TRACK 4: HOUSING

# AFFORDABLE OVERNIGHT LODGING IN HIGH-COST, HIGH-NEED COASTAL ENVIRONMENTS

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**INTRODUCTION**

Over the past 40 years, one of the strongest dialogues in the West has been the call to protect environmental resources, particularly access to the coastal environment. For example, in the mid-1970s the State of California created the Coastal Commission / Conservancy to protect, restore, and provide public access to California's world-renowned coastal environment and marine resources. The California Coastal Commission ("CCC") oversees all coastal development, manages habitat restoration and protection, and governs natural resource use.

Coastal areas Section 30213 of the California Coastal Act (Division 20 of the California Public Resources Code) requires the CCC to protect, encourage, and, where feasible, provide for lower cost overnight visitor accommodations ("LCOVA") along the State's coast. As a mitigation measure per Section 30213, the CCC typically requires hotel and other development projects to include LCOVA facilities on-site, off-site, or pay an in-lieu fee. Despite such measures, the market has produced few LCOVA facilities along the California coastline. The supply of LCOVA facilities has not kept pace with demand, and as a result, coastal lodging facilities remain unaffordable to many Californians.

Section 31104.1, Division 21 of the California Public Resources Code maintains the California State Coastal Conservancy ("SCC") may,

> *accept dedication of fee title, easements, development rights, or other interests in lands, including interests required to provide public access to recreation and resources areas in the coastal zone.*

Over the years, the SCC has funded overnight accommodation projects that include a Coastal Development Permit for the Port San Luis Harbor Terrace project, restoration of the Crystal Cove Cottages at Crystal Cove State Park in Orange County, and campground facilities at the Piedras Blancas Motel site within Hearst San Simeon State Park, among others.

Increasing the inventory of LCOVA also has important consequences for cities' entire housing markets. More available LCOVA units keeps long-term rental units from slipping into the vacation rental inventory (i.e. Airbnb, VRBO, Homestay, etc). Cities with high-cost, high-need housing inventories can utilize LCOVA as a lever to balance long-term and short-term markets and make housing on the whole more affordable. Moreover the preservation of low-cost overnight units can allow for more equitable access to coastal environments and natural resources to broader populations that cannot afford to live in coastal areas.

In this context it is important to understand the mechanism for monitoring and judging supply of LCOVA facilities in high-cost coastal areas, and also to understand affordability within the coastal areas the need-for or surplus-of affordable supply to match demand. This paper develops and pilots a methodology of assembling LCOVA supply data, and explores daily rate and hotel distribution metrics to illustrate supply and demand in the context of the need for LCOVA. Furthermore, it provides ideas of possible synergistic solutions that address coastal access while at the same time helping to address affordable housing and transportation crises in many high-cost, high-need markets.

## LITERATURE REVIEW

For background, there has been very little work on assessing LCOVA in the coastal zone. While work has evaluated the distributional equity aspects of the planning process as they relate to housing, it has not ventured much in to overnight accommodations. For example, in classic work Bobo and Shulman (1977) suggest more stringent development controls that require the use of inclusionary zoning ordinances to assure that the coast will service the housing needs of all economic segments of the community. They conclude that the housing sections of the plan lacked the necessary definition to implement the stated policies.

Recent literature has primarily focused on sustainable management and fisheries. This includes work by those such as Richmond, Riggs and Ponterelli arguing for a sustainable land use in the coastal zone (Richmond et al., 2019; Riggs & Pontarelli, 2014) as well as other works that highlights the connection of fishing industries to land-side infrastructure and resources (Sethi, Reimer, & Knapp, 2014; Sethi, Riggs, & Knapp, 2014).

Lester and Matella examine alternative statewide sea level rise adaptation policies that are consistent and compliant with the Coastal Act (Lester & Matella, 2016). They demonstrate six development contexts that illustrate planning challenges related to issues like redevelopment rules. The authors argue that the rise in sea level threatens residential development since emergency measures, such as seawalls, could lead to an incremental loss of recreational beach area, and provide a useful systematic classification of types that have similar attributes to describe residential development and hazard conditions along California's coastline.

Yet these have not focused on the coupled human and natural systems which are inherently complex yet essential to community resilience (Gunderson, 2010; Liu et al., 2007; Magis, 2010). None have focused on LCOVA specifically. Some work has looked at access—for example the spatial distribution of public access to the coastline in California relative to the distribution at the states diverse residents has been evaluated (Reineman, Wedding, Hartge, McEnery, & Reiblich, 2016). This is evaluated from shared benefit perspective in the context of decision-making, however, as opposed to a quantification, approach.

In one of the most relevant pieces of literature researchers looked at the coastal act and the housing dynamics associated with the introduction of the CCC (Kahn, Vaughn, & Zasloff, 2010). They compared housing market outcomes in select cities and argued that California's Coastal Act promoted housing for some lower income people (mainly seniors). Yet at the same time, they made no provisions for either average or median prices, and did not provide statewide methodologies.

Additional work from Pierucci, explored LCOVA specifically using a highly granular approach and highlighting the need for more research (Pierucci, 2015). The analysis explored the practice and legality of the California Coastal Commission's application of the $30,000/25% fee as a LCOVA mitigation measure. Based on a legal and policy analysis of the fee, Pierucci argues that the fee will likely fail the applicable legal standards—suggesting recommendations for developers.

This suggestive work comes at a time when housing affordability is acute yet development has become harder. Take for example the August 2015 report from the *San Diego Tribune* of the CCC's rejection of plans to develop up to three Harbor Island Hotels that would be located on public tidelands overseeing the port of San Diego (Weisberg, 2015). The commission was reported to have rejected the proposal in recognition of the fact that undeveloped waterfront tidelands are shrinking, and that the San Diego Port District would not make a stronger commitment to guaranteeing affordable lodging on or near Harbor Island. The report also stated that approximately $19 million in affordable lodging fees have been collected over the years, but close to $10 million remained unspent.

## METHODLOGY

Given this practical and theoretical need and to address the gaps in the literature and develop methods to better understand affordability needs, this paper develops and pilots a methodology of assembling LCOVA supply data, and explores daily rate and hotel distribution metrics to illustrate supply and demand in the context of the need for LCOVA. To do this we focused on analyzing average daily rate (ADR) data from hotel inventories for City of Long Beach, Orange County, Los Angeles County, the California Coastal Zone, and the Five-Miles-from-Shoreline Zone, and in calculating low-, moderate- and high-cost rates for these areas. We developed a preliminary database of motel, hotel, campsite and RV establishments by acquiring data from Smith Travel Research (STR) and Oddity Software to identify over 6,000 lodging establishments in California. We then narrowed the data to include only establishments within Coastal Counties. At the same time we assembled statewide lists of RV and campsites from a variety of sources

including California State Parks, AAA, HipCamp.com, TripAdvisor and Expedia. These data sets were combined into one mega-database for GIS analysis.

*Determining Affordability*

The process for arriving at the daily rate benchmarks involved working with SCC and benchmarking off of the Average Daily Hotel Rate (ADR) for California in 2015. The ADR figure was derived from all hotels in California that are included in the Smith Travel Research (STR) database, approximately 6,700 establishments, and was $150.03 as shown Table 1 which shows season variation of rates. For our purposes, Summer was considered the months of July and August. The maximum daily rate considered for "lower-cost accommodations" was calculated from the higher of two data points: $100 per night, and 75% of the 2015 California ADR.

| **2015 California ADR Time Period** | **ADR** (1) | **75% * ADR** | **Maximum Daily Rate for Lower-Cost Accommodations** (2) |
|---|---|---|---|
| All Year | $150.03 | $112.52 | $112.52 |
| July | $164.25 | $123.19 | $123.19 |
| August | $163.76 | $122.82 | $122.82 |

Notes:

