From: Elisabeth Landis
Sent: Friday, April 04, 2014 1:46 PM
To: Leon Freeman
Cc: Emma Howard; Joseph Decruyenaere
Subject: Some interesting photos

Here are some interesting photos that illustrate the effectiveness of clearing 200 feet from structures, but ignoring the flammable landscaping in the first 30 feet from the house.
These photos were taken before and after the Corral Canyon (Santa Monica Mountains) fire.This is in unincorporated County.
See attached.

What is vitally needed is General Plan landscape regulations for structures, particularly residential structures, in the "Wildland Urban Interface". Emphasis must be placed on no vines against the structure walls or roofs, no plants at all against the house (borders of decorative brick/tile or different colors of gravel or decomposed granite or pebbles are possibilities) especially where there are screened vents under the house or under the eaves.

No trees within 30 feet of the house.

No flammable trees within 100 feet of the house. Examples of flammable trees are conifers (pines, junipers, Italian cypress), eucalyptus species, acacias, /Shinus/ species such as Brazilian pepper or Peruvian pepper (erroneously called California pepper), palm trees. Examples of fire-resistant trees are mature coast live oak, mature toyon, healthy western sycamores. Coast live oaks are known as "ember-catchers" because their tannin-filled thick leaves and thick bark catch flying embers and extinguish them. They are a great windbreak. In fact, healthy mature ceanothus trees are fire-resistant for much the same reasons.

Note that low shrubs, concrete block/mortared stone or brick/chainlink/boulder fences will interrupt windflow especially if the wildfire is not a crown fire. Because we are in a mode of water conservation, the best groundcovers are not succulents, ivy, creeping /Myoporum/, or European vines that require a lot of water and develop a lot of flammable woody mass under their leafy canopies. Small groups of shrubs that grow no higher than three feet and that are surrounded by a border of stones, bricks or pavers can be grown in the next 70 feet from the house. These groups would be staggered and no more than 20 feet apart. Their job is to spread roots through the ground to stabilize the fuel mod zone and to break up wind flow. The plants need to be maintained with dead material removed underneath the plants and light pruning to promote healthy growth.

Native trees must not be "lollipopped". These chaparral trees grow perhaps ten to twelve feet tall. They depend on winter rains to soak the ground nutrients free for their roots to process and feed them during the winter through April. During the rest of the year they depend on their new leaves to process food for the whole plant and the mature leaves to shade the trunk and branches to prevent sunburn and overheating of the plant. When crews arrive to do "fuel mod clearance" they remove most of the new leaves, expose the trunks for heights of up to 6 feet and remove all root sprouts.

The chaparral trees are left with too little canopy and too hot a trunk to produce and move nutrients through the plant. Erosion exposes their root boles and roots. Usually these plants die in a few years.
See attached photos of typical results.

Let's look at this realistically. The current mode of "fuel mod" causes exactly the same damage as a wildfire causes that burns healthy habitat.

The difference is that "fuel mod" clears the habitat every year, while wildfire traditionally only burned habitat every 40 to 100 years. "Fuel mod" clearance kills the habitat that stabilized these slopes, stored rainwater, fed and protected a very biodiverse spectrum of creatures.

"Fuel mod" as it is currently practiced is destroying all flora and fauna and is destroying their abilities to recover. It is bad management of natural resources. For your information I have spent about twenty years studying various post-wildfire areas in the Santa Monica Mountains, the Simi Hills, the foothills of the San Gabriel Mountains and the northern Santa Ana Mountains.

It is time for the Los Angeles County General Plan Housing Element and Natural Resource Element to develop better management practices. Since constant increase in wildfire frequency, increase in acreage of erodable bare earth and loss of watershed resources affect local climate, the County Climate Action Plan should consider how to introduce better management practices of County natural resources.

Betsey Landis
Los Angeles / Santa Monica Mountains Chapter California Native Plant Society

Fire PixA,Donut Clearance_CorralCynHouse_before-1a, unknown source

Fire,DonutClearance_CorralCaynHouse_after1a,MWitter

More erosion east side of MCR north of 3744,20140302

Severe erosion exposes root boles east side of MCR North of 3744,20140302

California Native Plant Society

Los Angeles / Santa Monica Mts. Chapter

3908 Mandeville Canyon Road
Los Angeles, California 90049
February 5, 2014

Los Angeles County
Department of Regional Planning
General Plan Development Section
320 W. Temple Street
Los Angeles, CA 90012
Phone: 213-974-6417
Fax: 213-626-0434
General Plan <genplan@planning.lacounty.gov>
Emma Howard <ehoward@planning.lacounty.gov>

RE: Comments on Los Angeles County General Plan Public Review Draft: Appendix E

Dear Staff:

The Los Angeles / Santa Monica Mountains Chapter of the California Native Plant Society has 450 members in Los Angeles, San Fernando Valley and Santa Monica Mountains.

We are very interested in the progress of the General Plan, especially in Chapter 9: Conservation and Natural Resources Element, and in Appendix E: Significant Ecological Areas.

Here are some comments on Appendix E: Significant Ecological Areas:
SEA 2) Antelope Valley:
Criterions C and F: Mesquite bosque is declining due to wide-spread development drawing down groundwater. In the Antelope Valley this is an original natural biotic community that is dying out due to over-development without consideration of future water supplies. Mesquite bosque needs protection.

SEA 3) Cruzan Mesa Vernal Pools
Criterions B and E: Vernal pools are rare regionally. Vernal pools are very interesting scientifically because they represent an extreme natural biotic community and because they are good subjects for assessing the effects of drought and of climate change.

SEA 4) East San Gabriel Valley
Criterions B and C: California black walnut (*Juglans californica*) woodlands are limited in distribution both regionally and within the county. They used to be more widespread. The City of Los Angeles includes them in their protected tree ordinance. Is the California black walnut protected in Los Angeles County's Oak Ordinance? If not, then in all the SEAs the presence of *Juglans californica* woodlands should be noted as a special biotic community worthy of protection.

SEA 5) Griffith Park
Mountain lion (*Puma concolor*) is the top carnivore in Griffith Park. Please add it to the list of mammals.
I ask that you consider expanding the Griffith Park SEA to include small undeveloped areas between residential development in canyons and parks along Mulholland and on the ridges. I have seen evidence and

been given evidence that mountain lions travel along Mulholland and may have cubs in locations like Stone Canyon. There are rare plants along the way as well. Braunton's type location for the milkvetch named after him is in the Santa Monica Mountains, probably near Mulholland's first reservoirs in Franklin Canyon. I haven't found it yet, but the soil is the right type. Griffith Park does not have the right soil (ancient marine sediments) for Braunton's milkvetch.

SEA 6) Harbor Lake
Criterion A has been met by the presence of a core population of fairy shrimp in the vernal pool and the habitat of the vernal pool.

SEA 9) Palos Verdes Peninsula and Coastline
Criterion A: Include the only known mainland population of Crossosoma californicum (near Forrestal Drive). It grows on an unusual geologic outcrop and is very old, according to Bart O'Brien, who checked it out a few years ago when he was on the staff of Rancho Santa Ana Botanic Garden.

SEA 11) Rio Hondo College Wildlife Sanctuary
Criterions B, C, and F are met by the California black walnut (*Juglans californica*) woodlands which are rapidly disappearing and need protection.

SEA 13) San Dimas Canyon and San Antonio Wash
If Frank G. Bonelli Park is in this SEA, then I recorded a core population of *Dudleya multicaulis* there on rock slabs near a horse trail. That meets Criterions A and E. It is an isolated, scientifically interesting site.

SEA 14) San Gabriel Canyon
Criterion E is met because the Braunton's milkvetch population there is the farthest east of any of the other known populations and is of scientific interest due to its isolation.

SEA 15) Santa Clara River
This SEA is losing floodplain resources and watershed values to channelization of the watershed drainages in Newhall Ranch and the channelization of the main river due to development. This was the most important natural water resource in the county. How are you protecting its resource values now?

SEA 17) Santa Monica Mountains
Please add the east and west ridges around the head of Mandeville Canyon to this SEA. There is a very rich west-east wildlife corridor extending from Topanga State Park through Rustic, Sullivan, and Mandeville Canyons with an excellent range of habitats. It includes San Vicente Mountain Park and the undeveloped area above Encino Reservoir.

SEA 18) Santa Susana Mountains and Simi Hills
Chatsworth Reservoir is not a superfund cleanup site to my knowledge. I am involved in the Santa Susana Field Lab cleanup meetings. That is not a superfund cleanup site. Where did that information come from?

Thank you for your consideration of these comments.

Sincerely,

Betsey Landis

Betsey Landis, Conservation Committee
Los Angeles / Santa Monica Mountains Chapter
California Native Plant Society

California Native Plant Society

Los Angeles / Santa Monica Mts. Chapter

3908 Mandeville Canyon Road
Los Angeles, California 90049
February 3, 2014

Los Angeles County
Department of Regional Planning
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320 W. Temple Street
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Phone: 213-974-6417
Fax: 213-626-0434
General Plan <genplan@planning.lacounty.gov>
Emma Howard <ehoward@planning.lacounty.gov>

RE: Comments on Los Angeles County General Plan Public Review Draft: Chapter 9 and Appendix E

Dear Staff:

The Los Angeles / Santa Monica Mountains Chapter of the California Native Plant Society has 450 members in Los Angeles, San Fernando Valley and Santa Monica Mountains.

We are very interested in the progress of the General Plan, especially in Chapter 9: Conservation and Natural Resources Element, and in Appendix E: Significant Ecological Areas.

Here are some comments on Chapter 9:

1) P. 123, Goal C/Nr 1: Open Space areas that meet diverse needs of LA County: Open Space Acquisition:

a. Policy C/NR 1.4: After “Create” add “support and protect”

b. Policy C/NR 1.5: Add to sentence: “except in those areas containing listed flora and fauna, locally rare habitats, or threatened watershed resources.”

2) P.124, III Biological Resources,

a. Introduction: second paragraph: There are at least nine main types of biological resources. Change “six” to “nine” and add “chaparral, desert shrubland, and alpine”.

b. Background: Regional Habitat Linkages, second bullet: Add “to the Tehachapi and San Gabriel Mountains.”

3.) Pages 125-127, after Fig. 9.2: Regional Habitat Linkages Map are listed descriptions and locations of the previously listed habitats. Please add to this list descriptions and locations of chaparral, desert shrublands, and alpine habitats. For example, most of the SEAs have significant chaparral habitat, Joshua Tree has desert shrublands, as do most of the Antelope Valley areas, and alpine habitat includes high altitude, treeless areas such as the pebble plains of the San Gabriel Mountains.

California Native Plant Society, Los Angeles / Santa Monica Mountains Chapter comments (continued)

4.) P. 130, Goals and Policies for Biological Resources: Goal C/NR 3: Add after "...including: habitat linkages, *alpine habitat, chaparral, desert shrublands,...*"

a. Protection of biological resources: Policy C/NR 3: Add "chaparral and desert shrublands".

b. Site sensitive design: Policy C/NR 3.10: Add to end of sentence: "without negative impact to in situ native habitat."

5.) P. 131, Add Goal C/NR 5: Preserve and restore watershed resources that conserve local water supplies and sustain groundwater levels.

6.) P. 131 Policy C/NR 5.1: Preserve and conserve chaparral and shrubland habitat native to each watershed location.

There will be more comments to follow.

Thank you for your consideration of these comments.

Sincerely,

Betsey Landis

Betsey Landis
Conservation Committee
Los Angeles / Santa Monica Mountains Chapter
California Native Plant Society

California Native Plant Society

Los Angeles / Santa Monica Mts. Chapter

3908 Mandeville Canyon Road
Los Angeles, California 90049
February 5, 2014

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RE: Comments on Los Angeles County General Plan Public Review Draft: Appendix E

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Sincerely,

Betsey Landis

Betsey Landis, Conservation Committee
Los Angeles / Santa Monica Mountains Chapter
California Native Plant Society

COOK HILL PROPERTIES

Norman E. Witt, Jr. AICP
Senior Vice President

April 7, 2014

Ms. Emma Howard
Regional Planner, Community Studies North
Room 1354
LA County Department of Regional Planning
320 West Temple Street
Los Angeles, CA 90012

Re: APN 5271-001-030, 047, 048, 049; APN 5271-020-028,029, 030, 072, 073, 074 and 075: Comment to Draft 5 Significant Ecological Areas Ordinance released March 25, 2014 and Request of Boundary Change to Eliminate Site from Puente Hills Significant Ecological Areas (SEA) Map

Dear Ms. Howard,

Cook Hill Properties, LLC (CHP) wishes to submit comments to the 5th draft of the Significant Ecological Area (SEA) Ordinance in addition to those we submitted in our letter dated April 1, 2013 (attached).

In addition to the comments submitted on April 1, 2013, we are writing to request the elimination of the Montebello Hills Specific Plan property as described above from within the Puente Hills SEA boundary.

The 488 acre property, located in the incorporated City of Montebello, is identified as the Montebello Hills Specific Plan (MHSP) area and is currently the subject of a General Plan Amendment 3-07, Zone Change 3-07, Specific Plan 1-07 and Tentative Tract Map 74020. The City completed its first Draft EIR in 2009 and a Recirculated Draft EIR is anticipated to be released in the summer of 2014. The MHSP area property received a Biological Opinion in April 2009 from the US Department of the Interior, Fish and Wildlife Service authorizing the development of 1,200 residential units, a neighborhood park, recreation center, multi-use trail system and associated infrastructure on approximately 234 acres. In conjunction with the project proposal, approximately 314 acres will be preserved in permanent open space with approximately 260.6 acres reserved for the creation and long term management of the Montebello Hills Habitat Reserve.

Please see the attached aerial map taken from the County SEA website. Note the MHSP area property is the area located west of the Whittier Narrows and Whittier Dam; south of the Shops at Montebello, Montebello Town Center and the Costco site; and north of the existing La Merced Neighborhood. The property is also referenced in the Puente Hills SEA description from the

Draft General Plan 2035: Technical Appendix E, first paragraph, which mentions the undeveloped portions of the Montebello Hills, the oil field and transmission lines. Since the early 1900s, the MHSP area property has been an active oil field. The highly disturbed property has been modified for oil and gas production activities over the last 96 years or so. As the map shows, these areas are extensively traversed by roadways or contain oil and gas production facilities (e.g. well pads, pipelines, equipment, etc.) At present, all portions of the field are being accessed as part of the ongoing operations. Approximately 132.7 acres of roads and pads have been created at the site over the past 96 years. These roads and pads are used on a regular basis for drilling and production operations. Development of the site will facilitate the creation and preservation of the 260.6 acre habitat reserve, as described above.

The MHSP was designed to incorporate Smart Growth strategies, and anticipated the approval of the Sustainable Communities and Climate Protection Act of 2008 (SB375). The site is considered by Southern California Association of Governments (SCAG) to be an infill site, and as such meets many of the Regional Transportation Plan (RTP) and Sustainable Communities Strategy (SCS) Guiding Policies and Goals.

By the reclamation of this industrial brown field, the MHSP project will also assist the City of Montebello in meeting their regional housing needs. SCAG has projected that at least an additional 1,066 units are needed to fulfill future housing needs in the City of Montebello. The MHSP, as proposed, will enhance the quality of life for the region by maximizing the use of this in fill land resource in order to assure the availability of a wide variety of energy efficient, market rate, safe, decent housing, while creating a suitable living environment, and expanding economic opportunities for the community.

The MHSP is positioned along Montebello Bus Lines' major local service, Line 20, which runs at high frequencies adjacent to the MHSP area and is also within walking distance of the Taylor Ranch Express (Express 341) to downtown Los Angeles.

As proposed to the City of Montebello, and federally permitted, the MHSP balances development and habitat preservation, meeting federal, state and regional goals. Therefore, the inclusion of the MHSP area within the Puente Hills SEA is unnecessary and, in fact, contrary to federal, state and regional goals.

<u>Specific Comments on the Draft 5 SEA Ordinance</u>

1. The Puente Hills SEA description states that other "local jurisdictions have also been included within the SEA in order to delineate the boundaries of functioning habitat units." The Ordinance and the SEA description should make it clear that it does not apply to areas within the jurisdiction of a city. The MHSP area is within the jurisdiction of the City of Montebello and is not within the County's jurisdiction. The ordinance should also clarify that where a project is within an incorporated City, the County will not apply the SEA ordinance for any required County permits solely related to connections to County facilities.

2. On August 6, 2013, Ms. Susan Lindquist of CHP spoke with Ms. Emma Howard regarding the SEA. Ms. Howard indicated that land may be exempt from the SEA if it contains man-made disturbances, such as rigs, roads, parking lots, structures and similar improvements. Although the MHSP is within the incorporated City of Montebello, and therefore, the SEA ordinance does not apply, to ensure there is no confusion in the future about the applicability of the SEA, we hereby request that the MHSP be excluded from the SEA.
3. The ordinance is based on out-of-date information. For example, the Puente Hills SEA description from Technical Appendix E does not reference numerous more recent biological information and CEQA and NEPA environmental documents. One example is the City of Montebello 2009 DEIR for the Montebello Hills Specific Plan. Other examples include the Tehachapi Renewable Transmission Project (TRTP) EIR/EIS and the Discovery Center EIR. By relying on outdated information, the Ordinance does not meet CEQA's informational purposes.
4. The Puente Hills SEA description treats different areas inconsistently. For example, under "General Boundary and Resources Description," third paragraph, it states that it is "intended that the SEA encompass only natural areas of the basin and portions of the San Gabriel River and Rio Hondo." Further, "manicured areas of the County Recreation Area on the east side of Rio Hondo are not included." As explained above, the MHSP area has been operated as an oil field for almost 100 years and is substantially disturbed. The Ordinance and the underlying support information in the Draft General Plan should be revised to clarify that it does not encompass the oil field.
5. In the Puente Hills SEA "Critical Analysis of the Puente Hills SEA" the County states that the populations of the gnatcatcher at the Montebello Hills "is probably one of the largest single populations in the U.S." This statement is misleading as it uses a colloquial definition of the word "population" to describe a complex scientific term used to describe and evaluate groups of individuals. In population ecology, a "population" is defined by specific variables that describe the dynamics of birth rates, death rates, immigration, and emigration. Under these more precise terms the Montebello Hills supports a "deme" or regionally defined aggregation of individuals. The Montebello Hills would be considered a more average-sized deme or subpopulation for the gnatcatcher across this species range. Whereas, the Montebello Hills provides a regionally important gnatcatcher resource in this portion of Los Angeles County there are many well-documented gnatcatcher populations and metapopulations in San Diego County, Orange County, and Riverside County that support double or triple the overall individuals and include an aerial extent that are orders of magnitude larger.

