CHAPTER 2
Comments on the Draft EIR

2.1 Introduction

This chapter includes comments on the Draft EIR received during the public comment period (from November 19, 2012 to January 11, 2013).

2.2 Summary of Comment Letters

The public agencies, organizations, and individuals that submitted comments on the Draft EIR are listed below in Table 2-1. As shown in the table, each comment letter has been designated by a specific letter and number that will be used to refer to particular comments and responses. Comment letters are reproduced in Section 2.3 below and are identified by the number code shown in the table below.

TABLE 2-1
PERSONS AND AGENCIES COMMENTING ON THE DRAFT EIR

Commenter	Letter/Email Date	Letter/Email Code
Public Agencies (A)		
Federal Agencies		
United States Department of Navy – NAVFACSW	December 4, 2012	A1
United States Department of Agriculture – Forest Service	January 10, 2013	A2
State Agencies		
California Department of Forestry and Fire Protection	November 21, 2012	A3
California Department of Transportation	January 4, 2013	A4
California Department of Fish and Wildlife	January 11, 2013	A5
Local Agencies		
Beckwourth Fire District (Chief McCaffrey)	November 20, 2012	A6
Plumas Local Agency Formation Commission	December 8, 2012	A7
Plumas County Public Works Department	January 11, 2013	A8
Individuals and Organizations (I)		
Heather Kingdon (email)	November 28, 2013	I1
Todd and Terri Dabney-Anderson	November 29, 2013	I2
Richard Floch, Richard Floch and Associates	December 3, 2012	I3
George Terhune	December 13, 2012	I4
Larry A. Fites	December 19, 2012	I5
Mark Nicholson, Lake Almanor Associates, LP	January 2, 2013	I6

TABLE 2-1
PERSONS AND AGENCIES COMMENTING ON THE DRAFT EIR

Commenter	Letter/Email Date	Letter/Email Code
Todd and Terri Dabney-Anderson	January 4, 2013	I7
Stevee Duber, High Sierra Rural Alliance	January 7, 2013	I8
Harry G. Reeves, Plumas Audubon Society	January 7, 2013	I9
Patricia A. Wormington	January 7, 2013	I10
Alicia Knadler	January 10, 2013	I11
Jack McLaughlin	January 10, 2013	I12
Daniel Salvatore	January 10, 2013	I13
Centella Tucker	January 10, 2013	I14
Carol Viscarra, Indian Valley Citizens for Private Property Rights	January 10, 2013	I15
Sierra Nevada Alliance	January 11, 2013	I16
Warren and Kristine Gorbet	January 11, 2013	I17
Heather Kingdon	January 11, 2013	I18
Steve Lindberg, Plumas-Sierra Bicycle Club	January 11, 2013	I19
Cedric Twight, Sierra Pacific Industries	January 11, 2013	I20
Maria (Mia) Van Fleet	January 11, 2013	I21
Joyce Wangsgard	January 11, 2013	I22
Jason Moghaddas	January 14, 2013	I23

Response to Comments

Each of the comment letters identified above in Table 2-1 are provided on the following pages, with individual responses to each of the comment letters provided in Chapter 3 "Responses to Comments on the Draft EIR". The content of each letter has been divided into individual comments. To assist in referencing these comments and providing a link to the responses (included in Chapter 3), each comment letter has been assigned a letter and number combination (i.e. A1, A2, etc.) and each individual comment within the letter a corresponding number (i.e. A1-1, A1-2, etc.). Letters received from public agencies have been organized alphabetically and identified by the letter "A", followed by a number. For example, the first agency letter (United States Department of Navy – NAVFACSW) is identified as "A1", the second agency letter (United States Department of Agriculture – Forest Service) as "A2", and so forth. Letters from individuals have been assigned the letter "I". This category follows the same numbering assignment as described previously (I1, I2, I3, etc.). The responses provided in Chapter 3 of this Final EIR are organized in a similar fashion.

Where changes to the Draft EIR text result from these responses to comments, those changes are presented in Chapter 4 "Minor Revisions to the Draft EIR" of this document, with changes shown by underlining new text (e.g., <u>new text</u>) and striking out text to be deleted (e.g., ~~deleted text~~). Comments which present opinions about the project unrelated to environmental issues or which raise issues not directly related either to the substance of the Draft EIR or to environmental issues are noted without a detailed response.

Public Hearing Comments

A public/agency hearing was held on December 12, 2012 to review the proposed project and obtain comments on the Draft EIR. Attendees that provided oral/written comments included those individuals identified above in Table 2-1. Submitted comments are similar to those identified in the various comment letters that follow, with responses provided in Chapter 3 of this Final EIR.

2.3 Comments

Comments received on the Draft EIR are presented on the following pages. Each letter is presented in its original format and listed with a letter and number to identify individual comments. Responses to comments are provided in Chapter 3.

From:	Wilson, Randy
To:	Peacher, Kimberly N CIV NAVFAC SW, ESWD
Cc:	Hulse, David S CIV NAVFAC SW; Coleen Shade; Settlemire, Craig; Mansell, Steve; Cortez, Liz; Ray Weiss; Herrin, Becky
Subject:	RE: update on EIR
Date:	Tuesday, December 04, 2012 7:16:10 AM

Kimberly

Thank you for commenting. Your comment will be forwarded to the Consulting Team who will develop a response to your comment in the Final EIR.

Randy

-----Original Message-----
From: Peacher, Kimberly N CIV NAVFAC SW, ESWD [mailto:kimberly.peacher@navy.mil]
Sent: Monday, December 03, 2012 2:44 PM
To: Wilson, Randy
Cc: Hulse, David S CIV NAVFAC SW
Subject: RE: update on EIR

Hello Randy:

We have reviewed the Draft Environmental Impact Report (DEIR) for the General Plan Update for consistency with the proposed General Plan Land Use Element update relative to planning for compatible land uses within Military Operating Areas (MOAs) (Pages 36, 53, and 63 of the Land Use Element and pages 140 of the Safety Element of Draft General Plan Amendment). A1-1

While the DEIR mentions the need to coordinate and plan to avoid incompatible land uses, the DEIR does not specifically address compatible land uses within the MOAs. Therefore, we suggest that the Final Draft Environmental Impact Statement clarify that the County needs to consider the impact of new development within the MOAs and provide the map depicting the MOAs in Plumas County as presented to the Planning Commission (attached Military OpArea).

These revisions would also support the California Government Code SB 1468 which calls for local jurisdictions to assess impacts of development on military readiness near military installations and under military training routes or restricted airspace, and to incorporate methods to assess these impacts into their General Plans.

In addition, we have yet to see the map that will be in the Appendix (didn't see Appendix online) nor do I see any sign of the figure in the Table of Contents. Attached is the map we have produced. When will the draft map be incorporated for review?

Thank you for the opportunity to review the DEIR and please feel free to contact us if you have any questions or additional comments.

V/R,
Kimberly N. Peacher
Intergovernmental Planner
NAVFACSW Intergovernmental Branch AM-3
1220 Pacific Hwy, San Diego, CA 92132
DSN 522-1187 COM 619-532-1187
kimberly.peacher@navy.mil

-----Original Message-----
From: Wilson, Randy [mailto:RandyWilson@countyofplumas.com]
Sent: Monday, December 03, 2012 12:15

To: Peacher, Kimberly N CIV NAVFAC SW, ESWD
Subject: RE: update on EIR

Hi Kim

The DEIR is out. I have been busy and have ment to email you. You can find a copy on the county website. The comment period ends around Jan 3th. I am out of the office today-doc appointment and back tomorrow. We can sent a cd. Randy

_____
From: Peacher, Kimberly N CIV NAVFAC SW, ESWD [kimberly.peacher@navy.mil]
Sent: Monday, December 03, 2012 12:02 PM
To: Wilson, Randy
Subject: update on EIR

Hello,

I wanted to check in and see if you had any good news about the draft EIR. We are shooting to come up in mid January. Do you think it will be ready by then? If so, are there any dates in particular that work for you?

Thank you.

V/R,
Kimberly N. Peacher
Intergovernmental Planner
NAVFACSW Intergovernmental Branch AM-3
1220 Pacific Hwy, San Diego, CA 92132
DSN 522-1187 COM 619-532-1187
kimberly.peacher@navy.mil

United States Department of Agriculture

Lassen National Forest
2550 Riverside Drive
Susanville, CA. 96126
(530) 257-2151

Tahoe National Forest
631 Coyote Street
P.O. Box 6003
Nevada City, CA. 95959
(530) 256-4531

Plumas National Forest
159 Lawrence Street
P.O. Box 11500
Quincy, CA 95971-6025
(530) 283-2050 (Voice)

File Code: 1560

Date: January 10, 2013

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PC Planning + Building

Randy Wilson
555 Main St.
Quincy, CA 95971

Subject: Comments on 2035 Plumas County General Plan Update - Draft Environmental Impact Report (DEIR)

To: Randy Wilson, Planning Director, Plumas County

Thank you for inviting the USDA-Forest Service (USFS) to participate in your planning process for the Plumas County General Plan Update and DEIR. The Forest Service has had a representative involved since 2009. In addition, District Rangers served as "agency liaisons" to the five Supervisorial District working groups, communicating the Agency's interests and policies as an adjacent jurisdiction. A2-1

We have reviewed the Plumas County DEIR and provide the following comments. By definition, a General Plan is a comprehensive long-range planning document that serves as a roadmap for future growth (development). One of the goals of the County General Plan Update is to align the County with Federal and State planning processes. We support this goal and have shared information with the County, investing in the success of the Plumas County General Plan for the 2035 planning horizon. A2-2

The Forest Service (Lassen, Plumas, and Tahoe National Forests) has reviewed this DEIR with respect to potential impacts to surrounding National Forest System (NFS) lands resulting from the growth-induced impacts under the proposed project. Approximately 76 % of Plumas County land is managed by the USFS. Public (NFS) lands will be affected by policies that guide future land and socio-economic development flowing from the General Plan.

The Forest Land and Resource Management Plans (LRMPs), as amended, for the three National Forests provide direction and guidance for management of NFS lands. The purpose is to guide efficient use and protection of National Forest resources, fulfill legislative requirements, and balance local, regional, and national needs. Our interests in the proposed project, and any

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alternatives analyzed, as stated in our response to the NOP on February 8, 2012 include the following. A2-2 cont.

The DEIR summarizes comment letters received during the NOP scoping process in Table 1-2 and elsewhere. The commenter is identified throughout the document as the Plumas National Forest, but the commenter is actually all three National Forests with adjacent jurisdiction to Plumas County (Lassen, Plumas and Tahoe National Forests).

The proposed project considers land use patterns that direct new development (residential, commercial, industrial, and public uses) to existing community core areas and transportation routes. This will support future economic growth in the County and facilitate the efficient provision of new infrastructure and public services in and around existing services, versus more widely distributed growth. Public safety concerns (wildland fires, flooding, and landslides) were key issues addressed by the County in this DEIR when planning the location and intensity of future development. The USFS is supportive of the general framework of the proposed project, as it would reduce potential impacts to surrounding NFS lands (natural resources, visual character, aesthetic resources, open space, air quality, noise sources, noxious weeds, and cultural history), while protecting private property rights.

The proposed project would also discourage intensive development in designated high fire-prone areas, which the USFS supports. The very high fire hazard throughout many County areas makes them unsafe for development and occupancy unless strong fire safety measures are taken. Even where organized protection does exist (fire-fighting personnel and equipment), fire suppression may be hampered by lack of water, rugged terrain, poor access, and delayed response times. Public safety concerns associated with adequate fire protection (as well as emergency evacuation) are a primary safety concern as the risk of large wildfires rises. Structural fire protection in Plumas County is provided by 19 local fire protection districts (the majority of which are staffed by volunteers). Through a cooperative agreement between Cal Fire and the USFS, the three National Forests have wildfire protection responsibilities for vegetation fires on private lands for a majority of the County, as well as wildland fires on the surrounding NFS lands.

The proposed project is designed to provide protection to watersheds (including wetlands and riparian areas) and wildlife habitat (including concerns for species habitat reduction and fragmentation) by encouraging residential, commercial, and industrial development within existing communities and services (water, sewer, fire protection, flood control, power, telephone, road access, law enforcement, and medical response) and by seeking to reserve commercially viable agriculture and forest lands from other uses. The proposed project preserves the larger watershed area to conserve limited water supplies for current and projected future uses, including urban, rural, and agricultural. The proposed project ensures development accounts for physical constraints and the natural hazards of the land.

A concern for the Forest Service is the creation of additional impervious surfaces and concern for the total impervious surface in a watershed, reduced infiltration capacity associated with such surfaces and the resultant concern for the storm drainage system to significantly alter runoff and erosion and damaging watershed processes on surrounding NFS lands. The proposed project could result in the construction of facilities within areas that are subject to flooding, which could redirect or impede flood flows. This could result in interference with existing flood flows. Such A2-3

effects could be detrimental to existing or proposed uses, where flooding does not presently occur. In the DEIR, impact 4.6-7 shows the resultant level of significance as "less than significant". Stormwater drainage concerns were addressed by avoiding increases in off-site stormwater flows, minimizing paved surfaces, and construction of sedimentation basins. The Forest Service would like to see language in the General Plan for collaborative resource management among land management agencies (General Plan Goal: COS 7.1.3) during discretionary project planning. A2-3

The proposed project assumes an increasing population supported by growth in the tourism economy tied to Plumas County's status as a tourism and recreation destination, among other industry sectors. The Almanor (Dyer Mountain project), Mohawk Valley, and Sierra Valley geographic areas are assumed to have the majority of new population growth (associated with new housing growth) by 2035. The proposed project could result in increased urban development, resulting in increased demands on existing facilities in parks, trails, recreation areas, and other open space areas. New and expanded County services could be required. The projected population growth could also lead to increased demand for access to surrounding NFS lands and recreation areas and a need to review Federal land management objectives and capacity in collaboration with the County early in future development proposals (General Plan Goal: COS 7.1.3). A2-4

The proposed project encourages a climate change strategy appropriate for the County's rural character and the continued support for open space and healthy forest practices that contribute to carbon sequestration and biomass energy production. The proposed project identifies ways the County or communities can reduce transportation-related greenhouse gas (GHG) emissions and addresses adaptation to the potential effects of climate change, such as directing more compact patterns of development which encourage and facilitate the placement of employment in close proximity to housing, as well as ways to encourage alternative forms of transportation. These are consistent with climate change policy on NFS lands. A2-5

The Land Use Element of the General Plan also guides coordination and planning with other jurisdictions, such as the Forest Service, to address land use compatibility concerns. Policies in the General Plan promote community cohesiveness by encouraging the placement of compatible land uses, by developing environmentally sensitive land uses, and by discouraging conversion of forest lands. Land use coordination and compatibility considerations are a part of NFS planning as well. A2-6

The proposed project designates certain lands as "Agricultural Buffer" (Section 9-4.303 of the Plumas County Code) to protect existing agricultural uses from incompatible land use conflicts. A second concern of the USFS is the need to address specific population growth and potential conflicts with management of surrounding NFS lands (relative to encroachment, right-of-way, future utility or roads, and other considerations), and the need for a "NFS Buffer" to maintain public benefits (access, etc.). The concern is development that results in the loss of forest land or conversion of forest land to non-forest use on the surrounding NFS lands. Page 4.10-7 of the DEIS says "the proposed use will not significantly reduce or destroy the buffering effect of existing large parcel sizes adjoining timber production lands". In the DEIR (Impact 4.10-2), the significance conclusion states that "policies have been developed to avoid or minimize adverse impacts to the maximum extent practicable; however, the possible conversion of some forest lands adjacent to development would be an irreversible consequence associated with A2-7

implementation of actions authorized under the proposed project, no mitigation is available, and the determination is 'a significant and unavoidable' impact". We are requesting the inclusion of a policy statement that would require agency coordination in the permitting process for discretionary projects adjacent to NFS lands. A2-7 cont.

The proposed project emphasizes policies that support the long-term preservation of agriculture and timber in Plumas County and ensures that development pressures are avoided to the maximum extent feasible. The proposed project calls for the continued recognition of agriculture and timber lands as a productive use of resource lands, for the continuation of a diversified economy, for the maintenance of the County's rural character, for the protection of scenic, natural, and recreational resources, and as a defining characteristic of the County's quality of life. Page 4.10-7 of the DEIR says "...support the maintenance of a healthy and productive forest by limiting the encroachment of incompatible uses and encourage the development of new markets and services based on forest resources ..." A2-8

The County cannot prohibit new development, which would be the only way to reduce important agricultural/forest land conversion impacts to a "less than significant" level in the analysis in the DEIR. This could be a "significant and unavoidable" impact of population growth. The proposed project strives for orderly development, while discouraging premature development of agricultural/forest lands. Conversion could lead to land use conflicts between urban land uses (complaints related to dust, noise, etc.) and agricultural/forest activities, as well as competition for limited water supplies. This is in the best interest of the surrounding NFS lands as well. The Forest Service acknowledges the County's General Plan Goal (COS 7.1.3) to promote collaborative resource management among the land management agencies and to maintain strong working relationships with the Forest Service.

The proposed project would result in land use patterns that accommodate the most recent population growth, housing, and employment projections in an orderly manner that minimize environmental impacts as feasible while meeting the County's obligations to provide housing for all income levels. The proposed project is based on land use concepts of focused growth in/near existing communities and preservation of natural areas that would direct future growth away from open space and scenic areas which would be most deleteriously impacted by urban development. The proposed project minimizes public costs of infrastructure and services and correlates their timing with new development. The proposed project emphasizes compatibility between land uses and discourages the introduction of incompatible uses. The proposed policies also allow for the implementation of land use planning tools such as buffers to reduce the impacts between urban and agricultural/forestry land uses where these edges do occur. The USFS supports these policies.

The primary difference between alternatives is how future growth is managed under the alternatives. The proposed project considers existing constraints (infrastructure and environmental) to development and concentrates population growth within established growth areas (communities) where infrastructure and services are available. While the proposed new growth is considered relatively small for the 2035 planning horizon, the concept of orderly growth will help future land use planning decisions efficiently expand from existing public service and utility infrastructures. The new development is well-connected and compatible with surrounding uses. Any intensification of rural areas away from existing communities by development of new towns or large developments would put additional pressures on surrounding A2-9

NFS lands. Based on the community input provided at numerous public workshops on the Plumas County General Plan Update, the Forest Service supports the proposed project, understanding that the decision-making authority resides with the County Board of Supervisors. A2-9 cont.

The General Plan Update reflects the current values and vision of the community and will serve to guide county officials and decision-makers well for the planning horizon. The General Plan is designed to preserve the existing rural character of the County through the preservation of open space and agricultural/forestry land uses. The proposed project retains the important environmental and socio/economic qualities of Plumas County. A2-10

Thank you for inviting the Forest Service to participate in the County's General Plan Update process. We have been engaged in working group meetings, public workshops, and County Planning Commission Meetings from 2009-2013. We appreciate the opportunity to comment and believe the County has an interest in maintaining a strong working relationship with the USFS and in working together in the years ahead. A2-11

Sincerely,

/s/ *Earl W. Ford*	/s/ *Jerry Bird*	/s/ *Tom Quinn*
EARL W. FORD Forest Supervisor Plumas National Forest	JERRY BIRD Forest Supervisor Lassen National Forest Service	TOM QUINN Forest Supervisor Tahoe National Forest

cc: Earl Ford
Tom Quinn
Jerry Bird

State of California — The Natural Resources Agency

Memorandum

To: Bill Holmes, Chief
Northern Region
Department of Forestry and Fire Protection

Date: November 21, 2012
R13

Attention: Environmental Coordinator
Lassen-Modoc Unit

Telephone: (916) 657-0300

RECEIVED
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From: Department of Forestry and Fire Protection
Daniel G. Foster, Senior Environmental Planner
Environmental Protection

Subject: Environmental Document Review

Project Name: 2035 Plumas County General Plan Update
SCH #: 2012112016
Document Type: Draft Environmental Impact Report (DEIR)

Potential Area(s) of Concern: Fire Protection?;
Other:
MANDATED DUE DATE: 1/2/2012 = Extended to Jan. 18, 2013

The above referenced environmental document was submitted to State Headquarters, Environmental Protection for review under the California Environmental Quality Act (CEQA) or the National Environmental Policy Act (NEPA). The proposed project, located within your Unit/Program Area, may have an impact upon the Department's fire protection and/or natural resource protection and management responsibilities or require the Department's permits or approval. Your determination of the appropriate level of CAL FIRE involvement with this project is needed. Please review the attached document and address your comments, if any, **to the lead agency** prior to the due date. Your input at this time can be of great value in shaping the project. If your Unit's Environmental Coordinator is not available, please pass on to another staff member in order to meet the mandated deadline.

Please submit comments directly to the lead agency before the mandated due date with copy to the State Clearinghouse (P.O. Box 3044, Sacramento, CA 95812-3044).

☒ No Comment - explain briefly on the lines below.

Our comments and recommendations were provided during the draft General Plan Update on October 13, 2011. We have attached a copy for your reference and consideration. A3-1

Name and Title of Reviewer: Jeffery B Young
Phone: (530) 310-2200 Email: Jeff.Young@fire.ca.gov
Note: Please complete this form and return it, with a copy of any comments, for CAL FIRE's records to: Ken Nehoda or Dan Foster, Environmental Protection, P.O. Box 944246, Sacramento CA 94244-2460.

Plumas County General Plan

Recommendations

October 13, 2011

From

CAL FIRE Lassen Modoc Plumas Unit

DEPARTMENT OF FORESTRY AND FIRE PROTECTION
697-345 Highway 36
Susanville, California 96130
(530) 257-4171
Website: www.fire.ca.gov/LMU

October 13, 2011

Mr. Randy Wilson, Senior Planner
Plumas County Planning and Building Services
555 Main Street
Quincy, California 95971

Subject: Plumas County Draft General Plan.

Attached are comments and recommendations by the local CAL FIRE Unit for the Plumas County Draft General Plan update.

Purpose and Background: The California State Board of Forestry and Fire Protection (BOF) is required to make recommendations to the fire safety element of general plan updates in accordance with Government Code Section 65302.5. The review and recommendations apply to those general plans with State Responsibility Areas (SRA) as defined in the Public Resources Code Section 4125 and areas designated as Very High Fire Hazard Severity Zones (VHFHSZ) by Government Code Sections 51175 - 51179.

Methodology for Review and Recommendations: The BOF has established a standardized method to review the fire safety element of general plans. The methodology includes 1) examining the general plan for inclusion of factors that are important for mitigation of fire hazards and risks, and 2) making recommendations related to these factors. The evaluation factors and recommendations were developed using CAL FIRE technical documents and input from local fire departments. Each entity should evaluate their general plan using the factors and include the appropriate recommendation as a part of the general plan.

Questions regarding these recommendations should be addressed to Division Chief Jeff Young at (530) 257-2201.

Sincerely,

B. Lutts

Brad Lutts, Chief
Lassen Modoc Plumas Unit

General Plan Safety Element Recommendations

Wildfire Protection Planning

General Plan References and Incorporates County and Unit Fire Plans:

Recommendation: Identify, reference or create (if necessary) a fire plan for the geographic scope of the General Plan. General Plan (GP) should incorporate the general concepts and standards from any county fire plan, fire protection agency (federal or state) fire plan, and local hazard mitigation plan, including the Lassen Modoc Plumas Unit Fire Plan..

Recommendation: Ensure fire plans incorporated by reference into the GP contain evaluations of fire hazards, assessment of assets at risk, prioritization of hazard mitigation actions, and implementation and monitoring components.

Land Use Planning:

Goals and policies include mitigation of fire hazard of fire hazard for future development.

Recommendation: Establish goals and policies for specific ordinances addressing evacuation and emergency vehicle access; water supplies and fire flow; fuel modification for defensible space; and home addressing and signing.

Recommendation: Develop fire safe development codes used as standards for fire protection for new development in State Responsibility Area (SRA) within the entity's jurisdiction that meet or exceed statewide standards in 14 California Code of Regulations Section 1270 et seq.

Recommendation: Adopt, and have certified by the BOF, local fire safe ordinances which meet or exceed standards in 14 CCR § 1270 for State Responsibility Area.

Disclosure of wildland urban interface hazards including Fire Hazard Severity Zones designations and Communities at Risk designations:

Recommendation: Specify whether the entity has a Very High Fire Hazard Severity Zones (VHFHSZ) designation pursuant GC 51175 and include a map of the zones that clearly indicates any area designated VHFHSZ.

Recommendation: Adopt CAL FIRE recommended Fire Hazard Severity Zones including model ordinances developed by the Office of the State Fire Marshal for establishing VHFHSZ areas.

Recommendation: Identify and disclose information on communities listed as "Communities at Risk".

Recommendation: The Plumas County Wildfire Protection Plan (CWPP) needs to be included into the general plan.

Housing/Structures and Neighborhoods:

Incorporation of current fire safe building codes.

Recommendation: Adopt building codes for new development in State Responsibility Area or incorporated areas with VHFHSZ that are established by the Office of the State Fire Marshal in Title 19 and Title 24 CCR, referred to as the "Wildland Urban Interface Building Codes".

Identification and actions for substandard fire safe housing and neighborhoods relative to fire hazard area.

Recommendation: Identify and map existing housing structures that do not conform to contemporary fire standards in terms of building materials, perimeter access, and vegetative hazards in VHFHSZ or SRA by fire hazard zone designation.

Recommendation: Identify plans and actions to improve substandard housing structures and neighborhoods. Plans and actions should include structural rehabilitation, occupancy reduction, demolition, reconstruction, and neighborhood – wide fuels hazard reduction projects, community education, and other community based solutions.

Recommendation: Identify plans and actions for existing residential structures and neighborhoods, and particularly substandard residential structures and neighborhoods, to be improved to meet current fire safe ordinances pertaining to access, water flow, signing, and vegetation clearing.

Consideration of occupancy category effects on wildfire protection

Recommendation: Ensure risks to uniquely occupied structures, such as seasonally occupied homes, multiple dwelling structures, or other structures with unique occupancy characteristics, are considered for appropriate and unique wildfire protection needs.

Fire engineering features for structures in VHFHSZ.

Recommendation: Ensure new development proposals contain specific fire protection plans, actions, and codes for fire engineering features for structures in VHFHSZ. Examples include codes requiring automatic sprinklers in VHFHSZ.

Conservation and Open Space/Agriculture and Forestry:

Identification of critical natural resource values relative to fire hazard areas.

Recommendation: Identify critical natural resources and other "open space" values within the geographic scope of the GP. Determine maximum acceptable wildfire size, fire prevention plans, emergency response plans and initial attack suppression success rates for protection of these areas and values.

Inclusion of resource management activities to enhance protection of open space and natural resource values.

Recommendation: Forest management must take into consideration resource values other than sound silvicultural practices. Therefore, the second sentence in the first paragraph headed "Forest Resources" should be revised to read: "Forest management is based on sound silvicultural practices, while giving consideration to the public's need for watershed protection, fisheries and wildlife, aesthetics, and recreational opportunities alike in this and future generations."

Recommendation: CEQA Guidelines (14 CCR 15382) defines "Significant effect on the environment" as a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance." The removal of trees to transform timberland to a non-timber growing use (conversion) has an effect on the physical environment and should be included as a disturbance to timber resources. Therefore, the first sentence of the fifth paragraph should read: "Disturbances affecting timber resources within the County include wildfires, bark beetles, conversions of timberland to a non-timber land use, and the exacerbating effect of climate change."

Recommendation: The last sentence of the sixth paragraph states that "Given the number of Federal and State regulations affecting the management of forests, an emphasis on providing landowners with assistance in achieving timber management goals is needed."

Professional Foresters Law can be found in Public Resources Code (PRC) 750. PRC 753 defines "Forestry," as the science and practice of managing forested landscapes and the treatment of the forest cover in general, and includes, among other things, the application of scientific knowledge and forestry principles in the fields of fuels management and forest protection, timber growing and utilization, forest inventories, forest economics, forest valuation and finance, and the evaluation and mitigation of impacts from forestry activities on watershed and scenic values, to achieve the purposes of this article. The practice of forestry applies only to those activities undertaken on forested landscapes. The professions specified in Section 772 are not practicing forestry when mitigating or recommending mitigation of impacts from previous forestry activities on related watershed or ecological values within their area of professional expertise or when recommending those mitigations for proposed timber operations. However, public and private foresters are required to be licensed pursuant to this article when making evaluations and determinations of the appropriate overall combination of mitigations of impacts from forestry activities necessary to protect all forest resources.

It is important to note that large timberland ownerships in Plumas County such as Sierra Pacific Industries, Soper Company, and Collins Company, to name a few, are managed by

California Registered Professional Foresters (RPF). Smaller timberland owners typically secure the services of local consulting RPFs. Pursuant to PRC 753 foresters are required to be licensed when making evaluations and determinations of the appropriate overall combination of mitigations of impacts from forestry activities necessary to protect all forest resources, i.e. providing landowners with assistance in achieving timber management goals.

The last sentence of the sixth paragraph is vague and ambiguous. How does Plumas County plan to emphasize the importance of providing landowners with assistance in achieving timber management goals? This sentence should be re-written after much consideration of Professional Foresters Law and its close association with the California Forest Practice Act and Rules. Otherwise, the sentence should be scratched from the text.

Values and Issues

Recommendation: The first sentence in the paragraph headed "Values and Issues" states, "Plumas County's Agriculture and Forestry Element of the General Plan will lead, direct, and guide the sustainable use and management of lands identified as important agriculture and timber resources to the local communities."

What criteria is Plumas County using for deciding what agriculture and timber resource is important? The work 'important' implies that some agriculture and timber resources are unimportant and the General Plan will not lead, direct, and guide the sustainable use and management of lands considered less important. This sentence should be re-written to include all agriculture and timber resource lands in Plumas County.

Recommendation: The work 'date' in the second sentence of the paragraph appears to be a typo and should be deleted from text.

Definitions

Recommendation: The California Forest Practice Act was adopted in 1973, resulting in a comprehensive process where California Department of Forestry and Fire Protection (CAL FIRE) oversees enforcement of California's forest practice regulations. For private lands, CAL FIRE is the lead agency responsible for regulating timber harvesting under the California Forest Practice Rules (FPRs). The purpose of the Forest Practice Rules is to implement the provisions of the Z'berg-Nejedly Forest Practice Act of 1973 in a manner consistent with other laws, including, but not limited to, the Timberland Productivity Act of 1982, the California Environmental Quality Act (CEQA), the Porter Cologne Water Quality Act, and the California Endangered Species Act.

The word "Timberland" as defined in the proposed Plumas County General Plan is "Timberlands include all private lands that are mapped as either Important Timber Resource Areas or Timber Production Zones. These are lands primarily devoted to timber management activities and other compatible uses."

The definition of "Timberland" should be changed so that it is consistent with the definition set forth in Public Resources Code 4526, "Timberland means land, other than land owned by the federal government which is available for, and capable of, growing a crop of trees of any commercial conifer species used to produce lumber and other forest products."

Recommendation: The definition of "Conversion" as set forth in the proposed Plumas County General Plan is "To change from one use type to another. As in: to convert important agricultural lands to secondary suburban residential use."

Pertaining to Timberland Production Zone (TPZ) lands, conversion is considered the rezoning of TPZ lands, but within non-TPZ timberlands conversion is typically the transforming of timberland to a non-timber growing use. Since there is a distinction between converting TPZ and non-TPZ lands the following definition should be added to the Plumas County General Plan definitions:

Timberland Conversion:

1) Within non-Timberland Production Zone (TPZ) timberland, transforming timberland to a non-timber growing use through timber operations where future timber harvests will be prevented or infeasible because of land occupancy and activities thereon; or

2) Within TPZ lands, the immediate rezoning of TPZ lands, whether timber operations are involved or not.

Recommendation:

Public Resources Code 4527 defines "Timber Operations" as:

1) "Timber operations" means the cutting or removal, or both, of timber or other solid wood forest products, from timberlands for commercial purposes.

2) "Commercial purposes" includes (A) the cutting or removal of trees that are processed into logs, lumber, or other wood products and offered for sale, barter, exchange, or trade, or (B) the cutting or removal of trees or other forest products during the conversion of timberlands to land uses other than the growing of timber, including, but not limited to, residential or commercial developments, production of other agricultural crops, recreational developments, water development projects, and transportation projects.

The definition of "Timber Operations" should be added to the Plumas County General Plan definitions because it is relevant to forest management in the County. Regardless if on TPZ or non-TPZ land, it is important to recognize that timber operations are conducted when commercial tree species are cut to produce a commercial forest product, or to convert forestland to uses other than growing trees.

Plans and Planning

Recommendation: The heading "Plans and Planning" provides a bulleted list of local and regional plans, programs, and organizations that affect or can contribute to the implementation of the Agriculture and Forestry Element.

Pertaining to timber operations on lands considered timberland, the Forest Practice Rules constitute the minimum standards. Nothing contained in the Forest Practice Rules shall be considered as abrogating the provisions of any ordinance, rule or regulation of any local jurisdiction providing such ordinance, rule regulation or general plan element is equal to or more stringent than these minimum standards. The board of Forestry may certify local ordinances as equaling or http://www.co.el-dorado.ca.us/building/FSArtical1.htm-top#top exceeding these regulations when they provide the same practical effect.

That being said, the California Forest Practice Rules (Title 14 California Code of Regulations Chapter 4, 4.5, and 10) should be added to the list that can affect or contribute to the implementation of the Agriculture and Forestry Element.

Goals

Goal Commercial Timber Production Lands

Recommendation: The last sentence under "Implementation Measure" states that "These lands shall be maintained for the purposes of protecting and encouraging the production of timber, other wood products and associated activities." This sentence should be revised to state, "These lands shall be maintained for the purposes of protecting and encouraging the production of timber and other wood products, while giving consideration to the public's need for watershed protection, fisheries and wildlife, aesthetics, and recreational opportunities alike in this and future generations."

Goal Protect Timberlands from Incompatible Uses

Recommendation: Implementation Measure 14iii states that "Lands not contained within either of the above categories which are suitable for timber production as shown on the adopted land use maps." This measure should be revised to state, "Lands not contained within either of the above categories that are available for and capable of, growing a crop of commercial tree species used to produce forest products as shown on the adopted land use maps."

Goal Forestland Management Policies and Coordination

Recommendation: The sentence under the above referenced heading states that Plumas County will, "Support fewer, more effective and lower-cost forest management regulations as a strategy to maintain timber and other wood product production as the primary use of forestlands."

The purpose of the Forest Practice Rules is to implement the provisions of the Z'berg-Nejedly Forest Practice Act of 1973 in a manner consistent with other laws, including but not limited to, the Timberland Productivity Act of 1982, the California Environmental Quality Act (CEQA), the Porter Cologne Water Quality Act, and the California Endangered Species Act.

The goal of these laws are to substantially lessen significant adverse impacts on the environment and to achieve long-term, maximum sustained production of forest products, while protecting soil, air, fish and wildlife, and water resources from unreasonable degradation, and which evaluate and make allowance for values relating to range and forage resources, recreation and aesthetics, and regional economic vitality and employment.

The sentence under Goal 8.10.1 is vague and ambiguous for it does not identify the regulations that would be more effective and provide lower forest management costs. Pursuant to Public Resources Code 4516.5 individual counties may recommend that the California Board of Forestry adopt additional rules and regulations for the content of timber harvesting plans and the conduct of timber operations to take account of local needs.

Rules may be adopted if the board finds the recommended rules and regulations are consistent with the intent and purposes of Title 14 California Code of Regulations Chapters 4,4.5 and 10, and necessary to protect the needs and conditions of the county recommending them. The rules and regulations, if adopted by the board, shall apply only to the conduct of timber operations within the recommending county and shall be enforced and implemented by the department in the same manner as other rules and regulations adopted by the board.

The Forest Practice Rules are comprehensive, and after having an understanding of the repercussions of advocating forest practice rule changes, the sentence should be re-written to reflect the goal of environmental protection while allowing for local economic vitality and employment.

Goal Development Application Findings for Timber Resource Lands

Recommendation: The first sentence states that "The County shall evaluate discretionary development applications involving Timber Resource lands, Timber Production Zone (TPZ) lands and adjoining lands." The sentence should be revised to read, "The County shall evaluate discretionary development applications involving timberland, including but not limited to Timber Production Zone (TPZ) land, non-TPZ land, and adjoining lands."

Since 'Timber Resource land' is not defined it is assumed that it is synonymous with timberland as defined in Public Resources Code 4526. Therefore, for the sake of consistency with state law, 'Timber Resource land' should be excluded from text.

Recommendation: Establish goals and policies for incorporating systematic fire protection improvements for open space. Specifics policies should address facilitation of safe fire suppression tactics, standards for adequate access for firefighting, fire mitigation planning with agencies/private landowners managing open space adjacent to the GP area, water sources for fire suppression, and other fire prevention and suppression needs.

Urban forestry plans relative to fire protection:

Circulation and Access:

Adequacy of existing and future transportation system to incorporate fire infrastructure elements.

Recommendation: Establish goals and policies for proposed and existing transportation systems to facilitate fire infrastructure elements such as turnouts, helispots and safety zones.

Adequate access to high hazard wildland/open space areas.

Recommendation: Establish goals and policies should be established to delineate residential evacuation routes and evacuation plans in high or very high fire hazard residential areas.

Defensible Space

Geographic specific fire risk reduction mitigation measures using fuel modification.

Recommendation: Include policies and recommendations that incorporate fire safe buffers and greenbelts as part of the development planning. Ensure that land uses designated near high or very fire hazard severity zones are compatible with wildland fire protection strategies/capabilities.

Fuel Modification around homes.

Recommendation: Establish an ordinance countywide for vegetation fire hazard reduction around structures that meet or exceed the Board of Forestry and Fire Protection's Defensible Space Guidelines, (http://www.bof.fire.ca.gov/pdfs/Copyof4291.finalguidelines92906.pdf) for SRA.

Fire suppression defense zones.

Recommendation: Establish goals and policies that create wildfire defense zones for emergency services including fuel breaks, back fire areas, or other staging area that support safe fire suppression activities.

Recommendation: Establish goals and policies that identify structures (or other critical/valuable assets) that have adequate fuel modification or other fire safe features that provide adequate fire fighter safety when tactics call for protection of a specific asset (i.e. which houses are safe to protect).

Public Health and Safety:

Map/description of existing emergency service facilities and areas lacking services:

Recommendation: Include descriptions of emergency services including available equipment, personnel, and maps of facilities.

Recommendation: Initiate studies and analyses to identify appropriate staffing levels, equipment needs and fire flows, commensurate with the current and projected emergency response environment.

Assessment and projection of future emergency service needs:

Recommendation: Ensure new development includes appropriate facilities, equipment, personnel and capacity to assist and support wildfire suppression emergency service needs. Future emergency service needs should be:

Established consistent with state or national standards.

Develop based on criteria for determining suppression resource allocation that includes elements such as identified values and assets at risk, ignition density, vegetation type and condition, as well as local weather and topography.

- Local Agency Formation municipal services reviews for evaluating level of service, response times, equipments condition levels and other relevant emergency service information.
- A dedicated employee, (i.e., County Fire Warden) should handle fire protection issues within the county and administer the development and enforcement of fire protection laws for the county.
- Incorporate Fire Hazard Severity Zone map into the general plan, in order to identify limitations in fire hazard areas.
- Adequacy of training

Recommendation: Establish goals and policies for emergency service training that meets or exceeds state or national standards.

Inter-fire service coordination preparedness/mutual aid and multi-jurisdictional fire service agreements.

Recommendation: Adopt the Standardized Emergency Management Systems for responding to large scale disasters requiring a multi-agency response. Ensure and review mutual aid/automatic aid and other cooperative agreements with adjoining emergency service providers.

Post Fire Safety, Recovery and Maintenance:

The post fire recommendations address an opportunity for the community and landowners to re-evaluate land uses and practices that affect future wildfire hazards and risk. They also provide for immediate post-fire life and safety considerations to mitigate potential losses to life, human assets and critical natural resources.

Revaluate hazard conditions and provide for future fire safe conditions.

Recommendation: Incorporate goals and policies that provide for reassessment of fire hazards following wildfire events. Adjust fire prevention and suppression needs commensurate for both short and long term fire protection needs.

Recommendation: Develop burn area recovery plans that incorporate strategic fire safe measures developed during the fire suppression, such as access roads, fire lines, safety zones, and fuel breaks, and helispots.

Restore sustainable landscapes and restore functioning ecosystems.

Recommendation: Develop burn area recovery plans, evaluation processes and implementation actions that encourage tree and biomass salvage, reforestation activities, create resilient and sustainable landscapes, and restore functioning ecosystems.

Incorporate wildlife habitat/endangered species consideration.

Recommendation: Establish goals and policies for consideration of wildlife habitat/endangered species into long term fire area recovery and protection plans, including environmental protection agreements such as natural community conservation plans.

Native species reintroduction.

Recommendation: Incorporate native species habitat needs as part of long term fire protection and fire restoration plans.

Evaluation of redevelopment.

Recommendation: In High and Very hazardous area, ensure redevelopment utilizes state of the art fire resistant building and development standards to improve past 'substandard' fire safe conditions.

Long term maintenance of fire hazard reduction mitigation projects.

Recommendation: Provide polices and goals for maintenance of the post-fire-recovery projects, activities, or infrastructure.

Post fire life and safety assessments

Recommendation: Develop frameworks for rapid post-fire assessment and project implementation to minimize flooding, protect water quality, limit sediment flows and reduce other risks on all land ownerships impacted by wildland fire.

Recommendation: Identify flood and landslide vulnerability areas related to post wildfire conditions.

Recommendation: Establish goals and policies that address the intersection of flood/landslide/post fire burn areas into long term public safety protection plans. These should include treatment assessment of fire related flood risk to life, methods to control storm runoff in burn areas, re-vegetation of burn areas, and drainage crossing debris maintenance.

Recommendation: Encourage rapid post-fire assessment, as appropriate, and project implementation to minimize flooding, protect water quality, limit sediment flows and reduce other risks on all land ownerships impacted by wildland fire.

Terrorist and Homeland Security Impacts on Wildfire Protection

These recommendations are included to address fire protection needs related to terrorist acts or other homeland security preparedness and response actions. Both preparedness and incident response can adversely impact fire protection. Adverse effects include substantially decreasing emergency resources' availability, responsiveness and effectiveness by diverting resources, interrupting communications, or restricting emergency access.

Communication channels during incidences

Recommendation: Establish goals and policies consistent with the Governor's Blue Ribbon Fire Commission of 2005 for communications and interoperability. Example goals and policies should address fire personnel capability to communicate effectively across multiple frequency bands and update and expansion of current handheld and mobile radios used on major mutual aid incidents.

Emergency response barriers.

Recommendation: identify goals and policies that address vital access routes that if removed would prevent fire fighter access (bridges, dams, etc). Develop an alternative emergency access plan for these areas.

Prioritizing asset protection from fire with lack of suppression forces

Recommendation: Identify and prioritize protection needs for assets at risk in the absence of response forces.

Recommendation: Establish fire defense strategies (such as fire ignition resistant area) that provide adequate fire protection without dependency on air attack and could serve as survivor safety zones for the public or emergency support personnel.

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY Edmund G. Brown Jr, Governor

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January 4, 2013

IGR/CEQA Review
General Plan Update DEIR
SCH# 2012012016

Mr. Randy Wilson
Plumas County Planning Department
555 Main Street
Quincy, CA 95971

Dear Mr. Wilson:

Thank you for the opportunity to provide comments on the General Plan Update Draft Environmental Impact Report (DEIR).

As stated in the DEIR, "The primary goal of the proposed project is to provide residents of the County with a blueprint for public and private development, and to act as the foundation upon which County leaders will make decisions related to growth and land use." Additionally, the Governor's Office of Planning and Research has said, "The coordination and harmonization of land use and transportation planning and development is a foundation of sustainable development and smart investments." Since the County is updating its blueprint for development, now is the time to ensure that a strategy is in place to address the General Plan's traffic impacts to the state highway system. Unfortunately, the DEIR improperly concludes that mitigation to the state highway system is infeasible and does not take advantage of the opportunity for coordination. A4-1

The DEIR's conclusion that mitigation to the state highway system located inside or outside the County's jurisdiction is infeasible is wrong. There are several options that would allow the County to ensure that direct and indirect traffic impacts, as well as the contribution to cumulative traffic impacts, from the General Plan Update are mitigated to a level of less than significant. For example, the County can negotiate a co-operative agreement with Caltrans where the County agrees to make a fair share payment towards improvements that Caltrans agrees to implement. The County has the opportunity to work with Caltrans and the Plumas County Transportation Commission to determine how the traffic impacts from County growth will be mitigated. Additionally, when projects are initiated, the County or project proponent can apply for an encroachment permit from Caltrans to perform work in the State owned right of way to implement the necessary mitigation. The County's statement that it cannot be certain that the improvements will be built because the impacted facilities are not in its jurisdiction is a misstatement.

The main issue is whether or not there is an obligation to mitigate the recognized project impacts, and to correctly identify the methods – such as conditions of approval, development agreements, and cooperative agreements – that ensure the measures are implemented in a reasonable period of time. The recommended mitigation measures that include the requirements of other agencies, such as Caltrans or Lassen County are fully enforceable through permit conditions, agreements, or other legally-binding instruments under the control of the County. The County has demonstrated that this is feasible mitigation with the approval of the Development Agreement for the Lake Front project which includes developer fees for proportionate share mitigation consistent with the California Environmental Quality Act (CEQA).

Mr. Randy Wilson
Plumas General Plan Update DEIR
SCH# 2012012016
January 4, 2013

We agree with the general plan policy that includes providing a funding mechanism through implementation of a countywide traffic impact fee, and coordination with a regional traffic impact fee. Our position is that the Regional Transportation Plan and other planning studies are an adequate starting point for mitigation discussions until a fee program for the state highways is adopted. With the General Plan Update, the County has the responsibility under CEQA, as well as a great opportunity, to coordinate with Caltrans and the Plumas County Transportation Commission to determine how the traffic impacts from County growth will be mitigated. If the DEIR would adequately identify the impacts, determine the appropriate mitigation, identify the overall costs of the mitigation, and calculate the General Plan's fair-share contribution, then it could be utilized as a basis for a fee program and could eliminate the need for cumulative traffic impact analyzes at the project level. In the interim, all regionally significant projects must individually address their impacts through the CEQA process. A4-1 cont.

The Regional Transportation Plan (RTP) represents Caltrans' and the County's commitment to implement the identified projects and outlines the manner in which these projects will be funded. As growth occurs and projects are proposed the RTP can be amended to include the transportation projects needed to accommodate the planned growth. The lead agencies will need to perform a cumulative analysis and identify the project's fair share contribution through the standard CEQA process. Caltrans or the County will collect the CEQA mitigation funds and will work to identify additional funding sources necessary to construct the highway improvements. Another option available is for the County or the developer to negotiate an agreement on equal mitigation at an alternative location that reduces the project's impacts. Again, the County has not adequately engaged Caltrans to explore the various options.

We also note a similar concern with the conclusion of significant and unavoidable impacts for Impact 4.5-1: Mobile Noise Sources. The significance determination discussion notes uncertainty with the site specific conditions that may occur. However, the County does have certainty that it will assess each case to determine whether there are feasible mitigation measures that will reduce the level of impact. The County can also coordinate with or challenge projects proposed by agencies or entities that could result in unacceptable noise sources to make sure that feasible mitigation measures have been considered and adopted. A4-2

We will continue to work in partnership with the County and the Transportation Commission to mitigate traffic impacts of implementing the general plan and new development. If you have any questions, or if the scope of this project changes, please call me at 225-3369.

Sincerely,

MARCELINO GONZALEZ
Local Development Review
District 2

c: Plumas County Transportation Commission

State of California – The Natural Resources Agency
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EDMUND G. BROWN, Jr. Governor
Charlton H. Bonham, Director

January 11, 2013

Randy Wilson
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Subject: Comments on the 2035 Plumas County General Plan Update Draft Environmental Impact Report/SCH 2012012016

Dear Mr. Wilson:

On November 20, 2012, the Department of Fish and Wildlife (DFW), formerly known as the Department of Fish and Game, received a Draft Environmental Impact Report from the Plumas County Planning Department for the 2035 Plumas County General Plan Update (Project). As a trustee for the State's fish and wildlife resources, the DFW has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants and the habitats necessary to sustain their populations. As a responsible agency, the DFW administers the California Endangered Species Act (CESA) and other provisions of the Fish and Game Code that afford protection to the State's fish and wildlife public trust resources. The DFW offers the following comments and recommendations in our role as both trustee and responsible agency under the California Environmental Quality Act (CEQA). The comments provided are based on our review of the *Plumas County Draft General Plan Project Description for the Draft Environmental Impact Report* (General Plan Update) and the *2035 Plumas County General Plan Update Draft Environmental Impact Report* (DEIR). A5-1

The Project is the update to Plumas County's General Plan. It is a statement of long-range public policy to guide the use of private and public lands within the County. Plumas County includes 1.67 million acres in the northern Sierra Nevada and Southern Cascade Ranges. Elevation is between 1800 and 8380 feet. Approximately 29% of the County's land area, or 482,910 acres, are privately owned.

Overall, the DFW finds that the proposed Project provides sound policy recommendations for the protection of the biological resources under our jurisdiction, and provides clearer policy direction for mitigating impacts to biological resources than the existing General Plan. In particular, the DFW agrees with the Project objective of consolidating all development in and around previously developed areas by directing development to specified Planning Areas. Further construction of dwellings in rural areas removed from Planning Areas should be avoided, as this will only increase impacts to biological resources, including direct disturbance to habitat, habitat fragmentation and degradation, direct disturbance to wildlife and result in an increase in detrimental human-wildlife interactions.

Our comments and recommendations below address mitigating biological resource impacts to a "less than significant" level, memorializing land use designations that are used as mitigation for

impacts to biological resources, developing implementation measures to be tracked as part of mitigation monitoring and reporting, environmental baseline deficiencies, and black bears. A5-1 cont.

Mitigation of Impacts to Biological Resources

Impact 4.11-1: Special Status Species: The DEIR states that the Project could have a "potentially significant" impact on special status species, and that significance is reduced to "less than significant" by altering Conservation and Open Space (COS) Policy 7.2.13 to include the use of biological surveys in addition to reference maps. We agree that maps, surveys and recommendations are important components of the environmental assessment and review process. Nevertheless, implementation of the revised Policy 7.2.13 would still not mitigate for impacts to special status species, even when combined with implementation of other policies. We recommend that the following statement be added to this policy/mitigation measure: **"Measures necessary to avoid, mitigate and/or compensate for impacts to special-status species and sensitive natural communities shall be incorporated into the project as part of the permitting process."** Also, care should be taken when using maps, and use of maps should be combined with consultations with local experts. Maps alone should not be used to "identify habitat concerns and guide mitigations." Therefore, we recommend the addition of the following statement to this policy/mitigation measure: **"The maps should be used as a first step, combined with consultation with knowledgeable experts, to assist with the identification of potential impacts."** A5-2

The DFW does not concur that the alteration of COS Policy 7.2.13 alone will mitigate Impacts 4.11-1 (Special Status Species), 4.11-2 (Natural Communities including Riparian Habitat and Wetlands) and 4.11-3 (Wildlife Movement and Wildlife Nursery Sites) to a "less than significant" level. For effective mitigation, we recommend the following changes to the policies/mitigation measures which are cited in Chapter 4.11 (Biological Resources) of the DEIR as part of a "comprehensive approach" to mitigation for Impacts 4.11-1, 4.11-2 and 4.11-3.

COS 7.2.2 Species and Habitat Avoidance: Minimizing impacts may still result in significant impacts to sensitive species and special-status habitats. We recommend that this policy/mitigation measure specifically address that contingency by stating **"The County shall require new discretionary projects to avoid impacts to special-status species and special-status habitat as defined by appropriate State and federal agencies, to the maximum extent feasible. Where impacts cannot be avoided, projects shall include the implementation of site-specific mitigation measures developed by qualified professionals in consultation with appropriate State and federal resource agencies."** A5-3

COS 7.2.7 Wetland and Riparian Habitat Buffers: Adequate riparian and wetland buffers are critical for the conservation of those ecosystems and the species associated with them. We recommend that this measure state that: **"Criteria for developing buffer width standards shall be developed in consultation with the DFW."** Alternatively, standards themselves could be incorporated into an implementation measure. We recommend buffers of at least 100 feet wide on fish-bearing streams and large significant wetlands because riparian habitat needs to be of an adequate width to minimize human disturbance, to maintain habitat integrity, and to effectively provide nutrients, shade, bank protection, microclimate, large woody debris and habitat complexity and heterogeneity, among other critical riparian functions. We recommend that intermittent streams, riparian habitats and swales be protected by no less than a 50-foot non-building setback buffer established on each side of the stream. Buffer widths should be modified to protect the most sensitive species present from human traffic, development, and other disturbances. A5-4

The following statement in COS 7.2.7 is confusing and should be clarified: "The County shall continue to identify areas as Open Space and Significant Wetlands as an ongoing process when those areas are identified." A5-4 cont.

COS 7.2.9 Wildlife Fencing: In order to mitigate impacts of fencing in rural areas on wildlife, we recommend that this policy state that: **"Fencing in rural areas shall incorporate wildlife friendly fencing standards in project development, as identified by the DFW, in order to avoid negative impacts to movement of wildlife and prevent injury or death to deer and other wildlife."** A5-5

COS 7.2.10 Lake Davis Area: In order for this measure to effectively mitigate impacts to deer fawning areas, we recommend that the General Plan state that: **"Any 'compensating areas' shall be reviewed and approved by the DFW. Compensating areas shall be clearly mapped and designated in the County's mapping system, and deed restrictions shall be recorded on any such parcels."** A5-6

Memorializing Land Use Designations and Mechanisms

Several General Plan Policies address or recommend the use of various land use designations as tools for conservation. These policies include COS 7.2.10 (Lake Davis Area), COS 7.1.4 (Conservation Easements), and COS 7.2.11 (Density Transfers). In addition, COS 7.1.2 (Conservation and Open Space Program) references mechanisms such as "stream and watercourse restrictions, wetland restrictions, natural hazards constraints and planned development dedications." The DFW supports the implementation of such policies. In order for the tools to be effective in mitigating future impacts to special status species, special status natural communities, or other fish and wildlife resources under the DFW's jurisdiction, we recommend that a clear program and mechanism be established by which such designations can be identified, mapped, and tracked in order to both inform future land use decisions and track General Plan effectiveness in mitigating impacts to biological resources. We recommend that such a mechanism be specified as an implementation measure, and carried forward in the mitigation monitoring and reporting program to be developed for the Project under CEQA. A5-7

Implementation Measures

The General Plan Update includes no Implementation Measures for Biological Resources. In order to ensure that mitigations are carried out effectively and reduce biological resource impacts to a "less than significant" level, we recommend that such measures be articulated consistent with the policies that have been developed. For example, Land Use Implementation Measure 4(d) on pages 59-60 of the General Plan Update lays out how particular land use policies shall be implemented by recording easements in perpetuity and other means. We recommend that similarly detailed measures be developed for biological resource policies to ensure that they are carried and successfully mitigate for impacts. A5-8

Environmental Setting

The environmental setting portion of the DEIR does not provide accurate or adequate baseline information for the Project. Table 4.11 lists some general habitat types and some wildlife species associated with them. It is not clear what criteria were used to pick the species associated with each habitat type and we do not recommend that the county, project proponents or consultants use this table as a reference. A5-9

A5-9 cont.

The California Wildlife Habitat Relations (CWHR) offers a good starting place for classifying habitat types and determining wildlife species associated with them. CWHR contains life history, geographic range, habitat relationships, and management information on 694 species of amphibians, reptiles, birds, and mammals known to occur in the State. CWHR products are available to anyone interested in understanding, conserving, and managing California's wildlife. This program can be found at http://www.dfg.ca.gov/biogeodata/cwhr/. In addition, the DFW website provides extensive information for lead agencies and consultants in assessing sites for rare plants and special-status natural communities for the purpose of CEQA: http://www.dfg.ca.gov/biogeodata/vegcamp/naturalcommunities.asp

Table 4.11-3 is particularly confusing in that it does not define "Special Status Species" and appears to include some federal- and State- listed species and some California species of special concern and fully protected species but not others. Apparently, California Natural Diversity Database (CNDDB), was used to create the list, but as the DEIR itself points out, CNDDB is simply a record of reported occurrences and should not be used exclusively to determine what species may be in an area. The process that the DFW recommends for identifying and analyzing impacts to sensitive species and habitats begins with scoping, followed by surveys and mitigation development. CNDDB is an ongoing and continuously updated database, and the information should not be regarded as complete data on the elements or areas being considered. Other sources for identification of species and habitats near or adjacent to the Project area should include, but may not be limited to, State and federal resource agency lists, California Wildlife Habitat Relationship System (CWHR), California Native Plant Society (CNPS) Inventory, agency contacts, environmental documents for other projects in the vicinity, academics, and professional or scientific organizations. Again, we do not recommend that the county, project proponents or consultants use this table as a reference.

For example, some of the special status species that are not mentioned in the DEIR but occur within the Project area and could be significantly impacted by the Project are:

California red-legged frog (*Rana draytoni*) CSSC
Western pond turtle (*Emys marmorata)* CSSC
Golden eagle (*Aquila chrysaetos*) FP
Northern harrier (*Circus cyaneus*) CSSC
American peregrine falcon (*Falco peregrinus anatum*) FP
Burrowing owl (*Athene cunicularia*) CSSC
California spotted owl (*Strix occidentalis occidentalis*) CSSC
Vaux's swift (*Chaetura vauxi*) CSSC
Olive-sided flycatcher (*Contopus cooperi*) CSSC
Yellow warbler (*Dendroica petechial brewsteri*) CSSC
Yellow-breasted chat (*Icteria virens*) CSSC
Yellow-headed blackbird (*Xanthocephalus xanthocephalus*) CSSC
American badger (*Taxidea taxus*) CSSC

(CSSC = California Species of Special Concern; FP = Fully Protected Species)

Also, Table 4.11-3 incorrectly states that there are no willow flycatcher (*Empidonax traillii*) occurrences in the CNDDB for Plumas County, when in fact there are several. We also note that three listed bird species documented to both occur and nest in Plumas County on an annual basis, but were listed as having a "Low" or "Medium" potential to occur. These are Swainson's hawk (*Buteo swainsonii*), bank swallow (*Riparia riparia*) and willow flycatcher.

A comprehensive list of special-status animal species in California (including both State, federal and international status) can be found at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPAnimals.pdf A list of special-status plant species can be found at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPPlants.pdf A5-9 cont.

Black Bears

Implementation of the Project will result in increased residential and commercial development summer use by visitors and employees. Plumas County is within prime black bear habitat and they can be expected to occasionally wander through the area. Most residential areas and summer home sites in the adjacent areas have experienced bear disturbances of garbage cans. The DFW policy is not to trap and relocate bears. It is the responsibility of residents to keep garbage cleaned up and unavailable to bears and other wildlife per Plumas County Code Section 6.10.104. The DFW recommends that the General Plan Update include policies and implementation measures that minimize conflicts with black bears. For example, we recommend a policy that states that: **"All new development projects should provide a domestic garbage collection system that is bear-proof. Commercial or multi-unit residential garbage dumpsters should be equipped with bear-proofed metal lids that are latched (with a minimum of two latches) and the dumpster storage area be fenced with a minimum of seven-foot high heavy woven (cyclone) wire fence to further make garbage unavailable."** Further, we recommend increased enforcement of the existing Code Section 6.10.104 to minimize and reduce human-bear conflicts. A5-10

Pursuant to Public Resources Code §21092 and §21092.2, the DFW requests written notification of proposed actions and pending decisions regarding the proposed Project. Written notifications shall be directed to: California Department of Fish and Wildlife Region 2, 1701 Nimbus Road, Rancho Cordova, CA 95670. A5-11

Thank you for considering our comments on the proposed Project. DFW personnel are available for consultation regarding biological resources and strategies to minimize impacts. If you have questions please contact Julie Newman, Staff Environmental Scientist, by e-mail at julie.newman@wildlife.ca.gov or by phone at (530) 283-6866.

Sincerely,

Tina Bartlett

Tina Bartlett
Regional Manager

ec: Terri Weist
Amber Coates
Julie Newman

State Clearinghouse

From:	Wilson, Randy
To:	Chief McCaffrey
Cc:	Ray Weiss; Coleen Shade; Settlemire, Craig; Mansell, Steve; Herrin, Becky
Subject:	RE: DEIR
Date:	Monday, November 26, 2012 7:19:43 AM

Greg

Thanks for your comment. I will forward to the consulting team so this comment can be addressed in the Response to Comments for the EIR. We are in the Draft EIR period and your comment is recognized as a comment on the Draft EIR. We look forward to additional comments the Beckwourth Fire District may have on the Draft EIR during the comment period, which ends on or about January 3, 2012.

Randy

-----Original Message-----
From: Chief McCaffrey [mailto:chiefmccaffrey@beckwourthfire.com]
Sent: Tuesday, November 20, 2012 12:16 PM
To: Wilson, Randy
Subject: DEIR

Randy,
I've been reviewing the DEIR and have one comment and one question. A6-1
Comment: the map of the Fire Districts 4.8-1 is incorrect.
Question: I read a lot about fire protection, but still don't see A6-2
anywhere that new construction must be within a Fire District?
I believe this was one of the main issues with the old General Plan and
was supposed to be corrected in the new General Plan. This issue has
also been addressed by more than one Grand Jury report.
Am I just not seeing it?
Mr. Beniot can offer a better Fire District map.
Thanks for your time,

--
Greg McCaffrey RN, MICN, MICP
Fire Chief
Beckwourth Fire District
chiefmccaffrey@beckwourthfire.com

"The Beckwourth Fire District is committed to the protection of life and property, using as a model; safety, teamwork, continuous education and training"

Plumas Local Agency Formation Commission
John Benoit, Executive Officer
P.O Box 2694 Granite Bay, California 95746
(530) 283-7069 johnbenoit@surewest.net

December 8, 2012

County of Plumas
Planning Department
555 Main Street
Quincy, CA 95971

Attn: Randy Wilson, Planning Director

SUBJECT: Comments Regarding the Draft Plumas County General Plan EIR

Dear Randy,

Thank you for the opportunity to review the County's Draft EIR for its General Plan. It is the policy of Plumas LAFCo to actively participate in the development of Environmental Documents where LAFCo may be a Responsible Agency or Lead Agency for related projects such as Sphere of Influence Updates. As mention in the Notice of Preparation response LAFCo submitted to the County, LAFCo is concerned with the orderly provision of services throughout the County and that the services required for any subsequent development be provided by an established service provider where feasible and that the service provider has and maintains adequate funding for the services to be provided. A7-1

As you are aware, LAFCO is in the ongoing process of preparing Municipal Service Reviews for all services Countywide and ultimately, Sphere of Influence updates for all agencies subject to LAFCO's jurisdiction in the County. As determined by the Commission, LAFCo intends to use the County General Plan EIR for its environmental document where feasible for many of the upcoming Sphere of Influence. Please provide language in section 1.1 (Purpose and Use) on page 1.2 (future uses) of the DEIR that LAFCo intends to use this EIR for upcoming Sphere of Influence updates for agencies within Plumas County, as appropriate. A7-2

On page 4.9.3 Section 4.9 Public Services, Recreation Resources, and Utilities please include the words " Spheres of Influence" in the section entitled "Plumas County Local Agency Formation Commission-Municipal Services Review" Please re-word the section to read: *Plumas Local Agency Formation Commission – Municipal Services Reviews and Spheres of Influence"*

In the text of that section please re-word the second paragraph as follows:

"To assist with these functions, *California Government Code Section 56425 requires LAFCo's to prepare and update Spheres of Influence, and amend as necessary every five years for agencies subject to its jurisdiction. A Sphere of Influence is defined as a plan for the probable physical boundaries and service area of a local agency, as determined by the (LAFCo) Commission.* In order to update a Sphere of Influence, Government Code Section 56430 requires LAFCOs to conduct Municipal Services Reviews (MSRs) that describe the municipal

services provided by the agencies that are subject to LAFCo authority. MSRs are comprehensive studies designed to collect and analyze information about the governance structures and efficiencies of service providers, to estimate their ability to meet current and future service needs, and to identify opportunities for greater coordination and cooperation between providers.

A7-2 cont.

LAFCo may include one or more services in a MSR, and the study area may be the whole county, *a single agency*, or any subarea as determined by LAFCo. *In addition to the statutory requirement to support a local agency's Sphere of Influence*, the goals of the MSR are to determine *the location and characteristics of any disadvantaged unincorporated communities within or contiguous to the Spheres of Influence*, infrastructure needs or deficiencies, growth and population projections for the affected area, financing constraints and opportunities, opportunities for shared facilities, and government structure options. MSRs can therefore provide useful information in evaluating in a variety of public service issues."

On page 8-5 under Section 4.9 Public Services, Recreation Resources, and Utilities, The following references should be changed:

Plumas Local Agency Formation Commission, Final Eastern Plumas Municipal Service Review, Adopted on October 3, 2011, Prepared by Policy Consulting Associates, LLC. , 2011.

Plumas Local Agency Formation Commission, Adopted Lake Almanor Area Municipal Service Review, Adopted on October 15, 2012 prepared by Policy Consulting Associates, LLC., 2012.

Thank you for providing LAFCo with the opportunity to comment on the DEIR for the County's General Plan. LAFCo requests a hard copy of the FEIR, the Statement of Overriding Considerations, the Notice of Determination, and adopting resolutions for the EIR and General Plan when released as well as the Adopted County's General Plan Policy Document and Land Use Diagram.

Sincerely,

John Benoit
Executive Officer, Local Agency Formation Commission

PLUMAS COUNTY PUBLIC WORKS DEPARTMENT

1834 East Main Street, Quincy CA 95971 – Phone (530) 283-6268 Facsimile (530) 283-6323
Robert A. Perreault Jr., Director Joe Blackwell, Deputy Director

January 11, 2012

Randy Wilson, Planning Director
Plumas County Planning Department
555 Main Street
Quincy, CA 95971

Re: 2035 Plumas County General Plan DEIR

Dear Mr. Wilson

The Plumas County Public Works Department is responsible for the design and construction of county roads, bridges and storm water drainage systems in accordance with local, state, and federal laws in a manner that maximizes public safety. In all, the Plumas County Public Works Department is responsible for the maintenance of over 680 miles of roadways, including 89 bridges and several hundred drainage structures. A8-1

It is of great interest to the Public Works Department that the information contained in both the DEIR and the Draft General Plan be as accurate as possible. Many of the following comments have been provided during the Department of Public Work's review of the Administrative Draft General Plan and are being repeated in this letter as formal responses to the DEIR.

Comment #1 – Introduction

The Public Works Department acknowledges the language explaining Plumas County's status as a "Coordinating Agency" pursuant to Resolution 08-7514. As stated, this resolution confers a responsibility to coordinate the plans, policies, and priorities of Plumas County with those of federal and state agencies, particularly the United States Forest Service with the purpose of promoting consistency with federal and state agency plans. A8-2

The Plumas County Public Works Department believes that the responsibility to coordinate with federal and state agencies, pursuant to Resolution 98-7514, should be included as a General Plan policy.

Comment #2 - Section 4.1 Land Use and Aesthetics, Page 4.1-4 – Regulatory Setting, Local Regulations

The Plumas County Public Works Department believes that a discussion of Publics Works encroachment permit and road controls should be included in this section so that commentary applicable to State roadways are also applicable to County roadways. A8-3

Comment #3 - Section 4.2 Traffic and Circulation, Page 4.2-2 – State Regulations, *California Department of Transportation*

The Department of Public Works believes that an explanation of Caltran's funding process is needed under the heading of State Regulations. This explanation should include a discussion of funding timelines and the forecasting documents and tools used to plan improvements to State highways. Failure to include this information leads the perception that some impacts will not be mitigated because they are anticipated to occur beyond the Caltrans planning and funding processes. This is most clearly evident in the characterization that portions of State Highway 36 will attain a Level of Service D in the future. A8-4

The statement that the mitigation measures for this single segment of SR 36 will never be implemented is incorrect. Transportation improvement projects are rarely "programmed" or entered into formal funding program prior to five years before construction. Just because a project is not listed in a Regional Transportation Plan (RTP) or within the State Highway Operation and Protection Program (SHOPP) does not mean that it is infeasible or that it will never be built. Plumas County's RTP is updated every 5 years and the SHOPP is updated annually.

The segment (SR 36 – West of Chester) is listed with an existing LOS of "D" and a future LOS of "D" for the westbound direction only and only during the summer peak hour. If the "project" (the General Plan update) has no effect on the LOS why is a mitigation required for a pre-existing condition under CEQA? A8-5

The SR 36 Transportation Concept Report (TCR) was completed and adopted after the completion of the County's RTP. Caltrans' TCR for this segment estimates the current LOS at "C" and the future LOS at 2030 to decrease to a "D". Since the TCR was not completed prior to the RTP, the RTP only lists this segment of SR 36 to need shoulder and drainage improvements within a 20+ year forecast period. However, the PCTC has adopted the SR 36 TCR. The TCR is the long range plan for the state highway. It specifically lists the widening of the two-lane segment to four lanes under Potential Future 20-year projects. Consequently, the statement that Caltrans has "no plans to widen the segment" is false and misleading. A8-6

The other segment listed as reaching a LOS of "D" in the future is SR 36 – East of Chester. Again, the reader has to be reminded to understand the correct perspective of the impact. *The forecast is that the segment will operate at a future LOS of "D" for the westbound direction only and only during the summer peak hour.* The County has already demonstrated its ability to fund future mitigation measures specifically for this segment with the execution of the Lake Front Development Agreement. The improvements called for in the SR 36 TCR to maintain a LOS of "C" are included under the Lake Front Development Agreement and multiple planned development permits for subdivision on the Almanor Peninsula.

Furthermore, impact fees for improvements to County roads and State Highway 36 necessary to mitigate development project impacts have been collected since 1996 in the Almanor area utilizing the Planned Development Permit (PDP) process. Finally, under SB 45 passed in 1997, the County and the City of Portola have the mechanism, State Transportation Improvement Program (STIP) to address land use impacts to State Highways within Plumas County in cooperation with Caltrans and developers. The STIP is a five-year program that is updated every two years.

It is important to remember that the Almanor Regional Transportation Assessment (ARTA) traffic analyses and forecasts were based upon the speculated economic growth and proposed large developments in Plumas and Lassen Counties in 2006. At that time, the State's forecast for Plumas

County was for a population increase of 35% by 2030. With the economic downturn due to the collapse of the housing markets and the mortgage industry and the disappearance of speculative development proposals, the 2010 RTP forecasted little growth through 2030 but for planning purposes used a rounded +1% annual growth rate. Currently, the State's forecast for Plumas County is no increase in population through 2040. Plumas County currently leads all counties in the state in annual population decreases. A8-6 cont.

Considering the County's limited growth potential, future impacts are expected to be relatively minor as mechanisms to mitigate them are already in place. Therefore, the County Road System (CRS) has no additional forecasted capacity-related impacts to it beyond those already included in existing Development Agreements and Planned Development Permits. Future impacts to the CRS caused by the General Plan Update are only estimated to occur for funding maintenance. All future development projects will need fund their own internal road maintenance. Adequate maintenance funding for new developments' transportation infrastructure can be accommodated either by Road Maintenance Association (privately maintained) or by road maintenance agreements with the County (publicly maintained) such as tax assessments on individual lots.

Comment #4 - Section 4.2 Traffic and Circulation, Page 4.2-4 – Local Regulations – Plumas County Transportation Commission, 2010 Regional Transportation Plan

The 2010 RTP was adopted in January of 2011. The 2035 General Plan should accurately reflect this adoption date. A8-7

The sentence "available and convenient rail service" should be clarified. Is this phrase referring to rail service for goods and materials or people? Also, the Public Works Department believes that a policy discussing the preservation of rail corridors for future transportation use should be included within the General Plan. A8-8

Comment #5 - Section 4.2 Traffic and Circulation, Page 4.2-22 – Operations Analysis Summary

It should be made clear that the LOS D condition along a segment of SR 36 only occurs during peak hour and only along a specific segment. A8-9

Comment #6 - Section 4.2 Traffic and Circulation, Page 4.2-24 – Footnote at bottom of page

The Development Agreement referenced in the footnote is between the County of Plumas and Lake Almanor Associates. A8-10

Comment #7 – Air Quality, Section 4.3, Air Quality Conditions, Page 4.3-9

Numerous references are made to Portola Valley. This should be corrected to the "Portola area" as there is no officially recognized place in Plumas County known as Portola Valley. A8-11

Comment #8 – Hydrology, Water Quality and Drainage, Section 4.6, Regulatory Setting, Page 4.6-2

Reference should be made to "navigable waters" and the regulatory control of the U.S. Army Corp of Engineers. A8-12

Comment #9 – Hydrology, Water Quality and Drainage, Section 4.6, Water Supply and Availability, Page 4.6.10, Water Service Purveyors and Water Supply, Table 4.6-5

A discussion should be included regarding the use of Lake Davis Water by the City of Portola. Part of the Grizzly Lake Community Services District (formerly GLRID) could receive water from Lake Davis but uses a well near the treatment plant which should not be considered the Sierra Valley Basin; the other part comes from springs and other waters. A8-13

Grizzly Ranch Community Service District receives raw water from Grizzly Creek for irrigation purposes. Potable water from a well which would be a stretch to consider it part of the Sierra Valley Basin. A8-14

Comment #10 – Hydrology, Water Quality and Drainage, Section 4.6, Flooding and Stormwater Drainage, Page 4.6-11

The Chester diversion facility, listed in the tables and figures in this section, should have a footnote associated with it as a dam that is built to limit flow down the North Fork of the Feather River. Excess flows are diverted to the diversion channel. A8-15

Comment #11 – Hazardous Materials and Public Safety, Section 4.8, Federal Regulation, Page 4.8-2

It could be clarified that that the Hazardous Materials Regulations (HMR) are issued by the Pipeline and Hazardous Materials Safety Administration and govern the transportation of hazardous materials by highway, rail, vessel, and air. This comes under the DOT but this aspect should be highlighted in the discussion as well as the *Federal Hazardous Materials Transportation Law of July 6, 2012* A8-16

Comment #12 – Hazardous Materials and Public Safety, Section 4.8, Business Plan Act, Page 4.8-3

It should be correctly noted that required information is provided directly to the State and is made available to emergency response agencies through the State website. A8-17

Comment #13 – Hazardous Materials and Public Safety, Section 4.8, Hazardous Materials Transportation, Page 4.8-4

It could be clarified that the State's Explosives Law authorizes the California State Fire Marshal to adopt regulations for the safe use, handling, storage and transportation of explosives. In addition, a new program has been established for the reporting of hazardous materials which includes reports being logged on a State website and made available for local agency review. A8-18

Comment #14 – Hazardous Materials and Public Safety, Section 4.8, Environmental Setting, Hazardous Materials, Page 4.8-6

Hazardous wastes should be correctly identified as follows: A8-19

Hazardous Wastes are solid wastes that are toxic, ignitable, reactive, or corrosive according to Chapter 11 of Division 4.5 of Title 22 of the California Code of Regulations. Hazardous waste can come from households.

Comment #15 – Hazardous Materials and Public Safety, Section 4.8, Environmental Setting, Hazardous Materials, Page 4.8-7

The paragraph should be rewritten to clarify who is primarily a transporter, storer, or disposer. Query if this topic is needed. A8-20

County landfills are either closed or partially active. Transfer stations are used, with waste transported to Nevada. Hazardous materials transporters, such as railroad and trucking, are not listed. A8-21

Comment #16 – Hazardous Materials and Public Safety, Section 4.8, Contaminated Sites, Table 4.8-2 Hazardous Materials Cleanup Sites in Plumas County, Page 4.8-7

Why is Gopher Hill Landfill listed as a cleanup site? The correct category would be Closed with monitoring. Also, there is no mention of the Chester Landfill, which is partially active. A8-22

Comment #17 – Hazardous Materials and Public Safety, Section 4.8, Aviation Hazards, Page 4.8-8

Noise impacts should not be listed as a safety hazard. A8-23

In addition to the above comments (#1 through #25, inclusive) on the DEIR, I would like to reiterate the Department of Public Works comments pertaining to the Draft General Plan, since the Draft General Plan serves as the environmental setting for the DEIR. A8-24

Comment #18 - Circulation Context (Page 85)

This section should make reference to the numerous miles of private roadways which make up a large portion of transportation network within Plumas County. These private roadways pose unique challenges with regard to yearly and long term maintenance issues, and should therefore be discussed under the Circulation Context heading of the draft General Plan. A8-25

Comment #19 – Plans and Planning – Regional Transportation Plan (Page 90)

The most recent adoption of the Regional Transportation Plan occurred in January of 2011. Are the documents listed at the end of the paragraph a compilation of the plans in which circulation issues are discussed? If so, then the list should make reference to the Short Range Transit Plan. The Public Works Department is not aware that the Plumas County Trails Master Plan has been adopted by the County Board of Supervisors or the Regional Transportation Plan. A8-26

Comment #20 – CIR 4.1.1 Roadway Classification System (Page 90)

This policy reflects an antiquated classification methodology. The Public Works Department recommends a policy that requires the County to develop a new road classification and condition scheme based on a Level of Service standard as opposed to maintaining and updating the existing classification and condition report. The corresponding implementation measure on page 97 should be modified as appropriate to maintain consistency. A8-27

Comment #21 – CIR 4.2.1 Complete Street Design (Page 92)

Most of the elements listed under Complete Street Design include the phrase "where appropriate and financially feasible". The Public Works Department recommends that all of the elements include this phrase. The corresponding implementation measure on page 97 should be modified as appropriate to maintain consistency. A8-28

In addition, it's recommended that the last element pertaining to cul-de-sac design be modified for clarification purposes to read ".....over alternative **turnaround** designs, such as t-turnarounds." A8-29

Comment #22 – CIR 4.3. Transit (Page 93)

All of the policies should include the financial caveat phrase: "where appropriate and financially feasible." A8-30

Comment #23 – CIR 4.3.3 Improvement of Bus Stops (Page 93)

This statement is incorrect. The County does not control the school district's decisions regarding the development of bus stops. The directive to coordinate should be the responsibility of the school district to coordinate with the County for the school district's development and improvement of school bus stops. The corresponding implementation measure on page 97 should be modified as appropriate to maintain consistency. A8-31

Comment #24 – CIR 4.4. Bicycle and Pedestrian (Page 94)

All of the policies should include the financial caveat phrase: "where appropriate and financially feasible." A8-32

Comment #25 – CIR 4.6.3 GHG Reductions (Page 95)

The Plumas County Department of Public Works reviewed and commented on the *2005 Community-wide Greenhouse Gas Emissions Inventory*. Review of this document by the Department of Public Works was, and is, critical as greenhouse gas (GHG) emissions from the transportation sector allegedly contribute approximately 76% of Plumas County's total GHG emissions. The policies and regulations requiring reduction in these emissions will undoubtedly impact those agencies primarily responsible for development and implementation of transportation-related mitigation measures designed to reduce these emissions. A8-33

Upon review of the above referenced document, the Department of Public Works sent a letter, dated June 20, 2012, to Planning Director, Randy Wilson. See Attachment 1. This letter outlined the Department of Public Works' concerns and recommended that several changes be made to the document. In response to these concerns the Sierra Business Council (SBC) modified the document. These modifications however, fell short of satisfying the concerns and issues enumerated by the Plumas County Public Works Department (PCPW). See Attachment 2.

It is noted that the SBC document, referenced above, has never been reviewed and approved by the Board of Supervisors. Public Works recommends that the General Plan should not incorporate, nor include reference to a document that has major policy implications that has not been fully vetted, reviewed and approved by the Board of Supervisors.

Comment #26 – CIR 4.6.3 GHG Reductions – (Page 95)

In the discussion pertaining to climate change, SB 375 is California law that is important to the regulatory controls imposed by the State. Nevertheless, SB 375 is applicable only to those Counties that are located within a designated MPO region. As such, SB 375 is not applicable to Plumas County and should be clearly stated within the General Plan Update. A8-34

Comment #27 – Circulation Element Implementation Measures – (Page 97)

Implementation #1 should reference the Bicycle Transportation Plan and Pedestrian Transportation Plans as separate documents. The draft form of the plan does not currently incorporate a discussion of pedestrian transportation issues. In addition, implementation responsibility of such measure should rest with the Public Works Department and not the Plumas County Transportation Commission (PCTC). A8-35

The Pedestrian Transportation Plan does not exist as a separate plan. The present form of the Bicycle Transportation Plan is draft only, and has never been adopted by the Plumas County Transportation Commission.

Implementation #5 should reference the Short Range Transit Plan as opposed to the Plumas County Transit Development Plan. A8-36

Please consider the comments to this document as formal comments to both the DEIR and Draft General Plan.

Sincerely,

Robert A. Perreault Jr., P.E.
Director of Public Works
Plumas County

Attachments:

Attachment No. 1 – Comment Letter to Randy Wilson regarding 2005 Community-wide Greenhouse Gas Emissions Inventory

Attachment No. 2 – Follow-up comment memo regarding 2005 Community-wide Greenhouse Gas Emissions Inventory

PLUMAS COUNTY PUBLIC WORKS DEPARTMENT

1834 East Main Street, Quincy CA 95971 – Phone (530) 283-6268 Facsimile (530) 283-6323
Robert A. Perreault Jr., Director Joe Blackwell, Deputy Director

Date: June 20, 2012

To: Randy Wilson, Director – Plumas County Planning Department

From: Bob Perreault, Director – Plumas County Public Works

Re: 2005 Community-wide Greenhouse Gas Emissions Inventory

Thank you for the opportunity to review the *2005 Community-Wide Greenhouse Gas Emissions Inventory*, herein after referred to as the "Document".

It is noted the Document is titled, "*2005 Community-Wide Greenhouse Gas Emissions Inventory*" However, the Report itself goes far beyond "inventorying". Thus, adoption of the Document by the Board of Supervisors will pave the way to policy language obliquely reflected in the document.

Inasmuch as the Document findings attribute the transportation sector with the over 76% of total GHG emissions, it is disappointing that the Plumas County Director of Public Works (and Road Commissioner) was not contacted or interviewed during the preparation of the Document.

Following preliminary critique of this Document by Public Works staff, the following comments are submitted for your consideration:

It is stated in the Document that greenhouse gas emissions from the transportation sector constitute 76.6% of Plumas County's emissions. This is nearly eight times that of the second highest generating sector – Agriculture at 9.8%. While reductions in emissions from the transportation sector can be achieved through improved public transportation, the continued encouragement of carpooling, and the use of bicycles, it should be noted that local reductions in this sector are constrained by legislative and economic limitations. For example, emission standards from vehicles that are controlled by the California Air Resources Board (CARB) are outside local legislative authority. And while public transportation does reduce private vehicle use, many users of the transportation system do not have access such alternative modes of transportation. In addition, public transportation in Plumas County is provided primarily through Plumas Transit Systems and Seniors Transit Services. Operating costs for these services are subsidized at a rate of over 80% by State sales and fuel taxes, and Federal transit dollars. Funding by these sources is matched by a minimum fare box ratio, which makes expansion of these services difficult as route expansion has proven to result in a diminishing returns scenario.

Plumas County, like many other rural counties, will show emissions from the transportation sector as being nearly twice that of the State as a whole. This is due to the fact that, unlike many other counties in the State, Plumas County is sparsely populated and does not have a high concentration and intensity of industrial, commercial, or agricultural land uses. As a result of these demographic characteristics,

proposed target emission reductions must be achieved on the back of the transportation sector, identified as the major emission contributor in the Document, where local government has limited authority to implement emission reduction strategies at a scale enabling compliance with emission reduction targets.

In addition, *Executive Order S-3-05* does not set 2005 as the baseline year. EO S-3-05 states the targets are to be based upon 1990 and 2000. If the necessary *"comprehensive data"* is not available for 1990 and 2000, then why are we being told to measure ourselves by those years?

The Executive Summary provides a broad review of the Document, key findings, and next steps. Public Works staff recommends that additional clarifying information be included in this section. For example, it is stated in the Executive Summary that Plumas County has begun the "climate action planning process." A description of what this planning process entails should be included in this Document. In addition, the "Next Steps" paragraph is fragmented and confusing and should be re-worded with an explanation of what a Climate Action Plan (CAP) entails.

Within the Climate Change Background section, under the heading of California Policy, there is discussion of climate change legislation. It is recommended that this section be amended to more accurately reflect actual law and applicability to Plumas County. For example, it is stated that the target of "2000 emission levels by 2010" is an AB 32 target, when it is actually a target established by Executive Order S-3-05. This Executive Order also sets a target of "80% below 1990 by 2050", which is not referenced in this section. It should also be stated that SB 375 does not apply to Plumas County. It applies to the 18 Metropolitan Planning Organizations in California where the overwhelming majority of traffic and congestion exist. This entire section should be discussed in the context of the recent Climate Change Scoping Plan, as set forth in AB 32.

In the Climate Change Background section, under the heading of "ICLEI Local Governments for Sustainability Climate Mitigation Program", there is a discussion of a "Five Milestones" framework and methodology. The Document should contain no implicit commitment to undertake these other activities associated with adoption of this plan by the Plumas County Board of Supervisors. It should be clearly noted that the ICLEI is part of the ideological debate that presently surrounds the global climate change topic.

In the Climate Change Background section, under the heading of "Sustainability & Climate Change Mitigation Activities in Plumas County", there is a discussion of the activities undertaken by the Plumas County Fire Safe Council and their efforts to reduce the risk of wildfires and their substantial greenhouse gas emissions, yet the inventory does not include GHG emission quantities from catastrophic wildfires. It is staff's opinion that wildfire emissions are incorrectly considered in the Document as an "Information Item".

The contribution of GHG resulting from catastrophic wildfires cannot be disregarded or understated. A study of GHG emissions from four California wildfires was performed by Thomas M. Bonnicksen, Ph.D. In his report entitled *Greenhouse Gas Emissions from Four California Wildfires: Opportunities to Prevent and Reverse Environmental and Climate Impacts*, GHG emissions from the 2007 Moonlight Fire in Plumas County generated 4,910,941 tons of GHGs. This one fire generated 12 times the "normal" yearly community emissions for Plumas County. Characterized in other terms, the Moonlight Fire generated GHG emissions equivalent to the yearly operation of 966,880 vehicles. GHGs from wildfires should be included in Plumas County's emissions inventory, and the fuels reduction activities undertaken by the

Plumas County Fires Safe Council, industrial forest landowners, and the USDA Forest Service, should be considered an appropriate and effective strategy for reducing GHGs, and credited towards emission reduction targets.

- In the Community Emissions Inventory Results section, under the heading of Residential, NV Energy is cited as a source of consumption data. What is their relevance to Plumas County?

Did the GHG emission contribution from residential equipment usage, such as lawnmowers, consider that this equipment is used only seasonally?

- In the Community Emissions Inventory Results section, under the heading of Commercial/Industrial, the listing of stationary combustion sources seems rather limited. Are there other sources that can be consulted in order to develop a more comprehensive list?

- In the Community Emissions Inventory Results section, under the "Transportation" heading, emission baselines are established. These baselines should be based upon measurable data to be valid for use in determining if a GHG reduction program or strategy is effective, otherwise the results can be manipulated or misinterpreted. Future year reports should be based upon measurements performed in the same manner as the baseline to obtain a valid comparison.

The values for GHG emissions generated by the transportation sector for County Roads is based upon the State's estimates for annual vehicle miles traveled. That number is estimated by the State, not the County. The AVMT shown assumes all County Roads are open for use 365 days per year, which is not the case. The AVMT number appears to also be based upon summer ADT's and, therefore, would not reflect any reduction in the volume of trips made during winter months and the off-tourist season in this county.

Typically, the State estimates VMT as follows:

CALIFORNIA MOTOR VEHICLE STOCK, TRAVEL AND FUEL FORECAST
For the base year, county VMT on State Highways is obtained directly from the Division of Traffic Operations' annual Traffic Accident Surveillance and Analysis System (TASAS) file. County VMT on all other public roads, except that on the local road functional class, is estimated from the annual HPMS file. Local road VMT cannot be obtained from either TASAS or HPMS. Therefore, statewide local road VMT is calculated as the difference: statewide total VMT (MVSTAFF) minus State Highway VMT (TASAS) and other road VMT (HPMS). Statewide local road VMT is then allocated to each county on the basis of the relative distribution of the quantity, "county automobile registrations times the proportion of local road mileage to the total system mileage."

The problem with this type of estimate is that Plumas County has a ratio of registered vehicles-to-population of 1.6:1, double the statewide ratio of registered vehicles-to-population of 0.8:1. The other problem with this estimate is that it is not based on anything that can be monitored locally for change. The Department of Public Works can measure ADT on a roadway several times in a year to accurately reflect the seasonal distribution of trips in a rural mountainous county and determine an AVMT based upon the roadway length, the vehicles counted, and provide a breakdown of whether the vehicles were trucks or cars. However, we would then only be able to compare that data to a baseline that is calculated by vehicle registration.

When the 2005 estimates are compared to actual data collected in the field for VMT, compared with fleet replacement programs, pedestrian and bicycle facilities constructed, rising fuel prices, and the overall economic downturn since 2005, the transportation sector in this county will have demonstrated its effort toward the "targets" despite no additional funding being provided to the County by either AB32 or Executive Order S-03-05.

For comparison purposes:

If Public Works:
- Uses the most recent counts available
- Applies estimated counts where needed based upon land use and trip generation factors measured elsewhere in the County or similar rates demonstrated by adjoining roadways
- Multiplies the two-way ADT by the road segment length (currently the 681 miles of road are broken into 730 separate segments)
- Does not apply seasonal variation factors
- Does not apply seasonal closure factors

Then the current estimate for AVMT would be 98.9 million on County roads, which would result in a number that remains unnecessarily too high. Notwithstanding that conclusion, the Document used the State's estimate of 142.7 million AVMT for 2005.

There is no discussion whatsoever about the contributions from the railroad systems through Plumas County. The number of railway miles in Plumas County is significant and railroad locomotives are notorious for their pollution. Consideration should be given to this transportation mode and should identify areas where these trains are sided and idle for an extended duration. The County should not bear responsibility, or impact, for agencies or industries over which it has no control.

In the Community Emissions Inventory Results section, under the heading of Solid Waste and Wastewater heading, the following comments are provided:

- The specific number, size, and location of many of the historic "burn and bury" landfill sites is, and will remain, unknown. Waste reduction by burning, as well as the number of years that this waste has been buried, has a significant impact on current emissions; one that the Department is not sure has been factored in. A much more accurate method of estimating these emissions would be to locate and sample a few of the historic landfills. Emission figures based on population studies and not taking into account emission reductions over time (through the various decomposition cycles) seem speculative, particularly when the figures given are of the magnitude shown.
- There seems to be a conflict within the document between waste exported (> 99%) and waste deposited in Plumas County, listed as 24.5% in the pie chart.
- It is true that there are no methane recovery systems at any of the landfills in Plumas County, either historic or "modern". None of the landfills currently receive putrescible waste, and while Gopher Hill has methane venting pipes through the final cover, the landfill is completely closed. Quarterly testing is performed at the Chester Landfill, resulting so far in negligible readings of methane gas (<2%).

- Emissions are undoubtedly generated by the short-term storage of wastes at the County's Transfer Stations before they are transported out of County to their final disposal location. Staff finds no mention of this in the report unless it is being described as "waste deposited". No studies on these emissions have been done of which the Department is aware.
- Wastewater emissions are provided for East Quincy Services District. This should be changed to Quincy Community Services District.

In the Community Emissions Inventory Results section, under the Agriculture heading, there is a discussion of agricultural related emissions in Portola. Why is Portola's contribution in this category discussed here and other emission categories ignored?

Has the Farm Advisor/Agricultural Commissioner had an opportunity to review this data?

In the Conclusion & Next Steps section, recommendations are provided as to how Plumas County should proceed in its efforts to reduce emissions to meet stated targets. While considerable discussion and effort is provided to identify and quantify emissions, no discussion is provided regarding the efforts that Plumas County fleet has undertaken thus far in reducing GHG emissions. For example, the Public Works Department has undertaken an Accelerated Turnover Program, which requires the complete fleet of Public Works diesel vehicles to be replaced with newer lower emission diesel vehicles. This program, instituted by the California Air Resources Board, requires compliance by the year 2032 at a total estimated cost of 32 million dollars, a huge state-mandated investment for a County with a population of less than 20,000. Vehicle replacement together with after treatment emission reduction measures has exceeded 1.8 million dollars in expenditures to date. In addition, Public Works is investigating the feasibility of installing solar panels at the main office and satellite shops around the county.

There is also a call for the development of a Climate Action Plan. A brief discussion of what this entails should be included in the Document, together with a detailed description of the departmental duties and responsibilities associated with implementation of this plan. As noted, all of this activity goes far beyond the "inventorying" task.

The State of California Targets and Guidance section should correctly identify the targets associated with Executive Order S-3-05 and those associated with AB 32.

The Creating an Emissions Reduction Strategy section should list continued support of the Plumas Fire Safe Council and their efforts in reducing the threat of catastrophic wild fires as mentioned above. Many of the tasks listed have already been undertaken to various degrees. These should be listed and analyzed for their relative effectiveness with recommendations as to where additional GHG reduction strategies would be most effective. Generic recommendations, without consideration of current strategies, are of limited use.

Thank you again for the opportunity to comment on this document.

Robert A. Perreault Jr., P.E.
Director of Public Works
Plumas County

Attachment No. 2 to the Letter of Comments on the General Plan Update by Public Works

MEMORANDUM TO FILE

January 11, 2013

From: Bob Perreault, Director – Plumas County Public Works

Re: *2005 Community-wide Greenhouse Gas Emissions Inventory (Draft)*
Summary of the June 20, 2012 Letter of the Department of Public Works and the Responses Thereto

In May and June, 2012, the Plumas County Department of Public Works was afforded an opportunity to review and comment on the *2005 Community-wide Greenhouse Gas Emissions Inventory (Draft)*. Review of the document by the Department of Public Works was, and is, critical as greenhouse gas (GHG) emissions from the transportation sector comprise approximately 76% of Plumas County's total GHG emissions. The policies and regulations requiring reduction in such emissions will undoubtedly impact those agencies primarily responsible for development and implementation of transportation related mitigation measures designed to reduce these emissions.

Upon review of the subject document, the Department of Public Works sent a letter, dated June 20, 2012, to Planning Director, Randy Wilson. The Planning Director, in turn, forwarded the letter of comments to the author of the document, Sierra Business Council (SBC). The letter outlined 24 separate concerns of the Department of Public Works and recommended that several changes be made to the document. In response to the submitted concerns, the Sierra Business Council (SBC) modified only certain portions of their draft document. The modifications, however, collectively fell short of satisfying the concerns and issues enumerated by the Plumas County Public Works Department (PCPW).

Only 12 out 24 Comments were adequately addressed. Following is a Summary of the concerns, SBC's responses, and Public Works' responses to SBC's responses:

PCPW Comment #1

SBC's Response: Not addressed.
PCPW's Response: Discussions should occur between the authors of this document and the Director of Public Works.

PCPW Comment #2

SBC's Response(s): SBC commented.
PCPW's Response: Nevertheless, SBC failed to address PCPWs comments that the document should note that local reductions in the transportation sector emissions are constrained by legislative and economic limitations. The point of PCPW's comments is to emphasize that the vast majority of Plumas County's GHG emissions are generated from a sector that Plumas County has limited ability to make significant reductions. This should be clarified, noted and understood by the Board of Supervisors and included within the text of the report.

PCPW Comment #3

SBC's Response: Not addressed.
PCPW's Response: PCPW requests an answer to this question.

PCPW Comment #4

SBC's Response: Not addressed.

PCPW's Response: PCPW requests that this comment be addressed.

PCPW Comment #5

SBC's Response: SBC rewrote this section.

PCPW's Response: Comments have been adequately addressed.

PCPW Comment #6

SBC's Response: SBC rewrote this section.

PCPW's Response: Comments been adequately addressed.

