20 25 30 Kilometers

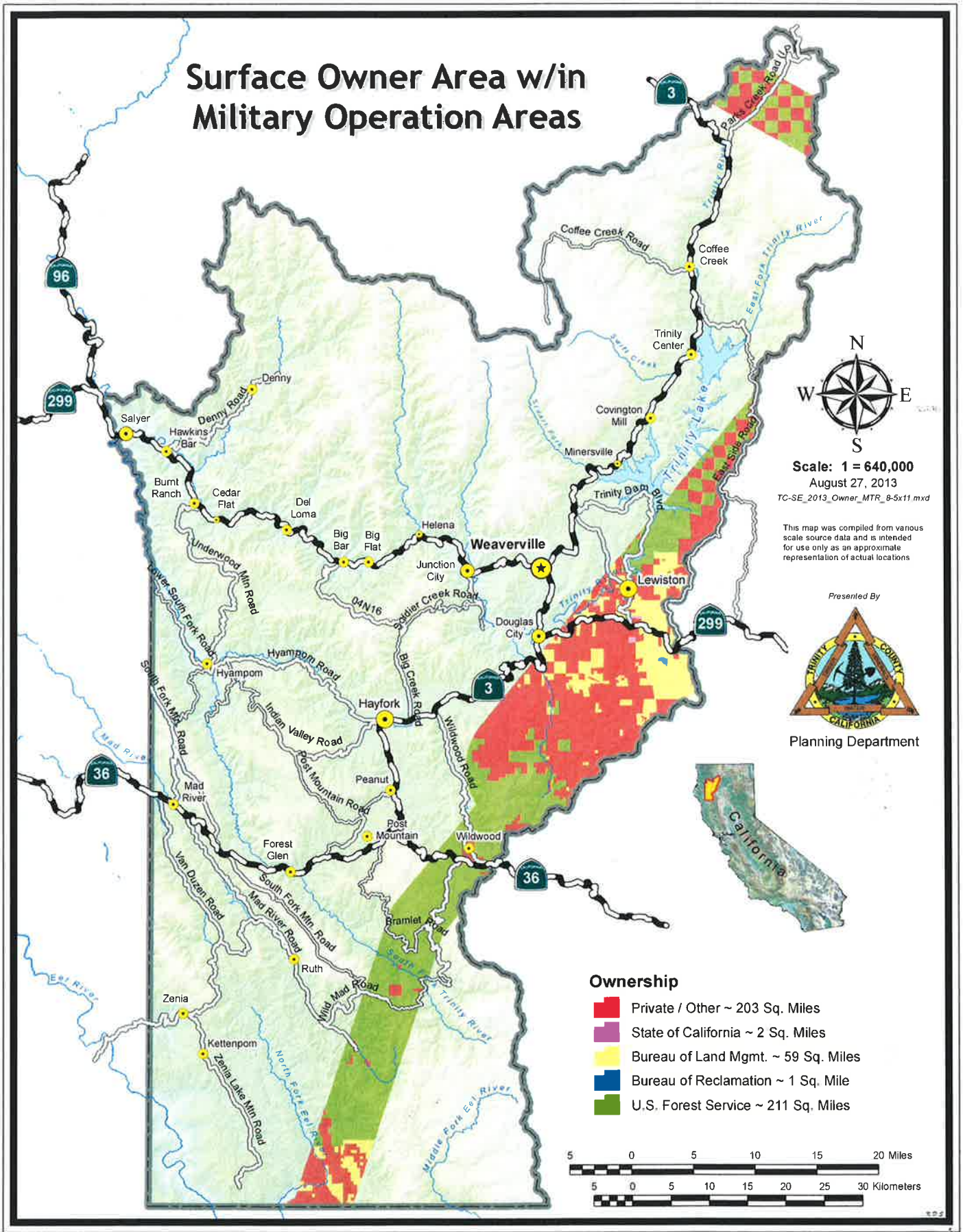

Fire Hazard Severity Classification
3
96
299
Weaverville
299
3
Hayfork
36
36
N
W
E
S
Scale: 1 = 640,000
August 22, 2013
TC-SE_2013_Fire_Hazard_8-5x11.mxd
This map was compiled from various scale source data and is intended for use only as an approximate representation of actual locations.
Presented By
TRINITY COUNTY
CALIFORNIA
Planning Department
California
Hazard Severity in State Responsibility Areas (SRA)
Very High
High
Moderate
Unclassified Federal Lands (FRA)
5 0 5 10 15 20 Miles
5 0 5 10 15 20 25 30 Kilometers