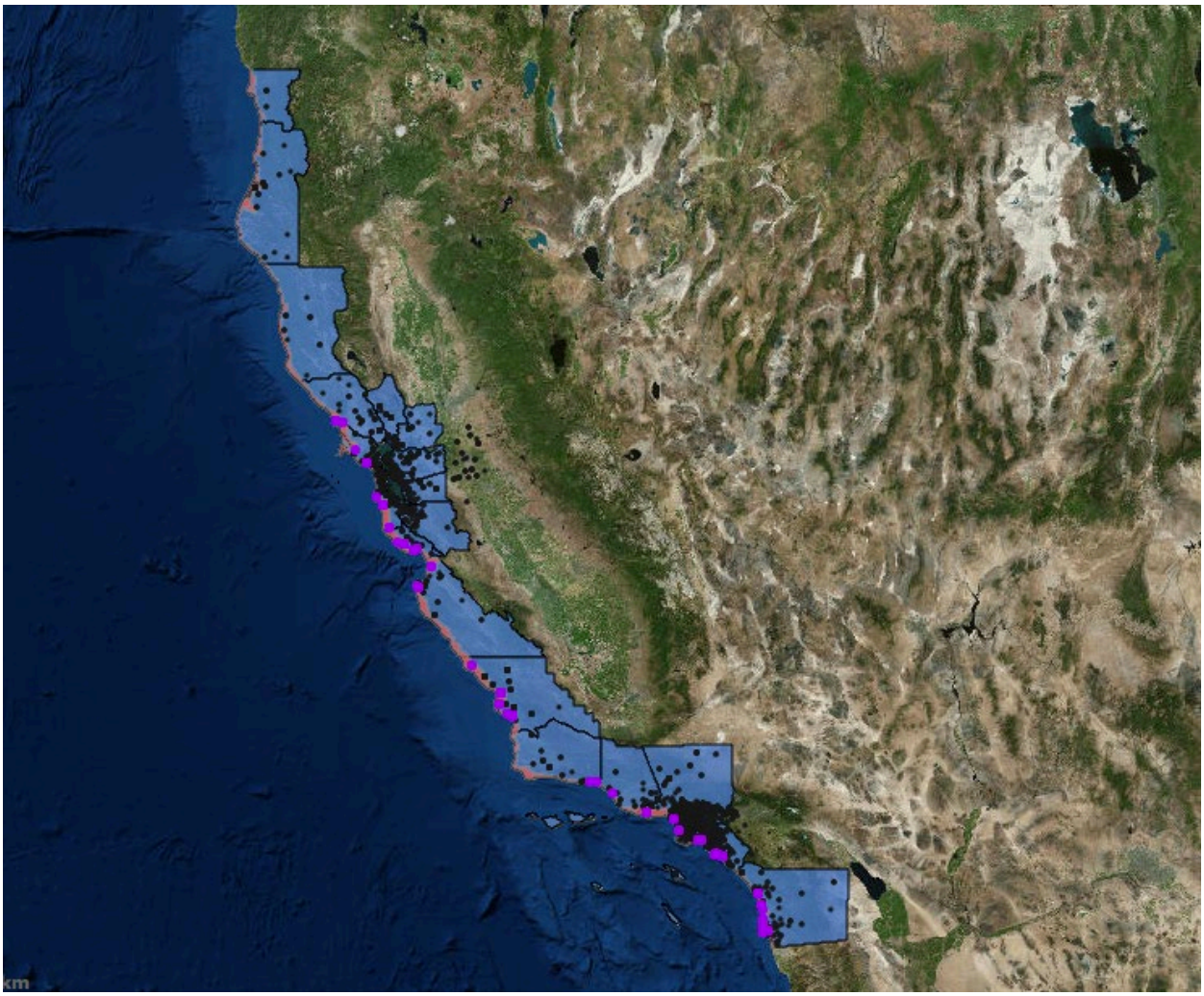
(1) Data from STR 2015 California Trend Report

(2) The higher of $100 per night or 75% of the 2015 California ADR

*Preliminary GIS Assessment*

Following the preliminary data assembly process, we used GIS technology to geo-code the exact location of each establishment to determine which were located in the Coastal Zone or within one mile of the shoreline. This was done using a method of analysis called spatial selection. A representation of this is shown in Figure 1 below. The California State Coastal Conservancy (SCC) provided an initial GIS layer representing a 1-mile buffer beyond the coastal zone. To comply with the scope of work Author developed a new GIS layer that instead identified the geographic area located within 1-mile of the California shoreline.

**Figure 11.** Spatial Selection of Coastal California Overnight Accommodation Establishments



*Source:* Author

It is worth noting that there were two key challenges in geocoding data for project sites that led to a visual overlap in the online GIS and many duplicate entries in the data when it was converted from a Excel / comma separated value (CSV) file to a GIS shapefile.

1. Google data scraping issue: available XY coordinates were the same for a number of properties. These coordinates appeared to be accurate only within 1/4 to 1/2 mile causing sites located within close proximity (e.g. across the street from each other) to be assigned the same location coordinates in the Google database.

2. ArcGIS bug: a geocoding bug related to the number of characters in an Excel field caused duplicate entries to be created. When the CSV file was read in ArcGIS Online, if there were fields that contained long entries, the record was split, and new rows (or field entries) were created. This error is related to an ArcGIS 'inspection' issue in which imported field entries are defined by looking only at the first 10 rows. More discussion on this is found here: https://geonet.esri.com/thread/179295.

While we originally thought that each property in the database would need to be manually separated (a task that would have taken an ~15 minutes per location) after further evaluation a more efficient, two-pronged approach was devised to resolve each of the identified issues.

1. Google data scraping issue: XY coordinate data was sorted by length. Any site with less than 4 decimal degrees in the XY coordinate was ruled to be too spatially aggregate and flagged for correction. For these sites (numbering roughly 300) a new XY coordinate was gathered; geocoding using the available postal address. Following this data was scrubbed for errors, including missing negative signs and inadvertently included punctuation that would prevent proper mapping.

2. ArcGIS bug: a workaround was devised that involved two strategies. First, before uploading, the excel function =len() was used to determine the number of characters in each cell in the spreadsheet. Following this, spreadsheet data was sorted so that records with fields containing the longest entries appeared within the top 10 records. Doing this ensured that ArcGIS would not 'split' those down the line for subsequent field entries. For any sites not corrected using this method, an offsite geocoding service hosted by Texas A&M was used (https://geoservices.tamu.edu/Services/Geocode/).

*County-by-County Validation*

Following the GIS assessment Author validated and cleaned the data. We eliminated rental agencies, restaurants and other facilities miss-coded as hotels, and undertook a county-by-county assessment to evaluate and include hotels that were not a part of the initial list. This effort was required to incorporate smaller, boutique establishments that were not included in the STR and Oddity Software data sets, yielding a total data set of 942 unique accommodations, each with related geo-spatial information. As a sample size this number of sites is statistically significant at the 95% confidence interval with a margin of error of +/-2.9%

*Finalization with Data*

Following the County-by-County validation, our team gathered data for each establishment in the Coastal Zone or 1-mile-from-shoreline buffer, as shown in Table 1. AAA and Trip Advisor rating categories were added to the dataset, where appropriate—beyond Task 2 language in the scope of work yet consistent with conversations with SCC staff. Longitude and Latitude (X,Y) spatial coordinates were scrubbed from our GIS files using Google Earth.

In gathering cost data, we captured the daily room rate at each overnight accommodation facility. To determine a low, average, and high cost for a 2-queen bed motel or hotel room in the summer and winter, we used direct sampling methods (calling lodging establishments and surveying on-line hotel reservation systems) to obtain data. To capture the number of rooms per establishment, we documented the actual number of rooms. However, for a small number of establishments, where no reliable information existed, we assumed 10 rooms as a proxy for the size of standard small inn. Our analysis assumes that one family would occupy one 2-queen bed motel/hotel room. Therefore, larger group accommodations usually did not match the low-cost criteria, even though the per person rate could be considered relatively inexpensive. We made no adjustments for sharing economy supply from sites like Airbnb or VRBO rooms

/ units on the market. STR reports at the time indicated that peer-to-peer based lodging tools currently make up 5.4% of the accommodations in many markets, offering an opportunity for future evaluation.[1]

**Table 6.** Data Categories for Task 2 Database

| Variable Name | Description | Source |
|---|---|---|
| X | Geographic Coordinates: Longitude | Author (?) |
| Y | Geographic Coordinates: Latitude | Author |
| Facility_Name | Name of Lodging | STR / Author |
| Type | Facility Type (RV / Campsite / Hotel & Motel) | Author |
| Campsite_RV | Campsite / RV Filter | Author |
| Public | Public or Private site | Author |
| AAA | 1-5 AAA Diamond Rating (if any) | AAA.com |
| TripAdvisorRating | TripAdvisor.com User Rating (if any) | TripAdvisor.com |
| Address | Street Address | STR / Author |
| City | City | STR / Author |
| State | State | STR / Author |
| Zip | Zip Code | STR / Author |
| County | County | STR / Author |
| Phone | Phone | STR / Author |
| Email | Email | STR / Author |
| Website | Website | STR / Author |
| Number_Sites_Rooms | Total Number of Rooms | STR / Author |
| Cost_Per_Night | Average Room Cost per Night for Summer | STR / Author |
| Number_of_People | Average Number of Individuals per Room | STR / Author |
| Max_Occupancy | Max Individuals Accommodated | STR / Author |
| Occupancy_Rate | Annual Occupancy | STR / Author |
| Below Max | Below the Maximum ADR | Author |
| 1Mile Coast | Filter for Sites 1-Mile from the Coast | Author |

