General Plan Biological Resources Policy Update and Oak Resources Management Plan

Environmental Impact Report Notice of Preparation (NOP)

Agency, Group and Organization Comments received during the 30-day NOP Comment Period July 17, 2015 – August 17, 2015

Comment Period closed at 5:00 p.m. on August 17, 2015

Date Submitted	Name	Agency, Group, Organization	Submittal Method	Pdf Page Numbers
7/20/15	Janet Cobb	California Oaks	Email/attachment	2 – 11
7/20/15	Steve Love	California Oaks	Email/attachment	12 – 21
8/11/15	Roger Lewis	El Dorado Sr. Housing, LLC	Email/attachment	22 – 24
8/13/15	Carol Louis	El Dorado Council	Letter/attachment	25 – 28
8/14/15	Roger Lewis	El Dorado Sr. Housing, LLC	Email/attachment	29 – 32
8/14/15	Trevor Cleak	Central Valley Regional Water Quality Board	Letter dated 10 August 2015	33 – 36
8/17/15	Scott Morgan	State of CA Office of Planning and Research	Letter	37 – 40
8/17/15	Susan Britting	California Native Plant Society	Email/attachment	41 – 93
8/17/15	John Hidahl	EL Dorado Hills Area Planning Advisory Committee	Email/attachment	94 – 97

Shawna Purvines <shawna.purvines@edcgov.us>

Re: NOP letter by California Oaks

1 message

Janet Cobb <jcobb@californiawildlifefoundation.org> Mon, Jul 20, 2015 at 2:59 PM
To: Shawna Purvines <shawna.purvines@edcgov.us>

Thank you, Shawna. Janet

From: Shawna Purvines <shawna.purvines@edcgov.us>
Sent: Monday, July 20, 2015 2:56 PM
To: Janet Cobb
Subject: Re: NOP letter by California Oaks

Will do.

Thank you Janet.

Shawna

On Monday, July 20, 2015, Janet Cobb <jcobb@californiawildlifefoundation.org> wrote:

> Shawna, Please make sure our letter is submitted into the record for the just-released NOP. Thank you. California Oaks

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Shawna L. Purvines
Principal Planner

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Oaks California Oaks

Preserving and perpetuating California's oak woodlands and wildlife habitats

July 6, 2015

Community Development Agency
Long Range Planning Division
2850 Fairlane Court
Placerville, CA 95667
shawna.purvines@edcgov.us

Re: Biological Policy Update Project

Shawna Purvines, Principal Planner:

California Oaks appreciates the opportunity to comment on the Biological Policy Update Project. Review of the project finds that it fails to consider California Environmental Quality Act (CEQA) greenhouse gas (GHG) emission requirements concerning the conversion of native forest resources to another land use. Specifically, the DEIR provides no analysis regarding potential forest conversion carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) emission effects or proportional mitigation measures. This DEIR omission is contrary to California forest GHG policy and law.

The 2008 California Air Resources Board's AB32 Scoping Plan recognized the significant contribution that terrestrial greenhouse gas storage will make in meeting the state's GHG emissions reduction goals: *"This plan also acknowledges the important role of terrestrial sequestration in our forests, rangelands, wetlands, and other land resources."*[1] Gov. Brown reiterated this point in his January 2015 inaugural address: "*And we must manage farm and rangelands, forests and wetlands so they can store carbon.*" Further, the CEQA Guidelines specifically address biogenic GHG emissions due to the conversion of forest land to non-forest use.[2] Biogenic GHG emissions are those derived from living plant cells. Fossil fuel GHG emissions are derived from living plant cells but are categorized differently.

The following 2009 Natural Resources Agency CEQA GHG Amendments response to comments quotation supports the contention that direct and indirect biogenic GHG emissions effects occur when native forest resources are converted. The response use of the word "and" clearly indicates that there are two potentially significant GHG emission effects to be analyzed regarding forest conversion to another land use. CEQA recognizes these secondary biogenic GHG emissions in the indirect effects language of Guidelines § 15358(2), *"... are later in time or farther removed in distance, but are still reasonably foreseeable."*

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[1] The AB32 Scoping Plan set a "no net loss" goal for forest land carbon sequestration and "stretch targets" of increasing forest land CO_2 storage by 2 million metric tonnes by 2020 and 5 MMT by 2050. http://www.climatechange.ca.gov/forestry/documents/AB32_BOF_Report_1.5.pdf

[2] Oak woodlands are defined as "forest land" by Public Resources Code Section 12220(g)(l). This section is referenced in CEQA Appendix G, forest resources checklist.

Natural Resources Agency Response 66-7

"*As explained in the Initial Statement of Reasons, conversion of forest lands to non-forest uses may result in greenhouse gas emissions and reduce sequestration potential.* (Initial Statement of Reasons, at pp. 63-64.)" See Exhibit A for a detailed CEQA discussion of forest conversion biogenic GHG emission effects.

When a native tree species is felled biomass carbon sequestration ceases. This immediate loss of biomass carbon sequestration capacity represents the direct forest conversion biogenic GHG emission effect. Upon disposal of the biomass carbon, the decomposition of biomass does in all cases result in indirect CO_2 and CH_4 emissions[3] and the combustion of biomass does in all cases result in indirect CO_2, CH_4 and N_2O emissions.[4] Thus, a CEQA oak woodlands GHG emission effects analysis requires carbon dioxide equivalent[5] estimations for both the direct effect from loss of carbon sequestration and the indirect effect due to biogenic emissions associated with oak forest biomass disposal. Notably, burning biomass emits GHG instantaneously, while biomass decomposition takes years and even decades. See Exhibits B, C and D for biomass decomposition and combustion biogenic GHG emission citations.

Summary

Substantial evidence has been presented that project biogenic GHG emissions due to forest land conversion will result in potentially significant environmental effects that have not been sufficiently analyzed or feasibly mitigated. The project has not made *"a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project"* (CEQA Guidelines § 15064.4(a)). Therefore the Biological Policy Update Project is deficient as an informational document, in that it fails to apprise decision-makers/public of the full range and intensity of the adverse GHG emission effects on the environment that may reasonably be expected if the project is approved.

Sincerely,

Janet Cobb

Janet Cobb, Executive Officer
attachments (4)

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[3] "Anaerobic digestion, chemical process in which organic matter is broken down by microorganisms in the absence of oxygen, which results in the generation of carbon dioxide (CO_2) and methane (CH_4) .... Sugars, starches, and cellulose produce approximately equal amounts of methane and carbon dioxide." Encyclopædia Britannica (2013). http://www.britannica.com/EBchecked/topic/22310/anaerobic-digestion

[4] "... the combustion of biomass does in all cases result in net additions of CH_4 and N_2O to the atmosphere, and therefore emissions of these two greenhouse gases as a result of biomass combustion should be accounted for in emission inventories under Scope 1" (at p. 11). World Resources Institute/World Business Council for Sustainable Development (2005).
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Letter 97

Kari Fisher
Associate Counsel
California Farm Bureau Federation

Tim Schmelzer
Legislative and Regulatory Representative
Wine Institute

November 10, 2009

Comment 97-1

Comment is introductory in nature and expresses the organizations' concerns on the guidance for analysis and mitigation for GHG emissions in the proposed amendments. The Natural Resources Agency should reevaluate and revise Appendix G, Section II: Agriculture prior to adopting the proposed amendments.

Response 97-1

The comments object generally to the inclusion of forestry resources among the questions in Appendix G related to agricultural resources. The Initial Statement of Reasons explained the necessity of the added questions:

> The proposed amendments would add several questions addressing forest resources in the section on Agricultural Resources. Forestry questions are appropriately addressed in the Appendix G checklist for several reasons. First, forests and forest resources are directly linked to both GHG emissions and efforts to reduce those emissions. For example, conversion of forests to non-forest uses may result in direct emissions of GHG emissions. (L. Wayburn et al., A Programmatic Approach to the Forest Sector in AB32, Pacific Forest Trust (May 2008); see also California Energy Commission Baseline GHG Emissions for Forest, Range, and Agricultural Lands in California (March, 2004) at p. 19.) Such conversion would also remove existing carbon stock (i.e., carbon stored in vegetation), as well as a significant carbon sink (i.e., rather than emitting GHGs, forests remove GHGs from the atmosphere). (Scoping Plan, Appendix C, at p. C-168.) Thus, such conversions are an indication of potential GHG emissions. Changes in forest land or timberland zoning may also ultimately lead to conversions, which could result in GHG emissions, aesthetic impacts, impacts to biological resources and water quality impacts, among others. Thus, these additions are reasonably necessary to ensure that lead agencies consider the full range of potential impacts in their initial studies. In the same

> way that an EIR must address conversion of prime agricultural land or wetlands as part of a project (addressing the whole of the action requires analyzing land clearance in advance of project development), so should it analyze forest removal. [¶] During OPR's public involvement process, some commenters suggested that conversion of forest or timber lands to agricultural uses should not be addressed in the Initial Study checklist. (Letter from California Farm Bureau Federation to OPR, February 2, 2009; Letter from County of Napa, Conservation, Development and Planning Department, to OPR, January 26, 2009.) As explained above, the purpose of the Proposed Amendments is to implement the Legislative directive to develop Guidelines on the analysis and mitigation of GHG emissions. Although some agricultural uses also provide carbon sequestration values, most agricultural uses do not provide as much sequestration as forest resources. (Climate Action Team, Carbon Sequestration (2009), Chapter 3.3.8 at p. 3.21; California Energy Commission, Baseline GHG Emissions for Forest, Range, and Agricultural Lands in California (2004), at p. 2.) Therefore, such a project could result in a net increase in GHG emissions, among other potential impacts. Thus, such potential impacts are appropriately addressed in the Initial Study checklist.

(Initial Statement of Reasons, at pp. 63-64.) Specific objections to the questions related to forestry are addressed below.

Comment 97-2

Amendments to Appendix G, Section II: Agriculture, adding forest resources, distort the section from its original intent of protecting agriculture resources and will subject projects to extensive and unnecessary analysis beyond what is already legally required. Amendments to Section VII: Greenhouse Gas Emissions will adequately address any significant impact a project may have on greenhouse gas emissions.

Response 97-2

The comment's assertion that the addition of questions related to forestry "specifically target[s] the establishment of [agricultural] resources for extensive and unnecessary analysis above and beyond what is already legally required," is incorrect in several respects. First, the addition of questions related to forestry does not target the establishment of agricultural operations. The only mention in the Initial Statement of Reasons of agricultural operations in relation to those questions was in response to comments that the Office of Planning and Research received indicating that only conversions of forests to non-agricultural purposes should be analyzed. Moreover, the text of the questions themselves demonstrate that the concern is *any* conversion of forests, not just conversions to other agricultural operations.

Second, analysis of impacts to forestry resources is already required. For example, the Legislature has declared that "forest resources and timberlands of the state are among the most valuable of the natural resources of the state" and that such resources "furnish high-quality timber, recreational opportunities,

and aesthetic enjoyment while providing watershed protection and maintaining fisheries and wildlife." (Public Resources Code, § 4512(a)-(b).) Because CEQA defines "environment" to include "land, air, water, minerals, flora, fauna, noise, [and] objects of historic or aesthetic significance" (Public Resources Code, section 21060.5), and because forest resources have been declared to be "the most valuable of the natural resources of the state," projects affecting such resources would have to be analyzed, whether or not specific questions relating to forestry resources were included in Appendix G. (*Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th 1099, 1109 ("in preparing an EIR, the agency must consider and resolve every fair argument that can be made about the possible significant environmental effects of a project, irrespective of whether an established threshold of significance has been met with respect to any given effect").) If effect, by suggesting that the Appendix G questions be limited to conversions to "non-agricultural uses," the comment asks the Natural Resources Agency to adopt changes that are inconsistent with CEQA, which it cannot do.

The comment's suggestion that the questions related to greenhouse gas emissions are sufficient to address impacts related to greenhouse gas emissions does not justify deletion of the questions related to forestry resources. As explained in the Initial Statement of Reasons, not only do forest conversions result in greenhouse gas emissions, but may also "remove existing carbon stock (i.e., carbon stored in vegetation), as well as a significant carbon sink (i.e., rather than emitting GHGs, forests remove GHGs from the atmosphere)." Further, conversions may lead to "aesthetic impacts, impacts to biological resources and water quality impacts, among others." The questions related to greenhouse gas emissions would not address such impacts. Thus, the addition of forestry questions to Appendix G is appropriate both pursuant to SB97 and the Natural Resources Agency's general authority to update the CEQA Guidelines pursuant to Public Resources Code section 21083(f). The Natural Resources Agency, therefore, rejects the suggestion to removal all forestry questions from Appendix G.

Comment 97-3

The amendment adding forest resources to Appendix G: Section II loses sight of the intent and purpose of the Legislature's directive in SB 97. The amendments do not further the directive or intent of SB 97 and unfairly attack and burden all types of agriculture, both crop lands and forest lands.

Response 97-3

SB97 called for guidance on the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions. (Public Resources Code, § 21083.05.) As explained in the Initial Statement of Reasons, forest conversions may result in direct greenhouse gas emissions. Further, such conversions remove existing forest stock and the potential for further carbon sequestration. (Initial Statement of Reasons, at p. 63.) Sequestration is recognized as a key mitigation strategy in the Air Resources Board's Scoping Plan. (Scoping Plan, Appendix C, at p. C-168.) Thus, the Natural Resources Agency disagrees with the comment, and finds that questions in Appendix G related to forestry are reasonably necessary to effectuate the purpose of SB97. Notably, such questions are also supported by the Natural Resources

Agency's more general authority to update the CEQA Guidelines every two years. (Public Resources Code, § 21083(f).)

The Natural Resources Agency also disagrees that the questions related to forestry "unfairly attack and burden all types of agriculture." Nothing in the text of the proposed amendments or the Initial Statement of Reasons demonstrate any effort to attack, or otherwise disadvantage, any agricultural use. Questions related to forestry impacts are addressed to any forest conversions, not just those resulting from agricultural operations. Further, the questions do not unfairly burden agriculture. To the extent an agricultural use requires a discretionary approval, analysis of any potentially significant impacts to forestry resources would already be required, as explained in Response 97-2, above.

Comment 97-4

The amendments adding forest resources to Appendix G: Section II go beyond the scope of mandate by SB 97 and will adversely affect California's agricultural industry. The only alternative is to recognize the loss of forest land or conversion of forest is only significant when it results in a non-agricultural use.

Response 97-4

The Natural Resources Agency finds that the addition of questions related to forest impacts are reasonably necessary to carry out the directive both in SB97 and the general obligation to update the CEQA Guidelines, as described in both the Initial Statement of Reasons and Responses 97-2 and 97-3, above.

Though the comment states "the proposed changes in Section II [of Appendix G] ... are highly onerous to the State's agricultural industry," the comment provides no evidence to support that claim. On the contrary, as explained in Responses 97-2 and 97-3, above, CEQA already requires analysis of forestry impacts, regardless of whether Appendix G specifically suggests such analysis.

The Natural Resources Agency declines to revise the forestry-related Appendix G questions as suggested. As explained in Response 97-2, above, exempting agricultural projects from the requirement to analyze impacts to forest resources is inconsistent with CEQA.

Exhibit B

Forest Land Conversion
Biomass Combustion and Decomposition GHG Emissions

California Air Resources Board

"California is committed to reducing emissions of CO_2, which is the most abundant greenhouse gas and drives long-term climate change. However, short-lived climate pollutants [methane, etc.] have been shown to account for 30-40 percent of global warming experienced to date. Immediate and significant reduction of both CO_2 and short-lived climate pollutants is needed to stabilize global warming and avoid catastrophic climate change .... The atmospheric concentration of methane is growing as a result of human activities in the agricultural, waste treatment, and oil and gas sectors." *Reducing Short-Lived Climate Pollutants in California*, 2014.

UN Framework Convention on Climate, Deforestation Definition

"Those practices or processes that result in the change of forested lands to non-forest uses. This is often cited as one of the major causes of the enhanced greenhouse effect for two reasons: 1) the burning or decomposition of the wood releases carbon dioxide and 2) trees that once removed carbon dioxide from the atmosphere in the process of photosynthesis are no longer present and contributing to carbon storage." http://www.gofc-gold.uni-jena.de/redd/sourcebook/Sourcebook_Version_June_2008_COP13.pdf

Stanford University Engineering

Biomass burning also includes the combustion of agricultural and lumber waste for energy production. Such power generation often is promoted as a "sustainable" alternative to burning fossil fuels. And that's partly true as far as it goes. It is sustainable, in the sense that the fuel can be grown, processed and converted to energy on a cyclic basis. But the thermal and pollution effects of its combustion - in any form - can't be discounted, [Mark] Jacobson said.

"The bottom line is that biomass burning is neither clean nor climate-neutral," he said. "If you're serious about addressing global warming, you have to deal with biomass burning as well." engineering.stanford.edu/news/stanford-engineers-study-shows-effects-biomass-burning-climate-health

Jacobson, M. Z. (2014). *Effects of biomass burning on climate, accounting for heat and moisture fluxes, black and brown carbon, and cloud absorption effects*.

European Geosciences Union

"Biomass burning is a significant global source of gaseous and particulate matter emissions to the troposphere. Emissions from biomass burning are known to be a source of greenhouse gases such as carbon dioxide, methane and nitrous oxide" (at 10457). *A review of biomass burning emissions, part I: gaseous emissions of carbon monoxide, methane, volatile organic compounds, and nitrogen containing compounds.* R. Koppmann, K. von Czapiewski and J. S. Reid, 2005. http://www.atmos-chem-phys-discuss.net/5/10455/2005/acpd-5-10455-2005-print.pdf

Phoenix Energy

"As wood starts to decompose it releases roughly equal amounts of methane (CH_4) and carbon dioxide (CO_2)." 2014. http://www.phoenixenergy.net/powerplan/environment

Macpherson Energy Corporation

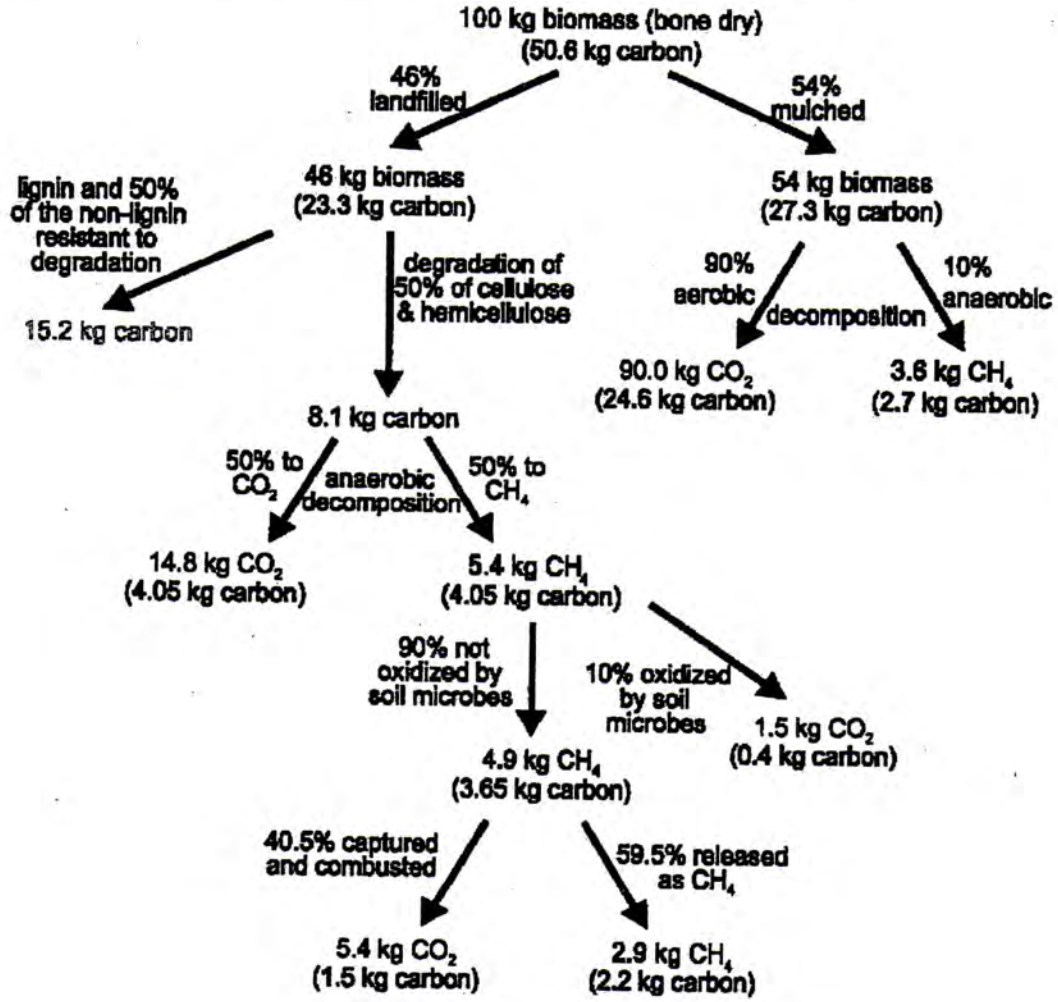
"Rotting produces a mixture of up to 50 percent CH_4, while open burning produces 5 to 10 percent CH_4." 2014. http://macphersonenergy.com/mt-poso-conversion.html

Exhibit C

Biomass Decomposition Greenhouse Gas Emissions

Biomass presentation by Alex Hobbs, PhD, PE to the Sierra Club Forum at North Carolina State University (November 24, 2009).

- If 100 kilograms of bone dry biomass were dispersed to a controlled landfill (46%) and mulched (54%) greenhouse gas emissions would be: 111.7 kilograms of CO_2 emissions + 6.5 kilograms of CH_4 emissions = 274.2 kilograms CO_2-equivalent emissions.



Landfill: 46 kg biomass/23.3 kg CO = 21.7 kg CO_2 + 2.9 kg CH_4 = 94.2 kg CO_2-equivalent.
Mulch: 54 kg biomass/27.3 kg CO = 90 kg CO_2 + 3.6 kg CH_4 = 180 kg CO_2-equivalent.
Total: 100 kg biomass/50.6 kg CO = 111.7 kg CO_2 + 6.5 kg CH_4 = 274.2 kg CO_2-equivalent.

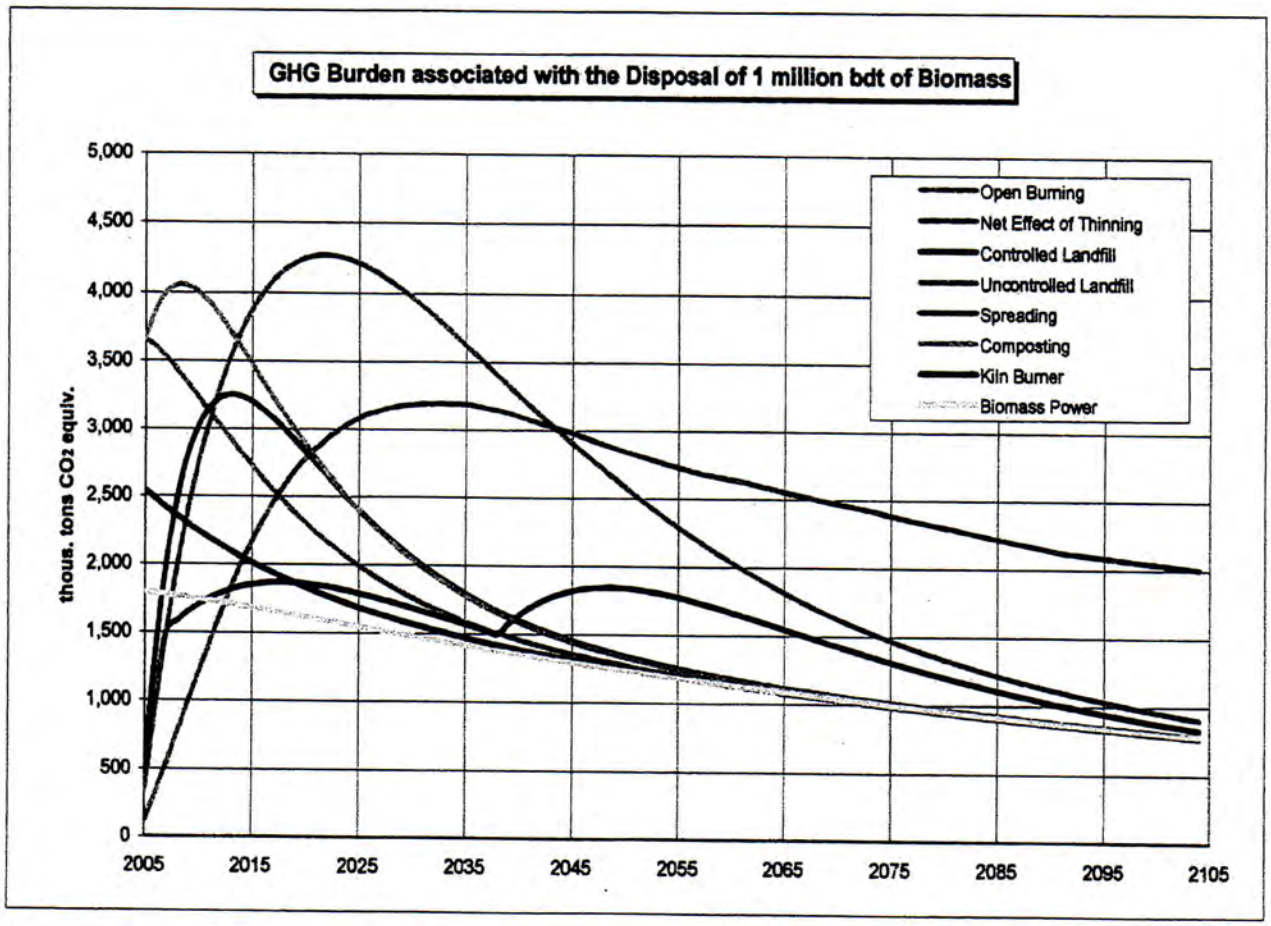
Exhibit D

Biomass Disposal Greenhouse Gas Emissions

The following chart illustrates the relative biogenic GHG emission effects from common methods of vegetation (biomass) disposal.[1] However, for a variety of reasons these chart values are too unrefined to be applied for project site-specific biogenic GHG emissions analysis.

Uncontrolled landfill disposal produces the greatest biomass GHG emissions followed by composting, open burning, mulching, forest thinning, firewood burning, controlled landfills and biomass power. Notably, biomass power emissions do not include methane and nitrous oxide emissions. The chart demonstrates that peak greenhouse gas emissions vary substantially depending on the means of biomass disposal.

Terminology: Net effect of thinning emissions apply to forest thinning emissions; Spreading emissions are equivalent to mulching emissions and Kiln Burner emissions are analogous to fireplace burning emissions.



Graphic: Gregory Morris, PhD. *Bioenergy and Greenhouse Gases*. Published by Pacific Institute (2008).

[1] One bone dry ton (bdt) is a volume of wood chips (or other bulk material) that would weigh one ton (2000 pounds, or 0.9072 metric tons) if all the moisture content was removed.