Potential Burn Severity Rating
(Based on Existing Vegetation Conditions)
3
96
299
Weaverville
299
3
Hayfork
36
36
N
W
E
S
Scale: 1 = 640,000
March 4, 2014
TC-SE_2013_Burn_Severity_8-5x11.mxd
This map was compiled from various scale source data and is intended for use only as an approximate representation of actual locations.
Presented By
TRINITY COUNTY
CALIFORNIA
Planning Department
California
Very High
High
Medium High
Medium
Low
Very Low
Barren
Open Water
5 0 5 10 15 20 Miles
5 0 5 10 15 20 25 30 Kilometers


Emergency
Evacuation Routes
N
W
E
S
Scale: 1 = 640,000
August 23, 2013
TC-SE_2013_Evac_Routes_8-5x11.mxd
This map was compiled from various scale source data and is intended for use only as an approximate representation of actual locations.
Presented By
Planning Department
Roadways
State Highways
Additional Evacuation Routes
Other Populated Roads
5 0 5 10 15 20 Miles
5 0 5 10 15 20 25 30 Kilometers
Weaverville
Lewiston
Hayfork
Trinity Center
Coffee Creek
Ramshorn Rd
East Side Rd
Trinity Dam Blvd
Deadwood Rd
Lewiston Rd
Hoadley Peaks Rd
Minersville
Covington Mill
Denny
Salyer
Hawkins Bar
Hennessey Rd
Burnt Ranch
Del Loma
Cedar Flat
Big Bar
Big Flat
Helena
Junction City
Douglas City
Underwood Mtn Rd
Corral Bottom Rd
Hyampom Rd
Hyampom
Wildwood Rd
Peanut
Post Mountain
Wildwood
Mad River
Forest Glen
Van Duzen Rd
Ruth
Zenia
Zenia Bluff Rd
Kettenpom
Ruth Zenia Rd
Mad River Rd
Zenia Lake Mtn Rd
South Fork Trinity River
North Fork Eel River
Middle Fork Eel River
Eel River
California
3
96
299
36


Known Naturally Occurring Asbestos Locations
N
W
E
S
Scale: 1 = 640,000
March 4, 2014
TC-SE_2013_Asbestos_8-5x11.mxd
This map was compiled from various scale source data and is intended for use only as an approximate representation of actual locations.
Presented By
Planning Department
Asbestos
Asbestos locations from USGS Mineral Resources Data System (MRDS) and other significant known/identified locations
5 0 5 10 15 20 Miles
5 0 5 10 15 20 25 30 Kilometers
Coffee Creek Road
Coffee Creek
Trinity Center
Trinity Lake
East Side Road
Covington Mill
Minersville
Trinity Dam Blvd
Weaverville
Junction City
Helena
Big Bar
Big Flat
Lewiston
Douglas City
Trinity River
Soldier Creek Road
04N16
Big Creek Road
Wildwood Road
Hayfork
Hyampom
Hyampom Road
Lower South Fork Road
Underwood Mtn Road
South Fork Mtn. Road
Indian Valley Road
Post Mountain Road
Peanut
Post Mountain
Wildwood
Mad River
Forest Glen
Van Duzen Road
Mad River Road
South Fork Mtn. Road
Bramlet Road
Ruth
Wild Mad Road
Zenia
Kettenpom
Zenia Lake Mtn Road
North Fork Eel River
Middle Fork Eel River
South Fork Trinity River
Eel River
Mad River
Denny
Denny Road
Salyer
Hawkins Bar
Burnt Ranch
Cedar Flat
Del Loma
Parks Creek Road
California
96
299
3
36