*Population Assessment*

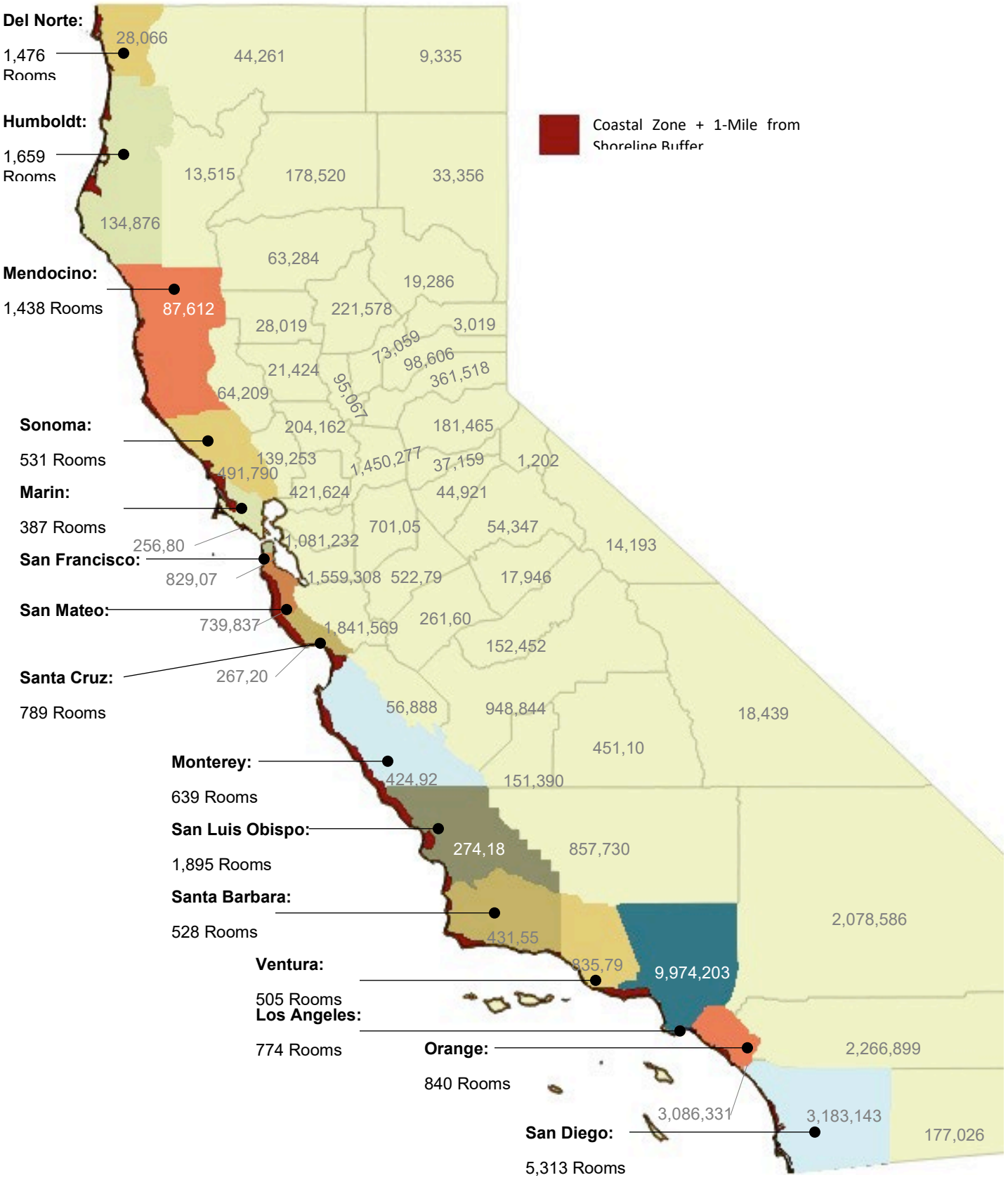
Once the coastal lodging establishments dataset was complete our team compared overnight accommodation data to population and economic (median income) data compiled from US Census Bureau, 2014 American Community Survey (ACS) 5-year estimates. ACS estimates provide the most up-to-date population and economic data available. They are available in 1, 3 and 5-year increments, in which statistical sample becomes increasingly more accurate. We use the 5-year estimates, since they are the only data sets available at small geographies and represent the highest degree of accuracy. We combined this inventory prepared with U.S. Census data of family income and population by County to analyze LCOVA supply relative to geographic, population, and income profiles. We gathered this population and median income data for all counties within 150 miles from the coast. To visualize and analyze this we established a comparison using the simple-share or ratio method of economic analysis for each location (e.g. comparing the number of rooms in each county to the number of people in each 150-mile buffer). Although this approach was limited in that it allowed for a degree of overlap and limited ability to compare county to county statewide, it was distinctly easier to explain to a larger audience (e.g. number of units per person or every X number of people within 150 mile) and more disaggregate than other approaches considered.

[1] "Airbnb Accounts for 5.4% of NYC Demand." Hotel News Now. http://www.hotelnewsnow.com/articles/24578/Airbnb-accounts-for-54-of-NYC-demand.

**RESULTS**

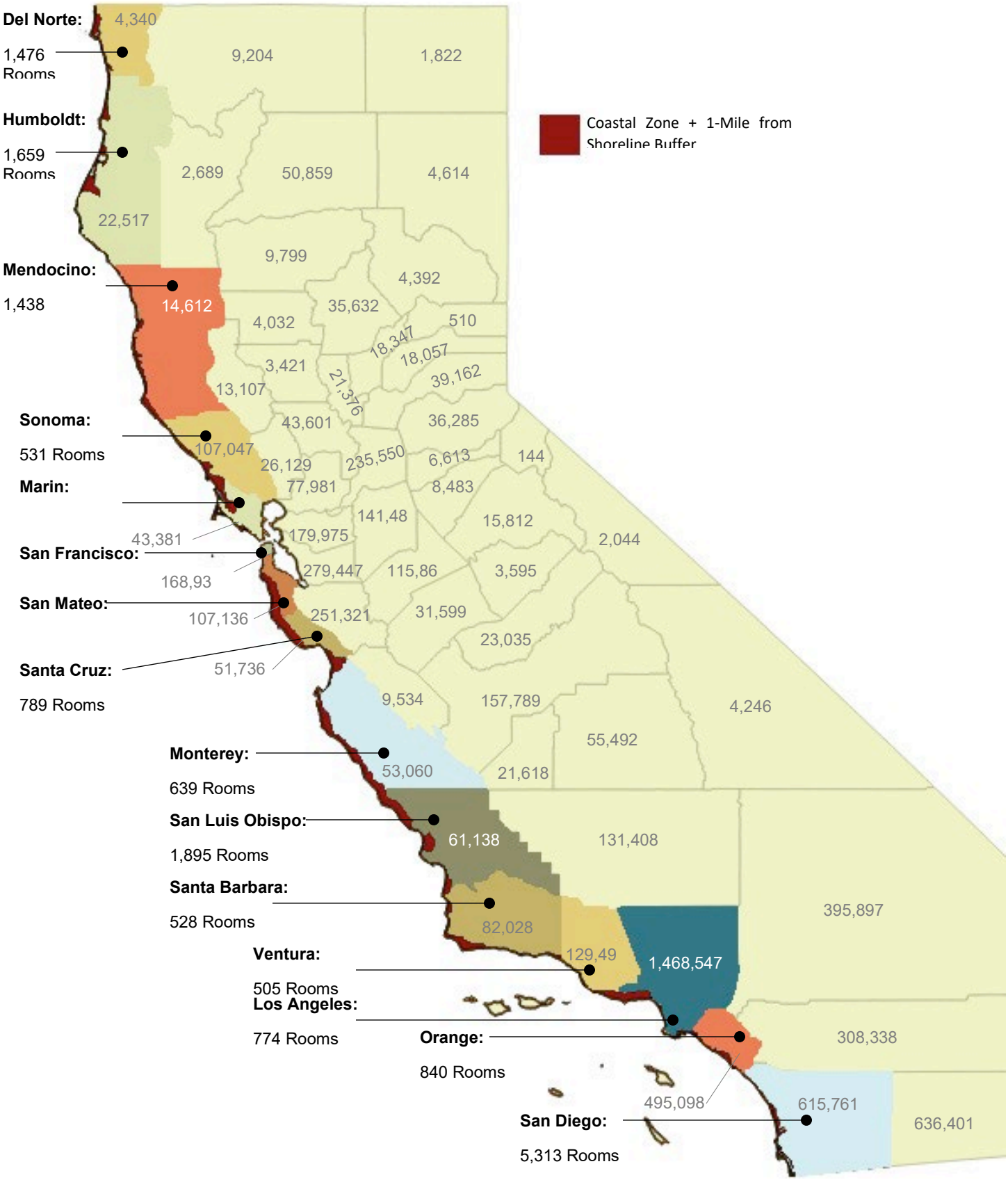
There are approximately 64,611 rooms in the combined Coastal Zone and 1-mile from shoreline buffer, of which 17,094 rooms, or approximately 26 percent, fall below the $112 maximum daily rate for lower-cost accommodations. Table 2 illustrates the distribution of coastal rooms in each California county. Figure 2 and Figure 3 illustrate the supply of coastal rooms in each California county in comparison to total county populations and the number of households in each county that earn below 80% of area median income (AMI).

