ECONOMIC EFFECTS OF CRITICAL HABITAT DESIGNATION FOR LYON'S PENTACHAETA IN TWO CALIFORNIA COUNTIES

Prepared For

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I BACKGROUND

On November 10, 2005, the U.S. Fish & Wildlife Service (Service) proposed critical habitat for the Lyon's pentachaeta, *Pentachaeta lyonii*, pursuant to the Endangered Species Act of 1973.[1] For this economic analysis, a total of 4,212 proposed acres in Ventura and Los Angeles are examined. This report quantifies the economic effects associated with the proposed designation of critical habitat. It does so by taking into account the cost of conservation-related measures that are likely to be associated with future economic activities that may adversely affect the habitat within the proposed boundaries.

This information is intended to assist the Secretary in determining whether the benefits of excluding particular areas from the designation outweigh the biological benefits of including them.[2] In addition, this information allows the Service to address the requirements of Executive Orders 12866 and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).[3] This report also complies with direction from the U.S. 10th Circuit Court of Appeals that "co-extensive" effects should be included in the economic analysis to inform decision-makers regarding which areas to designate as critical habitat.[4]

I.1 IDENTIFIED HABITAT

The Service identified seven habitat units and fourteen subunits with known occurrences of pentachaeta. In identifying areas as critical habitat, the Service considered those physical and biological habitat features that are essential to the conservation of the species. These essential features are referred to as the species' primary constituent elements (PCEs). Areas that do not contain any PCEs at the time of critical habitat designation are not considered critical habitat, whether or not they occur within a mapped critical habitat unit. The primary constituent elements for pentachaeta are as follows:

1. Clay soils of volcanic origin;
2. Exposed soils that exhibit a microbiotic crust which may inhibit invasion by other plant competitors; and
3. Low proportion of total vegetative cover (<25%).

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[1] 70 FR 68982

[2] 16 U.S.C. §1533(b)(2).

[3] Executive Order 12866, "Regulatory Planning and Review," September 30, 1993; Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," May 18, 2001; 5 U.S.C. §§601 *et seq* ; and Pub Law No. 104-121.

[4] In 2001, the U.S. 10th Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed CHD, regardless of whether those impacts are attributable co-extensively to other causes (*New Mexico Cattle Growers Ass'n v. U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001)).

I.2 THREATS

In the proposed rule, the Service identified urban development as the primary threat to pentachaeta.

I.3 CONSULTATION HISTORY

Through the Section 7 process, the Service has consulted with Federal agencies seven times on actions affecting pentachaeta. Other consultations include one with the State of California and one with a private entity. The consultations include:

- One consultation with the California Department of Health Services regarding a proposal by the Los Angeles Department of Water and Power to construct water treatment facilities in Stone Canyon and Encino;
- One consultation with the Department of Homeland Security regarding the repair of the Leo Carrillo State Park Campground in Los Angeles County;
- One consultation with the National Park Service concerning a fire management plan for the Santa Monica Mountains National Recreation Area;
- One consultation with the Natural Resources Conservation Service concerning the Calleguas Creek Watershed Management Program;
- One consultation with the Federal Emergency Management Agency on Tier 1 determination for the Etz Meloy Fuel Break Maintenance Project in Los Angeles County;
- One consultation the US Army Corps of Engineers concerning a proposed Lennar Homes project in Moorpark (see section IV.1.2 for additional discussion of the consultation);
- One consultation with the 7th Day Adventist church concerning a local development project in Thousand Oaks; and
- One consultation with the Santa Monica Mountains National Recreation Area concerning reconstruction of a dam spillway in Los Angeles County.

The California Department of Fish and Game has also consulted on actions affecting pentachaeta under the California Endangered Species Act. These consultations include:

- One consultation in 1998 for a 356.6 acre housing development near Lake Sherwood in Ventura County. Mitigation measures included a 50-foot buffer around known areas of pentachaeta, a conservation easement upon large landscape units on the property, and the salvage of seeds and soil in the event of any loss of pentachaeta.
- One consultation in 2000 for the 85 acre Sycamore Canyon development project in Westlake Village, Los Angeles County. The conditions of the resulting incidental take permit required that a 5.7 acre conservation area and a 0.6 acre preservation area be protected to avoid the majority of pentachaeta on the site.

- One consultation in 1995 for the 301.8 acre Hidden Valley Ranchos project in Thousand Oaks, Ventura County. The project size was reduced and configuration altered to avoid potential impacts to sensitive biological resources on the site, including wetlands and pentachaeta. The revised design avoided all impacts to pentachaeta and dedicated 221.9 acres to the Conejo Open Space Conservation Agency (COSCA; see section I.4.1.)

I.4 PRESERVED OPEN SPACE

Several of the areas proposed for critical habitat are already designated as open space or parkland. For each of the open space preserves affected by the proposed rule, management personnel were interviewed to determine potential economic effects of the proposed rule on the activities listed in section I.2, and to assess whether preservation of the open space could be attributed to conservation of pentachaeta.

I.4.1 The Conejo Open Space Agency

Portions of Units 2A, 2B, 2C, 3A, 3B, 3C, and 7 are managed by the Conejo Open Space Agency (COSCA). COSCA is the entity charged with preserving, protecting and managing open space resources in the Conejo Valley. It was created in 1977 by a joint powers agreement between the City of Thousand Oaks and the Conejo Recreation and Park District. COSCA has managed these lands as open space since before listing of pentachaeta, and city personnel stated that no incremental costs attributable to the Act have occurred or are anticipated.[5]

I.4.2 Conejo Recreation and Parks District

Portions of Unit 2A are managed by the Conejo Recreation and Parks District. The District was formed in 1963, with voter approval, as an independent special district. Senior management within the District have stated that there are no incremental costs attributable to the listing or the proposed rule[6]

I.4.3 Santa Monica Mountains National Recreation Area

A large portion of Unit 5B is in the Santa Monica Mountains National Recreation Area (NRA), which is managed by the National Park Service. The Park Service stated that, although it does manage for pentachaeta within the NRA, these activities are due to the NPS mandate to protect and conserve sensitive species and would occur even if pentachaeta had not been listed under the Act. Therefore, there are no incremental costs attributable to the listing or the proposed rule.[7]

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[5] Personal communication with Rick Burgess, senior planner, city of Thousand Oaks, February 28, 2006.

[6] Personal communication with Loren Pluth, Senior Park Planner, Conejo Recreation and Park District, February 27, 2006.

[7] Personal communication with Christy Brigham, Restoration Ecologist, Santa Monica Mountains National Recreation Area, March 2, 2006.

I.4.4 Santa Monica Mountains Conservancy

Unit 5C is private land that is managed by the Santa Monica Mountains Conservancy, a state agency established by the Legislature. According to conservancy personnel, no past costs have been borne due to the listing of pentachaeta, and no future management costs or development impacts are anticipated.[8]

I.4.5 Malibu Creek State Park

Portions of Unit 7 are managed by Malibu Creek State Park. Park personnel were interviewed and stated that no additional costs have been incurred due to the listing of pentachaeta. All management activities that are performed would have occurred absent the listing of the species.[9]

I.4.6 Mountains Recreation and Conservation Authority

Unit 1B and portions of Unit 4 are managed by the Mountains Recreation and Conservation Authority (MRCA). The MRCA is a local government public entity established in 1985 pursuant to the Joint Powers Act. The MRCA is a local partnership between the Santa Monica Mountains Conservancy, the Conejo Recreation and Park District, and the Rancho Simi Recreation and Park District. MRCA personnel stated that there are no incremental costs attributable to the listing or proposed rule.[10]

II ANALYTICAL FRAMEWORK

This economic analysis considers both the economic efficiency and distributional effects that may result from species and habitat protection. Economic efficiency effects generally reflect "opportunity costs" associated with the commitment of resources required to accomplish species and habitat conservation. Efficiency losses also include reductions in surplus levels resulting from economic activities such as land development. Similarly, the costs incurred by a Federal action agency to consult with the Service under section 7 represent opportunity costs of habitat conservation.