Finally, while the MHSP area should be excluded from the Puente Hills SEA, CHP supports the good intentions of the proposed Significant Ecological Areas Ordinance. CHP is pleased to note that when the MHSP is implemented, many goals of the ordinance, as well as SB375, will be met.

Sincerely,

Norman E. Witt, Jr.
Senior Vice President

Attachments

COOK HILL PROPERTIES

Norman E. Witt, Jr. AICP
Senior Vice President

April 1, 2013

Ms. Emma Howard
Regional Planner, Community Studies North
LA County Department of Regional Planning
320 West Temple Street
Los Angeles, CA 90012

Via Email: ehoward@planning.lacounty.gov

Re: Comment to Draft Significant Ecological Areas Ordinance dated December 20, 2012

Dear Ms. Howard:

Cook Hill Properties, LLC (CHP) wishes to submit comments on the 3rd draft of the Significant Ecological Area (SEA) ordinance that was released on December 31, 2012 ("Draft Ordinance').

CHP represents various landowners in Los Angeles County, and to our knowledge, none of those owners were notified that their properties may be affected by the SEA expansion and the Draft Ordinance. The Ordinance, if adopted, will obviously affect future land development, as well as agriculture other businesses, agricultural and other individual land owners.

The Draft Ordinance creates a fundamental shift in land development policy in Los Angeles County. Under current practices, proposed projects are designed, and then analyzed to achieve a balance under CEQA and the existing ordinance by identifying and mitigating environmental impacts. Even the Conservation and Natural Resources Element of the County's draft General Plan (2012) acknowledges that "[t]he General Plan goals and policies are intended to ensure that privately-held lands within the SEAs retain the right of reasonable use, while avoiding activities and developments that are incompatible with the long-term survival of the SEAs." Without a thorough environmental review based on all available science, we do not believe it is appropriate to amend the SEA at this time.

The SEA ordinance and SEATAC as an advisory body should not unnecessarily complicate and duplicate regulatory processes of other state and federal agencies such as California Department of Fish and Wildlife, the US Army Corps of Engineers, US Fish and Wildlife Service or the Regional Water Quality Control Boards. The proposed Draft Ordinance dramatically expands the scope of issues and topics addressed by the current SEA Program, without regard to other regulatory programs that may exist. As a result, many elements of the proposal are fundamentally duplicative of and more importantly, in some cases conflict with the regulations of other resource agencies. Not only will this will create redundancy, but also complications for

individual projects. Since the inception of the County's SEA Program, state and federal agencies have passed new regulations to protect threatened and endangered species; these rules have widely expanded the amount of land designated as critical habitat. The County proposal goes far beyond this already wide scope and further constrains future development. It also uses other land development constraints, such as floodplains, fire zones, or hillsides as the basis for SEA expansion, adding excessive and unreasonable regulation to lands where development is already heavily constrained.

Finally, in order for the public to adequately comment on the Draft Ordinance, Staff should provide "SEA Developed and Disturbed Areas Map" and the "SEA Habitat Linkages and Wildlife Corridors Map". When these Maps are available, CHP and the public will be able to more adequately comment on the Draft Ordinance.

The County must provide for future housing and economic development. We ask for additional study and request flexibility in the proposed plans and ordinances to allow for such development. Hearings or adoption of the Draft Ordinance is premature at this time. Once the public has had an opportunity to review the maps referenced above in conjunction with the Draft Ordinance, we request a public workshop to present testimony and engage in further dialogue with Staff.

Thank you for the opportunity to comment on the Draft Ordinance.

Sincerely,

Norman E. Witt, Jr.
Senior Vice President


San Gabriel
Rosemead
El Monte
South San Gabriel
South El Monte
Whittier Narrows
Monterey Park
Whittier
Montebello
HELLMAN AV
EMERSON PL
N NEW AV
S NEW AV
NEW AV
DEL MAR AV
GRAVES AV
GARVEY AV
E GARVEY AV
N ROSEMEAD BLVD
WALNUT GROVE AV
RUSH ST
RAMONA BLVD
VALLEY MALL
COGSWELL RD
DUREE AV
TYLER AV
MOUNTAIN VIEW RD
MERCED AV
SANTA ANITA AV
POTRERO GRANDE DR
HILL DR
SAN GABRIEL BLVD
CALIFORNIA 60
MONTEBELLO BLVD
N MONTEBELLO BLVD
N LINCOLN AV
ROSEMEAD BLVD
PECK RD
UPRR
SAN GABRIEL RIVER FRWY

San Gabriel
Rosemead
South San Gabriel
Whittier Narrows
South El Monte
El Monte
Monterey Park
MHSP
Whittier
Montebello
HELLMAN AV
EMERSON PL
N NEW AV
NEW AV
S NEW AV
DEL MAR AV
GARVEY AV
E GARVEY AV
GRAVES AV
RUSH ST
WALNUT GROVE AV
N ROSEMEAD BLVD
ROSEMEAD BLVD
RAMONA BLVD
VALLEY MALL
COGSWELL RD
DURFEE AV
TYLER AV
MOUNTAIN VIEW RD
MERCED AV
SANTA ANITA AV
POTRERO GRANDE DR
HILL DR
SAN GABRIEL BLVD
CALIFORNIA 60
MONTEBELLO BLVD
N MONTEBELLO BLVD
N LINCOLN AV
PECK RD
SAN GABRIEL RIVER FRWY
UP RR

HILLS FOR EVERYONE

Southern California comes together at the Puente - Chino Hills

Los Angeles County
Orange County
Riverside County
San Bernardino County

Monday, February 3, 2014

Via email and Postal Service

County of Los Angeles
Department of Regional Planning
Attn: Emma Howard
Regional Planning Department
Room 1354
320 W. Temple Street
Los Angeles, CA 90012
ehoward@planning.lacounty.gov

Re: Comments on the Draft Significant Ecological Area maps

Dear Ms. Howard:

Hills For Everyone (HFE) appreciates the opportunity to comment on the Draft Significant Ecological Area (SEA) map. "). HFE is a non-profit organization that strives to protect, preserve, and restore the environmental resources and natural environs of the Puente-Chino Hills and surrounding areas for the enjoyment of current and succeeding generations, and is closely following the County's processing of the proposed changes to the SEA map.

HFE is disappointed to see the exclusion of land on the south western portion of the Aera property. Instead we support retaining the entire AERA property into a SEA as described on pages 2 to 6 in the attached letter from the Habitat Authority dated 8/29/07.

Thank you,

Claire Schlotterbeck

Claire Schlotterbeck
Executive Director

Exhibit 1: 8/29/2007 Habitat Authority letter

Puente Hills Landfill
Native Habitat Preservation Authority

August 29, 2007

County of Los Angeles
Department of Regional Planning
General Plan Development Section
Attn: Mark Herwick, General Plan Section Head
320 West Temple Street
Los Angeles, CA 90012

Comments on Draft Los Angeles County General Plan

Dear Mr. Herwick:

The Puente Hills Landfill Native Habitat Preservation Authority (Habitat Authority) appreciates the opportunity to comment on the draft General Plan.

The Habitat Authority is a joint powers authority established pursuant to California Government Code Section 6500 *et seq.* with a Board of Directors consisting of the City of Whittier, County of Los Angeles, Sanitation Districts of Los Angeles County, and the Hacienda Heights Improvement Association. According to our mission, the Habitat Authority is dedicated to the acquisition, restoration, and management of open space in the Puente Hills for preservation of the land in perpetuity, with the primary purpose to protect the biological diversity. Additionally, the agency will endeavor to provide opportunities for outdoor education and low-impact recreation. The Habitat Authority's jurisdiction extends within eastern Los Angeles County approximately from the intersection of the 605 and 60 Freeways in the west to Harbor Boulevard in the east. The Habitat Authority owns and or manages 3,860 acres which lie within the Cities of Whittier and La Habra Heights as well as in the County unincorporated area of the Puente Hills known as Hacienda Heights and Rowland Heights.

Proposed Puente Hills Significant Ecological Area (SEA) Delineation:
The Habitat Authority supports in concept the proposed expansion of the Puente-Chino Hills Significant Ecological Area (SEA), and we support our properties being included within the SEA. The County's efforts to propose protection of wildlife habitat as a part of the land use element in the general plan are commendable. In order to maintain the integrity of the scientific work conducted, we recommend that the boundaries of the SEAs proposed by County consultants (PCR 2000) not be reduced even outside of the unincorporated area without further scientific evidence to support that change. In addition, there are several areas for which the biological evidence supports their inclusion within this SEA.

The open space of the Puente Hills between Harbor Blvd. and State Route 57 has been previously shown to be of great conservation concern to the entire Puente-Chino Hills corridor, both for its value in linking the west and east corridor (cite: Missing Middle) as well as because of its intrinsic value in supporting significant populations of sensitive animal species.

The current boundaries of the proposed Puente Hills Significant Ecological Area purport to encompass the significant open space of this portion of the hills, but as currently drawn, they omit a critically-important portion of the open space in unincorporated Los Angeles County: the southwestern corner of the Aera project area, which extends east from Harbor Blvd.

An aerial photo of the area in question is in Figure 1. This shows well the mosaic of habitat dominated by extensive, intact grassland (native/non-native mix), which appears tan in color. Southern California black walnut woodland (dark green) and coastal sage scrub (gray-green, lower right) comprise the other two main habitat types.

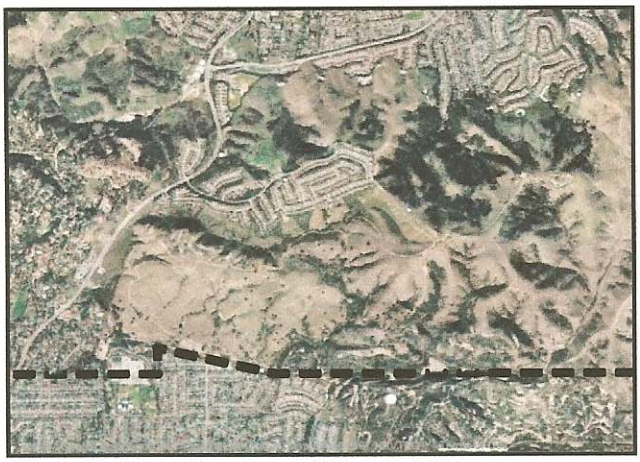

Figure 1. "Aera" region of Puente Hills.

The proposed boundaries of the SEA are reproduced in Figure 2 (in green). This configuration clearly excludes the entire southwestern corner of the Aera project area (lower left), which is marked with a red arrow in Figure 3.

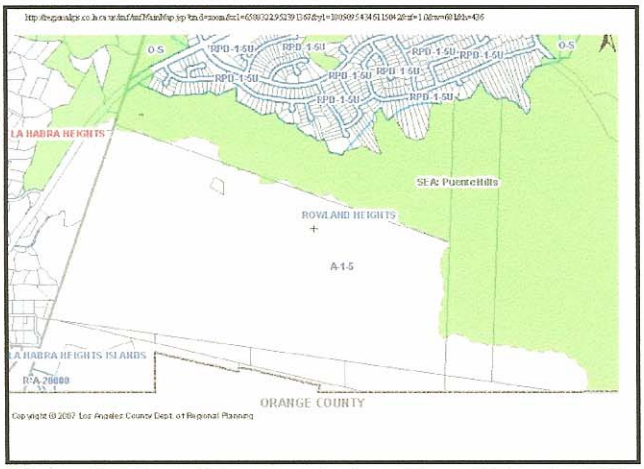

Figure 2. Map of Aera project portion of Puente Hills SEA, from Los Angeles Co. General Plan update.

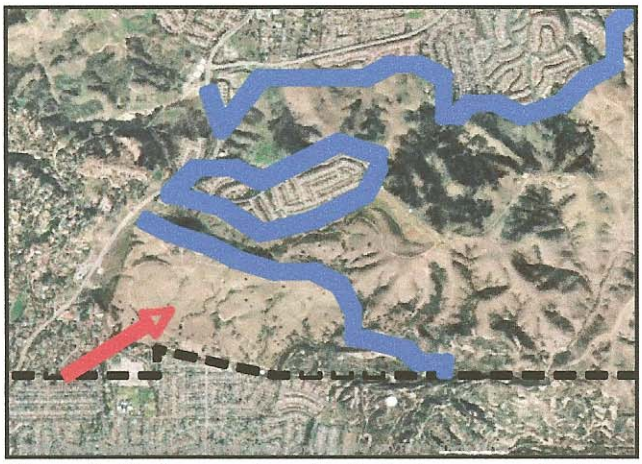
Figure 3. Red arrow denotes "missing corner" of Aera project area, a region of high-quality habitat currently excluded from coverage. Blue lines show proposed boundaries of SEA

The decision to omit this area from the SEA is puzzling, especially because it exhibits features consistent with the rest of the SEA, and even supports species that are extremely localized and declining region-wide, which are presumably of great conservation concern.

Though the wording of the Los Angeles County General Plan update regarding SEAs is vague ("Conservation and Open Space" section, p. 118), a more detailed definition was provided by PCR (2000), listing six main criteria, of which the Puente Hills met four.

The criteria which it met are also satisfied by the inclusion of the omitted Aera project site, namely:

- Biotic communities, vegetative associations, and habitat of plant or animal species that are either unique or are restricted in distribution (both a, regional and b, county-wide).

- Habitat that at some point in the life cycle of a species or group of species, serves as concentrated breeding, feeding, resting or migrating grounds and is limited in availability.
- Areas that would provide for preservation of relatively undisturbed examples of the original natural biotic communities of Los Angeles.

The breeding bird species of the Puente-Chino Hills were treated by Cooper (2000), who identified three key areas most important for bird conservation in the range; two of these are located in the southwestern Aera region, *including in the portion excluded by the current boundaries*. These include the extensive grassland between Harbor Blvd. and State Route 57, and the coastal sage scrub of north Brea/west Yorba Linda.

The extensive grassland of the Aera site is unique in the Puente Hills; no other comparably large grassland remains in the Los Angeles Basin. Therefore, it is extremely important for grassland obligate species such as White-tailed Kite, Grasshopper Sparrow, and others. Despite the admixture of non-native grasses in the system, this habitat is very robust, and supports countless patches of native species, even where grazed.

The coastal sage scrub along the southeastern corner of the Aera site is an extension of what is arguably the highest-quality stand of this habitat in the entire Puente-Chino Hills, that along the northern border of the City of Brea (Orange Co.). This habitat, which also includes extensive Cactus Scrub, was found to support a robust population of the Federally-threatened California Gnatcatcher, among many other sensitive species (see below).

Southern California black walnut woodland, considered a sensitive natural community and wholly restricted to the hills surrounding the Los Angeles Basin, is probably best developed in the eastern Puente Hills (LSA 2007), including the Aera property. Prior to grazing, this habitat was probably more extensive in the "missing" Aera piece.

In a review of the status of sensitive nesting bird species of the hills (Cooper 2000:230-232) identified 18 species considered regionally-declining and at high risk of local extinction along the Puente-Chino Hills Corridor. Most of these are found within this Aera portion of the hills, including some that reach their maximum abundance in Los Angeles County here.

Notable among these are the following species:

Northern red diamond rattlesnake *Crotalus ruber ruber*
California Reptile Species of Special Concern
This animal reaches the northern global extent of its range in south-facing slopes of the Whittier Hills (Haas et al. 2002), and the Aera site presumably supports this taxon, as it occurs just to the east above Yorba Linda (pers. obs.).

White-tailed Kite *Elanus leucurus*
California Bird Species of Special Concern

Kites, presumably breeding locally, were a common site during spring/summer surveys in this area in the late 1990s; this species is effectively at the northern edge of its range in the Puente-Chino Hills in the Harbor Blvd. area, with perhaps a single pair to the west (in Powder Cyn.).

Golden Eagle *Aquila chrysaetos*
California Bird Species of Special Concern
The only Golden Eagles observed perched in the Puente-Chino Hills during breeding surveys in 1997-98 were an adult and a juvenile observed in the Aera site, just off the eastern border of the omitted piece. These birds were detected on 24 May 1997, and presumably were the same birds that have been documented nesting near Chino Hills State Park to the east.

Loggerhead Shrike *Lanius ludovicianus*
California Bird Species of Special Concern
The Aera property may represent the last hope for breeding shrikes in the Los Angeles Basin; a recent survey (2005) conducted by the Los Angeles Co. Museum of Natural History (which did not include the Puente Hills) found no breeding pairs, yet two were on the Aera property on 31 May 1997 (Cooper, unpubl. data), suggesting breeding at least then. The habitat - rolling hills with grassland - is ideal for this species.

