A PILOT WILDFIRE RISK ASSESSMENT FOR CALIFORNIA

PREPARED FOR:
Bureau of Land Management, California State Office
California Department of Forestry and Fire Protection
United States Forest Service, Pacific Southwest Region

PREPARED BY:
Jim Napoli, Julie W. Gilbertson-Day,
Joe H. Scott, Kevin C. Vogler, April Brough

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TABLE OF CONTENTS

LIST OF FIGURES

1 EXECUTIVE SUMMARY

The pilot effort to assess risk to certain highly valued resources and assets is an extension of the California All-Lands Hazard Assessment, a project funded by the USDA Forest Service that produced fuel and wildfire hazard information for the year 2020. Since that time, the wildfire hazard data has been updated to reflect the historic wildfire events of 2020 that impacted millions of acres across the state.

As a pilot assessment, the set of Highly Valued Resources and Assets (HVRA) was limited to housing, critical infrastructure, and surface drinking water — those most commonly identified HVRA for wildfire risk assessments and generally most representative of risk to communities. These HVRA were identified at the outset of the project as a baseline assessment of wildfire risk that can be expanded with a larger set of HVRA as additional funding and projects are identified. In February 2022, a small group of interagency stakeholders met virtually to review and edit HVRA characterization inputs needed to calculate wildfire risk. Their task was to review a preliminary set of Response Functions that characterized each HVRA's response to fires of different intensity levels, to assign Relative Importance values which establish the ranking of the primary HVRA relative to each other, and agree on a common set of inputs needed to calculate wildfire effects analyses described in this report.

Leveraging the results of the updated 2021 wildfire hazard products, the pilot wildfire risk assessment consists of three parts: wildfire risk assessment and associated HVRA characterization, wildfire risk transmission analysis and summaries by county and jurisdiction, and updating the Risk to Communities summary tables (based initially on 2020 results) using the more recent wildfire hazard data. Reports documenting the methods and results of the original fuelscape[1] and wildfire hazard products[2] are available for download.

Changes to the community rankings are expected due to factors other than simply updating the wildfire hazard data. In the most recent fuelscape and hazard data, changes were made to vegetation types labeled as "ruderal" in the LANDFIRE Existing Vegetation Type (EVT) dataset. These vegetation assignments led to reduced fire behavior – in the original Risk to communities effort – in vegetated areas that were expected to produce fire behavior more like the neighboring wildland fuels than highly developed areas. In the 2021 effort, these areas with a Building Cover[3] percentage less than five percent were set to the vegetation type of their neighbors. This produced an increase in fire behavior in these areas as compared with the fire behavior metrics summarized in the 2020 Risk to Communities tables.

The perimeter event sets produced in simulations of wildfire likelihood were used to compare the sources of wildfire risk (risk transmission) across counties and general land-management jurisdictions within each county. Wildfire risk transmission is then compared with *in situ* wildfire

[1] CAL Fuelscape report: http://pyrologix.com/wp-content/uploads/2021/06/CAL_FuelscapeReport.pdf
[2] CAL Wildfire Hazard report: http://pyrologix.com/reports/Contemporary-Wildfire-Hazard-Across-California.pdf
[3] Building Coverage (BuildingCover): https://www.fs.usda.gov/rds/archive/catalog/RDS-2020-0060

risk to identify the counties and land ownerships on which damaging wildfires tend to occur and originate.

This report documents the wildfire risk portion of the quantitative wildfire risk assessment. While this report was generated by Pyrologix LLC, the overall analysis was developed as a collaborative effort with numerous agencies and partners providing data and feedback.

1.1 PURPOSE OF THE ASSESSMENT

The purpose of the California All Lands Risk Assessment-Pilot (CAL) is to provide foundational information about wildfire hazard across the geographic area. Such information supports wildfire response, regional fuel management planning, and revisions to land and resource management plans. A wildfire risk assessment is a quantitative analysis of the assets and resources across a specific landscape and how they are potentially impacted by wildfire. The CAL analysis considers:

- likelihood of a fire burning,
- the intensity of a fire if one should occur,
- the exposure of assets and resources based on their locations, and
- the susceptibility of those assets and resources to wildfire.

To manage wildfire across that state, accurate wildfire risk data must be available to inform land and fire management strategies. These risk outputs can be used to aid in the planning, prioritization, and implementation of prevention and mitigation activities. In addition, the risk data can be used to support fire operations in response to wildfire incidents by identifying those assets and resources most susceptible to fire.

1.2 QUANTITATIVE RISK MODELING FRAMEWORK

The basis for a quantitative framework for assessing wildfire risk to highly valued resources and assets (HVRAs) has been established for many years (Finney 2005; Scott 2006). The framework has been implemented across a range of scales, from an individual county (Ager et al. 2017), a portion of a national forest (Thompson et al. 2013), individual states (Buckley et al. 2014), to the entire continental United States (Calkin et al. 2010). In this framework, wildfire risk is a function of two main factors: 1) wildfire hazard and 2) HVRA vulnerability (Figure 1).

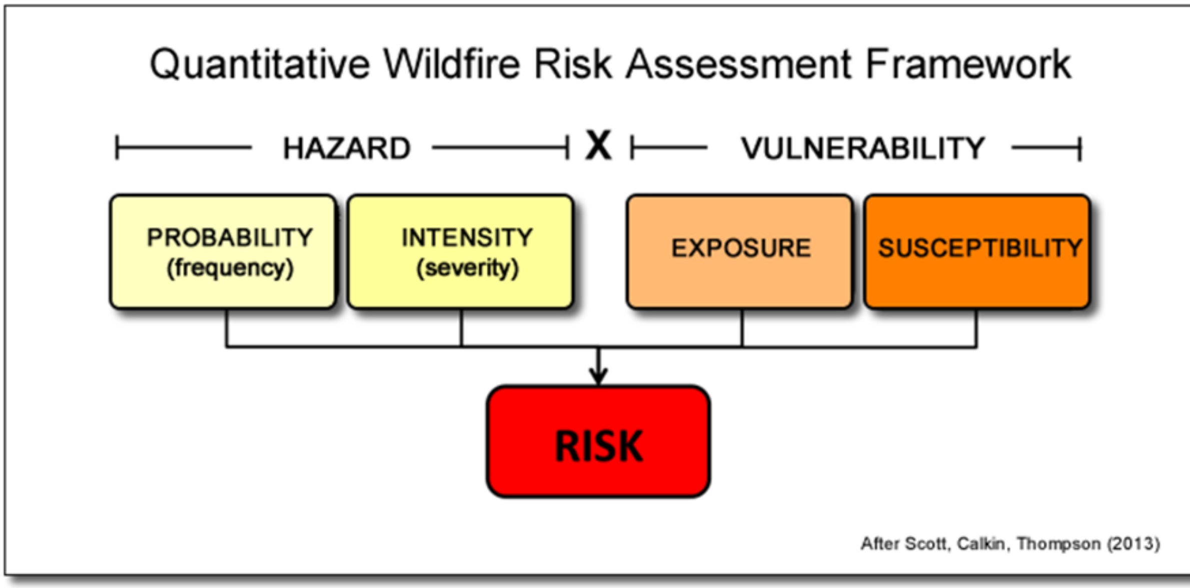

Figure 1. The components of the Quantitative Wildfire Risk Assessment Framework.

Wildfire hazard is a physical situation with the potential for causing damage to vulnerable resources or assets. Quantitatively, wildfire hazard is measured by two main factors: 1) burn probability (or likelihood of burning), and 2) fire intensity (measured as flame length, fireline intensity, or other similar measures).

HVRA vulnerability is also composed of two factors: 1) exposure and 2) susceptibility. Exposure is the placement (or coincidental location) of an HVRA in a hazardous environment—for example, building a home within a flammable landscape. Some HVRAs, like wildlife habitat or vegetation types, are not movable; they are not "placed" in hazardous locations. Still, their exposure to wildfire is the wildfire hazard where the habitat exists. Finally, the susceptibility of an HVRA to wildfire is how easily it is damaged by wildfire of different types and intensities. Some assets are fire-hardened and can withstand very intense fires without damage, whereas others are easily damaged by even low-intensity fire.

2 RISK ANALYSIS OVERVIEW

For any risk assessment, it is imperative to have spatial continuity across all aspects of project development. This ensures data alignment and logically consistent results across all data products. The project boundaries used in the California All Lands Risk Assessment-Pilot are described below in sections 2.1.1 – 2.1.3 and are shown in Figure 2.

2.1 LANDSCAPE ZONES

2.1.1 ANALYSIS AREA

The Analysis Area (AA) is the area for which valid burn probability results are produced. The Analysis Area for the California All Lands Risk Assessment-Pilot (CAL) pilot was defined as a 10-kilometer buffer on the state boundary (Figure 2). Further details about the methods and base data used to generate the CAL landscape zones are available in the fuelscape report.

2.1.2 FIRE OCCURRENCE AREAS

To ensure valid Burn Probability (BP) results in the AA and prevent artificial reduction in BP near the AA boundary, it is necessary to allow FSim to start fires outside of the AA and burn into it. This larger area where simulated fires are started is called the Fire Occurrence Area (FOA). We established the FOA extent as a 30-km buffer on the AA. The buffer was expanded into northwest Nevada to include the entirety of the administrative units of the California state office of the Bureau of Land Management (Figure 2). The adjusted buffer provides sufficient area to ensure all fires that could reach the AA are simulated.

The Fire Occurrence Area covers roughly 127.5. million acres and is characterized by diverse topographic and vegetation conditions. We divided the overall FOA extent into fourteen individual FOAs to model this large area where historical fire occurrence and fire weather are highly variable. Individual FOA boundaries were developed to group geographic areas that experience similar patterns of wildfire occurrence. These boundaries were generated using a variety of inputs including large-fire occurrence boundaries developed for national-level work (Short et al. 2020), aggregated level IV EPA Ecoregions, and local fire staff input. For consistency with other FSim projects, we numbered these FOAs 510 through 523.

2.1.3 FUELSCAPE EXTENT

The available fuelscape extent was delineated by adding a 30-km buffer to the FOA extent. This buffer allows fires starting within the FOA to grow unhindered by the edge of the fuelscape, which would otherwise truncate fire growth and affect the simulated fire-size distribution, potentially introducing errors in the calibration process. A map of the AA, FOA boundaries and fuelscape extent are presented in Figure 2.

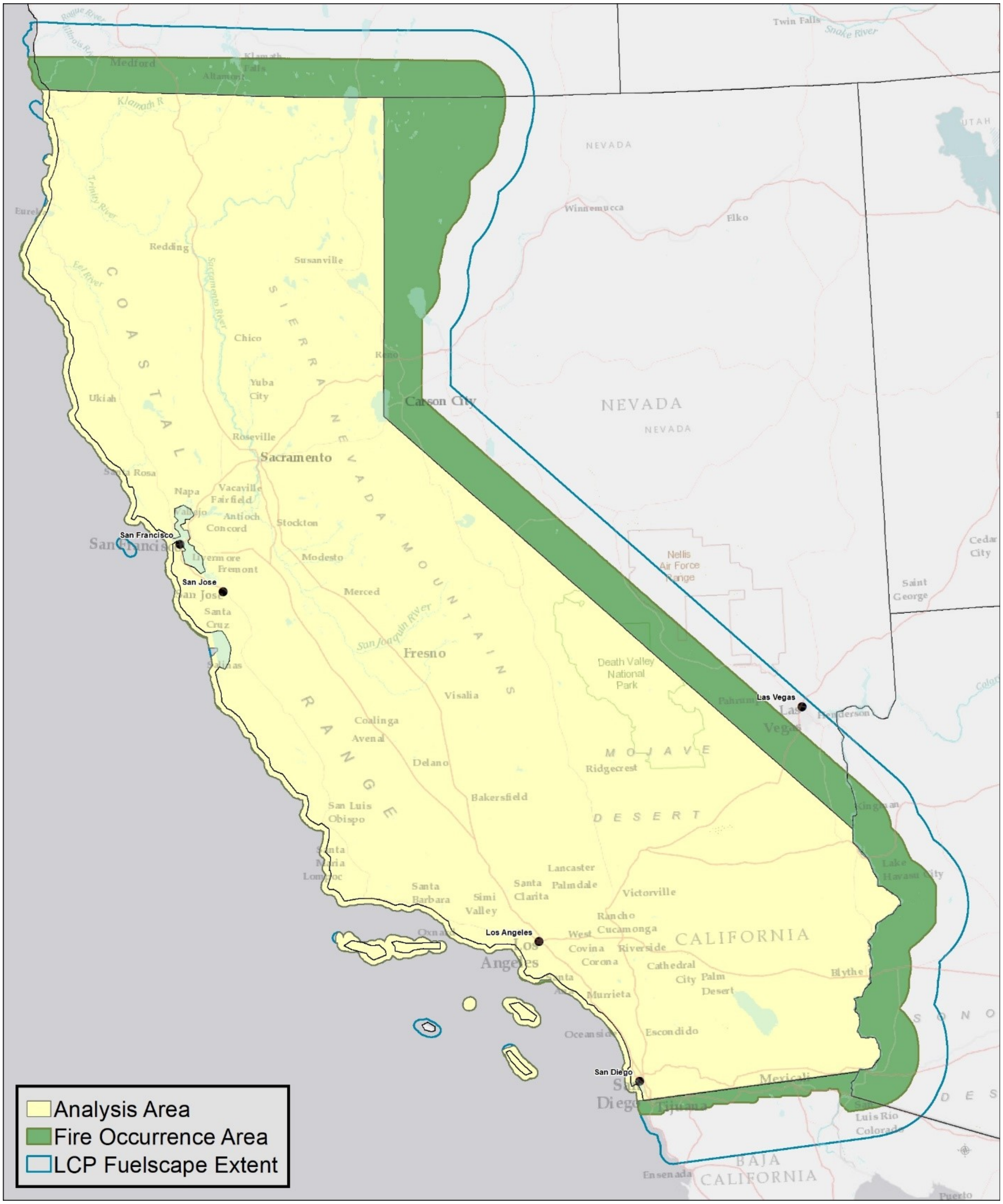

Figure 2. Overview of landscape zones for California Wildfire Risk Pilot.

3 ANALYSIS INPUTS

Quantifying wildfire risk requires a comprehensive assessment of a focus area's high-value resources and assets, integrated with wildfire hazard (burn probability and fire intensity). A critical component to determining relevant wildfire hazard metrics is an accurate current condition fuelscape. The integrated risk assessment inputs are discussed further in Sections 3.1- 3.2.

3.1 FUELSCAPE

The foundation of any wildfire hazard assessment is a current condition fuelscape updated for recent disturbances and calibrated to reflect the fire behavior potential realized in recent historical wildfire events. LANDFIRE 2016 Remap 2.0.0 (LF Remap) data was leveraged to generate a calibrated fuelscape for this state-wide assessment.

The fuelscape consists of geospatial datasets representing surface fuel model (FM40), canopy cover (CC), canopy height (CH), canopy bulk density (CBD), canopy base height (CBH), and topography characteristics (slope, aspect, elevation). The FM40 dataset can be seen in Figure 3 in groups of similar fuel types. The fuelscape datasets can be combined into a single landscape (LCP) file and used as a fuelscape input in fire modeling programs. Further details about the methods and base data used to generate the calibrated CAL all lands fuelscape are available in the fuelscape report.

Figure 3. Map of fuel model groups across the California All Lands LCP extent.