This analysis also addresses the distribution of impacts associated with the designation, including an assessment of any local or regional impacts of habitat conservation and the potential effects of conservation activities on small entities and the energy industry. This information may be used to determine whether the effects of the designation unduly burden a particular group or economic sector. For example, while habitat conservation activities may have a small impact relative to the national economy, individuals employed in a particular sector of the regional economy may experience a significant level of impact. The difference between economic efficiency effects and distributional effects, as well as their application in this analysis, are discussed in greater detail below.

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[8] Personal communication with Paul Edelman, Deputy Director of Natural Resources and Planning, March 3, 2006.

[9] Personal communication with Nat Cox, Environmental Scientist, California State Parks, March 8, 2006.

[10] Personal communication with Paul Edelman, Deputy Director of Natural Resources and Planning, March 3, 2006.

II.1 EFFICIENCY EFFECTS

At the guidance of the Office of Management and Budget (OMB) and in compliance with Executive Order 12866 "Regulatory Planning and Review," Federal agencies measure changes in economic efficiency in order to discern the implications on a societal level of a regulatory action. For regulations specific to the conservation of the pentachaeta, efficiency effects represent the opportunity cost of resources used, or benefits foregone, by society as a result of the regulations. Economists generally characterize opportunity costs in terms of changes in producer and consumer surplus in affected markets.[11]

In some instances, compliance costs may provide a reasonable approximation of the efficiency effects associated with a regulatory action. For example, a lead Federal agency may enter into a consultation with the Service to ensure that a particular activity will not adversely modify critical habitat. The end result of the consultation may be a small amount of additional mitigation for on-site impacts of the proposed activity. The cost of the additional mitigation would have been spent on alternative activities if the proposed project not been designated critical habitat. In the case that compliance activity is not expected to significantly affect markets – that is, not result in a shift in the quantity of a good or service provided at a given price, or in the quantity of a good or service demanded given a change in price – the measurement of compliance costs provides a reasonable estimate of the change in economic efficiency.

More generally, where habitat protection measures are expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, a designation that precludes the development of large areas of land may shift the price and quantity of housing supplied in a region. In this case, changes in economic efficiency (i.e., social welfare) can be measured by considering changes in producer and consumer surplus in the real estate market.

II.2 DISTRIBUTIONAL AND REGIONAL ECONOMIC EFFECTS

Measurements of changes in economic efficiency focus on the net impact of conservation activities, without consideration of how certain economic sectors or groups of people are affected. Thus, a discussion of efficiency effects alone may miss important distributional considerations. OMB encourages Federal agencies to consider distributional effects separately from efficiency effects.[12] This analysis considers several types of distributional effects, including impacts on small entities and impacts on energy supply, distribution, and use.

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[11] For additional information on the definition of "surplus" and an explanation of consumer and producer surplus in the context of regulatory analysis, see Gramlich, Edward M., A Guide to Benefit-Cost Analysis (2nd Ed.), Prospect Heights, Illinois: Waveland Press, Inc., 1990; and U.S. 240-R-00-003, September 2000, available at http://yosemite.epa.gov/ee/epa/eed.nsf/ webpages/Guidelines.html.

[12] U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf.

II.3 SCOPE OF THE ANALYSIS

This analysis identifies those economic activities believed to most likely threaten the listed species and its habitat and, where possible, quantifies the economic impact to avoid, mitigate, or compensate for such threats within the boundaries of the proposed critical habitat. In instances where critical habitat is being proposed after a species is listed, some future impacts may be unavoidable, regardless of the final designation and exclusions under 4(b)(2). However, due to the difficulty in making a credible distinction between listing and critical habitat effects within critical habitat boundaries, this analysis considers all future conservation-related impacts to be coextensive with the designation.[13,14]

Coextensive effects may also include impacts associated with overlapping protective measures of other Federal, State, and local laws that aid habitat conservation in the areas proposed for designation. We note that in past instances, some of these measures have been precipitated by the listing of the species and impending designation of critical habitat. Because habitat conservation efforts affording protection to a listed species likely contribute to the efficacy of the critical habitat designation, the impacts of these actions are considered relevant for understanding the full effect of the proposed designation. Enforcement actions taken in response to violations of the Act, however, are not included.

II.3.1 Sections of the Act Relevant To the Analysis

The analysis focuses on activities that are influenced by the Service through sections 4, 7, 9, and 10 of the Act. Section 4 of the Act focuses on the listing and recovery of endangered and threatened species, as well as critical habitat designation. According to section 4, the Secretary is required to list species as endangered or threatened "solely on the basis of the best available scientific and commercial data."[15]

The protections afforded to threatened and endangered species and their habitat are described in sections 7, 9, and 10 of the Act, and economic impacts resulting from these protections are the focus of this analysis:

Section 7 of the Act requires Federal agencies to consult with the Service to ensure that any action they authorize, fund, or carry out will not likely jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of the species' designated critical habitat. The administrative costs of these

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[13] In 2001, the U.S. 10th Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed CHD, regardless of whether those impacts are attributable co-extensively to other causes (New Mexico Cattle Growers Assn v. U.S.F.W.S., 248 F.3d 1277 (10th Cir. 2001)).

[14] In 2004, the U.S. 9th Circuit invalidated the Service's regulation defining destruction or adverse modification of critical habitat (Gifford Pinchot Task Force v. United States Fish and Wildlife Service). The Service is currently reviewing the decision to determine what effect it (and to a limited extent Center for Biological Diversity v. Bureau of Land Management (Case No. C-03-2509-SI, N.D. Cal.)) may have on the outcome of consultations pursuant to section 7 of the Act.

[15] 16 U.S.C. §1533.

consultations, along with the costs of project modifications resulting from these consultations, represent compliance costs associated with the listing of the species and the designation of critical habitat.[16]

Section 9 defines the actions that are prohibited by the Act. In particular, it prohibits the "take" of endangered wildlife, where "take" means to "harass, harm, pursue, or collect, or to attempt to engage in any such conduct."[17] The economic impacts associated with this section manifest themselves in sections 7 and 10. While incidental take permits are not issued for plant species, the Service is obligated to ensure that proposed activities adequately minimize impact to species.

Under section 10(a)(1)(B) of the Act, an entity (e.g. a landowner or local government) may develop a Habitat Conservation Plan (HCP) for an endangered animal species in order to meet the conditions for issuance of an incidental take permit in connection with the development and management of a property.[18] The requirements posed by the HCP may have economic impacts associated with the goal of ensuring that the effects of incidental take are adequately minimized and mitigated. The designation of critical habitat does not require completion of an HCP; however, the designation may influence conservation measures provided under HCPs. While HCPs are not developed solely for plant species, if listed plants occur in the area subject to the HCP, the Service must consider whether the proposed activities adversely affect or jeopardize the continued existence of the plant species.

II.3.2 Other Relevant Protection Efforts

The protection of listed species and habitat is not limited to the Act. Other Federal agencies, such as the Army Corps of Engineers, as well as State and local governments, may also seek to protect the natural resources under their jurisdiction.

In particular, pentachaeta was also listed as endangered in June, 1990 by the state of California under the California Endangered Species Act (CESA). Managed by the California Department of Fish & Game (DFG), CESA is similar in nature and scope to the Federal ESA. It requires state agencies to consult with DFG over actions that may jeopardize the continued existence of a state-listed endangered or threatened species, or its habitat. Like the Federal ESA, it also allows for take incidental to otherwise lawful development projects.[19] There is evidence that CESA has resulted in additional protection to pentachaeta above that provided by the Federal ESA (see section I.3.)

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[16] The Service notes, however, that a recent Ninth Circuit judicial opinion, Gifford Pinchot Task Force v. United States Fish and Wildlife Service, has invalidated the Service's regulation defining destruction or adverse modification of critical habitat. The Service is currently reviewing the decision to determine what effect it (and to a limited extent Center for Biological Diversity v. Bureau of Land Management (Case No. C-03-2509-SI, N.D. Cal.)) may have on the outcome of consultations pursuant to section 7 of the Act.

[17] 16 U.S.C. §1538 and 16 U.S.C. §1532.

[18] U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning," http://endangered.fws.gov/hcp/.