Military Operation Areas
N
W
E
S
Scale: 1 = 640,000
August 27, 2013
TC-SE_2013_Military_Ops_8-5x11.mxd
This map was compiled from various scale source data and is intended for use only as an approximate representation of actual locations
Presented By
Planning Department
Operation Areas
Floor Elevation from Ground Level - 200 Feet
Floor Elevation from Ground Level - 300 Feet
Overlapping MTR - 500 Feet
5 0 5 10 15 20 Miles
5 0 5 10 15 20 25 30 Kilometers
California
Weaverville
Hayfork
Lewiston
Trinity Center
Coffee Creek
Covington Mill
Minersville
Junction City
Douglas City
Helena
Big Bar
Big Flat
Del Loma
Cedar Flat
Burnt Ranch
Hawkins Bar
Salyer
Denny
Hyampom
Peanut
Post Mountain
Wildwood
Forest Glen
Mad River
Ruth
Zenia
Kettenpom
Bramlet
Parks Creek Road
Coffee Creek Road
Denny Road
Underwood Mtn Road
Lower South Fork Road
Soldier Creek Road
04N16
Hyampom Road
South Fork Mtn. Road
Big Creek Road
Wildwood Road
Indian Valley Road
Post Mountain Road
Van Duzen Road
Mad River Road
South Fork Mtn. Road
Wild Mad Road
Zenia Lake Mtn Road
East Side Road
Trinity Dam Blvd
Trinity Lake
East Fork Trinity River
South Fork Trinity River
North Fork Eel River
Middle Fork Eel River
Eel River
Mad River
3
96
299
36


Surface Owner Area w/in Military Operation Areas
N
W
E
S
Scale: 1 = 640,000
August 27, 2013
TC-SE_2013_Owner_MTR_8-5x11.mxd
This map was compiled from various scale source data and is intended for use only as an approximate representation of actual locations
Presented By
Planning Department
Ownership
Private / Other ~ 203 Sq. Miles
State of California ~ 2 Sq. Miles
Bureau of Land Mgmt. ~ 59 Sq. Miles
Bureau of Reclamation ~ 1 Sq. Mile
U.S. Forest Service ~ 211 Sq. Miles
5 0 5 10 15 20 Miles
5 0 5 10 15 20 25 30 Kilometers
Weaverville
Lewiston
Hayfork
Wildwood
Junction City
Douglas City
Helena
Big Bar
Big Flat
Del Loma
Cedar Flat
Burnt Ranch
Salyer
Hawkins Bar
Denny
Denny Road
Coffee Creek
Coffee Creek Road
Trinity Center
Covington Mill
Minersville
Trinity Dam Blvd
East Side Road
Trinity Lake
East Fork Trinity River
Parks Creek Road
Underwood Mtn Road
Lower South Fork Road
04N16
Soldier Creek Road
Hyampom
Hyampom Road
South Fork Mtn Road
Big Creek Road
Wildwood Road
Indian Valley Road
Post Mountain Road
Peanut
Post Mountain
Mad River
Forest Glen
Van Duzen Road
Mad River Road
South Fork Mtn Road
Bramlet Road
Ruth
Wild Mad Road
Zenia
Kettenpom
Zenia Lake Mtn Road
North Fork Eel River
Middle Fork Eel River
South Fork Trinity River
Trinity River
Eel River
Mad River
California
96
299
3
36

References

Agee JK. 1993. Fire ecology of Pacific Northwest forest. Washington, DC. Island Press. 493 p.

Agee JK, Skinner CN. 2005. Basic principles of forest fuel reduction treatments. Forest Ecology and Management 2111: 83-96.

Allen D, Savage M, Falk DA, Suckling KF, Swetnam TW, Schulke T, Stacey PB, Morgan P, Hoffman M, Klingel JT. 2002. Ecological restoration of southwestern ponderosa pine ecosystems: a broad perspective. Ecol. Appl. 12: 1418-1433.