Shawna Purvines <shawna.purvines@edcgov.us>

Notice of Preparation

1 message

Steven Love <slove@californiawildlifefoundation.org> Mon, Jul 20, 2015 at 3:02 PM
To: "shawna.purvines@edcgov.us" <shawna.purvines@edcgov.us>
Cc: Janet Cobb <jcobb@californiawildlifefoundation.org>

Ms. Purvines,

Please find our attached comments for NOP for El Dorado County Oak Plan. We request that you notify us of receipt of our comments.

Thank you,

Steve

Steven Love
External Relations Manager
California Wildlife Foundation
428 13th Street Suite 10A
Oakland, CA 94612
Office: 510.763.0282
Cell: 925.212.9056

Placerville Letter.pdf
5616K

Oaks California Oaks

Preserving and perpetuating California's oak woodlands and wildlife habitats

July 6, 2015

Community Development Agency
Long Range Planning Division
2850 Fairlane Court
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Letter 97

Kari Fisher
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(Initial Statement of Reasons, at pp. 63-64.) Specific objections to the questions related to forestry are addressed below.

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Amendments to Appendix G, Section II: Agriculture, adding forest resources, distort the section from its original intent of protecting agriculture resources and will subject projects to extensive and unnecessary analysis beyond what is already legally required. Amendments to Section VII: Greenhouse Gas Emissions will adequately address any significant impact a project may have on greenhouse gas emissions.

Response 97-2

The comment's assertion that the addition of questions related to forestry "specifically target[s] the establishment of [agricultural] resources for extensive and unnecessary analysis above and beyond what is already legally required," is incorrect in several respects. First, the addition of questions related to forestry does not target the establishment of agricultural operations. The only mention in the Initial Statement of Reasons of agricultural operations in relation to those questions was in response to comments that the Office of Planning and Research received indicating that only conversions of forests to non-agricultural purposes should be analyzed. Moreover, the text of the questions themselves demonstrate that the concern is *any* conversion of forests, not just conversions to other agricultural operations.

Second, analysis of impacts to forestry resources is already required. For example, the Legislature has declared that "forest resources and timberlands of the state are among the most valuable of the natural resources of the state" and that such resources "furnish high-quality timber, recreational opportunities,

and aesthetic enjoyment while providing watershed protection and maintaining fisheries and wildlife." (Public Resources Code, § 4512(a)-(b).) Because CEQA defines "environment" to include "land, air, water, minerals, flora, fauna, noise, [and] objects of historic or aesthetic significance" (Public Resources Code, section 21060.5), and because forest resources have been declared to be "the most valuable of the natural resources of the state," projects affecting such resources would have to be analyzed, whether or not specific questions relating to forestry resources were included in Appendix G. (*Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th 1099, 1109 ("in preparing an EIR, the agency must consider and resolve every fair argument that can be made about the possible significant environmental effects of a project, irrespective of whether an established threshold of significance has been met with respect to any given effect").) If effect, by suggesting that the Appendix G questions be limited to conversions to "non-agricultural uses," the comment asks the Natural Resources Agency to adopt changes that are inconsistent with CEQA, which it cannot do.

The comment's suggestion that the questions related to greenhouse gas emissions are sufficient to address impacts related to greenhouse gas emissions does not justify deletion of the questions related to forestry resources. As explained in the Initial Statement of Reasons, not only do forest conversions result in greenhouse gas emissions, but may also "remove existing carbon stock (i.e., carbon stored in vegetation), as well as a significant carbon sink (i.e., rather than emitting GHGs, forests remove GHGs from the atmosphere)." Further, conversions may lead to "aesthetic impacts, impacts to biological resources and water quality impacts, among others." The questions related to greenhouse gas emissions would not address such impacts. Thus, the addition of forestry questions to Appendix G is appropriate both pursuant to SB97 and the Natural Resources Agency's general authority to update the CEQA Guidelines pursuant to Public Resources Code section 21083(f). The Natural Resources Agency, therefore, rejects the suggestion to removal all forestry questions from Appendix G.

Comment 97-3

The amendment adding forest resources to Appendix G: Section II loses sight of the intent and purpose of the Legislature's directive in SB 97. The amendments do not further the directive or intent of SB 97 and unfairly attack and burden all types of agriculture, both crop lands and forest lands.

Response 97-3

SB97 called for guidance on the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions. (Public Resources Code, § 21083.05.) As explained in the Initial Statement of Reasons, forest conversions may result in direct greenhouse gas emissions. Further, such conversions remove existing forest stock and the potential for further carbon sequestration. (Initial Statement of Reasons, at p. 63.) Sequestration is recognized as a key mitigation strategy in the Air Resources Board's Scoping Plan. (Scoping Plan, Appendix C, at p. C-168.) Thus, the Natural Resources Agency disagrees with the comment, and finds that questions in Appendix G related to forestry are reasonably necessary to effectuate the purpose of SB97. Notably, such questions are also supported by the Natural Resources

Agency's more general authority to update the CEQA Guidelines every two years. (Public Resources Code, § 21083(f).)

The Natural Resources Agency also disagrees that the questions related to forestry "unfairly attack and burden all types of agriculture." Nothing in the text of the proposed amendments or the Initial Statement of Reasons demonstrate any effort to attack, or otherwise disadvantage, any agricultural use. Questions related to forestry impacts are addressed to any forest conversions, not just those resulting from agricultural operations. Further, the questions do not unfairly burden agriculture. To the extent an agricultural use requires a discretionary approval, analysis of any potentially significant impacts to forestry resources would already be required, as explained in Response 97-2, above.

Comment 97-4

The amendments adding forest resources to Appendix G: Section II go beyond the scope of mandate by SB 97 and will adversely affect California's agricultural industry. The only alternative is to recognize the loss of forest land or conversion of forest is only significant when it results in a non-agricultural use.

Response 97-4

The Natural Resources Agency finds that the addition of questions related to forest impacts are reasonably necessary to carry out the directive both in SB97 and the general obligation to update the CEQA Guidelines, as described in both the Initial Statement of Reasons and Responses 97-2 and 97-3, above.

Though the comment states "the proposed changes in Section II [of Appendix G] ... are highly onerous to the State's agricultural industry," the comment provides no evidence to support that claim. On the contrary, as explained in Responses 97-2 and 97-3, above, CEQA already requires analysis of forestry impacts, regardless of whether Appendix G specifically suggests such analysis.

The Natural Resources Agency declines to revise the forestry-related Appendix G questions as suggested. As explained in Response 97-2, above, exempting agricultural projects from the requirement to analyze impacts to forest resources is inconsistent with CEQA.

Exhibit B

Forest Land Conversion
Biomass Combustion and Decomposition GHG Emissions

California Air Resources Board

"California is committed to reducing emissions of CO_2, which is the most abundant greenhouse gas and drives long-term climate change. However, short-lived climate pollutants [methane, etc.] have been shown to account for 30-40 percent of global warming experienced to date. Immediate and significant reduction of both CO_2 and short-lived climate pollutants is needed to stabilize global warming and avoid catastrophic climate change .... The atmospheric concentration of methane is growing as a result of human activities in the agricultural, waste treatment, and oil and gas sectors." *Reducing Short-Lived Climate Pollutants in California*, 2014.

UN Framework Convention on Climate, Deforestation Definition

"Those practices or processes that result in the change of forested lands to non-forest uses. This is often cited as one of the major causes of the enhanced greenhouse effect for two reasons: 1) the burning or decomposition of the wood releases carbon dioxide and 2) trees that once removed carbon dioxide from the atmosphere in the process of photosynthesis are no longer present and contributing to carbon storage." http://www.gofc-gold.uni-jena.de/redd/sourcebook/Sourcebook_Version_June_2008_COP13.pdf

Stanford University Engineering

Biomass burning also includes the combustion of agricultural and lumber waste for energy production. Such power generation often is promoted as a "sustainable" alternative to burning fossil fuels. And that's partly true as far as it goes. It is sustainable, in the sense that the fuel can be grown, processed and converted to energy on a cyclic basis. But the thermal and pollution effects of its combustion - in any form - can't be discounted, [Mark] Jacobson said.

"The bottom line is that biomass burning is neither clean nor climate-neutral," he said. "If you're serious about addressing global warming, you have to deal with biomass burning as well." engineering.stanford.edu/news/stanford-engineers-study-shows-effects-biomass-burning-climate-health

Jacobson, M. Z. (2014). *Effects of biomass burning on climate, accounting for heat and moisture fluxes, black and brown carbon, and cloud absorption effects*.

European Geosciences Union

"Biomass burning is a significant global source of gaseous and particulate matter emissions to the troposphere. Emissions from biomass burning are known to be a source of greenhouse gases such as carbon dioxide, methane and nitrous oxide" (at 10457). *A review of biomass burning emissions, part I: gaseous emissions of carbon monoxide, methane, volatile organic compounds, and nitrogen containing compounds.* R. Koppmann, K. von Czapiewski and J. S. Reid, 2005. http://www.atmos-chem-phys-discuss.net/5/10455/2005/acpd-5-10455-2005-print.pdf

Phoenix Energy

"As wood starts to decompose it releases roughly equal amounts of methane (CH_4) and carbon dioxide (CO_2)." 2014. http://www.phoenixenergy.net/powerplan/environment

Macpherson Energy Corporation

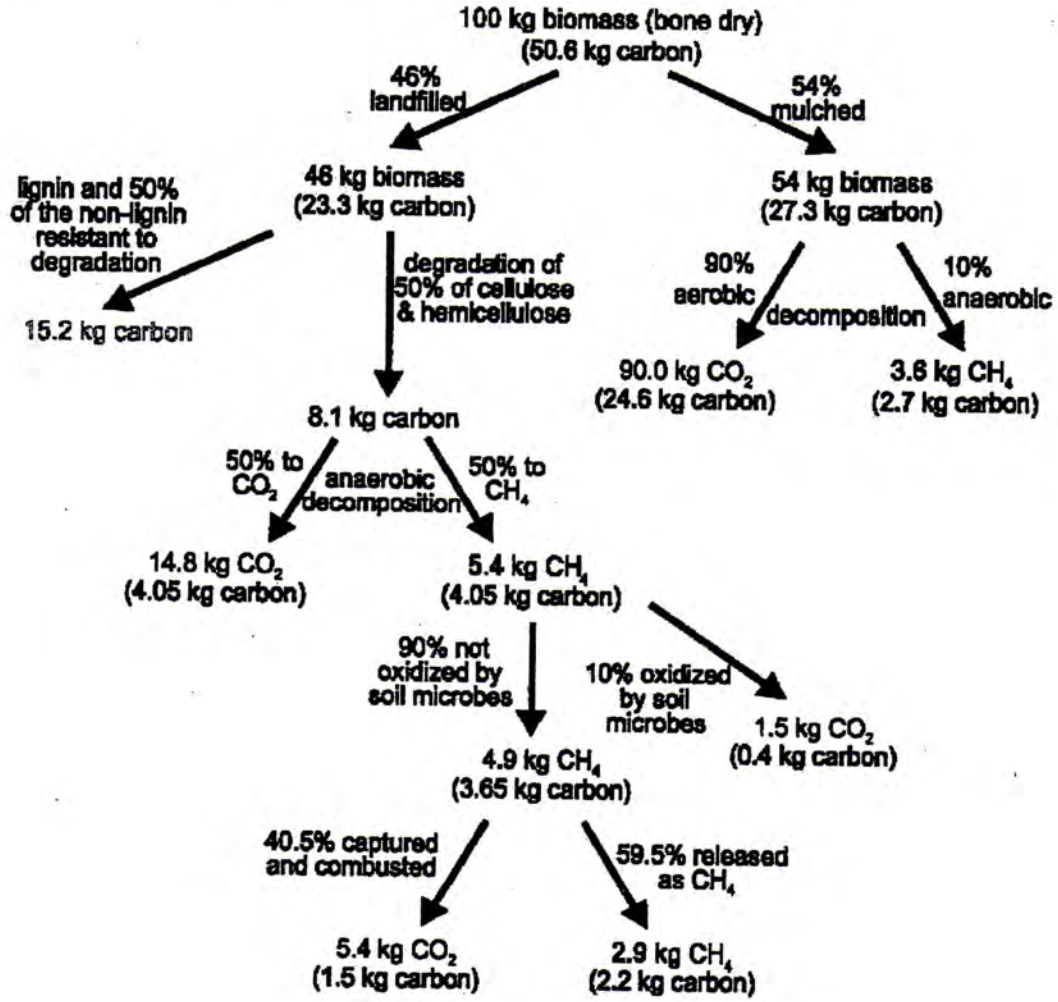
"Rotting produces a mixture of up to 50 percent CH_4, while open burning produces 5 to 10 percent CH_4." 2014. http://macphersonenergy.com/mt-poso-conversion.html

Exhibit C

Biomass Decomposition Greenhouse Gas Emissions

Biomass presentation by Alex Hobbs, PhD, PE to the Sierra Club Forum at North Carolina State University (November 24, 2009).

- If 100 kilograms of bone dry biomass were dispersed to a controlled landfill (46%) and mulched (54%) greenhouse gas emissions would be: 111.7 kilograms of CO_2 emissions + 6.5 kilograms of CH_4 emissions = 274.2 kilograms CO_2-equivalent emissions.



Landfill: 46 kg biomass/23.3 kg CO = 21.7 kg CO_2 + 2.9 kg CH_4 = 94.2 kg CO_2-equivalent.
Mulch: 54 kg biomass/27.3 kg CO = 90 kg CO_2 + 3.6 kg CH_4 = 180 kg CO_2-equivalent.
Total: 100 kg biomass/50.6 kg CO = 111.7 kg CO_2 + 6.5 kg CH_4 = 274.2 kg CO_2-equivalent.

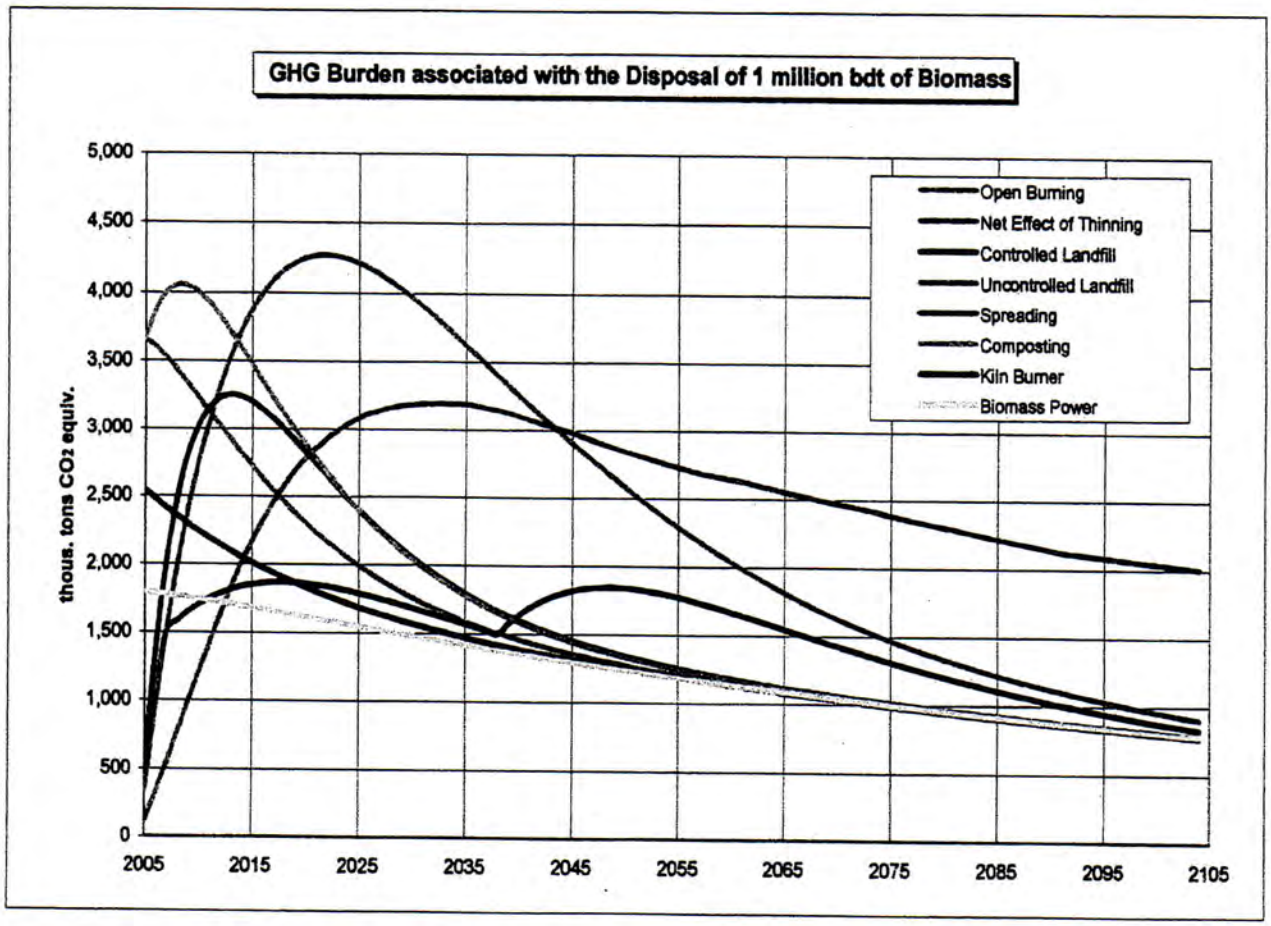
Exhibit D

Biomass Disposal Greenhouse Gas Emissions

The following chart illustrates the relative biogenic GHG emission effects from common methods of vegetation (biomass) disposal.[1] However, for a variety of reasons these chart values are too unrefined to be applied for project site-specific biogenic GHG emissions analysis.

Uncontrolled landfill disposal produces the greatest biomass GHG emissions followed by composting, open burning, mulching, forest thinning, firewood burning, controlled landfills and biomass power. Notably, biomass power emissions do not include methane and nitrous oxide emissions. The chart demonstrates that peak greenhouse gas emissions vary substantially depending on the means of biomass disposal.

Terminology: Net effect of thinning emissions apply to forest thinning emissions; Spreading emissions are equivalent to mulching emissions and Kiln Burner emissions are analogous to fireplace burning emissions.



Graphic: Gregory Morris, PhD. *Bioenergy and Greenhouse Gases*. Published by Pacific Institute (2008).

[1] One bone dry ton (bdt) is a volume of wood chips (or other bulk material) that would weigh one ton (2000 pounds, or 0.9072 metric tons) if all the moisture content was removed.

Shawna Purvines <shawna.purvines@edcgov.us>

Notice of Preparation (NOP) for the General Plan Biological Resources Policy Update Draft Environmental Impact Report (EIR) - Comments

Roger Lewis <re.lewis@comcast.net> Tue, Aug 11, 2015 at 11:12 AM
To: Shawna Purvines <shawna.purvines@edcgov.us>
Cc: Shirley Parker <sparker07@comcast.net>, jim davies <j854davies@att.net>, Ron Kooyman <ron@thekooymans.com>, bosone@edcgov.us, bostwo@edcgov.us, bosthree@edcgov.us, bosfour@edcgov.us, bosfive@edcgov.us, edc.cob@edcgov.us

Ms. Shawna Purvines

Principal Planner

El Dorado County Community Development Agency

Long Range Planning Division

2850 Fairlane Court,

Placerville, CA 95667

Dear Ms. Purvines,

We have reviewed the subject NOP and submit herewith our comments. We trust they will be considered and incorporated where possible into the draft EIR.

Sincerely,

Roger Lewis

El Dorado Sr. Housing, LLC.

854 Diablo Rd.

Danville, CA 94526

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Comments on the Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the General Plan Biological Resources Policy Update and Oak Resources Management Plan (ORMP)

By El Dorado Sr. Housing, LLC

August 11, 2015

These comments pertain primarily to the Oak Resources Management Plan

Use Quantitative Analysis for Impact Assessments

1. As stated in Section 2.0 of the NOP, Project Background and History, the County's adoption of the May 6, 2008 OWMP was challenged and the Appellate Court held that the County had not adequately evaluated the environmental effects of the OWMP. It is therefore essential that the County perform a proper evaluation at this time. However, in accordance with CEQA Guidelines Section 15063(c)(3), if it is demonstrated that impacts to particular resources would be less than significant, those resources need not be evaluated. It is therefore incumbent upon the authors of the EIR to unequivocally demonstrate significance, or non-significance, of all impacts that are being evaluated.

2. The environmental impact report should evaluate the impact of specific, quantifiable actions on the environment, not of subjective, unsubstantiated opinions or hypothetical "what-if" situations, especially when there are studies and existing data that can be referenced. Such an evaluation can be done even though specific construction or development projects may not be contemplated.

3. Resource inventories, referenced in Section 2.0 of the NOP, apparently are available to facilitate the necessary quantitative evaluations. Reports state that there are from 250,000 to 300,000 acres of oak resources in El Dorado County. It is the impact of development on these resources that must be quantified.

4. The EIR must quantify the expected overall impact of development, i.e. the report must stipulate how many acres of resources and individual heritage trees are expected to be removed as a result of planned and unplanned development. Consider that, according to the El Dorado County Economic and Demographic Profile, 2010-2011, in the past 25 years there have been an average of only 500 acres of development per year in El Dorado County, and within that development, an estimated 20%, about 100 acres, resulted in impact to oak resources. This is an impact of just 0.04% of existing resources.

5. Determine and include the effects of natural regeneration of resources in any assessment of impact. This obviously will have the effect of mitigating any impacts. In fact it might be revealed that natural regeneration of resources more than offsets impacts from development.

6. Supervisor Veerkamp opined that in his many years of residency in El Dorado County, he has notice a marked increase in the number of trees. At June 22, 2015 BOS meeting (video 2:31:09) he said, "having lived here 57 years now, I've seen an overall increase in the amount of trees in the County to the point where we're getting bombarded from the fire safe councils, and insurance companies pulling out, so somehow we've got to strike a balance to all this." This statement reaffirms the need to consider natural regeneration as a mitigating factor in the EIR.

Oak Tree Retention Standards are Unnecessary

7. Conservationists have made multiple requests to not amend the retention requirements of the original OWMP and to disallow 100% tree removal on a project. In fact removing 100% of the trees on just a single project should not be a major issue because the effects of this action are not cumulatively considerable. What is important is the cumulative effect of all resource usage compared to available resources and the impact that any reduction has.

8. If it can be quantitatively demonstrated that a large percentage of developers want to remove 100% of the oak trees from their projects, then retention requirements may be reevaluated.

Public Comments Drift from Mitigation Process

9. There have been public arguments put forth that are irrelevant to the EIR process, e.g. trees are a health benefit, trees remove pollutants, trees produce oxygen for people. Obviously trees are beneficial, but that is not the issue, and pointing out statistical facts does nothing to foster solutions to the problem of how to mitigate the impact of loss of oak trees during development.

10. Carol Lewis concluded her remarks on June 22, 2015 with a statement that she and others find it unacceptable that that County is allowing developers to remove a "great percentage" of our oak trees. She used as an example a developer who cut down 300 trees one weekend and paid a fee of $30,000. Her statement that "we don't need to be removing a great percentage of our oak trees because it is detrimental to our health" is a commendable statement; however, it was not backed up by an estimate of what that percentage is. County reports will verify that on average developers remove less than 0.04% of the oak trees each year. 300 trees is approximately 0.001%. Are these numbers a "great percentage" and what exactly is the impact to health from removing this amount? If being considered, the EIR must quantitatively address this issue.

11. Hopefully, this process will not deter from the idea that we seek "mitigation" answers to whatever impact is realized. The mitigation should not become a detriment to the development of privately owned properties to such a degree that development cannot be realized. Instead the process needs to take into account the rights of the individual property owners.

August 14, 2015

El Dorado County Planning Commission

RE: El Dorado County General Plan Biological Policy Oak Tree and Woodland Mitigation

TREES SAVE LIVES

Outdoor air pollution is a serious environmental health risk linked to both chronic and acute health conditions including:

*Heart Disease *Asthma *Stroke * Lung Cancer *Respiratory Infections

*Chronic Pulmonary Disease

Trees and forests in the US remove 17.4 million tons of air pollution in one year with human health effects valued at over $6.8 million a year.

Trees remove air pollution primarily by uptake of pollutants via leaf stomata (pores on the outer skin layers of the leaf).

Most of the pollution removal occurs in RURAL AREAS where tree cover can be as high as 88 percent.

TREES ARE LIVING AIR PURIFIERS - Every tree helps the environment and the people living around them. Trees around homes can increase property values by as much as 15%.

They also:

*Decrease carbon dioxide and increase oxygen levels in the atmosphere

*Improve water quality and reduce erosion

*Provide food for wildlife

*Reduce cooling and heating costs by providing shade in summer and wind breaks in winter

*Plus provide natural beauty to El Dorado County, a county who historically has been known for its oaks

The EPA, over the last 40 years, has done studies to develop more refined and focused regulations and strategies for decreasing pollution thru our forests worldwide.

These policies have aided in a better understanding of clean air science which has led directly to these policies widely credited with better air quality, which in turn reduces hospitalizations, worsening levels of asthma, cardiac events and even death.

WHAT ARE YOU AND I BREATHING? These are some of the major air pollutant:

*Carbon Dioxide *Sulfur Dioxide *Hydrogen Fluoride and Silicon Tetrafluoride *Ozone *Methane

*Nitro Oxide *Chlorofluorocarbons

The burning of fossil fuels for energy and large scale forest fires are major contributors to the buildup of CO2 in the atmosphere.

The destruction of our trees by drought and disease in California has led to the loss of 12.5 million trees to beetle infestation alone. Forest fires, removal of orchards and development are jeopardizing the health of all of us for generations to come.

We should demonstrate our responsibility to our children and grandchildren, that we care about our air quality for their future. This means being conscious in analyzing the removal of our oaks and other trees, this impact will last well beyond our life time.

Myself and other residents are opposed to the Board of Supervisors DENIAL of including an AIR QUALITY COMPONENT dealing with oaks in the general plan.

The Highway 50 corridor is the chosen area for development. This corridor, because of the traffic it generates, is the higher pollutant producer with the ability of multi-developers to mitigate the tree removal,(up to 100% of the tree canopy) then plant 1 to 15 gallon oak trees in a preserve far away from the polluted impacted area, does not serve to benefit county residents living in that area.

Large oak tree canopies are the greater air filters, this also includes large pines as great filters because of their needle density.

Trees:

*Help to settle out, trap and hold particle pollutants (dust, ash, pollen and smoke)

*Absorb CO2 and other dangerous gasses and, in turn, replenish the atmosphere with oxygen

*Produce enough oxygen on each acre for 18 people everyday

*Absorb enough CO2 on each acre, over a year's time to equal the amount you produce when you drive 26,000 miles

Trees remove gaseous pollutants by absorbing them through the pores on the leaf surface. Particles are trapped and filtered by leaves, stems, and twigs and washed to the ground by rainfall. This is why large canopies are so important.

As more and more cars travel Highway 50 and other arterial roads, county residents, their children and especially the elderly will have a higher incidents of chronic health issues.

The responsibility of this board and other governing boards is to develop policies to benefit and protect the residents that exist in this county, not to accommodate a developers need for higher density housing or other types of development for future residents to the detriment of those of us now living here.

The impact of large sections of oak tree removal should not be done without the thorough evaluation of its impacts to air quality. The Oak Tree/Air Quality Component should be included in the General Plan. Once these trees are removed it will take decades and life times to replenish their loss to the community.

