



MOTHER LODGE CHAPTER

1414 K STREET, SUITE 500
SACRAMENTO, CA 95814
TEL. (916) 557-1100 EXT. 108 FAX: (916) 557-9669
coordinator@sierraclub-sac.org – www.motherlode.sierraclub.org

May 16, 2007

Submitted Via Fax and Email

Maywan Krach
Placer County Community Development Resource Agency
Environmental Coordination Services
3091 County Center Drive
Auburn, CA 9

Comments re: Second Partially Recirculated Revised Draft EIR: Placer Vineyards Specific Plan

Dear Mr. Krach,

On behalf of the Sierra Club, thank you for the opportunity to comment on the Second Partially Recirculated Revised Draft EIR. We will confine our comments to the Supplement to Section 4.4, Biological Resources portion of the document.

As noted, the Conservancy fairy shrimp is a federally listed endangered species and has recently been discovered in western Placer County, in the general vicinity of the Placer Vineyards site. Additionally, the project site is within the USFWS Vernal Pool Recovery Plan core area. The Plan requires that, in addition to preserving 85% of habitat for the Vernal pool fairy shrimp and Vernal pool tadpole shrimp, 100% of any newly discovered listed species, such as the Conservancy fairy shrimp, must be preserved as well.

In response to comments, the Final EIR noted that biological surveys were conducted during winter (December 1999 and February 2000) and noted that “the surveys should clearly not be interpreted as conclusive,” and added that, “Final and conclusive surveys are not required for an adequate EIR and the documentation contained in the Revised Draft EIR is fully consistent with the intent of CEQA.” (Response 25C)

Given the inadequacy of the biological surveys, we were already aware that determining appropriate feasible mitigation would be impossible. Now, given the potential presence of the Conservancy fairy Shrimp, which demands an even a higher level of protection than species previously known to occur, there is more evidence that full compliance with CEQA requires additional biological surveys. Surveys must take place in the spring, when detection of *B. conservatio* would be most likely, not in the winter. It is vital to determine whether *B. conservatio* is present or not. If it is present, a higher level of feasible mitigation under CEQA would be clearly indicated.

Representing 19,000 members in 24 counties in Northern and Central California

Alpine - Amador - Butte - Calaveras - Colusa - El Dorado - Glenn - Lassen - Modoc - Nevada - Placer - Plumas
Sacramento - San Joaquin - Shasta - Sierra - Siskiyou - Solano - Stanislaus - Sutter - Tehama - Tuolumne - Yolo - Yuba

A

Thank you for the opportunity to comment on this document. Please continue to provide us with any public notices and documents relating to this project.

Sincerely,

A handwritten signature in cursive script that reads "Terry Davis".

Terry Davis
Conservation Program Coordinator
Mother Lode Chapter Sierra Club

**LETTER 67 TERRY DAVIS, CONSERVATION PROGRAM COORDINATOR, MOTHER LODE CHAPTER
SIERRA CLUB**

Response 67A: The May 2006 Revised Draft EIR and the June 2006 First Partially Recirculated Revised Draft EIR evaluated impacts to special status vernal pool species. In response to a March 2007 report that a single Conservancy fairy shrimp (*Branchinecta conservatio*) was found in western Placer County, a supplement was added to Section 4.4 as part of the Second Partially Recirculated Revised Draft EIR. Table 4.4-3 of the Revised Draft EIR has also been amended to include the addition of the Conservancy fairy shrimp. Based on the March 2007 report, the Conservancy fairy shrimp is now considered as potentially-occurring within the Placer Vineyards Specific Plan area and potential off-site improvement areas, although it is still considered “unlikely” to occur there, based on its prior-documented limited distribution and the fact that ongoing determinate surveys for vernal pool aquatic invertebrates throughout the plan area have, thus far, not indicated its presence. (Second Partially Recirculated Revised Draft EIR, pp. 4.4-1 to 4.4-2.)

The commenter asserts that additional surveys must take place in the spring to determine whether the Conservancy fairy shrimp is present in the project area or not, and if present, a higher level of feasible mitigation under CEQA would be indicated. The requested surveys are unnecessary at the current level of planning and the current stage of the CEQA process. In conjunction with the State and federal permit processes, as further outlined below, Mitigation Measures 4.4-1 and 4.4.2 will create a comprehensive mitigation strategy that, among many other things, will fully mitigate for any potentially significant impacts to any affected vernal pool invertebrates listed as endangered or threatened under either the federal Endangered Species Act (ESA) or the California Endangered Species Act (CESA). Mitigation Measure 4.4-1 will require the proponents of site-specific development proposals to prepare Open Space Mitigation and Management Plans that will preserve an acre of open space for every acre of open space lost due to the project. These preserved lands, in some instances, will include vernal pool habitat. The project proponents must also meet stringent performance standards for the mitigation of impacts to these listed species, typically in the form of mitigation ratios for the preservation or restoration of vernal pools and the preservation of surrounding uplands. Where additional surveys are required to ensure compliance with these performance standards, they will be required.

Should the County Board of Supervisors approve the Placer Vineyards Specific Plan, the project proponents will also need to obtain wetland fill permits (404 permits) from the United States Corps of Engineers, which must comply with the National Environmental Policy Act (NEPA) and consult with the U.S. Fish and Wildlife Service pursuant to Section 7 of ESA before issuing any such permits. Wholly independent of the County’s CEQA process, these federal processes will also ensure adequate mitigation of the newly-discovered fairy shrimp species, which are not expected to be found, as they have not been discovered in any of the many invertebrate surveys that have already been performed throughout the Placer Vineyards site. As part of the federal NEPA, section 404, and ESA processes, the commenter will have many additional opportunities to make known its views regarding how much on-site avoidance, as opposed to off-site mitigation, will be appropriate for the project area.



Letter 68

RECEIVED

MAY 16 2007

ENVIRONMENTAL COORDINATION SERVICES

May 15, 2007

VIA FACSIMILE (530) 745-3003

Ms. Maywan Krach
 Placer County Community Development Resource Agency
 Environmental Coordination Services
 3091 County Center Drive
 Auburn, CA 95603

Re: Union Pacific Railroad Company's Comments on
 Partially Recirculated Revised Draft EIR for Placer Vineyards
 Specific Plan Project, SCH #1999062020

Dear Ms. Krach:

We represent Union Pacific Railroad Company ("UP"). By this letter, UP presents its comments in response to Placer County's Notice of Preparation of the Partially Recirculated Revised Draft EIR for the Placer Vineyards Specific Plan Project (the "Project").

The Project encompasses approximately 5,200 acres at the southwest corner of Placer County, approximately 15 miles north of the City of Sacramento. The existing land uses on the site consist mostly of undeveloped grazing and agricultural land, with approximately 150 residences. The Project's western boarder along the Sutter/Placer County line and Pleasant Grove Road lies approximately 1 mile from the active track right-of-way of UP's Sacramento Subdivision main line (the "Main Line"). While the physical boundaries of the site do not appear to include the Main Line, the Project proposes substantially to increase the population and traffic in close proximity to UP's active rail line.

A

UP hereby brings to the County's attention concerns regarding traffic and safety. Based on our comments, below, UP respectfully requests that the County analyze these impacts associated with the Project's location near the Main Line and set forth adequate mitigation measures that reduce those impacts.

1. Background on UP

Many people know about UP's distinguished history. UP played a prominent role in the development of the first transcontinental railroad in the late 1860's. What many people do not know is that today, UP remains a significant owner of railroad property and a major freight

B

Ms. Maywan Krach
May 15, 2007
Page Two



transporter in the western two-thirds of the United States. In fact, UP is the largest railroad company in North America.

Of particular relevance to the Project, UP owns a railroad track and right-of-way in and through Sutter County (the aforementioned Sacramento Subdivision main line) that very roughly parallels Natomas Road in close proximity to west of the track. The Main Line lies approximately 1 mile from the Project's western boarder along the Sutter/Placer County line and Pleasant Grove Road. At the present, approximately 18 freight trains use the Main Line on a daily basis. The maximum locomotive speed is 70 miles per hour.

B cont.

Given UP's significant presence in close proximity to Placer County, UP takes great interest in the County's growth and improvement. It is with this perspective that UP respectfully submits the comments in this letter.

2. Traffic

Many of the concerns specific to this Project, including, but not limited to, a concern about traffic, arise from the associated increase in population within the close proximity of the UP Main Line. The Project proposes to develop on the 5,200-acre site, which currently consists of mostly undeveloped grazing and agricultural land, between 14,132 to 21,631 homes, approximately 275 acres of commercial uses, between 641 to 686 acres of quasi-public land uses (including public facilities/services, religious facilities, schools, and major roadways), and between 919 to 982 acres of park and open space land. At Project build out, Placer Vineyards is projected to have a population of between 33,000 to 49,400 people.

As noted, the UP Main Line runs approximately 1 mile away from the Project's western border. The project's new development therefore necessarily will result in a significant increase in population within the vicinity of the UP tracks. A natural consequence of the increased population will be an increase in traffic volume through the existing at-grade rail crossing at Riego Road to access SR 99 and other nearby attractions. Additional vehicle trips and traffic congestion also negatively could impact at-grade rail crossings in the area by increasing the chance of train-vehicular conflicts, thereby raising an obvious safety issue.

C

In addition to impacts on traffic caused by this Project, there likely will be cumulative traffic impacts in this area due to another nearby project that is currently under environmental review in Sutter County, known as the Sutter Pointe Specific Plan Project ("Sutter Pointe Project"). Specifically, the Sutter Pointe Project is located approximately 1 mile to the west of the Project, with its eastern boarder along Natomas Road. The Sutter Point Project proposes to develop a 7,500-acre site, which currently consists of agricultural and industrial uses, a maximum of 17,500 residential dwelling units, approximately 3,600 acres of employment-generating uses, and a number of K-8 and high schools, parks and open space, and other community facilities. A natural consequence of the increased population will be an increase in traffic volumes within the vicinity general and, in particular, across the existing at-grade crossing

Ms. Maywan Krach
May 15, 2007
Page Three



of Riego Road, in order for people to travel between the two project areas.

The Partially Recirculated Revised Draft EIR recognizes that cumulative conditions will increase traffic on Riego Road to the extent of requiring an expansion of this road from two lanes to six lanes. UP's operations must not be affected by greater traffic and potential congestion at at-grade crossings, and, thus, adequate mitigations should be implemented, including, most importantly, a grade separation at the Riego Road crossing. Although Mitigation Measure 4.7-2 requires the Project to pay its fair share toward a grade separation for this crossing "if needed," UP strongly urges the County to require the construction of a grade-separated crossing in relation to this Project. As the Partially Recirculated Revised Draft EIR recognizes, adequate land needs to be reserved to provide the right-of-way for the separation, and, thus, the County also should require that such a reservation of adequate land for the grade separation be included as an additional mitigation measure.

C cont.

3. Pedestrian Safety

The addition of this large, new residential population near the UP Main Line creates concerns not only about traffic, but also about pedestrian safety. The Partially Recirculated Revised Draft EIR mistakenly concludes that "there would be no impact associated with pedestrian and bicycle traffic" because "few or no pedestrians and bicyclists from Placer Vineyards are expected to travel across the rail line on Riego Road." This conclusion is based, in part, on the stated premise that "there are no schools, parks or similar facilities west of the rail line." As noted above, however, the Sutter Pointe Project currently under environmental review lies immediately to the west of the tracks, and proposes to develop approximately 17,500 residential dwelling units, approximately 3,600 acres of employment-generating uses, and a number of K-8 and high schools, parks and open space, and other community facilities. As a result, contrary to the conclusion in the Draft EIR, it is expected that pedestrians and bicyclists from Placer Vineyards indeed are likely to travel across the rail line at Riego Road.

D

The County should therefore closely analyze pedestrian and bicycle safety and set forth appropriate mitigation measures. Specifically, the County should consider requiring the developer to install grade-separated pedestrian walkways or a grade-separated roadway across the Main Line. Other possible mitigation measures that the County should consider include, but are not limited to, solid barriers (for example, walls, as opposed to fencing, to manage pedestrians and vehicles), pedestrian gates, pavement markings, and signs.

4. Trespassing

The anticipated increase in population and pedestrian traffic also brings the increased risk of trespassing onto UP's right-of-way. The development of housing, schools, and parks near the right-of-way can result in more individuals, particularly children, walking onto the track or engaging in mischief that could pose serious safety concerns and interfere with rail service. Some residents could decide to trespass onto the right-of-way, either as a shortcut for reaching

E

Ms. Maywan Krach
May 15, 2007
Page Four



their destination or for the purpose of extending their walks or jogs.

The Partially Recirculated Revised Draft EIR should study the Project from a safety perspective and the increased likelihood of trespassing on the Main Line. Possible mitigation measures include relocating such land uses far away from the tracks where possible, setbacks and buffers, the installation of sound walls or other barrier fencing along the full lengths of the right-of-way, "no trespassing" signs, railroad safety education programs, and planning for safe transportation routes to schools, entertainment, shopping, and recreational facilities.

E cont.

UP appreciates this opportunity to comment on the NOP for this Project and hopes that the County, as lead agency, gives due consideration to the above concerns. On UP's behalf, we would welcome the opportunity to sit down together with County officials and staff to discuss this Project as it progresses, as well as any other project that may relate to UP's property or operations in or near Placer County. Such a discussion would afford UP and the County the opportunity to work in collaboration, to ensure that the Project and all future development near UP lines are compatible with the rail services that will continue to serve the County and State for years to come.

F

Please give notice to UP of all future developments with respect to this Project and any proposed transportation improvements in the vicinity as follows:

Mr. Terrel Anderson
Manager of Industry and Public Projects
Union Pacific Railroad Company
10031 Foothills Boulevard
Roseville, California 95747-7101

With a copy to:

Andrew Bassak, Esq.
Shirley Jackson, Esq.
Steeffel, Levitt & Weiss
One Embarcadero Center, 30th Floor
San Francisco, California 94111

Ms. Maywan Krach
May 15, 2007
Page Five



Please do not hesitate to contact our office if you would like to schedule a meeting with UP or have any questions. UP will monitor this project with interest.

Sincerely,

Shirley E. Jackson

Shirley E. Jackson

cc: Andrew Bassak, Esq.
Mr. Terrel Anderson
5274:6585787.2

LETTER 68 SHIRLEY E. JACKSON, STEEFEL, LEVITT & WEISS (UNION PACIFIC RAILROAD COMPANY)

Response 68A: Comment states that the commenter represents the Union Pacific Railroad Company (UP), and discusses the existing rail line closest to the project site. Comment noted.

Response 68B: Commenter provides background on UP. Comment noted.

Response 68C: Commenter expresses concerns regarding project traffic having a negative impact on the at-grade rail crossing. For a discussion of existing and cumulative traffic impacts on the UPRR line, please see Impacts 4.7-23 and 4.7-24 in the Second Partially Recirculated Revised Draft EIR and Response to Comment 59K.

Commenter notes that the Sutter Pointe project is located about 1 mile west of Placer Vineyards, and would contribute to cumulative impacts. The Sutter Pointe project is assumed in the cumulative traffic analysis (see “South Sutter Specific Plan” in Table 4.7-15 on page 4.7-34 of the Revised Draft EIR).

Comment states that UP’s operations must not be affected by increased traffic on Riego Road and congestion at at-grade crossings. The Proposed Project should not alter UP operations. Please see Responses to Comment 59K and 63-A.

Commenter states that the County should require reservation of adequate land for a grade separation. Placer County has no authority to reserve land or provide right-of-way adjacent to the UPRR tracks, because the tracks are in Sutter County, approximately 1 mile west of the Placer County line.

Response 68D: Commenter expresses concern that bicyclists and pedestrians will travel across the tracks between Sutter Pointe and Placer Vineyards. While bicyclists might travel to Sutter Pointe, it is unlikely that many pedestrians would. Sutter Pointe and Placer Vineyards would not be within typical walking distance of one another (generally about ¼ mile). Students from Placer Vineyards would not be expected to attend schools in Sutter County or vice versa, because the school districts do not overlap and schools will be provided within both Placer Vineyards and Sutter Pointe. Similarly, a full range of park facilities and commercial services will be provided within Placer Vineyards to serve its residents, reducing the likelihood that pedestrians would travel to Sutter Pointe.

Sutter County could require development within its boundaries, which would be proximate to the rail line, to install grade separated pedestrian facilities, solid barriers or other features to prevent access to the tracks.

Response 68E: Commenter expresses concern that residents of the Proposed Project could trespass on to the UP right-of-way. Please see Response to Comment 68D.

Response 68F: Commenter offers to work with the County on the issues raised in the comment letter. Comment noted.

**RESPONSES TO COMMENTS RECEIVED TOO LATE FOR
INCORPORATION IN THE FIRST FINAL EIR**

Late Comment Letter 1

BOARD OF COUNTY SUPERVISORS

1160 CIVIC CENTER BLVD.
YUBA CITY, CALIFORNIA 95993

January 16, 2007

Placer County Board of Supervisors
175 Fulweiler Avenue
Auburn, CA 95603



Post-It® Fax Note		7671	
To	PLACER COUNTY	Date	1-18
Co./Dept.	PLACER CO	From	CLAY CASTLEMAN
Phone #		Co.	SUTTER CO
Fax #	530-745-3567	Phone #	
		Fax #	
		# of pages	3

Re: Sutter County's Objections to Placer Vineyards Specific Plan Final Environmental Impact Report, Pursuant to Public Resources Code Section 21177 and Request for Continuance of Approval and Certification

Dear Board:

Sutter County requests that you continue consideration of the Final Environmental Impact Report for the Placer Vineyards Specific Plan ("EIR") until such time that Placer and Sutter Counties have been able to negotiate an appropriate resolution of the adverse environmental impacts to Sutter County roadways from traffic generated by the Placer Vineyards Specific Plan ("Project"). We are presenting this letter to you as the decision-making body for this EIR to restate our objections to the EIR and the Project pursuant to Public Resources Code section 21177.

