

# Rebuilding for a Resilient Recovery

Planning in California's Wildland Urban Interface

JUNE 2021



## Appendix A: Detailed Methodology

This multifaceted schema enabled a robust investigation into possible pre- and post-wildfire rebuilding and recovery pathways that could mitigate future risk. While these three case study locations share a history of devastating wildfires, they are geographically, socioeconomically, and culturally distinct—which facilitates a nuanced conversation about rebuilding strategies in diverse contexts.

### Interviews

The report employed interviews throughout the research process to inform both the scenarios and policy recommendations. The research team conducted interviews with over 65 stakeholders from a diverse range of perspectives, including community stakeholders and local and regional government officials; state government officials; and experts in fire science, hazard mitigation, disaster recovery, insurance, fire response, community resilience and related fields, as summarized in Table 1 below. The research team conducted each interview conducted over Zoom as semi-moderated conversations that lasted approximately 45 minutes, on average. Interviews were usually conducted by 2-3 members of the research team, who took extensive written notes to document interview content and findings.

Interview Type	Number
Consultants & Policy Advocates	11
Local & Regional Government	11
Community-Based Organizations	8
Academia	7
State & Federal Government	9
Philanthropy	3

### Scenario Exercise

This report uses scenario planning as a tool that enables planners, policymakers, and community members to “transcend the prediction tunnel and open [their] minds to new and multiple possibilities.”<sup>1</sup> In this sense, scenarios can test specific planning strategies, generating quantitative outputs for alternative futures that can inform policy-making more generally. As such, this analysis is more of a ‘scenario exercise’ than ‘scenario planning,’ as the outcomes

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<sup>1</sup> Rickards, L., Wiseman, J., & Edwards T. (2014). The problem of fit: scenario planning and climate change adaptation in the public sector. *Environment and Planning C: Government and Policy* 32: 641-662.

generated are not proposals for these individual communities, but instead, a tool for informing this research.

In developing these scenarios, the research team drew from existing literature on the subject. This process revealed that scenario planning's greatest strength can also present significant limitations. Its ability to question long-held beliefs can be controversial and prompt institutional and community-wide opposition.<sup>2</sup> To address this concern, the scenarios were designed in consultation with local stakeholders. These conversations offered insight into past and ongoing recovery efforts at the household and community-levels.

While the scenarios incorporate community feedback, they are meant to provide a high-level understanding of the many trade-offs associated with recovery strategies and are exploratory, rather than practical, in nature. They are not proposals for how the case study communities should adapt. Instead, tailoring alternative futures for these unique case study communities highlights nuanced strategies that are generalizable and applicable to a variety of California communities grappling with wildfire recovery and mitigation.

The research team also evaluated scenarios using UrbanFootprint, an online planning and analysis software, and IMPLAN, a software tool that is used to estimate economic and fiscal impacts of new development. Below is an overview of how these tools were used.

### Urban Footprint Analysis

UrbanFootprint updates its base canvas data regularly to provide users with accurate estimates when designing scenarios and comparing results. It extrapolates a number of metrics from Census data and applies them to land use classifications (e.g., changing the land use from townhouse to estate lot will trigger changes to outputs via assumptions tied to land use type). Parcel data sourced from CoreLogic populates land uses and building attributes, when available.<sup>3</sup> The program then uses 2010 block group Census data to identify and fill in gaps and check the accuracy of parcel data. UrbanFootprint uses dwelling units to estimate the number of households by using 2018 American Community Survey 5-year estimates for occupancy rate. This means that UrbanFootprint assumes all units are occupied and adjusts household estimates to reflect the vacancy rate. UrbanFootprint then calculates population estimates based on Census dwelling unit characteristics and average household size. Thus, population and unit counts do not reflect reality in a definitive way and should be analyzed comparatively rather than on a stand-alone basis. Additionally, UrbanFootprint creates outputs by condensing specific development types into four categories of residential units: Large Lot Detached Single-Family, Small Lot Detached Single-Family, Attached Single-Family, and

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<sup>2</sup> *ibid.*

<sup>3</sup> Base Parcel Canvas Creation. UrbanFootprint. Available at: <https://help.urbanfootprint.com/methodology-documentation/base-parcel-canvas-creation>

Multifamily. These oversimplified classifications produce output values that may not fully encompass the full variety of building types in the real world, or characteristics of certain scenarios. For example, scenarios that use manufactured home units and ADUs likely underestimate certain outputs due to this simplification.