PCPW Comment #7

SBC's Response: This report does not attempt to inventory emissions from wildfires as there was not sufficient time and a lack of detailed protocol. The wood burning emissions included as information items in this report are for home heating, and were derived from US Census data. Only the CO2 portion of the emissions were informational (since they are considered biogenic), the CH4 and N2O emissions were counted in the residential sector.

PCPW's Response: The magnitude of GHG contribution from wildfires should warrant the time spent to estimate these emissions. Many of the other sectors are estimates as well.

PCPW Comment #8

SBC's Response: This is understood, however there was not sufficient time allowed in this particular inventory, or a detailed protocol for calculating emissions, for wildfire emissions to be included in this inventory. If the County is able to access data, it is encouraged to update this inventory as needed.

PCPW's Response: The time and effort should be dedicated to performing this inventory from this source. Why submit an inventory that leaves out a source that contributes so greatly to Plumas County's total emissions? This document will undoubtedly be used to drive future reduction efforts. Omission of this source will result in the misdirection of resources and make it more difficult for Plumas County to achieve its local reduction goals.

PCPW Comment #9

SBC's Response: SBC commented.

PCPW's Response: Comment has been adequately addressed.

PCPW Comment #10

SBC's Response: SBC commented.

PCPW's Response: Comment has been adequately addressed.

PCPW Comment #11

SBC's Response: SBC commented.

PCPW's Response: Comment has been adequately addressed.

PCPW Comment #12

SBC's Response: Not addressed.

PCPW's Response: PCPW requests that this comment be addressed.

PCPW Comment #13

SBC's Response: SBC commented.

PCPW's Response: Comment has been adequately addressed.

PCPW Comment #14-A

SBC's Response: SBC commented by adding a paragraph to the report.

PCPW's Response: An attempt should be made to quantify emissions from the rail system including impacts associated with engines idling for hours in the Portola rail yard.

PCPW Comment #14-B

SBC's Response: SBC commented.

PCPW's Response: Comment has been adequately addressed.

PCPW Comment #15

SBC's Response: Not addressed.

PCPW's Response: PCPW requests that this comment be addressed.

PCPW Comment #16

SBC's Response: There is no protocol for estimating these emissions, therefore they were not accounted for in this report. If the County has available data, then it should be included in an updated inventory.

PCPW's Response: PCPW requests that this comment be addressed.

PCPW Comment #17

SBC's Response: SBC commented.

PCPW's Response: Comment has been adequately addressed.

PCPW Comment #18

SBC's Response: SBC commented.

PCPW's Response: Comment has been adequately addressed.

PCPW Comment #19

SBC's Response: I reached out to the farm advisor and received no response.

PCPW's Response: Additional effort should be made to contact the Farm Advisor.

PCPW Comment #20

SBC's Response: SBC commented.

PCPW's Response: Comment has been adequately addressed.

PCPW Comment #21

SBC's Response: SBC commented.

PCPW's Response: Comment has been adequately addressed.

PCPW Comment #22

SBC's Response: SBC commented.

PCPW's Response: Comment has been adequately addressed.

PCPW Comment #23

SBC's Response: This type of analysis of what tasks are most effective would be completed as part of the development of a climate action plan. The County can update the report as seen fit.

PCPW's Response: Regardless, the efforts of the Plumas County Fire Safe Council and their efforts in reducing catastrophic wildfires should be included in the report.

From: Heather Kingdon [mailto:heatherandbrian.kingdon@gmail.com]
Sent: Wednesday, November 28, 2012 5:13 PM
To: Wilson, Randy; leah wills; Chris Reilly; Meacher, Robert
Cc: Amber Coates (Rossi); Alicia Knadler; Marie Anderson; Paul Roen; Sharon Thrall; Gary Brown; nunes Bill; Todd Anderson; Swofford, Terrell; Susie Pearce; Bill Copren; Jeff Carmichael; Emily Creely; Charles Neer; villagedrugco@gmail.com; Simpson, Lori; John Olofson; Kennedy, Jon; The Van Fleet's; Albert & Joyce Wangsgard; Carol Viscarra; Carol Dobbas; Holly George; Dave Goicoechea; Nils Lunder; Robert Foster; smithrancheatbeef@gmail.com; Mike Lydon
Subject: list of concerns..General Plan Draft..Water Recourses section attached

Objections: From the Ag point of view...Indian Creek drainage.

1. The below paragraph must be omitted- it is completely false and outdated. This paragraph is antiquated and divisive. I1-1

Water Resources
.Page 2-third Par.-
Many tributaries exhibit some level of degradation due to human activities....This is not correct-
much of the degradation is due to severe floods and erosion would have happened if "we " were here or not. (this is written primarily for grant funding and is detrimental to our livelihoods.)
Our water surface quality has very few issues directly related to Ag. practices.-we are in compliance with the Clean Water Act. The Upper Feather Watershed Group has been in place and active in monitoring our water throughout our usage areas for over 6(?) years.
Water diversion??? What is this supposed to mean...the water diversions that have been in place in the Indian Creek Decree for example, have been operating since the 1800's and our ditches and canals also act as a conveyance for the water runoff during the winter storm season.
Irrigation practices??? Again we (Ag.) producers /water right holders have been in compliance with all aspects of the Clean Water act.
This paragraph must be struck from this General Plan document as it is untrue and misleading.
Grazing??? What this watershed needs is more grazing....These statements are antiquated and slanderous. There have been multiple studies in which it has been proven over and over that grazing helps the health of the watershed and surrounding areas.
To update this document these aspects must be rewritten. (check with Holly George)

The most negative aspects happening now to our drainage area and watershed in

recent years has been caused by the implementation of Pond and Plug projects by the Feather River CRM/Plumas Corp. I1-1 cont.

The water quality is degraded.

The water Quantity is degraded..in late season.-increased evapotranspiration.

The water temperatures are higher in the vast number of stagnant ponds

These projects wash-out and their contribution to sediment flows are extensive.

The negative impact to aquatic life is extreme. Detrimental to fisheries.

Creeks being destroyed and completely dried-up in late season.

Much of the lack of riparian vegetation in our area was due to epic floods and the Army Corps of Engineers in 1967, when they bulldozed the stream banks and took out all the willows and sloped the banks..for a clear path.

Page 5.
The FRCRM is no longer a separate entity.
Shouldn't UFRWG also be listed...since We are the holders of the Rights to use California's water

Page 6
-W 9.2.6 County shall ensure the BMP to control erosion...sediment will be incorporated into dev. design and improvements...What is this in relation to?
Will BMP's be expected on FRCRM projects as well? For these FRCRM projects in the past have contributed greatly to the for-mentioned..

pg.7-Water Resource Adaptation
W 9.3.1....this insert sets an open ended situation in relation to our adjudicated water rights.....This is not acceptable.

9.3.2...is good!:)

W-9.4...EXPORT of water....??For Sale??? for our(water right holders) protection?
9.4.1...Examples???of new developement projects..to mitigate potential impacts..seems very vague.

9.4.2...this is good except where as the FRCRM is concerned, this has not been practiced....at all.

9.4.6..Export Projects ?-Examples?...In an average growing season there is little to No excess water to export. Is this referring to persons,entities who have springs that originate and end on their property?.For bottling?..or is this a larger scale endeavor? Heart K???

Page.18....#5....concerning....how will this be transfered?...bypassed diversion points? ...measured? More questions then answers. Water not used by the above water right holder is used by the next diverter within their adjudicated water right.

That's all for now...:)

From:	Wilson, Randy
To:	Terri Andersen
Cc:	Settlemire, Craig; Mansell, Steve; Cortez, Liz; Coleen Shade; Ray Weiss; Herrin, Becky
Subject:	RE: "2035 Plumas County General Plan DEIR"
Date:	Thursday, November 29, 2012 8:22:43 AM

Todd and Terri

Thank you for commenting. Your comment will be forwarded to the Consulting Team who will develop a response to your comment in the Final EIR.

Randy

From: Terri Andersen [mailto:andersenterri@gmail.com]
Sent: Thursday, November 29, 2012 8:16 AM
To: Wilson, Randy
Subject: "2035 Plumas County General Plan DEIR"

Date: 11/29/2012
To: Randy Wilson, Plumas County Planning Director

From: Todd and Terri Dabney-Andersen, 15389 Old Wagon rd. (HWY 89

Crescent Mills, CA

Subject: "2035 Plumas County General Plan DEIR"

I2-1

The Integrated regional water management Plan (IRWMP), for the upper Feather River watershed dated 2005 has false and misleading information in it, section 4.7 page 64 Indian Valley Groundwater basins. This violates water code section 10534. Water Code Section 10534 state "At a minimum, an Integrated Regional Water Management Plan describes the major water-related objectives and conflicts within a region" The water resources flowing from Green Mountain Mining Tunnel #6 or diversion box number 123 in Crescent Mills CA, is not within Indian Valley Watermaster service area when the boundaries were drawn. The California Department of Water Resources is not responsible for managing these water resources. This is a conflict within the region (Upper Feather River Watershed).
Water Code Section 238: (a) "The California Department of Water Resources shall conduct studies of the Sacramento River and the Feather River and their tributaries north of Sacramento, including watershed hydrologic inventories and studies of water sources" etc.
Plumas County Flood Control and Water Conservation District, Planning Department, Public Works Department and the California Department of Water Resources should have already been aware of The Conflict (The water resource flowing from Green Mountain Mining Tunnel # 6 before the year of 2005 when the Integrated regional water management plan for the upper Feather River watershed dated 2005, was signed and submitted to the people of California as a truthful document. Conflicts within the region needed to be address prior to grants being issued using the Integrated Regional Water Management Plan (IRWMP), for the upper Feather River

I2-1 cont.

watershed dated 2005.
2035 Plumas County General Plan (DEIR) is basing/using The Intergraded Water Management Plan for the Upper Feather Watershed, dated 2005 throughout the DEIR based on False and Misleading information.
On November 15 2012, I attended Plumas County's Planning Commission and submitted documented documents for the Plumas County Planning Director, to make copies and pass this out to all the Planning Commissioners. (1) was a letter from the California Department of Water Resources, dated July 27, 2012, (2) A judgment from Plumas County Superior Court, dated March 17, 1914, (3) Water code section 10534 and many other water codes section. Once water code section 10534 is deemed to be violation, many other water code sections would have been violated.
We will be e-mailing this document to Randy Wilson on 11/29/2012. We will follow it up with a hard copy, hand delivered with all the above documentation we have mentioned. Todd and Terri Dabney Andersen.

--
Todd and Terri Andersen

From:	Wilson, Randy
To:	Coleen Shade; Ray Weiss; Herrin, Becky
Cc:	Settlemire, Craig; Mansell, Steve; Cortez, Liz; Herrin, Becky
Subject:	FW: General Plan Comments
Date:	Wednesday, January 02, 2013 1:59:15 PM
Attachments:	GP DEIR Comments (2).pdf

FYI

From: Richard Floch [mailto:richard.floch@comcast.net]
Sent: Wednesday, January 02, 2013 1:01 PM
To: Wilson, Randy
Cc: Mark Nicholson
Subject: Re: General Plan Comments

Randy,

In that case, please accept the attached as Lake Almanor Associates, LP's official comment letter on the General Plan DEIR. It is identical to the letter Mark sent previously except it is in pdf format and bears his signature. I3-1

_____
Richard Floch

On Dec 31, 2012, at 10:08 AM, Wilson, Randy wrote:

Mark

I am forwarding your comments to the consulting team who will address your comments for the Final EIR.

Randy

Richard Floch AND ASSOCIATES

MEMORANDUM

December 3, 2012

TO: Randy Wilson
FROM: Richard Floch
SUBJECT: Plumas County General Plan and Draft EIR

Becky Herrin sent me a copy of the DEIR for the proposed General Plan for which I want to thank you and your staff. In reviewing it, I noticed a number of things that are of concern to me both as a planner who has been involved with and committed to major undertakings in Plumas County for well over a decade and as the representative to the owners of the Lake Front project. I have shared these concerns with Mr. Nicholson and he asked me to prepare this memorandum as background to a discussion that we need to have as soon as possible. I3-2

You and I are both well aware of the difficulties of undertaking good planning and achieving real economic progress in Plumas County, given its general remoteness in the marketplace and severely limited economic resources. Yet I have always felt that we share a common goal to make the most of the opportunities that present themselves and to work together to make something positive happen. I think that given the fact that the Lake Front project embraced a number of public objectives articulated by the County, such as providing low and moderate income housing, agreeing to implement sustainable principles, and having a willingness to address major infrastructure deficiencies in bringing modern wastewater treatment and water recycling to the Lake Almanor area. This is is proof of our good faith effort to work together with the County to implement those common goals. It is clear, at least in the case of traffic, that this work is unfinished.

As you recall, perhaps the greatest difficulty in the processing of the Lake Front project was that neither the State nor the County had the resources to deal with future traffic needs in the region, particularly with State highways. Traffic Engineers were working on both the state/bi-county ARTA[1] process concurrently with the processing of our project and the EIR for Lake Front (which was prepared under County direction and analyzed for LOS "C" standard using a more detailed intersection-capacity utilization method). This showed similar results, indicating a need for significant road and highway improvements in the future. As a result, the County imposed conditions on Lake Front to pay what it considered its fair share

[1] The "Almanor Regional Transportation Assessment" or ARTA process was a joint undertaking of CALTRANS, Plumas and Lassen Counties in 2008 and 2009 which I monitored closely that examined future traffic needs under three LOS scenarios, LOS C, LOS D and LOS E given a planning horizon of 2030. The results of the ARTA effort is cited in numerous places as a basis of the traffic analysis in the Draft EIR for the proposed General Plan which has a similar time frame of 2035. However ARTA examined a total of 16 highway segments of SR 36, SR 89 and SR 147 in the Lake Almanor area, a considerably more detailed level of analysis than the County General Plan undertakes, which examines only 9 segments in the entire County. A number of capacity improvements were identified depending upon LOS standards to be implemented. LOS C level improvements were essentially similar to those identified in the Lake Front EIR since they correspond to the same regions of the County and same cumulative growth. It's final report calculated a traffic mitigation fee on all future residential units of $10,700, $8,800, and $5,500 respectively for each LOS standard, would be necessary to fund improvements. No fees were ever adopted by Plumas or Lassen County, however.

of planned improvements (estimated to be typically 20-25% depending upon the specific improvement project). Traffic mitigation fees of $7,000 to nearly $10,000 per unit were imposed by the County as Lake Front's fair share. I3-2 cont.

At no point was it apparent how the County's 75-80% of the cost of those improvements might be generated given the fact that the fees recommended in the ARTA process had not been adopted. We understood, however, that the County was undertaking a new General Plan for which an EIR would be developed that would also have to deal with future traffic impacts. For that reason a provision was included in our Development Agreement that states that when Plumas County implemented traffic mitigation measures in its new General Plan, those measures as they apply to the Lake Almanor Region or the County as a whole, will prevail over the mitigation program stipulated on Lake Front in the D.A. We were confident that this would also resolve the problem of the unfunded County share of needed improvements for which we had been required to pay our "fair-share", and would provide a basis for the imposition of fees on ALL future growth and development in an equitable manner.

Now that the DEIR for the General Plan has been released, instead, we see that it takes the position that "No feasible mitigation method is available to reduce the significance of this impact (*traffic impacts to SR 36*) to a level less than significant."[2]

It is evident to us that the County's own recent record of certifying the EIR for the Lake Front project and accepting the final ARTA report (which is cited by reference in the General Plan EIR, itself) do not support this finding and that the DEIR does not provide full disclosure required by CEQA. More specifically:

- Despite the fact that the General Plan DEIR cites the ARTA study as a reference in its traffic analysis, it fails to disclose the fact that this reference contains a more detailed analysis than the nine road segments examined by by LSC Consultants for a similar cumulative growth horizon and under a similar LOS D standard. The DEIR also fails to either disclose or resolve the major differences in the impacts found and the fact that feasible mitigation measures do exist and methods of funding them are identified in the ARTA study. I3-3
- The failure of the County to address cumulative traffic impacts in any serious way for future development allowed under the proposed General Plan creates an inability to perform the traffic mitigation which the County, itself, required under the Lake Front Development Agreement. 75% of that mitigation requirement is the responsibility of cumulative growth that is allowed under the County General Plan for which no funding will exist. I3-4

Fundamentally Lake Almanor Associates, LP and the County share common goals for good planning and economic development. We have a common interest in the economic future of Plumas County by playing a major role in its development and in providing jobs for years to come. Lake Almanor Associates has always sought to avoid conflict with the County I3-5

[2] *DEIR for the General Plan*, Page 4.2-19

and only wishes to be treated on a equitable basis with all of its other land owners and to be subject to the same rules. I3-5 cont.

It is my professional opinion that despite the fact that Plumas County development has historically been at a disadvantage in the marketplace due to its remoteness, there are changes occurring in how people live and work that will improve its appeal as a place to live and do business in the future that can be enhanced by a project. Already we can see that advances in telecommunications bring many of the resources that had previously been available in urban areas. This will mean that dependence upon the second home market will be less and less important for places like Plumas County.

Our national economy is already transitioning away from a manufacturing base to a service and distribution economy. Telecommunications makes new concepts like “work-at-home” and “shop-at-home” a reality for many. Even before the recession there were over 18 million home-based businesses (over 12% of all US households) and another 35 million active home offices nationally. These trends not only make places like Plumas County more viable as a place to live and conduct business, but they also mitigate against automobile dependance and the eventual need for more traffic related highway improvements. When taken together with the ever increasing cost of fuel, it may be that highway capacity improvements based upon historic patterns of automobile use, will be entirely unnecessary.

The Lake Front ownership group is conscious of these trends as well, and believes that parts of their project can be targeted to these emerging markets. The Lake Front Partners cannot be required to provide public infrastructure in a different manner than other undeveloped sites. Nor can they be in the untenable position of trying to build out a project and the other public infrastructure they have committed to such as public water and wastewater systems, in an unequal regulatory and financial environment such as would be created by the decision of the County to apply traffic mitigation fees on Lake Front that it is unwilling to apply to any other benefitting property.

If the County takes the position that it cannot support the idea that it will impose fees on private owners to build improvements to State highways that the State will not fund itself (and which may ultimately not be necessary) we do not disagree. Such fees have a deadening effect upon the local economy, reduce the competitiveness of Plumas County in the region and ultimately are counter-productive to everyone. Lake Front’s position is to be treated under the same rules as all other land owners in the County. To do otherwise should be as unacceptable to the County as it is to us. If the County intends to adopt overriding considerations for its General Plan and does not adopt significant traffic mitigation on an equitable basis to what it has required of Lake Front, Lake Almanor Associates will likely be unable to proceed with their project as it is currently conditioned.

In speaking to Mr. Nicholson, after reviewing the General Plan EIR, he believes it is vital to meet with you and Supervisor Thrall before the close of the comment period on the General Plan DEIR to discuss how to avoid this critical problem which I believe jeopardizes both our project and the new General Plan.

From:	Wilson, Randy
To:	George Terhune
Cc:	Alan Holloway; Bill Mainland; Herb Bishop; William Weaver; Herrin, Becky; Coleen Shade; Ray Weiss; Settlemire, Craig; Mansell, Steve; Cortez, Liz
Subject:	RE: Comment on the Draft GP EIR
Date:	Monday, January 07, 2013 7:45:21 AM

George

Thanks I will forward to the consulting team so that this can be addressed in the Final EIR.

Randy

From: George Terhune [mailto:gterhune@sbcglobal.net]
Sent: Thursday, December 13, 2012 3:13 PM
To: Wilson, Randy
Cc: Alan Holloway; Bill Mainland; Herb Bishop; William Weaver
Subject: Comment on the Draft GP EIR

Randy,

Attached are my comments. These are my personal comments, not intended to represent the ALUC. I4-1

Amendment of the ALUCPs would seem to be the most likely way to set up the process of regulating new private airports and heliports, and authority to amend those plans would best be included in the adoption of the new General Plan and an amended Zoning Ordinance by the BOS. Since we are very unlikely to have a new private airport come about right away, I think we can wait on the PC and BOS actions before taking ALUC action.

Also, instead of amending the ALUCPs, it may be possible to deal with this issue in the ALUC Rules and Regulations.

I think we should work out a plan of action on these issues, and at least get ALUC input by email if not in a formal meeting, then be ready to present that plan to the BOS when they are considering the adoption of the new General Plan.

George

December 13, 2012

Comments on the Plumas County General Plan Draft EIR by George Terhune.

The Draft General Plan and EIR reference the Airport Land Use Compatibility Plans for the three public use airports in Plumas County, and appropriately support the regulation of land uses near those airports. But the need to deal with the possible development of a private use airport or heliport is not addressed.

There are both Federal and State regulations governing the development of private use airports, which establishes a precedent and some justification for such land use in general terms. Therefore I believe the County has an obligation to provide "due process" by which a person could apply for approval of a private use airport and have that application appropriately considered.

The Airport Land Use Compatibility Plans deal mostly with newly proposed land uses in the Airport Influence Areas around existing public airports. The Airport Land Use Commission also deals with any application to create a new public airport.

I4-2

I suggest that the General Plan and the General Plan EIR should state that the Airport Land Use Commission is expected to deal with new private airports or heliports on the same basis and for the same reasons as it would deal with new public airports. That would provide support for the ALUC to develop specific criteria for approval of such developments, and initiate appropriate due process for consideration and action on the basis of those criteria. In the EIR this would be almost entirely an issue of Public Safety, and the appropriate mitigation of the hazards involved would be evaluation of each proposed new private airport or heliport by the ALUC.

Since the balance of public benefit against public safety would almost certainly be quite different for a private airport or heliport compared to a public airport, I would expect it to be very difficult to justify any specific proposal for the private facility. But the possibility should exist and the judgment should be made on specific criteria that the ALUC is in the best position to develop and apply.

/s/ George Terhune

December 19, 2012

RECEIVED
DEC 19 2012
PC Planning + Building

To: Randy Wilson, Planning Director
Plumas County Planning Department

From: Larry A. Fites

Re: Plumas County General Plan Update,
Draft EIR

I believe that the Draft EIR fairly appraises the potential impacts, and prescribes suitable mitigation measures for the contemplated effects of future actions. The following comments and suggestions are intended to make the two documents more effective. I5-1

Figures 3. I recognize that the large office copies of the planning area maps are available for specific interpretation; however, the plats in the draft document need to be more readable. Readability and interpretation would be improved if the boundaries of the respective Planning Area Details were clearly delineated on the applicable, shaded, planning area on the Key Map. I5-2

Figure 3.6. Mohawk Meadows should be clearly delineated and shaded. It appears as nothing (?) now. I presume that it's the same land use designation as Valley Ranch Estates. I5-3

Table 3.8. The Department of Finance has recently issued new population projections for 2010-2050 that are significantly reduced from the projections listed in the Draft. The new projections should be used. I5-4

Figure 4.2. A circulation diagram should be included for Mohawk Valley. This is an area of significant future growth; and there will be a need for planning additional major circulation facilities, including Middle Fork crossings. I5-5

Pg. 4.9-4, para. 6. Eastern Plumas Healthcare District provides ambulance service within its District boundaries. I5-6

Table 4.9.2. Graeagle Fire Protection District currently has no Station #2. Its construction is pending. I5-7

Pg. 4.9-16, et. seq. It should be clearly articulated that fair share funding will include the provision of warranted facilities and services for special districts (and public utilities), not just Plumas County Departments. I5-8

Pg. 4.11-21, et seq. It should be indicated what level of significance - Unlikely, Low Potential, Medium Potential, High Potential - requires a Special Survey. I5-9

January 2, 2013

Mr. Randy Wilson, Planning Director
Plumas County Planning Department
555 Main Street
Quincy CA 95971

Subject: Comments on Draft EIR for 2035 Plumas County General Plan

Dear Mr. Wilson,

The following comments are submitted by Lake Almanor Associates, LP in regard to the Notice of Availability dated November 19, 2012 and circulation of the above Draft EIR for comments. I6-1

After a careful review of the above DEIR, we believe it contains a number of serious deficiencies, fails to meet the requirements of Public Resources Code §21000-21177 (CEQA) and the California Code of Regulations §15000-15387 (CEQA Guidelines), and should not be certified until the deficiencies are corrected and a revised DEIR is recirculated.

Traffic and Circulation

1. The analysis of traffic related impacts in the DEIR is based upon an inadequate analysis of only 9 State Highway segments in the entire County of which only four are located in the critical Lake Almanor-Westwood region, which has the highest capacity for growth under the proposed 2035 General Plan. No potential impact is examined for any County Road or intersection. The lack of an adequate traffic analysis in the General Plan EIR also brings into question the adequacy of all potential effects of the General Plan that are dependent upon the effective mitigation of traffic congestion, including potential noise impacts, air quality impacts, and any compressive analysis of Greenhouse Gas Emissions. I6-2

2. The DEIR Traffic Impact discussion (§4.2) and Appendix C (Traffic Analysis) contain many references to the Almanor Regional Transportation Assessment (ARTA)[1] process as a primary basis for traffic analysis. Since the "project" analyzed in the DEIR is the General Plan, itself, there is a clear relationship between the cumulative regional traffic projected and analyzed by ARTA and the "existing plus project" conditions discussed in the DEIR. Yet the DEIR fails to disclose the conclusions of substantial traffic related impacts by 2030 found in the ARTA study under a more detailed level of analysis than that performed in the DEIR, itself, under similar LOS criteria and within the time frame of the 2035 General Plan. Although the DEIR finds that one of its analyzed road segments (SR 36 east of Chester) will reach LOS D under existing plus project scenario, evidence in the cited ARTA Reports shows a far greater level of potential traffic congestion at key locations within this section of I6-3

[1] The ARTA process was joint effort of Caltrans, Plumas and Lassen Counties from 2006 to 2008 to examine future traffic needs and traffic mitigation funding alternatives in the Lake Almanor-Westwood region. It analyzed projected cumulative traffic at 16 State and County road segments in the study area and identified a number of capacity improvements necessary by 2030 under LOS C, D and E scenarios. ARTA produced two primary reports: *Almanor Regional Transportation Assessment, Final Report*, September 2008; and the *Almanor Regional Transportation Assessment, Financial Report*, September 2008.

SR36 as well as other locations in the region that were not even examined in the DEIR. These are shown in Table 15 of the Final ARTA Report as follows[2]:

I6-3 cont.

Table 15 - Year 2030 Roadway LOS, Without Improvements

Segment	County	Route	Road From	Road to	Existing LOS (2005)	Year 2030 LOS
State Route 36						
1	TEH/PLU	36	Jct. SR 32	Jct. SR 89	C	D
2	PLU	36	Jct. SR 89	Collins Drive (Begin 4-lane)	D	E
3	PLU	36	Collins Drive (Begin 4-lane)	North Fork Feather River Bridge (End 4-lane)	D	E
4	PLU	36	North Fork Feather River Bridge	Melissa Avenue	D	E
5	PLU	36	Melissa Avenue	Begin Passing Lane	C	E
6-EB	PLU	36	Begin Passing Lane	Jct. Cnty Rd. A-13 (Big Springs Road)	B	C
6-WB	PLU	36	Jct. Cnty Rd. A-13 (Big Springs Road)	Begin Passing Lane	D	E
7	PLU/ LAS	36	Jct. Cnty Rd. A-13 (Big Springs Road)	Jct. SR 147	C	D
8	LAS	36	Jct. SR 147	Delwood Street (Begin 50 mph)	B	C
9	LAS	36	Delwood Street (begin 50 mph)	Jct. County Road A-21 (Pittville Road)	B	C
10	LAS	36	Jct. County Road A-21 (Pittville Road)	Goodrich Creek Bridge (#7-48)	B	C
State Route 89						
1-NB	PLU	89	Forest Service Road 27N80	Jct. SR 147	C	D
1-SB	PLU	89	Jct. SR 147	Forest Service Road 27N80	D	D
2-NB	PLU	89	Jct. SR 147	Jct. SR 36	C	C
2-SB	PLU	89	Jct. SR 36	Jct. SR 147	C	C
State Route 147						
1	PLU	147	Jct. SR 89	County Road A-13	B	C
2	PLU / LAS	147	County Road A-13	Begin 35 mph	B	C
3	LAS	147	Begin 35 mph	County Road A-21	B	C
4	PLU / LAS	147	County Road A-21	Jct. SR 36	A	C

Notes:
1. The year 2030 service levels assume the predicted land use growth, without capacity improvements to the transportation system.

[2] *ARTA Final Report*, September 2008, page 29

3. Although Table 4.2-4 in the DEIR cites a number of "mitigating policies" contained in the Draft General Plan, these generalized policy statements are typically little more than statements of intent or relate to standards or plans that have no measurable effect upon traffic capacity impacts. The DEIR fails to make a good faith attempt to identify any other form of traffic mitigation. I6-4

4. Despite substantial evidence contained in the ARTA reports, the DEIR erroneously, and without basis, concludes that "No feasible mitigation is available to reduce the significance of this impact to a level of less than significant. Therefore, this remains a *significant and unavoidable* impact."[3] This statement is unsupported by any evidence in the DEIR, and is untrue. To the contrary, the cited ARTA Report identifies a number of *specific* traffic capacity improvements including intersection improvements, additional lanes, passing lanes, and signalization improvements that will be necessary to maintain the LOS D standard used in the General Plan. These are shown in Figure 10 from the ARTA Report (attached as Exhibit 1) and would constitute actual mitigation measures that are available and which can be implemented. In fact, the entire purpose of the ARTA process was to identify such mitigation measures to avoid future traffic congestion and to identify feasible funding mechanisms for their implementation. As an example, the ARTA Financial Report evaluated the cost of mitigation improvements under LOS scenarios, including LOS D, and projected potential traffic impact development fees for various land uses. The ARTA Report concludes on page 41: I6-5

   > *"If the roadway LOS is maintained at the "D" threshold, the improvement cost is estimated at $81.5 Million*[4] *(2007 dollars). This estimate includes improvements for seven roadway segments and six study intersections."*

   On December 16, 2008, the Plumas County Board of Supervisors unanimously adopted *Resolution 08-7523*[5], finding that the ARTA process was "...a reasonable and comprehensive evaluation of future conditions...likely to occur as a result of future development... (and) that ARTA should be considered during preparation and administration of the General Plan for Plumas County." The DEIR not only fails to do so but fails to disclose that the ARTA process contains the very mitigation measures and feasible financing mechanisms to mitigate traffic impacts that it finds are "unavailable".

5. A Notice of Availability of the DEIR for the 2035 General Plan was sent on November 19, 2012 to all parties who had requested copies of the DEIR along with a CD-Rom that contained the DEIR. However that distribution did not contain any of the supporting materials contained in Appendices including the Traffic Analysis in Appendix C. Nor were these appendices available on the County Web site at the time of distribution. Although Appendix C was provided to us by staff upon request at a subsequent date, the fact remains that the circulation of the DEIR and request for public comments was flawed and did not conform to the requirement under §15200 of the California Code of Regulations by providing adequate time for the public to review and comment on the entire document. The DEIR I6-6

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[3] DEIR, page 4.2-19

[4] A residential traffic impact fee of $8800 per unit was identified as providing full funding to achieve LOS D even if no other funding source became available and is shown as Exhibit 2. *Almanor Regional Transportation Assessment, Financial Report*, September 2008.

[5] Resolution 08-7523 attached as Exhibit 3.

should be revised and recirculated once it is revised and meets the standards under CEQA for full disclosure. I6-6 cont.

The proposed 2035 General Plan constitutes the *only* opportunity for the County to address cumulative traffic in a comprehensive manner over the next 20 or more years and to develop appropriate mitigation measures to minimize traffic related impacts in a way that equitably spreads the cost of mitigating the impacts of growth allowed under the General Plan over all new development that contributes to those impacts. The lack of full disclosure of the facts surrounding this issue in the EIR for the 2035 General Plan is a major deficiency in the process and a violation of CEQA. Its failure to make a good-faith effort to address necessary road capacity improvements within the General Plan horizon of 2035 as part of an overall program to reduce future congestion and vehicle miles traveled (vmt) is contrary to the stated goals of the 2035 General Plan to have an adequate circulation system and would be a disservice to all existing and future residents of Plumas County. I6-7

Respectfully Submitted,

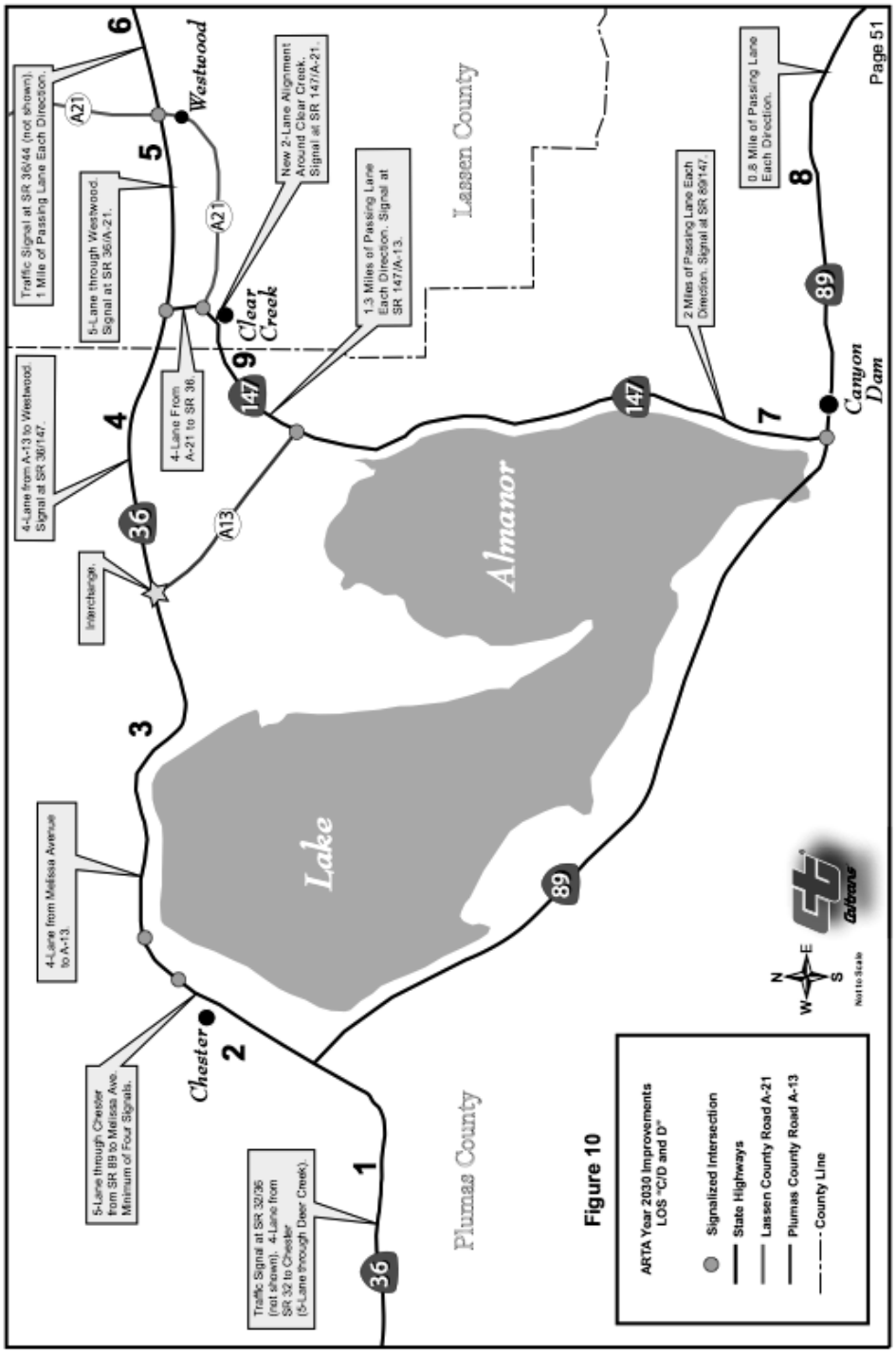
Mark Nicholson
General Partner, Lake Almanor Associates, LP

Attachments

Cc: Supervisor Thrall

Subject: Comments on Draft EIR for 2035 Plumas County General Plan

Exhibit 1: ARTA, LOS "D" Needed Traffic Improvements



5

Subject: Comments on Draft EIR for 2035 Plumas County General Plan

Exhibit 2: ARTA, LOS "D" Traffic Mitigation Fees

ALMANOR REGION
FINANCIAL ANALYSIS

Step 8: Calculate Impact Fee for Each Land Use Category

Level of Service "C/D" Standard

Based on the nexus analysis and the assumption that Traffic Impact Fees are the only funding source utilized to improve the transportation system, the maximum Traffic Impact Fee for each development type at the LOS C/D standard would be as follows:

- Single Family Dwelling Unit: $10,700 per unit
- Secondary Dwelling Unit: $10,700 per unit
- Commercial: $25.29 per square foot
- Dyer Mountain Development: $6,487,000

Level of Service "D" Standard

Based on the nexus analysis and the assumption that Traffic Impact Fees are the only funding source utilized to improve the transportation system, the maximum Traffic Impact Fee for each development type at the LOS D standard would be as follows:

- Single Family Dwelling Unit: $8,800 per unit
- Secondary Dwelling Unit: $8,800 per unit
- Commercial: $18.33 per square foot
- Dyer Mountain Development: $5,387,000

Level of Service "E" Standard

Based on the nexus analysis and the assumption that Traffic Impact Fees are the only funding source utilized to improve the transportation system, the maximum Traffic Impact Fee for each development type at the LOS E standard would be as follows:

- Single Family Dwelling Unit: $5,500 per unit
- Secondary Dwelling Unit: $5,500 per unit
- Commercial: $13.00 per square foot
- Dyer Mountain Development: $3,324,000

Subject: Comments on Draft EIR for 2035 Plumas County General Plan

Exhibit 3: Plumas County Board Resolution 08-7523

RESOLUTION NO. 08- 7523

**RESOLUTION OF THE BOARD OF SUPERVISORS
OF THE COUNTY OF PLUMAS
CONCURRING WITH THE
ALMANOR REGIONAL TRANSPORTATION ASSESSMENT
(ARTA)**

WHEREAS, the Plumas County Board of Supervisors is responsible for development and implementation of the General Plan for Plumas County, which includes Land Use and Circulation elements that address the relationship between land use and local and State transportation system; and

WHEREAS, the California Department of Transportation, District 2 (District 2) is responsible for the planning, construction and operation of the State Highway system, which includes the functional relationship between the State highway system and local road system; and

WHEREAS, District 2 in cooperation with Plumas County and Plumas County has prepared the Almanor Regional Transportation Assessment (ARTA) which evaluates future development potential within the study area based on the existing General Plan for each County; and

WHEREAS, the ARTA evaluates the traffic volumes and transportation impacts likely to occur as a result of future development and identifies improvements to the transportation system at Year 2030 and Build-out that will be necessary to address those impacts; and

WHEREAS, District 2 and the Plumas County Board of Supervisors agree that the ARTA is a reasonable and comprehensive evaluation of future conditions within the study area.

NOW, THEREFORE, BE IT RESOLVED by the Plumas County Board of Supervisors that the ARTA presents a balanced and logical estimate for the development and operation of the transportation system within the study area over the next twenty years.

NOW, THEREFORE, BE IT FURTHER RESOLVED by the Plumas County Board of Supervisors that the ARTA should be considered during preparation and administration of the General Plan for Plumas County.

NOW, THEREFORE, BE IT FURTHER RESOLVED by the Plumas County Board of Supervisors that both the Director of Public Works and the Director of Planning and Building Services are hereby authorized to sign the "Concurrence" block on the signature sheet for the ARTA.

ARTA Resolution of Concurrence
Plumas County Board of Supervisors

12/16/08

Subject: Comments on Draft EIR for 2035 Plumas County General Plan

DULY PASSED AND ADOPTED this 16th day of December 2008 by the Plumas County Board of Supervisors by the following vote:

AYES:	Supervisors:	Powers, Thrall, Meacher, Olsen and Comstock
NOES:	Supervisors:	None
ABSENT:	Supervisors:	None

Rose Comstock, Chair

ATTEST:

Nancy L. DaFormo, Clerk of the Board

ARTA Resolution of Concurrence
Plumas County Board of Supervisors

12/16/08

From: Wilson, Randy
To: Terri Andersen
Cc: Herrin, Becky; Settlemire, Craig; Mansell, Steve; Cortez, Liz; Coleen Shade; Ray Weiss
Subject: RE: "2035 Plumas County General Plan DEIR"
Date: Monday, January 07, 2013 7:41:05 AM

Todd and Terri

Thanks. I am forwarding your email onto the consultant who will address in the Final EIR.

Randy

From: Terri Andersen [mailto:andersenterri@gmail.com]
Sent: Friday, January 04, 2013 8:40 AM
To: Wilson, Randy
Subject: "2035 Plumas County General Plan DEIR"

Date: 01/04/2013

To: Randy Wilson, Plumas County Planning Director

From: Todd and Terri Dabney-Andersen, 15389 Old Wagon rd. (HWY 89)

Crescent Mills, CA APN #111-050-010

Subject: "2035 Plumas County General Plan DEIR"

This letter is a follow up to what Todd Andersen's verbal comments on December 13, 2012, and additional questions for the General Plan DEIR.

There needs to be Land use for Hydrology/Water where no significant mediation measures for a water industry in Plumas County. Hydrology and Water need to be addressed in land use associated with agriculture and forestry where no significant medication measures. I7-1

California Case Law (State of California vs. Hanson dated 1961, 189 Cal App 2d 604; II Cal Rptr335. "... the owner of the land in which it lies, under ordinary circumstances, owns the water as completely as he does the soil." (Simons v. Inyo Cerro Gordo Co., 48 Cal.App. 524, 542 [192 P. 144] [by the Supreme Court on denial of Petition for Hearing]; San Francisco Bank v. Langer, 43 Cal. App. 2d 263, 268 [110 P.2d 687].)

The County of Plumas has signed a Memorandum of Understanding for Coordinated Resource Management and Planning in California. III. Policy "Other agencies, organizations, and individuals will be asked to participate as appropriate".

Questions:

Is the Update to the General Plan for Plumas County considered a planned project?

I7-1 cont.

Is our parcel within this planned project area?

Is our flowing artesian spring addressed within the DEIR?

Why were We not asked to participate in the process form the start of this planed project?

Is our parcel within a special management area?

Is Plumas County required to disclose to all parcel owners when their lands fall into a special management area and groundwater recharge areas?

There are no maps showing groundwater recharge area for protection, this must be disclosed to all parcel owners when their lands are in a protection area?

What Superior Court has adjudicated the right to implement ordnances/plans and policies on ground water within the Indian Valley Ground Water Basin?

How do you protect ground recharging areas on one hand and them allow development on flood plains?

Does Plumas County get compensated for the regulations, Plans and policies in the Draft General Plan (DEIR) The Monterey Settlement Agreement, Monterey Plus?

How does the County of Plumas in the (DEIR), Plan to protect Private Water Rights/origins of Water, without paying compensation for the deminished value of the land?

How do you define the word 'Protection' within the (DEIR)

The "2035 General Plan DEIR"

Financial Conflicts of interest, those exist within the "2035 General Plan DEIR" Planning Commission, Board of Supervisors and County of Plumas.

Plumas County Board of Supervisor's, Building Department, Planning Department has had full knowledge of the spring on the Dabney/Andersen's parcel since 1952, when a house was built on this parcel, using the spring for domestic, livestock and agriculture purposes.

Todd and Terri Dabney-Andersen

Be Happy, Stay Rural!

Board of Directors:
Diane Neubert, President
Judy Lawrence, Vice President
Cindy Ellsmore, Treasurer
Linda Frost, Secretary

Stevee Duber, Project Manager
stevee@highsierrarural.org

High Sierra Rural Alliance

Post Office Box 65
Sierra City, CA 96125

P: 530.868.4449

www.highsierrarural.org

Randy Wilson, Planning Director
Plumas County Planning Department
555 Main Street
Quincy, CA 95971

January 7, 2013

RE: 2035 Plumas County General Plan DEIR

Via: email

Dear Mr. Wilson,

The High Sierra Rural Alliance submits these comments pursuant to the California Environmental Quality Act (CEQA) on the 2035 Plumas County General Plan Update (GPU) and the 2035 Plumas County General Plan Update Draft EIR (DEIR). We commend the County's recognition of the vital importance of directing growth and development in a manner that will invigorate existing communities, preserve resource production lands, and enhance the special rural nature of Plumas County. Balancing the need for growth and development against the equally important need to preserve agricultural lands, timberlands, air quality, water quality and quantity, and ensure public safety requires significant vision and leadership on the part of the County. I8-1

As discussed below, however, the GPU fails to further the County's goals. The GPU relies on unenforceable policies and implementation measures that "encourage," but do not mandate that growth will occur in Planning Areas, with the result that important development decisions are left to the marketplace. Because the bulk of mitigation measures listed in the DEIR are GPU policies, which either lack implementation measures or are not enforceably implemented, the DEIR fails to effectively mitigate potentially significant environmental impacts of the GPU. Indeed, the DEIR often excuses itself from mitigating potential impacts through the refrain: "The County cannot prohibit new development, which would be the only way to

reduce [a particular] impact to a less than significant level." On the contrary, the County can under its police power limit the types of development that may occur in strategic areas in order to realize the goals, objectives and policies of the GPU through its Zoning and Subdivision Code.

I8-1 cont.

The DEIR also does not meet the requirements of CEQA. The DEIR does not sufficiently inform decision makers and the public. As discussed in further detail below, the project is not properly defined or described, the growth analysis is improperly limited, the impacts are not adequately quantified, enforceable mitigation measures are not imposed, the document is internally inconsistent and adequate alternatives are not considered. A decision to approve a project "is a nullity if based upon an EIR that does not provide the decision-makers, and the public, with the information about the project that is required by CEQA."[1]

1. Introduction

I8-2

The purpose of the DEIR is to provide a complete and comprehensive evaluation of the physical impacts of the proposed GPU and inform decision-makers and the public of the environmental impacts of the GPU. The DEIR is intended to identify ways to minimize significant impacts and describe reasonable alternatives that avoid or reduce significant impacts.

The DEIR states that the General Plan Briefing Report (Briefing Report) and the 2035 General Plan Goals and Policies Report (Goals and Policies Report) are incorporated into the DEIR by reference. A single document entitled Draft General Plan and Project Description for the EIR Goals and Policies Report is posted on the County website. Communication with planning staff indicates that this single document is simultaneously the GPU, the Goals and Policies Report and the Project Description for the DEIR. Essentially, as authorized under CEQA Guidelines section 15166, Plumas County has combined the GPU and its EIR into a set of three documents: the Briefing Report which contains information on setting; the GPU which in essence is the project description for purposes of CEQA; and the DEIR which discusses the impacts, mitigation measures and alternatives needed to satisfy the requirements of CEQA. The DEIR identifies "mitigating policies" within the GPU which serve as mitigation measures for purposes of CEQA.

The EIR being prepared for the GPU is a program EIR. It functions as a first-tier EIR. For purposes of reviewing the DEIR, the GPU is both the Project Description for the DEIR and, as explained within the DEIR (page 1-8 thru 1-9) the basis for the subsequent impact analysis,

[1] *San Joaquin Raptor/Wildlife Rescue Center v. county of Stanislaus (1994) 27 Cal.App.4th 713, 721-722 (Quoting Santiago County Water Dist. V. County of Orange (1981) 118 Cal.app.3d 818,829)*

identification of mitigation and establishment of a Mitigation Monitoring and Reporting Program (MMRP). To the extent the GPU is legally inadequate, internally inconsistent, or conflicts with relevant regulations, the DEIR lacks an adequate project description and fails to satisfy its requirement to inform and analyze the Project impacts that may occur. I8-2 cont.

A general plan EIR can be seen as describing the relationship between the proposed density and intensity of land use described by the plan and the carrying capacity of the area. The EIR must evaluate the proposed GPU's effects on both the existing physical conditions of the actual environment and the environment envisioned by the existing general plan.[2] The analysis of significant effects of the GPU cannot be deferred to a later tiered EIR.[3] A general plan EIR is a particularly useful tool for identifying measures to mitigate the cumulative effects of new development.

2. Legal Background

a. General Plan Requirements

According to the office of the California Attorney General:[4] I8-3

> "The General Plan is "at the top of the 'hierarchy of local government law regulating land use[.]'"[5] As the California Supreme Court noted, this basic land use charter governing the direction of future land use is in the nature of a '"constitution; for future development,"[6] and taking some measure of control over future land use is the local government's affirmative duty. "The planning law…compels cities and counties to undergo the discipline of drafting a master plan to guide future local land use decisions."[7]
>
> Thus, a General Plan must be more than a statement of broad but unenforceable policies and goals for the future. It must "designate…the proposed general distribution and general location and extent" of land uses.[8] Finally, a general plan must disclose information to the public in a format that is readily accessible. "A general plan which does not set forth the required elements in an understandable manner cannot be deemed to be in substantial compliance" with planning law.[9] The General Plan must state "with reasonable clarity" what the plan is.[10] Thus, a

[2] *Environmental Planning and Information Council v. County of El Dorado (1982) 131 Cal.App.3d354)*
[3] *Stanislaus Natural Heritage Project, Sierra Club v. County of Stanislaus (1996) 48 Cal.App.4th 182)*
[4] Fiering, Susan, Deputy Attorney General in a letter dated May 27, 2010 to David Bryant, Project Planner in the Tulare County Resource Mangement Agency regarding the Tulare County General Plan and Recirculated Draft Environmental Impact Report. (Attachment A)
[5] *DeVita v. County of Napa (1995) 9Cal.rth 763, 773(internal citation omitted).*
[6] *Id*. (quoting *Lesher Communications, Inc. v. City of Walnut Creek (1990) 52 Cal.3d 531, 542*).
[7] *DeVita, sputa, 9 Cal.4th at p. 773*
[8] Gov. Code Section 65302(a).
[9] *Kings County Farm Bureau v. City of Hanford (1990) 221 Cal.App.3d 692, 744.*
[10] Concerned Citizens of Calaveras County v. Board of Supervisors (1985) 166 Cal.App.3d 90, 97.

reader consulting the general plan must be able to determine with relative ease, the amount of land available for development, the land-use designation of that land, any restrictions on development of the land, and the maximum amount of new development that can occur under the plan."

I8-3 cont.

Population density and building intensity standards are required for all zoning districts. Pursuant to Government Code section 65302 (a) a general plan must contain a land use element that:

"…include[s] a statement of the standards of population density and building intensity recommended for the various districts and other territory covered by the plan." [11]

b. CEQA Requirements:

Again, according to the office of the California Attorney General:[12]

I8-4

"CEQA is one of California's most important and fundamental environmental laws. For more than 40 years, CEQA has guided the State toward sustainable development. As the Act states, it is California's policy to "create and maintain conditions under which man and nature can exist in productive harmony to fulfill the social and economic requirements of present and future generations."[13]

An environmental impact report (EIR) is an informational document intended to provide both the public and government agencies with detailed information about the effects of a proposed project on the environment, to list ways in which those effects can be mitigated, and to discuss and analyze alternatives to the project. A "project" is defined as "the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment…"[14] The project must be adequately described in the EIR,[15] and the entirety of the project must be considered, not just some smaller portion of it.[16]

CEQA further mandates that public agencies not approve projects unless feasible measures are included that mitigate the project's significant environmental effects.[17] CEQA therefore requires that "[e]ach public agency shall mitigate or avoid the significant effects on the

[11] Also see: *Camp v. county of Mendocino (1981)123 Cal.App. 3d 334 and Twain Harte Homeowner's Association v. Tuolumne County (1982) 138 Cal.App3d664.*
[12] Fiering, Susan, Deputy Attorney General in a letter dated May 27, 2010 to David Bryant, Project Planner in the Tulare County Resource Mangement Agency regarding the Tulare County General Plan and Recirculated Draft Environmental Impact Report.
[13] Pub. Resources Code, section 21001,subd.(e).
[14] Cal. Code Regs., tit.14, section 15378, subd. (a)(hereafter "Guidelines").
[15] Guidelines, section 15124
[16] *San Joaquin Raptor/Wildlife Rescue Center v. County of Merced (2007) 149 Cal.App.4th 645m 654,*
[17] Pub. Resources Code, section 21002

environment of projects that it carries out or approves whenever it is feasible to do so."[18] The mitigation measures must be enforceable, rather than just vague policy statements.[19]"

I8-4 cont.

3. Analysis

a. The inadequacies of the GPU confound the analysis of the DEIR

As discussed above the GPU is the Project Description for the DEIR. "An accurate, stable and finite project description is the *sine qua non* of an informative and legally sufficient EIR." "A curtailed or distorted project description may stultify the objectives of the reporting process"[20].

I8-5

Where the GPU does not satisfy state requirements, the project description is curtailed or distorted and the objectives of the reporting process of the DEIR is diminished.

i. The GPU does not contain the location, distribution and extent of land uses for the entire County

The GPU lacks required land use designations and building intensity standards for substantial areas within the County's jurisdiction. A reader of the GPU cannot determine what kind or how much development can occur within vast areas of the County. The GPU does not serve as a yardstick by which a reader could determine the extent of potential future development that could occur in the County under GPU policies.

Lands outside of Planning Areas lack designations on the Land Use Maps (DEIR p. 3-9 thru 3-15, GPU p. 29-33). General plan law requires all lands within the County's jurisdiction to have general plan designations. It seems that the County intends to defer designation of Open Space lands to an unrevealed later date. COS Policy 7.1.1 defines "open space land" as those lands designated Resort and Recreation, Agriculture and Grazing, Agricultural Preserve, Mining Resource, Timber Resource, Lake, Open Space-Significant Wetlands, Scenic area, and Historic Area. COS 7.1.2 requires the County to inventory its open space lands through the mapping of land use designations that qualify for designation as defined in COS 7.1.1. Without designations for all land in the County's general plan, the GPU is inadequate and by extension the project description of the DEIR is also inadequate. If the County intends to apply new criteria to determine what lands are eligible for the Open Space designation, as implied by

[18] Pub. Resources Code sections 21002.1, subd.(b); *City of Marina Board of Trustees (2006) 39 Cal.4th 341,360.*
[19] See Pub. Resources Code 212081.6, subd. (b); *Federation of Hillside and Canyon Associations v. City of Los Angeles (2000) 83 Cal.App.4th 1252, 1261 &n.4 (*agency must take steps to ensure mitigation measures are fully enforceable through permit conditions, agreements, or other measures).
[20] *County of Inyo v. City of Los Angeles (3d Dist. 1977) 71 Cal.App.3d 185, 193*

Implementation Measures AG/FOR 2a, 12, 13, and 14a among others, those criteria should be revealed so that analysis can take place, otherwise the project is being illegally piece-mealed.[21] I8-5 cont.

The GPU does not include required density and intensity standards for several of the land use designations (Lake, Open Space-Significant Wetlands, Scenic Area, Scenic Road, Historic Road, Historic Building, Historic Road, Public Facilities) established in LU 1.2.1. Of twenty-one land use designation categories identified in the GPU only two contain building intensity standards. (GPU p.42-48) Without intensity standards the extent of potential growth and the potentially significant impacts of development cannot be determined. I8-6

Table 1-4 (GPU p. 50-51) attempts to relate land use designations with county zoning code districts, but no information is provided in the GPU which describes what the abbreviations in the table identify or what the zoning districts are. Nor does the Land Use Element identify the extent of the uses of the land allowed in various land use designations. Furthermore, in some instances, for example single family and multiple family residential designations, the GPU defers its authority to determine population density to the Zoning Ordinance. It appears the GPU depends upon the Zoning Ordinance to describe permitted uses within various designations. This is inappropriate because the general plan is at the top of the planning hierarchy. Allowing the tail to wag the dog could result in a situation where essentially a general plan amendment is achieved through a zoning amendment evading statutory regulations regarding general plan amendments.

The reader cannot determine the location and designation of parcels of property zoned for timberland production pursuant to the California Timberland Productivity Act as required by state law. These deficiencies render the GPU inadequate and by extension the project description of the DEIR is also inadequate. I8-7

The complete distribution and general location of land uses under the GPU is impossible to discern from Plan documents. The maps included in the Land Use Element leave substantial areas of land available for development undesignated. Nor does the GPU contain a table indicating the general location, extent and type of land uses that could occur in the various geographic areas of the County. It is "impossible to relate any tabulated density standard of population to any location in the County."[22] Because the GPU does not state "with reasonable clarity" what the plan is, a reader consulting the general plan cannot determine

[21] We do not understand why the County proposes to defer inventorying and mapping open-space lands to the future. The data is available on its geographical information system under current zoning. Without comparing the extent, size and location of land dedicated to agricultural and forest resources between what is presently designated and what is proposed, the DEIR is inadequate.

[22] *Camp v. Board of Supervisors of Mendocino County (1981) 123 Cal.App.3d 334, 350.*

with relative ease, the amount of land available for development, the land-use designation of that land, any restrictions on development of the land, and the maximum amount of new development that can occur under the plan. Without an adequate project description, the DEIR fails its obligation to inform and cannot provide an adequate impact analysis. I8-7 cont.

ii. The GPU as currently drafted is primarily a wish not a plan. I8-8

The DEIR is fundamentally flawed because it assumes without any compelling reason that substantial development will not occur outside of Planning Areas. A key aspect of the Land Use Element is to direct future growth into Planning Areas (DEIR 3-17). The DEIR purports that this project objective is realized in Land Use Policy 1.1.1. Indeed, LU Policy 1.1.1 is invoked frequently as a "mitigating policy" of potentially significant environmental impacts. However, it is precisely in this key policy where the GPU and DEIR fail. LU 1.1.1:

> "The County shall require future residential, commercial and industrial development to be located adjacent to or within existing Planning Areas; areas identified on Plumas County's General Plan Land Use Maps as Towns, Communities, Rural Areas or Master Planned Communities (insert reference to maps here (sic)) in order to maintain Plumas County's rural character with compact and walkable communities. Future development may also be approved within areas for which Community Plans or Specific Plans have been prepared. Small, isolated housing tracts in outlying areas shall be discouraged as they disrupt surrounding rural and productive agricultural lands, forests, and ranches and are difficult and costly to provide with services. Land division may be allowed outside of Planning Areas only when the resulting development complies with all applicable General Plan Policies and County Codes."

Land Use Policy 1.1.1 (GPU p. 39) is a curiously self-canceling and inconsistent policy. The policy requires future residential, commercial and industrial development to be located adjacent to or within existing Planning Areas; while simultaneously allowing future development outside of Planning Areas when it can comply with General Plan Policies and County Codes. Why allow development adjacent to Planning Areas when the Planning Areas already contain designated Expansion Areas? If the GPU requires future development within and adjacent to Planning Areas how can development outside of Planning Areas ever comply with GPU policies? Allowing development outside of Planning Areas conflicts with all GPU objectives. (GPU p.3-5)

Further, the policy is implemented merely by encouragement rather than standard-based parameters that would provide information on the extent and location of future development. (GP p.58, Implementation Measure 1). Despite discouragement of isolated housing tracts in outlying areas, the policy allows an unlimited number of new planned communities in undisclosed locations dependent upon the preference of the market. In several

places the DEIR concedes, "… the exact timing of full build-out under the proposed project is unknown and will ultimately be market driven…" In fact, the bulk of the few enforceable implementation measures in the GPU facilitate increased development throughout the County without constraints on location. Thus, despite GPU goals and assurances that development is directed to Planning Areas, nothing in the Plan prevents a significant portion of future growth from occurring outside of the Planning Areas during the planning horizon. I8-8 cont.

Correcting this fundamental policy, LU 1.1.1 and implementing it with enforceable measures is probably the single most important step the County can take in rectifying the inconsistencies and inadequacies of the GPU and DEIR. Otherwise, the GPU largely leaves the amount and location of new development primarily up to market forces. There is no evidence in the DEIR that the goals of potential developers are compatible with the goals of the GPU.

Similarly, policy LU 1.1.4 simultaneously prohibits land division for residential uses in areas which are not specifically designated for residential uses in the GPU, but then, inconsistently, requires findings to be made for land divisions outside of Planning Areas that include assuring that the clustering of parcels does not convert the primary land use to residential. This implies that land divisions outside of Planning Areas on land not specifically designated for residential use could be divided. The implementation measure for this policy, 4a-d, is equally incomprehensible in its ability to promote Goal LU 1.1. Implementation measure 4a is vague and Measures 4c and 4d are unenforceable. How they relate to limiting the rate of land division for residential uses is not disclosed. I8-9

The DEIR misleads the reader into thinking that all development will take place within Planning Areas which include: Towns, Communities, Rural Areas and Master Planned Communities and Expansion Areas because these are the only areas on the Designation Maps which have been assigned land use designations. However, the GPU does not prevent development on lands that have no designation in the GPU.

Identification of where development may occur is also frustrated by the use of colors on the Land Use Maps which are difficult to distinguish. For example, the difference between Agricultural Preserve and USA is difficult to determine. At least two readers I spoke with assumed all the light green areas on the map which indicate USA lands are designated Agricultural Preserve and the white areas on the maps are Forest Service lands. I8-10

Essentially, the GPU is a hope that development will occur within Planning Areas, but a plan to allow market-driven growth to occur according to developer's wishes. I8-11

iii. The GPU does not contain all required elements.

I8-12

The GPU does not include the Housing Element despite specific references to the Housing Element in Table 1.1 (GPU p.23)[23]. It is therefore impossible for the reader to determine if the rest of the GPU is consistent with the Housing Element and therefore if the DEIR environmental analysis is adequate.

iv. Implementation Measures in the GPU are illegal

I8-13

The Economics Element Implementation measures 16 and 17 which require the County to consider granting variances from development standards to encourage transit-oriented and infill development are inappropriate and illegal uses of the variance.

v. The GPU is internally inconsistent

I8-14

As discussed elsewhere in this letter there are many places where the GPU is internally inconsistent. Therefore, the DEIR is incorrect when it concludes the level of significance is less than significant due to potential conflicts with adopted land use plans. (DEIR Impact 4.1-2 p. 4.1-15)

b. General Plan Policies do not constitute adequate or enforceable mitigation

I8-15

According to the Attorney General,[24]

> "CEQA provides that a public agency should not approve a project as proposed if there are feasible mitigation measures that would substantially lessen the significant environment impacts of the project. Further, in order to ensure that mitigation measures are actually implemented, they must be "fully enforceable through permit conditions, agreement, or other measures.""[25] [26]

The DEIR utilizes GPU policies as mitigation measures which in turn will be the basis to satisfy the requirements for a Mitigation and Monitoring Report Program. However, many of the

[23] Table 1.1 cites Housing Element Section 2.1. This reference does not exist in the GPU or in the online version of the existing Housing Element found on the County's website: http://www.countyofplumas.com/DocumentCenter/Home/View/4337

[24] *Ibid.*

[25] Public Resource Code, section 21081.6, subd. (b)

[26] Fiering, Susan, Deputy Attorney General in a letter dated May 27, 2010 to David Bryant, Project Planner in the Tulare County Resource Mangement Agency regarding the Tulare County General Plan and Recirculated Draft Environmental Impact Report.

"mitigating policies" cited either do not have an implementation measure or the implementation measure is unenforceable. I8-15 cont.

General plan policies on their own are not enforceable measures. The policies must be translated into implementation measures which are enforceable regulations, such as zoning ordinances, subdivision ordinances, specific plans, public project consistency requirements, development agreements, building and housing codes, etc. "An implementation measure is an action, procedure, program, or technique that carries out general plan policy. *Each policy must have at least one corresponding implementation measure.*[27]

Even if policies were enforceable on their own, a large portion of the General Plan consists of unenforceable statements of policies using terms like "encourage"; "require…where feasible"; "shall strive"…; "shall promote"…; "to the extent practicable", "shall avoid"…; "shall establish a plan"…; "shall consider"….; "shall protect….by discouraging"; etc. Likewise, many of the implementation measures in the GPU are merely advisory and lack enforceable language. These advisory statements or promises to plan do not constrain or direct growth in an enforceable manner. They simply state the wish of the County and do not constitute the statutory requirements for a plan.

Regarding unenforceable mitigation measures, the Attorney General's office stated[28]:

> "Until the County adopts mitigation measures that will be imposed and enforced as conditions of all future development projects, the County has not complied with its duty under CEQA to implement mitigation measures to reduce the environmental impacts of the project. There are a number of steps that the County can take to correct these deficiencies. First, and most simply, the County can re-word its policies and implementation measures to make them mandatory and enforceable, not merely advisory.

i. Policies in the Conservation and Open Space Element of the GPU designed to encourage production and conservation of minerals, while preserving other valuable resources lack implementation measures. I8-16

None of the "mitigating policies" (DEIR p. 4.7-23) identified in the DEIR purported to conserve mining resources and limit the development of incompatible land uses have implementation measures. In particular COS 7.4.4 requires preservation of future use areas with potentially important mineral resources by limiting residential or other uses that are considered incompatible with mining operations. The policy does not have an implementation

[27] General Plan Guidelines 2003, p. 16
[28] *Ibid.*

measure; but, the Mining designation inconsistently allows subdivision of mining resource lands into 10 acre residential subdivisions. Besides the Mining Resource Zone, the Mining designation of the GPU seems to contain the Scenic Area, Scenic Road, Historic Area, Historic Building, Historic Road and Public Facilities Zoning Districts (Table 1-4 GPU p.51). Indeed, COS 7.4.2 will allow mining to occur anywhere. There is no explanation within the GPU about how mining will be permitted in Zones other than Mining Resource Zones, or how incompatibility issues will be minimized except through broad and inconsistent policy statements. Inconsistent with Government Code 65302(a), the Land Use Element does not provide information regarding the distribution and location of mineral resources or provisions for their continued availability. The DEIR cannot find that the proposed project will not result in the loss of availability of a known mineral resource because it has not informed us what and where those resources are. Likewise, the DEIR cannot determine that mining projects will not cause land use conflicts because the GPU inconsistently allows incompatible uses in the Mining Resources designation.

I8-16 cont.

ii. Policies in the Water Element of the GPU designed to protect, enhance and restore water quality lack enforceable implementation measures.

I8-17

Implementation Measure Water 2 requires channelization of "vegetation". We expect that is a typo and the measure is meant to channel water. Exactly how or why this measure would adequately mitigate all the potential impacts identified in DEIR section 4.6 attributed to it is not explained. Furthermore, channelization of water is known to have environmental impacts of its own which is not addressed in the DEIR[29].

Policy W 9.1.2 requires new development to adequately protect groundwater recharge areas. The policy does not have an implementation measure and it will only cover projects within Planning Areas due to the GPU's unique definition of development (See Section 3cv, below). "Adequate" protection is not a measurable standard. The DEIR does not consider prohibiting development on identified recharge areas as a possible mitigation measure. According to the Department of Water Resources, recharge areas in the Sierra Valley occur mostly along the upper portions of the alluvial fans that border the Valley. These areas have been mapped by the Department of Water Resources[30]. The DEIR states:

[29] United States Environmental Protection Agency, "Management Measure for Physical and chemical Characteristics of Surface Waters-II. Channelization and Channel Modification Management Measures; Attached.
[30]Northeastern Counties Ground Water Investigation, Areal Geology Sierra, Mohawk, and Humbug Valleys Ground Water Basins, The Resources Agency of California, Department of Water Resources Northern Branch, 1962; and DWR Bulletin 118. (attached)

I8-17 cont.

> "As described…groundwater recharge rates could be affected through several factors including increased impervious surfaces and increased demand on County groundwater supplies by future growth. Future growth could result in the decline of groundwater levels within portions of the County, in particular those basin areas experiencing the majority of future growth (i.e., Almanor, Mohawk, and Sierra Valley) and those having previously experienced significant groundwater declines (i.e., Sierra Valley Groundwater Basin).....Additionally, the specific locations of these future dwellings, their design, their relationship to other development and land uses, and the character of their surroundings cannot be accurately determined that far into the future. Consequently, implementation of the proposed project would increase water demand within the County. This additional development would further stress both groundwater supply and quality in various groundwater basins throughout the County. No additional mitigation is currently available to reduce the significance of this impact to a less than significant level. Therefore, this is a ***significant and unavoidable*** impact."

It is precisely the responsibility of a general plan to direct the specific location of future dwellings and their relationship to other development and land uses. Here, the DEIR concedes that the GPU does not direct growth into Planning Areas as the DEIR often states and claims as a key aspect and mitigating policy.

The DEIR must consider prohibition of development on identified recharge areas as a feasible mitigation measure through the implementation of overlay districts and construction setbacks in the Zoning Code designed to protect water resources.

I8-18

iii. The DEIR mitigates impacts to Biological Resources with policies, which by and large do not have implementation measures, or the implementation measures are merely advisory.

The first 34 policies of the Conservation and Open Space Element of the GPU do not have implementation measures and, therefore, cannot decrease the potentially significant impacts identified in the Biological Resources analysis of the DEIR to less than significant. Furthermore, possibly effective policies, such as COS 7.2.2, 7.2.3, 7.2.4, which could protect wildlife habitat areas and stream corridors, if implemented, would only protect those areas within Planning Areas and not areas within open space lands because of the GPU's limited definition of development. (See Section 3cv, below)

I8-19

iv. Possible measures to mitigate Wildfire Hazards are not considered.

The DEIR states:

> "…adding additional development within areas of high and very high hazard would still expose people or structures to a significant risk of loss, injury or death involving wildland fires. *Outside of prohibiting new development within these areas, development restriction would be the only way to reduce wildland fire impacts to a less than significant level."* (DEIR 4.8-16)

I8-19 cont.

Directing development away from areas with catastrophic hazards is exactly what a general plan is designed to do. The DEIR summarily dismisses the option without discussion. Furthermore, not only does the GPU allow development in areas of very high fire risk, it increases the potential capacity for such development to occur by allowing residential development and subdivision of Open Space land, particularly Timber Resource lands. Considering the GPU contains at least 14 times the capacity for new housing units within the planning horizon, it is impossible to conclude that prohibiting some amount of new development outside of Planning Areas is not feasible. The DEIR does not include CALFire's map[31] identifying Very High Fire Hazard Severity Zones in Plumas County. This map overlayed on the Plumas County Planning Area Map may show that directing new growth into existing communities will avoid placing new housing in very high fire hazard zones, thus satisfying the objectives of the plan and mitigating potentially significant environmental impacts. Consolidating development in communities rather than increasing the wildland-urban interface manages the risks and the DEIR must consider the option.[32]

Furthermore, the lack of information in the land use maps, discussed above, and the lack of information in the growth analysis regarding quantity and size of parcels outside of Planning Areas, makes it impossible for the reader of the GPU to assess the actual growth allowed in the GPU. The DEIR fails its obligation to inform and mitigate.

v. Because the GPU does not effectively direct growth into Planning Areas, the DEIR's analysis that Greenhouse Gas Emissions are mitigated is false.

I8-20

The DEIR concludes that the GPU limits GHG emissions through policies which reduce vehicular travel by encouraging land use patterns that cluster new development near existing community areas, however, none of the "mitigating policies" cited in Table 4.4-5 (DEIR p. 4.4-18) have enforceable implementation measures, if they have implementation measures at all.

[31] Available at: http://frap.cdf.ca.gov/webdata/maps/plumas/fhszl_map.32.pdf and attached
[32] Gude, Jones, Rasker and Greenwood, "Evidence for the effect of homes on wildfire suppression costs" and "Summary: Wildland Fire Research. "Scenarios to Evaluate Long Term Wildfire Risk in California"—A White Paper from the California Energy Commission's California Climate Change Center. All attached.

I8-21

vi. The DEIR ignores readily available information about potential impacts caused by development near water resources and therefore doesn't consider feasible mitigation measures for them.

The DEIR acknowledges that water quality in the County has already been significantly impacted from a variety of common land uses in the County (DEIR p 4.6-8), but finds that impacts from implementation of the GPU which would increase many of the same land uses is less than significant. The conclusion is incorrect. If an impact is already significant increasing it contributes to the significance. The more severe existing environmental problems are, the lower the threshold for treating a project's contribution to cumulative impacts as significant. [33] Despite available information that riparian buffers provide extensive protection to water resources[34], the DEIR does not consider construction setbacks as a mitigation measure for development activities. The DEIR should address this possible mitigation measure, and be recirculated.

I8-22

c. The DEIR analysis fails to assess the growth and development allowed by the GPU

The DEIR is disingenuous and misleading in its analysis of the potentially significant impacts of the GPU because the DEIR assumes development will occur primarily in Planning Areas even though the GPU allows for development to occur outside these areas. Further, the the GPU contains no enforceable implementation measures to ensure that outcome.

I8-23

i. The analysis of where growth will occur is biased.

Remarkably, the DEIR growth analysis only considers and predicts new residential growth *within* Planning Areas:

> "The allocation of future housing units within each Geographic/Planning Area…was then based on the proportion of building permits issued *within each individual Planning Area from 2000 to 2010*, for both Plumas County and the City of Portola." (GP 3-29) (*emphasis added)*

This analysis completely ignores development outside of Planning Areas. It does not consider building permits issued or the number of subdivision projects applied for outside of Planning Areas during this same time period[35]. It does not consider the development pressure

[33] *Kings County Farm Bureau v. City of Hanford (5th Dist. 1990) 221Cal.App.3d 692*
[34] Chagrin River Watershed Partners, Inc. "Riparian Setbacks, Technical Information for Decision Makers" attached.
[35] Attachment 10—list of subdivision and general plan amendment projects considered between 2000 and 2010.

to convert open space and resource production land to residential uses. It does not consider the possibility or likelihood that over the planning horizon the County will see a significant amount of development proposals outside of Planning Areas and that the GPU has no enforceable measures to reject those proposals. Concentrating the environmental analysis on an assumption that growth will only occur within Planning Areas is flawed unless the GPU actually restricts growth to Planning Areas with enforceable implementation measures.

I8-23 cont.

Not only does the GPU allow residential development to occur outside of Planning Areas, the GPU will allow subdivision of these lands to create more development potential.[36] The DEIR, however, does not inform the reader what the existing number, size or location of parcels which could accommodate development are, or what is the potential number, size and location of parcels that could be a result of subdivision into the minimum sizes allowed.

The DEIR does not analyze the actual growth pattern the GPU allows. It ignores the potential for growth and development outside of Planning Areas. The growth analysis is inadequate. The DEIR fails its obligation to inform.

ii. The DEIR does not adequately disclose the location of potential growth the GPU will allow.

I8-24

The DEIR limits its growth analysis by assuming development will occur in identified Planning Areas and ignores the likelihood that development will be proposed outside of the Planning Areas. Indeed, the GPU does not even provide land use designations for areas outside of Planning Areas on the Land Use Maps in the GPU or DEIR, and does not identify intensity standards or what land uses are permitted within Land Use Designations. Analysis of growth impacts of the GPU cannot be determined if the areas which will be impacted or the possible use and maximum building intensity of the land are not identified. The reader cannot determine the distribution and general location and extent of the uses of the land for housing, business, industry, open space, including agriculture, natural resources, recreation, and enjoyment of scenic beauty, education, public buildings and grounds, solid and liquid waste disposal facilities, and other categories of public and private uses of land.

[36] The GPU's allowance of a single family residence on all Timber Production Zone parcels 160 acre or larger as a right also is in conflict with State law, which only allows single family residences on TPZ parcels "as necessary for the management of timber." Because TPZ lands are given generous tax subsidies, the policy would encourage development of TPZ parcels. If you desire a forest estate, why build a house on a 160 acre parcel where you would have to pay property taxes on the entire lot, if you could build the house on a 160 acre parcel where the taxes on 159 of the acres is essentially waived? The policy has growth-inducing and cumulative impact potential on Open Space lands which has not been analyzed in the DEIR.

I8-24 cont.

As currently drafted, the GPU merely states a set of mostly unenforceable preferences and policies for how growth will occur in the County. The DEIR estimates a need for 4,765 housing units over the planning horizon and assumes that development will occur in Planning Areas. It reports that under present zoning there is the potential for 65,548 housing units to occur. (DEIR 3-28)

It is impossible to tell from the analysis (DEIR p. 3-26 thru3-32) if the 65,548 unit capacity is contained within Planning Areas only or the entire County. We also note that Table 3-6 of the DEIR does not include the City of Portola in its summary. Is the City of Portola included in the capacity calculation? We also note the total developed acres plus undeveloped acres in Table 3-7 (DEIR p. 3-27) is 1,413 acres less than the total number of subdivision acres in the same table. These inconsistencies confuse the issues and the reader.

Is the growth analysis telling the reader that there exists 55,884 acres (using the number of acres in Table 1-2 of the GPU which includes the City of Portola) or 52,392 acres (using a calculated total from Table 3-6 in the DEIR) which could allow 65,548 new housing units within Planning Areas or within the entire County? In other words there may be nearly 14 times the needed capacity or more within the County to satisfy the projected need for housing over the planning horizon. This is an increase of 4,439 potential dwelling units over the design capacity for the existing General Plan. The design capacity for the existing General Plan is 61,109 potential units within Opportunity Areas[37]. Not surprisingly, the existing General Plan did not consider residential development on open space lands in its growth analysis either. The GPU induces growth by substantially increasing the number of potential dwelling units that will be allowed as compared with what is allowed in the existing General Plan. Considering the overabundant potential for new development to occur in the existing GP, what is the justification of creating additional potential for more rural sprawl? The DEIR should discuss the reasons and impacts associated with increasing growth potential in the County.

The growth analysis in the GPU does not appear to calculate the number of housing units the GPU will allow outside of Planning Areas. The information is necessary to determine the potential significant impacts of the Plan and to consider how best to mitigate those impacts. As stated in the GPU, “Small, isolated housing tracts…disrupt surrounding rural and productive agricultural lands, forests, and ranches and are difficult and costly to provide with services.” This is a strong argument to restrict new development to Planning Areas, and perhaps even decrease the size of the Planning Areas or consider phasing.

[37] Plumas County General Plan adopted 1981 p.5

I8-24 cont.

To reach its conclusions that potential significant environmental impacts of the GPU are mitigated, the DEIR analysis appears to assume development will only occur in Planning Areas. Without enforceable implementation measures to ensure development only occurs in Planning Areas, the DEIR analysis is based upon a faulty assumption. The DEIR fails its obligation to adequately inform.

I8-25

iii. The DEIR does not consider the full extent of the growth permitted by the GPU.

In order to comply with CEQA, the DEIR must describe and consider the full extent of the growth permitted by the Plan and must quantify the impacts.[38]

The DEIR predicts a need for 4,765 new housing units over the planning horizon increasing permanent residences by 12 percent and seasonal/vacation homes by 70 per cent. The DEIR allocates construction of all of these new units to Planning Areas only. (DEIR p.3-29) The DEIR contains no analysis of potential impacts of growth and development outside of Planning Areas.

The DEIR states full build out of the project will result in 65,548 units. It is not clear if that is the potential capacity for new units only within Planning Areas, or within the entire County. The distinction is important and should be revealed. If the full build out prediction is confined to Planning Areas only, the DEIR is deficient in its analysis of the "whole" project. If the full build out prediction is for the whole County, the DEIR should inform the reader how many new units could potentially be built inside Planning Areas and how many could be outside. The information affects the County's ability to make findings of over-riding considerations.

Because the GPU lacks enforceable implementation measures to limit growth to Planning areas, the possibility that development will occur outside of Planning Areas during the planning period exists. The DEIR must analyze the impacts associated with the possibility that 65,548 units or more will be built within the County because the opportunity to do so exists within the GPU.

As the Attorney General's office stated:[39]

[38] *City of Redlands v. County of San Bernardino (2002) 96 Cal.App4th 398, 409*

[39] Fiering, Susan, Deputy Attorney General in a letter dated April 14, 2008 to David Bryant, Project Planner in the Tulare County Resource Mangement Agency regarding Draft Environmental Impact Report for Tulare County General Plan 2030 Update

I8-25 cont.

> "In order to comply with CEQA, it is not sufficient for the DEIR to disclose only an assumed level of growth based on population projections, and an assumed distribution of that growth based on general policies and statements of preference. Rather, it must disclose the full potential for market-driven growth that is permitted under the Plan, and must evaluate the extent and impact of GHG emissions if a significant portion of that growth is accommodated in rural, undeveloped areas…".

This analysis is not a "worst case scenario."[40] It is simply a CEQA requirement that an EIR must evaluate the project's potential to affect the environment, even if the project does not ultimately materialize.[41] [42]. The DEIR must disclose and analyze the full market-driven potential permitted under the Plan. The DEIR must inform the reader how many residential units could be built outside of Planning Areas under the existing build out potential of the GP as opposed to envisioned build out capacity of the proposed GPU. The DEIR must also analyze potentially significant environmental impact should units be scattered across the County willy-nilly according to market whims. Finally, the DEIR must consider feasible mitigation measures to reduce or eliminate potential impacts.

The inadequacy of the growth analysis and the fallacy of the assumption that development will occur mainly in Planning Areas, brings into question the validity of the DEIR's analysis of nearly all other potentially significant impacts it is required to consider.

I8-26

iv. The DEIR does not analyze how removing certain constraints in the existing General Plan will encourage new growth in open space lands.

The EIR must evaluate the proposed GPU's effects on both the existing physical conditions of the actual environment and the environment envisioned by the existing general plan.[43] The DEIR contains a single paragraph describing the existing General Plan (GP):

> "Plumas County's most recent General Plan was adopted by the Board of Supervisors in 1984. The existing 1984 General Plan has been amended numerous times over the past 28 years, with development governed in part by specific zoning designations and "Opportunity Areas". Opportunity Areas are categorized as prime, moderate, or limited (with five subcategories within the moderate classification) based on existing availability or the feasibility of providing public services. All Opportunity Areas classified as prime have services; however,

[40] An EIR need not engage in speculation to analyze a "worst-case scenario." (*Napa Citizens for Honest Government v. Napa County Bd. Of Supervisors (2001) 91 Cal.App.4th 342, 373.)*
[41] *Bozung v. Local Agency Formation Com. (1975) 13 Cal.3d 263, 279, 282.*
[42] Fiering, Susan, Deputy Attorney General in a letter dated May 27, 2010 to David Bryant, Project Planner in the Tulare County Resource Mangement Agency regarding the Tulare County General Plan and Recirculated Draft Environmental Impact Report.
[43] *Environmental Planning and Information Council v. County of El Dorado (1982) 131 Cal.App.3d354)*

I8-26 cont.

> the range of services (water, municipal sewer, fire protection, power and telephone) varies by location. For the moderate and limited Opportunity Areas, the key limiting service is typically roadway access. For example, limited Opportunity Areas usually have little or no access". (DEIR p 4.1-5)

The DEIR does not evaluate the proposed GPU's effect on the environment envisioned by the existing GP. However, the GPU proposes key changes which will increase potentially significant environmental impacts. For example:

- The GP does not allow new development in floodplains or alteration, of secondary flood hazard areas to accommodate new development.[44] The GPU on the other hand not only allows development in floodplains but also allows creation of new residential parcels in areas which lie entirely within Special Flood Hazards (PHS 6.4.3, GPU p. 146). The policy increases the potential for significant environmental impacts over baseline conditions by increasing the potential for construction of dwelling units within the 100-year floodplain. The DEIR does not quantify the existing or proposed potential for the construction of housing within areas that are subject to 100-year flooding partly because, based on a false assumption, which is abetted by a limited definition of development (See Section 3cv, below) ; and unenforceable implementation measures, it assumes residential development will not occur outside of Planning Areas. (DEIR 4.6-27) The DEIR fails to adequately analyze the growth potential of the GPU, or consider and apply feasible mitigation measures to decrease the potential for significant environmental impacts. The GPU inconsistently allows development to occur in floodplains while using floodplains as a component of the Open Space Element and the Open Space Action Plan.

I8-27

- The GP limits new secondary suburban (three to ten acres per dwelling unit) to be within a direct line ¼ mile of a paved, maintained County Road or State Highway.[45] The GPU removes this constraint and pretty much allows development to occur outside of Planning Areas wherever a developer is willing to pay what it will take to provide infrastructure and services to the development. The policy increases the potential for significant environmental impacts over what was envisioned in the GP. The DEIR must analyze the increased potential for significant environmental impacts allowed in the GPU over what is envisioned in the GP. The DEIR fails to fully describe changes to baseline conditions proposed by the GPU, and thus is inadequate.

[44] Plumas County General Plan p. 17
[45] ibid. p. 30

I8-28

v. The DEIR is blind to the potential development allowed on Open Space lands

The DEIR does not analyze development which leads to the loss of Open Space because the GPU narrowly defines "development" to mean: *"… lot creation, condominium projects, or utilization of commercial, multi-family residential or industrial parcels*" rather than the usual meaning of development, which is to make improvements on land. Therefore, development, in the usual sense of the word, simply does not occur as far as the GPU is concerned when improvements are constructed or subdivisions occur on lands designated Resort and Recreation, Agricultural and Grazing, Agricultural Preserve, Mining Resource, Timber Resource, Lake, Open Space-Significant Wetlands, Scenic Area, and Historic Area. This paradox in the GPU is of particular concern because these Land Designations constitute the definition of Open Space Land and form the basis for its Open Space Action Plan. (GPU p. 168, COS Policy 7.1.1).

The definition for development in the GPU conflicts with the State's definition for Open Space: Open-space land is defined in statute as any parcel or area of land or water that is essentially unimproved and devoted to open-space use (Government Code §65560(b)). But, open space lands in Plumas County can be intensively developed. Because of the GPU definition of development, combined with a lack of required building intensity standards, Plumas County's Zoning Code allows, for example, an unlimited number of lodging facilities to be built on Open Space lands.

According to LU policy 1.1.1: "Small, isolated housing tracts in outlying areas…disrupt surrounding rural and productive agricultural lands, forests, and ranches and are difficult and costly to provide with services." (GPU p.39) Under the GPU's definition of development, subdivision of Open Space Lands designated Mining Resource, is not considered development yet threatens to convert Open Space lands for Resource Production into 10 acre residential subdivisions in areas remote from Planning Areas, despite the acknowledged disadvantages of that type of development and the incompatibility of residential and mining uses. Additionally, the GPU appears to allow suburban and residential development (S-1, R-10 and R-20) on land designated Agriculture and Grazing, (GPU p. 51) but the lack of information regarding what the abbreviations or zoning districts are in Table 1.4 make comprehension of the information impossible. Suburban and residential development of those densities is also inconsistent with the Agriculture and Grazing designation where the minimum parcels size is 40 acres. Allowing subdivision of Mining Resource designated lands into 10 acre subdivisions with single family residences or land designated Agriculture and Grazing with suburban and rural uses conflicts with the goals, objectives and policies of the rest of the GPU; and, without

land use designations identified outside of Planning Areas provided on the land use maps, the reader cannot determine where these subdivisions might occur. I8-28 cont.

Potential development/improvements and subdivisions on parcels in residential, suburban, rural, or recreational, timber, mining, agricultural or open space districts outside of Planning Areas goes unnoticed and unanalyzed by the DEIR because of a limited definition of development. The term development is used in the GPU 464 times. Applying the GPU definition to the term often does not make sense. (employment development, development rights, development of Plumas County GPU, water resources development, sustainable development, development of goals…, future development, etc.) The definition for developable land in the 2003 General Plan Guidelines is:

> **"Developable Land**: Land that is suitable as a location for structures and that can be developed free of hazards to, and without disruption of, or significant impact on, natural resource areas".[46]

Development is the construction of improvements on land regardless of location. Development should not be occurring on natural resource areas which are defined as Open Space. The definition of development in the GPU is similar to the definition in the existing General Plan and should be dropped. It has caused and will continue to cause mind-twisting confusion and problematic loopholes.

The GPU potentially allows extensive development on open space lands, but the DEIR does not analyze the potential impacts of this development, in the usual sense of the word, to occur. A rose without a name is till a rose and development on Open Space Land is still development.

vi. The DEIR'S alternatives analysis does not meet CEQA's standards. I8-29

According to the Attorney General's office:[47]

> The CEQA Guidelines provide that an EIR must discuss a "range of reasonable alternatives to the project or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives."[48] The EIR must include sufficient information about each alternative to provide meaningful analysis and comparison, and must consider alternatives that could

[46] General Plan Guidelines 2003 p. 260
[47] *ibid.*
[48] Cal. Code Regs., tit.14, section 15125.5 subd. (a)

I8-29 cont.

> eliminate significant effects or reduce them to a less than significant level, even if the alternatives could impede the attainment of the project's objectives to some degree.
>
> CEQA requires public agencies to refrain from approving projects with significant environmental impacts when there are feasible alternatives that can substantially lessen or avoid those impacts.[49] The "cursory rejection" of a proposed alternative "does not constitute an adequate assessment of alternatives as required under CEQA," and it "fails to provide solid evidence of a meaningful review of the project alternative that would avoid the significant environmental effects identified…."[50]

In light of the acknowledged significant impact the GPU will have on multiple resources, including Land Use and Aesthetics, Traffic and Circulation, Air Quality, Noise, Hydrology, Water Quality and Drainage, Hazardous Materials and Public Safety, Agriculture and Timber Resources, and Cultural Resources, it is incumbent on the County to carefully consider all of the feasible alternatives to the General Plan. Based on the existing record it appears that at least two alternatives to the proposed General Plan either alone or combined could significantly reduce the impacts—The Restrictive Growth Alternative and the Focused Growth Alternative.

The Restrictive Growth Alternative is similar to the proposed project but would be more restrictive for individual residential development outside of the Planning Areas by reducing the overall density on lands designated as General Forest, Agriculture Preserve and Agriculture and Grazing. Residential densities would be reduced to allow one additional dwelling unit /160 acre parcel minimum otherwise all objectives, goals policies and implementation measures would remain the same. The alternative was summarily dismissed over concerns of its potential conflict with existing property rights. There is no discussion, however, as to what the conflict might be and why the alternative is unfeasible as required by CEQA. This lack of analysis does not meet CEQA's informational standards.

The Focused Growth Alternative would provide for a slight increase in planned urban residential densities in existing Planning Areas, but all other aspects of the GPU would remain the same. The DEIR concludes that the Focused Growth Alternative is the environmentally superior alternative though not without significant and unavoidable impacts related to cultural resources, agricultural resources traffic, air quality, hydrology and visual resources. Why the County has not adopted this alternative is not clear.

Most importantly, however, the DEIR does not evaluate an alternative that would actually limit growth to Planning Areas, though it purports to do so. Nor does the DEIR

[49] Pub. Resources Code section 21002; CEQA Guidelines, sections 15002, subd. (a)(3), 15021, subd. (a)(2).)
[50] *Mountain Lion Foundation v. Fish & Game Commission (1997) 16 Cal.4th 105, 136*

consider an alternative which would limit development to Planning Areas, decrease overall densities outside of Planning Areas and increase planned urban residential densities in Planning Areas. These alternatives are reasonably feasible and environmentally superior. There is no support in the record for this omission. I8-29 cont.

4. Conclusion

The DEIR concludes that the project will result in significant and unavoidable impacts to Land Use and Aesthetics; Traffic and Circulation; Air Quality; Noise; Hydrology, Water Quality, and Drainage; Hazardous Materials and Public Safety; Agricultural and Timber Resources; Biological Resources; and Cultural Resources. In light of the fact the project is not properly defined, growth analysis is flawed, the impacts are not adequately quantified, enforceable mitigation measures are not imposed, internal inconsistencies exist and adequate alternatives are not considered, this conclusion is unsupported and contravenes CEQA.[51] The DEIR is so fundamentally inadequate and conclusory due in part to the inadequacy of the proposed GPU that meaningful public review has been precluded. I8-30

The County can transform the DEIR into a legally adequate analysis by extending its description and analysis to the entire County rather then just the Planning Areas; considering adequate alternatives and enforceable mitigation measures such as: phasing, prohibition of lot splits outside of planning areas, enforcing state regulations regarding single family residences on TPZ lands, prohibiting development in floodplains outside of Planning Areas, setbacks standards for water resource, prohibiting development on recharge areas, and requiring conditional use permits for development outside of Planning Areas in order to be able to condition development on measures which will enforceably mitigate the impacts of rural sprawl.

The Goals and Objectives of the GPU are commendable. The County can transform the GPU from a wish to a legally-required constitution for future development by ensuring that Goals and Objectives are linked to specific and enforceably worded policies and implementation measures which actually mitigate the potential environmental impacts of growth associated with the GPU. With a committed effort, we believe the policies and implementation measures of the plan could be rectified to make the plan and its DEIR adequate and legally defensible documents which will serve Plumas County as a foundation for environmentally and economically sound planning. We would welcome the opportunity to review a renovated GPU along with a re-circulated DEIR.

[51] See *Berkeley Keep Jets Over the Bay committee v. Board of Port Commissioners (2001) 91 Cal.App.4th 1344, 1371 (*lead agency cannot simply conclude that there are overriding considerations that would justify a significant and unavoidable effect without fully analyzing the effect.)

Sincererly,

Stevee Duber

Attachments:

1) Fiering, Susan, Deputy Attorney General in a letter dated May 27, 2010 to David Bryant, Project Planner in the Tulare County Resource Mangement Agency regarding the Tulare County General Plan and Recirculated Draft Environmental Impact Report
2) Chagrin River Watershed Partners, Inc. “Riparian Setbacks, Technical Information for Decision Makers”
3) Very High Fire Hazard Severity Zones in Plumas County
4) Gude, Jones, Rasker and Greenwood, “Evidence for the effect of homes on wildfire suppression costs” and
5) “Summary: Wildland Fire Research.
6) “Scenarios to Evaluate Long Term Wildfire Risk in California”—A White Paper from the California Energy Commission’s California Climate Change Center
7) United States Environmental Protection Agency, “Management Measure for Physical and chemical Characteristics of Surface Waters-II. Channelization and Channel Modification Management Measures;
8) Northeastern Counties Ground Water Investigation, Areal Geology Sierra, Mohawk, and Humbug Valleys Ground Water Basins, The Resources Agency of California, Department of Water Resources Northern Branch, 1962;
9) DWR Bulletin 118
10) CEQAnet Database Inquiry showing Subdivision and General Plan Amendment projects in Plumas County from 2000-2010.

EDMUND G. BROWN JR.
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May 27, 2010

By Overnight Mail and Facsimile

David Bryant
Project Planner
Tulare County Resource Management Agency
Government Plaza
5961 South Mooney Boulevard
Visalia, CA 93277

RE: Tulare County General Plan and Recirculated Draft Environmental Impact

Dear Mr. Bryant:

The Attorney General submits these comments pursuant to the California Environmental Quality Act ("CEQA") on the Tulare County General Plan (General Plan) and Recirculated Draft Environmental Impact Report ("DEIR").[1] We applaud the County's recognition of the vital importance of directing growth and development in a manner that will preserve the special agricultural and rural nature of Tulare County. Balancing the need for sustainable development against the equally important need to preserve agriculture and the natural environment requires significant vision and leadership on the part of the County.

As discussed below, however, the General Plan and DEIR fail to further the County's goals. The General Plan relies on unenforceable policies that "encourage," but do not mandate that growth will occur in certain areas, with the result that all important development decisions are left to the marketplace.

According to the County website, Tulare County is the second leading producer of agricultural commodities in the United States, as well as a gateway to Sequoia National Park. The rural and agricultural character of the County is the backbone of its present economy and the mainstay of its future. In the past Tulare County showed remarkable foresight in developing

[1] The Attorney General provides these comments pursuant to his independent power and duty to protect the natural resources of the State from pollution, impairment, or destruction in furtherance of the public interest. (See Cal. Const., art. V, § 13; Cal. Govt. Code, §§ 12511, 12600-612; *D'Amico v. Board of Medical Examiners* (1974) 11 Cal.3d 1, 14-15.) These comments are made on behalf of the Attorney General and not on behalf of any other California agency or office.

plans, like the Rural Valley Land Plan, that have protected agricultural land from conversion to non-agricultural uses and preserved the special rural character of the County. The County leaders of today should exercise similar foresight in planning, to preserve the County's unique and irreplaceable resources for its present and future generations.

1. Introduction

In April, 2008, the Attorney General submitted comments to Tulare County concerning its Draft Environmental Impact Report. We appreciate the fact that the revised General Plan and the recirculated DEIR address and correct a number of the deficiencies noted in those comments. Just as one example, we note that the County has prepared a Greenhouse Gas Inventory for the planning area and has taken the first steps toward developing a Climate Action Plan.