California Gnatcatcher *Polioptila californica californica*
Federally Threatened
The largest population of this taxon in the Puente-Chino Hills is in the band of scrub from just east of Harbor Blvd. (incl. the Aera site missing from the proposed SEA), east into Yorba Linda in Orange Co. (visible in gray-green at the lower left of Fig. 3). Several dozen acres of this habitat appears to have been left out of the SEA. This population is presumably the source population for subpopulations farther west along the hills, including several pairs along Arroyo San Miguel (vic. Colima Rd.). Further degredation of the open space between these two groups could have detrimental effects on both populations.

Southern California Rufous-crowned Sparrow *Aimophila ruficeps canescens*
California Bird Species of Special Concern
Very common throughout site (and throughout hills).

Bell's Sage Sparrow *Amphispiza belli belli*
California Bird Species of Special Concern
This California-Baja endemic is known in the Puente Hills only from a single (juvenile) individual observed along the eastern edge of the missing Aera corner on 24 May 1997 (Cooper, unpubl. data). This species is strongly tied to undisturbed coastal sage scrub and Chamise chaparral in our area, and, like the Loggerhead Shrike, may be extremely dependent upon this habitat on the Aera site for its persistence in the Los Angeles area. The nearest Los Angeles County populations are vic. Claremont, along the foothills of the San Gabriel Mtns. (possibly extirpated) and at Castro Peak in the western Santa Monica Mtns.

Western Grasshopper Sparrow *Ammodramus savannarum perpallidus* California Bird Species of Special Concern

Known from just a handful of areas in the Puente Hills, this range is arguably the most important site for this species in Los Angeles County. The largest population in the hills by far is located in the grassland between Harbor Blvd. and the 57 Fwy. (20+ birds in 1997, D. Cooper unpubl. data). They would be expected to occur in grassland on the southwestern corner as well. Just west of here, a breeding colony of this species was also present (<5 pr.) in the southeastern portion of Powder Canyon along the Schabarum Trail, and on a grassy ridge just south of Turnbull Canyon. (Skyline Trail).

A major study (Resource Management Plan, Puente Hills Landfill Native Habitat Authority, LSA and Associates 2007) compiled much of the pertinent information on the sensitive wildlife and plants of the Puente Hills within the Habitat Authority's jurisdiction. Notably absent from the proposed boundaries of the SEA is the entire extent of "Core habitat" which was delineated by the Habitat Authority within its Resource Management Plan located west of Colima Rd. This large parcel, now managed by the Habitat Authority, is contiguous to habitat known to support some of the most imperiled species of the Puente Hills, including the federally-threatened California Gnatcatcher and such California species of special concern as coastal populations of the Cactus Wren *Campylorhynchus brunneicapillus*, the latter having suffered widespread extirpations in recent years. These areas should be included within the SEA.

Also, please consider for inclusion other biologically rich lands owned or managed by the Habitat Authority at the top of the Turnbull Canyon watershed. There are several other parcels adjacent to Habitat Authority properties in this area than warrant inclusion into the SEA due to habitat importance (Figure 4). This is an area that was found to support several rare plants, including Plummer's Mariposa-Lily *Calochortus plummerae* and the western spadefoot *Spea hammondii* (described in the RMP). However, the proposed SEA would actually reduce the coverage of this important upper watershed zone. In this case, we recommend that at the least, the existing SEA boundary remain in place.

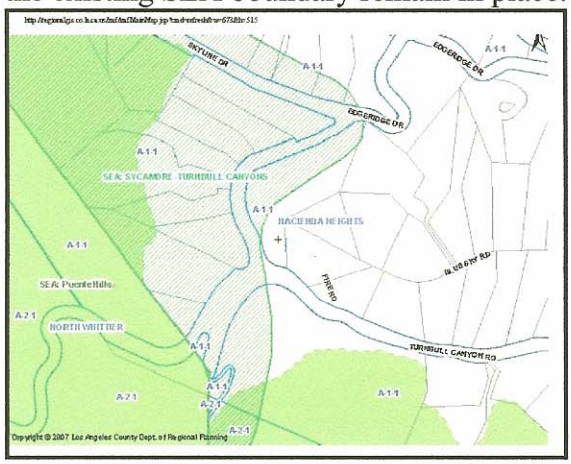

Figure 4. Hacienda Heights Area, showing pale green shaded area formerly included in the Puente Hills SEA.

While in general, the Habitat Authority welcomes the SEA designation over its properties, please consider deletion of the developed area of Sycamore Canyon from the proposed SEA designation. The Habitat Authority is considering installing a small office in bewteen two

existing buildings at this location where there would no impacts to the native landscape or environment. This physical presence would enable us to better manage this and other sensitive habitat areas in the western Puente Hills.

Habitat Authority would welcome the opportunity to meet with County staff to discuss any of these matters in further detail.

Proposed Puente Hills SEA Description:
In addition, please note the following changes to the current description for the Puente Hills SEA.

On Page 1 of the Puente Hills Description– Paragraph 4- Please note that there are key regional habitats represented in the Puente Hills such as southern California black walnut woodland.

Page 2, Paragraph 1- Oak woodland is prevalent in the Hacienda Hills as well.

Paragraph 2 - Oak Riparian woodland is not extensive in Powder Canyon. Powder Canyon is a mostly arid drainage that does not have the riparian elements of many other drainages in the hills. The classic oak-willow-sycamore canopy and the dense, herbaceous understory typical of this habitat is absent from most of Powder Canyon.

Paragraph 4 – Please reevaluate the description of willow scrub. It is our understanding that willow scrub has dense understory, composed of Mulefat and Sandbar Willow *Salix exigua*.

Paragraph 5 – Please replace the word "robust" with "high in stature," "high, evergreen" or something else - most habitats have robust species, even non-native grassland.

The western limit of "mixed chaparral" in the Puente Hills extends to about Powder Canyon, and is dominated by the species listed, as well as by Scrub Oak (*Q. berberidifolia*), with subdominants of Chamise, *Cercocarpus*, and *Ceonothus*; Laurel Sumac is uncommon. The chaparral-*like* habitat prevalent west of Powder Canyon is better termed "sumac scrub", and is dominated by the species listed in the paragraph 5 of page 2; Laurel Sumac, for example, is common and dominant in sumac scrub

Page 2, Paragraph 5 (continued on page 3) - Mixed Chaparral is widespread in the eastern Puente Hills, and Sumac Scrub is widespread in the western Puente Hills - I would not single out individual drainages (Sycamore Canyon, etc.) here.

Page 3, Paragraph 1 - Coastal sage scrub is very robust. Maybe write "short in stature" to distinguish it from chaparral. Please note that cactus scrub forms a very important subunit of coastal sage scrub, and is extensive on southerly and westerly slopes, including Sycamore Canyon, Hellman Park, and the entire La Habra Heights area. These patches represent some of the best examples of cactus scrub in the entire county, and should be noted as such.

Paragraph 2 - Non-native grassland is extensive in three important areas of the Puente Hills; along the Skyline Trail south of Turnbull Canyon, vic. Powder Canyon, and south of Rowland

Heights ("Aera" property). This habitat supports a variety of sensitive plant and animal species (e.g., Catalina Mariposa-Lily *Calochortus catalinae*, Grasshopper Sparrow, Western Spadefoot), and is not degraded as portrayed here.

Paragraph 3 - Freshwater marsh is restricted to the San Bernardino County portion of upper Tonner Canyon, both north and south of Grand Ave. (easily visible from road); no actual freshwater marsh habitat exists within this SEA in Los Angeles Co., though there is substantial freshwater marsh to the west, within Whittier Narrows.

Paragraph 5 - Invertebrates were investigated by LSA (2005), who documented several scarce butterflies, including California Dogface *Colias eurydice*, Western Tailed-Blue *Everes amyntula*, and Mormon *Apodemia mormo* and Fatal *Calephelis nemesis* Metalmarks. These are scattered throughout the hills.

The herpetofauna of this SEA was investigated by Haas et al. (2002) and LSA (2005), who found the hills to support several locally-rare and/or sensitive species, including Western Spadefoot (one recent record vic. Skyline Trail south of Hacienda Hts.), Arboreal Salamander *Aneides lugubris* (Whittier Hills, Powder Cyn.), two species of slender-salamander (*B. nigriventris* and *B. major*; widespread), Coastal Western Whiptail *Cnemidophorus tigris* (widespread), Red Diamondback Rattlesnake *Crotalus ruber* (localized), and Western Blind Snake *Leptotyphlops humilis* (Powder Cyn.).

Page 4, Paragraph 1 - Sensitive mammals (LSA 2005) include the Desert Woodrat *Neotoma lepida* and habitat specialists like the Cactus Mouse *Peromyscus eremicus* (Whittier Hills) and the Western Gray Squirrel *Sciurus griseus* (Powder Cyn.).

The Puente Hills is extremely important for bats, and 11 species were documented here during a recent study (Remington 2006), including such sensitive species as Yuma myotis *Myotis ymanensis*, western red bat *Lasiurus blossevillii*, western yellow bat *Lasiurus xanthinus*, hoary bat *Lasiurus cinereus*, pallid bat *Antrozous pallidus*, pocketed free-tailed bat *Nyctinomops femorosaccus*and western mastiff bat *Eumops perotis*.

Page 4 – Paragraph 2 –The Mountains Recreation and Conservation Authority (a joint powers of the Santa Monica Mountains Conservancy) working with the Wildlife Corridor Conservation Authority commissioned the study of wildlife movement in Puente Hills.

Page 5 - A major study (LSA 2007) compiled much of the pertinent information on the sensitive wildlife and plants of the Puente Hills within the Habitat Authority's jurisdiction. The federally Threatened California Gnatcatcher occurs in at least two areas of the hills, vic. Arroyo San Miguel east of Colima Dr. and a smaller, possibly irregular population along Sycamore Canyon in the western Puente Hills. These represent some of the last locales for this bird in the Los Angeles Basin, and some of the farthest-north individuals of the species.

This range is notable as holding among the last known populations in the Los Angeles area for several taxa that are considered California Species of Special Concern and/or that are nearly extinct locally, and through recent biological monitoring, we are discovering additional

protected species every year, including the federally Endangered Least Bell's Vireo, detected in 2005 and 2007 and possibly rare summer resident. It is not a coincidence that many of these species are grassland or coastal scrub specialists; these habitats have been virtually eliminated in the Los Angeles Basin, but persists in a reasonably intact state in the Puente-Chino Hills (Cooper 2000).

Proposed SEA Ordinance:
From time to time the Habitat Authority will propose improvements to the open space such as low impact recreational trailheads, trails, wildlife road underpasses, or fences to limit illegal off-road activity on protected preserve areas. Our intentions with these and similar projects are to design them around the existing biological resources to ensure the resources will continue to function and even flourish. We recommend that open space management activities of this nature be considered as compatible and appropriate within a SEA. More specifically, we recommend that language be added into the SEA Ordinance allowing public land preservation agencies with adopted management plans to carry out all activities that contribute the mission of their agency.

Circulation:
In regards to Figure 4.6, Adopted and Proposed Scenic Corridors, we support the existing candidacy of Colima Rd., Hacienda Rd., Harbor Blvd., and the 57 Freeway as scenic corridors. In addition, we support adding Turnbull Canyon Rd., as a proposed scenic corridor.

Conservation & Open Space Element:
We commend the County for its efforts in protecting the last remaining open space areas in the Los Angeles Basin. In regards to Figure 5.1, Open Space, we will support the inclusion of the unicorporated Authority owned/managed lands to be designated as Other Park and Conservancy Land. Currently some of the unincorporated properties we own/manage are indicated as such, but not all of them. Please contact the Habitat Authority staff for a map of Habitat Authority owned/managed lands in GIS at your convenience.

In regards to Figure 5.2, Trail Network, missing is the existing Los Angeles County Schabarum Trail through the Puente Hills. Please include this trail and its connector trails, as well as adopted trails of the Habitat Authority which can be designated as Existing Official Trails on Public Lands Trail Network. Please contact the Habitat Authority staff for a map of these trails in GIS at your convenience.

In regards to the Biological Resources: Urban-Wildland Interface (page 123), we recommend that its definition include the following italicized language "…where the edge of the forest *and other publicly owned open space* lands meet development…" The Habitat Authority's adopted Resource Management Plan addresses urban edge issues, and we also have produced a DVD regarding urban edge issues, both intended to protect the Puente Hills' biotic, watershed, aestheic and recreational resources. Edge issues are not unique to the forest.

Safety:
On page 164, please add to Goal S-2: Coordination with other public agency emergency planning and response activities.

Furthermore, the General Plan should address the issue of compatibility of roadways with wildlife in the Circulation and Conservation and Open Space Elements, not exclusively in the section dealing with Significant Ecological Areas. Issues to address include the restriction of wildlife movement, the increase in wildlife mortality with roadways, and the threat of public safety with vehicular-wildlife collisions. The draft General Plan should include measures such as wildlife underpasses, overpasses, fencing, or signage to address these conditions during the continued operation of existing roadways, for new roadway development, and for other development that would significantly increase traffic on roadways, near natural and wildland areas.

Please add us to the mailing list for the draft General Plan and all associated documents when they are made available for public review. Thank you for your consideration of our comments. Again, we would like to meet with County staff to further discuss these issues at your convenience. Feel free to contact me or Andrea Gullo, Executive Director, at (562) 945-9003 for further discussion.

Sincerely,

Bob Henderson
Chairman

cc: Board of Directors
Citizens Technical Advisory Committee

Sources Cited:

Cooper, D.S. 2000. Breeding landbirds of a highly-threatened open space: The Puente-Chino Hills, California. Western Birds 31(4):213-234.

Haas, C.D., A.R. Backlin, C. Rochester, and R.N. Fisher. 2002. Monitoring reptiles and amphibians at longterm biodiversity monitoring stations: The Puente-Chino Hills. USGS Western Ecology Research Center. Final report. Sacramento, California.

LSA Associates, Inc. 2005. Dragonfly, Butterfly, and Vertebrate Species Matrix for the Puente Hills Landfill Native Habitat Preservation Authority Lands, Results of Multispecies Surveys and Pitfall Trapping, Irvine, California.

LSA Associates, Inc. 2007. (Draft) resource management plan. Puente Hills Landfill Native Habitat Preservation Authority. (May 2007) July 2007. Irvine, California.

PCR Services Corporation (with Frank Hovore & Associates and FORMA Systems). 2000. Biological resources assessment of the proposed Puente Hills Significant Ecological Area. November 2000. Irvine, California.

Remington, S. 2006. Bat surveys of the Puente Hills. Final report. Costa Mesa, California. July 2006.

From: Witter, Martha
Sent: Monday, April 07, 2014 7:25 AM
To: Elisabeth Landis; alexandra D. syphard
Cc: Leon Freeman; Emma Howard; Joseph Decruyenaere
Subject: Re: Some interesting photos

Hi Betsy-

Here are some of the docs you requested. I have cc'd Alex - she can let you know when her effective fuel modification distance paper will be available to share.

I know that the Forestry Department was in the middle of revising their fuel mod guidelines a couple of years back, but don't know where that effort went. This may be the right time to revivie that effort and change the guidelines based on more recent science. You could talk to J Lopez to see what happened..

We are available if regional planning has anu questions.

They can always check the CFSC site http://cafiresci.org/central-and-southern-ca/

Marti

Marti Witter, PhD.
Fire Ecologist, Mediterranean Coast Network
Santa Monica Mountains National Recreation Area/ Channel Islands National Park/ Cabrillo National Monument
401 W. Hillcrest Dr.
Thousand Oaks, CA 91360
805-370-2333

"The good thing about science is that it's true whether or not you believe it." *Neil deGrasse Tyson*

On Fri, Apr 4, 2014 at 10:04 PM, Elisabeth Landis wrote:

Hi Marti-
Los Angeles County Regional Planning Staff seem to be interested in evidence that might promote change in the current size of fuel mod clearance.
At least I and two people from Puente Hills Conservancy really pressed for better management of fuel mod clearance by everyone concerned.
They asked us for references.
Do you have a link to Alex's paper?
I have two 11 x 14 sheets with Robert S. Taylor's fire history and with the number of fires in the western half of the Santa Monica Mountains. Do you have access to those on a computer?

County staff were interested. I could suggest that they use those as a criteria for determining stricter regulations on the first 30 feet of landscaping around structures.
Betsey

Witter, Martha wrote:

Hi Betsy-

great donut photos

There is also REAL DATA that shows that fuel mod needs to be less than even 100' to prevent structure loss. it hasn't been published yet, but there is also Alex's already published paper that shows location and NOT shrub cover are the best predictors of structure loss.

Marti

Marti Witter, PhD.
Fire Ecologist, Mediterranean Coast Network
Santa Monica Mountains National Recreation Area/ Channel Islands National Park/ Cabrillo National Monument
401 W. Hillcrest Dr.
Thousand Oaks, CA 91360
805-370-2333

"The good thing about science is that it's true whether or not you believe it." * Neil deGrasse Tyson*

On Fri, Apr 4, 2014 at 1:46 PM, Elisabeth Landis wrote:

Here are some interesting photos that illustrate the effectiveness of clearing 200 feet from structures, but ignoring the flammable landscaping in the first 30 feet from the house.
These photos were taken before and after the Corral Canyon (Santa Monica Mountains) fire.This is in unincorporated County.
See attached.

What is vitally needed is General Plan landscape regulations for structures, particularly residential structures, in the "Wildland Urban Interface". Emphasis must be placed on no vines against the structure walls or roofs, no plants at all against the house (borders of decorative brick/tile or different colors of gravel or decomposed granite or pebbles are possibilities) especially where there are screened vents under the house or under the eaves.