**Figure 2.** Number of Low Cost Accommodations (Rooms) in the Coastal Zone + 1-Mile from Shoreline Buffer (by County) and Total *Households* in California Counties




*Source:* Authors, American Community Survey 2014 5-Year Estimates

**Figure 7.** Number of Low Cost Accommodations (Rooms) in the Coastal Zone + 1-Mile from Shoreline Buffer (by County) and Number of *Households* Per County Below 80% Area Median Income within 150 Miles from the Coastal Zone Boundary




*Source:* Authors, American Community Survey 2014 5-Year Estimates

**Table 7.** Number of Rooms Below Annual Maximum Daily Rate for Lower-Cost Accommodations ($112)

| County | Total Coastal Rooms | Number of Lower Cost Coastal Rooms | Percent of Total by County |
|---|---|---|---|
| Del Norte | 1,927 | 1,476 | 77% |
| Humboldt | 2,421 | 1,659 | 69% |
| Los Angeles | 2,494 | 774 | 31% |
| Marin | 413 | 387 | 94% |
| Mendocino | 2,291 | 1,438 | 63% |
| Monterey | 2,996 | 639 | 21% |
| Orange | 7,727 | 840 | 11% |
| San Diego | 30,452 | 5,313 | 17% |
| San Francisco | 10 | 0 | 0% |
| San Luis Obispo | 4,724 | 1,895 | 40% |
| San Mateo | 987 | 320 | 32% |
| Santa Barbara | 3,184 | 528 | 17% |
| Santa Cruz | 2,176 | 789 | 36% |
| Sonoma | 814 | 531 | 65% |
| Ventura | 1,995 | 505 | 25% |
| **Total** | **64,611** | **17,094** | **26%** |

Furthermore, when comparing the population breakdown for households with income levels below 80% AMI, we find that there are substantial variations in the distribution of lower cost accommodations throughout the State. As is shown in Table 3, individuals living in households 150 miles inland from various coastal counties have different levels of spatial access[57] to low-cost accommodations. For example, in the North there are roughly 20 affordable rooms for every 1,000 potential households within 150 miles inland, while in the Bay Area and Southern California the proportion narrows to 1:1000 and 2:1000 respectively.

This is statewide breakdown is illustrated in the figures found in the appendices as well as the population to accommodation ratio density map shown in Figure 5. This figure shows a heat map of population (households <80% AMI) in relationship to accommodations, with increasingly warmer colors indicating 'hot spots' where demand might exceed supply. Both of these graphics consistently suggest that there are needs for increased affordable accommodations in both the San Francisco Bay Region and in Southern California, opportunity for future investment and development.

**Table 8.** Number of Households Compared to Lower-Cost Accommodations (Rooms)

| | Total Households | Ave. HH Income | Population <80% AMI | Low Cost Rooms (LCR) | *LCR per 1000* |
|---|---|---|---|---|---|
| **North** (*Del Norte, Humboldt, Mendocino*) | 1,217,092 | $44,044 | 239,330 | 4,573 | 20 |
| **Bay Area** (*Sonoma, Marin, San Francisco, San Mateo, Santa Cruz*) | 11,186,585 | $67,584 | 1,965,068 | 2,027 | 1 |
| **Central** (*Monterey, San Luis Obispo, Santa Barbara*) | 4,061,265 | $52,296 | 636,586 | 3,062 | 5 |

[57] Calculated using linear vs. network distance that would factor in transportation routes.

| | | | | | |
|---|---|---|---|---|---|
| **South** (*Ventura, Los Angeles, Orange, San Diego*) | 21,601,978 | $60,809 | 3,433,774 | 7,432 | 2 |

**Figure 4.** Lower Cost Accommodations (Rooms) per 1,000 Households Regionally in California

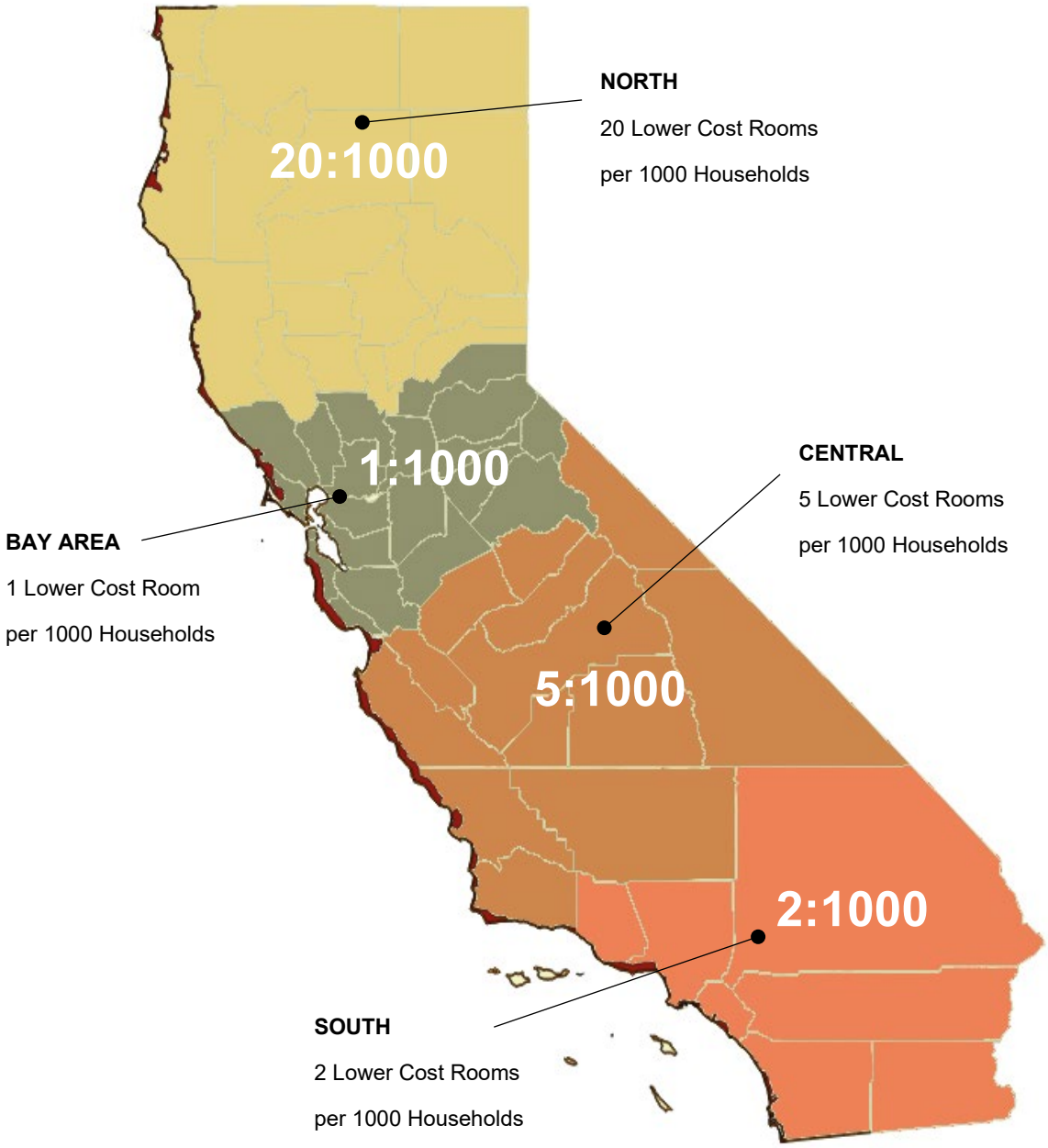
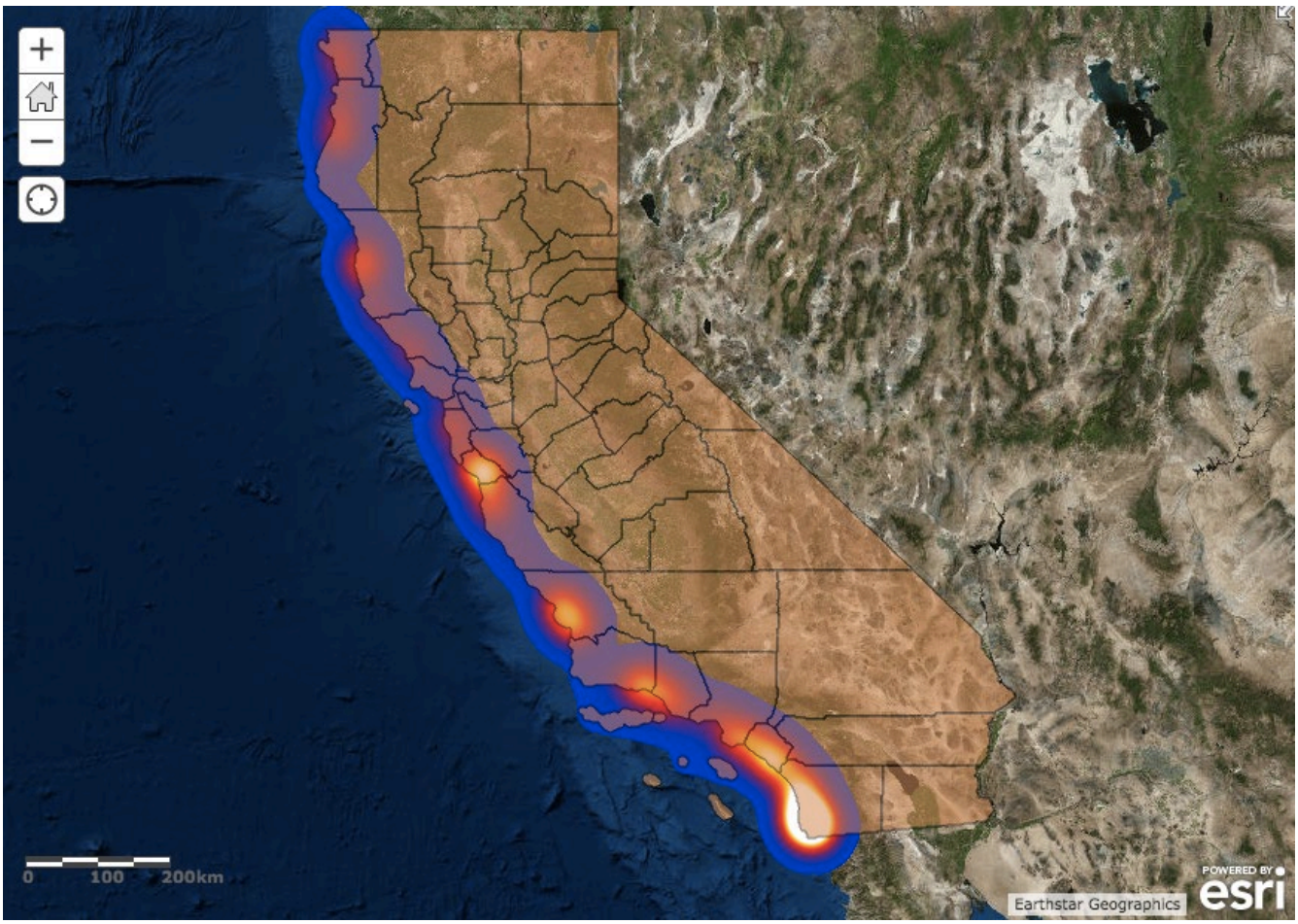