I and others I represent, are strongly requesting you to include Air Quality and the Oak Heritage components in the general plan update. This is too important for future generations and too important to our health to ignore.

Carol Louis

El Dorado Council.org

CC: Letter from the California Oaks .org

Oaks California Oaks

California Board of Forestry and Fire Protection
P.O. Box 944246
Sacramento, CA 94244-2460
board.public.comments@fire.ca.gov

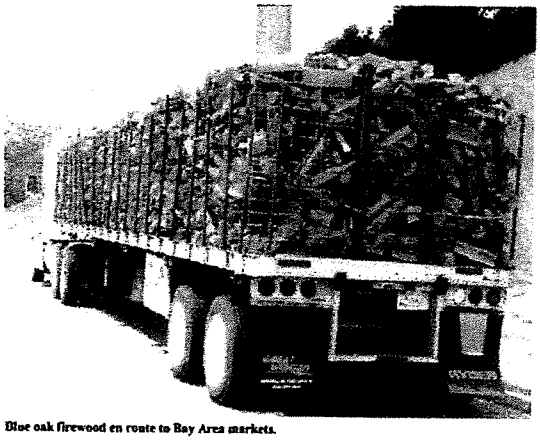
California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812
dmallory@arb.ca.gov

June 29, 2015

Re: Oak Woodland Greenhouse Gas Emissions

California Board of Forestry and Fire Protection and California Air Resources Board Members:

California Oaks would like to raise the incongruity of the accompanying photo relative to the Board of Forestry and Air Resources Board joint policy regarding meeting AB32 Scoping Plan forest targets. Although the state's forest greenhouse gas (GHG) focus may be on "timberland," in fact California's GHG policies and laws apply equally to all native "forest land."



Blue oak firewood en route to Bay Area markets.

The 2008 AB32 Scoping Plan recognized the significant contribution that terrestrial greenhouse gas storage will make in meeting the state's GHG emissions reduction goals: "*This plan also acknowledges the important role of terrestrial sequestration in our forests, rangelands, wetlands, and other land resources.*" The Scoping Plan set a "*no net loss*" goal for forest land carbon sequestration and "*stretch targets*" of increasing forest land CO_2 storage by 2 million metric tonnes by 2020 and 5 MMT by 2050.

California Oaks would appreciate a cogent explanation of how the pictured blue oak firewood is consistent with the state's natural and working lands sector targets, given that unregulated/unmitigated oak tree cutting for "commercial purposes" results in: (1) the loss of carbon sequestration capacity; (2) produces carbon dioxide, methane and nitrous oxide emissions from burning the firewood.

Sincerely,

Janet Cobb

Janet Cobb, Executive Officer

Shawna Purvines <shawna.purvines@edcgov.us>

RE: Notice of Preparation (NOP) for the General Plan Biological Resources Policy Update Draft Environmental Impact Report (EIR) - Additional Comments

1 message

Roger Lewis <re.lewis@comcast.net> Fri, Aug 14, 2015 at 2:53 PM
To: Shawna Purvines <shawna.purvines@edcgov.us>
Cc: Shirley Parker <sparker07@comcast.net>, jim davies <j854davies@att.net>, Ron Kooyman <ron@thekooymans.com>, bosone@edcgov.us, bostwo@edcgov.us, bosthree@edcgov.us, bosfour@edcgov.us, bosfive@edcgov.us, edc.cob@edcgov.us, rich.stewart@edcgov.us, gary.miller@edcgov.us, tom.heflin@edcgov.us, dave.pratt@edcgov.us, brian.shinault@edcgov.us

Ms. Shawna Purvines

Principal Planner

El Dorado County Community Development Agency

Long Range Planning Division

2850 Fairlane Court,

Placerville, CA 95667

Dear Ms. Purvines,

Having attended the Planning Commission hearing of August 13, 2015, we offer the attached comments which are additional to those offered on August 11, 2015. We trust they will be considered and incorporated where possible into the draft EIR.

Sincerely,

Roger Lewis

El Dorado Sr. Housing, LLC.

854 Diablo Rd.

Danville, CA 94526

From: Roger Lewis [mailto:re.lewis@comcast.net]
Sent: Tuesday, August 11, 2015 11:13 AM
To: 'Shawna Purvines'
Cc: 'Shirley Parker'; jim davies (j854davies@att.net); Ron Kooyman (ron@thekooymans.com); bosone@edcgov.us; bostwo@edcgov.us; bosthree@edcgov.us; bosfour@edcgov.us; bosfive@edcgov.us; edc.cob@edcgov.us
Subject: Notice of Preparation (NOP) for the General Plan Biological Resources Policy Update Draft Environmental Impact Report (EIR) - Comments

Ms. Shawna Purvines

Principal Planner

El Dorado County Community Development Agency

Long Range Planning Division

2850 Fairlane Court,

Placerville, CA 95667

Dear Ms. Purvines,

We have reviewed the subject NOP and submit herewith our comments. We trust they will be considered and incorporated where possible into the draft EIR.

Sincerely,

Roger Lewis

El Dorado Sr. Housing, LLC.

854 Diablo Rd.

Danville, CA 94526

EDSH_comments_on_NOP_of_draft_EIR_2.pdf
267K

Comments on the Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the General Plan Biological Resources Policy Update and Oak Resources Management Plan (ORMP)

By El Dorado Sr. Housing, LLC

August 13, 2015

These comments are further to our comments of August 11, 2015 and are prompted by our attendance at the Planning Commission hearing of August 12, 2015

Use Quantitative Analysis for Impact Assessments

1. During the Planning Commission hearing Commissioner Platt opined that there are a lot of trees in El Dorado County and pointed out that natural, ambient regeneration of oak resources occurs at the rate of approximately 2% every ten years. This statement reaffirms our Comment No. 6 of August 11, 2015, see footnote (a) below. This number is extremely significant because if correct, natural regeneration becomes the most predominant mitigating factor in the oak resources issue. Simple mathematics and historical records of development in El Dorado County back up this point.

   Oak resource inventory reports state that there are from 250,000 to 300,000 acres of oak resources in the County. At the rate of growth of 2% in 10 years, our resources will increase by at least 5,000 acres over the 10-year period, or 500 acres per year on average.

   According to the El Dorado County Economic and Demographic Profile, 2010-2011, in the past 25 years there have been an average of just 500 acres of development per year in the entire County, and of that development, only an estimated 20%, i.e. about 100 acres per year, resulted in impact to oak trees.

   By comparing the number of trees lost to development to the number gained through natural regeneration, it is clearly seen that natural mitigation results in an increase in resources of five times the amount lost to estimated development. We therefore must reiterate our Comment No. 5 of August 11, 2015, see footnote (b) below, and suggest strongly that the effects of natural regeneration be quantitatively included in the EIR.

Impact on Property Owners

2. With all of the focus on determining the impact on oak trees, habitat, animal life, etc. … resulting from development, we believe we are omitting one important consideration, i.e. the impact on humans by restrictively regulating development. Accordingly, we propose that the EIR include an assessment and evaluation of the impact on the health and well-being of property owners and local residents of ***NOT*** being able to reasonably develop a property. Specifically, disallowing the removal of oak trees or making their removal prohibitively difficult

or expensive can result in grave economic consequences and detrimental health issues to owners of property who could otherwise develop their properties. A case in point is El Dorado Sr. Housing, LLC where the stress of not knowing how to proceed with project development has taken its toll on the well-being of the member/owners. Moreover, adopting overly restrictive policies and adverse mitigation measures with respect to ongoing development may result in degradation of the entire local economy with the consequential loss of jobs and quality of life for all residents.

These are important points that should be considered in the preparation of the EIR

Foot Notes:

a. Supervisor Veerkamp opined that in his many years of residency in El Dorado County, he has notice a marked increase in the number of trees. At June 22, 2015 BOS meeting (video 2:31:09) he said, "having lived here 57 years now, I've seen an overall increase in the amount of trees in the County to the point where we're getting bombarded from the fire safe councils, and insurance companies pulling out, so somehow we've got to strike a balance to all this." This statement reaffirms the need to consider natural regeneration as a mitigating factor in the EIR.

b. Determine and include the effects of natural regeneration of resources in any assessment of impact. This obviously will have the effect of mitigating any impacts. In fact it might be revealed that natural regeneration of resources more than offsets impacts from development.

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

Central Valley Regional Water Quality Control Board

10 August 2015

Shawna Purvines
El Dorado County
2850 Fairlane Court
Placerville, CA 95667

CERTIFIED MAIL
7014 2870 0000 7535 4852

COMMENTS TO REQUEST FOR REVIEW FOR THE DRAFT ENVIRONMENTAL IMPACT REPORT, BIOLOGICAL RESOURCES POLICY UPDATE AND OAK RESOURCES MANAGEMENT PLAN PROJECT, SCH# 2015072031, EL DORADO COUNTY

Pursuant to the State Clearinghouse's 17 July 2015 request, the Central Valley Regional Water Quality Control Board (Central Valley Water Board) has reviewed the *Request for Review for the Draft Environment Impact Report* for the Biological Resources Policy Update and Oak Resources Management Plan Project, located in El Dorado County.

Our agency is delegated with the responsibility of protecting the quality of surface and groundwaters of the state; therefore our comments will address concerns surrounding those issues.

Construction Storm Water General Permit

Dischargers whose project disturb one or more acres of soil or where projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres, are required to obtain coverage under the General Permit for Storm Water Discharges Associated with Construction Activities (Construction General Permit), Construction General Permit Order No. 2009-009-DWQ. Construction activity subject to this permit includes clearing, grading, grubbing, disturbances to the ground, such as stockpiling, or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP).

For more information on the Construction General Permit, visit the State Water Resources Control Board website at:
http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml.

Phase I and II Municipal Separate Storm Sewer System (MS4) Permits[1]

The Phase I and II MS4 permits require the Permittees reduce pollutants and runoff flows from new development and redevelopment using Best Management Practices (BMPs) to the maximum extent practicable (MEP). MS4 Permittees have their own development standards, also known as Low Impact Development (LID)/post-construction standards that include a hydromodification component. The MS4 permits also require specific design concepts for LID/post-construction BMPs in the early stages of a project during the entitlement and CEQA process and the development plan review process.

For more information on which Phase I MS4 Permit this project applies to, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/water_issues/storm_water/municipal_permits/.

For more information on the Phase II MS4 permit and who it applies to, visit the State Water Resources Control Board at:
http://www.waterboards.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.shtml

Industrial Storm Water General Permit

Storm water discharges associated with industrial sites must comply with the regulations contained in the Industrial Storm Water General Permit Order No. 2014-0057-DWQ.

For more information on the Industrial Storm Water General Permit, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/water_issues/storm_water/industrial_general_permits/index.shtml.

Clean Water Act Section 404 Permit

If the project will involve the discharge of dredged or fill material in navigable waters or wetlands, a permit pursuant to Section 404 of the Clean Water Act may be needed from the United States Army Corps of Engineers (USACOE). If a Section 404 permit is required by the USACOE, the Central Valley Water Board will review the permit application to ensure that discharge will not violate water quality standards. If the project requires surface water drainage realignment, the applicant is advised to contact the Department of Fish and Game for information on Streambed Alteration Permit requirements.

If you have any questions regarding the Clean Water Act Section 404 permits, please contact the Regulatory Division of the Sacramento District of USACOE at (916) 557-5250.

[1] Municipal Permits = The Phase I Municipal Separate Storm Water System (MS4) Permit covers medium sized Municipalities (serving between 100,000 and 250,000 people) and large sized municipalities (serving over 250,000 people). The Phase II MS4 provides coverage for small municipalities, including non-traditional Small MS4s, which include military bases, public campuses, prisons and hospitals.

Clean Water Act Section 401 Permit – Water Quality Certification

If an USACOE permit (e.g., Non-Reporting Nationwide Permit, Nationwide Permit, Letter of Permission, Individual Permit, Regional General Permit, Programmatic General Permit), or any other federal permit (e.g., Section 9 from the United States Coast Guard), is required for this project due to the disturbance of waters of the United States (such as streams and wetlands), then a Water Quality Certification must be obtained from the Central Valley Water Board prior to initiation of project activities. There are no waivers for 401 Water Quality Certifications.

Waste Discharge Requirements

If USACOE determines that only non-jurisdictional waters of the State (i.e., "non-federal" waters of the State) are present in the proposed project area, the proposed project will require a Waste Discharge Requirement (WDR) permit to be issued by Central Valley Water Board. Under the California Porter-Cologne Water Quality Control Act, discharges to all waters of the State, including all wetlands and other waters of the State including, but not limited to, isolated wetlands, are subject to State regulation.

For more information on the Water Quality Certification and WDR processes, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/help/business_help/permit2.shtml.

Regulatory Compliance for Commercially Irrigated Agriculture

If the property will be used for commercial irrigated agricultural, the discharger will be required to obtain regulatory coverage under the Irrigated Lands Regulatory Program.
There are two options to comply:

1. **Obtain Coverage Under a Coalition Group.** Join the local Coalition Group that supports land owners with the implementation of the Irrigated Lands Regulatory Program. The Coalition Group conducts water quality monitoring and reporting to the Central Valley Water Board on behalf of its growers. The Coalition Groups charge an annual membership fee, which varies by Coalition Group. To find the Coalition Group in your area, visit the Central Valley Water Board's website at: http://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/app_approval/index.shtml; or contact water board staff at (916) 464-4611 or via email at IrrLands@waterboards.ca.gov.

2. **Obtain Coverage Under the General Waste Discharge Requirements for Individual Growers, General Order R5-2013-0100**. Dischargers not participating in a third-party group (Coalition) are regulated individually. Depending on the specific site conditions, growers may be required to monitor runoff from their property, install monitoring wells, and submit a notice of intent, farm plan, and other action plans regarding their actions to comply with their General Order. Yearly costs would include State administrative fees (for example, annual fees for farm sizes from 10-100 acres are currently $1,084 + $6.70/Acre); the cost to prepare annual monitoring reports; and water quality monitoring costs. To enroll as an Individual Discharger under the Irrigated Lands Regulatory

Program, call the Central Valley Water Board phone line at (916) 464-4611 or e-mail board staff at IrrLands@waterboards.ca.gov.

Low or Limited Threat General NPDES Permit

If the proposed project includes construction dewatering and it is necessary to discharge the groundwater to waters of the United States, the proposed project will require coverage under a National Pollutant Discharge Elimination System (NPDES) permit. Dewatering discharges are typically considered a low or limited threat to water quality and may be covered under the General Order for *Dewatering and Other Low Threat Discharges to Surface Waters* (Low Threat General Order) or the General Order for *Limited Threat Discharges of Treated/Untreated Groundwater from Cleanup Sites, Wastewater from Superchlorination Projects, and Other Limited Threat Wastewaters to Surface Water* (Limited Threat General Order). A complete application must be submitted to the Central Valley Water Board to obtain coverage under these General NPDES permits.

For more information regarding the Low Threat General Order and the application process, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2013-0074.pdf

For more information regarding the Limited Threat General Order and the application process, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2013-0073.pdf

If you have questions regarding these comments, please contact me at (916) 464-4684 or tcleak@waterboards.ca.gov.

Trevor Cleak
Environmental Scientist

cc: State Clearinghouse unit, Governor's Office of Planning and Research, Sacramento

STATE OF CALIFORNIA

GOVERNOR'S OFFICE *of* PLANNING AND RESEARCH

STATE CLEARINGHOUSE AND PLANNING UNIT

EDMUND G. BROWN JR.
GOVERNOR

KEN ALEX
DIRECTOR

Notice of Preparation

July 17, 2015

To: Reviewing Agencies

Re: Biological Resources Policy Update and Oak Resources Management Plan
SCH# 2015072031

Attached for your review and comment is the Notice of Preparation (NOP) for the Biological Resources Policy Update and Oak Resources Management Plan draft Environmental Impact Report (EIR).

Responsible agencies must transmit their comments on the scope and content of the NOP, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of the NOP from the Lead Agency. This is a courtesy notice provided by the State Clearinghouse with a reminder for you to comment in a timely manner. We encourage other agencies to also respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

Shawna Purvines
El Dorado County
2850 Fairlane Court
Placerville, CA 95667

with a copy to the State Clearinghouse in the Office of Planning and Research. Please refer to the SCH number noted above in all correspondence concerning this project.

If you have any questions about the environmental document review process, please call the State Clearinghouse at (916) 445-0613.

Sincerely,

Scott Morgan
Director, State Clearinghouse

Attachments
cc: Lead Agency

Document Details Report
State Clearinghouse Data Base

SCH#	2015072031
Project Title	Biological Resources Policy Update and Oak Resources Management Plan
Lead Agency	El Dorado County

Type	NOP Notice of Preparation
Description	El Dorado County proposes to amend several General Plan objectives, policies, and implementation measures addressing biological resources and to adopt an Oak Resources Management Plan.

Lead Agency Contact

Name	Shawna Purvines		
Agency	El Dorado County		
Phone	530 621 5362	*Fax*	
email			
Address	2850 Fairlane Court		
City	Placerville	*State* CA	*Zip* 95667

Project Location

County	El Dorado			
City				
Region				
Cross Streets				
Lat / Long				
Parcel No.				
Township		*Range*	*Section*	*Base*

Proximity to:

Highways	
Airports	
Railways	
Waterways	
Schools	
Land Use	

Project Issues	Aesthetic/Visual; Agricultural Land; Air Quality; Archaeologic-Historic; Biological Resources; Drainage/Absorption; Flood Plain/Flooding; Forest Land/Fire Hazard; Geologic/Seismic; Minerals; Noise; Public Services; Recreation/Parks; Schools/Universities; Soil Erosion/Compaction/Grading; Solid Waste; Toxic/Hazardous; Traffic/Circulation; Vegetation; Water Quality; Water Supply; Wetland/Riparian; Growth Inducing; Landuse; Cumulative Effects
Reviewing Agencies	Resources Agency; Cal Fire; Department of Parks and Recreation; Department of Water Resources; Department of Fish and Wildlife, Region 2; Native American Heritage Commission; Caltrans, District 3 S; Air Resources Board; Regional Water Quality Control Bd., Region 5 (Sacramento)

Date Received	07/16/2015	*Start of Review*	07/17/2015	*End of Review*	08/17/2015

Notice of Completion & Environmental Document Transmittal

SCH# 2015072031

Mail to: State Clearinghouse, P.O. Box 3044, Sacramento, CA 95812-3044 (916) 445-0613
For Hand Delivery/Street Address: 1400 Tenth Street, Sacramento, CA 95814

Project Title: El Dorado County Biological Resources Policy Update and Oak Resources Management Plan
Lead Agency: El Dorado County — Contact Person: Shawna Purvines
Mailing Address: 2850 Fairlane Court — Phone: 530.621.5362
City: Placerville — Zip: 95667 — County: El Dorado

Project Location: County: El Dorado — City/Nearest Community: County-wide
Cross Streets: — Zip Code:
Longitude/Latitude (degrees, minutes and seconds): ° ' " N / ° ' " W Total Acres:
Assessor's Parcel No.: — Section: — Twp: — Range: — Base:
Within 2 Miles: State Hwy#: — Waterways:
Airports: — Railways: — Schools:

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Document Type:

CEQA: ☒ NOP ☐ Draft EIR ☐ Supplement/Subsequent EIR (Prior SCH No.) ☐ Early Cons ☐ Neg Dec ☐ Mit Neg Dec Other:
NEPA: ☐ NOI ☐ EA ☐ Draft EIS ☐ FONSI
Other: ☐ Joint Document ☐ Final Document ☐ Other:

Local Action Type:

☐ General Plan Update ☐ General Plan Amendment ☒ General Plan Element ☐ Community Plan
☐ Specific Plan ☐ Master Plan ☐ Planned Unit Development ☐ Site Plan
☐ Rezone ☐ Prezone ☐ Use Permit ☐ Land Division (Subdivision, etc.)
☐ Annexation ☐ Redevelopment ☐ Coastal Permit ☒ Other: oak resource management plan

Development Type:

☐ Residential: Units Acres
☐ Office: Sq. ft. Acres Employees
☐ Commercial: Sq. ft. Acres Employees
☐ Industrial: Sq. ft. Acres Employees
☐ Educational:
☐ Recreational:
☐ Water Facilities: Type MGD
☐ Transportation: Type
☐ Mining: Mineral
☐ Power: Type MW
☐ Waste Treatment: Type MGD
☐ Hazardous Waste: Type
☐ Other:

Project Issues Discussed in Document:

☒ Aesthetic/Visual ☒ Agricultural Land ☒ Air Quality ☒ Archeological/Historical ☒ Biological Resources ☐ Coastal Zone ☒ Drainage/Absorption ☐ Economic/Jobs
☐ Fiscal ☒ Flood Plain/Flooding ☒ Forest Land/Fire Hazard ☒ Geologic/Seismic ☒ Minerals ☒ Noise ☐ Population/Housing Balance ☒ Public Services/Facilities
☒ Recreation/Parks ☒ Schools/Universities ☐ Septic Systems ☐ Sewer Capacity ☒ Soil Erosion/Compaction/Grading ☒ Solid Waste ☒ Toxic/Hazardous ☒ Traffic/Circulation
☒ Vegetation ☒ Water Quality ☒ Water Supply/Groundwater ☒ Wetland/Riparian ☒ Growth Inducement ☒ Land Use ☒ Cumulative Effects ☐ Other:

Present Land Use/Zoning/General Plan Designation:
Click here to enter text.

Project Description: *(please use a separate page if necessary)*
El Dorado County proposes to amend several General Plan objectives, policies, and implementation measures addressing biological resources and to adopt an Oak Resources Management Plan.

Note: The State Clearinghouse will assign identification numbers for all new projects. If a SCH number already exists for a project (e.g. Notice of Preparation or previous draft document) please fill in.

KRS

)P Distribution List

County: El Dorado **SCH#** 2015072031

ırces Agency

esources Agency
adell Gayou

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- [ ] **California Coastal Commission**
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- [ ] **Colorado River Board**
  Lisa Johansen
- [ ] **Dept. of Conservation**
  Elizabeth Carpenter
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  Eric Knight
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  Dan Foster
- [ ] **Central Valley Flood Protection Board**
  James Herota
- [ ] **Office of Historic Preservation**
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- [ ] **California Department of Resources, Recycling & Recovery**
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- [ ] **S.F. Bay Conservation & Dev't. Comm.**
  Steve McAdam
- [ ] **Dept. of Water Resources**
  Resources Agency
  Nadell Gayou

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  Environmental Services Division
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  Curt Babcock
- [ ] **Fish & Wildlife Region 1E**
  Laurie Harnsberger
- [x] **Fish & Wildlife Region 2**
  Jeff Drongesen
- [ ] **Fish & Wildlife Region 3**
  Charles Armor
- [ ] **Fish & Wildlife Region 4**
  Julie Vance
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  Leslie Newton-Reed
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- [ ] **Fish & Wildlife Region 6**
  Tiffany Ellis
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- [ ] **Depart. of General Services**
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- [x] **Caltrans, District 3**
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  Tom Dumas
- [ ] **Caltrans, District 11**
  Jacob Armstrong
- [ ] **Caltrans, District 12**
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Cal EPA

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  - [ ] Transportation Projects
    Nesamani Kalandiyur
  - [ ] Industrial/Energy Projects
    Mike Tollstrup
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- [ ] **State Water Resources Control Board**
  Karen Larsen
  Division of Drinking Water
- [ ] **State Water Resources Control Board**
  Student Intern, 401 Water Quality Certification Unit
  Division of Water Quality
- [ ] **State Water Resouces Control Board**
  Phil Crader
  Division of Water Rights
- [ ] **Dept. of Toxic Substances Control**
  CEQA Tracking Center
- [ ] **Department of Pesticide Regulation**
  CEQA Coordinator

Regional Water Quality Control Board (RWQCB)

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  North Coast Region (1)
- [ ] **RWQCB 2**
  Environmental Document Coordinator
  San Francisco Bay Region (2)
- [ ] **RWQCB 3**
  Central Coast Region (3)
- [ ] **RWQCB 4**
  Teresa Rodgers
  Los Angeles Region (4)
- [x] **RWQCB 5S**
  Central Valley Region (5)
  - [ ] **RWQCB 5F**
    Central Valley Region (5)
    Fresno Branch Office
  - [ ] **RWQCB 5R**
    Central Valley Region (5)
    Redding Branch Office
- [ ] **RWQCB 6**
  Lahontan Region (6)
  - [ ] **RWQCB 6V**
    Lahontan Region (6)
    Victorville Branch Office
- [ ] **RWQCB 7**
  Colorado River Basin Region (7)
- [ ] **RWQCB 8**
  Santa Ana Region (8)
- [ ] **RWQCB 9**
  San Diego Region (9)

- [ ] **Other** _____

_____

_____

- [ ] _____
  Conservancy

Last Updated 6/23/2015

Shawna Purvines <shawna.purvines@edcgov.us>

Comments on biological resources GP amendment

1 message

Susan Britting <britting@earthlink.net> Mon, Aug 17, 2015 at 1:10 PM
To: Shawna Purvines <shawna.purvines@edcgov.us>

Hi Shawna --
See attached comments on behalf of CNPS and CSNC on GP amendment. I will drop a paper copy at the front desk of the Planning Department this afternoon.

- Sue

--
Susan Britting, Ph.D.
Executive Director
Sierra Forest Legacy

britting@earthlink.net
(530) 295-8210

www.sierraforestlegacy.org

CNPS CSNC comments on bio resources amendment 8-17-15.pdf
157K

Shawna Purvines <shawna.purvines@edcgov.us>

Attachments now included -- Re: Comments on biological resources GP amendment

1 message

Susan Britting <britting@earthlink.net> Mon, Aug 17, 2015 at 2:04 PM
To: Shawna Purvines <shawna.purvines@edcgov.us>

Hi Shawna --
In my eagerness to send, I forgot to include the attachments. They are here now. I will drop a paper copy with same at front desk today.

- Sue

On 8/17/2015 1:10 PM, Susan Britting wrote:

> Hi Shawna --
> See attached comments on behalf of CNPS and CSNC on GP amendment. I will drop a paper copy at the front desk of the Planning Department this afternoon.
>
> - Sue
>
> --
> Susan Britting, Ph.D.
> Executive Director
> Sierra Forest Legacy
>
> britting@earthlink.net
> (530) 295-8210
>
> www.sierraforestlegacy.org

--
Susan Britting, Ph.D.
Executive Director
Sierra Forest Legacy

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CNPS CSNC comments on bio resources amendment 8-17-15.pdf
2702K

August 17, 2015

Shawna Purvines, Principal Planner
El Dorado Community Development Agency
Long Range Planning Division
2850 Fairlane Court
Placerville, CA 95667

Re: Comments on notice of preparation for general plan amendments to biological resources plan components

Ms. Purvines:

We have reviewed the notice of preparation (NOP) for the biological resources policy update to the general plan (GP) and offer the following comments on behalf of the California Native Plant Society and Center for Sierra Nevada conservation.

1) Changes in Objectives 7.4.1 and 7.4.2 and Associated Polices

We raised in earlier comments a concern about the lack of integration between objectives and policies. We remain concerned that the project description in the NOP and supporting documents still does not provide the integration provided by the existing general plan. The project description in the NOP also does not clearly define some terms, e.g., "special-status vegetation communities" or more specifically the "vegetation communities" to which the mitigation ratios in Policy 7.4.2.8 will apply. We ask that the assumptions about which "vegetation communities" that will be subject to the mitigation ratios be clearly stated and evaluated in the draft environmental impact report (DEIR).