No trees within 30 feet of the house.
No flammable trees within 100 feet of the house. Examples of flammable trees are conifers (pines, junipers, Italian cypress), eucalyptus species, acacias, /Shinus/ species such as Brazilian pepper or Peruvian pepper (erroneously called California pepper), palm trees. Examples of fire-resistant trees are mature coast live oak, mature toyon, healthy western sycamores. Coast live oaks are known as "ember-catchers" because their tannin-filled thick leaves and thick bark catch flying embers and extinguish them. They are a great windbreak. In fact, healthy mature ceanothus trees are fire-resistant for much the same reasons.
Note that low shrubs, concrete block/mortared stone or brick/chainlink/boulder fences will interrupt windflow especially if the wildfire is not a crown fire. Because we are in a mode of water conservation, the best groundcovers are not succulents, ivy, creeping /Myoporum/, or European vines that require a lot of water and develop a lot of flammable woody mass under their leafy canopies. Small groups of shrubs that grow no higher than three feet and that are surrounded by a border of stones, bricks or pavers can be grown in the next 70 feet from the house. These groups would be staggered and no more than 20 feet apart. Their job is to spread roots through the ground to stabilize the fuel mod zone and to break up wind flow. The plants need to be maintained with dead material removed underneath the plants and light pruning to promote healthy growth.
Native trees must not be "lollipopped". These chaparral trees grow perhaps ten to twelve feet tall. They depend on winter rains to soak the ground nutrients free for their roots to process and feed them during the winter through April. During the rest of the year they depend on their new leaves to process food for the whole plant and the mature leaves to shade the trunk and branches to prevent sunburn and overheating of the plant. When crews arrive to do "fuel mod clearance" they remove most of the new leaves, expose the trunks for heights of up to 6 feet and remove all root sprouts. The chaparral trees are left with too little canopy and too hot a trunk to produce and move nutrients through the plant. Erosion exposes their root boles and roots. Usually these plants die in a few years.
See attached photos of typical results.
Let's look at this realistically. The current mode of "fuel mod" causes exactly the same damage as a wildfire causes that burns healthy habitat. The difference is that "fuel mod" clears the habitat every year, while wildfire traditionally only burned habitat every 40 to 100 years. "Fuel mod" clearance kills the habitat that stabilized these slopes, stored rainwater, fed and protected a very biodiverse spectrum of creatures. "Fuel mod" as it is currently practiced is destroying all flora and fauna and is destroying their abilities to recover. It is bad management of natural resources.
For your information I have spent about twenty years studying various post-wildfire areas in the Santa Monica Mountains, the Simi Hills, the foothills of the San Gabriel Mountains and the northern Santa Ana Mountains.

It is time for the Los Angeles County General Plan Housing Element and Natural Resource Element to develop better management practices. Since constant increase in wildfire frequency, increase in acreage of erodable bare earth and loss of watershed resources affect local climate, the County Climate Action Plan should consider how to introduce better management practices of County natural resources.

Betsey Landis
Los Angeles / Santa Monica Mountains Chapter
California Native Plant Society

OPEN ACCESS Freely available online

PLoS one

Housing Arrangement and Location Determine the Likelihood of Housing Loss Due to Wildfire

Alexandra D. Syphard[1]*, Jon E. Keeley[2,3], Avi Bar Massada[4], Teresa J. Brennan[2], Volker C. Radeloff[4]

1 Conservation Biology Institute, La Mesa, California, United States of America, **2** United States Geological Survey, Western Ecological Research Center, Sequoia-Kings Canyon Field Station, Three Rivers, California, United States of America, **3** Department of Ecology and Evolutionary Biology, University of California Los Angeles, Los Angeles, California, United States of America, **4** Department of Forest and Wildlife Ecology, University of Wisconsin-Madison, Madison, Wisconsin, United States of America

Abstract

Surging wildfires across the globe are contributing to escalating residential losses and have major social, economic, and ecological consequences. The highest losses in the U.S. occur in southern California, where nearly 1000 homes per year have been destroyed by wildfires since 2000. Wildfire risk reduction efforts focus primarily on fuel reduction and, to a lesser degree, on house characteristics and homeowner responsibility. However, the extent to which land use planning could alleviate wildfire risk has been largely missing from the debate despite large numbers of homes being placed in the most hazardous parts of the landscape. Our goal was to examine how housing location and arrangement affects the likelihood that a home will be lost when a wildfire occurs. We developed an extensive geographic dataset of structure locations, including more than 5500 structures that were destroyed or damaged by wildfire since 2001, and identified the main contributors to property loss in two extensive, fire-prone regions in southern California. The arrangement and location of structures strongly affected their susceptibility to wildfire, with property loss most likely at low to intermediate structure densities and in areas with a history of frequent fire. Rates of structure loss were higher when structures were surrounded by wildland vegetation, but were generally higher in herbaceous fuel types than in higher fuel-volume woody types. Empirically based maps developed using housing pattern and location performed better in distinguishing hazardous from non-hazardous areas than maps based on fuel distribution. The strong importance of housing arrangement and location indicate that land use planning may be a critical tool for reducing fire risk, but it will require reliable delineations of the most hazardous locations.

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Introduction

As the frequency, extent, and severity of wildfires are surging across the world [1,2], so too are the ecological, social, and economic consequences. Residential losses associated with wildland fire have escalated globally [3–5], and recent fire events have resulted in billions of dollars of damage per event [6]. The problem is particularly critical in Mediterranean-climate regions of the world, where major metropolitan centers are juxtaposed with highly flammable ecosystems [7]. Since the 1950s, southern California has experienced the highest losses in property and life in the U.S., averaging 500 homes per year [8]. Here we show that the arrangement and location of structures strongly affects their susceptibility to being destroyed in a wildfire, and that empirically based maps developed using housing density and location can better identify hazardous locations than fuel-based maps.

The escalation of wildland fire losses is typically attributed to housing development within or adjacent to wildland vegetation (i.e., the "wildland-urban interface") [6,9], changing climate conditions [1], or an accumulation of hazardous wildland fuels [10]. The primary preventive strategy used for reducing fire impacts has been the manipulation of wildland vegetation to reduce hazardous fuels. The U.S. federal government has strongly promoted and funded fuel reduction treatments to mitigate fire hazard, and federal land management agencies spent billions of dollars (e.g., $2.7 billion from 2001–2006) to treat millions of hectares within the last decade [10]. Yet, while costs for suppression and treatment have nearly tripled since 1996 [11], the fire problem has only gotten worse.

With the growing realization that wildland fuel manipulations can alter fire outcomes only to a limited extent, the need for alternatives has risen. For example, a structure's survival during a wildfire depends largely on its building materials and the characteristics of fuels in its immediate surroundings [3], suggesting that fire hazard can be reduced by homeowner actions to protect the structure [12].

However, what remains unclear is to what extent property loss depends on the role of land planning and the placement and arrangement of homes relative to the spatial patterns of wildland fire hazards. Past land-use decision-making has allowed homes to be constructed in highly flammable areas, and this may be one of the roots of the fire problem [13]. Although it is not feasible to change current housing patterns, homes in the most hazardous locations could be identified and prioritized for fire protection efforts, and land use planning and regulation may potentially be a powerful tool for reducing future property loss [14], especially in

areas such as southern California where substantial future housing growth is expected [15], and across the western US, where further development is expected in a substantial proportion of the wildland-urban interface [16].

If land use regulation and planning are to effectively reduce wildland fire loss, they have to be based on solid understanding of what landscape factors most significantly contribute to wildfire danger and where to locate and arrange homes to reduce fire hazard. Currently, most fire hazard maps are based on expert knowledge of how fuel and fire history determine threats to a given community e.g., [17–19]. Similar fire hazard maps have been created for the state of California that identify communities at risk and areas of substantial fire threat to people. These maps are readily available [20] and widely used. Fire hazard maps, however, are only effective if they accurately delineate areas where property loss is most likely to occur. Whether this is the case or not is unknown since most have never been evaluated against empirical data.

We constructed a complete database of structure locations in two extensive, fire-prone regions of southern California and identified which structures were destroyed or damaged by wildfires since 2001 (Fig. 1). These two regions were the Santa Monica Mountains, one of the largest wildland open space areas adjacent to the Los Angeles metropolitan area and San Diego County, site of major wildfire losses in both 2003 and 2007 [20]. Based on these data, we used logistic regression and maximum entropy analysis to answer three questions: 1) What is the relative importance of housing arrangement (i.e., the spatial pattern of residential structures), location, and environment in explaining property loss from fire? 2) How well do currently available statewide fuel-based maps of fire hazard correspond to actual wildfire impacts? 3) Can fire hazard maps based on empirical data and an expanded set of explanatory variables successfully predict local-scale housing losses?

Results

In the Santa Monica Mountains, 3% of 36,399 structures were located within the boundaries of 10 large fires that occurred from 2001 to 2009. In these fires, 173 homes, guest houses, or outbuildings were destroyed and an additional 140 were damaged. For the second study region in San Diego County, 4% of 687,869 structures were located within one of 40 fire perimeters. In these fires, 4315 structures were completely destroyed and an additional 935 were damaged.

In both study regions, the spatial arrangement of structures (Table 1) significantly influenced the likelihood of property loss (i.e., destruction or damage) (Figs. 2 and 3). Property loss was more likely in smaller, more isolated housing clusters with low- to intermediate housing density and fewer roads, although road density was insignificant after accounting for spatial autocorrelation in the Santa Monica Mountains (Table 2). Structures located near the edges of developments, or in housing clusters on steep slopes, were also more susceptible. Many relationships were nonlinear, with the highest property loss occurring when structures were at intermediate distances to other structures or housing clusters.

In addition to spatial arrangement, a structure's location on the landscape was also a highly significant predictor of property loss (Fig. 2). In both study regions, property loss was significantly related to a structure's distance from the coastline, but the relative effect varied. In the Santa Monica Mountains, property loss occurred disproportionately closer to the coast, whereas structures farther from the coast were most susceptible in San Diego County (Tables 2 and 3).

The other significant location-dependent variable affecting property loss was historical fire frequency (Fig. 2). In the Santa Monica Mountains, this was the single most important predictive variable. Here, property loss was most likely in areas of historical high fire frequency, which corresponded with wind corridors. Fire frequency was also a significant variable in San Diego County, but here the relationship was nonlinear.

Property loss was more likely to occur when structures were surrounded by wildland vegetation rather than by urban or impervious areas (Fig. 4). However, property loss was also more (Santa Monica Mountains) or as likely (San Diego County) to

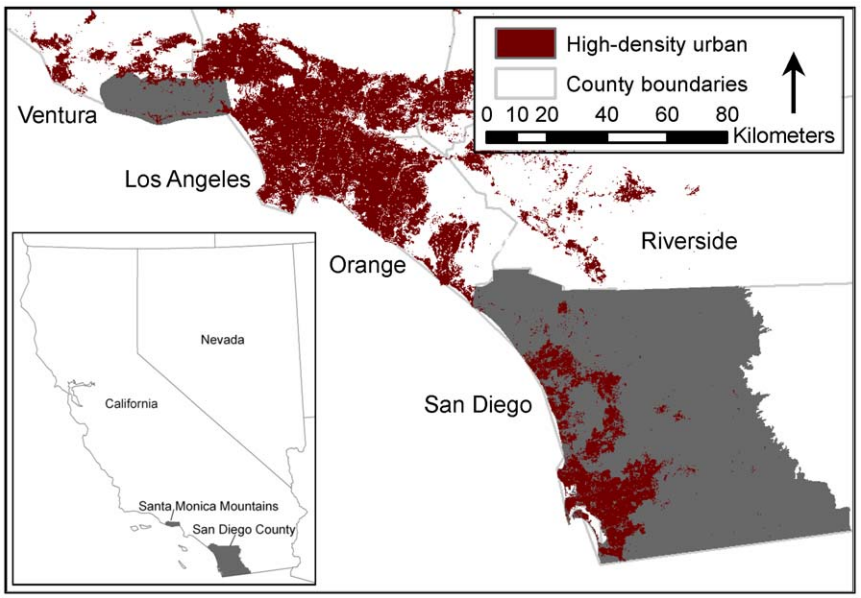

Figure 1. The Santa Monica Mountains and San Diego County, California, USA. Study areas in gray. The Santa Monica Mountains are located in Ventura and Los Angeles counties, and both study areas are located within the South Coast Ecoregion of California, USA. Study areas in gray.
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Table 1. Variables analyzed for explaining structure loss in the Santa Monica Mountains and San Diego County.

Variable	*Source*	*Description*
Fire frequency 2001	CDF* Fire perimeter overlays	Number of fires (2001–2010)
Distance to coast	Derived from coastline of county	Continuous distance in meters
Fire threat	CDF*	Ranking from 1 to 5
Fire threat to people	CDF*	Ranking from 1 to 5
Communities at risk	CDF*	Binary, at risk or not at risk
Housing density	Derived from digitized structures	Structures per hectare
Distance nearest housing cluster	Derived from 100 m buffer of structures	Continuous distance in meters
Housing dispersion	Derived from 100 m buffer of structures	Standard deviation/mean distance between structures in housing cluster
Distance to nearest structure	Derived from digitized structures	Continuous distance in meters
Distance to edge of housing cluster	Derived from digitized structures	Continuous distance in meters
Area of housing cluster	Derived from 100 m buffer of structures	Squared meters
Elevation	US Geological Survey digital elevation model (DEM	30 meters
Slope	Derived from the DEM	Percent slope
Southwestness	Derived from the DEM	SW = con(aspect(<dem>) = = −12, 201,(cos(((aspect(<dem>)−255) div deg)+1) * 100)))
Road length	US Census Bureau TIGER/Line files	Meters

*California Department of Forestry Fire and Resource Assessment Program.
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occur within herbaceous fuel types than within the higher fuel-volume woody types that are typically considered as the most hazardous fuels.

Variables with correlation coefficients greater or equal to 0.7 in the Santa Monica Mountains included road length and area of housing cluster (0.95) and elevation and distance to coast (0.72). In San Diego County, pairs of correlated variables also included road length and area of housing cluster (0.99), distance to nearest structure and distance to nearest housing cluster (0.71). Distance to coast was correlated with housing density (−.71) and elevation (0.89). To develop multiple-regression models, we removed elevation and road length from consideration in the Santa Monica Mountains, because they explained less variation than the variable with which they were correlated. For the San Diego County analyses, we removed distance to coast, road length, and distance to nearest housing cluster.

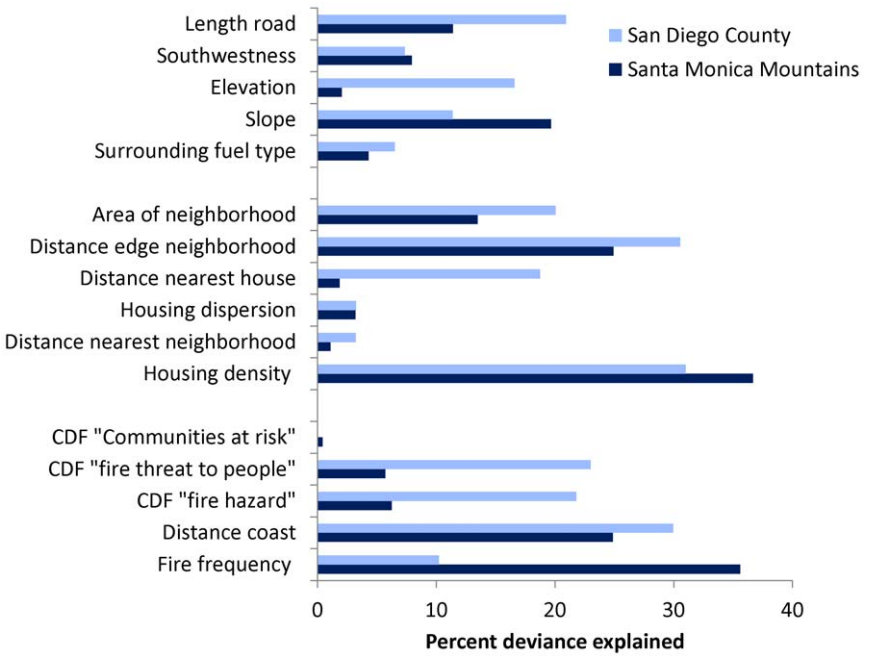

Figure 2. Percent deviance explained for generalized additive models (GAMs). GAMs explain the influence of firefighter access, biophysical variables, structure arrangement, and structure location on burned structures from fires during 2001–2010 in the Santa Monica Mountains, CA and San Diego County, CA. CDF – California Department of Forestry and Fire Protection.
doi:10.1371/journal.pone.0033954.g002

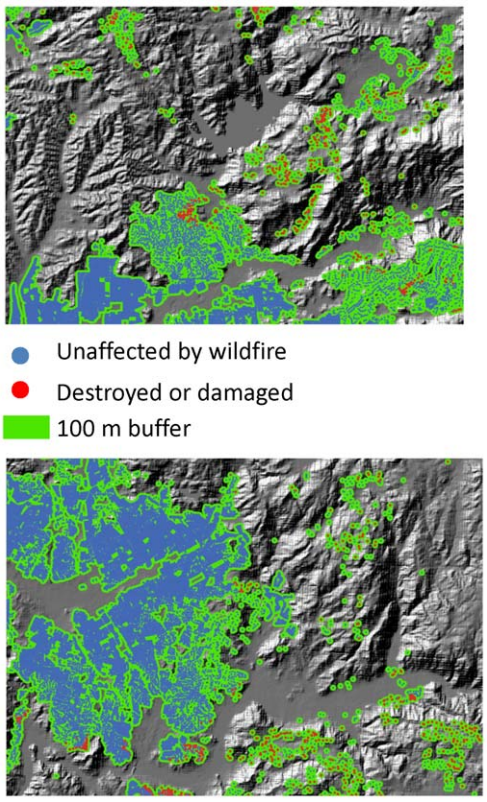

Figure 3. Maps from portions of San Diego County illustrating how housing arrangement influences the likelihood that a house will be lost from wildfire. Structures most likely to be burned by fires (in red) were: in areas with low to intermediate structure density; in small, dispersed housing clusters, close to the edge of the housing cluster, at intermediate distance to the nearest structure or housing cluster than structures that were unaffected (in blue).
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The multiple-regression GAM model for the Santa Monica Mountains included fire frequency, housing density, distance to edge of housing cluster, distance to coast, slope, area of housing cluster, southwestness, fuel type, housing dispersion, distance to nearest structure and housing cluster. Only nonparametric terms were selected, except fuel type, which was categorical. The deviance explained for the model was 65.7%, and the area under the curve (AUC) of receiver operating characteristic (ROC) plots, indicating the ability of the model to discriminate between burned and unburned structures on test data (20%), was 0.82.