Brown JK, Reinherdt ED, Kramer KA. 2003. Coarse woody debris: managing benefits and fire hazard in the recovering forest. USFS Rocky Mountain Research Station. RMRS-GTR-105.

Brown JK, Arno SF. 1991. The paradox of wildland fire. Western Wildlands (Spring): 40-46.

California Department of Forestry and Fire Protection and State Board of Forestry and Fire Protection. 2010. A Strategic Fire Plan for California [Internet]. Available from: http://cdfdata.fire.ca.gov/pub/fireplan/fpupload/fpppdf668.pdf

California Governor's Office of Planning and Research. 2003. Fire Hazard Planning General Plan Technical Advice Series.

[CAPCOA] California Air Pollution Control Officers Association. 2012. Progress toward clean air [Internet]. Available from: http://www.capcoa.org/wpcontent/uploads/downloads/ 2012/04/CAPCOA-Progress-Toward-Clean-Air-2012.pdf

[CARB] California Air Resources Board. 2008 and 2005 [Internet]. Available from: http://www. arb.ca.gov/homepage.htm

[CDF] California Department of Forestry and Fire Protection. 2002. Information and data center Fire and Resource Assessment Program. Sacramento, CA. Available from: http://frap.cdf.ca.gov/infocenter.html

[DMG] California Division of Mines and Geology. 1965.

[DMG] California Division of Mines and Geology. 1974.

[DMG] California Division of Mines and Geology. 1997.

California Fire Alliance [Internet]. Available from: www.cafirealliance.org

California State Aeronautics Act. 1967. Public Utility Code [PUC] Sections 21670 et. seq.

Electric Power Research Institute. 2003. Global Climate Change and California: potential implications for ecosystems, health and economy [Internet]. Prepared for California Energy Commission. 500-03-058CF. Available from: http://www.energy.ca.gov/reports/500-03-058/2003-10-31_500-03-058CF.PDF

Evans AM, Everett RG, Stephens SL, Youtz JA. 2011. Comprehensive fuels treatment practices guide for mixed conifer forests: California, Central and Southern Rockies and the Southwest. Santa Fe, NM: Forest Guild. 112 p.

Firewise Communities Recognition Program [Internet]. Available from: www.firewise.org

Fried J, Torn MS, Mills E. 2004. Impact of climate change on wildfire severity: a regional forecast for Northern California. Climate Change 64: 169-191.

Humboldt Bay Municipal Water District. December 2008. Emergency Action Plan for R.W. Matthews Dam. Project No.03430-CA

Irwin WP. 1960. Geologic reconnaissance of the Northern Coast Ranges and Klamath Mountains, California.

Lenihan JM, Drapek R, Bachelet D, Neilson RP. 2003. Climate change effects on vegetation distribution, carbon stocks and fire regimes in California. Ecological Applications 13(6): 1667–1681.

Living on Shaky Ground [Internet]. Available from: http://humboldt.edu/shakyground/

Martin RL. 2012. Evaluation of the air quality management challenges in California's North Coast Air Basin. Proceedings of Abstracts 8th International Conference on Air Quality Science and Applications; Athens, Greece.

McKelvey KS, Skinner CN, Chang C, Erman DC, Husari SJ, Parsons DJ; van Wagtendonk JW, Weatherspoon CP. 1996. An overview of fire in the Sierra Nevada. Pages 1033-1040 in: Sierra Nevada Ecosystem Project, Final Report to Congress, Vol. II, Assessments and Scientific Basis for Management Options. Davis, CA: University of California, Centers for Water and Wildland Resources. Report No. 37.

National Institute for Occupational Safety and Health. 2010. Pocket Guide to Chemical Hazards.

[NCUAQMD] North Coast Unified Air Quality Management District Air Monitoring Report. September 2012.

North Coast Unified Air Quality Management District Website. October 2012. Available from: http://ncuaqmd.org

Radke LF, Ward DE. 1991. Prescriptions for biomass fire smoke reductions. Proceedings of the 11th Conference on Fire and Forest Meteorology; April 16-19, 1991; Missoula, MT. Bethesda, MD: Society of American Foresters. 10 p.