We also think that the emphasis on Pine Hill plants in Policy 7.4.1 without providing equal emphasis on other species protected by state and federally de-emphasizes the commitment in the GP to other protected species. The lack of emphasis on other protected species is illustrated by Policy 7.4.2.1 which commits only to coordinating wildlife programs with state and federal agencies. The affirmation from the County in the existing Objective 7.4.1 protect all state and federally recognized rare, threatened or endangered species and their habitat consistent with state and federal law should be retained in the proposed action and preferred alternative.

"Large expanses of native vegetation" are to be "conserved" through the programs implemented in the GP (Policy 7.4.2.8) yet it is unclear which policies under Objective 7.4.2 specifically implement this direction. Fragmentation of habitats through the development centered along Highway 50 has long been known to be a significant impact. We ask that the

DEIR evaluate the impacts of the project description and alternatives on their potential to fragment existing areas of native vegetation in the county. When evaluating expanses of native vegetation, we also ask that you consider habitat patches of all sizes and not arbitrarily limit the evaluation to patches of certain size or exclude areas based on parcel size.

2) In-lieu Fee to Conserve Oak Woodlands

The NOP indicates the County's intent to use the Oak Resources Management Plan and supporting policies to provide an option that allows a project proponent to mitigate for all projects impacts by paying a fee in-lieu of any other mitigations requirements. We do not believe that this mitigation approach in the project description is legally sufficient to reduce significant impacts of development to the extent feasible. We come to this conclusion since the in-lieu fee program does not address mitigation in the area where the principle impacts occur – the Highway 50 development corridor.

Presently, the in-lieu fee program does not include any Priority Conservation Areas (PCAs) in the central portion of the county near Highway 50. Yet we know from presentations made by to the Board of Supervisors (BOS) in February 2015 that there are biological "shortfalls" in the existing PCA system. The analysis provided indicated that the estimated impacts to woodland values cannot be mitigated only by the PCAs. In response, the BOS agreed to allow conservation to occur on lands outside the PCAs and would establish criteria for identifying additional conservation areas.

Having agreed that the locations of the existing PCAs were not by themselves sufficient to address impacts to oak woodlands, the proposed in-lieu fee program (designed solely on the cost to acquire lands in the PACs) is not sufficient to mitigate the impacts on oak woodlands in the areas where development is expected. Because the in-lieu fee does not incorporate the higher cost of the "additional areas" needed to make the PCA strategy sufficient, payment of an in-lieu fee alone cannot be assured to reduce impacts to the extent feasible. Also, the ORMP only states that conservation outside of the PCAs may occur, but fails to identify when it must occur due to the location of project related impacts.

We propose the following as mitigation measures to provide for conservation and to feasibly lessen impacts on oak woodlands:

- Require a combination of on-site mitigation and in-lieu fee for those projects in the central portion of the county that contribute to impacts on oak woodlands; or

- Develop PCAs in the central portion of county that reduce impacts from fragmentation in the central portion of the County and incorporate the acquisition costs of these areas into the in-lieu fee program.

There may well be other options for mitigation measures. Our principle point is that for the in-lieu fee program to be relied upon it must include the costs of all the lands needed to make the

program sufficient to meet the conservation objectives and planning requirements for oak woodlands. We also believe that it is necessary to mitigate project impacts as close as possible to the area of impact.

3) Analysis of the Impacts of Development on Oak Woodland Fragmentation

We ask that you complete a spatial analysis of potential impacts of development on oak woodlands that utilizes the current condition as the baseline. We ask that you not limit the characterization of current condition by arbitrarily defining "large" patches of oak woodland or constraining the sizes of the parcels considered. We note that by accepting in the draft ORMP land dedications of 5-acres or greater having conservation value, any analysis of impacts should include patches of oak woodland at least this size and greater. We would argue that depending on the woodland type (e.g., rarity) and location, patches smaller than 5 acres can be biologically significant.

We also ask that the spatial analysis take into account the variety of woodland types encountered in the county (e.g., species and woodland density). We have attached information on habitat values of oak woodland of various types to inform the evaluation of existing condition and potential impacts.

4) The Project Description is not Stable

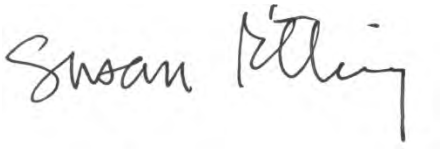
Simultaneous with this amendment of the biological policies and objectives is a targeted GP amendment and zoning ordinance update (TGPA/ZOU). Changes as a result of that process have the potential to increase the impacts on oak woodland resources. We ask that the DEIR analyze both the existing GP and the changes proposed in the TGPA/ZOU to ensure that the analysis for this proposal covers the range of conditions that may be in existence upon implementation.

Conclusion

We believe the project description still lacks clarity about the habitat that will be conserved under objective 7.4.2. We also identified a fundamental flaw in the design of the in-lieu fee program, i.e., its failure to adequately address the "shortfall" in the existing PCAs. We believe these deficiencies are sufficiently severe that the project description should be revised to provide remedies prior to completing a DEIR.

We appreciate the opportunity to comment on the proposed changes to the general plan. Please include us on future notifications as the process moves forward. Please contact Sue Britting, if you have questions or wish to discuss our comments.

Sincerely,



Susan Britting, Ph.D.
Conservation Chair
El Dorado Chapter
PO Box 377
Coloma, CA 95613

Karen Schambach
President
Center for Sierra Nevada Conservation

Attachments: Guidelines for Managing California's Hardwood Rangelands (1996)

Saving, S. C., & Greenwood, G. B. (2002). The potential impacts of development on wildlands in El Dorado County, California. In *Proceedings of the 5th Symposium on California's Oak Woodlands: Oaks in California's Landscape. USDA Forest Service Gen. Tech. Rep. PSW-GTR-184* (pp. 443-461).

Guidelines for Managing California's Hardwood Rangelands

UNIVERSITY OF CALIFORNIA DIVISION OF AGRICULTURE & NATURAL RESOURCES PUBLICATION 3368
1996

UNIVERSITY OF CALIFORNIA
INTEGRATED HARDWOOD RANGE MANAGEMENT PROGRAM

CALIFORNIA DEPARTMENT OF FISH & GAME

CALIFORNIA DEPARTMENT OF FORESTRY & FIRE PROTECTION

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Publication 3368

Printed in the United States of America.

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Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits and/or vegetables ready to be picked.

Mix and apply only the amount of pesticide you will need to complete the application. Spray all the material according to label directions. Do not dispose of unused material by pouring down the drain or toilet. Do not pour on ground; soil or underground water supplies may be contaminated. Follow label directions for disposing of container. Never burn pesticide containers.

PHYTOTOXICITY: Certain chemicals may cause plant injury if used at the wrong stage of plant development or when temperatures are too high. Injury may also result from excessive amounts or the wrong information or from mixing incompatible materials. Inert ingredients, such as wetters, spreaders, emulsifiers, diluents, and solvents, can cause plant injury. Since formulations are often changed by manufacturers, it is possible that plant injury may occur, even though no injury was noted in previous seasons.

ON THE COVER: Oaks on a foggy morning — Murphy's Laurelwood Ranch, Sonoma County, California. Photograph courtesy of Michael Brigham, Photographix, 131 E. First Street, Cloverdale, CA 95425. Inside photographs by Michael Brigham, Richard B. Standiford, and Douglas R. McCreary.

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Chapter Three

Resource Assessment and General Hardwood Rangeland Values

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General Assessment of Property

Once you have completed an assessment of the goals for your hardwood rangeland property, it is necessary to assess the various resources to determine if it is possible to accomplish these goals, and where management activities should be directed. In this chapter, we will present two general worksheets. Worksheet 3-1 gives a framework for evaluating the overall hardwood rangeland property, while worksheet 3-2 will help you assemble basic information about your hardwood stands. Most of the information for 3-1 is easily available from a general reconnaissance of the property, as well as an evaluation of maps and aerial photos. The section on sources of assistance gives advice on ordering maps and photos if you do not already have these. You should plan on completing this entire resource assessment exercise because it can provide a foundation upon which sound land management actions may be built. This is a good activity for all family members or parties interested in a particular property to participate in together. The information gained in this exercise will ensure that everyone has a common base of knowledge about the existing resources on a property.

Stand Level Assessment

Once you have completed the general property assessment in Worksheet 3-1, take a look at the information in table 3-1 for some general resource enterprises that may work on your property. These possible enterprises can be compared with those which fit in with your goals developed from the worksheets in chapter 1, to decide on the management potential for your hardwood rangeland property. Then you will be able to direct your attention to detailed discussions in chapters 4 through 9 of this book on various hardwood rangeland enterprises. You may need to collect additional information for a detailed assessment of the individual enterprises. This should help guide your decision about which types of management activities will be best for your situation.

Seen at left is a large madrone tree located on a ranch in Sonoma County. In the background are black oak trees. Madrone trees frequently occur on montane hardwood rangelands.

Worksheet 3-1. Hardwood Rangeland Propety Assessment

General Property Information

Property name _____ Parcel size _____ acres Elevation _____ feet

Describe how property was acquired (date, method acquired, original purchase price/basis)

Current Property Value _____

Nature of ownership

❑ Sole ❑ Joint ❑ Partnership ❑ Other _____

Property location (describe general loeation of property; use local maps where possible)

Accessibility (deseribe road access to various parts of the property and locate on map/photo)

Adjacent land uses (describe all adjacent land uses)

❑ Ag./open space ❑ Suburban ❑ Rural Residential ❑ Urban ❑ Public land ❑ Protected Areas

Topography (show on map/photo)

Acres on slopes less than 30% ___ Acres on slopes greater than 30% ___

Distance to markets

Distance to urban areas/clientele base for hunt clubs and customers for firewood: ___ miles

Distance to livestock markets: ___ miles

Other markets: ___ miles

Legal/political/social constraints (list ordinances, deed restrictions, zoning, and neighbor concerns affecting property)

Water

Sources of water (describe all sources of water on property and locate on map/photo where appropriate)

❑ Ponds ❑ Water troughs ❑ Springs ❑ Intermittent streams ❑ Perennial streams

❑ Wells ❑ Irrigation ditch ❑ Municipal water source ❑ Other _____

Water quality concerns (describe and locate areas with specific water quality concerns)

General Vegetation Information

Acres by general vegetation cover types (locate vegetation types on map/pboto)

Grassland _____ acres Oak woodlands _____ acres Shrubland _____ acres

Irrigated agric. _____ acres Residential areas _____ acres Wetlands/riparian zones _____ acres

Other forested type _____ acres Other ( ) _____ acres

Worksheet 3-1. Hardwood Rangeland Property Assessment (cont.)

Current Management/Economic Uses

Grazing/livestock (check current enterprises that apply, and general information below)

❑ Cow/calf ❑ Stocker ❑ Sheep; ewe/lamb ❑ Lease grazing to others

❑ Other livestock _____

Current livestock inventory: ____ head on ____ acres

Season of use (check all that apply): ❑ Fall ❑ Winter ❑ Spring ❑ Summer

Other sources of forage: ❑ Public land lease ❑ Private lease ❑ Another ranch ❑ Other _____

Tree harvest (describe current tree harvest and marketing programs)

Type of wood products sold: ❑ Firewood ❑ Sawtimber ❑ Biomass ❑ Other _____

Species of tree sold: ❑ Blue oak ❑ Live oak ❑ Foothill pine ❑ Other _____

Harvest _____ cords every ____ years on _____ acres

Hunt Club (describe any hunt club activities you have)

Game species hunted: ❑ Deer ❑ Turkey ❑ Other gamebirds ❑ Pigs ❑ Elk ❑ Other _____

Lease description (describe hunt club economic arrangement)

List other economic uses of hardwood rangeland property

Capital improvements (list of all capital improvements and show on map/photo)

Buildings	Fencing	Road systems	Other Improvements

Resource Constraints

Soils (list all soil series, general productivity, and constraints)

Erodible areas (list all eroded and erodible areas and locate on map/photo where possible)

Threatened and endangered plant and animal species

Table 3-1. Matrix of resource assessment and management enterprises (for assessment chapter)

Assessment Criteria	Livestock grazing	Hunt club/ recreation	Conservation land	Wood products	Specialty products
Parcel size	>25 acres	>500 ac (deer); >100 ac. (turkeys)	>100 ac.	>100 ac.	Depends on product
Cover type and pattern	Must have patches of open or low density woodlands for forage	Mixture of dense and open woodlands with large patches of dense connected woodlands	Must have some special cover type being lost near property or a highly desirable habitat	Must have stands with over 40 percent cover	Sufficient amount of vegetation type for product
Water	Need water	Need water	May enhance value	Not important	May be important
Access	Not important	Need road system for transport	Not essential unless public access desired	Need road system for hauling	Need access for transportation and management
Adjacent land use	Urban uses may present social conflicts	Urban uses may present social conflicts: Rely on neighbors for some habitat needs	Opportunities are best in areas close to urban/residential areas	Urban uses may present social conflicts	Urban uses may present conflicts or opportunities depending on product
Topography	Most areas <50 pct. slope	Need areas with <50 pct. slope for access	Slope class has little effect	Operate only in areas with <30 pct. slope	Most likely need areas <30 pct. slope
Distance to market	Unlimited with new video marketing sales	Need to be <120 miles	Generally near to urban areas or areas with some adverse impact	<100 miles	Should be <100 miles to market to minimize transportation
Capital improvements	Fences, water facilities	Not critical	Not critical	Depends on product	Depends on product
Legal constraints	Local ordinances, T&E species	T&E species, hunting regulations	Often restricts future land use; may be constraints on compatible enterprises	Local ordinances, T&E species, deed restrictions, Forest Practice Act	Need to check health codes, zoning restrictions, T&E species
Resource constraints	Need residual biomass	Species of interest should be present in sufficient numbers to support harvest (i.e. turkeys, deer, etc.)	Presence of critical habitat or threatened and endangered species may enhance value	Site must be capable of regeneration from seedlings or sprouting	Need to ensure that "product" management does not disrupt site ecological processes

Assessing Legal Concerns

Today's land management must often comply with numerous laws and regulations that are imposed at all levels - local, state, and federal. Federal laws and regulations are implemented by either the federal agency which has jurisdiction, or are delegated to a state agency. State laws and regulations for the most part are the responsibility of the jurisdictional agency, although responsibilities can be delegated to county or district agencies. Local ordinances are implemented by the county or district agency. An important part of an assessment is finding out which of these legal concerns apply to your situation, and what these require you to do. Some of the different types of laws and regulations you should be investigating are described, as well as where you might find more information.

Water: Water rights and water quality are both the responsibility of the California State Water Resources Board, who further delegate the water quality responsibilities to nine Regional Water Quality Control Boards. Federal laws such as the Federal Clean Water Act, Safe Drinking Act, and Coastal Zone Act are tailored for implementation in California by the Porter-Cologne Act. Water rights are involved when considering pond or spring development and diversions for water supplies. Water rights applications and information for land parcels are obtained at the county recorder's office. Stream water diversions require a "1603 permit" from the California Department of Fish and Game. Water quality considerations for hardwood rangelands most often involve nonpoint source pollution factors, including sedimentation, nutrients, and/or pathogens. Riparian vegetation management is frequently considered along with these other nonpoint source pollution factors.

Wetlands: Wetlands jurisdiction is confusing and landowners and managers should check to see what issues are of local concern and which agency is involved. Laws and regulations are under a state of revision. For most agricultural lands, the Natural Resources Conservation Service (NRCS) has the lead role for wetlands management. In some cases, the Army Corps of Engineers, the US Fish and Wildlife Service, or the California Department of Fish and Game may be the lead agency.

Air Quality: Any burning activities are under the jurisdiction of local Air Quality Management Districts (AQMD). Check with your local AQMD to determine an air quality restrictions that would apply to management of your hardwood rangelands.

Wildlife: The County Agricultural Commissioner handles issues related to controlled materials for predator control. The California Department of Fish and Game is responsible for issuing predation permits for some animals (deer, mountain lions, bear, etc.), and for setting regulations over hunting and fishing. Furthermore, the Department protects species listed as threatened, endangered, or protected by state law, and it has general jurisdiction and public trust responsibility for the state's fish and wildlife and their habitats.

Timber: Most tree species on hardwood rangelands are currently not considered "commercial species" and are not subject to the Forest Practice Rules administered by the State Board of Forestry. However, a number of counties and cities have ordinances that affect the harvest of oak trees on rangelands. Several other counties have voluntary oak tree harvesting guidelines and suggested best management practices. Check with local experts to see what local rules and guidelines apply to your area.

Endangered Species: Both federal and state laws list plants and animals that are threatened or endangered. The US Fish and Wildlife Service has jurisdiction over the federally listed species, while the California Department of Fish and Game has jurisdiction of those listed by the state (see Appendix A and B). Specific circumstances may prohibit certain management practices or changes in land use if they affect a listed plant or animal. Check locally with California Department of Fish and Game, U.S. Fish and Wildlife Service, or UC Farm Advisors for the situation in your area. This is discussed in more detail in chapter 4.

Archaeological Sites: There is increasing public concern about preserving historically and culturally significant

sites. The presence of such sites may impact proposed changes in land use or management. County planning, Community Colleges, State Colleges, and local museums are good sources of information on archaeological sites in your area.

Land Use: A number of land use related issues may influence certain management decisions. The California Land Conservation Act (Williamson Act) contracts with certain counties to provide tax relief for agreeing to not develop land for 10 years. County General Plans often have restrictions on parcel size, land use, and zoning. Easements for utilities, conservation, open space, and wildlife habitat are becoming more common. Other laws and ordinances to be aware of are those relating to the right to farm and fence, trespass laws, as well as private property rights laws.

Livestock: There are a number of laws relating to livestock including: animal identification (branding) law; laws relating to diseases such as TB and brucellosis; and laws concerned with the disposal of dead animals. Your local agricultural commissioner can provide information on each of these.

Professional Certification: The State Board of Forestry has the licensing authority over natural resource professionals to protect the natural resources of the state and to protect the public interest by ensuring competent professional work. Designations for Certified Rangeland Managers (CRM) and Registered Professional Foresters are maintained by the State Board of Forestry. Details on qualifications, duties, and a list of certified professionals are available.

Values for Hardwood Rangeland Stands

Worksheet 3-2 helps you to collect basic information on hardwood rangeland cover type, canopy cover, slope class, and associated habitat elements, and will allow you to look up some general ecological and managerial recommendations. Table 3-2 shows how the information on tree cover type and canopy density can be used to refer you to a specific description. For example, if your stand is a blue oak woodland with a 50 percent canopy cover, you would go to the description for site C, found on page 11 of this chapter.

Each of the 12 broad site descriptions gives general recommendations and assessments on four categories: oak cover/forestry; recreation; wildlife diversity; and grazing. These are based on some very broad statewide conclusions from practical experiences and research studies. These descriptions, assessments, and recommendations are intended to guide you through some general ideas on the potential uses for hardwood rangeland stands on your property. As you evaluate these recommendations, the rainfall zone, slope class, and presence of wildlife habitat elements such as snags, riparian zones, or downed woody debris, which you are assessing in worksheet 3-2, will allow you to refine these recommendations. These general recommendations must be followed up with site specific information for your local area. Chapters 4 through 9 will help you develop this site specific information for your property.

Table 3-2. Classification for hardwood rangeland sites based on tree cover type and canopy cover.

Tree Cover Type	Tree Canopy Cover			
	10 - 24%	25 - 39%	40 - 59%	60 - 100%
Blue oak woodland, blue oak-foothill pine woodland	A	B	C	D
Valley oak woodland	E	F	G	H
Coastal oak woodland, montane hardwood	I	J	K	L

Worksheet 3-2. Hardwood Rangeland Stand Assessment

Property name

Location of Stand (describe general location on property, use maps where possible)

Acres in Stand		Elevation	Soil Series	
Aspect	❑ North	❑ South	❑ East ❑ West	
Av. Annual Rainfall	❑ <15"	❑ 15 - 25"	❑ 25 - 35"	❑ >35"
Slope Class	❑ Gentle (<30%)		❑ Steep (>30%)	
Erosion	❑ None	❑ Sheet/rill	❑ Gullies	
Ground cover	❑ <25%		❑ 25 - 50%	❑ 51 - 75% ❑ >75%
Tree Cover Type	❑ Blue oak woodland, Blue oak-foothill pine woodland ❑ Valley oak woodland ❑ Coastal oak woodland, montane hardwood			
Tree Canopy Cover	❑ Minimal (<10%) ❑ Moderate (40 - 59%)		❑ Sparse (10 - 24%) ❑ Dense (60 - 100%)	❑ Open (25 - 39%)
Average Tree Size	❑ Seedling (<1 in. DBH) ❑ Pole (6 - 11 in. DBH) ❑ Med./Large tree (>24 in. DBH)			❑ Sapling (1 - 6 in. DBH) ❑ Small tree (11 - 24 in. DBH) ❑ Multi-layered
Tree Mortality	❑ None		❑ Light (<5 % trees)	❑ Heavy (>5% trees)
Regeneration status (check all that apply)	❑ none evident ❑ Saplings (3 - 10' tall)		❑ Small seedlings (<1' tall)	❑ Large seedlings (1 - 3' tall)
Shrub canopy cover	❑ Minimal (<10%) ❑ Moderate (40 - 59%)		❑ Sparse (10 - 24%)	❑ Open (25 - 39%) ❑ Dense (60 - 100%)
Shrub age class (yrs. since fuel reduction)	❑ <5 years ❑ >25 years		❑ 5 - 15 years	❑ 15 - 25 years
Habitat elements (check all that apply)	❑ Brush piles ❑ Riparian zones		❑ Snags	❑ Dead and down logs
Water sources	❑ None ❑ Springs		❑ Perennial streams ❑ Water developments	❑ Intermittent streams ❑ Other _____

Threatened and endangered plants and animals present:

Site A: Blue oak woodland, blue oak foothill pine woodland; 10 – 24 percent canopy cover

Oak Cover/Forestry Assessment:
Oak volume ranges from 20 to 170 cubic feet per acre, and 10-year growth rate ranges from 2 to 40 cubic feet per acre. These are not good areas for commercial harvesting activities due to very low stocking and low growth rates. Many open blue oak savannahs lack oak regeneration, especially on low elevation and/or low rainfall zones. Managers should compare current levels of mortality to regeneration. In areas where mortality exceeds regeneration, it may be necessary to adopt management procedures to encourage regeneration.

Recreation Assessment:
These areas offer only limited opportunities for hunt clubs in their current condition because of low cover and acorn production. Medium populations of quail can be expected, which can be improved by providing additional water and cover with brush piles. It may be desirable to increase cover if feasible to improve habitat for deer and turkeys.

Wildlife Diversity Assessment:
These open blue oak savannah stands contain both grassland and woodland wildlife species. In general, the habitat is good for open grassland species such as western meadowlark, but marginal for woodland species such as Pacific-slope flycatchers. Habitat elements, such as riparian zones, snags, trees with cavities, and large woody debris, have an important effect on biodiversity by making habitats more complex. More complex habitats support greater numbers of wildlife. According to the California Wildlife Habitat Relationships system (CWHR) there are 21 amphibian species, 33 reptile species, 73 mammal species, and 137 bird species which are predicted to occur in these habitats if various elements occur. If there are no riparian zones or sources of water, no snags or cavity trees, and no large woody debris or brush piles on the site, the number of vertebrate wildlife species predicted to occur in these habitats falls to 10 amphibian species, 31 reptiles, 39 mammals, and 101 bird species. This points to the importance of maintaining diversity in the habitat elements present in the stand to provide for the highest possible diversity of wildlife species.

Grazing Assessment:
Average forage production capability is 3,000 pounds per acre with a range from 1,500 to 4,500 pounds. In low rainfall areas, the presence of scattered trees has been found to increase overall range forage production. However, thistles and other undesirable plants may occur under the tree canopy, although this is not common. Potential for range improvement through seeding, fertilization, and grazing management may increase productivity where production is currently at the lower end of the scale and available soil and soil moisture is not limiting.

Site B: Blue oak woodland, blue oak foothill pine woodland; 25 – 39 percent canopy cover

Oak Cover/Forestry Assessment:
Oak volume ranges from 170 to 425 cubic feet per acre and the 10-year growth is 25 to 70 cubic feet per acre. These areas are generally not good for commercial firewood harvesting. The existing stocking level is good for diverse resource values, and managers should not take canopy density much lower. Some light thinning may be possible in dense clusters, but avoid using equipment on areas with over 30 percent slope to minimize erosion. Perhaps 40 to 85 cubic feet could be harvested per acre in higher productivity sites every 20 years. Many areas like these have an absence of oak regeneration, especially on low elevation and/or rainfall areas. Managers should assess current levels of mortality and compare this to seedling and sapling regeneration. In areas where mortality exceeds regeneration, it may be necessary to adopt management procedures to encourage regeneration.

Recreation Assessment:
These areas have good overall habitat for mule and black-tailed deer, wild pigs and California quail. Habitat can be improved by enhancing acorn production, planting legumes, and maintaining these through proper livestock and deer management. Any reductions in oak cover will also decrease habitat value for many desired game spe-

cies. Areas with slopes greater than 30 percent will have lower values for hunt clubs because of the difficult access.

Wildlife Diversity Assessment:
These blue oak woodland stands support both grassland and woodland wildlife species. In general, the habitat is fairly good for a large number of wildlife species. The occurrence of more complex habitats, through the presence of habitat elements such riparian zones, snags, trees with cavities, and large woody debris, has an important effect on biodiversity. There are 21 amphibian species, 31 reptile species, 64 mammal species, and 128 bird species which are predicted to occur by CWHR on the most diverse habitats in these stands. If there are no riparian zones or sources of water, no snags or cavity trees, and no large woody debris or brush piles on the site, the number of vertebrate wildlife species predicted to occur on these habitats falls to 10 amphibian species, 29 reptiles, 30 mammals, and 95 bird species. This points to the importance of maintaining diversity in the habitat elements present in the stand to provide for the highest possible diversity of wildlife species.

Grazing Assessment:
Average forage production capability is 3,000 pounds per acre with a range from 1,500 to 4,500 pounds. In low rainfall areas, the presence of scattered trees has been found to increase overall range forage production. However, thistles and other undesirable plants may occur under the tree canopy, although this is not typical. Potential for range improvement through seeding, fertilization, and grazing management may increase productivity where production is currently at the lower end of the scale and available soil and soil moisture is not limiting.

Site C: Blue oak woodland, blue oak foothill pine woodland; 40 – 59 percent canopy cover

Oak Cover/Forestry Assessment:

Oak volumes range from 425 to 1200 cubic feet per acre. Ten year growth ranges from 50 to 130 cubic feet per acre. Firewood harvest potential exists, but avoid using equipment on slopes over 30 percent to minimize erosion.. Harvest levels should approximately equal growth to maintain existing oak cover for diverse resource values. Approximately 85 to 250 cubic feet per acre can be harvested every 20 years from these stands. Ensure adequate oak regeneration after harvest.