The multiple-regression GAM model for San Diego County included housing density, distance to edge of housing cluster, area of housing cluster, elevation, fire frequency, fuel type, and housing dispersion. All terms included in the model were nonparametric except for distance to edge of neighborhood, which was linear, and fuel type. The deviance explained for the model was 45.5%, and the AUC was 0.87.

Our fire-hazard maps developed with the Maxent model using empirical data and multiple explanatory variables (Figs. 5 and 6) performed well. The AUC of receiver operating characteristic (ROC) plots on test data (15% withheld) was 0.987 for the Santa Monica Mountains and 0.923 for San Diego County.

In contrast, statewide fire-hazard maps developed using fuel rank and fire rotation were unable to predict which structures were burned by fire (Fig. 7). This poor performance of the statewide maps was also evident through visual comparison with maps of actual property loss (Figs. 5 and 6). Similarly, property loss was not substantially higher in the highest hazard or communities-at-risk areas of the statewide maps. In most cases, property loss was evenly divided among hazard levels (Fig. 8A and 8B), and even where a substantial proportion of burned structures were located in areas mapped as high fire hazard, most of the unaffected structures were also distributed in these high-hazard areas, suggesting high commission error (Fig. 8C and 8D). The most worrisome finding was that the majority of property loss occurred in areas not designated as at-risk (Fig. 8E and 8F).

The results of all sensitivity analyses indicated that the results were robust: the importance and ranking of variables remained essentially the same for all data sets at different buffer distances and certainty classifications (Table 3). Differences in results were slightly larger using different buffer distances than using all burned structures across a range of certainty levels versus all destroyed structures classified at the highest level of certainty. The main difference between the 200 and 100-m buffer analysis was that housing density was somewhat less important while distance to nearest housing cluster and southwestness were somewhat more important using the 200-m buffer in the Santa Monica Mountains. In San Diego County, housing dispersion and distance to the edge of housing cluster were somewhat more important using the 200-m buffer. We also found no substantial difference in results for the Maxent models.

After adding a spatial term, spatial autocorrelation was no longer present in the residuals of any of the models (Table 2). Also, although there were small differences in the coefficients between spatial and non-spatial models, the direction of influence consistently remained the same. The only variables that were no longer significant after accounting for spatial autocorrelation included the CDF communities at risk map, the distance to the nearest housing cluster, southwestness, and road length for the Santa Monica Mountains, and southwestness for San Diego County.

Discussion

Wildfire is a key process that interacts with all major components of the earth system, but fire frequency, extent, and/or severity are on the rise [1,2,21,22]. Residential losses to wildfire have also escalated despite enormous investments in wildland fuel manipulation, improvements in fire-safe codes and building regulations, and advanced fire suppression tactics. Therefore, our finding that housing arrangement and location were the most important contributors to property loss supports the notion that patterns of land use may be partly responsible for property loss in the wildland-urban interface [13].

One reason that property loss is related to the arrangement of housing across the landscape may be that the amount and arrangement of human infrastructure also strongly and non-linearly influence wildfire ignitions and frequency [7,23,24]. Therefore, the places where homes are most likely to burn may also be the places where fires are most likely occur, which is partly a function of the distribution of people. Thus, there may be spatial interactions and feedbacks between fire and housing patterns.

In southern California, as in many regions, humans cause most fires [7,23–25]. Thus, population growth and housing development increase fire frequency. Yet, although urban expansion increases fire frequency in general, the highest hazard tends to be in low-density housing areas, where structures are interspersed with wildland vegetation [9]. Scattered, isolated structures are more difficult for firefighters to defend, and poor firefighter access may explain why housing clusters with fewer roads were more vulnerable in San

Table 2. Model coefficients for generalized linear models (GLMs) estimated with and without autocovariate terms in the Santa Monica Mountains and San Diego County.

	Linear	*Autocovariate linear*	*Quadratic*	*Autocovariate quadratic*	*P-value*
Santa Monica Mountains					
Fire frequency 2001	0.860	0.440			<0.001
Distance coast	0.004	0.002	−7.0E-07	−4.0E-07	<0.001
CDF Fire threat	5.900	2.880	−8.5E-01	−3.9E-01	<0.001
CDF Fire threat people	3.070	1.540			<0.01
CDF Communities risk	−0.540	−0.280			NS
Housing density	1.010	1.130	−3.9E-01	−4.0E-01	<0.001
Distance housing cluster	0.006	0.004	−1.0E-05	−7.0E-06	NS
Housing dispersion	2.280	2.670			<0.001
Distance structure	0.020	0.020	−3.0E-05	−2.0E-05	<0.001
Distance edge	−0.021	−0.017			<0.001
Area housing cluster	−2.0E-07	−8.0E-08			<0.001
Slope	0.033	0.016			<0.001
Elevation	−0.001	−0.001			0.01
Southwestness	−0.002	0.002			NS
Road length	−2.0E-05	−2.0E-05			NS
San Diego County					
Fire frequency 2001	1.53	1.05	−0.33	−0.22	<0.001
Distance to coast	3.0E-04	3.0E-09	2.0E-04	2.0E-09	<0.001
CDF Fire threat	−0.54	−0.68	0.189	0.17	<0.001
CDF Fire threat people	2.27	1.69			<0.001
CDF Communities risk	−0.93	−0.51			<0.001
Housing density	−0.99	−0.47			<0.001
Distance housing cluster	0.005	0.004	−4.0E-06	−1.0E-06	<0.001
Housing dispersion	−3.08	−1.68	0.865	0.542	<0.001
Distance structure	0.007	0.004	−5.0E-06	−2.0E-06	<0.001
Distance edge	−0.02	−0.01			<0.001
Area of housing cluster	−2.0E-08	−7.0E-09			<0.001
Slope	0.17	0.12			<0.001
Elevation	0.001	0.003			<0.001
Southwestness	−0.005	−0.003			NS
Road length	−1.0E-06	−7.0E-07			<0.001

Quadratic terms were evaluated for all models, and coefficients are only provided for those models in which the quadratic term was significant in the non-spatial model.
doi:10.1371/journal.pone.0033954.t002

Diego County. However, there can also be situations in which high housing density contributes to structure-to-structure fire spread e.g., [26], depending on their flammability [27].

The importance of a structure's location on the landscape relative to the coast and historical patterns of fire frequency shows that certain places are more fire-prone than others, which in turn reflects how biophysical and human variables together create conditions that are particularly conducive to wildfire occurrence [2]. In our study areas, these relationships are also likely a function of a structure's location relative to predominant wind patterns and direction [28]. In the Santa Monica Mountains, certain fire corridors tend to burn repeatedly, and winds funnel down these corridors toward vulnerable structures located directly in their path. Here, the high-density coastal strip is narrow, and homes are closer to continuous vegetation than in San Diego County, where high-density development extends inland for much greater distances. This may be why houses were more likely to burn at a closer distance to the coast in the Santa Monica Mountains than in San Diego County. The low-density, high-risk areas in San Diego County are located farther inland where, if an ignition occurs there under extreme wind conditions, the fire is in its initial stages. Santa Ana winds blow from west toward the coast, and they are particularly dangerous in the beginning because they are usually most explosive and fast-moving right after they start, and it takes time to mobilize firefighting resources. Thus, the significance of distance to coast may be a proxy for other variables, such as the juxtaposition of housing density, contiguous fuels, and location relative to predominant wind patterns.

The importance of historical fire frequency suggests that, at least in non-forested ecosystems, fuel age may not be an important predictor of home loss [25], despite the fact that fuel age and time-since-fire maps are often used to delineate fire hazard. In fact, substantial property loss occurred when the primary surrounding fuel type was low fuel-volume grasslands. Although this result may seem counter-

Table 3. Percent deviance explained in generalized additive models (GAMs) for structures that were destroyed or damaged (Burned) and destroyed with the highest certainty (Destroyed); and for burned structures analyzed using a 200 m buffer distance (200 m).

	Burned	*Destroyed*	*200 m*	*Relationship*
Santa Monica Mountains				
Fire frequency 2001	35.59	31.63	NA	Positive
Distance coast	24.86	22.85	NA	Intermediate
CDF fire threat	6.23	4.37	NA	Intermediate
CDF fire threat people	5.69	5.01	NA	Positive
CDF Communities at risk	0.42	0.81	NA	Negative
Housing density	36.68	33.19	14.04	Intermediate
Distance housing cluster	1.08	1.46	14.23	Intermediate
Housing dispersion	3.18	2.23	4.24	Positive
Distance structure	1.85	2.17	NA	Intermediate
Distance edge	24.92	33	16	Negative
Area of housing cluster	13.47	12.88	18.06	Negative
Surrounding fuel type	4.3	3.18	NA	NA
Slope	19.66	17.79	18.31	Positive
Elevation	2.04	0.78	1.62	Negative
Southwestness	7.93	8.91	16.1	NA
Road length	11.4	11.2	13.98	Negative
San Diego County				
Fire frequency 2001	10.2	10.6	NA	Intermediate
Distance coast	30.0	28.19	NA	Intermediate
CDF fire threat	21.8	20.4	NA	Intermediate
CDF fire threat to people	23.9	24.1	NA	Positive
CDF Communities at risk	0.0	0.02	NA	Negative
Housing density	31.0	28.16	21.59	Negative
Distance housing cluster	3.2	2.92	0.97	Intermediate
Housing dispersion	3.3	2.85	8.62	Parabolic
Distance structure	18.7	15.73	NA	Intermediate
Distance edge	30.5	28.74	54.76	Negative
Area of housing cluster	20.1	16.41	10.63	Negative
Surrounding fuel type	6.5	4.90	NA	NA
Slope	11.4	13.94	10.61	Positive
Elevation	16.6	25.5	19.75	Positive
Southwestness	7.3	6.98	4.17	NA
Road length	20.9	19.6	15.4	Negative

The buffer distance used in all other analysis was 100 m. Relationship describes the shape of the response curve for all models. Ïntermediate signifies a nonlinear relationship in which values were highest at intermediate levels of the variable. Values listed as NA in 200 m were for variables that were only analyzed at the level of the individual house.

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intuitive, herbaceous fuels tend to have low fuel moisture, facilitate high wind speeds and fire spread, and have low heat requirements for ignition, thus promoting longer fire seasons and high fire frequency [29,30]. Grasslands also tend to ignite quickly, then carry fires into shrublands or woodlands [31]. These results suggest a need to reexamine the assumptions used in existing hazard maps and the management practice of converting shrublands to grasslands.

Fire hazard in the CDF statewide maps, as with most hazard maps [17–19,32], depends largely on the assumption that fuel properties are the primary contributors to fire danger. However, our empirical data indicate that, at least at the local scale considered here, fuel was not as significant as measurable factors related to the arrangement and location of structures. This is likely because the influence of fuel is complex and interacts with other risk factors [33]. Therefore, our empirical maps developed using a more comprehensive set of predictor variables, including fuel type, housing arrangement and location, and other environmental variables, performed better in distinguishing hazardous from non-hazardous areas.

Another reason for the discrepancy in map performance may be related to differences in mapping approach: while our approach used empirical data on actual structure loss, the statewide maps were developed based on a priori assumptions of where hazard is expected to be highest. At larger scales, such as the state level, the CDF fuel-based maps would likely perform better at picking out where homes are most vulnerable to fires. We also did not evaluate the CDF maps developed for local responsibility areas, which may better capture finer-scale patterns of hazard in local jurisdictions.

The fact that unburned structures in our analysis were more likely to be located in ''communities at risk,'' whereas burned structures were more likely to be located outside of high-risk areas is potentially due to two reasons. At the most basic level, this may simply be caused by an incorrect identification of communities at risk. However, we caution that the discrepancy may also be due to scale effects and the definition of ''community at risk.'' At a broad scale, ''communities at risk'' are likely located within areas that generally have the potential for hazardous fires, and places with more houses in such a danger zone are more likely to be identified as a ''community at risk.'' However, at the structure level, low-housing density significantly increases the chance a house will burn – while it decreases the likelihood that at home will be included in a ''community at risk.'' In summary, our results support the notion that property loss is a function of many physical and biological factors, in addition to characteristics of home construction and maintenance that we did not consider, such as roofing, construction materials, and home landscaping.

The effects of housing arrangement and location on the likelihood that a house will be destroyed or damaged by wildfire suggest that land use planning may be a critical tool for reducing fire hazard. Restricting development from hazardous locations has been effective for other hazards, such as flooding and the prevention of building on floodplains [34]. In the case of fire, new structures should be located and arranged in ways that not only minimize their exposure to hazard, but may also limit the increase in fire occurrence that often accompanies urban development. For example, our results suggest that in both study areas, new development would have a lower likelihood of burning if it were located away from fire-prone areas, such as wind corridors or steep slopes, and if new structures were arranged in intermediate-to high-density neighborhoods designed to minimize the amount of interface between homes and wildland vegetation. New development within large, existing urban areas, which typically also have better firefighter access, would also lower the likelihood of burning, compared to new development in more isolated, remote settings. Land use planning that considers minimizing future structure loss and prioritizing other fire prevention actions would be more informed with maps that reliably differentiate the most hazardous locations than with maps currently used for this purpose. Although the direction of influence was the same for most variables in the two study regions, the relative importance varied, and the distance from coast and elevation had opposite effects. This supports the notion that hazard is place-specific [35], and fire hazard mapping should therefore be individualized for specific landscapes.

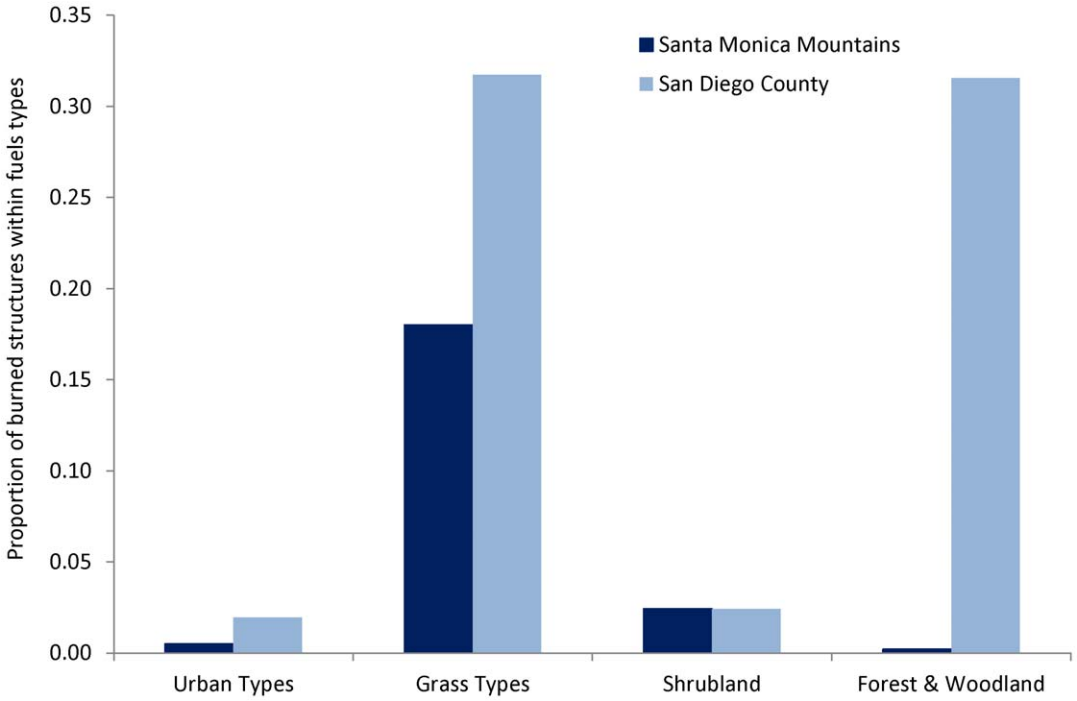

Figure 4. Proportion of burned structures within broad fuels types in the Santa Monica Mountains and San Diego County.
doi:10.1371/journal.pone.0033954.g004

Materials and Methods

Data and digitizing structures

We explained property loss by comparing structures that were burned (i.e., destroyed or damaged) by wildfires to those structures that were unaffected. The likelihood of a house burning in a fire has two major components: the first is the likelihood that there will be a fire, and the second is the likelihood that a structure will burn if there is a fire. That 'total' likelihood required us to include both structures inside and outside of fire perimeters in the model. We