L-A

To date, Placer County has not satisfactorily resolved the following Sutter County issues, which previously have been formally identified and objected to in our comments to the Draft EIR, Revised Draft EIR and Partially Recirculated Revised Draft EIR:

Signals

Sutter County commented that all intersections with Riego Road (Pacific, Natomas, Riego Road/Union Pacific Railroad crossing, Pleasant Grove North, and Pleasant Grove South) were not adequately addressed. The EIR confirms a significant impact to traffic in these areas. However, it proposes signalization as a mitigation measure at only three of the five intersections, and then concludes that the impact is unavoidable because the improvements lie outside Placer County jurisdiction. We object to this conclusion. We commented that the Project should pay for this mitigation measure. Placer County's response was that its analysis shows that the Project only creates part of the need and should only pay a fair share, because future anticipated development will also contribute

L-B

MEMBERS OF THE BOARD

LARRY MONTNA
STANLEY CLEVELAND, Jr.
LARRY MUNGER
JIM WHITEAKER
DAN SILVA

DISTRICT 1
DISTRICT 2
DISTRICT 3
DISTRICT 4
DISTRICT 5

COUNTY ADMINISTRATOR
LARRY T. COMBS

CLERK OF THE BOARD
JOAN BECHTEL

Placer County Board of Supervisors
 January 16, 2007
 Page 2 of 3

to the effect. We disagree and propose that the adequate mitigation measure would be for Placer County to require the Project to fund the entire improvement now and establish reimbursement mechanisms from such future anticipated development.

L-B cont.

Signal Maintenance

In response to our comment suggesting establishment of a maintenance district for the admittedly necessary signals, the mitigation measure provided is for Placer County to consider a temporary budget component of any future funding mechanism. This is far too speculative of a source of repayment to Sutter County for maintenance of signals needed as a result of the Project and Sutter County objects to this mitigation measure.

L-C

Riego Road Interchange

The originally omitted analysis of AM peak hour conditions in Sutter County that we commented was necessary has now been completed. It shows a significant impact with the proposed mitigation of either additional lanes or a Highway 99 interchange. However, the EIR again concludes that such impact is unavoidable because Placer County cannot ensure the measure is implemented. We object to this determination and assert that Placer County should require the Project to fund it with the opportunity for reimbursement of fair share from future developments in Placer County and Sutter County, if any.

L-D

Riego Road

We commented that Riego Road should be upgraded to safely handle the forecasted traffic volumes from the Project. We received the completely unacceptable response that the traffic signals, the very same ones that Placer County indicated it cannot require to be built, will mitigate the effects. We object to this conclusion. At best, they would partially mitigate. However, as we noted in our comments, the roads must be upgraded.

L-E

The EIR makes the assumption that 50 percent of Sutter County's Industrial/Commercial Reserve will be built-out, including the expansion of Riego Road to six lanes, even though Sutter County has not approved a development project. In response to our comments, we were informed that it is unreasonable to assume no growth in Sutter County. We are dismayed that data used to make determinations in this highly critical EIR came from discussions with the developer of a project that has yet to receive a General Plan Amendment or project approval in Sutter County and for which payment of infrastructure costs has not been established.

Railroad Crossing

The reply to our comment of the need for a grade separation of Riego Road at the Riego Road/Union Pacific Railroad intersection due to increased traffic from the Project was that the Project does not add sufficient volume to require it. Again, we object to this

L-F

Placer County Board of Supervisors
January 16, 2007
Page 3 of 3

conclusion. The traffic studies show that six lanes are needed approaching this railroad crossing. We do not find it acceptable to have those six lanes narrow down to two lanes at the railroad crossing and do not believe that Union Pacific will find it acceptable either. Placer County should facilitate discussions with Union Pacific regarding this issue. Sutter County will be happy to participate in those discussions, but Placer County must take the lead.

L-F cont.

In summary, Sutter County has grave concerns about the inadequacy of the EIR and mitigation measures proposed for this Project. Sutter County objects to the adequacy of the EIR, the adequacy of Placer County's responses to our comments, the approval and certification of the EIR and approval of the Project. We request that your Board not approve the EIR and continue its approval to allow sufficient time for resolution of the traffic impact issues between our counties. Sutter County will not accept inadequately mitigated effects from this Project.

L-G

We appreciate your consideration of this request.

Very truly yours,

SUTTER COUNTY BOARD OF SUPERVISORS



DAN SILVA, CHAIRMAN

LATE COMMENT LETTER I DAN SILVA, CHAIRMAN, SUTTER COUNTY BOARD OF SUPERVISORS

Response IL-A: Commenter requests that the County continue consideration of the project until the two counties have negotiated an appropriate resolution of impacts to Sutter County roadways. Sutter County believes that several issues remain outstanding. Placer County respectfully disagrees that it should delay consideration of the project. The Placer Vineyards Specific Plan has been in process since the Placer County Board of Supervisors last updated the County General Plan in 1994. The EIR for the project has been in process since the late 1990s, and after an initial 60-day public review period in late 2004, was fully recirculated once in early 2006, and partly recirculated twice more (once during the summer of 2006 and again in the spring of 2007). The Planning Commission recommended approval of the project in late January 2007. The project is now set for consideration by the Placer County Board of Supervisors this summer. Even so, Placer County looks forward to working with Sutter County to fashion a mutually acceptable agreement to address transportation impacts occurring due to planned development within the two jurisdictions. Mitigation Measure 4.7-2a requires the County to attempt to enter into an agreement with Sutter County to address such issues. Some traffic and other impacts originating in Placer County can be considered in connection with pending land use decisions in Sutter County, including its expected consideration of the proposed Sutter Pointe project, which, like Placer Vineyards, would create traffic impacts in both Sutter County and Placer County. Placer County understands that the Sutter County Board of Supervisors has not yet considered that project, but it appears to be reasonably foreseeable in light of the results of the November 2004 vote on Measure M on the Sutter County ballot and Sutter County's recent issuance of a Notice of Preparation ("NOP") for the project. The voters of Sutter County approved that advisory measure by a substantial margin, indicating strong public support for development in the Sutter Pointe area. The issuance of an NOP indicates that the project is progressing through the County's planning process, and that preparation of an EIR is underway. Placer County is hopeful that, pursuant to Mitigation Measure 4.7-2a, its agreement with Sutter County can be part of a larger, sub-regional agreement that would also include Sacramento County, the City of Roseville, and Caltrans. Such an agreement would be a major step forward in fashioning the institutional arrangements necessary to deal with inter-jurisdictional traffic issues.

Sutter County also advises that its objections are restated pursuant to Public Resources Code Section 21177, which provides that no action or proceeding may be brought against the project under CEQA unless the grounds for the action or proceeding were presented during the public comment period or prior to the close of the public hearing on the project. Placer County acknowledges this comment, but expresses its hope that the above-described agreement(s) will provide a forum/venue to work through any areas of disagreement. Specific responses to issues raised are provided below.

Response IL-B: Commenter objects to proposed mitigation and finding of significant and unavoidable with regard to signal installation in Sutter County and requests that Placer Vineyards project proponents fully fund the signals in Sutter County. As is reported under Final EIR Response to Comment 38A (Doug Libby), Placer County modified proposed Mitigation Measure 4.7-8b to require the project proponents to construct the three signals in question. However, the finding of significant and unavoidable is the proper CEQA conclusion for Placer County to make because the proposed improvements cannot be made by Placer County or the

project proponents acting alone. The facilities are controlled by Sutter County, not Placer County. Therefore Placer County cannot be certain that, despite the overtures it will have to make pursuant to Mitigation Measure 4.7-2a (see discussion above), Sutter County will consent to enter into an agreement to deal with transportation issues of mutual concern to both counties. The “significant and unavoidable” finding is simply recognition of the fact that the County cannot predict the future with certainty, and therefore must assume that Sutter County might choose not to participate. As required by Mitigation Measure 4.7-2, Placer County will impose such fees (or other agreed upon mechanisms) when and if Sutter and Placer Counties enter into enforceable reciprocal agreements to mitigate project impacts that cross county boundaries.

The actual mechanism for funding improvements in other jurisdictions would depend on the agreements between Placer County and each jurisdiction. Options include the collection of fees that are transmitted to the affected jurisdiction, and/or requiring the applicant to fully fund and/or construct the improvements with the expectation of reimbursement as fees are collected from other jurisdictions.

With respect to the intersection of Riego Road and Pacific Road, a traffic analysis was prepared in response to this comment. The analysis demonstrates that overall intersection average delay is minimal and would remain so with development of the proposed project (see Final EIR Tables below). Therefore, under either Existing plus Project conditions or Existing plus Blueprint conditions, there would be no new significant impacts identified in the a.m. or p.m. peak hour. The volumes on Pacific Street are too low to meet signal warrants, so the installation of a traffic signal is not justified.

For a discussion of why the intersection of Pacific Avenue and Riego Road was not analyzed under cumulative conditions, please see Final EIR Response to Comment 13A.

Final EIR Table						
A.M. and P.M. Peak Hour Levels of Service at Study Intersections – Unincorporated Sutter County Existing Plus Project Conditions						
Intersection			Existing Conditions		Existing Plus Project Conditions	
Time	North-South Roadway	East-West Roadway	Level of Service	Unsignalized Intersection (Delay)¹	Level of Service	Unsignalized Intersection (Delay)¹
AM	Riego Road	Pacific Avenue	A	1.0	A	0.6
PM	Riego Road	Pacific Avenue	B	1.1	A	1.0

Notes: Significant impacts are highlighted in bold letters.
¹ Average delay for all movements at intersection, including uncontrolled movements. Delay on some stop-signed controlled left-turn movements may be substantial, but typically impacts a limited number of vehicles.
 Source: DKS Associates, 2007.

Final EIR Table						
A.M. and P.M. Peak Hour Levels of Service at Study Intersections – Unincorporated Sutter County Existing Plus Blueprint Conditions						
Intersection			Existing Conditions		Existing Plus Project Conditions	
			Level of Service	Unsignalized Intersection (Delay)¹	Level of Service	Unsignalized Intersection (Delay)¹
Time	North-South Roadway	East-West Roadway				
AM	Riego Road	Pacific Avenue	A	1.0	A	0.7
PM	Riego Road	Pacific Avenue	B	1.1	A	1.0

Notes: Significant impacts are highlighted in bold letters.
¹ Average delay for all movements at intersection, including uncontrolled movements. Delay on some stop-signed controlled left-turn movements may be substantial, but typically impacts a limited number of vehicles.
Source: DKS Associates, 2007.

Response IL-C: Commenter objects to the proposed funding mechanism for signal maintenance in Sutter County. Although the commenter does not identify the source of the concern, it is assumed that the comment is in response to Placer County’s Response to Comment 38B as contained in the Final EIR. Because the issue of signal maintenance funding in Sutter County does not pertain to a significant effect on the environment per CEQA Guidelines Section 15064, the County refers the commenter to the previous response. Consistent with Mitigation Measure 4.7-2a, as described above, Placer County will work with Sutter County as the project proceeds to establish an appropriate mechanism ensuring that development within Placer County contributes a fair share toward needed funding in Sutter County.

Response IL-D: Commenter objects to finding of significant and unavoidable with regard to roadway impacts in Sutter County and requests that Placer Vineyards project proponents fully fund all roadway improvements in Sutter County. As explained in Response to Comment 1L-B, the finding of significant and unavoidable is the proper CEQA conclusion for Placer County to make because the proposed improvements cannot be made by Placer County or the project proponent acting alone. The facilities are controlled by Sutter County and/or Caltrans, not Placer County. Placer County has proposed mitigation that would, if implemented, reduce the project’s impact on the subject facilities to less than significant. There is no basis to require the project proponents to fully fund roadway improvements that would benefit a variety of users, including proposed development projects in Sutter County.

Response IL-E: Commenter states that Riego Road must be upgraded and that traffic signals would only partially mitigate the impact. According to the traffic study prepared for the Placer Vineyards Specific Plan project, Riego Road widening only becomes necessary in the cumulative condition, to which the project would contribute its fair share, assuming an agreement is reached between Sutter County and Placer County. As reported in the Final EIR and the Second Partially Recirculated Revised Draft EIR, under existing plus project conditions the roadway will operate at acceptable levels in both the AM and PM with the proposed traffic signal/intersection improvements. Sutter County has presented no studies prepared by experts or others with standing in the field of traffic impact assessment that show specifically how Riego Road could not safely handle the forecasted traffic volumes from the project. Absent such information, there is no basis for Sutter County’s general and unsubstantiated request that the road be upgraded.

With regard to the commenter's concern about assumed development in South Sutter County in the cumulative condition, Placer County continues to believe that it is reasonable to do so. The County appears to allege that future development in South Sutter County is so speculative that the area should be assumed to remain in agriculture. Yet the Sutter County General Plan shows that the area in question has been planned for development since 1996; Sutter County voters recently approved Measure "M" indicating a preference for development in the area; and the County has issued an NOP for the project (See discussion above in Response to Comment 1L-A). Further, an application for the Sutter Pointe Specific Plan has been on file with County for more than a year. Finally, the Sutter County Board of Supervisors actually approved a significant land development project in the subject South Sutter area in April 2002; however, the project did not proceed due to a court challenge. Development in South Sutter is reasonably foreseeable based on both past Sutter County actions and recent Sutter County actions. Therefore, Placer County would have understated the cumulative effect and been remiss in not assuming that development would occur. With regard to speaking to the developer of the Sutter Pointe Specific Plan project, as is described in Final EIR Response to Comment 38F, Placer County was directed to the developers by Sutter County staff.

Response 1L-F: Commenter raises the issue of railroad grade separation at Riego Road and indicates dissatisfaction with the County's previous response. Based on receipt of a subsequent letter from the State Public Utilities Commission, the County has more fully addressed the grade separation issue in the Second Partially Recirculated Revised Draft EIR. The commenter is referred to pages 4.7-25 through 4.7-27 of the recirculated document and to responses to Late Comment letter 4 contained herein.

Response 1L-G: Commenter summarizes concerns and objects to certification of EIR. See Response 1L-A regarding the commenter's request that the Placer County Board of Supervisors delay its consideration of the project.



**SIERRA
CLUB**
FOUNDED 1892

Late Comment Letter 2
MOTHER LODE CHAPTER

1414 K STREET, SUITE 500
SACRAMENTO, CA 95814
TEL. (916) 557-1100 x 108 FAX: (916) 557-9669
Email: coordinator@sierraclub-sac.org
Web: www.motherlode.sierraclub.org

January 25, 2007

Placer County Planning Commission
3091 County Center Drive
Auburn, CA 95603

PLACER COUNTY
DATE RECEIVED

JAN 25 2007

PLANNING COMMISSION

Placer Vineyards Specific Plan – Written Testimony for the Public Hearing

Dear Chairman and Members of the Planning Commission,

Please accept the comments below as our written testimony for your consideration of the Placer Vineyards Specific Plan. We would also like to incorporate by reference our comment letter on the DEIR dated May 19, 2006. The comments below reflect some of the impacts of particular concern to us that would not be fully mitigated should the project be approved at this time.

L-A

Impacts to vernal pool resources:

The Placer Vineyards Specific Plan FEIR fails to show adequate mitigation for the loss of vernal pool complexes. The project should not be approved with the current mitigations because Placer County entered into the Planning Agreement with the resource agencies under which the county agreed that interim projects would be consistent with the conservation goals and strategies of the Placer County Conservation Plan (PCCP). The project's current mitigation fails to honor the Planning Agreement, fails to provide feasible mitigation under CEQA for impacts to vernal pool habitat, and fails to approximate eventual avoidance or offsite mitigation requirements under federal wetlands and ESA regulations.

L-B

The PCCP is aimed at ensuring that functional natural systems are preserved. To be biologically functional, vernal pools preservation must include intact hydrologic basins and nearby grasslands. The Conservation Strategy of the PCCP is based on the preservation of complete vernal pool systems rather than wetted acres. The PCCP calls for the retention of existing vernal pool complexes in large preserves that minimize the urban edge and provide buffers to minimize management conflicts with adjacent urban uses.

L-C

On the Placer Vineyards site, surveys in conjunction with the PCCP identified 2,233 acres of vernal pool complexes (Glazner). The FEIR fails to cite the Glazner survey, but FEIR Figure 9 suggests there are 2,182 acres of complexes. That acreage was calculated applying 250 foot

Representing 20,000 members in 24 counties in Northern and Central California

Alpine - Amador - Butte - Calaveras - Colusa - El Dorado - Glenn - Lassen - Modoc - Nevada - Placer - Plumas
Sacramento - San Joaquin - Shasta - Sierra - Siskiyou - Solano - Stanislaus - Sutter - Tehama - Tuolumne - Yolo - Yuba

buffers to vernal pools. Although such a method of delineating vernal pools is arbitrary, it is relatively close to the Glazner data.

L-C cont.

Given the amount of urban development that the site would absorb, it is inaccurate in the extreme for the Final EIR to claim the project would impact just 69 acres of vernal pool habitat. The EIR evaluates impacts to 4,251 acres. 3,520 acres of open space would be converted to urban uses, with 714 acres retained as open space, in linear patterns along drainages and utility corridors. The California Department of Fish and Game (DEIR comment letter of May 19, 2006) concludes that the project impacts all 4,251 acres of the various types of habitat that currently exist onsite.

L-D

Despite the requirements of CEQA, the FEIR fails to provide an alternative that avoids the entire 2,182 to 2,233 acres of existing vernal pool complexes onsite (depending on which data is used). It evaluates a project that would impact 85% of the vernal pool complexes, but should have evaluated a project with 100% onsite avoidance.