Recreation Assessment:
These areas are excellent for medium to large populations of mule and black-tailed deer, squirrel, wild pigs, wild turkeys, mourning dove, and band-tailed pigeons. On areas with less than 30 percent slope, the terrain is excellent for hunter access. Careful tree thinning can complement game habitat. Where controlled fire can be used, it can help stimulate palatable shrub browse. Seeding clover and other legumes and maintaining it through grazing will benefit deer, turkey and quail.

Wildlife Diversity Assessment:
These blue oak woodland stands support a large number of wildlife species. The higher tree density makes these areas less desirable for open grassland species such as western meadowlarks and western kingbirds, but very desirable for woodland species such as Pacific-slope flycatchers and wild pigs. The occurrence of more complex habitats, through the presence of habitat elements such riparian zones, snags, trees with cavities, and large woody debris, has an important effect on biodiversity. 19 amphibian species, 28 reptile species, 64 mammal species, and 128 bird species are predicted to occur by CWHR on the most diverse habitats in these stands. If there are no riparian zones or water sources, no snags or cavity trees, and no large woody debris or brush piles on the site, the number of vertebrate wildlife species predicted to occur on these habitats falls to 10 amphibian species, 26 reptiles, 30 mammals, and 95 bird species. This points to the importance of maintaining diversity in the habitat elements present in the stand to provide for the highest possible diversity of wildlife species.

Grazing Assessment:
Average forage production capability is 2,000 pounds per acre with a range from 1,000 to 2,800 pounds. In areas with less than 20 inches of annual rainfall and during drought years on higher average rainfall areas, range productivity and forage nutritional value is often enhanced by the presence of this level of oak cover. In higher rain-

fall areas, the shading effect of the canopy suppresses total production. Thistles and other undesirable plants may occur under the tree canopy, although this is not typical. Potential for range improvement on slopes less than 30 percent through seeding, fertilization, and grazing management may increase productivity by two- to three-fold where production is currently at the low end of the scale. Tree thinning will increase forage production under the removed canopy in the higher rainfall zones of the state (over 20 inches per year).

Site D: Blue oak woodland, blue oak-foothill pine woodland; 60 – 100 percent canopy cover

Oak Cover/Forestry Assessment:
Oak volume ranges from 1200 to 3800 cubic feet per acre. Estimated growth ranges from 170 to 510 cubic feet per acre over 10 year. Firewood harvest can be carried out to permanently reduce cover and improve habitat for selected wildlife species and range productivity. Areas with less than 30 percent slope are a good place to prioritize for harvesting on the ranch. 500 to 2500 cubic feet per acre can be harvested from these stands to permanently reduce stands to 40 to 60 percent canopy cover after 20 years. If stand openings are absent, you may wish to make some small openings through the firewood operation to encourage blue oak regeneration.

Recreation Assessment:
These areas provide excellent habitat for mule and black-tailed deer, squirrel, wild pig, wild turkey, mourning dove, and band-tailed pigeons. On areas with over 30 percent slope, hunter access is too difficult for commercial operations. Thinning stands back to 50 percent cover in a patchy pattern can enhance deer habitat. Turkeys do best with a dense canopy, and California quail do best with less tree canopy, but both species prefer dense shrub layers and ample water sources.

Wildlife Diversity Assessment:
These dense blue oak woodland stands support a large number of wildlife species, although the higher tree density makes these areas undesirable for open grassland species. A few species such as Cooper's hawks and orange-crowned warblers, actually prefer the dense conditions found in these stands. The occurrence of more complex habitats, through the presence of habitat elements such riparian zones, snags, trees with cavities, and large woody debris, has an important effect on biodiversity. There are 19 amphibian species, 25 reptile species, 62 mammal species, and 102 bird species which are predicted to occur by CWHR on the most diverse habitats in these stands. If there are no riparian zones or sources of water, no snags or cavity trees, and no large woody debris or brush piles on the site, the number of vertebrate wildlife species predicted to occur on these habitats falls to 10 amphibian species, 23 reptiles, 28 mammals, and 77 bird species. This points to the importance of maintaining diversity in the habitat elements present in the stand to provide for the highest possible diversity of wildlife species. Some thinning may help enhance overall biological diversity.

Grazing Assessment:
Average forage production capability is 900 pounds per acre with a range from 500 to 1,500 pounds. The dense tree cover suppresses forage production, leaving less available for livestock operations. Thinning stands on slopes less than 30 percent will increase forage production under the removed canopy for about 15 years by 50 to 100 percent especially on poor sites. After tree thinning, seeding, fertilization, and grazing management may increase forage production. Little improvement potential exists on steeper slopes.

Site E: Valley oak woodland; 10 – 24 percent canopy cover

Oak Cover/Forestry Assessment:
Oak volume ranges from 40 to 340 cubic feet per acre. Growth ranges from 17 to 80 cubic over 10 years. The canopy in these open valley oak savannahs needs to be maintained. These areas are poor candidates for any harvest activity. Managers should encourage the recruitment of young seedlings to sapling size through management activities.

Recreation Assessment:
These areas offer only limited opportunities for hunt clubs in their current condition because of low shrub cover

and acorn production. Medium populations of quail can be expected, which can be improved by providing additional water and cover with brush piles. It may be desirable to increase cover, if feasible, to improve habitat for deer and turkeys.

Wildlife Diversity Assessment:
These open valley oak savannah stands contain both grassland and woodland wildlife species. In general, the habitat is good for open grassland and open woodland species such as western meadowlark, and marginal for woodland species such as Pacific-slope flycatcher. The presence of more complex habitats, through the presence of habitat elements such riparian zones, snags, trees with cavities, and large woody debris, has an important effect on biodiversity. There are 19 amphibian species, 32 reptile species, 72 mammal species, and 132 bird species which are predicted to occur by CWHR on the most diverse habitats in these stands. If there are no riparian zones or sources of water, no snags or cavity trees, and no large woody debris or brush piles on the site, the number of vertebrate wildlife species predicted to occur on these habitats falls to 8 amphibian species, 30 reptiles, 38 mammals, and 99 bird species. This points to the importance of maintaining diversity in the habitat elements present in the stand to provide for the highest possible diversity of wildlife species.

Grazing Assessment:
Average forage production capability is 3,500 pounds per acre with a range from 2,000 to 5,000 pounds. In low rainfall areas, the presence of scattered trees has been found to increase overall range forage production. Thistles and other undesirable plants may occur under the tree canopy, although this is not typical. Potential for range improvement through seeding, fertilization, and grazing management may increase productivity where production is currently at the lower end of the scale and available soil and soil moisture is not limiting.

28 Site F: Valley oak woodland; 25 – 39 percent canopy cover

Oak Cover/Forestry Assessment:
Oak volume ranges from 340 to 1100 cubic feet per acre. Ten year growth ranges from 60 to 150 cubic feet per acre. Although these are not good areas for commercial harvesting, there is some potential for light thinning due to the relatively high productivity of valley oak stands. It may be desirable to utilize trees being lost to mortality if not needed to provide snags in the stand. Perhaps 40 to 170 cubic feet per acre could be harvested every 20 years on slopes less than 30 percent. The existing stocking level is good for diverse resource values, and managers should not take canopy density much lower. Attempts should be made to encourage recruitment of oak seedlings to sapling size through management practices. Rapid growth of seedlings is possible.

Recreation Assessment:
These areas have good overall habitat for mule and black-tailed deer, wild pigs and California quail. Habitat can be improved by enhancing acorn production, planting clover and other legumes, and maintaining these through proper livestock and deer management, and enhancing shrub cover. Any reductions in oak cover will also decrease habitat value for most commercial game species. Areas with slopes greater than 30 percent will have lower values for hunt clubs because of the difficult access.

Wildlife Diversity Assessment:
These valley oak woodland stands have both grassland and woodland wildlife species. In general, the habitat is fairly good for a large number of wildlife species. The occurrence of more complex habitats, through the presence of habitat elements such riparian zones, snags, trees with cavities, and large woody debris, has an important effect on biodiversity. There are 19 amphibian species, 30 reptile species, 71 mammal species, and 128 bird species which are predicted to occur by CWHR on the most diverse habitats in these stands. If there are no riparian zones or sources of water, no snags or cavity trees, and no large woody debris or brush piles on the site, the number of vertebrate wildlife species predicted to occur on these habitats falls to 8 amphibian species, 28 reptiles, 37 mammals, and 96 bird species. This points to the importance of maintaining diversity in the habitat elements present in the stand to provide for the highest possible diversity of wildlife species.

Grazing Assessment:
Average forage production capability is 3,000 pounds per acre with a range from 1,500 to 4,500 pounds. In low rainfall areas, the presence of scattered trees has been found to increase overall range forage production. However, thistles and other undesirable plants may occur under the tree canopy, although this is not typical. Potential for range improvement through seeding, fertilization, and grazing management may increase productivity where production is currently at the lower end of the scale and available soil and soil moisture is not limiting.

Site G: Valley oak woodland; 40 – 59 percent canopy cover

Oak Cover/Forestry Assessment:
Oak volume ranges from 1100 to 2900 cubic feet per acre. Ten year growth ranges from 120 to 420 cubic feet per acre. Some thinning on a sustainable basis is possible, especially in stands with large numbers of small trees to improve individual tree growth rate. There is some possibility to utilize harvested trees for solid wood products, such as white oak lumber or barrel staves. 170 to 680 cubic feet per acre could be harvested every 20 years on stands with less than 30 percent slope. It is important to ensure that adequate oak regeneration results after the harvest.

Recreation Assessment:
These areas are excellent for medium to large populations of mule and black-tailed deer, squirrel, wild pigs, wild turkeys, mourning dove, and band-tailed pigeons. On areas with less than 30 percent slope, the terrain is excellent for hunter access. Some careful tree thinning can complement game habitat. Where controlled fire can be used, it can help stimulate palatable shrub browse. Seeding clover and other legumes and maintaining these through grazing, as well as increasing shrub cover, will benefit deer, turkey and quail.

Wildlife Diversity Assessment:
These valley oak woodland stands support a large number of wildlife species. The tree density makes these areas less desirable for open grassland species such as western meadowlarks and western kingbirds, but very desirable for woodland species such as Pacific-slope flycatchers and orange-crowned warblers. The occurrence of more complex habitats, through the presence of habitat elements such riparian zones, snags, trees with cavities, and large woody debris, has an important effect on biodiversity. There are 17 amphibian species, 27 reptile species, 63 mammal species, and 123 bird species which are predicted to occur by CWHR on the most diverse habitats in these stands. If there are no riparian zones or sources of water, no snags or cavity trees, and no large woody debris or brush piles on the site, the number of vertebrate wildlife species predicted to occur on these habitats falls to 8 amphibian species, 25 reptiles, 29 mammals, and 93 bird species. This points to the importance of maintaining diversity in the habitat elements present in the stand to provide for the highest possible diversity of wildlife species.

Grazing Assessment:
Average forage production capability is 2,000 pounds per acre with a range from 1,000 to 2,800 pounds. On such sites, the shading effect of the canopy usually suppresses total production. Thistles and other undesirable plants may occur under the tree canopy, although this is not typical. Potential for range improvement on slopes less than 30 percent through seeding, fertilization, and grazing management may increase productivity by two- to three-fold where production is currently at the low end of the scale. Tree thinning will increase forage production under the removed canopy in the higher rainfall zones of the state (over 20 inches per year).

Site H: Valley oak woodland; 60 – 100 percent canopy cover

Oak Cover/Forestry Assessment:
Oak volume ranges from 2900 to 5100 cubic feet per acre. Estimated ten year growth rate ranges from 220 to 420 cubic feet per acre. Harvest could be carried out to increase individual tree diameter and crown growth rate on areas with less than 30 percent slope and high stem density and small diameter trees. This may help improve acorn production and create conditions favorable for seedling establishment. Seedlings are likely to be absent or very slow growing due to little sunlight reaching the ground. Harvest levels of 420 to 1700 cubic feet per acre can be

carried out every 20 years. There is some possibility to utilize harvested trees for solid wood products, such as white oak lumber or barrel staves. It is important to ensure that adequate oak regeneration results after the harvest.

Recreation Assessment:
These areas offer good opportunities for habitat for mule and black-tailed deer, western gray squirrel, wild pig, wild turkey, mourning dove, and band-tailed pigeons. On areas with over 30 percent slope, hunter access is too difficult for commercial operations. Thinning stands to 50 percent cover in a patchy pattern may enhance deer habitat if shrub cover is increased. Turkeys do best with a dense canopy, and California quail do best with somewhat less canopy.

Wildlife Diversity Assessment:
These dense valley oak woodland stands support a large number of wildlife species. The tree density makes these areas undesirable for open grassland species. A few species such as orange-crowned warblers and house wrens, actually prefer the dense conditions found in these stands. The occurrence of more complex habitats, through the presence of habitat elements such riparian zones, snags, trees with cavities, and large woody debris, has an important effect on biodiversity. There are 17 amphibian species, 24 reptile species, 61 mammal species, and 96 bird species which are predicted to occur by CWHR on the most diverse habitats in these stands. If there are no riparian zones or sources of water, no snags or cavity trees, and no large woody debris or brush piles on the site, the number of vertebrate wildlife species predicted to occur on these habitats falls to 8 amphibian species, 22 reptiles, 27 mammals, and 74 bird species. This points to the importance of maintaining diversity in the habitat elements present in the stand to provide for the highest possible diversity of wildlife species. Thinning may enhance biological diversity.

Grazing Assessment:
Average forage production capability is 1,200 pounds per acre with a range from 800 to 1,500 pounds. The dense tree cover suppresses forage production, leaving less available for livestock operations. Thinning stands on slopes less than 30 percent will increase forage production under the removed canopy for about 15 years by 50 to 100 percent at lower levels of current production. After tree thinning, improvement potential through seeding, fertilization, and grazing management may increase forage production. Little improvement potential exists on steeper slopes.

Site 1: Coastal oak woodland, montane hardwood; 10 – 24 percent canopy cover

Oak Cover/Forestry Assessment:
Oak volume ranges from 35 to 250 cubic feet per acre and growth ranges from 17 to 50 cubic feet every 10 years. These areas are not good locations for firewood harvests due to very open stocking. Regeneration concerns are not as pronounced in live oak stands due to rapid resprouting in most areas of the state.

Recreation Assessment:
These areas may offer only limited opportunities for hunt clubs in their current condition because of low tree cover. Medium populations of quail can be expected, which can be improved by providing additional water and cover with brush piles. It may be desirable to increase cover if feasible to improve habitat for mule and black-tailed deer and turkeys. The presence of sprouting live oaks allows greater latitude in quail management than deciduous oaks with similar cover.

Wildlife Diversity Assessment:
These open live oak savannah stands contain both grassland and woodland wildlife species. In general, the habitat is good for open grassland species such as western meadowlark and western kingbirds, and marginal for woodland species such as Pacific-slope flycatcher and western gray squirrels. The presence of more complex habitats, through the presence of habitat elements such riparian zones, snags, trees with cavities, and large woody debris, has an important effect on biodiversity. There are 18 amphibian species, 35 reptile species, 74 mammal species, and 135 bird species which are predicted to occur by CWHR on the most diverse habitats in these stands. If there are no riparian zones or sources of water, no snags or cavity trees, and no large woody debris or brush

piles on the site, the number of vertebrate wildlife species predicted to occur on these habitats falls to 7 amphibian species, 33 reptiles, 38 mammals, and 101 bird species. This points to the importance of maintaining diversity in the habitat elements present in the stand to provide for the highest possible diversity of wildlife species.

Grazing Assessment:
Average forage production capability is 2,700 pounds per acre with a range from 1,800 to 4,000 pounds. Oak canopy in these lightly stocked areas may enhance forage production in low rainfall areas or during drought years. These low canopy levels have only minimal impact on forage production in higher rainfall zones, although thistles and other undesirable plants may occasionally occur under the tree canopy. Potential for range improvement through seeding, fertilization, and grazing management may increase productivity where production is currently at the lower end of the scale and available soil and soil moisture is not limiting.

Site J: Coastal oak woodland, montane hardwood; 25 – 39 percent canopy cover

Oak Cover/Forestry Assessment:
Oak volume ranges from 250 to 850 cubic feet per acre, with a ten year growth of 50 to 100 cubic feet per acre. Rapid regrowth of stump sprouts and fairly high growth potential of live oaks would allow some commercial harvest to take place. Harvest levels of 85 to 250 cubic feet per acre every 20 years are possible on areas with less than 30 percent slope. It is important to ensure that regeneration from seedlings or stump sprouts is adequate to replace trees being harvested.

Recreation Assessment:
These areas provide good overall habitat for deer, wild pigs and California quail. Habitat can be improved by enhancing acorn production, planting clover and other legumes and maintaining these through proper livestock and deer management, and enhancing shrub cover. Some selective thinning of dense stands may improve habitat for some game species, although leaving some denser areas will maintain habitat values for species using denser cover. If brush is present, brush piles can considerably improve quail habitat. Areas with slopes greater than 30 percent will have lower values for hunt clubs because of the difficult access.

Wildlife Diversity Assessment:
These live oak woodland stands support both grassland and woodland wildlife species. In general, the habitat is fairly good for a large number of wildlife species. The occurrence of more complex habitats, through the presence of habitat elements such riparian zones, snags, trees with cavities, and large woody debris, has an important effect on biodiversity. There are 18 amphibian species, 34 reptile species, 74 mammal species, and 131 bird species which are predicted to occur by CWHR on the most diverse habitats in these stands. If there are no riparian zones or sources of water, no snags or cavity trees, and no large woody debris or brush piles on the site, the number of vertebrate wildlife species predicted to occur in these habitats falls to 7 amphibian species, 32 reptiles, 38 mammals, and 98 bird species. This points to the importance of maintaining diversity in the habitat elements present in the stand to provide for the highest possible diversity of wildlife species.

Grazing Assessment:
Average forage production capability is 2,500 pounds per acre with a range from 1,500 to 3,500 pounds. Tree cover will cause some suppression of winter and spring production except in areas of low rainfall. Thistles and other undesirable plants may sometimes occur under the tree canopy. Potential for range improvement on slopes less than 30 percent through seeding, fertilization, and grazing management may increase productivity by two- to three- fold where production is currently at the low end of the scale. Tree thinning may increase forage production under the removed canopy in the higher rainfall zones of the state (over 20 inches per year).

Site K: Coastal oak woodland, montane hardwood; 40 – 59 percent canopy cover

Oak Cover/Forestry Assessment:
Oak volume ranges from 850 to 2200 cubic feet per acre. Growth rates of 100 to 190 cubic feet per acre are expected every 10 years. These stands are excellent candidates for sustainable wood harvest operation if slopes are

less than 30 percent. There is some potential for utilization of trees for sawtimber in larger straight-stemmed trees. Harvest levels of 170 to 510 cubic feet per acre every 20 years are possible. It is important to ensure that regeneration from seedlings or stump sprouts are adequate to replace trees being harvested.

Recreation Assessment:
These areas are excellent for quail and moderately good for deer, wild pigs, wild turkeys, and band-tailed pigeons. On areas with less than 30 percent slope, the terrain is excellent for hunter access. Some careful tree thinning can complement game habitat, although some dense areas should be left for cover and breeding purposes. If brush is absent, brushpiles can improve quail habitat considerably. If possible, prescribed burning can stimulate shrub layer browse. Seeding clover and other legumes and maintaining it through grazing, and enhancing shrub cover will benefit deer, turkey and quail.

Wildlife Diversity Assessment:
These live oak woodland stands support a large number of wildlife species. The tree density makes these areas less desirable for open grassland species such as western meadowlarks and western kingbirds, but very desirable for woodland species such as Pacific-slope flycatchers and orange-crowned warblers. The occurrence of more complex habitats, through the presence of habitat elements such riparian zones, snags, trees with cavities, and large woody debris, has an important effect on biodiversity. There are 16 amphibian species, 30 reptile species, 66 mammal species, and 126 bird species which are predicted to occur by CWHR on the most diverse habitats in these stands. If there are no riparian zones or sources of water, no snags or cavity trees, and no large woody debris or brush piles on the site, the number of vertebrate wildlife species predicted to occur in these habitats falls to 7 amphibian species, 28 reptiles, 30 mammals, and 95 bird species. This points to the importance of maintaining diversity in the habitat elements present in the stand to provide for the highest possible diversity of wildlife species.

Grazing Assessment:

Average forage production is 2,000 pounds per acre, ranging from 1,000 pounds to 2,800 pounds. Forage production is usually suppressed by tree canopy except in low rainfall zones. Thinning may increase forage under some removed canopies by 100 to 200 percent. Brush understory may occur in some locations and is suitable for management burns. Potential for range improvement through seeding, fertilization, and grazing management may increase productivity where production is currently at the lower end of the scale and available soil and soil moisture is not limiting.

Site L: Coastal oak woodland, montane hardwood; 60 – 100 percent canopy cover

Oak Cover/Forestry Assessment:
Oak volume ranges from 2200 to 5100 cubic feet per acre. Growth ranges from 190 to 310 cubic feet every 10 years. These very dense stands could benefit from thinning to improve overall biological diversity, acorn production, and forage yields. Restrict harvest to areas with less than 30 percent slope. Harvest levels of 510 to 1700 cubic feet per acre can be carried out every 20 years. There is some potential to utilize larger diameter logs for sawtimber, especially if boles have few branches. It is important to ensure that regeneration from seedlings or stump sprouts are adequate to replace trees being harvested.

Recreation Assessment:
These areas offer good opportunities for habitat for deer, western gray squirrel, wild pig, wild turkey, mourning dove, and band-tailed pigeons. On areas with over 30 percent slope, hunter access is too difficult for commercial operations. Thinning stands back to 50 percent cover in a patchy pattern may enhance deer habitat if shrub and herbaceous cover are improved. Turkeys do best with a dense canopy, and California quail do best with somewhat less canopy, but both prefer moderately dense shrub layers.

Wildlife Diversity Assessment:
These dense live oak woodland stands support a large number of wildlife species. The tree density makes these areas undesirable for open grassland species. A few species such as orange-crowned warblers, actually prefer the dense conditions found in these stands. The occurrence of more complex habitats, through the presence of habitat

elements such riparian zones, snags, trees with cavities, and large woody debris, has an important effect on biodiversity. There are 16 amphibian species, 26 reptile species, 64 mammal species, and 99 bird species which are predicted to occur by CWHR on the most diverse habitats in these stands. If there are no riparian zones or sources of water, no snags or cavity trees, and no large woody debris or brush piles on the site, the number of vertebrate wildlife species predicted to occur in these habitats falls to 7 amphibian species, 24 reptiles, 28 mammals, and 76 bird species. This points to the importance of maintaining diversity in the habitat elements present in the stand to provide for the highest possible diversity of wildlife species. Some thinning may help enhance overall biological diversity.

Grazing Assessment:
Average forage production capability is 900 pounds per acre with a range from 500 to 1,500 pounds. The dense tree cover suppresses forage production, leaving less available for livestock operations. Thinning stands on slopes less than 30 percent will increase forage production under the removed canopy for about 15 years by 50 to 100 percent at lower levels of current production. After tree thinning, improvement potential through seeding, fertilization, and grazing management may also increase forage production. Little improvement potential exists on steeper slopes.

Chapter Four

Oak Woodland Wildlife Ecology, Native Plants, and Habitat Relationships

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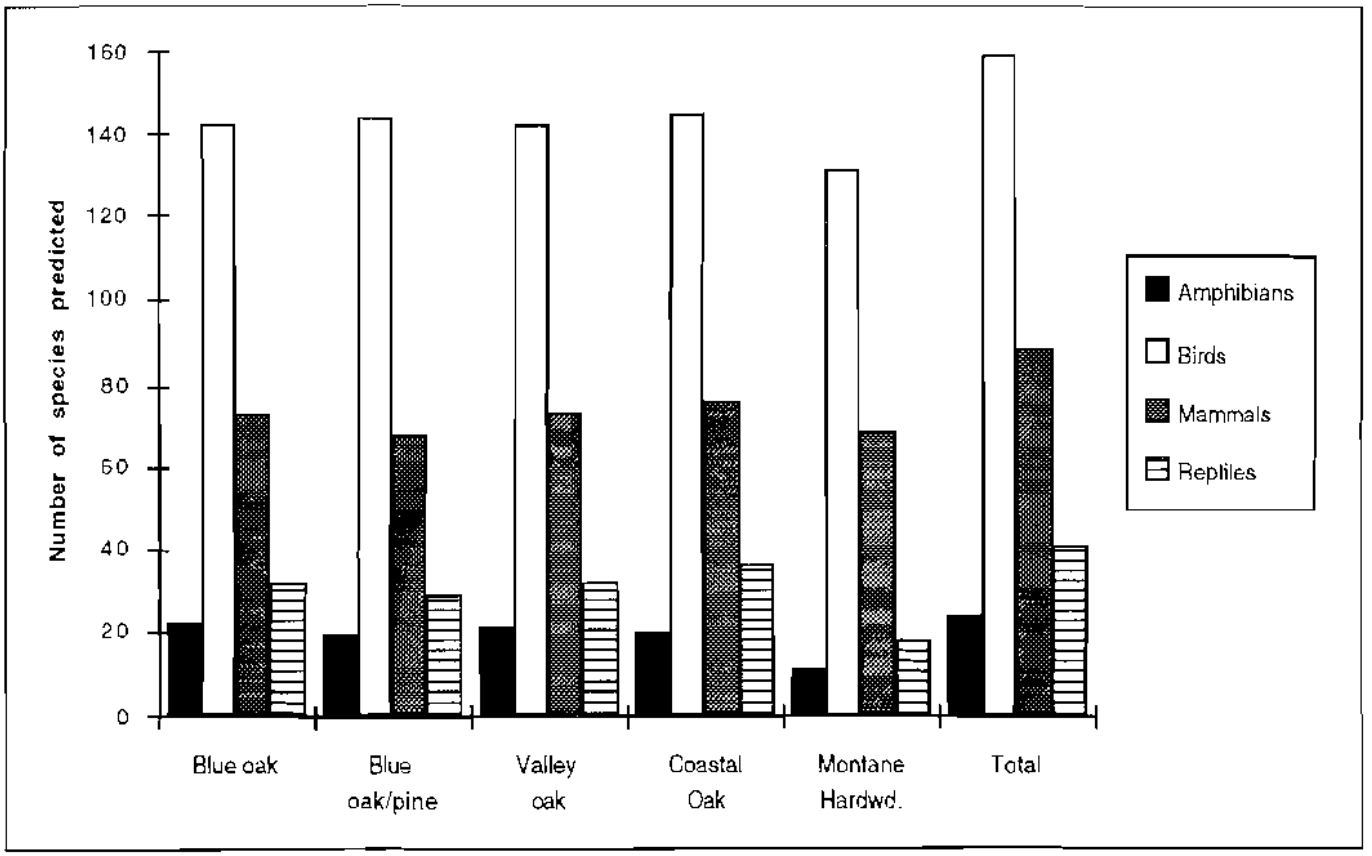
The five habitat types occurring in California's hardwood rangelands (also known as oak woodlands) provide habitat for at least 313 species of birds, mammals, reptiles, and amphibians; more than 2000 plant species; and an estimated 5000 species of insects. Figure 4-1 graphically shows the diversity of vertebrate wildlife species predicted for each of the five major habitat types described in chapter 2. A complete list of all 313 species and their habitat associations is given in Appendix A. The management and long-term sustainability of California's hardwood rangeland habitats will best be served if ecological components and their inter-relationships are recognized and addressed by owners and managers. This chapter provides information on oak woodland ecology

Figure 4-1. Numbers of amphibians, birds, mammals, and reptiles predicted to occur in the five California hardwood rangeland habitats by Version 5.0 of the California Wildlife Habitat Relationships System (CWHR). This list only includes those species in the CWHR System that are predicted to use one or more tree size and canopy cover classes for breeding, feeding, and/or cover.



and wildlife-habitat relationships to serve as a guide for land management activities. The presence and sustainability of specific plant and animal species on hardwood rangeland properties needs to be evaluated with scientific information.