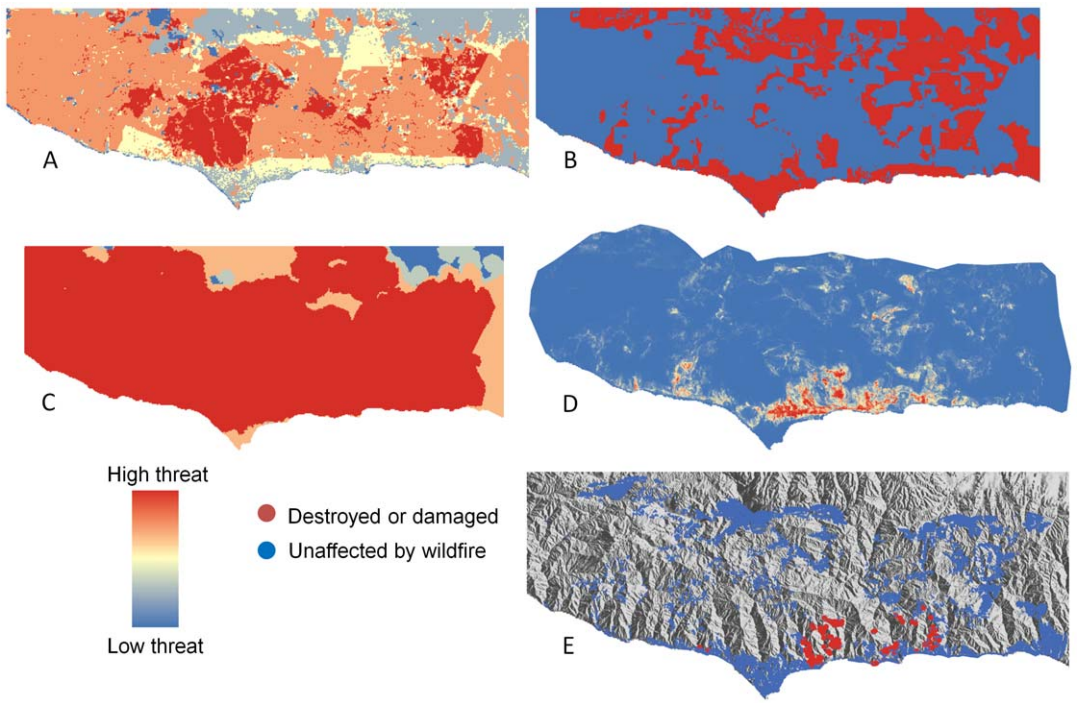

Figure 5. Fire hazard maps versus actual burned structures in the Santa Monica Mountains. (A) CDF "Fire threat" (B) CDF "Communities at risk" (C) CDF "Fire threat to people (D) Empirically based map showing probability of structure being burned by fire (E) Structures that were destroyed or damaged (red) and unaffected (blue) by wildfire from 2001–2010. CDF – California Department of Forestry and Fire Protection.
doi:10.1371/journal.pone.0033954.g005

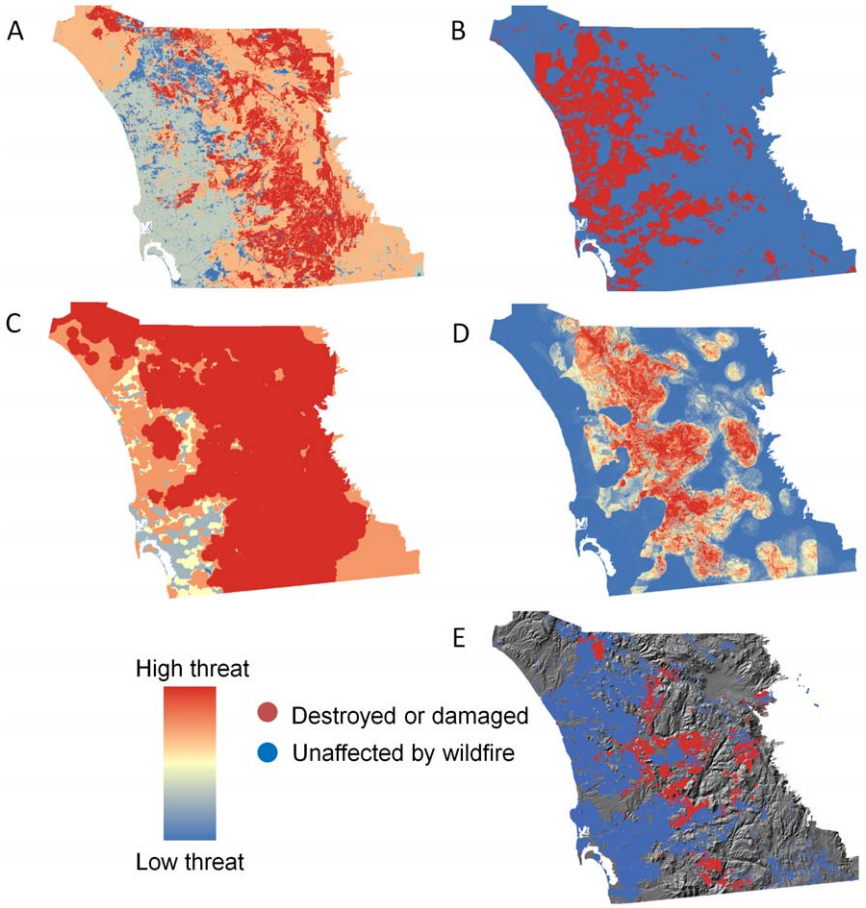

Figure 6. Fire hazard maps versus actual burned structures in San Diego County. (A) CDF "Fire threat" (B) CDF "Communities at risk" (C) CDF "Fire threat to people (D) Empirically based map showing probability of structure being burned by fire (E) Structures that were destroyed or damaged (red) and unaffected (blue) by wildfire from 2001–2010. CDF – California Department of Forestry and Fire Protection.
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also wanted to account for the full range of variation for the explanatory variables because planning decisions occur at a landscape scale, not just for a subset of structures within fire perimeters. Therefore, we digitized and analyzed all residential structures within the Santa Monica Mountains National Recreation Area in Ventura and Los Angeles counties, California as well as the portion of San Diego County that falls within the South Coast Ecoregion. Using onscreen digitizing, we carefully scanned the most recent aerial imagery available in Google Earth for each study area and placed a point over every visible structure. We digitized all structures, including homes, outbuildings, and guest houses, because we assumed that the factors explaining which homes burned were similar to those explaining the burning of other structures. Because most of the vegetation in our study areas is non-forested, there were very few occasions in which vegetation canopy obscured structures in the imagery. Structures were in all cases at least partly visible, even if they were covered by vegetation, and we looked at earlier images available in Google Earth to confirm where structures were located. The canopy cover was generally lower farther back in time.

Due to the large number of structures in San Diego County, many of which are located in high-density urban core areas, we used a parcel map to facilitate the digitizing process. For small parcels (area <900 m^2, equivalent to one 30×30 m pixel of the environmental data, see below), we placed the point representing the structure in the centroid of the polygon instead of digitizing the exact location of the structure within the parcel boundary. We assumed the location of the structure within the boundary of small parcels would not significantly alter the overall calculations of spatial pattern among structures. However, for large parcels, the location of the structure within the parcel boundary may be important because the parcel may include more than one pixel, and thus, the environmental data are associated with the structure may depend on structure location. Distance calculations to other structures could also be more substantially influenced by the location of structures in large parcels, which is why we analyzed the Google Earth imagery to place those structures accurately. We did not digitize houses under construction at the date the remote sensing imagery was recorded.

To identify burned structures, we developed an initial address list and spatial database of structures destroyed or damaged by fires from a variety of records, including official incident reports, county assessors' offices, public works departments, city records, and newspaper reports. Because these records were incomplete, we also used Google Earth imagery for a systematic visual analysis to correct geocoded locations and to identify additional structures that had not been documented. For this analysis, we identified burned structures by comparing pre-fire to post-fire images that are available in Google Earth. To develop a data set of houses to inspect for property loss, we selected all structures that fell within and up to 80 m outside any perimeter of a fire that occurred since 2001 in both study areas. We used 80 m because it is twice the distance beyond which flame fronts are not expected to ignite

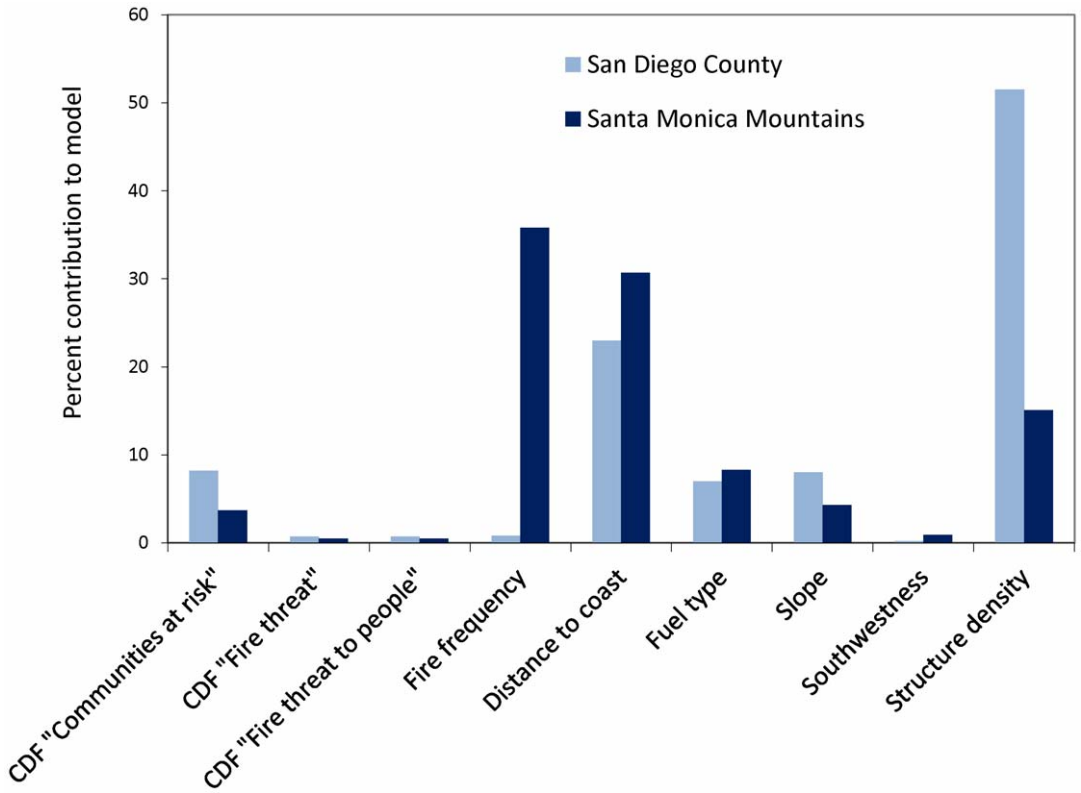

Figure 7. The percent contribution of explanatory variables in Maxent empirical fire hazard model. CDF – California Department of Forestry and Fire Protection.
doi:10.1371/journal.pone.0033954.g007

wood [36].The determination of destroyed or damaged structures was based on data collected from official records combined with visual inspection of imagery. Destroyed structures were those in which the house had completely burned to the ground, whereas damaged structures where those that had partially burned. Because damaged structures were more difficult to identify in the imagery, we ruled that if a fire had clearly burned into the property (i.e., if vegetation had visibly been burned), the structure was classified as damaged.

For both the destroyed and damaged structures, we assigned an estimate of certainty for the classification and conducted sensitivity analyses to test if results were similar for destroyed structures that were classified with the highest level of certainty versus a complete dataset with all destroyed and damaged homes at all certainty levels. In our classification, we indicated "1" for uncertain if the house was damaged or destroyed; "2" for fairly certain; "3" for absolutely certain. Since the results were similar (Table 3), we used the full dataset in our analyses to obtain the largest sample size. Although rare, if two buildings burned on a parcel, we only included one in our analysis. For those structures that burned in more than one fire, which only occurred in San Diego, we only used the data for the first fire to avoid double counting of structures in the spatial analysis.

Explanatory variables

To fully explore the influence of housing arrangement and pattern, we analyzed both the spatial relationships among individual structure locations and the arrangement of structures within housing clusters. Housing clusters were defined as groups of houses with a maximum distance of 100 m from each house to any other house [24]. We calculated these housing clusters by creating a 100 m buffer around each structure and dissolving overlapping boundaries. Thus, areas with many homes within 100 m of each other constituted one large housing cluster, while smaller housing clusters contained fewer or more isolated homes. This allowed spatial analysis based on the spatial and biophysical properties of the structure locations as well as spatial and biophysical properties of the housing clusters within which structures were located. Thus, some variables were calculated for the housing cluster in which the structure was located and the values for that housing cluster were assigned back to the structure. Other variables were calculated only for the location in which the structure was located.

Because our objective was to better understand the landscape factors that significantly contribute to the likelihood that a house will burn in a wildfire, particularly focusing on those factors that are relevant to land use planning, we only assessed variables affecting exposure of structures to wildfires (i.e., fires spreading into the property and reaching the structure, or embers landing on a structure). We did not consider factors such as urban landscaping or housing construction materials within the home ignition zone that determine whether the house survived the exposure. To evaluate the influence of housing arrangement and location on susceptibility to wildfire, we considered a suite of variables representing different spatial configurations and locations of structures as well as additional environmental variables that may affect property loss due to their potential control over fire spread behavior, fuel moisture, or flammability [23,37] (Table 1).

Housing arrangement variables. We evaluated the area of the housing cluster to test the hypothesis that small, isolated groups of structures are more susceptible to wildfire than large groups of structures. Housing density was calculated as the number of structures divided by the area of the housing cluster. For every

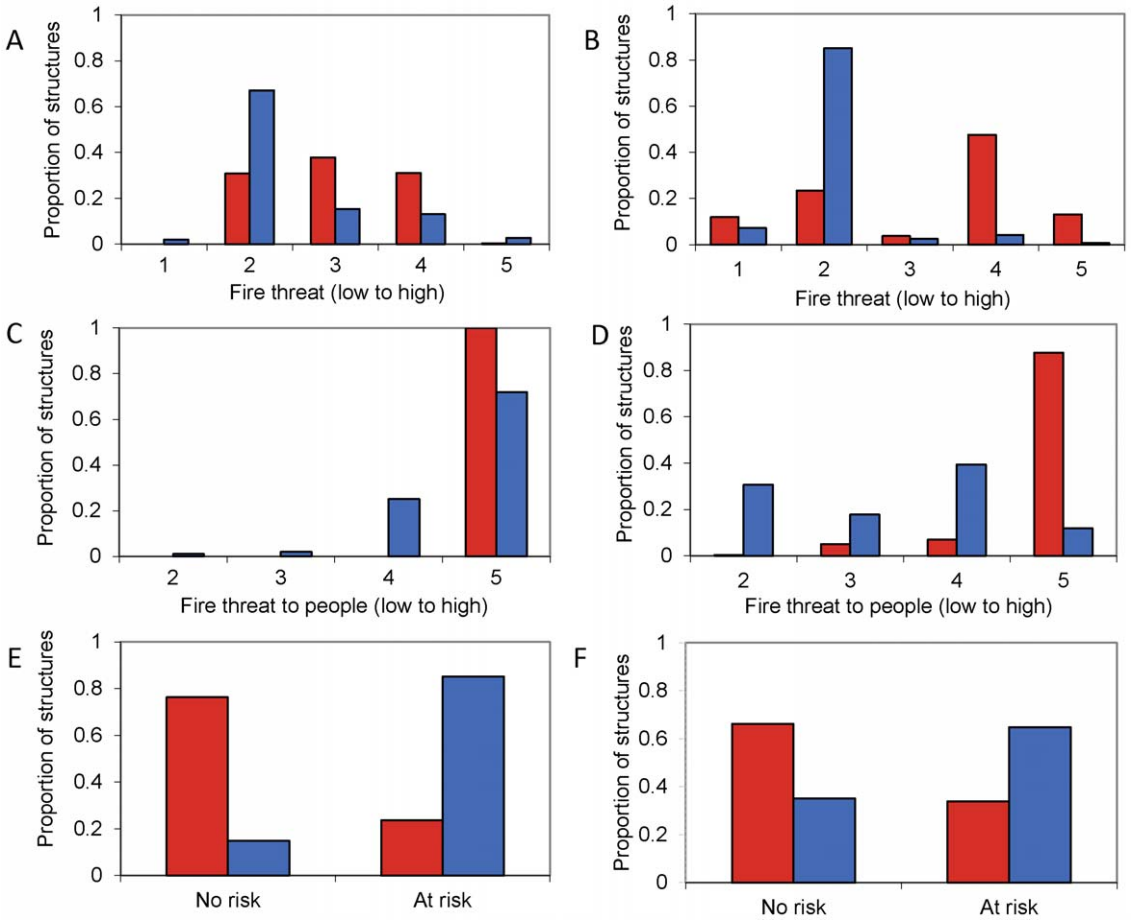

Figure 8. Distribution of actual burned structures in classes of statewide fire hazard maps. Proportion of structures burned (in red) or unaffected (in blue) distributed within map classes of: (A) CDF "Fire threat" in Santa Monica Mountains. (B) CDF "Fire threa" in San Diego County. (C) CDF "Fire threat to people" in Santa Monica Mountains (D) CDF "Fire threat to people" in San Diego County (E) CDF "Communities at risk" in Santa Monica Mountains (F) CDF "Communities at risk" in San Diego County. CDF – California Department of Forestry and Fire Protection.
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structure, we calculated the distance to the edge of the housing cluster to evaluate whether structures in the interior of housing clusters were less susceptible to wildfire than structures at the edge. To assess local spatial patterns, we calculated the distance from each structure to its nearest neighbor, and for overall landscape configuration of structures, we calculated the distance from each housing cluster to the next nearest housing cluster. Finally, we calculated the coefficient of variation, or, the standard deviation of distance among structures in a housing cluster divided by the mean to assess housing dispersion, or, regularity of housing pattern.