**Figure 5.** Spatial Hot Spot Analysis of the Number of Households <80% AMI compared to the number of Lower Cost Accommodations. More intense warm shades indicated increased population demand (e.g. greater population to fewer or fixed accommodations.




*Source: American Community Survey 2014 5-Year Estimates.*

In looking at affordability, there is vast variation in the data across both summer and winter as is show by the a minimum, maximum, and average costs illustrated in Table 4 and Table 5. This indicates an opportunity for policy and supply intervention.

**Table 4.** Range of California Room Rates by County within 1-Mile-of-the-Shoreline Zone (Summer)

| County | Average | Low | High |
|---|---|---|---|
| Del Norte | $135 | $72 | $200 |
| Humboldt | $153 | $80 | $300 |
| Los Angeles | $254 | $69 | $904 |
| Marin | $180 | $37 | $325 |
| Mendocino | $193 | $87 | $425 |
| Monterey | $274 | $133 | $665 |

| | | | |
|---|---|---|---|
| Orange | $287 | $89 | $799 |
| San Diego | $211 | $39 | $822 |
| San Francisco | $182 | $182 | $182 |
| San Luis Obispo | $248 | $69 | $500 |
| San Mateo | $302 | $140 | $1,000 |
| Santa Barbara | $343 | $146 | $1,470 |
| Santa Cruz | $245 | $52 | $1,037 |
| Sonoma | $223 | $99 | $300 |
| Ventura | $194 | $90 | $407 |

**Table 5.** Range of California Room Rates by County within 1-Mile-of-the-Shoreline Zone (Winter)[58]

| County | Average | Low | High |
|---|---|---|---|
| Del Norte | $104 | $56 | $167 |
| Humboldt | $107 | $61 | $176 |
| Los Angeles | $202 | $65 | $469 |
| Marin | $79 | $79 | $79 |
| Mendocino | $156 | $74 | $374 |
| Monterey | $207 | $69 | $499 |
| Orange | $256 | $90 | $795 |
| San Diego | $194 | $56 | $682 |
| San Francisco | $162 | $162 | $162 |
| San Luis Obispo | $171 | $56 | $420 |
| San Mateo | $291 | $119 | $609 |
| Santa Barbara | $289 | $66 | $995 |
| Santa Cruz | $178 | $52 | $418 |
| Sonoma | $228 | $134 | $300 |
| Ventura | $144 | $61 | $240 |

## DISCUSSION

This analysis indicates that LCOVA are an acute need, particularly in high-cost coastal regions, and this presents distinct policy and management ideas worth discussion. Perhaps there is a need to rethink the

[58] Winter rates were obtained for 660 of the total lodging establishments documented in the coastal zone (N=1,064). It should be noted that the average season discount rate statewide was 16%, while literature suggests a rate of 45-50% during Winter.[58, 58]

affordability of access to coastal areas and begin to subsidize coastal lodging in certain ways. This analysis suggests a program that might promote more camping or RV sites, or the acquisition of existing motels by non-profits or public agencies, might help preserve lower cost rooms in perpetuity and is therefore viable and be worthy of further consideration. Investments in accessibility to coastal resources also include the preservation of existing lower-cost rooms that should otherwise be considered at-risk (e.g. lower cost rooms that are anticipated to be subject of rate increases that are in-line with market rate increases).

If this potential access management strategy were to be explored key considerations should evaluate when considering the purchase of an existing motel for the purposes of implementing and maintaining lower cost rates in perpetuity are:

- **Upfront Capital Expenditures**. Properties may require retrofit to achieve compliance with current ADA or seismic requirements and to remediate lead paint, asbestos, or other hazardous materials.

- **Low Profit Margins**. Lower cost rates produce profit margins that may be sufficient to attract non-profit partners (operating and/or ownership), but may not be sufficient to attract for-profit partners.

- **Low Cost Rate May Exceed Market Rate.** It is possible that a statewide low cost rate could exceed the market-rate of limited-service motels in certain areas.

- **Financing**. The exact amount of financing required will vary for individual property, but generally, a large up-front investment would be needed for a lower cost motel acquisition. A key constraint in attaining a loan for the property would be the amount of income the property must produce above and beyond debt service (the loan payment). Current underwriting criteria suggest lenders would require property income that is 20% more than the loan payment (debt service coverage ratio of 1.2 or higher). Underwriting criteria is subject to change, and should be monitored. Mission-oriented and /or social impact lenders may be willing to issue loans with more flexible underwriting criteria.

## Successful LCOVA Development Projects

Recent coastal development projects have successfully preserved low-cost accommodations. These case-studies can serve as a model on how public and private organizations collaborated to both conserve historic state park areas and create funding networks to support restoration. Many new accommodations are advertised as “alternative accommodations” by the state parks website and are great options for people that do not want to camp in tents. Perhaps the best example are the newly remodeled Crystal Cove Cottages. The Crystal Cove Conservancy collaborated with California State Park System to prevent the historic state park area from becoming a luxury resort in 1999 (Crystalcove.org). The Crystal Cove Conservancy has been able to remodel 29 out of 46 cottages using diverse funding sources including private donors, state and local government support, and low-interest loans (Crystalcove.org). The individual cottages start at $39 per night and can house 2 – 9 people. Additionally, dorm-style accommodations provide the opportunity for underserved high school students to participate in overnight educational programming in partnership with UC Irvine.

Re-purposing lighthouses is another creative option for coastal accommodation. Another alternative accommodation through the California State Parks system is the Pigeon Point Lighthouse Hostel. This

hostel can offer accommodations to 50 travelers in houses originally constructed by the U.S. Coast Guard in the 1960s (https://www.parks.ca.gov/?page_id=21997). Similarly, visitors can stay in the Point Montara Lighthouse hostel (https://www.hiusa.org/blog/miscellaneous/history-point-montara-lighthouse). Point Cabrillo Lighthouse is another option for families or individuals that do not want dorm-style hostel accommodation. In 2002, the CCC worked with California State Parks to restore the buildings (https://pointcabrillo.org/learn/history/restoration-2002-to-today/). Two lightkeeper's houses and other property cottages are available for rent (https://pointcabrillo.org/rentals/).

Interestingly, other State Park alternative accommodations do not meet the criteria for low-cost accommodation. For example, San Clemente State Parks leased four of their campsites to local entrepreneurs who installed retro Shasta trailers (Dwell.com). These trailers are $209.00 per night, showing that this model is perpetuating the high-cost market. However, as previously mentioned in methodology, our analysis assumes one family per campsite. These vintage trailers offer space for four adults and one child, with four additional campers welcome to set up tents outside (https://www.theholidaysca.com/san-clemente-rentals). In this case, the per person overnight cost may be affordable to larger families or groups.