3.2 WILDFIRE HAZARD

3.2.1 WILDFIRE SIMULATION (BURN PROBABILITY)

The FSim large-fire simulator was used to quantify wildfire hazard across the landscape at a pixel size of 120 m (3.5 acres per pixel). FSim is a comprehensive fire occurrence, growth, behavior, and suppression simulation system that uses locally relevant fuel, weather, topography, and historical fire occurrence information to make a spatially resolved estimate of the contemporary likelihood and intensity of wildfire across the landscape (Finney et al. 2011). To enable greater resolution on HVRA mapping, we chose to upsample the FSim burn probability (BP) raster from its native resolution of 120 m to 30 m. Further details regarding methods and hazards results are available in the hazard report[1].

3.2.2 INTENSITY CALCULATIONS

In addition to estimates of wildfire likelihood, FSim produces measurements of predicted wildfire intensities. Due to the inherent challenges of estimating intensity with a stochastic simulator, estimates of fire intensity were developed using a custom Pyrologix utility called WildEST (Scott et al. 2020). WildEST is a deterministic wildfire modeling tool that integrates spatially continuous weather input variables, weighted based on how they will likely be realized on the landscape. This makes the deterministic intensity values developed with WildEST more robust for use in effects analysis than the stochastic intensity values developed with FSim. This is especially true in low wildfire occurrence areas where predicted intensity values from FSim are reliant on a very small sample size of potential weather variables. The WildEST methodology is further described in Section 3 of the Hazard report[2].

3.3 HVRA CHARACTERIZATION

Highly Valued Resources and Assets (HVRA) are the resources and assets on the landscape most likely to warrant protection if found to be at risk of wildfire. The key criteria for inclusion in the CAL pilot assessment is an HVRA must be of greatest importance to the state, the spatial data must be readily available, and the spatial extent of the identified HVRA must be complete.

There are three primary components to HVRA characterization: HVRAs must be identified, and their spatial extent mapped, their response to fire (negative, or neutral) must be characterized, and their relative importance to each other must be determined.

3.3.1 HVRA IDENTIFICATION

A set of HVRA was identified based on readily available spatial datasets for the entire state. The complete list of HVRA and their associated data sources are listed in Table 1.

Table 1. HVRA and sub-HVRA identified for the CAL Risk Assessment Pilot and associated data sources.

HVRA & Sub-HVRA	Data Source
People and Property	
People and Property	This data set represents housing unity density data (HUDen) produced by Pyrologix using the building footprints and U.S. Census — Census Block population data.
Infrastructure	
Electric transmission lines – high & low voltage	Geo-spatial data representing electric power transmission lines acquired from the Homeland Infrastructure Foundation-Level Data (HIFLD) program.
Communication Sites	Communication sites were acquired from the Homeland Infrastructure Foundation-Level Data (HIFLD) program including cellular towers, land mobile towers, FM/AM transmission towers, microwave service towers, paging transmission towers, antenna structure, TV analog/digital transmitters, broadband radio transmitters, internet service providers, and internet exchange points.
Power	Data representing the geo-spatial location of power plants and substations was acquired from the Homeland Infrastructure Foundation-Level Data (HIFLD) program.
Drinking-Water	
Surface Drinking Water	Surface drinking water (24-hour) protection areas were acquired from the EPA Source Water Protection Area program.

To the degree possible, HVRA are mapped to the extent of the Analysis Area boundary (Figure 2). This is the boundary used to summarize the final risk results.

3.3.2 RESPONSE FUNCTIONS

Each HVRA selected for the assessment must also have an associated response to wildfire, whether neutral or negative. We relied on expertise from previous risk assessments to determine initial response function assignments. The initial RF assignments were reviewed and finalized during a virtual workshop (February 12, 2022) attended by interagency representatives from across the state. The focus of the discussion was to review each resource or asset's response to fires of different intensity levels and characterized the HVRA response using values ranging from -100 to 0. The flame-length values corresponding to the fire intensity levels used in risk calculations are shown in Table 2. The response functions (RFs) used in the risk results are shown in Table 3 thru Table 7 below.

Table 2. Flame-length values corresponding to Fire Intensity Levels used in assigning response functions.

Fire Intensity Level (FIL)	**1**	**2**	**3**	**4**	**5**	**6**
Flame Length Range (feet)	0-2	2-4	4-6	6-8	8-12	12+

3.3.3 RELATIVE IMPORTANCE

The relative importance (RI) assignments are needed to integrate results across all HVRA. Without this input from leadership to prioritize among HVRA, the default is to assume equal weighting among HVRA – a result that is never a desired outcome. Initial RI suggestions were provided by Pyrologix using information and lessons learned from previous risk assessments. The RI assignments were reviewed and finalized during a virtual workshop (February 12, 2022) with interagency representatives. The focus of this discussion was to review the importance and ranking of the primary HVRAs relative to each other. The People and Property HVRA received the greatest share of RI at 60 percent, followed by the Infrastructure (20%) and Water (20%) HVRA (Figure 4). These importance percentages reflect the overall importance of the primary HVRA relative to each other.

Because Overall Relative Importance percentages are based on expert opinion, there is no mathematical way to determine whether final RI values are appropriate. The question was asked during the virtual review of how much importance homes (People and Property HVRA) were worth per person relative to Surface Drinking Water on a per person-served basis. To address this question, we calculated the per-person share of People and Property HVRA based on the 2019 California Census population estimates, versus the total population served by public water supply systems (ca 2019) identified in this assessment. The results very similar RI values per person, with homes receiving 1.5 percent of the importance per person, and surface drinking water receiving 1.1 percent per person.

Sub-RIs consider both the relative importance per unit area and the mapped extent of the Sub-HVRA layers within the primary HVRA category. These calculations need to account for the relative extent of each HVRA to avoid overemphasizing HVRA covering many acres. This was accomplished by normalizing the calculations by the relative extent of each HVRA in the assessment area. Here, relative extent refers to the number of 30-m pixels mapped in each HVRA. In using this method, the relative importance of each HVRA is spread out over the HVRA's extent. An HVRA with few pixels can have a high importance per pixel; an HVRA with a great many pixels can have a low importance per pixel. A weighting factor (called Relative Importance Per Pixel [RIPP]) representing both the relative importance per unit area and overall importance was calculated for each HVRA.

In Table 3 thru Table 7, we provide the share of HVRA relative importance within each primary HVRA.

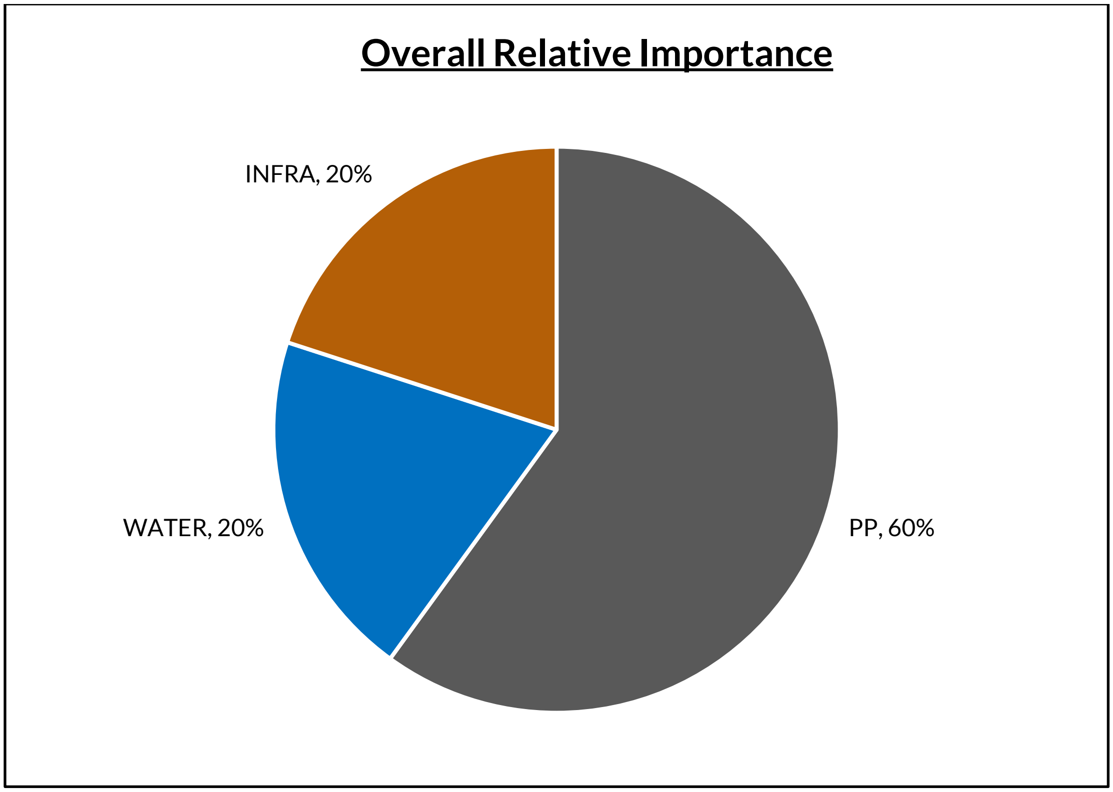

Figure 4. Overall HVRA Relative Importance for the primary HVRA.

3.4 HVRA CHARACTERIZATION RESULTS

Each HVRA was characterized by one or more data layers of sub-HVRA and, where necessary, further categorized by an appropriate covariate. Covariates separate HVRA by their response to wildfire, such as different response functions for transmission lines by voltage classes. The main HVRA in CAL are mapped below along with a table containing the assigned response functions, the within-HVRA share of relative importance, and total acres for each sub-HVRA. These components are used along with fire behavior results from FSim and WildEST in the wildfire risk calculations described in section 4.1.

3.4.1 PEOPLE AND PROPERTY

3.4.1.1 HOUSING UNIT DENSITY (HUDEN)

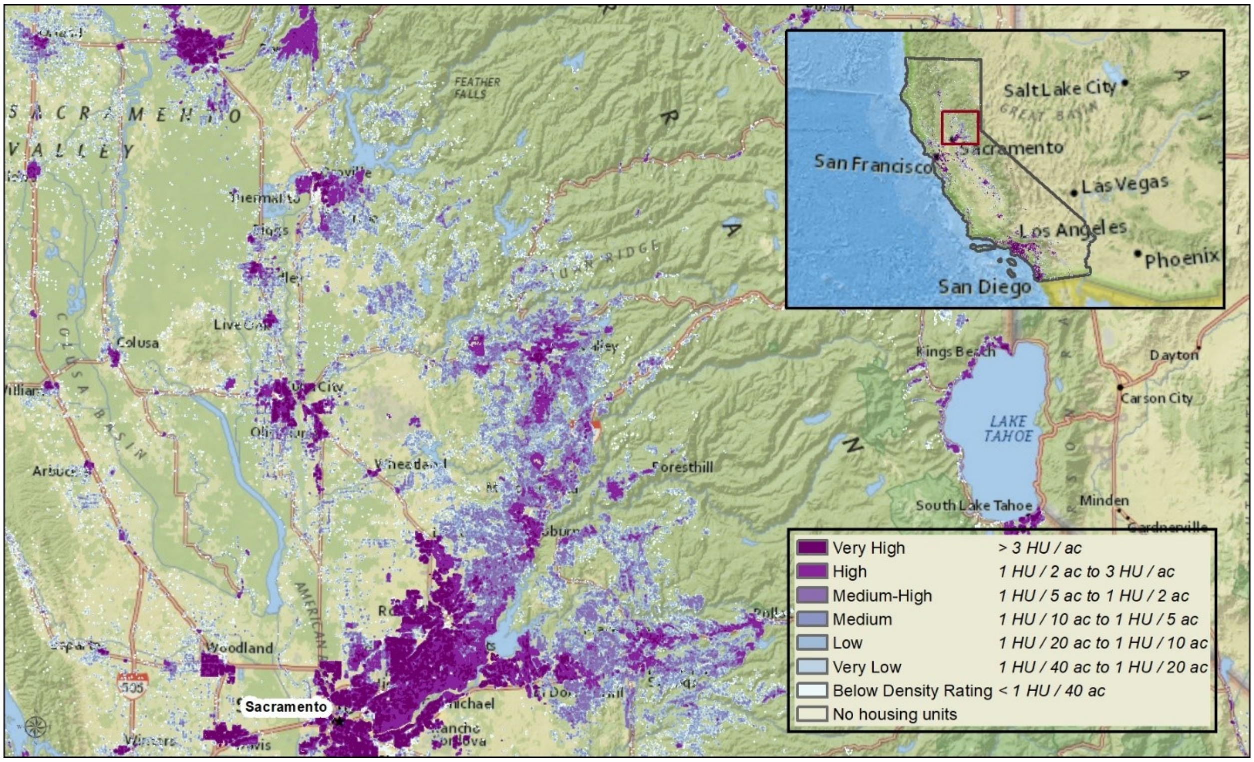

Figure 5. Map of Housing Unit Density within the Analysis Area.

The HUDen raster was produced by Pyrologix using the Microsoft Building Footprints and U.S. Census — Census Block population data. Population estimates were brought forward to 2018 county population estimates. Our approach estimates the housing-unit count for a census block and then allocates that count to the portions of the block likely to contain those housing units, identified as where the buildings are located within the block. This methodology was developed for the Wildfire Risk to Communities project (Scott et al. 2020). The same set of response functions was applied to all HU density classes.

The People and Property (HUDen) HVRA received negative response functions for all fire intensity levels (Table 3). The RF assignments demonstrate a pattern of increasing loss with increasing fire intensity, reaching near-total loss by FIL6. People and Property HVRA located in tree/shrub lifeform pixels were assigned a stronger negative response due to the likelihood of ember-cast from these fuel types and the suppression difficulty presented with such fire behavior. Conversely, People and Property HVRA located in grass pixels may present fewer challenges to fire suppression efforts – resulting in less loss overall.

Risk calculations for the People and Property (PP) HVRA were implemented with a custom Pyrologix approach using a three-pass, 300-m focal mean smoothing. This process allowed areas containing burnable fuel models to 'ooze' the consequence of potential urban conflagrations onto adjacent, non-burnable areas. This approach matches the extent of the oozed burn probability.

Without applying this approach to the PP HVRA calculations, we could quantify the estimated likelihood of wildfire, but not the consequence (or loss) associated with home damage caused by house-to-house spread.

Special considerations were taken to prevent oozing onto pixels mapped as water or ice and to avoid spreading consequence from small, burnable islands (<500 ha). The purpose of removing these small burnable islands is to prevent the spread from areas such as golf courses and urban parks that are less likely to ignite and spread fire to homes. To ensure risk calculations in the original burnable pixels were not altered, the original values were stamped back on top. Oozed values remained only in the adjacent, non-burnable areas.

Table 3. Response functions for the People and Property HVRA to highlight HUDen.

Sub-HVRA	FIL1	FIL2	FIL3	FIL4	FIL5	FIL6	Share of RI[1]	Acres
P&P – Tree	-20	-30	-50	-70	-80	-95	68%	4,736,404
P&P – Shrub	-15	-25	-40	-60	-80	-95	16%	1,977,311
P&P – Grass	-10	-20	-30	-50	-60	-70	16%	2,929,476

[1] Within-HVRA relative importance.