[19] http://www.dfg.ca.gov/hcpb/ceqacesa/cesa/incidental/cesa_policy_law.shtml

In general, economic impacts will be evaluated regardless of whether or not species protection measures required by the Act are also required by other Federal agencies or State and local governments. The impacts of these protection measures are "co-extensive" with or attributable to the species' listing and critical habitat designation. Examples of the type of regulations that fall into this category include but are not limited to the California Environmental Quality Act (CEQA) and Section 404 of the Clean Water Act.

II.3.3 Time Frame

The analysis examines activities taking place both within and adjacent to the proposed designation. It estimates impacts based on activities that are "reasonably foreseeable," including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. Accordingly, the analysis bases estimates on activities that are likely to occur within a 20-year time frame, beginning on the day that the current proposed rule becomes available to the public. In addition, past impacts are measured starting at the listing of the species in 1997.

II.3.4 Benefits

Under Executive Order 12866, OMB directs Federal agencies to provide an assessment of both the social costs and benefits of proposed regulatory actions.[20] OMB's Circular A-4 distinguishes two types of economic benefits: *direct benefits and ancillary benefits*. Ancillary benefits are defined as favorable impacts of a rulemaking that are typically unrelated, or secondary, to the statutory purpose of the rulemaking.[21]

In the context of CHD, the primary purpose of the rulemaking (i.e., the direct benefit) is the potential to enhance conservation of the species. The published economics literature has documented that social welfare benefits can result from the conservation and recovery of endangered and threatened species. In its guidance for implementing Executive Order 12866, OMB acknowledges that it may not be feasible to monetize, or even quantify, the benefits of environmental regulations due to either an absence of defensible, relevant studies or a lack of resources on the implementing agency's part to conduct new research.[22] *Rather than rely on economic measures, the Service believes that the direct benefits of the proposed rule are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*

Critical habitat designation may also generate ancillary benefits. Critical habitat aids in the conservation of species specifically by protecting the primary constituent elements on which the species depends. To this end, critical habitat designation can result in maintenance of particular environmental conditions that may generate other social benefits aside from the preservation of the species. That is, management actions

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[20] Executive Order 12866, *Regulatory Planning and Review*, September 30, 1993.

[21] U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf.

[22] U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf.

undertaken to conserve a species or habitat may have coincident, positive social welfare implications, such as increased recreational opportunities in a region. While they are not the primary purpose of critical habitat, these ancillary benefits may result in gains in employment, output, or income that may offset the direct, negative impacts to a region's economy resulting from actions to conserve a species or its habitat.

It is often difficult to evaluate the ancillary benefits of critical habitat designation. To the extent that the ancillary benefits of the rulemaking may be captured by the market through an identifiable shift in resource allocation, they are factored into the overall economic impact assessment in this report. For example, if decreased off-road vehicle use to improve species habitat leads to an increase in opportunities for wildlife viewing or hiking within the region, the local economy may experience an associated measurable, positive impact. Where data are available, this analysis attempts to capture the *net* economic impact (i.e., the increased regulatory burden less any discernable offsetting market gains), of species conservation efforts imposed on regulated entities and the regional economy.

II.4 INFORMATION SOURCES

The primary sources of information for this report were communications with and data provided by the Service. In addition, the analysis relies on information from the following entities:

- UC Berkeley Department of City and Regional Planning, for the CURBA urban planning model;
- DataQuick Information Systems, for data on new home sales;
- Marshall & Swift, for data on building costs;
- Environmental Systems Research Institute (ESRI), for geographic data;
- The Southern California Association of Governments (SCAG), for socioeconomic forecasting.

III METHODOLOGY

The Service identified urban development as the most significant threat to pentachaeta; however, since urban development typically occurs on private lands, these activities do not come under the purview of the section 7 consultation process unless there is a federal nexus. Most of the consultations that have occurred for this species have been for projects associated with urban development within the region, such as water retention facilities, water treatment facilities, and construction of communication sites (see Section 1.3).

The methodology of this analysis is twofold. First, it quantifies past costs that have resulted from efforts to conserve the species within areas of critical habitat. Second, it considers future costs resulting from efforts to conserve the species. Future costs are considered by describing a) the present value of the economic surplus generated by land development and other activities within the area of critical habitat, and b) the potential impact of efforts to protect the plant by regulating these activities.

III.1 PAST COSTS

This analysis defines past costs as costs that occurred between when pentachaeta was listed under the Act (January 29, 1997) and the present. Past costs were calculated by interviewing the affected entities within critical habitat—typically landowners—to determine if any resources had been expended on management, consultation with the Service, or other activities intended to conserve the species. Past costs also include the value of any lost economic opportunities attributable to listing. For example, a housing development that reconfigured to avoid development on areas containing pentachaeta would incur an economic loss if those actions were required to conserve the species or its habitat.

III.2 FUTURE COSTS

Future costs are costs attributable to the conservation of pentachaeta that will occur between the present and 2025. These costs vary based on the reasonably-foreseeable highest and best economic uses for each individual designated parcel of land. For example, land owned by a public entity and designated as open space typically has little potential to be used for residential or commercial development purposes over the relevant time frame. In these cases, the future costs of critical habitat designation are calculated as the sum of the management and other burdens imposed on the landowner, discounted to present value. (Section I.4 contains a summary of the past and future effects of the listing on the open space entities affected by the designation.)

Several of the proposed critical habitat units contain privately-owned land that may accommodate residential development in the future. Here, the analysis synthesizes available data on residential development patterns and intensity to model development pressure on these areas.

III.2.1 Conceptual Model

This analysis adopts a partial equilibrium approach to estimate the effects of critical habitat designation on the markets for land and new housing.[23] This is justified in light of relatively small amount of land at issue. Habitat units for pentachaeta typically comprise a small portion of the relevant market for housing. Market effects of the designation will be small, and do not warrant a general equilibrium analysis.[24]

The analysis provides a measure of the total surplus or quasi-rent that will accrue from permitted housing development within the area of proposed critical habitat. The amount of surplus generated per housing unit is calculated as the market price of the new housing minus the variable costs of development and construction: total expected surplus within

[23] See, for example, "Economic Effects Of Critical Habitat Designation For The Red-Legged Frog In 23 California Counties," http://www.fws.gov/sacramento/ea/Documents/Red-Legged%20Frog%20DEA%2010-19-05.pdf

[24] In a partial equilibrium analysis, changes within an individual market are studied while holding other markets constant. A general equilibrium analysis would also consider the response of other relevant markets to those changes.

the unit is calculated by multiplying this expression by the expected number of housing units.

III.2.2 Empirical Estimation

Measurement of surplus is conducted in part using data obtained from DataQuick, which maintains a database of new home transactions for the state of California. This analysis uses data on all new homes bought or sold in counties containing critical habitat after 1998, totaling approximately 100,000 observations.

For each unit of critical habitat, DataQuick observations within a radius of one mile of the habitat unit were sampled to obtain representative housing characteristics for the local market. This resulted in a sample size of between 200 and 600 new home sales per unit of critical habitat. Since California home prices have exhibited considerable volatility in recent years, it is necessary to inflate all home prices to 2006 value. This was accomplished using the Freddie Mac Conventional Mortgage Home Pricing Index.[25]

Marshall and Swift's Residential Cost Handbook provides detailed estimates of construction costs per square foot for houses of various size, material (e.g., stud framed, masonry), and quality. DataQuick data provides mean square footage estimates per census tract. By using a "very good" quality, two-story, stucco house as the basic house profile, building costs estimates were then generated in each habitat unit.

In addition to these "vertical" costs of homebuilding, it is also necessary to include development costs (not counting the developer's profit or returns to the landowner). There are two types of development costs that should be considered: "soft" costs and "hard" costs. Soft costs include the cost of design, permitting, marketing and sales. Hard costs of development include costs of grading, construction of local roads, installation of water collection systems, construction of parks, clubhouses and other amenities within the development, bringing utilities to the project, installation of streetlights, and other physical costs. Based on interviews with housing developers, total development costs are assumed equal to 17% of the cost of homebuilding. The sum of the building and development cost is the variable cost of new housing.