East Palo, Alto Mountain View, and Oakland are another case study for increasing affordable housing within the Coastal Zone. Located within Silicon Valley, long-time residents are faced with evictions from rising rents. Resident's solution has become living in RVs; however, they face a variety of obstacles. Right now, it is illegal in many locations to have an RV parked on the street overnight. In East Palo Alto, an RV Safe Parking Pilot Program has been implemented to provide for legal overnight parking to residents. The hope is to create an RV co-op in a safe, secure lot with bathroom and shower facilities with reasonable monthly fees. One major limitation of the program is the requirement for RV owners to move during the day; this requires maintenance on the RV so that it is mobile and increases spending on gas. While more permanent solutions must be implemented this temporary program allows for low-income residents to continue living within a Coastal Zone.

## Opportunities for New Construction

In addition to preserving existing low-cost rooms and acquiring low-cost motels, there is also an opportunity to construct new low-cost housing and campgrounds. Recent technological advances in prefabricated modular construction and new composite materials, as well as the commercialization of these technologies, provide a good opportunity to build lower cost housing. These have been backed by a market demand for modular, affordable homes, as a result of the growing popularity of the "tiny house movement," accessory dwelling unit (ADU) regulations throughout California, as well as the demand for vacation homes and rentals outside of cities during COVID-19. Many developers today cater to this sector and provide various financing options. For instance, several design-build companies put up all of the capital for construction and then share in the rental revenue. Options like this would reduce the upfront capital by the Coastal Commission to site expenditures only, without any housing cost.

However, sea level rise as a result of global warming will threaten California's coastal regions. Currently, sea levels are rising 3.2 millimeters (0.13 in) per year (although it varies from place to place),[i] but this number is expected to rapidly increase as average temperatures rise, with roughly seven and a half feet of sea level rise expected per degree Celsius of warming. Even the conservative 2 degrees Celsius of temperature increase, the goal of the Paris Agreement, would likely cause sea levels to rise an average

4.6 meters (15 ft), putting coastal areas. This will diminish access to coastal areas and may flood existing lodging facilities such as camp sites. Therefore, new construction needs to take resilience in mind.

The most resilient strategies for new construction is to move away from the risk, by building higher upland. However, this could be counter to the objective to increase visitor access to the waterfront. To counter this, another opportunity for resilient housing is floating structures. Floating structures rise and fall with floodwaters. They could also be amphibious, with modular homes built on raft structures that provide buoyancy to float the entire weight of the house. These structures double as a foundation on land and will float in case of a flood. There are several examples of low-cost homes like this, including in New Orleans and Amsterdam.

In the following, five specific new construction typologies will be evaluated.

1. **Portable Cabin Communities**
   COVID-19 further fueled the already growing demand for tiny houses and cabins, catering to predominantly millennials looking for weekend getaway options near large metropolitan cities. Many of these are built on wheels, circumventing zoning regulations that may put limits on the use of land. This makes them ideal for temporary housing on sites. They are also ideal for sites with limited utilities. They would require septic fields to handle sewage, photovoltaics to provide power, and a daily delivery of water. Given their small environmental footprint, these would be appropriate for areas where a minimal intrusion into the landscape is desirable.

2. **Modular Housing Communities**
   Many companies are stepping into the market for ADU's, by providing affordable, prefabricated modular housing. These could be used for affordable coastal lodging and could be installed quickly on site. Like the portable cabin communities, these would be relevant in areas where lower density is more desirable

3. **Container Housing Communities**
   There are many examples around the world of converted container housing projects. These are ideal for temporary housing, given that they are easy to move. And since shipping containers can be stacked, they could achieve higher densities. Therefore, these would be most appropriate for temporary sites that require higher capacity. Upcycled shipping containers provides environmental benefits, since there is less embodied energy wasted on new construction.

4. **Floating Housing**
   Within the context of a limited supply of land and a lack of affordable housing, several cities in Europe are building floating communities, such as Amsterdam, Rotterdam and Copenhagen. These homes could be made from upcycled shipping containers, reducing the environmental footprint of these projects even more. Projects like this would be more appropriate in sheltered bay areas with limited wave action. They provide guests with unique experiential qualities, giving them the opportunity to stay on water.

### 5. Floating Campgrounds

Floating campgrounds provide an even lower cost option. Several of these have been built on barges. In some cases, they include a one-story platform to be able to double capacity. Even more so than floating housing, floating campgrounds require very sheltered bay areas with little wave action. Alternatively, they could be docked to the shore.

| Type | Attributes + Site | Case Study |
|---|---|---|
| **Portable Cabins** | - Temporary<br>- Minimal intrusion<br>- Limited site utilities required<br>- Low density |  <br>Getaway House, Shenandoah Valley. Source: Nicolás Boullosa, Flickr. |
| **Modular Housing** | - Low density |  <br>Weehouse prefab, California. Source: Nicolás Boullosa, Flickr. |
| **Container Housing** | - Temporary<br>- Low embodied energy<br>- Medium density | |

| | | |
|---|---|---|
| | |  <br>Container student homes “Space Boxes”, Delft. Source: Christopher Parkes, Flickr. |
| **Floating Housing** | - Temporary<br>- Limited site utilities required<br>- Low density<br>- Bays with limited wave action |  <br>Floating container student homes “Urban Rigger” by the Bjarke Ingels Group, Copenhagen. Source: Jimmy Baikovicius, Flickr. |
| **Floating Campgrounds** | - Temporary<br>- Limited site utilities required<br>- Medium density<br>- Bays with very limited wave action |  <br>Floating campground, Lake Oroville. Source: Tom Owen, Flickr. |

## Transportation considerations

Transportation costs and accessibility are significant obstacles to public coastal access. Expensive parking rates, limited parking space, and insufficient public transit are important barriers keeping individuals from going to the beach (UCLA IoES, 2016). In Southern California, only 3% of beach visitors use public transportation while 90% drive (UCLA IoES, 2017). Individuals who do not have access to a car are much less likely to be able to visit the beach.

Therefore, transportation considerations are critical for future LCOVA development projects. Projects should be planned near public transit. For example, in Los Angeles the addition of the 15-mile Expo Line connects downtown Los Angeles to coastal city of Santa Monica (UCLA IoES, 2017). However, the end of the line is still over ¼ mile from the sand, which may be too long of a distance for elderly or disabled populations (UCLA IoES, 2017).

## City and Community Benefits

Increased LCOVA availability would allow for a greater proportion of California residents to benefit from coastal areas. There is a considerable amount of research showing that outdoor recreation is excellent for mental and physical health (https://doi.org/10.3390/ijerph18052506; https://doi.org/10.1177/030802260606900406; will fill in more references). In fact, simply viewing the ocean was associated with reduced "psychological distress" in one New Zealand-based study (https://doi.org/10.1016/j.healthplace.2016.03.002). Other benefits of outdoor recreation include crime reduction, educational opportunities, and increased community engagement (i.e. volunteering) (10.3390/ijerph16060937).

Investing in LCOVA development projects is an important way for cities to increase equitable access to the outdoors. Research shows that 'populous minority groups' have the lowest access to the beach and thus would likely benefit most from coastal accommodations (Reineman et al., 2016). Additionally, according to a UCLA study, people with household incomes greater than $60K are more likely to visit the beach. Lower-income communities are disproportionately less likely to visit the beach and receive the mental and physical health benefits of outdoor recreation. A lack of affordable accommodations is a self-reported barrier from visiting the beach, particularly for Latinos and families with young children (UCLA IoES, 2017).

## CONCLUSIONS

This key question drives this work, exploring data and modeling policy solutions that can help increase the ability for individuals of all races and social classes to access coastal environs and habitat in a sustainable and equitable manner. Further, it is possible that there may be synergistic solutions that address coastal access while at the same time helping to address housing and transportation crises in many high-cost markets. We show LCOVA is limiting, demonstrating a model that employs a comprehensive database of lower-cost overnight accommodations in coastal California as a template that can be used in other coastal high-cost, high-need environments. This offers a method of determining a distribution analysis of households at 80% of the median income level within 150 miles of the coast that can yield specific strategies to provide affordable transportation access to these important environmental resources.

This work offers a platform for future work that can help unravel how these triends are tied-to and perhaps correlated-with different types of local land use regulations or transportation patterns. We speculate that access to coastal areas will continue be limited both from an overnight standpoint and that demand far exceeds supply on local housing / transportation networks, particularly in high-cost markets. The expectation is that broader housing, transportation and equity policies will need to be cultivated in these areas with critical environmental habitat but also a need to provide both short and long-term housing. In this light there are opportunities to explore new construction typologies in the planning and architecture communities, including but not limited to: portable cabin; modular and container housing; and floating communities. All of these strategies will help broaden the dialogue on providing lower-cost accommodations in coastal areas in parallel with preserving local environments.

## REFERENCES


Bobo, B. F., & Shulman, D. (1977). Managing California's Coast: The Problem of Housing Distribution. *California Management Review*, *20*(1), 74–80.