Housing location variables. To test whether structures located in fire-prone parts of the landscape were more likely to be burned, we overlaid fire perimeter polygons compiled by the California Department of Forestry (CDF)-Fire and Resource Assessment Program and created a continuous raster map representing the number of times an area had burned from the beginning of record-keeping, 1878, until 2001. We did not include any fires that occurred after 2001 to ensure that our count of fire frequency was independent of those fires that burned the structures in our analysis. We calculated the distance from the coast for every structure as another way to test whether a structure's location influences its likelihood to be burned. In southern California, a number of variables that influence fire patterns, including climate, terrain, and vegetation distribution, are correlated with the distance to the coast. Distance to the coast is also correlated with housing patterns, and may influence how a house is arranged relative to the major wind corridors in the region [38]. Although the inclusion of weather data at the time of fires would be more directly related to fire behavior and danger, the high variability of weather over space and time limits the ability to relate specific weather data to the place and time that fires burn structures. First, we did not know the exact time that fires burned structures, and thus could not retrieve the temporally matching weather data. Second, weather stations are generally located too far away from where fires burned homes to reflect local variability in weather conditions.

Biophysical variables. Terrain-derived variables included the average elevation and percent slope of the housing cluster as well as a cosine-transformation of aspect to create an index of 'southwestness,' which could account for the influence of solar radiation and aspect on fuel properties and fire behavior. For each structure, we also determined fuel type in the surrounding by identifying the most common fuel model within a 1 km buffer of the structure. This buffer allowed us to identify the vegetation types fires spread through before reaching the property. Our objective for this analysis was to determine which broad-based fuel classes were most closely associated with structure loss. If more than one fuel type occurred in the buffer, we used the fuel type present in the majority of the area. We obtained spatial fuel model

data, developed for fire behavior modeling, from statewide maps developed by the U.S. Forest Service (N. Amboy) at 30 m resolution. The fuel models provided in the USFS maps were created through remote sensing and classified according to Scott and Burgan [39]. From this map, we grouped together the fuel models from broad fuel types (representing grassland, shrubland, and timber). We also grouped agriculture, barren land, and urban land into one type representing mostly urban landscaping and impervious surface (i.e., with little wildland vegetation).

Firefighter access. As a way of indirectly assessing firefighter access to the structure, we calculated the length of road within each housing cluster using the 2000 US Topologically Integrated Geographic Encoding and Referencing system TIGER/line files from the US Census.

Statewide fire hazard maps

Statewide fire hazard maps were available online from the California Department of Forestry and Fire Protection (CDF) [20].We downloaded the Wildland Urban Interface (WUI) "fire threat" data product that includes a series of maps that rank the wildland fire threat to human development. The term "fire threat" in these maps is used analogously to the way we use the term fire "hazard" or, a phenomenon or place where harm is likely to occur.

The "fire threat" map is based on the hazard ranking of different fuels types combined with the fire rotation period, or, the average area burned during the period of record for different vegetation types. Fuels types with higher fuel loads and vegetation types that burned most frequently were considered most hazardous. The "fire threat to people" map is based on a cost-distance calculation that estimates distances from areas of high fire hazard. As an example, the highest "fire threat to people" is calculated as a maximum of 2400 m from "extreme threat" in the fire threat map. Finally, the "communities at risk" map depicts U.S. Census communities with more than 1 house per 8.09 ha (20 acres) that are located in areas with "high fire threat to people."

The CDF provides additional fire hazard severity maps developed separately for state and local responsibility areas. The finer-scale maps for local responsibility areas, which include incorporated cities, cultivated agricultural lands, and portions of the desert, are limited in extent and only overlap a small portion of our study areas. Due to the limited extent of the local responsibility area maps, and the fact that the state responsibility maps were still being refined, we did include these in our analysis. Their proposed modeling approach will be based upon the existing fire threat and communities at risk maps and will be refined to include additional methods that characterize brand production from vegetative fuels.

To evaluate how well the CDF statewide fire hazard maps corresponded to actual burned structures, we included the three maps as predictor variables in our statistical analyses and quantified the distribution of burned and unaffected structures within the different classes of each map.

Analysis

To identify the variables that best explain property loss and to estimate the relative contribution of each variable, we developed generalized additive models (GAMs) using a binary response (i.e., house burned or unaffected by fire) and logit link. We used three target degrees of freedom for smoothing splines for our continuous explanatory variables. Because we wanted to compare the independent relative variance explained for all explanatory variables, we estimated separate regression models for each variable. However, we also calculated the correlation coefficients among all variables and developed multiple-regression models with non-correlated variables for each study area. We used a stepwise selection procedure, entering variables according to amount of deviance explained and exploring both forward and backwards directions. We used AIC as the selection criterion for variable selection. To develop the models, we split the data for training and testing (withholding 20% of the data for testing) so we could calculate the area under the curve (AUC) of receiver operating characteristic (ROC) plots on an independent dataset to quantify model performance.

We used GAMs because prior studies reported nonlinear relationships between fire patterns and many of our predictor variables [7,23,24]. Unlike parametric statistical methods, such as generalized linear models (GLMs), in which nonlinear relationships are specified *a priori* (e.g., through polynomial terms) in the model, GAMs allow the structure of the data to determine the shape of the response curves. Thus, GAMs provide a more flexible and automated approach for identifying and describing nonlinear relationships [40,41]. We used the GAMs to estimate the shape of response curves and to calculate deviance explained (D^2, analogous to R-squared in linear regression) for all explanatory variables.

Although non-parametric methods, such as GAMs, tend to be less sensitive to the effects of spatial autocorrelation than other model approaches [42], we wanted to ensure that spatial autocorrelation did not significantly influence the results of our analysis. The main concerns about spatial autocorrelation in regression models are inflated significance values and biased coefficients [42,43]. GAMs do not estimate regression coefficients, which are replaced with smoothing functions. This is why we also fit GLMs to our data because they are parametric models similar to GAMs, but they estimate coefficients. Therefore, the GLMs allowed us tocheck the influence of autocorrelation on both coefficients and the significance of variables. The GLMs also allowed us to test whether our results were robust by comparing two modeling methods. We first developed non-spatial GLMs, and fit linear and quadratic terms for all variables (except for fuel type, which was categorical). After detecting residual autocorrelation in these nonspatial models using Moran's I [43], we calculated an autocovariate term to account for the influence of neighboring values on predictions, and included as the term as an additional explanatory variable in models. To calculate the autocovariate term, we specified a neighborhood radius of 1, which finds the minimum distance for which all observations (i.e., structure locations) are linked to at least one neighbor. The influence of structures located within any neighborhood radius was weighted by inverse distance. . After fitting these autocovariate models, we used Moran's I to recheck for spatial autocorrelation of model residuals, compared the coefficients to the nonspatial models, and checked variable significance after incorporating the autocovariate term..All model fitting and evaluation were accomplished using the gam, spdep, vegan, and ROCR packages for R [44].

Empirical fire mapping

To develop empirical fire hazard models and maps, we selected Maxent [45], a machine-learning method that is best recognized for creating species distribution models and maps. We selected Maxent because it outperforms other presence-only and presence-background species distribution modeling methods [41] and has been applied successfully to map the distribution of fire [46]. Maxent assumes that the best approximation of an unknown distribution (e.g., fire hazard) is the one with maximum entropy. The model iteratively evaluates contrasts between values of explanatory variables at locations of the response variable (i.e.,

burned structures) and for averages of the explanatory variables across the entire study area. The output is an exponential function that assigns a hazard probability (i.e., probability of structure being burned) to each site or cell of a map. In the output map, areas of predicted high risk that do not have structures on them represent environmental conditions similar to those in which structures have actually burned.

Because mapped predictor variables were required for the modeling, so that conditions similar to those where structures were burned could be delineated continuously across the landscape, we created maps representing a subset of the variables that we explored with the regression analysis. These variables represented a combination of structure arrangement, location, and biophysical variables, including: interpolated structure density, distance to coast, fuel type, slope, historical fire frequency, and southwestness. We developed models that included CDF fire hazard maps as predictors to test their importance relative to the other predictor variables. However, for generating maps and quantifying model performance, we only used models that did not include CDF predictor variables.

Sensitivity tests

The results of our analysis may have been affected by the size of the buffer that we used around structures to create housing clusters, the degree of impact of fire on the structure (i.e., destroyed or damaged), and certainty of the classification (i.e., 1–3). Therefore, to evaluate how sensitive our results were to these variables, we created housing clusters around structures using a 200 m buffer and compared the regression results for which housing cluster was relevant in the to those obtained when using a 100 m buffer. We also performed separate regressions using only those structures that had been destroyed with complete certainty (a "3") and compared those to the regressions of all burned structures at all certainty levels. For the Maxent analysis, we also compared models using only structures that were destroyed with the highest level of certainty to models using all burned structures at all certainty levels.

Acknowledgments

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Author Contributions

Conceived and designed the experiments: ADS JEK ABM TJB VCR. Performed the experiments: ADS ABM TJB. Analyzed the data: ADS JEK ABM. Wrote the paper: ADS JEK ABM TJB VCR.

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Publication Brief

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Housing Location Factors Determine Risk of Structure Loss from Wildfires in Southern California

Wildfire risk reduction efforts in southern California focus primarily on fuel reduction and less so on house characteristics and homeowner responsibility. However, the extent to which land use planning could alleviate wildfire risk has been largely missing from the debate, despite large numbers of homes being placed in the most hazardous parts of the landscape.

A *PLoS ONE* study authored by Conservation Biology Institute ecologist Alexandra Syphard, USGS fire ecologist Jon Keeley and colleagues from the University of Wisconsin examined how housing location and arrangement affects the likelihood that a structure will be lost when a wildfire occurs. Researchers developed an extensive geographic dataset of structure locations, including more than 5,500 structures in the San Diego region and Santa Monica Mountains region that were destroyed or damaged by wildfire since 2001, and identified the main contributors to structure loss.

The arrangement and location of structures strongly affected their susceptibility to wildfire. Structure losses were greatest in areas with a history of frequent fire. Losses also were higher when structures were surrounded by wildland vegetation, and were higher in herbaceous fuel types than in higher fuel-volume woody types. Housing arrangement was also important, as destruction was most likely at low to intermediate structure densities.

Researchers also tested fire hazard maps developed using housing pattern and location against traditional maps based on the assumption that fuel distribution is the primary determinant of hazard. The fuel-based maps correctly identified general patterns of fire hazard across the state. However, at the regional scale, fuel-based maps did not predict structure loss as well as maps developed using a combination of factors that included housing arrangement and location.

Management Implications

- Land use planning and housing development policies should be important components of fire risk management plans for southern California's wildland-urban interface.
- Housing location factors, such as surrounding vegetation type and history of frequent fire, highlight the need to reexamine existing policies on fuel load reduction. Woody fuel clearing may increase highly ignitable and flashy herbaceous fuels, which were correlated with structure loss in Ventura and Los Angeles counties.
- Traditional fire hazard maps based primarily on fuel distribution do not predict structure loss at the regional scale compared to fire hazard maps that incorporate multiple variables, including housing arrangement and location.

THIS BRIEF REFERS TO:
Syphard, AD, JE Keeley, A Bar Massada, TJ Brennan, VC Radeloff. Housing arragement and location determine the likelihood of housing loss due to wildfire. PLoS ONE 7(3): e33954. doi: 10.1371/journal.pone.0033954

http://www.werc.usgs.gov/seki
http://www.werc.usgs.gov/ProductDetails.aspx?ID=4692

The strong importance of housing arrangement and location indicate that land use planning may be a critical tool for reducing fire risk, but it will require reliable delineations of the most hazardous locations.

Housing location can determine the likelihood of structure loss due to wildfire.

latimes.com/news/local/la-me-wildfire-houses-20120616,0,4730156.story

latimes.com

Wildfire risk to homes is most related to location, study finds

Buildings on steep slopes, in Santa Ana wind corridors and in low-density developments mixed with wild lands were most likely to have burned in the last decade.

By Bettina Boxall, Los Angeles Times

June 16, 2012

The expression "location, location, location" doesn't apply just to buying real estate; it can also determine whether a house burns down in a wildfire.

Researchers who studied data on more than 5,500 buildings damaged or destroyed in Southern California fires during the last decade found the most vulnerable structures were in certain places and certain arrangements.

The results, recently published in the online journal PlosOne.org, have important implications for wildfire protection policies in the Southland, which focus on brush clearance and fireproof construction. That is not enough, say the authors, who argue there are some places where homes simply shouldn't be built.

"We're finding that geography is most important—where is the house located and where are [houses] placed on the landscape," said the paper's lead author, research scientist Alexandra Syphard of the Conservation Biology Institute.

Syphard and her coauthors from the U.S. Geological Survey and the University of Wisconsin gathered data on 700,000 addresses in the Santa Monica Mountains and part of San Diego County. They then mapped the structures that had burned in those areas between 2001 and 2010, a time of devastating wildfires in the region.

Buildings on steep slopes, in Santa Ana wind corridors and in low-density developments intermingled with wild lands were the most likely to have burned. Nearby vegetation was not a big factor in home destruction.

"If you want to predict whether or not a home will be lost in a fire, going out and looking at the surrounding fuels is not going to tell you nearly as much as looking at the location and the frequency of fires in that location in the past," said coauthor Jon Keeley, a USGS research scientist and chaparral expert.

Comparing the state's fire hazard maps with their own results, the researchers also concluded that on a local community scale, the state maps were not very good at identifying the most vulnerable areas.

The state maps estimate fire risk based on wild land fuel distribution, assuming that the denser and older the brush, the greater the threat. Because most of the Santa Monicas are covered with coastal scrub and chaparral, the state maps put most of the range in the medium- or high-risk category.

But during the study period, home loss was concentrated in only a portion of the Santa Monicas: in the Malibu area, which sits in the path of hot, dry Santa Ana winds that carry embers for miles.

Looking at vegetation growing within roughly half a mile of structures, the authors concluded that the exotic grasses that often sprout in areas cleared of brush could be more of a fire hazard than the brush. "We ironically found that homes that were surrounded mostly by grass actually ended up burning more than homes with higher fuel volumes like shrubs," Syphard said.

Dry grasses ignite quickly and flames race through them, easily outrunning attempts to contain them. Firefighters have seen "greater structure loss and greater loss of life from the flashy grass fires," said Los Angeles County Deputy Fire Chief John Todd, adding that it was critical for residents to cut back neighboring grasslands.

Along with geography, historic wildfire frequency was a harbinger of future destruction. Areas that had burned most frequently between 1910 and 2000 were the ones most likely to have lost buildings in the past decade. "There are certain fire corridors where we repeatedly get fires," Keeley said. "If you're in an environment that historically had a lot of fire, today you're much more vulnerable."

Land use planners and the firefighting community should be taking such factors into account, the researchers argue. Just as there are flood zones where construction is restricted, there should be fire zones designated where development is discouraged through insurance and tax policies and local planning guidelines.

"It's the most difficult thing to achieve, but it could result in the most significant protection," Syphard said, acknowledging the political sensitivity of that approach.

L.A. County planners have begun to take fire hazard into consideration. In 2004, the county adopted an ordinance setting certain ridgelines off limits for home construction because of the fire danger. But most county regulations deal with building standards or siting on a parcel, such as prohibiting open eaves or discouraging long driveways that hinder firefighter access.

Private parcels were laid out long ago in the Santa Monicas, limiting what the county can do in terms of clustering development or keeping it out of wind corridors, said Gina Natoli, a supervising regional planner for the county. "The pattern has been set."

Fire-prone spots are often the most popular home sites. "In the Santa Monica Mountains, they want to have their home on the edge of the cliff so they can have a better view of the ocean," Todd said. "It's going to reduce the survivability of your home."

bettina.boxall@latimes.com

Puente Hills
Habitat Preservation Authority
Endowment Provided by the Puente Hills Landfill

HABITAT AUTHORITY
CELEBRATING 20 Years
Preservation, Restoration, and Education

March 12, 2014

County of Los Angeles
Department of Regional Planning
General Plan Development Section
Attn: Connie Chung, Supervising Regional Planner
Attn: Susan Tae, Supervising Regional Planner
320 West Temple Street
Los Angeles, CA 90012

Comments on Revised Draft Los Angeles County General Plan 2035 (rev. 1/2014)

Dear Ms. Chung and Ms. Tae:

The Puente Hills Habitat Preservation Authority (Habitat Authority) appreciates the opportunity to comment on the revised draft General Plan dated January 2014. On previous General Plan drafts, we provided comment letters dated 08/29/2007, 01/22/2009, 09/08/2011, 07/26/2012, and 11/7/2013. Comments that were not incorporated but that the Habitat Authority believes still apply are reiterated here.

The Habitat Authority is a joint powers authority established pursuant to California Government Code Section 6500 *et seq*. with a Board of Directors consisting of the City of Whittier, County of Los Angeles, Sanitation Districts of Los Angeles County, and the Hacienda Heights Improvement Association. According to its mission, the Habitat Authority is dedicated to the acquisition, restoration, and management of open space in the Puente Hills for preservation of the land in perpetuity, with the primary purpose to protect the biological diversity. Additionally, the agency endeavors to provide opportunities for outdoor education and low-impact recreation. The Habitat Authority owns and or manages over 3,800 acres which lie within the Cities of Whittier and La Habra Heights, as well as in the County unincorporated areas of the Puente Hills known as Hacienda Heights and Rowland Heights.