3.4.2 INFRASTRUCTURE

3.4.2.1 COMMUNICATION SITES

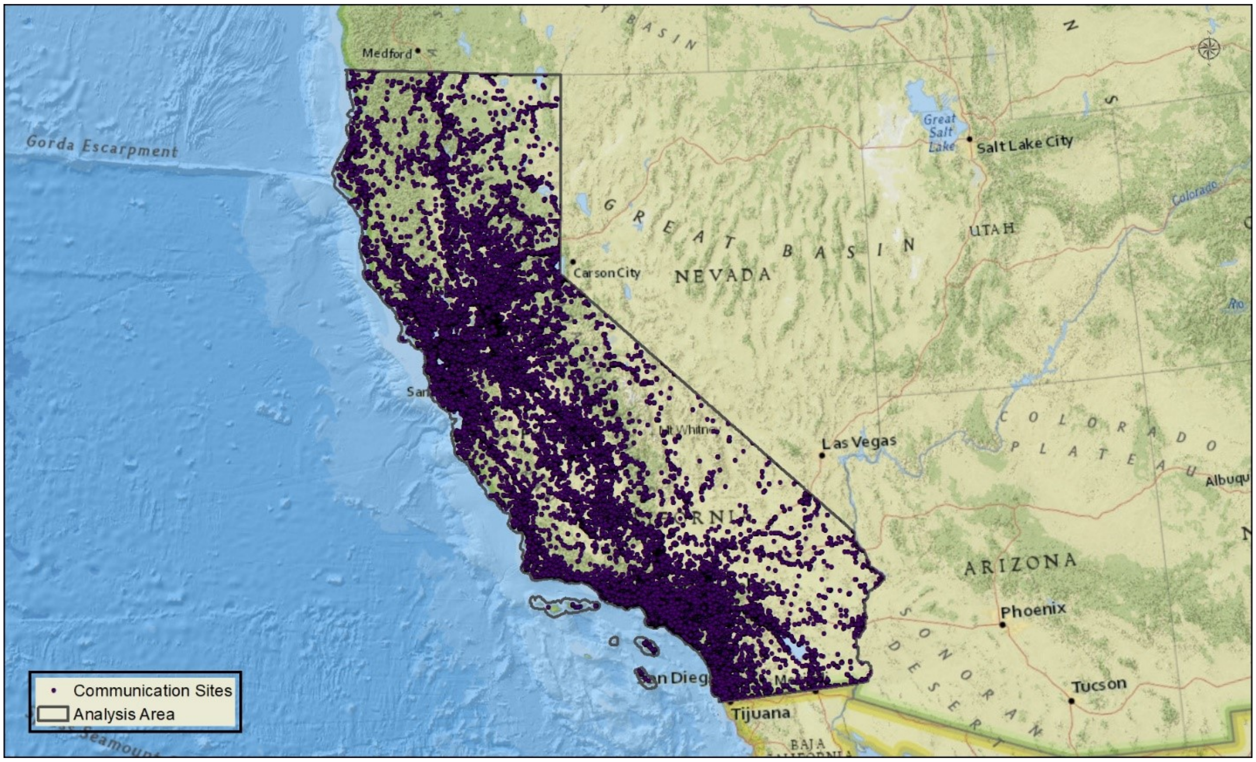

Figure 6. Map of Communication Sites within the Analysis Area.

Communication sites for the analysis area (Figure 6) were acquired from the Homeland Infrastructure Foundation-Level Data (HIFLD)[4]. The types of communication sites compiled for the assessment include cellular towers, land mobile towers, FM/AM transmission towers, microwave service towers, paging transmission towers, antenna structure, TV analog/digital transmitters, broadband radio transmitters, internet service providers, and internet exchange points. All communication sites were merged into a single feature class and converted to 30-m pixels using the ArcGIS Focal Statistics tool. Focal statistics were calculated using the sum of an annulus neighborhood with an inner radius of zero and an outer radius of two, resulting in a point feature being represented by thirteen, 30-m pixels.

The response functions for communication sites demonstrate a pattern indicative of their generally hardened structures and defensible space, showing a neutral response at lower flame lengths, with an increasingly negative response to fires of increasing intensity (Table 4). As expected, the burnable vegetation types associated with higher fire intensities (tree/shrub) show a more negative response to increasing intensities when compared to grass.

[4] HIFLD data downloaded from https://hifld-geoplatform.opendata.arcgis.com/

Communication sites were allocated 50 percent of the share of the Infrastructure HVRA importance. The share of HVRA importance is based on relative importance per unit area and mapped extent.

Table 4. Response functions for the Infrastructure HVRA to highlight Communication Sites.

Sub-HVRA	FIL1	FIL2	FIL3	FIL4	FIL5	FIL6	Share of RI[1]	Acres
Communication Sites – Tree	0	-10	-20	-30	-40	-50	28%	47,360
Communication Sites – Shrub	0	-5	-15	-20	-40	-50	11%	18,473
Communication Sites – Grass	0	0	-10	-10	-20	-30	12%	19,666

[1] Within-HVRA relative importance.

3.4.2.2 TRANSMISSION LINES

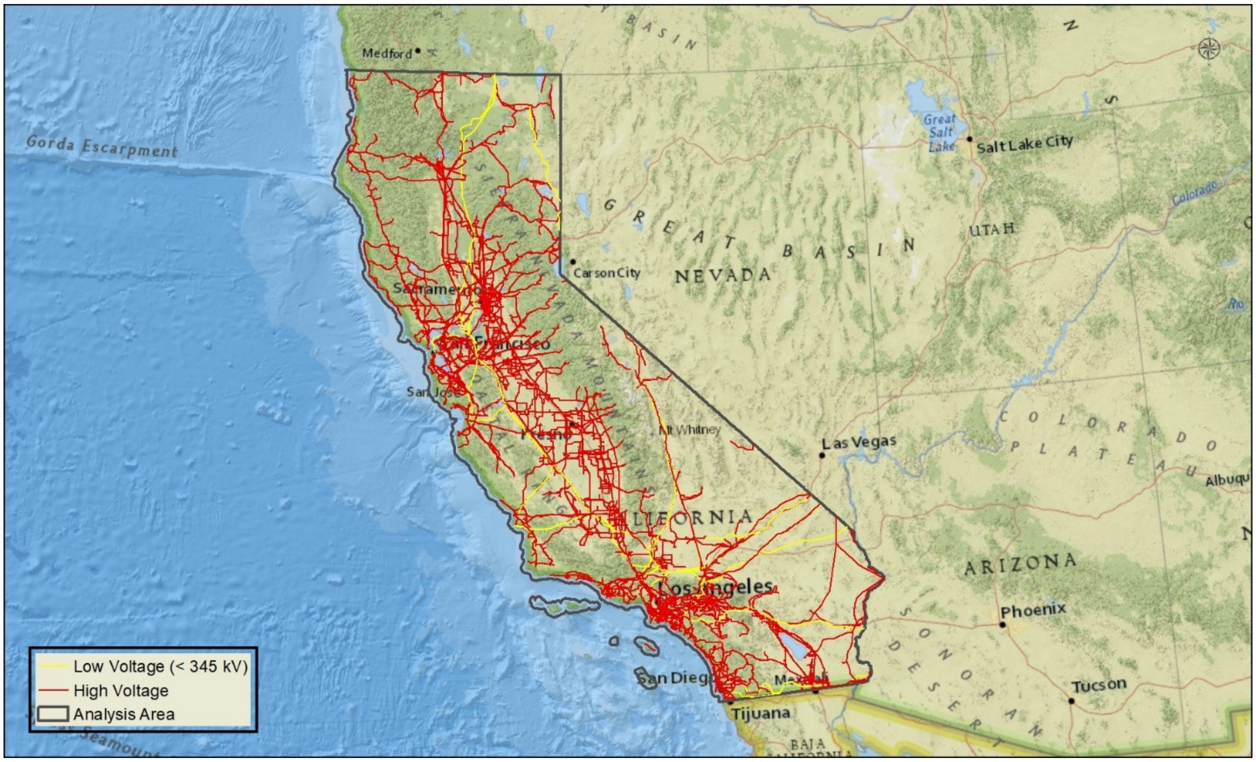

Figure 7. Map of Transmission Lines within the Analysis Area.

Transmission Lines within the analysis area (Figure 7) were acquired from the Homeland Infrastructure Foundation-Level Data (HIFLD)[4]. The lines were classified using a voltage break of 345 volts (transmission lines carrying less than 345 volts classified as '1', and those greater than 345, classified as '2'). The data were classified, converted to a 30-m raster based on voltage classification, expanded out one additional pixel (per side) using the ArcGIS Expand tool, and mosaiced back together to capture more of the area impacted by wildfire.

Low voltage lines (<345 kV) are mostly wooden poles, and therefore, demonstrate a strongly negative response to all fire intensities. Near-total loss was expected for fires greater than FIL4 (Table 5). High voltage transmission lines (≥345 kV) are expected to be constructed of largely non-burnable materials that can withstand exposure to lower fire intensities and experience less loss at the higher intensity classes (Table 5).

Due to the number of acres mapped on the landscape and their importance to infrastructure, electric transmission lines received 44 percent of the share of the Infrastructure HVRA importance. The share of HVRA importance is based on relative importance per unit area and mapped extent.

Table 5. Response functions for the Infrastructure HVRA to highlight Transmission Lines.

Sub-HVRA	FIL1	FIL2	FIL3	FIL4	FIL5	FIL6	Share of RI[1]	Acres
High Volt (>=345)	0	0	-20	-30	-50	-60	11%	143,516
Low Volt (wooden poles)	-40	-50	-70	-90	-100	-100	33%	884,677

[1] Within-HVRA relative importance.

3.4.2.3 POWER PLANTS & SUBSTATIONS

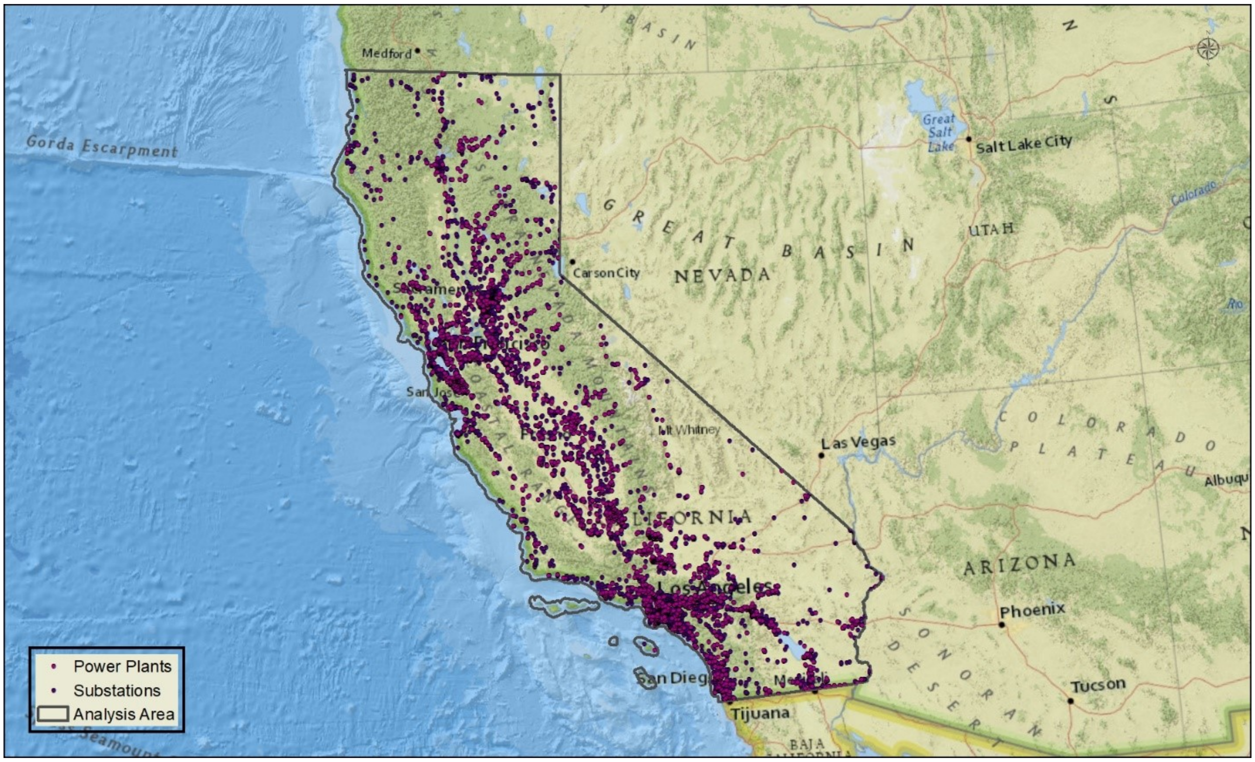

Figure 8. Map of Power Plants & Substations within the Analysis Area.

Power Plants and Substations within the analysis area (Figure 8) were derived from the Homeland infrastructure Foundation-Level Data (HIFLD)[4]. The acquired data was converted to 30-m pixels using the ArcGIS Focal Statistics tool. Focal statistics were calculated using the sum of an annulus neighborhood with an inner radius of zero and an outer radius of two, resulting in a point feature being represented by thirteen, 30-m pixels.

Due to the hardened nature of the structures and defensible space, the response function assignments for power plants and substations demonstrate a neutral response to nearly all fire intensities. They demonstrate a response only to fires of higher intensity and show minimal loss (Table 6)

Power plants and Substations were allocated 6 percent of the share of the Infrastructure HVRA importance. The share of HVRA importance is based on relative importance per unit area and mapped extent.

Table 6. Response functions for the Infrastructure HVRA to highlight Power Plants & Substations.

Sub-HVRA	FIL1	FIL2	FIL3	FIL4	FIL5	FIL6	Share of RI[1]	Acres
Power Plants	0	0	0	-10	-20	-30	2%	3,924
Substations	0	0	0	-10	-20	-30	4%	7,065

[1] Within-HVRA relative importance.

3.4.3 DRINKING WATER

3.4.3.1 SURFACE DRINKING-WATER

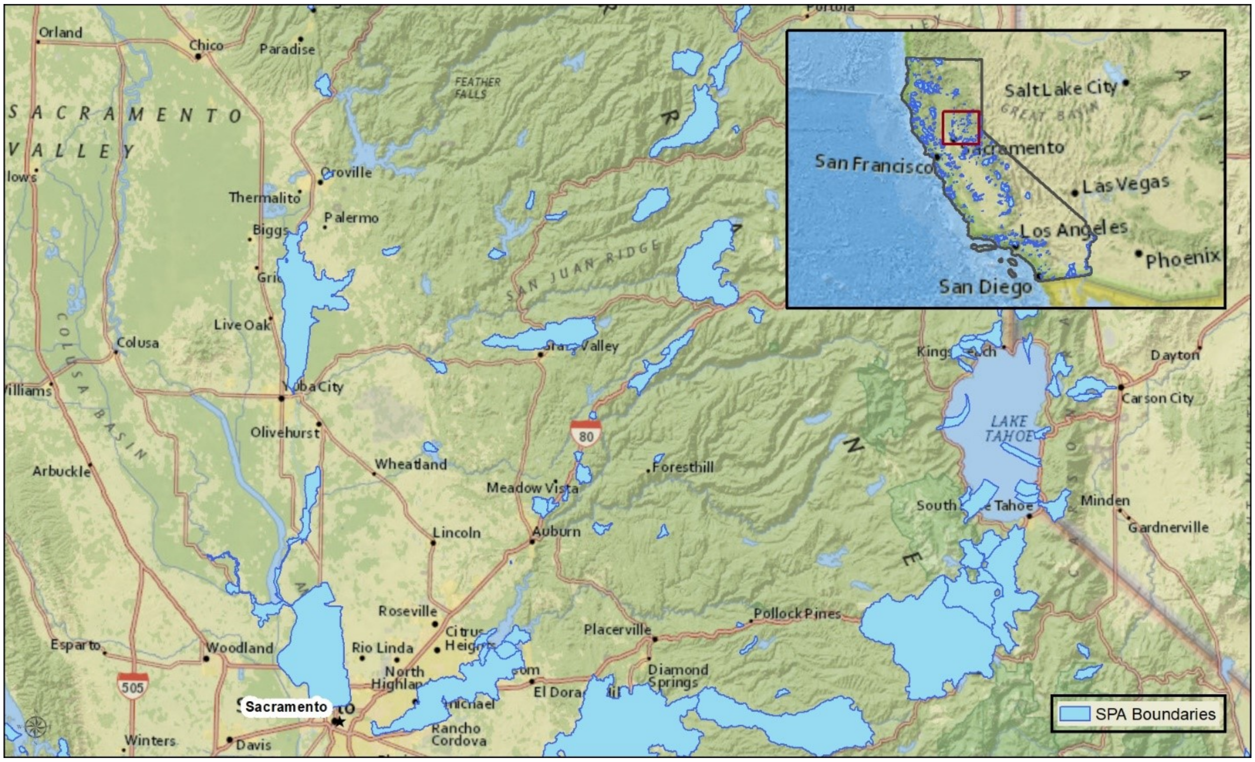

Figure 9. Map of Drinking Water Protection Areas within the Analysis Area.