Gunderson, L. (2010). Ecological and Human Community Resilience in Response to Natural Disasters. *Ecology & Society*, *15*(2). Retrieved from http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=17083087&AN=52292481&h=AopRO7lAs9w%2F9QA3v5g7JPHvhXlu%2FQ2jeJg0kVKeV6rhPjEzzxV3oBuSwm8iskpEoLe8f%2B%2Fk1GR5Ube5to9PHA%3D%3D&crl=c

Kahn, M. E., Vaughn, R., & Zasloff, J. (2010). The housing market effects of discrete land use regulations: Evidence from the California coastal boundary zone. *Journal of Housing Economics*, *19*(4), 269–279.

Lester, C., & Matella, M. (2016). Managing the coastal squeeze: Resilience planning for shoreline residential development. *Stan. Envtl. LJ*, *36*, 23.

Liu, J., Dietz, T., Carpenter, S. R., Alberti, M., Folke, C., Moran, E., … others. (2007). Complexity of coupled human and natural systems. *Science*, *317*(5844), 1513–1516.

Magis, K. (2010). Community resilience: An indicator of social sustainability. *Society and Natural Resources*, *23*(5), 401–416.

Pierucci, D. F. (2015). *The California Coastal Commission's Approach to Lower Cost Overnight Visitor-Serving Accommodations Mitigation: A Policy and Legal Analysis*.

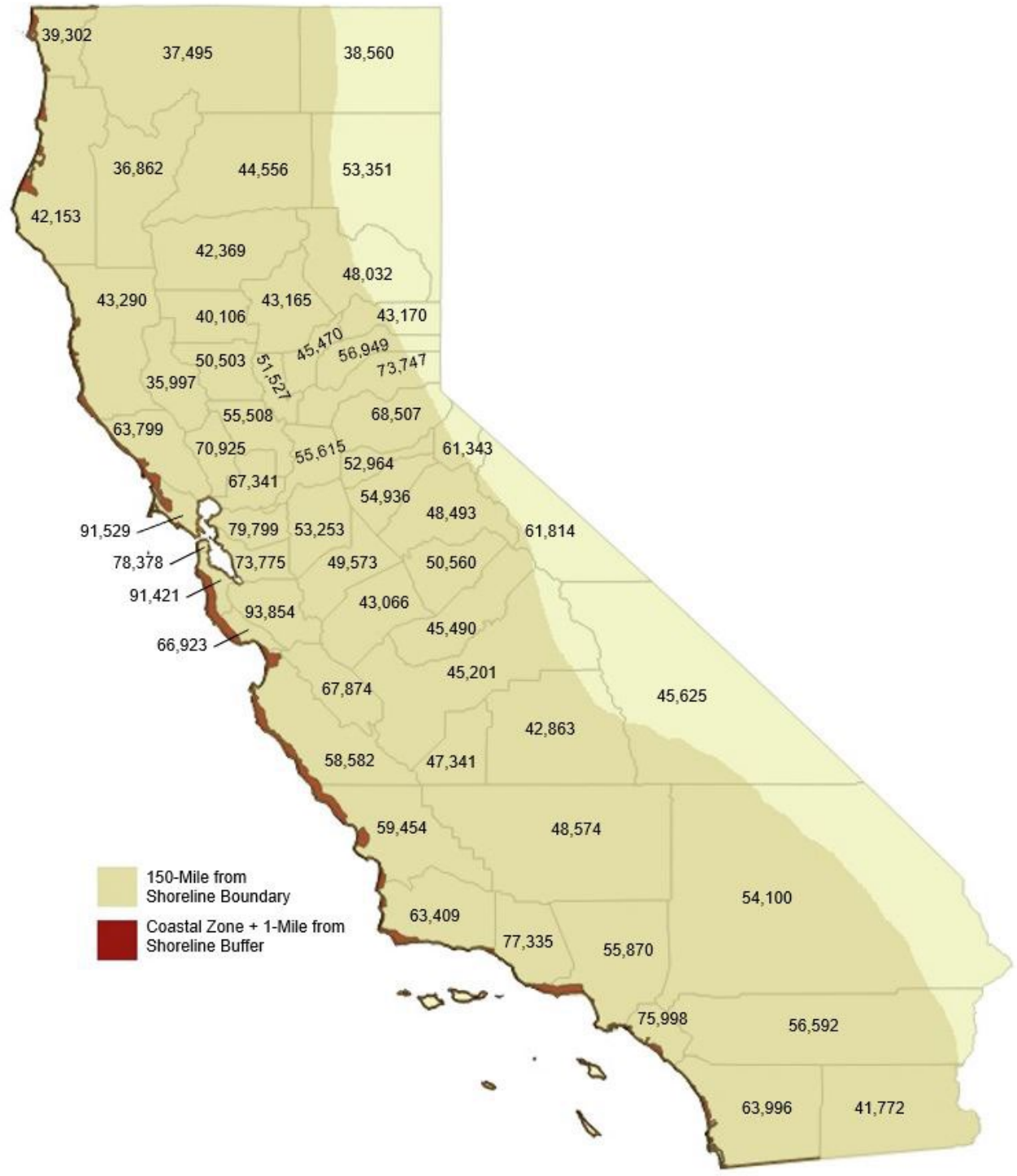
Reineman, D. R., Wedding, L. M., Hartge, E. H., McEnery, W., & Reiblich, J. (2016). Coastal access equity and the implementation of the California Coastal Act. *Stan. Envtl. LJ*, *36*, 89.
Richmond, L., Dumouchel, R., Pontarelli, H., Casali, L., Smith, W., Gillick, K., … Suarez, A. (2019). Fishing Community Sustainability Planning: A Roadmap and Examples from the California Coast. *Sustainability*, *11*(7), 1904.
Riggs, W., & Pontarelli, H. (2014). Community sustainability planning as a tool for increased environmental sustainability: The case of two California cities. *Focus*, *11*(1), 23.
Sethi, S. A., Reimer, M., & Knapp, G. (2014). Alaskan fishing community revenues and the stabilizing role of fishing portfolios. *Marine Policy*, *48*, 134–141. https://doi.org/10.1016/j.marpol.2014.03.027
Sethi, S. A., Riggs, W., & Knapp, G. (2014). Metrics to monitor the status of fishing communities: An Alaska state of the state retrospective 1980–2010. *Ocean & Coastal Management*, *88*, 21–30. https://doi.org/10.1016/j.ocecoaman.2013.11.007
Weisberg, L. (2015, August 14). Harbor Island Hotels Rejected. *San Diego Union-Tribune*.

## APPENDICES

**Figure A1.** Total Households for California Counties


*Source:* Authors, American Community Survey 2014 5-Year Estimates

**Figure A2.** County 80% Area Median Household Income within 150 Miles from the Coastal Zone Boundary (Figures Shown in Dollars)




*Source:* Authors, American Community Survey 2014 5-Year Estimates

**Figure A3.** Number of *Households* Per County Below 80% Area Median Income within 150 Miles from the Coastal Zone Boundary


*Source:* Authors, American Community Survey 2014 5-Year Estimates

**Table A1.** County Population and Households Below 80% Area Median Income within 150 Miles from the Coastal Zone Boundary