Determination of the expected quantity of new homes built within each unit of critical habitat requires a combination of forecasting data from the Southern California Association of Governments (SCAG), and other modeling. SCAG creates growth forecasts for housing and population at the census tract level, a standard unit of analysis in economics, for the entire Southern California region. Development is allocated probabilistically within the census tract using the CURBA model, an urban growth forecasting tool developed at the UC Berkeley Department of City and Regional Planning.[26]

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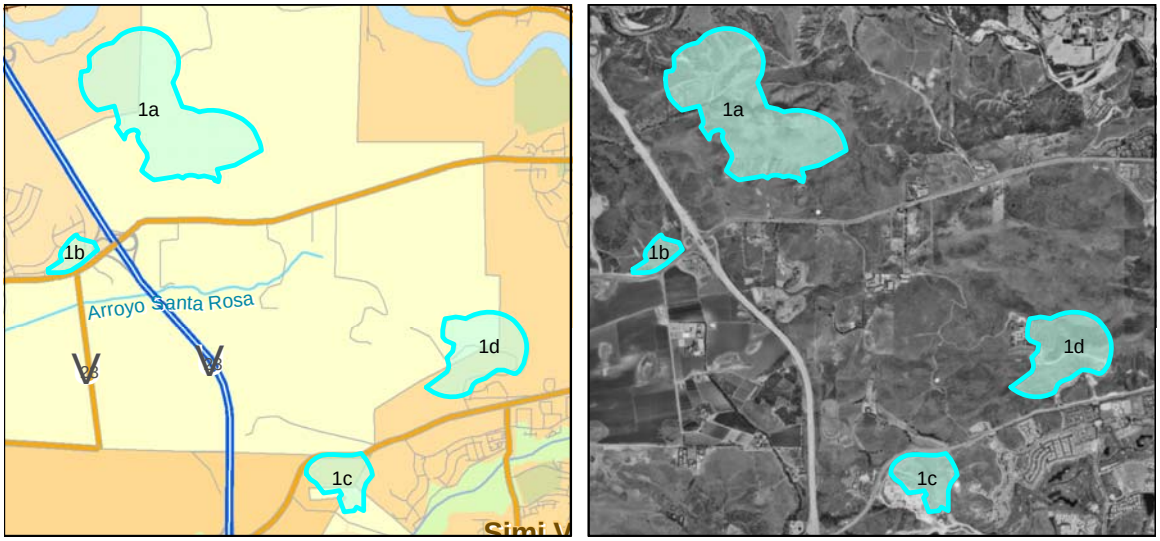
[25] http://www.freddiemac.com/finance/cmhpi/

[26] For a description of the CURBA model, see Landis, John. CUF, CUF II, and CURBA: A Family of Spatially-Explicit Urban Growth and Land Use Policy Simulation Models. 2001. Richard Brail and Richard Klosterman, eds., Planning Support Systems. Redlands: ESRI Press.

IV RESULTS OF THE ANALYSIS

The results of the analysis are discussed on a unit-by-unit basis below. Table 1: Results of Modeling Analysis gives the results of the modeling framework discussed in section III.2 for the relevant subunits. Table 2: Annualized Results of Modeling Analysis presents these results annualized at 3% and 7% discount rates. Table 3: Zoning Allowances summarizes relevant zoning which may affect development within critical habitat if upzoning does not occur.

IV.1 UNIT 1



IV.1.1 Unit 1A

This subunit consists of 283 acres of private land east of Moorpark.[27] Based on SCAG forecasts and urban growth modeling, CRA analysis projects growth within the unit to be 9 households over the next 20 years. Total expected surplus from housing development within this subunit of critical habitat is $4,001,885 or $2,038,883 per developed acre.

IV.1.2 Unit 1B

This subunit consists of 19 acres of private land in eastern Moorpark. The land is part of the Tierra Rejada Vernal Pool Preserve owned by the Serenata Homeowners association and managed by Mountains Recreation and Conservation Authority. The land is preserved open space and the proposed rule will have no incremental impact (see section I.4.6.)

The preserve was created as part of a 1999 consultation with the Army Corps of Engineers concerning a proposed Lennar Homes development project. In the course of the consultation, Lennar

[27] See appendix for additional visual aides.

> "redesigned the project with the deletion of 11 lots that would have affected the eastern colony of Lyon's pentachaeta, and reconfiguration of a cul-de-sac within the preserve area for Lyon's pentachaeta to further reduce direct effects."

The total surplus that would have been generated from these 11 lots is $5,533,841, or $295,713 per developed acre.

IV.1.3 Unit 1C

This subunit is located in western Simi Valley near the Wood Ranch Reservoir and consists of roughly 50 acres of private land and less than 1 acre of local agency land belonging to the Calleguas Municipal Water District.[28] The Water District has no plans for their land and the listing and proposed rule will not impose any incremental costs on the District.[29]

A section of the private land along the eastern side of the unit falls within the city of Simi Valley. It is part of the Wood Ranch development and is entirely contained within one developed plot that cannot be subdivided. According to city personnel, the portion of the plot that falls within the proposed habitat has been developed as an avocado grove.[30]

The remainder of the private land in the unit is primarily in Thousand Oaks, with a small portion in unincorporated Ventura County, and is slated for future development.

Based on SCAG forecasts and urban growth modeling, 41 new homes are predicted within the subunit. The estimated price for each home is $835,000. Total expected surplus from housing development within this subunit of critical habitat is $18,718,650 or $513,965 per developed acre.

Current zoning restrictions allow for a maximum of 9 new homes to be built within this subunit. In the event that zoning restrictions are binding, these units will result in $4,088,514 in surplus.

IV.1.4 Unit 1D

This subunit consists of 106 acres of private land adjacent to the Ronald Reagan National Library in western Simi Valley.[31] The southern and eastern portions of the unit fall within the City of Simi Valley and the rest of the unit is in an unincorporated portion of Ventura County.[32] Using SCAG forecasts and urban growth modeling, 65 new homes are predicted within the subunit. These homes will have an estimated value of approximately

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[28] See appendix for additional visual aides.

[29] Personal communication with Eric Bergh, Manager of Resources, Calleguas Municipal Water District, March 2, 2006.

[30] Personal communication with Sam Freed, Senior Planner, Simi Valley Department of Environmental Services, March 7, 2006.

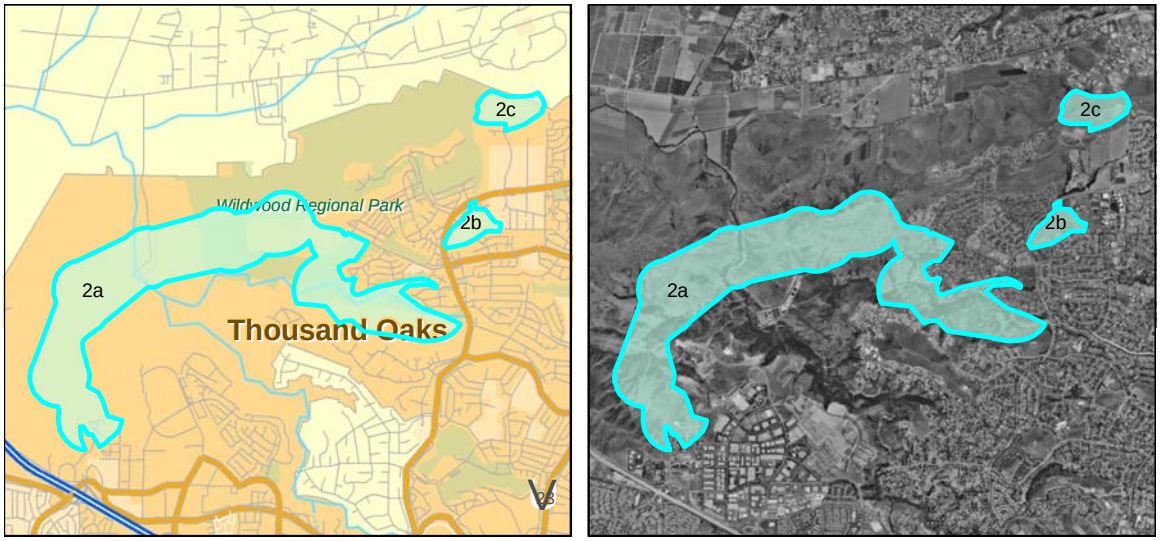
[31] See appendix for additional visual aides.

[32] See appendix for additional visual aides.

$800,000 each. Total expected surplus from housing development within this subunit of critical habitat is $28,282,671 or $705,346 per developed acre.

While the subunit does not overlap with the existing footprint of the Reagan National Library, the Library has expressed an interest in constructing a parking facility near the current premises. The Library stated it would relocate the facility in the event it conflicted with critical habitat.[33]

IV.2 UNIT 2



IV.2.1 Unit 2A

This subunit consists of 1,037 acres of local agency land (Lynmere, Wildwood Park, and Mount Clef Ridge) designated as open space and owned by COSCA and Conejo Recreation and Parks District, and 159 acres of private land.[34] The private land belongs to the 7th Day Adventists Church. The land is zoned for several uses, including the construction of a restaurant, school, and retirement housing.[35] Using SCAG projections for growth, 76 new homes are predicted within the subunit. Total expected surplus from housing development within this subunit of critical habitat is $37,658,436 or $2,023,278 per developed acre.

IV.2.2 Unit 2B

This subunit consists of 31 acres of local agency land designated as open space and owned by COSCA and 16 acres of private land.[36] A portion of the private land is owned by California Lutheran University (CLU). CLU included in their 1998 Master Plan a

[33] Personal communication with Joanne Drake, Chief of Staff, Office of Ronald Reagan, March 7, 2006.

[34] See appendix for additional visual aides.

[35] Personal communication with John Prescott, Community Development Manager, City of Thousand Oaks, March 3, 2006.

[36] See appendix for additional visual aides.

proposal to build faculty and affordable housing within their portion of the subunit. If CLU is unable to build their proposed project on the land in subunit 2B, CLU has another potential site on their north campus. The impacts will be estimated as the cost to move the project to the CLU north campus. CLU staff estimates the major costs will include the widening of Mountclef Boulevard, installation of all utilities on the site, and the lost rent of proposed soccer fields. The total cost of moving the project is currently projected at approximately $1.96 million.

The owner of the remaining private land has designated a large portion of their land as preserved open space and has been approved by the city to construct one new home on the remaining land near Olsen Road. The project has been permitted by the city and there was no pentachaeta found in the development area. Thus, there would be no future cost attributable to the listing or proposed rule.

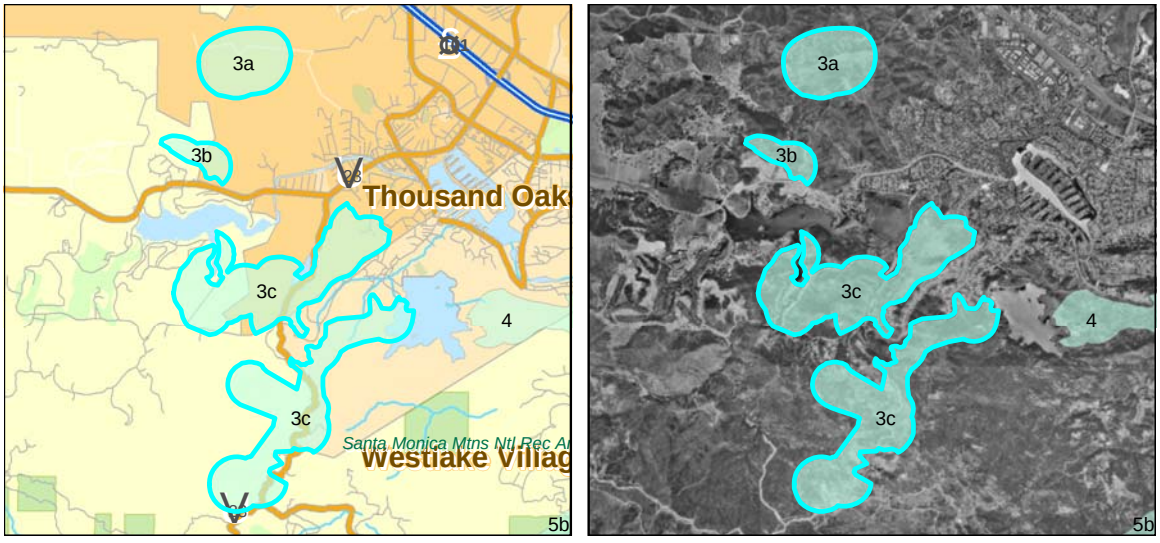
IV.2.3 Unit 2C

This subunit consists of 11 acres of local agency land designated as open space and owned by COSCA and 63 acres of private land, primarily owned by CLU.[37] CLU has designated their land as preserved open space and predicts no incremental cost from the listing or proposed rule. The remaining acres of private land are identified by the city of Thousand Oaks as being slated for development.

Using SCAG projections and urban growth modeling, 8 new homes are predicted within the subunit. Total expected surplus from housing development within this subunit of critical habitat is $7,332,711 or $549,761 per developed acre.

Current zoning would restrict the development to 4 houses. In the event that zoning restrictions are binding, producer surplus would total $3,677,137.

IV.3 Unit 3



[37] See appendix for additional visual aides.

IV.3.1 Unit 3A

This subunit is located north of Lake Sherwood and consists of 150 acres of local agency land designated as open space owned by COSCA, and 86 acres of private land.[38] Based on SCAG forecasts and urban growth modeling, 12 new homes are predicted within the 86 acres of private land in the subunit. Their estimated value is $1.5 million per home. Total expected surplus from housing development within this subunit of critical habitat is $12,428,368 or $1,794,195 per developed acre.

In the event that development conforms to zoning over the next 20 years, at least 4 homes would be built in this subunit. Approximately 5 acres are zoned as hillside planned development, and an additional 66 acres are unzoned. According to the Thousand Oaks Planning Department, permissible densities for hillside development vary inversely with slope. For the areas in question, the slope varies between 20% and 30%, and allowable densities range from .4 to 1.2 dwelling units per acre.

IV.3.2 Unit 3B

This subunit is located on the north side of Lake Sherwood and consists of 34 acres of local agency land owned by COSCA, and 41 acres of private land.[39] The 41 acres are modeled to support construction of 7 new homes that will be valued at slightly over $1.5 million. Total expected surplus from housing development within this subunit of critical habitat is $7,722,743 or $2,113,208 per developed acre.

IV.3.3 Unit 3C

This subunit is located south of Lake Sherwood and consists of 548 acres of local agency land designated as open space owned by COSCA, and 611 acres of private land. All but a small section of the private land has been preserved as open space or falls within a census tract where SCAG predicts zero growth over the next 20 years.

The remaining portion of the subunit is developable. Using SCAG forecasts and urban growth modeling, 8 new homes are predicted within the subunit at a value of approximately $1.7 million each. Total expected surplus from housing development within this subunit of critical habitat is $5,067,003 or $1,826,572 per developed acre.[40]

In the event that development conforms to zoning over the next 20 years, approximately 11 homes would be built in this subunit; 20 acres are zoned for .1 dwellings per acre, 20 acres are zoned for .4 dwellings per acre, and .3 acres are zoned for 1.8 units/acre.

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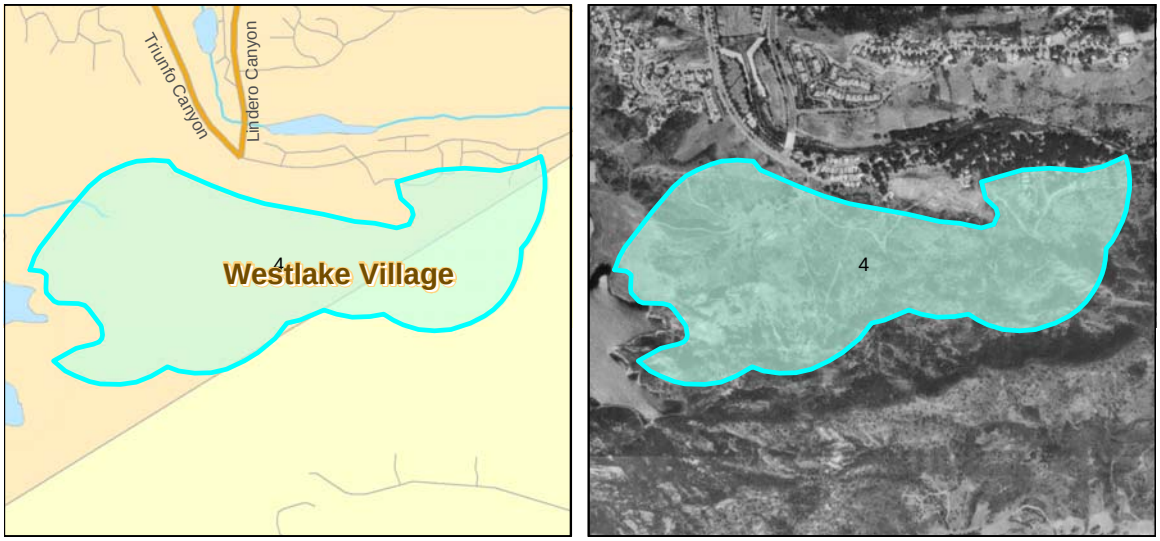
[38] See appendix for additional visual aides.

[39] See appendix for additional visual aides.

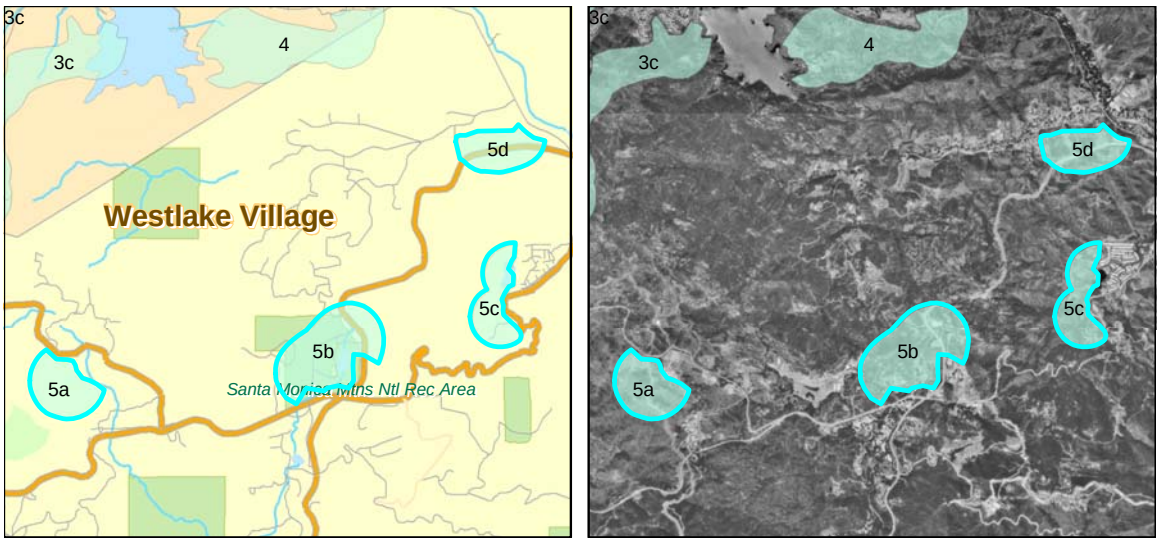
[40] Under the Thousand Oaks General Plan, a maximum of 11 homes could be built within critical habitat. This constraint is assumed to be nonbinding.

IV.4 UNIT 4



This unit is located in Westlake Village and in an unincorporated portion of Los Angeles County. It consists of 223 acres of local agency land (Mountains Recreation and Conservation Authority and Las Virgenes Metropolitan Water District), and 13 acres of private land. The Water District does not have any plans for facility improvements in the proposed habitat area. The District could not estimate any costs attributable to the listing or proposed rule.[41] The private land is part of a subdivision within the city of Westlake Village and city personnel have stated that the property can not be further developed.[42]

IV.5 UNIT 5



[41] Personal communication from Eugene Talmadge, Planning Administrator, Las Virgenes Municipal Water District, March 8, 2006.

[42] Personal communication with Scott Wolf, Assistant Planner, Westlake Village Planning Department, March 7, 2006.

IV.5.1 Unit 5A

This subunit consists of 82 acres of private land along the south side of Mulholland Drive. CRA analysis, relying on SCAG projections for household growth, predicts less than one house will be built in the subunit over the next 20 years Thus, we predict the listing and proposed rule will have minimal incremental cost. CRA is unaware of any proposed development projects in this subunit that are not reflected in SCAG data.

IV.5.2 Unit 5B

This subunit consists of 116 acres of Federal land (Santa Monica Mountains National Recreation Area) in Rocky Oaks Park and 47 acres of private land on the west side of Kanan Road. CRA analysis, relying on SCAG projections for household growth, predicts less than one house will be built in the subunit over the next 20 years. Thus, we predict the listing and proposed rule will have minimal incremental cost. CRA is unaware of any proposed development projects in this subunit that are not reflected in SCAG data.

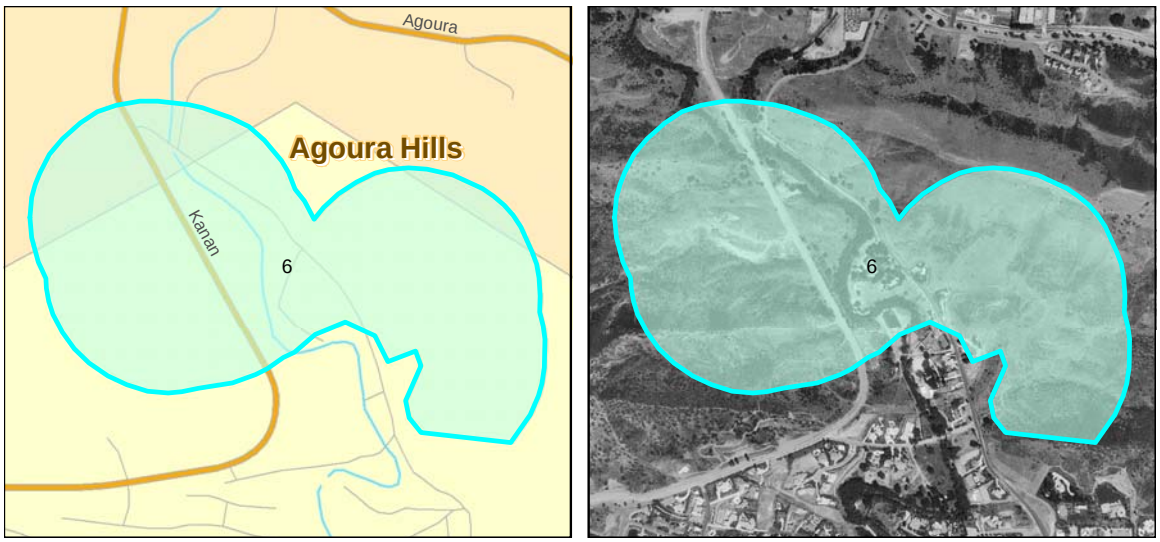
IV.5.3 Unit 5C

This subunit consists of 78 acres of private land designated as open space and managed by Santa Monica Mountains Conservancy on Mulholland Drive. Conservancy personnel have stated that the listing and proposed rule will have no incremental cost.

IV.5.4 Unit 5D

This subunit consists of 73 acres of private land on Kanan Road. CRA analysis, relying on SCAG projections for household growth, predicts less than one house will be built in the subunit over the next 20 years. Thus, we predict the listing and proposed rule will have minimal incremental cost. CRA is unaware of any proposed development projects in this subunit that are not reflected in SCAG data.

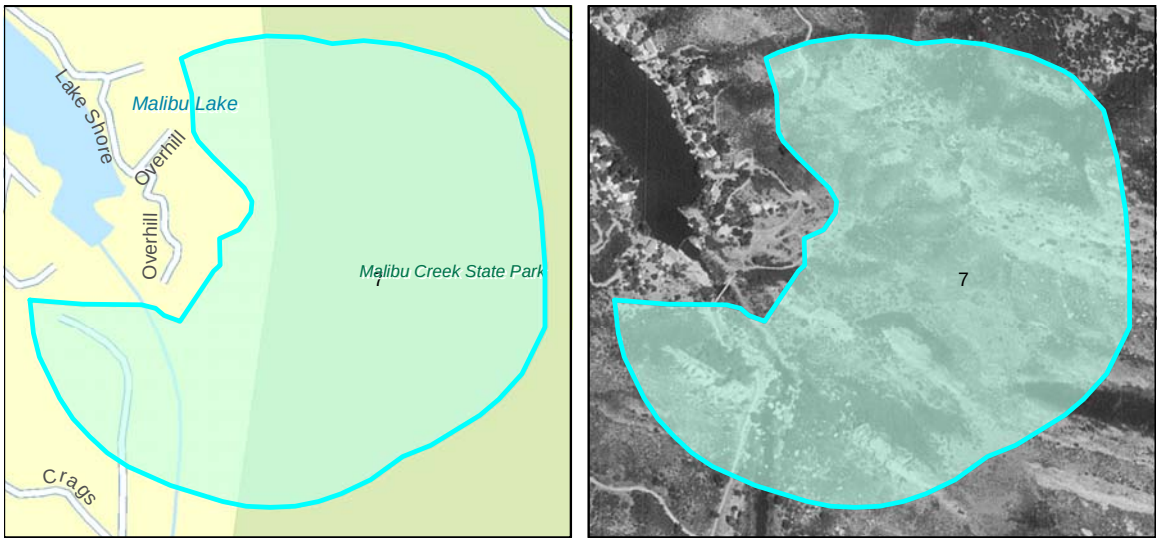
IV.6 Unit 6



This unit is located in the Santa Monica Mountains in Los Angeles County and consists of 233 acres of private land. Although SCAG forecasts show negligible development in this area over the next 20 years, a 320 acre development, 180 acres of which is within this

unit, has been proposed. The developer has proposed creating 81 lots, 78 of which would be within the proposed habitat boundaries. The developer has estimated the value of the lots at $1 million each.[43] Additionally the developer has estimated redesign costs to be over $2.5 million.

IV.7 UNIT 7



This unit is located in the Santa Monica Mountains in Los Angeles County and consists of 67 acres of state land (Malibu Creek State Park) and 35 acres of private land. The private land is part of the Malibu Lake Mountain Club and is a preserved recreation area.

IV.8 UNCERTAINTY REGARDING REGULATORY IMPACTS

The analysis in the preceding sections has quantified the total economic surplus resulting from land development activities within critical habitat. There is considerable uncertainty regarding how the designation of critical habitat will ultimately influence this level of surplus. Accordingly, there is uncertainty about the marginal economic impacts of critical habitat designation for the pentachaeta.

Factors that will influence how critical habitat will affect future surplus from development include how the Gifford Pinchot decision will be applied to critical habitat, where the plant is actually located within units of critical habitat, the timing of land development (which is important for discounting and measurement of annual impacts), and the sparse consultation history relating to the species.

However, based on the limited information on regulatory treatment contained in the available consultations, it appears that total avoidance of the plant is a possible outcome. For example, the 1999 consultation with Lennar Homes referred to above resulted in over 97 percent avoidance of the pentachaeta.

[43] Personal communication from Paul Weiland, Sage Community Group, March 3, 2006.

If total avoidance is the regulatory outcome, then the development surplus measures presented in the preceding sections are an accurate measure of the economic impacts of critical habitat designation. There are two basic components to the surplus calculations: returns to the landowner and developer profits.[44] Land is a fixed asset and if land is rendered undevelopable as a result of critical habitat, then its price will be reduced to just a salvage value. Similarly, development opportunities are highly limited in Southern California. The latest State of California Statewide Housing Plan Update reports that Los Angeles and Orange Counties will run out of developable vacant land by 2010, and San Diego and Ventura Counties will run low on developable land by 2020.[45] Recent econometric evidence on the supply of new housing suggests that the elasticity of supply in California metropolitan areas is among the lowest in the nation, with supply elasticities not significantly different from zero.[46] This finding suggests that the supply of housing is nearly exogenous in the study area, and is most likely heavily influenced by local regulation.[47]

V REGIONAL ECONOMIC IMPACTS

The distributional effects of critical habitat designation are examined using IMPLAN Economic Modeling Software.[48] The IMPLAN Model is a widely used tool for analysis of economic events such as a change in industrial output. IMPLAN was developed by the U.S. Forest Service, which continues to use it today, and is now also used by 1,500 agencies and companies, including the San Diego Association of Governments, the California Energy Commission, the California Departments of Finance, Transportation, Water Resources, and Labor and Employment, San Diego State University, Stanford, U.C. Berkeley, and numerous private consulting companies.[49]

The core of IMPLAN is an input-output model. This type of model traces the "multiplier effect" of an industry making purchases from other industries.[50] The economy is

[44] The analysis implicitly assumes that there are no consumer losses from critical habitat. This assumption is consistent with the observation that the area of critical habitat for the pentachaeta is small, and changes in development within critical habitat are unlikely to have measurable market effects on housing prices. This assumption is equivalent to a specification of perfectly elastic demand for housing within critical habitat, or an assumption that consumers have an abundance of substitute locations to choose from.

[45] *Raising the Roof: California Housing Projections and Constraints, 1997-2020*, California Department of Housing & Community Development, May 2000.

[46] Richard Green, Stephen Malpezzi and Stephen Mayo, "Metropolitan-Specific Estimates of the Price Elasticity of Housing, and Their Sources," *American Economic Review* (May 2005): 334-339.

[47] John Quigley and Steven Raphael, "Regulation and the High Cost of Housing in California," *American Economic Review* (May 2005): 323-328; David Sunding and Aaron Swoboda, "Rationing in the Market for New Housing," April 2005.

[48] MIG, Inc., IMPLAN Professional Version v.2.0.1024, 1997-2006.

[49] http://www.implan.com/references.html

[50] For a detailed discussion of this modeling method see, Ronald Miller and Peter Blair, *Input Output Analysis, Foundations and Extensions*, New Jersey: Prentice Hall.

described by 509 IMPLAN industry sectors, which are based on the North American Industry Classification System (NAICS) and the Bureau of Economic Analysis (BEA) commodity classifications. "Direct effects" are the changes in final demand being modeled (the goods and services produced or purchased from an industry). "Indirect effects" estimate inter-industry purchases. Regional purchase coefficients are used to estimate the proportion of inter-industry purchases occurring within the study area. In addition to the interactions between the 509 IMPLAN industries, "induced effects" estimate the impact of household spending caused by the change in final demand.[51] In the table and discussion that follow, the sum of indirect and induced effects are referred to as secondary effects.

According to the IMPLAN model, one dollar in revenue in the new residential home construction sector (Sector 33) causes $0.86 in secondary impacts. The building costs per acre of development in Los Angeles, Orange, and Ventura counties were estimated as part of the welfare analysis. These costs are input as revenue to new residential home construction in IMPLAN.[52] The construction revenue associated with development is $83 million, and this in turn results in $71 million in secondary impacts. The 509 IMPLAN sectors are aggregated by 2-digit NAICS code. The distributional effects are described in Table 4: IMPLAN Analysis.

VI SECONDARY ECONOMIC EFFECTS

Federal guidelines require additional analysis of potential effects on the energy industry and small businesses.

VI.1 IMPACTS ON THE ENERGY INDUSTRY

Pursuant to Executive Order 13211, Federal agencies are required to submit a summary of the potential effects of regulatory actions on the supply, distribution, and use of energy, assuming those actions meet certain criteria outlined by the OMB:[53]

- Reductions in crude oil supply in excess of 10,000 barrels per day;
- Reductions in fuel production in excess of 4,000 barrels per day;
- Reductions in coal production in excess of 5 million tons per year;
- Reductions in natural gas production in excess of 25 million mcf per year;

[51] Direct impacts – the revenue in the construction sector – and indirect impacts –the purchases made by the construction sector and other businesses – are captured in the standard input-output model. Induced impacts – purchases by employees of the construction firms and indirect businesses – are captured when the model is "closed" with respect to households. The version of IMPLAN used here is closed.