Drinking water protection areas were mapped using data from the EPA's Source Water Protection Area program[5]. The dataset includes surface drinking water protection areas (24-hour critical water basins) and their associated intake facilities. Basins were limited to those with an associated intake, being careful to not truncate basins at project boundaries during processing. The resulting critical watershed map is shown in Figure 9.

The response functions for the Surface Drinking-Water HVRA vary by vegetation type and slope class (Table 7). The fire effects are mostly benign in the grass vegetation types and increase in the shrub and timber fuel types that are associated with greater fire intensities and increased residence times. For all fuel types, the fire effects demonstrate a more negative response to fire in areas associated with the steeper slope class (>30%).

For the CAL, watershed resources were analyzed using a custom approach to determine the importance of each pixel within a basin, based on population served and distance to intake. We calculated the Euclidean distance to the drinking water intake for each pixel within its associated watershed. We then divided the result by the Euclidean distance to create a proportion of importance based on the distance to the intake, and to prevent values from decaying as rapidly we divided the distance by 1/3. We then multiplied by the intake's population served. The sum of the importance for each watershed was then normalized to the total population served to prevent overweighting the

[5] https://www.epa.gov/sourcewaterprotection/delineate-source-water-protection-area

largest watersheds. A single pixel can belong to one or more overlapping watersheds; therefore values are cumulative across overlapping watersheds.

Table 7. Response functions for the Critical Watersheds HVRA.

Sub-HVRA	FIL1	FIL2	FIL3	FIL4	FIL5	FIL6	Share of RI[1]	Acres
Drinking Water: Timber, SLP LTE 30	0	0	-5	-20	-50	-70	27%	1,870,496
Drinking Water: Timber, SLP GT 30	0	-5	-20	-50	-70	-100	31%	2,149,591
Drinking Water: Shrub, SLP LTE 30	0	0	-5	-10	-40	-60	11%	789,694
Drinking Water: Shrub, SLP GT 30	0	-5	-10	-40	-60	-90	10%	675,864
Drinking Water: Grass, SLP LTE 30	0	0	0	-10	-10	-20	16%	1,146,423
Drinking Water: Grass, SLP GT 30	0	0	-10	-10	-20	-30	5%	383,530

[1] Within-HVRA relative importance.

4 EFFECTS ANALYSIS

An effects analysis quantifies wildfire risk as the expected value of net response (Finney 2005; Scott et al. 2013) also known as expected net value change (eNVC). Effects analysis relies on input from resource specialists to produce response functions for Highly Valued Resources and Assets (HVRA) occurring in the analysis area. A response function is a tabulation of the relative change in the value of an HVRA if it were to burn in each of six WildEST flame-length classes. A positive value in a response function indicates a benefit or increase in value; a negative value indicates a loss or decrease in value.

For the CAL assessment, the term Highly Valued Resources and Assets (HVRA) is used to describe what has previously been labeled “values at risk.” This change in terminology is important to highlight because resources and assets are not themselves “values” in a way that the term is conventionally defined—they *have* value (importance). For example, assets are human-made features, such as commercial structures, critical facilities, housing, etc., that have specific importance or value. Similarly, resources are natural features, such as wildlife habitat, vegetation type, or water, etc., also with specific importance or value. While such resources and assets may be exposed to wildfire, they are not necessarily “at-risk”—that is the purpose of the assessment.

4.1 CALCULATIONS

Integrating HVRAs with differing units of measure (for example, habitat vs. homes) requires relative importance (RI) values for each HVRA/sub-HVRA. These values were identified in the RI review process, as discussed in section 3.3.3. The final importance weight used in the risk calculations is a function of overall HVRA importance, sub-HVRA importance, and relative extent (pixel count) of each sub-HVRA. This value is therefore called relative importance per pixel (RIPP).

The RF and RIPP values were combined with estimates of the flame-length probability (FLP) in each of the six flame-length classes to estimate conditional NVC (cNVC) as the sum-product of flame-length probability (FLP) and response function value (RF) over all the six flame-length classes, with a weighting factor adjustment for the relative importance per unit area of each HVRA, as follows:

$$cNVC_j = \sum_{i}^{n} FLP_i * RF_{ij} * RIPP_j$$

where *i* refers to flame length class (n = 6), *j* refers to each HVRA, and RIPP is the weighting factor based on the relative importance and relative extent (number of pixels) of each HVRA. The cNVC calculation shown above places each pixel of each resource on a common scale (relative importance), allowing them to be summed across all resources to produce the total cNVC at a given pixel:

$$cNVC = \sum_{j}^{n} cNVC_j$$

where cNVC is calculated for each pixel in the analysis area. Finally, eNVC for each pixel is calculated as the product of cNVC and annual BP:

$$eNVC = cNVC * BP$$

4.2 UPSAMPLING FSIM RESULTS

FSim's stochastic simulation approach can be computationally intensive and time constraining on large landscapes. The challenge is to determine a resolution sufficiently fine to retain detail in fuel and terrain features while producing calibrated results in a reasonable timeframe. Moreover, HVRA are often mapped at the same resolution as the final BP produced by FSim. To enable greater resolution on HVRA mapping, we chose to upsample the FSim burn probability (BP) rasters to 30-m, consistent with HVRA mapping at 30-m. More information on probability upsampling is available in the CAL Wildfire Hazard report[2].

4.3 WILDFIRE TRANSMISSION (RISK-SOURCE)

The potential for wildfires to transmit risk is a function of the spatial variation in fire occurrence and fire growth potential, in conjunction with spatial variation in HVRA location. To evaluate this potential, the total cNVC – the sum of all HVRA (People and Property, Infrastructure, and Critical Watersheds) – was determined for each simulated FSim fire perimeter. The sum of total cNVC and individual HVRA within each fire perimeter was then attributed to its associated ignition point. Summaries were limited to "large" fire perimeters, defined here as perimeters greater than the Lorenz curve large-fire threshold. Below this perimeter size, simulated fire-size distributions do not match historical distributions. More information on the Lorenz curve large-fires threshold is available in the CAL Wildfire Hazard report[2].

The final raster dataset created from the perimeter overlay exercise (risk-source) represents the expected annual risk per km^2 (or total wildfire transmission risk) for all HVRA from ignitions across the landscape. We refer to this raster as Expected Transmitted Risk (eRiskSource_allHVRA.tif).

The Expected Transmitted Risk raster was generated using a multi-stage process. The CAL analysis area includes fourteen Fire Occurrence Areas (FOAs) with a varying number of iterations. The number of iterations used in the simulation was added to the attribute table for each fire and a new attribute representing cNVC per iteration was generated. Including the number of iterations in the calculation provides the "expected" or likelihood component of risk source. Using the ArcGIS Point Statistics tool, the sum of cNVC per iteration within a 5-km moving window was calculated.

The second step involved calculating the sum of the ignitable[6] land area using the same tool and parameters on a point feature class differentiating ignitable and nonignitable fuel models. Finally, the sum of cNVC per iteration was divided by the sum of ignitable land area per km^2 to get the expected risk-source per km^2 of source area. These results can be used to look at the relative likelihood and consequence of ignitions occurring across the landscape.

4.3.1 RISK TRANSMISSION SUMMARIES

Using the risk results above, we assessed the risk to all HVRA in California using two approaches. The first – called *in situ analysis* – rates wildfire risk to HVRA where they exist on the landscape. The second approach rates the potential for wildfires originating in one part of the landscape to transmit risk to HVRA in another. This second approach is often referred to as wildfire transmission or risk-

[6] Ignitable fuel includes burnable fuel, but not the custom burnable-urban fuel model.

source analysis. This report presents results for both approaches to explore landscape-scale risk transmission patterns and identify the counties and land jurisdictions in which damaging wildfires tend to occur and originate. Results such as these can be used in wildfire management and mitigation planning by identifying areas with the greatest annual risk to HVRA and the areas most likely to transmit that risk.

4.3.1.1 CALIFORNIA LAND JURISDICTIONS

We summarized the source locations of risk to the county and land ownership level. The information identifying jurisdictional agency was acquired from an earlier version of the Jurisdictional Unit spatial data layer for use with WFDSS, IFTDSS, IRWIN, and InFORM[7]. The spatial jurisdiction boundaries were intersected with California county boundaries and the agency information was collapsed into ten unique categories. Table 8 shows the total acreage and percent of land-area each jurisdiction covers with the state. Figure 10 shows the final jurisdiction map used for spatial overlays in the subsequent analysis.

Table 8. Land area by jurisdiction use in risk analysis

Landowner/Category	Acres	Percent of Total
Bureau of Indian Affairs	728,678	0.7%
Bureau of Land Management	14,934,941	14.0%
Bureau of Reclamation	217,725	0.2%
Department of Defense	4,000,440	3.7%
Local Government	2,241,026	2.1%
National Park Service	7,681,089	7.2%
Private/Other	52,971,988	49.6%
State Lands	2,865,747	2.7%
U.S. Forest Service	20,779,874	19.5%
U.S. Fish and Wildlife Service	322,056	0.3%

[7] https://www.arcgis.com/home/item.html?id=3b2c5daad00742cd9f9b676c09d03d13

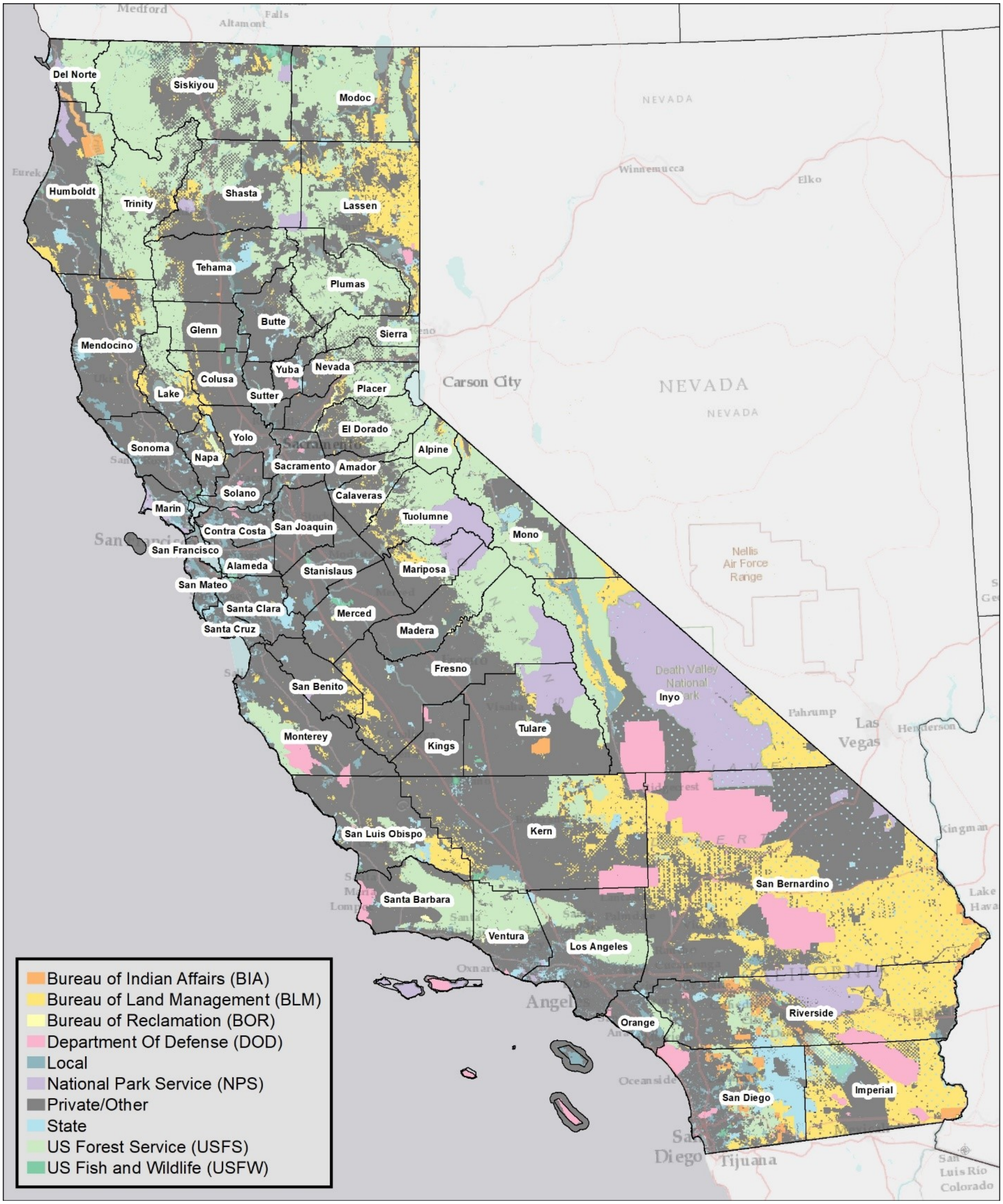

Figure 10. General Land Ownership in California

5 RESULTS

5.1 EFFECTS ANALYSIS RESULTS

The cumulative results of the wildfire risk calculations described in section 4.1 are the spatial grids of cNVC and eNVC, representing both the conditional and expected change in value from wildfire disturbance to all HVRAs included in the analysis. Results are limited to those pixels that have at least one HVRA and a non-zero burn probability. Both cNVC and eNVC reflect an HVRA's response to fire and their relative importance within the context of the assessment, while eNVC additionally captures the relative likelihood of wildfire disturbance. Cumulative effects of wildfire across the landscape vary by HVRA (Figure 11). Results are scaled to cumulative eNVC values for the People and Property HVRA in the CAL analysis area, with all HVRA demonstrating a net negative eNVC. People and Property show the greatest cumulative wildfire losses (eNVC) result followed by Infrastructure, and Water.

Figure 12 shows cNVC results at a 30-m resolution across the analysis area. The most adverse effects are shown in dark red and are largely concentrated around CAL communities. Adjusting cNVC by fire likelihood (i.e., burn probability) narrows the range of values for negative outcomes and highlights areas more likely to be visited by wildfire as seen in the eNVC map in Figure 14.

Figure 13 shows the upsampled BP, as discussed in section 4.2. Figure 15 shows the wildfire transmission results, as discussed in section 4.3.