L-E

The FEIR also fails to provide mitigation offsite that would mitigate impacts to vernal pool complexes to less than significant levels, even though such mitigation would be feasible. The FEIR points to market realities as making acquiring land as offsite mitigation difficult, yet the Placer Vineyards Specific Plan includes 24 property owners who collectively have ownership of or have options on large acreages of potential mitigation land in western Placer County.

L-F

Offsite mitigation inappropriately relies on creation of vernal pools. Based on claims that impacts to only 69 acres of vernal pool complexes must be mitigated for, the project would provide offsite mitigation of 192 acres of existing vernal pool complexes and the creation of 74 acres of the resource. But the creation of vernal pool complexes is not only unproven in terms of biological function, the created vernal pools are in areas in which the county has been expressly requested by the USFWS not to allow.

L-G

The project would create vernal pools in parcels known as Redwing and Antonio Mt. Ranch. They have existing vernal pool resources which would be added to through the creation of additional vernal pools, resulting in densities that do not provide biological functionality. This creation of vernal pools at high density in existing vernal pool resource areas has been expressly forbidden in an email to the county from Ken Sanchez of the US Fish and Wildlife Service. (Email to Assist. Planning Director Loren Clark, 4/27/2006)

L-H

Offsite mitigation by creation of vernal pools is also planned in Lincoln Ranch, which has no existing vernal pools, but is used to grow rice. The scientific literature does not support the idea that fully functional vernal pools can be successfully created, particularly in areas that have been cultivated for rice. Three other mitigation parcels, Musolino Children's Trust, Placer 312, and Vogt also have no existing vernal pools but vernal pools are to be created—again, successful creation is not supported in the scientific literature.

L-I

The project's mitigation for vernal pool complexes is based on a 2:1 ratio of offsite preservation, which is apparently roughly consistent with requirements under the PCCP. The PCCP has generated a number of alternative maps of a potential reserve system. The resources agencies have indicated a preliminary preference for four alternatives, map numbers 2, 4, 6 and 7. They reflect an average vernal pool complex mitigation ratio among these maps is 2:1.

L-J

Therefore, using the PCCP data that 2,233 acres of vernal pool complexes exist onsite along with DFG's conclusion that all onsite habitats will be impacted, the project should provide 4,466 acres of vernal pool complexes offsite to reach the 2:1. Instead, the project only supplies 192 acres of existing vernal pool complexes as mitigation for 69 acres of impact. With actual impacts to 2,233 acres, this is only a 0.08:1 mitigation ratio.

The project's minimal mitigation for impacts to vernal pool resources also places the county and the proponent on a collision course with the federal agencies that must issue permits to fill wetlands and take endangered species associated with vernal pools.

In 2002 the USFWS proposed that 3,320 acres of land in Placer Vineyards be designated Critical Habitat for the vernal pool species. Subsequently the agency issued a rule excluding the area from Critical Habitat. However, economic exclusions were challenged in federal court. In a November 2006 decision, Federal District Court Judge William B. Shubb ruled that economic exclusions cannot be implemented without viable Vernal Pool Recovery Plans. The court ordered FWS to reconsider its decision to exclude the nearly 900,000 acres and eleven counties and issue a new critical habitat rule in 120 days. Therefore the Critical Habitat designation may be restored to vernal pool complexes in Placer Vineyards if the court is not satisfied that species recovery is being accomplished.

L-K

Even if the Critical Habitat designation is not restored, the Vernal Pool Recovery Plan for this area of the county will have to be implemented. The recent court decision referenced above has lent further weight to these recovery plans. Since about 3000 acres of Placer Vineyards is in the Vernal Pool Recovery Plan Core Area and 85% of existing vernal pool complexes are required to be preserved in these areas, mitigating for just 69 acres of 2,233 acres to be impacted cannot be anticipated to be close to being acceptable to the USFWS.

L-L

The final approval of projects by local government unfortunately occurs prior to the issuance of federal permits. Therefore it is important for local government to provide mitigation that is as consistent as possible with the mitigation anticipated to be required by the resource agency permits. In this instance, the proposed mitigation for impacts to vernal pool complexes is wholly inadequate in relation to the implementation of the Vernal Pool Recovery Plan and the Endangered Species Act, setting up a potential serious disconnect between the mitigation Placer County is requiring versus the federal agencies. Such potential for conflict and delays can be avoided if Placer County requires mitigation that is consistent with the PCCP and consistent with fully mitigating for the loss of the 2,233 acres of vernal pool complexes that have been delineated by the county. The county should require onsite avoidance, or 2:1 offsite preservation (4,466 acres).

L-M

In conclusion, the Final EIR does not provide adequate and feasible mitigation for impacts to the vernal pool complexes either through onsite avoidance or offsite preservation. Mitigation for impacts to vernal pool complexes are inconsistent the Planning Agreement and are not compatible with the Placer County Conservation Plan. Finally, the current mitigation places the county grossly out of sync with mitigation that will be required by the federal resource agencies.

L-N

Impacts to air quality

We would like to thank the county for accepting some of our recommendations. Additionally we make the following requests:

1) The Final EIR should clarify that projects will be subject to the specific air quality requirements at the time of project approval if more stringent or different air quality mitigation programs are in place. The Specific Plan EIR should not grandfather projects into a lesser level of air quality mitigation than would otherwise be required. This would address our concern that the project should be subject to the 2007 ozone attainment plan measures.

L-O

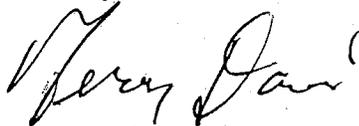
2) Regarding addressing impacts of the project on attainment of state air quality standards, case law has established the rationale that projects of this magnitude, with dramatic increases in vehicle miles traveled in what are now rural areas, under CEQA should assess impacts on state air quality standards which are more stringent than federal air quality standards and therefore more difficult to reach. (El Dorado County and Voices for Rural Living, and Shingle springs Neighbors for Quality Living et al. v. California Department of Transportation et al., County of Sacramento, 2004)

L-P

The Sierra Club requests that the Planning Commission deny certification of the FEIR and approval of the Placer Vineyards Specific Plan until such time as adequate mitigations are provided.

L-Q

Sincerely,



Terry Davis
Conservation Program Coordinator
Mother Lode Chapter Sierra Club

**LATE COMMENT LETTER 2 TERRY DAVIS, CONSERVATION PROGRAM COORDINATOR, MOTHER
LODE CHAPTER SIERRA CLUB**

Response 2L-A: Commenter provides additional written comments as described below and incorporates by reference comments contained in Sierra Club letter dated May 19, 2006. Commenter's additional written comments are responded to below as Responses to Comments L-B through L-Q. The comments contained in the May 19, 2006 letter were responded to in the October 2006 Final EIR for the Placer Vineyards Specific Plan as Responses to Comment 24A through 24AA.

Response 2L-B: Commenter opines that the project's current mitigation is inconsistent with the conservation goals and strategies of the Placer County Conservation Plan (PCCP). As noted in the Response to Comment 15A in the Final EIR, however, the Open Space/Biological Resources Mitigation and Management Strategy presented in the Revised Draft EIR is intended to dovetail with the possible requirements of the draft PCCP. The Revised Draft EIR acknowledges that the PCCP has not been officially adopted; however, the comprehensive mitigation strategy will allow the Placer Vineyards Specific Plan to move forward without the PCCP program in place, and also provides the opportunity for the PCCP program to be utilized, if adopted in the future. At present, no one can predict with certainty what the PCCP as finally adopted will require. Regardless of how closely the Open Space/Biological Resources Mitigation and Management Strategy mirrors what the PCCP will eventually require, the mitigation strategy represents a very thorough approach to mitigating the project's impacts on open space and biological resources.

See also Response to Comment 27B in the Final EIR. The 2001 Planning Agreement requires that all projects designed during the development of the PCCP must be consistent with the principles and objectives of the conservation process and must not compromise the successful development or implementation of the PCCP. As a result, the Revised Draft EIR necessarily describes mitigation measures and their relationship to the PCCP effort as required by the Planning Agreement. As explained above, the Revised Draft EIR recognizes that the PCCP process is underway and that requirements under the PCCP are not certain at this time.

Response 2L-C: The commenter describes the purpose and goals of the PCCP focusing on strategies for preservation of vernal pool systems, and discusses the "Glazner Survey" performed during the PCCP process. The County does not disagree with the commenter's characterization of the proposed PCCP purpose and goals and has provided mitigation that would ensure compliance with the PCCP, if the PCCP is adopted prior to Specific Plan implementation (see Revised Draft EIR Mitigation Measure 4.4-1 and Response to Comment 2L-M).

The "Glazner Survey" (2003) referenced in the Sierra Club's letter was actually an aerial photo interpretation exercise wherein Northfork Associates (the company retained to conduct the "Glazner Survey") mapped "vernal pool complexes" (a relatively undefined term subject to individual interpretation). In general terms, the U.S. Fish and Wildlife Service describes these as assemblages of several pools including upland habitat and interconnecting swales. It is difficult to apply this "definition" to the landscape, particularly in the context of an aerial photo interpretation exercise because of the subjectivity of both the definition of "vernal pool" (vs. isolated seasonal wetland) and the amount of surrounding upland habitat included.

Figure 9 of the Final EIR, which illustrates the 85% avoidance alternative, was actually created by defining 250-foot buffers around individually mapped vernal pools, basin-type seasonal wetlands, and drainage swales. Figure 9 was not an attempt to designate “vernal pool complexes” within the Placer Vineyards Specific Plan area. This assemblage of wetland types is believed to represent what the U.S. Fish and Wildlife Service would likely consider to constitute habitat for federally-listed aquatic invertebrates (e.g., vernal pool fairy shrimp and/or vernal pool tadpole shrimp). Much of the area shown on Figure 9 (approximately 3,996 acres out of 5,238 acres, or 76%) was based upon actual on-ground wetland delineations (according to standards promulgated by the U.S. Army Corps of Engineers). While it may be described as “arbitrary,” the U.S. Fish and Wildlife Service interpretation and policy were also the basis for the utilization of the 250-foot buffer, as this buffer distance is incorporated into the *“Programmatic Formal Endangered Species Act Consultation on Issuance of 404 Permits for Projects with Relatively Small Effects on Listed Vernal Pool Crustaceans Within the Jurisdiction of the Sacramento Field Office, California”* (USFWS 1996), and is routinely relied upon for indirect effects determinations in the context of Section 7 consultations.

To describe Figure 9 as “arbitrary” and to imply that Figure 9 is somehow a less accurate depiction of the distribution of “vernal pool complex” habitat is mistaken. The two maps were derived using entirely different methodologies in response to different interpretations of “vernal pool complex” habitat (or vernal pool aquatic invertebrate habitat, or “shrimp habitat,” as identified in Figure 9). While there is some correspondence between the maps, this is due to the fact that the wet acres of “vernal pool complex” (as mapped by Glazner) represents a subset of the aquatic invertebrate habitat mapped in Figure 9. Apart from this conceptual overlap, the close correspondence between the Glazner value of 2,233 acres and the Final EIR Figure 9 value of 2,182 acres is coincidence.

Response 2L-D: Commenter states that the Final EIR claims that Placer Vineyards impacts only 69 acres of “vernal pool habitat,” then repeats the California Department of Fish and Game’s assertion that all of the acreage within the plan area should be considered impacted. Commenter implies a dramatic contrast between 4,251 acres of total habitat conversion and 69 acres of “vernal pool habitat,” characterizing the Final EIR as “inaccurate in the extreme.” Regarding the commenter’s dramatic comparison of 4,251 acres of total habitat conversion with 69 acres of “vernal pool habitat” impacts, it is assumed that the commenter is implying that the 2,233 acres of “vernal pool complex” (as mapped by Glazner and referenced in Comment 2L-C) would be a more appropriate statement of the impacts to “vernal pool habitat.” First, it should be clarified that the 69 acres of “vernal pool habitat” impact quoted by the commenter is actually the figure reported only for direct impacts on-site. This figure is derived from a summation of the anticipated impacts to wet acres of vernal pool, isolated seasonal wetlands, and drainage swales (believed to represent what the U.S. Fish and Wildlife Service would consider habitat for federally-listed aquatic invertebrates). Secondly, as stated elsewhere, the County disagrees with the assertion that the approximately 700 acres of open space to remain should be considered totally impacted. The “extreme inaccuracy” claimed by the commenter is the result of the confusion of direct, on-site impacts to wet-acres of potential listed aquatic invertebrate habitat (i.e., 69 acres) versus assumed conversion impacts to “vernal pool complex habitat” (including both uplands and wetlands, as mapped by Glazner).

Response 2L-E: Commenter states that the Final EIR evaluates an alternative that would impact “85%” of the vernal pool complexes and should have evaluated a project with 100% on-site avoidance. The Revised Draft EIR did evaluate an alternative with 100% on-site avoidance described as the “No Project” alternative (see Revised Draft EIR page 6-15). Contrary to the commenter’s assertion, the Final EIR does not evaluate an alternative that impacts 85% of the vernal pool complexes; rather, it evaluates an alternative with 85% avoidance of vernal pool resources (see Final EIR Response to Comment 27P and Final EIR Figure 9), consistent with the Vernal Pool Recovery Plan recently finalized by the U.S. Fish and Wildlife Service. The commenter is also referred to CEQA Guidelines Section 15126.6(a), which reads in part: “An EIR shall describe a range of reasonable alternatives to the project, or the location of the project, which would feasibly attain most of the project objectives of the project but would avoid or substantially lessen any of the significant effects of the project...” (Emphasis added). Notably, CEQA does not require lead agencies to include every alternative suggested by commenters, but rather leaves to lead agencies the task of formulating a “reasonable range of potentially feasible alternatives[.]” (CEQA Guidelines, § 15126.6, subd. (a); see also *Laurel Heights Improvement Association v. Regents of the University of California* (1988) 47 Cal. 3d 376, 406.

Response 2L-F: The commenter criticizes the Final EIR for failing to provide sufficient off-site mitigation to mitigate vernal pool impacts to a less than significant level and suggests that such mitigation is feasible. For CEQA purposes, the County (as stated on page 4.4-102 of the Revised Draft EIR) has conservatively concluded that the impact to on-site vernal pool habitat and species is significant and unavoidable regardless of the amount of off-site mitigation provided. Stated simply, there is no way to proceed with the project without adversely affecting on-site vernal pools. This is the basis for the conclusion. Off-site mitigation would reduce the impact but not to a less than significant level. Although the commenter appears to minimize the “market realities” within the western Placer County region, available land is at a premium there, and willing sellers are necessary for any successful transaction. Although some owners within the Placer Vineyards ownership group may have holdings outside the project area but within western Placer County, this fact does not change the County’s view that its mitigation measures for lost open space and impacted biological resources represent effective and thorough mitigation. Moreover, the County must consider the Specific Plan as a single integrated project, and is not in a position to insist that specific individual landowners within the owners group dedicate some of their off-site holdings to mitigate for impacts associated with development on land owned by others within the owners group nor treat particular landowners differently from others solely because certain landowners are thought to be wealthier or more financially successful than others (See *Maintain Our Desert Environment v. Town of Apple Valley* (2004) 124 Cal.App.4th 430, 448-449.).

Response 2L-G: The commenter has confused several subjects while addressing “Vernal Pool Complex Habitat” impact and mitigation acreages reported in Revised Table 4.4-12, “Aquatic Resource Impact Estimates,” presented in Response to Comment 27P in the Final EIR.

This comment opens with the assertion that “off-site mitigation inappropriately relies on creation of vernal pools.” It should be noted that the U.S. Army Corps of Engineers routinely (and as a matter of policy) requires the creation of compensation wetlands or the purchase of compensation credits from established mitigation banks when it authorizes fill of jurisdictional

waters/wetlands (including vernal pools) under Section 404 of the Clean Water Act. General Condition 20 of the current Nationwide Permit Program requires that "...compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10 acre and require preconstruction notification..." Further, the U.S. Fish and Wildlife Service routinely (and as a matter of policy) requires the creation of compensation vernal pool habitat in Biological Opinions issued authorizing the incidental take of federally-listed aquatic invertebrates (e.g., vernal pool fairy shrimp). Describing this mitigation strategy as "inappropriate" is an opinion unsupported by the regulatory record created by these trustee agencies and extending back to 1993.

The statement that "based on claims that impacts to only 69 acres of vernal pool complexes must be mitigated for ..." misinterprets Revised Table 4.4-12. This table reports in four separate columns (reading left-to-right) labeled "Direct Impacts (on-site)," "Direct Impacts (off-site)," "Indirect Impacts (on-site)," and "Indirect Impacts (off-site)," a total impact value of 96 acres (i.e., 69 + 5 + 19 + 3). A "Preservation" acreage requirement of 192 acres is anticipated per Note #1, which reads, "2:1 for direct and indirect impacts to Vernal Pool Complex Habitat." A "Creation/Restoration" acreage requirement of 74 acres is anticipated per Note #2, which should have also included 1:1 creation/restoration for vernal pool complex habitat (wetted acres). Because subsequent comments (discussed below) are apparently based upon the misunderstanding that the table is reporting some combination of both dry and wet (i.e., upland and wetland) acres (despite the title "Aquatic Resource Impact Estimates" (emphasis added)), the County is taking this opportunity to clarify certain issues by presenting a further Revised Table 4.4-12 (see below).