In several scenarios, green space as a wildfire buffer was added. In UrbanFootprint, users have the choice of what land use type makes up this buffer (e.g., Parks & Open Space, Orchard, Natural Shrub, etc). For the purposes of the Santa Rosa scenarios, agricultural land was used as a buffer for Scenario 3 ('Resilience Nodes'); the remaining scenarios did not include a wildfire buffer. For the purposes of the Paradise scenarios, the Parks & Open Space type was used for all new greenspace development as a tool for maintaining consistency across scenarios (with an exception detailed later to test the effect of conservation land uses). The authors note that UrbanFootprint categorizes Parks & Open Space as development rather than natural lands, which artificially increases outputs related to water use and land consumption and masks the benefits of conservation. The land use representations of these buffers in UrbanFootprint do not represent this important debate and should be understood as placeholder wildfire buffer space with indeterminate land uses and vegetation types that require further study and local expertise.

UrbanFootprint has limitations for this report's case study findings. Since the scenarios focused primarily on residential development, calculations dependent on "jobs-housing balance" may have been skewed by assuming new residents would have to drive further for both residential-serving retail and job access. This is relevant for VMT and associated GHG calculations. Additionally, VMT calculations apply commute data generated from the base scenario to calculate VMT for new scenarios, which may result in outputs that do not fully reflect the VMT benefits of locating closer to job centers. Lastly, since the scenarios did not alter transit and transportation networks, scenario outputs may assume heavy reliance on automobile transportation, even in densified and mixed-use nodes. These factors ultimately make the analysis more conservative.

### IMPLAN Analysis

To estimate the one-time impacts of the scenarios, the total number of new units constructed in each scenario was used as an input. These units were separated into single family (e.g. attached, detached, accessory dwelling units, and manufactured units) and multifamily to account for the different costs associated with each type of housing. To estimate ongoing impacts, the research team input estimated household spending based on projected net new population and county-level median household income. The team then ran the IMPLAN analysis to see the one-time and ongoing impacts for each case study scenario.

IMPLAN is a proprietary software and the research team was unable to assess the assumptions underlying the calculations. The software simply required a number of inputs and then reported

the results. While IMPLAN is a commonly used software, it is nonetheless important to highlight areas in which the research team could not be completely transparent. Second, IMPLAN's results show economic impacts at the county level. Therefore, IMPLAN's economic impact estimates are likely conservative. In reality, other cities in Sonoma, Butte, and Ventura counties would also grow. Despite these limitations, a county-level analysis is appropriate, because wildfires have regional and county-wide economic impacts.

## Appendix B: Fiscal Impact Analysis

Table B-1. Existing WUI Development in California

Parcel Type	Population	DUs	Improvement Value	Land Value	Total Value
Multifamily	518,007	233,586	\$18,303,039,135	\$13,935,362,000	\$33,182,862,371
Single-Family Attached	136,456	57,347	\$5,921,721,663	\$6,085,991,266	\$11,779,025,055
Single-Family Detached	2,760,252	1,145,984	\$327,323,664,214	\$340,774,185,731	\$668,090,619,468
Total	3,406,807	1,456,292	\$404,941,776,101	\$425,449,800,455	\$830,927,210,467

Table B-2. WUI Development Capacity in California

Parcel Type	Under-Built Parcels	Current DUs	Improvement Value	Land Value	Total Value	Development Capacity
<i>(on under-built parcels)</i>						
Multifamily	10,401	53,539	\$3,510,292,177	\$6,885,328,735	\$10,385,132,165	\$3,270,810,598
Single-Family Attached	9,071	22,981	\$1,720,492,208	\$3,719,244,583	\$5,309,336,166	\$1,933,776,072
Single-Family Detached	362,525	412,958	\$103,820,328,202	\$334,483,594,467	\$334,483,594,567	\$123,057,410,075
Total	866,766	503,220	\$115,221,573,661	\$407,164,691,722	\$407,164,691,722	\$137,859,166,929