Ultimately, however, serious and critical deficiencies remain that undermine both the Plan and the DEIR and render them legally inadequate and ineffective as tools for implementing the County's goals. The most important of these deficiencies are discussed in more detail below. Where the Plan and DEIR are deficient in the same manner as noted previously, we hereby incorporate our previous comments into this comment letter. (A copy of the Attorney General's previous letter is attached.)

2. Legal Background

a. General Plan Requirements

As noted in our previous letter, the general plan is "at the top of the 'hierarchy of local government law regulating land use[.]'"[2] As the California Supreme Court noted, this basic land use charter governing the direction of future land use is in the nature of a "'constitution' for future development,"[3] and taking some measure of control over future land use is the local government's affirmative duty. "The planning law . . . compels cities and counties to undergo the discipline of drafting a master plan to guide future local land use decisions."[4]

Thus, a general plan must be more than a statement of broad but unenforceable policies and goals for the future. It must "designate[] the proposed general distribution and general location and extent" of land uses.[5] Finally, a general plan must disclose information to the public in a format that is readily accessible. "A general plan which does not set forth the required elements in an understandable manner cannot be deemed to be in substantial compliance" with planning law.[6] The General Plan must state "with reasonable clarity" what the plan is.[7] Thus, a

[2] *DeVita v. County of Napa* (1995) 9 Cal.4th 763, 773 (internal citation omitted).
[3] *Id.* (quoting *Lesher Communications, Inc. v. City of Walnut Creek* (1990) 52 Cal.3d 531, 542).
[4] *DeVita, supra*, 9 Cal.4th at p. 773.
[5] Gov. Code § 65302(a).
[6] *Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 744.

reader consulting the general plan must be able to determine with relative ease, the amount of land available for development, the land-use designation of that land, any restrictions on development of the land, and the maximum amount of new development that can occur under the plan.

b. CEQA Requirements

CEQA is one of the California's most important and fundamental environmental laws. For more than 40 years, CEQA has guided the State toward sustainable development. As the Act states, it is California's policy to "create and maintain conditions under which man and nature can exist in productive harmony to fulfill the social and economic requirements of present and future generations."[8]

An environmental impact report (EIR) is an informational document intended to provide both the public and government agencies with detailed information about the effects of a proposed project on the environment, to list ways in which those effects can be mitigated, and to discuss and analyze alternatives to the project. A "project" is defined as "the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment. . . ."[9] The project must be adequately described in the EIR,[10] and the entirety of the project must be considered, not just some smaller portion of it.[11]

CEQA further mandates that public agencies not approve projects unless feasible measures are included that mitigate the project's significant environmental effects.[12] CEQA therefore requires that "[e]ach public agency shall mitigate or avoid the significant effects on the environment of projects that it carries out or approves whenever it is feasible to do so."[13] The mitigation measures must be enforceable, rather than just vague policy statements.[14]

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[7] *Concerned Citizens of Calaveras County v. Board of Supervisors* (1985) 166 Cal.App.3d 90, 97.
[8] Pub. Resources Code, § 21001, subd. (e).
[9] Cal. Code Regs., tit. 14, § 15378, subd. (a) (hereafter "Guidelines").
[10] Guidelines, § 15124.
[11] *San Joaquin Raptor/Wildlife Rescue Center v. County of Merced* (2007) 149 Cal.App.4th 645, 654.
[12] Pub. Resources Code, § 21002.
[13] Pub. Resources Code §§ 21002.1, subd. (b); *City of Marina Board of Trustees* (2006) 39 Cal.4th 341, 360.
[14] See Pub. Resources Code § 21081.6, subd. (b); *Federation of Hillside and Canyon Associations v. City of Los Angeles* (2000) 83 Cal.App.4th 1252, 1261 & n.4 (agency must take steps to ensure mitigation measures are fully enforceable through permit conditions, agreements, or other measures).

3. Analysis

a. The General Plan is primarily an aspirational document that does not exercise control over growth.

As currently drafted, with the exception of the Rural Valley Lands Plan (Rural Valley Plan),[15] the General Plan is not a true planning document. It states a set of unenforceable preferences and policies for how growth will occur in the County on the available non-agricultural land. The Plan purports to direct development to the designated Urban Development Boundaries (UDB) and Hamlet Development Boundaries of the existing cities, hamlets, and communities, but declines to set any criteria for determining where such growth will be permitted and in what density, thus leaving open development that can occur haphazardly in those areas. It permits development of an undetermined amount in the "Foothill Development Corridors" and within areas set aside under the "Mountain Framework Plan." (General Plan ("GP") 2-7.) Finally the Plan permits the development of "New Towns (Planned Communities)" on unspecified rural land "when appropriate to meet the social and economic needs of current and future residents." (GP 2-67.) There is no indication of the standards that would make such development "appropriate," the number of the New Towns that will be allowed "when appropriate," where the New Towns will be located, the number of acres that will be developed, and in what densities. The Plan also permits the County to adopt as yet undetermined Corridor Plans adjacent to major transportation routes with no identification of what areas these Corridor Plans will cover, the acreage available for development, and the density.

In addition, large portions of the General Plan consist of unenforceable statements of goals and objectives, using terms like "encourage," rather than "require." For example: "The County shall encourage new major residential development to locate near existing infrastructure for employment centers, services, and recreation"; "The County shall encourage high-density residential development . . . to locate along collector roadways and transit routes, and near public facilities . . . , shopping, recreation, and entertainment" (GP 4-27); the County "shall strive to maintain distinct urban edges for all unincorporated communities"; and the County "shall encourage urban development to locate in existing UDBs and HDBs where infrastructure is available or may be established . . ." (GP 2-25 – 2-26.) These advisory statements do not constrain or direct growth in an enforceable manner.

The County can transform the General Plan from an aspirational document to the legally-required constitution for future development by ensuring that goals and objectives are linked to specific and enforceably worded policies and implementation measures. Such measures can include, for example, development phasing so that land is not developed until available infill (areas in or adjacent to developed areas) has been used to the maximum extent feasible, and coordination between a County and the cities in its jurisdiction about where future growth will occur. For example, the City of Stockton has entered into a settlement agreement with the

[15] We recognize that the County has a strong Rural Valley Plan that significantly limits conversion of agriculture land to other uses.

Attorney General that incorporates this type of phasing approach. (Copy attached.) The agreement stipulates that Stockton will locate a specified number of new housing units in infill areas (¶¶ 6.a., 6.b) and will impose limits on growth outside the city limits until certain criteria are met. (¶ 7.) In a similar fashion, the Livermore General Plan imposes growth boundaries for the purpose of managing growth and directing growth into the existing city limits, and specifically into the downtown. In combination with these growth boundaries, the City of Livermore and the County of Alameda have adopted a transfer of development credit system that further manages growth by providing an incentive for potential development in the unincorporated County to be transferred and built in the downtown of Livermore.

b. The open-ended nature of the General Plan affects the County's obligation to describe the project and analyze the project's impacts under CEQA.

The *sine qua non* of an environmental impact report is an accurate project description.[16] Any evaluation of the General Plan "must necessarily include a consideration of the larger project, i.e., the future development permitted by the amendment."[17] In order to comply with CEQA, the DEIR therefore must describe and consider the full extent of the growth permitted by the Plan and must quantify the impacts. (*Id.*)

Because the Plan itself does not direct and control growth, the DEIR relies on market-driven projections and "Population Growth Assumptions under the General Plan," including the assumption that certain percentages of the population growth will occur within certain areas. (DEIR 2-24). The DEIR assumes that 75% of the growth will occur within the UDBs and Spheres of Influence of incorporated cities throughout the County and that the remaining 25% of growth "is expected to occur" in unincorporated communities and hamlets, foothill development corridors, urban and regional growth corridors, and mountain service centers. (GP 2-24.)

Other outcomes are, however, also quite possible. As discussed, there is nothing in the General Plan or the DEIR that limits or caps growth to the amount projected to occur in the County during the planning period. Nor is there anything in the General Plan or DEIR that affirmatively requires that any set percentage of growth be located in particular areas. Unfocused development in rural areas of Tulare County is not only likely in the future – it is already in progress; the County is currently considering just such a development project, the Yokohl Valley Ranch, a 10,000 unit residential development to be located in the Sierra Nevada foothills on land that is currently set aside for agriculture. This is only one example of New Towns allowed by the Plan, that are not described in terms of number, location, or type of growth.

[16] *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713, 730; *County of Inyo v. City of L.A.* (1977) 71 Cal.App.3d 185, 199.
[17] *City of Redlands v. County of San Bernardino* (2002) 96 Cal.App.4th 398, 409 (citation omitted).)

The DEIR analysis, therefore, does not satisfy the CEQA requirements that the DEIR must consider as the "project," the full potential for growth that is permitted under the Plan, and must evaluate the full extent of the impacts if a significant portion of that growth is accommodated, in particular, in rural, undeveloped areas, as the Plan appears to allow. [18] This analysis is not a "worst case scenario."[19] It is simply a CEQA requirement that an EIR must evaluate the project's potential to affect the environment, even if the project does not ultimately materialize.[20]

c. The DEIR fails to consider and impose enforceable mitigation measures.

CEQA provides that a public agency should not approve a project as proposed if there are feasible mitigation measures that would substantially lessen the significant environmental effects of the project. Further, in order to ensure that mitigation measures are actually implemented, they must be "fully enforceable through permit conditions, agreements, or other measures."[21]

There are a number of areas in which the DEIR fails to impose enforceable mitigation measures. In the area of climate change alone, the DEIR notes that greenhouse gas ("GHG") emissions *based on projected population growth* would increase nearly 1 million metric tonnes (metric tons)/year from 2007 to 2030 (DEIR 3.4-22) and that this would cause several significant and unavoidable impacts, including conflicting with the State's goal of reducing GHG emissions.[22]

While the DEIR relies on a number of General Plan policies to mitigate the impact of this increase in GHG emissions, many of these policies are unenforceable. For example, the policies merely "promote" smart growth (LU 1.1); "promote" innovative development (LU 1.2); "encourage" and "provide incentives" for infill (LU 1.8.), "encourage" new development to locate near existing infrastructure (LU 3.1); "encourage" new development to incorporate energy conservation and green building practices (AQ 3.5); "encourage" high density residential development to locate along transit routes and near public facilities (LU 3.3); "encourage" school

[18] We note that there is no information disclosed either in the General Plan document itself or in the incorporated area plans that would enable a reader to calculate the total acres of land available for development, and the land use designation of those acres. The County of Tulare has one of the oldest and most sophisticated geographic information mapping systems of all the counties in California. Information on land use locations, densities, and intensities is available and can be readily produced by the County and will enable the public and decision makers to determine where the actual development can occur, and in what amount.

[19] An EIR need not engage in speculation to analyze a "worst-case scenario." (*Napa Citizens for Honest Government v. Napa County Bd. of Supervisors* (2001) 91 Cal.App.4th 342, 373.)

[20] *Bozung v. Local Agency Formation Com.* (1975) 13 Cal.3d 263, 279, 282.

[21] Public Resources Code, § 21081.6, subd. (b).

[22] We note that because this estimate is based on projected population growth focused in incorporated cities and CACUDBs, and not on the development that may occur under the Plan, the estimates of GHG emissions may be substantially understated.

districts to locate new schools in areas that allow students to walk or bike from their homes (LU 6.3), "encourage" land uses that generate higher ridership (TC 4.4); "consider" incorporating facilities for bike routes, sidewalks and trails when reviewing new development proposals (TC-5); "encourage" location of ancillary employee services near major employment centers (AQ 3.1); "encourage" the use of solar power and energy conservation in all new development (LU 7.15); "encourage" the use of ecologically based landscape design principles that improve air quality; and "encourage" LEED and LEED-ND certification for new development (AQ implementation measure 12). None of these measures are mandatory and enforceable.

Until the County adopts mitigation measures that will be imposed and enforced as conditions of all future development projects, the County has not complied with its duty under CEQA to implement mitigation measures to reduce the environmental impacts of the project. There are a number steps that the County can take to correct these deficiencies. First, and most simply, the County can re-word its policies and implementation measures to make them mandatory and enforceable, not merely advisory. We pointed out some of these opportunities in our previous letter. In addition to the policies and programs noted previously, there are good examples of policies and implementation measures that foster energy efficiency and smart growth contained in California Air Pollution Control Officers' Model Policies for Greenhouse Gases in General Plans (June 2009), Caltrans's Smart Mobility Handbook (Feb. 2010), and the California Energy Commission's Energy Aware Planning Guide (Dec. 2009), which the County should consult.[23]

Finally, in connection with the Draft Climate Action Plan (CAP), we recommend that the County should (1) commit in the General Plan to adopting by a date certain a CAP with defined attributes (targets, enforceable measures to meet those targets, monitoring and reporting, and mechanisms to revise the CAP as necessary) that will be integrated into the General Plan; (2) incorporate into the General Plan interim policies to ensure that any projects considered before completion of the CAP will not undermine the objectives of the CAP; and (3) for all GHG impacts the County has designated as significant, adopt feasible mitigation measures that can be identified today and that do not require further analysis. (CEQA Guidelines § 15183.5.) Such a programmatic approach would have the substantial benefit of streamlining the CEQA review for future projects. (*Id.*)

d. The DEIR does not consider all feasible alternatives

The CEQA Guidelines provide that an EIR must discuss a "range of reasonable alternatives to the project or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." [24] The EIR must

[23] http://www.capcoa.org/download/Model+Policies+Document, http://www.dot.ca.gov/hq/tpp/offices/ocp/smf_files/SmMblty_v6-3.22.10_150DPI.pdf http://www.energy.ca.gov/energy_aware_guide/index.html

[24] Cal.Code Regs., tit. 14, § 15125.5, subd. (a).

include sufficient information about each alternative to provide meaningful analysis and comparison, and must consider alternatives that could eliminate significant effects or reduce them to a less than significant level, even if the alternatives could impede the attainment of the project's objectives to some degree.

CEQA requires public agencies to refrain from approving projects with significant environmental impacts when there are feasible alternatives that can substantially lessen or avoid those impacts.[25] The "cursory rejection" of a proposed alternative "does not constitute an adequate assessment of alternatives as required under CEQA," and it "fails to provide solid evidence of a meaningful review of the project alternative that would avoid the significant environmental effects identified . . . ." [26]

In light of the acknowledged significant impact the General Plan will have an multiple resources, including air, water, and greenhouse gas emissions, it is incumbent on the County to carefully consider all of the feasible alternatives to the General Plan. Based on the existing record, there appear to be at least two alternatives to the proposed General Plan which, alone or combined, would significantly reduce the impacts. The DEIR attempts to define more compact and urban alternatives with the "City Centered Development Scenario," which focuses more growth in the city UDBs, and the "Confined Growth Alternative," which would establish hard boundaries to protect important agricultural resources. Both of these alternatives protect agricultural land and maintain the rural character of the County to a greater extent than the General Plan and would have significantly lower environmental impacts, including impacts on GHG emissions. The County rejected the City Centered scenario based on its assertion that it "may make it more difficult to achieve the desired level of reinvestment within existing communities and hamlets." (DEIR 4-19.) There is no analysis or discussion, however as to why the anticipated 20% growth in the unincorporated community and hamlet areas under this alternative would not be sufficient to meet these goals.

The County notes that the Confined Growth Alternative would meet all of the project's objectives (DEIR 4-33) and is the environmentally superior alternative and would reduce the severity of most environmental impacts associated with the project. (DEIR 4-36) It is not clear, therefore, why the County has not adopted this alternative.

Further, the DEIR notes that the Planning Commission directed the staff to consider an additional City/Focused Community Alternative, one in which growth would be accommodated in vacant urban, as well as legal suburban and rural (hamlet and other existing communities) lots of record in the County, without permitting development in outlying rural areas. The DEIR summarily concludes that the suggested alternative was not significantly different from the City Centered alternative and therefore was not discussed further. (DEIR 4-18.) Since the City/Focused Community Alternative appears to meet the project goal of fostering development

[25] Pub. Resources Code § 21002; CEQA Guidelines, §§ 15002, subd. (a)(3), 15021, subd. (a)(2).)
[26] *Mountain Lion Foundation v. Fish & Game Commission* (1997) 16 Cal.4th 105, 136.

in the communities and hamlets, while having less of an environmental impact than the project, it is not clear why the DEIR declines to discuss it in any detail.

Finally, the DEIR does not evaluate an alternative that would limit growth to the cities and existing unincorporated community (hamlet, etc.) boundaries, and does not determine whether there is sufficient capacity in these areas to accommodate growth during the period of the General Plan, without permitting further growth in rural and agricultural areas. There is no support in the record for this omission.

e. The DEIR's conclusion that environmental impacts are significant and unavoidable is unsupported.

The DEIR concludes that the project will result in 27 significant and unavoidable impacts including violation of air quality standards, conflicting with or obstructing implementation of an applicable air quality plans, and conflicting with the State goal of reducing greenhouse gas emissions in California to 1990 levels by 2020. (DEIR ES-13.) In light of the fact that the project is not properly defined, the impacts are not adequately quantified, enforceable mitigation measures are not imposed, and adequate alternatives are not considered, this conclusion is unsupported and contravenes CEQA.[27]

4. <u>Conclusion</u>

Tulare County showed remarkable foresight in enacting the Rural Valley Plan that has served for decades to protect the special rural and agricultural nature of Tulare County. The County again is in a position to exercise similar foresight and leadership for the benefit of current and future generations. We would be happy to provide examples of land use policies and mitigation measures that should be considered by the County, and to meet with you and work

[27] See *Berkeley Keep Jets Over the Bay Committee v. Board of Port Commissioners* (2001) 91 Cal.App.4th 1344, 1371 (lead agency cannot simply conclude that there are overriding considerations that would justify a significant and unavoidable effect without fully analyzing the effect.)

together in whatever way possible to achieve the goals of preservation and smart growth set by the County.

Sincerely,

/s/

SUSAN S. FIERING
Deputy Attorney General

For EDMUND G. BROWN JR.
Attorney General

Attachments

EXHIBIT A

EDMUND G. BROWN JR.
Attorney General

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DEPARTMENT OF JUSTICE

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April 14, 2008

By Overnight Mail and Facsimile

David Bryant
Project Planner
Tulare County Resource Management Agency
Government Plaza
5961 South Mooney Boulevard
Visalia, CA 93277

RE: Draft Environmental Impact Report for Tulare County General Plan 2030 Update
SCH # 2006041162

Dear Mr. Bryant:

The Attorney General submits these comments pursuant to the California Environmental Quality Act ("CEQA") on the Draft Environmental Impact Report ("DEIR") for the Tulare County General Plan 2030 Update ("General Plan").[1]

1. Introduction

The general plan is "at the top of the hierarchy of local government law regulating land use[.]"[2] As the California Supreme Court has noted, this basic land use charter governing the direction of future land use is in the nature of a planning "constitution."[3] Taking some measure of control over future land use is the local government's affirmative duty. "The planning law . . . compels cities and counties to undergo the discipline of drafting a master plan to guide future

[1]The Attorney General provides these comments pursuant to his independent power and duty to protect the natural resources of the State from pollution, impairment, or destruction in furtherance of the public interest. (See Cal. Const., art. V, § 13; Cal. Govt. Code, §§ 12511, 12600-12; *D'Amico v. Board of Medical Examiners* (1974) 11 Cal.3d 1, 14-15.) These comments are made on behalf of the Attorney General and not on behalf of any other California agency or office.

[2]*DeVita v. County of Napa* (1995) 9 Cal.4th 763, 773 (internal citation omitted).

[3]*Ibid; Lesher Communications, Inc. v. City of Walnut Creek* (1990) 52 Cal.3d 531, 542.

local land use decisions."[4] The Tulure County General Plan thus presents both an opportunity and a responsibility to the County – an opportunity to shape the future growth of the County, and a responsibility to ensure that such growth is consistent with State and local goals, including protecting the public health and welfare of the County's inhabitants and protecting the environment.

According to the DEIR, the Plan anticipates that the population of Tulare County will reach 621,549 by 2030, an increase of approximately 254,000 people,[5] and that emissions of carbon dioxide (CO_2) from this growth will increase by approximately 1.7 million tons/year. As you are aware, global warming presents profoundly serious challenges to California and the nation. While we commend the County for addressing greenhouse gas ("GHG") emissions in the DEIR, we have concluded that the DEIR is not in compliance with the requirements of CEQA in significant respects. First, the DEIR does not disclose the actual growth that may occur under the proposed General Plan – which leaves much of the control over land uses and growth patterns to the market – and the GHG emissions that will result from such growth. Second, the DEIR considers only vehicle miles traveled and dairies as sources of GHG emissions, and neglects to consider other significant new sources of GHG emissions, including emissions from construction, residential and non-residential energy use, and other activities that will result from the build-out of the Plan. Third, the DEIR considers only a narrow range of alternatives, ignoring any alternative that would aggressively foster "smart growth" by more significantly limiting development to existing urban areas. Finally, the DEIR does not impose enforceable and quantifiable mitigation measures to mitigate the impact of the GHG emissions.

Because the analysis of GHG emissions is inadequate and incomplete, the DEIR does not comply with CEQA, and does not provide substantial evidence to support the County's finding that the impacts of GHG emissions will be "significant and unavoidable."

2. Climate Change Background

Before discussing the General Plan and legal adequacy of the DEIR, it is important to understand why human-caused climate change is of particular concern to California and to the San Joaquin Valley.[6]

The impacts of climate change are not limited to remote parts of the world – they are being felt in California today. In California, global warming is causing damage to agriculture, losses to the Sierra snowpack, higher risks of fire, eroding coastlines, and habitat modification

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[4] *DeVita, supra*, 9 Cal.4th at p. 773.

[5] The County indicates that the General Plan is intended to accommodate 25% of this grown in the unincorporated areas, an increase of approximately 64,000 residents.

[6] The physics of climate change are well described in the Intergovernmental Panel on Climate Change, Fourth Assessment Report, "Frequently Asked Questions" (available at http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Print_FAQs.pdf) and need not be repeated here.

and destruction. Global warming affects public health directly, through heat-related illnesses and deaths caused by more hot days, and longer heat waves, and indirectly as higher temperatures favor the formation of ozone and particulate matter in areas that already have severe air pollution problems.[7]

The impacts of climate change are of particular concern to the San Joaquin Valley and Tulare County, especially in the areas of agriculture and public health. According to a whitepaper from the California Climate Action Team on the impacts of climate change on agriculture, "California's cornucopia is predicated on its current climate and its supply and distribution of irrigation water[.]"[8] Rising temperatures will cause larger crops growing in warmer climates to use more water and also may stimulate more weeds and insect pests. Pollination – essential to many Valley crops – will be negatively affected if warming causes asynchronization between flowering and the life cycle of insect pollinators. And the occurrence of adequate winter chill, necessary for fruit trees to flower, may be lost for many fruit species.[9] Higher temperatures due to global warming also have an impact on the dairy industry, which is of special importance to Tulare County, by causing lower milk production and heat-related animal deaths. Dairy producers will no doubt recall the extended heat wave of 2006, which caused the death of thousands of cows and created a backlog of carcasses for disposal.[10]

The health related impacts of climate change are also of substantial importance to the County. A Stanford study details how for each increase in temperature of 1 degree Celsius (1.8 degrees Fahrenheit) caused by climate change, the resulting air pollution would lead annually to about a thousand additional deaths and many more cases of respiratory illness and asthma.[11] The effects of warming are most significant where the pollution is already severe. Thus, the study has serious implications for California overall and for the San Joaquin Valley in particular. Given that California is home to six of the ten U.S. cities with the worst air quality, including Visalia-Tulare, and that the San Joaquin Valley has some of the worst air quality in the nation, the State and the Valley are likely to bear an increasingly disproportionate public health burden if we do not significantly reduce our GHG emissions.

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[7]A summary of impacts to California, together with citations, is available on the Attorney Generals' website at http://ag.ca.gov/globalwarming/impact.php.

[8]California Climate Change Center, *An Assessment of the Impacts of Future CO2 and Climate on Californian Agriculture* (March 2006) at p. 1, available at http://www.energy.ca.gov/2005publications/CEC-500-2005-187/CEC-500-2005-187-SF.PDF.

[9]*Id.*, Abstract.

[10]Williams, "Dairy producers regroup after cow deaths," Bakersfield Californian (Aug. 5, 2006) available at http://www.bakersfield.com/102/story/66292.html.

[11] Jacobson, Mark Z., *On the causal link between carbon dioxide and air pollution mortality*, Geophysical Research Letters, Vol. 35 L03809 (2008).

The atmospheric concentration of CO_2, the leading GHG, is now 380 parts per million (ppm),[12] higher than any time in the last 650,000 years,[13] and rising at about 2 ppm per year. According to experts, an atmospheric concentration of CO_2 "exceeding 450 ppm is almost surely dangerous" to human life because of the climate changes it will cause.[14] Thus, we are fast approaching a "tipping point," where the increase in temperature will create unstoppable, large-scale, disastrous impacts for all the inhabitants of the planet.[15]

We must take prompt action and control of our future. In the words of Rajendra Pachauri, Chairman of the United Nations Intergovernmental Panel on Climate Change, "If there's no action before 2012, that's too late. What we do in the next two to three years will determine our future. This is the defining moment."[16]

3. Description of the General Plan

Pursuant to Government Code section 65302, subdivision (a) a general plan must contain a land use element that

> designates the proposed general distribution and general location and extent of the uses of the land for housing, business, industry, open space . . . and other categories of public and private uses of land. . . .

The distribution and general location of land uses under the Tulare County General Plan Update is almost impossible to discern from Plan documents. Maps typically accompany general plans.[17] While the General Plan does identify a limited number of land use designations (General Plan at pp. 5-5 to 5-12), it does not include any maps or diagrams identifying where the designations are, or the acreage available for development within each designation. A document entitled Board Update, dated April 2006, which was provided to the Board of Supervisors, includes detailed land use maps for certain limited areas – specifically, each of the 21 existing

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[12] http://www.esrl.noaa.gov/gmd/ccgg/trends/

[13] IPCC 4th, WGI, Frequently Asked Question 7.1, *Are Increases in Atmospheric Carbon Dioxide and Other Greenhouse Gases During the Industrial Era Caused by Human Activitites?* http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Print_FAQs.pdf.

[14] *See* http://www.nasa.gov/centers/goddard/news/topstory/2007/danger_point.html.

[15] *See ibid.*

[16] Rosenthal, *U.N. Chief Seeks More Leadership on Climate Change*, N.Y. Times (November 18, 2007).

[17] *See Las Virgenes Homeowners Federation, Inc. v. County of Los Angeles* (1986) 177 Cal.App.3d 300, 307 [general plan maps are visual depictions of planned development policies indicating the geographic or spatial aspects of the plan].

unincorporated communities "hamlets." These maps, however, are not included in the General Plan. Nor does the Plan contain a table or tables indicating the general location, extent and type of land uses that could occur in the various geographic areas of the County. Ultimately, it is "impossible to relate any tabulated density standard of population to any location in the County."[18]

The General Plan contains a Goals and Policies Report that purports to set forth a "hierarchy of goals, policies, and implementation measures designed to guide future development in the County." (General Plan at p. 1-3.) The policies and implementation measures are in many cases nothing more than statements of preferences and opinions, rather than definite commitments to adopt enforceable policies and specific standards, or to use the powers the County has to enact ordinances and control development.

For example, one policy states that the County shall "encourage" residential growth to locate in existing Urban Development Borders ("UDBs"), Urban Area Boundaries ("UABs"), and Hamlet Development Boundaries ("HDBs"), but none of the accompanying implementation measures provide enforceable requirements or standards that would ensure that this policy is followed.[19] (General Plan at pp. 2-16 to 2-21.) Similarly, while the Plan states a policy of discouraging "new towns" (*id.* at p. 2-12), the policy has only very broad, general criteria and appears to allow new planned communities at an unlimited number of locations in the County as controlled by the market.[20] In the area of Land Use, the Plan again states a series of policies that are said to promote smart growth, encourage mixed use and infill development, etc. (General Plan at pp. 5-12 to 5-19), but the accompanying implementation measures contain no enforceable requirements that would ensure that development occurs consistent with these policy statements. (*Id.* at pp. 5-22 to 5-24.)

Thus, despite the general goals of the Plan to direct development in urban areas and in unincorporated hamlets and communities, nothing in the Plan will prevent a significant portion of the future growth from occurring outside the UDBs, for example in the foothill areas in the far eastern part of the County that are far from services, jobs, and transportation.

Ultimately, it appears that, rather than being a "constitution" for future development, the General Plan will largely leave the shape of new development, in amount and in location,

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[18] *See Camp v. Board of Supervisors of Mendocino County* (1981) 123 Cal.App.3d 334, 350.

[19] According to the 2003 State of California General Plan Guidelines ("General Plan Guidelines") at pp. 16-17, published by the Governor's Office of Planning and Research, a general plan should contain implementation measures which are actions, procedures, programs, or techniques, that carry out the general plan policy, as well as standards, which are rules or measures establishing a level of quality or quantity that must be complied with or satisfied.

[20] Similarly the Plan states a policy to "discourage the creation of ranchettes. . . ." (Plan at p. 4-4), which are residences built on large lots from 1.5 acres up. This policy does not, however, impose any enforceable limitations on ranchette development.

primarily to the control of the market. This is as much as acknowledged in the DEIR which states repeatedly that "[w]hile the proposed General Plan Update includes policies intended to control the amount and location of new growth. . . it does not solidly advocate, promote or represent any one development scenario because any attempt to predict the exact pace and locations of future market-driven growth is considered speculative." (DEIR at p. ES-7.)

4. CEQA Requirements

An EIR is an informational document intended to provide both the public and government agencies with detailed information about the effects of a proposed project on the environment, to list ways in which those effects can be mitigated, and to discuss and analyze alternatives to the project.[21] A "project" is defined as "the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment. . . ."[22] The project must be adequately described in the EIR,[23] and the entirety of the project must be considered, not just some smaller portion of it.[24] A decision to approve a project "is a nullity if based upon an EIR that does not provide the decision-makers, and the public, with the information about the project that is required by CEQA."[25]

CEQA was enacted to ensure that public agencies do not approve projects unless feasible measures are included that mitigate the project's significant environmental effects.[26] CEQA therefore requires that "[e]ach public agency shall mitigate or avoid the significant effects on the environment of projects that it carries out or approves whenever it is feasible to do so."[27] The mitigation measures must be enforceable and the benefits quantifiable, rather than just vague

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[21] *Laurel Heights Improvement Ass'n v. Regents of University of California* (1988) 47 Cal.3d 376, 390-91 (citing Pub. Res. Code, § 21061; Cal.Code Regs., tit. 14, § 15003, subd. (b)-(e) (hereafter "Guidelines").

[22] Guidelines, § 15378, subd. (a).

[23] Guidelines, § 15124.

[24] *San Joaquin Raptor Rescue Center v. County of Merced* (2007) 149 Cal.App.4th 645, 654.

[25] *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713, 721-22 (quoting *Santiago County Water Dist. v. County of Orange* (1981) 118 Cal.App.3d 818, 829).

[26] Pub. Res. Code, § 21002.

[27] Pub. Res. Code, §§ 21002.1, subd. (b); *City of Marina Board of Trustees* (2006) 39 Cal.4th 341, 360.

policy statements.[28]

The CEQA Guidelines further provide that the EIR must discuss a "range of reasonable alternatives to the project or to the location of the project which would feasiblely attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives."[29] The EIR must include sufficient information about each alternative to provide meaningful analysis and comparison,[30] and must consider alternatives that could eliminate significant effects or reduce them to a less than significant level, even if the alternatives could impede the attainment of the project's objectives to some degree.[31]

5. <u>The DEIR Does Not Adequately Analyze GHG Emissions Under CEQA</u>

As the Legislature has recognized, global warming is an "effect on the environment" under CEQA, and an individual project's incremental contribution to global warming can be cumulatively considerable and therefore significant.[32] The DEIR briefly and generally discusses global climate change, noting that California has passed Assembly Bill 32 ("AB 32"), the Global Warming Solutions Act of 2006, which requires the Air Resources Board to implement regulations to reduce GHG emissions statewide to 1990 levels by 2020. (DEIR at pp. 4-44 to 4-46.) The DEIR concludes that, even with mitigations, the GHG emissions from the project will be significant and unavoidable and will conflict with the goals of AB 32. (*Id.* at pp. 4-64 to 4-68). This analysis is deficient for the reasons discussed below.

a. The DEIR Does Not Adequately Disclose and Analyze All of the Potential Growth and GHG Emissions that May Result from the General Plan

A general plan embodies an agency's decisions as to how to guide future development, and any evaluation of the general plan "must necessarily include a consideration of the larger

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[28]*See* Publ. Res. Code, § 21081.6, subd. (b); *Federation of Hillside and Canyon Associations v. City of Los Angeles* (2000) 83 Cal.App.4th 1252, 1261 (agency must take steps to ensure mitigation measures are fully enforceable through permit conditions, agreements, or other measures).

[29] Guidelines, § 15126.6, subd. (a).

[30] Guidelines § 15126.6, subd. (d).

[31] Guidelines § 15126.6, subd. (b); see also *Save Round Valley Alliance v. County of Inyo* (2007) 157 Cal.App.4th 1437, 1456-57 [cannot exclude alternative simply because it impedes project objectives or is more costly].

[32]*See* Pub. Res. Code, § 21083.05 subd. (a); see also Sen. Rules Com., Off. of Sen. Floor Analyses, Analysis of Sen. Bill No. 97 (2007-2008 Reg. Sess.) Aug. 22, 2007.

project, i.e., the future development permitted by the amendment."[33] Thus, in order to comply with CEQA, the DEIR must describe and consider the full extent of the growth permitted by the Plan and must quantify the GHG emissions, both direct and indirect from that growth.[34]

Because the Plan does not include enforceable measures guiding how and where development will occur in Tulare County, the DEIR performs its analysis based on "assumptions" about "population growth and the market distribution of that growth throughout the County." (DEIR at p. 2-7.) The DEIR states that the population of Tulare County is anticipated to reach 621,549 by 2030, an increase of approximately 254,000 people, and assumes that approximately 75% of that growth is expected to occur within the UDBs of the incorporated cities, with the remaining 25%, or approximately 64,000 new residents, in unincorporated communities, hamlets and development corridors. (*Id.* at pp. ES-5, 2-7.)

In fact, however, as discussed above, the proposed General Plan is so open-ended that it does nothing to constrain market-driven population growth in the County and appears to allow unlimited development far beyond the scope of what is assumed in the DEIR. The actual remaining capacity for development within the existing UABs and UDBs of unincorporated communities in Tulare County is over 126,000 residents, indicating that the existing potential for growth in unincorporated areas is nearly twice the 64,000 that the DEIR assumes.[35] Further, development is not limited to existing communities and hamlets, but can occur at the discretion of the County in new towns located in rural, undeveloped areas of the County. Such development is not only likely in the future – it is already in progress; the County is currently considering just such a development project, the Yokohl Valley Ranch, a 10,000 unit residential development to be located in the Sierra Nevada foothills on land that is currently set aside for agriculture.[36]

In order to comply with CEQA, it is not sufficient for the DEIR to disclose only an assumed level of growth based on population projections, and an assumed distribution of that growth based on general policies and statements of preference. Rather, it must disclose the full potential for market-driven growth that is permitted under the Plan, and must evaluate the extent and impact of GHG emissions if a significant portion of that growth is accommodated in rural,

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[33] *City of Redlands v. County of San Bernardino* (2002) 96 Cal.App.4th 398, 409.

[34] *See* Guidelines, §§ 15126, 15358, subd. (a)(1), (2); *Las Virgenes Homeowners Federation, supra*, 177 Cal.App.3d at p. 307 [in adopting General Plan, County "necessarily addressed the cumulative impacts of buildout to the maximum possible densities allowed by those plans"]; see also *Christward Ministery v. Superior Court* (1986) 184 Cal.App. 3d 180, 194 [evaluation of general plan must include future development permitted by amendment].

[35] Tulare County General Plan Board Update (2006) at p. 8 [table showing estimate of population capacity within existing UDBs and UABs of unincorporated communities].

[36] *See* Notice of Preparation and Initial Study for Yokohl Ranch Project, available at http://www.ceqanet.ca.gov/DocDescription.asp?DocPK=617530.

undeveloped areas, as the Plan appears to allow.

b. The DEIR Does Not Adequately Quantify the Emissions from the Assumed Growth

In addition to failing to disclose the full amount of potential growth that may occur under the General Plan, the DEIR also fails to properly quantify the GHG emissions from the development it does disclose. The DEIR purports to quantify GHG emissions from the anticipated increase in vehicle miles traveled ("VMT") in the assumed market-driven development, stating that CO_2 emissions will increase from 1,997,046 to 3,446,934 tons/year, (approximately a 73% increase). (DEIR at p. 4-50.)

There is no explanation or supporting analysis describing how the DEIR derives this number. It would seem impossible to determine VMT without knowing in general terms where the new development will occur in the County and the distance from workplaces and services. Development that occurs close to urban centers and mass transit will produce significantly less VMT (and GHG emissions) than development that occurs in the far foothills, away from the population centers. Since the General Plan relies on "market-driven" development and does not implement enforceable procedures to guide development, the assessment of GHG emissions from increased VMT is inaccurate and incomplete.

Second, the DEIR discusses only emissions related to VMT and dairy operations. While the DEIR notes that there will be increased emissions from the actual "buildout" of the Plan (including increased use of electricity, woodburning fireplaces, natural gas, and equipment), it states that it lacks information to quantify these emissions, and therefore makes no effort to do so. (DEIR at p. 4-50) These omitted emissions are almost certainly substantial. According to the California Energy Commission, residential, commercial, and industrial sources make up about 30% of the CO_2 emissions in the State,[37] and that does not include methane production from sources such as landfills and wastewater treatment.

There are a number of models available to assist the County in estimating future GHG emissions. One source of helpful information is the report issued by the California Air Pollution Control Officers Association (CAPCOA), "CEQA and Climate Change."[38] The document discusses a variety of models that can be used to calculate GHG emissions. Similarly, the Attorney General's Website provides a table of currently available models that are useful for calculating emissions.[39] Other models are available from a variety of sources,[40]

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[37]California Energy Commission, *Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004*, December 2006, Table 6.

[38]The document is available at http://www.capcoa.org/.

[39] http://ag.ca.gov/globalwarming/ceqa/modeling_tools.php.

[40] *See, e.g.*, UPlan at http://ice.ucdavis.edu/doc/uplan.

The DEIR must fully quantify and consider all of the emissions from the project, including those resulting from the build-out.

c. The DEIR Does Not Include All Feasible Alternatives and Does Not Quantify GHG Emissions from Those Alternatives

The DEIR considers five alternatives which it terms the (1) No-Project alternative, (2) City-Centered Alternative, (3) Rural Communities Alternative, (4) Transportation Corridors Alternative, and (5) Confined Growth Alternative. (DEIR at pp. ES-8 to 9, 7-3 to 7-34.) Based on Table 7-1, which outlines the assumed population growth in unincorporated areas for each of the alternatives, it appears that the range of alternatives is narrow, representing a difference of only approximately 4% in growth in unincorporated areas (from 26% to 30%). (DEIR at pp. 7-3 to 7-4.) The alternatives thus ignore a range of "smart growth" alternatives that would concentrate development in already existing urban areas near mass transit and preserve more agricultural land and open space. A more intense "smart growth" alternative would appear to be feasible given the evidence that existing cities can currently accommodate all of the growth anticipated by the County.[41] Thus, in order to be consistent with CEQA, the DEIR must consider a broader range of alternatives that would focus more of the development in existing urban areas, or explain and provide evidence supporting a conclusion as to why such alternatives would be infeasible.

Moreover, while the DEIR purports to compare the impacts of the various alternatives, the discussion of the alternatives is inadequate. There are no anticipated population numbers provided for two of the alternatives (No-Project and Confined Growth alternatives), making it impossible to compare them to the other three alternatives (DEIR at pp. 7-3 to 7-4), and the discussion of alternatives does not even mention GHG emissions. (DEIR at pp. 7-14 to 7-34.) In order to comply with CEQA, the DEIR must quantify and compare the GHG emissions from each of the alternatives. Again, as discussed above, there are modeling resources available to the County for performing this analysis.

d. The DEIR Does Not Impose All Feasible Measures to Mitigate GHG Emissions

CEQA provides that a public agency should not approve a project as proposed if there are additional feasible mitigation measures that would substantially lessen the significant environmental effects of the project.[42] Further, in order to ensure that mitigation measures are actually implemented, they must be "fully enforceable through permit conditions, agreements, or

[41]Tulare County General Plan: Policy Alternatives, Board of Supervisors Edition (August 2005) at p. 9, available at http://generalplan.co.tulare.ca.us/documents.html.

[42] Pub. Res. Code, § 21002.

other measures."[43]

The DEIR refers to a series of policies in the General Plan that purport to mitigate GHG emissions related to general development. They include, for example, requiring any development to minimize air impacts, requiring the County to "consider" any strategies identified by the California Air Resources Board, studying methods of transportation to reduce air pollution, encouraging departments to replace existing vehicles with low emission vehicles, and identifying opportunities for infill. (General Plan at pp. 9-4 to 9-5.) While these policies are a positive step, they are general and unenforceable, as are the accompanying implementation measures. Further, the DEIR makes no attempt to quantify the extent to which these mitigation measures will reduce GHG emissions, instead simply jumping to the conclusion that the climate change impacts from the project would be "significant and unavoidable." (DEIR at pp. 4-65 to 4-68.)[44]

In fact, there are many mitigation measures that are readily available to the County to decrease GHG emissions from new development. We are not suggesting that the County must adopt any specific set of mitigation measures, since this is a decision within its discretion. The County is, however, required by law to determine which measures are reasonable and feasible and to implement and enforce those measures. In considering which mitigation measures to implement, the County has many resources available. It can consider, for example, the measures set out in the CAPCOA document referenced above (pp. 79-87 and Appendix B-1), and those set forth in the list on the Attorney General's website[45] (copy attached), and in the comments in the letter of the San Joaquin Valley Unified Air Pollution Control District ("APCD") dated May 26, 2006, included in Appendix A to the Notice of Preparation. All of these sources provide concrete and enforceable recommendations, and address all aspects of project development that have an impact on GHG emissions, including conservation, land use, circulation, housing, open space,

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[43] Pub. Res. Code, § 21081.6, subd. (b); *Federation of Hillside & Canyon Ass'ns, supra,* 83 Cal.App.4th at p. 1261.

[44] The shortcomings of the mitigation discussion is further apparent in the DEIR's discussion of mitigation measures for dairies, which addresses GHG reduction only incidentally in the context of reducing other air pollutants, and which fails to discuss many potentially significant mitigation measures that are available. (DEIR at pp. 4-66 to 4-67.) To take one example, methane digesters, which are increasingly being used on dairies in California, process animal waste under anaerobic conditions, yielding methane gas that is collected on site and can be sold directly to utilities or used to generate electricity, bringing in revenue to the dairy. *See* California Energy Commission, *Dairy Power Production Program, Dairy Methane Digester System 90-Day Evaluation Report, Eden-Vale Dairy,* December 2006 at p. 4; http://cpuc.ca.gov/Final_resolution/68429.htm; http://www.epa.gov/agstar/resources.html; Fresno County Notices of Intention to Adopt a Mitigated Negative Declaration (Unclassified Conditional Use Permits 3215-3218).

[45] http://ag.ca.gov/globalwarming/ceqa.php.

safety, and energy. Other sources discussing mitigation measures are readily available.[46]

Finally, the DEIR states that the County will, at some unspecified future time, develop a GHG Emissions Reduction Plan that parallels requirements adopted by the California Air Resources Board. (DEIR at p. 4-67) While we commend the County for recognizing that such a plan is necessary, this reference to an as yet undeveloped and completely undefined plan cannot serve as mitigation for the project's GHG emissions, since deferring environmental assessment to some future date is counter to CEQA's mandate that environmental review be performed at the earliest stages in the planning project.[47]

We encourage the County to pursue adoption of a GHG Emissions Reduction Plan as part of its General Plan. To constitute effective mitigation, the County should consider including in the Plan a baseline inventory of the GHGs currently being emitted in the County from all sources, projected emissions for target years (e.g., 2020 and beyond), targets for the reduction of those sources of emissions that are consistent with AB 32 and Executive Order #S-03-05, and a suite of feasible emission reduction measures to meet the reduction target(s).[48] An effective plan would also likely include monitoring and reporting requirements so that the County will obtain information on the performance of its plan, and an adaptive management element to ensure that the Plan, once implemented, can be adjusted if necessary to meet the reduction targets.

In sum, given the wealth of resources available describing specific mitigation measures for GHG emissions, it is feasible for the County to develop and impose a set of mitigation measures that will be implemented and enforced as conditions of all future development projects. Since the County has not fully explored the extent to which there are feasible mitigation measures that would substantially reduce the global warming impacts of this project, it has not complied with CEQA.

e. The DEIR Cannot Conclude, Without Fuller Analysis, that GHG Effects are Significant and Unavoidable and Inconsistent with AB 32

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[46] *See, e.g.*, www.gosolarcalifornia.ga.gov/nshp [discussing the California Energy Commissions' New Solar Homes Partnership which provides rebates to developers of six units or more who offer solar power on 50% of the new units]; www.energy.ca.gov/efficiency/lighting/outdoor_reduction.html and www.newbuildings.org/lighting.htm [energy efficient lighting]; www.energy.ca.gov/title24/2005standards/ [feasible green building measures identified by the California Energy Commission's Compliance Manuals]; www.vtpi.org/park_man.pdf [discussion of parking management programs that provide environmental benefits].

[47] Pub.Resources Code, § 21003.1; *Sunstrom v. County of Mendocino* (1988) 202 Cal.App.3d 296, 307 (and cases cited therein).

[48] See the Attorney General's settlement with San Bernardino County, available at http://ag.ca.gov/cms_pdfs/press/2007-08-21_San_Bernardino_settlement_agreement.pdf.

The DEIR concludes that the GHG emissions from the project will be significant and unavoidable. (DEIR at p. 4-68.) In light of the fact that the emissions are not fully quantified, enforceable mitigation measures are not imposed, and the efficacy of any mitigation are not analyzed qualitatively or quantitatively, this conclusion is unsupported and contravenes CEQA.[49]

6. Conclusion

This is a critical time for all of California. Scientists acknowledge that global warming is real. Unless we depart from the "business as usual" paradigm and embrace the new principles of "smart growth," we risk pushing the environment past the "tipping point" into catclysmic climate change. The stakes are too high for Tulare County to abdicate it responsibilities, allowing the market to control the future of the hundreds of thousands of people who currently live and work – and the hundred thousands more who will live and work – in Tulare County. The County, through its General Plan and the CEQA process, has the opportunity, and indeed the duty, to become one of the leaders in planning the future of California. The decisions the County makes today will determine what the County will look like in the coming years and 30 years from now, and they can help move California forward into a new era of development and sustainable growth, consistent with the State's goals for a lower-carbon future.

Thank you for your consideration of these comments. We would appreciate the opportunity meet with County staff to discuss these comments further in an effort to work cooperatively on these issues.

Sincerely,

/S/

SUSAN S. FIERING
Deputy Attorney General

For EDMUND G. BROWN JR.
Attorney General

[49] *See Berkeley Keep Jets Over the Bay Committee v. Board of Port Commissioners* (2001) 91 Cal.App.4th 1344, 1371 [lead agency cannot simply conclude that there are overriding considerations that would justify a significant and unavoidable effect without fully analyzing the effect].

EXHIBIT B

MEMORANDUM OF AGREEMENT

This Memorandum of Agreement ("Agreement") is entered into by and between the City of Stockton ("City"), Edmund G. Brown Jr., Attorney General of California, on behalf of the People of the State of California ("Attorney General"), and the Sierra Club, and it is dated and effective as of the date that the last Party signs ("Effective Date"). The City, the Attorney General, and the Sierra Club are referred to as the "Parties."

RECITALS

On December 11, 2007, the City approved the 2035 General Plan, Infrastructure Studies Project, Bicycle Master Plan, Final Environmental Impact Report ("EIR"), and Statement of Overriding Considerations. The General Plan provides direction to the City when making land use and public service decisions. All specific plans, subdivisions, public works projects, and zoning decisions must be consistent with the City's General Plan. As adopted in final form, the General Plan includes Policy HS-4.20, which requires the City to "adopt new policies, in the form of a new ordinance, resolution, or other type of policy document, that will require new development to reduce its greenhouse gas emissions to the extent feasible in a manner consistent with state legislative policy as set forth in Assembly Bill (AB) 32 (Health & Saf. Code, § 38500 et seq.) and with specific mitigation strategies developed by the California Air Resources Board (CARB) pursuant to AB 32[.]" The policy lists the following "potential mitigation strategies," among others, for the City to consider:

(a) Increased density or intensity of land use, as a means of reducing per capita vehicle miles traveled by increasing pedestrian activities, bicycle usage, and public or private transit usage; and

(b) Increased energy conservation through means such as those described in Appendix F of the State Guidelines for the California Environmental Quality Act.

The 2035 General Plan also includes other Policies and goals calling for infill development, increased transit, smart growth, affordable housing, and downtown revitalization.

In December 2006, in accordance with the requirements of the California Environmental Quality Act ("CEQA"), the City prepared and circulated a Draft EIR. Comments were received on the EIR; the City prepared responses to these comments and certified the EIR in December 2007.

On January 10, 2008, the Sierra Club filed a Petition for Writ of Mandate in San Joaquin County Superior Court (Case No. CV 034405, hereinafter "Sierra Club Action"),

alleging that the City had violated CEQA in its approval of the 2035 General Plan. In this case, the Sierra Club asked the Court, among other things, to issue a writ directing the City to vacate its approval of the 2035 General Plan and its certification of the EIR, and to award petitioners' attorney's fees and costs.

The Attorney General also raised concerns about the adequacy of the EIR under CEQA, including but not limited to the EIR's failure to incorporate enforceable measures to mitigate the greenhouse gas ("GHG") emission impacts that would result from the General Plan.

The City contends that the General Plan and EIR adequately address the need for local governments to reduce greenhouse gas ("GHG") emissions in accordance with Assembly Bill 32, and associated issues of climate change.

Because the outcome of the Parties' dispute is uncertain, and to allow the Stockton General Plan to go forward while still addressing the concerns of the Attorney General and the Sierra Club, the Parties have agreed to resolve their dispute by agreement, without the need for judicial resolution.

The parties want to ensure that the General Plan and the City's implementing actions address GHG reduction in a meaningful and constructive manner. The parties recognize that development on the urban fringe of the City must be carefully balanced with accompanying infill development to be consistent with the state mandate of reducing GHG emissions, since unbalanced development will cause increased driving and increased motor vehicle GHG emissions. Therefore, the parties want to promote balanced development, including adequate infill development, downtown vitalization, affordable housing, and public transportation. In addition, the parties want to ensure that development on the urban fringe is as revenue-neutral to the City as to infrastructure development and the provision of services as possible.

In light of all the above considerations, the Parties agree as follows, recognizing that any legislative actions contemplated by the Agreement require public input and, in some instances, environmental review prior to City Council actions, which shall reflect such input and environmental information, pursuant to State law:

AGREEMENT

Climate Action Plan

1. Within 24 months of the signing of this Agreement, and in furtherance of General Plan Policy HS-4.20 and other General Plan policies and goals, the City agrees that its staff shall prepare and submit for City Council adoption, a Climate Action Plan, either as a separate element of the General Plan or as a component of an existing General Plan element. The Climate Action Plan, whose adoption will be subject to normal requirements for compliance with CEQA and other controlling state law, shall include, at least, the measures set forth in paragraphs 3 through 8, below.

2. The City shall establish a volunteer Climate Action Plan advisory committee to assist the staff in its preparation and implementation of the Plan and other policies or documents to be adopted pursuant to this Agreement. This committee shall monitor the City's compliance with this Agreement, help identify funding sources to implement this Agreement, review in a timely manner all draft plans and policy statements developed in accordance with this Agreement (including studies prepared pursuant to Paragraph 9, below), and make recommendations to the Planning Commission and City Council regarding its review. The committee shall be comprised of one representative from each of the following interests: (1) environmental, (2) non-profit community organization, (3) labor, (4) business, and (5) developer. The committee members shall be selected by the City Council within 120 days of the Effective Date, and shall serve a one-year term, with no term limits. Vacancies shall be filled in accordance with applicable City policies. The City shall use its best efforts to facilitate the committee's work using available staff resources.

3. The Climate Action Plan shall include the following measures relating to GHG inventories and GHG reduction strategies:

a. Inventories from all public and private sources in the City:

(1) Inventory of current GHG emissions as of the Effective Date;

(2) Estimated inventory of 1990 GHG emissions;

(3) Estimated inventory of 2020 GHG emissions.

The parties recognize that techniques for estimating the 1990 and 2020 inventories are imperfect; the City agrees to use its best efforts, consistent with methodologies developed by ICLEI and the California Air Resources

Board, to produce the most accurate and reliable inventories it can without disproportionate or unreasonable staff commitments or expenditures.

b. Specific targets for reductions of the current and projected 2020 GHG emissions inventory from those sources of emissions reasonably attributable to the City's discretionary land use decisions and the City's internal government operations. Targets shall be set in accordance with reduction targets in AB 32, other state laws, or applicable local or regional enactments addressing GHG emissions, and with Air Resources Board regulations and strategies adopted to carry out AB 32, if any, including any local or regional targets for GHG reductions adopted pursuant to AB 32 or other state laws. The City may establish goals beyond 2020, consistent with the laws referenced in this paragraph and based on current science.

c. A goal to reduce per capita vehicle miles traveled ("VMT") attributable to activities in Stockton (i.e., not solely due to through trips that neither originate nor end in Stockton) such that the rate of growth of VMT during the General Plan's time frame does not exceed the rate of population growth during that time frame. In addition, the City shall adopt and carry out a method for monitoring VMT growth, and shall report that information to the City Council at least annually. Policies regarding VMT control and monitoring that the City shall consider for adoption in the General Plan are attached to this Agreement in Exhibit A.

d. Specific and general tools and strategies to reduce the current and projected 2020 GHG inventories and to meet the Plan's targets for GHG reductions by 2020, including but not limited to the measures set out in paragraphs 4 through 8, below.

4. The City agrees to take the following actions with respect to a green building program:

a. Within 12 months of the Effective Date, the City staff shall submit for City Council adoption ordinance(s) that require:

(1) All new housing units to obtain Build It Green certification, based on then-current Build It Green standards, or to comply with a green building program that the City after consultation with the Attorney General, determines is of comparable effectiveness;

(2) All new non-residential buildings that exceed 5000 square feet and all new municipal buildings that exceed 5000 square feet to be certified to LEED Silver standards at a minimum, based on the then-current LEED standards, or to comply with a green building program that the City, after consultation with the Attorney General, determines is of comparable effectiveness;

(3) If housing units or non-residential buildings certify to standards other than, but of comparable effectiveness to, Build It Green or LEED Silver, respectively, such housing units or buildings shall demonstrate, using an outside inspector or verifier certified under the California Energy Commission Home Energy Rating System (HERS), or a comparably certified verifier, that they comply with the applicable standards.

(4) The ordinances proposed for adoption pursuant to paragraphs (1) through (3) above may include an appropriate implementation schedule, which, among other things, may provide that LEED Silver requirements (or standards of comparable effectiveness) for non-residential buildings will be implemented first for buildings that exceed 20,000 square feet, and later for non-residential buildings that are less than 20,000 and more than 5,000 square feet.

(5) Nothing in this section shall affect the City's obligation to comply with applicable provisions of state law, including the California Green Building Standards Code (Part 11 of Title 24 of the California Code of Regulations), which, at section 101.7, provides, among other things, that "local government entities retain their discretion to exceed the standards established by [the California Green Building Standards Code]."

b. Within 18 months of the Effective Date, the City staff shall submit for City Council adoption ordinance(s) that will require the reduction of the GHG emissions of existing housing units on any occasion when a permit to make substantial modifications to an existing housing unit is issued by the City.

c. The City shall explore the possibility of creating a local assessment district or other financing mechanism to fund voluntary actions by owners of commercial and residential buildings to undertake energy efficiency

measures, install solar rooftop panels, install "cool" (highly reflective) roofs, and take other measures to reduce GHG emissions.

d. The City shall also explore the possibility of requiring GHG-reducing retrofits on existing sources of GHG emissions as potential mitigation measures in CEQA processes.

e. From time to time, but at least every five years, the City shall review its green building requirements for residential, municipal and commercial buildings, and update them to ensure that they achieve performance objectives consistent with those achieved by the top (best-performing) 25% of city green building measures in the state.

5. Within 12 months of the Effective Date, the City staff shall submit for City Council adoption a transit program, based upon a transit gap study. The transit gap study shall include measures to support transit services and operations, including any ordinances or general plan amendments needed to implement the transit program. These measures shall include, but not be limited to, the measures set forth in paragraphs 5.b. through 5.d. In addition, the City shall consider for adoption as part of the transit program the policy and implementation measures regarding the development of Bus Rapid Transit ("BRT") that are attached to this Agreement in Exhibit B.

a. The transit gap study, which may be coordinated with studies conducted by local and regional transportation agencies, shall analyze, among other things, strategies for increasing transit usage in the City, and shall identify funding sources for BRT and other transit, in order to reduce per capita VMT throughout the City. The study shall be commenced within 120 days of the Effective Date.

b. Any housing or other development projects that are (1) subject to a specific plan or master development plan, as those terms are defined in §§ 16-540 and 16-560 of the Stockton Municipal Code as of the Effective Date (hereafter "SP" or "MDP"), or (2) projects of statewide, regional, or areawide significance, as defined by the CEQA Guidelines (hereafter "projects of significance"), shall be configured, and shall include necessary street design standards, to allow the entire development to be internally accessible by vehicles, transit, bicycles, and pedestrians, and to allow access to adjacent neighborhoods and developments by all such modes of transportation.

c. Any housing or other development projects that are (1) subject to an SP or MDP, or (2) projects of significance, shall provide financial and/or other

support for transit use. The imposition of fees shall be sufficient to cover the development's fair share of the transit system and to fairly contribute to the achievement of the overall VMT goals of the Climate Action Plan, in accordance with the transit gap study and the Mitigation Fee Act (Government Code section 66000, *et seq.*), and taking into account the location and type of development. Additional measures to support transit use may include dedication of land for transit corridors, dedication of land for transit stops, or fees to support commute service to distant employment centers the development is expected to serve, such as the East Bay. Nothing in this Agreement precludes the City and a landowner/applicant from entering in an agreement for additional funding for BRT.

d. Any housing or other development projects that are (1) subject to an SP or MDP or (2) projects of significance, must be of sufficient density overall to support the feasible operation of transit, such density to be determined by the City in consultation with San Joaquin Regional Transit District officials.

6. To ensure that the City's development does not undermine the policies that support infill and downtown development, within 12 months of the Effective Date, the City staff shall submit for City Council adoption policies or programs in its General Plan that:

a. Require at least 4400 units of Stockton's new housing growth to be located in Greater Downtown Stockton (defined as land generally bordered by Harding Way, Charter Way (MLK), Pershing Avenue, and Wilson Way), with the goal of approving 3,000 of these units by 2020.

b. Require at least an additional 14,000 of Stockton's new housing units to be located within the City limits as they exist on the Effective Date ("existing City limits").

c. Provide incentives to promote infill development in Greater Downtown Stockton, including but not limited to the following for proposed infill developments: reduced impact fees, including any fees referenced in paragraph 7 below; lower permit fees; less restrictive height limits; less restrictive setback requirements; less restrictive parking requirements; subsidies; and a streamlined permitting process.

d. Provide incentives for infill development within the existing City limits but outside Greater Downtown Stockton and excluding projects of significance. These incentives may be less aggressive than those referenced in paragraph 6.c., above.

7. Within 12 months of the Effective Date, the City staff shall submit for City Council adoption amendments to the General Plan to ensure that development at the City's outskirts, particularly residential, village or mixed use development, does not grow in a manner that is out of balance with development of infill. These proposed amendments shall include, but not be limited to, measures limiting the granting of entitlements for development projects outside the existing City limits and which are (1) subject to an SP or MDP, or (2) projects of significance, until certain criteria are met. These criteria shall include, at a minimum:

a. Minimum levels of transportation efficiency, transit availability (including BRT) and Level of Service, as defined by the San Joaquin Council of Government regulations, City service capacity, water availability, and other urban services performance measures;

b. Firm, effective milestones that will assure that specified levels of infill development, jobs-housing balance goals, and GHG and VMT reduction goals, once established, are met before new entitlements can be granted;

c. Impact fees on new development, or alternative financing mechanisms identified in a project's Fiscal Impact Analysis and/or Public Facilities Financing Plan, that will ensure that the levels and milestones referenced in paragraphs 7.a. and 7.b., above, are met. Any such fees:

(1) shall be structured, in accordance with controlling law, to ensure that all development outside the infill areas within existing City limits is revenue-neutral to the City (which may necessitate higher fees for development outside this area, depending upon the costs of extending infrastructure);

(2) may be in addition to mitigation measures required under CEQA;

(3) shall be based upon a Fiscal Impact Analysis and a Public Facilities Financing Plan.

d. The City shall explore the feasibility of enhancing the financial viability of infill development in Greater Downtown Stockton, through the use of such mechanisms as an infill mitigation bank.

8. The City shall regularly monitor the above strategies and measures to ensure that they are effectively reducing GHG emissions. In addition to the City staff reporting on VMT annually, as provided in paragraph 3.c., the City staff or the advisory committee shall report annually to the City Council on the City's progress in implementing the

strategies and measures of this Agreement. If it appears that the strategies and measures will not result in the City meeting its GHG reduction targets, the City shall, in consultation with the Attorney General and Sierra Club, make appropriate modifications and, if necessary, adopt additional measures to meet its targets.

Early Climate Protection Actions

9. To more fully carry out those provisions of the General Plan, including the policy commitments embodied in those General Plan Policies, such as General Plan Policy HS-4.20, intended to reduce greenhouse gas emissions through reducing commuting distances, supporting transit, increasing the use of alternative vehicle fuels, increasing efficient use of energy, and minimizing air pollution, and to avoid compromising the effectiveness of the measures in Paragraphs 4 through 8, above, until such time as the City formally adopts the Climate Action Plan, before granting approvals for development projects (1) subject to an SP or MDP, or (2) considered projects of significance, and any corresponding development agreements, the City shall take the steps set forth in subsections (a) through (d) below:

(a) City staff shall:

(1) formulate proposed measures necessary for the project to meet any applicable GHG reduction targets;

(2) assess the project's VMT and formulate proposed measures that would reduce the project's VMT;

(3) assess the transit, especially BRT, needs of the project and identify the project's proposed fair share of the cost of meeting such needs;

(4) assess whether project densities support transit, and, if not, identify proposed increases in project density that would support transit service, including BRT service;

(5) assess the project's estimated energy consumption, and identify proposed measures to ensure that the project conserves energy and uses energy efficiently;

(6) formulate proposed measures to ensure that the project is consistent with a balance of growth between land within Greater Downtown Stockton and existing City limits, and land outside the existing City limits;

(7) formulate proposed measures to ensure that City services and infrastructure are in place or will be in place prior to the issuance of new entitlements for the project or will be available at the time of development; and

(8) formulate proposed measures to ensure that the project is configured to allow the entire development to be internally accessible by all modes of transportation.

(b) The City Council shall review and consider the studies and recommendations of City staff required by paragraph 9(a) and conduct at least one public hearing thereon prior to approval of the proposed project (though this hearing may be folded into the hearing on the merits of the project itself).

(c) The City Council shall consider the feasibility of imposing conditions of approval, including mitigation measures pursuant to CEQA, based on the studies and recommendations of City staff prepared pursuant to paragraph 9(a) for each covered development project.

(d) The City Council shall consider including in any development approvals, or development agreements, that the City grants or enters into during the time the City is developing the Climate Action Plan, a requirement that all such approvals and development agreements shall be subject to ordinances and enactments adopted after the effective date of any approvals of such projects or corresponding development agreements, where such ordinances and enactments are part of the Climate Action Plan.

(e) The City shall complete the process described in paragraphs (a) through (d) (hereinafter, "Climate Impact Study Process") prior to the first discretionary approval for a development project. Notwithstanding the foregoing, however, for projects for which a draft environmental impact report has circulated as of the Effective Date, the applicant may request that the City either (i) conduct the Climate Impact Study Process or (ii) complete its consideration of the Climate Action Plan prior to the adoption of the final discretionary approval leading to the project's first phase of construction. In such cases, the applicant making the request shall agree that nothing in the discretionary approvals issued prior to the final discretionary approval (i) precludes the City from imposing on the project conditions of approvals or other measures that may result from the Climate Impact Study Process, or (ii) insulates the project from a decision, if any, by the City to apply any ordinances and/ or enactments that may comprise the Climate Action Plan

ultimately adopted by the City.

Attorney General Commitments

10. The Attorney General enters into this Agreement in his independent capacity and not on behalf of any other state agency, commission, or board. In return for the above commitments made by the City, the Attorney General agrees:

a. To refrain from initiating, joining, or filing any brief in any legal challenge to the General Plan adopted on December 11, 2007;

b. To consult with the City and attempt in good faith to reach an agreement as to any future development project whose CEQA compliance the Attorney General considers inadequate. In making this commitment, the Attorney General does not surrender his right and duties under the California Constitution and the Government Code to enforce CEQA as to any proposed development project, nor his duty to represent any state agency as to any project;

c. To make a good faith effort to assist the City in obtaining funding for the development of the Climate Action Plan.

Sierra Club Commitments

11. The Sierra Club agrees to dismiss the Sierra Club Action with prejudice within ten (10) days of the Effective Date. Notwithstanding the foregoing agreement to dismiss the Sierra Club Action, the City and Sierra Club agree that, in the event the City should use the EIR for the 2035 General Plan in connection with any other project approval, the Sierra Club has not waived its right (a) to comment upon the adequacy of that EIR, or (b) to file any action challenging the City's approval of any other project based on its use and/or certification of the EIR.

General Terms and Conditions

12. This Agreement represents the entire agreement of the Parties, and supercedes any prior written or oral representations or agreements of the Parties relating to the subject matter of this Agreement.

13. No modification of this Agreement will be effective unless it is set forth in writing and signed by an authorized representative of each Party.

14. Each Party warrants that it has the authority to execute this Agreement. Each Party warrants that it has given all necessary notices and has obtained all necessary consents to permit it to enter into and execute this Agreement.

15. This Agreement shall be governed by and construed in accordance with the laws of the State of California.

16. This Agreement may be executed in counterparts, each of which shall be deemed an original. This Agreement will be binding upon the receipt of original, facsimile, or electronically communicated signatures.

17. This Agreement has been jointly drafted, and the general rule that it be construed against the drafting party is not applicable.

18. If a court should find any term, covenant, or condition of this Agreement to be invalid or unenforceable, the remainder of the Agreement shall remain in full force and effect.

19. The City agrees to indemnify and defend the Sierra Club, its officers and agents (collectively, "Club") from any claim, action or proceeding ("Proceeding") brought against the Club, whether as defendant/respondent, real party in interest, or in any other capacity, to challenge or set aside this Agreement. This indemnification shall include (a) any damages, fees, or costs awarded against the Club, and (b) any costs of suit, attorneys' fees or expenses incurred in connection with the Proceeding, whether incurred by the Club, the City or the parties bringing such Proceeding. If the Proceeding is brought against both the Club and the City, the Club agrees that it may be defended by counsel for the City, provided that the City selects counsel that is acceptable to the Club; the Club may not unreasonably withhold its approval of such mutual defense counsel.

20. The City shall pay Sierra Club's attorney's fees and costs in the amount of $157,000 to the law firm of Shute, Mihaly & Weinberger LLP as follows: $50,000 within 15 days of dismissal of the Sierra Club Action, and (b) the balance on or before January 30, 2009.

21. Any notice given under this Agreement shall be in writing and shall be delivered as follows with notice deemed given as indicated: (a) by personal delivery when delivered personally; (b) by overnight courier upon written verification of receipt; or (c) by certified or registered mail, return receipt requested, upon verification of receipt. Notice shall be sent as set forth below, or as either party may specify in writing:

City of Stockton: Attorney General's Office

Richard E. Nosky, City Attorney
425 N. El Dorado Street, 2nd Floor
Stockton, CA 95202

Lisa Trankley
Susan Durbin
Deputy Attorneys General
1300 I Street, P.O. Box 944255
Sacramento, CA 94255-2550

Sierra Club:
Aaron Isherwood
Environmental Law Program
85 Second Street, 2nd Floor
San Francisco, CA 94105

Rachel Hooper
Amy Bricker
Shute, Mihaly & Weinberger
396 Hayes Street
San Francisco, CA 94102

22. Nothing in this Agreement shall be construed as requiring the City to relinquish or delegate its land use authority or police power.

(SIGNATURES ON FOLLOWING PAGE)

In witness whereof, this Agreement is executed by the following:

PEOPLE OF THE STATE OF CALIFORNIA
BY AND THROUGH ATTORNEY GENERAL
EDMUND G. BROWN JR.

Lisa Trankley

DATED: 10/14/08

ATTEST:

KATHERINE GONG MEISSNER
City Clerk of the City of Stockton

CITY OF STOCKTON,
a municipal corporation

J. GORDON PALMER, JR.
City Manager

DATED 9/25/08

APPROVED AS TO FORM:

RICHARD E. NOSKY, JR.
City Attorney

DATED 9-9-08

THE SIERRA CLUB

BARBARA WILLIAMS, CHAIR
MOTHER LODE CHAPTER

DATED _____

In witness whereof, this Agreement is executed by the following:

PEOPLE OF THE STATE OF CALIFORNIA
BY AND THROUGH ATTORNEY GENERAL
EDMUND G. BROWN JR.

_____

DATED: _____

ATTEST:

KATHERINE GONG MEISSNER
City Clerk of the City of Stockton

APPROVED AS TO FORM:

RICHARD E. NOSKY, JR.
City Attorney

DATED _____

CITY OF STOCKTON,
a municipal corporation

J. GORDON PALMER, JR.
City Manager

DATED _____

THE SIERRA CLUB

Barbara Williams

BARBARA WILLIAMS, CHAIR
MOTHER LODE CHAPTER

DATED 10/11/08

EXHIBIT A

Policy Re: VMT Monitoring Program

The City's policy is to monitor key City-maintained roadways to estimate Vehicle Miles Traveled (VMT) by single-occupant automobile per capita on an annual basis, to be submitted as an annual report to the City Council. The estimate of citywide VMT should be developed in cooperation with the San Joaquin Council of Governments (**"**SJCOG**"**), by augmenting local City data with VMT estimates from SJCOG and Caltrans for the regional Congestion Management Plan network. The estimated change in annual VMT should be used to measure the effectiveness of jobs/housing balance, greenhouse gas emission reduction, and transit plans and programs.

Implementation Program

In order to develop an annual estimate of citywide VMT, the City should augment local City data with VMT estimates from SJCOG and Caltrans for regional facilities, or adopt other methodologies to estimate citywide VMT that are approved in concept by the two agencies. For purposes of calculating annual changes in VMT, the annual estimate of VMT should subtract out the estimates of regional truck and other through traffic on the major freeways (I-5, SR 4, SR 99).

Policy Re: Reduce Growth in VMT

The City's policy is to achieve the following fundamental goals to regulate vehicle emissions and reduce greenhouse gas emissions, improve jobs/housing balance, and increase transit usage over the duration of this General Plan: Reduce the projected increase in VMT by single-occupant automobile per capita to an annual rate over the planning period that is equal to or less than the population increase (this goal is also required for the City to receive funding through the Measure K/Congestion Management Plan program).

Implementation Program

In order to keep annual increases in VMT to a rate equal to or less than population increases, the following trip reduction programs should be considered by the City: increased transit service (Bus Rapid Transit) funded through new development fees; planning all future housing development to be in the closest possible proximity to existing and planned employment centers; provision of affordable housing; creation of higher density, mixed use and walkable communities and development of bicycle and pedestrian trails; and other proven programs.

Implementation Program

If the City goal of reducing the projected increase in VMT to an amount equal to or less than the population increase, and increase transit usage, is not met for two or more years during each five-year cycle of VMT monitoring, the City should consider adoption of the following programs, among others:

Adopt more vigorous economic development programs with funding for staff; and

Slow the rate of approvals of building permits for housing developments.

EXHIBIT B

Policy Re: Bus Rapid Transit

The City's policy is to vigorously support efforts to develop Bus Rapid Transit (BRT) within and beyond Stockton as a major priority of its General Plan, in order to increase overall transit usage over time. Based on an updated transit study, the City should plan for and provide BRT service running along key north-south routes as a first priority: Pacific Avenue; El Dorado Street; West Lane/Airport Way; Pershing Avenue. BRT service along key east-west corridors should also be provided. Transit use goals should be approved and monitored by the City over the planning period.

Implementation Program

In order to fund the initial capital and operating costs for BRT along major north-south arterials, the City should consider adoption of a comprehensive new development BRT fee program that requires new growth to significantly fund BRT, following a study consistent with the requirements of State law. The new development BRT fee program should ensure that "greenfield" projects approved at the fringe of the City pay a fee that represents the full cost of providing BRT service to the new housing; infill development may be granted a reduced BRT fee based on the reduced distance of service provided to the inner city areas.

Implementation Program

In order to augment the new development funding of the initial capital and operating costs for BRT, the City should strongly advocate for Measure K funding and should seriously consider placing an initiative on the ballot to receive voter approval for additional funding from existing residents and businesses.

Implementation Program

The City should establish transit use goals that set specific targets (e.g., transit mode split percentage of total trips and bus headways) that represent an increase in public transportation ridership and level of service over current levels by 2012 and then another increase by 2018.

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Chagrin River Watershed Partners, Inc. *January 2006*

Riparian Setbacks
Technical Information for Decision Makers

November 1997
Revised February 1999
Revised January 2006

CRWP's primary support comes from its Members including *Auburn Township, City of Aurora, Bainbridge Township, Village of Bentleyville, Chagrin Falls Township, Village of Chagrin Falls, Chester Township, Claridon Township, Cleveland Metroparks, Cuyahoga County, City of Eastlake, Village of Gates Mills, Geauga County, Geauga Park District, Village of Hunting Valley, City of Kirtland, Village of Kirtland Hills, Lake County, Lake County Metroparks, City of Mayfield Heights, Mayfield Village, City of Mentor, Village of Moreland Hills, Munson Township, Newbury Township, Orange Village, City of Pepper Pike, Russell Township, City of Solon, Village of South Russell, Waite Hill Village, City of Wickliffe, City of Willoughby, City of Willoughby Hills, and Village of Woodmere.*

The Chagrin River Watershed Partners, Inc (CRWP)

CRWP was formed by 16 cities, villages, townships, counties, and park districts in 1996 in response to increasing concerns about flooding, erosion, and water quality problems. These founders understood the need to improve land use decisions and to limit the impacts of development and rising infrastructure costs due to increased storm water quantities. Today CRWP's 34 members represent 90% of the watershed. CRWP provides technical assistance to members and develops cost effective solutions to minimize new, and address current, water quality and quantity problems as communities grow. CRWP's accomplishments include the on-going collaboration of 34 local governments on watershed protection; the development of model natural resource management regulations; the successful adoption and implementation of these models by communities; the review and improvement of development proposals; successful grant applications for member storm water and stream restoration projects; and a variety of other member specific services. CRWP also developed a model National Pollutant Discharge Elimination System (NPDES) "Phase II" Storm Water Management Program in use by communities across the watershed and assists members with successful implementation and annual reporting of the Phase II program. CRWP and its member communities support the adoption and implementation of riparian setback zoning as one of the most cost-effective tools to minimize the impacts of land use change in developing communities.

Acknowledgements

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Further Investigation

The literature cited in this document was obtained through review of published work as well as personal communications. Sources of information included existing bibliographies, federal and state agencies, county soil and water conservation districts, and individuals. This report is intended as a "living document." Please contact the Chagrin River Watershed Partners, Inc. with any comments, questions, or recommendations.

Terms Defined

BMP, Best Management Practices
CRWP, Chagrin River Watershed Partners, Inc.
Corps, The U.S. Army Corps of Engineers
CWW, Cincinnati Water Works
DDT, Dichloro-diphenyl-trichloroethane
FEMA, Federal Emergency Management Agency
MRB, Multi-species riparian buffer
NAPA, National Agency of Public Administration
NFIP, National Flood Insurance Program
NPDES, National Pollutant Discharge Elimination System
ODNR, Ohio Department of Natural Resources
OHIO EPA, Ohio Environmental Protection Agency
PCB's, Polychlorinated biphenyls
SWCD, Soil and Water Conservation District
USDA, United Sates Department of Agriculture

Chagrin River Watershed Partners, Inc. *January 2006*

Introduction to the Third Revision of
Riparian Setbacks: Technical Information for Decision Makers

This third revision of **Riparian Setbacks: Technical Information for Decision Makers** continues the commitment of the Chagrin River Watershed Partners to bring its members the best available science to support riparian setback regulations. The first edition of this work relied on scientific literature on riparian function [5-8] and seminal research on the function of riparian buffers as water quality best management practices in agriculture [9, 10] and forestry [11]. Reliance on this sound scientific literature represented the "first generation" of scientifically based riparian setback regulations.

First generation riparian setback regulations drew heavily on the analogous services reported in the scientific literature for riparian buffer function in agriculture and forestry, and proved to be an effective model that has been replicated, refined, and implemented around the country. Since the original publication of **Riparian Setbacks** by CRWP, more recent literature reviews with a broader scope have been independently assembled and continuously improved. Significant contributions include scientific review of the basis for riparian setback regulations for the Cities of Everett, Washington [12] and Renton, Washington [13], the Etowah River Habitat Conservation Plan [14] in Georgia, and a thorough widely cited literature review from the Institute of Ecology at the University of Georgia by Wenger [15]. In addition to updating results from more recent scientific research, these reviews incorporated scientific literature conveying new advances in understanding riparian processes, such as the importance of wood in streams (often referred to as large woody debris or coarse woody debris), and the far reaching influence of headwater streams on watershed hydrology and water quality.

This continually improved knowledge base validates the use of the scientific literature to support local government interests in the CRWP riparian setback regulations. The findings from the updated literature also validate the recommendations that balance riparian services and the beneficial use of private property, previously established in the CRWP setback model regulation. This revision of **Riparian Setbacks** updates our understanding of riparian function, continuing the established use of current scientific literature to support setback recommendations and provide the sound basis for local government interests and authority in promulgating riparian setback regulations in the Chagrin River watershed.

In reviewing the recent scientific literature, it is clear that the scientific understanding of riparian processes and the services they provide has undergone a dramatic transformation since this document was first published. A burgeoning literature has emerged reporting experimental site-specific effects of a wide variety of riparian management practices across a diverse array of physiographic, ecohydrologic, and hydroclimatic provinces. This growing literature reinforces the foundation for understanding the processes and factors influencing the benefits and services of riparian setbacks.
Yet, beyond richer site-specific results that offer further analogues for riparian setback function,

the synthesis of interdisciplinary research is rapidly reformulating our understanding of the far reaching extent and dynamic linkages through which robust interconnected riparian corridors affect the landscape.

This emerging scientific understanding has given rise to the second generation of integrated riparian management. We now understand that riparian services are far more pervasive and interdependent than any narrow investigations of, e.g., nitrogen removal or sedimentation in riparian buffers could have revealed. We now understand that the rich portfolio of riparian services flows directly from maintaining and enhancing the dynamic connections and exchanges between rivers and their riparian corridors. Viewed through the lens of this integrative understanding, the value of riparian setback guidelines originally advanced by CRWP in **Riparian Setbacks** are strongly validated as a simple cost-effective zoning tool to minimize encroachment and disturbance of the connected riparian corridor on which these services depend. Our current understanding reaffirms the value of the CRWP riparian setback model regulation as an effective means to maintain the vital connectivity of rivers and floodplains, while striking a prudent pragmatic balance between the valuable services derived from riparian protection, and the beneficial uses of private property by riparian landowners.

Synthesis

The scope and breadth of this second generation understanding of riparian function and services is incorporated in this revised version of **Riparian Setbacks** and reflects the synthesis of interdisciplinary research in the scientific literature, notably punctuated by:

- The American Fisheries Society's Monograph on the source, effects, and control of sediment in streams [16];

- Results from the International Workshop on Efficiency of Purification Processes in Riparian Buffer Zones, held in Hokkaido Japan in 2001, and the International Conference on Ecological Engineering for Landscape Services and Products, held in Christchurch, New Zealand in 2001, published in a special edition of the Journal *Ecological Engineering* [17];

- Research reports compiled from the International Conference on Wood in World Rivers [18];

- The National Academy of Sciences' report of the Committee on Riparian Zone Functioning and Strategies for Management [1];

As well as timely reviews and syntheses of the scientific understanding and recent research on:

- Buffers and pesticides [19, 20];
- Landuse effects on aquatic ecosystems [21, 22];
- Groundwater – surface water interactions [23-25];
- River bank filtration [26];

- Sedimentation effects on lotic food webs [27];
- Riparian nitrogen removal [28-31];
- Riparian management practices [32-34];
- Recognition of an "urban stream syndrome" affecting the world's developing watersheds [35, 36].

Implications for Riparian Management

The emerging science has not only refined our understanding of local factors that moderate specific riparian processes, but also provided a broader synthesis that guides us to far reaching conclusions on the importance of riparian protection. The implications of the current scientific literature for management are that a stream buffer, riparian setback, or forested buffer should be viewed as not only a parcel-specific best management practice, such as a stormwater management pond or a bioretention structure, but also as a watershed-scale management system.

We now recognize that the essential value of riparian services derives from maintaining the connectivity and dynamic exchanges and processes throughout the riparian system. The superposition of political boundaries and individual property rights presents the challenge of effectively managing the functional integrity and the valuable resulting services provided by this dynamic interconnected system, through the collective efforts of individual decisions by riparian landowners. It is precisely this joint coordinated management of the riparian resource that riparian setback regulations attempt to institutionalize in simple easily implemented zoning instruments.

Perhaps the most important guiding principles to emerge from the current scientific literature are the importance of contiguity in riparian protection, and the great value and importance of protecting the remaining least disturbed riparian corridors.

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EXECUTIVE SUMMARY

Riparian areas adjoin rivers and streams, connecting aquatic and terrestrial systems across unique ecological, biogeochemical, and hydrologic gradients. If properly maintained and sized, riparian areas provide services to communities, including flood control, erosion control, and water quality protection, at little cost.

Riparian setbacks are a zoning tool local governments can use to maintain riparian functions as communities grow and land is developed. In the Chagrin River watershed and nationwide, communities recognize the need for riparian setbacks as a preventive tool to minimize encroachment on stream channels while providing a cost-effective alternative that minimizes the need for storm water infrastructure and engineered solutions to flooding, erosion, and water quality problems.

Riparian areas are the lands adjacent to rivers and streams.

Riparian areas stabilize streambanks, limit erosion, reduce flood size flows, and filter and settle out runoff pollutants.

A riparian setback is a local zoning tool that uniformly limits soil disturbing activities in riparian areas to protect public health and safety.

Riparian setbacks protect public health and safety by maintaining the flood control, erosion control, and water quality protection services of riparian areas.

Riparian setback regulations facilitate a uniform approach to riparian management in a community. An ordinance or resolution establishing a riparian setback must be justifiable in terms of its protection of public health and safety; designed with an awareness of the impacts on individual properties; and implemented with public support and understanding of what the regulation does, and more importantly what it does not, accomplish.

This report focuses on introducing riparian areas and discussing the functions, services, and benefits they provide local governments and landowners. The report is designed for local decision makers – county commissioners, mayors, township trustees, council members, and planning and zoning commission members – as well as their engineers, law directors, and other professional advisors. The report provides the technical information necessary for these decision makers to adopt and implement riparian setback zoning as it relates to the authority of Ohio local governments to protect public health and safety.

The report also discusses the economics of riparian setbacks and the implementation of riparian setbacks through zoning regulations in Northeast Ohio. Through its review of setback programs nationwide and the current research on riparian area functions and widths, the report concludes that CRWP's recommended minimum setback widths are accurate and pragmatic compromises between the various setback widths reported in the literature as necessary to maintain the services of riparian areas and the development patterns of the Chagrin River watershed.

RIPARIAN SETBACKS:
TECHNICAL INFORMATION FOR DECISION MAKERS

Within the Chagrin River watershed and across the country, communities are protecting vegetated riparian areas along their rivers and streams with riparian setback regulations. If appropriately sized, these areas benefit communities by controlling flooding, erosion, and water quality as well as by protecting a community's groundwater and quality of life. Vegetated riparian areas provide these services at little cost to taxpayers. A community may protect riparian areas through a variety of mechanisms including land purchases and conservation easements. One of the most effective methods is through the adoption of local regulations establishing riparian setbacks, a zoning tool similar to front and side yard setbacks that excludes development and related soil disturbing activities within a prescribed distance from a watercourse.

To implement riparian setback regulations local officials need technical information linking riparian setbacks to the protection of public health and safety. Further, officials must have the information to design setback regulations that are reasonable and sensitive to local conditions. This report provides the technical support decision makers need to meet these challenges. The report introduces riparian setbacks; discusses their functions, benefits and economics; and explores the technical issues related to the successful implementation of a riparian setback regulation.

THE RIPARIAN CORRIDOR

Riparian refers to the organisms and their environment adjacent to or near flowing water. Riparian corridors include the stream channel and its adjacent land where vegetation may be influenced by high water tables, flooding or the ability of soils to hold water [7]. Because these corridors link terrestrial and aquatic ecosystems, their importance is far greater than their minor proportion of the land base would suggest [37]. Riparian areas extensively influence and are influenced by other areas of the landscape. It is this aspect of riparian corridors that makes their protection a useful natural resource management tool. With their unique position in the landscape, riparian areas can mitigate the impacts of one land use on another [8].

The geologic and hydrologic processes at work in a riparian corridor form its three typical components: stream channel, wetlands, and floodplain [38]. The stream channel meanders through the landscape carving through terrain, depositing and remobilizing sediments as it flows. In the Chagrin River watershed the stream's constant reworking of the channel and floodplain

may result in steeply sloped areas within the stream valley. The sediments and depressions near the edge of the stream channel often intersect the water table supporting the formation of riparian wetlands. In addition to steep slopes and wetlands, most stream channels are surrounded by a broad level area known as the floodplain. Floodplains are periodically inundated by overbank flows, and occupy the unique position in the landscape between the active stream channel and the surrounding hillslopes [37]. This is the area on which flood waters spread during periods of high flow. Floodplains can be defined by the frequency and extent of inundation. For example the "100-year floodplain" designates the area having at least a 1 percent chance of flooding in any given year. The 100-year floodplain designation is perhaps best known due to the widespread preparation of 100-year floodplain maps by the Federal Emergency Management Agency (FEMA) in support of the National Flood Insurance Program (NFIP). It is important to note, however, that the absence of a FEMA map of the 100-year floodplain, should not be misinterpreted as the absence of flood risk; most streams overtop their banks during high flows.

The components of the riparian corridor function together to provide valuable natural resource services. The National Academy of Sciences [1] emphasized the importance of the gradients in environmental conditions and the connection between rivers and riparian areas in providing these services, and cautioned against the loss of ecological function in riparian areas that become hydrologically disconnected from their adjacent stream channels. A riparian setback regulation is a flexible zoning mechanism through which communities can preserve and enhance these natural resource services by maintaining the natural connectivity between streams and riparian corridors. For example, in the Chagrin River watershed riparian setbacks provide a transitional zone between streams and the streets, houses, parking lots, and open lands they drain. This drainage contributes water, nutrients, pesticides, and sediments to streams. The impact of nonpoint pollution on water quality can be diminished if this runoff first passes through a vegetated riparian setback. Riparian setbacks also lessen the impact of streams on land by slowing erosion and minimizing flood damage.

BENEFITS OF RIPARIAN AREAS AND SETBACKS

Historically public health and safety problems associated with growth and land development, such as water quality degradation and increased flooding and erosion, have been addressed through engineered structural solutions such as dams, rip rap, channelization, and water treatment plants. Typically implemented after a problem has developed, each of these engineered infrastructure responses has associated capital, operation, and maintenance costs. The need for these costly solutions can be reduced or avoided by preserving and enhancing the natural functions and

> ***Except for support of biodiversity, some of the environmental services of riparian areas can be provided by technologies, such as reservoirs for flood control and treatment plants for pollutant removal. However, these substitutions are directed at single functions rather than the multiple functions that riparian areas carry out simultaneously and with little direct costs to society.***
> ***- National Research Council [2]***

services provided by a healthy connected riparian corridor. Riparian setbacks offer a low-cost proactive approach to maintain these valuable riparian services. By minimizing encroachment, a riparian setback maintains the connectivity between rivers and floodplains that moderates flood peaks, traps sediments and sustains the dynamic biogeochemical processes that enable riparian corridors to function as living filters. The details of these, and other, benefits of riparian setbacks are discussed below.

Flood Control Services

Flooding is a natural process, essential for the maintenance of floodplain plant and animal communities and soil fertility. However, flood waters can significantly damage public and private property and threaten human life, especially where vulnerable structures remain in the flood plain as a result of historic development. Communities along the Chagrin River have experienced significant flooding. This has included large flood events in the City of Eastlake as well as small floods throughout the watershed. Years of attempts to control floods have shown that traditional structural solutions alone are not sufficient to minimize the impacts of flooding. According to the Federal Interagency Task Force on Floodplain Management:

> *…the most sensible, least costly approach to flood hazard protection may have less to do with dams and disaster relief, and more to do with land-use patterns within floodplains. [38].*

Flooding is a natural restorative process for riparian systems that maintains the form, function, and connectivity of stream channels and their floodplains. Riparian setbacks maintain the natural connection between rivers and their adjacent floodplains and protect the floodplain's natural functions in storing and attenuating flood flows. These floodplain services offer low maintenance cost-effective solutions to community flooding. The National Park Service's review of the economic impacts from protecting rivers describes local and county government experiences with the benefits of landuse-based non-structural flood policies [39]. For example:

> *Johnson County, Kansas expected to spend $120 million on stormwater control projects. Instead, voters passed a $600,000 levy to develop a county-wide streamway park system. Development of a greenways network along streambeds will address some of the County's flooding problems, as well as provide a valuable recreation resource.*

This review similarly documented the justification of greenways as a cost-effective means to address county level flood damage by Dutchess County, New York [40]:

> *Floodplains function well as emergency drainage systems - for free - when they are left undisturbed. The public pays a high price when misplaced or poorly designed development interferes with this function. Human encroachment on the natural flood corridors often increases the risk to downstream homes and businesses by increasing the volume of runoff and altering the flood path. The resulting demands for costly drainage improvements, flood control projects, flood insurance, and disaster relief are all, ironically, preventable by conserving and respecting the floodplains from the outset.*

Rockland County's greenways acquisition program was inspired by the County's dismay over the costs of coping with drainage problems caused by encroachment into floodplain systems.

The value of non-structural flood control management from connected riparian corridors entered national flood control policy as part of a planned channel improvement project in Littleton, Colorado in 1971. The U.S. Army Corps of Engineers' (Corps) plan to channelize part of the South Platte River was challenged by the citizens of Littleton, who organized to preserve the river's scenic natural floodplain. Congress, through the Water Resources Act of 1974, enabled the Corps to contribute federal funds for the acquisition of land in the floodplain for flood protection in lieu of the traditional structural channel improvements. Searns [41] describes the events in Littleton that ultimately resulted in land acquisitions and the creation of a floodplain park, as the precedent-setting legislation that required the Corps to consider the value of non-structural alternatives in all Federal flood protection projects.

Stream disconnected from its adjacent floodplain. Only at very high flows would water reach the floodplain, removing the potential for flood attenuation for the majority of storms.

The City of Soldiers Grove, Wisconsin realized the direct benefits from restoring floodplain function choosing to relocate the entire business district out of the floodplain of the Kickapoo River at a cost of $1 million. The conventional structural alternative of a levee system proposed by the Corps would have cost $3.5 million, and imposed an annual maintenance cost that was more than twice the City's entire real estate tax base. Along with the creation of a floodplain park, the relocation is credited with annual savings of $127,000 in avoided flood damages. Similar benefits from maintaining floodplain connectivity on the Charles River in Massachusetts were realized by the purchase of full title or easements to 8,500 acres of floodplain wetlands in the upper Charles River at a cost of $10 million, as an alternative to the estimated $100 million cost for upstream levees and flood control reservoirs that had been proposed. The ***annual*** flood damages that would have resulted from the loss of flood control services provide by these wetlands has been estimated at $27 million [42].

This stream is connected to its adjacent floodplain.

Flood Control Services: *Bank storage*

In addition to the temporary storage and gradual drainage of floodwaters from inundated floodplains, rising streamflow also recharges alluvial aquifers through the bed and banks of rivers and streams. This recharge of alluvial groundwater occurs whenever river levels rise above the elevation of the water table – not just during periods of overbank flow. Bank storage reduces flood peaks by recharging surface runoff into the pore spaces of riverbank sediments and helps maintain higher baseflow through the slow release of groundwater back to the stream as river levels decline. The joint services of flood attenuation and baseflow augmentation provided by bank storage also provide favorable soil moisture conditions for riparian vegetation, and the biogeochemical processing of contaminants in riparian soils.

Stream at base flow with active stream and land connection

In a detailed study of bank storage on the Cedar River in Iowa [43] a 6.6 foot (2 m) rise in river stage induced substantial groundwater recharge of the connected alluvial aquifer. Observation wells in the floodplain clearly showed that river water, uniquely identified by its lower concentration of dissolved solids, recharged more than 98 feet (30 meters) into the stream bank, to a depth of over 13 feet (4 meters). The "new" groundwater, with the distinctive chemical signature of river water, slowly discharged back to the river over a period of five weeks as river levels fell. Bank storage thus provides flood peak reduction and incremental baseflow maintenance for relatively frequent high flow events that do not result in overbank flows. Even higher recharge of bank storage can be expected to occur with overbank flooding. The result is stable river flow and a reduction in dramatic shifts in water levels [5]. Bank storage moderates the development of high flows as well as the frequency and duration of extremely low flows. Preserving the connection and natural exchanges between rivers and floodplains provides flood attenuation services naturally, along the entire length of the stream system.

Whiting and Pomeranets [44] modeled the groundwater hydraulics of bank storage and showed that the volume of bank storage is nearly proportional to the floodplain width and bank height. Both the volume and duration of bank storage discharge increase with floodplain width. Moreover the rate and volume of bank recharge are nearly directly proportional to the hydraulic conductivity of the bank material. Drainage from bank storage may last for weeks to a few years in sandy banks, with longer drainage times and lower drainage rates for silt or clay banks.

Flood Control Services: Riparian Vegetation

Traditional flood control strategies for large waterways have promoted the clearing of vegetation from river channels. More recent investigations question whether the removal of riparian vegetation from riverbanks has increased the vulnerability of adjacent lands to erosion [45]. The active removal of riparian corridor vegetation to maintain conveyance of the floodway creates

ongoing labor intensive maintenance demands and degrades the habitat and aesthetic amenities of the riparian resource [46]. Removing riparian vegetation reduces bank strength and hydraulic roughness, and can lead to increased near-bank flow velocities, accelerated bank erosion, [45] and can increase flood damages.

Standard hydraulic analysis of riparian floodways usually considers the effect of riparian vegetation on hydraulic roughness as it affects flood heights and inundation areas. A more inclusive consideration of connected riparian corridors also accounts for the value of floodplain vegetation in protecting upland terraces and hillslopes from flood waters. Woody floodplain vegetation dissipates stream energy, reducing scour and resulting flood damage. The value of the riparian corridor and its associated vegetation is strikingly demonstrated by the flood damages following the Great Flood in the Mississippi River Basin in 1993. In Central Kansas, Geyer et al. [47] found the greatest lateral streambank erosion during the 1993 flood occurred on sandy streambanks adjoining cropland, while streambank erosion was negligible along forested streambanks. In the Missouri Basin, Allen et al.'s [48] analysis of levee failures along a 353 mile section of the Missouri River found compelling evidence of the flood protection services provided by wooded riparian corridors. The absence of woody riparian vegetation in the floodplain was consistently associated with a greater likelihood of levee failure and longer lengths of levee failure. Over 40% of the 1993 levee failures on the Missouri River occurred in areas where woody vegetation was absent from the riparian corridor and nearly 75% of the failures were associated with areas in which the width of the woody riparian corridor was less than 300 feet. Moreover, discontinuities in woody corridors were associated with more than 27% of the observed failures, reinforcing the importance of the *contiguity* of the riparian corridor as well as its width. It is particularly notable that engineered levees, designed to resist damaging flood waters, were themselves afforded flood protection by woody riparian floodplain vegetation.