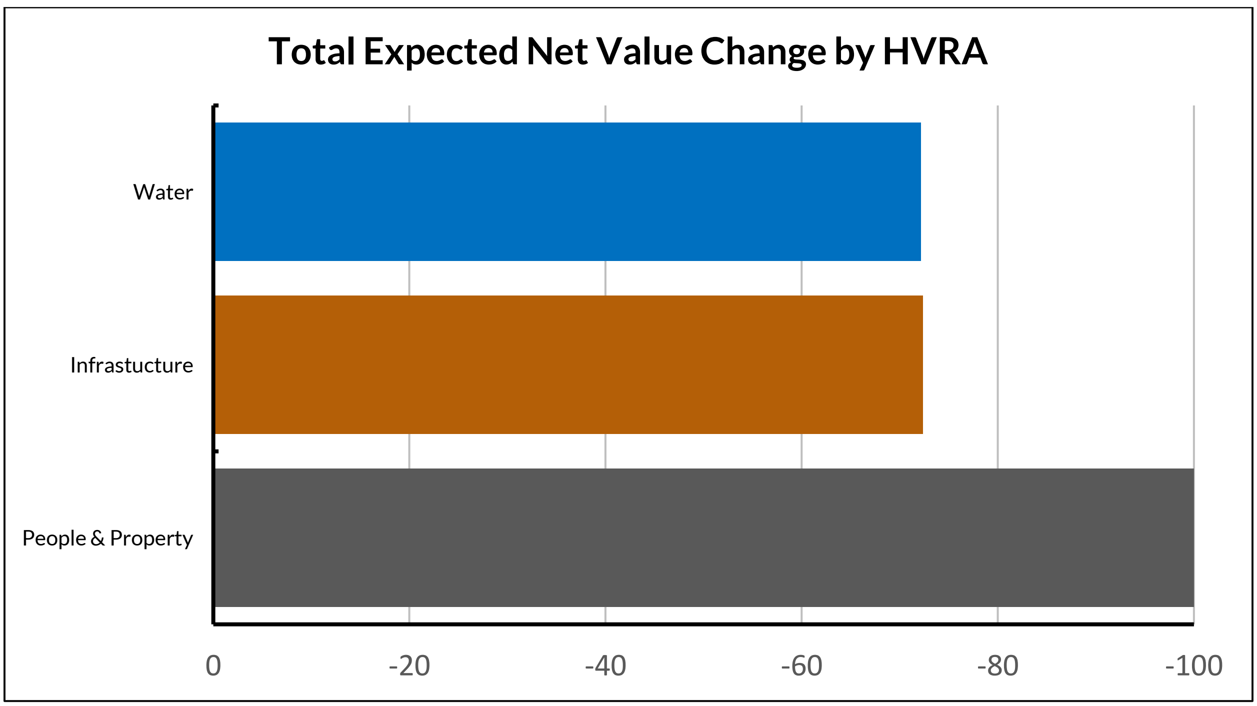

Figure 11. Weighted net response overall highly valued resources and assets (HVRAs) in the assessment. The HVRAs are listed in order of net value change and scaled to eNVC values for the People and Property HVRA.

5.1.1 CONSEQUENCE – CONDITIONAL NET VALUE CHANGE (CNVC)

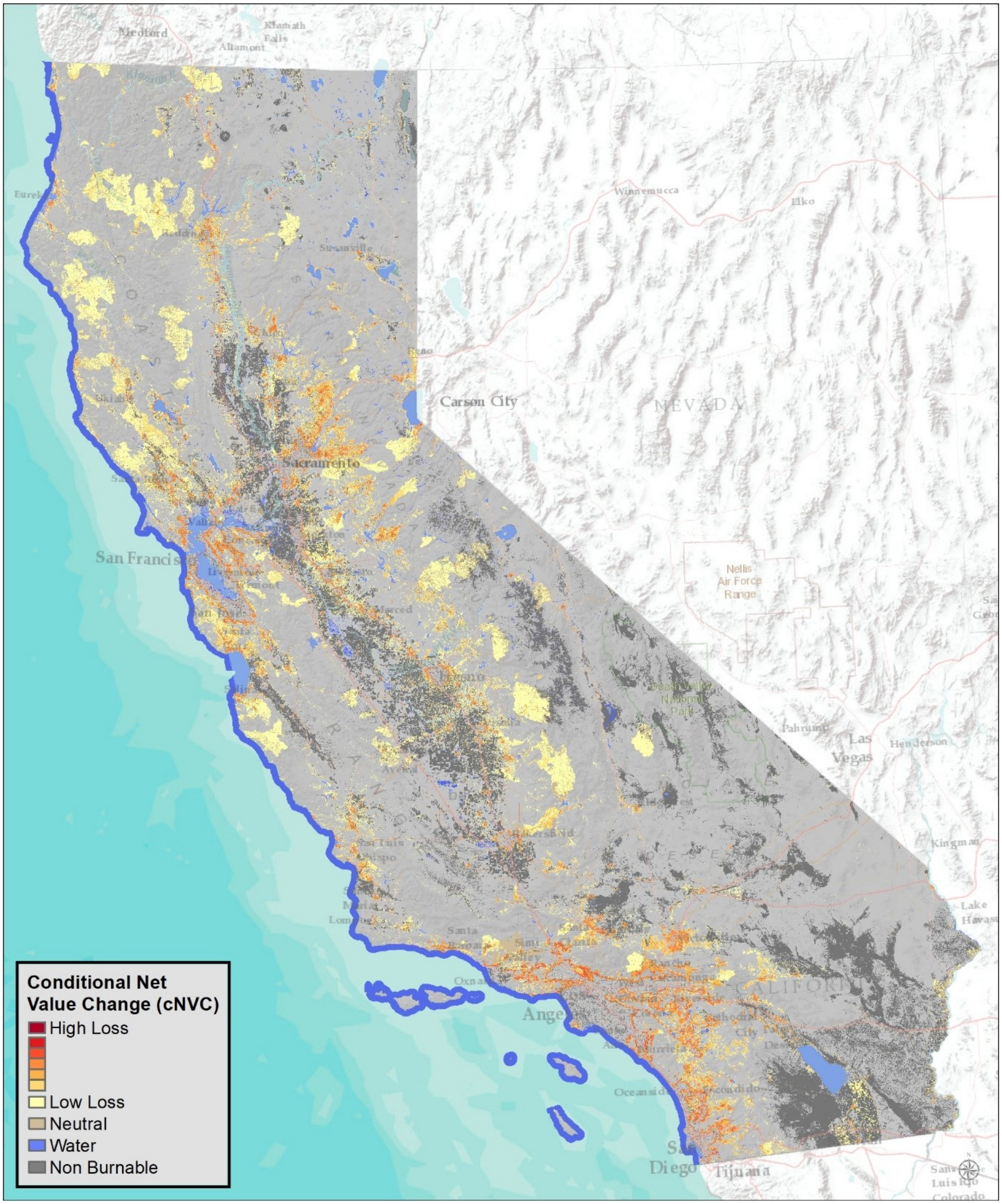

Figure 12. Map of Conditional Net Value Change (cNVC) at 30-m for the analysis area.

5.1.2 LIKELIHOOD – ANNUAL BURN PROBABILITY (BP)

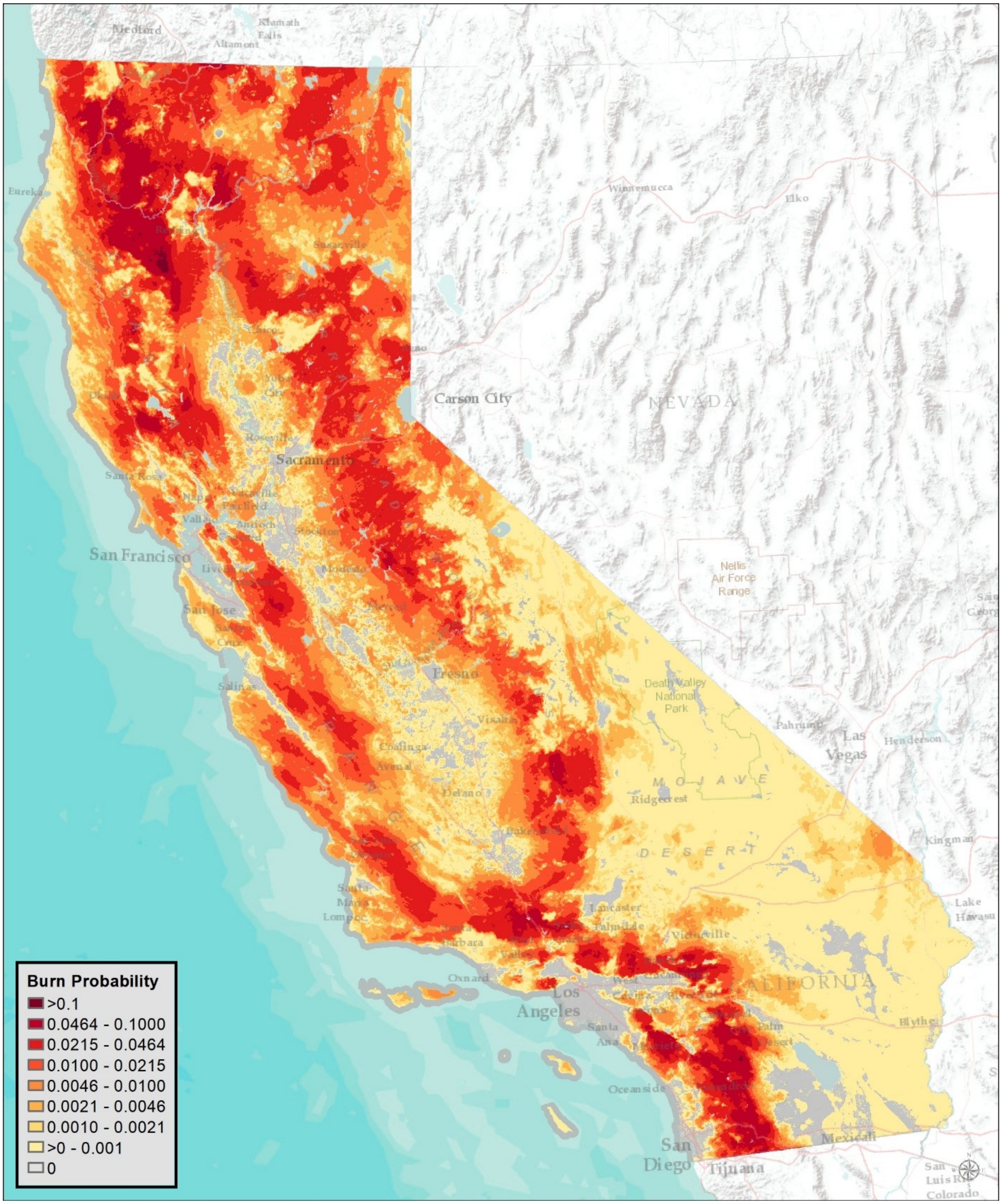

Figure 13. Map of integrated FSim burn probability results for the study area at 30-m resolution.

5.1.3 RISK – EXPECTED NET VALUE CHANGE (ENVC)

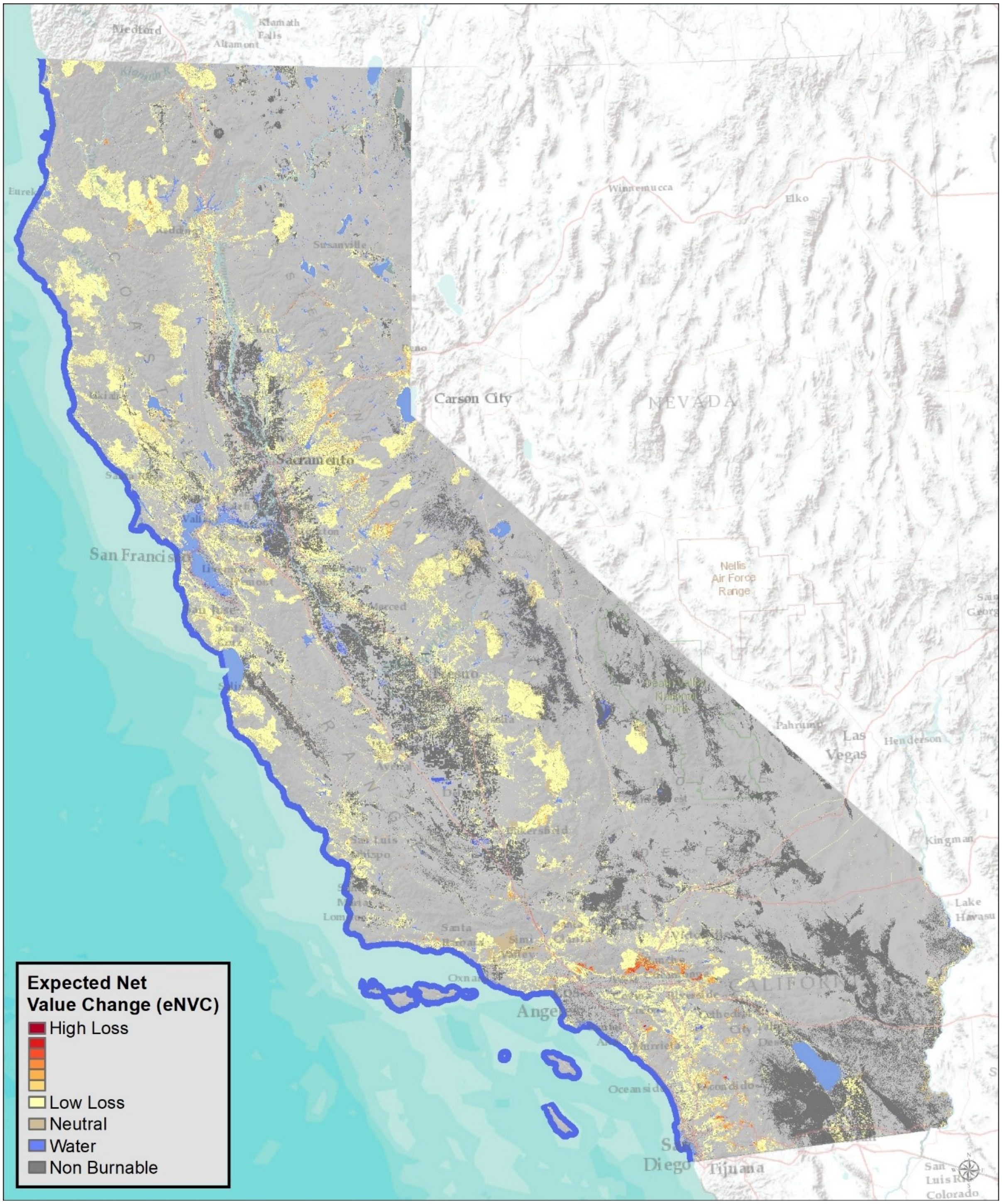

Figure 14. Map of Expected Net Value Change (eNVC) at 30-m for the analysis area.