Table B-3. Potential Annual Lost Tax Revenue from WUI Disasters

Parcel Type	Total Value	Annual Property Taxes
Multifamily	\$33,182,862,371	\$331,828,624
Single-Family Attached	\$11,779,025,055	\$117,790,251
Single-Family Detached	\$668,090,619,468	\$6,680,906,195
<b>Total</b>	<b>\$830,927,210,467</b>	<b>\$8,309,272,105</b>

Note: Assumes everything in the WUI burns and a property tax rate of 1%

Table B-4. Potential Levy on Current WUI Units

Parcel Type	Total Value	Annual Levy	NPV, 30-Year	Total, 30-Year
Multifamily	\$33,182,862,371	\$82,957,156	\$1,264,344,456	\$3,365,412,472
Single-Family Attached	\$11,779,025,055	\$29,447,563	\$825,632,597	\$2,781,639,922
Single-Family Detached	\$668,090,619,468	\$1,670,226,549	\$20,725,910,028	\$50,160,796,460
<b>Residential and Vacant Subtotal</b>	<b>\$725,022,150,080</b>	<b>\$1,812,555,375</b>	<b>\$23,187,216,570</b>	<b>\$57,151,572,093</b>
<b>Total</b>	<b>\$830,927,210,467</b>	<b>\$2,077,318,026</b>	<b>\$25,777,524,938</b>	<b>\$62,319,540,785</b>

Note: Assumed levy at 0.25%, inflation rate of 2%, and a discount rate of 7%. NPV is the net present value.

## Appendix C: Detailed Policy Recommendation Matrix

Policy Recommendations for a Resilient Wildland Urban Interface
<p>These recommendations are informed by this report's case studies and offer a menu of tools that can transfer the costs of WUI sprawl to subsidize infill development. Often the only opportunity to change land use patterns is following a disaster, but a transformative recovery is only possible if the tools and mechanisms are ready before disaster strikes. WUI sprawl increases wildfire suppression, mitigation, and disaster costs, on top of the higher fiscal burden and carbon emissions that result from urban sprawl.</p> <p>Shifting new development in California away from the WUI and towards sustainable infill will provide fiscal, environmental, and climate benefits, while also reducing hazard mitigation and disaster recovery costs. In order to promote long-term fiscal health, reduce carbon emissions, protect California's valuable natural assets, and advance disaster resilience, the State must implement new planning, policy, and funding mechanisms that minimize new WUI development and enable infill development affordable to people of all income levels.</p>



Policy Recommendations for a Resilient Wildland Urban Interface		
Policy Type	Policy Goal	Policy Recommendation
Funding and Financing	Reducing Vulnerability	<p><b>Incorporate disaster resilience financing districts</b></p> <p><i>Local or regional governments and residents can incorporate districts that have bond authority to finance pre-disaster resilience planning, community hazard mitigation, and post-disaster relief and recovery. Districts would encourage regional revenue sharing and enable strategic investments at larger geographic scales. Local financing offers flexibility to how these resilience funds can be used. Resilience pays for itself over time, so bonds are an appropriate financing mechanism, in which cash flow becomes commensurate with the benefits. Federal and state subsidies are helpful inducements to make this type of local or regional investment more attractive to voters, who will understand that they are at risk and that they are paying into a bond financing mechanism that will protect local fiscal health and regional property values.</i></p>
	Housing Supply and Resilience	<p><b>Support post-disaster financing for multifamily and missing middle infill housing development</b></p> <p><i>State can help capitalize revolving loan funds for duplexes and ADUs in post-disaster receiving communities out of the WUI to support housing supply in vulnerable regions. Such a program accelerates production at a point when the housing supply is urgently needed and when federal disaster recovery funds are already flowing. This recommendation seeks to support post-disaster housing recovery for people at all income levels. Many people will relocate temporarily or permanently to receiving communities, which will ultimately benefit from an expanded housing supply and greater diversity in housing options.</i></p>
	Reducing Vulnerability	<p><b>Statewide property insurance surcharge for hazard mitigation and climate adaptation</b></p> <p><i>The Legislature could approve a surcharge on the full state, recognizing the complex and statewide implication of a tight and unaffordable housing market and local fiscal pressure to encourage new greenfield development on working lands in the WUI.</i></p>