Part II. Planning Areas Framework

Chapter 5. II. Planning Areas Descriptions

1. In Table 5.1 on page 27, various Opportunity Area Types are listed as areas to be considered when preparing community-based plans. Please consider adding a type for Open Space .

2. It is assumed that on page 35 under Geography, "The San Gabriel River runs along the Interstate-610…." should be "The San Gabriel River runs along the Interstate-605….".

Part III: General Plan Elements

Chapter 7: Mobility Element

3. On page 102, Section 5. Impacts of Transportation on Natural and Community Resources -The Habitat Authority recommends a discussion on how changes in transportation can influence accessibility of open spaces (i.e. greater access) leading to an increase in the number of visitors and potentially affecting biological resources.

Chapter 9: Conservation and Natural Resources Element

4. Policy C/NR 1.2 states "Protect and conserve natural resources, natural areas, and open spaces on park properties." It is unclear why this would only pertain to "…park properties." We believe it is the intent of the Policy to cover all natural resources, natural areas, open space, and potential park properties in unincorporated LA County. Therefore, please consider adding following in italics and deleting the strikethrough: *"Protect and conserve natural resources, natural areas, and open spaces* ~~on park properties~~*."*

5. Regarding Policy C/NR 1.5: "Increase and improve access to dedicated open space and natural areas for all users." The County works with numerous land owners (see Appendix E) who own/manage open space within the jurisdiction of this General Plan. Since the County cannot control access to land that they don't own/manage, please clarify by adding the following italicized language. "Increase and improve access to dedicated open space and natural areas for all users *as determined appropriate by each land management agency*."

6. Policy C/NR 1.6 states "Prioritize open space acquisitions for available lands that contain unique ecological features, streams, watersheds, woodlands, grasslands, and/or offer linkages that enhance wildlife movements and genetic diversity." However there are numerous other important habitat types besides woodlands and grasslands that support important natural resources. Therefore, please consider amending the sentence as noted in italics with deletions in strikethrough: "Prioritize open space acquisitions for available lands that contain unique ecological features, streams, watersheds, ~~woodlands, grasslands,~~ *habitat types* and/or offer linkages that enhance wildlife movements and genetic diversity."

7. Regarding Policy C/NR 2.4 to "Collaborate with public, non-profit, and private organizations to acquire and preserve available open space lands.", please consider adding the following language in italics to include the acquisition of land in different land use categories that could be converted to open space: "Collaborate with public, non-profit, and private organizations to acquire and preserve available open space lands *or other lands that could be converted to open space*."

8. On page 128, 2nd paragraph, the Habitat Authority recommends that language be added into the SEA Ordinance allowing public land preservation agencies with adopted management plans to carry out all activities that contribute to the management of the land for preservation, access and safety.

9. On page 130, Policy C/NR 3.9 outlines design considerations for projects proposed in SEAs. The Habitat Authority recommends inclusion of a requirement that such projects retain a contiguous area of undisturbed open space over the most sensitive natural resources to maintain regional connectivity within the undeveloped area, and to preserve these areas in perpetuity through a recorded fee simple dedication to an open space park agency currently operating and/or based in the project area prior to the issuance of any permits.

10. Regarding Policy C/NR 7.2 to "Support the preservation, restoration and strategic acquisition of open space to preserve natural streams, drainage paths, wetlands, and rivers, which are necessary for the healthy function of watersheds.", the acquisition of land types, other than open space, could converted to open space for the protection of those resources. Therefore, please consider adding the following language in italics: "Support the preservation, restoration and strategic acquisition of open space, *and other land types that could be converted to open space,* to preserve natural streams, drainage paths, wetlands, and rivers, which are necessary for the healthy function of watersheds."

11. In Section IV Goals and Policies, Policy P/R 1.9 is to "offer more lighted playing fields using energy efficient light fixtures where appropriate to extend playing time." Please consider implementing spill light limits on ballfields that are adjacent to open space. We suggest the following: "All lighting shall be designed and shielded with the intent of preventing spillage of light into adjacent open space areas. All lighting shall be constructed so that all light emitted by the fixture, either directly from the lamp or from a diffusing element, or indirectly by reflection or refraction from any part of the luminaire, is projected away from the open space as determined by photometric test or certified by the manufacturer."

Appendix E: Conservation and Natural Resources Element Resources

12. On page 40-41, regarding the summary of the Puente Hills SEA, it notes that "significant wildlife movement throughout the Puente Hills SEA has been documented in a two year carnivore study commissioned by the Santa Monica Mountains Conservancy as part of a multi-jurisdictional effort to establish a region wide wildlife movement linkage." Please

update this statement to acknowledge numerous additional wildlife movement studies that have been conducted in this SEA on the Puente Hills Preserve, including several studies of both the Harbor Boulevard Wildlife Underpass and the Colima Road Underpass, all of which are available on the Habitat Authority's website (www.habitatauthority.org/publications).

13. Due to an agency name change, on page 44 (and throughout document), change "California Department of Fish and Game (CDFG)" to "California Department of Fish and Wildlife (CDFW)".

14. The Regional Habitat Linkages section in Appendix E (Conservation and Natural Resources Element) states on page 40 that "critical biological resources are maintained through habitat connectivity, which sustains population genetic diversity, and provides refuge for migrant species". In addition, the Significant Ecological Areas section of Appendix E (page 44) states that one of the two primary conservation principles on which the SEAs are designated is that "isolated habitat areas have less opportunity to regain species by re-colonization from other areas" and that "The SEAs are designed to provide habitat linkages between related habitat types…by encompassing areas of sufficient width to function as wildlife movement routes between these open space areas".

    Please consider revising the SEA selection criteria to directly acknowledge the importance of habitat connectivity and wildlife movement corridors on pages 44-46. It is clear from the language in the Draft General Plan Appendix E, that wildlife movement corridors and habitat connectivity are critical to the concept of SEAs. However, the SEA selection criteria do not mention wildlife movement, corridors, or habitat connectivity[1]. The only criterion that can be construed as being related is criterion D: "Habitat that at some point in the life cycle of a species or a group of species, serves as concentrated breeding, feeding, resting, or migratory grounds, and is limited in availability either regionally or in Los Angeles County". Please consider revising the SEA selection criteria to include lands that provide habitat connectivity and wildlife movement corridors and opportunities, as consistent with the Draft General Plan in Appendix E. The maintenance of wildlife populations in western portions of the Puente-Chino Hills, such as in the Habitat Authority's Preserve, are critically dependent on the movement of individuals from locations further east in the Corridor, and a reduction of this potential movement may pose a serious threat to the persistence of these populations in the future[2].

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[1] PCR. 2000. Los Angeles County Significant Ecological Area Update Study 2000: Background Report. Prepared for: Los Angeles County Department of Regional Planning. November 2000.
[2] Conservation Biology Institute. 2005. Maintaining Ecological Connectivity Across the "Missing Middle" of the Puente-Chino Hills Wildlife Corridor. July 2005.

The following comments are regarding the description of the Puente Hills SEA, beginning on page 136:

15. On page 138, fourth paragraph, please note in the text that Sycamore Canyon also supports coastal cactus wrens.

16. On page 139, first paragraph, please add language that describes the habitat in Arroyo San Miguel as coastal sage scrub, chaparral, grassland and riparian and supporting a population of federally-threatened coastal California gnatcatcher.

17. Please note that as of August 15, 2011, due to an amendment of the Habitat Authority's Joint Powers Authority Agreement, the official agency name changed to Puente Hills Habitat Preservation Authority (PHHPA). Please use this name when referring to the agency in future documents and correspondence. On page 139, the last paragraph still references the old agency name. Please check the document for other instances.

18. The open space of the Puente Hills between Harbor Blvd. and State Route 57 has been previously shown to be of great conservation concern to the entire Puente-Chino Hills corridor, both for its value in linking the west and east corridor as well as because of its intrinsic value in supporting significant populations of sensitive animal species.

Comments on Community Climate Action Plan

Based on review of the Community Climate Action Plan, the Habitat Authority respectfully submits the following comments:

1. Page 5-6, Table 5-1, Land Conservation and Tree Planting – Protect Conservation Areas: Please consider not only the evaluation of the Oak Woodland Conservation Management Plan for the preservation of existing oak woodlands but preserving all other native habitats as well. There are numerous native habitats within Los Angeles County that provide important habitat for a suite of species including those protected by law such as the federally threatened California Gnatcatcher, *Polioptila californica*, that depends on coastal sage scrub habitat and the California State Species of Special Concern Coastal Cactus Wren, *Campylorhynchus brunneicapillus*, that nests almost exclusively in prickly pear (*Opuntia littoralis* and *O. oricola*) and coastal cholla (*O. prolifera)*, within coastal sage scrub habitat, to name a few. In addition, the California endemic Southern California black walnut (*Juglans californica* var. *californica*) is severely threatened by ubanization and is considered by The Nature Conservancy and the state of California to be one of California's "rare and imperiled natural communities" (http://www.fs.fed.us/database/feis/plants/tree/jugcal/all.html). The Chino-Puente Hills is a major center of distribution for this species and is one of the dominant woodland community tree species in the Puente Hills Preserve. Therefore, please consider revising the Initial Implementation Step in Protecting Conservation Areas to include a complete review of all native communities.

2. Page C-20 , LC-2 Create New Vegetated Open Space – Additional Information:
   This section currently states that "New vegetated open spaces should be designed and maintained to minimize the spread of invasive species." Please considering adding language to encourage the use of drought-tolerant native plantings in all revegetation projects since this can contribute to decreasing water consumption.

3. Page C-20, LC-4 Protect Conservation Areas – Action Status:
   The *Additional Information* (page C21) acknowledges that open spaces can sequester atmospheric CO_2 creating a sink of carbon and thus having Greenhouse Gas (GHG) benefits. However, the Plan currently states that "GHG emissions reductions have not been quantified or counted toward attainment of the County's CCAP target." Therefore to acknowledge the contribution of open spaces as carbon sinks, the Habitat Authority recommends conducting a quantifiable analysis of open space area contributions to atmospheric CO_2 sequestration.

4. Page C-21, LC-4 Protect Conservation Areas – Approaches:
   To support the Action Goal of "Encourage the protection of existing land conservation areas" please consider the preservation of other native habitats besides oak woodlands (see detailed info in comment 1).

We appreciate the opportunity to comment on the General Plan and CCAP documents. Please notify us when the Habitat Conservation Plan, Mitigation Land Banking Program, Trails Master Plan, Open Space Land Acquisition Strategy, and Oak Woodland Conservation Management Plan, documents are available for public review.

Thank you for your consideration of our comments. Feel free to contact me or Lizette Longacre, Ecologist, at (562) 945-9003 for further discussion.

Sincerely,

Bob Henderson
Chairman

cc: Board of Directors
Citizens Technical Advisory Committee

WILDLIFE CORRIDOR CONSERVATION AUTHORITY

570 WEST AVENUE 26, SUITE 100, LOS ANGELES, CALIFORNIA 90065
TELEPHONE: (310) 589-3230
FAX: (310) 589-2408

February 10, 2014

Emma Howard
Regional Planning Department
320 West Temple Street, Room 1354
Los Angeles, California 90012

Draft SEA Ordinance
Released December 5, 2013

Dear Ms. Howard:

The Wildlife Corridor Conservation Authority (WCCA) was created to provide for the proper planning, conservation, environmental protection and maintenance of the habitat and wildlife corridor between the Whittier-Puente Hills, Chino Hills, and the Cleveland National Forest in the Santa Ana Mountains. WCCA has been following the General Plan and Significant Ecological Area (SEA) development closely and provides the following comments on the draft SEA Ordinance, released December 5, 2013.

WCCA supports the inclusive proposed SEA boundaries and commends the County on applying this approach. We continue to compliment the County's efforts to propose more inclusive and biologically sound boundaries to ensure long-term sustainability of SEAs. However, a key area southwest of the Puente Hills SEA is not included in the newly proposed SEA boundaries. This area contains habitat resources for sensitive species found in the Puente Hills. WCCA recommends that the area shown on the attached map be included in the Puente Hills SEA.

Puente Hills Significant Ecological Area Boundaries

WCCA recommends the inclusion of an area east of Harbor Boulevard, in unincorporated Los Angeles County near the Los Angeles County/Orange County border (shown in the attached map). This area is part of the Aera project boundary. It serves a distinct and critical purpose in the broader integrity of the SEA by providing both habitat for coastal California gnatcatcher (*Polioptilla californica californica*) and buffer for adjacent core habitat and movement corridors. Any extensive development in this subject area would unquestionably harm the ecological integrity of the Puente Hills and potentially sever genetic connections across Harbor Boulevard. Any further substantial fragmentation of habitat in the Puente Hills would irreparably damage the biological resources WCCA is charged with protecting. Only inclusion in the SEA can provide the needed level of review and protection given the biological significance of the area.

The subject area is adjacent on several sides[1] to known populations of the federally threatened coastal California gnatcatcher.[2] The mixed native-nonnative grassland interface with coastal sage scrub provides ideal less-dense scrub preferred by the species. While dependent on coastal sage scrub within its U.S. range, the gnatcatcher regularly uses other habitats and shows seasonal and perhaps daily patterns in such use.[3] The subject area is positioned between three known occurrences, making it indisputably part of the gnatcatcher's range.

Grassland has noticeably reduced over time in the Puente-Chino Hills due to residential encroachment and the reestablishment of woody plants following the removal of grazing.[4] Vegetation patterns are dynamic and SEA boundaries should consider ecosystems in their entirety rather than static conditions. Any significant disturbance in the subject area would disrupt daily and seasonal patterns and critically threaten the viability of local gnatcatcher populations. Substantial loss of habitat in key areas in this location could irreversibly genetically isolate populations further west in the Whittier-Puente Hills.

Aside from the threatened gnatcatcher, grassland on or adjacent to the subject area is known to support breeding populations of other sensitive and declining bird species. A 1999 report on avian resources in the Puente-Chino Hills states:

> The exotic and semi-native grasslands of the Puente-Chino Hills may represent their greatest contribution to the breeding bird community of coastal Southern California, as so much of this habitat has been permanently lost to urbanization.

Subsequently, a 2000 study identified the grassland east of Harbor Boulevard on the Aera project site as one of three areas of highest conservation concern for birds in the Puente-Chino Hills region.[5] The author writes, "While smaller regions of grassland throughout the study area, such as the Whittier Hills, support a few pairs of species like the grasshopper sparrow or lazuli bunting, these and other grassland birds are abundant here." Breeding

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[1]Glen Lukos Associates. 2005. Biota Report. Aera Master Planned Community. Significant Ecological Area 15, Tonner Canyon/Chino Hills, Los Angeles/Orange County, California.

[2]*California Natural Diversity Database.* Department of Fish and Wildlife.

[3]Campbell, K.F., R.A. Erikson, W.E. Haas, and M.A. Patten. 1998. California Gnatcatcher use of habitats other than coastal sage scrub: Conservation and management implications. Western Birds 29:421-43.

[4]Campbell, K.F., R.A. Erikson, W.E. Haas, and M.A. Patten. 1998. California Gnatcatcher use of habitats other than coastal sage scrub: Conservation and management implications. Western Birds 29:421-43.

[5]Cooper, D.S. 2000. Breeding landbirds of a highly threatended open space: The Puente-Chino Hills, California. Western Birds 31:213-234.

pairs of the following sensitive species are known to occur in or adjacent to the subject area: white-tailed kite[6], golden eagle[7], greater roadrunner, lesser nighthawk, loggerhead shrike, horned lark, rufous-crowned sparrow, blue grosbeak, grasshopper sparrow, and western meadowlark. Any substantial diminution in habitat quality on the Aera site may cause a chain reaction of instability among sensitive species populations to the west. Without SEA designation of the subject area, these grassland-dependent sensitive species are expected to become locally extirpated.

Furthermore, the County's proposed SEA to the north of the subject area covers a narrow canyon that crosses Harbor Boulevard to the west. The edge effects of the existing Shea Homes development are already diminishing the value of the corridor through which all east-west Puente Hills wildlife movement occur using the Harbor Boulevard Wildlife Underpass. Should the southern edge of this narrow corridor be similarly developed, the entire corridor will be subjected to the direct and indirect impacts of urbanization. The only way to protect the biological integrity of the movement corridor is to provide as much open space buffer as physically possible. The subject area provides ancillary habitat benefits by serving as an extensive southern buffer for wildlife using the underpass to cross Harbor Boulevard.

Although we note that the County has expanded the SEA slightly in the Puente Hills area, more gnatcatcher habitat can be protected by expanding SEA boundaries to include this key subject area. Conservation biology principles clearly warrant that additional expansion in the Puente Hills area must include the rest of the southwest corner of the Aera project property boundary. There is no biological justification for not including the subject area.

We appreciate your consideration of these comments. If you have any questions, please contact Judi Tamasi of our staff by phone at (310) 589-3230, ext. 121, or by email at judi.tamasi@mrca.ca.gov. Thank you for your consideration.

Sincerely,

Glenn Parker
Chairperson

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[6]Ibid. Cooper notes that fewer than ten breeding pairs are known in the Puente-Chino Hills.

[7]Ibid. Cooper notes that only one or two breeding pairs are known in the Puente-Chino Hills.

Wildlife Corridor Conservation Authority

Proposed Addition to Puente Hills SEA Boundaries

February 10, 2014

From Los Angeles County SEA Development Map 4: