



The Spatial History Project

[Publications](#) > [Table of Contents](#) > [Bay Area Conservation and Development](#)Spatial History Project online publication 15 July 2009 | doi: [10.1215/00141801-122009001](#); Received 15 June 2009; Accepted 30 June 2009; Published online 15 July 2009

Bay Area Conservation and Development

Carrie Denning¹ & Jon Christensen²

1. Stanford University Spatial History Lab, Research Assistant
2. Stanford University Spatial History Project, Associate Director

This study examines regional land-use questions in the Silicon Valley, and more broadly in the Bay Area, through the historical analysis of open space conservation and urban development trends. Our research began by analyzing larger historical conservation and development trends in the Bay Area. Drawing from our findings, we then created a counterfactual map using GIS and focused our research question on a “what if” proposition—what would have happened to the currently preserved lands in the Silicon Valley had they been developed. The results of this study are currently in review.

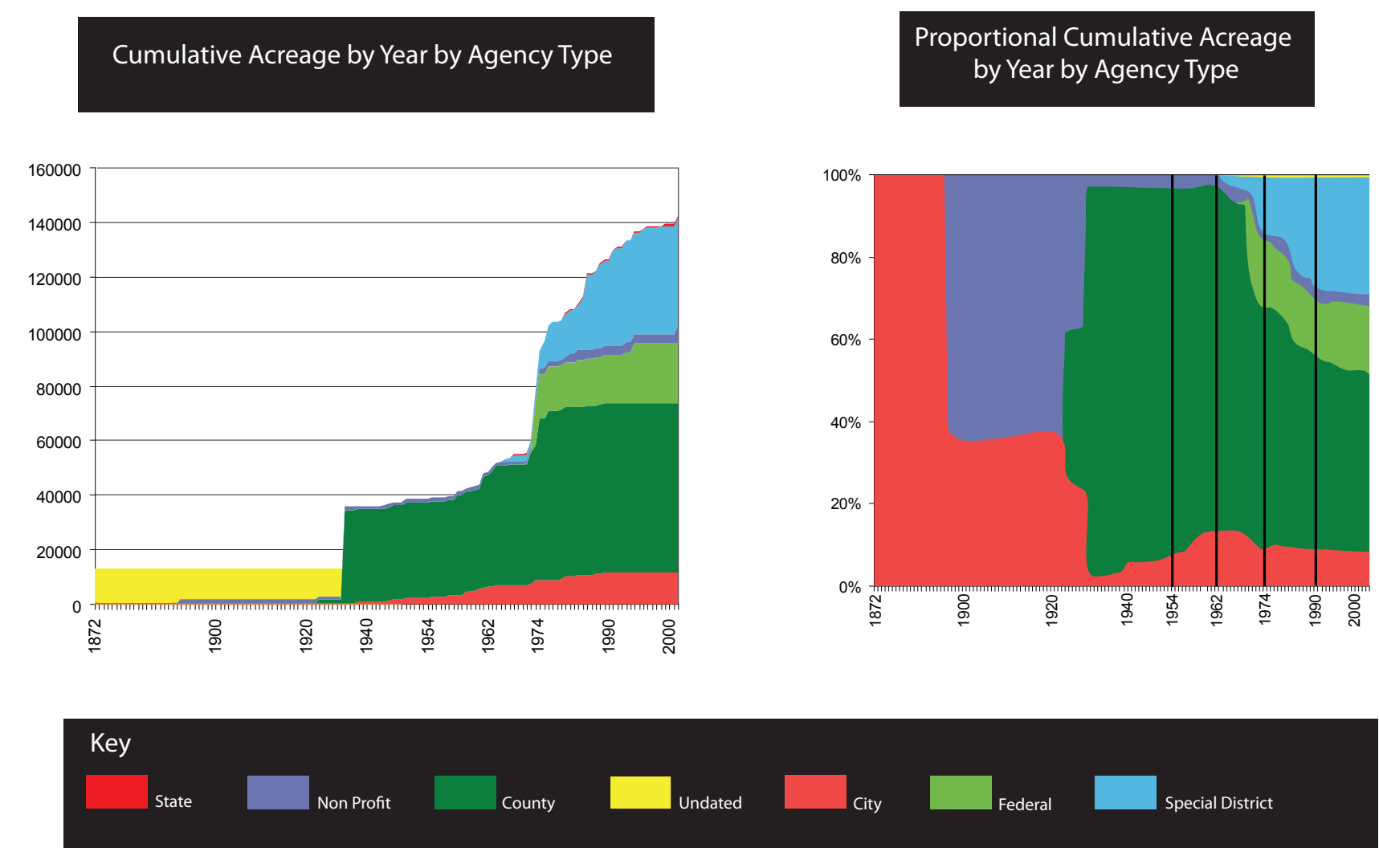
Currently, there is a contentious debate in the Bay Area between developers and conservationists. While conservationists pride themselves with the acquisition of large tracts of preserved open spaces, homebuilders and developers believe that excessive conservation has lead to a reduction of viable land for housing, resulting in higher housing prices^{1, 2, 3}. Several other studies have noted that conservation raises local land prices⁴ and has led to sprawl⁵. Other academic studies, however, have noted that conservation is just one of many factors that influences development, and in some cases, conservation actually triggers development as opposed to limiting its reach⁶. In order to answer this question, we supplied an alternative hypothesis, that open space parcels in the Silicon Valley would have actually seen low density development, as the largest protected sites are either too hilly or considered too wet to support dense, affordable development.

Historical Overview

Unlike many predictive models that have been used for this kind of research, our study benefits from a rich, historical dataset. Our data is built upon a dataset of conserved parcel shapefiles provided by the GreenInfo Network. However, this database did not record the date when most of the parcels were conserved. As a result, we have researched the acquisition dates for thousands of parcels from a wide variety of sources in order to document when property passed from private hands into the control of one of five agencies: state, county, federal government, non-profit, and special district. Our study examined protected parcels in the Silicon Valley, a watershed that drains into the Bay from South Bruno through San Jose. Using data from the GreenInfo Network (2008). We succeeded in documenting an acquisition date for 87% of the conserved parcels in Silicon Valley, which accounts for 98.8% of the 1.07 million acres conserved in the region.

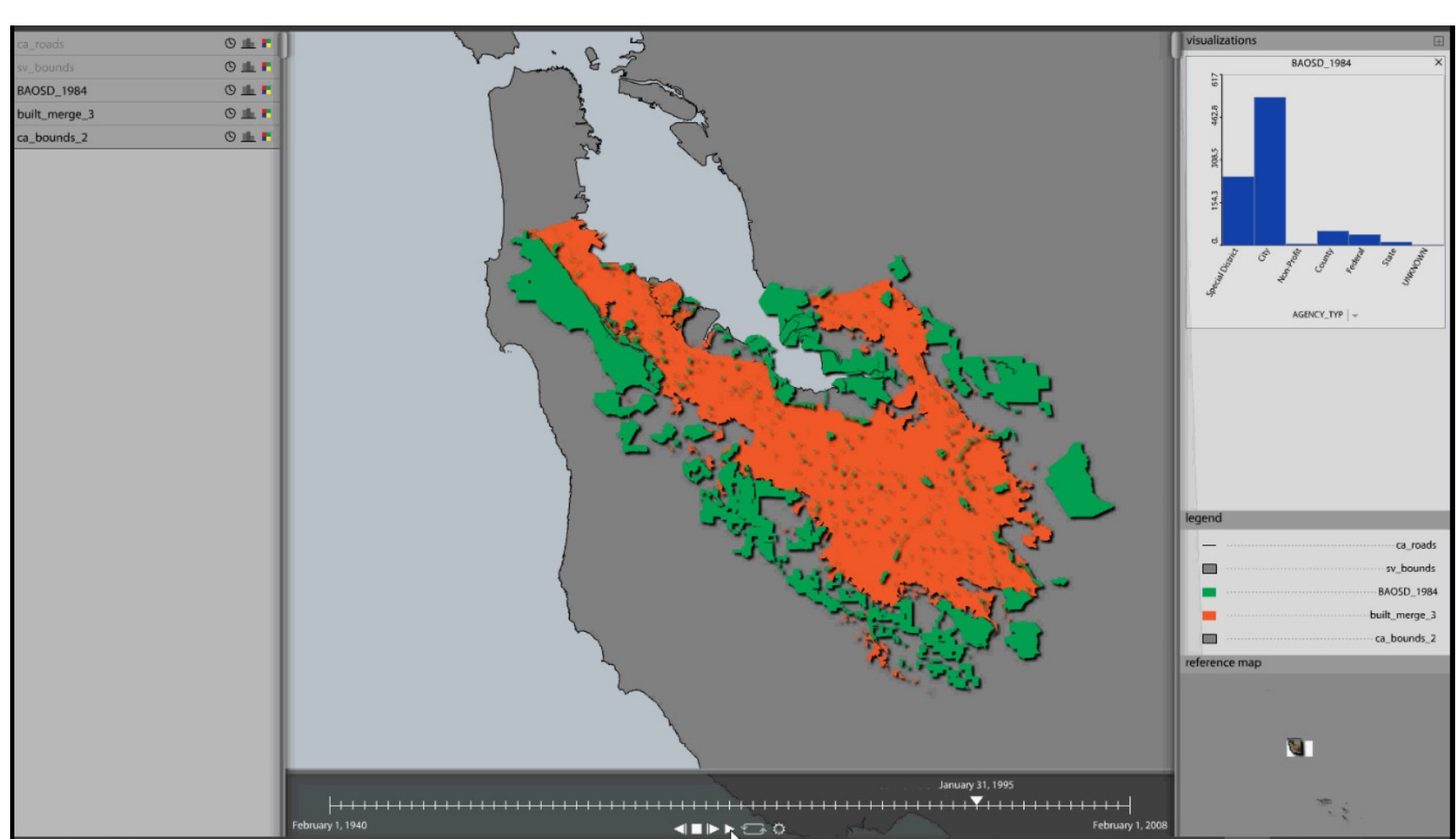
Our database also contains the parcel name, acreage, accessibility, year of acquisition, agency name, and agency type. This has allowed us to construct several visualizations displaying conservation trends in the Silicon, over time. These graphs reveal the change in conservation ownership and agency activity during the rapid period of metropolitan growth in this region after World War II. This first histogram illustrates trends in conservation throughout the Silicon Valley based on agency type. Initially, many parcels were acquired by county agencies, while nonprofits, cities, special districts, and federal acquisitions grew in importance later and were very substantial in terms of acreage and significance of conservation.

Figure 1. Cumulative acreages chronologically by agency type.

[High resolution image \(.JPG\)](#) [Underlying data \(.CSV\)](#)

The intricacies of conservation are important, but the combination of this historical database along with corresponding development trends answer important questions as to the changes in conservation acquisitions, agencies involved, and concurrent urban growth during this very active post-war period. The periods of conservation that we are examining correspond to periods for which we have data and maps of development, which were created by digitizing USGS 1:15000 Topographic Quadrangles for the years 1947/8, 1961, and 1972, and from the California Farmland Mapping and Monitoring Project's digital maps for 1984, 1994, and 2004. When the conservation and development layers are combined, the map shows the spatial pattern of both processes from 1940 to the present, allowing for a very detailed analysis of actual conservation and development trends. While there was conservation activity mainly for water resource protection during the pre-war era, the impetus to conserve open space began in earnest in the 1960's, first with civic activism to save the foothills, and then following these successes, Save the Bay began to conserve parcels along the water⁷.

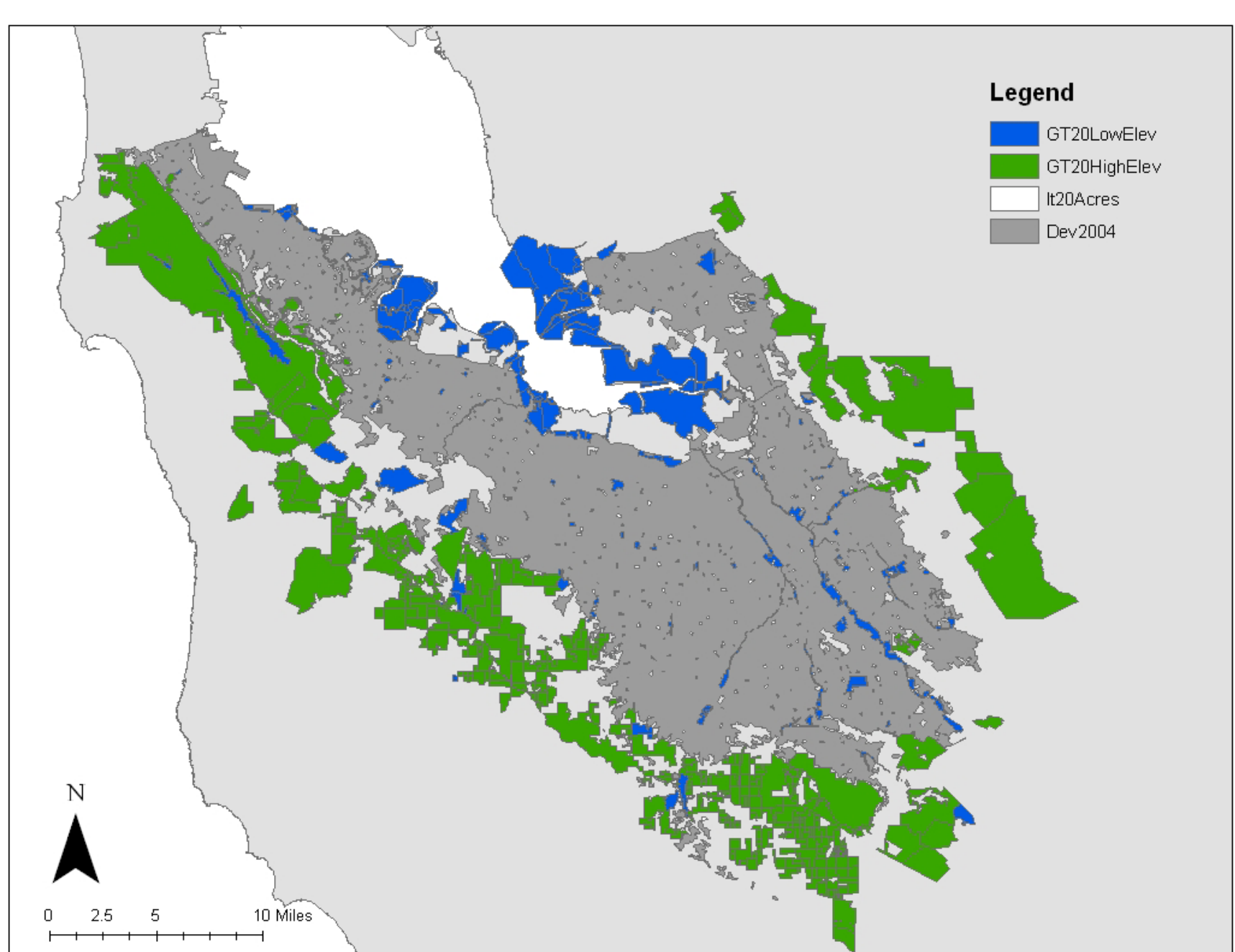
Figure 2. Built and conserved areas from 1940 to 2008.

[Video clip \(26,522K\)](#) [Small multiples \(.PDF\)](#) [Underlying data \(.CSV\)](#)

Counterfactual

Based on the information compiled through the larger, historical analysis of conservation trends, we were able to divide our conserved parcels into three distinct categories in order to do our analysis of what would have happened to these lands had they not been conserved. These parcels included a range of open spaces, from municipal parks to large, state-owned preserves. We then subdivided the protected lands into three groups: parcels larger than 8 ha that are higher than 100m in elevation, usually hilly sites with steep slopes; parcels larger than 8 ha that are lower than 100m, usually wetland parcels closer to the Bay; and lastly, small parcels less than 8 ha, generally urban parks.

Figure 3. Three conserved parcel types.

[High resolution image \(.JPG\)](#) [Underlying data \(.CSV\)](#)

Using housing density information from the Wildland-Urban Interface dataset⁸, we tested the probability of development and predicted housing densities on these conserved lands using six different explanatory variables. Our potential explanatory variables were chosen based on our historical analysis and three different parcel types, which revealed that topography and hydrology were important factors for conservation efforts. Drawing from this assumption and from previous work on urban growth drivers in Silicon Valley⁹, we assembled information on 6 explanatory variables: slope, wetland status, distance to stream, distance to highways, distance to railroads, and the distance to historical urban centers. The probability of being developed was estimated using a logistic regression. We then used a linear regression to determine predicted densities for those developable sites. The results from this study will soon be released, and we aim to touch upon both the predicted development, but also briefly analyze the cost of the homes that would have potentially been developed.

Conclusion

Our aim is to conclude that conservation had little impact on housing in the Silicon Valley, and that any development that would have occurred on conserved parcels, had they not been protected, would have resulted in very low density development. Moving beyond this analysis, our study would also like to argue that many factors shape local urban growth patterns, including hydrology, topography, transportation corridors, and the proximity to historical urban centers. The combination of these factors is a much more telling marker of the probability of development and subsequent housing densities than land protection alone. The findings from our study will hopefully lead to a more in depth understanding of the interplay between conservation and development, revealing that it is just one of several factors that influences urban growth in a region.

Endnotes

Viverra, orci augue laoreet neque, vitae volutpat tortor nibh sed risus. Morbi congue ultricies lectus vel sollicitudin. Ut sit amet lectus neque, in malesuada ligula. Vivamus varius tortor et odio cursus vel feugiat quam congue. Aliquam volutpat rutrum cursus. Vestibulum blandit sollicitudin mattis. Quisque sed nibh sapien. For more information please contact Carrie Denning at cdenning@stanford.edu.

¹ Fimrite, P., 2005. Bay Area's open space tight rope. San Francisco Chronicle, June, A17.

² McCabe, M., 2001. Keeping it open: conservationists gaining ground on developers in the Bay Area. San Francisco Chronicle, July, A13.

³ McHugh, P., 2003. Preserving open spaces: wildlife habitat focus of push. San Francisco Chronicle, October, C11.

⁴ Armsworth, P.R., Daily, G.C., Kareiva, P., and Sanchirico, J.N., 2006. Land market feedbacks can undermine biodiversity conservation. Proceedings of the National Academy of Sciences of the United States of America 103, 5403-5408.

⁵ Bruegmann, R., 2001. Sprawl: a compact history, University of Chicago Press, Chicago.

⁶ Conway, T.M., and Lathrop, R.G. Jr., 2005. Modeling the ecological consequences of land-use policies in an urbanizing region. Environmental Management 35, 278-291.

⁷ Walker, R., 2007. The country in the city, University of Washington Press, Seattle.

⁸ Radeloff et al., 2005

⁹ Reilly, in review