[52] For simplicity, costs were annualized by dividing total costs by 20. Development may occur throughout the twenty-year timeframe. The total change in building costs divided by 20 is the average annual revenue to new home construction.

[53] U.S. Office of Management and Budget, "Memorandum for Heads of Executive Departments and Agencies, and Independent Regulatory Agencies," July 13, 2001.

- Reductions in electricity production in excess of 1 billion kilowatt-hours per year or in excess of 500 megawatts of installed capacity;
- Increases in energy use required by the regulatory action that exceed any of the thresholds above;
- Increases in the cost of energy production in excess of one percent;
- Increases in the cost of energy distribution in excess of one percent; or
- Other similarly adverse outcomes.

No present or planned power generation facilities are located within the area of proposed critical habitat.

VI.2 IMPACTS ON SMALL BUSINESSES

According to the Regulatory Flexibility Act, as amended by the Small Business Regulatory Enforcement Fairness Act, Federal agencies must determine if proposed legislation will have a "significant economic impact on a substantial number of small entities."[54] There is virtually no consultation for this species relevant to private development. As a result, the analysis in this section is predicated on the worst-case assumption that the presence of the pentachaeta results in total avoidance within the area of critical habitat. In the event that conservation is achieved without requiring developers to completely avoid critical habitat, impacts on small businesses will be lower.

This analysis employs a methodology used by Industrial Economics to estimate the potential impact to small construction firms for critical habitat designation of the thread-leaved brodiaea.[55] Because the brodiaea designation occurred in a similar area of Southern California, its assumptions concerning development by small businesses can be cross-applied to this analysis.

To estimate the number of firms potentially affected, this analysis uses the following steps. First, it calculates the number of homes built by small businesses annually. Average annual revenues for a small construction firm are $694,000 annually.[56] The mean new home price for the study area of this analysis is approximately $920,000. Small construction firms are assumed to build one new home per year.

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[54] EPA, "Revised Interim Guidance for EPA Rulewriters: Regulatory Flexibility Act as Amended by the Small Business Regulatory Enforcement Fairness Act," 29 March 1999, p.11.

[55] Industrial Economics, "Final Economic Analysis of Critical Habitat Designation For The Thread-Leaved Brodiaea," November 16, 2005.

[56] Average annual revenues for small firms classified under NAICS code 236115 "New Single-Family Housing Construction (except Operative Builders)." Note that RMA reports annual sales for size classes zero to $1 million, $1 to $3 million, $3 to $5 million, $5 to $10 million, and $25 million and over. Entities classified under this NAICS code are small if they have annual revenues under $28 million annually. This analysis estimates average annual sales for small businesses using data for size classes up to $25 million in sales. As a result, it understates actual average annual revenues. (The Risk Management Association (RMA), Annual Statement Studies: Financial Ratio Benchmarks, 2004-2005, p. 177.)

Second, it calculates the portion of new home construction discussed in section IV that would be undertaken by small businesses. Prior analysis of permitting data in Sacramento County found that 22% of building permits for single family dwellings were issued to builders which were classified as small businesses.[57] A total of 222 new homes are projected to be built within critical habitat over the next 20 years. Accordingly, 49 are projected to be built by small businesses.

Since each firm builds one home per year, 49 small firms are potentially affected over the 20-year timeframe of this analysis, approximately five firms every two years.

[57] CRA International, "Economic Impacts of Critical Habitat Designation for Vernal Pool Species," June 20, 2005, p. 110.

Table 1: Results of Modeling Analysis

Name	Unit	Projected Households	Acres of CH	Mean New Home Price	Mean Square Feet	Surplus Per Home	Total Surplus Within CH	Surplus Per Developed Acre
Simi Valley	1a	9	282.7	$830,346	3,078	$445,669	$4,001,885	$2,038,883
Simi Valley	1c	41	50.0	$834,431	3,042	$454,279	$18,718,650	$513,965
Simi Valley	1d	65	106.3	$798,119	2,863	$433,987	$28,282,671	$705,346
Montclef Ridge	2a	76	1,195.1	$846,353	2,716	$498,728	$37,658,436	$2,023,278
Montclef Ridge	2c	8	73.3	$1,361,509	3,610	$919,284	$7,332,711	$549,761
Thousand Oaks	3a	12	235.4	$1,499,914	3,537	$1,066,627	$12,428,368	$1,794,195
Thousand Oaks	3b	7	75.1	$1,569,015	3,897	$1,098,583	$7,722,743	$2,113,208
Thousand Oaks	3c	4	1,157.1	$1,697,562	4,332	$1,187,440	$5,067,003	$1,826,572
Total		222	3,175				$121,212,468	

Sources:

1. SCAG forecasts
2. CURBA urban growth model

Table 2: Annualized Results of Modeling Analysis

Name	Unit	Annualized Surplus Within CH (3%)	Annualized Surplus Per Developed Acre (3%)	Annualized Surplus Within CH (7%)	Annualized Surplus Per Developed Acre (7%)
Simi Valley	1a	$261,155	$133,053	$353,037	$179,866
Simi Valley	1c	$1,221,541	$33,540	$1,651,316	$45,341
Simi Valley	1d	$1,845,670	$46,029	$2,495,032	$62,224
Montclef Ridge	2a	$2,457,513	$132,035	$3,322,140	$178,489
Montclef Ridge	2c	$478,518	$35,876	$646,875	$48,499
Thousand Oaks	3a	$811,050	$117,086	$1,096,402	$158,280
Thousand Oaks	3b	$503,971	$137,904	$681,283	$186,422
Thousand Oaks	3c	$330,662	$119,198	$446,999	$161,136
Total		$7,910,079		$10,693,084	

Table 3: Zoning Allowances

Name	Unit	Households Allowed by Zoning	Total Surplus Within CH	Surplus Per Developed Acre
Simi Valley	1c	9	$4,088,514	$513,965
Montclef Ridge	2c	4	$3,677,137	$549,761
Thousand Oaks	3a	4	$4,266,507	$853,301
Thousand Oaks	3c	11	$13,061,836	$326,546
Total		28	$7,765,652	

Table 4: IMPLAN Analysis

Industry	Study Area Data: Industry Output	Model Results: Direct Effects	Model Results: Secondary Effects
11 Ag, Forestry, Fish & Hunting	$1,993,879,000	$0	$101,018
21 Mining	$3,035,610,000	$0	$202,137
22 Utilities	$12,287,892,000	$0	$1,051,405
23 Construction	$43,944,429,000	$83,157,335	$355,924
31-33 Manufacturing	$178,154,345,000	$0	$10,171,531
42 Wholesale Trade	$51,790,672,000	$0	$6,394,354
48-49 Transportation & Warehousing	$30,933,625,000	$0	$3,378,174
44-45 Retail trade	$51,050,228,000	$0	$12,039,689
51 Information	$70,968,158,000	$0	$2,151,221
52 Finance & insurance	$71,164,040,000	$0	$5,503,276
53 Real estate & rental	$78,821,253,000	$0	$3,778,408
54 Professional- scientific & tech svcs	$64,508,959,000	$0	$5,757,737
55 Management of companies	$18,226,711,000	$0	$1,089,368
56 Administrative & waste services	$27,985,650,000	$0	$2,299,384
61 Educational svcs	$7,395,382,000	$0	$681,623
62 Health & social services	$46,877,961,000	$0	$4,755,961
71 Arts- entertainment & recreation	$20,602,660,000	$0	$767,176
72 Accomodation & food services	$23,388,714,000	$0	$2,186,349
81 Other services	$27,108,559,000	$0	$2,513,206
92 Government & non NAICs	$97,258,922,000	$0	$5,935,704
Total	$927,497,649,000	$83,157,335	$71,113,648

Source: IMPLAN model.