Wildlife Habitat Relationships

Habitats are the specific locations where the factors needed for wildlife survival and reproduction are provided. Successful long-term perpetuation of California's hardwood rangeland wildlife is best achieved by managing habitats because they are the foundation on which wildlife depend. California's five major hardwood rangeland vegetation types (see Chapter 2) and associated riparian types provide habitat for the largest number of vertebrate wildlife species in the state, when compared to habitats dominated by conifers, shrubs, grasses and wetlands. Hardwood rangeland habitats must be able to supply food, water, protection from weather and predators, and locations to reproduce in order to support viable wildlife populations.

In eastern Tehama County, deer use of the lower elevation blue oak and blue oak-foothill pine woodlands are an example of wildlife habitat relationships. These areas are important winter habitat with food and cover for deer that have migrated from higher elevation conifer and meadow habitats around Mount Lassen where they spend the spring and summer to produce fawns. Their autumn migrations take them through montane hardwood habitats where they feed on acorns and browse to gain weight for the strenuous rutting period where bucks (male deer) compete for breeding opportunities. Breeding takes place during the fall and early winter on the lower elevation oak woodlands. Does (female deer) feed on acorns and herbaceous vegetation of oak woodland wintering habitats to provide energy for fawning. These activities are critical and their populations would be dramatically reduced if hardwood habitats failed to provide these key breeding, food, and cover resources.

Habitat Scale Concepts

One way to understand the management complexities of hardwood rangelands is to look at the relationships among its component parts. Wildlife biologists typically evaluate woodland habitats on five levels, providing a convenient system for explaining woodland ecology. Although each level has its applications, it is critical for you to select the management level that is appropriate for your goals. From smallest to largest, these levels are:

1. *Individual*: The interactions of individual plants or animals with their surroundings is the most tangible level of woodland ecology. Survival and reproduction are results that you can observe from the interactions of individual plants or animals.
2. *Population*: The interactions among individuals of the same species and the interactions with their woodland environment form the population level of organization. A population is typically described by the shared characteristics of its individuals, including where they occur, the range of things they eat, when and how they produce young, and how they disperse or migrate. We use this composite picture to define the wildlife habitat relationships between a species and the areas where it occurs. Although this composite picture is somewhat abstract, population data allows biologists to predict the consequences of management activities in woodlands.
3. *Community*: The interactions among species that occur together in a community form the next step in the hierarchy. Species interactions define this level; some species prey on others, some compete with each other for resources, some share resources or recycle nutrients for one another, and some interact in hundreds of other ways. Examples include a deer browsing on oak seedlings, bees pollinating wildflowers, or jays planting acorns. Community interactions are often difficult to detect, and may occur over long time periods.
4. *Ecosystem*: The physical processes and structure that link living things to each other and their ecosystem is the next level of organization. Ecosystems are often defined by their resident or dominant species, such as the hardwood rangeland vegetation types discussed previously. This level of management is somewhat abstract, with boundaries that often blend into adjacent ecosystems.
5. *Landscape*: The geographic patterns of all the other levels creates the landscape level of organization. Some aspects of landscapes are quite tangible, such as the boundaries of a watershed. Others are abstract, such as the patterns of gene flow across the oaks in the coast ranges.

If you protect a 400-year-old oak in your backyard, then you are operating at the individual level of conservation. However, it is often impractical for landowners to manage their woodlands tree by tree. If your goal is to

maintain a specific density or age distribution of oak trees on your property, then you're working at the population level. If you control exotic plants to reduce their effect on oak seedling survival, then you're altering community level interactions among your understory plants. Altering fire frequency to re-establish oak understory would be an ecosystem level of action. Finally, fires burn many different patterns across a landscape, from small patches to catastrophic sweeps of multiple watersheds. Using prescribed burning to create a mosaic of burned and unburned habitats would be a landscape management action.

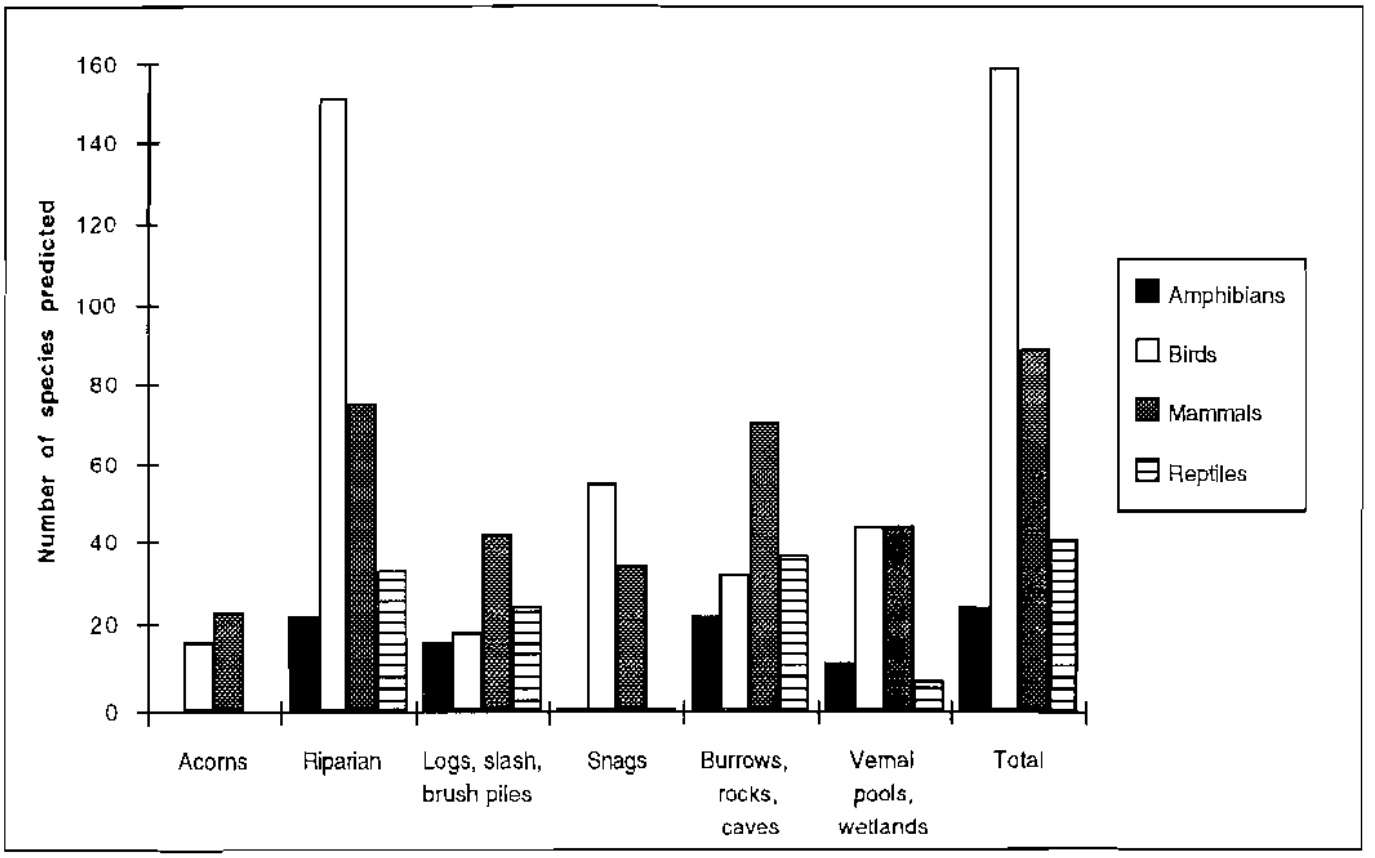
Habitat Structure

Favorable hardwood rangeland habitats supply food, water, and cover to sustain wildlife species. Each habitat element provides unique niches, favoring particular wildlife species. Conversely, the absence of a particular element in a habitat may limit species diversity.

Examples of elements of a hardwood rangeland habitat that are important to consider include riparian zones, vernal pools, wetlands, dead and downed logs and other woody debris, brush piles, snags, rock outcroppings, and cliffs. Figure 4-2 gives the relative number of wildlife species that are predicted to use various elements found on hardwood rangelands. The complete species list in Appendix A shows the specific species that are predicted to use these elements on hardwood rangeland habitats.

Riparian areas are those habitats influenced by the presence of adjacent seasonal or yearlong watercourses. They tend to have a higher biomass level of vegetation due to better water availability throughout the growing season. In general, they have higher tree crown cover, a more diverse assortment of vegetation species, and herbaceous material that stays green later into the summer. As shown, riparian habitat elements are used by almost 90 percent of all hardwood rangeland wildlife species, illustrating the importance of conserving this habitat element where present.

Figure 4-2. Number of amphibians, birds, mammals, and reptiles predicted to use several important habitat elements of California hardwood rangeland habitats by Version 5.0 of the California Wildlife Habitat Relationships System (CWHR). This list includes those species in the CWHR System that are predicted to use one or more of these elements for breeding, feeding, and/or cover.



Over one-third of all bird species on hardwood rangelands make use of snags, or standing dead trees in the stand. This suggests that management strategies to maintain an appropriate number of snags will result in greater wildlife species diversity.

Another important aspect of hardwood rangeland habitat structure is the spatial arrangement of the vegetative cover. The vertical and horizontal distribution of vegetation are both readily visible and easily measured.

Vertical Distribution

Vegetation often occurs in layers from grasses, to shrubs, to trees. This vertical layering affects the duration and intensity of light reaching the ground, which in turn, affects the insects, plants and subsequently those vertebrates dependent on them. Multi-layered habitats provide a diversity of elements offering more niches for wildlife. Most hardwood rangeland species, including California quail, western fence lizards, rufous-sided towhee and acorn woodpeckers, depend on multi-layered vegetation structure. Land managers should consider the consequences of activities that tend to simplify or eliminate vegetation layers.

Horizontal Distribution.

The distribution of different types of habitat or successional stages across a landscape creates diversity in all habitat elements needed for breeding, food and cover. Considering horizontal distribution is important for species that rely on large blocks of land, such as black-tailed deer, mountain lions, and red-tailed hawks.

Alteration of the horizontal distribution of habitats across large landscapes from fire, weather, residential development, rangeland conversion, or oak harvesting, can result in smaller, fragmented habitat patches. Small, isolated patches can eventually become *islands* of habitat that have a similar biological function to oceanic islands. The movement of populations of species isolated on these islands are restricted, so these populations are more susceptible to local extinction than populations which have free access to larger habitat patches. Less mobile species, such as many amphibians, have greater risks of local extinctions than those with greater mobility, such as bird species.

Maintenance of free interaction between reproducing adults is key to the survival of any wildlife species. Connecting patches of habitat through habitat *linkages or corridors* improves the interaction of breeding individuals between otherwise isolated populations. These linkages reduce predation and minimize impacts of harsh environmental conditions. Riparian areas often serve as linkages to hardwood rangeland habitats.

Resources Change Through Time

Important wildlife habitat attributes from oaks such as acorn-producing trees, snags, logs, and large and/or dead branches require considerable amounts of time to develop, even though they may persist for decades once they develop these characteristics. Land use practices that remove these attributes without allowing replacement will negatively alter the wildlife community. For example, it may take almost a century for most oaks to grow from acorn-produced seedlings to mature trees capable of producing abundant acorn crops. Oaks must be mature and several centuries old before they are large enough to have large diameter branches. Also, dead branches often result from heart rot which typically affects older, less healthy trees that are more susceptible to decay agents. An oak tree typically must live its entire life of several centuries before it dies and becomes a snag. Once developed, snags persist for many decades before they fall down and become logs. Logs will persist for many decades until they decay and become part of the soil. Furthermore, individual trees may produce more acorns, have more large branches, and make larger snags and logs than other trees. Therefore, trees with these desirable characteristics should be identified and retained so that wildlife communities will benefit. For example, observing acorn production of individual trees for two or three years over several weather cycles should allow most landowners to identify trees that produce large acorn crops relative to other trees on their lands (see chapter 9).

Habitat Use

The functional relationships among plants, animals and their physical environments are the foundation of ecosystems. Most wildlife species can use a variety of habitat types. The deer mouse is an example of a habitat generalist. It is thought to be the most widely distributed and abundant mammal in North America, and occurs in virtually every terrestrial vegetation type. Deer mice feed on a wide variety of plant and animal materials. They store food for use during periods of shortages, and build nests in almost any form of confined cover, such as rocks, leaves, or logs. The deer mouse can get its water from free water sources, dew, or from its food.

However, some wildlife species are so specialized that they occur in a relatively small number of habitats. The acorn woodpecker is an example of a habitat specialist. Although it has a widespread distribution, its habitat use

patterns are relatively restricted, coinciding with acorn-producing tree and shrub oaks in oak and oak-pine forests and woodlands.

Every wildlife community consists of both habitat generalists and specialists. Habitat generalists are more tolerant of a variety of land use practices than the habitat specialists. The challenge to any manager or landowner is to ensure that habitat needs are provided for all members of the wildlife community. This can be achieved by designing land use activities that ensure the continued presence of habitats and habitat elements needed by all members of the wildlife community.

For example, consider a large tract with a mosaic of oak woodlands, brush patches, riparian areas, savannas, pastures and grasslands. Cyclic, seasonal vegetation changes provide a diversity of food resources, including forbs, insects, fruits, and seeds, including acorns, that allow species with differing foraging strategies to co-exist. Birds that frequent oak woodlands throughout the year, both resident and migratory species, will partition these resources to minimize competition for them. If the necessary habitat elements are present, herbivores (plant eaters), insectivores (insect eaters), carnivores (meat eaters), omnivores (plant and meat eaters) and even highly specialized piscivores (fish eaters) can co-exist on this tract because of the way each group selects its food.

Species grouped according to a particular habit are referred to as a *guild*. (see Figure 4-3). For example, herbivorous species that eat seeds and are restricted to habitat edges are in a single guild. This includes song sparrows, California towhees, and rufous-crowned sparrows. If the necessary food and habitat elements are removed from an area, all species associated with this guild will also be removed. Similarly, insectivorous species that forage on wood would be negatively impacted if all standing and dead trees were removed from the site. Pileated woodpeckers, white-breasted nuthatches, and hairy woodpeckers are examples of species in this guild.

Wildlife use habitats at two broad levels usually defined as *macro* and *micro* levels. Management activities must consider both levels to sustain the biological integrity of hardwood rangeland habitats. The *macro*-level consists of all the habitats and their inter-relationships. *Macro*-level characteristics include habitat patch size and shape, edges with other habitats, and adjacent habitats. *Macro*-level features are used over a wide area during a time period that ranges from several weeks to several years.

Micro-level habitat characteristics are more focused on the individual features of the plants and the physical environment within an individual stand of trees. These features include species of plants, snags, rocks, water, acorns and other food items, tree size, and amount of vegetation cover. *Micro*-level elements are items an individual wildlife species uses throughout their daily and yearly cycles for breeding, feeding, and cover.

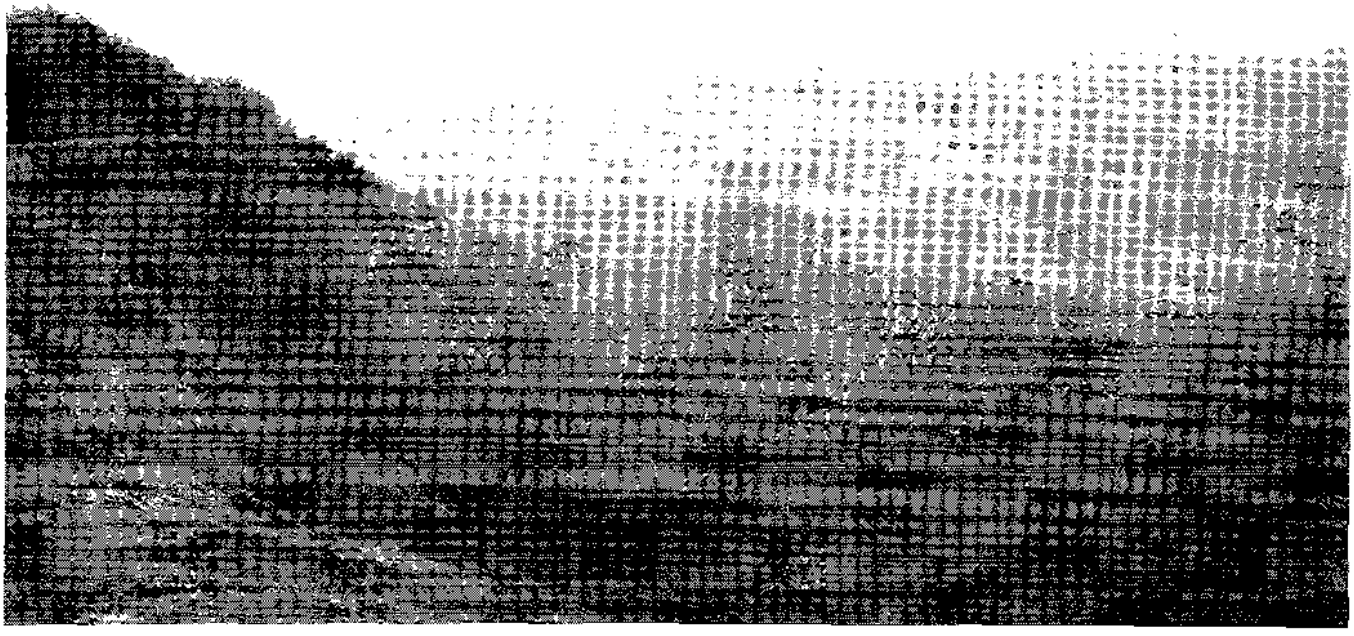
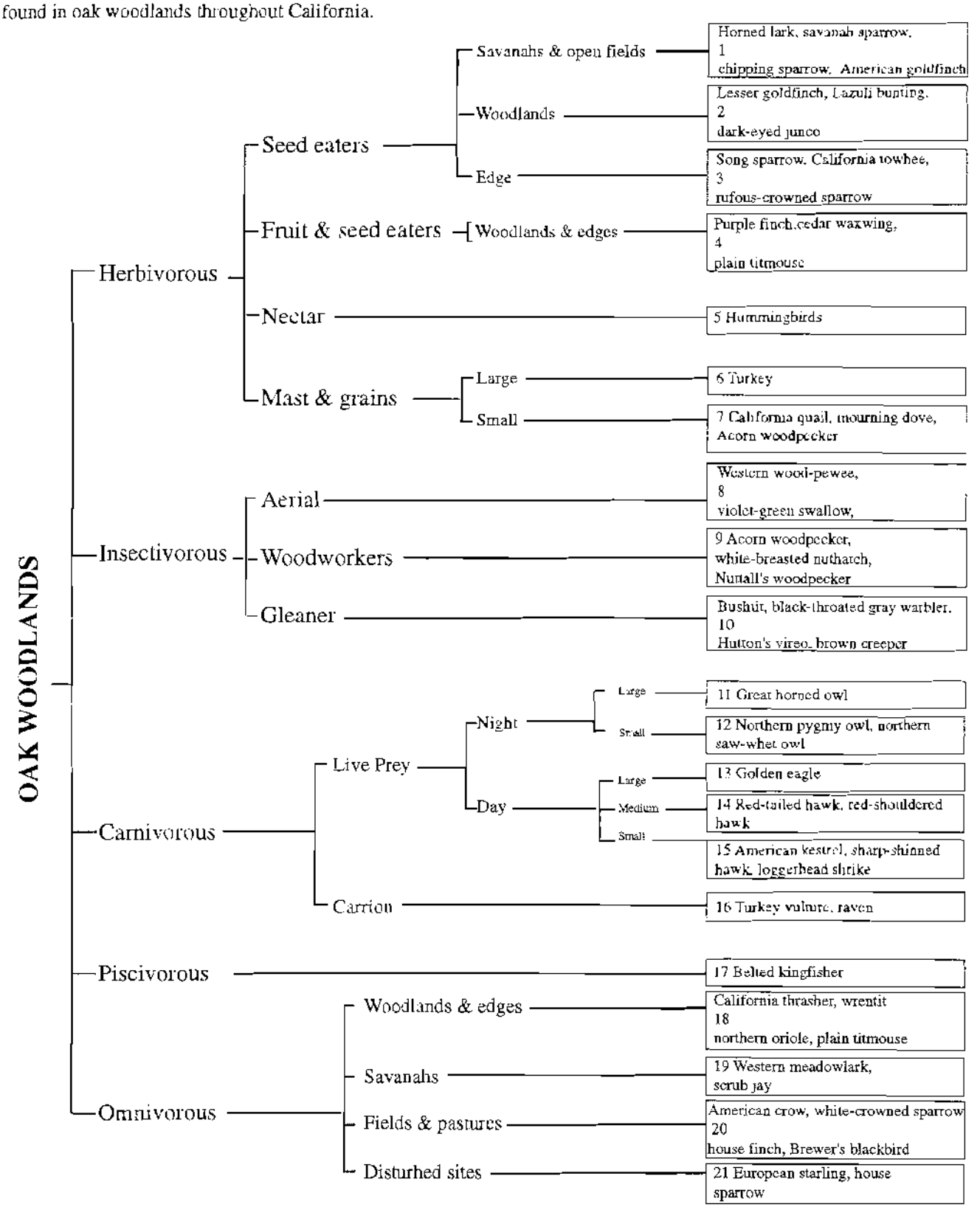


Fig. 4-3. An example of resource partitioning based on food habits of some land-dwelling birds that are commonly found in oak woodlands throughout California.



Wildlife respond to many different environmental characteristics when they select habitats to use. The three primary characteristics known to be important to many wildlife are: 1) habitat structure (e.g., size, height, amount of vegetation cover); 2) vegetation species composition; and 3) presence of *micro*-habitat elements.

Acorn woodpeckers are a good example illustrating the selection for the three broad habitat characteristics: structure, composition, and elements. They are found almost exclusively in open canopied, tree-sized habitats with substantial numbers of oaks, demonstrating selectivity in the structure and composition of their habitat. Their selection of habitats dominated by tree-sized oaks to provide live trees and snags large enough for granaries and nest cavities, demonstrates habitat selection on the basis of micro-habitat element characteristics. All three characteristics are inter-related to varying degrees, and the overall importance of a particular characteristic varies by season and geographic location.

Studies have also demonstrated the importance of habitat characteristics in California's hardwood habitats to other species. The importance of blue oak woodlands to wintering deer in Tehama County were discussed earlier in this chapter. Black bears showed greater use of habitats dominated by canyon live oak in the San Bernardino Mountains in spring, summer, and fall because these habitats provide cool environments, sufficient water, and low levels of human activity.

Wildlife habitat use changes over time and across landscapes. The migratory and wintering habitat use patterns of deer previously discussed is a good example. Black-tailed deer along the Coast Ranges are year-round residents and do not have pronounced migratory patterns. Yet, these resident deer use many habitats throughout the year, relying on oak-dominated habitats when acorns are available.

Golden eagles display fairly pronounced locational habitat use patterns. In hardwood rangelands, their nesting habitat includes area with large diameter, tall foothill pines with large branches, or tall cliffs with ledges for nests. Therefore, their nesting habitats are typically blue oak woodlands, blue oak-foothill pine woodlands, shrublands, or other habitats located in canyons or along cliffs. However, they feed in grasslands and open oak-dominated woodlands with sufficient populations of prey such as California ground squirrels, black-tailed hares, other medium-sized mammals, and ground-dwelling birds. These different nesting and feeding habitats must occur together over a large area in order to support a pair of nesting golden eagles.

Native Plants within Oak Woodlands

Oak woodlands are a diverse and dynamic ecosystem in California. In fact, for many people, oaks are a symbol of this State. Within oak woodlands, the several species of oak are the most striking plants present. But they represent only a small portion of the plant diversity which occurs in oak woodlands. As stated above, over 2,000 species of California native plants occur in oak woodlands. The scope of this book does not allow for detailed description of the many native plants of oak woodlands. For the more common plants associated with oak woodlands, refer to Appendix C. This section provides information on fundamental habitat relationships of plants that are considered to be sensitive to land use practices in oak woodlands. These species are a small, but special portion of those 2,000+ plant species that coexist with oaks.

Sensitive Plants

There are 130 known sensitive plant species that occur in oak woodlands. Sensitive is defined as plant species that are considered rare, threatened, or endangered within California, whether or not they are state or federally listed.Many of these plants are naturally rare because unique biological needs limit their distribution. Others may have been affected by human activities such that they have become rare, threatened, or endangered within California. Appendix B lists 130 sensitive plant species and their known oak habitat relationships. If a particular oak habitat exists on your property, you may have a particular sensitive plant species depending on the plants' distribution and special habitat relationships (see *Investigating the Occurrence of Sensitive Plants*)

Different Designations of Sensitive Plants

Appendix B designates sensitive species in three categories: federally listed, state listed, and California Native Plant Society (CNPS) categories 1B and 2. Eight oak woodland plant species are federally listed as threatened or endangered, while the State of California has listed 42 as rare, threatened, or endangered. The federal Endangered Species Act establishes protection for federally listed species. Plants state-listed as rare, threatened, or endangered are protected under the Native Plant Protection Act or the California Endangered Species Act. CNPS maintains an inventory that evaluates native plants on their rarity, endangerment, and distribution. This chapter lists only two of their five categories: 1B and 2. Category '1B' is defined as *rare or endangered in California and elsewhere*, while

category '2' is defined as *rare and endangered in California; more common elsewhere.* For a more thorough list of sensitive plant species and a detailed explanation of CNPS's inventory system, you may refer to the electronic or printed California Native Plant Society's INVENTORY of Rare and Endangered Vascular Plants of California (5th. Edition). You may also wish to attain a copy the California Department of Fish and Game's (CDFG) *Special Plants List.*

Investigating the Occurrence of Sensitive Plants

As stated above, the list of plants in Appendix B does not reveal whether a particular plant species does occur on your land. The table does inform you if a particular plant has been found in a particular oak habitat(s). Additionally, the table lists unique ecological characteristics of each plant species. This information is a starting point for you to determine the possibility of one or more rare plants being found on your land. In many cases, the type, periodicity, and intensity of the land use determines whether rare, native plants exist, just as is the case for wildlife.

When determining what plants occur on your land, surveying your land for all plants (*floristic* survey) allows you gain detailed knowledge about the occurrence, distribution, and abundance of all plants, whether they be oaks, common trees, shrubs, grasses, and herbs, or sensitive species. In some cases, plant survey information may already exist for your property. In addition, there are other sources of useful information. These sources would be the local university or college, the regional resource conservation district, individuals or firms involved in biological consulting, your regional CDFG Plant Ecologist or District Biologist, and CDFG's Natural Diversity Database (NDDB). NDDB maintains location information for sensitive plants, animals, and natural communities for all of California. Regional CDFG staff have access to NDDB information, and you may contact NDDB directly if you wish to investigate what is already known about sensitive plants in your area. However, if the NDDB does not include any known records of sensitive plants on your property, this is no guarantee that sensitive plants do or do not occur there. Only plant surveys can determine that.