Policy Recommendations for a Resilient Wildland Urban Interface		
Incentives and Disincentives	Reducing Vulnerability	<p><b>Promulgate risk ratings and insurance premiums that incentivize community-scale home hardening, defensible space, and wildfire buffers</b></p> <p><i>The Department of Insurance (CDI) should embrace regulatory reform and leverage the insurance market to promote community hazard mitigation. A community-scale approach is needed, since one structure's exposure is dependent upon surrounding structures and vegetation. Admitted market insurance rates in the WUI should rise to reflect increasing risk, but policyholders should be encouraged to lower their rates through home hardening and vegetation management. Fire Departments or Fire Safe Councils can receive additional funding to support planning and home hardening programs. Disaster Resilience Financing Districts could also be instrumental in facilitating community or regional scale hazard mitigation efforts.</i></p>
	Housing Supply Resilience	
	Reducing Vulnerability	<p><b>Reinstate a more encompassing hazard severity zone development impact fee</b></p> <p><i>While the state may not be able or even want to prohibit all new development in high-risk WUI areas, it should disincentivize it. Hardened homes in high fire risk areas are still vulnerable. All new development in the WUI should be subject to a development impact fee that supports wildfire resilience costs, including mitigation, adaptation, and suppression.</i></p>
	Reducing Vulnerability	<p><b>Offer tax incentives for households that relocate out of the WUI</b></p> <p><i>Build on the recent Proposition 19 and AB 3012, which allow wildfire victims to transfer their existing property tax base to a new location and allow survivors to use their insurance payout to relocate. The state should offer additional tax incentives for homeowners who relocate out of the WUI.</i></p>
	Reducing Vulnerability	<p><b>Wildfire suppression fees on WUI homeowners</b></p> <p><i>The state should weigh the cost of wildfire suppression towards those who most directly benefit from this growing taxpayer expense. The Legislature could authorize Cal Fire to determine which properties should be assessed. Low and moderate-income homeowners and manufactured housing residents should be exempt.</i></p>
Protecting Natural and Working Lands	<p><b>Award grants and offer preferential state assistance to regions or localities for affordable housing or climate adaptation that adopt and enforce urban growth boundaries that protect natural and working lands</b></p> <p><i>The state should offer fiscal incentives for UGBs and greenbelts that support the conservation of environmentally-valuable but high-risk forests and open spaces and agricultural working lands.</i></p>	
Reducing Vulnerability		



Policy Recommendations for a Resilient Wildland Urban Interface		
Interagency Coordination	Reducing Vulnerability	<p><b>Establish an interagency strategy between Cal HCD and Cal OES for buyouts and hazard mitigation</b></p> <p><i>State agencies investing federal and state funds for wildfire resilience should collaborate on their project selection criteria and outcomes. Cal HCD and Cal OES both administer federal hazard mitigation and disaster relief and recovery funding and should ensure inter-agency funding strategies are in alignment.</i></p>
	Housing Supply and Resilience	<p><b>Identify buyout opportunity areas</b></p> <p><i>Cal Fire, Cal OES, and Cal HCD should coordinate to identify buyout opportunity areas to begin planning for strategic buyouts and managed retreat from the highest risk areas. This managed retreat approach can complement a standing state post-disaster buyout program for homeowners who move out of the WUI. The state should offer seed financing and grants to regional or state agencies that administer buyouts, for example, a disaster resilience financing district.</i></p>
	Protecting Natural and Working Lands	<p><b>Promulgate statewide land use guidelines in the WUI, developed by an interagency task force including Cal Fire, Cal HCD, Cal OES, and other non-governmental stakeholders</b></p> <p><i>The state should formalize land use guidelines for new development in the WUI to require development patterns that reduce risk of wildfire ignition in the built environment. Strategies from this report's case studies offer examples for lower risk land uses in the WUI.</i></p>
Regional Governance and Capacity Building	Reducing Vulnerability	<p><b>Authorize regional agencies with standing authority to issue bonds for climate adaptation and resilience</b></p> <p><i>The state Legislature should grant regional planning agencies (Metropolitan Planning Organizations/Council of Governments (MPO/COGs)) standing authority to raise revenue for climate and disaster resilience in metropolitan regions. Regional revenue sharing can spread risk and reduce fiscal vulnerabilities to wildfires. MPOs/COGs that can build and coordinate support for new taxes and revenue for regional adaptation and resilience will have greater flexibility and capacity to invest in the interjurisdictional planning and projects needed to reduce future risk and vulnerability. While regional agencies could stand up new programs, these funds could also be used for programs under AB 38 or fund the local match for FEMA's Hazard Mitigation Grant Program (HMGP), and HUD's Community Development Block Grant Mitigation (CDBG-MIT) Program.</i></p>
	Reducing Vulnerability	<p><b>Require all MPOs, COGs, or counties to lead regional pre-disaster resilience plans for post-disaster recovery</b></p>
	Housing Supply Resilience	<p><i>State awards grants to regional convening entities to conduct regional disaster resilience planning and corresponding local disaster resilience planning. Regional climate and disaster resilience planning should be accompanied by aligned local resilience planning.</i></p>