| County | Total Households by County | Median Household Income ($) | 80% Median Household Income ($) | Number Household < 80% Median Household Income |
|---|---|---|---|---|
| Alameda | 1,559,308 | $73,775 | $59,020 | 279,447 |
| Alpine | 1,202 | $61,343 | $49,074 | 144 |
| Amador | 37,159 | $52,964 | $42,371 | 6,613 |
| Butte | 221,578 | $43,165 | $34,532 | 35,632 |
| Calaveras | 44,921 | $54,936 | $43,949 | 8,483 |
| Colusa | 21,424 | $50,503 | $40,402 | 3,421 |
| Contra Costa | 1,081,232 | $79,799 | $63,839 | 179,975 |
| Del Norte | 28,066 | $39,302 | $31,442 | 4,340 |
| El Dorado | 181,465 | $68,507 | $54,806 | 36,285 |
| Fresno | 948,844 | $45,201 | $36,161 | 157,789 |
| Glenn | 28,019 | $40,106 | $32,085 | 4,032 |
| Humboldt | 134,876 | $42,153 | $33,722 | 22,517 |
| Imperial | 177,026 | $41,772 | $33,418 | 20,640 |
| Inyo | 18,439 | $45,625 | $36,500 | 4,246 |
| Kern | 857,730 | $48,574 | $38,859 | 131,408 |
| Kings | 151,390 | $47,341 | $37,873 | 21,618 |
| Lake | 64,209 | $35,997 | $28,798 | 13,107 |
| Lassen | 33,356 | $53,351 | $42,681 | 4,614 |
| Los Angeles | 9,974,203 | $55,870 | $44,696 | 1,468,547 |
| Madera | 152,452 | $45,490 | $36,392 | 23,035 |
| Marin | 256,802 | $91,529 | $73,223 | 43,381 |
| Mariposa | 17,946 | $50,560 | $40,448 | 3,595 |
| Mendocino | 87,612 | $43,290 | $34,632 | 14,612 |
| Merced | 261,609 | $43,066 | $34,453 | 31,599 |
| Modoc | 9,335 | $38,560 | $30,848 | 1,822 |
| Mono | 14,193 | $61,814 | $49,451 | 2,044 |
| Monterey | 424,927 | $58,582 | $46,866 | 53,060 |
| Napa | 139,253 | $70,925 | $56,740 | 26,129 |
| Nevada | 98,606 | $56,949 | $45,559 | 18,057 |
| Orange | 3,086,331 | $75,998 | $60,798 | 495,098 |
| Placer | 361,518 | $73,747 | $58,998 | 68,143 |
| Plumas | 19,286 | $48,032 | $38,426 | 4,392 |
| Riverside | 2,266,899 | $56,592 | $45,274 | 308,338 |
| Sacramento | 1,450,277 | $55,615 | $44,492 | 235,550 |
| San Benito | 56,888 | $67,874 | $54,299 | 9,534 |
| San Bernardino | 2,078,586 | $54,100 | $43,280 | 395,897 |
| San Diego | 3,183,143 | $63,996 | $51,197 | 615,761 |
| San Francisco | 829,072 | $78,378 | $62,702 | 168,934 |
| San Joaquin | 701,050 | $53,253 | $42,602 | 141,485 |
| San Luis Obispo | 274,184 | $59,454 | $47,563 | 61,138 |
| San Mateo | 739,837 | $91,421 | $73,137 | 107,136 |
| Santa Barbara | 431,555 | $63,409 | $50,727 | 82,028 |
| Santa Clara | 1,841,569 | $93,854 | $75,083 | 251,321 |
| Santa Cruz | 267,203 | $66,923 | $53,538 | 51,736 |
| Shasta | 178,520 | $44,556 | $35,645 | 50,859 |
| Sierra | 3,019 | $43,107 | $34,486 | 510 |
| Siskiyou | 44,261 | $37,495 | $29,996 | 9,204 |
| Solano | 421,624 | $67,341 | $53,873 | 77,981 |
| Sonoma | 491,790 | $63,799 | $51,039 | 107,047 |
| Stanislaus | 522,794 | $49,573 | $39,658 | 115,865 |
| Sutter | 95,067 | $51,527 | $41,222 | 21,376 |
| Tehama | 63,284 | $42,369 | $33,895 | 9,799 |
| Trinity | 13,515 | $36,862 | $29,490 | 2,689 |
| Tulare | 451,108 | $42,863 | $34,290 | 55,492 |
| Tuolumne | 54,347 | $48,493 | $38,794 | 15,812 |

| | | | | |
|---|---|---|---|---|
| Ventura | 835,790 | $77,335 | $61,868 | 129,493 |
| Yolo | 204,162 | $55,508 | $44,406 | 43,601 |
| Yuba | 73,059 | $45,470 | $36,376 | 18,347 |

*Source:* Authors, American Community Survey 2014 5-Year Estimates

**Table A2.** Clustered Population and Households Below 80% Area Median Income within 150 Miles from the Coastal Zone Boundary

| | *County* | *Households* | *HH Income* | *80% HH Income* | *Num HH < 80%* |
|---|---|---|---|---|---|
| NORTH | **Del Norte County, California** | **28,066** | **$39,302** | **$31,442** | **4,340** |
| | Siskiyou County, California | 44,261 | $37,495 | $29,996 | 9,204 |
| | Modoc County, California | 9,335 | $38,560 | $30,848 | 1,822 |
| | | | | | 15,366 |
| | **Humboldt County, California** | **134,876** | **$42,153** | **$33,722** | **22,517** |
| | Trinity County, California | 13,515 | $36,862 | $29,490 | 2,689 |
| | Shasta County, California | 178,520 | $44,556 | $35,645 | 50,859 |
| | Lassen County, California | 33,356 | $53,351 | $42,681 | 4,614 |
| | Tehama County, California | 63,284 | $42,369 | $33,895 | 9,799 |
| | | | | | 90,478 |
| | **Mendocino County, California** | **87,612** | **$43,290** | **$34,632** | **14,612** |
| | Lake County, California | 64,209 | $35,997 | $28,798 | 13,107 |
| | Glenn County, California | 28,019 | $40,106 | $32,085 | 4,032 |
| | Colusa County, California | 21,424 | $50,503 | $40,402 | 3,421 |
| | Butte County, California | 221,578 | $43,165 | $34,532 | 35,632 |
| | Sutter County, California | 95,067 | $51,527 | $41,222 | 21,376 |
| | Yuba County, California | 73,059 | $45,470 | $36,376 | 18,347 |
| | Nevada County, California | 98,606 | $56,949 | $45,559 | 18,057 |
| | Plumas County, California | 19,286 | $48,032 | $38,426 | 4,392 |
| | Sierra County, California | 3,019 | $43,107 | $34,486 | 510 |
| | | | | | 133,486 |
| | | | | | **239,330** |
| BAY AREA | **Sonoma County, California** | **491,790** | **$63,799** | **$51,039** | **107,047** |
| | Napa County, California | 139,253 | $70,925 | $56,740 | 26,129 |
| | Yolo County, California | 204,162 | $55,508 | $44,406 | 43,601 |
| | Solano County, California | 421,624 | $67,341 | $53,873 | 77,981 |
| | Sacramento County, California | 1,450,277 | $55,615 | $44,492 | 235,550 |
| | Placer County, California | 361,518 | $73,747 | $58,998 | 68,143 |
| | El Dorado County, California | 181,465 | $68,507 | $54,806 | 36,285 |
| | Amador County, California | 37,159 | $52,964 | $42,371 | 6,613 |
| | | | | | 601,349 |
| | **Marin County, California** | **256,802** | **$91,529** | **$73,223** | **43,381** |
| | **San Francisco County, California** | **829,072** | **$78,378** | **$62,702** | **168,934** |
| | **San Mateo County, California** | **739,837** | **$91,421** | **$73,137** | **107,136** |
| | **Santa Cruz County, California** | **267,203** | **$66,923** | **$53,538** | **51,736** |

| | | | | | |
|---|---|---|---|---|---|
| | Contra Costa County, California | 1,081,232 | $79,799 | $63,839 | 179,975 |
| | Alameda County, California | 1,559,308 | $73,775 | $59,020 | 279,447 |
| | Santa Clara County, California | 1,841,569 | $93,854 | $75,083 | 251,321 |
| | San Joaquin County, California | 701,050 | $53,253 | $42,602 | 141,485 |
| | Stanislaus County, California | 522,794 | $49,573 | $39,658 | 115,865 |
| | Calaveras County, California | 44,921 | $54,936 | $43,949 | 8,483 |
| | Tuolumne County, California | 54,347 | $48,493 | $38,794 | 15,812 |
| | Alpine County, California | 1,202 | $61,343 | $49,074 | 144 |
| | | | | | 1,363,719 |
| | | | | | **1,965,068** |
| CENTRAL | **Monterey County, California** | **424,927** | **$58,582** | **$46,866** | **53,060** |
| | San Benito County, California | 56,888 | $67,874 | $54,299 | 9,534 |
| | Merced County, California | 261,609 | $43,066 | $34,453 | 31,599 |
| | Fresno County, California | 948,844 | $45,201 | $36,161 | 157,789 |
| | Mariposa County, California | 17,946 | $50,560 | $40,448 | 3,595 |
| | Madera County, California | 152,452 | $45,490 | $36,392 | 23,035 |
| | Mono County, California | 14,193 | $61,814 | $49,451 | 2,044 |
| | | | | | 280,656 |
| | **San Luis Obispo County, California** | **274,184** | **$59,454** | **$47,563** | **61,138** |
| | **Santa Barbara County, California** | **431,555** | **$63,409** | **$50,727** | **82,028** |
| | Kings County, California | 151,390 | $47,341 | $37,873 | 21,618 |
| | Kern County, California | 857,730 | $48,574 | $38,859 | 131,408 |
| | Tulare County, California | 451,108 | $42,863 | $34,290 | 55,492 |
| | Inyo County, California | 18,439 | $45,625 | $36,500 | 4,246 |
| | | | | | 355,930 |
| | | | | | **636,586** |
| LA / SOUTH | **Ventura County, California** | **835,790** | **$77,335** | **$61,868** | **129,493** |
| | **Los Angeles County, California** | **9,974,203** | **$55,870** | **$44,696** | **1,468,547** |
| | **Orange County, California** | **3,086,331** | **$75,998** | **$60,798** | **495,098** |
| | San Bernardino County, California | 2,078,586 | $54,100 | $43,280 | 395,897 |
| | Riverside County, California | 2,266,899 | $56,592 | $45,274 | 308,338 |
| | | | | | 2,797,373 |
| | **San Diego County, California** | **3,183,143** | **$63,996** | **$51,197** | **615,761** |
| | Imperial County, California | 177,026 | $41,772 | $33,418 | 20,640 |
| | | | | | 636,401 |
| | | | | | **3,433,774** |