Commenter states that the "creation of vernal pool complexes is ... unproven in terms of biological function ..." Just like the term "vernal pool complex," "biological function" can be defined in different ways. Depending upon the user, the term may actually imply and include many different functions and parameters, some measurable, others not. There may be differences of opinion even within the scientific and regulatory community about which of these functions and parameters are important to appropriate biological function for a given habitat type and/or even a given habitat unit. Since approximately 1990, the local (Sacramento area) environmental consulting community has been designing, creating/restoring, and monitoring (in response to permit requirements of the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service) compensation wetland habitats, including vernal pool habitats. During that period, mitigation monitoring requirements and success criteria have changed in response to the changing perceptions within the scientific/regulatory/consulting community of appropriate biological function and the communal learning curve regarding these habitats. While detailed statistics have not been compiled, numerous successes, as measured by successful completion of permit-required monitoring programs and documented attainment of agency-prescribed success criteria, have been achieved. Further, these agencies, along with the CDFG and the U.S. Environmental Protection Agency, have sanctioned local mitigation banks to sell prior-constructed vernal pool compensation acres (or credits). Presumably, the compensation habitat units being sold by these approved mitigation banks are functioning appropriately.

Finally, commenter states that these compensation habitats are to be constructed in "areas which the county has been expressly requested by the USFWS not to allow." The commenter may be

referring to an April 20, 2006, e-mail from Ken Sanchez, of the Sacramento Office of the U.S. Fish and Wildlife Service, to a number of undisclosed recipients (cited in Comment 2L-H as an e-mail to Loren Clark on April 27, 2006). In reviewing this e-mail, it is apparent that, while Mr. Sanchez was questioning the efficacy and long-term wisdom of creating/restoring vernal pools within existing vernal pool landscapes and encouraging people to look to already modified landscapes as appropriate venues for vernal pool creation/restoration, his remarks stopped short of an “express request” to prohibit such creation/restoration. In fact, he expressed a commitment to continue working on those projects already under review, while indicating that the burden of proof on future projects may be more demanding with respect to “analysis of effects to uplands, wetlands, and hydrology, etc.” Should the County Board of Supervisors approve the Placer Vineyards Specific Plan, the project proponents will need to obtain wetland fill permits (404 permits) from the Corps of Engineers, which, in turn, must consult with the U.S. Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act before issuing any such permits. As part of that process, Mr. Sanchez or one of his colleagues will have an opportunity to make known his or her views regarding how much on-site avoidance, as opposed to off-site mitigation, will be appropriate for the project area.

**Second Revised Table 4.4-12
Aquatic Resource Impact Estimates and Mitigation Requirement Forecast**

Habitat Type	Direct Impacts, on-site (acres)	Direct Impacts off-site, (acres)	Indirect Impacts, on-site (acres)	Indirect Impacts, off-site (acres)	Total Direct Impacts (acres)	Total Indirect Impacts (acres)	Total Direct and Indirect Impacts (acres)	Anticipated Preservation Requirement (acres)	Anticipated Creation/ Restoration Requirement (acres)
Vernal Pool Complex Habitat (wetted acres only):	69	5	19	3	74	22	96	192	74
Other Wetlands/Waters:	27	2	0	N/A	29	N/A	N/A	0	29
Total	96	7	19	N/A	103	N/A	N/A	192	103

Notes:
 1. 2:1 for direct and indirect impacts to vernal pool complex habitat (wetted acres only).
 2. 1:1 for direct impacts to vernal pool complex habitat (wetted acres only) and other wetlands/waters
 3. Additional restoration may be used in lieu of preservation in circumstances deemed appropriate by the County Planning Director.
 N/A means that no indirect effects to other wetlands/waters have been estimated
 Source: ECORP Consulting, 2007

Response 2L-H: Commenter amplifies Comment 2L-G by identifying potential mitigation sites Redwing and Antonio Mountain Ranch, postulating that proposed construction of compensation vernal pools at these locations would result in densities “that do not provide biological functionality”, and repeating the claim that such creation/restoration was “expressly forbidden in an e-mail to the county from Ken Sanchez ...”

See Response to Comment 2L-G. The creation and restoration of vernal pools in existing vernal pool habitat does not preclude “biological functionality.” In fact, vernal pool restoration may increase density to existing habitat, but can replicate historic densities. Likewise, vernal pool creation in existing habitat does not necessarily result in unacceptable density or automatically fail to provide habitat function.

Response 2L-I: Commenter identifies potential off-site mitigation areas Lincoln Ranch, Musolino Children’s Trust, Placer 312, and Vogt, noting that rice is grown at Lincoln Ranch, and that there are “no existing vernal pools, but vernal pools are to be created.” Commenter claims that the scientific literature does not support the idea that fully functional vernal pools can be successfully created, particularly in areas that have been cultivated for rice.” It is ironic to note that Comments 2L-G and 2L-I are aimed at the perceived inappropriateness of constructing/restoring vernal pools where they already exist, while comment 2L-I seemingly implies that it is equally inappropriate to construct/restore them where they don’t.

See Responses to Comments 2L-G and 2LH regarding appropriate function of created vernal pools. The appropriateness of the identified sites for vernal pool creation or restoration will be further addressed both when the project proponents seek County approval of proposed individual Open Space Mitigation and Management Plans (see Mitigation Measure 4.4-1a, Revised Draft EIR, p. 4.4-95) and when they seek 404 permits from the Corps of Engineers. At present, the County has no reason to believe that the identified properties are not suitable for the construction of new vernal pools, particularly since the sites may have formerly contained such features before the land was altered to facilitate the production of rice. The *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 1995) recognizes uncertainty and potential difficulties associated with both restoration and creation, yet anticipates the necessity of both restoration and creation for the recovery of vernal pool species. While laser-leveled rice fields may pose more challenges to successful vernal pool restoration than other less-altered sites, where appropriate soil conditions still exist (or can be reestablished), and where appropriate hydrologic regimes can be reestablished, it is believed that functioning systems can be recreated.

Response 2L-J: Commenter references the project’s mitigation proposal for vernal pools and states that the ratios proposed are roughly consistent with the requirement of the Placer County Conservation Plan (PCCP). Further, maps generated as part of the PCCP reflect an average of 2:1 preservation ratio.

Since no PCCP has been adopted, there is no final determination of a conservation strategy or any “requirements under the PCCP.” On January 23, 2007, the County Board of Supervisors adopted the “Board Approved Conservation Plan” map. This map will serve as the basis for

discussions and negotiations with the federal agencies regarding the ultimate strategy for conservation under the PCCP.

Commenter again reports the on-site vernal pool complex acreage derived from the Glazner study referenced in Comment 2L-C (i.e., 2,233 acres), and relies on the CDFG's prior-stated assumption (i.e., Comment 27-G) that all of the habitat values on the site would be totally destroyed by the proposed project. Commenter believes that this justifies a mitigation requirement for 4,466 acres of off-site vernal pool complex mitigation.

As discussed above under Response to Comment 2L-C, the vernal pool complex acreage reported by Glazner was derived from aerial photographic interpretation, but does not differ significantly from the acreage derived by the method used to produce Final EIR Figure 9 (specific buffering of largely ground-mapped wetlands). As noted before, "vernal pool complex" remains a relatively undefined term, and may be defined in different ways by different parties, especially where "complexes" are defined from aerial photograph interpretation with little or no groundtruthing. At any rate, this issue is considered largely irrelevant, both because the difference is minimal, and because the 2:1 preservation ratio anticipated by the Final EIR (i.e., Revised Table 4.4-12, "Aquatic Resource Impact Estimates") is intended to be based upon wetted acres of vernal pool complex habitat (consisting of vernal pools, seasonal wetland basins, and drainage swales), as is typical in the context of the federal endangered species permitting/consultation processes administered by the U.S. Fish and Wildlife Service. Additional upland habitat would undoubtedly need to be preserved, the amount to be based in part on the conditions surrounding the wetted acres. See Response to Comment 2L-D. Further, the County disagrees with the assumption that open space on the project will offer no residual habitat value after project buildout. The approximately 714 acres of open space to remain after project buildout may, in fact, provide enhanced wildlife habitat values in some locations. Thus, the application of an inapplicable 2:1 preservation ratio to 2,233 acres of affected vernal pool complex habitat is not valid.

Commenter contrasts the justification of 4,466 acres of vernal pool complex habitat mitigation with the applicant's proposal, calculating a perceived-proposed mitigation ratio of 0.08:1. This comment evidences a misinterpretation of Revised Table 4.4-12, "Aquatic Resource Impact Estimates" with respect to the difference between wetted and dry (i.e., wetland and upland) acreages. This comment also apparently confuses the Final EIR's forecast of anticipated mitigation requirements (actually reported in Revised Table 4.4-12) with the applicant's proposed mitigation program. See Response to Comment 2L-G, wherein a further revised Table 4.4-12 is introduced.

Response 2L-K: The commenter states that in 2002, 3,320 acres of land in Placer Vineyards were designated as critical habitat for vernal pool species. The commenter notes that the November 2006 decision (*Home Builders Association of Northern California, et al. v. U.S. Fish & Wildlife Service* (Case No. CIV. S-05-0629 WBS-GGH) by Federal District Court Judge William B. Shubb resulted in a determination that economic exclusions cannot be implemented without a viable recovery plan. According to the commenter, the court ordered U.S. Fish and Wildlife Service to reconsider its proposed exclusion of 900,000 acres and 11 counties from critical habitat and issue a new rule in 120 days. The commenter also believes that the vernal pool

critical habitat designation may be restored in Placer Vineyards if the court is not satisfied that recovery is being accomplished.

In its November 2006 decision, the court found that the U.S. Fish and Wildlife Service's reasoning regarding the critical habitat exclusions failed to adequately consider the recovery standard under the Endangered Species Act and it remanded the matter back to U.S. Fish and Wildlife Service with instructions to submit a final rule within 120 days (January 23, 2007 Order 5; Nov. 2, 2006 Order 63). The court, however, found that the error committed by the U.S. Fish and Wildlife Service was "minor in the grand scheme of its analysis" and that "there is a legitimate possibility that the agency will be able to substantiate its rule without altering the ultimate substance" (January 23, 2007 Order 16). The Court did not require in its opinion that the Placer Vineyards Specific Plan project site be designated as critical habitat if the court is not satisfied that recovery is being accomplished by the U.S. Fish and Wildlife Service.

In accordance with Judge Shubb's decision, the U.S. Fish and Wildlife Service has addressed the Court's order. While the Court upheld the U.S. Fish and Wildlife Service's analysis of the benefits of exclusion, the Court found that the U.S. Fish and Wildlife Service must consider the recovery standard in its analysis. In accordance with the decision, the U.S. Fish and Wildlife Service has weighed the benefits of inclusion of the areas as critical vernal pool habitat versus the costs of designation of critical vernal pool habitat and has issued its final rule, which upheld the exclusion of the Specific Plan area and other portions of western Placer County. Thus, the Specific Plan area is not designated as critical habitat for vernal pool species.

Response 2L-L: The commenter states that even if the critical habitat designation is not restored, the Vernal Pool Recovery Plan for this area of Placer County will have to be implemented. Since about 3,000 acres of Placer Vineyards are in the Vernal Pool Recovery Plan Core Area and 85% of existing vernal pool complexes are required to be preserved in these areas, according to the commenter, mitigation for 69 acres of 2,233 acres of impacted habitat cannot be found acceptable to U.S. Fish and Wildlife Service.

The commenter is referred to Response to Comment 2L-K. Judge Shubb's decision did not address the implementation of the Vernal Pool Recovery Plan either generally or specifically as it pertains to the designation of critical habitat within Placer Vineyards nor did it opine on the applicability of the recovery standard set forth in the Recovery Plan. The County does not agree that Judge Shubb's opinion has somehow altered the legal status of recovery plans. For many years, federal case law has clearly held that recovery plans do not create any enforceable obligations under the Endangered Species Act (ESA) and thus do not impose any obligations on local land use planning agencies.

Response 2L-M: Commenter claims that proposed mitigation is inadequate in relation to the Vernal Pool Recovery Plan, the Endangered Species Act and the PCCP. See Responses to Comments 2-LJ, 2L-K and 2L-L. It is not possible for the County to require compliance with mitigation contained in an incomplete and unadopted PCCP. Mitigation Measure 4.4-1 requires compliance with the PCCP to the extent it is adopted prior to project implementation. Further, the project must comply under any circumstance with the dictates of the Endangered Species Act, as they may be applicable to the project site.

Response 2L-N: Commenter summarizes the reasons for his disagreement with mitigation proposals for vernal pool complexes. The County disagrees with the commenter's conclusions and has provided relevant responses to points raised in the paragraphs above. See Responses to Comments 2L-B through 2L-L.

Response 2L-O: Commenter wants assurance that the project will be subject to more stringent air quality requirements that may be promulgated in future years. Comment noted. The County cannot exempt projects within the Placer Vineyards Specific Plan area from future more stringent air quality regulations that may be promulgated by state or federal government. The Placer County Air Pollution Control District will be obligated to enforce the most current regulations even though they may exceed current stated mitigation requirements.

Response 2L-P: Commenter opines that CEQA review for this project should assess impacts on State air quality standards which are more stringent than federal air quality standards (citing *El Dorado County and Voices for Rural Living, and Shingle Springs Neighbors for Quality Living et al. v. California Department of Transportation et al.*, County of Sacramento, 2004). The trial court decision invoked by the commenter is no longer valid, as it was disapproved by the Court of Appeal, which held that it could not uphold this aspect of the trial court's decision because the petitioners in the case had failed to exhaust their administrative remedies. Thus, neither case law nor CEQA itself impose a requirement that large scale projects must assess impacts on State air quality standards, when such standards are more stringent than federal standards.

Moreover, commenter requests that impacts to State air quality standards be addressed and cites case law requiring the analysis when projects would have "...dramatic increases in vehicle miles traveled in what are now rural areas..." (emphasis added). See Response to Comment 24R in the Final EIR. Although the commenter suggests that the project site is "rural", the County disagrees. The site is proximate to urbanized lands in the City of Roseville and County of Sacramento and has been shown on the Placer County General Plan for intensive urban development since 1994.

As described in Section 4.8.3 of the Revised Draft EIR, the California Air Resources Board (CARB) has primary responsibility in California to develop and implement air pollution control plans designed to achieve and maintain the National Ambient Air Quality Standards (NAAQS) established by the Environmental Protection Agency (EPA). In addition, California has established California Ambient Air Quality Standards (CAAQS). Table 4.8-5 in Section 4.8.2 of the Revised Draft EIR presents the federal and State air quality standards.

Air quality in the Specific Plan is regulated by several agencies including EPA, CARB and the Placer County Air Pollution Control District (PCAPCD). Each of these agencies develops rules and/or regulations to attain various air quality goals. Although EPA regulations may not be superseded, both State and local regulations may be more stringent than federal air quality regulations. The Revised Draft EIR discloses and analyzes the project's potential air quality impacts in light of federal, State, and local standards that relate to the proposed Specific Plan (Revised Draft EIR, pp. 4.8-18 to 4.8-45).

Response 2L-Q: Commenter requests that the Planning Commission deny the project. The Planning Commission declined to accept this recommendation and on January 25, 2007, unanimously recommended that the Board of Supervisors approve the proposed project.

William D. Kopper

Attorney at Law
417 E Street
Davis, CA 95616
(530) 758-0757
Fax (530) 758-2844

Paralegal
Kristin Rauh

January 19, 2007

Planning Commissioners and
Planning Department
Placer County
11414 "B" Avenue
Auburn, CA 95603

Re: Placer Vineyards Specific Plan Final Environmental Impact Report (Sch. No. 1999062020)

Dear Planning Staff and Members of the Planning Commission:

These comments on the Placer Vineyards Specific Plan and Final Environmental Impact Report ("FEIR") are submitted on behalf of Rob Collins, Mark Steelman, and Mike Williams. These are their comments. The comments include those of Daniel Smith, Traffic Engineer, and Steve Pettyjohn, Acoustical Engineer. We also incorporate into our comments all of the comments of other individuals and organizations, and intend to rely on those comments as well as our own. Furthermore, my clients oppose Placer County adopting the Placer Vineyards Specific Plan and the General Plan and Community Plan Amendment, Development Agreements and Placer Vineyards Specific Plan EIR. In these comments we intend to highlight some of the deficiencies in the FEIR and Project documents.

L-A

A. Airport Noise.

In Letter 9 of the FEIR the County of Sacramento County Airport System provided comments on the noise impacts of McClellan Airfield on the Project. The County of Sacramento is a sister agency and the comments of the County of Sacramento are entitled to substantial weight. The Draft EIR relied upon the 60 CNEL (Community Noise Equivalent Level) contour line as a basis for concluding that the McClellan Airfield operations would have no impact on the residential areas of Placer Vineyards. The Sacramento County Airport System comments as follows:

L-B

This area [the Placer Vineyards] would be subject to frequent large aircraft (over 75,000 pounds) from McClellan Airfield operating over the area under 3,000 feet above ground level.

Based on current and historical experience, the Airport System's specific concern is related to single-event noise occurrences and the high probability of complaints from future homeowners in the Placer Vineyards residences due to aircraft over flights in this area.

In Section 4.9-1 of the Project EIR, the EIR concluded that because the Project is outside the 60 dB CNEL contour line, the aircraft noise impacts due to possible McClellan Park activities will be less than significant. However, the EIR failed to take into account the impact of single-events and the interference of such single-events with sleep. In fact, the Draft EIR completed no sound measurements on the Project site to determine the sound levels from military aircraft. The noise from military aircraft is different from civilian aircraft because military aircraft is not required to install any noise control devices. The noise from military aircraft is unmitigated. Further, military aircraft are permitted to take-off and land at any time during the day and night. Sacramento County Airport System was absolutely correct under CEQA when concluding that the DEIR was not sufficient to analyze the noise impacts of the Project. In the case of *Berkeley Keep-Jets Over The Bay Committee v Board of Port Commissioners* (2001) 91 Cal.App.4th 1344, the court required a supplemental noise analysis because the Board of Port Commissioners of the City of Oakland intended to rely only upon the 65 CNEL noise contour as a basis for approval of an expansion of the cargo business at the Oakland Airport. The opponents of the project, who primarily lived in the City of Berkeley, complained that the existing traffic in and out of the Oakland Airport was causing instantaneous noise events at night that exceeded by as much as 20 DB the 65 CNEL standard. The CNEL is an average noise production over 24 hours that uses a weighted average to reduce nighttime noise levels.

L-B cont.

The EIR for the Oakland Airport Expansion Project did not even consider the noise impacts on Berkeley because Berkeley fell outside the 65 CNEL corridor. However an acoustical engineer testified that "The significant number of aircraft over-flights (20%) appear to produce maximum noise levels in excess of 65 DBA, roughly 20 DBA higher than the median sound level during the day, and 30 DBA higher than the median sound level occurring during the late night and early morning hours. 20% of existing aircraft over-flights may produce single event levels in excess of SEL 61 ("SEL" stands for "Single Event Level".) The Draft EIR for the Oakland Expansion Project indicated that a single noise event with SEL 61 or higher will disturb the sleep of about 30% or more of those people exposed to such noise. About 70% or more of those people exposed may be awakened from sleep, if only briefly, and possibly without remembering."

The court in *Berkeley Keep Jets Over the Bay* found that the flaw in the EIR's noise analysis was its failure to provide in addition to the CNEL Analysis, the most fundamental information about the Project's noise impacts, specifically the number of additional nighttime flights that will occur under the Project Expansion, the frequency of those flights, and their effect on sleep. Further, the court found that the probability of

being repeatedly awakened by multiple single event sounds can be calculated given sufficient data. The court endorsed the concept that “the Sound Exposure Level [SEL] has been found to be the most appropriate and useful descriptor for most types of single event sounds including aircraft fly-bys.” The court further stated:

“We believe the potential noise impact of increased nighttime flights mandates further study. The Guidelines provide that the level of detail required in addressing particular impacts should be “in proportion to their severity and probability of occurrence.” (Guidelines, §15143.) Using this standard, the Port cannot simply ignore the CEQA standard of significance for assessing noise, the credible expert opinion calling for further evaluation of the impact of single-event-noise, and public concern over the noise created by increased nighttime flights.”

L-B cont.

In this case there is expert testimony from the Sacramento County Airport System and Mr. Steve Pettyjohn that reliance on the 60 CNEL line does not adequately assess the impacts of the aircraft noise from McClellan. Further sound measurements are necessary. Actual data from the aircraft over flights during the night and during the day is necessary to calculate the SEL for purposes of determining whether the Project is likely to cause sleep disturbance in the Project area. The EIR is inadequate because it does not include enough information to determine the number of flights and the sound levels of the flights landing and leaving McClellan Air Force Base. These flights may very well have an adverse impact on the residence of the Project to be able to sleep.

The Federal Inter-Agency Committee on Aviation Noise (“FICAN”), now contends that a DNL metric or a CNEL metric are not sufficient to evaluate the noise from airports. As is set forth in the FICAN study entitled “The use of Supplemental Noise Metrics in Aircraft Noise Analyses” (February, 2002) (See Exhibit A), “throughout the world, single event noise contours are commonly included in environmental assessment and information reports [for airports]”. The results of the 2002 FICAN study are as follows:

Single event data, expressed as SENEL or SEL, are particularly useful for addressing sleep interference issues. In fact, the FICAN sleep disturbance curb (FICAN, 1997) uses SEL as a metric for estimating levels of sleep interference.

L-C

FICAN finds that supplemental metrics provide valuable information that is not easily captured by DNL. Supplemental metrics are particularly useful for assessing the effects of aircraft noise on interference with activities such as

sleep and speech. In these cases, the use of metrics such as single event exposure metrics can provide a more meaningful estimate of interference than a single DNL estimate.

The report attached as Exhibit B completed by the Netherlands Organization for Applied Scientific Research, entitled as “Elements for a Position Paper on Night Time Transportation Noise and Sleep Disturbance includes a very comprehensive study of sleep disturbance related to airport noise. The study notes that an 80 SEL is equivalent to an Lmax of 70 DB. At 80 SEL the sleep disturbance is very pronounced. The FICAN 1997 Study showed that at 80 SEL approximately 10% of the people were awakened (see Exhibit C). The Netherlands’ study found that there is recent evidence for a direct link between nighttime noise levels and cardiovascular disease. However, there is not enough evidence to set appropriate levels of nighttime noise levels to protect against cardiovascular disease. The study found that there was a benefit in not having the bedroom face the noise source. Further, the study found that “a reduction of the indoor bedroom sound level is more than two times less effective in reduction of self-reported sleep disturbance than the same reduction of the outdoor level.” In order to comply with accepted standards, the authors of the EIR need to conduct comprehensive measurements of the noise events on the Site, and complete SEL calculations and also prepare SEL contours.

L-C cont.

The Draft EIR Section 4.9-2 implies that McClellan Air Force Base is now decommissioned and no longer in use. However, McClellan Air Force Base is currently used for the repair of military aircraft and military aircraft fly in and out of McClellan Air Force Base. Further, McClellan Air Force Base may have future commercial uses. Therefore, the flights are currently continuing and the implication that there are no further flights in the EIR is wrong.

L-D

Further, the EIR relies on a Federal Interagency On Noise (FICON) 1992 study to support the use of the descriptors such as DNL and CNEL as measurements for acceptable aircraft noise. However, subsequent studies by FICON have stated that the DNEL metric or CNEL metric are not sufficient to evaluate the noise from airports. (See Exhibit A and Exhibit C.) The EIR has relied on out of date rules and regulations to support a position which is incorrect. The EIR needs to be revised and recirculated with proper information concerning airport noise.

L-E

In the response to the Sacramento County Airport System comment, the EIR states: “Placer County considers concerns about single-event noise exposures to be speculative in nature.” Clearly the Court of Appeals disagree in light of the decision of *Berkeley Keep Jets Over The Bay Committee v Port Commissioners*.

L-F

B. The EIR is Non-Responsive as to the Project’s Adverse Impacts and Public Safety Services.

In Letter 5, the California Highway Patrol stated that there were no plans to expand the CHP workforce in the Auburn area CHP office. Further, the Placer Vineyards Project would create substantially more demand for services. In Letter 11, Mr. Bob Lundin comments that “the effect of this Project on CHP staffing and services provided to other parts of the County are not addressed in the EIR. While other parts of the County have reduced services when this Project is built.” In response to Mr. Lundin’s comment, the EIR refers the readers to Response 5A which is responsive to the Highway Patrol comments.

In Response 5A, the EIR acknowledges that the Project will contribute to traffic congestion and will add traffic to the roadway systems. The EIR then states: “mitigation measure 4.7-2 calls for project developers to contribute their fair share toward the funding of improvements on state highways, if and when the County enters into an agreement with CalTrans for such funding.” The funding of mitigation measures that may relieve congestion on state highway systems is speculative because the EIR does not require the County to enter into an agreement with CalTrans to provide for mitigation measures on the state highway system as a condition of the Project. The EIR then states: “these improvements would relieve congestion associated with new developments so that the Highway Patrol is able to travel more efficiently.” This response is clearly non-responsive and speculative. It is speculative because the EIR and the Project documents do not require an agreement between Placer County and CalTrans to mitigate the Project’s impact on the state highway system. The EIR therefore concludes that the Project’s impacts on the state highway system are significant and unavoidable. The EIR does not contend that highway congestion and adding traffic to the state highway system will not have an adverse effect on the CHP’s ability to provide traffic and safety services on the state highway system in Placer County. Therefore, the EIR has improperly concluded that the Project would have no impact on police protection. The only reference to the Highway Patrol is on page 4.11-13 where the EIR states: “the California Highway Patrol provides traffic related enforcement services throughout Placer County. The nearest Highway Patrol offices are the Auburn area office located in New Castle, and the North Sacramento area office, serving the Sacramento area north of the American River, located at 5109 Tyler Street, Sacramento.” The EIR does not consider adverse impacts on the ability of the Highway Patrol to provide services. Clearly, the Project will have a

L-G cont.

significant adverse impact on the Highway Patrol’s ability to provide traffic and police services in Placer County. Because the EIR did not even consider an impact to the Highway Patrol, it did not consider mitigation measures. The Project’s EIR is inadequate because of its failure to consider the Project’s impact on the police and public safety services provided by the California Highway Patrol.

L-G cont.

C. Failure to Disclose Inconsistencies Between The County General Plan and The Specific Plan.

In Letter 7, the West Placer Municipal Advisory Council questioned the adequacy of the use of buffer zones between existing residences and the Project boundaries. The authors of the EIR answer as follows: “although the specific plan describes various buffering concepts, it may not achieve the level of buffering envisioned by Exhibit 1 of the Community Plan, which emphasizes the need to establish buffers between the Specific Plan area and other uses, and between uses within the Specific Plan area (revised draft, page 4.1-48). This is not an issue that must be resolved in a revised Draft EIR; rather, this is a policy decision that would ultimately be made by the Board of Supervisors, after considering relevant input from all commenters.”

L-H

The above statement indicates that there is a changing project description for the Placer Vineyards Project that is unacceptable. The Community Plan is a part of the General Plan. Therefore, the Specific Plan must be consistent with the Community Plan or at a minimum explain the inconsistencies. The problem with the Draft EIR and the Final EIR is that they do not explain how the Project buffering varies from the General Plan requirements and where the Project buffering will vary from that General Plan requirements. (See pages 4.1-47 and 4.1-48 of the DEIR.) Without information about where the buffering will vary from the General Plan, the EIR is inadequate and it is also impossible for the EIR to include as it does on page 4.1-49 that the impact is less than significant. The EIR is inadequate because it includes a changing project description as to buffering requirements, it does not explain the inconsistencies between the Specific Plan and the General Plan as to buffering. In fact, the EIR does not include any description at all as to where the buffering requirements in the Specific Plan will vary from the County General Plan.

D. Failure to Provide an Adequate Project Description and a Description of Environmental Setting.

As stated in Guidelines Section 15125(c) knowledge of the regional setting is critical to the assessment of environmental impacts. Further Guidelines Section 15125(d) states the EIR shall discuss any inconsistencies between the proposed Project and applicable general plans and regional plans. Guideline Section 15124(a) states: “the precise location and boundaries of the proposed Project shall be shown on a detailed map,

L-I

preferably topographic. The location of the Project shall also appear on a regional map.”

The description of the Project is inadequate because the EIR fails to include a map that shows the relationship of the Project to the City boundaries in the area of influence of the City of Roseville. Further, the EIR does not include a boundary line for the proposed Elverta Specific Plan. The EIR refers to the Project impacts on the City of Roseville in great detail, and also considers the relationship between the Project and the proposed Elverta Specific Plan area in Sacramento County. These areas are not shown on a map with respect to the Project location.

L-I cont.

The EIR fails to include a map which shows the relationship of McClellan Field to the Project site. Since the impact of noise from McClellan planes is an important environmental impact, the EIR should include a map that shows the relation of the Air Force Base to the Specific Plan area. In fact, the State Department of Transportation, a Trustee Agency, specifically stated that the County was required to inform future homeowners and tenants of the proximity of McClellan Airport and the probability of aircraft over flights pursuant to §11010 of the Business and Profession Code and §§1102.6, 1103.4, and 1353 of the Civil Code. (See Letter 14 of the FEIR.) The response in the EIR was that it was Placer County’s opinion that the Placer Vineyards area was not within an “airport influence area.” In order for the public and the decision-makers to assess the merit of the Department of Transportation’s position and the necessity of notification to homeowners and tenants as required by State statutes, the EIR must include enough information in the Project description so that the public and decision-makers can understand the proximity of McClellan Airport to the Placer Vineyards Project. However, this information is absent from the EIR in violation of CEQA.

L-J

E. Improper List of Projects For Cumulative Impacts.

The Placer Vineyards EIR used the list method under §15130(b)1(a) of the Guidelines to determine projects with connotative impacts. Under the list of Projects Method, projects are to be included that have progressed to the stage that CEQA review has been initiated. Such projects are treated as foreseeable probable future projects. Guidelines §15130(b)1(b) includes guidance as to the selection of projects to include on the list and what probable future projects should be included. In *San Franciscans For Reasonable Growth v City and County Of San Francisco* (1984) 151 Cal.App.3d 61, 75, the court made clear that those projects that are under environmental review or have progressed to the stage that environmental review has been initiated are foreseeable projects.

L-K

The EIR for the Placer Vineyards Specific Plan has provided a new twist to the selection of projects for cumulative impacts. In Letter 38 of the Final Environmental

Impact Report, Sutter County indicates that the EIR improperly assumes that 50% of the Sutter County Measure M area will be built out as well as the Riego Road/Highway 99 interchange under the cumulative conditions. The Draft Environmental Impact Report includes the Measure M area approved by voters in November, 2004 as part of the cumulative conditions (page 5-5.) However, no environmental review has begun for the Measure M area and the Measure M area is not part of the Sutter County General Plan or an approved project. The Placer Vineyards Specific Plan assumes that the Measure M area (Sutter Pointe Specific Plan) will mitigate traffic impacts in Sutter County. Sutter County has advised that the Measure M area is not properly included in the cumulative conditions. An EIR may not include projects in the list of cumulative projects that have not initiated environmental review, do not have completed CEQA environmental documents, and are not included in an adjacent agencies general plan. The use of an assumed project in an adjacent jurisdiction to mitigate the Placer Vineyards traffic impacts in that jurisdiction does not comply with the requirements of CEQA. An agency cannot assume unapproved projects will mitigate impacts so that an agency can approve a project without providing needed mitigation.

L-K cont.

F. Failure to Consider Global Warming on the Availability of Water Supplies.

With respect to comments about global warming diminishing the available water supplies for the Project, the Project Environmental Impact Report dismisses these concerns as speculative. However, the effect of global warming on water availability is not speculative and scientific studies show that it is a measurable impact. On September 27, 2006, Governor Schwarzenegger signed Assembly Bill 32, the “California Global Warming Solutions Act of 2006.” It is now a matter of law in the State of California that “global warming poses a serious threat to the economic well-being, public health, natural resources and the environment of California.” (Health and Safety Code §38501(a)). Further, it is a matter of law that “the potential adverse impacts of global warming include the exacerbation of air quality problems [and] a reduction in the quality and supply of water to the state from the Sierra snow pack.” (id.) Contrary to the statements in the FEIR the impacts of global warming are no longer considered speculative in the State of California (see Exhibit D.)

L-L

The impacts of global warming can also be quantified as to the effect of global warming on water supply. In the attached article (Exhibit E) included in the Journal Nature, Dr. T.P. Barnett of the Climate Research Division, Scripps Institute of Oceanography, provides the results of modeling the effect of climate change on the west coast snow pack. The article includes the following information with respect to the snow pack on the west coast:

The most significant impact of a general warming was found

to be a large reduction in mountain snow pack and a substantial shift in stream-flow seasonality, so that by 2050, the spring stream-flow maximum will come about one month earlier in the year. There is not enough reservoir storage capacity over most of the west to handle this shift in maximum runoff and so most of the 'early water' will be passed on to the oceans. These hydrological changes have considerable impact on water availability and are discussed in the literature.

L-L cont.

As pointed out by Dr. Barnett, the models show the reduction in water availability due to the spring runoff occurring one month earlier. These calculations must be considered in determining whether there will be water available for the Placer Vineyards Project. The Placer Vineyards Project cannot rely upon the currently available water in order to assure that water will be available 30 years in the future when build out is complete. The EIR needs to model and consider the impact of global warming. The failure of the Environmental Impact Report to consider the effects of global warming on water availability is a defect in the EIR.

G. The County Has Failed to Impose Feasible Mitigation Measures on the Project In Violation of CEQA.

Public Resources Code §21081 states that “no public agency shall approve or carry out a project for which an Environmental Impact Report has been certified which identifies one or more significant effects on the environment that would occur if the project is approved or carried out unless “the public agency makes one or more of the following findings with respect to each significant effect: (1) changes or alterations have been required and are incorporated into, the project which mitigate or avoid the significant effects on the environment.” This language has been interpreted by all treatises on CEQA to require that an EIR must identify mitigation measures that reduce or eliminate significant impacts that are created by the Project. In the case of cumulative impacts, the standard is different. Fee based programs such as programs that will fund infrastructures, can be used where the impact results from cumulative conditions not solely from the development of a single project. (*Napa Citizens for Honest Government v Napa County Board of Supervisors* (2001) 91 Cal.App.4th 342, 363.) To support a finding that an impact will in fact be mitigated by a fee based program, the mitigation fees must be a component of a reasonable, enforceable mitigation program that is tied to mitigation of the identified impact. (*Anderson First Coalition v City of Anderson* (2005) 130 Cal.App.4th 1173.)

L-M

The *Nollan/Dolan* nexus requirement that is included in the Regulations and Guidelines §15126.4(a)(4) is applicable to fee based programs to mitigate cumulative impacts. The *Nollan/Dolan* nexus requirement is not applicable to project caused

impacts. The FEIR is defective because it fails to distinguish mitigation measures that are subject to the nexus requirement and those that must be provided by the Project.

L-M cont.

As pointed out in Letter 20 from the Sacramento County Department of Transportation the DEIR on page 4.7-44 to 4.7-45 states that: “development of the proposed Specific Plan under existing conditions would cause impacts on the following Sacramento County roadway segments:

a. Level of service on the two to four lane segment of Watt Avenue from the Placer County line to Elverta Road would degrade from LOS A to LOS F.

b. Level of service on the segment of Watt Avenue from Elverta Road to Antelope Road would degrade from LOS D to LOS F.

c. Level of service on the segment of Watt Avenue from Antelope Road to Elkhorn Boulevard would continue to operate at LOS F conditions and the volume to capacity ratio would increase by more than .05.

d. Level of service on the segment of Watt Avenue from Elkhorn Boulevard to Don Julio Boulevard would continue to operate at LOS F condition and the volume to capacity ratio would increase by more than .05.