Policy Recommendations for a Resilient Wildland Urban Interface		
	Reducing Vulnerability	<b>Require all local governments to conduct pre-disaster recovery and resilience planning as a component of all existing General Plan elements and in alignment with Local Hazard Mitigation Plans</b>
	Housing Supply Resilience	<i>The state will need to fund this mandate with planning grants. The Governor's Office of Planning and Research can role in consultation with Cal OES, HCD, Cal Fire, the California Coastal Commission, and other relevant stakeholders.</i>
	Reducing Vulnerability	<b>Integrate disaster resilient and hazard mitigation planning into existing regional planning processes, including Regional Housing Needs Assessments and Sustainable Communities Strategies in metropolitan regions</b>
	Protecting Natural and Working Lands	<i>The state needs to elevate resilience planning as a regional priority that has the same importance as housing and sustainability planning. Resilience has risen to this level of urgency and needs to be addressed concurrently with regional housing and transportation planning.</i>
	Reducing Vulnerability	<b>Promote transfer of development rights and capitalize TDR banks</b>
	Protecting Natural and Working Lands	<i>The Strategic Growth Council should award grants to capitalize TDR banks that limit WUI development and protect working lands. Special consideration should be given to cities, counties, or regions that have reduced barriers to new affordable infill development.</i>
Protecting Vulnerable Populations	Housing Supply and Resilience	<b>Promulgate post-disaster community preference policies for renters</b> <i>HCD should provide technical assistance and planning grants to local, county, and regional agencies to develop community preference policies for renters who have been displaced by disasters. Regional, or county-wide approaches may be the most effective, since disasters can displace people across jurisdictional lines.</i>
	Housing Supply and Resilience	<b>Award pre- and post-disaster planning grants for supporting resilience and recovery of manufactured housing communities (MHCs) in disaster-affected regions</b> <i>The state needs to fill an inadequately understood housing type in the WUI. MHCs are an important source of affordable housing throughout California and especially in rural communities. Many communities erect barriers to manufactured housing, forcing MHCs into less resourced jurisdictions and more hazardous areas. Social stigma against MHCs may reinforce existing disadvantages their residents face in federal disaster recovery fund allocations. MHC planning grants will support the resilience of this growing segment of the housing market and advance equity in disaster recovery.</i>



Policy Recommendations for a Resilient Wildland Urban Interface		
Catastrophe Modeling and Insurance	Reducing Vulnerability	<p><b>Collect standardized and comprehensive data on wildfire suppression, mitigation, and disaster damage costs</b></p> <p><i>A standardized and complete data set on all local wildfire costs is needed to advance understanding the specific costs and benefits of specific wildfire mitigation interventions. OPR in coordination with the Department of Insurance, HCD, OES, and Cal Fire should collect and standardize these data.</i></p>
	Reducing Vulnerability  Housing Supply Resilience	<p><b>Allow insurance companies to use catastrophe models to set more granular risk ratings, while protecting vulnerable households from unaffordable premiums</b></p> <p><i>Insurance companies need to be able to use catastrophe models to assess risk and set rates, but policyholders should be entitled to adjust any resulting rate increases down by carrying out risk reduction measures, certified by a local fire department or third party entity like a Fire Safe Council. To allow insurers to set climate change-informed rates, the state must offer grants or no-interest loans to low and moderate-income households to ensure that the most vulnerable households are not left behind.</i></p>