Management of Lands for Sensitive Native Plants

In a nutshell, there is no recipe for maintaining an area's native flora. For certain species with certain needs, avoidance or minimum activity for a period of time may be crucial (i.e., removing cattle while plants are flowering and setting seed). On the other hand, management for native plants might involve a certain activity for a particular period of time (i.e., prescribed burning to allow seeds to sprout; maintaining grazing so to reduce exotic grasses which in turn allows native species to exist, etc.). Each sensitive plant has specific needs, and it is best to consult with your local botanists, field biologists, and other plant and vegetation experts when deciding on land management activities to meet your needs and the needs of the sensitive plants that may exist on your land.

A Worksheet for Evaluating Woodland Habitat Impacts

There are many ways landowners can manage their oak woodlands for wildlife or to maintain native plants. One can choose to manage on the basis of vegetation composition, percent canopy cover, or even a single wildlife species such as deer. Yet, when assessing various management enterprises, land managers should consider a broad scale approach to management. This *system-wide* management approach considers both ecological and economic effects prior to implementing a management plan. This is really just a new way of saying *"don't put all of your eggs in one basket"*.

When evaluating the impacts of various management actions, there are often unforeseen consequences. It is easy to recognize the consequences of harvesting individual oaks (e.g., they become firewood), but more difficult to recognize the potential consequences at the population (e.g. loss of acorn producers), community (loss of bird nesting locations), ecosystem (increased light to forage plants), and landscape (increased edge with grasslands or loss of habitat linkages) levels. Worksheet 4-1 is provided to help assess these broader effects by examining the resources present in the area proposed for management and the anticipated changes of the proposed enterprise to the woodland ecosystem. It is suggested that you work through this process for any enterprise you are considering, to allow you to assess the concepts presented in this chapter.

This worksheet is designed to help assess the impact of the proposed hardwood rangeland enterprise on a particular habitat element. In column one of the worksheet, you should assess the particular habitat element in the area proposed for a particular enterprise. Column two is used to describe how significant that element in the enterprise area is in relationship to the broad region or landscape surrounding the enterprise area. Column three

is used to describe anticipated changes that are expected to occur as a result of the particular enterprise. Column four is used to list the anticipated regional impacts expected as a result of undertaking a specific enterprises. In order to undertake this exercise, you will need a map of your property and basic knowledge of its resources. It is best to have an aerial photograph of your land and the surrounding landscape, but you may use other estimates if a photograph is unavailable. The material you have developed from chapter 3 will help you get started. Instructions on the use of the worksheet and definitions of terms used will follow.

The Potential Impacts of Development on Wildlands in El Dorado County, California[1]

Shawn C. Saving[2] and Gregory B. Greenwood[3]

Abstract

We modeled future development in rapidly urbanizing El Dorado County, California, to assess ecological impacts of expanding urbanization and effectiveness of standard policy mitigation efforts. Using raster land cover data and county parcel data, we constructed a footprint of current development and simulated future development using a modified stochastic flood-fill algorithm. We modeled combinations of constraints from the 1996 County General Plan and parcel data—slope, stream buffers, oak canopy retention, existing development, public ownership, regional clustering, and acquisition programs—and overlaid development outcomes onto the land cover data. We then calculated metrics of habitat loss and fragmentation for natural land cover types. Rural residential development erodes habitat quality much more than habitat extent. Policy alternatives ranging from existing prescriptions to very restrictive regulations had marginal impact on mitigating habitat loss and fragmentation. Historic land parcelization limits mitigation of impacts by the current General Plan prescriptions that only apply when a parcel requires subdivision before development. County-wide ordinances were somewhat more effective in preserving habitat and connectivity. These solutions may not offer enough extra protection of natural resources to justify the expenditures of "political capital" required for implementation. Custom, parcel based acquisition scenarios minimized habitat loss and maximized connectivity. Better analysis of public policy and planning design may be a more effective "smart growth" tool than generic policy prescriptions.

Introduction

The California Department of Finance projects the State's population to increase from 34 million to over 45 million by the year 2020 (California Department of Finance 2001). During the past 20 years, the spatial distribution of California's population has also changed as more people moved to the periphery of the dense Los Angeles and San Francisco Bay metropolitan areas and to the historically lower density Central Valley and Sierra Nevada foothills (U.S. Census Bureau 1991, 2001). Since the eastern half of many of these Sierran counties is predominantly national forest above 1,500 meters, the vast majority of this additional population will reside in the lower elevation foothills, a region dominated by oak hardwood savannah. The hardwood rangeland region of the Sierra, extending from 100 to 1,500 meters in elevation, is almost exclusively privately owned and has historically been used for grazing and some dryland farming (Duane 1996, Greenwood and others 1993). The switch from large parcel, low to moderate intensity agriculture to small parcel, high intensity urban and ex-urban land use promises great change to the natural

[1] An abbreviated version of this paper was presented at the Fifth Symposium on Oak Woodlands: Oaks in California's Changing Landscape, October 22-25, 2001, San Diego, California.

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ecosystems of the foothills region. These 5-acre to 40-acre ranchettes will likely contain the majority of naturally functioning hardwood landscape in the near future.

One such region of rapid change is El Dorado County in the Central Sierra Nevada Mountains. We conducted a policy analysis of the El Dorado County General Plan by modeling development in the western, foothill portion of the county. We were interested in two topics: 1) ecological impacts on wildland habitat resulting from expanding urbanization under the County's General Plan; and 2) the effectiveness of commonly proposed land use policy initiatives to mitigate those impacts. Several models exist for projecting development expansion at the county and regional scale (Landis 1994, 1995, 1998a, 1998b; Johnston 2000, 2001; US Environmental Protection Agency 2000). These models focus on dense urban development (1 - 2 acre parcels or smaller) using economic formulas of land values and empirically derived "attractors" of development such as proximity to existing infrastructure (roads, sewer, water, etc.) to guide development probabilistically and incrementally over time. However, in rural areas (5 - 40 acre parcels), where attractors are less obvious or more difficult to model, or where tractable economic factors are not the primary drivers behind development decisions, these models generally ignore rural development or resort to random allocation (Johnston 2001). In El Dorado County, the General Plan designates 23 percent of the county for development in this rural density range. In order to adequately predict impacts in these regions, we needed to place the existing and potential footprint of development as explicitly as possible. We developed a cell-based, empirical model that characterizes development patterns from existing development and then extends those patterns across the landscape onto vacant lands. Because we were primarily concerned with the relative impacts of the county's General Plan and alternative policy proposals, we chose to extend development to full "buildout" of the General Plan, approximately a 20-year time horizon, rather than incorporating an economic component which might allow the phasing of development over time.

We began by determining where development existed in 1996, the most recent year for which digital parcel data were available. We then predicted where development would be at full buildout of the General Plan under various scenarios (e.g., uncontrolled vs. smart growth, strict vs. loose environmental land use policy, and combinations thereof). For any given scenario, our model can assess the implications for a variety of issues ranging from natural ecosystem functions to local and regional economies to general quality of life. At present, we have analyzed a wide range of land use policies in the County and their relative impacts on two major areas of concern, wildland habitat quality (characterized by extent, fragmentation, and configuration) and economic costs and losses due to wildfire. This paper presents our research on the former.

Study Area

El Dorado County is a predominantly rural county in the Central Sierra region of California stretching from the floor of the Central Valley east of Sacramento to the crest of the Sierras and the southern portion of Lake Tahoe (mean latitude 38.75° N, mean longitude 120.5° W). The county's 463,500 hectares cover a wide diversity of habitats including low elevation annual grasslands and blue oak (*Quercus douglasii*) savannah at the western edge, mid-elevation oak woodlands and mixed oak-conifer-shrub complexes in the central region, and Sierran mixed conifer forest dominated by

Figure 1—Location of study area with major highways and cities.

ponderosa pine (*Pinus ponderosa*), Jeffrey pine (*Pinus jeffreyi*), and lodgepole pine (*Pinus contorta*) in the eastern half. According to the 2000 Census (U.S. Census Bureau 2001), 156,299 people lived in El Dorado County at an overall density of 33.7 persons/km^2. However, because the eastern half of the county is almost entirely national forest except for settlements on the southern littoral edge of Lake Tahoe, the average density for private lands is 63.3 persons/km^2. Housing density is 28.9 units/km^2. Our study area encompasses 220,954 ha and is restricted to the predominantly privately owned western foothills region of the county (*fig. 1*).

From the time Gold Rush pioneers settled in the 1850s, the population of El Dorado County fluctuated between 6,000 and 20,000 people until the 1950s. Since that time the decadal growth rate has ranged from 20 percent to 100 percent, with growth rates of 46.8 percent and 24.0 percent in the 1980s and 1990s, respectively (U.S. Census Bureau 1991, 2001). State Department of Finance projections indicate this magnitude of growth continuing for the next two decades resulting in 252,900 residents by 2020 (California Department of Finance 2001).

Methods

Study Design

The purpose of this study was to evaluate the potential impact of El Dorado County's General Plan on wildland habitat in the county (primarily oak woodland) and how policy alternatives might mitigate these impacts. We modeled several

alternative scenarios, three iterations each, by varying one or more of the General Plan prescriptions, as well as the possible spatial configuration of future development (*table 1*), and overlaying the resulting footprint of development onto the land cover data and measuring the core extent, fragmentation and configuration of wildland. As we intended this work to be directly relevant to issues facing the county, many of these scenarios were devised from suggestions by residents and county officials. Thus, we did not attempt to analyze every possible combination of variables, especially as it became apparent that one of them was not proving to be effective in mitigating the impacts on wildland.

We used three main geographic information system (GIS) datasets as inputs: 1) 1990 Hardwood Rangelands Pixel Data (Pacific Meridian Resources 1994) for land cover and current footprint of development (*fig. 2a*); 2) 1996 County Assessor's parcel data for land tenure information; and 3) 1996 Adopted County General Plan for future potential development densities (*fig. 2b*). We converted the parcel and General Plan data to 25 m raster grids and snapped them to the Hardwoods data. We conducted all spatial modeling with ESRI's ARC/INFO and GRID software (vers. 7.1.1 - 8.1) on UNIX workstations except the fragmentation metrics, which we calculated using APACK v. 2.15 (Mladenoff and DeZonia 2000) on a Windows2000 operating system. An in-depth detail of our methodology has been previously published on the CDF-FRAP website (Greenwood and Saving 1999). Here, we present only a basic overview.

Creating the Footprint of Development

In order to model future development, we first had to construct a pixel-based *footprint of current development* which showed as explicitly as possible where structures and other human disturbances to the natural landscape exist. Remote sensing-based pixel data, such as the Hardwoods data, serve this purpose to some degree, especially in rural areas (Merenlender and others 1998, Ridd and Liu 1998), but provide no context of land use. Such data also miss development obscured by tree canopy and tend to confuse some urban and non-urban land cover types (e.g., rock outcrops and concrete) (Bruzzone and others 1997, Fisher and Pathirana 1990, Quarmby and Cushnie 1989). From the parcel data we determined the land use of each parcel and thus derived two binary layers—development status (*developed* or *vacant*) and intensity of use (*intense* or *not intense*) at the parcel level. For *developed* and *intense* parcels smaller than 1 hectare (2.5 acres), we included the entire parcel in the footprint. However, for larger parcels we turned to the Hardwoods data to identify specific areas of human disturbance within the parcel. We compared the classes Urban and Other (U/O) from the Hardwoods data to the development status of the parcel data. Where a U/O pixel(s) existed inside a *developed* parcel, we included those U/O pixels in the *footprint of current development*. Where a U/O pixel(s) existed in a *vacant* parcel, we considered those pixels "false positives" and did not include them in the *footprint of current development*, although they did remain in the land cover layer as Barren. For *developed* parcels with no U/O pixel(s), we simulated a pattern of development in the parcel using the same technique to project future development patterns (see below). Thus, we created a picture of current development composed of three elements: 1) small, intensely used parcels; 2) scattered pixels of development in larger parcels; and 3) stochastically placed pixels in developed parcels within which we could not determine the explicit location of development (*fig. 2c*).

Table 1—*Descriptions of the combinations of restrictions used for each scenario tested.*

	Slope/Stream Restrictions			Canopy Retention[1]			Other Restrictions			Total Area (ha)
Scenario	Description	Extent	Area (ha)	Description	Extent	Area (ha)	Description	Extent	Area (ha)	Restricted[6]
500	Present Condition	-	-	-	-	-	-	-	-	-
503	25 m stream setbacks, < 40% slope	subdiv.	19,567	as per GP	subdiv.	5,980	-	-	-	122,774
504	25 m stream setbacks, < 40% slope	all	26,983	as per GP	subdiv.	5,980	-	-	-	128,389
505	50 m stream setbacks, < 40% slope	subdiv.	23,319	as per GP	subdiv.	5,980	-	-	-	125,988
506	50 m stream setbacks, < 40% slope	all	31,819	as per GP	subdiv.	5,980	-	-	-	132,694
507	25 m stream setbacks, < 40% slope	subdiv.	19,567	as per GP	subdiv.	5,980	Clustering[3]	LDR, subdiv.	12,526	122,774
508	25 m stream setbacks, < 40% slope	subdiv.	19,567	as per GP	subdiv.	5,980	Clustering[4]	LDR, subdiv.	12,526	122,774
509	25 m stream setbacks, < 40% slope	subdiv.	19,567	Increased[2]	subdiv.	7,096	-	-	-	123,920
513	25 m stream setbacks, < 40% slope	subdiv.	19,567	as per GP	all	6,409	-	-	-	123,368
514	25 m stream setbacks, < 40% slope	all	26,983	as per GP	all	6,409	-	-	-	128,944
515	50 m stream setbacks, < 40% slope	subdiv.	23,319	as per GP	all	6,409	-	-	-	126,564
516	50 m stream setbacks, < 40% slope	all	31,819	as per GP	all	6,409	-	-	-	133,217
520	50 m stream setbacks, < 40% slope	all	31,819	as per GP	all	6,409	Clustering[4]	LDR, subdiv	12,526	133,127
543	25 m stream setbacks, < 40% slope	subdiv.	19,657	as per GP	subdiv.	5,980	Acquistion[5]	AOC	2,071	124,513

[1] Canopy retention restricts development by limiting the amount of development. In most cases, this does not mean complete restriction but rather a reduction in density only (*table 2*). See Greenwood and Saving, 1999.

[2] For details, see Greenwood and Saving, 1999.

[3] Proportion (B) of developed cells increased from 9% to 14%. Adjacency (C) increased from 55% to 95%.

[4] Proportion (B) of developed cells increased from 9% to 14%. Adjacency (C) increased from 55% to 98%.

[5] We manually selected parcels to be restricted from development in Areas of Concern (AOC).

[6] Includes all restrictions plus existing *developed* parcels, parcels *closed to development* , public ownership, and areas designated Open Space (OS) in the General Plan.

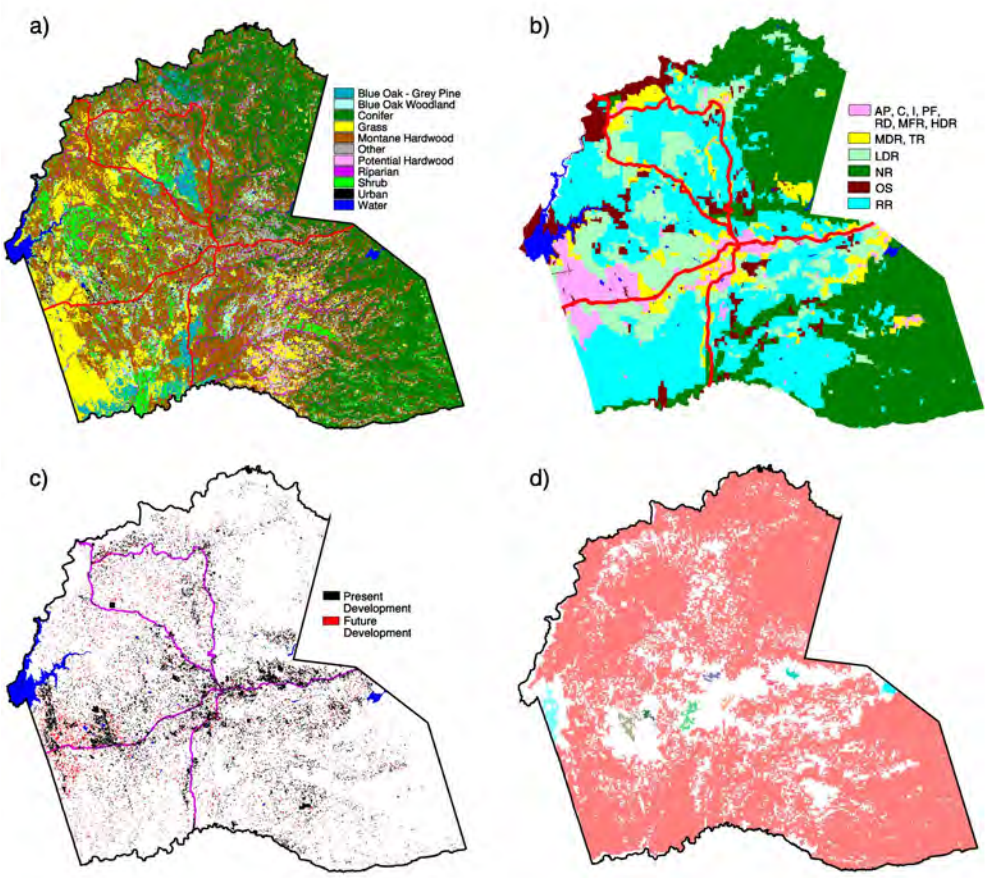

Figure 2—a) Land cover types from 1990 Hardwoods Pixel Data (Pacific Meridian Resources 1994), b) 1996 El Dorado County Adopted General Plan land use classes collapsed to 6 categories (see *table 2* for land use codes), c) footprint of current and future development under General Plan scenario (503), and d) map of current wildland habitat in the study area.

The first step in creating the *footprint of future development* required knowing where development could *not* occur. From the General Plan we derived a restriction status for each parcel. A parcel was *closed to future development* if it were already developed and already at the minimum allowable lot size for that General Plan density class. Alternatively, a parcel was *open to development with restrictions* imposed by the General Plan (i.e., discretionary permit review) if it were *developed* or *vacant* but at least twice as large as the allowable minimum lot size, meaning the lot could be further subdivided. Finally, a parcel was *open to development without restriction* (i.e., ministerial review) if it were *vacant* and already at the minimum allowable lot size for that General Plan density class and therefore could not be subdivided further.

The General Plan contained three major restrictions applying to discretionary permit review that we were able to model spatially – 25 m (1 pixel) stream setbacks,[4]

[4] The Adopted General Plan calls for 100' stream setbacks. Since our model is raster based, we used a one pixel (25 m) buffer as the closest estimate.

Table 2—*Canopy retention guidelines from Adopted General Plan. Values represent percentage of canopy that must be retained for each combination of General Plan Land Use Class and Current Oak Canopy Closure percentage. Where 100 percent of the canopy must be retained, no development can occur on oak pixels.*

	Current oak canopy closure (pct)				
General Plan land use class	**≤ 19**	**20-39**	**40-59**	**60-79**	**80-100**
Multi-family Residential (MFR)	90	85	80	70	60
High Density Residential (HDR)	100	90	80	70	65
Medium Density Residential (MDR)	100	90	80	70	65
Low Density Residential (LDR)	100	100	90	85	80
Rural Residential (RR)	100	100	100	95	90

no development on slopes over 40 percent, and an oak canopy retention guideline based on the density class of development and the existing canopy cover (*tables 1, 2*). We created a separate mask for each of these restrictions which could be turned on or off or, in order to simulate an ordinance, be applied to all parcels *open to development* regardless of restriction class. We also created similar masks reflecting 50 m stream buffers and increased canopy retention. Lastly, some areas were off limits to development in every scenario—areas classified as Urban or Other in the Hardwoods data, parcels that were *developed* and *closed to future development*, public lands, private reserves, easements, and open space designated in the General Plan.

Once we determined where development was allowable, we then determined the spatial configuration of development at the 25 m pixel scale. McKelvey and Crocker (1996) developed a stochastic flood-fill algorithm to create theoretical landscapes burned by fire using two aspects of spatial configuration—proportion (B) of landscape burned by fire, and the spatial adjacency (C) of the burned pixels. Adjacency is defined as the probability that if a cell is burned, an adjacent cell is also burned.[5] We modified their algorithm to create binary neutral landscapes that mimic the development patterns for each housing density class in the General Plan. By overlaying the Urban and Other pixels from the Hardwoods data onto classified 1990 Census block housing density data, we calculated proportion (B) and adjacency (C) for landscapes settled at different densities. The proportion of Urban and Other pixels ranged from 27 percent for housing density classes greater than 1 unit/acre down to 3 percent for density classes less than 1 unit/40 acres (*table 3*). Adjacency values varied to a lesser degree, ranging from 62 percent to 50 percent over the same housing density range (Greenwood and Saving 1999). By masking non-developable areas and inserting portions of these theoretical landscapes into the appropriate General Plan density region, we created potential *footprints of future development* for the study area (*fig. 2c*).

[5] McKelvey and Crocker refer to the adjacency measure (C) as contagion. To avoid confusion with the contagion indices of O'Neill and others (1988) and Li and Reynolds (1993), we have chosen to use the term adjacency.

Table 3—*General Plan land use classes and allowable lot sizes with proportion of cells (B) from the Hardwoods data classified as Urban or Other and likelihood of adjacency (C) of Urban and/or Other cells.*

General Plan land use class	Allowable lot size (ac)	Proportion of urban or other cells (B)	Probability of adjacency (C)
Multi-family Residential (MFR), High Density Residential (HDR)[1]	<= 1	0.27	0.62
Medium Density Residential (MDR)[2]	1 - 5	0.14	0.61
Low Density Residential (LDR)	5 - 10	0.09	0.55
Rural Residential (RR)	10 - 40	0.06	0.55
Natural Resources (NR)	40 - 160	0.03	0.50

[1] Includes these General Plan Land Use Classes - Adopted Plan (AP), Commercial (C), Industrial (I), Public Facilities (PF), and Research and Development (RD)
[2] Includes Tourist Recreation (TR)

For most scenarios, we assumed the spatial configuration of development for a given density class would not be significantly different in the future than at present. In other words, the values of B and C for a given density class did not change. However, the model did not limit us to this assumption. The General Plan allows for the doubling of total housing density in the Low Density Residential (LDR) class (5 - 10 acre parcels) if the development is highly "clustered." Our landscape generator allowed us to easily simulate how this development pattern might appear (scenarios 507 and 508). We created two clustered density patterns for LDR by increasing B from 9 percent to 14 percent to simulate the density bonus, and by increasing C from 55 percent to 95 percent and 98 percent to simulate clustering (*table 1*).

Quantifying Impacts to Wildand Habitat

For this analysis, we defined *habitat* as all land cover types in the 1990 Hardwoods Pixel Data that were not Urban, Other, or Water. We combined Urban and Other pixels, along with developed cells from the *footprint of future development*, into one class called *developed*. Water was masked from the analysis environment. We defined *wildland habitat* as *habitat* more than 50 m (2 pixels) from a *developed* pixel, in patches greater than 100 hectares and containing no constrictions, or narrow necks, of *wildland habitat* narrower than 50 m. *Urban habitat* were those areas of natural vegetation within 50 m of a *developed* pixel. *Marginal habitat* were all areas not defined as *urban* or *wildland habitat* (narrow constrictions or patches less than 100 hectares, and > 50 m from *developed* pixels). This overlay of the footprint of development onto the natural land cover creates a landscape mosaic of *wildland*, *marginal* and *urban habitats*.

A quick review of the landscape ecology literature reveals many highly specialized metrics for capturing specific characteristics of a landscape. Several studies (Hargis and others 1999; McGarigal and McComb 1995, 1999; Ritters and others 1995; Tinker and others 1998) have shown that the simplest, most basic measures are the easiest to understand and serve well to compare and contrast landscapes. We calculated the following fragmentation metrics for wildland habitat for each scenario—total area, number of patches, mean patch size, largest patch size, mean shape index (Frohn 1998, McGarigal and Marks 1995, Ritters 1995), corrected

mean perimeter/area (P/A) ratio (Baker and Cai 1992), and total edge density. Ritters (1995) inverts McGarigal and Marks' (1995) mean shape index for raster data, calling it "average normalized area, square model," to make the values range from 1.0 for a perfectly square patch to 0.0 for patches that are long and narrow. The APACK software calculates Ritters' metric. As this metric measures the same landscape attribute as McGarigal's mean shape index (shape complexity - patch shape relative to a square), we have chosen to use McGarigal's name, mean shape index, when referring to it rather than Ritters' more cumbersome moniker. Although these metrics provide an objective means of comparing landscapes, they do not quantify all aspects of landscape configuration. Therefore, we also assessed model results through visual inspection of the output maps of *wildland habitat* extent.

Results

General Plan

Figure 2d shows the present extent of *wildland habitat* in the study area. The dominant feature of the landscape is a single patch of wildland (mean area of three iterations, 159,535 ha) that extends across the county from north to south and bridges the Highway 50 corridor. The influence of development is substantial yet would appear not to have significantly disrupted the contiguity of wildlands outside of the Highway 50 corridor and the communities of Pilot Hill and Georgetown. *Figure 3a* shows how the county's wildlands might appear if the General Plan were completely built out (scenario 503). The most apparent impact is the increase in number of patches and the cleaving of the wildland into distinctly separate northern and southern regions. Compared to present conditions, mean number of patches per iteration double from 10.0 to 19.67 and mean patch size accordingly drops from 16,182 ha to 6,337 ha (*table 4*). Mean largest patch size similarly declines to 59,603 ha. As patch sizes drop, measures of total edge density and corrected perimeter-to-area (P/A) perforce increase. Mean total edge density rises from 46.6 m/ha to 68.4 m/ha while mean corrected patch P/A ratio increases from 8.97 to 9.76. Mean shape index decreases from 0.070 to 0.043 indicating that not only does wildland shrink and fragment, it also becomes more complex spatially due to low density development perforating the existing wildland matrix. It is important to note, however, that the significant loss of wildland does not mean that large portions of the county have been paved over. While the mean loss of wildland is 23 percent, only 4.5 percent of wildland is actually converted to urban use. For oak woodland land cover types, 40 percent of wildland becomes *marginal* or *urban* woodland but only 4 percent is physically lost to development. In other words, areas that once functioned under a more natural state and presumably provided functional habitat for species are degraded, either due to proximity to urban land uses or by isolation from larger patches of contiguous natural vegetation.

Table 4—*Mean values of wildland habitat landscape metrics for three iterations of the Present Condition (500) and General Plan (503) scenarios.*

	Present condition scenario 500	General Plan scenario 503
Total area	161,825 ha	123,267 ha
Number of patches	10.00	19.67
Mean patch size	16,182 ha	6,337 ha
Largest patch size	159,535 ha	59,603 ha
Mean shape index	0.070	0.043
Mean patch P/A ratio, corrected	8.974	9.762
Total edge density	46.57 m/ha	68.38 m/ha

General Plan Alternatives Increased Development Restrictions

Figure 3 (*b-d* and *g-k*) shows extents of wildlands for the General Plan alternatives meant to mitigate impacts through increased restrictions to development. The most noticeable aspect of the maps is their similarity to the General Plan scenario. The north and south patches remain highly separated in all scenarios except for scenario 543 where a few small patches come close to reconnecting the north and south patches. The differences become more apparent when the metrics are examined. All scenarios maintain a greater area of wildland than the General Plan. Scenarios that increase the areal extent of development restrictions (504, 505, 506, 509, 513, 514, 515, 516) generally indicate a decrease in fragmentation (mean number of patches decreases slightly and mean patch size increases slightly) (*fig. 4*). However, the range for number of patches and mean patch size for these scenarios is high, indicating site-specific sensitivity to placement of development. Scenarios 506 and 516 show the greatest increase in wildland mean total area (126,716 ha and 126,877 ha, respectively) and mean largest patch size (60,906 ha and 61,105 ha, respectively). Scenarios 506, 509 and 516 have the highest mean patch sizes (6,805 ha, 7,021 ha, and 6,952 ha), although 509 has a large range (1,238 ha). These results are consistent with those expected as the scenarios 506 and 516 restrict the largest amounts of land from development (132,694 ha and 133,217 ha, respectively). Patch shape complexity shows little difference in all scenarios as mean shape index remains virtually unchanged as does the mean corrected patch P/A ratio. Mean total edge density declines slightly with 506 and 516 having the greatest decrease (67.02 m/ha and 67.00 m/ha, respectively).

General Plan Alternatives Development Clustering

For scenarios 507 and 508 we examined the efficacy of clustering development for mitigating wildland habitat loss. For General Plan density classes of Low Density Residential (LDR), we increased adjacency (C) values to 95 percent and 98 percent, respectively. Because the General Plan allowed for a density bonus to the next higher density class, Medium Density Residential (MDR), we also increased the proportion (B) of developed pixels in LDR from 9 to 14 percent for both scenarios. Neither scenario shows a demonstrable increase in wildland habitat retention over the General Plan scenario, while some metrics indicate increased fragmentation. Mean

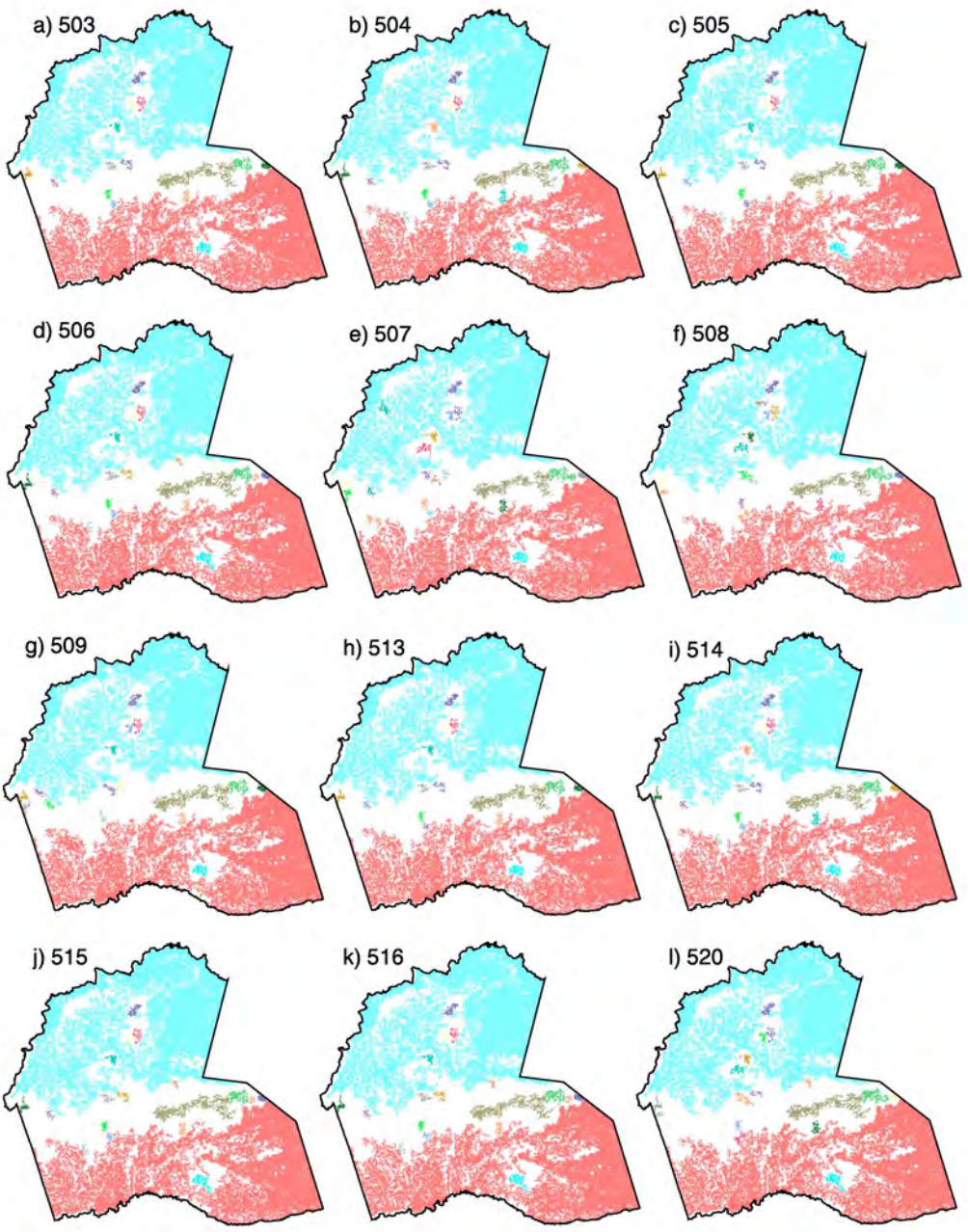

Figure 3—Maps of wildland habitat after full buildout for all scenarios. Areas of the same shade are a contiguous patch.

total area for scenario 507 (123,310 ha) is virtually the same as the General Plan and only slightly higher for scenario 508 (123,831 ha) (*fig. 4*). Mean largest patch size (507 = 59,502 ha, 508 = 59,847 ha) and mean corrected patch P/A ratio (507 = 0.044, 508 = 0.047) show similar behavior while mean total edge density does decrease slightly for 508 (67.39 m/ha). Mean number of patches (507 = 20.67, 508 = 19.0) remains within the range of values of those of the General Plan. Mean patch size actually goes down for 507 (5,979 ha) and remains unchanged for 508 (6,517 ha).

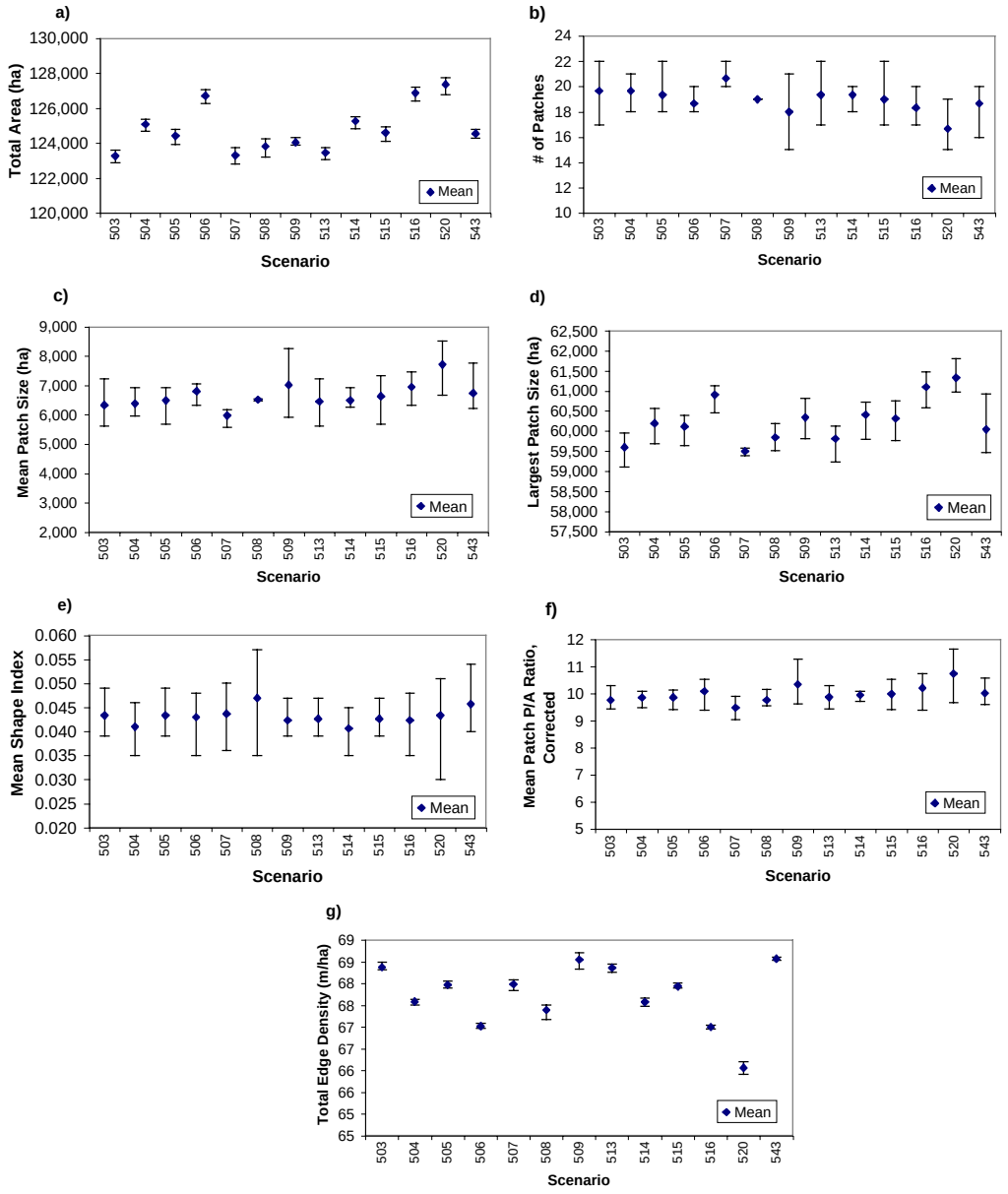

Figure 4—Values of wildland habitat landscape metrics for three iterations of the General Plan scenario (503) and alternatives (504-543). a) total area, b) number of patches, c) mean patch size, d) largest patch size, e) mean shape index, f) mean patch P/A ratio, corrected, and g) total edge density.

One of the iterations for scenario 508 has the highest mean shape index of all scenarios (0.057) but another iteration of 508 has the second lowest (0.035). Neither scenario was effective at maintaining the north-south connection (*figs. 3e, 3f*).

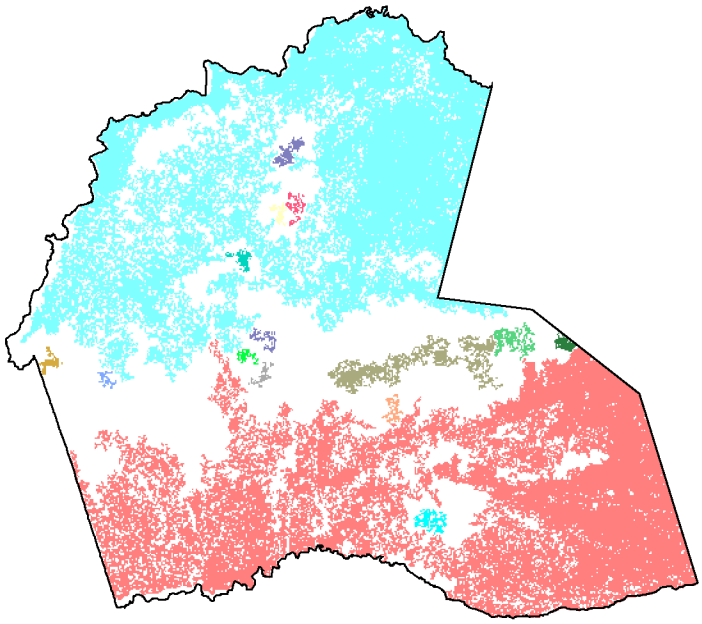

Figure 5— Map of wildland habitat after full buildout for parcel acquisition scenario (543).

General Plan Alternatives "Kitchen Sink" and Planned Acquisition

Given that scenarios 504-516 were ineffective at increasing wildland habitat retention over the General Plan scenario or at maintaining the north-south connection, we tested two additional approaches. Scenario 520, dubbed the "Kitchen Sink" scenario, combined all of the most restrictive policies yet tested – 50 m stream buffers, 40 percent slope restriction, oak canopy retention for all developable land regardless of restriction status, plus clustering as per scenario 508 (B = 14 percent, C = 98 percent) (*table 1*). In contrast, Scenario 543 took a completely different approach leaving all original General Plan restrictions intact but expanding the area of non-developable land by restricting select parcels from development in key areas of concern. This scenario simulates a planned acquisition approach through the use of easements and/or outright purchase of development rights by the county. We selected several vacant parcels in the Indian Creek canyon area where it crosses Highway 50 between Placerville and Shingle Springs in an attempt to reconnect the northern and southern portions of wildland. In those selected parcels, we only restricted development on oak pixels and areas within 50 meters of oak pixels. This left some parcels still potentially developable.

As expected, scenario 520 retains the highest mean total area (127,376 ha) of wildland because it restricts the greatest area of land from development (133,217 ha) (*table 1*). Mean number of patches (16.67) is the lowest for all scenarios and subsequently mean patch size (7,721 ha) is the highest (*fig. 4*). Mean largest patch size (61,332 ha) is also the highest of all scenarios. Shape complexity does not

decrease, however. Shape index is the same (0.043) as the General Plan scenario and mean corrected patch P/A ratio is the highest of all scenarios (10.74). In contrast, mean total edge density is the lowest of all scenarios (66.1 m/ha). Scenario 520 also does not come close to maintaining the north-south connection (*fig. 3l*).

As we made no attempt to preserve amount, but rather configuration, of wildland, scenario 543 only preserves an average of 1,296 more hectares than the General Plan (mean total area = 124,563 ha) and actually has slightly more average patches (20.0) and a smaller mean patch size (6,229 ha) (*fig. 4*). However, mean shape index is the second highest for all scenarios (0.046) while mean corrected patch P/A ratio is only slightly better than the General Plan (10.013). Mean total edge density is the same as the General Plan (68.57 m/ha). Most importantly, however, scenario 543 comes the closest of all scenarios to maintaining a connection between the northern and southern wildland patches (*fig. 5*).

Discussion

Our study demonstrated that the General Plan for El Dorado County will not allow the county to become one giant suburban subdvision. The General Plan allocates 43.0 percent of private land to development in the 1 unit/5 acre to 1 unit/40 acre density range (LDR and RR). Moreover, only 4 percent of the existing oak canopy will actually be removed by, or converted to, development. However, the configuration of this development is of concern as full buildout could force as much as 40 percent of the County's existing *wildland* oak woodlands into *marginal* or *urban* habitats. When counties are faced with such impacts, a popular mitigation approach is to implement prescriptions in the General Plan that regulate, and/or limit, how and where development can occur (e.g., stream setbacks, slope restrictions, etc.). However, such prescriptions can only apply to development that will undergo discretionary permit review, that is, parcels that have yet to be subdivided to the smallest allowable density in the General Plan. In the case of El Dorado County, 31 percent of *vacant* land that is *open to development* in the county (86 percent of parcels) had been subdivided prior to the adoption of the General Plan and is therefore not subject to these prescriptions. These parcels only require ministerial review (i.e., a building permit) before construction can occur. To impose a restriction that would regulate where development could occur in those parcels would require a county-wide ordinance. Our model allowed us to test both alternative General Plan prescriptions and county-wide ordinances. The former had little effect decreasing wildland habitat loss or fragmentation over existing General Plan policies. We attribute this to the large portion of the county not subject to the prescriptions due to prior subdivision. Ordinances showed greater wildland retention over the General Plan but that increase was still small. Scenario 516, the most restrictive ordinance scenario, only preserved 3,610 hectares more wildland than the General Plan and made little difference to patch configuration, shape complexity or edge density. The political expense in implementing ordinance-type solutions would seem to far outweigh the potential ecological benefits to oak woodlands.

Clustered development is a popular prescription proposed by the smart growth community. By holding overall density constant for an area but decreasing the space between structures, less space is scattered between structures which could otherwise serve as habitat and perform other ecosystem functions. The perceived advantages are so great that in order to promote clustering, El Dorado County offers a density

bonus for clustered development in the Low Density Residential category (5 - 10 acre parcels). We modeled two clustering scenarios allowing densities to increase to the Medium Density Residential level (1 - 5 acre parcels). Neither scenario improved wildland habitat condition over the General Plan and some metrics for scenario 507 (mean number of patches, mean patch size and largest patch size) were actually worse. The increase in density, and therefore the increase in the amount of land developed, offset any benefit that would be gained from clustering. Furthermore, clustering can only occur in *vacant* parcels *open to development with restriction* in LDR. This occurs only in a few small areas in the northern portion of the county.

Scenario 520, the Kitchen Sink scenario, employed the strictest policy restrictions we tested, plus clustering. Looking solely at the fragmentation metrics (*fig. 4*), this scenario offered the most improvement in wildland habitat condition over the General Plan. Yet when examining the maps, we did not notice any significant difference in wildland amount or configuration (*fig. 3l*). Most notably, the north-south separation was still very pronounced. Implementing county-wide ordinances which mandate 50 m stream buffers, 40 percent slope restrictions and oak canopy retention on all undeveloped parcels, plus requiring clustering in LDR, is highly unrealistic, not to mention, very politically expensive. Again, we contend that the political costs of such a scenario are probably greater than the ecological benefits.

Alternatively, we examined a limited parcel acquisition, or easement, strategy (scenario 543) for areas of concern which removes key parcels from the potential development landscape. One such area is the Indian Creek Canyon region. Here, a stringer of oak woodlands presently connects the northern and southern wildland patches. Although this scenario did not actually maintain the connection, several small patches do extend through the area indicating that the concept has the potential to maintain this critical corridor. This area of the county is highly desirable for development, therefore making this scenario potentially fiscally expensive. However, unlike the ordinance approach, an acquisition approach would encounter fewer stakeholders directly and would offer owners compensation for the loss of development rights on their property. Involving private conservation groups or land trusts could greatly reduce costs to the public sector.

Rural residential development erodes habitat quality much more than habitat extent, requiring a more nuanced approach to assessing impacts than when natural habitats are simply removed or paved over. At these low densities, we were unable to use polygons of housing density to determine the relationship of naturalness to density. At certain scales, the landscape still looks much as it once did. Rather, we modeled the real impacts of site alteration which required an entirely unique set of variables and characteristics such as determining the exact footprint of development (e.g., Do lightly used roads count? Do outbuildings?) and establishing the sphere of influence from a structure (e.g., How far from the structure is natural vegetation disturbed? How far does sound travel? What impact does it have? What influence do pets have and at what distance?). We can easily adjust these variables in our model to examine their sensitivity and ability to assess other issues besides wildland connectivity such as impacts to specific species habitat requirements, watershed degradation from increased sediment generation, and changes in wildfire probability due to vegetative fuel alteration. Most people can agree that high density urban and suburban development do not provide much high quality habitat for most species, but seldom can stakeholders, land managers, public officials, or even scientists agree on the thresholds or the degrees at which rural development begins to impact the

landscape. As more of the landscape of California transitions from large extents of wilderness owned by relatively few private individuals to a landscape divided up amongst thousands of owners regularly dotted with houses every few thousand feet, understanding these impacts and enacting policies that are effective, fair, and feasible become ever more important and challenging.

Future Directions

One aspect of development and conversion of natural land cover that we have not addressed is agricultural expansion. In El Dorado County this primarily involves vineyards. Agricultural expansion has the potential for far greater impact to habitat extent and connectivity than residential development as a greater area of land in larger contiguous patches is generally more greatly disturbed. Agricultural expansion can also be more difficult to predict. Heaton and Merenlender (2000) have developed a model to determine site suitability for vineyard expansion in Sonoma County which could be adapted for use in El Dorado County.

More investigation of the effects of riparian corridors on habitat connectivity is needed, including the effectiveness of stream setbacks and the development of methods to characterize linear features, as opposed to the two dimensional patch features analyzed here.

Better knowledge of the likelihood of development would enhance our ability to tailor solutions to specific areas of concern. The incorporation of economic models of development such as Johnston's UPLAN (2001) and Landis's CURBA (1998a, 1998b) would provide more realistic future scenarios as well as the ability to model development in stages over time rather than only at full buildout as we have done. Implementing other constraining factors to development such as water availability and habitat conservation plans could also improve our predictions of future development.

Conclusion

Fine-grained spatial models with highly detailed datasets are required for evaluating impacts of development on ecological, economic, or social systems at the local level. Such large-scale, high-resolution models also enable stakeholders to more easily relate the data portrayed on maps to their perception of the landscape in which they live. However, most site-specific models of development have been created for dense urban areas, using complex economic formulas of land value and empirically derived patterns of past development trends. These models prove less than reliable at predicting low-density development of the rural ranchette variety which is now so prominent in the Sierra foothills and which has such great impact on habitat quality. We have developed a model that is both fine-grained and capable of predicting potential rural ranchette development and its impacts. Moreover, by having a tool that can operate under various assumptions and constraints, we can actually test a proposed solution's efficacy at achieving a desired goal, which in this case is maintaining wildland connectivity. We have also used our model of predicting footprint of development to assess impacts of wildfire on future structure loss. Our explicit model of development could prove useful for studies of water quality and cumulative impacts for watersheds by incorporating elements such as sediment

generation from road development, nutrient loading from septic systems, and conversion of natural land cover to impervious surfaces.

Existing land tenure (the historic parcelization of land) limits effective control of development by General Plan prescriptions that are only applicable when a parcel requires subdivision before development, thus leaving solutions that require large expenditures of political capital such as ordinances or downzoning. The political expense in implementing such solutions would seem to far outweigh the potential benefits. For El Dorado County, our study concludes that the most effective way to maintain wildland oaks in large contiguous patches would be a land acquisition program focused on those critical areas of connectivity, often referred to as habitat corridors. More importantly, broad-brush, "best management practice" type solutions (i.e., the conventional wisdom) applied evenly across the landscape are not necessarily the most effective approach. Site-specific design may be a more effective tool in minimizing negative impacts of development than generic policy prescriptions. "Good" policy should be a process by which better analysis of the problem leads ultimately to better design of the solution.

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EDH APAC Letter on the NOP-EIR BioResources and ORMP

1 message

Hidahl@aol.com <Hidahl@aol.com> Mon, Aug 17, 2015 at 3:53 PM
To: shawna.purvines@edcgov.us
Cc: david.defanti@edcgov.us, jeff.h@ix.netcom.com, aerumsey@sbcglobal.net, hpkp@aol.com, jjrazz@sbcglobal.net, bosone@edcgov.us, bostwo@edcgov.us, bosthree@edcgov.us, bosfour@co.el-dorado.ca.us, bosfive@edcgov.us, rich.stewart@edcgov.us, gary.miller@edcgov.us, tom.heflin@edcgov.us, dave.pratt@edcgov.us, brian.shinault@edcgov.us

Shawna,

Attached is APAC's letter regarding the subject NOP for EIR. Please note that the first portion of the letter was approved by the APAC board, while the second portion (new project alternative) is only a subcommittee level recommendation at this time.

If you have any questions, please contact me @ (916) 933-2703

Thanks, John
EDH APAC TGPA/ZOU Subcommittee Chair

APAEBC~1.DOC
287K

El Dorado Hills
Area Planning Advisory Committee
1021 Harvard Way
El Dorado Hills, CA 95762

August 17, 2015

El Dorado County Development Services Department, Planning Services
Attn: Shawna Purvines, Senior Planner
2850 Fairlane Court, Building "C"
Placerville, CA 95667

Subject: APAC Comments-NOP EIR GP-Biological Resources and Oak Resources Management Plan

Dear Shawna,

An El Dorado Hills APAC subcommittee reviewed the subject NOP EIR, and recommended the questions/responses at the APAC meeting held on Wednesday August 12th. APAC voted 4-0 to submit the information below. Subsequent participation in the County Planning Commission's scoping meeting held on Thursday August 13th resulted in a new project alternative being proposed, which is addressed separately at the bottom of the letter as a subcommittee recommendation. The full APAC will review the subcommittee's recommendation at our monthly meeting on September 9th.

Biological Resources:

Objective 7.4.1: Why is 'protection for' Federal and State Rare Plant Species being eliminated?
General: How do these proposed changes affect the County's enforcement requirements (more enforcement required/less enforcement required/no change)?

Oak Resources Management Plan

2.1: Discretionary approvals are mentioned. Please identify by whom, and under what rule would these approvals be given and where it applies?

Road widening and re-alignment projects are being exempted- We disagree, partial mitigation should be considered.

Affordable housing projects are being exempted- need to add definition of affordable housing projects to Section 6.0. Some form of mitigation should be considered.

Agricultural exemption- need to preserve historical wildlife corridors.

Williamson Act Contract exemptions- must prohibit removal of any trees for the purpose of eventually rezoning the property to residential

Personal Property exemption- need to define further what "for the owner's personal use" means? How is this enforced by County?

2.4: 'Replacement trees shall be regularly monitored and maintained…….' By whom? The 'Serrano' oak and native plantings achieved nothing and the sticks for the trees can still be seen on the boulevard with no follow up…..

"On-Site replacement trees are to be planted to the satisfaction of the Development Services Director". We would suggest this be to the satisfaction of an arborist or forester

If you have any questions on any of the comments and/or concerns expressed herein, please contact the Sub-Committee Chairmen; John Hidahl @ (916 933-2703).

APAC appreciates having the opportunity to comment.

Sincerely,

Jeff Haberman
Jeff Haberman,
Chairman, APAC

APAC Subcommittee recommendation for a new Project Alternative

County planning should consider a new project alternative focused on maximizing the preservation of Oak Resources, and providing incentives for existing land owners to be good stewards of their oak resources, while providing reasonable access and enjoyment of their property.

This alternative could use an aerial survey of the private property oak resources combined with county documented Priority Conservation Areas (PCAs) and the Important Biological Corridor (IBC) overlay to achieve a comprehensive oak resource/owner needs balance. This could be entitled something like the 'Biologically Balanced' alternative?

The project could pictorially define the current oak tree resources (total inventory), then address the PCAs and the criteria/requirements for oak tree removal and incentives for Oak Tree retention within the PCAs. It would next address the IBCs and the criteria/requirements for oak tree removal and incentives for Oak Tree retention within the IBCs. The 'remainder' consists of the areas with current oak tree resources that are not within the bounds of the PCA and/or IBC. The 'remainder' would similarly have

criteria/requirements (possibly using the GP land use designations?) for oak tree removal and incentives for Oak Tree retention.

This approach should balance the needs/desire to maintain the look and feel of our rural County (Rural Regions), while recognizing that urbanized areas (Community Regions) require more stringent mitigation measures and fees to retain the desired population of native oak trees.

John Hidahl

John Hidahl,
TGPA/ZOU SubCommittee Chairman, APAC

cc: BOS1, BOS 2, BOS 3, BOS 4, BOS 5
Planning Commission
APAC Read File