L-N

Since the above impacts are caused by the Project, and not cumulative impacts, the nexus and fair share requirement is not applicable. Projects are required to mitigate their impacts. The argument that the EIR makes that the impacts will occur outside the County’s jurisdiction and therefore the County has no authority to mitigate the impacts, is without foundation in CEQA. In fact, such an argument cannot be applied to the impacts in Sacramento County since the County has agreed that Placer County and the Project may install and pay for the mitigation measures that are identified as Mitigation Measure 4.7-5b and 4.7-6b (See Letter No. 20 of the FEIR.) Mitigation Measure 4.7-6b mitigates the impacts that the Specific Plan would cause on intersections in Sacramento County. These impacts are identified on page 4.7-47 of the DEIR.

The Project EIR provides different strokes for different folks. In the case of the impact of the Project at three intersections on Natomas Road and Pleasant Grove Road in Sutter County which will go from an existing Level of Service of C, D to an F, the EIR proposes that the Project construct the following improvements in Sutter County: 1) install a signal at the intersection at Reigo Road and Natomas Road, 2) install a signal at

L-O

the intersection of Reigo Road and Pleasant Grove Road, and 3) install a signal at the intersection of Reigo Road and Pleasant Grove Road. However, for some inexplicable reason the Project EIR does not include as mitigation measure improving the intersections and road segments in Sacramento County where the Project causes a significant impact. The EIR fails as an informational document because it does not evaluate, address, and recommend feasible mitigation measures that should be provided by the Project.

L-O cont.

Further, Sutter County asks that the Project maintain the signals that are triggered by the Project. (See Letter 38.) Instead of including this necessary mitigation in the Project EIR, the EIR only states that it will consider whether to include “a temporary component for signal maintenance” in the budget of any funding mechanism that is created by the County. The EIR does not appear to adopt feasible mitigation by merely considering necessary mitigation.

L-P

H. Mitigation Measures for Cumulative Impacts Are Not Complete.

As set forth in Guidelines §15126.4(a)(2), mitigation measures may be fully enforceable through agreements or other legally binding instruments. As previously stated, to support a finding that an impact will in fact be mitigated, the mitigation fees must be a component of a reasonable, enforceable mitigation program that is tied to mitigation of the identified impact. (*Anderson First Coalition v City of Anderson* (2005) 130 Cal.App.4th 1173.)

In this case, the EIR proposes that the Project’s traffic impacts on adjacent jurisdictions – Sutter County, Sacramento County, City of Roseville, and the State of California mainline freeway sections may be mitigated by entering into a fee agreement with these agencies whereby the Project will pay its fair share of fees. The financial plan for the Project makes some estimates of the cost of the improvements and what the Projects fair share might be for the needed improvements. The EIR suggests that in the event that agreements cannot be met to provide for the needed improvements, then the impacts will be significant and unavoidable. Because the impacts may be avoided by such agreements, there exists feasible mitigation. The agreement should be drafted and provided to the public and the decision-makers prior to certification of the EIR. The Final Environmental Impact Report indicates that the County is negotiating with the City of Roseville to pay a fair share as is required by a memorandum of understanding between the two public agencies. However, as a matter of law (and as described in the previous section), the County and the Project are required to mitigate the Project’s significant impacts in the City of Roseville. The Environmental Impact Report does not include mitigation measures for the Project’s impact in the City of Roseville. The County may not legally enter into an agreement with the City of Roseville only to pay a fair share of mitigating impacts that are directly attributable to the Project.

L-Q

The State of California Department of Transportation, a Trustee and Responsible Agency, has asked that an agreement be reached with Placer County to pay a fair share of mitigation for the Project’s impacts on freeway interchanges and mainline sections. This agreement should be provided to the public and the decision-makers prior to adoption of the EIR. The agreement to pay a fair share represents a feasible mitigation plan.

L-R

In the County of Sacramento comments (Letter 20, FEIR), the County asks that in the event that the Project pays a fair share of the cumulative impact on Sacramento County roads, the EIR needs to identify the sources of funds that will pay the rest of the fees so that the mitigation measure may be built. This is a requirement of the *Anderson* case. In each case where the project proposes to pay a fair share of fees toward construction of the improvements, the EIR needs to be expanded to set forth other realistic and potential sources of fees so that the mitigation measure is reasonably certain to be completed. With respect to the FEIRs response to Comment 20c, it is non-responsive.

L-S

I. The EIR Adapts Meaningless Measures to Facilitate Public Transportation.

One of the EIRs primary measures to facilitate public transportation is to dedicate a right-of-way for a BRT line on Watt Avenue. This measure is ineffectual for several reasons. Firstly, as pointed out in Letter 20 (Section H), once the BRT line crosses the Sacramento County line there will be no continued BRT line to the Watt Avenue light rail station. Therefore, the BRT line for such a short distance is a meaningless and ineffective mitigation measure. Moreover, the County and the Project are not required to pay for construction of the BRT lanes. In order for the BRT line to be effective mitigation, the mitigation measure should be expanded so that the Project will construct the BRT lanes in Placer County and will pay its fair share to obtain the rights of way and construct the BRT lanes in Sacramento County.

L-T

J. The EIR Fails to Include Adequate Energy Conservation Measures.

The EIR fails to comply with the requirements of CEQA because it does not include any information regarding the transportation use of energy related to the Project as is required by Appendix F of the CEQA Guidelines. Moreover, the Project includes absolutely no mitigation measures that will reduce the Project’s use of energy. Title 24 compliance is the absolute minimum standard. All buildings must comply with Title 24. CEQA envisions that EIRs will discuss energy conservation beyond the minimum standards included in Title 24. Such energy conservation measures are necessary for the State to meet its goal of reducing greenhouse gases. Almost all energy in the State of California is generated by burning hydrocarbons that generate greenhouse gases. Almost all transportation energy consumed results in the burning of greenhouse gas. The EIR is

L-U

required to address how much transportation energy will be used by the Project, and to provide mitigation measures that will reduce the transportation energy use.

L-U

K. The EIR Fails to Include Adequate Traffic Analysis.

In comment 15hh the FEIR defends use of the circular 212 methodology. The FEIR provides no explanation for its failure to calculate queuing distances for intersections where such queuing distances can be calculated using the modern HCM method. The EIR is inadequate because it fails to use modern methodologies to calculate the traffic impact of the Project on intersections.

L-V

The response to comment 15ii is inadequate. Clearly, using the average delay does not address the impacts of projects on two-way stop sign controlled intersections. If people have to wait 5 to 10 minutes to be able to enter a roadway, that is a significant impact by any measure. Further, it is dangerous because residents of the area are likely to pull out into rapid traffic because of the need to access one of the major roadways. The failure to correctly analyze the delay at two-way stop controlled intersections is a failure to comply with CEQA.

L-W

The EIR fails to assess the environmental impacts throughout the County of the proposed amendment to General Plan Policy 3.A.12. This amendment will give the Board of Supervisors an effective veto power over traffic improvements and will dilute the standards that are included in the General Plan. Such a modification of the General Plan may have broad implications for traffic congestion throughout the County. The EIR includes no discussion of these potential impacts.

L-X

As set forth in Response 15mm the project mitigation measures do not include any funding for transit services, facilities and a transit system. The failure to include such funding as part of the Project mitigation measures is a violation of CEQA. CEQA requires a project to include feasible energy mitigation measures, including public transit.

L-Y

The EIR is non-responsive to comment 15ss. The degradation of level of service on Walergo and PFE Roads is a significant impact of the Project that is not addressed. The response included in the FEIR is non-responsive.

L-Z

In response to comment 46g, the County takes the position that the Placer Vineyards Specific Plan is not subject to the Highway 65 Joint Powers Authority. The EIR provides no information as to why the Specific Plan would not be subject to the Joint Powers Authority. This information must be provided.

L-AA

In response to comment 46j, which asks for at least 2 grade separated bicycle crossings on Baseline Road, the County states in the EIR that it will provide only one

L-BB

such grade separated crossing. There is no explanation as to why one grade separated crossing will be safe considering the very substantial size of this Project. It would appear that because there is only one grade separated crossing, many bicyclists will be crossing at grade creating a safety hazard. This hazard should be evaluated in the EIR and a proper determination of the number and places of grade separated crossings should be made.

L-BB cont.

L. The EIR Does Not Adequately Address Protection of Endangered Species and Habitat Mitigation.

The comments of Sierra Club, Friends of Swanson’s Hawk, Defenders of Wildlife and Sierra Foothills Audubon Society (Letter 24), the letter of Friends of Swanson’s Hawk, (Letter 25) and the letter of Sandra Morey of the Department of Fish and Game, (Letter 27), all state that the proposed habitat mitigation is inadequate. Letter 27 from the Department of Fish and Game is particularly important because the Department of Fish and Game is both a responsible and trustee agency. As stated in the Department of Fish and Game letter, the Project as currently designed does not comply with the California Endangered Species Act and the Federal Endangered Species Act. The Project takes a very substantial portion of critical habitat for vernal pool species. In compliance with US Fish and Wildlife Service criteria for vernal pool conservation in the area of the Project, the Project should achieve 85% retention of vernal pool resources. In response to this requirement, the authors of the EIR set forth a proposed alternative plan which provides the developed area in the middle of the proposed Placer Vineyard Specific Plan area. This alternative shows the need for a map that sets forth the location of the Placer Vineyards Specific Plan with respect to the City of Roseville and development in Sacramento County. The EIR claims that the Placer Vineyards is in fact a contiguous development with the Elverta Specific Plan area. Without a proper map within the EIR it is impossible for the public and decision-makers to determine whether it is possible to meet the 85% avoidance by developing an area contiguous within the City of Roseville or the Elverta Specific Plan area. To these commenters, it appears that the southeastern area of the Placer Vineyards Specific Plan could be developed adjacent to urban development in the City of Roseville and achieve the 85% avoidance. It is remarkable that in response to comment 27p the EIR considers the alternative for avoiding the vernal pools as a “leap frog”. The entire Placer Vineyard Specific Plan is a leap frog development. There is no development in Placer County that is adjacent to the Placer Vineyards Specific Plan area. The EIR for the Placer Vineyards Project is inadequate because it fails to consider a high-density alternative (for example an alternative that includes high-rise tower development) on a much smaller footprint that protects 85% of the vernal pools on the site.

L-CC

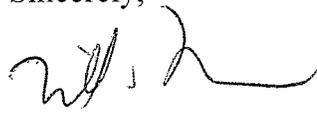
The Final Environmental Impact Report includes no scientifically supportable response to the Department of Fish and Game comments that the creation of vernal pools does not work. The Department of Fish and Game as well as Letters 24 and 25 address

L-DD

the failure of the EIR to provide adequate mitigation measures for the impacts on vernal pools and other species. The Final Environmental Impact Report fails to establish that the proposed broken-up mitigation areas will be sufficient to mitigate the Project's impact on critical wetlands, vernal pool habitat, and grassland habitat. The Final Environmental Impact Report fails to adequately address the current concerns of the Department of Fish and Game about the lack of adequate mitigation for the Project's impacts.

L-DD cont.

Sincerely,



WILLIAM D. KOPPER

WDK:jp

REVIEWS

Potential impacts of a warming climate on water availability in snow-dominated regions

T. P. Barnett¹, J. C. Adam² & D. P. Lettenmaier³

All currently available climate models predict a near-surface warming trend under the influence of rising levels of greenhouse gases in the atmosphere. In addition to the direct effects on climate—for example, on the frequency of heatwaves—this increase in surface temperatures has important consequences for the hydrological cycle, particularly in regions where water supply is currently dominated by melting snow or ice. In a warmer world, less winter precipitation falls as snow and the melting of winter snow occurs earlier in spring. Even without any changes in precipitation intensity, both of these effects lead to a shift in peak river runoff to winter and early spring, away from summer and autumn when demand is highest. Where storage capacities are not sufficient, much of the winter runoff will immediately be lost to the oceans. With more than one-sixth of the Earth's population relying on glaciers and seasonal snow packs for their water supply, the consequences of these hydrological changes for future water availability—predicted with high confidence and already diagnosed in some regions—are likely to be severe.

Water is essential to human sustenance. Well over half of the world's potable water supply is extracted from rivers, either directly or from reservoirs. The discharge of these rivers is sensitive to long-term changes in both precipitation and temperature, particularly in the snowmelt-dominated parts of the world. Changes in the amount of precipitation tend to affect the volume of runoff and particularly the maximum snow accumulation, which usually occurs near the end of the winter at the onset of the melt season. On the other hand, temperature changes mostly affect the timing of runoff. Increasing temperatures lead to earlier runoff in the spring or winter, and reduced flows in summer and autumn—at least in the absence of changes in precipitation.

In general, the direction and (to a lesser extent) the magnitude of surface temperature changes are much more consistent among climate models than are precipitation changes¹. Near-surface air-temperature predictions from existing global climate models that are forced with anthropogenic increases in atmospheric greenhouse gas concentrations imply a high degree of confidence that future changes to the seasonality in water supply will occur in snowmelt-dominated regions. Even for models with temperature sensitivities near the lower end of the predicted range, impacts on snowmelt-dominated regional water resources are substantial². Indeed, such changes are already obvious in the observational records of key components of the hydrological cycle, such as snow pack in the western USA^{3–5}. Taken together, the predictions and observations portend important issues for the water resources of a substantial fraction of the world's population.

It is generally thought that increasing greenhouse gases will cause the global hydrological cycle to intensify¹, with benefits for water availability^{1,6}, although a possible exacerbation of hydrological extremes may counteract the benefits to some degree. However, in regions where the land surface hydrology is dominated by winter

snow accumulation and spring melt, the performance of water management systems such as reservoirs, designed on the basis of the timing of runoff, is much more strongly related to temperature than to precipitation changes. Even though there is relatively little agreement among the global models as to the magnitude (and even direction of) precipitation changes regionally^{7–10}, there is no indication for a seasonal shift of precipitation to the summer and autumn. The projected changes in temperature therefore strongly imply future changes of seasonal runoff patterns in snowmelt-dominated regions.

The hydrological cycle at the land surface includes the processes of snow/ice accumulation and melting as well as the impact these processes will have on regional changes in evaporative demand. In a warmer climate, snow will melt earlier in the year than it did before and in some places this has already happened^{3,11,12}. Taken together, these impacts mean less snow accumulation in the winter and an earlier peak runoff in the spring.

On a global scale, the largest changes in the hydrological cycle due to warming are predicted for the snow-dominated basins of mid- to higher latitudes, because adding or removing snow cover fundamentally changes the snow pack's ability to act as a reservoir for water storage¹³. Studies in various regions of the globe indicate that the stream-flow regime in snowmelt-dominated river basins is most sensitive to wintertime increases in temperature^{12,13}. Because of this, and also because there is little certainty in precipitation predictions^{7–10}, we focus here on the sensitivity of water resources in snowmelt-dominated regimes to temperature.

All models show warming with increasing greenhouse gases, so we can begin to say with some certainty how some critical components of the hydrological cycle will respond in the future.

Global distribution of snowmelt-dominated runoff

We used a spatially distributed macroscale hydrology model¹⁴ to identify the regions of the globe where snowmelt plays a dominant

¹Climate Research Division, Scripps Institution of Oceanography, La Jolla, California 92093, USA. ²Department of Civil and Environmental Engineering, ³Department of Civil and Environmental Engineering, University of Washington, Seattle, Washington 98195-2700, USA.

role in the seasonal patterns of stream-flow. The model was run over all global land areas (excluding Antarctica and Greenland) at a spatial resolution of 0.5° latitude/longitude for a twenty-year (1980–1999) period. We approximated the importance of snow to annual runoff by using the ratio R of the accumulated annual snowfall to annual runoff (Fig. 1, colour scale). This allowed us to determine whether or not runoff for each grid cell is snowmelt-dominated by using the criterion that $R > 0.5$ for these cells.

We compared, for each of the world's major river basins, the simulated annual runoff to the estimated reservoir storage capacity^{15,16} in order to determine cases where reservoir storage capacity is adequate to buffer large seasonal stream-flow shifts (and hence exclude basins that, in spite of being snowmelt-dominated, would be insensitive to shifts in runoff timing). Watersheds within the snowmelt-dominated domain that meet these criteria include the Colorado River, the Churchill River and the Grand River (all in North America), and the Angara River (a tributary of the Yenisei River) in Asia. The red outline in Fig. 1 shows the domain where runoff is snowmelt-dominated minus the four basins identified as having large storage capacities relative to runoff. Within this domain, water resources are arguably susceptible to warming-induced shifts in stream-flow seasonality.

In general, the snowmelt-dominated regions occupy parts of the globe that are at latitudes greater than $\sim 45^\circ$ (North and South), with some exceptions. (1) Mountainous regions (except those nearest the Equator) are generally snowmelt-dominated (the inset of Fig. 1 shows the regions of the world that are topographically complex according to a criterion based on average slope¹⁷). (2) Some regions poleward of 45° North that are warmed by oceans do not experience enough snowfall to be snowmelt-dominated (for example, parts of Europe and the coastal regions of the USA Pacific Northwest and British Columbia). (3) Cold dry regions that experience little wintertime precipitation also do not receive enough snowfall to be snowmelt-dominated (for example, northeastern China).