Floodplain vegetation also diffuses concentrated overland flow and resists the formation of erosive rills, rivulets, channels, and gullies. Complex shallow flow paths on vegetated riparian areas encourage sedimentation and infiltration of overland flows [6]. The combined effect of these floodplain functions is reduced flow velocity, increased storage of water, and the attenuation of downstream flood impacts [38].

Riparian setbacks are an essential component of land-use management to reduce flood hazards and maintain the flood control services of floodplains. Through the implementation of a riparian setback program, a community protects its floodplain and the services floodplains provide. During high flows, floodwaters are temporarily stored as they spread across the floodplain, dissipating much of the energy of flood flows [37] and reducing downstream flood heights. Floodplain vegetation also presents a barrier to flood flow and runoff, encouraging water to move slowly and infiltrate soils reducing the contribution to downstream flood peaks.
A riparian setback program protecting floodplains also reduces potential property damage from flooding by setting development back from the stream channel and out of the floodplain area. FEMA divides the 100-year floodplain into two areas based on water velocity: the floodway and

the flood fringe. To participate in the NFIP, communities must prohibit development in the floodway and place restrictions on development in the flood fringe. While this minimizes the blockage to the free flow of flood waters downstream, it does not fully protect the storage capacity of the floodplain. A riparian protection program that prohibits development in both the floodway and the flood fringe preserves natural areas for temporarily storing flood flows and protects structures from flood damage [8]. An example of a riparian setback regulation designed with its highest priority on flood protection services is found in Garner, North Carolina, which established setbacks of 50 to 100 feet from the limits of the 100-year floodplain [49].

Riparian setbacks reduce flood hazards and contribute flood protection services by limiting development within floodplains, restoring the natural flood protection services provided by riparian floodplains, and fostering riparian vegetation that reduces erosion. Hancock [24] concludes that limiting human disruption of riparian corridors is an important cost-effective component of strategies to prevent the degradation of these essential linkages and riparian functions. Riparian setbacks provide a cost-effective zoning tool to achieve these outcomes.

Riparian Setbacks Protect Floodplains and:

- *Reduce flood flow velocity.*
- *Facilitate infiltration.*
- *Provide temporary storage and slow drainage of floodwaters.*
- *Reduce property damage.*
- *Maintain stream baseflow and recharge alluvial aquifers.*

Erosion Control Services

In addition to reducing flooding and associated property damage, riparian setbacks counteract the erosive forces of water. Stream bank erosion is a significant concern to Chagrin River watershed communities. Residents lose both land and structures as stream banks slump and soils are washed downstream. Once in streams, sediments destroy aquatic habitat and degrade water quality. Eroded sediment can also block storm water conveyance structures and is costly to remove through dredging.

Erosion at any particular point along a stream may be caused by the erosive effects of surface runoff and the erosive force of flowing water in the stream channel. Setbacks address both sources of erosion [50]. By presenting a physical barrier to overland flow, riparian vegetation slows surface runoff and disrupts concentrated flow paths, enhancing infiltration and diminishing runoff's erosive potential. The root systems of riparian vegetation, particularly trees, hold bank soils in place against the erosive force of high velocity waters [37] maintaining soil structure and bank stability [6]. The stronger the rooting system, the greater this benefit. According to the Ohio Environmental Protection Agency [51], vegetated stream banks are up to 20,000 times more resistant to erosion than bare stream banks.

In addition to altering channel hydraulics and dissipating erosive shear stresses, riparian

vegetation increases the strength of streambanks through both mechanical effects of roots [52, 53] and hydrologic effects on the pore water pressure in the soil matrix [54]. Using the U.S. Department of Agriculture Agricultural Research Service's Bank Stability and Toe Erosion Model [55], the effect of riparian vegetation on the resistive forces in a streambank can be quantified. As an example, model calculations estimate that a 30 year old stand of ash can roughly double the factor of safety (the ratio of resistive forces to driving forces in bank failure) for a prototypical 16.4 foot (5 meter) streambank with an alluvial soil profile. Abernathy and Rutherford [56] similarly quantified the geotechnical reinforcement of soil strength by the roots of native riparian tree species along the Latrobe River in Australia. They found root reinforcement could raise the factor of safety for an otherwise unstable bank section by 60%.

The long-term contribution of riparian vegetation to stream bank stability is strikingly displayed on the Sacramento River in California. From the careful evaluation of 100 years of maps and aerial photography, Micheli et al. [45] compared river meander rates between forested and agricultural floodplains below Shasta Dam. They estimated that agricultural floodplains have been 80% to 150% more erodible than forested floodplains during the latter half of the 20th century. Even the control of flood flows provided by the construction of Shasta Dam could not offset the increase in observed erodibility that accompanied the conversion of forested floodplains to agriculture.

Micheli et al. [57] also analyzed channel migration rates from 40 years of aerial photographs on California's Kern River and found migration rates for streambanks with wet meadow vegetation were 10 times lower than streambanks without wet meadow vegetation. Their results also emphasize the importance of maintaining the hydrologic connection of the riparian corridor to bank stability. They note that channel incision may reduce bank stability through both the increase in the bank height and the loss of wet meadow vegetation as channel downcutting alters the local water tables that support riparian vegetation.

Following severe flooding in British Columbia, Beeson and Doyle [58] surveyed more than 700 stream reaches using aerial photography to identify post-storm channel erosion. They found that stream bends without riparian vegetation were 30 times more likely to show some evidence of channel erosion and major channel erosion was nearly 5 times more likely on unvegetated streambanks. The greater stability of forested streambanks stems, in part, from their ability to resist the initiation of bank erosion. Along a 62 mile (100km) section of the Upper Illinois River in Oklahoma, Harmel et al [59] estimated short-term and long-term bank erosion rates using a combination of aerial photography and field measurements from erosion pins. Short-term erosion rates on banks with forested, grassed, and mixed vegetation were not significantly different. However, 20 years of aerial photography showed that significant erosion (greater than 2m) occurred along 66% of the grassed banks compared to only 16% of the forested bank length.

The dominant contribution of stream bank erosion to excess sedimentation in urbanizing watersheds has been carefully documented by Trimble [60] in Southern California. Over the 10 year period from 1983 to 1993, Trimble [61] found channel erosion contributed two-thirds of the annual sediment load of San Diego Creek and concluded bank stabilization should be a priority in managing sediment yield. The role of riparian vegetation in reducing sedimentation and bank erosion has generated varying management recommendations concerning the short-term and long-term value of different types of riparian vegetation on streambank erosion [3, 56, 61-63].

Severe stream bank erosion

Erosion Control Services: Riparian Vegetation

Vegetation in the riparian corridor affects the width and geometry of streams by stabilizing stream banks against bank erosion and bank failure, and trapping sediment in overland and overbank flow. The relationship between riparian vegetation and channel form is dynamic and changes with the size and scale of the watershed [64]. For small streams draining less than 4-40 square miles (10-100 km^2), forested streams tend to be wider than grassed streams; in larger watersheds streams with forested banks tends to be narrower than similarly sized watersheds with grassed banks. On the well studied Coon Creek watershed in Wisconsin, Trimble [61] estimated the stream's grassed banks were storing up to 16,800 cubic yards of sediment per mile of streambank (8,000 cubic meters per km). Based on this observation, Lyons et al. [63] suggested sediment loads in Midwest streams might be cost-effectively managed by actively converting stream bank vegetation from forest to grasses in order to store more sediment.

Gully erosion from storm water runoff

Davies-Colley [65] made similar observations comparing forested streams to streams with grass banks adjoining pasture land in New Zealand. Like Trimble, Davies-Colley[65] raised concerns about development of downstream sedimentation problems as the natural return of forest vegetation shaded out the grasses and remobilized the substantial sediment stored in the vegetated banks of narrower pasture streams. He also noted, however, that the sediment *currently* stored in the vegetated banks of these narrow pasture streams represents encroachment that followed earlier land clearance, as forest land was actively converted to managed pastures.

The empirical relationship between stream width and bank vegetation is not a static "endpoint" but represents a dynamic balance between the processes that mobilize and deposit sediment moving through stream systems. Allmendinger et al. [66] found grass cover resulted in up to 3 times greater sediment deposition compared to wider forested streams, but the erosion of cut banks in grassed streams was up to 5 times greater than forested streams. On balance, although grassed streams are less wide and store more sediment in their banks, they are also less stable than wider forested streams. Wider more stable forested streams also store sediment, associated with stable wood (sometimes referred to as coarse woody debris), which also provides habitat, structure, and refuges for aquatic biota. Hart [67] similarly considered stream width and bank vegetation in headwater streams in the Great Smoky Mountains. He also found that wider forested streams store sediment instream in deposits associated with stable wood, and the stored sediment in forested streams was up to 3 times greater than the sediment remobilized by channel widening as forest cover replaced grassed banks.

Consistent with the greater stability of vegetated streams, Zaimes et al. [68] found streams with streamside forest cover were more stable with lower erosion rates than streams adjoining either row crop or grazed agriculture land uses. They estimated that the presence of riparian forest buffers along the entire length of the roughly 7 mile (11 km) reach they studied would have reduced stream bank erosion by approximately 78% in a single year. Similar results have been reported in urban streams by Hession et al. [69]. For streams in Missouri's glacial till plain Burckhardt and Todd [70] compared bank erosion between pairs of similar streams for which the primary difference was the presence or absence of riparian forest on the streambanks. They too found that rates of lateral bank migration were 3 times greater along unforested concave banks.

The active removal of riparian vegetation can have dramatic effects on streambank erosion. Montgomery [2] describes the extensive channel widening that occurred on the Tolt River in Washington's Cascade Range following the clearing of forest vegetation down to the streambank. This widening, along with the pulse of mobilized sediment that led to filling of the channel downstream, was attributed to the loss of bank-stabilizing tree roots. Even more dramatic stream channel adjustments have been observed on the Cann River in Victoria, Australia, where Brooks et al. [71] estimated that rates of lateral channel migration have increased 150 fold, with an 860 fold increase in annual sediment yield and a 45 fold increase in bankfull discharge since European settlement. Most of these dramatic channel adjustments are estimated to have occurred in the last 40 years, in response to the removal of riparian vegetation and stable wood in the stream channel.

Riparian Setbacks Protect Streambanks and:

- *Minimize erosion from overland flow*
- *Reduce erosion from instream flow.*
- *Reduce property damage.*

- *Minimize sedimentation on streams and storm water conveyance.*

Water Quality Protection Services

Vegetated riparian areas are a cost effective best management practice (BMP) to address nonpoint source pollution and their use in this capacity is widespread [8, 72]. The term BMP refers to a practice or combination of practices that a State determines to be practical and effective in preventing or reducing the amount of pollution generated by diffuse sources to levels compatible with water quality goals [73]. The Ohio EPA and ODNR have, for example, recommended specific BMPs to meet Ohio water quality goals as established in the National Pollutant Discharge Elimination System (NPDES) General Construction Site Permit. These recommended BMPs include riparian setbacks and other non-structural planning techniques.

Connected riparian corridors function as filters that protect adjoining streams and downstream receiving waters [30]. By minimizing disturbance and encroachment, riparian setbacks protect and enhance the filtering functions through which riparian corridors sequester and remove sediments, nutrients, and a range of contaminants. These water quality services result from filtration and adsorption, uptake by riparian vegetation, and biogeochemical and microbial processes that immobilize, assimilate, and degrade dissolved contaminants. Vegetated riparian setbacks disperse concentrated or channelized runoff, increasing infiltration, slowing surface runoff, and enhancing the deposition of sediment and sediment associated contaminants from both overland flows and overbank floodwaters. Vegetative uptake and assimilation can remove nutrients, soluble ions, and some organic contaminants from shallow groundwater, incorporating these contaminants in plant biomass [74, 75]. The microbial and biogeochemical processes at work in saturated sediments, leaf litter on the forest floor, and in the thatch layer of riparian grasses, immobilize and transform dissolved nutrients, metals, and many organic contaminants.

Riparian setbacks maintain the connectivity and exchange of surface water and groundwater between rivers and uplands. The exchange of surface water and groundwater links riparian processes with the metabolism and productivity of streams through microbial processing in biofilms on the streambed and the surfaces of sediments in channels, bars, riffles, and streambanks [29, 76]. These living biofilms are dynamic ecosystems that adapt to changing conditions of flow, nutrient loading, water chemistry, temperature, etc. [3, 28, 77, 78]. The surface of sediments at the riparian interface where surface water and groundwater mix is now understood to play a central role in maintaining the chemical and microbial transformations that naturally maintain and regulate water quality [23, 24, 79]. Maintaining riparian zones and effective land use practices are widely recognized as two valuable strategies to prevent the degradation of water quality services provided by these essential riparian processes [24].

The intimate physical association between streams and their riparian corridor is self evident, but we now understand that the influence of riparian corridors on water quality is proportionately much greater than the relatively small area in the landscape they occupy. This is especially true on small first order streams that generate most of the runoff in watersheds. As a result of the strong topographic controls on runoff, riparian areas in headwater and first order streams may

intercept most of the runoff that reaches the stream system, producing water quality services that extend far downstream and enhance water quality throughout the watershed. Using topographic indexes of wetness, sediment transport, and discharge Burkhart et al. [80] mapped hydrologically-based locations for effective stream buffer placement in the Deep Loess Region of Iowa, Missouri, and Nebraska. Watershed-scale analysis demonstrated that riparian areas in small first order streams exhibited much greater potential to intercept larger fractions of runoff and affect basin-wide water quality than larger streams. Moreover, discharge through riparian areas in the smallest stream catchments was dominated by groundwater, creating very high potential for riparian processes to remove nitrate, some pathogens, and most pesticides in the region.

Water Quality Protection Services: Infiltration and Sedimentation

Vegetated riparian setbacks create complex flowpaths that slow the velocity and decrease the turbulence in overland flow. Shallow distributed flow enhances sedimentation and the removal of sediment-associated contaminants while increasing infiltration and reducing surface runoff. The effectiveness of riparian setbacks can be severely compromised by the development of concentrated flow paths that bypass the riparian zone [81, 82]. Stiff, tufted grasses have proven very effective in disrupting channelized flows and increasing infiltration rates in riparian buffer systems [83, 84]. Significant increases in infiltration rates are consistently observed in vegetated riparian buffers [85] contributing to sediment removal and carrying dissolved constituents into shallow groundwater where they may be further immobilized and metabolized by geochemical and microbial processes [86, 87]. Bharati et al. [88] found cumulative infiltration rates in a multispecies riparian buffer were five times greater than in adjoining cropland and grazed pastures. In Schmitt et al.'s [89] experimental investigations fescue filter strips infiltrated 36% - 82% of runoff and cumulative infiltration doubled as the width of the filter strip was doubled from 25 to 50 feet (7.5 m to 15 m).

On experimental plots Blanco-Canqui et al. [90] found that a dense 2.3 foot (0.7 m) switchgrass barrier was sufficient to disrupt and distribute concentrated flow into more uniformly distributed sheet flow, significantly enhancing the performance of vegetated filter strips. With a switchgrass barrier, a 24 foot (7.3 m) fescue filter strip achieved 90% removal of sediment. By interrupting and temporarily pooling concentrated flow the switchgrass barrier also increased the particulate phosphorous removal by nearly a factor of 4 and removed 2 to 5 times more nitrogen compared to fescue filter strips with no vegetated barrier.

Water Quality Protection Services: Pesticides and Organic Chemicals

With significant variability in reported results, vegetated buffers and filter strips have also proven effective in reducing the runoff of herbicides and pesticides [91-94]. The greater complexity of the processes and chemical properties that influence pesticide and herbicide fate and transport accounts for the high variability in reported results and points to the need for a

process-based understanding of riparian area effects on contaminant fate and transport [20]. Nevertheless the extent to which riparian areas trap organic compounds and prevent them from entering the stream system offers long-term preventive water quality benefits especially in urban and urbanizing streams.

Parker et al. [95] found significant concentrations of organochlorine compounds in urban stream sediments in Phoenix, Arizona even though many of these compounds are no longer in use. Despite the ban on some pesticides nearly 30 years ago, Chlordane, DDT and its decay products, dieldrin, toxaphen, and PCBs were ubiquitous in the sediments in Phoenix's urban stream channels. The persistence of these compounds, which pose very costly remediation challenges, highlights the long-term value of preventing contaminants in non-point runoff from entering streams. Riparian setbacks offer a last barrier to intercept and prevent persistent organic contaminants from entering the stream system.

An example of process-based determination of buffer widths to protect surface waters from multiple pollutants is described by Lin et al. [96] and Lin et al. [97]. To meet targeted water quality goals in the Shei Pa National Park in Taiwan, individual buffer widths were derived for over 50 different contaminants. Buffer widths for each contaminant uniquely account for the effects of slope and soil properties along the stream, as well as the specific attenuation and degradation processes affecting the fate and transport of each contaminant, such as denitrification, adsorption, and microbial degradation. From the analysis of 46 pesticides of interest, the pesticide Fenarimol required the widest buffer to protect water quality. Among the exchangeable ions of magnesium, potassium, sodium, and calcium; extractable metallic ions of copper, iron, manganese, and zinc; and soluble forms of nitrogen and phosphorous, the high mobility of potassium salts required the widest buffer width [97]. The largest buffer width was selected along each stream reach to provide protection from all the contaminants considered.

This process-based design of riparian buffers illustrates the explicit linkage between buffer width and the performance-based choice of riparian services. It also illustrates the substantial data needs required for site-specific performance-based design of varying buffer widths. The process analysis that supported these buffer calculations required site-specific data including slope, depth to water table, and the bulk density, saturated hydraulic conductivity, organic content, and saturated water content of each riparian soil along each stream segment. In addition to considering the specific services and tradeoffs provided by the choice of buffer width, consideration of site-specific setback widths creates pragmatic tradeoffs among the resources required for site assessment and data collection and the information needed for reliable setback implementation. As a result of the complexity and cost of developing site-specific setback widths, as well as the accuracy of CRWP's recommended widths as highlighted in this report, CRWP recommends fixed minimum setbacks of 25, 75, 120, or 300 feet depending on drainage area. This recommendation is discussed in more detail below.

Water Quality Protection Services: Denitrification and Nutrient Removal

The rapid growth of chemical fertilizer use and wastewater treatment discharges has dramatically

accelerated the nitrogen inputs to rivers, lakes, and the coastal ocean. From Chesapeake Bay to the Mississippi River and the Gulf of Mexico, nitrogen enrichment of surface and groundwater resources has become an ubiquitous management challenge around the world [98, 99]. Nitrogen removal in the riparian zone is unequivocally recognized as one of the most cost-effective means to control excess nitrogen losses from intensively developed watersheds [9, 29-31, 100-102] and helps to guide our expectations and management of riparian setbacks.

Riparian areas reduce nitrogen pollution through nutrient uptake and assimilation by vegetation, and the transformation of dissolved nitrogen to nitrogen gas that is returned to the atmosphere through microbial *denitrification*. The nitrogen carried in flood flows and runoff becomes available to riparian vegetation as nitrogen rich surface water enters shallow groundwater. Nitrogen loss through denitrification takes place predominantly under anaerobic soil conditions - a circumstance in which no free oxygen is present in the soils. Such conditions are common in saturated or poorly drained floodplains.

Denitrification requires a population of denitrifying bacteria, a source of carbon, and sustained conditions with low dissolved oxygen concentrations. Shallow groundwater flow paths that maintain saturated conditions in riparian floodplains can sustain anoxic or reducing conditions, conducive for denitrification. Undisturbed riparian floodplains typically combine shallow water tables, a ready carbon source in rooted riparian vegetation, and the natural occurrence of denitrifying bacteria creating persistent zones of reducing conditions that support high rates of microbial nitrogen reduction. Denitrification rates vary with the position of the water table and variation in the geochemical environment along groundwater flow paths. Deep groundwater flow paths may bypass shallow reducing zones, as do tile drains and ditches that rapidly convey groundwater and dissolved nitrate to streams [103]. Nitrogen removal also varies with the seasonal variation in water tables and the residence time of groundwater flow. Nitrogen taken up by vegetation during the growing season may be released and recycled as plants lose their leaves in fall and winter. This transient uptake is nevertheless valuable for protecting groundwater from excess nitrogen inputs. The seasonal uptake of nitrogen by deep-rooted vegetation effects a net transfer of inorganic nitrogen in groundwater to organic nitrogen as leaf litter on floodplains and riparian forest floors where it can be re-mineralized and denitrified by soil microbes [104].

In contrast to seasonal uptake and recycling by riparian vegetation, denitrification can permanently remove nitrogen from riparian groundwater throughout the year as long as suitable biogeochemical conditions are maintained. Under appropriate conditions, denitrification rates remain high throughout the year [31, 105-107] and have been observed to increase as vegetation becomes dormant in fall and winter [105, 108]. The seasonal decline in vegetative uptake leaves more nitrogen in groundwater for microbial reduction. The accompanying seasonal decline in evapotranspiration leaves more soil water available to maintain saturated reducing conditions in the soil. Together these seasonal changes can support increased winter denitrification rates and sustain nitrogen removal throughout the year.

The spatial and temporal variability in factors affecting denitrification account for much of the

site-specific variability reported in the riparian buffer literature and explain why setback width alone is insufficient to uniquely predict nitrogen removal rates. Highly permeable riparian sediments with high groundwater flow velocities require high rates of microbial transformation to achieve significant nitrogen removal. Long groundwater flow paths with residence times of 50 to 75 years have been observed to achieve nearly total nitrogen removal with very modest denitrification rates, due to the long effective reaction time [103]. Nitrogen removal efficiency reflects both the biogeochemical rate and the hydrogeologic contact time for nitrogen reducing chemical transformations. In glacial till and outwash soils in southern Ontario, Vidon and Hill [109] observed 90% removal of nitrogen in the first 50 feet (15 m) of riparian buffers in soils with sandy loam or loamy sand textures; in sand and cobble soils the distance to achieve a 90% removal of nitrogen ranged from 82 feet to over 574 feet (25 m to over 175 m) – reflecting the higher flow velocity, and therefore shorter contact times, in these more conductive soils. Groffman et al. [110] similarly suggested that gravel bars with low rates of denitrification may nevertheless be significant nitrogen sinks in urban streams due to the relatively long contact time of stream water flowing through the sediment matrix.

Despite great variability in seasonal and site-specific denitrification rates, preserving riparian corridor functions is unequivocally recognized as one of the most effective means to manage excess nutrient losses from intensively used watersheds [100]. That is one of the reasons that the National Academy of Sciences [1] concluded that:

> *Future structural development on floodplains should occur as far away from streams, rivers, and other water bodies as possible to help reduce its impact on riparian areas…. Thus, preventing unnecessary structural development in near-stream areas should be a high priority at local, regional, and national levels [1].*

Water Quality Protection Services: Stream Productivity and Nutrient Removal

Beyond biogeochemical processes in the riparian floodplain, the riparian corridor is inextricably linked to the metabolism and productivity of streams. Streams do not just convey nutrients and contaminants delivered to them, but actively process nutrients and dissolved constituents on the active biofilms on the streambed [76] and on the surfaces of sediments in the channel and streambank [29]. The highest processing rates occur on headwater streams [3] that, together with their disproportionate contribution of watershed discharge, produce cumulative water quality services that extend far downstream.

Not only do forest buffers prevent nonpoint source pollutants from entering small streams, they also enhance the in-stream processing of both nonpoint and point source pollutants, thereby reducing their impact on downstream rivers and estuaries.[3]

We now understand that surface water does not just flow through the stream channel. At the head of riffles, streamflow enters stream gravels and flows into the streambank, reentering the channel in downstream pools and upwelling zones. The high surface area, intense mixing of

surface water and ground water, and sharp chemical gradients in these mixing environments support some of the most important biogeochemical processing of nutrients, organics, and dissolved constituents in the landscape. For example, the low nutrient concentrations found in pristine headwater streams have traditionally been interpreted as merely the consequence of low nutrient inputs. We now understand that undisturbed headwater streams also have some of the highest rates of nutrient assimilation and stream metabolism in the landscape. Riparian areas are essential to maintain these highly productive interconnected systems and their integrity warrants protection. Using the radioisotope N^{15} as a tracer, Peterson et al. [111] found ammonium experimentally introduced to streams was completely assimilated over a downstream distance of only 33 to 330 feet (10m to 100m) in headwater streams, with distances typically 5 to 10 times longer for the uptake of nitrate. In contrast, ammonium uptake distances between roughly ½ to ¾ of a mile (766m to 1,349m) were observed in second order streams, in which nitrate uptake was undetectable [112]. The spatial pattern of human alteration of the landscape affects the status of rivers through variations in the length, width, and gaps of riparian buffers, all of which influence the effectiveness of buffers as nutrient sinks [113].

Streams in suburban/urban areas are impacted by pollutants from activities such as construction, road maintenance, and lawn care, as well as by streambank erosion. These pollutants, including sediments, nutrients, pesticides, and heavy metals, reduce water quality in a variety of ways. Elevated nutrient levels in urban streams reflect increased nutrient loads as well as the lower productivity and reduced capacity to assimilate nutrients. Nutrient processing of streams decreases with urbanization, characterized by an "urban stream syndrome" [4, 36] of increased nutrient and contaminant loading, increased stream flashiness, and altered biotic assemblages [4].

Elevated nutrient concentrations associated with urbanization are usually attributed to increased inputs from point and non-point sources; our results indicate that concentrations also may be elevated because of reduced rates of nutrient removal. Altered ecosystem function is another symptom of an urban stream syndrome. [4]

Urban Stream Syndrome

Riparian Setbacks Protect Water Quality and:

- *Provide for the uptake and storage of nitrogen.*
- *Facilitate the gaseous loss of nitrogen.*
- *Minimize sedimentation by controlling streambank erosion.*
- *Trap sediments, phosphorus, and some pesticides.*
- *Maintain the riparian biogeochemical processes that regulate stream water quality.*

Groundwater Purification Services

Riparian vegetation can remove certain nutrients and some metals from groundwater. Research

shows that significant pollutant removal can occur if groundwater is available to root systems and to denitrifying microbes. Desbonnet et al. [8] reported 84% to 87% removal of nitrate from groundwater in a forested riparian area. This method of groundwater purification is generally not effective at removing oils, pesticides, and the majority of metals. Groundwater purification in the riparian corridor is enhanced by the convergence of runoff and the shallow depth of the water table near the root zone of riparian vegetation [114]. Connected riparian areas play a crucial role in the purification of groundwater in alluvial aquifers. Groundwater pumping from alluvial aquifers can induce recharge along the length of hydraulically connected rivers and streambanks. Groundwater flow through alluvial aquifers results in substantial removal of dissolved particulate materials, bacteria, pathogenic parasites such as *Giardia* and *Cryptosporidium*, and a variety of reactive contaminants. In central Europe bank filtration is a widely used component of drinking water purification [26].

The passage of river water through a stream's bed and banks into adjoining alluvial aquifers provides filtration and attenuation of suspended sediment and turbidity, microbial pathogens, and a variety of constituents ranging from fecal coliform bacteria to forms of organic carbon that can form potentially carcinogenic compounds when exposed to common drinking water disinfectants such as chlorine. The water treatment value of natural riverbank filtration has long been recognized. In Germany and central Europe river bank filtration via active pumping from alluvial aquifers has been used as an integral component of the water treatment process for public water supply for decades [26]. The natural hydraulic connection between surface water and alluvial groundwater systems in healthy riparian corridors is a necessity for sustained riverbank filtration. Under the Safe Drinking Water Act, the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) requires water suppliers to meet effective removal criteria for the microscopic intestinal parasite, *Cryptosporidium*. Riverbank filtration may provide removal credits toward compliance with the LT2ESWTR at very modest cost. Bank filtration requires no chemical costs and has low maintenance costs. Moreover the diverse removal processes operating along groundwater flow paths can effectively remove a wide variety of drinking water contaminants [115].

In southwest Ohio, the Cincinnati Water Works (CWW) draws most of its water supply from the thick alluvial Great Miami Aquifer. CWW's C.M. Bolton wellfield produces about 40 million gallons per day (mgd) from a field of ten wells located within approximately 800 feet from the Great Miami River, which recharges the aquifer. Extended monitoring data from the Bolton wellfield confirmed that riverbank filtration consistently provided greater than 3 log (i.e. 3 order of magnitude) removal of pathogen surrogates, such as aerobic and anaerobic spore-forming bacteria, and neither *Cryptosporidum* nor *Giardia* were detected in any groundwater samples [116]. Similar analysis from full scale riverbank filtration facilities along the Wabash, Missouri, and Ohio Rivers also found no detectable *Cryptosporidum* or *Giardia*, and only infrequent detection of any coliform bacteria, with 5-6 log reduction in average coliform concentrations relative to river water [117].

Partinoudi et al. [118] compared the filtration performance of full scale operating riverbank

filtration systems in Pembroke, New Hampshire, Cedar Rapids, Iowa, and Louisville, Kentucky to conventional slow sand filtration. They concluded that riverbank filtration had similar performance to slow sand filtration for the removal of pathogens and turbidity, and superior performance in the removal of dissolved organic carbon and other precursors of disinfection byproducts.

Riparian Setbacks Purify Groundwater and:

- *Remove nutrients and some metals.*
- *Maintain the hydraulic connection between rivers and alluvial aquifers supporting riverbank filtration of groundwater.*

Ecosystem Protection Services

People are attracted to the Chagrin River watershed for the quality of life it provides. A critical component of this quality of life is the watershed's ecosystem features including its wildlife, streams, and open spaces. Riparian setbacks protect these ecosystem features. Setbacks are a component of a community's overall open space and support plant and animal populations in streams and throughout the watershed in a variety of ways.

Ecosystem Protection Services: Aquatic Systems and Stream Temperature

Riparian vegetation that shades streams, such as trees and large shrubs, stabilizes water temperatures and light levels [7]. Shading also minimizes the presence of aquatic nuisance species such as blue-green algae [119]. These species thrive in direct sunlight and may replace some of a stream's native food sources if riparian vegetation is removed. Stream temperature exerts important controls over chemical reaction rates in stream systems as well as the metabolism and development rates of fish eggs, fry, and macroinvertebrates [120]. Stream warming has direct effects on mortality rates, body morphology, disease resistance, and metabolic rates in fish. Changes in stream temperatures can cause eggs of spawning species, such as walleye, to mature early and disrupt the delicate synchronization between thermal and hydrologic regimes that has evolved in their reproductive behavior. The solubility of dissolved oxygen is strongly dependent on water temperature and key aspects of the life cycle of spawning fish are synchronized by stream temperatures [22].

Land transformation affects stream temperatures by removing shading from tree canopies, increasing heat inputs through direct runoff from roofs, roads, and parking lots, and increasing ambient air temperatures following the loss of shading and evaporative cooling. Changes in the inputs and connectivity to groundwater systems can also disrupt cooler groundwater inputs from alluvial aquifers, seeps, and springs that provide valuable thermal refuges for aquatic organisms under summer low flow conditions [121].

The influence of the riparian corridor on stream temperatures is not always easily quantified due to the variety of factors that contribute to the stream energy balance, the diversity of hydrologic settings in the landscape, and the limited data often available to elucidate these influences. Variation in average stream temperatures throughout the year is closely correlated with air

temperature as well as the annual cycle of streamflow and vegetative cover [122]. The empirical correlation between air temperature and stream temperatures can provide significant skill in predicting average stream temperatures [123] and has led some to conclude that air temperature exerts a greater control on stream temperature than the inputs of solar radiation and shading by riparian vegetation [124]. These issues have assumed great significance in the Pacific Northwest where temperature effects from clearcutting directly threaten salmon, and both the width and length of forested riparian buffers required to protect stream temperatures have direct economic impacts in constraining timber harvest.

The effect of riparian shading is challenging to quantify due to the variability in the shading characteristics of leaf canopies of different riparian species and the change in shading as stream orientation to the sun varies along its course. For example, in reviewing best management practices in riparian forest management Broadmeadow and Nisbet [33] describe the results of a simple stream shading model that accounted for the different shadow lengths cast on north and south facing slopes and noted that buffer widths necessary to achieve stream shading goals will vary significantly with stream reach orientation.

Stream temperatures are determined by the energy balance of heat inputs from upstream runoff, incoming solar radiation, heat exchange with the atmosphere streambed and banks, and inputs from colder groundwater seeps and springs. The relative magnitude of each of these inputs is site specific and varies with season, geology, latitude, weather, and time of day. Direct solar radiation inputs vary along the course of a stream, as the meandering channel's orientation to the sun changes, and the channel's width to depth ratio exerts a strong influence on the rate of heat exchange. Wide shallow channels are easily heated by direct solar inputs, while narrow deep channels offer relatively little surface area to collect solar energy relative to the overall volume of water absorbing the heat. This complexity and variability, along with very limited data on all the terms in the heat balance, contributes to the challenge of quantifying the effects of any individual term in the heat balance.

Nevertheless the importance of stream temperature and its relationship to riparian vegetation has motivated research that provides clearer insights into the controls of stream temperature. Direct solar radiation has a relatively small effect on average stream temperature, but is most responsible for deviations of stream temperature above the mean. Moreover, of all the factors that influence stream temperature, incoming solar radiation is the main factor that can be influenced by management of the riparian corridor and streamside vegetation [125]. Danehy et al. [126] also determined that direct solar radiation exercised the predominant effect on maximum summer stream temperatures in mountain streams in Oregon and Idaho, observing significantly lower variability in minimum temperatures.

In southwest Wisconsin, Gaffield et al. [121] used a simple screening model based on heat transport to predict steady-state temperatures for whole reaches of coldwater streams. The simple heat balance elucidated the relative importance of meteorology, channel geometry, and stream shading on summer stream temperatures and quantified the importance of cold

groundwater inputs, as well as channel width and stream shading, as the dominant variables controlling summer stream temperatures.

In one of the most carefully instrumented experimental studies of stream temperature effects, Johnson [127] developed detailed heat budgets from a shading experiment on stream reaches in the H.J. Andrews experimental forest in Oregon. Following two weeks of monitoring air and water temperature and solar radiation, a 492 foot (150 m) stream reach was experimentally shaded and monitored for two weeks. Maximum water temperatures were significantly lower with shading, with no significant change in mean or minimum daily temperature. The detailed heat budget constructed from this data clearly identified the dominant role of direct solar radiation on maximum daily stream temperature; stream shading exerted a much stronger influence on maximum stream temperature than ambient air temperature. An inferential model-based analysis of the relative effects of stream shading, wind sheltering, and hydrologic heat sources similarly concluded that the effect of stream shading was stronger than stream sheltering in a broad analysis of temperature data from 596 stream gauging stations in the eastern and central U.S. [128].

The vegetated riparian corridor provides a buffering effect on stream temperatures by moderating air temperatures, but primarily through the shading of streams. The effectiveness of vegetative shading varies with the height, density, and configuration of vegetation and tree crowns, as well as the latitude, the orientation, and width of the stream reach, the slope of the adjoining riparian lands, and the degree of canopy closure. Variation in tree canopy form, slope, and solar declination all influence the buffer width required for effective stream shading. The heat budget for a stream reach is affected by upstream stream temperatures. For this reason the *length* of the riparian area also affects stream temperatures, by influencing this significant upstream heat source. Moreover the relative importance of upstream temperature inputs and direct solar inputs result in a tradeoff between the width and the upstream length of riparian area required to maintain a specified temperature target. Broadmeadow and Nisbet [33] describe results from Barton at al.'s [129] analysis of these tradeoffs for streams in southern Ontario. The results suggest that a 459-foot (140 m) riparian area 3,281 feet (1 km) in length would be expected to keep maximum water temperatures at 22 degrees C. If the riparian area length was increased to 6,562 feet (2 km), the width necessary to maintain a 22 degree C maximum daily temperature would only need to be 164 feet (50 m) in width. This echoes Correll's [130] recommendation on the importance of continuous riparian areas and minimizing variances to riparian setback regulations in order to sustain resilient riparian function.

Ecosystem Protection Services: Aquatic Systems and Sedimentation

Perhaps the most pervasive ecological effects from riparian disruption may result from increased sedimentation and turbidity. In his review of the effects of sediment on fish, Waters [16] concluded:

> *After a half-century of the most rigorous research, it is now apparent that fine sediment, originating in a broad array of human activities (including mining) overwhelmingly*

constitutes one of the major environmental factors – perhaps the principal factor in the degradation of stream fisheries.

In documenting the effects of sedimentation on fish communities, Rabeni and Smale [131] identify the control of sedimentation dynamics as one of the most beneficial services provided by riparian areas, and conclude that proper riparian management can mitigate the undesirable effects of sedimentation.

Sediment effects on fish include direct effects, such as mortality and disease, and sublethal effects on reproduction, growth, behavior, and food supply. Elevated suspended sediment concentrations have been shown to depress growth, degrade the visual cues for fish reproduction and predation, and increase vulnerability of fish to disease and specific bacterial, viral, and protozoan pathogens. Experimental studies have documented the physiological symptoms of sediment-induced stress in fish [16]. Turbidity refers to the clarity of water, and even modest increases in turbidity lead to reduced primary productivity that can propagate through the food chain. For example, on the Colorado River Osmundson et al. [132] related the low abundance of the endangered Colorado pike minnow to the increased accumulation of fine sediments due to river regulation through withdrawals, impoundments and other reservoir control. The entire food chain was disrupted by these changes, as the accumulation of fine sediments reduced the populations of macroinvertebrates, algae, and microbes on the streambed that are, in turn, the primary food source for the Colorado pike minnow's prey species.

The reproductive cycle of spawning salmon and trout are particularly vulnerable to the effects of sedimentation and have been the focus of a large body of research on sediment effects on these highly prized fisheries [133]. With the exception of lake trout, all North American salmon and trout lay their eggs in gravel nests, called redds, whose structure alters local flow patterns to maintain the exchange of oxygenated waters over incubating eggs. Excess sediment results in high mortality by restricting the flow of oxygenated water over the eggs, smothering embryos and sac fry within the redd, and entombing emerging fry. The pervasive influence of sediment on fish is best understood by considering sediment effects throughout each stage of their life history. Fulfilling the different life history requirements for fish requires a complex mosaic of suitable aquatic and floodplain habitats [134]. Excess sedimentation can disrupt every life stage in salmonids [135] as well as the prey species that support them.

Riparian degradation and increased stream sedimentation go hand in hand. Jones at al. [136] analyzed the changes in fish communities at 12 sites with more than 85% forested land cover in the Little Tennessee watershed, at which the upstream riparian corridor had been deforested. Despite the very high levels of forested land use remaining in the contributing watersheds, one of the principal consequences of removing riparian forest was increased stream sedimentation; the longer the nonforested riparian patch, the greater the sedimentation of riffles and pools, with concomitant shifts in fish assemblages. They conclude that, in addition to width, the length and area of riparian buffers are key factors in riparian management to mitigate sedimentation and protect aquatic ecosystems.

Some of the earliest process-based guidelines for riparian setbacks were developed by Trimble and Sartz [137] to protect streams from sedimentation originating on logging roads in the Hubbard Brook Experimental Forest in New Hampshire. Their early setback guidelines were based on the observed distance sediment traveled across the forest floor and inherently accounted for the runoff volume, soil characteristics, and slope-dependent velocity of runoff. To ease implementation, recommended widths were expressed as simple "rules of thumb" based on a minimum setback of 25 feet that increased 2 feet for every 1 percent of slope - to a maximum 165 foot width on 70% slopes. They also recommended doubling these widths to protect streams that served as water supply sources. This conservative margin of safety for critical or vulnerable uses illustrates the explicit risk-based judgment about the tradeoffs between acceptable risk and the beneficial use of lands inherent in any minimum setback recommendation.

Ecosystem Protection Services: Aquatic Systems and Invertebrates

The complex matrix of algae and microbes attached to submerged substrate in most aquatic ecosystems is referred to as periphyton. Periphyton is an important food source for many grazing invertebrates and some fish and can be an important sink for nutrients and contaminants. Broekhuizen et al. [138] studied the effect of sediment inputs on the ability of grazing macroinvertebrates to assimilate periphyton. Using the radioisotope C^{14} as a tracer, they found that carbon assimilation by periphyton grazers decreased in direct proportion to sediment increases. Kiffney et al. [139] compared the growth of periphyton in 13 clearcut headwater streams with riparian areas ranging from 0 feet to 98 feet (0m to 30m) in width. The periphyton biomass increased with narrower riparian widths, attributed to greater inputs of direct sunlight. As the periphyton biomass increased the inorganic content of the periphyton increased as well. These changes reflected a shift in algal composition from diatoms to filamentous algae that trapped more of the increased sediment load in the periphyton, decreasing its nutritional value and making it more difficult for grazing invertebrates to attach. The observed increase in sediment and periphyton inorganic content coincided with a decrease in mayflies and an increase in more pollution tolerant midges (chironomids). Kiffney et al. [139] concluded that retaining a forested buffer of at least 98 feet (30 m) was required to minimize the sediment effects of clearcut logging on these headwater streams.

Stream macroinvertebrates are sensitive indicators of aquatic ecosystem integrity. Changes in community structure are widely used as biological water quality indicators and the relative influence of key stressors on aquatic ecosystems, including stream corridor structure, siltation, and total suspended solids, can be inferred from the observed changes in the community structure of fish and benthic invertebrates [140]. Sedimentation and turbidity increase the natural drift of aquatic insects causing them to enter the flowing current to be carried downstream to less stressful conditions [141, 142]. This is especially true for the so-called EPT taxa – the mayflies (Ephemeroptera), stone flies (Plecoptera), and caddisflies (Trichoptera) that serve as the primary taxa available for fish. Through abrasion, turbidity, and the infilling of preferred habitat in the interstices of gravel and cobble substrates, sedimentation results in a benthic macroinvertebrate community characterized by higher densities of burrowing organisms,

such as sediment tolerant midges (chironomids) and annelid worms (oligochaetes) in soft mucky sediments, offering lower food value for fish.

A remarkable natural "experiment" on the effect of siltation on stream invertebrates in northeast Ohio was reported by Dewalt and Olive [143] in Portage County, Ohio. Silver Creek, a small headwater tributary of the Mahoning River, drains glacial sediments and periodically erodes a layer of glacially deposited silts. During these erosional episodes the cool clear gravel-cobble stream takes on a milky color and a thin layer of fine silts and clays accumulates on the streambed downstream from the source of these eroding silts. Dewalt and Olive [143] sampled the macroinvertebrate fauna upstream and downstream of such an erosional event that lasted from March to October 1984. Following the introduction of silt and clay into the stream they found the species richness, number of taxa, and abundance in the depositional reach dramatically declined, compared to upstream reaches. Of interest as well is the rapid rate at which the impacted reach recovered once the eroding silt was exhausted. The ecological integrity of the impacted reach recovered within 7 months of the cessation of siltation and was attributed to recolonization by drift from upstream populations. This remarkable process of impact and recovery highlights both the sensitivity of stream ecosystems to sedimentation and the ability of stream communities to recover from transient stresses, *if* they maintain their connectivity and function as part of a dynamic resilient stream system.

In contrast to the rapid recovery reported by Dewalt and Olive [143], Zuellig et al. [144] reported a similarly episodic discharge of approximately 9,156 cubic yards (7,000 m^3) of sediment flushed from a reservoir on the North Fork of the Cache La Poudre River in Colorado during dam inspections. As the sediment pulse worked its way through the river system, macroinvertebrates rapidly recolonized the affected reaches below the dam. However, the recolonized stream fauna differed radically and represented a complete functional shift from the pre-flush macroinvertebrate community. The dramatic change in the recolonizing fauna was attributed by Zuellig et al. [144] to the *absence* of permanently flowing tributaries that could connect similar biological populations for recolonization through passive downstream drift.

Forested riparian areas can insulate aquatic ecosystems from many of the effects of upslope land transformation - even clearcut forest harvesting. Quinn et al. [145] found that forest sites that had been harvested leaving continuous forested riparian areas had macroinvertebrate communities similar to unimpacted reaches. Stream ecosystems in which discontinuous or patch riparian areas were retained suffered a loss of taxonomic and functional diversity, but were not impacted as severely as reaches without any riparian areas. Their results reiterate the need to encourage contiguity in riparian areas, and the importance of the length of setbacks as well as their widths.

More widespread degradation is observed in streams with sustained stresses such as the permanent transformation of landuse and hydrology that accompanies current land development practices. In Big Darby Creek on the Scioto River in Franklin County, Ohio biological monitoring data document the impairment of aquatic ecosystems, water quality, and habitat

associated with suburban land transformation. Primary causes of ecosystem impairment were identified as riparian and habitat degradation and excess nitrate concentrations [146].

Using the State of Ohio's exceptional biological monitoring data, Miltner et al. [147] analyzed the effects of land transformation on aquatic ecosystems in three streams in Franklin County, Ohio. Analysis of 10 years of biological monitoring data show the degradation of fish communities associated with suburbanization - including local extirpation of pollution intolerant species such as silver shiners and hornyhead chubs, at sites where they had been historically abundant. Although a general storm water construction NPDES permit requiring best management practices to minimize sediment loads is applicable statewide in Ohio, the continuing loss of sensitive species with development led Miltner et al. [147] to question the adequacy and enforcement of required site-specific practices. Among the central Ohio streams analyzed, Miltner et al. [147] found the following:

> *The few sites in our data set where biological integrity was maintained despite high levels of urban land use occurred in streams where the floodplain and riparian buffer was relatively undeveloped. An aggressive stream protection policy that prescribes mandatory riparian buffer width, preserves sensitive areas and minimizes hydrologic alteration needs to be part of the larger planning and regulatory framework.*
>
> *And…*
>
> *Together these results suggest that aggressive regulations that protect riparian buffers and preserve much of the predisturbance hydrology may be effective at maintaining aquatic life uses consistent with basic clean Water Act goals in suburbanizing watersheds, at least up to a point.*

In Washington, D.C.'s rapidly developing Maryland suburbs Moore and Palmer [148] similarly analyzed the changes in ecosystem integrity across a gradient of agricultural to suburban landuse conversion. They similarly concluded that:

> *…maintenance of riparian forests even in highly urbanized watersheds may help alleviate ecological disturbances that might otherwise limit macroinvertebrate survival.*

Ecosystem Protection Services: Aquatic Systems and Stable Wood

Our understanding of the importance of naturally occurring wood in streams has grown dramatically to the point that stable wood, often referred to as large woody debris or coarse woody debris, is recognized as a crucial element of healthy stream function and stream restoration [134]. Following the recommendation of Gregory et al. [18], here and throughout this report we refer to "wood" in streams meaning "stable wood" that stores alluvial sediments, creates hydraulic variability, habitat diversity, and the overall complex characteristics of the most diverse and productive fluvial environments. This terminology is recommended to distinguish the variety of valuable functions associated with *stable* wood [149] from the

nuisance, aesthetic, and public safety dis-amenities associated with pruning waste, tree slash, and other forms of trash or garbage often associated with the terms debris, coarse woody debris, or large woody debris. In contrast to highly mobile debris that readily clogs culverts and damages infrastructure, tree ring analysis has shown that wood in natural streams can remain in place, providing structure and complexity in the fluvial system for over a century [67, 150].

Wood in streams provides ecological benefits ranging from instream habitat and shelter for fish, to the supply and accumulation of organic material and habitat supporting invertebrates, bacteria, and insects. The diverse habitats created by wood in streams are associated with hydraulic environments that dissipate stream energy, fostering the deposition and storage of sediment, detritus, and organic debris, as well as flow resistance that stabilizes and protects streambanks. Rivers and streams continually adjust to the dynamic inputs of wood and the associated changes in flow paths, channel form, and water surface elevations due to obstructions or logjams can create backwater conditions that increase flood risks for homes and structures in the floodplain. The routine clearance and removal of wood has therefore become common practice in developed watersheds. This removal of wood from streams is also associated with simplified stream and river channels and impoverished fish communities [151].

Moreover the indiscriminant removal of stable wood from streams can trigger profound changes in channel form, sediment storage, and the character and function of the riparian corridor, potentially causing additional flooding and erosion problems downstream. Brooks and Brierley [152] have reported on extensive analysis of channel changes in Australia's Cann River attributed primarily to the removal of riparian vegetation and wood since European settlement. The loss of storage and rapid mobilization of stream sediments with the removal of stable wood has resulted in a 700% increase in channel capacity associated with a 150-fold increase in the rate of lateral channel migration, a 40-fold increase in bankfull discharge, and even more dramatic increases in the annual sediment load. Of perhaps greater significance is the observation that these rapid adjustments have crossed key physical thresholds affecting stream processes. For example, the hydraulic significance of wood in streams changes as stream width increases relative to the mean size of wood [153]. In the Cann River, the vast increase in channel capacity has so widened the channel that the hydraulic effects of pre-development wood have fundamentally changed so that the reintroduction of riparian vegetation and predevelopment wood will not achieve stream channel recovery [152, 153]. These potentially irreversible changes in riparian systems emphasize the paramount importance of efforts to protect and maintain *existing* riparian function.

Management of riparian areas should give first priority to protecting those areas in natural or nearly natural condition from future alterations. [1]

In developed watersheds, the potential costs of wood in streams, such as undesirable changes in flood heights and channel alignments, must be balanced against the range of benefits from sediment storage, storage and dissipation of flood flows, and the critical ecological functions supporting diverse foodwebs and habitats. Along with desirable services, the potential for locally increased flood risks must be considered and logjams that threaten safety should be

cautiously removed. Wood in streams can have both beneficial and deleterious effects, but all wood should not be automatically removed. These dual functions are recognized by the Ohio Department of Natural Resources (ODNR) [149, 154]. The necessary balance between environmental services and flooding and erosion costs means that, pragmatically, the density and abundance of wood in developed streams will remain lower than in streams with minimal human impact. Though less abundant in developed watersheds, the biological value of wood that is found in developed streams is especially high - due in part to its relative scarcity. [151].

On balance, wood in streams and its dynamic replenishment from riparian corridors, provides enormous value in creating stable hydraulically diverse environments, critical habitat, and supporting the base of many aquatic food webs. The stable wood in resilient streams reduces erosion by protecting and stabilizing streambanks and creates pools that store sediment, dissipate flood flows, and reduce the hydraulic slope of individual stream reaches.

Boyer et al. [155] emphasize the critical importance of the linkages between riparian forests and floodplains in maintaining the processes that support their many diverse functions. They suggest that the conservation, enhancement, and restoration of these processes may be one of the most complex land management problems of the 21st century, and conclude that the conservation of intact riparian areas may prove to be the most cost-effective management approach for initial restoration of ecological functions to watersheds, including delivery of wood.

Ecosystem Protection Services: Terrestrial Systems

In addition to their value to aquatic systems, riparian areas are commonly recognized as corridors for animal movement and plant dispersal [37]. Floodplain plant species are adapted to the conditions created by the soil types, hydrologic variability, and disturbance regime characteristic of riparian areas. Riparian plants have evolved a variety of life histories that enable them to endure, resist, or avoid the extreme conditions of flooding, erosion, abrasion, and drought they regularly experience. For example, vascular plants that are periodically flooded have adapted to anoxic root conditions by developing air spaces, called aerenchyma, in their roots and stems that allow oxygen diffusion from the aerial portion of the plant to the roots. Anoxic conditions also mobilize ions such as manganese that can be toxic to plants. Riparian plants can create a thin oxygenated layer in the soil zone immediately surrounding the roots, called the rhizospere, to reduce this threat [156]. Similar adaptations are found in reproductive modes that synchronize seed dispersal with the seasonal disturbance and retreat of flood waters, and vegetative propagation via floating propagules that opportunistically disperse and colonize sand bars, streambanks, and terraces modulated by the frequency and elevation of flood waters.

The dynamic flux and exchange of surface water, groundwater, nutrients, sediment, and organic detritus enables riparian areas to support some of the highest levels of ecological diversity in the landscape. For example, Nilsson [157] reports 13% of the entire Swedish flora of vascular plants occurring along a single river corridor. Diversity in riparian corridors results from the abundance of nutrients, energy, and water as well as regular disturbances such as floods and

landslides, characteristic of the riparian zone. It is important to note that the disturbance regime that makes the riparian zone a disproportionately diverse and productive component of the landscape, also renders riparian areas generally unsuitable for development.

These disturbances in the riparian zone reduce the potential for competitive exclusion through periodic population reductions and environmental fluctuations [7]. Diverse plant life supports diverse wildlife which is enhanced if trees and shrubs are available to offer protection to nesting and resting areas [38]. For example, nearly 70% of vertebrate species in an area will use riparian corridors in some significant way during their life time [158]. The diversity of biogeochemical cycles, life histories, and disturbance regimes led Naiman et al. [7] to the unequivocal conclusion that:

> *Natural riparian corridors are the most diverse, dynamic, and complex biophysical habitats on the terrestrial portion of the Earth.*

Our understanding of the importance of riparian corridors for terrestrial fauna including mammals and birds, as well as semiaquatic species such as reptiles and amphibians lags behind the emerging understanding of the intimate coupling of riparian and aquatic ecosystems. This limited understanding of the terrestrial environment is reflected implicitly in many riparian management measures that are primarily based on protecting water quality. To extend current understanding of riparian function for semiaquiatic species, Semlitsch and Bodie [159] reviewed the literature on amphibian and reptile use of terrestrial habitats associated with streams and wetlands to identify "core habitats" necessary to carry out essential life-history functions. They focused in particular on the distinction between habitat use and occurrence that is most commonly observed, and habitat needs for all essential life-history functions. They note, for example, that reptiles such as turtles and snakes, that migrate to upland habitats to nest or overwinter, commonly forage and live in aquatic habitats. Conversely, frogs and salamanders that spend most of the year foraging and overwintering in uplands, must return to aquatic habitats to breed and lay eggs during their short reproductive season.

From their review of distances traveled for *essential* life-history functions (i.e. excluding dispersal, out-migration, and other non-essential functions) in 25 states and 5 countries, Semlitsch and Bodie [159] concluded that setbacks of 49 to 98 feet (15m to 30m) are inadequate to protect amphibians and reptiles, which have maximum core habitat requirements extending between 466 to 948 feet (142m to 289m) from the core stream or wetland. Here, the *core habitat* used by amphibians and reptiles is not a buffer, but the minimum necessary habitat, leading to the further recommendation that an additional 164-foot (50m) buffer should be maintained beyond these distances to insulate the core habitat from adjacent land disturbance. This guidance, based on literature synthesis, indicates the fledgling state of understanding about riparian habitat needs of amphibians and reptiles, and underscores the authors' conclusion that more research is needed to understand the effect of riparian management practices on the long-term sustainability of amphibians and reptiles. Recognizing the inherent balance between habitat protection and beneficial use of land, they conclude:

A sustainable balance between continuing economic development and protecting natural resources depends on knowing and responding to species' biological requirements and knowing how tradeoffs affect the maintenance of biodiversity.

Ecosystem Protection Services: Terrestrial Systems and Birds

Avian life histories are highly variable and a remarkable array of specialized ecological behaviors allows birds to partition a resource in both time and space. On Vancouver Island, Canada, Shirley and Smith [160] observed significant shifts in bird species richness, abundance, and composition with varying riparian buffer widths. The influence of edge effects on avian communities was significant and strongest in the narrowest buffers. They observed significant declines in abundance as buffer widths decreased from 410 feet (125 m) to 135 feet (41 m), and concluded that buffers greater than 328 feet (100 m) may be necessary to conserve forest interior species. Many studies provide similar observations of incremental shifts in species composition diversity and abundance of birds with land disturbance, particularly forest harvest, and various buffer treatments [161-165]. In spruce forests Hagvar et al. [162] found bird species richness increased with buffer width up to about 98 feet (30 m), and remained constant up to about 328 foot wide (100m) wide forested buffers. They also found that basal area, tree height, and visibility were additional habitat characteristics needed to understand the full ecological value of riparian corridors for breeding birds.

Considering the effects of forest buffers that ranged from 66 feet (20 m) to over ½ mile (800 m) in width, Hannon et al. [166] found that, while total bird abundance did not significantly decrease following forest harvest, the relative abundance of forest dependent birds declined as buffer widths decreased from 656 feet (200 m) to 328 feet (100 m). They concluded that 66 to 328 foot (20m to 100 m) buffers were inadequate to serve as reserves for forest songbirds. Pearson and Manuwal [165] found that buffer widths of at least 148 feet (45 m) were necessary to maintain the entire breeding bird population along second and third order streams in managed Douglas fir forests of the Pacific Northwest. Despite the growing empirical literature on short-term changes in avian abundance associated with forest harvest effects, understanding riparian influences on the sustainability of bird populations requires a more integrated understanding of avian ecological life histories.

For example Warkentin et al [167] studied behavior of water thrush, known as a riparian specialist, in forests 5 to 10 years after harvest. In these post-harvest study areas the riparian areas consistently had higher numbers and greater biomass of insects and other arthropod prey, as well as greater crowding of water thrushes. Nevertheless, water thrush had lower attack rates and longer flight distances to forage in riparian areas adjoining harvested areas. The observed increases in crowding and decreased feeding efficiency led Warenkin et al. [167] to question the long-term sustainability of conserving riparian habitat specialists with buffer strips alone. Riparian management nevertheless offers rich opportunities for joint services that enhance wildfowl habitat. In the Katy Prairie near Houston, Texas, agricultural floodplain lands have been purchased by a local land conservancy and leased to rice farmers. The leased lands are

allowed to flood, generating seasonal flood control benefits which also provide critical habitat for migratory waterfowl and generate local recreational benefits for hunting and birdwatching [168].

The benefits of riparian areas to birds are evident in Ohio. The Ohio EPA [51] reports that more than 50% of the breeding bird species in the State use riparian wooded areas to nest and these areas are also critical migratory habitats. During Spring and Fall, migratory birds are 10 to 14 times more abundant in riparian habitats than surrounding upland habitats [51]. Riparian areas also serve as corridors connecting larger natural areas and can prevent the isolation of small, non-viable populations.

Riparian Setbacks Protect Ecosystems and:

- *Enhance aquatic habitat by moderating stream temperatures, controlling sedimentation, and other services.*
- *Provide highly productive terrestrial habitat.*
- *Create linkages between aquatic, floodplain, and upland habitats.*

ECONOMICS OF RIPARIAN SETBACKS

In addition to the flood control, erosion control, water quality protection, groundwater purification, and ecosystem protection services provided by riparian areas, decision makers should be aware of the economics of riparian protection. Efforts to quantify the economic impacts of limiting development and maintaining natural riparian functions along streams and their associated wetlands are discussed below.

Natural resource services refer to the benefits communities receive directly or indirectly from natural resource functions. This includes only renewable natural resource functions, excluding non-renewable fuels and minerals. The natural resource benefits provided by riparian setbacks include [169]:

- Flood control and disturbance regulation through the control of extremely high and low stream flows.

- Erosion control and sediment retention through streambank stabilization and slowing runoff.

- Surface and ground water quality protection through nutrient cycling by nitrogen fixation and the storage of sediment bound phosphorus.

- Ecosystem protection through refuge by providing habitats for resident and transient plant and animal populations.

- Recreational services including hiking, picnicking, and the protection of resources for sport

fishing.

- Cultural services by providing opportunities for noncommercial uses such as aesthetic, artistic, educational, or scientific uses.

Riparian setbacks provide these natural resource benefits by minimizing encroachment on stream channels, thereby preserving the community services these areas provide. If natural systems are not protected to provide these services, there is an increased likelihood that engineering solutions, such as dams, streambank hardening, expanded storm water retention and treatment systems, and dredging may be necessary to prevent property damage and the loss of use of the resource. These engineering solutions have associated costs to communities that may not be offset by an increasing tax base or outside funds. Because riparian setbacks can minimize the need for these engineering solutions, the costs of these solutions provide approximate estimates of the value of the natural resource benefits of riparian setbacks.

Determining the value of the natural resource benefits riparian setbacks provide will help decision makers to more accurately balance community development goals with the need to protect public health and safety and spend tax dollars responsibly. Development brings significant economic benefits to communities including employment and tax revenues. It can also have significant costs as natural systems are altered and flooding, erosion, and impacts on water quality threaten property and a community's quality of life. Currently, the benefits of development are quantified while the benefits of natural systems are not fully captured in commercial markets [169]. As a result, the non-market benefits to a community from the services of riparian areas are often not considered in development decisions and taxpayers must absorb the potentially significant costs for remedial efforts to mitigate the negative impacts of development such as accelerated streambank erosion and increased flooding. By valuing these preventive natural resource services through the proxy of the cost to replace them with engineering solutions, local decision makers are better equipped to balance overall community development goals.

The cost of remedial engineering solutions is at best a rough proxy for the value of the natural resource benefits of riparian setbacks and does not capture the inherent recreational or cultural services provided by these areas of the landscape. Further research is needed to accurately capture the full value of riparian areas in economic terms. Until such information is available, however, experience supports the use of the remediation cost as a lower bound on future expenditures communities may face when natural systems are not factored into land use decisions. These costs may be quantified from experience in protecting drinking water supplies and remediating excess sedimentation, increased flood damages, and damage to infrastructure from debris. The following section presents salient examples of these costs.

Value of Natural Resource Services Estimated Through Remediation Costs

Water Quality Services

A lower bound on the water quality protection services provided by New York City's water

supply watersheds in the Catskill Mountains can be inferred from the estimated costs of $6 to $8 billion in capital investment and $300 million annual operating and maintenance costs that would be needed for drinking water filtration facilities to replace the natural filtration of the City's water supply. To preserve these services, the City of New York is investing $1.5 billion in the Catskill Mountain watershed for stream setbacks, stream fencing, and a range of best management practices to preserve the natural water filtration services of the riparian landscape [170]. In taking this action, the City is recognizing that the value of these watershed filtration services is significant enough to invest in stream protection in upstate watersheds outside of New York City.

Erosion Control

Nationally, Osterkamp et al. [171] estimates the annual damages from sedimentation are at least $16 billion in 1990 dollars. The costs of sedimentation can be appreciated by considering the town of Gastonia, North Carolina which saved $250,000 in annual water treatment costs by moving its water supply intake to a lake with no surrounding development [168]. In the year 2000, $300,000 of the annual $4 million operating budget of the Cobb County-Marietta Water Authority in Georgia was spent on increased chemical costs to remove sediment from drinking water taken from Lake Altoona [172]. Warner and Collins-Camargo [173] cited property value losses for "degraded streams and ponds" of $100 million, and "ecological damage" exceeding $50 million due to erosion and sedimentation, as the primary drivers for the design of sediment control systems in Atlanta's watersheds.

For the rapidly growing Atlanta metropolitan area sedimentation is ubiquitous. Although "mud in water" has historically been accepted as the natural status quo, a regional effort to change the attitudes and practices towards excess sedimentation resulted in a multijurisdictional partnership in the Metropolitan Atlanta Area called Dirt 2. The regional partnership engaged broad expertise in land development practices, institutional and legal structures, and engineering expertise in sediment and erosion control. The regional partners enlisted the National Academy of Public Administration (NAPA) [172], which helped assess and summarize the estimated regional economic damages from erosion and sedimentation. Among the continuing damages cited were frequent lawsuits by private property owners seeking compensation from the offsite damages of excess sedimentation. Although the average damages in individual actions were typically in the range of $10,000 to $30,000, the cumulative annual awards were estimated to range between $500,000 and $1 million, providing an indication of the frequency of recurring damages severe enough to lead to legal actions each year.

Lakeside property owners in the metropolitan Atlanta area have incurred significant dredging costs due to excess sedimentation. The NAPA study reported that 5 property owners in Lake Lanier paid $100,000 to dredge lakeshore sediments reported to have come from nearby development in order to maintain access to their boats as water levels fell in 1999. Comparable dredging costs of up to $500,000 were reportedly authorized by the City Council of Roswell, Georgia towards a total estimated dredging cost of $2 million to remove sediments from Stanford Lake attributed to upstream development [172]. Regional damages from sedimentation

identified by NAPA [172] are summarized as follows:

Excess Sedimentation
Estimated Damage Costs in the Atlanta Metropolitan Area

$0.5 to $1 million in annual damage awards to downstream property owners
$1 to $5 million in additional drinking water treatment costs
$1 to $10 million in annual dredging costs
$1 to $10 million in additional maintenance costs for hydroelectric generating stations
$25 to $50 million in replacement costs for lost hydroelectric capacity.

Along with detailed site design and revised engineering practices, the Dirt 2 initiative has resulted in a profound shift in acceptable site design and construction practices in the Atlanta area. Detailed design and analysis of modified construction costs concluded that, for typical sites, the cost of these new recommended practices were comparable to costs incurred for current sediment and erosion control practices [173]. Success of the so-called "transition to performance" hinged critically on the commitment of state, county and local jurisdictions to advancing low impact design practices throughout the development process from plan recommendations, site plan approvals, and site inspections during construction.

Flood Control

The City of Isaaquah, Washington has experienced increased flood damages of over $2 million between 1993 and 2000. Increasing flood damages are attributed to lost channel capacity due to sedimentation, partial clogging of culverts, filling of the floodplain, and increased runoff associated with more urban impervious area. The region has also experienced an increase in precipitation, apparently associated with a long term trend in weather cycles. Nevertheless hydrologic modeling conducted by Kings County estimated that current flood peaks in Isaaquah have increased by 8% due to urbanization alone, and could be expected to increase by 30% with buildout to current zoning [174].

Up to 90% of all natural disaster damages, excluding droughts, are caused by floods and associated natural debris flows [175]. Debris clogs of culverts and engineered structures in rivers create frequent maintenance problems for transportation and utility infrastructure and can result in significant damage when roads and culverts fail due to clogging, overtopping, and scour. The Washington State Department of Transportation reported substantial highway damage due to debris clogs during severe storms in October 2003. At just one site, a 6-foot culvert was clogged with debris and overtopped, resulting in the washout of 200 feet of State Route 20. This road section alone required repair costs of approximately $2 million, with total reimbursable damage costs from this single storm of $9 million.

Debris clogged the emergency spillway in Canyon Lake Dam resulting in its catastrophic failure during the Rapid City, South Dakota flood of 1972. The flooding also resulted in numerous debris clogs of road culverts leading to their overtopping and failure. Washouts during the flood

resulted in $22 million in damages, in 1972 dollars. Following this devastating flood, a regional floodplain plan was developed, converting most of the floodplain to large parks, restoring the connectivity with the river, and removing the most vulnerable structures from the floodplain [176].

Value of Natural Resource Services: Costs to Local Governments

In addition to valuing the natural resource benefits of riparian setbacks in terms of remediation costs for flooding, erosion, and water quality problems, the impact of preserving open spaces, such as riparian areas, on local government tax revenues and property values has been explored. The traditional economic argument against the preservation of open space is that undeveloped land is not economically productive while developed land provides tax revenues. This argument has been questioned in a variety of studies as reported by Stephen Miller in his 1992 book **The Economic Benefits of Open Space.** Miller found that proximity to open space enhanced property values. Citing a Philadelphia study, he showed that values for properties near open space were 40% higher than for properties away from open space. Miller [177] also reviewed several studies that compared municipal tax revenues to municipal costs for specific communities in 3 categories of land use: open space, residential, and commercial. Each community reviewed in these studies received more in tax revenues from open space than it paid in services.

The American Farmland Trust [178], in conjunction with Madison Village and Township in Lake County, Ohio, produced a study similar to the work reviewed by Miller [177]. This study examined the costs to communities to provide services to three land uses: residential; commercial/industrial; and farm, forest and open land. The study compared these costs to the tax revenues generated by each land use. On average, residential development required $1.54 in services for each $1.00 in revenue generated. In other words, for every dollar raised from residential revenues, the community spent an extra 54 cents on average to provide services such as education, health and human services, public safety and public works. By comparison, commercial/industrial development required $0.23 in services for each dollar it generated, and farm, forest and open land required $0.34 in services for each dollar it generated. A study done by the Portage County Regional Planning Commission in Shalersville Township, Ohio [179] had similar results.

The work in Madison and Shalersville shows that residential land use costs communities more than it provides in revenues and that other land uses help to offset this shortfall. The cost of providing new residents with services is greater than their gross contribution to the tax base. These studies also show the positive tax benefits of preserving land in agriculture and open space as well as having a balance of land uses in a community. Such a balance is necessary because while commercial/industrial development appears to provide the greatest economic gain, a disproportionate increase in commercial/industrial development may not help a community. If not properly planned, the tax revenues generated from such development may be negated by increased demand for services, such as new housing and roads, as well as increased costs associated with traffic congestion and pollution. From the Madison and Shalersville studies, a

mix of land uses appears to be best for tax revenues. These studies also show that development, either residential or commercial/industrial, does have associated costs that must be balanced against expected revenues.

Value of Natural Resource Services: Impacts on Property Values

The economic effects of open space, riparian setbacks, and other forms of environmental zoning can be rigorously estimated from observed prices of property sales using *hedonic price* analysis. King and Mazzota [180] offer the following explanation of hedonic pricing:

> *The hedonic pricing method is most often used to value environmental amenities that affect the price of residential properties…. The hedonic pricing method is relatively straightforward and uncontroversial to apply, because it is based on actual market prices and fairly easily measured data…. In general, the price of a house is related to the characteristics of the house and property itself, the characteristics of the neighborhood and community, and environmental characteristics. Thus, if non-environmental factors are controlled for, then any remaining differences in price can be attributed to differences in environmental quality.*

The direct effect of ecosystem or environmental services on homes and property can be estimated from observed sales prices using hedonic pricing. Acharya and Bennett [181] used hedonic pricing to estimate the effects of development "form" on observed housing prices, separating the features of individual homes and lots from the price effects of surrounding land use patterns and the proximity effects of amenities such as open space. The interaction of various amenity effects is a critical component of hedonic analysis of home prices. For example the significant effect of "scenic views" on home prices is well established [182]. Any estimates of the effect of riparian setbacks or other environmental zoning regulations on property values must therefore account for the combined effects of features of the individual home, the neighborhood, and proximity to various amenities.

The effect of environmental zoning can be understood to induce both a favorable "amenity" effect through, for example, the preservation of valuable views and proximity to open space, as well as an unfavorable "development" effect that reduces individual property prices by constraining development. The development effect however may be negative or positive, as limiting development may limit the supply of developable area, thereby increasing the demand and prices for those remaining developable tracts.

Spalatro and Provencher [183] examined the effect of minimum frontage zoning on sale prices of lakefront lots in Wisconsin. They found the amenity effects from minimum frontage requirements increased the sales price of lakefront homes 18% to 21% with only a negligible decrease in home prices attributable to the development effect of the frontage requirement. Similarly, a 3-mile greenbelt around Lake Merritt, near Oakland's city center, was found to add $41 million to the surrounding property values [168]. In London, Ontario Shrubsole et al. [184] found that homeowners did not perceive Provincial floodplain regulations to have any significant

effect on home prices; a perception that was validated by their analysis of observed sales price data.

Netusil's [185] recent hedonic price analysis of the effect of environmental overlay zoning in Portland, Oregon offers an insight into the range of effects environmental zoning may have on property values. Portland has two levels of environmental zoning with strong restrictions on development of parcels in the environmental protection zone (p-zone) and somewhat more accommodation of some development in the conservation zone. (c-zone). Some properties are in both a p-zone and a c-zone. Netusil [185] estimated home price effects for each of the 3 zoning combinations in each of 5 different areas of Portland. She found properties with a c-zone designation in North Portland sell for 35% more than homes without any environmental zoning, while c-zone designations are estimated to lower the sale price of properties in Southwest Portland by 2.6%. The mixed results highlight the importance of interaction effects from the full range of amenities affecting consumer perceptions and preferences in home purchases. Consider for example, the interactions among amenities associated with proximity to trails. Convenient trail access might offer a positive amenity effect for recreational use *or* a negative effect from the reduction of perceived privacy or, in Portland's case, the fact that many trails are railroad right-of-way conversions and are located in areas with other negative amenity values associated with the old industrial rail corridor.

Preservation of scenic views and open spaces and riparian proximity have generally been shown to provide consistent significant increases in individual property values….

We are currently aware of no study that specifically identifies the effect of riparian setback regulations on property values. To address this important information need, CRWP will initiate a rigorous hedonic price analysis of the effect of riparian setbacks on property values in the Chagrin watershed in 2006.

The effect of setback regulations on property values is uncertain. Setback regulations could create a development effect that either increases or decreases home and lot prices. While both river views and forest views are consistently shown to increase property values, Mooney and Eisgruber [186] estimated the effect of Oregon's voluntary riparian buffer rules, requiring a 50 foot *forested buffer* - not just a setback - reduced property values approximately 3%, attributed primarily to the loss of river view.

Setback regulations could also be expected to contribute positive amenity value from the preservation of scenic views and water quality protection, as seen in water clarity, in waterfront properties [187]. The statistical analysis of 7,658 sales transactions of single family homes located within 1.5 miles of Tanque Verde Wash in northeast Tucson, Arizona found proximity to riparian corridors had a very significant positive effect on home prices. Homes located within 0.1 mile (528 feet) of the riparian corridor commanded a 5.9% price premium compared to identical homes 1.5 miles away. For the 25,560 homes within 1.5 miles of the riparian corridor

the cumulative increase in property values exceeds $103 million, of which 75% or $77.3 million is realized by homeowners within 0.5 miles of the riparian corridor [188]. The very tangible direct financial benefit realized by these homeowners is another component of the portfolio of goods and services resulting from riparian protection. Similar analysis of home prices in 3 California counties found urban stream restoration projects which decreased flooding, stabilized banks, and enhanced fisheries added between 3% and 13% to mean property values [189].

These results emphasize the importance of considering the full range and interaction of amenity effects at the parcel, neighborhood, and regional scales, including proximity to open space, transportation amenities, and convenience of services. Preservation of scenic views and open spaces and riparian proximity have generally been shown to provide consistent significant increases in individual property values. These amenity effects interact with development effects. We are currently aware of no study that specifically identifies the effect of riparian setback regulations on property values. To address this important information need, CRWP will initiate a rigorous hedonic price analysis of the effect of riparian setbacks on property values in the Chagrin watershed in 2006.

IMPLEMENTING RIPARIAN SETBACKS THROUGH ZONING REGULATIONS IN NORTHEAST OHIO

This report establishes the flood control, erosion control, water quality protection, ground water purification, and ecosystem protection services provided by the riparian area. In working with its member communities to minimize the impacts of land use change as communities develop, CRWP recommends that members adopt zoning regulations to prevent development and other soil disturbing activities in riparian areas and to maintain these low-cost storm water management services. The remainder of this report discusses the specifics of implementing setbacks and includes information on CRWP's model regulation for riparian setbacks, steps involved with implementation, and factors to consider in adoption.

CRWP Model Regulation for Riparian Setbacks

To maximize the low-cost benefits of riparian setbacks communities should protect riparian areas through local regulations. These regulations must be properly designed and implemented and insure long-term setback maintenance. A variety of organizations in Northeast Ohio are available to assist communities interested in riparian regulations. These include CRWP, the Cuyahoga, Lake, and Geauga County Soil and Water Conservation Districts, and the Geauga and Lake County Planning Commissions. Working with these and other watershed stakeholders, CRWP maintains a riparian setback model ordinance and model resolution.

The model ordinance and resolution are based on the public health and safety services of riparian areas including flood control, erosion control, and water quality protection. The models establish minimum setback widths to control the location of soil disturbance on a parcel. A key feature of the riparian setback model is the emphasis on providing flexibility in other setbacks, such as side, rear, and front yard setbacks, to enable landowners to place their development as far out of

the riparian setback as possible while still developing their property. The recommended setback widths in the model range from 25 to 300 feet on either side of a watercourse as measured from the ordinary high water mark. These minimum setbacks are extended to the full extent of the 100-year floodplain and to encompass riparian wetlands in the minimum setback. The model also details suggested permitted and prohibited structures and uses and includes provisions to address non-conformities and to grant variances when necessary to permit buildability.

Steps to Implementing a Local Riparian Setback Regulation

Communities considering riparian setbacks should follow these steps:

- Update community comprehensive or land use plan to include documentation of the flood control, erosion control, and water quality protection services offered by local riparian areas. This could include mapping and other inventories of the community's streams, wetlands, and open spaces as well as documentation of past storm water problems related to loss of riparian functions through development.

- Review models available from CRWP and others as well as adopted regulations from communities such as the Cities of Kirtland and Aurora. It is important for communities in Northeast Ohio to note that while there are several models available for riparian setbacks, these models are essentially the same. Start with the model recommended by the organization assisting with your community process.

- Tailor the model to community norms. Throughout this process, follow community's standard practices for regulation review, public hearing, and adoption. Provide opportunities for public education on the need for riparian setback zoning at regularly scheduled Planning and Zoning Commission, Council, and/or Trustee meetings.

- Work with CRWP and/or local SWCD to provide technical support and to develop a guide riparian setback map. Having such a map of the potential setbacks in your community will enable Planning Commission to review the number and type of parcels covered and the extent of the proposed riparian setback.

- Adopt riparian setback zoning regulation with support of Planning and Zoning Commission, Council, and/or Trustees.

Factors to Consider When Adopting Riparian Setbacks

Factors to Consider When Adopting Riparian Setbacks: Minimum Setback Width

CRWP's riparian setback model recommends minimum setback widths of 25, 75, 120, or 300 feet on either side of a river or stream as measured from the ordinary high water mark. Communities across Northeast Ohio have followed these recommended minimum widths and they are supported by natural resource management professionals as effective minimum widths for riparian protection. As a result, Northeast Ohio has seen a consist and uniform approach to riparian setback implementation.

As this report highlights, there are a range of recommended widths based on the desired functions of riparian areas. However, beyond individual scientific studies that identify site-specific parameters for specific functions of setbacks and buffers, a number of literature reviews and federal, state, and municipal evaluations, provide general guidance supporting riparian setbacks widths. The CRWP minimum setbacks are consistent with setback widths adopted around the country as well as state and federal guidelines for riparian buffers and stream management zones. The recommended widths are consistent with the basic information required for their implementation, and represent a prudent balance between community values of maximizing riparian services and minimizing the restrictions on beneficial uses of property. Several reviews of setback widths are highlighted below to reiterate this point. These include:

- In a quantitative analysis of buffer widths from regulatory programs in Canada and the United States, Lee et al. [34] reported that mean buffer widths implemented in the surveyed programs ranged from 50 to 100 ft depending on waterbody type.

- In a comprehensive review of riparian literature, Scheuler and Holland [190] state that the typical minimum base width recommended to provide adequate stream protection is 100 ft, noting that buffers may be expanded beyond the minimum 100 ft to incorporate the following conditions:
  - The full extent of the 100-year floodplain.
  - Steep slopes greater than 25%.
  - Adjacent delineated wetlands or critical habitats.
  - Higher order or quality streams.

- Naiman and Decamps [156] suggest a multi-species riparian buffer (MRB) to provide protection of streams against agricultural impact. The MRB model employs 3 interactive zones in successive upslope order from the stream:
  - A permanent riparian forest about 33 ft wide,
  - A section of shrubs and trees up to 13 ft wide, and
  - An area supporting herbaceous vegetation such as forbs and grasses up to 21 ft wide.

- Depending on buffer function, Castelle et al. [6] noted that appropriate buffer widths vary widely. Considering the literature reviewed, buffers less than 17ft to 33ft appear to provide little protection for aquatic resources. In general, buffers designed to protect wetlands and streams should be at least 33ft to 100ft wide, with buffers at the low end of this range designed to manage the physical and chemical functions of the resource and buffers at the high end of the range designed to manage the biological functions of the riparian zone.

- Focusing on factors significant to the implementation of riparian buffer ordinances, Wenger [15] reviewed the riparian buffer literature to compile scientifically-based recommendations

supporting effective municipal ordinance adoption. Recognizing that buffer widths vary with both the particular riparian services desired, and site-specific factors including slope, rainfall, soil condition, vegetation, land use, and size of drainage area, Wenger [15] nevertheless offered general width guidelines drawn from the scientific literature. For sediment trapping efficiency, a minimum 100 foot buffer with either grass or forest vegetation was generally recommended, while noting that forest vegetation provides additional benefits over grass buffers. For proper sediment trapping, riparian setbacks should also consider placing limits on upslope impervious areas, strictly enforcing upslope sediment controls, and ensuring continuous buffers along all streams to be protected. To emphasize nutrient removal services, buffer widths in the range of 50ft to 100ft were generally found effective, again dependent on local site characteristics and hydrology. To manage for aquatic habitat, buffers should consist of forest vegetation 33ft to 100 ft wide for most species, but may require at least 330ft to maintain particularly diverse species populations.

- The ODNR, in their **Ohio Stream Management Guide: Forested Buffer Strips, Guide No. 13**, recommends that buffer width be based on actual riparian areas that can be estimated using floodplains identified in Federal Flood Insurance Rate Maps or by using county soil survey identification of soils that are "subject to frequent flooding". When riparian areas are too small to function as adequate buffers, as occurs with highly entrenched stream channels, ODNR suggests basing setbacks on generic standards such as 2.5 times the dimension of the bankfull channel width or 50 ft, whichever is less.

- In the United States Department of Agriculture (USDA) Forest Service handbook for establishing and maintaining riparian forest buffers in the Chesapeake Bay watershed [191], criteria for determining riparian buffer width includes the value of the resource, the site and watershed traits, intensity of adjacent land uses, and desired buffer functions. The following minimum width ranges are recommended based on specific functions:
  - Bank stabilization and aquatic food web processes - 10ft to 40ft.
  - Water temperature stabilization - 10ft to 60ft.
  - Nitrogen removal - 30ft to 140ft.
  - Sediment removal - 50ft to 160ft.
  - Flood mitigation - 65ft to 225ft.
  - Wildlife habitat - 45ft to 255ft.

- In the Cuyahoga Valley National Park, the National Park Service has recommended that riparian setbacks range from 50ft to 120 ft depending on drainage area, plus an additional 2 ft for each 1% increase in slope [192].

- The City of Everett, Washington conducted a review of riparian literature [12] and, as applied to the riparian function requirements of their community, came up with the following buffer width recommendations:
  - Sediment Retention and Filtration – 100ft to 300 ft.
  - Bank Stability - 100ft to 125 ft.

- Small Woody Debris - 250 ft.
- Shade/Water Temperature – 35ft to 250ft.
- Water Quality – 13ft to 600ft.
- Wildlife Habitat – 30ft to 1000ft.

- The City of Renton, Washington conducted a similar review of riparian literature to provide the scientific support for their riparian buffer ordinance [13], and reported the following recommended minimum buffer widths for their community:
  - Pollutant Trapping – 50ft to 100 ft
  - Sediment Trapping – 50ft to 200 ft.
  - Provide Particulate Nutrients to Stream (detritus) – 50ft to 100 ft.
  - Microclimate Control – 100ft to 525 ft.
  - Shade and Temperature Control - 50ft to 250ft.
  - Human Disturbance Control – 25ft to 50ft.
  - Bank Stability- 40ft to 70ft.

Factors to Consider When Adopting Riparian Setbacks: Expansion of the Minimum Setbacks for Floodplains, Wetlands, and Steep Slopes

Floodplains and Wetlands

As components of the riparian corridor, wetlands and floodplains are critical for the flood storage and pollutant removal functions of a riparian setback [38]. Minimum setback widths should be expanded to include these components. Depending on fluvial geomorphology, floodplains can extend a great distance and several floodplains with successively higher surfaces can occur along a single transect across a river valley [37]. It may not be practical for a community to protect this entire floodplain. To ensure reasonableness of its riparian setback regulation, a community should focus protection on the 100-year floodplain.

Steep Slopes

The degree to which riparian setbacks can filter sediments and nutrients depends to a great extent on the slope of the riparian area [38]. A slope of less than 15 percent is reported to allow for a retention time long enough to remove pollutants from runoff and to absorb water [8]. A steep slope, generally considered greater than 25 percent, reduces a setback's potential to slow flow and minimizes its ability to filter nonpoint pollution [193]. Even if steep areas are thickly vegetated, their steepness may negate the velocity reducing effects of vegetation and may promote erosion and channelization [8]. As a result, setbacks areas containing steep slopes may not significantly impact runoff velocity and minimum setback widths must be increased to compensate for these steep areas.

Factors to Consider When Adopting Riparian Setbacks: Riparian Area Contiguity

We now recognize that an essential value of riparian services derives from maintaining the connectivity and dynamic exchanges and processes throughout the riparian system. The superposition of political boundaries and individual property rights presents the challenge of

effectively managing the functional integrity and resulting services provided by this dynamic interconnected system, through the collective efforts of individual decisions by riparian landowners. It is precisely this joint coordinated management of the riparian resource that riparian setback regulations attempt to institutionalize in simple easily implemented zoning instruments.

Perhaps the most important guiding principles to emerge from the current scientific literature that should be considered when implementing riparian setback regulations are:

- The importance of contiguity in riparian protection and
- The great value and importance of protecting the remaining least disturbed riparian corridors in communities.

Contiguity and aquatic biota

We know that land use influences the diversity and integrity of aquatic ecosystems and stressors associated with land disturbance from agriculture, forestry, and urbanization are inexorably associated with a shift towards pollution tolerant ecological communities. Riparian setbacks that minimize the disturbance of the riparian corridor have consistently been associated with moderating these pervasive effects. These land use effects are clearly associated with not just the width of a setback at a particular location in the stream system, but are strongly related to the upstream extent or length of riparian areas, and the "zone of influence" of riparian disturbance propagates far downstream [136, 145, 147, 194, 195].

Contiguity and stream temperature

Stream shading has been well established as a significant influence on stream temperatures, along with air temperature, cool groundwater inputs, and other terms in the heat budget. The sensitivity of cold water fisheries such as salmon and trout has driven the retention of forested buffers in forestry practices to mitigate stream temperatures in cold water fisheries.

We now understand that direct solar radiation is one of the most important controls on maximum daily stream temperatures and its effect on stream temperature is affected by both the width and the upstream length of the riparian area. Moreover the shading effects of riparian corridor vegetation is the only factor affecting stream temperatures that can be controlled by managing riparian vegetation, and the forested buffer width required to realize temperature management goals increases as the upstream length of the forested buffer declines [121, 126, 127, 129, 196] .

Contiguity and sedimentation

Field scale evaluation of vegetated riparian filter strips and buffers in agriculture and harvested forests have demonstrated the influence of buffer width, along with site-specific factors such as slope, drainage area, and particle size distribution, in trapping eroded sediments before they enter the stream system. In addition to width, the contiguity of vegetated riparian areas critically influences the sediment inputs to stream systems. Even heavily forested watersheds with 85% to 90% forest cover, experience increased stream sedimentation when the riparian forest is

removed; the greater the riparian disturbance, the greater the sediment stress [27, 136, 145].

Contiguity and flood protection

Maintaining stream-floodplain connections with riparian setbacks has long been recognized as an effective means to maintain floodplain storage for overbank flows and reduce downstream flood damages. These riparian flood protection services are also extended by woody vegetation in connected riparian corridors and bank storage in alluvial floodplain sediments. Woody floodplain vegetation dissipates the energy of damaging floodwaters, and flood damages can be concentrated in areas in which gaps or discontinuities in the woody riparian vegetation are allowed to develop [47, 48, 197]. Bank storage helps dissipate flood peaks and moderate low flows for smaller more frequent storm events. Bank storage is nearly directly proportional to the width of the floodplain and helps reduce the flashiness and extremes of runoff along the entire length of the connected riparian corridor.[43, 44]

Contiguity and streambank erosion

Vegetated riparian corridors strengthen stream banks and dissipate concentrated overland flow, reducing erosion and bank failure, and promoting floodplain sedimentation. Riparian vegetation increases bank stability through both the mechanical effects from root strengthening and the hydrologic effects on soil pore water pressures. Discontinuities in the vegetated riparian corridor present vulnerable locations at which bank erosion is much more likely to be initiated, and individual stream reaches or river bends are far more likely to experience severe erosion where the contiguity of the vegetated riparian corridor has been compromised [55, 58, 59, 68, 70].

Contiguity and water quality

The capacity of riparian areas to remove sediments, nutrients, and dissolved contaminants has been well established experimentally. The surface of sediments at the riparian interface where surface water and groundwater mix is now understood to play a central role in maintaining the chemical and microbial transformations that naturally maintain and regulate water quality [23, 24, 79]. Maintaining riparian zones and effective land use practices are widely recognized as two valuable strategies to prevent the degradation of water quality services provided by these essential riparian processes [24]. These processes generate a valuable portfolio of water quality services that, once lost, are costly and difficult to replace. As Correll [130] observed,

> *Natural resource managers, having realized the values of healthy riparian zones, now face the challenge of restoration or recreation of functional riparian zones in many different settings.*

That is one of the reasons that the restoration of continuous riparian areas is an essential cost-effective component of watershed-scale efforts to protect and restore water quality from New York City's water supply watersheds and Chesapeake Bay to the control of nitrogen in the Mississippi River Basin to reduce chronic anoxia in the Gulf of Mexico.

Contiguity and groundwater purification

The riparian zone's capacity to infiltrate runoff and floodwaters and immobilize and degrade contaminants has been recognized as part of the natural system through which landscape processes protect and replenish groundwater. The hydraulic connection between rivers and streams and their adjoining alluvial aquifers provides an extremely cost effective portfolio of water treatment services that is widely relied on in Europe, and increasingly relied on for public water supply in the United States in cities from Cincinnati, Ohio and Louisville, Kentucky, to Kansas City, Missouri [116-118, 198]. The value and effectiveness of these services is directly linked to maintaining the hydraulic connection between river banks and alluvial aquifers.

The importance of contiguity in riparian protection is now clear in providing flood control services, ecological integrity, moderating stream temperatures, mitigating bank erosion and sedimentation, and modulating the landscape-level hydrologic fluxes and material loadings to fluvial systems [130, 199] The emerging knowledge and experience in managing the portfolio of beneficial riparian services at the watershed scale is crystallized in Correll's [130] conclusion that buffers along small headwater streams are most important, and that a continuous buffer is more valuable for overall waterway protection than a wide, but intermittent buffer.

The valuable portfolio of riparian services derives from the maintenance and enhancement of natural functions of the connected riparian corridor. The reliability and resilience of these functions will be maximized when the contiguity of the riparian corridor is preserved to the greatest degree possible. Setback programs should therefore emphasize the preservation of existing riparian land uses and discourage setback variances for new construction.

> ***Single-recipe approaches provide a poor foundation for management of rivers and streams, in part because they often ignore connections between physical and biological processes. …. That leaves us with two distinct choices for ecologically orientated river management: either trust that 'natural is best' and promote restoration of riparian forests, or treat each river on a case-by-case basis. [21***

Factors to Consider When Adopting Riparian Setbacks: Type of Setback Vegetation

The physical roughness, root depth, and metabolic capacity of riparian vegetation significantly influence a setback's ability to slow and filter runoff and to stabilize riverbanks. Streamside vegetation increases channel roughness during overbank flow, decreasing the erosive action of floods and retaining material in transport [37]. The greater a barrier vegetation presents to flow, the greater its ability to slow this flow.

Because the type of riparian setback vegetation is essential for setback functions, a setback regulation should have a vegetative target, or goal plant community. Riparian setback vegetation such as maintained lawns presents less resistance to flow and provides less support to stream

banks than vegetation such as unmowed grasses, shrubs and forests with leaf litter. Desbonnet et al. [8] found that both unmowed grass and forested areas effectively removed pollutants, provided that the setback was of a proper width and not particularly steep. Within theses types of "rough" vegetation, setbacks dominated by shrubs and trees are preferable to unmowed grasses for several reasons. After high flows, storage of litter on streambanks in a prairie system in Kansas was greater in forested reaches than in unmowed grassland reaches [200]. Trees and large shrubs also shade watercourses and minimize bank erosion as their roots penetrate soils and form a tight interlaced structure to hold bank soils in place against stream flow.

The vegetative target for most suburban/urban stream setbacks is the predevelopment riparian plant community [193]. In most cases this will be mature forest, however, the predevelopment plant community can be determined from reference riparian communities within the watershed or elsewhere. The native plant community is preferable because the benefits of riparian setbacks are natural functions and it is likely that native floodplain vegetation is best suited to achieve these functions at the lowest cost.

> ***Management of riparian areas should give first priority to protecting those areas in natural or nearly natural condition from future alterations. [1]***

In many areas, the riparian setback may be far from the vegetative target. A community has several options for reaching this target. If left untouched, native plants may eventually return. This takes time and delays realization of the benefits of the setback. To speed the process, a setback can be actively managed through reforestation efforts or through the removal of invasive and exotic trees, grasses and shrubs. When the setback is on private land, property owners can be encouraged through educational materials and technical assistance to undertake such management. Local county soil and water conservation districts and state agencies such as ODNR are excellent sources of such technical information.

Factors to Consider When Adopting Riparian Setbacks: Permitted & Prohibited Activities

A successful setback regulation should make clear the structures and uses allowed in the setback area. Uses that allow native vegetation to flourish and do not disturb soils are highly suitable for riparian setbacks [38]. These uses include passive recreation such as hiking, fishing and picnicking; the removal of damaged and diseased trees; and revegetation and reforestation efforts. The goal in determining suitable uses for a setback area is to allow flexibility for people to enjoy the area while not compromising the desired setback services.

Generally construction and other uses that disturb soil and vegetation should be prohibited. Construction of garages, patios and other structures adds impervious cover to the setback, decreasing its ability to slow flow and filter pollutants. However, selective timber harvesting, crossings, and erosion control projects may be appropriate and necessary in the riparian corridor. According to Lowrance et al. [9], periodic selective tree harvesting is necessary to keep forests highly productive where net nutrient uptake is high. If harvesting is done with minimum soil

disturbance during the dry season, it will have little detrimental effect on the pollution control by riparian systems [9]. Selective harvesting, crossings, and stream bank stabilization must be done under an approved plan to ensure that such requirements for minimal disruption are followed. A riparian setback regulation should detail the conditions under which harvesting, crossings, and stabilization will be allowed and should encourage erosion control projects using bioengineering techniques where appropriate.

Factors to Consider When Adopting Riparian Setbacks: Long-Term Setback Management

A long-term management plan is necessary to ensure the success of a riparian setback regulation. Based on a nationwide study by Heraty [201] of 36 local level setback programs, Schueler [193] presents several key areas necessary for successful long-term setback management. These include:

Identification

Riparian setbacks need to be delineated on all subdivision plans and construction plans. Without such delineation, encroachment on setback areas is likely during construction. It is also helpful to maintain the riparian setback map to ensure community zoning and building officials generally know which parcels have riparian setbacks.

Education

Identification of riparian setbacks is also necessary to ensure that property owners understand how they are affected by the regulation. Those living adjacent to a setback may also be interested in assistance from local officials to properly manage their portion. Desbonnet et al. [8] point out that most setbacks will require some form of maintenance to reduce channelization of flow and to increase the effectiveness of pollutant removal from runoff. This education can be done through pamphlets, stream walks, individual visits, and community presentations.

Staffing

While identification and education programs will minimize encroachment and deterioration of the setback area, staff is also necessary to assist landowners in understanding the implications of riparian setbacks during construction and other soil disturbing activities for which they may otherwise require some sort of zoning approval.

FINAL POINTS

This report presents technical information on the functions of riparian setbacks and the components necessary for the development of a successful setback regulation. This information is intended to assist decision makers in developing reasonable riparian setback regulations and highlights the strong association between riparian protection and a community's quality of life. Through riparian protection, a community preserves natural resource benefits at low cost and maintains the natural systems that make it an attractive place to live and work.

Before developing a setback regulation it is important to recognize that implementation of a riparian setback will require the commitment of community resources. Community staff will need time to delineate the setback and to provide on-going education, technical assistance, enforcement, and other long-term maintenance. In deciding to establish a riparian setback area, a community should consider issues such as the level of technical and administrative resources available; its current level of development; the specifics of affected properties; community river protection priorities; and desired services from a setback. With this self assessment, a community will be better equipped to develop a setback regulation tailored to its needs.