Skinner, C, Taylor A, and Agee J. 2006. Klamath Mountains Bioregion: fire in California's ecosystems. Sugihara NG, van Wagtendonk JW, Fites-Kaufman J, Shaffer KE, Thode AE, editors. University of California Press, Berkeley, CA. pp. 170-194.

State of California. California Global Warming Solutions Act (AB32). 2006.

State of California. Toxic Air Contaminant Identification and Control Act. 1983. (AB1807)

Trinity County Airport Land Use Compatibility Plan. Nov. 2009.

Trinity County Board of Supervisors. 2008. Resolution 2008-056 pertaining to a declaration of an emergency regarding wildfires of 2008.

Trinity County Board of Supervisors. 2009. Resolution 2009-058 pertaining to coordination between County of Trinity and USFS.

Trinity County Board of Supervisors. Hayfork Community Plan. 1996: 7.12

Trinity County Board of Supervisors. 2000 as amended 2009. Trinity County Zoning Ordinance. Section 29.4, Flood Hazard.

Trinity County Board of Supervisors. 2006. Vegetation Ordinance 1300 Title 8 County Code, Chapter 8.68 pertaining to Health and Safety for Vegetation.

Trinity County Emergency Operations Plan. 2010. Prepared by Trinity County Disaster Council and Trinity County Sheriff's Office, Office of Emergency Services.

Trinity County Emergency Operations Plan. 2012.

Trinity County Fire Safe Council. 2005 as amended 2010. Trinity County Community Wildfire Protection Plan (CWPP). www.tcrcd.net/fsc

Trinity County Hazardous Materials Area Plan. July 2011.

Trinity County Hazardous Materials Commodity Flow Study. Final Report 2011.

University of California Davis. 1996. Assessments and scientific basis for management options. In Sierra Nevada Ecosystem Project: Final report to Congress, vol. II. Centers for Water and Wildland Resources Report No. 37. 1033 p.

University of California Museum of Paleontology, *www.ucmp.berkeley.edu, accessed Sept. 2013.*

US Congress. Federal Clean Air Act. 1963 as amended.

US Congress. Federal Land Assistance, Management and Enhancement (FLAME) Act of 2009. (HR1404).

US Congress. Federal Land Policy and Management Act. 1976 as amended. 43 USC§ 1701 and 43 USC§ 1712.

US Congress. Flood Disaster Protection Act. 1973 as amended. 42 USC§ 4001, et. seq.

US Congress. National Flood Insurance Act. 1968 as amended.

US Congress. Secure Rural Schools and Communities Self-determination Act of 2000. (HR2389).

US Congress: Healthy Forest Restoration Act of 2003. (HR1904).

US Department of Agriculture Forest Service and US Department of Interior Bureau of Land Management. 1994. Record of decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the spotted owl. Portland, OR. 73 p.

US Department of Agriculture Forest Service. Definition of Wildland Urban Interface (WUI). The Federal Register (Region 5). January 4, 2001.Vol 66, No.3, p. 751-754.

US Department of Homeland Security, FEMA. 2007. National Flood Insurance Program. Code of Federal Regulations, Title 44, Section 60.3.

US Department of Interior Bureau of Reclamation Mid-Pacific Region. October 2011. Emergency Action Plan for Northern California Area Office Facilities.

US Department of Interior Bureau of Reclamation Technical Services Center. 1996. A Probable Maximum Flood Study. Denver, CO.

US Department of Interior, Bureau of Land Management Redding Area Office. 2004 Fire Management Plan.

US Department of Transportation. Emergency Response Guidebook. 2012.

Weatherspoon, C.P., Skinner, C.N. 1996. Landscape-level strategies for forest fuel management. In: Sierra Nevada Ecosystem Project: final report to Congress, II: Assessments, scientific basis for management options, vol. II: Assessments and scientific basis for management options. Centers for Water and Wildland Resources, University of California, Davis, Water Resources Center Report No. 37, p. 1471-1492.

Westerling, Bryant. 2006. Climate change and wildfire in California. Climate Change 87(0): 231-249.