The domain of influence within the red line of Fig. 1 is almost certainly underestimated, because the criterion we used is applied on a grid cell by grid cell basis, and does not account for areas where water availability is predominantly influenced by snowmelt that is generated upstream. Therefore, we extended the domain of influence

into sub-basins where the annual runoff originating in the snowmelt-dominated cells accounts for at least 50% of the runoff for the entire sub-basin (black lines in Fig. 1). These regions include parts of northern China, northwestern India, areas south of the Hindu Kush, sub-basins downstream of the southern Andes, north-central USA, and some coastal areas of western North America and Europe. According to a year 2000 population map¹⁸, approximately one-sixth of the world's population lives within this combined snowmelt-dominated, low-reservoir-storage domain. The population affected by warming-induced shifts in water availability is most probably greater than this estimate because we do not account for populations that derive their water resources from outside the basins in which they dwell. Note that the combined region in Fig. 1 encompasses much of the industrialized world, accounting for roughly one-quarter of the global gross domestic product.

Evapotranspiration in a warming climate

Our discussion so far has focused on the direct effects of warming on stream-flow seasonality in snowmelt-dominated regions. Warming-induced changes to evapotranspiration may also affect regional water availability. Unfortunately, there is little agreement on the direction and magnitude of historical, let alone one predicted, evapotranspiration trends. Observations from various countries in the Northern Hemisphere show that pan evaporation has been steadily decreasing for the past fifty years, contrary to the expectation that warming would cause increased evaporation^{19–22}. Two proposals exist to explain this paradox.

First, decreasing pan evaporation trends may be indicative of increasing actual (as opposed to potential) evapotranspiration in moisture-limited regions because increased land surface evaporation alters the humidity regime surrounding the pan, causing the air over the pan to be cooler and more humid^{23–26}. Second, consistent declines of pan evaporation, diurnal temperature range, and global solar irradiance suggest that actual evapotranspiration is also declining because of increased cloudiness and concentrations of atmospheric aerosols that systematically reduce surface energy availability for evaporation^{19,27–29}. Changes in wind speed or in the attenuation of wind at the surface due to changes in vegetation at observing sites

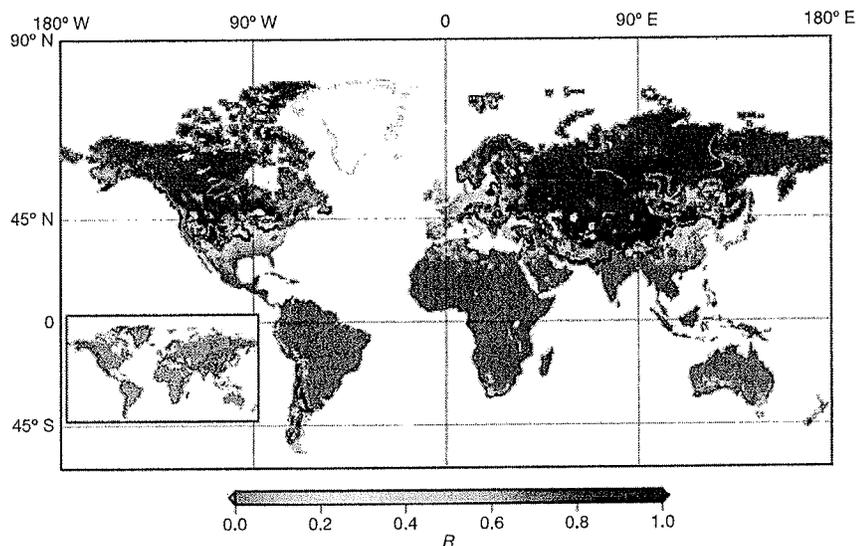


Figure 1 | Accumulated annual snowfall divided by annual runoff over the global land regions. The value of this dimensionless ratio lies between 0 and 1 and is given by the colour scale, R . The red lines indicate the regions where streamflow is snowmelt-dominated, and where there is not adequate reservoir storage capacity to buffer shifts in the seasonal hydrograph. The

black lines indicate additional areas where water availability is predominantly influenced by snowmelt generated upstream (but runoff generated within these areas is not snowmelt-dominated). The inset shows regions of the globe that have complex topography using the criterion of ref. 17.

may also play some role in apparent downward trends in pan evaporation data³⁰.

Ohmura and Wild²⁸ discuss some complications that impede our understanding of global trends in evapotranspiration. In snowmelt-dominated regions, though, these uncertainties are arguably of reduced importance, because changes in the timing of snowmelt runoff induce a negative feedback on changes in evapotranspiration. Earlier melt results in increased soil moisture (and so also the water available for evapotranspiration) earlier in the season, a time when potential evaporation (dominated by net radiation) is low. Later in the year, when potential evaporation is higher, the shift in snowmelt timing reduces soil moisture, and hence evaporative resistance is increased, again reducing the effect of evaporation changes. Therefore, although changes in evapotranspiration are critical to runoff production in most hydrological regimes, their effect (and hence the effects of the above-noted uncertainties) are attenuated in the snowmelt-dominated regions of the globe.

Impacts on regional water supplies

We examine three case studies from different parts of the world that are in the snowmelt-dominated domain. These case studies were selected to help provide an appreciation for the magnitude of the potential regional water problems that may be associated with shifts in the seasonality of runoff associated with climate change.

Western USA. The Accelerated Climate Prediction Initiative (ACPI)² demonstration project was launched in 2000 to investigate the impacts of greenhouse warming on water supplies in the western United States³¹. The methods and detailed results are included in 16 papers in a special volume of the journal *Climatic Change*². The most obvious signature of climate change in the simulations generated by this project was a general warming over the western USA: a warming that by the middle of the 21st century was projected to be 0.8–1.7 °C greater than present values. This warming is projected to be accompanied by little or no change in precipitation according to the climate change scenarios generated for the project by the NCAR-DOE Parallel Climate Model². In the western USA, much of the annual precipitation falls as snow in the mountains during the winter, and then melts during the spring and summer: that is, it is within the red lines shown in Fig. 1.

The most significant impact of a general warming was found to be a large reduction in mountain snow pack and a substantial shift in stream-flow seasonality, so that by 2050, the spring stream-flow maximum will come about one month earlier in the year. There is not enough reservoir storage capacity over most of the West to handle this shift in maximum runoff and so most of the 'early water' will be passed on to the oceans. These hydrological changes have considerable impacts on water availability and are discussed in the literature². For example, in the Columbia River system, less winter snowfall and earlier melting will force residents and industries to face, by 2050 or before, a choice of water releases for summer and autumn hydroelectric power or spring and summer releases for salmon runs. The ACPI research shows that, with the predicted climate change, the river cannot be managed to accommodate both, unless we are ready to accept substantial (10–20%) reductions of hydropower generation or serious harm to the federally protected salmon population of the region (Fig. 2)³².

The Rhine River in Europe. Climate-change simulations project a warming in the Rhine River basin of 1.0–2.4 °C over present values by the middle of the century¹. Hydrological simulations suggest that this warming will shift the Rhine River basin from a combined rainfall and snowmelt regime to a more rainfall-dominated regime, resulting in an increase in winter discharge, a decrease in summer discharge, increases in the frequency and height of peak flows, and longer and more frequent periods of low flow during the summer³³. Socio-economic implications include: a reduction in water availability for industry, agriculture and domestic use during the season of peak demand (which is further stressed by an increase in summertime

demand due to higher temperatures); an increase in the number of low-flow days during which ships cannot be fully loaded on major transport routes (causing an increase in transportation costs); a decrease in the level of flood protection (given no additional implementation of flood defence measures); a decrease in annual hydropower generation in some parts of the basin; and a loss in revenue due to a shortened ski season³³.

Canadian prairies. Climate studies for the Canadian prairies generally agree that a doubling of atmospheric CO₂ will result in an increase in surface air temperature (possibly as much as 8 °C during winter), a decrease in snow pack, an earlier snowmelt, and a decrease in summer soil moisture³⁴. These effects and a longer period of low flows during summer and autumn could lead to an increase in the frequency and severity of droughts³⁵. Historically, nearly 50% of the water use over the Canadian prairies has been for agriculture through irrigation, and this demand has been met primarily with surface water, unlike the prairies of the USA, which rely also on groundwater^{34,36}. For this reason and because stream-flows are limited and extremely variable from year to year, agriculture in the Canadian prairies is very sensitive to drought^{34,36}. Although global climate models do not predict great changes in precipitation for Canada, an earlier spring runoff peak will probably cause agriculture in the Canadian prairies to become more at risk in a warming climate³⁷. Furthermore, increased water demand for irrigation will also lead to heightened competition with other water needs, including stream-flow requirements to maintain aquatic habitat, and the needs of water users downstream of the Alberta–Saskatchewan border (under a 1969 agreement, Alberta must allow 50% of stream-flow to pass downstream of the border)³⁶.

Summary of regional impacts. The studies summarized above show that current demands for water in many parts of the world will not be met under plausible future climate conditions, much less the demands of a larger population and a larger economy.

The physics behind this statement is temperature-driven, not precipitation-driven, and this makes the conclusions robust because all current models predict a warmer future world. The other key factor affecting water availability is the lack of enough reservoir storage to manage a shift in the seasonal cycle of runoff. Current information about the climate-related water challenges facing much of the world, although by no means perfect, is sufficiently robust that major future problem areas can now be defined. The matter takes on a greater urgency because the model-predicted signals are already being observed.

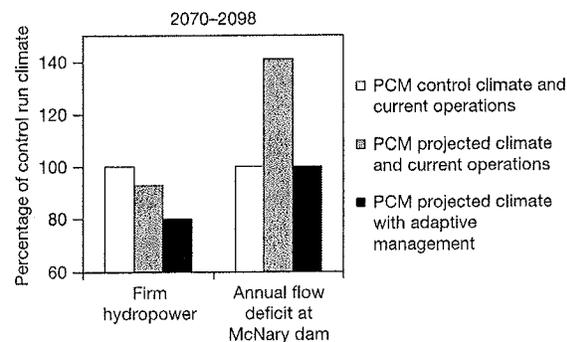


Figure 2 | Trade-off between firm hydropower and stream-flow requirements. The effect of Parallel Climate Model (PCM) climate change projections for the period of 2070 to 2098 on Columbia River Basin reservoir system reliabilities, as compared to the PCM control climate and operations scenario. Implementing adaptive management reduces the annual environmental flow deficit at McNary Dam in southeastern Washington, USA (benefiting salmon), but decreases firm (reliable) hydropower. Figure created by A. Hamlet using results from ref. 32.

Will changes in precipitation patterns offset the problems associated with warming? The most likely answer is 'no'. If less rain falls over a region, water availability will decrease. If more rain falls and the reservoir storage capacity is much less than the annual runoff, then the water will be lost downstream (to the ocean in many cases)—particularly in regions, like the western USA, where precipitation is mainly in winter and the effective storage capacity of winter snow pack will be lost. The changes in precipitation required to ameliorate the problem would have to come through a shift in the seasonal cycle of rainfall towards the dry season, a feature that is not usually exhibited by anthropogenically forced climate models.

Two examples of impacts on glaciers. The results for the regional water resources case studies discussed above and the simple physics behind them seem likely to be qualitatively reproduced in virtually all regions where snowmelt is important to local water availability⁶ and where annual runoff exceeds storage capabilities. Our results in the western USA suggest that even more serious problems may occur in regions that depend heavily on glacial meltwater for their main dry-season water supply. This is because, once the glaciers have melted in a warmer world, there will be no replacement for the water they now provide, in contrast to the present snow-pack-dependent water supply that is renewed seasonally. In this case, the natural storage of fossil water in the glaciers has even more importance than seasonal storage in just the snow pack. It is well documented that glaciers are in retreat over most (but not all) of the world^{1,38,39}, so the threat here seems both real and immediate—a situation also well documented in the world's press over the past several years.

Himalaya–Hindu Kush region. Perhaps the most critical region in which vanishing glaciers will negatively affect water supply in the next few decades will be China and parts of Asia, including India (together forming the Himalaya–Hindu Kush (HKH) region), because of the region's huge population (about 50–60% of the world's population). The ice mass over this mountainous region is the third-largest on earth, after the Arctic/Greenland and Antarctic regions. The hydrological cycle of the region is complicated by the Asian monsoon, but there is little doubt that melting glaciers provide a key source of water for the region in the summer months; as much as 70% of the summer flow in the Ganges and 50–60% of the flow in other major rivers^{40,41,42}. In China, 23% of the population lives in the western regions, where glacial melt provides the principal dry season water source⁴³.

There is little doubt that the glaciers of the HKH region are melting and that the melting is accompanied by a long-term increase of near-surface air temperature (ref. 44 and Figs 2.9 and 2.10 in ref. 1), the same level of warming we saw impacting the western USA. After 25 years of study, the China Glacier Inventory was recently released⁴⁵. It showed substantial melting of virtually all glaciers, with one of the most marked retreats in the last 13 years (750 m) of the glacier that acts as one of the major sources of the Yangtze River, the largest river in China. In total, it is estimated that the entire HKH ice mass has decreased in the last two decades. Furthermore, the rate of melting seems to be accelerating⁴⁶.

The few analytical studies that exist for the region suggest both a regression of the maximum spring stream-flow period in the annual cycle by about 30 days (ref. 47) and an increase in glacier melt runoff by 33–38% (ref. 48). These numbers seem consistent with what is being observed and bear striking similarities to the stream-flow results from the western USA. The huge inconsistency, however, occurs in the impacts on local water supplies. In the western USA, model-predicted impacts are already being seen in the hydrological cycle. The models suggest that the impacts will appear as a long-term trend in snow amount and runoff. But in the HKH region, there may (for the next several decades) appear to be normal, even increased, amounts of available melt water to satisfy dry season needs. The shortage, when it comes, will likely arrive much more abruptly in time; with water systems going from plenty to want in perhaps a few decades or less.

It appears that some areas of the most populated region on Earth are likely to 'run out of water' during the dry season if the current warming and glacial melting trends continue for several more decades. This may be enough time for long-term planning to see just how the region can cope with this problem. Unfortunately, the situation here is that when the glaciers melt and their fossil water is used or lost, their contribution to the water supply of the region will cease.

South American Andes. A large fraction of the population living west of the South American Andes relies on the glacial melt from those mountains to feed the area's rivers to supply water and hydro-power. Without the glacier-supplied river water, the people and economies of the region would have to undergo tremendous adjustments^{49,50}. The physics governing the Andean glaciers are more complicated than simple temperature forcing. Depending on the latitude and on which side of the Andes we consider, the glaciers' mass balance can be controlled by different factors^{51,52}. Although air temperature changes are still important in most areas, other processes (such as moisture flux and precipitation) dominate in some regions. This makes the prediction of what might happen in the Andes much more difficult. Although all greenhouse models predict warming air temperatures, they can disagree on predicted changes in rainfall, moisture flux, and so on.

In spite of this complexity, melting of the glaciers is well documented for the Andes^{53,54}. In Peru alone, the glacier-covered area has been reduced by 25% in the last three decades (as reported at the Conference on Mass Balance of Andes Glaciers, Huaraz, Peru, 6–9 July 2004; http://www.inrena.gob.pe/serusu/serusu_ppoint.htm). At current rates, some of the glaciers may disappear in a few decades, if not sooner. The high-frequency surges and retreats and the uneven spatial distribution of the general glacier retreat makes understanding and predicting the behaviour of glaciers in this area uncertain.

The melting started some decades ago. The International Panel for Climate Change (IPCC) shows a long-term trend in increasing air temperature in the region (ref. 38 and Figs 2.9 and 2.10 in ref. 1). Higher-resolution, more-detailed analysis of many stations in the region show a similar temperature increase, one that seems to be increasing^{55,56}. Consider the case of Quelccaya in the Andes (Fig. 3). When the summit core was originally drilled in 1976, it contained clear annual cycles in its layering that extended back in time for approximately 1,500 years (ref. 38). When it was re-drilled in 1991, the annual layers in the upper 20 m of the core had been obliterated by percolation of meltwater. Together, these two results show that melting at the summit had occurred, a condition that had not previously occurred in the last 1,500 years. The probability seems high that the current glacier melting in the Andes will continue, just as it will in Asia (and other regions of the world). It is fossil water that has been lost and will not be replaced anytime soon, especially not in the context of anthropogenically induced greenhouse warming. The results and projections suggest that current dry-season water resources will be heavily depleted once the glaciers have disappeared.

Some uncertainties in estimating impacts. All of the future climate predictions have uncertainties. We touch on only a few of the more important ones below, with the goal of seeing whether they might overcome the warming signal and make the conclusions above moot. We do not, however, attempt here a complete discussion of all the uncertainties that attend climate models.

In some cases, the uncertainties have to do with the models' inability to reproduce today's climate, casting doubt on future climate predictions. Predictions using regional, high-spatial-resolution models, of the type needed for regional water studies, are only now starting to come into their own in the greenhouse arena, but they carry a whole set of problems in addition to those associated with the coupled atmosphere–ocean general circulation models (CGCMs). For instance, they often have different physics from the CGCMs—there are scale-dependence issues, and new levels of parameterizations are required. However, such regional models will

be required for good quantitative estimates of potential future water problems. Such high-resolution, regional hydrological studies have not yet been undertaken for either the HKH region or South America.

One of the greatest uncertainties in future prediction has to do with how the models are forced. Stated more directly, what are the implications of omitting forcings that we strongly suspect (or know) are important but cannot yet reliably be included in the model physics? Of these, the most important is thought to be the incomplete inclusion of aerosols and their impacts, especially on clouds. Excellent discussions of the current state of the aerosol problem may be found in refs 57 and 58, and ref. 59 shows the sensitivity of climate model predictions to uncertainties in indirect aerosol forcing.

The key question for this paper is: Can the aerosol/cloud problem overwhelm the direct greenhouse-gas-induced temperature forcing that affects the regional hydrological cycle, giving net cooling as opposed to warming? We consider below some of these uncertainties qualitatively to see how they might impact the results discussed above.