It is important to note that riparian setbacks are only one part of an overall watershed approach to natural resource management. When implemented in conjunction with other sound land use practices, such as storm water regulation that address both water quality and quantity, riparian setbacks can maintain riparian corridor functions such as flood control, erosion control, nonpoint pollution control and groundwater purification. Setbacks will not eliminate the need for engineered solutions to severe encroachment on riparian corridors. They are preventive steps essential to maintaining the benefits of natural resources and reducing reliance on expensive engineering solutions to protect structures and reduce property damage.

Finally, riparian setbacks are an approved best management practice by the Ohio Environmental Protection Agency (Ohio EPA) for compliance with the Agencies National Pollutant Discharge Elimination System (NPDES) Phase II permit for storm water. Local setback regulations are also not in conflict with, or preempted by, the Ohio EPA's or the U.S. Army Corps of Engineers responsibility to review and permit impacts below the ordinary high water mark of streams and the jurisdictional boundaries of wetlands.

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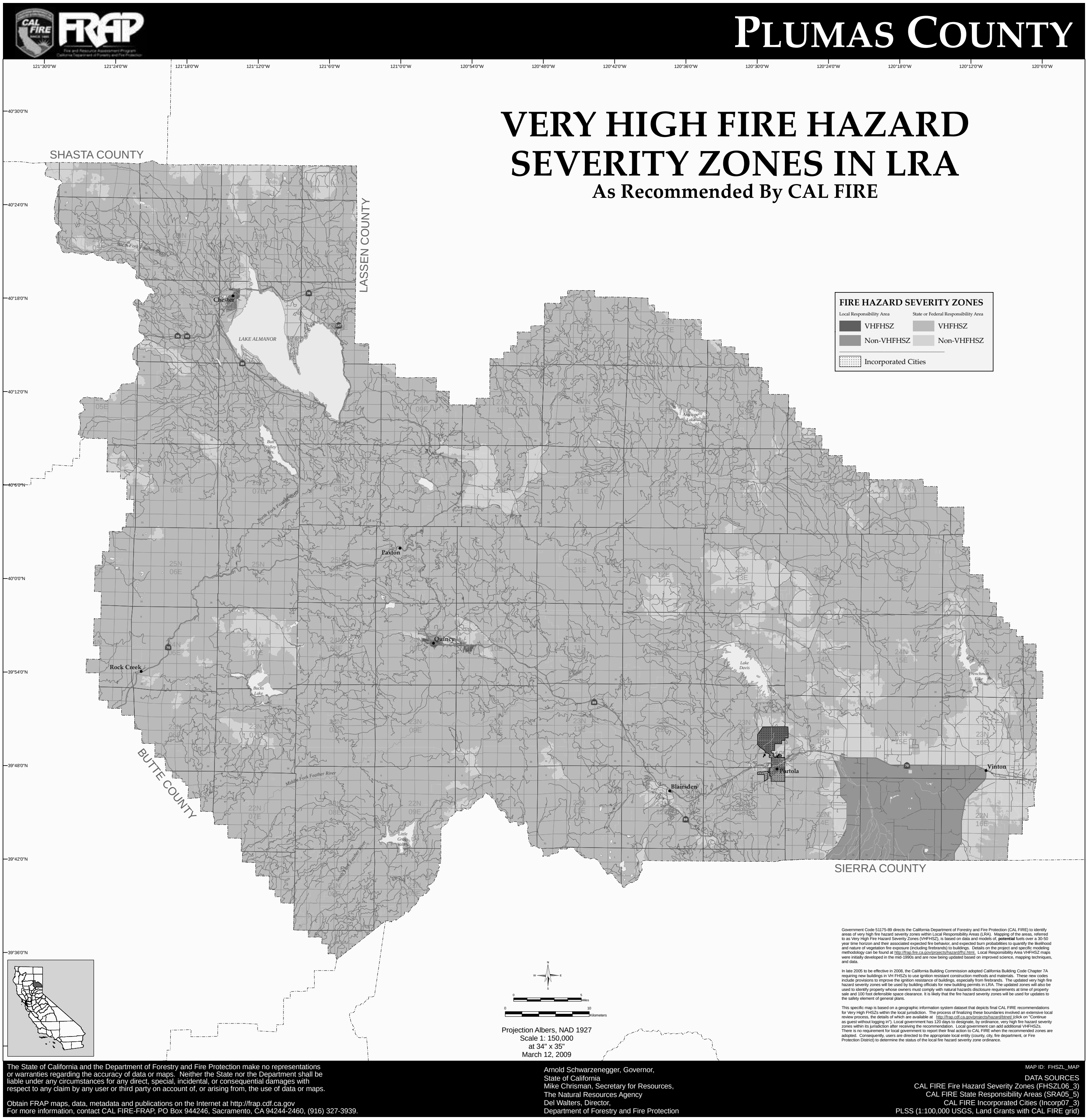
PLUMAS COUNTY
VERY HIGH FIRE HAZARD SEVERITY ZONES IN LRA
As Recommended By CAL FIRE
FIRE HAZARD SEVERITY ZONES
Local Responsibility Area
State or Federal Responsibility Area
VHFHSZ
Non-VHFHSZ
VHFHSZ
Non-VHFHSZ
Incorporated Cities
SHASTA COUNTY
LASSEN COUNTY
BUTTE COUNTY
SIERRA COUNTY
LAKE ALMANOR
Chester
Paxton
Quincy
Rock Creek
Portola
Blairsden
Vinton
Government Code 51175-89 directs the California Department of Forestry and Fire Protection (CAL FIRE) to identify areas of very high fire hazard severity zones within Local Responsibility Areas (LRA). Mapping of the areas, referred to as Very High Fire Hazard Severity Zones (VHFHSZ), is based on data and models of, potential fuels over a 30-50 year time horizon and their associated expected fire behavior, and expected burn probabilities to quantify the likelihood and nature of vegetation fire exposure (including firebrands) to buildings. Details on the project and specific modeling methodology can be found at http://frap.fire.ca.gov/projects/hazard/fhz.html. Local Responsibility Area VHFHSZ maps were initially developed in the mid-1990s and are now being updated based on improved science, mapping techniques, and data.
In late 2005 to be effective in 2008, the California Building Commission adopted California Building Code Chapter 7A requiring new buildings in VH FHSZs to use ignition resistant construction methods and materials. These new codes include provisions to improve the ignition resistance of buildings, especially from firebrands. The updated very high fire hazard severity zones will be used by building officials for new building permits in LRA. The updated zones will also be used to identify property whose owners must comply with natural hazards disclosure requirements at time of property sale and 100 foot defensible space clearance. It is likely that the fire hazard severity zones will be used for updates to the safety element of general plans.
This specific map is based on a geographic information system dataset that depicts final CAL FIRE recommendations for Very High FHSZs within the local jurisdiction. The process of finalizing these boundaries involved an extensive local review process, the details of which are available at http://frap.cdf.ca.gov/projects/hazard/btnet/ (click on "Continue as guest without logging in"). Local government has 120 days to designate, by ordinance, very high fire hazard severity zones within its jurisdiction after receiving the recommendation. Local government can add additional VHFHSZs. There is no requirement for local government to report their final action to CAL FIRE when the recommended zones are adopted. Consequently, users are directed to the appropriate local entity (county, city, fire department, or Fire Protection District) to determine the status of the local fire hazard severity zone ordinance.
Projection Albers, NAD 1927
Scale 1: 150,000
at 34" x 35"
March 12, 2009
The State of California and the Department of Forestry and Fire Protection make no representations or warranties regarding the accuracy of data or maps. Neither the State nor the Department shall be liable under any circumstances for any direct, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of data or maps.
Obtain FRAP maps, data, metadata and publications on the Internet at http://frap.cdf.ca.gov
For more information, contact CAL FIRE-FRAP, PO Box 944246, Sacramento, CA 94244-2460, (916) 327-3939.
Arnold Schwarzenegger, Governor,
State of California
Mike Chrisman, Secretary for Resources,
The Natural Resources Agency
Del Walters, Director,
Department of Forestry and Fire Protection
MAP ID: FHSZL_MAP
DATA SOURCES
CAL FIRE Fire Hazard Severity Zones (FHSZL06_3)
CAL FIRE State Responsibility Areas (SRA05_5)
CAL FIRE Incorporated Cities (Incorp07_3)
PLSS (1:100,000 USGS, Land Grants with CAL FIRE grid)

Evidence for the effect of homes on wildfire suppression costs

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Abstract

This paper uses wildfires in the Sierra Nevada area of California as a case study to estimate the relationship between housing and fire suppression costs. Specifically, we investigated whether the presence of homes was associated with increased costs of firefighting after controlling for the effects of potential confounding variables including fire size, weather, terrain, and human factors such as road access. Importantly, this paper investigates wildfires in a way that other published studies have not; we analyzed costs at the daily level, retaining information that would have been lost had we aggregated the data. By using linear mixed models with serial autocorrelation and error heterogeneity covariance structures we were able to estimate the effects of homes on daily costs while incorporating within-fire variation in the response and predictor variables. Our models were based on data from I-Suite Cost Reports, Geographic Information System fire perimeters, and ICS-209 forms. We conclude that the expected increase in daily log cost with each unit increase in log homes count within 6 miles of an active fire is 0.07 (p = 0.005). Because this relationship describes log-transformed variables we state that the expected change in firefighting costs with each 1% change in the count of homes within 6 miles is 0.07%. The findings of this study are in agreement with most other existing empirical studies that have investigated the relationship between fire suppression costs and housing using cumulative fire costs and more generalized data on home locations. The study adds to mounting evidence that increases in housing lead to increases in fire suppression costs.

1. Introduction

The wildland– urban interface (WUI), generally defined as areas where structures and other human development meet or intermingle with undeveloped wildland (Office of Inspector General [OIG] 2006), is experiencing rising population growth and new housing (Radeloff et al. 2005; Theobald and Romme 2007). The development of fire prone areas has been driven, in large part, by the phenomenon of people moving to areas of high natural amenities, sometimes called amenity migration (Moss 2006). Access to environmental amenities and public lands can be a primary motivation for residential development (Rudzitis 1999, 1996; Rasker 2006; Gude et al. 2006). This phenomenon is widespread in the United States (Johnson and Beale 1994; Johnson 1999), and is occurring in many other parts of the world as well, including the European Alps (Perlik, 2006, 2008), Norway (Flognfeldt 2006), Philippines (Glorioso 2006), Czech Republic (Bartos 2008), New Zealand (Hall 2006) and Argentina (Otero et al 2006, 2008).

The conversion of land to residential development in the WUI has also been driven by the increasing popularity of large residential lots (Theobald et al. 1997; Hammer et al. 2004). Housing is becoming increasingly dispersed, particularly in areas rich in natural amenities, resulting in extensive land conversion adjacent to lakes, national parks, wilderness areas, seashores, and forests (Bartlett et al. 2000; Rasker and Hansen 2000; Radeloff et al. 2001; Schnaiberg et al. 2002; Radeloff et al. 2005; Gude et al. 2006; Gude et al. 2007).

The cost of fighting wildfires has become a major budgetary concern for federal, state, and local agencies in the United States. The wildfire problems in the WUI have received national attention as more acres and homes are burned by wildfire (National Interagency Fire Center [NIFC] 2011). A recent government audit identified the WUI as the primary source of escalating federal firefighting costs, which exceeded $1 billion in three of the past six years (OIG 2006). In 87 percent of large wildfires reviewed in the audit, the protection of private property was cited as a major reason for firefighting efforts (OIG 2006).

WUI homes are also often difficult to protect because of remoteness, steep slopes, narrow roads and the dispersed pattern of development. These common characteristics can create dangerous situations for firefighters. From 1999 to 2010, $16.3 billion in federal funds were spent fighting wildfires (Congressional Research Service 2010) and 230 people were killed during wildland fire operations (National Wildfire Coordinating Group Safety and Health Working Team 2010); but despite the firefighting efforts, an average of 1,179 homes were lost annually to wildfires during this period (NIFC 2011).

Recent wildfire suppression has been costly, and estimates suggest these costs may increase significantly. Currently, only 14 percent of the available wildland interface in the western United States is developed (Gude et al. 2008). More development in these sensitive areas would likely lead to greater wildfire suppression costs. Climate change will likely exacerbate this effect. Nearly all climate models project warmer spring and summer temperatures across the West (Intergovernmental Panel on Climate Change 2001). This means that large wildfires and longer fire seasons are more likely (Westerling et al. 2006; Running 2006), and if development trends persist, more homes will be threatened by these fires.

This paper uses wildfires in the Sierra Nevada area of California as a case study to estimate the relationship between housing and fire suppression costs. California ranks first among western states in the number of homes built in the WUI (Gude et al. 2008), and has had many historically significant fires in which hundreds of structures were destroyed per event (NIFC 2011). The state offers ample opportunity to investigate the effect of residential development on fire suppression costs. Specifically, this research investigates whether the presence of homes

increases the cost of firefighting after controlling for the effects of potential confounding variables, such as fire size and terrain.

2. Methods

We set out to determine the evidence for the effect of homes on wildfire suppression costs. Isolating this effect required that we control for a suite of potential confounding variables, including weather, terrain, and human factors such as road access. To decide which variables should be included we sketched a diagram of theorized causal relationships of wildfire costs (Figure 1).

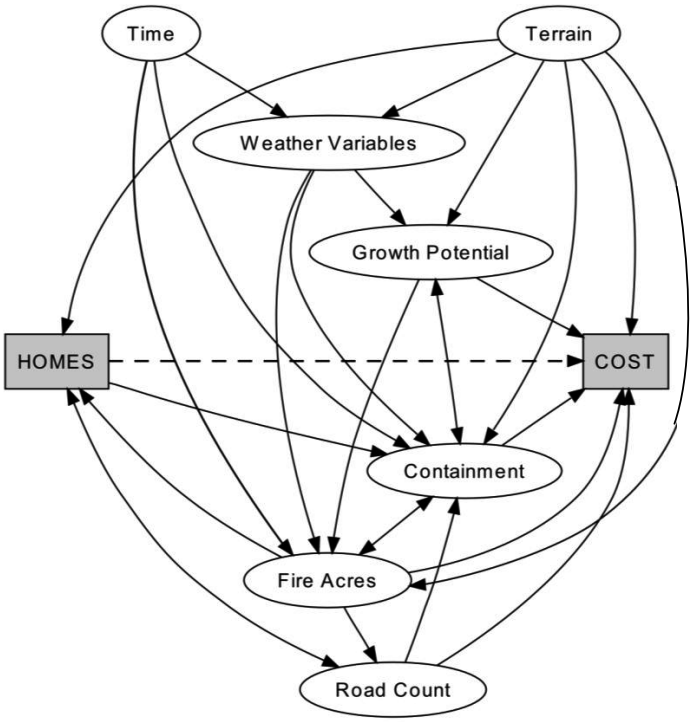

Figure 1. A diagram of potential causal relationships of wildfire costs.

2.1 Response and Explanatory Data

Daily cost data were compiled from I-Suite Cost Reports. Wildfires for which the cumulative costs reported in I-Suite were ten percent less than those reported by the US Forest Service's financial system were eliminated from the sample. Data describing other daily fire characteristics were generated using Geographic Information System (GIS) perimeters available from the U.S. Geological Survey's Rocky Mountain Geographic Science Center website or were compiled from ICS-209 forms (Table 1).

Table 1. Data collected for each day of firefighting for each of the 27 wildfires studied.

Data	Source
Total Daily Cost	I-SUITE
Percent Complete	I-SUITE
Fire Acres	GIS Perimeter Files
Percent Contained	209 Forms
Wind Speed	209 Forms
Temperature	209 Forms
Relative Humidity	209 Forms
Fire Growth Potential	209 Forms
Terrain Difficulty	209 Forms
Percent Forest	NASA MODIS Land Cover
Road Count	ESRI
Homes within 6 mi. (9.7 km) of wildfire*	Tax Assessor Records

*We originally hypothesized that homes within 1 mi. (1.6 km) of a fire would better explain firefighting costs. However, we found the zero-inflated distribution of this variable resulted in violation of distributional assumptions on model errors. Distributional assumptions were met by using the count of homes with 6 mi (9.7 km) of wildfires. This distance was also found to be influencial in a study of suppression costs in Montana (Gude et al. 2008).

All explanatory variables except "Percent Forest" were time-varying within fires. The explanatory variable used to represent the temporal progression of fires, "Percent Complete", was calculated by dividing the day of the observed data by the total number of days the fire was actively fought. We chose to represent this variable as a percent so that it would be standardized between fires. Calculations of daily fire acres, road counts, and homes within 6 mi. (9.7 km) of wildfires involved the use of GIS daily perimeter files. The "Road Count" variable was set equal to the number of road segments that intersected each daily fire perimeter. The homes variable was calculated by summing the number of homes within a 6 mi. (9.7 km) radius around each daily fire perimeter. The locations of homes were determined from county tax assessor records joined to tax lot boundaries. Generation of the "Percent Forest" variable for each of the 303 daily observations was too costly; therefore we used the most representative perimeter file per fire to calculate this variable. The other explanatory variables, including daily weather measurements and categorical variables representing growth potential and terrain difficulty, were used as reported in ICS-209 forms.

With the exception of grassland fires, the entire population of Sierra Nevada wildfires for which accurate data were available was included in the analyses. Grassland fires were not included because we expected that firefighting strategies, and therefore the relationship between cost and homes, would differ substantially between grassland and forest fires. Data explorations including histograms, boxplots, and numerical summaries revealed implausible observations and we removed 8 of the original 311 days of firefighting data.

The final dataset consisted of 303 days of information on total suppression costs and wildfire characteristics for 27 wildfires (Figure 2). The wildfires occurred in the Sierra Nevada region of California, plus portions of northwest California, from July 2006 through September 2009. Due to data availability, sample fires included only those in which the US Forest Service was the primary agency involved. The sample fires were distributed in and around 12 national forests: Eldorado, Inyo, Klamath, Lake Tahoe Basin, Lassen, Modoc, Plumas, Sequoia, Shasta-Trinity, Sierra, Stanislaus, and Tahoe. Klamath, Shasta-Trinity, and Modoc National Forests are to the north and northwest of what is typically defined as the Sierra Nevada. We included wildfires that burned around these three national forests in order to augment our sample size. The final sample included some wildfires that burned in areas where few or no homes were threatened, and some that burned through developed areas. This sample of fires allowed for a comparison between fires that threatened homes to varying extents.

Figure 2. The locations of 27 California wildfires included in this study are shown.

2.3 Mixed Models

Given the longitudinal structure of the data, a logical model choice was the linear mixed model (LMM) (Littell et al. 2006; Pinheiro and Bates 2000). This model is an extension of the general linear model and can be written

$$\begin{aligned}
&\boldsymbol{Y} = \boldsymbol{X}\boldsymbol{\beta} + \boldsymbol{Z}\boldsymbol{u} + \boldsymbol{e} \\
&\boldsymbol{u} \sim N(\boldsymbol{0}, \boldsymbol{G}) \\
&\boldsymbol{e} \sim N(\boldsymbol{0}, \boldsymbol{R}) \\
&Cov[\boldsymbol{u}, \boldsymbol{e}] = \boldsymbol{0}
\end{aligned}$$

where **Y** is a vector of response values, **X** is a fixed-effects design matrix, **ß** is a vector of fixed effects, **Z** is a random-effects design matrix, **u** is a vector of random effects, and **e** is the within-group error vector. Because the only constraint on the **G** and **R** matrices is symmetric positive-definiteness, this model provides a great deal of flexibility in modeling residual autocorrelation and heteroscedasticty (Var[**Y**] = **ZGZ'** + **R** in contrast to OLS regression where Var[**Y**] is proportional to an identity matrix).

We built LMMs of this form with the goal of drawing valid inferences on the ß coefficient associated with the homes effect. This required controlling for confounders, fitting the grouping and temporal correlation structures, and adding other terms needed to meet model assumptions. We used the *gls* and *lme* functions within the *nlme* packgage in the R statistical environment for all model fitting (Pinheiro et al. 2011, R Core Team 2011) . Model parameters were estimated using maximum likelihood.

2.3.1 Model Building

We first examined scatterplots of the response and continuous predictors with the goal of finding transformations to linearize relationships where needed. After choosing transformations we added model terms for all confounding variables, the homes variable, and the temporal structure of costs into the mean structure of the model (i.e. these variables plus a column of 1s for an intercept comprised the **X** matrix). We fit the model containing only these fixed effects and examined residual autocorrelation using an ACF plot of the empirical autocorrelations across days within fires. We judged significance of autocorrelations based on plotted Bonferroni-adjusted two-sided critical bounds for testing autocorrelations at all lags (see Pinheiro and Bates 2000 p. 241). Due to the known nested nature of the observations we then added random intercepts for each fire into the **Z** matrix, followed by random linear and quadratic slopes for the fire day, reassessing the autocorrelation diagnostics at each step. We also used *BIC* (Schwartz 1978) and examination of within-fire residual diagnostic plots to determine if structuring the **R** matrix with estimated variance heterogeneity and temporal correlation parameters improved model performance. Based on the plots and *BIC* values we chose appropriate variance and correlation structures from among those listed in Pinheiro and Bates' (2000) tables 5.1 and 5.3.

To assess fixed effects (i.e., estimates of **ß**) we used t-tests conditioned on the estimated random effects (Pinheiro and Bates 2000, p. 90). We set contrasts such that the two categorical predictors (Terrain Difficulty and Growth Potential) were dummy coded with coefficients representing differences from a baseline level. Terrain Difficulty had two levels and the associated ß represented the expected change from the High level to the Extreme level. The Growth Potential variable had 4 levels and the associated coefficients represented the expected changes from the Low level to the Medium, High, and Extreme levels. We checked for quadratic fixed effects of the continuous predictors, starting with the count of homes and the terms suggested by nonlinearities in the bivariate plots. We also tested for interactions of each of the confounding variables with the homes variable.

In addition to drawing inferences based on this "full model", we created a "reduced model" which was reduced based on two criteria. First, terms that were clearly confounders or were needed due to the data structure were not considered for removal; this included variables measuring the fire size, the within-fire temporal component,

and all covariance structures. The second criteria was that the p-value associated with the *t*-statistic for a predictor was greater than 0.2. The reason for stringency in setting the *p*-value cutoff was that all variables were carefully chosen based on the belief that they had potential for confounding the effect of interest, and because we aimed to avoid biases induced by intensive data-driven model selection (Hastie et al. 2009, Harrell 2001) and an overly simplistic model structure (Schabenberger and Gotway 2005, Vittinghoff 2005, Wolfinger 1993).

3. Results

The cumulative suppression cost per sample fire ranged from $478,642 to $72,226,070, with a mean of $18,379,112 (Table 2). The number of days the sample fires were actively fought ranged from 7 to 100, with an average of 36 days. The fires ranged in size from 1 to 311 square kilometers, with an average of 57 square kilometers. The average duration and size within our sample fires are representative of US Forest Service fires in the Sierra Nevada, however wildfires in which the state is the primary responder tend to be shorter and smaller due to higher numbers of threatened structures and resources (personal communication, David Passovoy, CAL FIRE). The results presented in this paper reflect US Forest Service wildfires, not state fought wildfires, of which there were none in our sample.

Table 2. Summary data per fire for each of the 27 wildfires studied.

Fire	Cumulative Cost	Year	Firefighting Days	Days in Sample	Avg Size of Fire (sq.km.)	Percent Forest	Avg Homes within 6 mi (9.7 km)
American River Complex	$22,795,346	2008	62	15	41	95%	543
Antelope Complex	$8,433,644	2007	10	4	86	62%	229
Backbone	$16,897,750	2009	20	10	22	96%	2
Bassetts	$7,687,375	2006	12	4	7	100%	537
Big Meadow	$16,947,242	2009	25	8	22	48%	76
Canyon Complex	$45,166,766	2008	58	24	91	90%	1,808
China-Back Complex	$2,934,617	2007	12	5	9	85%	265
Clover	$8,199,100	2008	46	16	24	26%	68
CUB Complex	$21,117,153	2008	31	17	37	99%	103
Elephant	$2,094,034	2009	7	4	1	100%	12
Fletcher	$4,092,990	2007	12	3	24	34%	5
Happy Camp	$10,264,472	2006	64	9	10	100%	84
Harrington	$478,642	2009	27	3	1	100%	0
Hat Creek Complex	$7,874,824	2009	9	5	37	91%	693
Hidden	$9,182,999	2008	26	10	9	93%	15
Iron Complex	$72,226,070	2008	79	12	89	98%	1,088
Kingsley Complex	$7,998,835	2006	18	3	4	100%	1

Knight	$12,122,449	2009	21	7	15	93%	3,689
Lime Complex	$62,050,552	2008	99	35	311	89%	2,494
Moonlight	$33,088,547	2007	31	8	208	88%	1,007
Piute	$24,229,665	2008	28	11	108	41%	1,532
Ralston	$13,849,333	2006	15	8	21	97%	938
Red Rock	$4,188,332	2009	15	9	4	86%	18
Siskiyou Complex	$44,860,758	2008	100	33	204	99%	34
Ukonom Complex	$25,623,333	2008	99	34	126	96%	121
Wallow	$4,973,823	2007	29	3	6	100%	67
Whiskey	$6,857,372	2008	29	3	29	38%	63

Bivariate scatterplots suggested taking the natural log of Cost, Homes, Fire Acres, and Road Count adequately linearized relationships. Both Homes and Road Counts contained 0 values and we added 1 to them prior to log-transforming. Checks for partial linearity throughout the multivariable modeling process also supported these transformations. The dot plot shown in Figure 3 shows the observed mean log of daily cost by quartiles of the observed predictor values. Each variable is split into quartiles (shown on the y-axis), represented by the four gray lines. The location of the dot on each line indicates the mean log daily cost (shown on the x-axis) within that quartile. This exploratory analysis indicates:

- The mean log of daily cost increased across the quartiles of the log count of homes.
- The mean log of daily cost was lower in the lowest and highest quartiles of the time variable (percent complete).
- Days in which wildfires were in the lowest quartile of log fire acres had lower mean log of daily cost.
- The mean log of daily cost increased with increases in growth potential.
- Days in which wildfires were in the lowest quartile of log road count had lower mean log of daily cost.
- The mean log of daily cost was lower in the highest quartile of percent forest.
- Temperatures above the median were associated with higher mean log of daily cost.
- Terrain difficulty, wind, and humidity appeared to have little relationship with the mean log of daily cost.

Although we focus our inferential results on the effect of homes count on costs, Figure 3 provides the reader with a summary of how observed daily costs varied across levels of each predictor within the raw data. As with inferential results presented below, this figure suggests that log count of homes and growth potential, in particular, are strongly associated with log daily costs. Figure 4 provides a more detailed view of the relationship between the log count of homes and the log daily costs is shown for each day of firefighting within each fire.

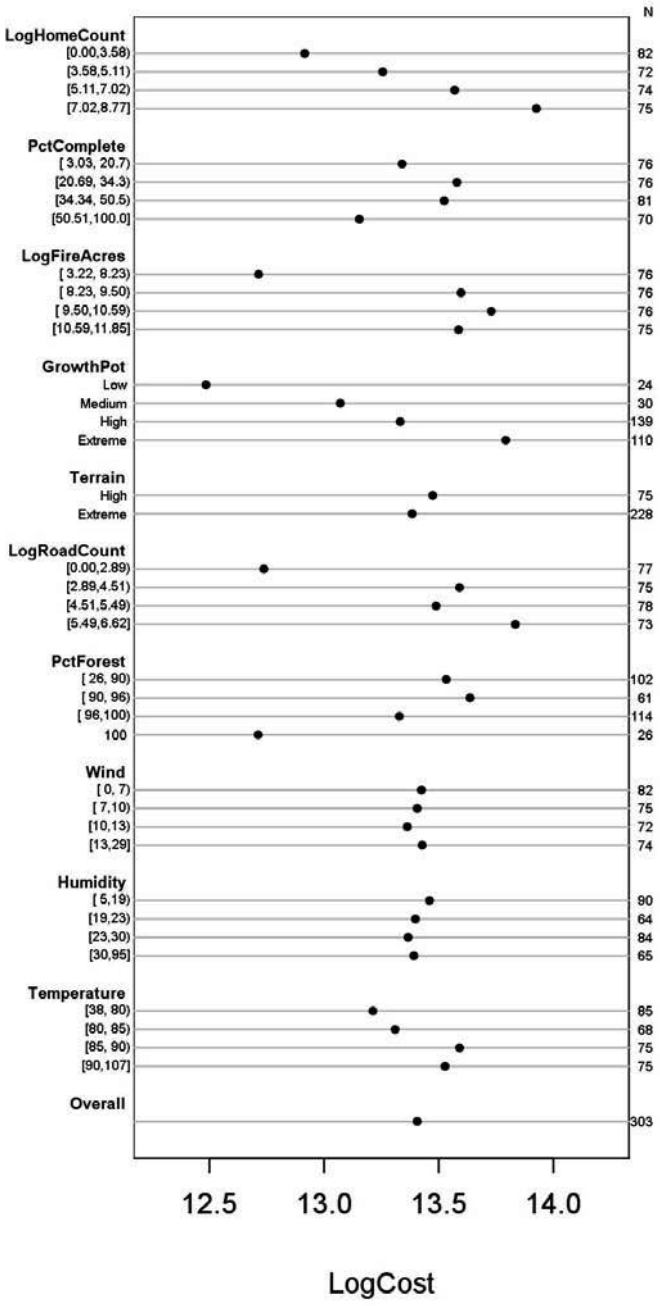

Figure 3. Observed mean log of daily cost by quartiles of the observed predictor values.

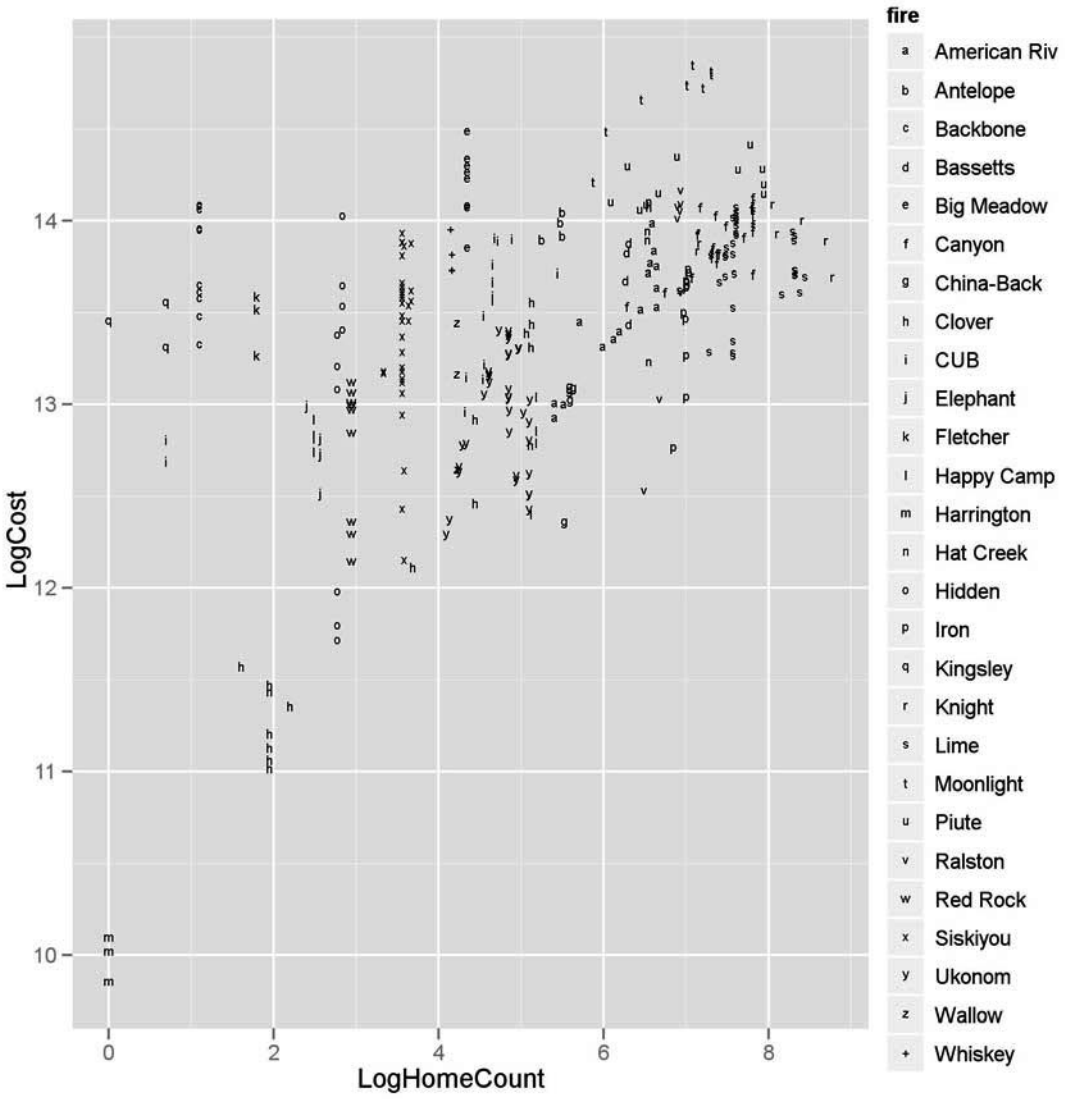

Figure 4. The log count of homes is plotted against the log daily costs in dollars for each day of firefighting within each of the 27 fires.

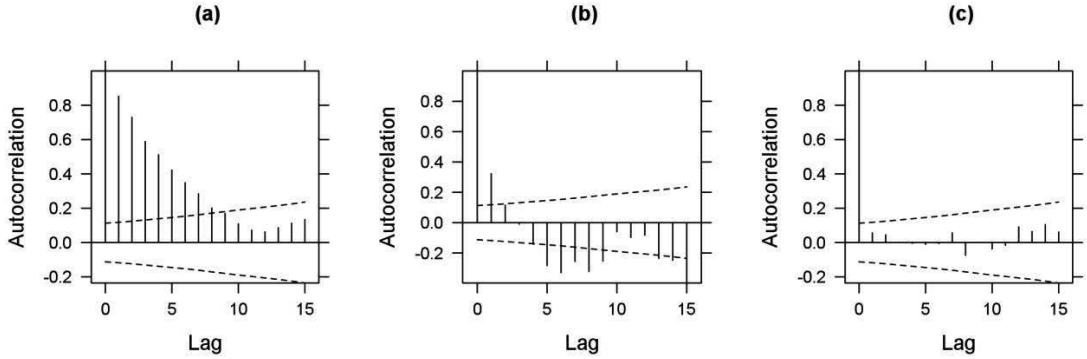

Figure 5. Plots of empirical autocorrelation functions for residuals from models with (a) fixed effects only, (b) additional random intercepts and random linear and quadratic slopes, and (c) random intercepts, linear and quadratic slopes, and within fire exponential correlation structure. The lines represent Bonferroni-adjusted two-sided critical bounds for the autocorrelations at each lag (Box et al., 1994).

3.1 Mixed Models

The ACF plot of residuals from the model containing only fixed effects indicated high levels of within-fire autocorrelation (Figure 5a). The addition of random intercepts and random slopes for the linear and quadratic temporal term (Percent Complete) decreased BIC by 412.5 points and produced visible improvements in fit (Figure 6), but significant autocorrelation remained at multiple lags (Figure 5b). Fitting an exponential correlation structure[1] to the off-diagonals of the **R** matrix accounted for the remaining autocorrelation (Figure 5c) and decreased BIC 184.5 points. However, at this point residual diagnostic plots suggested within-fire error heterogeneity, with residuals decreasing in absolute size as a function of fitted values (i.e. the models were doing better a predicting more expensive fire days). To account for this we fit a variance structure[2] to the diagonals of the **R** matrix, after which BIC decreased by 5.9 points and no apparent heteroscedasticity remained.

When we then checked the need for fixed quadratic effects we found significant convex effects of time (PctComplete), with costs tending to at first increase and then decrease during the course of each fire (Figure 6, Table 3). We found no other significant quadratic effects, nor interactions between the log homes count and other predictors.

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1 This is the corExp structure from Pinheiro and Bates (2000).Letting h denote the lag distance, the correlation between two model errors h days apart within a given fire is $\exp(-h/\varphi)$, where φ is the range of the correlation function. This correlation structure is a multivariate generalization of the continuous AR1 model (Pinheiro and Bates 2000, pg 232).

2 We fit the varPower structure from Pinheiro and Bates (2000). Letting v denote the model-fitted values, the error variances are modeled as $\sigma^2|v|^{2\delta}$, where δ is the parameter mediating the relationship between error variance and the fitted values. Because the error variance and fitted values are mutually dependent the variance structure is estimated through an "iteratively reweighted" optimization scheme (Pinheiro and Bates, pg 207).

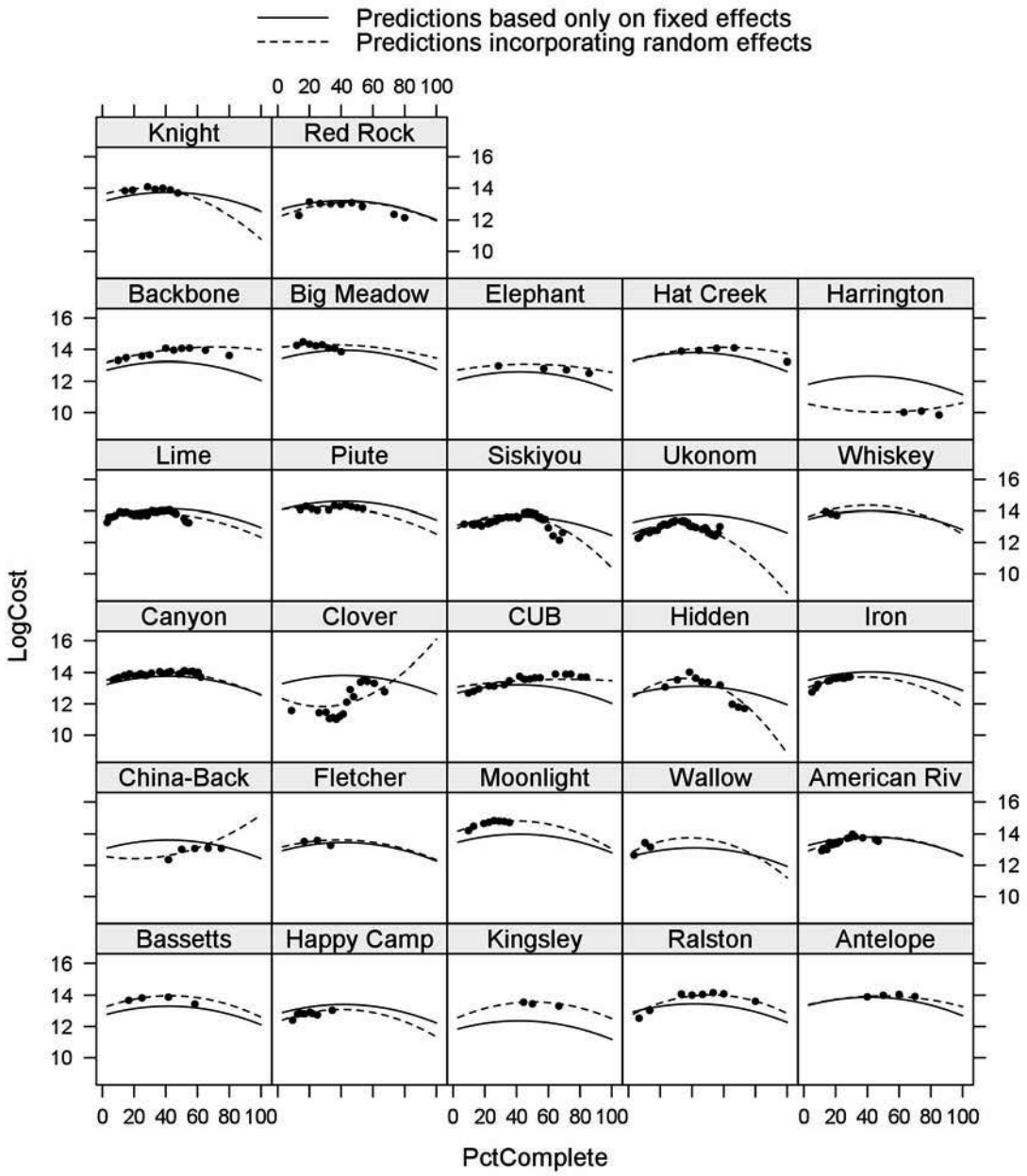

Figure 6. Values of predicted daily log cost over the life of each fire are shown with continuous predictors held at their observed mean value and categorical predictors at their most common value within fires.

Table 3. Inference statistics for fixed effects in the full and reduced mixed models predicting logged daily wildfire suppression costs.

Model	Variable	$\hat{\beta}$	95% CI	SE	df	t stat	p value
Full							
	Intercept	11.948	(10.911, 12.985)	0.540	263	22.12	0.000
	PctComplete	0.028	(0.012, 0.044)	0.008	263	3.33	0.001
	PctComplete2	-3e-04	(-5e-04, -2e-04)	1e-04	263	-3.62	<0.001
	logFireAcres	0.162	(0.056, 0.268)	0.055	263	2.94	0.004
	GrowPotMedium	0.020	(-0.107, 0.146)	0.066	263	0.30	0.762
	GrowPotHigh	0.258	(0.113, 0.404)	0.076	263	3.42	<0.001
	GrowPotExtreme	0.160	(-0.013, 0.334)	0.090	263	1.78	0.077
	ExtrTerrain	0.094	(-0.053, 0.242)	0.077	263	1.22	0.222
	PctContained	-6e-04	(-0.003, 0.002)	0.001	263	-0.42	0.678
	logRoadCount	-0.041	(-0.136, 0.0544)	0.049	263	-0.82	0.412
	PctForest	-0.010	(-0.019, -0.002)	0.004	25	-2.47	0.021
	Wind	-6e-04	(-0.004, 0.003)	0.002	263	-0.31	0.755
	Humidity	-7e-04	(-0.003, 0.002)	0.001	263	-0.50	0.621
	Temperature	-1e-04	(-0.003, 0.004)	0.002	263	0.05	0.957
	logHomeCount	**0.076**	**(0.024, 0.128)**	0.027	263	2.83	0.005
Reduced							
	Intercept	12.182	(11.324, 13.040)	0.443	269	27.52	<0.001
	PctComplete	0.026	(0.011, 0.041)	0.008	269	3.29	0.001
	PctComplete2	-3e-04	(-5e-04, -1e-04)	1e-04	269	-3.56	<0.001
	logFireAcres	0.118	(0.042, 0.195)	0.039	269	2.99	0.003
	GrowPotMedium	0.030	(-0.098, 0.157)	0.066	269	0.45	0.654
	GrowPotHigh	0.254	(0.110, 0.397)	0.074	269	3.43	<0.001
	GrowPotExtreme	0.206	(0.043, 0.368)	0.084	269	2.45	0.015
	PctForest	-0.009	(-0.017, -0.002)	0.004	25	-2.53	0.018
	logHomeCount	**0.075**	**(0.026, 0.126)**	0.026	269	2.87	0.004

At this point we had established the full model used to draw inferences about the effects of homes on wildfire-fighting costs. The model contained log transformations of the response (Daily Costs), the variable of interest (Homes Count within six miles), and two of the confounders (Fire Acres and Roads Count). All continuous predictors entered the mean structure of the model linearly other than the variable representing temporal progression (Percent Complete) which entered quadratically. The model also contained random intercepts and random linear and quadratic slopes for Percent Complete, as well as the error covariance parameters σ^2, δ, and φ. We viewed these covariance parameters as nuisance parameters that facilitated drawing valid inferences on the effects of interest in the face of correlated, heterogeneous errors, but were not of direct interest. Therefore we did not draw inferences on them, but for completeness report values here: the estimated range of the exponential correlation structure was $\varphi = 65.05$, the estimated error variance power parameter was $\delta = -5.75$, the estimate of σ^2 was 1.87×10^6 (note this is not the usual definition of σ^2 – see footnote 2), the estimated intercept variance was 1.69×10^{-23}, the estimated linear slope variance was 5.30×10^{-9}; and the estimated variance of the quadratic slope was 7.17×10^{-14}.

Reducing the model through backward elimination of the fixed effects resulted in the removal of the following variables (listed in the order removed): Temperature, Percent Contained, Wind Speed, Humidity, Log Road Count, and Terrain Difficulty. Removal of these variables resulted in a reduction of BIC by 15.4 points. For the reduced model the nuisance parameter estimates were: $\varphi = 54.49$, $\delta = -6.64$, $\sigma^2 = 1.75 \times 10^7$, intercept variance = 1.69×10^{-23}, linear slope variance = 5.30×10^{-9}, and quadratic slope variance = 7.17×10^{-14}.

Inference statistics for the fixed effects in the full and reduced models are shown in Table 3. Although statistics for all fixed effects estimates are shown, the focus of this paper is on the estimates describing the effects of homes on daily costs (shown in bold). Comparison of results from the full and reduced models indicates that removing the statistically insignificant predictors had little impact on the effect of interest. For each model we conclude that,

given the other variables, the expected increase in daily log cost with each unit increase in log homes count within 6 miles of an active fire is 0.07 (p = 0.005 for the full model and p = 0.004 for the reduced model). Because this relationship describes log-transformed variables we can interpret it as an elasticity and conclude that the expected change in firefighting costs with each 1% change in the count of homes within 6 miles is 0.07%. Interpreting the interval estimate we conclude with 95% confidence that the true change in firefighting costs with each 1% change in the count of homes is between 0.02% and 0.12%.

4. Discussion

This research finds that wildfire suppression costs are strongly related to the number and location of homes. Interpretation of our modeling suggests that after accounting for confounders, including fire size and growth potential, a 1% change in the number of homes within six miles of a wildfire is associated with a 0.07% increase in fire suppression costs. Similarly, after controlling for confounders, a doubling of homes (100% increase) is associated with a 7% increase in fire suppression costs.

These numbers mean that the additional fire suppression cost per home tends to be greater if development increases from 10 to 20 homes versus 1010 to 1020. In other words, the size of the effect is not as large if there are already hundreds of homes surrounding the fire, likely because at that point, fire managers are already doing all they can to stop the fire. For example, using the average daily cost within our sample ($816,439), the model predicts that daily costs would be $57,151 higher if 20 homes were within six miles of the wildfire versus 10 homes. However, the additional firefighting cost associated with 10 new homes is estimated to be only $566 per day given a scenario were 1010 homes were already present.

4.1 Comparison with other studies

Of the four existing empirical studies that investigate the relationship between fire suppression costs and housing, three studies found similar patterns and one study disagrees with our findings. Liang et al. (2008) found that fire size, perimeter to area ratio, percentage of private land, and total structure value had substantially higher independent effects than all other measured variables. They found expenditures to be positively correlated with percentage of private land and total structure value. Gebert et al. (2007) found that variables having the largest influence on cost included fire intensity level, area burned, and total housing value within 20 mi of ignition. Gude et al. 2008 found that an optimal set of explanatory variables for explaining daily fire suppression costs included the number of threatened homes, size of fire, rate of spread, and the difficulty of terrain.

Donovan et al. 2008 failed to find a relationship between housing and fire suppression cost. Donovan et al. estimated total costs from the 209 forms submitted daily by fire crews, which are known to be highly inaccurate (Gebert et al. 2007, personal communication Jaelith Hall-Rivera, Deputy Area Budget Coordinator, State and Private Forestry, U.S. Forest Service). In addition, Donovan et al. acknowledge that the sample may not have contained any fires that did not threaten homes, which may have made it impossible to detect an effect of homes on fire suppression costs.

Importantly, this paper investigates wildfires in a way that the other published studies did not. Liang et al. (2008), Gebert et al. (2007), and Donovan et al. (2008) examined cumulative costs per fire, rather than daily costs. Analyzing costs at the daily level allowed us to retain information that would have been lost had we aggregated response and predictor values. Our estimates of the effects of log homes count on log daily costs, for example, incorporated associated variation in both costs and homes within fires. In addition, our study and Gude et al. 2008 used counts of threatened homes as reported by county tax assessor offices. In the other studies, housing value averaged over census tracts or blocks were used to estimate threats to development. This representation is not ideal for several reasons. Census tracts are extremely large in rural areas. Sometimes they are the same as county boundaries, sometimes there are only 2 or 3 tracts per county. Also, fire managers may or may not spend more resources protecting expensive versus moderately priced versus inexpensive housing.

4.3 Policy Review and Implications

Existing federal and state wildfire policies have focused more on improving fuels management rather than on patterns of home development (Stephens and Ruth 2005; Gude et al. 2007). The major wildland fire policies since 2000 have been the National Fire Policy established in 2001 and designed to be a long-term, multibillion dollar effort at hazardous fuels reduction (GAO 2003), and the Healthy Forests Initiative and Healthy Forests Restoration Act, introduced in 2002 and 2003 respectively, aimed at shortening administrative and public review by limiting appeals processes. With few exceptions, state policies addressing the wildland urban interface have not been regulatory, and those states that have gone beyond incentive driven and voluntary measures, have focused almost entirely on fuels reduction projects. For example, California state law requires that homeowners in the WUI clear and maintain vegetation specific distances around structures (e.g., defensible space); Utah sets minimum standards for ordinance requirements based on the 2003 International Urban Wildland Interface Code; and, Oregon sets standards for defensible space, fuel breaks, building materials, and open burning on the property (Gude et al. 2007).

Importantly, thinning, prescribed fire, and the existing laws that address defensible space, ingress, egress, and water supply can provide a safer environment for firefighters and enable more structures to be saved. However, the extent to which these measures impact wildfire suppression costs is unknown. In some cases, these measures are prohibitively expensive. For example, markets for the products of thinning activities are limited. A comprehensive economic analysis that evaluates whether investments in fuels treatments reduce firefighting costs would be an important contribution. In some cases, policies that address fuels may create a safe enough environment to allow some homeowners to "shelter-in-place", a strategy promoted in Australian communities in which a homeowner remains to protect his or her property (Cova 2005). However, sheltering-in-place can result in loss of life, and puts an additional burden on firefighters of having to protect not only structures, but lives.

In light of mounting evidence that increases in housing lead to increases in fire suppression costs, future policies aimed at addressing the rising costs should attempt to either reduce or cover the additional costs due to future home development. To ignore homes in future wildfire policies is to ignore one of the few determinants of wildfire suppression cost that can be controlled. For example, governments have limited ability to control factors such as weather and the terrain in which wildfires burn.

The most obvious means of reducing additional suppression costs due to future home development would be to limit future home development in wildfire prone areas. Based on our findings, future savings may be achieved by a combination of policies that aim to keep undeveloped land undeveloped and encourage new development within existing urban growth boundaries and existing subdivisions. However, regulatory approaches that would accomplish these goals are challenging for policy makers to enact. Policy tools such as zoning are highly controversial in much of the rural United States due to the perception of regulatory takings, where the government effectively takes private property when zoning laws limit how it can be used. To date, instead of attempting to regulate development in fire prone lands, the majority of western states have enacted legislation that encourages counties to prepare plans that would reduce wildfire problems and, in some cases, clarifies that counties can legally deny subdivisions that do not mitigate or avoid threats to public health and safety from wildfire. While these types of policies may be helpful, they will likely not result in significant future savings because local governments, due to a lack of resources and a lack of cost accountability, have little incentive to act.

For several reasons, future policies will likely need to focus on covering the additional suppression costs related to new housing. First, both federal and state agencies have had difficulty budgeting for fire suppression in the past, and these challenges will worsen when there are more homes to protect. Second, as costs rise, the public may become dissatisfied with the existing arrangement in which the general taxpayer covers the costs of protecting at-risk homes. Third, finding a more equitable means of covering fire suppression costs may change behavior and lead to lower future costs. For example, if wildfire suppression costs were borne, in part, by those who build at-risk homes, or by local governments who permit them, rather than by the federal and state taxpayer, development rates in high risk areas may slow.

This study, which quantifies the recent effect of homes on firefighting costs for one part of the US West, demonstrates that policy makers can achieve future fire suppression cost savings by focusing attention on

development patterns. The study demonstrates that the largest future fire suppression savings related to housing will come from keeping undeveloped lands undeveloped. Effective management of future suppression costs would likely involve a combination of policies that regulate land use, provide incentives for limiting the "footprint" of future development, and reform how suppression costs are paid.

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Summary: Wildland Fire Research

August 2011

HEADWATERS ECONOMICS

THE PROBLEM: The price of fighting forest fires has been increasing substantially. At the national level, fire costs represent half of the U.S. Forest Service's budget and total expenses have exceeded $3 billion annually, more than twice what it cost a decade ago. Unfortunately, this expense is almost certain to continue to grow, and—unless action is taken—firefighting costs could double again in the next 15 years because of expanding residential development on fire-prone lands and increased temperatures associated with climate change.

THE RESEARCH: In addition to ongoing work in Oregon, Headwaters Economics has conducted research into four major areas (http://headwaterseconomics.org/wildfire):
(1) Homes in the Wildland-Urban Interface (WUI) and Costs of Fighting Fires
(2) Case Study: Cost of Protecting Homes and Impact of Warming Temperatures in Montana
(3) Case Study: Fire Fighting Costs in the Sierra Nevada
(4) White Paper: Ten Ways to Control Fire Suppression Costs

SUMMARY:

(1) Wildland-Urban Interface: http://headwaterseconomics.org/wildfire/development-on-fire-prone-lands/.

As of 2000, only 14 percent of the wildland-urban interface (private land near fire-prone public land) in the West had homes on it, leaving the other 86 percent—more than 20,000 square miles—open to residential development. The high firefighting costs we already pay are likely to increase dramatically as development in the WUI continues.

Headwaters Economics prepared maps and graphs illustrating this emerging problem for western communities with data and rankings available for each county in the eleven western states. Our analysis takes a long view, looking at the potential for more home construction next to fire-prone public lands and implications for future wildfire fighting costs.

Key findings of our research include:

- Only 14 percent of forested western private land adjacent to public land is currently developed for residential use.
- Given the skyrocketing cost of fighting wildfires in recent years, the potential for development on the remaining 84 percent of land would create an unmanageable financial burden for taxpayers.
- If homes were built in 50 percent of the forested areas where private land borders public land, annual firefighting costs could reach $4.5 billion—the size of the Forest Service budget.
- One in five homes (20%) in the wildland-urban interface is a second home or cabin, compared to one in twenty-five homes (4%) on other western private lands.
- Residential lots built near wildlands take up more than six times the space of homes built in other places. On average, 3.2 acres per person are consumed for housing in the wildland-urban interface, compared to 0.5 acres on other western private lands.

(2) Montana Case Study: http://headwaterseconomics.org/wildfire/montana-wildfire-costs/.

Using Montana as a case study, Headwaters Economics found that protecting the average home from a wildfire event costs roughly $8,000 and that 27 percent of firefighting costs are attributable to protecting homes in the WUI. Statewide, protecting homes from forest fires costs an average of $28 million annually. If development on private land near fire-prone forests continues, costs associated with home protection likely will rise to $40 million by 2025.

Climate change would increase costs even further. An average summer increase 1º F in Montana would at least double home protection costs, and the combination of additional development and hotter summers could push the average annual cost of protecting homes from forest fires to exceed $80 million by 2025.

Yearly Cost of Protecting Homes from Wildfires in Montana

(3) Sierra Nevada Case Study:
http://headwaterseconomics.org/wildfire/northern-california-homes-and-cost-of-wildfires/.

This recent research focuses on how growing residential development near the twelve national forests in the Sierra Nevada area of California has led to increases in fire suppression costs. The research focused on 27 wildland fires during 2006-2009.

Key findings of our research include:

- Rising average summer temperatures are strongly associated with an increase in acres burned. Within the Sierra Nevada study area, an increase in average summer temperature of 1º F is associated with a 35 percent increase in area burned by wildfires.

- Increases in sprawl and the area burned by wildfire have led to greater numbers of homes being threatened. During the past ten years twice as many homes (approximately 13,000) were within a mile of a wildfire compared to the 1980s or 1990s. Home building has increased rapidly in the Sierra Nevada area. Since 1950, more than 900,000 homes were built in the study area, and 1,500 square miles of undeveloped private land were converted to low density development.

- For fires in the Sierra Nevada, one-third of suppression costs are related to protecting homes. For the average U.S. Forest Service wildfire, 35 percent of total firefighting costs in the study area are associated with protecting homes. The cumulative cost of the 27 wildfires in the study was $496 million, of which we estimate $173 million were suppression costs related to homes.

- Additional firefighting costs associated with new homes depend on how many homes already are present. On average, the total estimated cost to protect a home within six miles of a fire was $81,650, but ranged significantly from $1,513 to $683,928. In low density areas, the cost of adding a single home can be incredibly high. If only one home is within six miles of a fire, the additional cost of a new home is $57,151 daily—or $2 million for the duration of a 35 day fire. By comparison, a new home added to a development of 50 existing homes costs $1,143 daily or $40,000 for the duration of a 35 day fire.

This research has two central policy implications:

- Keeping new housing within denser residential areas would reduce future firefighting costs by millions of dollars. Leaving land undeveloped saves the most taxpayer dollars.

- Today federal and state taxpayers pay a large portion of the cost of wildfires. If costs instead were borne in part by those who build at-risk homes, or by local governments who permit them, it would help pay for rising costs and may discourage new home development in high risk areas.

(4) White Paper: Ten Ways to Control Fire Suppression Costs:
http://headwaterseconomics.org/wildfire/fire-suppression-costs/.

Previous efforts to hold down or reduce fire suppression costs—such as increased coordination among agencies and educating homeowners how to live more appropriately near fire-prone lands—focus on increasing the safety of existing residences in the WUI.

Unfortunately, these proposals lacked the means to control future costs—which are driven by more frequent, larger fires and growing numbers of homes in the WUI—and may have unintentionally helped increase residential growth and subsequent fire suppression costs near fire-prone lands.

Another important concern is that the current approach to fire suppression has perverse incentives and lacks accountability. People who develop in forested areas, and local governments that allow such new subdivisions, do not pay their share of firefighting costs. Instead, the majority of firefighting expenses instead are paid by the Forest Service, Bureau of Land Management, and the Federal Emergency Management Agency. Because the national taxpayer pays the tab and—as long as someone else is paying the bill—those who build or permit the development of homes in dangerous, fire-prone landscapes have little incentive to change.

While the home building is not the only reason firefighting costs have increased—a warmer climate and fuel buildup from past practices also play a role—future policies and growth in the WUI is an area where communities can make progress.

This white paper provides ten policy ideas for controlling the rise of firefighting costs.

(1) Publicize maps identifying high-risk wildfire areas.

(2) Educate officials and the public about the financial consequences of building in fire-prone areas.

(3) Redirect federal aid to encourage land use planning on private lands.

(4) Provide incentives for counties to sign firefighting cost-share agreements.

(5) Purchase land or obtain easements on fire-prone lands.

(6) Institute a national fire insurance and mortgage program to require home firefighting insurance.

(7) Allow insurance companies to charge higher premiums in fire-prone areas.

(8) Limit development near fire risk lands through planning or local zoning.

(9) Eliminate mortgage interest tax deductions for homes built in the WUI.

(10) Reduce the federal firefighting budget, forcing cost transfers to the local level where land development decisions are being made.

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SCENARIOS TO EVALUATE LONG-TERM WILDFIRE RISK IN CALIFORNIA:

New Methods for Considering Links Between Changing Demography, Land Use, and Climate

A White Paper from the California Energy Commission's California Climate Change Center

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ABSTRACT

This paper describes the development and analysis of over 21,000 scenarios for future residential wildfire risk in California on a 1/8-degree latitude/longitude grid at a monthly time step, using statistical models of wildfire activity and parameterizations of uncertainties related to residential property losses from wildfire. This research explored interactions between medium-high and low emissions scenarios, three global climate models, six spatially explicit population growth scenarios derived from two growth models, and a range of values for multiple parameters that define vulnerability of properties at risk of loss due to wildfire. These are evaluated over two future time periods relative to a historic baseline. The study also explored the effects of the spatial resolution used for calculating household exposure to wildfire on changes in estimated future property losses. The goal was not to produce one single set of authoritative future risk scenarios, but rather to understand what parameters are important for robustly characterizing effects of climate and growth trajectories on future residential property risks in California. Overall, by end of century, results showed that variation across development scenarios accounts for far more variability in statewide residential wildfire risks than does variation across climate scenarios. However, the most extreme increases in residential fire risks result from the combination of high-growth/high-sprawl scenarios with the most extreme climate scenarios considered here. Furthermore, this study shows that the sign of overall statewide risk in the highest growth cases depends on key parameters describing how expected losses vary with increasing housing value at the local level. The paper features case studies for the Bay Area and the Sierra foothills to demonstrate that, while land use decisions can have a profound effect on future residential wildfire risks, the effects of diverse growth and land use strategies vary greatly around the state.

Keywords: Fire, wildfire, risk, climate, scenario, WUI, wildland-urban interface, spatial

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Section 1: Introduction

1.1 Climate Change and Residential Wildfire Risk

Wildfires in California routinely threaten people and property, destroy homes, force evacuations, expose large populations to unhealthful air, and result in the death or injury of some citizens and firefighters. Climate change may affect the size and frequency of wildfires in California, and its impacts are likely to vary substantially across the state (Westerling et al. 2011a; Bowman et al. 2009; Krawchuk et al. 2009; Westerling and Bryant 2008; Westerling et al. 2006; and Lenihan et al. 2003). And while wildfire poses many hazards, its most direct impacts on humans are fundamentally connected to how people are distributed over the landscape. In previous work (Bryant and Westerling 2009), we considered how changes in the probability of large fire events interact with changes in land use to affect residential property risks, drawing on a small number of scenarios for future climate, land use, and growth. In this paper, we expand the number of climate, land use, and growth scenarios considered, and also consider additional uncertainties and a more sophisticated model of expected housing loss due to wildfire, to more robustly characterize future changes in wildfire and wildfire-related residential property risk in California. A complementary study (Hurteau et al. in preparation) applies our results to assess changes in wildfire emissions of greenhouse gases and air pollutants.

This paper's primary aim is to describe how climate change and human development patterns over California may interact to lead to differing levels of fire-caused risk to residential property, with a greater focus on the relative impacts of different climate, population growth, and land use scenarios, as well as parameters related to fire management. This study used climate scenarios derived from three global climate models (GCMs) from the Intergovernmental Panel on Climate Change (IPCC)'s Fourth Assessment forced with medium-high and low emissions pathways (IPCC 2000, 2007). Our growth scenarios are derived from two different sets of spatially explicit raster data sets, each describing different twenty-first century population growth and land use scenarios. One set is based on work by Theobald (2005) and developed by the U.S. Environmental Protection Agency (U.S. EPA 2008) as the Integrated Climate and Land Use Scenarios (ICLUS) for the United States, and is provided at 100 meter (m) resolution. The other set is provided at 50 m resolution and generated using the UPlan growth model, developed for California by Thorne et al. (2012). As in Bryant and Westerling (2009), the primary results of this study are in the form of statistics on aggregate statewide relative risk, where the reference period is defined based on year 2000 development patterns and late twentieth-century (1961–1990) simulated climate. This paper also presents spatial distributions of changes in wildfire probabilities and expected losses to illustrate how these impacts can vary throughout the state.

In the remainder of the paper, we first review some impacts of wildfires. In Section 2, we develop our conceptual model and describe the data we have available for implementing such a model. In Section 3, we build up a formal model for estimating changes in wildfire risk; in the process clarifying our assumptions and how we handle the significant uncertainties inherent in

considering long-term scenarios of such risk.[1] Section 4 discusses the study's primary findings, including changes in aggregate statewide risk and also some sub-regional analysis, while Section 5 summarizes the results and considers their policy implications.

1.2 Ecological Context of Human Interactions with Fire

While this work focuses on risks to residential property, there are many other less-obvious impacts, both to humans and also to ecosystems, some of which are listed in Table 1. (See the California Board of Forestry's California Fire Plan [1996] for an extremely thorough attempt at comprehensively assessing wildfire impacts of all sorts). This paper focuses only on quantifying changes in direct damages to homes; therefore, when evaluating this study's results, it is important to remember that these impacts represent just a fraction of the total impacts from wildfire. While monetization of many of the impacts listed in Table 1 is difficult and fraught with uncertainty, the California Department of Forestry estimated that, for example, watershed impacts of wildfire, in the form of soil erosion and potential required sediment removal from water bodies, may easily average out to magnitudes on the order $100 per acre burned, possibly even up to thousands of dollars per acres burned in some cases (California Forestry Board 1996). This translates to at least tens of millions of dollars of annual impacts from that source alone. In addition, many of the environmental impacts have human consequences. The health and viewshed impacts of reduced air quality are readily apparent, but there are other more subtle and second-order effects, such as watershed impacts reducing desired fish populations and reducing power generation ability from hydroelectric dams.

Table 1: Types of Wildfire Impacts

Direct Human Impacts	Indirect Impacts
Structures burned/property value lost	Watersheds-soil loss, deposits
Prevention and suppression expenditures	Timber loss
Evacuation costs/lost productivity	Habitat disruption
Lives lost and adverse health effects of smoke	Species loss
Diminished recreational opportunities and viewsheds	Non-native species invasion
Disruption to infrastructure availability	

[1] In the interest of providing a relatively self-contained document, this paper incorporates a small amount of text from a previous white paper by the same authors, also written for the California Energy Commission (CEC-500-2009-048-F). These sections are primarily related to background material, while methods have since been enhanced and all of the results are based on new modeling work.

When considering damages, it is important to acknowledge that wildfire is in principle a natural phenomenon that serves a role in maintaining healthy ecosystems, but human presence and action combine to make fire both a risk to humans, and also potentially a risk to ecosystems. This is due to humans causing unnatural *patterns* of wildfire with intensities or frequencies outside the range of natural variability (Dellasala et al. 2004). For example, Stephens et al. (2007) estimate that fire suppression and land use changes reduced annual burned area in California forests from pre-settlement levels by more than 90 percent in the twentieth century. This long-term exclusion of wildfire may have led to increases in biomass and changes in fuel structure in some California forests that in turn have fostered hotter, more-intense forest wildfires that are harder to manage and may have had undesirable effects in forest ecosystems that are not adapted to high-severity fire (Gruell 2001; Allen et al. 2002; Miller et al. 2009). For another example, wildfire in chaparral ecosystems may not have been significantly affected by fire suppression, but pressures from increased development and human ignitions may have increased wildfire frequency and fostered invasion by exotic species (Keeley and Fotheringham 2003; Syphard, Radeloff et al. 2007). These changes can affect ecosystems in undesirable ways that may or may not be proportional to the residential impacts addressed here. With the importance of these ecological considerations in mind, we now turn to our focus on the risk of housing destruction due to wildfires.

Section 2: Conceptual Model of Long-Range Wildfire Risk and Available Scenario Data

Climate change impacts wildfire characteristics, as does human development on the landscape (growth). In turn, changes in wildfire characteristics affect the risk posed to that same human development. This section outlines these interactions at a high level, and discusses historical and modeled data available to us for considering different futures in a more quantitative way. The following section then formalizes these considerations into a quantitative risk model, in which risk is framed as expected losses of residential housing units to wildfire.

2.1 Conceptual Linkages Between Growth, Fire, and Risk

On seasonal to interannual time scales, climate-fire relationships describe the response of existing ecosystems to climate variability that affects fuel availability and flammability, with the relative importance of each varying significantly with ecosystem characteristics (e.g., Girardin et al. 2009; Krawchuk and Moritz 2011; Littell et al. 2009; Westerling 2010; Westerling et al. 2003). Climatic effects that influence the availability of fine surface fuels (grasses, forbs) tend to dominate in dry, sparsely vegetated ecosystems, while effects on flammability tend to dominate in moister, more densely vegetated ecosystems, although there is often not a clear partition between the two effects (Krawchuk and Moritz 2011; Littell et al. 2009; Westerling 2010; Westerling et al. 2003). On decadal timescales, shifts in climate that affect the spatial ranges of vegetation assemblages, and/or their productivity, have the potential to qualitatively alter fire regime responses to shorter-term climate variability.

In this study, the statistical fire models used allow a focus on how fire in existing ecosystems may respond to climate change, while the ecosystems themselves and their fire-climate relationships are implicitly assumed to remain fixed (as in Westerling et al. 2011a). To the extent that projected changes in climate and the resulting disturbance regimes may lead to qualitative changes in ecosystem responses to climate variability, these models may exhibit potentially significant biases, particularly for the warmest, driest scenarios toward the end of the century.

As with climatic variables, vegetation, and their attendant fire patterns, the distribution of people over the landscape also changes with time, and impacts eventual expected losses due to fires (fire risk). In fact, all of these changes are potentially linked to each other, though some links are stronger than others. Furthermore, changes in one variable may increase risk through one link while decreasing it through another. As an example of this phenomenon, development in a given region decreases the vegetation footprint available for the ignition of wildfires, but human presence may more than compensate by an increase in human-caused ignitions. However, the increased presence of humans may sometimes decrease fire size in the region, through early identification of fires and increased suppression efforts.[2] In general, the statistical

[2] The relationships between human presence, ignitions, and fire size are quite complex. The fire history data used here indicate that most large fires in coastal southern California are ignited by human activities; whereas, lightning ignitions play a more important role in Northern California forests. The

relationship between population density and the human-related "risk of fire" is some form of inverted U (or even one having multiple maxima), being zero at zero human presence, and zero at some saturated density (at an appropriately defined spatial scale), where everything is urban and wildfires cannot exist (Guyette et al. 2002). However, the range of shapes possible in between these extremes in our study area is not known, and likely highly contingent on many other variables associated with the locality.

To capture this dynamic and others, our model of fire risk accounts for human impacts on wildfire probabilities, and also allows for human development to act in ways that mitigate their exposure to fire proportionally with the value at risk, where *exposure* describes the expected losses entailed by the occurrence of a fire event. These relationships are shown conceptually below (Figure 1). Global growth scenarios affect emissions that drive climate change. Local growth scenarios, which are not necessarily coupled to global growth patterns, generate spatially explicit population trajectories through time. As modeled by Westerling et al. (2011a), this population distribution, together with climate change, affects wildfire occurrence and burned area, both directly and through their joint impact on vegetation change.

However, understanding changes in wildfire risk in terms of the potential loss of homes requires additional information beyond fire probabilities and burned areas: It requires an estimate of how those spatially explicit fire patterns interact with spatially explicit changes in housing across the state. Large increases in fire occurrence where there are no homes do not increase risk of housing loss, while new growth in a fire-prone area may dramatically increase risk even under unchanging fire behavior. Therefore, the focus of the present paper is on transforming scenarios of spatially explicit population growth into estimates of value exposed to loss from wildfire, and then linking those exposed value estimates to fire probabilities to generate estimates of overall risk.

We next present the data available to us for this task. Our treatment of the data specific to estimating fire probabilities is highly condensed, because there are many data sources (these are summarized graphically in Figure 3, which follows the detailed model description), and their use in generating fire probabilities and burned area has been described elsewhere, such as in Westerling et al. (2011a).

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large populations in coastal southern California and other areas of the state adjacent or easily accessible to urban population centers may imply a saturation of potential ignition sources in many parts of the state in recent decades (see Guyette et al. 2002). At the same time, only large fires (>200 hectares, ha) are modeled here. The vast of majority of wildfires reported in the state are below that threshold and excluded from analysis, while the vast majority of burned area is accounted for by the largest fires. Climate exerts a strong influence on whether ignitions—human or natural—can spread into fires larger than 200 ha. Consequently, the number of large fires may not be as sensitive to variability in human ignitions as it is to other factors, including climate. More difficult issues for predicting burned area accurately are clustering in lightning ignitions in northern California, such as in 1987 and 2008, and high wind events that fatten the extreme tail of the fire size distribution but do not significantly affect the number of ignitions.

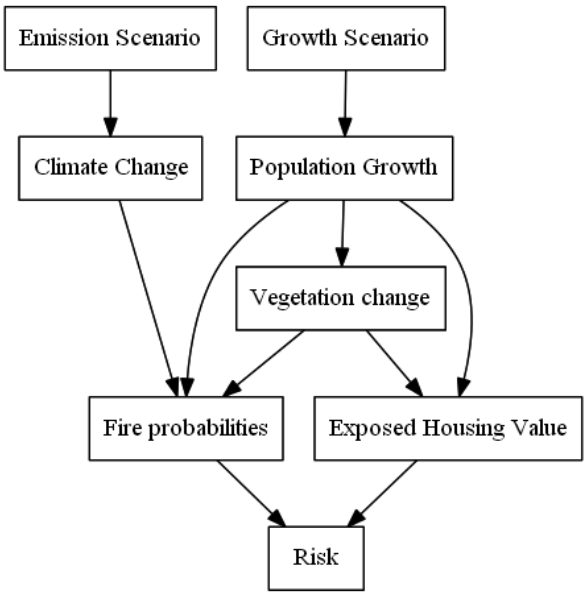

Figure 1: Conceptual Model of How Climate Change and Growth Affect Long-Term Fire Risk

2.2 Summary of Non-growth Scenario Data Used in the Fire Probability Model

2.2.1 Historical Climatic, Hydrologic, and Land Surface Characteristics Data

A common set of historical climate data, including gridded maximum and minimum temperature and precipitation and simulated hydrologic data, were assembled by the California Climate Change Center at the Scripps Institution of Oceanography for the 2006 California Scenarios project and the subsequent California Vulnerability and Adaptation project. Gridded daily climate data (temperature, precipitation) derived from historical (1950–1999) station observations were obtained online from Santa Clara University (see Maurer et al. 2002; Hamlet and Lettenmaier 2005; http://www.engr.scu.edu/~emaurer/data.shtml). Westerling et al. (2011a) then used these data with wind speed, topographic, and vegetation data to force the Variable Infiltration Capacity (VIC) macroscale hydrologic model at a daily time step in full energy mode with climatologic winds, producing hydroclimatic variables such as actual evapotranspiration, surface temperature, and snow water equivalent (Liang et al. 1994). The VIC model solves for water and energy balances given daily temperature, precipitation, and wind speed values as inputs. Westerling et al. (2011a) used the Penman-Monteith equation to estimate potential evapotranspiration (Penman 1948; Monteith 1965) and then calculated moisture deficit (potential minus actual evapotranspiration).

For the VIC inputs, Westerling et al. (2011a) used coarse vegetation categories based on the University of Maryland vegetation classification scheme with fractional vegetation adjustment (Hansen et al. 2000) and topographic data on a 1/8-degree grid obtained from the North

American Land Data Assimilation System (LDAS, see Mitchell et al. 2004; accessed online at http://ldas.gsfc.nasa.gov/). The LDAS topographic layers are derived from the GTOPO30 Global 30 Arc Second (~1kilometer [km]) Elevation Data Set (Mitchell et al. 2004; Gesch and Larson 1996; Verdin and Greenlee 1996). The LDAS data also provided inputs for the (Westerling et al. 2011a) fire models used in this study, including gridded aspect and vegetation fractions. Wind speed data for 1950–1999 were accessed online from the National Centers for Environmental Prediction (NCEP) Reanalysis project (http://www.esrl.noaa.gov/psd/data/reanalysis/) and used to calculate a monthly wind speed climatology interpolated to the LDAS grid for use in the VIC hydrologic simulations. Relative humidity and shortwave radiation values used in VIC were derived from the MT-CLIM algorithm, version 4.2, using temperature and precipitation as inputs (see Kimball et al. 1997; Thornton and Running 1999; Pierce and Westerling in review).

2.2.2 Projected Climate and Hydrologic Data

Cayan et al. (2009) obtained and downscaled twelve future climate scenarios for the California Vulnerability and Adaptation project, and used temperature and precipitation from these scenarios to force VIC hydrologic simulations, as described for the historical data above. A subset of six of those future climate scenarios are used here, derived from three global climate models (GCMs) (National Center for Atmospheric Research [NCAR] PCM 1, Centre National de Recherches Météorologiques [CNRM] CM 3.0, and Geophysical Fluid Dynamics Laboratory [GFDL] CM 2.1) from the Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment (AR4), forced with medium-high and low emissions pathways (the Special Report on Emissions Scenarios SRES A2 and SRES B1scenarios). These scenarios were downscaled by Cayan et al. (2009) using the bias-corrected constructed analogues method (Maurer et al. 2010.)

While the PCM 1 model from NCAR is an older-generation model that is not as up to date as the others, it was included because it is an outlier among the IPCC models, with lower climate sensitivity and smaller temperature increases over California than most other models. The CNRM and GFDL model sensitivities span the middle of the range of temperature projections available for California, but not the warmest scenarios that have been projected for the region. The NCAR model used here tends to have insignificant changes in precipitation over California by end of century, while the GFDL and CNRM models tend to project decreased precipitation (Cayan et al. 2009). Even where precipitation does not change significantly, increased temperatures can lead to drier fuels through increased evaporation and transpiration. Thus the scenarios used here span the lower to intermediate range projections for warmer, mostly drier conditions over California.

2.2.3 Fire History Data

While fire ignitions may be plentiful, most wildfires are too small to be consequential. Typically, a small fraction of all fires generates the vast majority of the total area burned, suppression costs, and damages (e.g., Strauss et al. 1989; Johnson 1992; Strategic Issues Panel on Fire Suppression Costs 2004) . Documentary records of larger fires also tend to be more comprehensive and higher quality, probably because of their greater economic and ecological consequences, and focusing on the small subset of large fires results in data that are more

tractable to quality assurance efforts (Westerling et al. 2006). Therefore, we restrict our analysis to fires exceeding 200 hectares (ha) in size.[3]

Westerling et al. (2011a) used fire history (1980–1999) data to estimate the fire models employed here and described in Section 3.2. Their data are an extension and update of the data sets used in Westerling et al. (2006), with the data methodology described in the online supplementary materials to Westerling et al. (2006). The portion of their fire history used here incorporates documentary records from the California Department of Forestry and Fire Protection (CalFire), county fire departments under contract with CalFire, U.S. Department of Interior agencies (Bureau of Land Management, Bureau of Indian Affairs, National Park Service), and the U.S. Department of Agriculture (Forest Service) to produce a comprehensive record of large fires covering most of the state and federal protection responsibility areas in California.[4] These are for wildfires that were classified as "action" or "suppression" fires, as opposed to prescribed or natural fires used to meet vegetation management goals. These data were aggregated by month on a 1/8-degree latitude and longitude grid, producing numbers of large fires and total area burned in those fires by the month and grid cell in which the fires were reported to have ignited. The fire probabilities simulated here reflect associations with historical climate and land surface characteristics detected in these historical fire data for California.

2.3 Spatially Explicit Population Growth Scenarios

We use two sources of spatially explicit housing scenarios as inputs to several variables in our model, and increase the richness of our explorations by considering variations derived from each source. In both cases, the primary data source provides fine-resolution raster data, where each raster cell holds an expected housing density and an expected population per housing unit. We then use these data sources as inputs into the following:

- Population for the fire probability model
- Vegetation fractions used in both the fire probability model and the exposure model
- Initial vulnerable values in the exposure model

Appendices A.1 and A.2 describe our algorithmic transformations of the data to extract the above model inputs from the raw scenario data. Here we simply describe the data sources as they relate to our scenario modeling.

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[3] The arbitrary 200 ha threshold was selected for historical reasons: The Canadian Large Fire History uses a 200 ha threshold (Stocks et al. 2002), so a consistent threshold was used to facilitate creation of a western North American fire history. This threshold allows the creation of a comprehensive data set that captures most of the burned area in the region, and meets statistical requirements for selecting a threshold value for estimating generalized Pareto distributions (Holmes et al. 2008).

[4] Local responsibility areas (LRAs) were excluded. LRAs are mostly urban and agricultural areas that account for most of the population of the state, but very few of its large wildfires.

2.3.1 Integrated Climate and Land Use Scenarios

The Integrated Climate and Land Use Scenarios (ICLUS) were developed to create thematically consistent land-use scenarios at high resolution across the United States (U.S. EPA 2008). They link country-level population growth assumptions with the Spatially Explicit Regional Growth Model (SERGoM) developed by Theobald (2005) to generate housing density projections at the 100 meter (m) level through the end of the twenty-first century. The ICLUS scenarios used for this study provide three different growth trajectories, originally intended to correspond with the SRES scenarios: A2 referred to a higher growth scenario relative to a base case (with a higher population growth and higher population per housing unit), and B1 referred to a lower growth population scenario. Because there need not be a strict correlation between the growth path of California and the global population storyline driving global climate, we vary these scenarios independently, and henceforth refer to ICLUS B1, base-case, and A2 scenarios as "low" "mid" and "high" to avoid confusion with the climate-specific scenarios, which we still refer to by their SRES labels of B1 and A2.

These projections were provided on a 100 m raster (where each cell is a "tract" as described in Section 3.1, and in contrast with the much larger 1/8 degree "grid cell"). Because of the sensitivity of our model to the density of tracts, and in turn the sensitivity of the density to the scale at which density is defined,[5] we also aggregate the ICLUS data to higher levels—to cells with 200 m, 400 m, and 800 m sides—and perform our loss calculations for each case.

2.3.2 UPlan Growth Scenarios for California

The UPlan scenarios were developed specifically for California by Thorne et al. (2012) and offer a set of projections for how new growth is distributed spatially throughout California in the year 2050, with the same amount of population growth in each scenario. They have numerous strengths relative to ICLUS, but also possess some key drawbacks specific to modeling fire risk. Like ICLUS, they offer three growth scenarios,[6] though unlike ICLUS they are not explicitly or conceptually tied to the SRES scenarios. One scenario is a business-as-usual case ("bau"), another refers to smart growth ("smart"), and another is premised on reducing development in areas assigned moderate or higher fire hazard severity ratings by CalFire ("fire"). It should be noted, however, that the fire hazard severity ratings are rather distinct from the risk measures generated here in that they account for fuel characteristics directly and are generally provided at a far finer spatial scale. Different hazard zones vary down to a minimum of 20 acres in size for urban areas and 200 acres for wildland areas. By contrast, one grid cell in our model is on

[5] As an example to illustrate the importance of spatial scale, consider an urban threshold of 10 households per hectare, and a 200 m × 200 m cell, which is subdivided into four 100 m × 100 m cells. If three of the 100 m-scale cells contain nine households and one cell contains 17, one arrives at very different outcomes dependent on the spatial scale: Using the 100 m spatial scale, three cells would be vulnerable and one would be considered urban; whereas, at the 200 m scale the average density would be 11, and therefore all 4 hectares would be considered urban.

[6] The study used scenarios and related spatial data made available in mid-2011. Additional scenarios have since been developed, as described in Thorne et al. (2012).

the order of 30,000 acres. These discrepancies may contribute to some of the non-intuitive results that are seen when comparing UPlan scenarios later on.

The UPlan data has a finer spatial resolution (50 m) compared to ICLUS, but the drawback of a coarser-density resolution, allowing new growth to occur in only a small number of discrete density classes (such as one housing unit per acre, five housing units per acre, and so on). Unlike the version of ICLUS we rely on, UPlan also has the advantage of explicitly projecting the future footprint of commercial and industrial growth and also allotting all new growth based on attractors that include actual county zoning plans. Unfortunately, while UPlan may better represent the processes of future growth, the drawback is that it does not rely on any explicit representation of the base year housing distribution, beyond assuming an urban mask in which new growth does not occur. This creates challenges when attempting to make valid risk estimates relative to a base year, which is addressed in Section 3.7.

Section 3: Formalizing and Implementing the Residential Wildfire Risk Model

This section establishes an expected loss framework of wildfire risk that ties together fire probabilities and expected losses contingent on fire events. We first briefly describe the statistical model used to arrive at spatially explicit fire probabilities. We then focus in great detail on how the study addressed the challenges of modeling expected losses when the joint spatial distribution of housing development and vegetation landscape cannot be predicted with any meaningful certainty at the fine spatial scales of our growth data.. We then discuss and illuminate the many cross-linkages between climate, growth, fire, and exposure to wildfire risk, and exactly how our model links many data sources and intermediate data products to produce our ultimate risk estimates. Lastly, discusses how we created the computational experimental design that specified our many thousands of scenarios.

3.1 A Nested Model of Residential Wildfire Risk

We focus first on the overall model of expected losses due to wildfire within a grid cell R, which is composed of tracts of equal area that together partition R.[7] In this modeling effort, the region R is a 1/8 degree grid cell mentioned above, and each tract is a raster cell as provided by either ICLUS or UPlan scenarios. Each region R is therefore approximately a rectangle with sides of 10–14 kilometers, and each tract is a square with sides between 50 and 400 meters (depending on the data source and parameter settings). Each tract τ_i ($i \in 1..N_\tau$) contains some value V_i, where *value* may be defined as monetary value, or, with increasing coarseness, the number of housing units or structures. Our analysis assumes that value is described by number of housing units, since that is how our growth scenario data was provided. To avoid spurious reliance on the very fine-grained detail provided by the growth scenarios, the study does not assume exact knowledge of the spatial distribution of housing units within the each cell, but instead uses that detailed information to create frequency distributions of tract values for each grid cell.

Following prior work (Westerling et al. 2011a and 2011b; Preisler et al. 2011; Westerling and Bryant 2008; and Preisler and Westerling 2007), we model a grid cell R as having a time-varying probability $P(F)$ of large fire occurrence, assumed to be a function $f_P(POP, VEG, C)$ of the population within the region (POP), fraction of the region that is vegetated (VEG), and other variables C, such as hydroclimate and diverse land surface characteristics. (Each of these sets of variables includes time-varying elements, but for notational simplicity we do not include time subscripts.) Any specific fire is associated with a perimeter that encompasses some subset of the tracts within R. And while the spatially explicit distribution of fire events is difficult to estimate, each tract can be considered to have some baseline probability of being encompassed by fire,

[7] The equal area assumption is not necessary to implement our approach, but essentially holds true for our raster-based growth scenario data and simplifies presentation and implementation of the method.

conditional on a fire event within the region.[8] We denote this $P(\tau_i \in \tau_F|F)$, where τ_F denotes the set of tracts encompassed by a fire. Then, by breaking out conditional probabilities, we can express the total expected loss within R as:

$$E(LOSS) = f_P(POP, VEG, C) \times \sum_{i=1}^{N_\tau} [P(\tau_i \in \tau_F|F) \times (L(V_i)|\tau_i \in \tau_F)] \quad (1)$$

This says that the expected loss in *R* is the probability of a fire within *R* multiplied by the sum of expected losses in each tract, given that there is a fire in *R*. The expected loss in each tract is similarly decomposed into the probability of that tract falling within a fire perimeter and the expected loss $L(V_i)$ contingent on a tract falling within a fire perimeter. We refer to this approach as *nested* because it identifies expected losses within each region by considering expected losses within each tract, contingent on a fire event. While "grid cell level conditional expected losses" would perhaps be the most accurate term to describe this latter concept, we refer to the right half of Equation 1 as "exposure" or "exposed value." It is slightly at odds with some other definitions of exposure, but consistent with the idea that exposed value is what will be lost in the event of the main hazard (wildfire in the region) coming to pass.

While theoretically consistent, we do not necessarily have historical or modeled data to support the identification of every element of the above equation. The next section discusses each component of the above equation and the strategies used to estimate changes in risk while accounting for the uncertainty and data limitations.

3.2 Fire Probability Model

This study used Westerling et al.'s (2011a) logistic regression models and data (summarized in Sections 2.2.1–2.2.3) to estimate monthly probabilities of fires in state and federal protection responsibility areas in California that exceed 200 ha and 8500 ha occurring in a region *R*. These probabilities are described as functions of climate, simulated hydrology, land surface characteristics, population, and growth footprint; and *R* is a cell on a 1/8 degree latitude/longitude grid (see also Preisler et al. 2004). Area burned in these fires is estimated using generalized Pareto distributions (GPDs) fit to fires between 200 ha to 8500 ha and to fires > 8500 ha, assuming that the fire size distributions are stationary over time and space. Monthly estimates produced are then averaged over time periods 1961–1990, 2035–2064, and 2070–2099 to produce expected annual fires and expected annual areas burned for each region within those periods.

[8] While somewhat cumbersome, we generally use the terminology of a tract "falling within a fire perimeter" rather than the far shorter "burning." This is in recognition of the fact that modern fire protection approaches mean that sometimes housing structures may be encompassed within a fire perimeter but not actually burn, due to the successful creation of defensible space and appropriate construction techniques, among other factors. Our terminology is therefore a conceptual distinction and also one that is formally represented in our model.

Formally, the probability of a fire greater than 200 ha occurring in region *R* for a given month, denoted *P(F)*, is estimated using a logistic regression model of the form:

$$\begin{aligned} Logit(P(F)) &= log(\,P\,/\,(1-P)\,) \\ &= \beta \times [1 + D30 + D01 + D02 + PCP + \\ &\quad G(D30, AET30) \times (\,1 + TMP + CD0) + \\ &\quad G(TMP) + G(RH) + G(POP) \times (\,1 + D30\,) + G(VEG) + FRA\,] \end{aligned} \quad (2)$$

where:

β is a vector of parameters estimated from the data,

G(•) are matrices describing semi-parametric smooth transformations of the data as described in Preisler and Westerling (2007),

G(D30,AET30) is a thin-plate spine that estimates a spatial surface as a function of 30-year average cumulative Oct.–Sep. moisture deficit (*D30*) and actual evapotranspiration (*AET30*) (Preisler and Westerling 2007; Preisler et al. 2011; we relied on modules for fitting thin-plate splines within R provided by the Geophysical Statistical Project (http://www.cgd.ucar.edu/stats/Software/Fields) that serves as a proxy for coarse vegetation characteristics (Westerling et al. 2011a online supplement),

D01 and *D02* are the 1- and 2-year leading cumulative Oct.–Sep. moisture deficit,

CD0 is the cumulative Oct.–current month moisture deficit,

PCP is the 2-month cumulative precipitation through the current month,

G(TMP) is the second-order polynomial transformation of monthly average surface air temperature,

G(RH) is the second-order polynomial transformation of *RH = log((x+.002)/(1-x+.002))*, where *x* is monthly average relative humidity,

G(VEG) is a degree 3 basis spline transformation of ***VEG*** *= log((x+.002)/(1-x+.002))*, where *x* is the vegetation fraction,

G(POP) is the second-order polynomial transformation of total population,

and *FRA* is *log((x+.002)/(1-x+.002))* where *x* is federal protection responsibility area as a fraction of total area,

The expected area burned, given that a fire greater than 200 ha occurs, is:

*E(A(F)) = E(A(F) | A(F) <8500)) + P(F|A(F)>8500) * E(A(F) | A(F) >8500))*

where *E(A(F) | A(F) <8500))* is the expected area burned by fires in the range of 200 to 8,500 ha, conditional on a fire greater than 200 ha occurring in the grid cell. This area is estimated from a truncated GPD fit to historical fires observed in California. Similarly,

E(A(F) | A(F) >8500)) is the expected area burned given that at least 8500 ha burned, and *P(F|A(F)>8500)* is derived from the logistic regression:

Logit(P(F)|A(F)>8500)) = β × [1 + RH + Aspect + USFS]

where *Aspect* is the north/south component of aspect computed as cos(π/2+aspect*π/180)

and *USFS* is *log((x+.002)/(1-x+.002))* where *x* is U.S. Forest Service protection responsibility area as a fraction of total area.

Because the GPD models are assumed to be stationary, *E(A(F)| A(F)<8500))* and *E(A(F) |A(F)>8500))* are constants. Climate affects expected area burned through its effects on *P(F)* and *P(F|A(F)>8500)*, which then determine area burned linearly. Similarly, changes in population affect estimates of *P(F)* directly, as well as indirectly through the effects of population growth and its spatial footprint on the vegetation fraction, *VEG* (see Appendix A.2).

As described in Westerling et al. (2011a), future fire probabilities are produced by feeding to the statistical models described above the temperature and precipitation values from downscaled GCM outputs, as well as variables derived from VIC hydrologic simulations forced by downscaled GCM outputs. The methodology used here projects fire-vegetation-climate interactions of present day ecosystems as they are currently managed onto simulated future climates.

3.3 Conditional Probability of Tract Falling Within a Fire Perimeter

Issues of scale and data availability present a significant challenge when it comes to estimating the probability of a given tract being encompassed by fire (the $P(\tau_i \in \tau_F|F)$ of Equation 1). In reality, this probability is influenced by many factors, such as the location of the tract with respect to vegetation in the region, the location of the tract with respect to boundaries that fire cannot cross, and also induced protective efforts due to value within the tract. While such factors can be somewhat precisely identified or estimated for near-term risk assessments, we cannot possibly know these relationships for multitudes of tracts decades into the future; therefore, we attempt to bound the impact of such uncertainty.

The basic strategy is to decompose the probability of a given tract falling within a fire perimeter into three components that we can better estimate, confidently bound, or identify as irrelevant. These are:

- $P_0(\tau_i \in \tau_F|\tau_i \in \tau_{VEG})$, the baseline probability a generic vegetated tract will fall within a wildfire perimeter under the assumption that there is nothing of high value to induce greater protection of that tract,
- $s(V_i)$, a scaling adjustment to the above probability, to account for value-induced protective efforts that reduce the probability that a given tract will burn, and
- $P(\tau_i \in \tau_{VEG})$, the probability that a given tract (with associated value V_i) is vegetated and therefore has a nonzero probability of being encompassed by a wildfire.

Note that we have dropped the conditionality on F for convenience, as all equations for the remainder of this section assume a fire event.

Using the above expressions, the probability of a tract burning can be decomposed as follows:

$$P(\tau_i \in \tau_F) = P_0(\tau_i \in \tau_F|\tau_i \in \tau_{VEG}) \times s(V_i) \times P(\tau_i \in \tau_{VEG}) \quad (3)$$

Note also that the above equation makes the assumption that non-vegetated tracts are not at risk for loss due to wildfire, i.e., $P_0(\tau_i \in \tau_F | \tau_i \notin \tau_{VEG}) = 0$. In reality, homes near the boundary of vegetated areas may be at risk due to firebrands, house-to-house spread, and ignition from direct heat (Cohen 2008). With access to highly reliable fine-scale predictions for both housing development and vegetation patterns, one could utilize such data to include structures lying within some distance of urban/vegetation boundaries as vulnerable. We unfortunately cannot rely on such data due to the long-term nature of our scenario investigation. Instead, we consider multiple definitions for defining vegetated and urban areas that attempt to bound the value in tracts truly at risk. These are discussed next.

3.3.1 Baseline Probability of Vegetated Area Burning

We assume that, prior to adjusting for the existence of valuable structures on a tract, there is a common baseline probability that a given vegetated tract will fall within a wildfire perimeter during a large fire event: $P_0(\tau_i \in \tau_F | \tau_i \in \tau_{VEG})$. That is, given a fire that starts in a hypothetical region covered with some vegetated tracts and some non-vegetated tracts, *all of which have no housing value*, what is the probability that any given vegetated tract will fall within the fire perimeter? Rather than attempt to estimate this probability, we make the assumption that it stays constant across time and scenarios, and that it therefore becomes irrelevant when considering relative risk across time periods and scenarios. This is one of two elements of our model that we do not explicitly bound or estimate, as it is both challenging to do, and also unnecessary in order to arrive at relative risk estimates.

However, we emphasize that this assumption is not as strong as it may appear. First, it only applies to the baseline probability assuming all else is equal, and is adjusted later based on exposure at the tract level (discussed in Section 3.3.2)—thus it is not the case that we assume all tracts have equal likelihood of falling within a fire perimeter.[9] Second, expected housing losses are driven by the structures in the tract, rather than simply by the number of tracts burned (though area burned is more strongly associated with other impacts of interest, and is given more focus in Westerling et al. 2011a). The variations in our scenarios for mapping exposed structures (in Section 3.3.3) should far outweigh any error or bias introduced by assuming constant baseline probabilities.

We did investigate a possible avenue for relaxing the assumption that $P_0(\tau_i \in F | \tau_i \in \tau_{VEG})$ stays constant over time and scenarios, which is to assume as a limiting case that the probability of a vegetated tract burning in a fire event is directly proportional to the expected size of a fire relative to the vegetated area. Mathematically, this would assume that:

$$P_0(\tau_i \in \tau_F | \tau_i \in \tau_{VEG}) = \min\left(\frac{E(A(F))}{A(\tau_{VEG})}, 1\right), \quad (4)$$

[9] Formally, this assumption may be considered equivalent to the assumption of a uniform prior distribution in the Bayesian sense.

where $A(.)$denotes area of the fire or vegetated area. While perhaps valid for small perturbations around large vegetated areas, this method drastically exaggerates the impact of reducing vegetated area in future periods, and does so in a way that is discordant with the theory behind how the fire probability model is estimated.

3.3.2 Value-Based Probability Scaling

We assume that, all else equal, the more housing units there are within a tract of given area, the less likely it is to succumb to wildfire. This is partly due to the physical characteristics of fire spread, but also due to the induced protection: Firefighters and managers of wildfire risk may be more likely to direct effort to protecting clusters of many homes; whereas, fewer resources may be directed to protecting a lone, difficult-to-access cabin amid many acres of trees. In the limit, large, densely developed areas of land are physically incapable of supporting wildfires and are deemed urban. Together, these dynamics suggest that, at some sufficient level of statistical averaging, the probability that a tract falls within a fire perimeter ($P(\tau_i \in \tau_F)$) should be reasonably modeled as decreasing monotonically as V_i increases, until the tract reaches some threshold density value (which we label the wildland-urban interface [WUI]/urban threshold), beyond which it is equal to zero. We also treat the WUI/urban threshold as the threshold beyond which a tract cannot be considered vegetated.[10] (Vegetation allocation is discussed in Section 3.6).

To capture the dynamics described above, we further adjust the probability of a tract being within a fire perimeter by a scaling function $s(V_i, D, k, \alpha)$, where *D, k,* and α are parameters. (We sometimes omit the parameters for convenient when referencing $s(V_i)$). Here D is the WUI/urban density threshold introduced above, α is the area or resolution over which value is considered when evaluating density, and k is a dimensionless shape parameter that controls the concavity of the function as V_i/α varies between 0 and D. While many functions could potentially capture the qualitative relationship, we use the following scaling function for s:

$$s(V_i, D, k, \alpha) = \begin{cases} \left[1 - \left(\frac{V_i}{\alpha} \Big/ D\right)^k\right]^{\frac{1}{k}} & \text{if } \frac{V_i}{\alpha} < D \\ 0 & \text{otherwise} \end{cases} \quad (5)$$

[10] We recognize that these two concepts are not necessarily captured by the same exact density, and we also recognize that the assumption that a density alone can be used to define a threshold between urban WUI does not account for different WUI classifications such as intermix and interface. However, we believe that by exploring significant variation in both the density threshold *and the spatial scale at which density is evaluated*, we capture the range of impacts that a more detailed (and infeasible) treatment of the WUI might yield.

High values of k lead to overall greater exposure (as we define it), in that a rise in value within a tract does not significantly reduce the likelihood of that tract burning until that value nears the WUI/urban threshold, while low values of k (below one) imply that even a little value within the tract induces significant protection efforts.[11]

Figure 2 illustrates some possible shapes captured in this framework. The location where the curves meet the X-axis is determined by D (with two different thresholds shown at the two vertical red lines), while their curvature is determined by k. Curves 1 (D = 147 households per square kilometer [HH/km^2], k =.333) and 2 (D = 147 HH/km^2, k=3) represent cases in which only relatively low-density tracts are considered vulnerable to wildfire, and 3 (D = 1000 HH/km^2, k = 1) and 4 (D = 1000 HH/km^2, k=3) correspond to an assumption that tracts remain vulnerable up to a higher density (the densities shown are the values applied to the ICLUS data set). All else equal, an assumption that Curve 1 best described how probability of tracts burning is reduced as density increases would lead to the lowest expected losses, while Curve 4 would lead to the highest expected losses, since it considers a wider range of densities as vulnerable to wildfire, and value within the vulnerable range is not appreciably scaled down until very close to the high-density threshold.

If we let $s(V_i, D, k, \alpha)$ range from zero to unity, then it can only decrease the likelihood of tracts burning. However, we do not have sufficient empirical knowledge to say whether a value-induced reduction in probability on a given tract lowers the probability of only that tract falling within the fire perimeter, or whether it lowers it in part by increasing the probability that other tracts will succumb to wildfire instead. One might imagine that in circumstances where fire-fighting resources are constrained, protecting certain tracts may leave other low-value tracts more vulnerable than they were otherwise, and so the total number of tracts encompassed by fire does not diminish significantly. Therefore we explore both possibilities by considering the full reduction case in which the output of $s(V_i, D, k, \alpha)$ ranges between zero and unity, but we also consider a case in which the total probability of tracts burning is fully conserved within the region R. In this case $s(V_i, D, k, \alpha)$ is used to identify initial weights on probabilities within [0,1], which are then normalized to sum to the total number of vegetated tracts. Specifically, under the assumption of normalization, we scale by $\hat{s}$ instead of s, as follows:

$$\hat{s}(V_i, D, k, \alpha) = \frac{N_{VEG} s(V_i, D, k, \alpha)}{\sum_{i \in \tau_{VEG}} s(V_i, D, k, \alpha)} \quad (6)$$

[11] For reasons of numerical convenience related to ensuring consistency between urban, vegetated, and vulnerable tracts, we consider scaling values for $V_i/\alpha \leq D$ to be bounded from below at a small positive value (10^{-6}), while values strictly above the threshold receive a scaling value of zero.

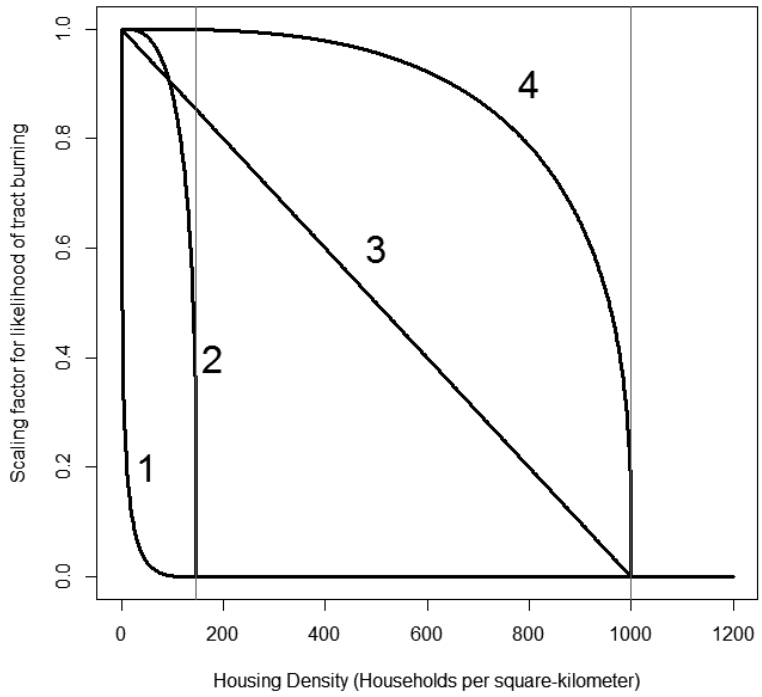


Figure 2: Different plausible relationships for how tract density influences the likelihood of a tract falling within a fire perimeter, as captured by the scaling function *s(V, D, k, α)*. The x-intercept is defined by *D* (located at the two vertical red lines in this plot), while curvature is described by the shape parameter *k*.

Later, when discussing the set of model runs we perform, we refer to whether or not we are assuming "protection normalization," which refers to whether we are using s or $\hat{s}$. When protection normalization is not assumed, the probability of a tract burning always goes down with increasing tract density, though the overall expected loss within the region may or may not go down depending on the value of the concavity parameter k. When protection normalization is assumed, the probability of any given tract burning will go up if other tracts in the region gain housing units.

While each aspect of the scaling function (D, k, α, and whether to normalize) represents an uncertainty, changes in these parameters may be thought of as manifestations of fire management policies. For example, currently there exists some (possibly regionally distinct) best values for each parameter. Whatever those may be, lowering the WUI/urban threshold D or decreasing expected losses within the vulnerable density range by decreasing the concavity parameter k would correspond to increased fire exclusion in areas below the current density. Such an exclusion might be achieved by suppression resources or vegetaton management or fire

prevention activities. If it is the case that fire policy today is better described by the protection normalization feature, moving the the strict-reduction case could (perhaps) be achieved by increased fire suppression resources, since protection normalization is based on the assumption that those resources are simultaneously effective and constrained. However, as we will emphasize later, the discussion in this subsection is about likelihood of tracts falling in a fire perimeter, and not the losses that occur when a tract does fall within a perimeter—an equally important factor.

When performing our set of model runs, we run all our ICLUS cases using a low value of *D* (147 HH/km^2) and a high value of *D* (1000 HH/km^2) in an attempt to bound the possible range of this variable. For ICLUS, these bounds derive from the the bounds of the "suburban" density range used in ICLUS: Higher than 1000 HH/km^2 is deemed "urban," while lower than 147 HH/km^2 is deemed "exurban." The lower threshold that we use UPlan for falls halfway between the R1 and R5 residential classes in UPlan (one and five housing units per acre, respectively), and is therefore equivalent to 741 in HH/km^2 and second is 10 percent above R5 (equivalent to 1359 HH/km^2). We consider this upper threshold to be somewhat unrealistically high (approximately 35 percent above our ICLUS high threshold), but chose it based on a desire to encompass most plausible outcomes, which would not be accomplished using the ICLUS thresholds due to the interaction of two particular features of the UPlan data: One is its coarsely spaced discrete density classes, and the other is that UPlan results show approximately 90 percent of new growth in all scenarios occurs at or above R5. Using all thresholds below R5 (which we explored) would convey artificially low sensitivity, while using thresholds above R5 will overestimate it somewhat, and since our emphasis is more on bounding, we chose to use the higher threshold. It is also worth noting that higher thresholds may be more appropriate when using smaller tracts. If density is evaluated at, say, the individual plot level, a single house may have extremely high density, but if amid other densely spaced houses, would certainly remain susceptible to being encompassed by wildfire.

3.3.3 Scenarios to Vary Exposure Within Grid Cells

Here we are interested in identifying $P(\tau_i \in \tau_{VEG})$, the probability that a given tract (and its associated housing) lies within a vegetated area. While $P_0(\tau_i \in \tau_F | \tau_i \in \tau_{VEG})$ and $s(V_i)$ describe probabilities contingent on how value (number of housing units) is distributed within a vegetated area, this element focuses on the distribution of tracts among vegetated areas. For our long-term scenarios, we know only the distribution of tract values within the region, *R*, along with the fractions taken up by various land uses. Therefore, to bound the changes in exposure, we would like to consider different scenarios for how housing values in the vulnerable density range are distributed over the vegetated area. This essentially involves specifying the joint distribution of V_i and vegetation status within the grid cell. In some sense, this may be considered equivalent to mapping the wildland-urban interface, though at an abstract level, since we do not consider actual geographic relationships within the grid cell. This is a simplification of the multifaced wildland-urban interface concept, which describes in general how development at the urban fringe transitions to wildlands, including the spatial relationships between vegetation and housing (Radeloff et al. 2005).

For near-term fire-planning efforts in small areas, this is actually a distribution that can be estimated by linking land cover data with geographic information on the location of housing structures. For our long-term scenario-based work, we do not attempt to actually estimate this relationship, but instead bound it by considering different cases for the prevalence of vulnerable tracts within the vegetated area of the region.

As discussed in Section 3.3, we assume that only vegetated tracts can support wildfires. Housing in the middle of an urban area or desert or amid cropland are not threatened by large wildfires of the sort modeled here. Vegetated tracts may still have housing structures on them, but not above a the WUI/urban density threshold *D*, otherwise the tract would be considered urban rather than vegetated. Therefore, we refer to tracts in this density range as "potentially exposed." Potentially exposed tracts are deemed actually exposed (i.e., at risk for loss due to wildfire) if they are on vegetated land, while those located on bare land are excluded, as are tracts with densities above the WUI/urban density threshold .

In this modeling effort, we have a set of tract values V_i within each region, and we know the total number of vegetated tracts (N_{VEG}) within each region, in additional to total number of urban, nonvegetated, and water tracts. However, we do not know how the tract values map to vegetation status of each tract, which will significantly affect the expected value lost in a fire event. Therefore, to explore the range of possible expected losses that could arise depending on how value is distributed across vegetated and non-vegetated tracts, we consider three limiting distributions for the relationship between tract values and vegetated areas, which we frame in terms of the exposed value contained in the WUI. (Technically, these schemes allocate growth in all vegetated areas, but most exposed value lies within the WUI, so we use WUI as a shorthand and a conceptual focus when describing our exposure scenarios.)

- **High-exposure WUI.** Of potentially exposed tracts (i.e., those that are not so dense as to be considered urban), we assign those with the highest probability-adjusted values (that is, the highest values of $s(V_i) \times L(V_i)$ to the vegetated area). If there are more potentially exposed tracts than vegetated tracts, the first N_{VEG} highest value tracts among all potentially exposed tracts are assigned to the vegetated area, with the remainder assigned to bare or agricultural land and considered not at risk to wildfire loss. If there are fewer potentially exposed tracts than vegetated tracts, all potentially exposed tracts are assumed vulnerable. If we let τ_H be the set of the first N_{VEG} tracts with the highest probability-adjusted loss potential (i.e., $s(V_i) \times L(V_i)$, then in this scenario we can formally express our probability rules as follows:

$$P(\tau_i \in \tau_{VEG}) = \begin{cases} 1 & \text{if } \tau_{\text{i}} \in \tau_H \\ 0 & \text{otherwise} \end{cases} \quad (7)$$

- **Low-exposure WUI.** This is simply the reverse of the above: Of potentially exposed tracts, we assign the those with the highest probability-adjusted loss values to bare areas first. If there are sufficient bare tracts in a region to hold all potentially exposed tracts, then there is no risk of housing loss in this scenario and in that region *R*; otherwise the

vegetated region is assigned the lower-valued tracts. If we let τ_L be the set of the first N_{VEG} tracts with the lowest probability-adjusted loss potential, then in this scenario we can formally express our probability rules as follows:

$$P(\tau_i \in \tau_{VEG}) = \begin{cases} 1 & \text{if } (\tau_i \in \tau_L) \\ 0 & \text{otherwise} \end{cases} \quad (8)$$

- **Neutral WUI.** In this case, we consider the chance of a tract falling within the vegetated area of R to be independent of the value in the tract. Specifically, it is "neutral" in the sense that there is no bias for development in or outside vegetated areas, but instead we assume that the likelihood of being within a vegetated area is simply equal to the fraction of open land taken up by vegetated area: N_{VEG}/N_{OPEN}, where N_{OPEN} is the number of non-urban and non-water areas. Therefore, every potentially exposed tract is considered vulnerable with a fractional expectation, rather than some tracts being completely safe and some being completely vulnerable. Formally:

$$\mathrm{P}(\tau_i \in \tau_{VEG}) = \begin{cases} \frac{N_{VEG}}{N_{OPEN}} & \text{if } V_i/\alpha < D \\ 0 & \text{otherwise} \end{cases} \quad (9)$$

The first two schemes respectively maximize and minimize the value that will be lost in the event of a fire within the WUI, by adjusting what tract values are assumed to lie within vegetated areas. The third, neutral, scheme provides a middle case that assumes each tract and its value V_i has an equal chance of being within a vegetated area, and therefore an equal chance of being encompassed by a wildfire perimeter. Our model runs include each of these three WUI-exposure cases for every other parameter combination considered.

3.4 Loss Conditional on Tract in Fire Perimeter

The expected damages contingent on a tract falling within a fire perimeter are a function of the value on that land, decreased by some scalar that captures protection efforts at the micro-level: Factors such as defensible space, construction material, ratio of land value to improved value, and others—it is not necessarily the case that a structure falling within the perimeter of a large fire is destroyed. In our present model considering long-term scenarios, this scalar is assumed to be some constant parameter so that $L(V_i) := \lambda V_i$. In principle λ could be tract-specific and time-specific, but for this analysis we assume it is constant statewide, in which case it falls out in our relative risk calculations (described later). As noted earlier, for value units V we use number of housing units, though a more sophisticated future analysis may attempt predicting monetary housing values based on projections from the present day combined with regional characteristics. However, at present such detail is unlikely to contribute much useful information for a scenario exercise with the timescale we are considering. Additionally, λ does not act in some complicated fashion and instead merely scales expected losses directly, so the value gained by incorporating variations in λ into our scenarios is minimal.

3.5 Calculation of Aggregate Relative Risk

The output of our model lies at the end of a cascading chain of uncertainty, and we do not consider our results to be predictions, but rather view this work as exploring the implications of different plausible assumptions about how long-term fire risk is best described. However, we can still take steps to reduce error and increase the validity of our findings by careful consideration of our output measures. In particular, to the extent that our individual model results can be considered a statistical product, we can reduce variance of our results by considering aggregate relative risk at larger spatial scales, rather than placing great stock in the absolute outcomes within individual grid cells. Aggregating to larger geographic areas (specifically, the whole state) helps reduce the effects of variance among individual grid cells, because the impact of random error will be reduced relative to our outcomes of interest. To the extent that any systematic bias in our model scales with the magnitude of impacts, the ratio of future losses to present losses evaluated under common assumptions will be a more reliable outcome measure. Most of our results are therefore presented as aggregate statewide relative risk, using common assumptions except where explicitly stated. Specifically, for each combination of scenarios and model uncertainties, we assess the sum of grid cell-level expected losses according to the following formula:

$$RR_T = \frac{\sum_j E(LOSS)_{jT}}{\sum_j E(LOSS)_{j0}} \quad (10)$$

where *RR* is relative risk, *j* indexes over grid cells within the state, *T* references two future time periods (30 years centered around 2050 and around 2085), and *E(LOSS)* is defined as in Equation 1. The base period in the denominator references losses simulated for 1961–1990 using climate simulated for 1961–1990 and estimated year 2000 population and vegetation fractions.

While aggregation can be useful, identifying the most appropriate spatial scale to use is actually not a trivial issue, because aggregation is not always better—in particular, it allows the most heavily weighted areas to mask what may be legitimate subregional effects. Therefore we consider maps that show grid cell spatial patterns, and we show statewide aggregates. We also added some summary statistics for UPlan performance aggregated for the Bay Area and Sierra foothills as an intermediate level.

3.6 Growth Patterns as Multi-faceted Driver of Fire Probabilities and Exposure

A unique contribution of our model is that fire probabilities and exposure are explicitly linked contingent on different development patterns throughout the state. Specifically, as mentioned in Section 3.2, population and the fraction of vegetated area within a given region is a significant predictor of wildfire probability. Of course, as development takes place across a landscape, the amount of vegetated area will change depending on the development pattern— as dense development occurs in previously vegetated areas, those areas will no longer be considered

vegetated or susceptible to wildfire. On the other hand, sparse development amid vegetated areas may not appreciably diminish the vegetated fraction of a region, but instead puts large amounts of housing at risk.

In our model, residential housing growth affects wildfire housing risk in multiple ways. First, new housing growth above the WUI/urban threshold density (D) is assumed to reduce the vegetated area if that growth occurs on a vegetated land. Therefore, under different growth scenarios of where high density growth occurs, vegetation may be more or less reduced. Second, as mentioned above, values above D are assumed not to be at risk for loss due to wildfire, which means that even without altering vegetated area, different values will be exposed to loss depending on different density distributions. Third, in protection normalization cases (Equation 6), the vegetated fraction factors into $\hat{s}$.

Thus the fire probabilities themselves are a function of the spatial distribution of new growth (and its density), and the value that may be lost depends on how densely it is distributed over the landscape. Figure 3 summarizes all the dependencies in the model, along with the data sources and algorithmic procedures. The algorithmic details of these linkages are described above, and in the appendices describing how we process the growth scenario inputs.

One aspect of Figure 3 that we have not paid much attention to is the vegetation allocation algorithm, which is also described in previous work (Westerling et al. 2011a; Bryant and Westerling 2009]), with an edited version reproduced in Appendix A.2 here. The key feature of the algorithm is that, because we do not know where dense development (development above the WUI/urban threshold) will be placed within a grid cell relative to vegetation in the grid cell, we again consider three bounding scenarios:

- All new growth above the WUI/urban threshold (high-density growth) is placed in existing vegetated areas, thereby reducing the vegetation footprint (dubbed the “min” scenario because it minimizes vegetation)
- All new high-density growth is preferentially allocated to non-vegetated areas (the “max” scenario)
- All new high-density growth is assigned to vegetated area in accordance with what fraction of available land is vegetated (the “neutral” scenario)

These scenarios share conceptual similarity with the WUI exposure scenarios of Section 3.3.3, except that those focus on value below the WUI/urban density threshold, and these focus on the value above it.

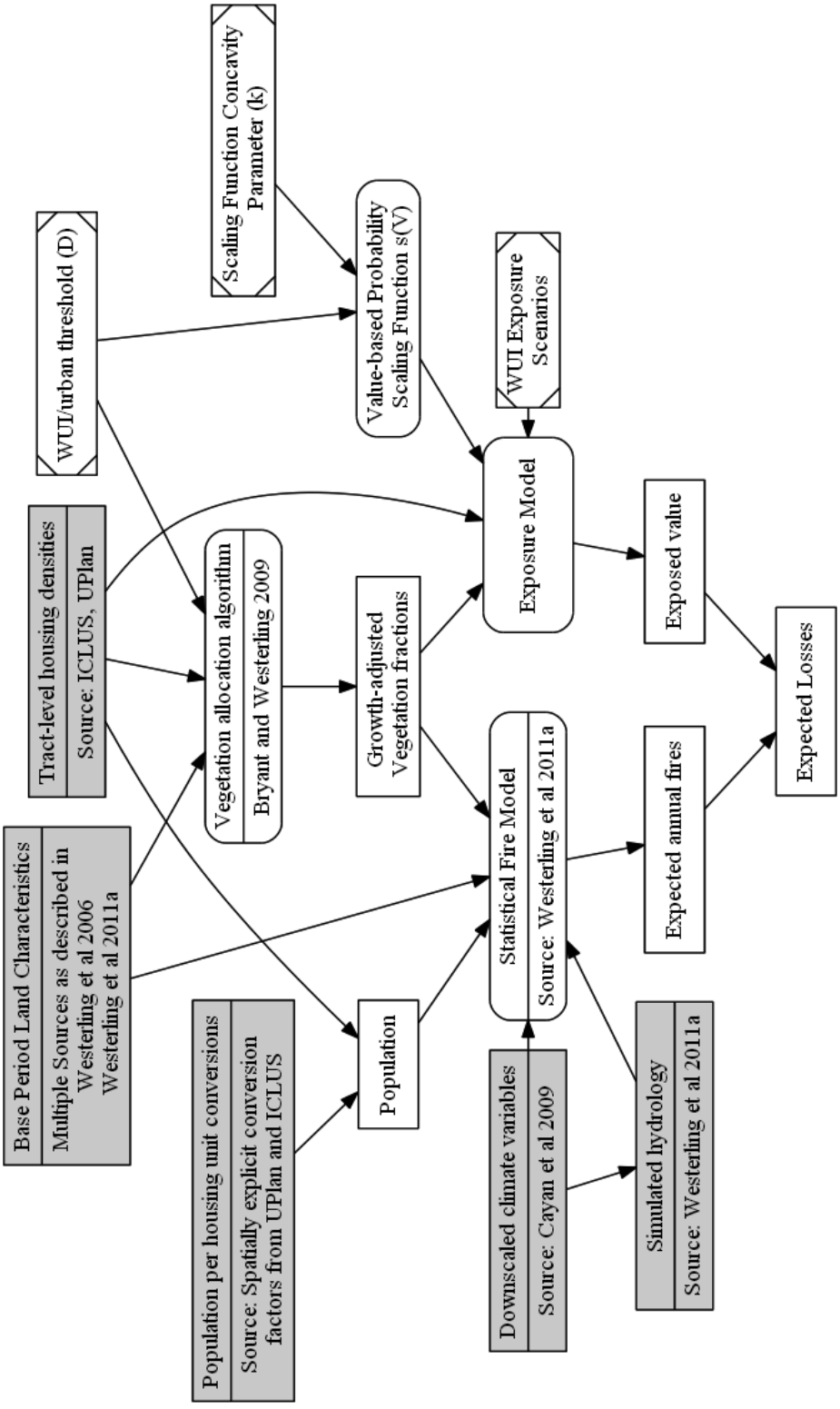


Figure 3: The implementation and detailed dependencies of the conceptual model in Figure 2. With the exception of initial UPlan and ICLUS data, all data sources and final outputs are at the level of the 1/8 degree grid cell, with the final product aggregated to the state level for most of our results. Grey boxes indicate external data products used as inputs, rounded boxes are functions or algorithms, rectangles are data products we produced, and rectangles with diagonal corners indicate parameters or scenario input we developed.

3.7 Integrating UPlan and ICLUS Data Sets for Scenario Runs

There are two related issues for the UPlan outputs that prohibit us from performing model runs that rely exclusively on UPlan data for our modeling inputs. The first, mentioned above, is that UPlan does not begin with or require a spatially explicit housing density map for the base year (2000). Rather, it utilizes a "pre-existing urban" layer that does not resolve residential density classes in developed areas, nor distinguish them from commercial and industrial land use. Rather, it assesses only whether each tract was deemed "urban" according to the criteria used by National Land Cover Database (NLCD: http://www.mrlc.gov/nlcd2001.php) or the California Augmented Multisource Landuse (CAML) map (http://cain.ice.ucdavis.edu/caml). The second issue is that all population in the base year is assumed to exist within this urban mask, which is problematic for wildfire risk analysis because both wildfire probabilities and wildfire-contingent damages are heavily influenced by the characteristics and population within the wildland-urban interface. This implies that without supplemental information, we cannot develop spatially explicit population estimates to drive the statistical model of wildfires. Furthermore, because our model assumes that housing within urban areas is not at risk for loss due to wildfire, relying only on the UPlan data would lead to zero risk for the base year. Essentially, UPlan's assumptions are incompatible with our assumptions for modeling fire risk in the base year. To handle this, we use the ICLUS year 2000 data, with the value at risk in the base year lying only where ICLUS has densities below the WUI/urban threshold *D*, and not masked out by the UPlan pre-existing urban map.

Finally, there is one more challenge to using the UPlan data for fire risk assessment, which is that it utilizes different criteria for the base-year urban layer depending on county. The default is to use the CAML urban layer, but in counties where there is insufficient open space to allocate all new required growth for 2050, the pre-existing urban layer is reduced to the NLCD boundaries (classes 22–24 based on impervious surface cover), which has equal or smaller cover than CAML. This was done as a method of modeling in-growth or urban redevelopment in counties that were already highly urbanized. However, if used as-is within our fire loss modeling framework, it would introduce significant inconsistencies into our calculation of vegetation fractions when we compare future years to base years, because it would involve making assumptions about tract vulnerability that would vary in ways wholly unrelated to their actual vulnerability.

To address this situation, we calculate vegetation fractions for the baseline year and 2050 year in three different ways: One is using UPlan's pre-existing urban layer, (a mix of NLCD and CAML as described above), and we also consider a full CAML and a full NLCD layer. In all cases we also count baseline ICLUS 2000 cells that are marked as commercial or lie above the WUI/urban threshold. We run these three layers for all our scenarios so we can assess the impact of the base-urban layer assumption and bound our estimates. We use a similar masking when identifying exposed values.

The detailed procedure for generating ICLUS and UPlan vegetation fractions is described at the algorithmic level in Appendix A.2.

3.8 Design of Computational Experiments

For our study design we produced two different full factorials of our emissions, climate, and growth scenarios crossed with various parameters designed to explore uncertainties in exposure: one for ICLUS and one for UPlan, as shown in Tables 2 and 3, respectively. In each table, the right two columns identify whether each factor has an influence on the probability of fires (P(F)), or the exposure, or both, reflecting the relationships shown in Figure 3.

Table 2: ICLUS Scenarios Factorial Study Design

Variable/Scenario	Levels	Affects P(F)	Affects Exposure
Emissions scenario	{B1, A2}	X	
Growth scenario	{low, mid, high}	X	X
Climate model	{NCAR PCM 1, CNRM CM 3.0, GFDL CM 2.1 }	X	
Vegetation allocation method	{min, neutral, max}	X	X
WUI exposure	{low, neutral, high}		X
WUI/urban threshold (D)	{147,1000} HH/km^2	X	X
Scaling function concavity parameter (k)	{.333, 1, 3}		X
Protection normalization	{no, yes}		X
Tract Spatial Scale*	{100, 200, 400, 800} (m)		X

*This refers to the level at which the density and spatial scale functions are evaluated—essentially the raster size to which the ICLUS data is aggregated. It applies to calculations of housing exposure to wildfire risk only—it does not affect calculations of vegetation fractions.

Table 3: UPlan Scenarios Factorial Study Design

Variable/Scenario	Levels	Affects P(F)	Affects Exposure
Emissions scenario	{B1, A2}	X	
Growth scenario	{bau, smart, fire}	X	X
Climate model	{ NCAR PCM 1, CNRM CM 3.0, GFDL CM 2.1 }	X	
Vegetation allocation method	{min, neutral, max}	X	X
WUI exposure	{low, neutral, high}		X
WUI/urban threshold (D)	{741, 1359} HH/km^2	X	X
Scaling function concavity parameter (k)	{.333, 1, 3}		X
Protection normalization	{no, yes}		X
Base urban layer	{NLCD, UPlan, CAML}	X	X

For ICLUS, we only consider different tract spatial scales for the exposure side, not for the fire probability side, even though that ignores the potential for tract resolution effects on vegetation fraction. We conducted a sensitivity analysis which revealed that in this framework the risk of property loss was relatively insensitive to the effects of tract resolution on vegetation fraction, though the tract spatial scale does play a bigger role in determining exposure.

Finally, for results describing wildfire frequency and burned area, we also estimate scenarios where ICLUS populations and vegetation fractions are held constant at their year 2000 values, in order to see the effects of climate change and the various other parameters independent of population growth. Future work will include additional decomposition to assess driving factors.

Section 4: Results

As in Westerling et al. (2011a), wildfire burned area increases substantially statewide (Figure 4) under the A2 emissions scenarios by end of century. End-of-century B1 emissions scenarios and all mid-century scenarios have similar, lower-median increases. Note also that all of the A2 scenarios do pose higher tail risks, with greater spread above the median. Burned area in the UPlan and constant population scenarios do not differ appreciably in the statewide totals from the ICLUS scenarios. As in Westerling et al. (2011a, not shown), large increases in burned area are for the most part concentrated in forest areas in the Sierra Nevada, southern Cascades, and northern Coast Ranges, with lesser increases in mountain forest areas throughout the rest of the state.

4.1 Statewide Wildfire Area Burned under Varying Climate and Growth Scenarios

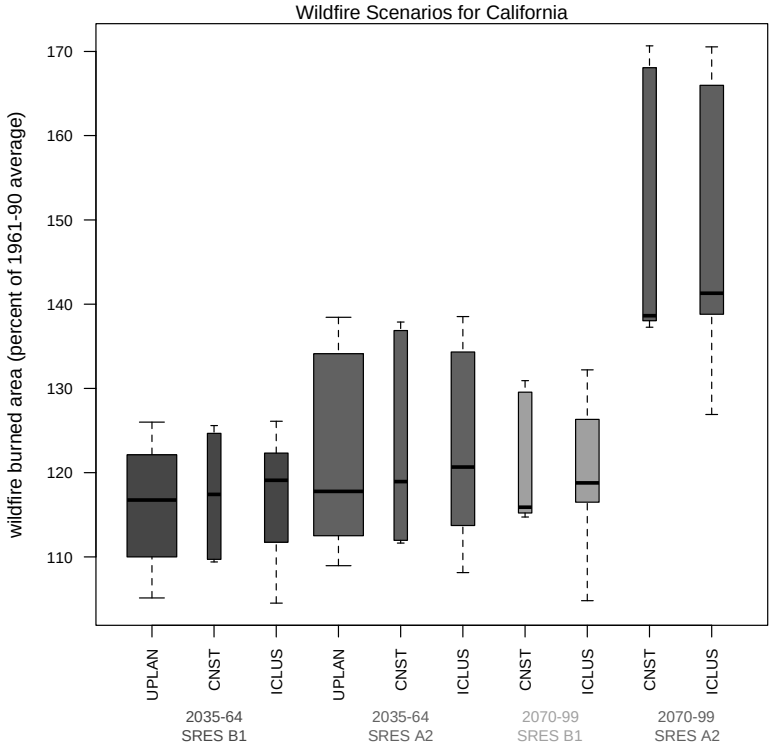
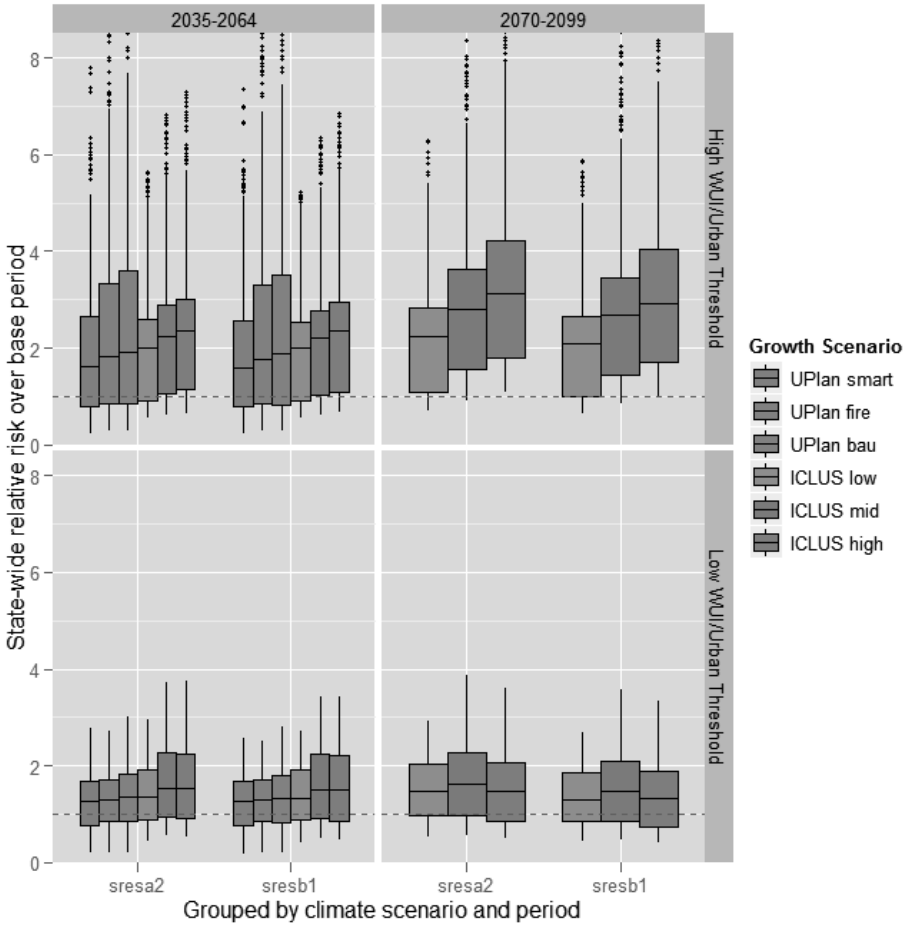


Figure 4: Statewide Wildfire Burned Area Scenarios for 2035–2064 and 2070–2099 Expressed as a Ratio to the Average Modeled for 1961–1990 (with Year 2000 Population and Land Use). Each UPlan boxplot summarizes 729 scenarios, while each ICLUS boxplot summarizes 162 scenarios. Constant (CNST) scenarios hold population and footprint constant at year 2000 levels; each CNST boxplot summarizes 54 scenarios.

4.2 Statewide Changes in Expected Losses under Varying Climate and Growth Scenarios



Notes: 28 ICLUS and 53 UPlan outliers between 8.5 and 12.09 are not shown; ICLUS and UPlan results capture different parameter assumptions. Vegetation fractions and WUI exposure held at "neutral" for the base year.

Figure 5: Statewide Relative Risk by Period, Broken Out by Growth Scenarios, Assumed WUI/Urban Thresholds, and Climate. Dashed red line represents no change in risk.

Figure 5 captures the range of results produced by the nearly 35,000 cases considered as part of our experimental design. Unlike Figure 4, which describes changes in area burned, Figure 5 shows the distributions of relative risk (*RR* as described in Equation 10) in each period of the twenty-first century, broken out by emissions and growth scenarios for two different housing density thresholds used to define the boundary between vegetated and urban (*D*). The variation associated with each individual box arises from different values for the remainder of our modeling parameters and other assumptions (e.g., scaling parameters, climate model used,

vegetation allocation scheme, and WUI exposure scenario). In this figure, each ICLUS box is capturing the variation of 648 individual parameter combinations and each UPlan box is capturing 486.

Even though there is wide variation within many emissions and growth combinations, the figure still identifies several clear trends. First, expected losses of housing units increase in future years under the vast majority of climate and growth scenarios and parameter uncertainty combinations. We can also see that the WUI/urban threshold (*D*) plays an important role in affecting both the magnitude and qualitative nature of the results. High threshold cases are associated with significantly higher relative risk in future periods, with medians between two and three in the 2070–2099 period, though ranging from below one to as high as ten. Low-threshold cases see almost all relative risks between one and two, with a small percentage negative. Qualitatively, high threshold cases follow the trend that scenarios with higher growth produce higher relative risk, while for the low threshold, the higher growth actually may reduce overall risk in some cases. This can be seen in the lower right panel, where the ICLUS high-growth case has a lower distribution than the ICLUS mid case. This can be explained by a combination of two factors: First, a lower threshold implies higher urban development, which implies smaller vegetated areas, which can reduce the probability of large fires. Second, lower thresholds exclude more value being considered exposed, via the action value-based scaling function $s(V_i)$.

4.3 Sources of Variation: Climate, Growth, and Land Use

Notes: 28 ICLUS and 53 UPlan outliers between 8.5 and 12.09 are not shown; ICLUS and UPlan results capture different parameter assumptions. Vegetation fractions and WUI exposure held at “neutral” for the base year.

Figure 5 also provides information about the relative importance of climate and growth scenarios in determining changes in residential wildfire risk, which we explore in more detail in this section. In particular, Figure 5 suggests that, at the state level, variation across growth scenarios is responsible for a greater variation in residential wildfire risk than changes across climate scenarios. This is indeed the case at the state level: A2 scenarios typically lead to greater wildfire risk over B1 scenarios in the 2070–2099 period, but the difference between them is small: 90 percent of cases lead to a relative increase in the range of -1 to 19 percent for A2 relative to B1. By contrast, the corresponding statistics when comparing ICLUS high growth to ICLUS low growth are: -24 percent and +72 percent. Note that these are statements about what the impact on risk could be when considering alternative futures, rather than parsing out responsibility for future increases in risk between climate and growth. Furthermore, because growth and fire management decisions are made on regional and smaller scales, it is also important to consider regional impacts, which do not necessarily represent statewide trends. We focus on these two aspects next.Notes: 28 ICLUS and 53 UPlan outliers between 8.5 and 12.09 are not shown; ICLUS and UPlan results capture different parameter assumptions. Vegetation fractions and WUI exposure held at “neutral” for the base year.

Figure

4.3.1 Climate and Growth Impacts

Figure 6 and Figure 7 show spatial variation in relative residential wildfire risk for the San Francisco Bay and Sierra foothills under varying climate, growth, and model parameters; comparing end-of-century climate and ICLUS growth scenarios to historical baselines.[12] In each case the values shown are ratios between expected losses for end-of-century scenarios and corresponding historical baseline scenarios. Growth and WUI exposure scenarios are held constant within each row, while climate scenarios are held constant in each column, with a B1 NCAR PCM1 climate scenario in the left column and an A2 GFDL CM2.1 climate scenario in the right column, and low growth in the first row and high growth in the second row. Thus, moving across columns shows the effect of climate holding everything else constant, while moving across the first two rows shows the effect of growth in the number of households. We can see that in the San Francisco Bay Area, the spatially explicit changes in wildfire risk mirror the larger statewide trends discussed above. The impact of climate is noticeable, but a more drastic change can be seen when moving from low growth to high growth. However, looking at the Sierra foothills, such trends are less clear. In fact, moving from A to B (low-growth/ low-climate change to low-growth/moderate-high-climate change) appears to increase risk in many places by as much or more than moving from A to C (low-growth/low-climate to a high-growth/low-climate). Though in both regions, their interaction in D produces the most dramatic changes.

[12] The change between low climate change and moderate-high climate change bounds the climate scenarios explored here. For a low climate scenario a run was used from the NCAR PCM1 model, which is less sensitive to forcing from greenhouse gases, forced with the lower SRES B1 emissions scenario. For the moderate-high climate change scenario, the GFDL CM2.1 model, which is more sensitive to greenhouse gases, was forced with the higher A2 emissions scenario. The term "moderate-high climate change" was used instead of "high climate change" because the warmest scenario explored here does not span the high range of potential scenarios available for California. This terminology is consistent with what has been used for the 2008 California Scenarios Project

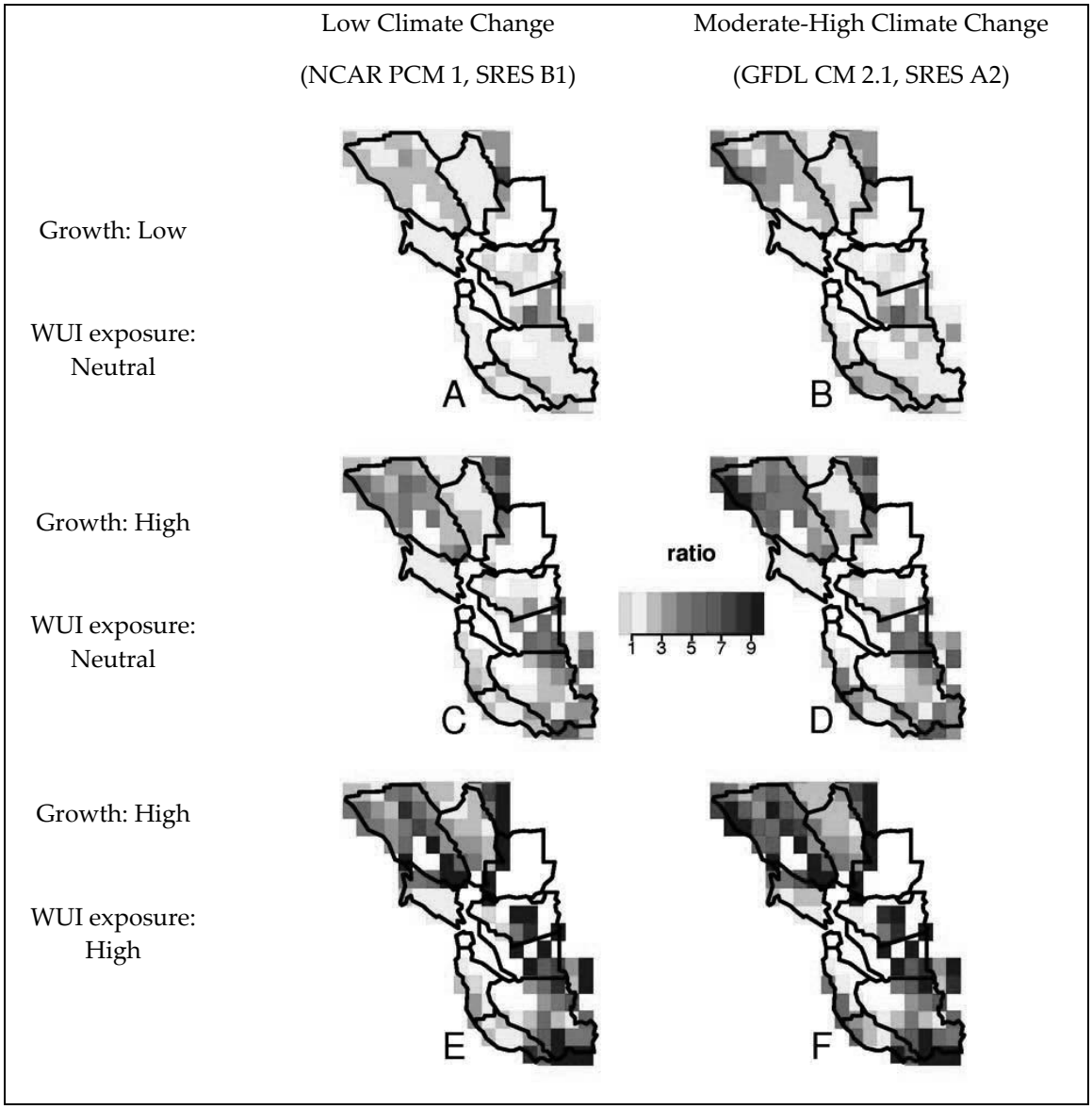


Figure 6: Spatial Variation in Wildfire Risk for the San Francisco Bay Area Using the Ratio of ICLUS 2070–2099 Scenarios to Risk Estimated for the Base Period. Six scenarios illustrate the effects of climate change, growth scenario, and WUI exposure on residential property risk. A relative risk of 1 is equal to no change; therefore, green cells represent reductions in risk. White cells are not modeled. Other parameters are fixed across all six scenarios: WUI/Urban threshold: 1000 HH/km^2, Vegetation allocation method (VEG): Neutral, Scaling function concavity parameter (k): 0.333, Protection normalization: yes, Resolution: 100 m.

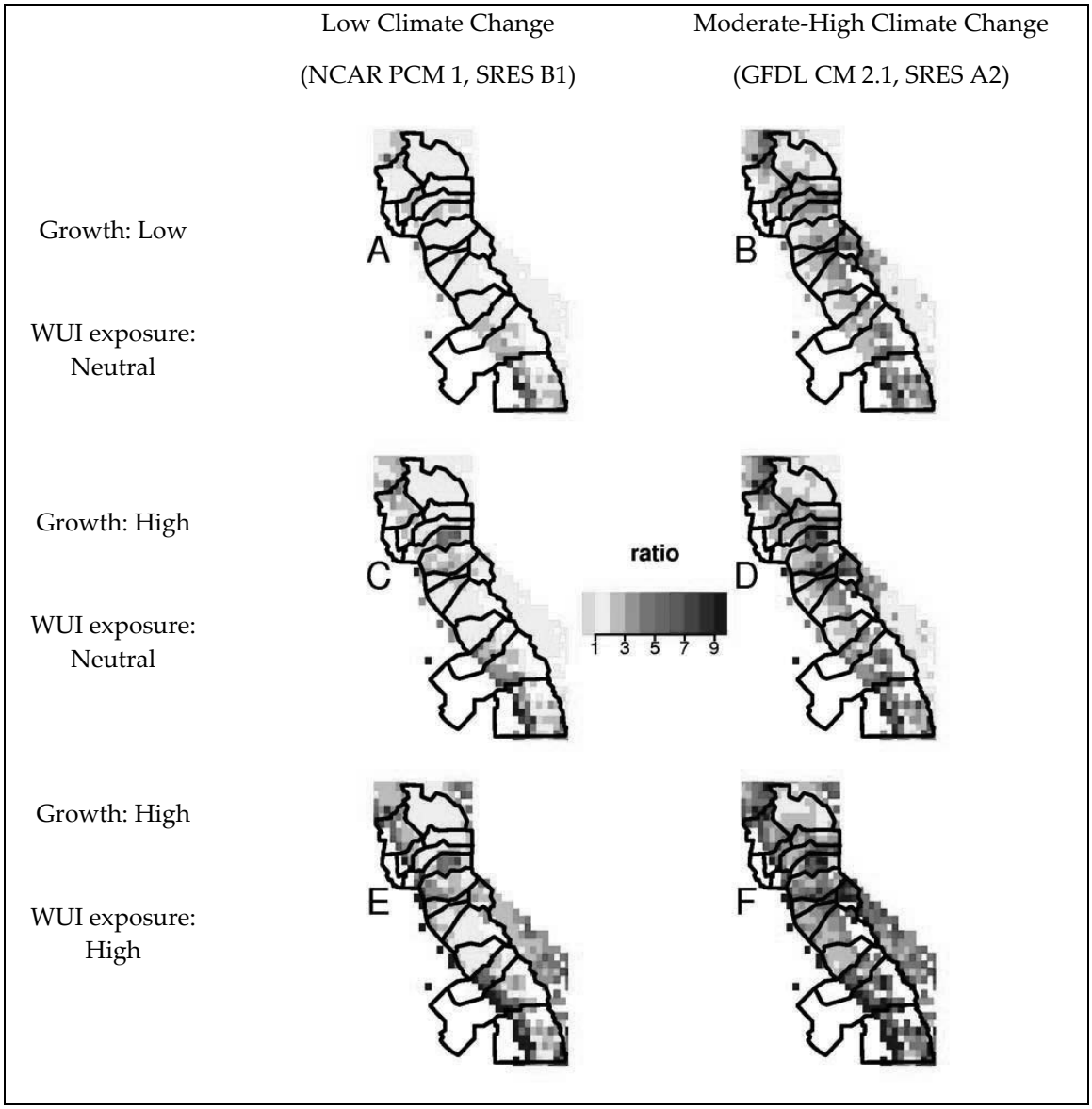


Figure 7: Spatial Variation in Wildfire Risk for the Sierra foothills Using the Ratio of ICLUS 2070–2099 Growth Scenarios to Risk Estimated for the Base Period: Six scenarios illustrate the effects of climate change, growth scenario, and WUI exposure on residential property risk. A relative risk of 1 is equal to no change; therefore, green cells represent reductions in risk. White cells are not modeled. Other parameters are fixed across all six scenarios: WUI/Urban threshold: 1000 HH/km^2, Vegetation allocation method (VEG): Neutral, Scaling function concavity parameter (k): 0.333, Protection normalization: yes, Resolution: 100 m.

4.3.2 Impact of Land Use Decisions

The first two rows of Figure illuminate how the relative impact of climate and growth may vary in diverse parts of the state. However, by considering the differences between the second row and the third row, we can see the marginal impact of development decisions on wildfire risk still holding all other parameters constant. Panels E and F describe the same high-growth situation as panels C and D, but consider different WUI housing allocations within each grid cell, with E and F representing cases in which more development occurs at highly exposed density levels within the vegetated areas of the wildland-urban interface. One can see that such a development pattern exacerbates the effects of more extreme climate and growth scenarios. In the Bay Area, the effects of greater high-exposure WUI development are particularly large in eastern Alameda and Santa Clara counties. (See Appendix A.3 for a county map of California with relevant counties labeled.) In the foothills on the west side of the Sierra Nevada, these effects are greatest in southern Sierra foothill counties of Madera, Fresno, and Tulare. On the east side of the Sierra Nevada, effects of high-exposure WUI development are particularly notable in Alpine county and northern Mono county under the warmer, drier SRES A2 GFDL CM2.1 scenario (B,D,F).

The UPlan scenarios for mid-century are able to more clearly illustrate the impact of different growth strategies, because population is held constant across the business-as-usual, smart growth, and fire threat avoidance scenarios. Therefore the only change is due to changes in growth patterns across the various UPlan development scenarios. The impact of the changes is summarized in Table 4, which shows how well each UPlan development scenario performed relative to the other scenarios, in the two regions mapped above. A few trends emerge: In general, “smart growth” outperforms “fire threat avoidance,” which in turn outperforms the “business-as-usual” case. Additionally, the relative impact of each scenario varies notably in both regions. In the San Francisco Bay area, the smart case can reduce expected losses by up to nearly 35 percent, while its strongest effect is less than half that in the Sierra foothills. We also see that, in the Sierra foothills, “smart growth” still shows the lowest expected losses, but that the “fire threat avoidance” scenario has many more positive scenarios relative to the San Francisco Bay area. For examples, it outperforms the “business-as-usual” scenario in only about one third of cases in the Bay Area, while it bests “business-as-usual” cases in 58 percent of scenarios in the Sierra foothills.

Table 4: Pairwise Performance of UPlan Scenarios for the San Francisco Bay Area and the Sierra Nevada Foothills

Bay Area	% cases with lower risk	Maximum reduction in risk (%)	Maximum increase in risk (%)		Sierra Foothills	% cases with lower risk	Maximum reduction in risk (%)	Maximum increase in risk (%)
smart relative to bau	99.6	34	0.5		smart relative to bau	100	15.7	NA
fire relative to bau	33.5	2.3	5.3		fire relative to bau	58.3	7.3	2.2
fire relative to smart	0.1	0.4	58.1		fire relative to smart	10.3	1.2	11.6

Table 4 supports two conclusions: Land use decisions matter, but the details of their implementation can (and do) vary across the state. Our model will generally show lower risk for scenarios that place more growth at higher densities, which the smart growth scenario does. However, because our model is highly sensitive to the threshold density, more robust conclusions would require an analysis using scenario data that features more finely resolved density classes, rather than the small number of discrete density classes used in the current UPlan scenarios.

In general, the residential wildfire risk scenarios are imposing a scaled household weighting on projected changes in wildfire. While all scenarios show the greatest increase in the expected area burned by large fires is projected to occur in mountain forests of northern California, the part of the Sierra Nevada that currently is given a high fire threat index by the California Department of Forestry and Fire protection is concentrated in the Sierra foothills, since much of the higher elevations are federal land. This is the same area where we see greater increases in risk, both area burned and expected losses, but also a relatively greater effect of the UPlan fire threat avoidance scenarios. It is also unfortunate that the UPlan scenarios do not extend to end of century, since the much larger increases in fire under end of century SRES A2 scenarios would provide a better test of the utility of the fire threat avoidance UPlan scenario.

By contrast, in the wildland-urban interface around the periphery of the San Francisco Bay Area, projected changes in large fire occurrence and burned area are much more modest, while proximity to large population centers guarantees rapid growth in households under the various population growth scenarios. Consequently, the changes in exposure are likely to drive the risk increases, and the density effects of smart growth have a much more noticeable effect.

4.4 Impact of Fire Risk Parameters

From a policy and management perspective, it is important to understand which factors impact magnitudes in a qualitatively important way. In particular, it is the case that under some parameter combinations, higher-growth scenarios lead to a decrease in expected fire losses, while in others it leads to an increase. What explains the difference?

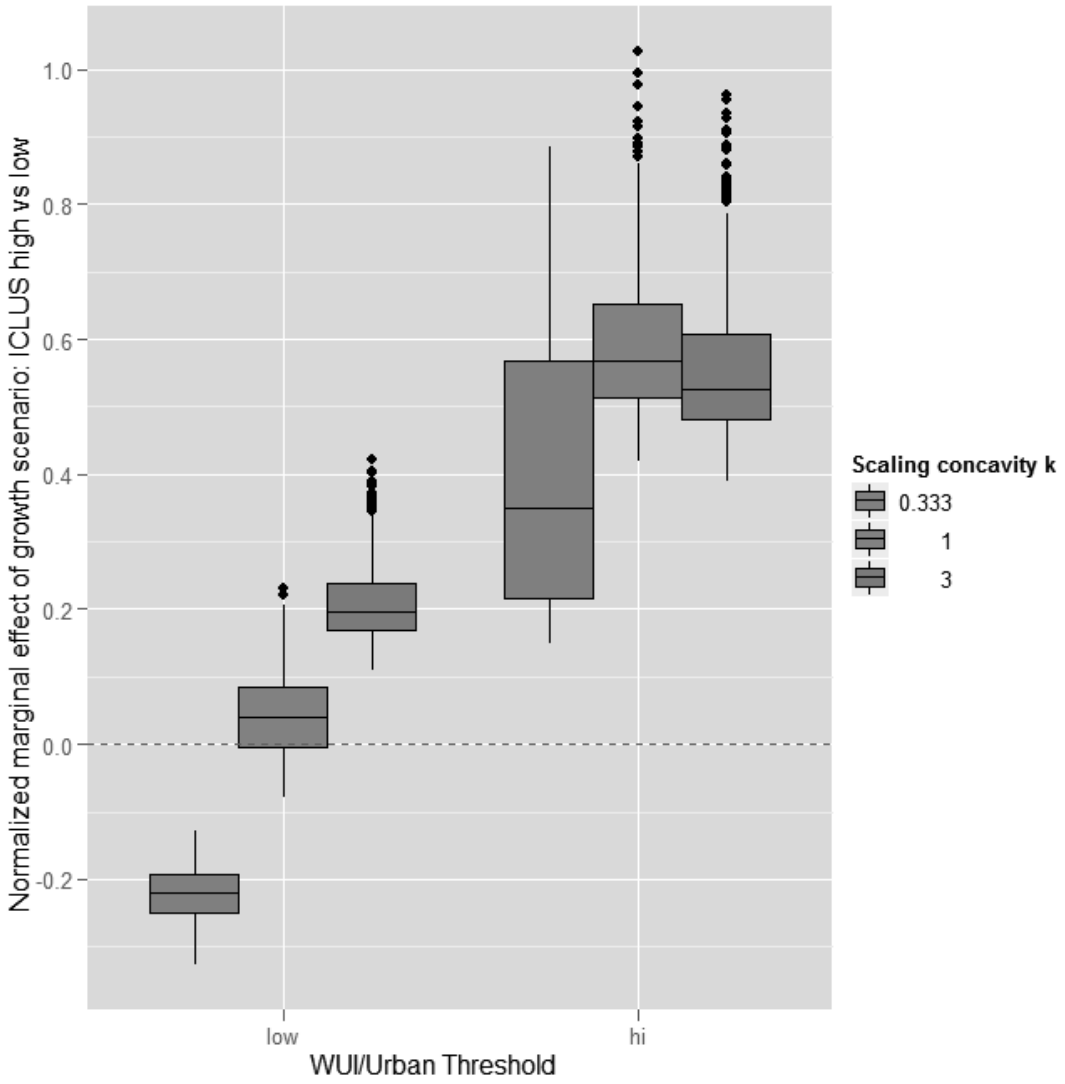


Figure 8: Relative Marginal Effect of High-Growth Compared to Low-Growth Scenario in 2070–2099, Grouped by Different Scaling Function Parameters. The interaction of the two has a strong influence on whether future growth increases or decreases expected losses statewide.

Figure 8 shows the impact of moving to a high-growth ICLUS scenario from a low-growth ICLUS scenario in 2070–2099, grouped by different combinations of the WUI/urban threshold (*D*) and the scaling concavity parameter *k*. In this figure, the y-axis represents the percentage change in 2070–2099 expected losses in a high-growth scenario relative to a low-growth scenario. For example, under the assumption that vulnerability to fire is best described by a low WUI/urban threshold and a small shape parameter (k=1/3), a high-growth scenario is likely to

lead to a 20 to 25 percent decrease in statewide expected losses relative to a low-growth scenario. By contrast, for a high threshold and large scaling parameter (k = 3), a high-growth scenario would lead to a 50–60 percent increase in expected losses.

Figure 8 clearly illustrates that those two parameters alone can determine the sign of the impact. If we think that fire behavior is accurately characterized by a low-threshold and a low-concavity parameter (the lower left), then we can expect a higher-growth scenario to lead to overall lower residential wildfire risk (i.e., paving over the risk), while high values for both implies that a high-growth scenario will lead to a large increase in fire risk. This suggests that, to the extent that the parameters describing exposure to wildfire are exogenous, it is important to learn about their true values in order to understand the impact that different growth scenarios are likely to have. Conversely, to the extent that these values can be affected by management, it provides an estimate of the importance of changing management schemes in ways that are reflected by lower thresholds and scaling parameters. Of course, policy levers in fire management and regional planning are far removed from simply adjusting the parameters of our scaling function. Rather, these are statistical-level descriptors of how the system may reflect different policies.

4.5 Discussion of Uncertainties and Caveats

While we go to great lengths to capture variation in outcomes due to different plausible modeling assumptions, there are nevertheless some that remain difficult to account for.

One issue we consider to be of concern is the construction of a fair base period at the grid cell level, due to compatibility of data sources. When we present relative risk compared to the year 2000 development crossed with 1961–1990 climate, our year 2000 data also rely on some modeling assumptions about land use, rather than drawing directly from a data set. In particular, our initial vegetation and urban fraction data rely on LDAS information, which was based on imagery collected in the early 1990s. For the maps presented here, we assume that growth happens according to the same rules between the time of LDAS data collection and the year 2000, as it does between LDAS and future years. But this need not be the case in reality. Growth may have proceeded under high-value WUI and high-vegetation-fraction conditions between LDAS and 2000, but could then plausibly shift to a low-value WUI case that also minimizes vegetation fractions in the future. In general, using consistent land use assumptions for the base year and future years represent entirely plausible scenarios, but also slightly reduces variation in the relative risk. To guard against false precision, our summaries of risk use the common baseline ("neutral" vegetation allocation and WUI exposure). We also emphasize that the ICLUS scenarios do not disaggregate population change and land use change. Future work may explore the disaggregation of these two factors.

Also, for UPlan, the use of a base year mask tends to reduce overall values exposed, and the criteria used to mask out those cells does not correlate perfectly with our WUI/urban threshold criteria that are applied to ICLUS base year data when used with UPlan, and that are applied to UPlan in future years. Another factor related to UPlan is that our WUI exposure scheme essentially overrides some of the UPlan modeling at the intra-grid-cell level, which is

particularly relevant for assessing the performance of the "fire-threat avoidance" scenario. To the extent that relocation of development only shifts UPlan growth patterns within grid cells, our results will not reflect that change—rather it is only where UPlan's fire scenario shifts them to grid cells with lower risk as we evaluate it that the change is apparent.

In general, our model makes a variety of assumptions about certain factors remaining constant over space and time, which may impact interpretation of results on both those dimensions. One is that fire probabilities continue to respond to the presence of vegetation and population in the same manner as they have historically done. We also assume that the probability of a tract burning conditional on a fire occurring in the grid cell is independent of the vegetated area of that tract, and of the expected size of fires originating in the tract. Perhaps more significantly, we assume that expected losses contingent on a tract falling within a fire do not change over time or space—we devote more discussion to this issue and its relation to policy in the Conclusion.

Even where we do explore variation in parameters that lead to different levels of exposure, scenarios apply the same parameters across the state, and generally apply parameters consistently across time periods. It is theoretically possible that these parameters could vary in ways that exacerbate or mitigate the otherwise risk-increasing impact of new growth. For example, it may be that in areas with high and topographic relief, housing remains vulnerable at even higher densities than we have considered, or it may be that communities that are cognizant of their own high fire risk take greater steps to reduce their exposure. Such actions may vary across the state within time period, but may also change across time periods as well. Either of these could imply that the spatial patterns produced at the level of our 1/8-degree grid cell cells might not be robust.

Section 5: Conclusion

Residential property risk due to wildfire increases over the coming several decades under the vast majority of scenarios that we consider through the end of the century, although high growth can lead to reduced risk under a limited set of parameter combinations. Expected losses increase in almost all scenarios through mid-century, with low WUI/urban thresholds producing changes in risk that commonly range from a 20 percent decrease to a 100 percent increase; while a high urbanization threshold assumption shows many instances in which risk more than triples by mid-century. As a reference point for the magnitude of these changes, from 1990 to 2010, wildfires in state responsibility areas averaged about 130 million dollars of structure damage per year in California (California Department of Forestry and Fire Prevention 2011), which represents only a fraction of the total cost wildfires imposed on the state. It is also important to note that, even in the cases where we show a reduction in expected losses under high growth, that reduction is in part based on an assumption of fire protection response that increases with value—thus lowered expected losses may still be associated with significant increases in other wildfire-related costs.

Increases are due to a combination of climate, population growth, and changing exposure based on how development occurs, while the decreases are due to a combination of reduced vegetated area and reduced exposure due to growth at high densities. Overall, the relative impact of changes in exposure dominates when varying across scenarios considered here. While this is explained in large part by greater changes due to exposure alone, it is also a function of where growth occurs relative to changing climate and wildfire patterns.

Climate change is expected to increase the probability of large wildfires occurring in a substantial portion of the state, but the greatest increases are projected for forests in the mountains and foothills of northern California (Westerling et al. 2011a; see also National Research Council 2011; Spracklen et al. 2009; Westerling and Bryant 2008). This is largely because climate effects on fuel flammability tend to be important in these forests (Westerling et al. 2003; Littell et al. 2009). Warmer temperatures are associated with drier conditions and a longer fire season in western U.S. forests, as well as an increased incidence of large forest fires (Westerling et al. 2011b; Swetnam et al. 2009; Littell et al. 2009; Heyerdahl et al. 2008; Morgan et al. 2008; Westerling et al. 2006). In the statistical fire models used here, the probability of large fire occurrence tends to increase with temperature-related increases in summer drought, so the most extreme fire scenarios occur at the end of the century under the higher-emissions scenario examined here (SRES A2), and especially for the model with the greatest temperature sensitivity to the resulting greenhouse gas forcing (GFDL CM2.1) (see Westerling et al. 2011a).

ICLUS and UPlan growth scenarios tend to concentrate development in and around existing urban areas. These are typically in lower elevation areas with drier climates, where climate effects on fuel availability tend to be more important than on fuel flammability. Temperature is typically less important than antecedent precipitation as a driver of fire in these locations, and consequently the effects of climate change on fire risks are weaker and less certain than in the less-populated forest areas in northern California forests. As a result, the greatest increases in

households in terms of numbers and aggregate values potentially at risk in the state are in areas with weaker and less-certain changes in fire risks. Thus, the effects of growth scenarios tend to dominate those of climate scenarios at the statewide level.

Yet, statewide aggregates tend to obscure interesting details revealed by spatially explicit scenarios for wildfire and property risk. California's ecosystems and fire regimes are quite diverse, and as noted above the greatest increases in wildfire are projected for northern California forests, corresponding to end-of-century increases on the order of 100 to over 300 percent above the recent historical baseline (Westerling et al. 2011a; National Research Council 2011; Westerling and Bryant 2008). Much of this forest area is federal land reserved from residential use, under Park Service and Forest Service management. Growth in households is constrained to occur in private lands in the foothills and small mountain enclaves. In these areas of the state, our modeling indicates that residential property risks are highly sensitive to the growth in the number of households and their spatial footprint, relative to historical baselines. ICLUS scenarios indicate that, by end of century, rapid, sprawling growth in areas on the periphery of the Sierra Nevada could result in substantial increases in residential wildfire risks—with substantial areas projected to increase on the order of five to 10 times above the historical baseline—in a diverse array of communities from Tehama and Butte counties in the far north, to El Dorado, Amador, and Alpine counties in the north, to Madera, Fresno, and Tulare counties in the south (Figure 7F). And while patterns in the San Francisco Bay Area tended to more closely reflect parameter and scenario effects at the state level, it is visible from Figure 6 that risk increases vary significantly across the region depending on parameters and scenarios; for example, Panel 6E and 6F show drastic differences in risk along the coastal portion of Sonoma County, and these differences are explained mainly by the different assumptions about the interaction of new development with existing vegetation.

As we have seen, the range of potential outcomes for residential property losses for any given climate and growth scenario is large, suggesting a dominance of inherent uncertainty. Yet the dependency on key parameter values is clear and has implications for policy and research priorities. In particular, the results are largely driven by assumptions about our scaling function $s(V_i,D,k,\alpha)$, which describes how the probability of a tract falling within a fire perimeter varies with the value contained within the tract. This suggests the importance of data collection to characterize this scaling function more accurately, both in its shape and in how it may vary across the state. Doing so will be one step toward more confidently drawing growth and fire management implications using our modeling approach, which currently assumes several factors remain constant throughout the state and over time. At the same time, a very robust result of our scenario analysis is that "smart" growth strategies that concentrate growth in existing urban areas and at higher densities reduced expected losses by mid-century across the vast majority of scenarios.

While varying the parameters of our scaling function clearly revealed their driving role, we note that our analysis does not consider variation in one important parameter: λ, the expected loss contingent on property-specific protective efforts. This variable represents the fraction of value that is lost when a tract is encompassed by wildfire, and could be highly variable. To the extent

that new housing growth and residential landscaping follows best practices for fireproofing, and to the extent that future residents are able to successfully manage their property for greater resilience to fire, future expected losses will be proportionately lower. Indeed, recent state-level policy changes requiring increased defensible space (Public Resources Code 4291) and fire-resistant home construction (California Building Code Chapter 7A) should succeed in lowering this parameter over time in regions of severe fire hazard.

Lastly, from a public policy standpoint, it is also important to consider costs and benefits of growth and land management policy more broadly than just the fire risk context. Besides the important ecological impacts mentioned in the introduction, people build homes with low density in the wildland-urban interface because they perceive it to be a more desirable environment than other alternatives. It is also possible people may not take all fire-proofing steps available to them because they may deem them excessively costly or aesthetically undesirable. To the extent that homeowners may not be fully aware of and may not fully bear wildfire-related risks, there remains a role for government, land management agencies, and private sector actors such as property insurers to improve homeowner's understanding of the risk they bear when making such decisions, and to take actions to mitigate that risk.

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Glossary

A	agricultural
AR4	IPCC Fourth Assessment
B	bare
CalFire	California Department of Forestry and Fire Protection
CAML	California Augmented Multisource Landuse
CNRM	Centre National de Recherches Météorologiques
D	density
FIPS	Federal Information Processing Standard
GCM	global climate model
GFDL	Geophysical Fluid Dynamics Laboratory
GPDs	generalized Pareto distributions
ha	hectares
ICLUS	Integrated Climate and Land Use Scenarios
IPCC	Intergovernmental Panel on Climate Change
km	kilometer
LDAS	Land Data Assimilation System
LRAs	local responsibility areas
m	meter
NCAR	National Center for Atmospheric Research
NCEP	National Centers for Environmental Prediction
NLCD	National Land Cover Database
NLDAS	North American Land Data Assimilation System
PIER	Public Interest Energy Research
RD&D	research, development, and demonstration
RR	relative risk
SERGoM	the Spatially Explicit Regional Growth Model
U	urban
V	Vegetation
VIC	Variable Infiltration Capacity
W	water
WUI	wildland-urban interface
N_{VEG}	number of vegetated tracts

Appendix A.1 Identifying New Populations for UPlan

UPlan data is provided on a 50 meter raster, with categorical encoding of housing and commercial densities. For calculating population, we assume that there are no residences on properties identified as light or heavy commercial, or industrial. Therefore, we create a new raster by substituting the per-acre household density into the raster according to the following mapping, provided in the UPlan description (Thorne et al. 2012).

Table A1: Raster Mappings for UPlan Housing Densities

Raster Value	Housing density (hh/acre)
9	20
10	5
12	1
13	.1
15	50
16	.5
17	0
18	0
19	0
20	10

Next, we make a similar substitution, replacing a raster encoding county level Federal Information Processing Standard (FIPS) codes with the county-specific population-per-household data used in the UPlan calculations. We then multiply those two rasters together to get per-acre population density by tract. Those values are then aggregated to the 1/8-degree grid cell and downscaled by the ratio of the tract area to an acre (2,500 square meters per tract to 4,046.85642 square meters per acre). Lastly, those are combined with the 1/8-degree estimates from ICLUS for the base year, which are calculated in a similar fashion. As discussed in the main text (Section 3.7), ICLUS data is used because the UPlan output does not include a year 2000 housing density map. The overall procedure is:

1. Combine UPlan 50 m rasters indicating household density with county-specific population-per-household data to develop a raster of population estimates at the 50 meter level.
2. Use point-in-polygon operations to sum populations within each grid cell. These provide the new populations only.
3. Combine the grid cell-level new populations for 2050 with the pre-existing grid cell level populations for 2000 from ICLUS.

Appendix A.2 Identifying Vegetated Areas Based on New Growth

This follows essentially the exact procedure as defined in the appendix to Westerling et al. (2009) and is included here for completeness. We first reproduce the salient points of that procedure, and then focus on the differences specific to UPlan.

In the limit of complete urbanization, it is clear that vegetation fraction is affected by encroaching human development, because a grid cell entirely covered by dense population would lack any sufficiently large vegetated space in which wildfires could exist. However, vegetation cover may be reduced by encroaching human development at intermediate scales as well, depending on how new growth is allocated. We model this allocation process as follows.

A given grid cell can be partitioned into the following disjoint areas, expressed as fractions of the grid cell they cover: Vegetation (V), urban (U), bare (B), agricultural (A), and water (W), with V+U+B+A+W = 1. These values exist for a baseline year, and when there is new urban growth with a footprint larger than the baseline urban fraction, it must be allocated to some combination of vegetation, bare, and agricultural land. To assess the range of impact that new growth may have on the vegetation fraction, we allot new growth in three different ways and consider the different impacts each method may have.

One is to maximize the wildfire-prone vegetation preserved, which is done by preferentially allotting new growth to the bare and agricultural areas before allotting any remaining growth to the vegetated areas:

$$VEG_{max} = V_0 - max(0, N-(A+B))$$

Where N is the new urban footprint requiring allocation—that is, the difference between the urban footprint in a given time versus the urban footprint in the base year. In this formulation, if there is sufficient agricultural and bare land to accommodate all new growth, the vegetation fraction is not reduced at all.

Another option is to reduce the vegetation fraction by as much as possible, assigning all new growth to the existing vegetated area:

$$VEG_{min} = max(0, V_0 - N)$$

These two allocation methods represent extreme bounds, and in reality, growth will tend to be distributed among all three land types. As a middle ("neutral") option, we calculate the vegetation fraction assuming vegetated area is covered in direct proportion to how much area it occupies relative to agriculture and bare land:

$$VEG_{neutral} = max(0, V_0 - N\,V_0/(A+N+V_0))$$

To adapt these procedures for use with the UPlan scenarios, first we reclassify UPlan's new growth raster according to Table A1 as above, except that we assign commercial and industrial land use (categories 17, 18, and 19) to have effective density of infinity rather than zero, because here we care about land use, rather than population or value. A value of infinity will always be deemed to be above the WUI/urban threshold, and therefore always classified as unvegetated. We then convert mapped values to per-hectare values by multiplying the raw housing density value by the area ratio of hectares to acres (2.47), and then divide each tract value by four, to translate the per-hectare value into the 50 meter tract value. Each tract then holds a value that corresponds to the actual expected number of housing units on that tract (which may be fractional). We then apply the rules described in the main text for deciding whether each tract is classified as unvegetated or not. The overall procedure is described algorithmically below:

1. Align the 2000 ICLUS commercial and housing grids (100 m) grids with the UPlan 50 m data, and disaggregate the ICLUS grids to 50 meters.
2. For each tract, identify whether the tract is "too urban to burn" by assessing whether it meets at least one of the following criteria:
    a. Was labeled commercial by ICLUS
    b. Was labeled commercial or industrial by UPlan
    c. Was labeled "pre-existing urban" by UPlan (with exceptions)
    d. The combined housing density identified by UPlan and ICLUS is above the WUI/urban threshold.
3. Aggregate the fraction of all tracts labeled as "too urban to burn" by grid cell.
4. Identify what fraction is "new growth" relative to the urban fractions calculated using early 1990s LDAS data.
5. Diminish LDAS vegetation fractions according to three different scenario rules, one of which preserves as much vegetation as possible, one of which minimizes vegetation preserved, and one of which distributes new growth evenly among all cell types.

Appendix A.3: County Map for California

Figure A.3.1: County map for California with county names labeled for subregions discussed in Section 4

http://www.epa.gov/owow/NPS/MMGI/Chapter6/ch6-2a.html
Last updated on Wednesday, January 13, 2010

Management Measure for Physical and Chemical Characteristics of Surface Waters - II. Channelization and Channel Modification Management Measures

One form of hydromodification is *channelization* or *channel modification*. These terms (used interchangeably) describe river and stream channel engineering undertaken for the purpose of flood control, navigation, drainage improvement, and reduction of channel migration potential (Brookes, 1990). Activities such as straightening, widening, deepening, or relocating existing stream channels and clearing or snagging operations fall into this category. These forms of hydromodification typically result in more uniform channel cross sections, steeper stream gradients, and reduced average pool depths.

The terms *channelization* and *channel modification* are also used in this chapter to refer to the excavation of borrow pits, canals, underwater mining, or other practices that change the depth, width, or location of waterways or embayments in coastal areas. Excavation of marina basins is addressed separately in Chapter 5 of this guidance.

The term *flow alteration* describes a category of hydromodification activities that result in either an increase or a decrease in the usual supply of fresh water to a stream, river, or estuary. Flow alterations include diversions, withdrawals, and impoundments. In rivers and streams, flow alteration can also result from undersized culverts, transportation embankments, tide gates, sluice gates, and weirs.

Levees along a stream or river channel are also addressed by this section. A *levee* is defined by the U.S. Army Corps of Engineers (USACE) as an embankment or shaped mound for flood control or hurricane protection (USACE, 1981). Pond banks, and other small impoundment structures, often referred to as levees in the literature, are not considered to be levees as defined in this section. Additionally, a *dike* is not used in this guidance to refer to the same structure as a levee, but rather is defined as a channel stabilization structure sited in a river or stream perpendicular to the bank.

For the purpose of this guidance, no distinction will be made between the terms *river* and *stream* because no definition of either could be found to quantitatively distinguish between the two. Likewise, no distinction will be made for word combinations of these two terms; for example, *streambank* and *riverbank* will be considered to be synonymous.

The following definitions for common terms associated with channelization activities apply to this chapter (USACE, 1983). Other definitions are provided in the Glossary at the end of the chapter.

Channel: A natural or constructed waterway that continuously or periodically passes

water.

Channel stabilization: Structures placed below the elevation of the average surface water level (lower bank) to control bank erosion or to prevent bank or channel failure.

Streambank: The side slopes of a channel between which the streamflow is normally confined.

Lower bank: The portion of the streambank below the elevation of the average water level of the stream.

Upper bank: The portion of the streambank above the elevation of the average water level of the stream.

Streambank stabilization: Structures placed on or near a distressed streambank to control bank erosion or to prevent bank failure.

Based on the above definitions, the difference between channel stabilization and streambank stabilization is that in streambank stabilization, the upper bank is also protected from erosion or failure. This additional protection guards against erosive forces caused by high-water events and by land-based causes such as runoff or improper siting of buildings. Levees are placed along streambanks to prevent flooding in adjacent areas during extreme high-water events.

Effects of Channelization and Channel Modification Activities

General Problematic Effects Channel modification activities have deprived wetlands and estuarine shorelines of enriching sediments, changed the ability of natural systems to both absorb hydraulic energy and filter pollutants from surface waters, and caused interruptions in the different life stages of aquatic organisms (Sherwood et al., 1990). Channel modification activities can also alter instream water temperature and sediment characteristics, as well as the rates and paths of sediment erosion, transport, and deposition. A frequent result of channelization and channel modification activities is a diminished suitability of instream and riparian habitat for fish and wildlife. Hardening of banks along waterways has eliminated instream and riparian habitat, decreased the quantity of organic matter entering aquatic systems, and increased the movement of NPS pollutants from the upper reaches of watersheds into coastal waters.

Channel modification projects undertaken in streams or rivers to straighten, enlarge, or relocate the channel usually require regularly scheduled maintenance activities to preserve and maintain completed projects. These maintenance activities may also result in a continual disturbance of instream and riparian habitat. In some cases, there can be substantial displacement of instream habitat due to the magnitude of the changes in surface water quality, morphology and composition of the channel, stream hydraulics, and hydrology.

Excavation projects can result in reduced flushing, lowered dissolved oxygen levels, saltwater intrusion, loss of streamside vegetation, accelerated discharge of pollutants, and changed physical and chemical characteristics of bottom sediments in surface waters surrounding channelization or channel modification projects. Reduced flushing, in particular, can increase the deposition of finer-grained sediments and associated organic materials or other pollutants.

Levees may reduce overbank flooding and the subsequent deposition of sediment needed to nourish riverine and estuarine wetlands and riparian areas. Levees can cause increased transport

of suspended sediment to coastal and near-coastal waters during high-flow events. Levees located close to streambanks can also prevent the lateral movement of sediment-laden waters into adjacent wetlands and riparian areas that would otherwise serve as depositories for sediment, nutrients, and other NPS pollutants. This has been a major factor, for example, in the rapid loss of coastal wetlands in Louisiana (Hynson et al., 1985). Levees also interrupt natural drainage from upland slopes and can cause concentrated, erosive flows of surface waters.

The resulting changes to the distribution, amount, and timing of flows caused by flow alterations can affect a wide variety of living resources. Where tidal flow restrictors cause impoundments, there may be a loss of streamside vegetation, disruption of riparian habitat, changes in the historic plant and animal communities, and decline in sediment quality. Restricted flows can impede the movement of fish or crustaceans. Flow alteration can reduce the level of tidal flushing and the exchange rate for surface waters within coastal embayments, with resulting impacts on the quality of surface waters and on the rates and paths of sediment transport and deposition.

Specific Effects Depending on preproject site conditions and the extent of hydromodification activity, new and existing channelization and channel modification projects may result in no additional NPS problems, additional NPS problems, or benefits.

The following are major categories of channelization and channel modification effects and examples of associated problems and benefits.

Changed Sediment Supply. One of the more significant changes in instream habitat associated with channelization and channel modification projects is in sediment supply and delivery. Streamside levees have been linked to accelerated rates of erosion and decreased sediment supplies to coastal areas (Hynson et al., 1985). Sherwood and others (1990) evaluated the long-term impacts of channelization projects on the Columbia River estuary and found that changes to the river system resulted in a net increase of 68 million cubic meters of sediment in the estuary. These changes in sediment supply can include problems such as increased sedimentation to some areas (an estuary, for example) or decreased sediment to other areas (such as streamside wetlands or estuarine marshes). Other changes may be beneficial; for example, a diversion that delivers sediment to eroding marshes (Hynson et al., 1985). Another example of a beneficial channel stabilization project might be one that results in increased flushing and the elimination of unwanted sediment in the spawning area of a stream.

Reduced Freshwater Availability. Salinity above threshold levels is considered to be a form of NPS pollution in freshwater supplies. Reduced freshwater availability for municipal, industrial, or agricultural purposes can result from some channelization and channel modification practices. Similarly, alteration of the salinity regime in portions of a channel can result in ecological changes in vegetation in the streamside area. Diversion of fresh water by flood- and hurricane-protection levees has reduced freshwater inputs to adjacent marshes. This has resulted in increased marsh salinities and degradation of the marsh ecosystem (Hynson et al., 1985). A benefit of other diversion projects was a reduction of freshwater inputs to estuarine areas that were becoming too fresh because of overall increases in fresh water from changes in land use within a watershed. Increases in oyster harvests have been attributed to a freshwater diversion in Plaquemines Parish, Louisiana. Over the 6-year period from 1970 to 1976, oyster harvests increased by over 3.5 million pounds (Hynson et al., 1985). Potential problems with diversions include erosion, settlement, seepage, and liquefaction failure (Hynson et al., 1985).

Accelerated Delivery of Pollutants. Channelization and channel modification projects can lead to an increased quantity of pollutants and accelerated rate of delivery of pollutants to downstream sites. Alterations that increase the velocity of surface water or that increase flushing of the streambed can lead to more pollutants being transported to downstream areas at

possibly faster rates. Urbanization has been linked to downstream channelization problems in Hawaii (Anderson, 1992). It is believed that the deterioration of Kaneohe Bay may be caused by development within the watershed, which has increased runoff flows to streams entering the Bay. Streams that once meandered and contained natural vegetation to filter out nutrient and sediment are now channelized and contain surface water that is rich in nutrients and other pollutants associated with urban areas (Anderson, 1992). Some excavation projects have resulted in poor surface water circulation along with increased sedimentation and other surface water quality problems within the excavated basin. In some of these cases, additional, carefully designed channel modifications can increase flushing rates, which deliver accumulated pollutants from the basin to points downstream that are able to assimilate or otherwise beneficially use the accumulated materials.

Loss of Contact with Overbank Areas. Instream hydraulic changes can decrease or interfere with surface water contact to overbank areas during floods or other high-water events. Channelization and channel modification activities that lead to a loss of surface water contact in overbank areas also may result in reduced filtering of NPS pollutants by streamside area vegetation and soils. Areas of the overbank that are dependent on surface water contact (i.e., riparian areas and wetlands) may change in character and function as the frequency and duration of flooding change. Erickson and others (1979) reported a major influence on wetland drainage in the Wild Rice Creek Watershed in North and South Dakota. Drainage rates from streamside areas were 2.6 times higher in the channelized area than in undisturbed areas during preliminary project activities and 5.3 times higher following construction. Schoof (1980) reported several other impacts of channelization, including drainage of wetlands, reduction of oxbows and stream meander, clearing of floodplain hardwood, lowering of ground-water levels, and increased erosion. Channel modification projects such as setback levees or compound channel design can provide the overbank flooding to areas needing it while also providing a desired level of flood protection to adjoining lands.

Changes to Ecosystems. Channelization and channel modification activities can lead to loss of instream and riparian habitat and ecosystem benefits such as pathways for wildlife migration and conditions suitable for reproduction and growth. Problematic flow modifications, for example, have resulted in reversal of flow regimes of some California rivers or streams, which has led to the disorientation of anadromous fish that rely on flow to direct them to spawning areas (James and Stokes Associates, Inc., 1976). Eroded sediment may deposit in new areas, covering benthic communities or altering instream habitat (Sherwood et al., 1990). Orlova and Popova (1976) researched the effects on fish population resulting from altering the hydrologic regime with hydraulic structures such as channels. The effects assessed by Orlova and Popova (1976) include:

- Deterioration of spawning habitat and conditions, resulting in lower recruitment of river species;
- Increases in stocks of summer spawning river species; and
- Changes in types and amounts of food organisms.

Many channel or streambank stabilization structures provide increased instream habitat for certain aquatic species. For example, Sandheinrich and Atchison (1986) reported increases in densities of epibenthic insects within revetments and stone dike areas and more suitable substrate for bottom-dwelling insects in revetment areas.

Instream and Riparian Habitat Altered by Secondary Effects. Secondary instream and riparian habitat alteration effects from channelization and channel modification projects include movement of estuarine turbidity maximum zones (zone of higher sediment concentrations caused by salinity and tide-induced circulation) with salinity changes, cultural eutrophication caused by

inadequate flushing, and trapping of large quantities of sediment. Wolff and others (1989) analyzed the impacts of flow augmentation on the stream channel and instream habitat following a transbasin water diversion project in Wyoming. The South Fork of Middle Crow Creek, previously ephemeral, was beneficially used as a conveyance to create instream habitat as a part of impact management measures of the transbasin diversion project. Discontinuous channels, high summer water temperature, and flow interruptions and fluctuations were identified as potential limiting factors for the development of such practices for this particular project. Modeling results, however, indicated that as the channel develops, the effects of the first two limiting factors will be negligible. Following 2 years of increased flow in the 5.5-mile section of stream channel (reach) used in this study, the volume of stream channel had increased 32 percent and more channel areas were expected to develop on approximately 67 percent of the stream reach. The total area of beaver ponds had more than doubled. The brook trout with which the beaver ponds were stocked were reported to be surviving and growing.

The examples described above illustrate the range of possible effects that can result from channelization and channel modification projects. These effects can be either beneficial or problematic to the ecology and surrounding riparian habitat. The effects caused by changed sediment supplies provide an excellent example of these varying impacts. In one case, sediment supplies to coastal marshes are insufficient and the marshes are subsiding (problem). In another case, sediment supplies to an estuary are increasing to the point of causing changes to the natural tidal flow (problem). A final example showed decreased sediment in a streambed, which has resulted in better conditions for native spawning fish (benefit). Thus, depending on site-specific conditions and the particular channelization or channel modification practices used, the project will have positive or negative NPS pollution impacts.

Another confounding factor is the potential for one project to have multiple NPS problems and/or benefits. Assuming that a channelization or channel modification project was originally designed to overcome a specific problem (e.g., channel deepening for navigation, streambank stabilization for erosion control, or levee construction for flood control), the project was intended to be beneficial. Unfortunately, planners of many channelization and channel modification projects have, in the past, been myopic when considering the range of impacts associated with the project. The purpose of the management measures in this section is to recommend proper evaluation of potential projects and reevaluation of existing projects to reduce NPS impacts and maximize potential benefits.

Proper evaluation of channelization and channel modification projects should consider three major points.

1. **Existing conditions**. New and existing channelization and channel modification projects should be evaluated for potential effects (both problematic and beneficial) based on existing stream and watershed conditions. Site-specific stream conditions, such as flow rate, channel dimensions, typical surface water quality, or slope, should be evaluated in conjunction with streamside conditions, such as soil and vegetation type, slopes, or land use. Characteristics of the watershed also need to be evaluated. This phase of the evaluation will identify baseline conditions for potential projects and can be compared to historical conditions for projects already in place.
2. **Potential conditions**. Anticipated changes to the base (or existing) conditions in a stream, along the streambank, and within the watershed should be evaluated. By examining potential changes caused by new conditions, long-term impacts can be factored into the design or management of a channelization or channel modification project. Studies like that of Sandheinrich and Atchison (1986) clearly show that short-term benefits from hydromodification activities can change to long-term problems.
3. **Watershed management**. Evaluation of changes in watershed conditions is paramount in the proper design of a channelization or channel modification project. Since the design of these projects is based on hydrology, changes in watershed hydrology will certainly

impact the proper functioning of a channelization or channel modification structure. Additionally, many surface water quality changes associated with a channelization or channel modification project can be attributed to watershed changes, such as different land use, agricultural practices, or forestry practices.

The two management measures presented in this section of the chapter promote the evaluation of channelization and channel modification projects. Channels should be evaluated as a part of the watershed planning and design processes, including watershed changes from new development in urban areas, agricultural drainage, or forest clearing. The purpose of the evaluation is to determine whether resulting NPS changes to surface water quality or instream and riparian habitat can be expected and whether these changes will be good or bad.

Existing channelization and channel modification projects can be evaluated to determine the NPS impacts and benefits associated with the projects. Modifications to existing projects, including operation and maintenance or management, can also be evaluated to determine the possibility of improving some or all of the impacts without changing the existing benefits or creating additional problems.

In both new and existing channelization and channel modification projects, evaluation of benefits and/or problems will be site-specific. Mathematical models are one type of tool used to determine these impacts. Some models provide a simple analysis of a particular situation and are good for screening purposes. Other models evaluate complex interactions of many variables and can be powerful, site-specific evaluation tools. There are also structural and nonstructural practices that can be used to prevent either NPS pollution effects from or NPS impacts to channelization and channel modification projects. Interpretation of design changes, model results predicting changes or impacts, or the effects of structural or nonstructural practices requires sound biological and engineering judgment and experience.

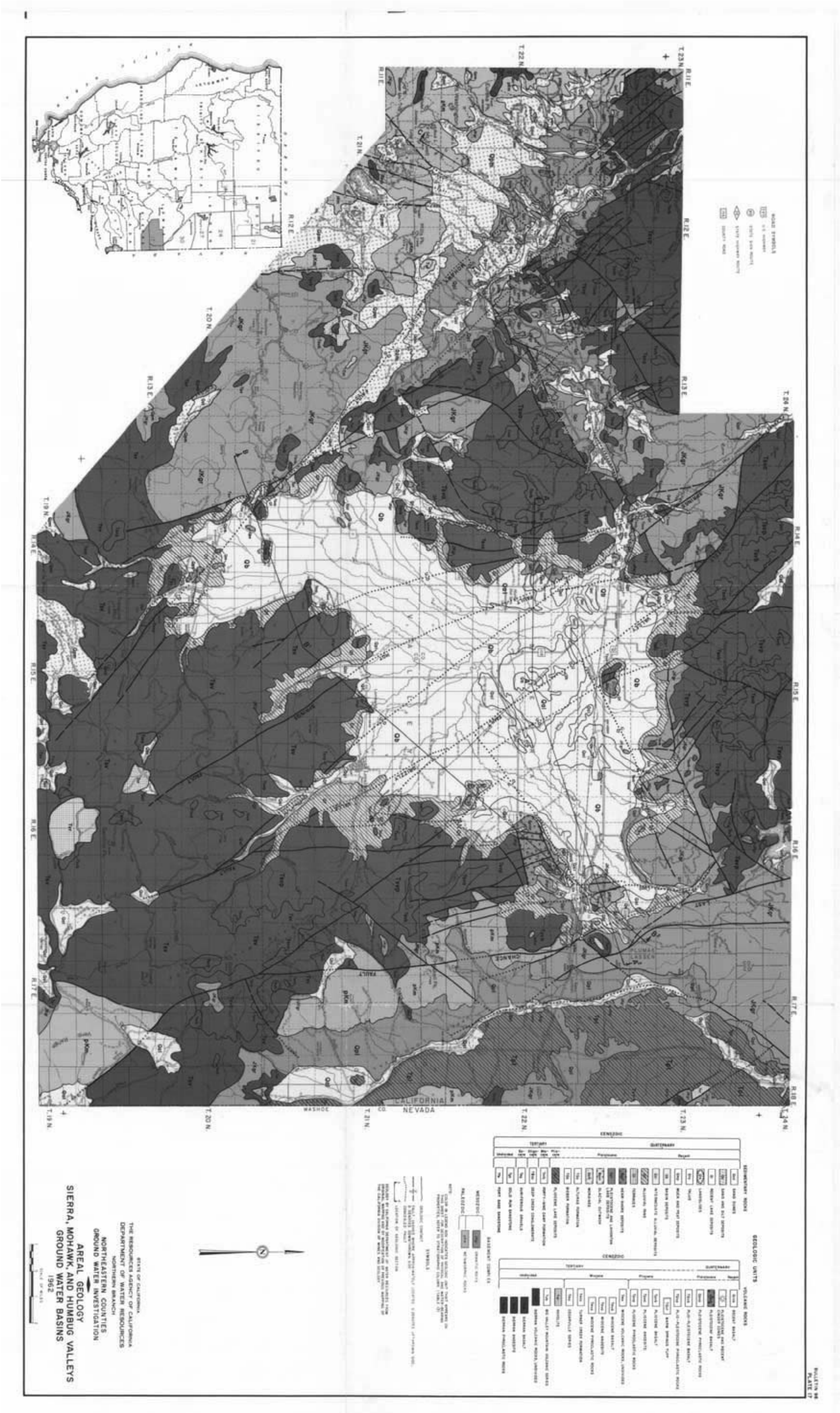
The first three problems listed above are usually associated with the alteration of physical characteristics of surface waters. Accordingly, they are addressed by Management Measure II.A in the section below. The last three problems listed above can be grouped to represent problems resulting from modification of instream and riparian habitat. They are addressed by Management Measure II.B in the subsequent section below.

A. Management Measure for Physical and Chemical Characteristics of Surface Waters

1. **Evaluate the potential effects of proposed channelization and channel modification on the physical and chemical characteristics of surface waters in coastal areas;**
2. **Plan and design channelization and channel modification to reduce undesirable impacts; and**
3. **Develop an operation and maintenance program for existing modified channels that includes identification and implementation of opportunities to improve physical and chemical characteristics of surface waters in those channels.**

1. Applicability

This management measure is intended to be applied by States to public and private channelization and channel modification activities in order to prevent the degradation of physical and chemical characteristics of surface waters from such activities. This management measure applies to any proposed channelization or channel modification projects, including levees, to


STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
NORTHERN BRANCH
NORTHEASTERN COUNTIES
GROUND WATER INVESTIGATION
AREAL GEOLOGY
SIERRA, MOHAWK, AND HUMBUG VALLEYS
GROUND WATER BASINS
1962
CALIFORNIA
NEVADA
WASHOE CO.
GEOLOGIC UNITS
CENOZOIC

Sierra Valley Groundwater Basin, Sierra Valley Groundwater Subbasin

- Groundwater Basin Number: 5-12.01
- County: Plumas, Sierra
- Surface Area: 117,700 acres (184 square miles)

Basin Boundaries and Hydrology

Sierra Valley is an irregularly shaped, complexly faulted valley in eastern Plumas and Sierra Counties. The basin is bounded to the north by Miocene pyroclastic rocks of Reconnaissance Peak, to the west by Miocene andesite of Beckwourth Peak, to the south and east by Tertiary andesite, and to the east by Mesozoic granitic rocks (Saucedo 1992).

The Middle Fork Feather River heads in Sierra Valley and is formed by the confluence of several streams draining the surrounding mountains. Most of the smaller tributaries flow north and northwest to join the Middle Fork Feather before it exits the valley at the northwest corner of the basin. Annual precipitation ranges from 13 inches in the valley to 29 inches in the upland areas to the south and west.

Hydrogeologic Information

Water-Bearing Formations

The primary water-bearing formations in Sierra Valley are Holocene sedimentary deposits, Pleistocene lake deposits, and Pleistocene lava flows. The aquifers of the valley are mainly alluvial fan and lake deposits. The alluvial fans grade laterally from the basin boundaries into course lake and stream deposits. The deposits of silt and clay act as aquitards or aquicludes in the formation. Aquiclude materials are predominantly fine-grained lake deposits. In the central part of the basin, alluvial, lake and basin deposits comprise the upper 30- to 200-feet of aquitard material that overlies a thick sequence of interstratified aquifers and aquicludes. The following summary of water-bearing formations is from DWR (1963) and DWR (1983).

Holocene Sedimentary Deposits. Holocene sedimentary deposits include alluvial fans and intermediate alluvium. Alluvial fans consist of unconsolidated gravel, sand, and silt with minor clay lenses. These deposits are located at the perimeter of the valley to a thickness of 200 feet. The fan deposits coalesce or interfinger with basin, lake, and alluvial deposits. Specific yield ranges from 8- to 17-percent. The fans are a major source of confined and unconfined groundwater and also serve as important recharge areas.

Intermediate alluvium consists of unconsolidated silt and sand with lenses of clay and gravel. Specific yield is estimated to range between 5- to 25-percent. This unit is limited in extent and is found along streams and centrally in the basin. The deposits are up to 50 feet in thickness and yield moderate amounts of groundwater to shallow wells.

Pleistocene Lake Deposits. Lake deposits underlie the majority of the valley and range in thickness to 2000 feet. These provide most of the

groundwater developed in the valley. The deposits consist of slightly consolidated, bedded sand, silt, and diatomaceous clay with the sand beds yielding large amounts of groundwater to wells. Specific yield ranges from 1- to 25-percent. Well production reportedly ranges up to 3,200 gpm.

Pleistocene Volcanic Rocks. Pleistocene volcanic rocks consist of jointed and fractured basalt flows ranging in thickness from 50- to 300-feet. These rocks are moderately to highly permeable and yield large amounts of groundwater to wells. They also serve as a recharge area and, where buried by lake deposits, form confined zones with significant artesian pressures.

Recharge Areas

Most of the upland recharge areas are composed of permeable materials occurring along the upper portions of the alluvial fans that border the valley. Recharge to groundwater is primarily by way of infiltration of surface water from the streams that drain the mountains and flow across the fans.

Groundwater Level Trends

Increases in groundwater development in the mid-late 1970s resulted in the cessation of flow in many artesian wells and large pumping depressions formed over the areas where heavy pumping occurred. Water levels in a flowing artesian well in the northeast portion of the basin declined to more than 50 feet below ground surface by the early 1990s, when reductions in groundwater pumpage occurred. Through the 1990's groundwater levels in the basin have recovered to mid 1970's levels.

Groundwater Storage

Groundwater Storage Capacity. The estimated groundwater storage in the basin is 7,500,000 acre-feet to a depth of 1000 feet (DWR 1963). DWR (1963) notes that the quantity of water that is useable is unknown. DWR (1973) estimates storage capacity to be between 1,000,000 to 1,800,000 acre-feet for the top 200 feet of sediments based on an estimated specific yield ranging from 5 to 8 percent. These estimates include the Chilcoot Subbasin.

Groundwater Budget (Type B)

Estimates of groundwater extraction are based on a survey conducted by the California Department of Water Resources during 1997. The survey included land use and sources of water. Estimates of groundwater extraction for agricultural and municipal/industrial uses are 3,400 and 110 acre-feet respectively. Deep percolation from applied water is estimated to be 2,100 acre-feet.

Groundwater Quality

Characterization. A wide range of mineral type waters exist throughout the basin. Sodium chloride and sodium bicarbonate type waters occur south of Highway 49 and north and west of Loyalton along fault lines. Two well waters are sodium sulfate in character. In other parts of the valley the water is bicarbonate with mixed cationic character. Calcium bicarbonate type water is found around the rim of the basin and originates from surface water runoff (DWR 1973). Total dissolved solids in the basin range in

concentration from 110- to 1620-mg/L, averaging 312 mg/L (DWR unpublished data).

Impairments. The poorest quality groundwater is found in the central west side of the valley where fault-associated thermal waters and hot springs yield water with high concentrations of boron, fluoride, iron, and sodium. Several wells in this area also have high arsenic and manganese concentrations. Boron concentrations in thermal waters have been measured in excess of 8 mg/L. At the basin fringes, boron concentrations are usually less than 0.3 mg/L (DWR 1983). There's also a sodium hazard associated with thermal waters and some potential for problems in the central portion of the basin (DWR 1983).

Water Quality in Public Supply Wells

Constituent Group[1]	Number of wells sampled[2]	Number of wells with a concentration above an MCL[3]
Inorganics – Primary	9	0
Radiological	3	0
Nitrates	10	0
Pesticides	9	0
VOCs and SVOCs	9	0
Inorganics – Secondary	9	1

[1] A description of each member in the constituent groups and a generalized discussion of the relevance of these groups are included in *California's Groundwater – Bulletin 118* by DWR (2003).
[2] Represents distinct number of wells sampled as required under DHS Title 22 program from 1994 through 2000.
[3] Each well reported with a concentration above an MCL was confirmed with a second detection above an MCL. This information is intended as an indicator of the types of activities that cause contamination in a given basin. It represents the water quality at the sample location. It does not indicate the water quality delivered to the consumer. More detailed drinking water quality information can be obtained from the local water purveyor and its annual Consumer Confidence Report.

Well Characteristics

	Well yields (gal/min)	
Irrigation	Range: 75 – 1500	Average: 640 (5 Well Completion Reports)
	Total depths (ft)	
Domestic	Range: 43 - 719	Average: 192 (178 Well Completion Reports)
Irrigation	Range: 80 - 1000	Average: 602 (31 Well Completion Reports)

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
DWR	Groundwater levels	34 wells semi-annually
DWR	Miscellaneous Water Quality	15 wells biennially(includes Subbasin 5-12.02)
Department of Health Services and cooperators	Miscellaneous Water Quality	9

Basin Management

Groundwater management:	Sierra Valley Groundwater Management District (authorized by Senate Bill 1391, enacted in 1980)
Water agencies	
Public	Loyalton Water District, Sierra Valley PUD
Private	Sierra Brooks Subdivision

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Errata

Changes made to the basin description will be noted here.

Click Project Title link to display all related documents. Document Type link will display full document description.

Records Found: 130

Query Parameters: Plumas MAP All

Date Range: 2000-01-01 to 2010-12-31

SCH#	Lead Agency	Project Title	Description	Document Type	Date Received
2005012010	Plumas County	Pine Ridge Tentative Subdivision Map	Annexation of unincorporated territory into the EPRFPD consisting of approximately 96 acres for a 13 lot subdivision.	NOD	12/1/2010
2010072072	Plumas County	Wolf Meadows Ranch LLC Tentative Parcel Map and Modification Permit (TPM/MOD 3-07/08-10)	Tentative Parcel Map to divide 216.09 acres into four parcels of 73.13 acres, 63.56 acres, 71.03 acres, 22.33 acres and a remainder parcel of 8.37 acres.	NOD	12/1/2010
2010112025	Plumas County	Aguilera, et al, Tentative Subdivision Map and Planned Development Permit (TSM/PD 7-09/10-01)	The project is a tentative subdivision map to divide approximately 87 acres into five parcels of 1.95 acres, 2.16 acres, 2.20 acres, 3.71 acres and 76.05 acres for single family residential use. The Planned Development Permit will allow a density transfer into the area zoned residential from the timber production area. The project is located near the community of La Porte in southwestern Plumas County. The project is located on both sides of Little Grass Valley Road and on the shores of Little Grass Valley Reservoir, which is operated by the South Feather Water and Power Agency.	MND	11/9/2010
2004032095	Plumas County	Lake Front at Walker Ranch	The project proposes a vesting tentative map and a planned development permit for a 1,397 acre site utilizing a combination of mixed land uses, including single-family and multi-family residential, commercial, open space, a golf course and related clubhouse, and hotel/spa. Approximately 410 acres are to be kept as open space and protective buffers (188 acre Bailey Creek Open Space Dedication Area and 222 acres of open space buffers). With the preparation of this EIR, the applicant is now seeking approval of the following: Planned Development (PD) Permit and Vesting Tentative Subdivision Map. In sum, the proposed project would include the following uses: - 1,674 residential dwelling units, varying in density and design - 9-acre, 100,000 square feet of retail and convenience commercial floor area - 14-acre, 150-room resort hotel/spa - 256-acre, 18-hole golf course - Approximately 410 acres of open space (including 188 acres designated as the Bailey Creek Open Space Dedication/Preserve, 222 acres of open space buffers) - 7-acre wastewater treatment plant facility and 37-acre recycled water storage ponds, to be managed and operated by the Walker Ranch Community Services District - Water supply system (including wells), to be managed and operated by the Walker Ranch Community Services District - Roadways and storm drainage infrastructure	NOD	10/7/2010
2010072072	Plumas County	Wolf Meadows Ranch LLC Tentative Parcel Map and Modification Permit (TPM/MOD 3-07/08-10)	NOTES: Review per Lead Tentative Parcel Map to divide 216.09 acres into four parcels of 73.13 acres, 63.56 acres, 71.03 acres, 22.33 acres and a remainder parcel of 8.37.	MND	7/28/2010
2010042039	Plumas County	Butler Tentative Parcel Map TPM 4-07/08-12	Tentative Parcel Map to divide one legal parcel totaling ~23.1 acres into two parcels of ~11.9 and 11.2 acres for residential development.	MND	4/13/2010
2007042162	Plumas County	Banchio Division of Land	Reconsideration of an approved tentative parcel map from Michael and Coleen Banchio to reduce the number parcels from 4 to 3 in order to	NOD	3/8/2010

		of Land	Coleen Bancroft to reduce the number parcels from 4 to 3 in order to reduce the length of required road improvements. This modification is accompanied by a Planned Development Permit application requesting use of a "T" turnaround in lieu of the normally required circular turnaround.		
2007072077	Plumas County	Schoensee Subdivision	Tentative Parcel Map dividing 15.51 acres into 5 parcels for residential and commercial use. One residence and 2 commercial structures are existing.	NOD	12/7/2009
2009109007	Plumas County	Paige Tentative Parcel Map and Planned Development Permit (File Number TPM/PD 1-07/08-08)	Division of 2.54 acres into two parcels of 0.54 acres and 2.00 acres for single family residential use. Planned Development Permit for density transfer and exception to the dead-end road length limit.	NOD	10/26/2009
2009092087	Plumas County	Karen Taylor-Partlow Tentative Parcel Map TPM 3-06/07-13	The project is a Tentative Parcel Map to divide one parcel totaling 80 acres into 4 parcel of 30.8, 20, 10.2 and 19 acres. Parcel 1 (19.0 acres) is developed with a single-family dwelling and several outbuildings. The remainder of the site is undeveloped.	MND	9/30/2009
2007072008	Plumas County	Don Melzark, Tentative Parcel Map & Planned Development TSM/PD 12-05/06-09	Tentative Parcel Map for division of 0.97 acres into four parcels. A maximum of 14 dwelling units could be constructed on the four lots. This project also includes a Planned Development permit to allow modification of the County's Class 3 Road standard. This modification includes the construction of a Class 3 roadbed within a 40 foot right of way and elimination of on-street parking. The County's Class 3 road standard allows reduction of the shoulder width when no on-street parking is permitted and no special maneuvering is needed for traffic safety and the average daily traffic is less than 1,000. This project will also necessitate the opening and improvement of the northerly 200 feet of Sierra Way to the County's Class 7 standard in order to provide a looped road system and avoid a dead end road length limit that violates County Code.	NOD	8/17/2009
2005012010	Plumas County	Pine Ridge Tentative Subdivision Map	Re-subdivision of portions of the existing Wildwood Estates Subdivision for a total of 22 parcels. A Planned Development Permit is required for a modification of the road standard.	NOD	7/2/2009
2009059001	Plumas County	Kunsman Tentative Parcel Map - TPM 3-05/06-17	Tentative Parcel Map to divide 4.73 acres into two parcels of 4.03 acres and 0.70 acres for commercial use.	NOD	5/5/2009
1980110305	Plumas County	TSM 4-01/02-05 - Creekside at Whitehawk Ranch Subdivision	Tentative Subdivision Map to divide 21.29 acres into 7 parcels for single family residential use under an existing Planned Development Permit and Development Agreement for Whitehawk Ranch.	NOD	4/28/2009
2009039007	Plumas County	Klivans Tentative Parcel Map - TPM 12-07/08-07	Tentative Parcel Map to divide 10 acres into three parcels for single-family residential use.	NOD	3/13/2009
2009029012	Plumas County	Tentative Parcel Map and Planned Development Permit for Elden and Virginia Bertrand	Tentative Parcel Map and Planned Development Permit to divide 30 acres into 4 parcels and a remainder for residential and recreational use. This project is in conjunction with a Planned Development Permit for a density transfer and modification of the road standards.	NOD	2/23/2009
2009029009	Plumas County	Tentative Subdivision Map and Planned Development Permit for Daniel Leonhardt	Tentative Parcel Map and Planned Development Permit for Daniel Leonhardt to divide 9.72 acres into 3 parcels of 3.24 acres each for industrial use. This project is in conjunction with a Planned Development Permit for modification of the dead-end road length limit standards.	NOD	2/13/2009
2009029010	Plumas County	Tentative Subdivision Map and Planned Development Permit for Chrismar Subdivision	Tentative Subdivision Map and Planned Development Permit for William C. Martin and Susan M. Christiansen to divide 2.19 acres into 5 lots for residential use ranging from 0.23 to 0.81 acres. This project is in conjunction with a Planned Development Permit for a density transfer in order to preserve residential density.	NOD	2/13/2009
2007082043	Plumas County	McMorrow Parcel Map TPM 4-06/07-	Tentative map to divide 51.13 acres into 4 parcels of 16.81 acres (net), 11.51 acres (net), 10.35 acres (net), and 10.6 acres (net).	NOD	11/13/2008

		14			
2008089013	Plumas County	Tentative Parcel Map and Planned Development Permit for Robert & Jean Blount	This proposed project is an application for a Tentative Parcel Map to divide an undeveloped 30.07-acre parcel into two (2) residential parcels, with Parcel 1 sized at 15.45 acres and Parcel 2 sized at 14.62 acres. Included with the map is an application requesting a transfer of residential density.	NOD	8/13/2008
1980110305	Plumas County	TSM 4-01/02-05 - Creekside at Whitehawk Ranch Subdivision	Tentative Subdivision Map to divide 100.27 acres into thirty-six parcels for single-family residential use in conjunction with a Modification Permit for use of t-turnarounds. Amendment of the existing Planned Development Permit and Development Agreement to allow one acre parcels not to exceed density allowed under the Development Agreement and modification of the GF boundary, consistent with the decision of the Plumas County Board of Supervisors, August 21, 2007.	NOD	3/26/2008
2006092104	Plumas County	Topol Tentative Parcel Map	This project consists of the issuance of a Timberland Conversion Permit for the construction of a campground and recreational development for a total of 13.79 acres of timberland.	NOD	3/5/2008
2007082043	Plumas County	McMorrow Parcel Map TPM 4-06/07-14	Tentative map to divide 51.13 acres into 4 parcels of 10.58 acres, 10.19 acres, 10.11 acres, 10.17 acres with a remainder of 10.10 acres for single-family residential use.	NOD	12/17/2007
2007082043	Plumas County	McMorrow Parcel Map TPM 4-06/07-14	The project is the division of 51.14 acres into four parcels of 10.58 acres, 10.19 acres, 10.11 acres, 10.17 acres and one remainder of 10.10 acres.	Neg	8/9/2007
2007072008	Plumas County	Don Melzark, Tentative Parcel Map & Planned Development TSM/PD 12-05/06-09	Tentative Parcel Map for division of 0.97 acres into four parcels. A maximum of 14 dwelling units could be constructed on the four lots. This project also includes a Planned Development permit to allow modification of the County's Class 3 Road standard. This modification includes the construction of a Class 3 roadbed within a 40 foot right of way and elimination of on-street parking. The County's Class 3 road standard allows reduction of the shoulder width when no on-street parking is permitted and no special maneuvering is needed for traffic safety and the average daily traffic is less than 1,000. This project will also necessitate the opening and improvement of the northerly 200 feet of Sierra Way to the County's Class 7 standard. This section of Sierra Way is unimproved and fenced off.	Neg	7/3/2007
2007052035	Plumas County	American Ridge Tentative Subdivision Map & Planned Development TSM/PD 9-05/06-04	Tentative subdivision map and planned development for division of 40 acres into 24 residential lots and a remainder with a modification of the dead-end road length limit.	Neg	5/8/2007
1980110305	Plumas County	TSM 4-01/02-05 - Creekside at Whitehawk Ranch Subdivision	Amendment to existing Planned Development Permit to allow modification of the ownership requirements in timber management areas and to clarify timber management process.	NOD	4/20/2007
2005012010	Plumas County	Pine Ridge Tentative Subdivision Map	Extension of time to record a subdivision map and planned development permit.	NOD	4/20/2007
2007032126	Plumas County	The Ridge at Chilcoot - Tentative Subdivision Map & Planned Development Permit - TSM/PD 7-04/05-01	Proposal to divide 33.82 acres into 9 parcels ranging in size from 2.57 acres to 6.53 acres for secondary suburban residential use with a planned development permit to allow modification of the minimum parcel size through a density transfer. Please refer to the tentative subdivision map.	Neg	3/26/2007
2005122112	Plumas County	Round Valley Woods Tentative Subdivision Map & Planned Development	Split 1.46 acre parcel into a 1.1 acre parcel and a .36 acre parcel.	NOD	1/22/2007
1981030218	Plumas County	Modification of Recorded Map by Certificate of Correction -	Modify the building and well exclusion area.	NOD	12/22/2006

		Countryman Estates - 5M106			
2006092104	Plumas County	Topol Tentative Parcel Map	Tentative Parcel Map to divide 13.8 acres into two parcels of 5.18 and 8.62 acres.	NOD	11/17/2006
2006062089	Plumas County	Feather River Pines, Tentative Subdivision Map, TSM 3-05/06-15	Tentative Subdivision Map for division of 14.92 acres into 49 single family residential lots and a 3 acre remainder parcel consisting of an existing church and parking area. This project also involves the extension of approximately 1,500 feet of water and sewer mains from the intersection of Chester-Warner Valley Road and Juniper Lake Road to the project site. The water and sewer mains will be located within the right of way of Chester Warner Valley Road. In January of 2006 the general plan designation of 11.94 acres of this property was changed from Prime Recreation with a Rec-1 zoning to Single Family Residential with a 7-R zoning in order to facilitate an entry level housing development.	NOD	11/17/2006
2006082149	Plumas County	Mill Site Tentative Subdivision Map	Mill Site Subdivision Unit #2, Tentative Subdivision Map to divide 12.20 acres into 27 lots (11 multiple family and 15 single family residential lots with an open space remainder). This project is the continuation of a development project that began with the recordation of Mill Site Subdivision Unit #1 which created 12 multiple family residential lots.	NOD	10/23/2006
2003102066	Plumas County	Darden Tentative Parcel Map - Negative Declaration #553	Tentative Parcel Map to divide 5.76 acres into 4 parcels.	NOD	10/23/2006
2006092104	Plumas County	Topol Tentative Parcel Map	Tentative Parcel Map to divide 13.8 acres into two parcels of 5.18 and 8.62 acres.	Neg	9/21/2006
2006098138	Plumas County	Spanish Creek Livestock Tentative Parcel Map/Planned Development Permit - TPM/PD 6-05/06-20	Tentative map dividing 277.12 acres into four parcels of 51.13 acres, 23.27 acres, 21.97 acres, 59.05 acres, and a remainder of 121.70 acres. The Planned Development Permit is to allow phasing of final maps and deferral of road improvements.	NOE	9/19/2006
2006082149	Plumas County	Mill Site Tentative Subdivision Map	Division of 12.20 acres into 27 lots (11 multiple family and 15 single family residential lots plus an open space remainder).	Neg	8/31/2006
2006062089	Plumas County	Feather River Pines, Tentative Subdivision Map, TSM 3-05/06-15	Tentative Subdivision Map for division of 14.92 acres into 49 single family residential lots and a 3 acre remainder parcel consisting of an existing church and parking area. This project also involves the extension of approximately 1,500 feet of water and sewer mains from the intersection of Chester-Warner Valley Road and Juniper Lake Road to the project site. The water and sewer mains will be located within the right of way of Chester Warner Valley Road.	EIR	8/8/2006
2006078164	Plumas County	Modification of Recorded Map by Certificate of Correction	Modification of Recorded Map by Certificate of Correction to modify (remove) a portion of the building exclusion area.	NOE	7/19/2006
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Modification of the use of Foxwood's Land Use Area #9 from a 300 unit recreational campground to single family residential use with a maximum of 83 units.	NOD	6/26/2006
1980110305	Plumas County	TSM 4-01/02-05 - Creekside at Whitehawk Ranch Subdivision	Tentative Subdivision Map to divide 16.8 acres into forty parcels under an existing Development Agreement.	NOD	6/26/2006
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Division of 43.29 acres into 83 residential lots with a Planned Development Permit for modification of the cul-de-sac design.	NOD	6/26/2006

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2006062089	Plumas County	Feather River Pines, Tentative Subdivision Map, TSM 3-05/06-15	Tentative Subdivision Map for division of 14.92 acres into 49 single family residential lots and a 3 acre remainder parcel consisting of an existing church and parking area. This project also involves the extension of approximately 1500 feet of water and sewer mains from the intersection of Chester-Warner Valley Road and Juniper Lake Road to the project site. The water and sewer mains will be located within the right of way of Chester Warner Valley Road.	NOP	6/19/2006
2006042017	Plumas County	Wilburn's Sierra Park; Tentative Subdivision Map, TSM 4-04/05-08	Division of 15.43 acres into 39 lots (33 multiple family residential and 6 periphery commercial lots).	NOD	6/5/2006
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Reconsideration of Phase 5 of Cedarwood consisting of 61 lots and designated open space.	NOD	5/15/2006
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Tentative Subdivision Map to divide 98.19 acres into one hundred nine parcels under an existing Planned Development Permit and Development Agreement.	NOD	5/15/2006
1980110305	Plumas County	TSM 4-01/02-05 - Creekside at Whitehawk Ranch Subdivision	Tentative Subdivision Map to divide 37.36 acres into forty parcels under an existing Planned Development Permit and Development Agreement.	NOD	4/25/2006
2006042017	Plumas County	Wilburn's Sierra Park; Tentative Subdivision Map, TSM 4-04/05-08	Tentative subdivision map for division of 15.43 acres into 39 lots (33 multiple family residential and 6 periphery commercial lots).	Neg	4/4/2006
2006039031	Plumas County	Zicker Tentative Parcel Map - TPM 11-04/05-09	Tentative Parcel Map to divide 212 acres into four parcels of 6.2 acres, 4.8 acres, 3.3 acres, 4.3 acres and a remainder of 193 acres for single-family residential and agricultural use.	NOD	3/28/2006

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Query Parameters: Plumas MAP All

Date Range: 2000-01-01 to 2010-12-31

SCH#	Lead Agency	Project Title	Description	Document Type	Date Received
2006012132	Plumas County	Tentative Parcel Map - William C. Goss - TPM 9-05/06-06	Tentative map to divide 28 acres into four separate parcels of 3.37 ac., 4.0 ac., 3.11 ac. and 17.52 ac. for single family residential use.	NOD	3/20/2006
2006012140	Plumas County	Tentative Parcel Map - Cassity, Michael and Joan - TPM 7-05/06-02	Tentative parcel map to divide 40 acres into three parcels of 5.7 acres, 3.0 acres and 27.3 acres for single family residential use.	NOD	3/20/2006
2005122112	Plumas County	Round Valley Woods Tentative Subdivision Map & Planned Development	Tentative subdivision map and planned development for division of 16.81 acres into 33 residential lots with a modification of the minimum parcel size through a density transfer. The density transfer is being sought to avoid construction on steeper slopes.	NOD	3/1/2006
2006012140	Plumas County	Tentative Parcel Map - Cassity, Michael and Joan - TPM 7-05/06-02	Tentative parcel map to divide 40 acres into three parcels of 5.7 acres, 3.0 acres and 27.3 acres for single family residential use.	Neg	1/30/2006
2006012132	Plumas County	Tentative Parcel Map - William C. Goss - TPM 9-05/06-06	Tentative map to divide 28 acres into four separate parcels of 3.37 ac., 4.0 ac., 3.11 ac. and 17.52 ac. for single family residential use.	Neg	1/27/2006
2005122112	Plumas County	Round Valley Woods Tentative Subdivision Map & Planned Development	Tentative subdivision map and planned development for division of 16.81 acres into 33 residential lots with a modification of the minimum parcel size through a density transfer. The density transfer is being sought to avoid construction on steeper slopes.	Neg	12/23/2005
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Reconsideration of tentative map to combine Foxhead Drive and Fox Leaf Lane into one road named Foxhead Drive, with through access for the entire development.	NOD	12/19/2005
2005102029	Plumas County	Richard and Pamela Gilpatrick Tentative Parcel Map and Planned Development	Proposal to divide 40.45 acres into four parcels for rural residential use with a planned development permit to allow modification of the minimum parcel size through a density transfer.	NOD	12/19/2005
2005122021	Plumas County	Tentative Parcel Map - Zicker, John E.	Tentative Parcel Map to divide 212 acres into four parcels of 6.2 acres, 4.8 acres, 3.3 acres, and 4.3 acres with a remainder of 193 acres for single-family and agricultural uses.	Neg	12/2/2005
2005082026	Plumas County	Svetz Tentative Parcel Map - TPM 6-04/05-22	Tentative parcel map to divide 90 acres into four parcels of 3.0 acres, 3.46 acres, 3.0 acres, and 80 acres for single-family residential use.	NOD	10/24/2005
2005102029	Plumas County	Richard and Pamela Gilpatrick Tentative Parcel Map and Planned	Proposal to divide 40.45 acres into four parcels for rural residential use with a planned development permit to allow modification of the minimum parcel size through a density transfer.	Neg	10/7/2005

		Development			
2003082030	Plumas County	Tentative Parcel Map and Planned Development Permit - TPM/PD 5-02/03-10 (Melts, Robert and Nansea)	Extension of time to record an approved tentative parcel map.	NOD	9/16/2005
1981030218	Plumas County	Modification of Recorded Map by Certificate of Correction - Countryman Estates - 5M106	Modification of Recorded Map to move the building exclusion area and to remove the water well exclusion area.	NOD	9/16/2005
1980110305	Plumas County	TSM 4-01/02-05 - Creekside at Whitehawk Ranch Subdivision	Extension of time to record Phase 1 of Creekside at Whitehawk Ranch subdivision.	NOD	8/17/2005
2005082026	Plumas County	Svetz Tentative Parcel Map - TPM 6-04/05-22	Tentative parcel map to divide 90 acres into four parcels of 3.0 acres, 3.46 acres, 3.0 acres, and 80 acres for single-family residential use.	MND	8/8/2005
1999102057	Plumas County	Tentative Subdivision Map and Planned Development Permit-Norton Meadows Subdivision TSM/PD 7-99/00-02	Extension of time to record Phase 2 of Norton Meadows Subdivision.	NOD	6/20/2005
2005012010	Plumas County	Pine Ridge Tentative Subdivision Map	Tentative Subdivision Map dividing 93.61 acres into 20 lots and the remainder for single-family residential use, with a Planned Development Permit to modify the dead-end road length limit.	NOD	2/22/2005
2004112072	Plumas County	Cormany Tentative Parcel Map - TPM 4-03/04-13	Tentative parcel map to divide 315.7 acres into two parcels of 161.33 acres and 154.37 acres.	NOD	1/18/2005
2005012010	Plumas County	Pine Ridge Tentative Subdivision Map	Tentative Subdivision Map to divide 93.61 acres into 8 new parcels and reconfigure 12 existing parcels for a total of 20 parcels.	Neg	1/4/2005
2004112017	Plumas County	Panfili Tentative Parcel Map	Tentative Parcel Map to divide two assessor parcels (one legal property) of 61.15 acres and 401.35 acres into four parcels of 2.71 acres, 3.05 acres, 5.34 acres, and 4.04 acres with a remainder parcel of 447.36 acres.	NOD	12/15/2004
2004112015	Plumas County	Tentative Parcel Map for Earle and Rosalie Little; TPM 4-03/04-12	Division of 15.16 acres into four parcels for industrial use.	NOD	12/15/2004
2004112072	Plumas County	Cormany Tentative Parcel Map - TPM 4-03/04-13	Tentative parcel map to divide 315.7 acres into two parcels of 161.33 acres and 154.37 acres.	Neg	11/18/2004
2004112015	Plumas County	Tentative Parcel Map for Earle and Rosalie Little; TPM 4-03/04-12	Division of 15.16 acres into four parcels for industrial use.	Neg	11/3/2004
2004112017	Plumas County	Panfili Tentative Parcel Map	Tentative Parcel Map to divide two assessor parcels (one legal property) of 61.15 acres and 401.35 acres into four parcels of 2.71 acres, 3.05 acres, 5.34 acres, and 4.04 acres with a remainder parcel of 447.36 acres.	Neg	11/3/2004
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned	Reconsideration of the Phase IV portion of the Bailey Creek tentative subdivision map and planned development permit consisting of the minor realignment of the roadways and the addition of 14 lots.	NOD	10/19/2004

		Development: TSM/PD 2-02/03-04			
2004082112	Plumas County	Tentative Parcel Map for Peter & Nancy Twight; TPM/PD 7-04/05-01	Division of 20 acres into two parcels of 10 acres each for residential use.	NOD	10/19/2004
2004109043	Plumas County	Metts Tentative Parcel Map and Planned Development Permit TPM/PD 5-02/03-10	Tentative Parcel Map for a division of a 13.55 acres into four parcels of 5.90 acres, 2.69 acres, 3.30 acres, and 1.66 acres along with a Planned Development Permit for a density transfer and reduction in minimum parcel size.	NOD	10/14/2004
2004062152	Plumas County	Tentative Parcel Map for James Birks; TPM/PD 10-03/04-07	Division of approximately 54.91 acres into four parcels and a remainder for commercial and residential use. This division includes a Planned Development permit which requests a transfer of residential density to permit one additional dwelling unit on commercial parcels 1 and 2, and a request to transfer commercial zoning from parcel 4 to a portion of the designated remainder.	NOD	9/13/2004
2004072152	Plumas County	Wittick Tentative Parcel Map - TPM 11-03/04-09	Tentative Parcel Map for a division of eighty acres into two parcels of 40 acres each.	NOD	9/13/2004
2004082112	Plumas County	Tentative Parcel Map for Peter & Nancy Twight; TPM/PD 7-04/05-01	Division of 20 acres into two parcels of 10 acres each for residential use.	Neg	8/26/2004
2004072152	Plumas County	Wittick Tentative Parcel Map - TPM 11-03/04-09	Division of 80 acres into two parcels of 40 acres each.	Neg	7/29/2004
2004062152	Plumas County	Tentative Parcel Map for James Birks; TPM/PD 10-03/04-07	Division of 54.91 acres into 4 parcels of 3.58, 1.58, and 6.17 acres with a remainder of 37.57 acres. This division includes a Planned Development permit which requests a transfer of residential density to permit 1 additional dwelling unit on commercial parcels 1 and 2, and a request to transfer commercial zoning from parcel 4 to a portion of the designated remainder.	Neg	6/30/2004
1980110305	Plumas County	TSM 4-01/02-05 - Creekside at Whitehawk Ranch Subdivision	Reconsideration of an approved tentative parcel map to divide 31.92 acres into seven parcels under an existing Development Agreement and Planned Development Permit.	NOD	5/14/2004
2003042145	Plumas County	Tentative Parcel Map for Richard Hanson; TPM 02-01/02-05	Division of 25.76 acres into 4 parcels (11.13, 3.10, 3.31 and 11.53 acres).	NOD	3/12/2004
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Division of 56 acres into 35 residential and 6 open space lots.	NOD	3/12/2004
2003062162	Plumas County	Tentative Parcel Map for Nissley and Plank (TPM 12-02/03-05)	Reconsideration of an approved tentative parcel map to divide 30.04 acres into two parcels.	NOD	3/3/2004
1980031302	Plumas County	Tentative Parcel Map for Tim & Terry Gallagher, TPM 10-03/04-06	Division of 3 acres into two parcels of suburban residential use.	NOD	1/20/2004
2003102066	Plumas County	Darden Tentative Parcel Map - Negative Declaration #553	Tentative parcel map for a division of 8.35 acres into 4 parcels of 2.12 acres, 1.69 acres, 3.13 acres & 1.41 acres for single family residential & commercial use.	NOD	12/17/2003
1996052080	Plumas County	SMITH CREEK	Division of 93.84 acres into four parcels for resources production and	NOD	10/20/2003

1996052080	Plumas County	SMITH CREEK RANCH UNIT #3	Division of 93.84 acres into four parcels for resources production and rural residential use.	NOD	10/20/2003
2003102066	Plumas County	Darden Tentative Parcel Map - Negative Declaration #553	Tentative parcel map for a division of 8.35 acres into 4 parcels of 2.12 acres, 1.69 acres, 3.13 acres & 1.41 acres for single family residential & commercial use.	Neg	10/14/2003
1999102057	Plumas County	Tentative Subdivision Map and Planned Development Permit-Norton Meadows Subdivision TSM/PD 7-99/00-02	Tentative Subdivision Map for a division of 52.09 acres into eleven parcels single-family residential use under an existing Planned Development Permit.	NOD	9/26/2003
2003062162	Plumas County	Tentative Parcel Map for Nissley and Plank (TPM 12-02/03-05)	Tentative Parcel Map dividing 30.04 acres into three parcels of 10.00 acre, 10.01 acres, and 10.02 acres for single-family residential use.	NOD	9/10/2003
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Tentative map for 397 lots, common area, and two remainders, Planned Development Permit for a 15 mile per hour design speed for roads in Cedarwood, consistent with the Planned Development Permit for Walker Ranch.	NOD	9/10/2003
2003072025	Plumas County	Marsh Tentative Parcel Map - TPM 11-02/03-04	Tentative Parcel map dividing 47.3 acres into 3 parcels of 10.41 acres, 5.68 acres, and 31.04 acres for single family residential use.	NOD	9/10/2003
2003082030	Plumas County	Tentative Parcel Map and Planned Development Permit - TPM/PD 5-02/03-10 (Melts, Robert and Nansea)	Tentative Parcel Map dividing 13.55 acres into four parcels of 5.90, 2.69, 3.30 and 1.66 acres for single-family residential use with a Planned Development Permit for a density transfer to reduce the minimum parcel size.	Neg	8/7/2003
1980110305	Plumas County	TSM 4-01/02-05 - Creekside at Whitehawk Ranch Subdivision	Tentative Subdivision Map dividing 31.92 acres into seven lots and for single-family residential use.	NOD	7/11/2003
2003072025	Plumas County	Marsh Tentative Parcel Map - TPM 11-02/03-04	Tentative Parcel map dividing 47.3 acres into 3 parcels of 10.41 acres, 5.68 acres, and 31.04 acres for single family residential use.	Neg	7/7/2003
2003062162	Plumas County	Tentative Parcel Map for Nissley and Plank (TPM 12-02/03-05)	Tentative Parcel Map dividing 30.04 acres into three parcels of 10.00 acre, 10.01 acres, and 10.02 acres for single-family residential use.	Neg	6/30/2003
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Division of 3.06 acres into 11 lots and a common area for multiple family residential use with a modification of the minimum lot size through a density transfer.	NOD	5/16/2003
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Division of 43.6 acres into 82 lots for single family and multiple family residential use with a Planned Development to allow the following: -Construction of up to three dwelling units on lots 587 through 613, and lots 285, 417, and 418. -Modification of the minimum parcel size through a density transfer.	NOD	5/16/2003

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Records Found: 130

Query Parameters: Plumas MAP All

Date Range: 2000-01-01 to 2010-12-31

SCH#	Lead Agency	Project Title	Description	Document Type	Date Received
2003042145	Plumas County	Tentative Parcel Map for Richard Hanson; TPM 02-01/02-05	Division of 25.76 acres into 4 parcels.	Neg	4/23/2003
1990020533	Plumas County	Hansen Woods Woods Unit	The project involves the division of 1.75 acres into 3 lots for single family residential use.	NOD	9/13/2002
2002062040	Plumas County	Eicher / Brenneman Tentative Parcel Map TPM 2-01/02-6	Tentative Parcel Map to divide 41.08 acres into four parcels of 10.92, 8.86, 17.78 and 3.51 acres.	NOD	9/5/2002
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Tentative Subdivision Map 6-01/02-7 Foxglenn Phase #2: Division of 52.97 acres into 25 lots for single family residential and a 43.44 acre remainder.	NOD	9/3/2002
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Planned development permit to allow construction of multiple units on a single lot by transfering unused density, and to modify the County's Class 3 road standard to permit perpendicular parking on one side of the street.	NOD	7/12/2002
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Amendment of the Planned Development Permit for Walker Ranch to add a visitors pavilion-information center and sales office-at the main entrance to the Foxwood development. The original application for Foxwood included a proposed visitors pavilion-welcome center, but that was not included in the uses permitted in the amended planned development permit for Walker Ranch.	NOD	6/24/2002
2002079051	Plumas County	Modification of a Recorded Map Through a Certificate of Correction - Lot of Countryman Estates	Application to amend the recorded map of Sierra Estates to modify the building exclusion area from 100 to 50 feet from the stream which crosses the lot.	NOD	6/24/2002
1996112067	Plumas County	Bucks Lake Meadow, Tentative Subdivision Map	Modification to: 1) Replace condition #7 with a condition which will require the developer to obtain a special use permit to allow improvement and use of an off-site forest service road, and to accept Bucks Meadows Drive as the functional equivalent of a looped road and, 2) allow phasing of final maps.	NOD	6/24/2002
2002062040	Plumas County	Eicher / Brenneman Tentative Parcel	Tentative Parcel Map to divide 41.08 acres into four parcels of 10.92, 8.86, 17.78 and 3.51 acres.	Neg	6/12/2002

		Map TPM 2-01/02-6			
1997022067	Plumas County	Tentative Subdivision Map & Planned Dev.: Sierra Mirage	Application to amend the recorded map of Sierra Estates to modify the designated w etland habitat boundary and corresponding and grading restrictions for Lot 11.	NOD	5/23/2002
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Modification permit for tentative subdivision map - Foxw ood Unit #1: Division of 196.54 acres into 84 lots and 7 remainders for single family residential and recreational use. The modification w ould remove the requirement for provision of on-street parking along that portion of Foxw ood Boulevard along the front of lot A.	NOD	5/23/2002
2002032061	Plumas County	Tentative Parcel Map-TPM 12-01/02-4	A Tentative Parcel Map to divide 40 acres into tw o parcels of 8 acres and 32 acres.	NOD	4/11/2002
2002032061	Plumas County	Tentative Parcel Map-TPM 12-01/02-4	A Tentative Parcel Map to divide 40 acres into tw o parcels of 8 acres and 32 acres.	Neg	3/11/2002
1980110305	Plumas County	TSM 4-01/02-05 - Creekside at Whitehaw k Ranch Subdivision	Tentative Subdivision Map dividing 7.35 acres into tw enty-tw o parcles and one common area for single-family residential use (common-w alled tow nhomes).	NOD	1/25/2002
2001109023	Plumas County	Tentative Parcel Map TPM 7-01/02-01 - Wiegand Parcel Map	Tentative parcel map dividing 12.93 acres into tw o parcels of 1.32 and 11.68 acres for single-family residential use.	NOD	10/15/2001
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Division of 196.54 acres into 84 lots and 7 remainders for single family residential and recreational use.	NOD	9/20/2001
2001072096	Plumas County	Tentative Parcel Map, Sylvia Kim (TPM 5-00/01-12)	Division of 131.26 acres into 3 parcels of 70.0, 51.26, and 10.0 acres for single-family residential use.	NOD	9/20/2001
2001052029	Plumas County	Leonhardt Tentative Parcel Map TPM 12-00/01-8	Tentative Parcel Map to divide 100.58 acres into four parcels of 19.97, 24.95, 4.12 and 11.90 acres w ith a designated remainder.	NOD	7/27/2001
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Amendment of approximately 6.13 acres of the planned development permit to modify the permitted land use from a 10 unit residential use to a 10,500 square foot church expansion consisting of a w orship center and classrooms.	NOD	7/27/2001
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Amendment of Planned Development Permit for approximately 418 acres consisting of 844 residential units, 24 acres of commercial, 300 space RV park, 7 acre church site, a new 9 acre sew age disposal area, and a 12.6 acre recreation site. The location and densities of the above land uses are proposed to be modified from the original Walker Ranch Planned Development Permit. The developer has also requested modification of minimum yard, structure height, and dead-end road length limit requirements.	NOD	7/27/2001
2001072096	Plumas County	Tentative Parcel Map, Sylvia Kim (TPM 5-00/01-12)	A Tentative Parcel Map to divide 131.26 acres into three parcels of 70 acres, 51.26 acres, and 10 acres for single-family residence.	Neg	7/23/2001
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map /	Division of 196.54 acres into 84 lots and 7 remainders for single family residential and recreational use.	NOD	7/20/2001

		Planned Development: TSM/PD 2-02/03-04			
2001052029	Plumas County	Leonhardt Tentative Parcel Map TPM 12-00/01-8	Tentative Parcel Map to divide 100.58 acres into four parcels of 19.97, 24.95, 4.12 and 11.90 acres with a designated remainder.	Neg	5/7/2001
1996112067	Plumas County	Bucks Lake Meadow, Tentative Subdivision Map	Extension of time for division of 148.8 acres into 19 lots for residential use.	NOD	4/13/2001
2000102030	Plumas County	Johnston Tentative Parcel Map TPM 7-00/01-1	Tentative Parcel Map to divide 120 acres into three parcels of 4.62, 4.62, and 8.73 acres with designated remainder.	NOD	12/20/2000
2000102030	Plumas County	Johnston Tentative Parcel Map TPM 7-00/01-1	Tentative Parcel Map to divide 120 acres into three parcels of 4.62, 4.62, and 8.73 acres with designated remainder.	Neg	10/10/2000
2000099029	Plumas County	Extension of Time, Tentative Parcel Map - TPM 6-97/98-08, Michael and Sandra Hartigan	Division of 1.54 acres into two parcels, 0.8 and 0.74 acres for single-family residential use.	NOD	9/15/2000
2000099029	Plumas County	Extension of Time, Tentative Parcel Map - TPM 6-97/98-08, Michael and Sandra Hartigan	Division of 1.54 acres into two parcels, 0.8 and 0.74 acres for single-family residential use.	NOD	9/15/2000
2000039007	Plumas County	Tenative Subdivision Map and Planned Development Permit-Norton Meadows Subdivision	Tenative Subdivision Map to divide 68 acres into 22 lots with an average site of one acre, with a Planned Development Permit for a density transfer and a modification of the dead-end road length limit.	NOD	3/13/2000
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Reconsideration of the tenative subdivision map for Baily Creek subdivision, a component of the Walker Ranch project. The reconsideration is for division of the original parcel A into ten (10) parcels. Parcel A includes the golf course, the future clubhouse site, and the Multiple Family Residential Area where is the interim clubhouse. The purpose of this proposal is financing	NOD	2/29/2000

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Records Found: 132

Query Parameters: Plumas AMENDMENT All

Date Range: 2000-01-01 to 2010-12-31

SCH#	Lead Agency	Project Title	Description	Document Type	Date Received
2009089015	Plumas County	Special Use Permit Amendment U 11-93/94-04	This proposal is for the expansion of use for the solid waste facility at the East Quincy Transfer Station To include recycling components of the County's Solid Waste northwesterly of the East Quincy Transfer Station. The proposed project consists of the addition of a recycling center (drop-off and buy-back) at the Armory site including a non-CRV sorting/drop-off facility and a CRV "redemption center", i.e., "buy-back" facility. Operations will be conducted during the same days and hours as the East Quincy Transfer Station, Friday Through Tuesday from 8 AM to 4 PM, except during winter hours, when the facility will be open from 9 AM to 4 PM. The buy-back portion of the County's recycling operations shall be conducted by TOMRA Pacific Company under permit from the State of CA Dept of Conservation, Division of Recycling. TOMRA will relocate their "reverse-vending" machine operation from Sav-Mor Market in East Quincy to the Armory site.	NOD	8/13/2009
2007042086	Plumas County	Feather River Inn General Plan Amendment, Rezone and Planned Development Permit	Project consists of restoration of the Feather River Inn, an existing recreational facility, within a master planned recreation-oriented residential development of up to 114 condominium/town home residences, along with open space, an events center, outdoor ceremony facilities, golf course, wastewater treatment facility, maintenance and parking.	NOD	6/8/2009
1980110305	Plumas County	TSM 4-01/02-05 - Creekside at Whitehawk Ranch Subdivision	Tentative Subdivision Map to divide 21.29 acres into 7 parcels for single family residential use under an existing Planned Development Permit and Development Agreement for Whitehawk Ranch.	NOD	4/28/2009
2007042086	Plumas County	Feather River Inn General Plan Amendment, Rezone and Planned Development Permit	General Plan Amendment and rezone and Planned Development Permit to allow restoration and rehabilitation of the historic Feather River Inn, to expand existing recreation and commercial activities and to create 112 dwelling units for recreation oriented residential development.	EIR	8/25/2008
1980110305	Plumas County	TSM 4-01/02-05 - Creekside at Whitehawk Ranch Subdivision	Tentative Subdivision Map to divide 100.27 acres into thirty-six parcels for single-family residential use in conjunction with a Modification Permit for use of t-turnarounds. Amendment of the existing Planned Development Permit and Development Agreement to allow one acre parcels not to exceed density allowed under the Development Agreement and modification of the GF boundary, consistent with the decision of the Plumas County Board of Supervisors, August 21, 2007.	NOD	3/26/2008
2005032110	Plumas County	Gould Swamp - 2005 Summer General Plan Amendments	Proposal to amend the general plan designation and zoning of approximately 14.4 acres from Timberland Production Zone (TPZ) to Prime Recreation and Recreation Commercial.	NOD	12/19/2007
2006082116	Plumas County	Taborski 2006 Summer General Plan Amendment	Amend .20 acres of the 1.76 acre property from Prime Opportunity, Periphery Commercial and C-2 zoning to Prime Opportunity, Multiple Residential and M-R zoning.	NOD	11/1/2007
1997072003	Plumas County	PD 1-99/00-04 & TPM 1-99/00-03; Grizzly Ranch	Proposal from Grizzly Creek Development, LLC to divide 2.14 acres into 4 lots for single family residential use with a planned development with modification to allow development on a roadway which exceeds the dead end road length limit and reduction of the minimum horizontal curve radius and associated pavement width.	NOD	6/27/2007

2007032135	Plumas County	Sierra Cascade Aggregate & Asphalt Products LLC - Amendment of a Permit to Mine & Reclamation Plan (MR 7/24/87-01) and Special Use Permit (U 6-03/04-19)	Proposal to amend an existing permit to mine and reclamation plan application to: (1) increase the maximum depth of mining from 30 to 80 feet, (2) expand the extraction area with the permitted mine site, (3) modify reclamation measures (including the grading of pit slopes and revegetation), (4) inclusion of an asphalt batch plant, and (5) incorporation of other requirements of the Surface Mining & Reclamation Act which were not in effect at the time of original approval of the reclamation plan. This application will supersede the previous reclamation plan approved for this property. The Special Use Permit will allow continuation of the mining use in conformance with Plumas County Code.	NOD	5/22/2007
2004112100	Plumas County	Wolf Meadows Ranch LLC General Plan Amendment - GPA 7-04/05-01	Project in Winter 2005 General Plan Amendment.	NOD	5/14/2007
2007042150	Plumas County	Farnham - 2006 Winter General Plan Amendment	Proposal to amend the general plan designation and zoning for approx. 19.98 acres from Moderate Opportunity, Secondary Suburban (S-3). The Secondary Suburban (S-3) designation permits residential use of property and no specific land use plan was provided in the application to the Department of Planning and Building Services.	Neg	4/27/2007
2007048146	Plumas County	Quintana, John and Corrine - General Plan Amendment	General Plan Amendment and rezone.	NOE	4/20/2007
2006082114	Plumas County	Darden - 2006 Summer General Plan Amendment	Amend a 3.27 acre portion of the 5.76 acre property from Moderate Opportunity area, Suburban, Periphery Commercial, and C-2 zoning to Moderate Opportunity area, Suburban and S-1 zoning with a Farm Animal Combining Zone (F).	NOD	4/20/2007
1980110305	Plumas County	TSM 4-01/02-05 - Creekside at Whitehawk Ranch Subdivision	Amendment to existing Planned Development Permit to allow modification of the ownership requirements in timber management areas and to clarify timber management process.	NOD	4/20/2007
2006092116	Plumas County	Little Norway 2006 Summer General Plan Amendment	Proposal to amend 1.52 acres from Recreation Commercial to Multiple Family Residential. The property is within a Prime Opportunity Area. The designation will permit residential units at the ratio of 1 unit for every 2,000 square feet. Residential units can include single family homes, connected units, or condominiums. This amendment will involve changes in permitted and conditionally permitted land uses.	NOD	4/20/2007
2007042086	Plumas County	Feather River Inn General Plan Amendment, Rezone and Planned Development Permit	The Feather River Inn has been operated as a resort sine the late 1800s. At one point it was the Feather River Prep School and, before the recent change in ownership, was owned and operated by the University of the Pacific as a resort. A golf course facility was located north and south of State Highway 70 until recently when the southerly portion of the golf course was abandoned due to inadequate access across State Highway 70. The golf course to the north of State Highway 70 has been redesigned and landscaped. The owners have applied for and received various building permits for construction for new motel units, demolition of unsafe structures, and restoration and rehabilitation of the lodge.	NOP	4/16/2007
2007032135	Plumas County	Sierra Cascade Aggregate & Asphalt Products LLC - Amendment of a Permit to Mine & Reclamation Plan (MR 7/24/87-01) and Special Use Permit (U 6-03/04-19)	This project is a proposal to amend an existing permit to mine and reclamation plan application to: (1) increase the maximum depth of mining from 30 to 80 feet, (2) expand the extraction area with the permitted mine site, (3) modify reclamation measures (including the grading of pit slopes and revegetation), (4) inclusion of an asphalt batch plant, and (5) incorporation of other requirements of the Surface Mining & Reclamation Act which were not in effect at the time of original approval of the reclamation plan. This application will supersede the previous reclamation plan approved for this property. The Special Use Permit will allow continuation of the mining use in conformance with Plumas County Code.	Neg	3/26/2007
2007032112	Plumas County	Finkbeiner - 2006 Summer General Plan Amendment	The proposal is to change approx. 0.64 acres from Suburban (S-1) to Recreation Commercial while retaining the Special Plan-Scenic Road (SP-ScR) Combining Zone. The site is designated Suburban within a Moderate Opportunity Area on the General Plan.	Neg	3/22/2007
2006052138	Plumas County	Conover - 2006 Summer General Plan Amendment	The proposal is to amend the General Plan designation of a 12.62 acre portion of the 20.67 acre site from Light Industrial to Single-Family Residential.	EIR	3/9/2007

2007032041	Plumas County	AVMI, LLC General Plan Amendment	General Plan Amendment application to change designation of portion of property from Periphery Commercial to Single Family Residential to provide for small lot residential in area with existing services.	Neg	3/8/2007
2007012123	Plumas County	Spanish Creek Livestock General Plan Amendment and Zone Change; Summer 2006 GPA 12-05106-09	General Plan Amendment and Zone Change to Moderate Opportunity area, Rural and Moderate Opportunity area, Secondary Suburban.	EIR	1/30/2007
2004112100	Plumas County	Wolf Meadows Ranch LLC General Plan Amendment - GPA 7-04/05-01	General Plan Amendment to amend from Important Ag, GA zoning to Moderate Opportunity area, Rural and R-10 zoning.	EIR	1/4/2007
2006052079	Plumas County	Pourcho General Plan Amendment	Project to amend the Plumas County General Plan to Moderate Opportunity, Secondary Suburban and rezone to S-3.	NOD	12/28/2006
2006062044	Plumas County	Taylor General Plan Amendment - Winter 2006 General Plan Amendments	Project to amend the Plumas County General Plan to Moderate Opportunity, Agricultural Buffer and rezone to R-10.	NOD	12/28/2006
2006042016	Plumas County	McIntyre General Plan Amendment and Rezone-Winter 2005	Project to amend the Plumas County General Plan to Moderate Opportunity, Suburban, Scenic Road and rezone to S-1 for one acre portion of parcel (retain SP-ScR zoning).	NOD	12/28/2006
2004102077	Plumas County	Perano General Plan Amendment - Winter 2005 General Plan Amendments	Project to amend the Plumas County General Plan to Prime Opportunity area, Periphery Commercial, Scenic Road, and Prime Recreation and rezone to C-2, SP-ScR, Rec-OS.	NOD	12/28/2006
2004102077	Plumas County	Perano General Plan Amendment - Winter 2005 General Plan Amendments	Project to amend the Plumas County General Plan to Moderate Opportunity, Rural and rezone to R-10.	NOD	12/28/2006
2006082118	Plumas County	Qintana General Plan Amendment - GPA 3-04/05-12	General Plan Amendment to change to Limited Opportunity, Scenic Road and R-20, SP-ScR zoning.	EIR	11/13/2006
2006102126	Plumas County	Summer 2006 General Plan Amendments - Schomac Group (Feather River Inn)	General Plan Amendment for a redesignation to Moderate Opportunity, Secondary Suburban, retaining Flood Plain, Scenic Road, Historic Building to facilitate construction of a recreation oriented residential development.	Neg	10/27/2006
2006092116	Plumas County	Little Norway 2006 Summer General Plan Amendment	Proposal to amend 1.52 acres from Recreation Commercial to Multiple Family Residential. The property is within a Prime Opportunity Area. The designation will permit residential units at the ratio of 1 unit for every 2,000 square feet. Residential units can include single family homes, connected units, or condominiums. This amendment will involve changes in permitted and conditionally permitted land uses.	Neg	9/25/2006
2006082118	Plumas County	Qintana General Plan Amendment - GPA 3-04/05-12	General Plan Amendment to rezone 46.86 acres from Agricultural Preserve to Limited Opportunity, Rural and R-20 zoning.	NOP	8/24/2006
2006082116	Plumas County	Taborski 2006 Summer General Plan Amendment	The proposal is to amend approximately 0.19 acre from Periphery Commercial (C-2) to Multiple Residential (M-R) with a Limited Combining Zone.	Neg	8/24/2006
2006082115	Plumas County	Lehr 2006 Summer General Plan Amendment	The proposal is to amend approximately 14.4 acres from Heavy Industrial (I-1) to Secondary Suburban (S-3), while retaining the Special Plan - Scenic Area (SP-ScA) Combining Zone and adding a Limited Combining Zone.	Neg	8/24/2006
2006082114	Plumas County	Darden - 2006 Summer General Plan Amendment	This amendment is a proposal to amend a 3.27 acre portion of a 5.76 acre property from Periphery Commercial (C-2) to Suburban Zone (S-1) and a Farm Animal Combining Zone (F). The property would retain the current Moderate Opportunity Area designation. There is a concurrent Tentative Parcel Map application in the Plumas County Planning Department to create three one acre lots on the portion of	Neg	8/24/2006

			the property under consideration in this General Plan Amendment.		
2006088190	Plumas County	Amendment to Special Use Permit for Mini-Storage Facility	To allow the modification of a portion of a mini storage development from an RV storage area to enclosed storage units similar to teh remainder of the facility.	NOE	8/21/2006
2006082030	Plumas County	Wittick 2006 Summer General Plan Amendment	Proposal to change the General Plan designation and zoning of 0.87 acre located at 1385 E. Main in Quincy from Periphery Commercial (C-2) to Multiple Family Residential (M-R), while retaining the Design Review Combining Zone. The M-R zone allows 1 dwelling unit for every 2,000 square feet of land.	Neg	8/8/2006
2006082029	Plumas County	Harrison 2006 Summer General Plan Amendment	Proposal to change the general plan designation and zoning of 0.87 acre located at 1385 E. Main in Quincy from Periphery Commercial (C-2) to Multiple Family Residential (M-R), while retaining the Design Review Combining Zone. The M-R zone allows one dwelling unit for every 2,000 square feet of land.	Neg	8/8/2006
2006078165	Plumas County	Amendment to Existing Special Use Permit to Construct 51 Additional Storage Units of Various Sizes within the Original Mini-Storage Complex for a Total of 9,025	Amendment to existing special use permit to allow construction of 51 additional storage units for an additional 9,025 square feet of storage.	NOE	7/19/2006
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Modification of the use of Foxwood's Land Use Area #9 from a 300 unit recreational campground to single family residential use with a maximum of 83 units.	NOD	6/26/2006
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Division of 43.29 acres into 83 residential lots with a Planned Development Permit for modification of the cul-de-sac design.	NOD	6/26/2006
2004102077	Plumas County	Perano General Plan Amendment - Winter 2005 General Plan Amendments	General Plan Amendment and rezoning to change the designation to Periphery Commercial and the zoning to C-2, retaining all other designations.	EIR	6/13/2006
2006062044	Plumas County	Taylor General Plan Amendment - Winter 2006 General Plan Amendments	General Plan Amendment for an amendment from Agricultural Preserve and AP zoning to moderate opportunity, Agricultural Buffer, and R-10 zoning.	Neg	6/8/2006
2006062018	Plumas County	Soper Wheeler - 2006 Summer General Plan Amendment	Proposal to amend approximately 200 acres from Important Timber with a Timberland Production Zone (TPZ) to Moderate Opportunity Suburban and zone Suburban (S-1).	NOP	6/6/2006
2006062005	Plumas County	Plumas County 2006 Summer General Plan Amendments	Proposal to amend 240 acres from Agricultural Preserve to Moderate Opportunity- Agricultural Buffer and Zone R-10. This amendment will involve changes in permitted and conditionally permitted land uses.	NOP	6/2/2006
2006052143	Plumas County	Gurman General Plan Amendment Summer 2006	Proposal to amend two adjacent parcels of 2.02 acres and 5.64 acres from Heavy Industrial (I-1) to Single Family Residential (7-R).	NOP	5/22/2006
2006052138	Plumas County	Conover - 2006 Summer General Plan Amendment	The proposal is to amend the General Plan designation of a portion of an approximately 20.67 acre (gross) site from Light Industrial, LTD (I-2) to Single-Family Residential (3-R). A small portion of the site is within a Prime Opportunity Area and the remainder is shown as a Moderate Opportunity Area and designated as Limited Industrial on the General Plan. The subject site was created by a Parcel Map	NOP	5/22/2006

			recorded in 1989 (9 PM 127). The division of land created three industrial lots. See vicinity map. The applicant has amended the initial application to request that a portion (approximately 5.16 acres) retains the Light Industrial designation to create a buffer between the proposed residential use and surrounding industrial uses. This Amendment will involve changes in permitted and conditionally permitted land uses.		
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Reconsideration of Phase 5 of Cedarwood consisting of 61 lots and designated open space.	NOD	5/15/2006
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Tentative Subdivision Map to divide 98.19 acres into one hundred nine parcels under an existing Planned Development Permit and Development Agreement.	NOD	5/15/2006
1997072003	Plumas County	PD 1-99/00-04 & TPM 1-99/00-03; Grizzly Ranch	Amendment of a Planned Development Permit: Amendment of the planned development permit to adjust the maximum densities of four single family residential planning areas, and to add golf cart storage to the allowed uses within the R-9 (private recreation facility) planning area. The planning areas to be modified include SFL 4- 4 lot increase, SFL 5 - 4 lot decrease, SFL 6 - 11 lot increase, SFL 8 - 11 lot decrease.	NOD	5/15/2006
1996092045	Plumas County	Permit to Mine/Reclamation Plan; Sierra Pacific Industries	Amendment of an existing permit to mine and reclamation plan to allow gravel washing operations to occur within the southwest corner of the existing pit. No changes are proposed to the reclamation plan in regard to extraction, reclamation, or maximum volumes of aggregate removed from mine.	NOD	5/15/2006

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Records Found: 132

Query Parameters: Plumas AMENDMENT All

Date Range: 2000-01-01 to 2010-12-31

SCH#	Lead Agency	Project Title	Description	Document Type	Date Received
2006052079	Plumas County	Pourcho General Plan Amendment	Proposal to amend the general plan and zoning from Moderate Opportunity, Suburban and S-1 zoning to Moderate Opportunity, Secondary Suburban and S-3 zoning.	Neg	5/11/2006
2006052080	Plumas County	Mancebo General Plan Amendment	Proposal to amend the general plan and zoning from Moderate Opportunity area, Rural and R-10 zoning to Moderate Opportunity area, Secondary Suburban and S-3 zoning.	Neg	5/11/2006
2006052061	Plumas County	Winter 2005 General Plan Amendments-Leonhardt Amendment	General Plan Amendment to rezone property to recreation.	Neg	5/9/2006
1997072003	Plumas County	PD 1-99/00-04 & TPM 1-99/00-03; Grizzly Ranch	Tentative Subdivision dividing 174 acres into 56 residential lots and 9 common area lots for wetland and open space.	NOD	4/25/2006
2004102077	Plumas County	Perano General Plan Amendment - Winter 2005 General Plan Amendments	General Plan Amendment application to redesignate approximately 40 acres from Limited Opportunity area to Moderate Opportunity area, Rural and R-10 zoning.	Neg	4/4/2006
2006042016	Plumas County	McIntyre General Plan Amendment and Rezone-Winter 2005	General Plan Amendment application to redesignate approximately 1 acre from Industrial to Residential. Property is occupied by an existing dwelling unit.	Neg	4/4/2006
2005032110	Plumas County	Gould Swamp - 2005 Summer General Plan Amendments	Proposal to amend the general plan designation and zoning of approximately 14.4 acres from Timberland Production Zone (TPZ) to Prime Recreation and zone Recreation Commercial (R-C) within a Secondary Suburban Opportunity Area, while retaining the Special Plan - Scenic Road (SP-ScR) Combining Zone.	NOD	3/28/2006
2005092100	Plumas County	Vandenberghe/Keefer - 2005 Summer General Plan Amendment	Proposal to amend the general plan designation and zoning of 11.94 acres of a 14.92 acre parcel near Chester from Prime Recreation (Rec-1) within a Suburban Opportunity Area to Single Family Residential (7-R) within a Prime Opportunity Area.	NOD	3/28/2006
2005092145	Plumas County	Gabriel and Elizabeth Castrejon - 2005 Summer General Plan Amendment	Proposal to amend the general plan designation and zoning of 11.59 acres from Prime Industrial, Heavy Industrial (I-1) in a Secondary Suburban Opportunity Area to Secondary Suburban and Zone S-3 within a Secondary Suburban Opportunity Area.	NOD	3/28/2006
2005092147	Plumas County	Sim & Kate Sheppard - 2005 Summer General Plan Amendment	Proposal to amend the general plan designation and zoning of 45.12 acres from General Forest (GF) to Rural (R-10) within a Rural Opportunity Area while retaining the Mobile Home (MH) Combining Zone.	NOD	3/28/2006
2005092146	Plumas County	William Byrd & Jeann Harrison - 2005 Summer General Plan Amendment	Proposal to amend the general plan designation and zoning of approximately 480 acres from Rural (R-10) within an Agricultural Buffer and Rural Opportunity Area to Agricultural Preserve (AP) while retaining the Flood Plain Combining Zone.	NOD	3/28/2006
2005102113	Plumas County	Sierra Valley Fire Protection District Summer General Plan Amendment	Proposal to amend 5.29 acres from Prime Industrial, Light Industrial (I-2) in a Suburban Opportunity Area to Prime Recreation and Zone Rec-1 within a Suburban Opportunity Area while retaining the existing Special Plan - Scenic Road designation and the Mobile Home (MH) and Farm Animal (F) combining Zone.	NOD	1/31/2006
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned	Reconsideration of tentative map to combine Foxhead Drive and Fox Leaf Lane into one road named Foxhead Drive, with through access for the entire development.	NOD	12/19/2005

		Development: TSM/PD 2-02/03-04			
2005102113	Plumas County	Sierra Valley Fire Protection District Summer General Plan Amendment	Proposal to amend the general plan designation and zoning of 5.29 acres from Prime Industrial, Light Industrial (I-2) in a Suburban Opportunity Area to Prime Recreation and Zone Rec-1 within a Suburban Opportunity Area. The planned recreational uses of the property have yet to be formalized, however, discussions have centered around construction of a baseball field, horse arena for 4-H, a community center and a tourist information center.	Neg	10/27/2005
2005092146	Plumas County	William Byrd & Jeann Harrison - 2005 Summer General Plan Amendment	Proposal to amend approximately 480 acres from Rural (R-10) within an Agricultural Buffer and Rural Opportunity Area to Agricultural Preserve (AP) while retaining the Flood Plain Combining Zone.	Neg	9/30/2005
2005092147	Plumas County	Sim & Kate Sheppard - 2005 Summer General Plan Amendment	Proposal to amend 45.12 acres from General Forest (GF) to Rural (R-10) within a Rural Opportunity Area while retaining the Mobile Home (MH) Combining Zone. This property was created through a tentative parcel map submitted by the project proponent in 2001. The division created three residential lots and the subject has a general forest designation.	Neg	9/30/2005
2005092145	Plumas County	Gabriel and Elizabeth Castrejon - 2005 Summer General Plan Amendment	Proposal to amend 11.59 acres from Prime Industrial, Heavy Industrial (I-1) in a Secondary Suburban Opportunity Area to Secondary Suburban and Zone S-3 within a Secondary Suburban Opportunity Area.	Neg	9/30/2005
2005092101	Plumas County	Topol Development - 2005 Summer General Plan Amendment	Proposal to amend 13.6 acres from Prime Recreation (Rec-1) within a Suburban Opportunity Area to Single Family Residential and Zone 7-R within a Prime Opportunity Area while retaining the Special Plan - Scenic Road (SP-ScR) Combining Zone. The 7-R zone allows for single family residential development with a 1/7 acre minimum parcel size. Note: Reference SCH#s: 2005032110,2005092100,2005092145,2005092147,2005092146	EIR	9/20/2005
2005092100	Plumas County	Vandenberghe/Keefer - 2005 Summer General Plan Amendment	Proposal to amend 11.94 acres of a 14.92 acre parcel from Recreation (Rec-1) within a Suburban Opportunity Area to Single Family Residential and Zone 7-R within a Prime Opportunity Area. The 7-R zone allows for single family residential development with a 1/7 acre minimum parcel size. The property is bounded on all sides by TPZ lands. The portion of the property to remain unchanged is improved with a church and a paved parking lot. The property is virtually flat. No water courses or drainages cross the property. Note: Reference SCH#s: 2005032110,2005092100,2005092145,2005092147,2005092146	EIR	9/20/2005
2005032110	Plumas County	Gould Swamp - 2005 Summer General Plan Amendments	Proposal to amend approximately 14.4 acres from Timberland Production Zone (TPZ) to Prime Recreation and zone Recreation Commercial (R-C) within a Secondary Suburban Opportunity Area, while retaining the Special Plan - Scenic Road (SP-ScR) Combining Zone. The Recreation Commercial (R-C) designation permits a wide range of recreationally oriented commercial uses. No specific land use was provided in the application submitted to the Department of Planning and Building Services. Note: Reference SCH#s: 2005092100,2005092101,2005092145,2005092147,2005092146	EIR	9/20/2005
2004102077	Plumas County	Perano General Plan Amendment - Winter 2005 General Plan Amendments	Six privately submitted applications to amend the General Plan - various designations and the 2005 Annual Review of the General Plan.	NOD	8/9/2005
2005032110	Plumas County	Gould Swamp - 2005 Summer General Plan Amendments	2005 Summer General Plan Amendments.	NOP	3/24/2005
1997072003	Plumas County	PD 1-99/00-04 & TPM 1-99/00-03; Grizzly Ranch	Tentative Subdivision Map/Planned Development Permit dividing 498.85 acres into 71 residential lots, 1 open space lot, a community recreation lot and a remainder, consistent with the Planned Development Permit amended November 10, 2004. In addition, a Planned Development Permit is requested to allow the use of "T" turnarounds on selected roads.	NOD	3/15/2005
2004102077	Plumas County	Perano General Plan Amendment - Winter 2005 General Plan Amendments	General Plan Amendments and Annual Review.	EIR	1/25/2005

2004112100	Plumas County	Wolf Meadows Ranch LLC General Plan Amendment - GPA 7-04/05-01	General Plan Amendment from Important Agriculture and GA zoning to Moderate Opportunity, Rural and R-10 zoning.	NOP	11/23/2004
1997072003	Plumas County	PD 1-99/00-04 & TPM 1-99/00-03; Grizzly Ranch	Planned Development Permit: modification of the previously approved project of The Founders at Grizzly Ranch (PD 1-99/00-04) which encompasses 1042 acres with a planned maximum number of 380 dwelling units, a golf course, and associated recreation and commercial development.	NOD	11/15/2004
2004102077	Plumas County	Perano General Plan Amendment - Winter 2005 General Plan Amendments	Winter 2005 General Plan Amendments and Sierra Valley - Last Chance Annual Review. Proposes to amend several different land use/ zoning areas.	NOP	10/22/2004
2002082101	Plumas County	Sierra Aggregates Special Use Permit Amendment U 11/12/85-26	This project involves the mining and reclamation of approximately 41 acres in northeast portion of Sierra Valley, approximately 1 mile northeast of the intersection of Highways 49 and 70.	NOD	10/19/2004
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Reconsideration of the Phase IV portion of the Bailey Creek tentative subdivision map and planned development permit consisting of the minor realignment of the roadways and the addition of 14 lots.	NOD	10/19/2004
1997072003	Plumas County	PD 1-99/00-04 & TPM 1-99/00-03; Grizzly Ranch	Amendment of a recorded Map by Certificate of Correction - 9 Maps 88, Grizzly Ranch Unit 1, lots 78, 79 (defunct), 80, 81, 82. Amendment to relocate the driveway easement across lots 79, 80, and 81; to lengthen Clubhouse Drive, and to remove the driveway easement across lots 78 and 82.	NOD	9/13/2004
1997072003	Plumas County	PD 1-99/00-04 & TPM 1-99/00-03; Grizzly Ranch	Tentative Subdivision Map dividing 1,042 acres into 61 lots, 4 parcels, and a remainder, consistent with the Planned Development Permit amendment March 10, 2004.	NOD	6/15/2004
2001072102	Plumas County	2001 Summer General Plan Amendment - GPA 11-00/01-09 - Sierra Pacific Industries	This project consists of the issuance of a Timberland Conversion Permit for the immediate rezoning of 817 acres of land zoned TPZ to Rural R10 zoning. The permittee is subject to the constraints contained in the application and plan, the conversion permit, and supporting documentation. The permittee shall comply will all applicable County, State and Federal codes, ordinances or other regulations and shall obtain all necessary approvals.	NOD	5/11/2004
2003102015	Plumas County	Plumas County 2004 Winter General Plan Amendments & American Valley, Middle Fork & Canyon Annual Review	2004 Winter General Plan Amendments & American Valley, Middle Fork & Canyon Annual Review.	NOD	5/10/2004
2004042093	Plumas County	Summer 2004 General Plan Amendment	Summer 2004 General Plan Amendments	Neg	4/20/2004
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Division of 56 acres into 35 residential and 6 open space lots.	NOD	3/12/2004
2003102015	Plumas County	Plumas County 2004 Winter General Plan Amendments & American Valley, Middle Fork & Canyon Annual Review	General Winter General Plan Amendments and American Valley, Middle Fork & Canyon Annual Review.	EIR	1/12/2004
2002082101	Plumas County	Sierra Aggregates Special Use Permit Amendment U 11/12/85-26	This project consists of an amendment of an existing special use permit to extend the life of mining operations by 20 years to allow continued extraction of aggregate in a manner consistent with the approved permit to mine and reclamation plan	NOD	12/11/2003
2003072101	Plumas County	Summer 2003 General Plan Amendments	Plumas County Summer 2003 General Plan Amendments.	NOD	10/20/2003
2003102015	Plumas County	Plumas County 2004 Winter General Plan Amendments & American Valley	General Plan Amendments changing various land use designations.	NOP	10/3/2003

		American Valley, Middle Fork & Canyon Annual Review			
1997072003	Plumas County	PD 1-99/00-04 & TPM 1-99/00-03; Grizzly Ranch	Tentative Subdivision Map dividing 1,042 acres into 91 lots consistant with the Planned Development Permit approved August 20, 2002.	NOD	9/26/2003
2003062161	Plumas County	Amendment of a Permit to Mine & Reclamation Plan: MR 1-02/03-01	This project is an amendment of an existing mining and reclamation on approximately 84 acres to increase the maximum extration depth from 18 feet to 60 feet.	NOD	9/26/2003
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Tentative map for 397 lots, common area, and two remainders, Planned Development Permit for a 15 mile per hour design speed for roads in Cedarwood, consistent with the Planned Development Permit for Walker Ranch.	NOD	9/10/2003
2003072101	Plumas County	Summer 2003 General Plan Amendments	Plumas County Summer 2003 General Plan Amendments.	EIR	7/18/2003
2003062161	Plumas County	Amendment of a Permit to Mine & Reclamation Plan: MR 1-02/03-01	This project involves an amendment of an existing permit to mine and reclamation plan for an 54-acre mining operation to increase the maximum extraction depth from 18 feet to 60 feet. The extraction area for the existing mining operation is 48 acres, the processing plant and storage area is 20 acres, an asphalt processing area is 16.8 acres. The proposal does not involve any new extraction areas or an increase in the aggregate produced on a yearly basis or an increase in daily traffic volumes. The existing operation is limited to the production and transport of no more than 450,000 tons per year.	Neg	6/30/2003
2002082101	Plumas County	Sierra Aggregates Special Use Permit Amendment U 11/12/85-26	This project consists of an amendment of an existing special use permit to extend the life of mining operations by 20 years.	EIR	5/23/2003
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Division of 43.6 acres into 82 lots for single family and multiple family residential use with a Planned Development to allow the following: -Construction of up to three dwelling units on lots 587 through 613, and lots 285, 417, and 418. -Modification of the minimum parcel size through a density transfer.	NOD	5/16/2003
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Division of 3.06 acres into 11 lots and a common area for multiple family residential use with a modification of the minimum lot size through a density transfer.	NOD	5/16/2003
2003042095	Plumas County	2002 Winter General Plan Amendments	GPA 8-01/02-03 Plumas County: General Plan Amendment to change the zoning from Multiple Family Residential (M-R) and Single Family Residential (7-R) to either Core Commercial (C-1) or Periphery Commercial (C-2). GPA 8-01/02-01 Durkin: General Plan Amendment to change the zoning from Multiple Family Residential (M-R) to Periphery Commercial (C-2). GPA 11-01/02-05 Plumas County: General Plan Amendment to change the zoning from Periphery Commercial (C-2) to Core Commercial (C-1)	Neg	4/14/2003
2002122063	Plumas County	Twain Enterprises - Amendment to Permit to Mine and Reclamation Plan	This project is an amendment of an existing mining and reclamation on approximately 10.7 acres of gravel bar adjacent to the North Fork of the Feather River. Material will be removed in a manner approved by the California Department of Fish and Game.	NOD	3/19/2003
2002122018	Plumas County	2003 Winter General Plan Amendments & Almanor Annual Review	2003 Winter General Plan Amendments & Almanor Annual Review.	EIR	3/5/2003

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Query Parameters: Plumas AMENDMENT All

Date Range: 2000-01-01 to 2010-12-31

SCH#	Lead Agency	Project Title	Description	Document Type	Date Received
2002122063	Plumas County	Twain Enterprises - Amendment to Permit to Mine and Reclamation Plan	Amendment of an existing permit to mine and reclamation plan to incorporate processing area and to modify extraction area to conform with State policies necessary to protect stream morphology and biological resources.	Neg	12/12/2002
2002122018	Plumas County	2003 Winter General Plan Amendments & Almanor Annual Review	Proposal to evaluate the County's development standards for roads in what the County defines as moderate opportunity areas. The County has three different opportunity areas Prime, Moderate, and Limited. These areas designate the required level of services required for development. The Prime Opportunity development standards requires that development be served by paved roads, community water and sewer, service by a local fire district, and other improvements. The Moderate Opportunity Area is broken down into five sub-classes: Suburban, Secondary Suburban, Rural, Prime Expansion, and Agricultural Buffer. The minimum parcel size and development standards for the respective areas.	NOP	12/4/2002
2002112060	Plumas County	Plumas County General Plan Amendment - Storrie	A General Plan Amendment and rezone, initated by the Plumas County Board of Supervisors, to amend to Moderate Opportunity, Secondary Suburban, Prime Recreation and to zone Rec-3 to allow for the use of this property for personal and social rehabilitation programs that the present designation and zoning do not allow.	Neg	11/14/2002
2002082082	Plumas County	Summer 2002 General Plan Amendments - Metts, Robert and Nansea (GPA 2-01/02-6)	General Plan Amendment and rezone from Moderate Opportunity, Agricultural Buffer, Scenic Road and R-10, SP-ScR zoning to Moderate Opportunity, Secondary Suburban, Scenic Road and S-3, SP-ScR zoning.	NOD	11/14/2002
1997072003	Plumas County	PD 1-99/00-04 & TPM 1-99/00-03; Grizzly Ranch	Tentative Subdivision Map dividing 1,042 acres into 82 lots and 4 remainders, consistent with the Planned Development Permit Approved August 20, 2002.	NOD	10/11/2002
1997072003	Plumas County	PD 1-99/00-04 & TPM 1-99/00-03; Grizzly Ranch	Planned Development Permit: modification of the previously approved (2001) project of the Founders at Grizzly Ranch (PD 1-99/00-04) to encompass 1042 acres with a planned maximum number of 380 dwelling units, a golf course, and associated recreation and commercial development.	NOD	9/3/2002
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Tentative Subdivision Map 6-01/02-7 Foxglenn Phase #2: Division of 52.97 acres into 25 lots for single family residential and a 43.44 acre remainder.	NOD	9/3/2002
2001072102	Plumas County	2001 Summer General Plan Amendment - GPA 11-00/01-09 - Sierra Pacific Industries	General Plan Amendment for a change from Important Timber and TPZ zoning to Moderate Opportunity, Rural and R-10 zoning.	NOD	8/29/2002
2002082101	Plumas County	Sierra Aggregates	This project consists of an amendment of an existing special use permit to extend the life of mining operations by 20 years.	EIR	8/28/2002

		Special Use Permit Amendment U 11/12/85-26			
2002082082	Plumas County	Summer 2002 General Plan Amendments - Metts, Robert and Nansea (GPA 2-01/02-6)	General Plan Amendment and rezone from Moderate Opportunity, Agricultural Buffer, Scenic Road and R-10, SP-ScR zoning to Moderate Opportunity, Secondary Suburban, Scenic Road and S-3, SP-ScR zoning.	Neg	8/26/2002
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Planned development permit to allow construction of multiple units on a single lot by transfering unused density, and to modify the County's Class 3 road standard to permit perpendicular parking on one side of the street.	NOD	7/12/2002
1996112087	Plumas County	Feather River Rock-Amendment to a Special Use Permit	Modification of a condition of an existing special use permit to allow phased improvements of the required encroachment imporvements at the intersection of Highw ay 36 and Airport Road.	NOD	7/12/2002
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Amendment of the Planned Development Permit for Walker Ranch to add a visitors pavilion-information center and sales office-at the main entrance to the Foxw ood development. The original application for Foxw ood included a proposed visitors pavilion-w elcome center, but that w as not included in the uses permitted in the amended planned development permit for Walker Ranch.	NOD	6/24/2002
2001072102	Plumas County	2001 Summer General Plan Amendment - GPA 11-00/01-09 - Sierra Pacific Industries	General Plan Amendment application for tentative approval of an immediate rezone from TPZ; proposal to zone Moderate Opportunity, Rural and rezone R-10.	SIR	5/15/2002
2002012040	Plumas County	General Plan Amendment-Sierra Health Foundation-GPA 10-01/02-04	A General Plan Amendment to change the designation from Moderate Opportunity, Suburban to Moderate Opportunity, Secondary Suburban, Prime Recreation and the zoning from S-3 to Rec-3.	NOD	3/18/2002
2001072102	Plumas County	2001 Summer General Plan Amendment - GPA 11-00/01-09 - Sierra Pacific Industries	General Plan Amendment and Rezone	EIR	2/1/2002
2002012040	Plumas County	General Plan Amendment-Sierra Health Foundation-GPA 10-01/02-04	A General Plan Amendment and rezone for a change to Moderate Opportunity, Secondary Suburan, Prime Recreation and Rec-3 zoning.	Neg	1/11/2002
2001052051	Plumas County	Plumas County Summer 2001 General Plan Amendments	General Plan Amendment proposal to add Prime Recreation designation and Rec-3 zoning to approximate 17 acres.	NOD	12/31/2001
1997062031	Plumas County	1997 Plumas General Plan Supplemental Amendment	General Plan Amendment and Zone change of 179 acres from Agricultural Preserve, w ith Agricultural Preserve (AP) zoning to Moderate Opportunity, Agricultural Buffer, w ith Rural (R-10) zoning and Prime Mining Resource Production Area w ith Mining (M) zoning.	NOD	12/14/2001
2001079065	Plumas County	5 RM 127-128 Martin Ranch, Lot 27 Amendment by Certificate of Correction	Amendment of a recorded map, 5 of Record Maps, pages 127-128, by a certificate of correction. This project entails amendment of the map recorded at Book 5 of Record Maps, page 128, Martin Ranch to relocate a drainage easement.	NOD	7/27/2001
1992092074	Plumas County	Bailey Creek	Amendment of Planned Development Permit for approximately 418	NOD	7/27/2001

		Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	acres consisting of 844 residential units, 24 acres of commercial, 300 space RV park, 7 acre church site, a new 9 acre sewage disposal area, and a 12.6 acre recreation site. The location and densities of the above land uses are proposed to be modified from the original Walker Ranch Planned Development Permit. The developer has also requested modification of minimum yard, structure height, and dead-end road length limit requirements.		
1992092074	Plumas County	Bailey Creek Investors - Tentative Subdivision Map / Planned Development: TSM/PD 2-02/03-04	Amendment of approximately 6.13 acres of the planned development permit to modify the permitted land use from a 10 unit residential use to a 10,500 square foot church expansion consisting of a worship center and classrooms.	NOD	7/27/2001
2001072102	Plumas County	2001 Summer General Plan Amendment - GPA 11-00/01-09 - Sierra Pacific Industries	Immediate rezone to permit development of subject area as a rural residential subdivision.	NOP	7/25/2001
2001052051	Plumas County	Plumas County Summer 2001 General Plan Amendments	General Plan Amendment proposal to add Prime Recreation designation and Rec-3 zoning to approximate 12 acres.	Neg	5/10/2001
2001032012	Plumas County	Sierra Valley General Plan Amendment	The proposed amendments will change General Plan land use designations from Low Density (3 to 20 acre) Residential to Important Agricultural areas. Approximately 2,443 acres are proposed to be changed from Low Density Residential to General Agriculture. The overall effect of the proposal would decrease the number of potential lots by 1,204 throughout the Sierra Valley Study area. A number of additional permitted and conditionally permitted uses are being proposed. Lastly, several new biological constraint maps are proposed to be adopted as part of the Plumas County General Plan. These constraint maps will be used to evaluate environmental compatibility of uses requiring discretionary approval, such as special use permits, permits to mine, tentative maps and others.	EIR	5/2/2001
2001032109	Plumas County	2001 Winter General Plan Amendments	2001 Winter General Plan Amendments.	Neg	3/14/2001
2001032012	Plumas County	Sierra Valley General Plan Amendment	The proposed Sierra Valley General Plan Amendment centers around Agricultural Preserve and General Agriculture Areas. The primary goal of this amendment is to recognize agriculture as a priority land use. This is proposed to be accomplished by amending general plan designations and redefining the allowable uses.	NOP	3/2/2001
1997072003	Plumas County	PD 1-99/00-04 & TPM 1-99/00-03; Grizzly Ranch	Planned Development encompassing 1,042 acres with a planned maximum number of 380 dwelling units, a golf course, and associated recreation and commercial development together with a tentative map to divide 1,042 acres into two parcels.	NOD	1/23/2001
1997072003	Plumas County	PD 1-99/00-04 & TPM 1-99/00-03; Grizzly Ranch	Amendment of condition #9 of the Planned Development Permit to allow issuance of a grading permit for the golf course prior to formation of the community Service District.	NOD	9/15/2000
2000052077	Plumas County	Summer 2000 General Plan Amendments	This project is the 2000 Plumas County General Plan Summer Amendments. It includes amendments for which applications were received by February 1, 2000, including County-initiated amendments. The location of the properties involving General Plan designations is shown on the site maps in this document.	Neg	5/16/2000
1996112087	Plumas County	Feather River Rock-Amendment to a Special Use Permit	Application to add an additional asphalt batch plant and relocate an exisiting aggregate processing and stockpile area.	NOD	5/10/2000
2000032074	Plumas County	2000 Winter General Plan Amendments	2000 Winter General Plan Amendments	Neg	3/15/2000

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Plumas Audubon Society
P.O. Box 3877
Quincy. Ca 95971

January 7, 2013

Randy Wilson, Director
Plumas County Planning Department
555 Main Street
Quincy, California 95971

Dear Mr. Wilson:

Comments: 2035 Plumas County General Plan Update Draft Environmental Impact Report

Plumas Audubon Society members have participated in numerous public meetings and provided comments and suggestions throughout the several years of preparation of the 2035 General Plan Update (GPU). It is commendable that this General Plan Update encourages future development within existing core areas and services districts. Retaining areas of open space and maintaining habitat connectivity, whether it be forest land, agricultural land or riparian zones, is becoming increasingly important to sustaining the existence of many native plants and animals. I9-1

We believe the planning process has been open, inclusive and has resulted in a well thought out plan that will serve to effectively guide the County Planning Department, Planning Commission and Board of Supervisors in the process of making well reasoned land use and development decisions.

Here are a few comments and suggestions we wish to have considered in the Final EIR: I9-2

- The Alternatives are well chosen and do, as intended by CEQA, provide a reasonable range for comparison with the preferred alternative. We agree with the explanation why the Restrictive Growth Alternative was eliminated from consideration.
- The Focused Growth Alternative, consisting of even greater concentration of development within core areas, provides a useful look at what could become a necessary option should there be significant future increases in fuel or transportation costs.
- The Flexible Growth Alternative demonstrates the costs and problems to the people of Plumas County should increased development outside of existing services districts be accommodated. This alternative would constitute an impractical imposition on the county.
- Climate Change. It is noted (Section 4.4-1) that the county's contribution to greenhouse gas emissions is minuscule. That is a point of view that makes significant reduction of emissions difficult to achieve. All greenhouse gas emissions throughout the world, when considered individually, are minuscule. The cumulative problem must be addressed at local levels in order

I9-2 cont.

to make real progress. Even though Plumas County has one of the lowest per capita emission rates in California, this should not justify merely meeting the minimum standards set by the State. Plumas County should be open to new science and technology and be a leader in reducing greenhouse gas emissions. There are several air quality mitigating policies such as those summarized on table 4.3-6 which should be aggressively pursued.

- Wildland Fire policy is important. Insofar as we live in a forested area where fire is inevitable, the GPU should encourage forest management practices that minimize smaller-sized fuels that contribute to excessive fire intensity. The GPU does a good job of addressing issues of public safety and interagency coordination.
- The Water Element of the GPU is extremely well written. The GPU wisely points out that the Feather River supplies the State Water Project and further emphasizes the importance of protecting water quality and quantity for local economic sustainability.
- The ranking of impacts and mitigations (e.g. Tables 2-1 and 5-1) erroneously suggests that all impacts are of relatively equal magnitude. For example Sections 4.8 (*Hazardous Materials and Public Safety),* 4.10 (*Agricultural and Timber Resources*), and 4.11 (*Biological Resources*) are subject areas where the Preferred Project and the Alternatives have distinctly different and important environmental consequences. Nonetheless Table 5-1 compares and distinguishes these impacts from one another with tiny "+" or "-" signs after codes like LTS (less than significant) or SU (Significant but Unavoidable). The impression one may get from sifting through these tables is that the differences between the Preferred Project and the Alternatives are slight. The Tables should be re-designed to make more apparent which impacts are most critical to environment quality and to recognize where alternatives differ significantly.

We feel that the Draft Environmental Impact Report (DEIR) to the Draft General Plan Update adopted by the Plumas County Board of Supervisors should be finalized, approved, and the 2035 General Plan Update formally adopted by the Plumas County Board of Supervisors without delay.

Plumas Audubon Society has approximately 200 members who are residents, part-time residents and frequent visitors to Plumas County. It is a Chapter of the National Audubon Society.

Sincerely yours,

Harry G. Reeves
Board Member and Newsletter Editor
Plumas Audubon Society
P. O. Box 3877
Quincy, CA 95971
Telephone 530-283-1230

To: Wilson, Randy
Subject: RE: Comments DIER General Plan 2013 Hope this is the correct address.

From: Pat Wormington [mailto:airecrew09@gmail.com]
Sent: Monday, January 07, 2013 4:42 PM
To: Wilson, Randy
Subject: Comments DIER General Plan 2013 Hope this is the correct address.

Patricia A. Wormington
7370 County Road A23
Beckwourth, CA 96129
530-832-5235
January 7, 2013

Mr. Randy Wilson, Plumas County Planning Director
555 Main Street
Quincy, CA 95971

Dear Mr. Randy Wilson;

Thank you for extending the deadline for comments on Plumas County's Draft EIR, General Plan. We live in a very special part of California. Sierra Valley is the largest valley in the Sierra Nevada Mountain Range and the largest sub-alpine valley on the North American Continent. The scenic beauty, freshwater marsh, migratory waterfowl wetlands, wildlife habitat, and natural environment of the Feather River Watershed are just a few reasons why Sierra Valley is such a special place. I10-1

The number one concern of Plumas County residents is the protection of open space according to the 20/20 public survey taken at the start of the General Plan review. It is your job to make it happen; To protect the natural heritage of this area for future generations and all Californian's, that they may know that the people of this Plumas County, value and protect our natural heritage. Leapfrog development and inappropriate uses in scenic areas need not be allowed. An emphasis on infill rather than creating new developments will protect open space and keep the cost of county services at a minimum. Towns should have boundaries to limit the creep of development into open space. Common ag areas at the edge of towns, for raising animals and community gardens would promote 4-H projects, community health and well being. I10-2

Agricultural Preserve zoning protects open space. Ranchers have commented that they don't want to make a living in a fishbowl with houses looking down on them.

The California Environmental Quality Act requires addressing cumulative and regional as well as local environmental impacts, in Environmental Impact Reports. The south end of Sierra Valley is in Sierra County. During previous General Plan reviews officials from surrounding counties were not welcome or invited to attend public meetings.

I10-2
cont.

Groundwater Recharge Areas

Groundwater recharge areas on the sloping mountain edges of valleys need to be protected from development. Use of off highway vehicles that damage terrain in the recharge areas need to be restricted. Many of these areas are very sensitive, having very little vegetation.

Private Airstrips

Private airstrips should only be allowed in remote areas. There is no need to have a private airstrip if the pilot can see a Plumas County Airport from his or her private residence. We have had low flying planes fly over our home many times as there is a private airstrip North of us. Our property and several neighbors are within the take off and landing zone. Actually there is constant air traffic most of the year along County Road A23.

Mining

Require mines visible from main and secondary roads to clearly mark excavation boundaries with white posts. The public and the neighboring properties should be able to clearly see where the excavation boundaries are. The large gravel mine on County Road A23 was limited to 40 acres. Does that include the access roads, debris piles, water containment ponds?

Protect watersheds from Cyanide Leach gold mining. A gold mine was proposed on the south side of Sierra Valley, in Sierra County. All the water in Sierra Valley flows north to the Feather River through wetland areas on the flattish valley floor. The Tenneco gold mine was rejected by residents who value unpolluted water and wetlands more than gold.

Zoning Change Notices

Zoning change notices should be more than 300 feet in areas that have large parcel sizes, such as Sierra Valley. Three hundred feet is appropriate in towns where parcel sizes are small.

Scenic Quality

It is no secret that Plumas County is a favorite vacation destination. Plumas County depends on tourism dollars. To keep tourism alive and well we need to protect the scenic quality of our area. Viewsheds and mountain tops need to be protected from unsightly use. Vistas across valley's, such as the Sierra Valley, need to be protected. During the flood of 1986, flood water levels were up to the road, along County Road A23. Road A23 is a virtual dike with a road on top, in flood prone areas on the valley floor. The views across Sierra Valley are enjoyed by local residents and tourists alike. The flood plain should remain Agricultural Preserve zoning to protect scenic quality. Working landscapes generate tax dollars for Plumas County and protect scenic quality.

I10-2
cont.

Cargo Shipping Containers

In the wide open spaces of Sierra Valley cargo shipping containers degrade the scenic quality of sage brush habitat. They can be seen for miles, thus they should not be allowed unless screened from the public view.

Biological Resources

In the 29 years my husband and I have lived on the west side of Sierra Valley we have witnessed the decline of the deer population and the increase of dogs packing up, running deer to exhaustion. The mountain mahogany and timber on the hill above our home provides our small resident deer herd protection from the elements during our harsh winters. In the late 1990's we saw dead deer hit by speeding cars on Co. Rd. A23 nearly every day (speed limit 65 MPH). We observed deer every day outside our windows in the early 1990's, the resident deer herd. The last couple of years we are lucky if we see deer once in a year. We traveled to Jackson, WY in September 2012. Jackson, WY is making a huge effort to protect their wildlife from cars and trucks. We saw large message boards along highways telling drivers to slow down, stating how many moose or elk have been killed. They have nighttime speed limits. In November 2012, during the fall migration, we saw three red blood streaks on County Road A23 and a deer killed near HWY 70 & A23. Four deer killed within a couple of days.

We took a walk Christmas Day on the Genesee Road north of Beckwourth. We saw five deer cross the road north of the north cattle chute and Spring. We watched them until they were next to Sugarloaf Mountain. A couple of deer had a hard time clearing the fence, jumped into the fence. We walked that road nearly every day when we lived in Beckwourth. Deer would hang out at the Spring and in the nearby trees. Most of that land is slated for development. Once again dogs will be harassing the deer herd at their water source. Over the hill to the west, the River Valley Development has loose dogs. Anywhere you have development you are going to have a dog problem when wildlife habitat is nearby. Genesee Road near Beckwourth is a nice quiet place to walk when the ground is saturated and muddy.

Plumas County remains sparsely populated. People from the large cities in Northern Nevada and the densely populated Tahoe region come here to escape the crowds and enjoy what our open spaces have to offer. People are taking vacations closer to home with the downturn of the economy and higher gas prices. We are a short distance from the Sacramento Valley. The Gateways to Plumas County need to attract tourist. With smart planning our clean air, beautiful vistas, and recreational opportunity's will continue to be a draw, for generations to come, to explore Plumas County.

Thank you for all your hard work on this General Plan Review. Thank you to everyone who cared enough to participate in this very long process and attend the many meetings. May we meet on a hiking trail, snowshoe trail, ski trail. Get Out There and enjoy beautiful Plumas County!

Sincerely,

Patricia A. Wormington
PCT 2009

From:	Wilson, Randy
To:	Alicia Knadler
Cc:	Herrin, Becky; Coleen Shade; Ray Weiss; Settlemire, Craig; Mansell, Steve; Cortez, Liz
Subject:	RE: Alicia - General Plan
Date:	Thursday, January 10, 2013 1:21:27 PM

Alicia

Thank you for commenting. Your comments will be forwarded to the Consulting Team who will develop a response to your comments in the Final EIR.

Randy

-----Original Message-----
From: Alicia Knadler [mailto:fabulous.alicia.knadler@gmail.com]
Sent: Thursday, January 10, 2013 12:54 PM
To: Wilson, Randy
Subject: Re: Alicia - General Plan

Thanks Randy - I talked it over with my husband, and he wishes us to make an official comment. We are both concerned and would like to make a comment about the land use element/flood zones and expansion zone depicted on the Indian Valley map in the general plan. The map delineates much of the North Valley Road area as flood zone, even up the hilly areas. My husband has never seen flooding in these areas in the more than 60 years he's owned his home here. Yet he and I have both seen it flood a number of times into the expansion zone shown in Mount Hough Estates (off Highway 89 at Pioneer Road). We are concerned the flood zone map used in the general plan is incorrect, and that by showing an expansion zone in Mt Hough Estates, the county will continue its history of permitting residential construction in areas historically and popularly known to be susceptible to flooding. Signed Abner "Joe" and Alicia Knadler, Greenville

I11-1

If you need our address, etc for your files, it is 2831 N. Valley Rd., Greenville CA 95947 530-284-7585

On Jan 10, 2013, at 7:53 AM, "Wilson, Randy" <RandyWilson@countyofplumas.com> wrote:

> Alicia
>
> Please email me you comments. Are these comments below additional comments?
>
> Randy
>
> -----Original Message-----
> From: Alicia Knadler [mailto:fabulous.alicia.knadler@gmail.com]
> Sent: Wednesday, January 09, 2013 10:31 PM
> To: Wilson, Randy
> Subject: Alicia - General Plan
>
> Hi Randy... I'm looking at the General Plan on the County Website and did not find an easy link to use to make public comments, nor do I have a newspaper close to hand. May I use email to you as a comment? Maybe I'm just misunderstanding something. I was looking at the Indian Valley Map (Land Use Element 29), and it shows us out here on North Valley Road as being in a flood zone. We did not flood here in '97. It shows Mt Hough Estates as being in an expansion area and not in the flood zone. That area did flood in '97. The blue color indicating flood area seems to stop at the boundary of that expansion area. My husband never could figure out why people were allowed to build there where it was well known to have flooded in the past... He was also told that no building would ever be allowed across the road from him, since that area flooded and had a high water table most of the year. So my concern is the determination of flood zones. Are they noted in error on this map, or am I missing

something? Will the continue letting people build in flood zones? Will the county make property owners with homes in existing flood zones make expensive repairs, remodels or give up their homes? Eh... I'm not sure how it all works. Thanks, Alicia

1-10-13

To: Plumas County Planning Dept.
Plumas County Board of Supervisors

RECEIVED
JAN 11 2013
PC Planning + Building

Re: Plumas County 2035 General Plan

Brief Summary

The Following are my objections to the 641 pages of the General Plan. I find many references to the U.N. Agenda 21 Sustainable Development and American Planning Association guidelines as per President Clinton E.O. 12852.

I12-1

On certain pages I found the following:

1. **Page 166** Conservation and Open Space Element.
Sustainability: Community use of natural resources in a way that does not jeopardize the ability of future generations to live and prosper.
Sustainable Development: Development that maintains or enhances equity, economic opportunity and community well being while protecting and restoring the natural environment upon which economics depend. Sustainable development meets the needs of the present without compromising the ability of future generations to meet their needs.

In 1987 the U.N. released the Brundtland Report, which included what is now one of the most widely recognized definitions:

Page 167: Viewshed Property Control!

Page 168: Conservation and Open Space. Property conservation Easements: Property Owners becomes second titleholder; loses most property rights, unable to sell property due to clouded title, and is liable for maintaining agreements. The easement holder has no liability; it falls on the property owner.

Page 200: Habitat Protection Green Lining Habitat Enhance: Green Lining. Agriculture Role in mitigating climate change: Greatest Fraud in History.

Page 182: Develop a climate change strategy: aiding and abetting the Greatest Fraud in American History.

Page 151: Promotion of Healthy Communities: Walkable Communities part of OBAMA'S E.O. 13575: White House Rural Council.

Page 209: Agriculture and Forestry Element: The county shall encourage agriculture support business etc., Encourage neighborhoods, grocery stores, farmers markets, etc.; Encourage institutions to provide foods locally and in the region. Create an Advisory Food Policy Council to recommend the creation and implementation of agriculture marketing programs and policy recommendations that create a robust and just food system in he county. This is Top-down control by an un-elected agency. Everything to due with agriculture is the new P.C. word. Peraculture. Napa County has implemented this. This part of the U.N. Agenda 21 Sustainable Agriculture and includes Sustainable Forestry. There is much more to point out, but this is enough to get my point across.

I12-1 cont.

In conclusion to this letter of opposition, I do not like all the County's *shall do this and do that*. This appears to be American Planning Association's Comprehensive Planning Guidelines to control and implement U.N. Agenda 21 Sustainable Development through out the State of California and the Nation, as signed by :
President Bush 1 1992 Rio Accords, President Bush 2 and Obama E.O. 13575. California SB 375, Sustainable Communities and Climate Act of 2008. Agencies like Cal/EPA lists Agenda 21 at the top of it's resources. California Air Resources Board partnered with International Council Local Environmental Initiatives (Iclei),Cal-trans with (Iclei). HUD, CCRL, tied to (Iclei).

Iclei is an international organization, NGO, that is promoting sustainable development. California is the most involved state with sustainable development next to Florida and other southern states.

I respectfully request that Plumas County Board of Supervisors and Planning Dept. and other agencies disregard this 2035 General Plan as it is too top-down intrusive and controlling of citizens of Plumas County. Go back and freshen up the 1984 General Plan with more local input, which would be more applicable to the needs of Plumas County area citizens. We don't need outsiders telling us how to survive and prosper as Plumas County for all reasons has been here for 162 years!

Furthermore, working with agencies, NGO's that work with and for a foreign agency such as ICLEI, you the public official, may be in violation of your oath to the U.S. Constitution of America, State of California.
Under Article 1 section 10 of the U.S. Constitution, States are prohibited from implementing foreign political initiatives through its prohibition by states of engaging in treaties, alliances or confederations and California Penal code #38 is clear: misprision of treason is the knowledge and concealment of treason, without otherwise assenting to or participation in the crime.

I sincerely request that you consider my opposition to the Plumas County 2035 General Plan as written, since I have done extensive research and believe my concerns are valid.

Thank you,

Jack McLaughlin

P.O. Box 92 Crescent Mills, California 95934

Jack McLaughlin

Subject: FW: 2030 General Plan Draft for Plumas County - options to Agenda 21 integration

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From: Daniel Salvatore [mailto:dansal7043@gmail.com]
Sent: Thursday, January 10, 2013 8:52 PM
To: Wilson, Randy
Cc: David Van Fleet
Subject: 2030 General Plan Draft for Plumas County - options to Agenda 21 integration

Dear Randy,

I have just been notified this evening that the draft for the EIR for the 2030 General Plan for Plumas County is being prepared and tomorrow, January 11 is that last day to comment. It is my understanding that the plan has been written in alignment with the goals of the United Nations Plan called Agenda 21. I am sure that is with your best intent that you have followed this global environmental agenda for many reasons, including possible federal funds that may be captured by accommodating Agenda 21. However, any effort to accommodate Agenda 21 is an step toward the destruction of our community and our nation. I13-1

I want to voice my strong opposition to Agenda 21 and any influence that it may have in our general plan. I strongly oppose the United Nations definition of "sustainability" which requires that all economic decisions be hinged on population reduction as well as "the rewilding" of America. As a leader in our county and director of the 2030 General Plan Redraft, I am sure you are aware of Agenda 21, but in case you are not, here are a few links for you and your team review.

http://users.sisqtel.net/armstrng/agenda21.htm
http://www.democratsagainstunagenda21.com/
http://en.wikipedia.org/wiki/Agenda_21

Again, I am voicing my strongest opposition to the 2030 General Plan Draft that is designed to meet the goals of Agenda 21. Please note that this notice is dated January 10, 2013 and will be made public in the common public forum called Facebook.

Sincerely,
Daniel Salvatore
--

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JAN 11 2013
PC Planning + Building

Centella Tucker
PO Box 298
Greenville, CA 95947

January 10, 2013

Plumas County Planning Commission
Randy Wilson, Director of Planning
555 Main Street
Quincy, CA 95971

RE: Comments on the General Plan

As a business owner in Plumas County I decided to focus on the General Plan Element most closely aligned with my concerns, Element 5: Economics Element. I14-1

This General Plan Element is optional according to California State Law, but if included has the same weight at the rest of the general plan. Looking at the stated goal of this element one sees:

> Plumas County is committed to protecting its communities in a manner that also addresses climate change. As part of the "Goals" section of this element, policies and implementation measures related to climate change are denoted with the symbol: [small green tree]

The need for this stated goal is based on unproven theories. Believers of human-caused climate change theories are being actively challenged by more than 17,000 scientists who caution against implementing environmental policies that may do more harm than good. I would suggest caution about the unforeseen consequences of policies based on theory, not fact. To base economic development on climate change in our rural area could actually hinder rather than help. Regulations from the State of California already impede business and economic development as can be seen by the exodus of businesses (about 4 per week) and people (100,000 per year) in the last few years.

This Element includes several pages of definitions related to economic activities. Among them:

> **Economic Sustainability:** Economic sustainability involves economic activities that meet the community's present needs without compromising the ability of future generations to meet their own needs.

This definition actually parallels the United Nations definition of Sustainable Development in the Agenda 21 Report: "meeting today's needs without compromising future generations to meet their own needs." The UN's own globalists state this is only possible with an 85% reduction in world-wide population. The1993 UN Report "Agenda 21: The Earth Summit Strategy to Save our Planet" states:

> *"Agenda 21 proposes an array of actions which are intended to be implemented by EVERY person on Earth…it calls for specific changes in the activities of ALL people…*

Effective execution of Agenda 21 will REQUIRE a profound reorientation of ALL humans, unlike anything the world has ever experienced."

I14-1 cont.

I object to having the Plumas County General Plan so closely follow a United Nations policy that openly states it intends to change all human activity on the planet. This statement clearly precludes individual choice and property rights and encourages additional government oversight and enforcement.

Economic sustainability from a business perspective means the effective use of assets to maintain a profitable enterprise; it is the responsibility of individual businesses, not of the government, and has no place in the General Plan.

One items listed as a KEY ISSUE in the Economic Element is:

- the need to monetize the ecological services that Plumas County provides to regions outside the County and the State of California, in the areas of water supply, energy supply, forest resources, including commodities as well as recreational opportunities, and carbon sequestration in order to bring money to the County to fund stewardship activities that will help to maintain and enhance these services over time.

I would like a clear language discussion of this issue. Are you selling water and land? Public or private? Are you planning to engage in the use of emanate domain to use private property?

Carbon sequestration is the process by which atmospheric carbon dioxide is taken up by trees, grasses, and other plants through photosynthesis and stored as carbon in biomass (trunks, branches, foliage, and roots) and soils. The US Forest Service already has management of more than 65% of the land in this county and will certainly deal with this resource as it does with others located within our county boundaries. I do not think we need this topic in the General Plan, and we DO need the rest of this issue clarified.

Many of the detailed goals listed in the Economic Element are so vague or unrealistic as to be worthless. They give lip service to economic encouragement without substantive action. Some of the goals can even appear as contradictory when the county has limited growth potential. For example:

5.6.4 Encouragement of Industrial Park Development
5.9.3 Mixed-Use Development
The County shall encourage commercial mixed-use development in town center areas and where appropriately designated to encourage energy efficiency.

Are we trying to develop industrial parks away from the town centers or encourage a variety of facilities within the town centers? We might not be able to do both.

Among the other goals items like the development of a "green supply chain" and passive solar energy come from environmentalists' wish lists and have little or no meaning to the active operation of viable businesses. These are decisions a business should be able to

choose or not choose. If they are mandated, they increase start-up costs and impede business development.

I14-1 cont.

Element 7, Conservation and Open Spaces adds another concerning note:

> ***7.10.5 Sustainable Business Practices***
> The County shall encourage all businesses to take the following actions as appropriate for each business: replace high mileage fleet vehicles with hybrid and/or alternative fuel vehicles, increase the energy efficiency of facilities, transition to the use of renewable energy instead of non-renewable energy sources, adopt purchasing practices that promote emissions reductions and reusable materials and increased recycling.

This seems to be an encroachment by the county into the business practices of private entrepreneurs. Listed as an "encouragement," a future Board of Supervisors could turn it into a county ordinance. These expenses will not help current businesses nor will they help new businesses develop.

As a business person, this economic element is meaningless and useless. All I can see ahead would be more invasion into my operation by county agencies and increased costs or taxes to pay for unwanted/unneeded services.

The county should reduce local regulations, streamline the building permit process, simplify zoning regulations and reduce business taxes and property taxes on businesses if it is serious about encouraging business development.

Centella Tucker
Greenville, CA

Centella Tucker

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JAN 11 2013
PC Planning + Building

January 10, 2013

Plumas County Planning Department
555 Main Street
Quincy, CA 95971
Attention: Randy Wilson

Dear Sir,
Please accept the following as official public commentary on the EIR/Plumas County General Plan Update.

Plumas County General Plan introduction contains a blanket statement that the General Plan supports ***Sustainable Development.*** It is universally accepted fact that the term "sustainable development" was coined by Gro Harlem Brundtland, when she served as the chairperson for the United Nations **World Commission on Environment and Development** (WCED). The term "sustainable development" arose out of the commission's work and goals establish by United Nations Agenda 21. This term, "sustainable development" and the planning concepts it is meant to describe, have been pushed into local municipalities by the implementation arm of Agenda 21, know first as ICLEI (**International Council for Local Environmental Initiatives**). *(see footnote). I object to the inclusion of this term sustainable development" throughout the Plumas County General Plan. This terminology "sustainable" opens the door in the future for others to interpret what is and is not "sustainable" in ways that present county leadership cannot begin to accurately envision. I believe the Plumas County General Plan is not enhanced in any way by the use of this term and it should be taken out of the document completely. ICLEI (ICLEI-Local Governments for Sustainability) has clearly influenced the Plumas County General Plan and is, in fact, listed on the GHG Emissions Report as having contributed to the report. I do not believe that the majority of Plumas County citizens have been made aware that the General Plan Update has been tailored in many ways to be in compliance and meet Agenda 21/ICLEI goals and objectives. I would like to go on record as stating the entire plan has been tainted by Agenda 21/ICLEI and the lack of transparency in regards to this and its future implications, both to the general public and perhaps even the Board of Supervisors, is absolutely unacceptable and challenges the credibility of the entire plan. I15-1

*ICLEI now calls themselves Local Governments for Sustainability

The following excerpts represent specific areas of concern, but due to the volume of the document are not all inclusive of concerning language and content. In an effort to adhere to the stated deadline for submission of public comment, the following areas are ones that I have chosen to address:

Primarily I would like to point out that one of the stated goals of the General Plan Update is "The General Plan Update is easily read and interpreted by the public."

I would like to point out that a 600 page document is a lot of things but easily read is not one of them. In attempting to do an exhaustive review of the document it is anything but easy to interpret. So if that goal was important in any way, I assure you that you have missed the mark.

7.10.6 - Sustainable Agricultural Practices
The County shall promote GHG emission reductions by encouraging carbon efficient farming methods, such as no till farming, crop rotation, cover cropping, installation of renewable energy technologies,

protection of grasslands, open space, riparian, and forest lands from conversion to other uses, and development of energy-efficient structures.

I15-1 cont.

The 2005 Greenhouse Gas Emissions Report upon which any reductions will be measured is a flawed analysis. It assumes that 140 lbs. of fertilizer per acre of agricultural production property is being applied, which is a gross misstatement. I am intimately familiar with ranching practices of fellow ranchers in Indian Valley and with rare exception the only fertilizer method being employed is the dragging of fields to break up and spread the cow manure produced by the livestock on irrigated grazing land. The emissions attributed to manure production is already accounted for in the report and the actual current methods typically employed in Indian Valley *are* only recycling that same manure. No one is applying an additional 140 lbs of any type of fertilizer per acre.

In addition and perhaps more importantly the county has no authority to subscribe, encourage or otherwise interfere in production practices as described above on private ranches in Plumas County.

The legal disclaimer on the Greenhouse Emissions report states that the preparers of the report **do not represent that the use of the information in the GHG Emissions Report will not infringe on privately owned property rights...** A troubling little disclaimer in very small print.

7.10.5 - Sustainable Business Practices

The County shall encourage all businesses to take the following actions as appropriate for each business: replace high mileage fleet vehicles with hybrid and/or alternative fuel vehicles, increase the energy efficiency of facilities, transition to the use of renewable energy instead of non-renewable energy sources, adopt purchasing practices that promote emissions reductions and reusable materials and increased recycling.

Why are we paying someone to put statements such as this in our county plan? It is arrogant to assume that the county government has the right or authority to advise ALL businesses about the way they choose to run their private enterprises. This has no place in the Plumas County General Plan.

Introduction to Section 8 - Agricultural Resources

Climate change could have a significant effect on farming and ranching in Plumas County. It has the potential to effect amount and timing of precipitation, length of season, and optimum growing temperatures for some crops. Water availability for Plumas County farmers and ranchers could be at odds with downstream demands for environmental flows to improve the Delta ecosystem and support greater water exports to the San Joaquin Valley and Southern California. Sustainable farming and ranching practices and the employment of best management practices along with restoration projects are reducing erosion, improving water quality, providing ecological benefits to the watershed and improving or restoring other ecosystem services; ecosystem services that will be important components in the adaptation and mitigation strategies that will be needed to adjust to climate change.

Sustainable farming and ranching practices and the employment of best management practices along with restoration projects are reducing erosion, improving water quality, providing ecological benefits to the watershed and improving or restoring other ecosystem services; ecosystem services that will be important components in the adaptation and mitigation strategies that will be needed to adjust to climate change.

Plumas County's Agriculture and Forestry Element of the General Plan will lead, direct, and guide the sustainable use and management of the lands designated as Agriculture and Timber resources which support the local communities, the local and state economy and environment. The people of Plumas County who have participated in one or more public workshops and sessions leading up to the development of this General Plan to date have all been in agreement that the agriculture and timber resources contribute to the reason they live in Plumas County. They agree that these resources constitute the working landscape that is important to the maintenance of local economies, sense of place, recreational values and also for the ecosystem services that are important to the Feather River Watershed and the State of California.

I15-1 cont.

Climate change is a theory and nothing more. Water availability to Plumas County farmers and ranchers is well spelled out in local adjudications of water rights and the accompanying Superior Court decrees and to suggest that any of the components listed above would either change or be superior to this decree is troubling. We need to protect Plumas County resources for Plumas County residents. To bring the Delta Ecosystem and the needs of the San Joaquin Valley and Southern California into the Plumas County General Plan is an affront.

The agricultural producers in Plumas County contribute approximately 30 million dollars a year to the Plumas County economy and do not need the county to lead, direct or guide them in "sustainable use and management" of their **privately held property**. The most recent "restoration projects" undertaken in Plumas County have caused considerable harm to agricultural producers in the county. The people who attended your public workshops may want a plan that will direct and influence the use of agricultural resources in Plumas County but unless they are the owners of this privately held land they have no jurisdiction over the private property of others. There are regulations in place from county, regional and state authorities that mandate best practices in water use in the Feather River Watershed and already have significantly raised costs for ranchers in Plumas County. We do not need more of the same.

8.2.3 - Clustering of Farm Buildings
Locate farm dwellings in a manner that protects both on-site and off-site agricultural practices. All dwellings in agriculturally zoned areas shall be encouraged to be clustered where the parcel is less suitable for agricultural use.

I object to any language in the county general plan whereas it is assumed that some county legislative body, who may or may not know anything about ranching or farming, will have the right to determine where on privately owned and operated farm or ranch property a structure can be built.

Legal Basis and Requirements
State law offers flexibility to go beyond the mandatory elements of the general plan. Section 65303 enables a county or city to adopt "any other elements or address any other subjects, which, in the judgment of the legislative body, relate to the physical development of the county or city." Once adopted, an optional element carries that same legal weight as any of the seven mandatory elements and must be consistent with all other elements as required by Subsection 65300.5. Plumas County has chosen to emphasize in this General Plan update the importance of agriculture and forestry resources to the economic, social, environmental and aesthetic well being of the County. By exercising the option to develop a separate Agriculture and Forestry Element, the County has the ability to provide more detail and, therefore more direction and guidance to support the long term sustainability of these land uses.

The goals, policies and implementation measures listed in the Agriculture and Forestry Element provide the high level, long range context for more detailed, short range and or site specific actions.

I15-1 cont.

Agriculture and Forestry do not need anyone to provide "more direction and guidance to support the long term sustainability of these land uses." Every time that some organization decides to provide more guidance in the name of sustainability it has shut down industry, destroyed jobs, and driven families out of Plumas County. It is especially troubling that the language reads "once adopted, an optional element carries the same legal weight as any of the seven mandatory elements and must be consistent with all other elements as required by Subsection 65300.5". This section in the General Plan is not mandated by the state planning guidelines and I would like to see the entire section excluded.

I would respectfully request that the response to these comments be forwarded back to me once the responses have been developed, inclusive of the names of those who author the responses.

Respectfully Submitted,

Carol O. Viscarra

Carol Viscarra
Defanti Ranch
Indian Valley Citizens for Private Property Rights
narmrn@frontiernet.net
530-284-7402

January 11, 2013

Randy Wilson, Director
Plumas County Planning Department
555 Main Street
Quincy, California 95971

SIERRA NEVADA ALLIANCE

Keeping light in the range.

Mr. Wilson,

I16-1

We have been in consultation with some of our Member Groups, other organizations, and interested citizens in Plumas County over the course of the General Plan Update. Overall, we are very impressed with the update process, the work of the Planning Commission, Plumas County staff, and the vision arrived upon for the General Plan that acts as the Proposed Project for the Draft Environmental Impact Report.

We and our local partners look forward to supporting overall general direction of the Plumas County General Plan and working with the County to make sure the vision is executed and enforceable.

With that in mind, here are our comments on the DEIR.

Contents

Definition of Development

I16-2

In the fall of 2011, Plumas County received a number of comments on the Draft General Plan (dated August, 2011). A comment was made more than once recommending that the definition of the term "development" in the Land Use element be revised.

That comment is reiterated here, in terms of the Draft Environmental Impact Report (DEIR).

In the Land Use Element, the definition of "development" is concerning because it includes, by definition, lot creation, condominium projects, and utilization of commercial, multi-family or industrial parcels, when it should cover all parcels and types of construction. By leaving out the land designations that constitute open space (i.e. Agricultural and Grazing, Agricultural Preserve, Timber Resource, Mining Resource, Resort and Recreation, etc.), the Draft General Plan may well allow extensive development on open space lands with little recourse for the County or residents. The DEIR does not analyze the effects of development on open space lands, and this development is likely between now and 2035 due to the definition of "development" in the Proposed Project.

Here are two possible solutions:

- Alter and re-circulate the DEIR so that it analyzes the effect of potential sprawled and concentrated residential development on open space land, based on the definition of development included in the Proposed Project.
- Define development as "any building, construction, renovation, mining, extraction, dredging, filling, excavation, or drilling activity or operation; any material change in the use or appearance of any structure or in the land itself; the division of land into parcels; any change in the intensity or use of land, such as an increase in the number of dwelling units in a structure or a change to a commercial or industrial use from a less intensive use; any activity that alters a shore, beach, river, stream, lake, pond, canal, marsh, meadow, woodlands, wetland, endangered species habitat, aquifer or other resource area, including clearing of natural vegetative cover (with the exception of agricultural activities).[1]

Please analyze whether the existing definition of development is unclear and whether it covers open space lands. If the definition is found to be unclear or not to cover open space lands, please provide clarity and coverage.

[1] Definition compiled from various definitions for "development" in the book "A Planners Dictionary" by the American Planning Association.

Energy and Climate Change

Economic Considerations

In the section "California Climate Trends and Associated Impacts" (DEIR pg. 4.4-11), there is no mention of economic impacts. Can you add a bullet that says "Adversely affects Plumas County's economy through decreased tourism, decreased and/or inconsistent crop yields, increased occurrences of invasive species and pests, and increased costs associated with an increase in frequency and intensity of forest fires."? I16-3

Along these lines, can you in this section or the Economics element, quantify some of the likely economic impacts due to climate change in order to better inform decision-making? An example would be a recently released report that shows the economic impact of low snow years on winter tourism: http://www.nrdc.org/globalwarming/climate-impacts-winter-tourism.asp

Climate Planning

There are two very similar policies in the Proposed Project regarding climate planning: Conservation and Open Space (COS) Policy 7.10.2 and Traffic and Circulation (CIR) Policy 4.6.4. These two polices are pointed to somewhat interchangeably in the DEIR, creating confusion. Additionally, the DEIR points to these two policies as mitigating policies for a number of different impacts in different elements, but there is no language that does more than encourage the County to undertake climate planning in a very vague way. This means that the DEIR cannot truly analyze any impacts, or mitigation of any impacts, which refer to either of the policies. I16-4

Can you please either clarify the distinction between the two policies and which should apply where or choose one:

Will the County please do the following in order to eliminate confusion and ensure that the DEIR is correctly analyzing the Proposed Project in terms of climate change and impact mitigation through climate planning?

- Update Policy 4.6.4 to identify a responsible party and create a binding timeline for developing and adopting a county-wide Climate Action Plan and create a GHG reduction target within the Climate Action Plan.
    - For example, "Within two years, the County will develop and adopt a Climate Action Plan that identifies strategies for increasing energy efficiency and carbon sequestration, reducing GHG emissions; and land use and transportation. The strategies developed will be consistent with the State of California's Assembly Bill 32 and/or Executive Order S-3-05 with GHG emissions targets of 1990 levels by 2020 (30% reduction from 2005 levels) and 80% below 1990 levels by 2050, respectively."
        - A second option for GHG reduction target could be a 30% reduction in GHGs from the Plumas County Inventory baseline year of 2005 by 2035 – the end of the planning horizon with the Proposed Project.
- Keep CIR-4.6.4, remove COS-7.10.2 and redirect all references to COS-7.10.2 to CIR-4.6.4 and add timeline to this policy, as recommended above.

- CIR-4.6.4 is more straightforward and eliminating COS-7.10.2 will remove confusion. Additionally, COS-7.10.2 refers to currently-nonexistent "requirements adopted by the California Air Resources Board and/or the Northern Sierra Air Quality Management District" as well as SB 375 which is not applicable to rural areas such as Plumas County that do not have a Metropolitan Planning Organization.
- For example, in the Energy and Climate section of the DEIR, Conservation and Open Space (COS) Policy 7.10.2 is pointed to four times as a mitigating policy:
  - Impact 4.4-1, on page 4.4-17 and in Table 4.4-5 on page 4.4-18
  - Impact 4.4-2 on page 4.4-21 both in the text and in Table 4.4-6

I16-4 cont.

It should be noted that the Greenhouse Gas Inventory prepared for Plumas County also recommends developing a Climate Action Plan as the next step in climate planning.

Agriculture and Timber Resources

Impact 4.10-1: Loss of Important Farmland or Timber Resource Lands

The DEIR finds that "Additional development would occur on individual lots, but on a more limited basis which could result in some conversion of Important Farmlands or Timber Resource Land to non-production uses" (DEIR, pg. 4.10). The DEIR goes on to state that "The County cannot prohibit new development, which would be the only way to reduce important farmland/forest land conversion impacts to a less than significant level" (DEIR, pg. 4.10-9).
Why can the County not prohibit residential development on important farmland/forest land? Is that not the purpose of a General Plan?

I16-5

With some strengthening of the existing AG/FOR policies, impact 4.10-1 can be mitigated to Less than Significant. Will the County please consider and respond to the follow suggestions:

I16-6

- AG/FOR Policies 8.1.1, 8.2.18.2.6, and 8.3.2 all seem to have the same, or at least very similar, intent – protect agricultural land from incompatible uses.
  - We recommend laying out specific allowed, conditionally allowed, and not-allowed uses in order to effectively mitigate the loss of agricultural land. For example:
    - **Secondary structures for Ag:**
      - **Allowed**
        - Associated residences based on permitted lot size.
        - Agricultural uses, including production of timber.
        - Animal husbandry.
        - Commercial practices performed incidental to or in conjunction with agricultural operations including selling, processing, packaging, preparation for market and equipment storage and repair.

- Local non-commercial sand and gravel operations not exceeding 250 cubic yards and used upon the property from which the sand and gravel is being extracted.

- **Conditionally Allowed**
  - A limited range of small scale, ancillary activities related directly to the cultivation, harvest, processing, and sale of crops. Compatible ancillary uses shall not create significant visual, noise, or other nuisance for neighboring residents beyond those inherent in agricultural activities.
- **Any of the following characteristics will define a use as incompatible:**
  - Use of or construction of structures which do not have a traditional farm appearance.
  - Use of more than 2000 square feet of structure for non-farm activities. Excluding residential.
  - Use of brightly colored awnings, multiple signs, or other features conveying a retail or "circus" appearance on-site or off-site.
  - Outside, unscreened storage of more than five non-farm vehicles, resembling a storage, repair, or dismantling business.
  - Regular use of purchased non-farm materials exceeding 30% of those used in processing or sales.
  - Noise generation exceeding Noise Element standards.
  - Bright and unshielded night lighting.
  - Hazardous material storage not otherwise required for agricultural businesses.
  - Prominent, unscreened non-farm parking and storage facilities.
  - Local, non-commercial sand and gravel operations between 250 - 1000 cubic yards.
  - A limited range of non-retail accessory or appurtenant activities such as riding stables, equestrian centers, hunting and fishing lodges, guest ranches, camping facilities, fish hatchery facilities, animal boarding, care and breeding facilities and other low-intensity outdoor recreation uses which may be appurtenant and which are subordinant to the agricultural use of the property

I16-6 cont.

- AG/FOR 8.3.2: Uses that Support Agriculture and Timber Resources
  - In line with above, could Implementation Measure 17: “Amend the Zoning Code to address the use of ministerial permitting of agriculture support uses” be altered to also include “forestry support uses” and use the language above, or very similar language, as the required Zoning Code?

I16-7

- AG/FOR 8.9.1: Minimal Parcel Size for Timber Resource Lands.

I16-8

- In accordance with State law, can you change the last sentence in this Policy to "Only parcels 160 acres in size or greater are allowed a residence or structure *as necessary for the management of the timber resource*. (Italics used for identification of suggested change). I16-8 cont.

- AG/FOR 8.9.2: Multiple Uses Purpose for Timber Resource Lands. I16-9
  - Could this be strengthened by changing the Policy text to "Timber Resource Lands ~~are reserved for multiple use~~ *shall only be used for* purposes that are compatible with timber production: other wood products, bio-mass, ~~mineral resource extraction,~~ grazing, recreation, carbon sequestration and wildlife habitat *and corridors*. (Italics and strikethrough used for identification of suggested changes).
    - Mineral resources are not generally compatible with forestry.

Impact 4.10-3: Conversion of Farmland/Timber Resource Lands to Non-Agricultural Use I16-10

As above, with some strengthening of the existing AG/FOR policies, impact 4.10-1 can be mitigated to Less than Significant. Will the County please consider and respond to the follow suggestions:

- AG/FOR Policies 8.1.1, 8.2.18.2.6, and 8.3.2 all seem to have the same, or at least very similar, intent – protect agricultural land from incompatible uses.
  - We recommend laying out specific allowed, conditionally allowed, and not-allowed uses in order to effectively mitigate the loss of agricultural land. For example:
    - **Secondary structures for Ag:**
      - **Allowed**
        - Associated residences based on permitted lot size.
        - Agricultural uses, including production of timber.
        - Animal husbandry.
        - Commercial practices performed incidental to or in conjunction with agricultural operations including selling, processing, packaging, preparation for market and equipment storage and repair.
        - Local non-commercial sand and gravel operations not exceeding 250 cubic yards and used upon the property from which the sand and gravel is being extracted.
      - **Conditionally Allowed**
        - A limited range of small scale, ancillary activities related directly to the cultivation, harvest, processing, and sale of crops. Compatible ancillary uses shall not create significant visual, noise, or other nuisance for neighboring residents beyond those inherent in agricultural activities.
      - **Any of the following characteristics will define a use as incompatible:**
        - Use of or construction of structures which do not have a traditional farm appearance.

- Use of more than 2000 square feet of structure for non-farm activities. Excluding residential.
- Use of brightly colored awnings, multiple signs, or other features conveying a retail or "circus" appearance on-site or off-site.
- Outside, unscreened storage of more than five non-farm vehicles, resembling a storage, repair, or dismantling business.
- Regular use of purchased non-farm materials exceeding 30% of those used in processing or sales.
- Noise generation exceeding Noise Element standards.
- Bright and unshielded night lighting.
- Hazardous material storage not otherwise required for agricultural businesses.
- Prominent, unscreened non-farm parking and storage facilities.
- Local, non-commercial sand and gravel operations between 250 - 1000 cubic yards.
- A limited range of non-retail accessory or appurtenant activities such as riding stables, equestrian centers, hunting and fishing lodges, guest ranches, camping facilities, fish hatchery facilities, animal boarding, care and breeding facilities and other low-intensity outdoor recreation uses which may be appurtenant and which are subordinant to the agricultural use of the property

I16-10

- AG/FOR 8.3.2: Uses that Support Agriculture and Timber Resources
  - In line with above, could Implementation Measure 17: "Amend the Zoning Code to address the use of ministerial permitting of agriculture support uses" be altered to also include "forestry support uses" and use the language above, or very similar language, as the required Zoning Code?

I16-11

- AG/FOR 8.9.1: Minimal Parcel Size for Timber Resource Lands.
  - In accordance with State law, can you change the last sentence in this Policy to "Only parcels 160 acres in size or greater are allowed a residence or structure *as necessary for the management of the timber resource*. (Italics used for identification of suggested change).

I16-12

- AG/FOR 8.9.2: Multiple Uses Purpose for Timber Resource Lands.
  - Could this be strengthened by changing the Policy text to "Timber Resource Lands ~~are reserved for multiple use~~ *shall only be used for* purposes that are compatible with timber production: other wood products, bio-mass, ~~mineral resource extraction,~~ grazing, recreation, carbon sequestration and wildlife habitat *and corridors*. (Italics and strikethrough used for identification of suggested changes).
    - Mineral resources are not generally compatible with forestry.

I16-13

Hydrology, Water Quality, and Drainage

Impact 4.6-4: Groundwater Supplies and Recharge

This impact was determined to be Potentially Significant and Significant and Unavoidable. The justification is that there will be growth in the unincorporated county and it is impossible to say where that growth will occur, but that some of it will occur in areas "having already experienced significant groundwater declines (i.e. Sierra Valley Groundwater Basin)" (DEIR pg. 4.6-24). The DEIR goes on to state that "the specific location of these future dwellings, their design, their relationship to other development and land uses, and the character of their surroundings cannot be accurately determined that far into the future." I16-14

1. A general plan is supposed to do exactly these things that the DEIR states is impossible to predict: protect sensitive areas (i.e. areas "having already experienced significant groundwater declines" and "the specific location of these future dwellings, their design, and their relationship to other development and land uses").
2. Groundwater is one of Plumas County's greatest resources and there are ways to mitigate the effects of development on groundwater resources.
3. The DEIR does not consider all feasible mitigation measures that could reduce or eliminate an impact, even if it does not reduce the impact to Less than Significant, as required by Public Resource Code 21002 and CEQA Guidelines 15126.4.[i]

In order to protect Plumas County's precious groundwater resources, will the County and GP consultants please evaluate the following changes and additions to the Mitigating Policies listed in Table 4.6-11 (DEIR pg. 4.6-24): I16-15

- W-9.1.1: Groundwater Management
    - Add an opening sentence: "***BEFORE*** development is allowed outside of Planning Areas in Sierra Valley, Almanor, and Mohawk, require the County to develop basin-specific groundwater management plans."
    - Add a bullet point requiring these basin-specific plans to include "existing and future (2035) estimates of demand, current and future estimates of groundwater availability, areas of high quality and volume groundwater recharge, and groundwater recharge rates under future water year (wet and dry year) and growth scenarios."
- W-9.1.2: Groundwater Recharge Area Protection and AG/FOR-8.6.1: Groundwater Recharge Areas. These Policies as written are very similar and provide little if any substance. What does "adequately protect" mean (W-1.9.2)? What are areas that are "identified as significantly contributing to groundwater recharge" and what are "uses that would reduce the ability to recharge or would threaten the quality of the underlying aquifers?" (AG/FOR-8.6.1). I16-16
    - Combine these two policies into one, likely W-9.1.2 and direct the AG/FOR element to this Policy.
    - Change wording to reflect the definitions of "adequately protect" and areas "identified as significantly contributing to groundwater recharge.
- W-9.8.3: Compact Development. This Policy has no teeth or enforcement mechanisms. I16-17

- Add language to cap development outside of Planning Areas and Expansion Areas annually at a percentage of development approved within the Planning and Expansion Areas. For example, "The County shall cap residential development outside of Planning and Expansion Areas at 10% of the square footage annually approved within Planning and Expansion Areas as determined by building permit approval." I16-17 cont.

- COS-7.1.4: Conservation Easements I16-18
  - Add a line at the end of this Policy: "Those areas identified as high-priority for groundwater protection, through groundwater management plans, shall be given higher priority."

Impact 4.6-6: Housing within a 100-Year Flood Hazard Area

Does the County agree that 100-year hazard areas and floodplains are likely to increase in size into the future as more precipitation likely falls as rain than snow due to climate change? I16-19

The DEIR is incorrect in stating that the impact is Less than Significant. By allowing residential parcels and development within identified floodplains, the impact is Potentially Significant. In order to mitigate to Less than Significant, will the County and consultants please evaluate and respond to the following suggested changes and additions to the Mitigating Policies listed in table 4.6-13 (DEIR pg. 4.6-27):

- PHS-6.4.2: Development in Floodways and Dam Inundation Areas
  - Remove the qualifiers "of critical or high-occupancy structures." No development should be allowed in floodways or dam inundation areas, as this is an increasing risk into the future as more precipitation is expected to fall as rain instead of snow, especially in the spring and fall.
  - What are the definitions of "Critical" and "High-Occupancy" and where are they defined?
- PHS-6.4.3: New Parcels in Floodplain I16-20
  - Eliminate the distinction between parcels lying entirely and partially within Special Flood Hazard Areas and include contiguous parcels. Make all residential parcels partially within or contiguous to Special Flood Hazard Areas requiring proof that potential flood impacts can be sufficiently mitigated before development is allowed on the parcel(s). Creation of residential parcels in current or future floodplains presents a risk and allows development to encroach on floodplains, which are likely to expand in the future as more precipitation falls as rain, especially in the spring and fall.

Specific Ordinances I16-21

Based on the Proposed Project analyzed by the DEIR, the vast majority (~70%) of new residential development is predicted to be second homes. The Proposed Project states that it is impossible to predict where exactly these homes will be built.

- Based on trends in the Sierra, would the County agree that the tendency for second homes is in areas and locations near sensitive resources such as streams, rivers, lakes, wetlands and meadows, and potential groundwater recharge areas?

- Will the County and Consultants create Policies and Implementation Measures, with timelines, to develop stream, lake, and meadow ordinances that lay out specific requirements for development within or contiguous to sensitive aquatic resources including, but not limited to streams, rivers, creaks, lakes, meadows, marshes, beaches, aquifers, and floodplains? Will these ordinances include language specific to setbacks, parcel size and divisions, allowed and disallowed land uses, etc?

I16-21 cont.

Air Quality

Impact 4.3-2: Criteria Pollutants

I16-22

Would it be possible to control some criteria pollutants in the County by banning wood-burning stoves in new construction and requiring retrofits upon sale? Would this be better focused on Portola Valley only?

Please consider and respond to this type of policy, which is in place in such locations as Mammoth Lakes, Aspen, Tahoe, and Reno, among others:

Wood Heaters:

The sale of wood heaters which do not meet the emission standards of this subsection is prohibited in [the County/Portola Valley (Region)]. Wood heaters to be installed, in the Region, either as new or replacement units, shall meet the requirements of this subsection. Coal shall not be used as a fuel source.

(1) Emission Standards: Wood heaters installed in the Region shall meet the following emission standards for total suspended particulates of smoke emissions:

(a) Catalytic wood heaters shall not cause emissions of more than 4.1 grams per hour.

(b) Non-catalytic wood heaters shall not cause emissions of more than 7.5 grams per hour.

(c) Wood heaters certified to meet the above standards by the U.S. EPA under 40 CFR Part 60 or the Oregon Woodstove Certification Program, shall be deemed in compliance with the above standards. Pellet fueled wood heaters labeled as exempt from 40 CFR Part 60 shall be deemed in compliance with the above standards.

(2) Limitations: Wood heaters shall be sized appropriately for the space they are designed to serve. Multi-residential projects of five or more units, tourist accommodations, commercial, recreation and public service projects shall be limited to one wood heater per project area.

(3) Wood Heater Retrofit Program: Prior to any sale, transfer or conveyance of any building, all existing wood heaters in the building, excluding legally existing open fireplaces which are not primary heat sources, shall be in conformance with the emission standards contained in subsection 91.3.B.

(a) Compliance with this section shall be evidenced by a statement of the seller made under penalty of perjury, on a form provided by the County, that all existing wood heaters in the building, excluding legally existing open fireplaces which are not primary heat sources, either conform to the emission standards in subsection 91.3.B or have been replaced with conforming units, or that the structure does not contain any existing wood heaters. The statement shall be submitted to the County prior to the sale, transfer or conveyance.

(b) A statement of wood heater conformance shall be required for any subsequent sales, transfers or conveyances.

[i] **Public Resource Code Section 21002**

The Legislature finds and declares that it is the policy of the state that public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects, and that the procedures required by this division are intended to assist public agencies in systematically identifying both the significant effects of proposed projects and the feasible alternatives or feasible mitigation measures which will avoid or substantially lessen such significant effects. The Legislature further finds and declares that in the event specific economic, social, or other conditions make infeasible such project alternatives or such mitigation measures, individual projects may be approved in spite of one or more significant effects thereof.

CEQA Guidelines 15126.4

(a) Mitigation Measures in General.

(1) An EIR shall describe feasible measures which could minimize significant adverse impacts, including where relevant, inefficient and unnecessary consumption of energy.

(A) The discussion of mitigation measures shall distinguish between the measures which are proposed by project proponents to be included in the project and other measures proposed by the lead, responsible or trustee agency or other persons which are not included but the lead agency determines could reasonably be expected to reduce adverse impacts if required as conditions of approving the project. This discussion shall identify mitigation measures for each significant environmental effect identified in the EIR.

(B) Where several measures are available to mitigate an impact, each should be discussed and the basis for selecting a particular measure should be identified. Formulation of mitigation measures should not be deferred until some future time. However, measures may specify performance standards which would mitigate the significant effect of the project and which may be accomplished in more than one specified way.

(C) Energy conservation measures, as well as other appropriate mitigation measures, shall be discussed when relevant. Examples of energy conservation measures are provided in Appendix F.

(2) Mitigation measures must be fully enforceable through permit conditions, agreements, or other legally-binding instruments. In the case of the adoption of a plan, policy, regulation, or other public project, mitigation measures can be incorporated into the plan, policy, regulation, or project design.

(c) Mitigation Measures Related to Greenhouse Gas Emissions.

Consistent with section 15126.4(a), lead agencies shall consider feasible means of mitigating greenhouse gas emissions that may include, but not be limited to:

(1) Measures in an existing plan or mitigation program for the reduction of emissions that are required as part of the lead agency's decision;

(2) Reductions in emissions resulting from a project through implementation of project features, project design, or other measures, such as those described in Appendix F;

(3) Off-site measures, including offsets, to mitigate a project's emissions;

(4) Measures that sequester greenhouse gases; and

(5) In the case of the adoption of a plan, such as a general plan, long range development plan, or greenhouse gas reduction plan, mitigation may include the identification of specific measures that may be implemented on a project-by-project basis. Mitigation may also include the incorporation of specific measures or policies found in an adopted ordinance or regulation that reduces the cumulative effect of emissions.

From: Wilson, Randy
To: Ray Weiss
Subject: FW: Plumas County General Plan
Date: Friday, January 11, 2013 5:28:12 PM

From: Gorbet, Kristine [KRF5@pge.com]
Sent: Friday, January 11, 2013 4:36 PM
To: Wilson, Randy
Subject: Plumas County General Plan

Dear Mr. Wilson:

I am concerned with the language written into the Plumas County General Plan by professional consultants. It appears there is a political correctness to the language that is subversive and dangerous. I17-1

Agricultural Resources:

It is my understanding this is a 30 year general plan. In the agricultural section you reference Williamson Act being at risk due to the current State of California budget crisis. Who made this up? The Williamson act has effectively protected land owners for years. To say it is at risk a political statement not a factual one.

In addition you reference 'climate change having a significant effect on farming and ranching'. This controversial science does not give the state the right to demand our local water for the Delta, San Joaquin Valley and Southern California communities. This language makes it seem as if the central valley and southern state water needs should be considered before the local farmers and ranchers. I cannot agree to this language.

Forest Resources:

The amount of timber products used by the Maidu people were miniscule in comparison to the amount of land that has been allowed to burn by the federal and state government. Why even state that? It add no value to the plan and is an empty and insensitive remark. With high unemployment in this logging community I would think the county would try very hard to encourage and support sustainable logging in the area. All I see in this plan is the county giving the state the ability (they call it flexibility) to go beyond the elements of the general plan. Why would we write something like that into our general plan?

Cultural and Historical Resources

I see no assurances in the language of this plan that Plumas County will support the protection of the existing historical and archaeological sensitive areas in the region. Allowing the county public works department to harvest firewood on our private property in an area with Native American village sites and burial grounds is a testimony to your lack of sensitivity to this issue.

Thank you for your time.
Warren and Kristine Gorbet
P.O. Box 85
Crescent Mills, CA 95934
530.284.6292

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Randy Wilson
Planning Director
Plumas County Planning Dept.
555 Main St.
Quincy, Ca. 95971

Jan.11,2013

Attn; 2030 Plumas County General Plan
EIR draft-comment letter
Dear Randy and Commission,

RECEIVED
JAN 11 2013
PC Planning Dept.

Below are my individual concerns.

I18-1

As you might have realized we, the agriculture community of Indian Valley, have spent countless hours pouring over the new General Plan and EIR draft and we have researched the data collected for this Plan and the resources that were used. Having said this it is apparent that Plumas County is mandated by the state of California to implement certain criteria into the current plan. How Plumas County does this and what ideology they embrace is up to the Planning Director, his assistant and the commission. In our research we found that the choice to implement Agriculture, Forestry, Water and Business was a choice of Plumas County alone and not mandatory.

Therefore this section or sections of the Plan need to be removed. Whether Plumas County did this for monetary gain from the local producers, through regulatory fees or job creation or for grant monies is irrelevant. Plumas County must not incorporate these, Agriculture-Forestry, Water, local Businesses, into the General Plan 2030.

I18-2

The GHG aspect of the General Plan is flawed in its data and sources. Using ICLEI as a source is unacceptable. Using data that is taken from the Sacramento Valley and not our own Ag Commission lets me know that this section of the Plan was not locally implemented.

I18-3

Plumas County must be certain any plan implemented can be repealed if it is found to infringe on individual property rights. Plumas County needs a Property Rights Council.

The Right to Farm ordinance in Plumas County is very important to all of Plumas County, for that is where we will recover. From the land,not living off of Grants which change our character with each money source.

Thank you very much for all of your hard work.

Heather Kingdon
Rancher
Taylorsville, Ca
95983

From:	Wilson, Randy
To:	Ray Weiss; Coleen Shade; Herrin, Becky; Settlemire, Craig; Mansell, Steve; Cortez, Liz
Subject:	FW: Comments: 2035 Plumas County General Plan Update Draft Environmental Impact Report
Date:	Friday, January 11, 2013 12:36:56 PM
Attachments:	Traffic and Circulation.docx

From: Steve Lindberg [mailto:lindberg@psln.com]
Sent: Friday, January 11, 2013 12:31 PM
To: Wilson, Randy
Cc: Len Fernandes
Subject: Comments: 2035 Plumas County General Plan Update Draft Environmental Impact Report

To:
Randy Wilson, Director
Plumas County Planning Department
555 Main Street
Quincy, California 95971

Attached are our comments for the Traffic and Circulation Element of the Plumas GP DEIR. We are submitting these comments in order to help make Plumas more bike/ped-friendly and to potentially attract funding. As stated herein, the Plumas-Sierra Bicycle Club is committed to help get a bicycle master plan in place. I19-1

.
"Every time I see an adult on a bicycle,
I no longer despair for the future of the human race." (H.G. Wells)
.
.
Len Fernandes, President, Plumas-Sierra Bicycle Club
Steve Lindberg, Ride Director, Plumas-Sierra Bicycle Club
https://www.facebook.com/PlumasSierraBicycleClub
POB 1895
Graeagle, CA 96103
For FEDEX delivery use this street address: 35 Wishram Trail

Traffic and Circulation

Issues

Mislabeled and nonexistent implementation measures

- There are several mislabeled and nonexistent implementation measures in the Proposed Project. Without implementation of Policies in the Proposed Project and with mislabeled Implementation Measures, the DEIR cannot effectively analyze the Proposed Project. Additionally, the public cannot effectively interpret the Proposed Project for the purposes of evaluating the DEIR or using the General Plan into the future. I19-2
    - Policy 4.1.3 Required Roadway Access refers to Table 4-2 (general roadways standards), but that table does not seem to be included in the Circulation element.
    - Policy 4.1.7 is referenced, but does not exist. Instead, there are two instances of 4.1.6.
    - There is no implementation for Policy 4.2.1 Complete Street Design
    - Implementation Measure 8 implements Policy 4.4.2, not 4.4.3 as indicated in the Proposed Project
    - Implementation Measure 10 implements Policy 4.6.2, not 4.6.3 as indicated in the Proposed Project
    - There is no implementation measure for 4.6.3 GHG Reductions or 4.6.4 Climate Action Plan

Impact 4.2-1: Traffic and LOS Standards

- The DEIR states that there is "No Additional Mitigation Available" to avoid the "exacerbate[d] unacceptable operations (LOS D) on the roadway segment of SR 36 between the eastern intersection with SR 89 and western end of the four-lane segment west of Chester." The DEIR goes on to state that implementation of Circulation policies 4.1.1-4.1.7, 4.2.1, and 4.6.2 support alternative modes of travel to reduce the use of automobiles and to "avoid and minimize adverse impacts on transportation and circulation impacts to the maximum extent feasible." I19-3
- Ultimately, the DEIR finds that widening the segment of SR 36 is the only way to truly mitigate the impact and that the County cannot guarantee construction, so the impact is Significant and Unavoidable.
    - Widening of the road will trigger a separate environmental review, likely with its own Potentially Significant impact(s), creating even another hurdle to mitigating the impact by widening the road.
    - These obstacles to mitigating Impact 4.2-1 by widening the road should have encouraged the County to look at other feasible mitigation measures instead of simply labeling the impact Significant and Unavoidable.
- California law requires the DEIR to consider all feasible mitigation measures that could reduce or eliminate an impact, even if it does not reduce the impact to Less than Significant (Public Resource Code 21002, CEQA Guidelines 15126.4).[i] The DEIR does not

- Impact 4.2-1 states "The policies included as part of the Proposed Project? also provide a funding mechanism, through implementation of a countywide traffic impact fee, and coordination with a regional traffic impact fee, which are intended to provide funding for transportation improvements." I19-3
    - Where in the Proposed Project is this language? Without details, it is impossible to know how much revenue is projected, where the funds will be directed, what the criteria are for prioritizing transportation projects, etc. Without this information, it is impossible to gauge whether or not these fees will actually be implemented or how they will help mitigate the impact on LOS.

There are a number of feasible ways to reduce, and maybe even eliminate, Impact 4.2-1, including correcting and enforcing implementation of the policies such as 4.1.1-4.1.7, 4.2.1, 4.4.1-4.4.3, 4.6.3, and 4.6.4. See "Potential Solutions," below, for more details.

Impact 4.2-2: Rural Road Safety

- For this impact to remain Less than Significant, pedestrian and bicycle facilities must be required instead of recommended as development occurs. Otherwise the Proposed Project will result in diminished safety for cyclists and pedestrians on rural roads, which is a Significant impact. I19-4

Increased danger to cyclists and pedestrians

- The DEIR states, under both the Existing Plus Proposed Project and Cumulative Plus Proposed Project scenarios that "Future development under the proposed project would result in more pedestrians and bicyclists on the roadways. The existing bicycle and pedestrian network is incomplete and could result in users needing to walk or ride on roadways that do not adequately accommodate pedestrians or bicyclists creating potentially unsafe conditions." I19-5

Potential Solutions

Mislabeled and nonexistent implementation measures

- Include Table 4-2, referred to in Policy 4.1.3 and add bicycle and pedestrian facilities to the general roadway standards. I19-6
- Correct the second instance of Policy 4.1.6 to be 4.1.7.
- Implement 4.2.1 by changing the wording from "The County shall support the elements of Complete Streets design, including the following:" to "The County shall update zoning codes and ordinances to require new development to include the elements of Complete Streets design, including the following:"
    - Create an Implementation Measure for 4.2.1 that requires the PCPC to update zoning codes and ordinances in accordance with Complete Street design and putting a timeline on updating zoning codes and ordinances – within 2 years.
- Implementation Measure 8 implements Policy 4.4.2, not 4.4.3 as indicated in the Proposed Project
    - Correct text in Proposed Project
- Implementation Measure 10 implements Policy 4.6.2, not 4.6.3 as indicated in the Proposed Project
    - Correct text in Proposed Project

- There is no implementation measure for 4.6.3 GHG Reductions or 4.6.4 Climate Action Plan I19-6 cont.
    - Policies and plans to reduce GHGs and inform a Climate Action Plan can be developed by:
        - Updating policies 4.1.1-4.1.7 to also apply to bicycle and pedestrian facilities
        - Implementing 4.2.1, as above
    - Identify a responsible party and create a binding timeline for developing and adopting a county-wide Climate Action Plan

Impact 4.2-1: Traffic and LOS Standards

There are a number of feasible ways to reduce, and maybe even eliminate, Impact 4.2-1, including amending, correcting, and enforcing implementation of the policies such as 4.1.1-4.1.7, 4.2.1, 4.4.1-4.4.3, 4.6.3, and 4.6.4. Additionally, more information needs to be provided regarding the traffic impact fees mentioned in the DEIR for the fees to be considered as any kind of mitigation. I19-7

Amend and correct policies 4.1.1-4.1.7 to include bicycle and pedestrian facilities and correct the numbering

- Policy 4.1.1 Roadway Classification System
    - Update to include bicycle facility classification (Class I, II, and III as defined in the Proposed Project) and conditions.
- Policy 4.1.3 Required Roadway Access
    - Include Table 4-2 (general roadways standards) in the Proposed Project and add standards for bicycle and pedestrian facilities. For example, new development shall be required to include sidewalks and streets shall be wide enough to allow Class II bicycle routes. If development occurs adjacent to existing or planned (per Bicycle Master Plan) Class II or Class III bicycle routes, the development must include corresponding and connecting bicycle facilities.
- Policy 4.1.4 Developer Participation in Roadway Improvements
    - Add “bicycle and pedestrian facilities” after “road” and “roadway.”
- Policy 4.1.5 Developer Coordination with Roadway Plans
    - Add “bicycle and pedestrian facilities” after each of the three instances of “roadway.”
- Policy 4.1.6(1) Roadway Elements Eligible for Developer Fee Programs
    - Include bicycle and pedestrian facilities as eligible for developer fee programs
- Policy 4.1.6(2) General Road Plan Standards
    - Re-label as 4.1.7
    - Include bicycle and pedestrian facilities as required for development in Town and Community Planning Area and Master Planned Communities.

Create an Implementation Measure for 4.2.1 I19-8

- Require the PCPC to update zoning codes and ordinances in accordance with Complete Street design and putting a timeline on updating zoning codes and ordinances – within 2 years.

Enforce implementation of Policies 4.4.1 and 4.4.3 and correct numbering in the Proposed Project I19-9

- Put a timeline on implementing 4.4.1 and 4.4.3, consulting with the Plumas-Sierra Bicycle Club, which offers to help design the plan.

- Correct Proposed Project so that Implementation Measure 8 correctly indicates that it implements Policy 4.4.2, NOT 4.4.3. I19-10

Implement Policies 4.6.3 and 4.6.4

- Update policies 4.1.1-4.1.7 to also apply to bicycle and pedestrian facilities I19-11
- Implement 4.2.1, as above I19-12
- Identify a responsible party and create a binding timeline for developing and adopting a county-wide Climate Action Plan I19-13

Traffic Impact Fees

- Provide details and a timeline for implementation of a countywide traffic impact fee, and coordination with a regional traffic impact fee, which are intended to provide funding for transportation improvements. I19-14
- ∗ In order to ensure that all of the bicycle and pedestrian policies mentioned specific to this impact and in these comments as a whole are implemented, a dependable revenue source must be identified. Dedicate a percentage (2.5-5%) of countywide and regional traffic impact fee revenue to bicycle and pedestrian infrastructure construction and maintenance.

<u>Impact 4.2-2: Rural Road Safety</u>

- Change the second sentence, "As development occurs, pedestrian and bicycle facilities should be constructed to meet demand" to "As development occurs, pedestrian and bicycle facilities ***shall*** be constructed to meet demand." I19-15
- In order to ensure that all of the bicycle and pedestrian policies mentioned specific to this impact and in these comments as a whole are implemented, a dependable revenue source must be identified. Dedicate a percentage (2.5-5%) of countywide and regional traffic impact fee revenue to bicycle and pedestrian infrastructure construction and maintenance.

<u>Increased danger to cyclists and pedestrians</u>

- This can be addressed by including bicycle and pedestrian facilities in policies 4.1.1-4.1.7 and implementing policies 4.2.1, 4.4.1-4.4.3, 4.6.2, and 4.6.3, as above. I19-16
- In order to ensure that all of the bicycle and pedestrian policies mentioned specific to this impact and in these comments as a whole are implemented, a dependable revenue source must be identified. Dedicate a percentage (2.5-5%) of countywide and regional traffic impact fee revenue to bicycle and pedestrian infrastructure construction and maintenance.

[i] Public Resource Code Section 21002

The Legislature finds and declares that it is the policy of the state that public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects, and that the procedures required by this division are intended to assist public agencies in systematically identifying both the significant effects of proposed projects and the feasible alternatives or feasible mitigation measures which will avoid or substantially lessen such significant effects. The Legislature further finds and declares that in the event specific economic, social, or other conditions

make infeasible such project alternatives or such mitigation measures, individual projects may be approved in spite of one or more significant effects thereof.

CEQA Guidelines 15126.4

(a) Mitigation Measures in General.

(1) An EIR shall describe feasible measures which could minimize significant adverse impacts, including where relevant, inefficient and unnecessary consumption of energy.

(A) The discussion of mitigation measures shall distinguish between the measures which are proposed by project proponents to be included in the project and other measures proposed by the lead, responsible or trustee agency or other persons which are not included but the lead agency determines could reasonably be expected to reduce adverse impacts if required as conditions of approving the project. This discussion shall identify mitigation measures for each significant environmental effect identified in the EIR.

(B) Where several measures are available to mitigate an impact, each should be discussed and the basis for selecting a particular measure should be identified. Formulation of mitigation measures should not be deferred until some future time. However, measures may specify performance standards which would mitigate the significant effect of the project and which may be accomplished in more than one specified way.

(C) Energy conservation measures, as well as other appropriate mitigation measures, shall be discussed when relevant. Examples of energy conservation measures are provided in Appendix F.

(2) Mitigation measures must be fully enforceable through permit conditions, agreements, or other legally-binding instruments. In the case of the adoption of a plan, policy, regulation, or other public project, mitigation measures can be incorporated into the plan, policy, regulation, or project design.

(c) Mitigation Measures Related to Greenhouse Gas Emissions.

Consistent with section 15126.4(a), lead agencies shall consider feasible means of mitigating greenhouse gas emissions that may include, but not be limited to:

(1) Measures in an existing plan or mitigation program for the reduction of emissions that are required as part of the lead agency's decision;

(2) Reductions in emissions resulting from a project through implementation of project features, project design, or other measures, such as those described in Appendix F;

(3) Off-site measures, including offsets, to mitigate a project's emissions;

(4) Measures that sequester greenhouse gases; and

(5) In the case of the adoption of a plan, such as a general plan, long range development plan, or greenhouse gas reduction plan, mitigation may include the identification of specific measures that may be implemented on a project-by-project basis. Mitigation may also include the incorporation of specific measures or policies found in an adopted ordinance or regulation that reduces the cumulative effect of emissions.

Sierra Pacific Industries

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January 11, 2013

Randy Wilson, Director
Plumas County Planning Department
555 Main Street
Quincy, CA 95971

Dear Mr. Wilson;

The following comments pertain to the Plumas 2035 General Plan Draft Environmental Impact Report.

1) Figure 2-1: The map legend does not depict what the solid green area represents inside the mapped perimeter of Plumas County. Looking at other maps of Plumas County I believe the solid green area is the Federal ownership in Plumas County, while the white area is private ownership. The legend in Figure 2-1 should clearly indicate the expansive Federal ownership in Plumas County, in contrast to the private ownership. I20-1

The differential in private versus Federal ownership will affect the analysis of any Alternative proposed in the Plumas County General Plan due to the sheer size of the Plumas National Forest Area and because the United States Forest Service (USFS) management goals generally differ from many private land owners. In addition to the size and goals of the USFS, the efficacy at implementing its management plans affects the *Environmental Setting* for the following sections of the DEIR: Timberlands, Economics, Air Quality, Climate Change and Public Health and Safety. The DEIR does not discuss the current conditions of the Plumas National Forest nor does it highlight the direction or trend of those conditions, except for the following statement:

United States Forest Service (USFS)

The USFS prepared the Plumas National Forest Land and Resource Management Plan (FLRMP) in 1988 to guide management and land use planning decisions in the Plumas National Forest. The FLRMP provides a designation for areas based on established priorities for various resources, including wilderness, recreation, wildlife, timber, and visual resources. The FLRMP also establishes visual quality objectives for decisions that are made specific to USFS lands within the County. I20-2

At a minimum the DEIR should summarize the numerous Federal management documents and annual reports that guide Federal activities on the approximately 1,253,000 acres of Federal land designated Timber Resource. An interview with the Plumas Forest Supervisor might expedite the compilation of relevant documents and provide useful citations regarding the current conditions, the implementation effectiveness of the FLRMP as amended by the Sierra Nevada Forest Management Plan (Framework), the QLG and a professional opinion of the anticipated future condition of Plumas National Forest land. If the Plumas National Forest is designated Timber Resource as part of the Plumas General plan its current and future condition needs to be more fully discussed. The DEIR will be a reference document from which decision makers will look to answer questions regarding

existing environmental conditions, proposed future conditions, and the assumptions used to arrive at those conclusions. I20-2 cont.

2) Page 2-2: The fifth bullet indicates that 65% of the land in Plumas County is public land managed by the USFS. In the first paragraph of page 4.1-5 the DEIR states that the amount of National Forest land managed by the USFS is 76% of Plumas County. These conflicting statements need to be clarified. I20-3

3) Page 3-26: The text under "Existing Land Use and Future Development Capacity" indicates that 86% of the total land area is "Timber Resource Lands". Does the 1,413,780 acres in Table 3-5 include the Federal ownership in Plumas County? Considering that the narrative and Table 3-5 is attempting to clarify the extent of land uses **and** future development capacity of lands in Plumas County, I think that a distinction must be made between the private and Federal ownership in Plumas County since both are designated Timber Resource. This is particularly important when discussing "land use **and** future development capacity" since the approximate 1,253,000 acres of Federal ownership in Plumas County will likely be managed less for its timber resource production as compared to private land, and the Federal ownership will never have a residential component. The DEIR should clearly indicate these differences as they are material to any thorough analysis. I20-4

4) Page 3-24: Under the heading "Analysis Assumptions and Methodology" the DEIR states, "Once adopted, the 2035 Plumas County General Plan will serve as the basis for population growth projections in unincorporated Plumas County." The DEIR explains that future development projections are based on historic trends. Then on page 3-31 the DEIR states; "Full build-out under the County's 2035 General Plan Update is identified in **Table 3-10**. Given the long-term nature associated with build-out of the County, residential growth was chosen as the indicator of full build-out, as it can be relatively constant to measure and easier to extrapolate than other factors." These previous statements indicate to the reader that a comprehensive estimate of growth in the unincorporated portion of Plumas County will be forthcoming; however the DEIR fails to complete this analysis, leaving two serious omissions in the DEIR. I20-5

One omission is found on page 3-39, in the third paragraph, which starts by stating, "The allocation of future housing units within each Geographic/Planning Area (see Table 3-9) was then based on the proportion of building permits issued within each individual Planning Area from 2000 to 2010, for both Plumas County and the City of Portola." The Plumas General Plan 2035 contemplates, in each Alternative, a permitted residential use in the Agricultural and Timber Resource land use designations; however there is no discussion regarding the potential for residential units outside of the Geographic/Planning Area. This DEIR must address the potential for residential units outside of the Geographic/Planning Area, since these areas may be a potential source of new residential units. It is understood that there were few building permits issued for these land use designations, and this trend is likely to continue, however avoiding any discussion about this potential source of new residential units fails to consider those potential environmental impacts.

The DEIR mentions that no building permits were pulled in several Planning Areas; Little Grass Valley, Blairsden, Tobin, Belden, or Tollgate; however "a modest level of future development was estimated based on potential development capacity". For this DEIR to be complete, some level of future development also needs to be estimated for all land use designations that contemplate a permitted residential use within or outside of a Geographic/Planning Area. The estimate for this future development needs to be clearly explained and justified so that these potential impacts are accurately identified and understood for each Alternative.

The second omission is found in the DEIR on Page 3-32, General Plan Development Potential, Table 3-10. This table fails to show any future residential units within the Agricultural or Timber Resource land use designations even though these land use designations historically have permitted a residential use, and each of the Alternatives proposed in the Plumas County General Plan being analyzed by this Environmental Impact Report allow a residence as a permitted use. Because these land use designations permit a residential use, albeit at a very low density, an estimate of total units developed, for the life of the General Plan must be included in Table 3-10 and analyzed in all other pertinent sections, for this DEIR to be complete. I20-5 cont.

5) On page 4.10-2 the DEIR states, "This Act is a federal law that is the primary statute covering the implementation of the "Quincy Library Group Community Stability Proposal" (QLG). In addition to funding via its ASQ assigned by Congress, the Plumas National Forest also receives additional funding through the QLG, to implement timber management practices that integrate hazardous fuel reduction." I20-6

While the above statement is correct, it does not inform the reader regarding the effectiveness of the QLG, for example the *Summary of Fuel Treatment Effectiveness in the Herger-Feinstein Quincy Library Group Pilot Project Area* (R5-TP-031) reports that as of December 2010, only approximately 60 percent of the networks of treated areas were in place.

In addition the it should be recognized that the fact that most of the treated acres were the low volume/value acres on the east side of the National Forest and the remaining portion of the QLG project are the much higher volume and higher risk stands on the west side of the National Forest. These lower value projects combined with every project being litigated through 2008 has caused the total costs of implementing the QLG through 2011 to reach $293.3 million while the cumulative revenues are only $23.8 million[1]. The return of revenue from the original EIS for the QLG project estimated $3 of revenue to the US Treasury for every $1 expended on the Pilot Project.

A broader summary of the QLG and Sierra Nevada Forest Plan (Framework) should be incorporated into the *Environmental Setting* discussion of the following sections of the DEIR: Timberlands, Economics, Air Quality, Climate Change and Public Health and Safety since the objectives of those plans and the efficacy of their implementation will effect 76% of the land in Plumas County and have an impact on the Timberlands, Economics, Air Quality, Climate Change and Public Health and Safety of Plumas County.

6) On page 4.10-2: In the section titled "California Timberland Productivity Act (TPA)" the DEIR incorrectly states, "Contracts involving Timber Production Zones (TPZ) are on 10-year cycles." I20-7

Parcels that qualify as timberland, pursuant to Government Code Sections 51100 et seq., may be zoned Timber Production, however inclusion in the Timber Production zone does not require a contract, except if the Timber Production zone ordinance, pursuant to Government Code 51119.5, provides for parcels to be subdivided to a size less than 160 acres. Parcel division to less than 160 acres requires a Joint Timber Management Plan (JTMP) to be prepared by a California Registered Professional Forester (RPF). The JTMP must provide for the management and harvesting of timber by the original and any subsequent owners. The JTMP is recorded with the county and runs with the land as a deed restriction for as long as the parcel remains in the Timber Production Zone.

7) On page 4.10-3: In the section titled "Timberlands" the DEIR stated that in 1994 almost 40 percent of timber harvest was on public land. I20-8

[1] Status Report to Congress Fiscal Year 2011, United States Department of Agriculture Forest Service Pacific Southwest Region, February 2012, Herger-Feinstein Quincy Library Group Forest Recovery Act Pilot Project

Reviewing the California Board of Equalization records the volume of timber harvested on Federal land was 22% in 1994 and in 2007 it was 10.9% of the yearly total. I20-8 cont.

8) On page 4-10.3 the DEIR states; "Over the last 15 years, forest production in Plumas County has varied significantly. In 1994, timber production was about 105,000 board feet. By 2010, production was about 89,000 million board feet. In the intervening years, production was as high as 176 million board feet in 1999, and as low as 80 million in 2002." I20-9

The statement above regarding timber harvest volumes needs to be corrected. The California Board of Equalization records indicate that the total volume of timber harvested in Plumas County in 1994 was 146.2 million board feet, timber harvested in 1999 was172.9 million board feet, and the lowest volume of timber harvested from 1994-2011 was 77.7 million board feet, which occurred in 2011.

The reporting in this section also should be expanded so that the public can understand the historic trend in both timber harvest volume and the shift in where timber harvest occurs in Plumas County. Because timber harvesting historically has been crucial to the economic well-being of Plumas County and the while the cause of its decline is many faceted, contrasting the relative production of timber from the Federal versus the private ownerships is worth highlighting in a more comprehensive manner as follows:

Reviewing the California Board of Equalization tax records, the total volume of timber harvested in Plumas County, from 1984 until 1993 averaged 253.6 million board feet. During 1984 until 1993 private timber harvest was 30% of the total, contributing on average 77.4 million board feet annually. The average volume harvested from Federal land during 1984-1993 was 176.2 million board feet, which was 70 percent of the total.

The total volume of timber harvested in Plumas County from 1994 to 2011 averaged 122.3 million board feet. The average harvest from private land from 1994 to 2011 was 95.9 million board feet, while Federal land produced on average 21.7 million board feet. The highest total timber harvest volume between 1994 and 2011 occurred in 1999 when a total of 172.9 million board feet was harvested. The Federal harvest in 1999 was 40 million and the private harvest was 132 million board feet respectively. These statistics show that from 1994 to 2011 approximately 81% of the timber harvest came from private land whereas 19% of the harvest was from Federal land. The lowest timber harvest from Federal land from 1994-2011 was in 2001 and 2003, when only 4.6 million and 2.8 million board feet respectively were harvested. The lowest production on private land was in 2009 when 45 million board feet was harvested.

The annual growth of timber on the Plumas National Forest far exceeds the amount of annual timber harvest. For perspective, the Plumas Forest Land Resource Management Plan (FLRMP), chapter 3, page 3-15, states that the "data suggests that the entire Plumas National Forest (PNF) could potentially grow up to 435 million board feet/year if all forest lands were fully stocked." This means that if the Plumas National Forests were fully stocked the annual sustained harvest level could be 435 million board feet per year. The 435 million board feet/year production however was tempered by the Plumas Forest Land and Resource Management Plan, chapter 4, and page 4-3, Forest Goals and Policies which states:

The management direction of this plan is to evolve the Plumas National Forest to a mosaic of:

- Intensively-managed, regulated, sustained-yield, and generally even-aged timberland on the most productive sites;
- Increasingly-productive and utilized rangeland
- Special interest, semi-primitive, and wild areas and
- developed recreation centers

while: I20-9

- Managing soil productivity and improving water quality
- Encouraging mineral and energy production,
- Conserving significant cultural resources, and
- Maintaining viability of all wildlife species.

Prior to being amended by the Sierra Nevada Forest Plan (Framework) in 2004, the combination of competing forest outputs, including the non-forest constraints listed above, resulted in the Plumas Forest Land and Resource Management Plan (FLRMP) having an Allowable Sale Quantity (ASQ) of 265.5 million board feet per year for the first decade (1986-1995). The FLRMP, chapter 4, and page 4-5, stated that the ASQ adheres to the principle of a non-declining yield of timber, which means that the timber harvest level is sustainable, and would not need to decline, because the annual rate of timber growth on the forest would exceed the annual amount harvested with all non-forest constraints considered. Therefore, consideration of non-forest constraints in the FLRMP reduced the timber yield from the Plumas National forest by approximately 40% of its maximum potential annual production of 435 million board feet to a non-declining yield of 265 million board feet and yet the timber harvested during the past 14 years (post enactment of the Quincy Library Group) the Plumas National Forest has averaged only 7% of the ASQ with an average harvest level of 18.6 million board feet.

Considering that the annual Federal timber harvest is well below the ASQ, only 60 percent of the QLG networks of treated areas were in place in 2010, and the cost of implementation realizes only $1 dollar of revenue for every $12.3 spent indicates that the Federal management process, not the timber harvest level is unsustainable.

Regarding the sustainability of timber harvest levels on private lands, it should be noted that the California Forest Practice Rules require all Timber Harvest Plans demonstrate that the goal of 14 CCR § 933.11 is being met. The goal of 14 CCR § 933.11 is to achieve Maximum Sustained Production of High Quality Timber Products (MSP) while at the same time:

> (1) Meeting the stocking and basal area standards provided in the California Forest Practice Rules;
> (2) Protecting the soil, air, fish and wildlife, water resources and any other public trust resources;
> (3) Giving consideration to recreation, range and forage, regional economic vitality, employment and aesthetic enjoyment;
> (4) Balancing growth and harvest over time. The projected inventory resulting from harvesting over time shall be capable of sustaining the average annual yield achieved during the last decade of the planning horizon. The average annual projected yield over any rolling 10-year period, or over appropriately longer time periods for ownerships which project harvesting at intervals less frequently than once every ten years, shall not exceed the projected long-term sustained yield.

Therefore adherence to the California Forest Practice Rules ensures that the timber harvest levels on private land are both maximizing the sustainable production of timber while also protecting other public trust resources.

9) In the section *Habitat Connectivity/Wildlife Movement and Corridors* on page 4.11-8 the DEIR states: "Habitat reduction and fragmentation are among the primary causes of species decline; consequently, the identification and preservation of key corridors is important to retaining native populations in Plumas County. Figure 4.11-2 identifies known species habitat and important wildlife migratory corridors within the County." I20-10

The statement above and the Figure 4.11-2 raise several questions. Why is there only one area in Plumas County that is identified as *Deer Migration Seasonal*? Looking at the habitat type map (Figure 4.11-1) it does not appear that this area is uniquely different from many other areas in Plumas County. How much of Plumas County was evaluated as "key corridors"? The DEIR needs to list citations for the conclusions drawn in the above statement, including how the "key corridors" were identified in Figure 4.11-2 and what supporting documentation was used for these designations, including the extent of the area analyzed for each citation listed. The use of citations and indicating the extent of the area analyzed for its importance as a "key corridor" are important because it will inform the public of the quality of the data that the DEIR is relying on for its conclusions and where gaps in the data exist. This method of reporting does not prevent conclusions to be drawn by the DEIR, and a Final EIR certified by the Board of Supervisors, but it prevents the DEIR from understating or overstating its conclusions and thus mislead the public during this process.

10) The DEIR does not define the term "urbanize" specifically, which means the public reading the DEIR can and must rely on other definitions. The Merriam Dictionary defines *urbanize* as: *to cause to take on urban characteristics* and defines *urban* as: *relating to, characteristic of, or constituting a city.* The Census Bureau defines an urban area as having minimum population of 2,500 at a density of 500 persons per mile. It should be noted that the California Department of Housing and Community Development defines Plumas County, in its entirety, as nonmetropolitan/rural. I20-11

The DEIR uses the term "urbanize" both correctly and incorrectly. The DEIR uses the term correctly in the Section Criteria Pollutant on page 4.3-5, which states; "Criteria air pollutants, listed below, are classified in each air basin, county, or in some cases, within a specific urbanized area."

In the Biological Resource section on page 5-20 the use of the term is a clear overstatement, the sentence reads; "Therefore, the Flexible Growth Alternative would ultimately provide additional growth and development opportunities outside of defined Planning Areas and result in the additional conversion of open space lands (those designated as TPZ lands) to more urbanized uses." The use of the term "urbanized" in the sentence above is incorrect. Does the DEIR suggest that a potential land division of undeveloped land, which results in a dwelling unit density of one per 40 acres, relates to or is characteristic of a city? In a county that is classified by the state as rural?

The density of one unit per 40 acres is characteristic of a rural setting. Government Code 50101 defines rural area as; "any open country or any place, town, village, or city which by itself and taken together with any other places, towns, villages, or cities that it is part of or associated with: (a) has a population not exceeding 10,000; or (b) has a population not exceeding 20,000 and is contained within a nonmetropolitan area. Housing and Community Development statute 25 CCR § 78 defines rural as "those unincorporated areas of counties designated and zoned by the appropriate local agency for the application of this article. In defining "rural," the agency shall consider local geographical or topographical conditions, conditions of general development as evidenced by population densities and availability of utilities or services, and such other conditions that the agency deems relevant to its determination. Suitable areas may include those wherein the predominant land usage is forestry, timber production, agriculture, grazing, recreation, or conservation."

A density of one unit per 40 acres does not meet the definition of a urbanized condition but clearly meets the definition of rural as provided in 25 CCR § 78. The use of urbanized in the sentence referenced above should be changed to rural.

11) There are numerous locations in the DEIR that use the term "conversion" incorrectly including page 5-19, 5-20,5-23, and5-24. The DEIR correctly uses the term conversion where it is associated with the portions of the Planning Areas that are identified for more intensive development as they will take on urban characteristics; however in outlying areas in the Timber Resource land use designation, the potential for land divisions should be considered rural development not conversion. Instead of discussing each situation in detail the following two sentences have been chosen to highlight how the term conversion is being used incorrectly. I20-12

The first example is found on page 5-19 under the **Agricultural and Timber Resources** section and reads; "As the Flexible Growth Alternative would provide additional growth and development opportunities outside of defined Planning Areas and through increased residential densities within some TPZ designated lands, this alternative would result in the additional conversion or fragmentation of lands currently designated for timber or forest production activities."

The second example is found on page 5-20 under the **Biological Resources** section and reads; "Therefore, the Flexible Growth Alternative would ultimately provide additional growth and development opportunities outside of defined Planning Areas and result in the additional conversion of open space lands (those designated as TPZ lands) to more urbanized uses, biological resource impacts would be greater under this alternative (compared to the proposed project)."

The California Forest Practice Rules define the Timberland Conversion in 14 CCR § 1100. Within land zoned Timber Production; conversion is defined as the "immediate rezoning of TPZ lands." The immediate rezoning of timberlands is required for parcels where the owner is seeking to change the parcel to a non-timber use or one that is not compatible with or inhibits the growing and harvesting of timber. Such a rezone requires a conversion permit pursuant to Section 4621 of the Public Resources Code and a 4/5th approval of the Board of Supervisors.

For timberland not zoned timber production a conversion means, "transforming timberland to a non-timber growing use through timber operations where: (A) Future timber harvests will be prevented or infeasible because of land occupancy and activities thereon; or (B) Stocking requirements of the applicable district forest practice rules will not be met within five years after completion of timber operations; or (C) There is a clear intent to divide timberland into ownerships of less than three acres (1.214 ha.)".

Considering the California Forest Practice Rule definitions of conversion above it is clear that a single residence on a forested parcel, which is at a density of one per 40 acres would not be considered a conversion of timberland. Considering the preceding discussion in item 10 above, such a land division would also not take on urban but instead a rural characteristic. In addition the conclusory statement on pages 5-19, "would result in additional conversion" and on page 5-20, "conversion of open space lands (those designated as TPZ lands) to more urbanized uses" clearly does not consider the mitigating effect of Policy AG/FOR-8.12.1, which states that all Timber Resource land (TPZ or GF zone designations) require; "the approving authority make all of the following findings prior to approving any development on these lands:

- The proposed use will not significantly detract from the use of the property for, or inhibit, growing and harvesting timber on that parcel or to adjoining parcels for long-term timber resource production value or conflict with timber resource production in that general area,
- The proposed use will not intensify existing conflicts or add new conflicts between adjoining proposed uses and timber production and harvesting activities,
- The proposed use will not create an island effect wherein timber production lands located between the project site and other non- timber production lands are negatively affected,

• The proposed use will not hinder timber production and harvesting access to water and public roads or otherwise conflict with the continuation or development of timber production harvesting, and
• The proposed use will not significantly reduce or destroy the buffering effect of existing large parcel sizes adjoining timber production lands.

I20-12 cont.

Reading the required findings in Policy AG/FOR-8.12.1, and considering the California Forest Practice Rule definition of conversion, it seems implausible that a proposal to divide a parcel to 40 acres could be approved if it would result in the "additional conversion" or "conversion of open space lands (those designated as TPZ lands) to more urbanized uses" as suggested on pages 5-19 and 5-20 of the DEIR.

I20-13

For consistency with the definition of conversion provided in the California Forest Practice Rules, the sentence on page 5-19 should be change to read; "As the Flexible Growth Alternative would provide additional growth and development opportunities outside of defined Planning Areas and through increased residential densities within some TPZ designated lands, this alternative would result in the additional ~~conversion or~~ fragmentation of lands currently designated for timber or forest production activities."

For consistency with the definition of conversion provided in the California Forest Practice Rules and the definition of "urbanized" provided in the discussion under item 10 above, the sentence on page 5-20 should be changed to read; "Therefore, the Flexible Growth Alternative would ultimately provide additional growth and development opportunities outside of defined Planning Areas and result in ~~the~~ additional *rural development* ~~conversion of open space lands~~ (those designated as TPZ lands) ~~to more urbanized uses~~, *and may cause* biological resource impacts *that* would be greater under this alternative (compared to the proposed project)."

To avoid being arbitrary the phrase "and may cause" must be included in the sentence above because the DEIR does not substantiate the conclusion that the Flexible Growth Alternative will result in more biological resource impacts with any evidence, substantial or otherwise.

The DEIR correctly uses the term conversion where it is associated with the portions of the Planning Areas that are identified for more intensive development, since in those areas the development will be at an intensity that will cause the land to take on urban characteristics; however in outlying areas the potential for land divisions in the Timber Resource land use designation should be considered rural development as the intensity is limited by Policy AG/FOR-8.12.1 and therefore could not take on urban characteristics.

I look forward to the next revisions of the DEIR, which incorporates the concerns and comments stated in this letter.

Sincerely,

Cedric Twight
Lands Forester
Sierra Pacific Industries
RPF #2469

Cc Plumas County Board of Supervisors

From: Wilson, Randy
To: Ray Weiss
Subject: FW: General Plan Comments
Date: Friday, January 11, 2013 5:27:50 PM

From: The Van Fleet's [NORTHARM5@FRONTIERNET.NET]
Sent: Friday, January 11, 2013 4:34 PM
To: Wilson, Randy
Subject: General Plan Comments

January 11, 2012

Randy Wilson, Director
Plumas County Planning Department
555 Main Street
Quincy, CAlifornia 95971

Dear Mr. Wilson,

In reviewing the General Plan, there is so much to object to that I have commented on only two issues, although I am voicing my strongest opposition to any Agenda 21 verbiage or influence in regard to the entire plan. I21-1

Agriculture and Forestry Element (8)

The below paragraph is ambiguous, yet allows for other unknown elements to be implemented at the discretion or indiscretion of the legislative body thus placing our private property rights in jeopardy.

Legal Basis and Requirements
State law offers flexibility to go beyond the mandatory elements of the general plan. Section 65303 enables a county or city to adopt "any other elements or address any other subjects, which, in the judgement of the legislative body, relate to the physical development of the county or city." Once adopted, an optional element carries that same legal weight as any of the seven mandatory elements and must be consistent with all other elements as required by subsection 65300. Plumas County has chosen to emphasize in this General Plan update the importance of agriculture and forestry resources to the economic, social, environmental and aesthetic well being of the County. By exercising the option to develop a separate Agriculture and Forestry Element, the County has the ability to provide more detail and, therefore more direction and guidance to support the long term sustainability of these land uses. The goals, policies and implementation measures listed in the Agriculture and Forestry Element provide the high level, long range context for more detailed, short range and or site specific actions.1

Land use by citizens of any nation necessarily changes biodiversity. Change in biodiversity, however, does not make land use bad. It changes the mix of age classes, species and structural components of biodiversity, but not in a way that necessarily harms ecosystem health. Biodiversity typically benefits from man-caused disturbances utilizing scientifically proven management techniques. Many European nations have intensively managed their biodiversity for centuries without overall detrimental effects. Having a multitude of private property owners who have a range of different land use objects creates biodiversity - not perfectly, but usually adequately. Very few species have become extinct due to land use activities by people. The greater the wealth that is generated, the better the land will be managed and protected. Furthermore, protecting land from human use creates monotypes, which decreases biodiversity and increases fire hazards. 2

"Sustainable", and "Best Management Practices" - is it not curious how definitions change with the times? These words reverberate throughout the Plumas County General Plan. Who will define, implement, and enforce these practices?

Sincerely,
Maria (Mia) Van Fleet

Notes and citations

1. Plumas County General Plan
2. The freedom 21 Agenda for Prosperity

Plumas County Planning Commission

Randy Wilson, Director of Planning

555 Main Street

Quincy, CA 95971

1-11-2012

RE: Comments on the General Plan EIR

I have been reviewing the General Plan Draft/ EIR for several months. The more I read, the more I believe that it is a fundamentally flawed document. The present base General Plan was 39 pages, and we now have a draft General Plan that is so large that it is not even economically feasible for the County to print it , for distribution to the general public, due to the printing costs involved. What is wrong with that picture?? I22-1

I believe that the process has also been flawed in that the general public did not really receive **adequate** notice of the fact that this general plan update was being developed and that it was to be a plan that we would be living with in Plumas County for the next 30 years. There are so many platitudes and provisions that have the potential to trample on private property rights that it is mind boggling. If you attended one of the initial "workshops" and signed up for email notifications of meeting from the Planning Commission/ Department…I am told you were indeed notified of meetings etc. Yet no articles of any substance were put in the local newspapers to let us know that this was being worked on and now finalized. I looked on the Plumas County website for agenda's and minutes of the Planning Commission, and discovered that 50% of the meeting in 2012 were canceled and almost that many were canceled in 2011. Opportunity for public participation was severely hampered by this.

I am listing just a few examples of my concerns as I could, in no way, list them all. Language that I find troubling is bolded

1.1.1 Future Development

The County shall require future residential, commercial and industrial development to be located adjacent to or within existing Planning Areas; areas identified on Plumas County's General Plan Land Use Maps as Towns, Communities, Rural Areas or Master Planned Communities (insert reference to maps here) in order to maintain Plumas County's rural character with **compact and walkable communities.** Future development may also be approved within areas for which Community Plans or Specific Plans have been prepared. Small, isolated housing tracts in outlying areas shall be discouraged as they disrupt surrounding rural and productive agricultural lands, forests, and ranches and are

I22-1 cont.

difficult and costly to provide with services. **Land division may be allowed outside of Planning Areas only when the resulting development complies with all applicable General Plan Policies and County Codes.**

1.1.2 Infill Development

The County shall plan to concentrate new growth both within and contiguous to existing Towns and Communities and require expansion of existing infrastructure as needed to efficiently and safely serve the new growth.

5.8.5 Financial Incentives for Energy Efficiency

The County shall explore participation in programs that provide financial incentives and financing to private parties to meet energy efficiency and conservation objectives, such as Property Assessed Clean Energy Bonds, **on-bill** financing, Community Choice Aggregation and participation in state and federal programs designed to encourage efficiency and renewable resources.

What is on-bill financing? What type of financial incentives are you referring to in this statement??Where would you expect these financial Incentives to come from?

5.9.2 Land Use Density

The County shall encourage compact residential and commercial uses that reduce travel, infrastructure and energy use.

This language comes directly from ICLEI

5.9.3 Mixed-Use Development

The County shall encourage commercial mixed-use development in town center areas and where appropriately designated to encourage energy efficiency.

This language comes directly from ICLEI

5.9.4 Transit-Oriented Development

The County shall encourage location of residential, commercial and industrial uses along and close to main transportation routes to encourage future public transportation service

Right out of Agenda 21….how are you going to implement this?

I22-1 cont.

5.9.5 Incentives for Use of Existing Infrastructure

The County shall provide incentives for the location of new uses in close proximity to existing infrastructure by requiring that new development pay the full cost of their share of the extension of new infrastructure and by creating incentives for uses that maximize the function of existing infrastructure.

What kind of incentive would the county be in a position to provide and who is going to pay it? This will only discourage new business's to locate in Plumas County.

5.9.6 Reduction in Single-Occupant Vehicular Travel

The County shall reduce the need for single-occupant vehicular travel by Encouraging measures that ensure more occupants per vehicle, including making land-use provisions and incentives for the use of van pools, shared rides and alternative modes of transportation.

Really, is this practical on any level and again it says that County SHALL….how is this going to be implemented?

5.9.7 Encouragement of Pedestrian and Bicycle Traffic

The County shall encourage pedestrian and bicycle traffic by including provision for bike lanes and bicycle-friendly communities, bicycle parking and for pedestrian amenities in site design and facility improvements in all major residential, commercial and industrial development projects or retrofits. Encourage the widening of shoulders along County roads and State highways to promote safe bicycle travel.

This would work out really well for about 3 months out of the year…and again, at what cost and who would pay for it? If this requirement was imposed on anyone wanting to retrofit a exsisting commercial building it would completely discouragement them. .

AGRICULTURE AND FORESTRY ELEMENT (8)

You have listed Feather River Coordinated Resource Management several times as an implementation partner , they are a Non-Governmental Agency and have no place being named specifically in our local general plan. Implementation partnerships should be available on a bid process to any who would wish to engage with the county

Also named as implementation partners is the Herger-Feinstein Quincy Library Group, and they are no longer in even in existence. All of the references to what the "County SHALL" do are interesting and completely unfeasible!! The county is in a position what they have had to cut <u>essential</u> services and to include all these shalls is irresponsible.

Thank- you for your attention to these concerns,

Joyce Wangsgard

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284-7004

Jason Moghaddas
PO Box 15
Taylorsville, CA 95983

Randy Wilson,
Planning Director
Plumas County Planning Department
555 Main Street
Quincy, CA, 95971

January 14th, 2013

RE: Comments on Plumas County General Plan, November 2012 Version
CC: Kevin Goss, District 2 Supervisor, Jon Kennedy, District 5 Supervisor

Hello Randy,

Hope all is well. While I applaud Plumas County for working to bring the General Plan up to date, after reading the draft on-line, I have a few concerns, particularly about how areas around North Arm and Diamond Mountain Roads are to be classified (or not classified) as Planning Areas. I'd appreciate a response to these comments or to have them addressed in the next draft of the plan. I apologize if I have misinterpreted the document and maps, though it is difficult to navigate all the separate pieces on-line in the short time available. I23-1

Comment #1 (Figure 3-5 Indian Valley General Plan Designations and Planning Areas): On this figure, the legend and locator map completely cover much of the communities along Diamond Mountain Road which is north of the intersection of North Arm and Diamond Mountain Roads. Several people live under the area covered by the legend. I'd suggest moving the legend to cover some of the green Forest Service lands or other undeveloped areas. I23-2

Comment #2 (Pg 3-17): The bolded statement below needs clarification. As it reads, it appears that there shall be no additional residential development along much of North Valley Road and nearly all of North Arm and Diamond Mountain Road, though as per comment #1 above, it is not possible to see all the potential zoning due to the location of the legend on the map. Based on figure 3-5 and the language below, it appears that no additional residential structures may be built in these areas, specifically along the existing roads described above, even though these areas are developed and inhabited with many year round and seasonal residents. These areas should be classified as "Rural Residential" or some other category instead of the current blank spaces which represent them on the map. I23-3

> **"Policy 1.1.1. Future Development. The County *shall require future residential*, commercial and industrial *development to be located adjacent to or within existing 2035 Plumas County General Plan Planning Areas; areas identified on Plumas County's General Plan Land Use Maps as Towns, Communities, Rural Areas or Master Planned Communities* in order to maintain Plumas County's rural character with *compact and walkable communities.* Future development may also be approved within areas for which Community Plans or Specific Plans have been prepared. Small, isolated housing tracts in outlying areas shall be discouraged as they disrupt surrounding rural and productive agricultural lands, forests, and ranches and are**

difficult and costly to provide with services. Land division may be allowed outside of Planning Areas only when the resulting development complies with all applicable General Plan Policies and County Codes."

I23-3 cont.

While Plumas County has many existing "compact and walkable" communities, many people already live outside of these areas, and as described above, the areas outside of towns are sometimes ignored by the current maps, appearing "un-inhabited". For those already living in these areas, use of a car is by necessity to get to work, transport children safely to school or daycare, and buy groceries. The general plan should acknowledge that while walking communities are valuable, to those of us with children, the elderly, handicapped, and others who live or work more than a ¼ mile from town, cars are needed to get around as there is not adequate public transit or other alternatives, especially in the cold of winter and heat or wildfire smoke of summer. It is not going to be possible to get rid of cars in Plumas County and the plan should reflect that reality.

I23-4

Comment #3: If in fact the adoption of this general plan renders existing subdivided and buildable parcels unbuildable (as per comment #2 above), will landowners be compensated for that potential loss in property value and will the county reassess all lands in these areas to reflect this change in market value due to the loss of development value of these lands?.

I23-5

Comment #4: The plan should facilitate the expansion of home based businesses to the maximum extent possible, especially local businesses which can operated on-line or within a home, with little to no disruption of neighbors. Many businesses can operate with no office at all, but if they are required to go through planning committees, commissions, hearings, and extensive public meetings for approval, they will likely locate somewhere else outside of Plumas County.

Thanks again for your attention to these comments,

Jason Moghaddas

The true amount of fertilizer N put on fields is unknown, but these estimates are closer to real numbers than 140 lbs N/ac figure from the Sacramento County GHG Inventory that consultants used for Plumas and Sierra Counties. I worked with UCCE colleagues to come up with figures then consulted with a few local growers as well as two major fertilizer salesmen who have serviced the area for years. It is important that nitrogen use efficiency be looked at, not just rate. –Holly George, University of California Cooperative Extension, Plumas-Sierra Counties, April 2013.

Agriculture Sector Notes for Plumas and Sierra County 2005 Community-Wide GHG Inventory Reports

CROP	# AC in Plumas County *	# AC in Sierra County*	Estimated Average #/ac N fertilizer **	Notes
Alfalfa Hay	6,000	1,200	10	N amount from fertilizers is estimate of the annual application of P fertilizers (across all fields) with 11-52-0 being applied. Not applied every year to all fields, with many fields receiving zero for many years. (Range 0-25 #N/ac/yr)
Meadow Hay	3,000	1,600	10	Most (~90%) of this acreage isn't fertilized as it is low quality forage; estimate ~10% of acreage receives 100#N/ac (Range 0-100#N/ac/yr)
Grain Hay	1,000	700	70	Range 0-150#N/ac/yr
Irrigated Pasture	35,000	11,445	25	Some improved irrigated pastures (~10%) are fertilized; but much of the acreage is a grass/sedge/rush mixture with the majority of the acreage (~90%) not being fertilized. (Range 0-80#N/ac/yr)

*Source of figures is 2005 Crop & Livestock Report prepared by Plumas-Sierra County Department of Agriculture

** Source of Estimated fertilizer application, UCCE Intermountain Farm Advisors (Holly George-Plumas-Sierra Counties, Steve Orloff-Siskiyou County, Rob Wilson-Intermountain Research and Extension Center-Tulelake) and Dan Putnam, Statewide Alfalfa-Forage Specialist, UC Davis.

Footnotes

1. These estimates may be high due to the widespread lack of inputs on some of these more marginal grounds, common practice for economic reasons.
2. Rate is only one of the factors when it comes to either water quality impacts or atmospheric gas emissions. Timing (single vs multiple), method of application (surface, knifing in, etc.), and source of fertilizer, plus use of nitrification inhibitors are at least as important if not more important. This is an important message for the water regulators as well as the air boards.