Aerosols and clouds. Aerosols are thought to cool the planet's surface through increased scattering and cloud cover and re-radiation of solar energy to space. The representation of clouds in CGCMs carries a large uncertainty all by itself, but the joint interaction of clouds and

aerosols represents one of the major challenges to climate modellers today. Virtually all climate models have some representation of direct aerosol effects (that is, reflectivity of the particles) in them, but none have yet fully included the indirect effects (for example, the effect of aerosols on cloud distributions via their role as cloud condensation nuclei, or other effects discussed below). A preliminary study⁶⁰ suggests that indirect aerosol impacts on clouds are important but, even given the uncertainty in estimating these impacts, this mechanism is not strong enough to counter greenhouse warming effects.

Recent observational studies^{58,60} show that locally, over India, the total aerosol effect (direct plus indirect) has been associated with a surface cooling of 0.3 °C over the last three decades. This is close to the warming expected from greenhouse gases. However, the aerosols are observed to be associated with warming in the lower to middle troposphere—the regions inhabited by the glacier fields. In this case the aerosols may be enhancing the direct temperature forcing by contributing to the melting of the higher glaciers of the HKH region. **Snowfall amounts.** Aerosols are found to alter cloud physics in a manner that reduces precipitation downstream from the pollution source^{61,62}. This also reduces the snow particle rime growth, resulting in lower snow water equivalent, a result obtained from direct field measurements^{62–64}. Properly represented aerosols in climate models will apparently also work together with increasing temperature to reduce snow/ice in regions where heavy air pollution exists (for example, China, the western USA and Europe).

Snow/ice melt rates. A common aerosol found in the atmosphere over many regions of the earth is black carbon. This substance absorbs sunlight. It is scrubbed from the atmosphere by precipitation and, because it is ubiquitous, is likely to end up in the snow and ice fields of the planet. There it could decrease the surface albedo, causing the snow/ice to absorb solar energy more readily and thereby melt sooner. Measurements of black carbon amounts and its budgets are only now being made. By whatever means, darkening the surface of a snow/ice field will enhance melt rates. Again, it seems that proper inclusion of aerosols in global climate models will increase early melting of snow packs and, especially, glaciers and sea ice⁶⁵.

The bottom line here is that other important, but poorly represented, atmospheric physical and chemical processes seem unlikely to neutralize or reverse greenhouse warming. This is true even if we take the lower end of the estimated warming by the IPCC (1.4 °C) to be the net thermal forcing on the snow/glacier packs. Our ACPI study² showed that such an increase, coupled with inadequate containment, is all it takes to invoke the water storage problems noted above.

Overview of expected regional water impacts

In this review, we suggest that the simplest of changes associated with global warming (a modest increase in near-surface air temperature) will be responsible for alterations of the hydrological cycle in snowmelt-dominated regions via seasonal shifts in stream-flow. Without adequate water storage capacity, these changes will lead to regional water shortages. The model-predicted changes are already being seen in the observed data. If maintained at current levels, these changes will lead to a serious reduction in dry-season water availability in many regions of the Earth within the next few decades.

The physical principles found to apply in snowmelt-dominated regions (for example, the western USA) are one of the probable causes of the observed early snowmelt and, more importantly, deglaciation that is now occurring in most mountainous regions of the world. The serious situations developing in the HKH region and South America have been briefly presented. It is clear that both regions, as well as others not mentioned, are headed for a water-supply crisis. Better water management techniques can help, but cannot solve the problem without significant changes to agriculture, industry and lifestyle. Detailed studies of the future impact of global warming on water resources in these regions are long overdue.

a 1978



b 2002



Figure 3 | Changes in the Qori Kalis Glacier, Quelccaya Ice Cap, Peru, between 1978 (a) and 2002 (b). Glacier retreat during this time was 1,100 m (L. Thompson, personal communication). Photographs courtesy of L. Thompson.

We have discussed briefly here some of the major uncertainties in the models, in particular the impacts of aerosols and clouds, as well as their suspected impacts on the aspects of the hydrological cycle having to do with snow and ice. In all the cases considered, current scientific evidence suggests that these processes, which are currently either not included, or are marginally included, in IPCC scenario runs, will act to increase the impact of mere temperature increase on the snow and ice fields of the planet.

Time is running out for nations in the sensitive areas we have evaluated, particularly those whose water supplies are dependent on mid-latitude glaciers, to understand just what the future might hold for them. How much they can do is uncertain given the several decades of warming that will occur as a result of past actions, even if greenhouse emissions were halted at today's levels⁶⁶, but perhaps the initiation of strategic planning will be motivated by the prospect (and what is rapidly becoming the reality) of diminished water supplies.

1. The International Panel for Climate Change (IPCC) *Climate Change 2001: The Scientific Basis* (eds Houghton, J. T. et al.) (Cambridge Univ. Press, Cambridge, UK, 2001).
2. Barnett, T. P. & Pennell, W. (eds) Impact of global warming on Western US water supplies. *Clim. Change* 62 (Spec. Vol.) (2004).
3. Mote, P. W., Hamlet, A. F., Clark, M. P. & Lettenmaier, D. P. Declining mountain snow pack in western North America. *Bull. Am. Met. Soc.* 86, 39–49 (2005).
4. Dettinger, M. D., Cayan, D. R., Meyer, M. K. & Jeton, A. E. Simulated hydrologic responses to climate variations and change in the Merced, Carson, and American River Basins, Sierra Nevada, California, 1900–2099. *Clim. Change* 62, 283–317 (2004).
5. Hamlet, A. F., Mote, P. W., Clark, M. P. & Lettenmaier, D. P. Effects of temperature and precipitation variability on snow pack trends in the western U.S. *J. Clim.* (in the press).
6. Douville, H. et al. Sensitivity of the hydrological cycle in increasing amounts of greenhouse gases and aerosols. *Clim. Dyn.* 20, 45–68 (2002).
7. Giorgi, F., Whetton, P. H. & Jones, R. G. Emerging patterns of simulated regional climatic changes for the 21st century due to anthropogenic forcings. *Geophys. Res. Lett.* 28, 3317–3321 (2001).
8. Giorgi, F. & Bi, X. Regional changes in surface climate interannual variability for the 21st century from ensembles of global model simulations. *Geophys. Res. Lett.* 32, L13701, doi:10.1029/2005GL023002 (2005).
9. Ruiz-Barradas, A. & Nigam, S. IPCC's 20th century climate simulations: Varied representations of North American hydroclimate variability. *J. Clim.* (submitted).
10. Dai, A. Precipitation characteristics of eighteen coupled models. *J. Clim.* (submitted).
11. Cayan, D. R., Kammerdiener, S. A., Dettinger, M. D., Caprio, J. M. & Peterson, D. H. Changes in the onset of Spring in the Western United States. *Bull. Am. Met. Soc.* 82, 399–415 (2001).
12. Stewart, I., Cayan, D. C. & Dettinger, M. D. Changes in snowmelt runoff timing in Western North America under a 'business as usual' climate change scenario. *Clim. Change* 62, 217–232 (2004).
13. Nijssen, B., O'Donnell, G. M., Hamlet, A. F. & Lettenmaier, D. P. Hydrologic vulnerability of global rivers to climate change. *Clim. Change* 50, 143–175 (2001).
14. Liang, X., Lettenmaier, D. P., Wood, E. F. & Burges, S. J. A simple hydrologically based model of land surface water and energy fluxes for general circulation models. *J. Geophys. Res.* 99(D17), 14415–14428 (1994).
15. Vörösmarty, C. J. K. et al. The storage and aging of continental runoff in large reservoir systems of the world. *Ambio* 26, 210–219 (1997).
16. Vörösmarty, C. J. et al. Anthropogenic sediment retention: Major global impact from registered river impoundments. *Glob. Planet. Change* 39, 169–190 (2003).
17. Adam, J. C., Clark, E. A., Lettenmaier, D. P. & Wood, E. F. Correction of global precipitation products for orographic effects. *J. Clim.* (in the press).
18. Center for International Earth Science Information Network (CIESIN). *Socioeconomic Data and Applications Center (SEDAC): Gridded Population of the World, Version 3* (Columbia University and Centro Internacional de Agricultura Tropical, Palisades, New York, 2004); available at (<http://beta.sedac.ciesin.columbia.edu/gpw>).
19. Peterson, T. C., Golubev, V. S. & Groisman, P. V. Evaporation losing its strength. *Nature* 377, 687–688 (1995).
20. Chattopadhyay, N. & Hulme, M. Evaporation and potential evapotranspiration in India under conditions of recent and future climate change. *Agricult. Forest Meteorol.* 87, 55–73 (1997).
21. Thomas, A. Spatial and temporal characteristics of potential evapotranspiration trends over China. *Int. J. Clim.* 20, 381–396 (2000).
22. Golubev, V. S. et al. Evaporation changes over the contiguous United States and the former USSR: a reassessment. *Geophys. Res. Lett.* 28(13), 2665–2668 (2001).
23. Brutsaert, W. & Parlange, M. Hydrologic cycle explains the evaporation paradox. *Nature* 396, 30 (1998).
24. Lawrimore, J. H. & Peterson, T. C. Pan evaporation trends in dry and humid regions of the United States. *J. Hydrometeorol.* 1, 543–546 (2000).
25. Hobbins, M. T. & Ramirez, J. A. Trends in pan evaporation and actual evapotranspiration across the conterminous U.S.: paradoxical or complementary? *Geophys. Res. Lett.* 31, doi:10.1029/2004GL019846 (2004).
26. Walter, M. T., Wilks, D. S., Parlange, J.-Y. & Schneider, R. L. Increasing evapotranspiration from the conterminous United States. *J. Hydrometeorol.* 5, 405–408 (2004).
27. Roderick, M. L. & Farquhar, G. D. The cause of decreased pan evaporation over the past 50 years. *Science* 298, 1410–1411 (2002).
28. Ohmura, A. & Wild, M. Is the hydrological cycle accelerating? *Science* 298, 1345–1346 (2002).
29. Wild, M., Ohmura, A. & Gilgen, H. On the consistency of trends in radiation and temperature records and implications for the global hydrological cycle. *Geophys. Res. Lett.* 31, doi:10.1029/2003GL019188 (2004).
30. International Panel for Climate Change. *Climate Change 2001: Impacts, Adaptation and Vulnerability* (eds McCarthy, J. J. et al.) (Cambridge Univ. Press, Cambridge, UK, 2001).
31. Barnett, T. P. et al. The effects of climate change on water resources in the West: Introduction and overview. *Clim. Change* 62, 1–11 (2004).
32. Payne, J. T., Wood, A. W., Hamlet, A. F., Palmer, R. N. & Lettenmaier, D. P. Mitigating effects of climate change on the water resources of the Columbia River Basin. *Clim. Change* 62, 233–256 (2004).
33. Middelkoop, H. et al. Impact of climate change on hydrological regimes and water resources management in the Rhine basin. *Clim. Change* 49, 105–128 (2001).
34. Gan, T. Y. Reducing vulnerability of water resources of Canadian prairies to potential droughts and possible climatic warming. *Wat. Res. Manag.* 14, 111–135 (2000).
35. Burn, D. Hydrologic effects of climatic change in west-central Canada. *J. Hydrol.* 160, 53–70 (1994).
36. de Loë, R., Kreutzweiser, R. & Moraru, L. Adaptation options for the near term: climate change and the Canadian water sector. *Glob. Environ. Change* 11, 231–245 (2001).
37. Schwindler, D. W. The cumulative effects of climate warming and other human stresses on Canadian freshwaters in the new millennium. *Can. J. Fish. Aquat. Sci.* 58, 18–29 (2001).
38. Thompson, L. G. et al. Tropical glacier and ice core evidence of climate change on annual to millennial time scales. *Clim. Change* 59, 137–155 (2003).
39. Combes, S., Prentice, M. L., Hansen, L. & Rosentratner, L. *Going, Going, Gone! Climate Change and Global Glacier Decline 1–6* (World Wildlife Fund Climate Change Programme, WWF Germany, Berlin, 2004).
40. Singh, P. & Bengtsson, L. Hydrological sensitivity of a large Himalayan basin to climate change. *Hydrol. Process.* 18, 2363–2385 (2004).
41. Singh, P., Jain, S. K. & Kumar, N. Estimation of snow and glacier-melt contribution to the Chenab River, Western Himalaya. *Mount. Res. Develop.* 17(1), 49–56 (1997).
42. Singh, P. & Jain, S. K. Snow and glacier melt in the Satluj River at Bhakdra Dam in the western Himalayan region. *Hydrol. Sci. J.* 47, 93–106 (2002).
43. Gao, Q. & Shi, S. Water resources in the arid zone of northwest China. *J. Desert Res.* 12(4), 1–12 (1992).
44. Hou, S. et al. Climatological significance of an ice core net-accumulation record at Mt. Qomolangma. *Chin. Sci. Bull.* 45, 256–261 (2000).
45. Chinese Academy of Sciences. *China Glacier Inventory* (World Data Center for Glaciology and Geocryology, Lanzhou Institute of Glaciology and Geocryology, Lanzhou, 2004); available from NSIDC User Services (nsidc@nsidc.org).
46. Meier, M. & Dyurgerov, M. Deciphering complex changes in snow and ice. *Science* 297, 350–351 (2002).
47. Singh, P. Effect of warmer climate on the depletion of snow covered area in the Satluj basin in the western Himalayan region. *Hydrol. Sci. J.* 48, 413–425 (2003).
48. Singh, P. & Kumar, N. Impact assessment of climate change on the hydrological response of a snow and glacier melt runoff dominated Himalayan river. *J. Hydrol.* 193, 316–350 (1997).
49. Liniger, H., Weingarten, R. & Grosjean, M. *Mountains of the World: Water Towers for the 21st Century 1–24* (Mountain Agenda, Center for Development and Environment, Institute of Geography, University of Bern, Bern, 1998).
50. Mark, B. G. & Seltzer, G. O. Tropical glacier melt water contribution to stream discharge: a case study in the Cordillera Blanca, Peru. *J. Glaciol.* 49, 271–281 (2003).
51. Kaser, G., Georges, C., Juen, I. & Moelg, T. in *Global Change and Mountain Regions: A State of Knowledge Overview* (eds Huber, U. M., Bugmann, H. K. M. & Reasoner, M. A.) 185–196 (Springer, New York, 2005).
52. Mark, B. G. & Seltzer, G. O. Evaluation of recent glacier recession in the Cordillera Blanca, Peru (AD 1962–1999): spatial distribution of mass loss and climatic forcing. *Quat. Sci. Rev.* (in the press).
53. Francou, B., Vuille, M., Wagnon, P., Mendoza, J. & Sicart, J. E. Tropical climate change recorded by a glacier in the central Andes during the last decades of the 20th century: Chacaltaya, Bolivia. *J. Geophys. Res.* 108, D54154, doi:10.1029/2002JD002959 (2003).

54. Mark, B.G. & Seltzer, G.O. in *Global Change and Mountain Regions: A State Of Knowledge Overview* (eds Huber, U. M., Bugmann, H. K. M. & Reasoner, M. A.) 205–214 (Springer, New York, 2005).
55. Vuille, M. & Bradley, R. S. Mean annual temperature trends and their vertical structure in the tropical Andes. *Geophys. Res. Lett.* 27, 3885–3888 (2000).
56. Vuille, M., Bradley, R. S., Werner, M. & Keimig, F. 20th century climate change in the tropical Andes: observations and model results. *Clim. Change* 59(1–2), 75–99 (2003).
57. Kaufman, Y. J., Didier, T. & Olivier, B. A satellite view of aerosols in the climate system. *Nature* 419, 215–223 (2002).
58. Ramanathan, V., Crutzen, P. J., Kiehl, J. T. & Rosenfeld, D. Aerosols, climate, and the hydrological cycle. *Science* 294, 2119–2124 (2001).
59. Kiehl, J. T., Schneider, T. L., Rasch, P. J. & Barth, M. C. Radiative forcing due to sulfate aerosols from simulations with the National Center for Atmospheric Research Community Climate Model, Version 3. *J. Geophys. Res.* 105, 1441–1457 (2000).
60. Krishnan, R. & Ramanathan, V. Evidence of surface cooling from absorbing aerosols. *Geophys. Res. Lett.* 29, 54–56 (2002).
61. Rosenfeld, D. TRMM observed first direct evidence of smoke from forest fires inhibiting rainfall. *Geophys. Res. Lett.* 26, 3105–3108 (1999).
62. Rosenfeld, D. Suppression of rain and snow by urban air pollution. *Science* 287, 1793–1796 (2000).
63. Borys, R. D., Lowenthal, D. H., Cohn, S. A. & Brown, W. O. J. Mountaintop and radar measurements of anthropogenic aerosol effects on snow growth and snowfall rate. *Geophys. Res. Lett.* 30(10), 45-1–45-4 (2003).
64. Givati, A. & Rosenfeld, D. Quantifying precipitation suppression due to air pollution. *J. Appl. Met.* 43, 1038–1056 (2004).
65. Hansen, J. & Nazarenko, L. Soot climate forcing via snow and ice albedos. *Proc. Natl Acad. Sci. USA* 101, 423–428 (2004).
66. Hansen, J. et al. Earth's energy imbalance: Confirmation and implications. *Science* 308, 1431–1435 (2005).

Acknowledgements This work is a contribution from IDAG, the International Detection and Attribution Group jointly supported by NOAA and DOE. The gross domestic product data set was developed by the Center for International Earth Science Information Network (CIESIN) at Columbia University, New York, with funding from the National Aeronautics and Space Administration. This manuscript was improved considerably through the suggestions of D. Pierce and A. Gershunov.

Author Information Reprints and permissions information is available at npg.nature.com/reprintsandpermissions. The authors declare no competing financial interests. Correspondence should be addressed to T.P.B. (timdotbarnett@ucsd.edu) or D.P.L. (dennisl@u.washington.edu).