5.1.4 WILDFIRE TRANSMISSION (RISK-SOURCE ANALYSIS)

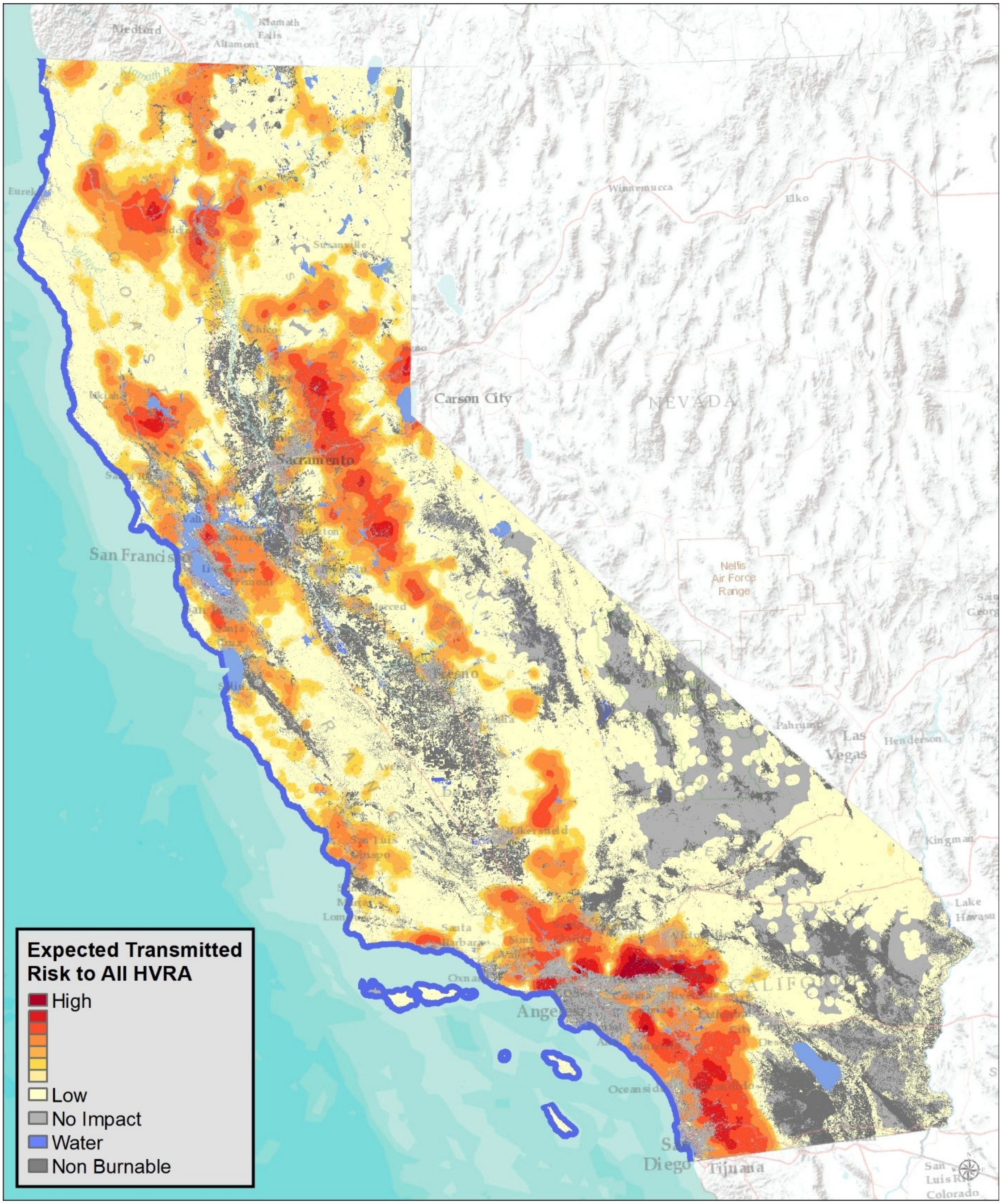

Figure 15. Map of the annual wildfire transmission risk (eRiskSource_allHVRA.tif) to all HVRA from ignitions across the landscape.

5.1.4.1 *IN SITU* RISK VERSUS TRANSMITTED RISK

Traditional *in situ* risk analysis evaluates both the likelihood and consequence of HVRA being visited by wildfire in terms of Expected Net Value Change (eNVC). To explore how risk between *in situ* and transmitted wildfire risk differs by jurisdiction, we summarized the overall *in situ* risk (eNVC, Figure 14) and the transmitted risk (eRiskSource_allHVRA.tif, Figure 15) by the Jurisdictional Unit[7] layer.

Table 9 compares the cumulative share of *in situ* versus transmitted risk by land ownership categories. The top four jurisdictions for both *in situ* and transmitted risk are Private/Other, U.S. Forest Service (USFS), Local Government, and Bureau of Land Management (BLM), respectively, with the remaining contributing smaller shares of risk and rankings shifting between both types of risk. Generally speaking, the closer the values between *in situ* and transmitted risk, the more we can conclude that fires that start within a jurisdiction impact HVRA located in that same jurisdiction. Further, there is a greater chance that mitigation efforts conducted within that jurisdiction will lead to a local reduction in wildfire risk. In both types of wildfire risk, private land holds the greatest share with 61.6 percent of the *in situ* risk and 51.2 percent of the transmitted. Since *in situ* risk is greater than transmitted risk on private lands, we can conclude that a transfer of wildfire risk exists from other ownerships. In other words, fires that ignite elsewhere on the landscape impact land that is privately held. Land management agencies tend to transmit a greater share of the risk than exists within the jurisdiction boundaries — in other words, they are generally a source of wildfire risk and private lands are a sink (or recipient) of transmitted risk. The difference of 10.4 percent between *in situ* and transmitted risk can be accounted for with 6.2 percent coming from USFS land, 1 percent each coming from Local Government, BLM, and State lands, and fractional amounts from the remaining agencies. This transfer between ownerships is likely to vary by location and from county to county based on prevailing wind directions, the proximity of HVRA relative to jurisdictional boundaries, and the spatial arrangement of fuel, among other things. This is a concept we will explore in the next section.

Table 9. Mean annual *In situ* and Transmitted risk by ownership in California

Ownership	*In Situ* Risk		Transmitted Risk		*In Situ* minus Transmitted
	Share of Total	Rank	Share of Total	Rank	
Private/Other	61.6%	1	51.2%	1	10.4%
US Forest Service	27.7%	2	33.9%	2	-6.2%
Local Govt	3.7%	3	4.9%	3	-1.2%
Bureau of Land Management	2.8%	4	4.1%	4	-1.4%
Bureau of Indian Affairs	1.7%	5	1.7%	6	0.0%
State	1.4%	6	2.5%	5	-1.1%
National Park Service	0.5%	7	0.5%	8	0.0%
Department of Defense	0.4%	8	0.6%	7	-0.2%
Bureau of Reclamation	0.2%	9	0.5%	9	-0.2%
US Fish & Wildlife Service	0.0%	10	0.1%	10	-0.1%

5.1.4.2 CONDITIONAL PER-FIRE TRANSMITTED RISK

In contrast to the annual transmitted risk, which includes a "likelihood" component of risk-source, the conditional (per fire) risk-source raster examines where damaging fires can originate across the landscape, without considering the likelihood of those ignitions. The map in Figure 16 highlights areas of the landscape where fires that ignite may have little consequence to the assessed HVRA versus the locations where ignitions are likely to result in greater impacts to HVRA.

For this analysis, we determined the total cNVC located within each simulated wildfire perimeter and attributed that risk to the fire's ignition location (section 4.3). The resulting smoothed point features (fire-ignition locations) generate a map showing the propensity of wildfires to ignite and transmit risk to HVRA (Figure 16).

The conditional transmitted risk metrics are included in the county summary tables introduced in the next section.

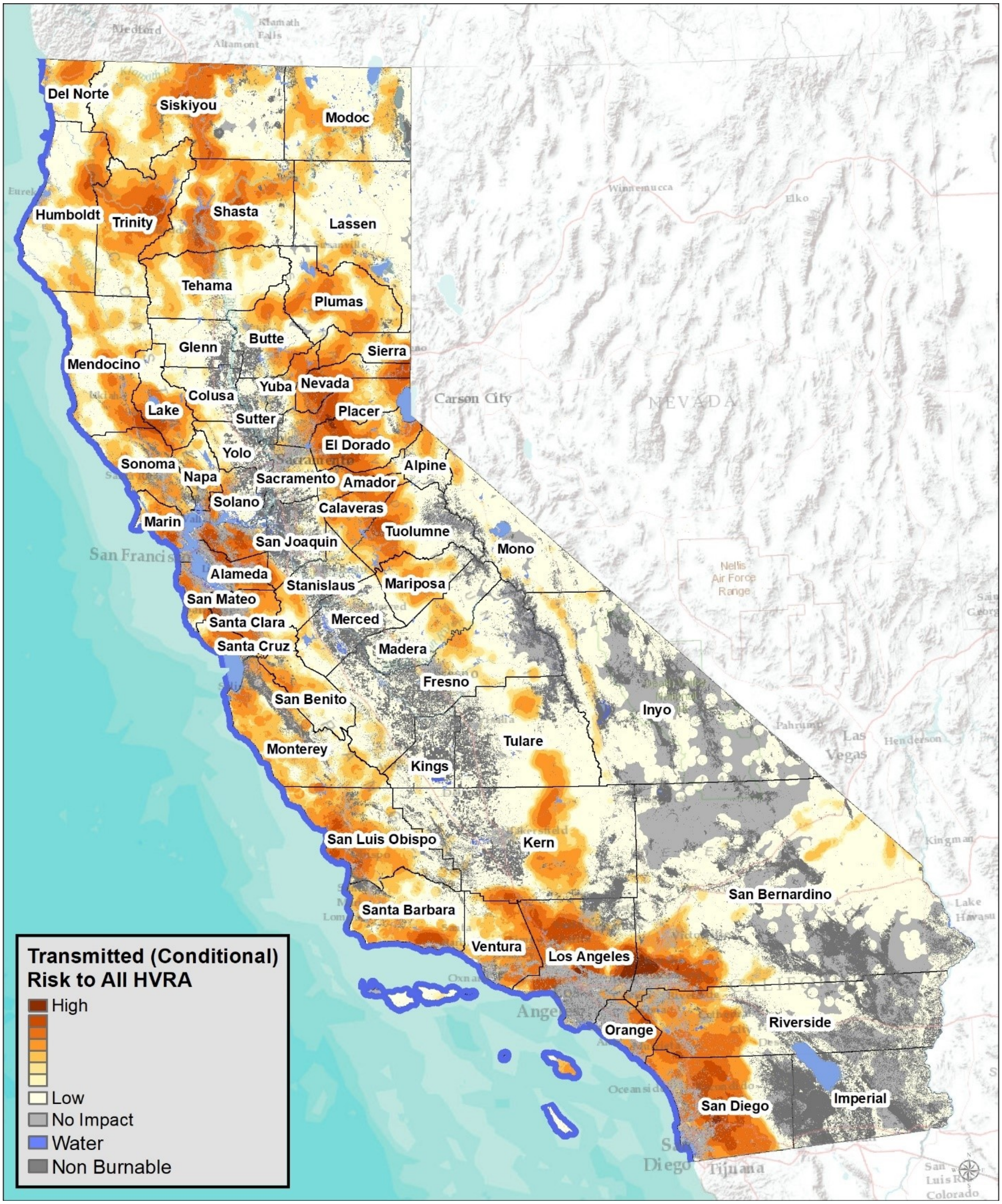

Figure 16. Conditional (per fire) wildfire risk to HVRA across California.

5.1.4.3 RISK TRANSMISSION SUMMARIES BY COUNTY AND OWNERSHIP

In the final step of the *in situ* versus transmitted risk analysis, we overlaid the various risk results with California county boundaries to evaluate patterns of risk by land ownership at a more localized extent. For each county, we first evaluated its share of both the statewide and the *in situ* risk by ownership (Table 10) to compare with the same results for transmitted risk (Table 11). A map comparing these results side by side is shown in (Figure 17).

San Bernadino has the greatest share of cumulative *in situ* risk (12.3 percent, Table 10) and it is also the largest county in the state (Figure 17). Though it ranks first in terms of *in situ* risk, it ranks third in total transmitted risk (Table 11). Generally speaking, fires that ignite in San Bernadino County tend to impact HVRA *within* the county versus transmitting risk to adjacent counties. As Figure 17 illustrates, fires that start in San Bernadino County near the county lines with Inyo, Kern, or Riverside can grow without impacting HVRA in those counties.

San Diego and Los Angeles counties rank highest in transmitted risk and their share of transmitted risk is slightly greater than their share of *in situ* risk (Table 10 and Table 11). These differences are likely due to prevailing wind and fire growth patterns and as well as the location of in HVRA and *in situ* risk relative to county boundaries.

Interestingly, though the greatest share of *in situ* risk across the state is on private lands (Table 9), the USFS lands in San Bernadino County have the highest *in situ* risk — more than double the share of risk on private lands (Table 10). To understand why that is, we must know more about risk by HVRA at these levels.

To address that question, we ranked the top twenty counties and jurisdictions as a function of numerous risk metrics: Mean Annual *In Situ* risk (Table 12), Cumulative Annual *In Situ* Risk (Table 13), and Relative Mean-Annual Transmitted risk (Table 14). Each table is filtered to show only jurisdictional zones with greater than one-thousand acres. In these tables, the breakdown of cumulative *in situ* risk by HVRA is also shown to illuminate which HVRA are at risk in each area and what their relative contribution to that risk is.

Table 12 identifies the county/jurisdictions with the greatest concentration of wildfire risk (after removing jurisdictions less than 1,000 acres from the list). In this case, USFS lands in Orange and San Bernadino counties rank highest. In both counties, the Drinking Water HVRA has the greatest contribution to the overall risk (Table 12). In Table 13, USFS in San Bernadino County and Private/Other lands in San Diego rank highest in terms of total or cumulative *in situ* risk, and USFS in Orange County ranks 20th. This can be explained both by the larger number of acres represented in these jurisdictions, but also because Drinking Water in San Bernadino County accounts for most of the cumulative *in situ* risk (Table 13). USFS lands in San Bernadino County have half of the exposed land area (BP>0 acres) of Private/Other lands in San Diego County but account for more total risk to Drinking Water than total People and Property risk in San Diego County. These results point to the importance of surface drinking water in USFS lands within San Bernadino County in terms of wildfire risk to drinking water basins that likely serve large populations in southern California.

Finally, in Table 14, we see that again USFS lands in Orange and San Bernadino counties rank first and second in the state in terms of transmitted risk (per million acres). Mitigation efforts focused in these areas might not only decrease *in situ* risk but also possibly the transmitted risk to adjacent ownerships.

Putting this all together, the mean-risk metric helps identify what locations on the landscape have the greatest average risk and therefore, which areas might be prioritized for mitigation efforts. The cumulative risk-measures help inform allocation decisions about "how much" mitigation might be needed. In this scenario, the concentration of Drinking Water risk (loss) on USFS lands in Orange County is slightly greater than USFS lands in San Bernadino County (-0.0059 to -0.0048), but the cumulative impacts to Drinking Water in San Bernadino County far outweigh those in Orange County. In this situation, USFS lands in San Bernadino County appear to warrant both prioritization of mitigation efforts and perhaps a greater share of allocated resources to mitigate risk to Drinking Water.

The full list of risk results by county and jurisdiction for all of California is available in the CAL Transmission Summaries supplemental tables[8].

[8] CAL Transmission Summaries: http://pyrologix.com/ftp/R5/CALRiskPilot/CAL_InSitu_Tansmitted_Risk_CountySummaries.xlsx

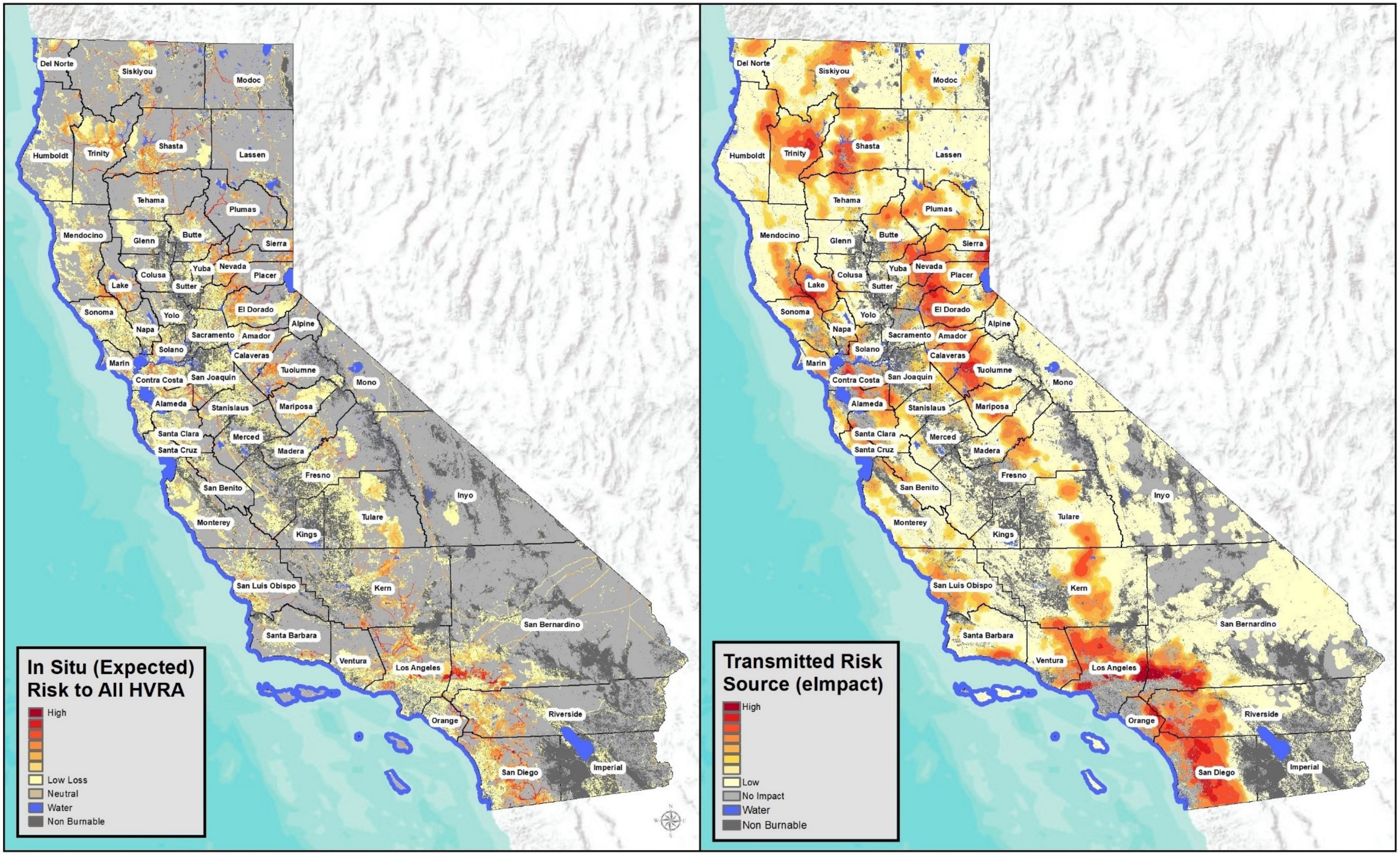

Figure 17. *In situ* (left) versus transmitted (right) wildfire risk to HVRA across California. For map display purposes, the pixel size of *in situ* risk results was increased to 360 m from 30 m.

Table 10. ***In situ*** **wildfire risk by county and jurisdictional agency.**

County	*In Situ* Risk — Percent of Total										
	USFS	Private/ Other	BLM	Local	State	NPS	BIA	DOD	USFWS	BOR	Total
San Bernardino	8.87%	3.12%	0.10%	0.09%	0.05%	0.03%	0.01%	0.00%	0.00%	0.00%	**12.27%**
San Diego	1.30%	7.62%	0.73%	0.91%	0.27%	0.00%	0.98%	0.32%	0.01%	0.00%	**12.14%**
Los Angeles	5.96%	3.59%	0.03%	1.03%	0.17%	0.01%	0.00%	0.00%	0.00%	0.00%	**10.79%**
Riverside	0.43%	4.12%	0.04%	0.04%	0.15%	0.00%	0.21%	0.00%	0.00%	0.00%	**5.01%**
Trinity	2.23%	2.11%	0.37%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	**4.72%**
Shasta	0.37%	3.39%	0.14%	0.00%	0.04%	0.01%	0.00%	0.00%	0.00%	0.08%	**4.03%**
El Dorado	0.32%	3.32%	0.06%	0.01%	0.02%	0.00%	0.00%	0.00%	0.00%	0.05%	**3.79%**
Nevada	0.30%	2.97%	0.05%	0.02%	0.13%	0.00%	0.00%	0.00%	0.00%	0.00%	**3.48%**
Kern	1.17%	2.04%	0.11%	0.13%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	**3.46%**
Tuolumne	0.40%	2.35%	0.17%	0.02%	0.03%	0.01%	0.02%	0.00%	0.00%	0.03%	**3.02%**
Siskiyou	0.37%	2.22%	0.07%	0.01%	0.01%	0.00%	0.03%	0.00%	0.01%	0.00%	**2.70%**
Calaveras	0.12%	1.96%	0.09%	0.02%	0.04%	0.00%	0.00%	0.00%	0.00%	0.02%	**2.25%**
Placer	0.17%	1.94%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.04%	**2.19%**
Lake	0.02%	1.85%	0.11%	0.01%	0.02%	0.00%	0.01%	0.00%	0.00%	0.00%	**2.01%**
Orange	1.30%	0.56%	0.00%	0.06%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	**1.93%**
Mendocino	0.01%	1.51%	0.08%	0.00%	0.01%	0.00%	0.04%	0.00%	0.00%	0.00%	**1.65%**
Plumas	0.71%	0.91%	0.00%	0.00%	0.01%	0.00%	0.01%	0.00%	0.00%	0.00%	**1.64%**
San Luis Obispo	0.22%	1.00%	0.01%	0.04%	0.02%	0.00%	0.00%	0.01%	0.00%	0.00%	**1.31%**
Humboldt	0.63%	0.46%	0.01%	0.00%	0.00%	0.00%	0.18%	0.00%	0.00%	0.00%	**1.28%**
Amador	0.08%	1.09%	0.09%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**1.27%**
Mariposa	0.06%	0.91%	0.13%	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	**1.22%**
Tulare	0.57%	0.26%	0.03%	0.00%	0.00%	0.25%	0.10%	0.00%	0.00%	0.00%	**1.21%**
Tehama	0.05%	1.02%	0.04%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	**1.15%**
Butte	0.06%	1.05%	0.01%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	**1.14%**
Sonoma	0.00%	0.98%	0.04%	0.04%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	**1.09%**
Contra Costa	0.00%	0.60%	0.00%	0.35%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	**1.01%**
Fresno	0.20%	0.70%	0.01%	0.00%	0.00%	0.03%	0.01%	0.00%	0.00%	0.01%	**0.97%**
Sierra	0.56%	0.37%	0.00%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.97%**
Alameda	0.00%	0.64%	0.00%	0.13%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.81%**
Santa Clara	0.00%	0.47%	0.00%	0.27%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.75%**
Yuba	0.05%	0.61%	0.00%	0.05%	0.02%	0.00%	0.00%	0.01%	0.00%	0.00%	**0.74%**
Santa Barbara	0.28%	0.41%	0.00%	0.02%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	**0.73%**
Modoc	0.37%	0.30%	0.02%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	**0.69%**
Ventura	0.05%	0.51%	0.00%	0.07%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.64%**
Madera	0.06%	0.56%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	**0.63%**
Monterey	0.05%	0.45%	0.02%	0.02%	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	**0.56%**
San Joaquin	0.00%	0.51%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.52%**
Stanislaus	0.00%	0.49%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.52%**
Lassen	0.05%	0.30%	0.06%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.43%**
Marin	0.00%	0.23%	0.00%	0.12%	0.02%	0.02%	0.00%	0.00%	0.00%	0.00%	**0.39%**
Del Norte	0.26%	0.06%	0.00%	0.00%	0.02%	0.00%	0.01%	0.00%	0.00%	0.00%	**0.35%**
San Benito	0.00%	0.31%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.33%**
Solano	0.00%	0.26%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.31%**
Santa Cruz	0.00%	0.27%	0.00%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.30%**
Napa	0.00%	0.19%	0.01%	0.03%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.24%**
Merced	0.00%	0.21%	0.00%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.23%**
Colusa	0.01%	0.16%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.17%**
Sacramento	0.00%	0.15%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.17%**
Inyo	0.01%	0.01%	0.06%	0.07%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.15%**
Yolo	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.11%**
Mono	0.04%	0.05%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.11%**
Alpine	0.03%	0.06%	0.01%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	**0.10%**
Glenn	0.01%	0.09%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.10%**
San Mateo	0.00%	0.06%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.10%**
Sutter	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.05%**
Kings	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.05%**
Imperial	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.01%**
San Francisco	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
Total	**27.73%**	**61.60%**	**2.77%**	**3.74%**	**1.38%**	**0.48%**	**1.66%**	**0.39%**	**0.03%**	**0.23%**	**100.00%**

Table 11. Transmitted wildfire risk by county and jurisdictional agency.

County	Transmitted Risk — Percent of Total										
	Private/Other	USFS	Local	BIA	State	BLM	DOD	USFWS	NPS	BOR	Total
San Diego	5.89%	2.37%	1.34%	1.05%	0.68%	0.64%	0.47%	0.09%	0.00%	0.00%	**12.53%**
Los Angeles	2.92%	7.43%	1.12%	0.00%	0.40%	0.04%	0.00%	0.00%	0.02%	0.00%	**11.94%**
San Bernardino	2.88%	7.42%	0.16%	0.03%	0.06%	0.14%	0.01%	0.00%	0.05%	0.00%	**10.74%**
Riverside	2.81%	1.47%	0.12%	0.26%	0.20%	0.21%	0.01%	0.00%	0.00%	0.00%	**5.09%**
Trinity	1.57%	2.75%	0.00%	0.00%	0.01%	0.40%	0.00%	0.00%	0.00%	0.00%	**4.73%**
Shasta	3.00%	0.68%	0.01%	0.00%	0.03%	0.27%	0.00%	0.00%	0.02%	0.04%	**4.06%**
El Dorado	2.82%	0.86%	0.02%	0.00%	0.03%	0.17%	0.00%	0.00%	0.00%	0.08%	**3.99%**
Nevada	2.42%	0.59%	0.03%	0.00%	0.13%	0.15%	0.00%	0.00%	0.00%	0.00%	**3.32%**
Tuolumne	1.83%	0.89%	0.01%	0.01%	0.03%	0.26%	0.00%	0.00%	0.01%	0.03%	**3.07%**
Kern	1.60%	1.08%	0.09%	0.00%	0.02%	0.26%	0.01%	0.00%	0.00%	0.00%	**3.06%**
Siskiyou	1.80%	0.74%	0.02%	0.00%	0.04%	0.09%	0.00%	0.01%	0.00%	0.00%	**2.70%**
Calaveras	1.80%	0.20%	0.02%	0.00%	0.02%	0.19%	0.00%	0.00%	0.00%	0.05%	**2.29%**
Placer	1.37%	0.42%	0.02%	0.00%	0.03%	0.15%	0.00%	0.00%	0.00%	0.21%	**2.20%**
Lake	1.65%	0.09%	0.03%	0.01%	0.10%	0.28%	0.00%	0.00%	0.00%	0.00%	**2.17%**
Orange	0.50%	0.95%	0.28%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	**1.75%**
Plumas	0.44%	1.17%	0.00%	0.00%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	**1.64%**
Mendocino	1.38%	0.04%	0.00%	0.03%	0.02%	0.11%	0.00%	0.00%	0.00%	0.00%	**1.59%**
San Luis Obispo	1.09%	0.23%	0.03%	0.00%	0.03%	0.04%	0.02%	0.00%	0.00%	0.00%	**1.45%**
Tehama	1.06%	0.15%	0.00%	0.00%	0.03%	0.04%	0.00%	0.00%	0.00%	0.00%	**1.29%**
Ventura	0.54%	0.49%	0.09%	0.00%	0.04%	0.00%	0.00%	0.00%	0.02%	0.00%	**1.19%**
Mariposa	0.76%	0.17%	0.00%	0.00%	0.00%	0.16%	0.00%	0.00%	0.08%	0.00%	**1.18%**
Humboldt	0.40%	0.54%	0.00%	0.18%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	**1.15%**
Tulare	0.23%	0.57%	0.00%	0.07%	0.00%	0.06%	0.00%	0.00%	0.20%	0.00%	**1.13%**
Contra Costa	0.51%	0.00%	0.49%	0.00%	0.09%	0.00%	0.01%	0.00%	0.00%	0.00%	**1.11%**
Butte	0.92%	0.07%	0.01%	0.00%	0.04%	0.03%	0.00%	0.00%	0.00%	0.00%	**1.07%**
Amador	0.91%	0.05%	0.01%	0.01%	0.00%	0.06%	0.00%	0.00%	0.00%	0.00%	**1.04%**
Sierra	0.21%	0.76%	0.00%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	**1.00%**
Sonoma	0.90%	0.00%	0.04%	0.00%	0.03%	0.02%	0.00%	0.00%	0.00%	0.00%	**0.98%**
Alameda	0.69%	0.00%	0.25%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.97%**
Yuba	0.58%	0.13%	0.03%	0.00%	0.04%	0.01%	0.00%	0.00%	0.00%	0.00%	**0.80%**
Fresno	0.60%	0.11%	0.01%	0.00%	0.01%	0.03%	0.00%	0.00%	0.02%	0.01%	**0.78%**
Santa Clara	0.50%	0.00%	0.25%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.78%**
Santa Barbara	0.41%	0.28%	0.03%	0.00%	0.01%	0.00%	0.03%	0.00%	0.00%	0.01%	**0.77%**
Monterey	0.50%	0.12%	0.04%	0.00%	0.01%	0.02%	0.04%	0.00%	0.00%	0.00%	**0.73%**
Modoc	0.21%	0.45%	0.00%	0.01%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	**0.70%**
Madera	0.51%	0.09%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.01%	**0.63%**
Santa Cruz	0.28%	0.00%	0.03%	0.00%	0.08%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.40%**
Marin	0.19%	0.00%	0.11%	0.00%	0.03%	0.00%	0.00%	0.00%	0.06%	0.00%	**0.40%**
San Joaquin	0.36%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.37%**
Stanislaus	0.33%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.36%**
Del Norte	0.04%	0.29%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.35%**
Lassen	0.18%	0.08%	0.00%	0.00%	0.01%	0.07%	0.00%	0.00%	0.00%	0.00%	**0.34%**
San Benito	0.29%	0.00%	0.00%	0.00%	0.01%	0.01%	0.00%	0.00%	0.01%	0.00%	**0.31%**
Napa	0.24%	0.00%	0.03%	0.00%	0.02%	0.01%	0.00%	0.00%	0.00%	0.00%	**0.31%**
Solano	0.21%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.26%**
Merced	0.20%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.22%**
Colusa	0.13%	0.01%	0.00%	0.00%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	**0.18%**
Sacramento	0.13%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.16%**
San Mateo	0.07%	0.00%	0.06%	0.00%	0.01%	0.00%	0.00%	0.00%	0.01%	0.00%	**0.14%**
Alpine	0.02%	0.09%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	**0.12%**
Yolo	0.09%	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%	**0.11%**
Inyo	0.00%	0.03%	0.04%	0.00%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	**0.11%**
Glenn	0.07%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.10%**
Mono	0.01%	0.05%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	**0.08%**
Sutter	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.05%**
Kings	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.05%**
Imperial	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.01%**
San Francisco	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
Total	**51.16%**	**33.94%**	**4.89%**	**1.68%**	**2.48%**	**4.14%**	**0.62%**	**0.13%**	0.50%	**0.45%**	**100.00%**

Table 12. Mean Annual *In Situ* Risk (expected) – top 20 with greater than 1,000 acres

County	Jurisdiction	Total Burnable Acres	Mean Burn Probability	Mean Transmitted Risk per Fire (conditional)	Cumulative Mean-Annual Transmitted Risk (expected)	Relative Mean-Annual Transmitted Risk (per million acres)	Mean Annual *In Situ* Risk (expected)	Cumulative Annual *In Situ* Risk (expected)	Cumulative Annual People/Property *In Situ* Risk (expected)	Cumulative Annual Drinking Water *In Situ* Risk (expected)	Cumulative Annual Infrastructure *In Situ* Risk (expected)
Orange	USFS	55,031	0.04269	-3,313.8	-1,103.4	-20,051.2	-0.005892	-1,466.7	-14.5	-1,295.8	-156.4
San Bernardino	USFS	452,212	0.02893	-3,396.8	-8,577.9	-18,968.7	-0.004790	-10,033.1	-173.8	-9,051.9	-807.4
Shasta	BOR	4,140	0.02422	-2,915.9	-51.0	-12,320.0	-0.004503	-86.4	-2.0	-67.8	-16.6
Siskiyou	BIA	1,800	0.01827	-1,165.6	-5.1	-2,832.0	-0.003337	-29.3	-26.3	0.0	-3.0
Calaveras	State	3,446	0.02547	-2,678.3	-28.4	-8,251.6	-0.002661	-41.7	-0.5	-37.1	-4.1
Amador	BLM	8,226	0.02208	-3,545.4	-74.7	-9,085.8	-0.002589	-96.9	-22.0	-49.6	-25.3
San Diego	Private/Other	674,102	0.02587	-1,992.9	-6,812.1	-10,105.5	-0.002587	-8,618.7	-6,142.3	-584.5	-1,891.9
Tuolumne	Local	2,105	0.02640	-1,012.8	-11.5	-5,466.0	-0.002351	-23.2	-7.6	-0.4	-15.3
Los Angeles	USFS	644,590	0.02918	-3,152.4	-8,592.9	-13,330.8	-0.002280	-6,735.3	-122.5	-4,416.3	-2,196.5
Nevada	Private/Other	354,173	0.01737	-2,763.8	-2,796.6	-7,896.0	-0.001997	-3,361.8	-2,577.7	-276.2	-507.9
Nevada	State	16,133	0.02084	-2,933.6	-145.6	-9,026.2	-0.001989	-147.6	-11.2	-106.8	-29.6
Los Angeles	Local	130,278	0.00770	-2,614.6	-1,300.7	-9,984.2	-0.001901	-1,164.0	-210.2	-812.9	-140.9
San Diego	BIA	127,496	0.04926	-1,984.0	-1,219.4	-9,564.3	-0.001890	-1,109.9	-664.4	-133.5	-312.0
Tuolumne	Private/Other	329,453	0.02235	-1,482.2	-2,111.5	-6,409.2	-0.001727	-2,653.1	-1,948.8	-266.2	-438.1
Trinity	State	1,165	0.04876	-3,515.1	-12.4	-10,672.2	-0.001602	-8.5	-2.5	-5.2	-0.8
Tuolumne	State	4,653	0.03107	-2,120.0	-36.4	-7,831.1	-0.001600	-33.7	-5.2	-24.7	-3.8
El Dorado	Private/Other	496,010	0.01616	-2,368.1	-3,259.9	-6,572.2	-0.001590	-3,756.0	-3,153.0	-225.6	-377.3
Yuba	Local	7,179	0.02224	-1,325.9	-36.6	-5,104.0	-0.001558	-52.0	-2.7	-1.7	-47.6
Lake	BIA	1,201	0.01941	-1,195.6	-5.9	-4,919.9	-0.001554	-9.5	-6.0	-2.9	-0.7
Sonoma	BLM	6,628	0.01962	-999.0	-23.8	-3,591.6	-0.001476	-45.3	-0.1	-20.0	-25.2

Table 13. Cumulative Annual *In Situ* Risk (expected) – top 10 with greater than 1,000 acres

County	Jurisdiction	Exposed Acres (BP > 0)	Mean Burn Probability	Mean Transmitted Risk per Fire (conditional)	Cumulative Mean-Annual Transmitted Risk (expected)	Relative Mean-Annual Transmitted Risk (per million acres)	Mean Annual *In Situ* Risk (expected)	Cumulative Annual *In Situ* Risk (expected)	Cumulative Annual People/Property *In Situ* Risk (expected)	Cumulative Annual Drinking Water *In Situ* Risk (expected)	Cumulative Annual Infrastructure *In Situ* Risk (expected)
San Bernardino	USFS	472,305	0.02893	-3,396.8	-8,577.9	-18,968.7	-0.004790	-10,033.1	-173.8	-9,051.9	-807.4
San Diego	Private/Other	852,269	0.02587	-1,992.9	-6,812.1	-10,105.5	-0.002587	-8,618.7	-6,142.3	-584.5	-1,891.9
Los Angeles	USFS	658,636	0.02918	-3,152.4	-8,592.9	-13,330.8	-0.002280	-6,735.3	-122.5	-4,416.3	-2,196.5
Riverside	Private/Other	1,366,430	0.01051	-507.7	-3,248.1	-3,322.7	-0.000937	-4,663.0	-3,989.8	-43.2	-629.9
Los Angeles	Private/Other	1,039,243	0.00923	-1,084.2	-3,376.6	-4,546.6	-0.001076	-4,056.4	-2,434.7	-509.7	-1,112.1
Shasta	Private/Other	1,423,521	0.01988	-845.2	-3,466.8	-2,571.4	-0.000613	-3,829.2	-1,761.0	-131.6	-1,936.7
El Dorado	Private/Other	544,931	0.01616	-2,368.1	-3,259.9	-6,572.2	-0.001590	-3,756.0	-3,153.0	-225.6	-377.3
San Bernardino	Private/Other	2,105,612	0.00255	-339.3	-3,336.9	-2,021.4	-0.000430	-3,527.0	-2,231.6	-651.9	-643.4
Nevada	Private/Other	384,284	0.01737	-2,763.8	-2,796.6	-7,896.0	-0.001997	-3,361.8	-2,577.7	-276.2	-507.9
Tuolumne	Private/Other	346,548	0.02235	-1,482.2	-2,111.5	-6,409.2	-0.001727	-2,653.1	-1,948.8	-266.2	-438.1
Trinity	USFS	1,462,728	0.03834	-732.0	-3,179.3	-2,204.9	-0.000384	-2,519.1	-120.4	-1,844.8	-553.9
Siskiyou	Private/Other	1,482,245	0.01934	-798.4	-2,082.4	-1,515.4	-0.000390	-2,506.6	-1,016.3	-319.8	-1,170.5
Trinity	Private/Other	492,744	0.03688	-1,208.4	-1,810.5	-3,810.9	-0.001083	-2,386.0	-1,162.7	-591.1	-632.2
Kern	Private/Other	3,339,387	0.00686	-130.1	-1,855.4	-686.2	-0.000175	-2,309.3	-1,036.8	-120.2	-1,152.3
Calaveras	Private/Other	512,361	0.02052	-1,192.5	-2,087.4	-4,260.6	-0.000973	-2,216.8	-1,552.4	-177.9	-486.5
Placer	Private/Other	458,030	0.01182	-1,367.4	-1,580.2	-4,132.3	-0.001173	-2,193.8	-1,618.8	-99.6	-475.5
Lake	Private/Other	405,100	0.02575	-1,253.6	-1,910.2	-5,235.3	-0.001201	-2,094.1	-1,208.5	-164.4	-721.3
Mendocino	Private/Other	1,716,002	0.01015	-382.3	-1,596.5	-972.4	-0.000225	-1,707.8	-364.0	-870.2	-473.6
San Diego	USFS	292,515	0.05605	-2,010.9	-2,746.3	-9,547.8	-0.001121	-1,471.8	-121.7	-769.9	-580.2
Orange	USFS	55,380	0.04269	-3,313.8	-1,103.4	-20,051.2	-0.005892	-1,466.7	-14.5	-1,295.8	-156.4

Table 14.Relative Mean-Annual Transmitted Risk for California counties and land ownerships – top 10 with greater than 1,000 acres

County	Jurisdiction	Exposed Acres (BP > 0)	Mean Burn Probability	Mean Transmitted Risk per Fire (conditional)	Cumulative Mean-Annual Transmitted Risk (expected)	Relative Mean-Annual Transmitted Risk (per million acres)	Cumulative Annual *In Situ* Risk (expected)	Mean Annual *In Situ* Risk (expected)	Cumulative Annual People/Property *In Situ* Risk (expected)	Cumulative Annual Drinking Water *In Situ* Risk (expected)	Cumulative Annual Infrastructure *In Situ* Risk (expected)
Orange	USFS	55,380	0.04269	-3,313.8	-1,103.4	-20,051.2	-1,466.7	-0.005892	-14.5	-1,295.8	-156.4
San Bernardino	USFS	472,305	0.02893	-3,396.8	-8,577.9	-18,968.7	-10,033.1	-0.004790	-173.8	-9,051.9	-807.4
Los Angeles	USFS	658,636	0.02918	-3,152.4	-8,592.9	-13,330.8	-6,735.3	-0.002280	-122.5	-4,416.3	-2,196.5
Shasta	BOR	4,291	0.02422	-2,915.9	-51.0	-12,320.0	-86.4	-0.004503	-2.0	-67.8	-16.6
Placer	BOR	20,364	0.02309	-5,029.5	-243.3	-12,215.7	-40.2	-0.000441	-12.1	-8.0	-20.1
Lake	Local	3,372	0.05092	-2,704.6	-34.5	-11,254.5	-11.0	-0.000758	-10.6	-0.4	-0.1
Nevada	BLM	16,410	0.02762	-4,213.9	-178.8	-11,001.8	-59.1	-0.000802	-27.5	-6.9	-24.6
Trinity	State	1,188	0.04876	-3,515.1	-12.4	-10,672.2	-8.5	-0.001602	-2.5	-5.2	-0.8
Placer	BLM	17,481	0.02870	-4,622.5	-177.8	-10,311.5	-26.2	-0.000334	-11.9	-2.9	-11.4
San Diego	Private/Other	852,269	0.02587	-1,992.9	-6,812.1	-10,105.5	-8,618.7	-0.002587	-6,142.3	-584.5	-1,891.9
Los Angeles	Local	141,936	0.00770	-2,614.6	-1,300.7	-9,984.2	-1,164.0	-0.001901	-210.2	-812.9	-140.9
San Diego	BIA	131,206	0.04926	-1,984.0	-1,219.4	-9,564.3	-1,109.9	-0.001890	-664.4	-133.5	-312.0
San Diego	USFS	292,515	0.05605	-2,010.9	-2,746.3	-9,547.8	-1,471.8	-0.001121	-121.7	-769.9	-580.2
El Dorado	BLM	21,608	0.02183	-3,260.5	-199.2	-9,298.8	-69.3	-0.000715	-34.0	-25.6	-9.6
Los Angeles	State	53,638	0.01554	-2,775.9	-463.6	-9,261.7	-191.0	-0.000809	-59.6	-55.8	-75.6
San Diego	Local	178,594	0.02704	-2,268.4	-1,547.7	-9,207.4	-1,032.0	-0.001320	-147.7	-456.1	-428.2
Amador	BLM	8,332	0.02208	-3,545.4	-74.7	-9,085.8	-96.9	-0.002589	-22.0	-49.6	-25.3
Nevada	State	16,588	0.02084	-2,933.6	-145.6	-9,026.2	-147.6	-0.001989	-11.2	-106.8	-29.6
El Dorado	BOR	10,825	0.01699	-3,130.6	-95.3	-8,927.0	-55.4	-0.001142	-11.1	-35.4	-8.9
San Diego	USFWS	12,996	0.00705	-2,563.2	-106.9	-8,368.6	-15.2	-0.000261	-6.0	0.0	-9.2

6 ANALYSIS SUMMARY

The CAL Wildfire Risk Assessment provides foundational information about wildfire hazard and risk across the state. The results represent the best available science across a range of disciplines. While this report was generated by Pyrologix LLC, the overall analysis was developed as a collaborative effort between California BLM State Office, the U.S. Forest Service Region 5, and California Department of Forestry and Fire Protection (CALFIRE). This analysis can provide great utility in a range of applications including resource planning, prioritization and implementation of prevention and mitigation activities, and wildfire incident response planning.

The county and jurisdiction tabular summaries have wealth of information to inform fuel and fire management decisions by land-management agencies including generally identifying risk patterns on the landscape, exploring sources and sinks of wildfire risk, informing prioritization and allocation of wildfire mitigation measures, as well as placement of suppression resources and protection agreement exchanges between jurisdictional agencies.

Lastly, this analysis should be viewed as a living document. While the effort to parameterize and calibrate model inputs should remain static, the landscape file should be periodically revisited and updated to account for future forest disturbances.

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8 DATA PRODUCTS

The CAL Wildfire Risk Assessment required the development of a wide range of data products. The section below outlines those datasets, with a brief description, based on provided data deliverables. More detailed descriptions of data product background and development procedures can be found in the metadata of each data product.

Deliverable Folder	Data Product	Description
HVRA Characterization		
1.1.1	HVRA Spatial Data	The subfolder contains an ESRI 10.7 geodatabase that contains five, 30-m HVRA rasters used as inputs for the risk calculations: drinking water, communication sites, power (power plants & substation), transmission lines, and people & property.
1.1.2-1.1.3	Table of final RFs/RIs	The subfolder contains an Excel file containing a table of response functions and relative importance values for each assessed HVRA.
Effects Analysis		
1.2.1	Risk and consequence results (e/cNVC)	The subfolder contains two ESRI ArcMap geodatabases that contain rasters representing conditional and expected NVC results for all assessed HVRA individually (drinking water, infrastructure, and people & property), and in total.
1.2.2	Risk Source Analysis (Transmitted eImpact)	The subfolder contains: • Four 30-m risk source raster in TIFF format representing the Expected Transmitted Risk to all HVRA and to each HVRA, individually . The subfolder also contains an ESRI ArcMap 10.3 layers file for recommended symbology. • A geodatabase of simulated ignition locations, each attributed with the cNVC associated with each fire – in total and for each HVRA.

1.3.2	Table of Risk Transmission Summaries	The subfolder contains an Excel file containing a table of risk transmission summaries for California counties and jurisdictions (*CAL_InSitu_Tansmitted_Risk_CountySummaries.xlsx*).
Risk to Communities		
1.4	Risk to California Communities	This subfolder contains tabular summaries of wildfire Risk to California Communities that reflect fuel conditions in 2021. The summaries are performed for counties, county subdivisions, and expanded community zones (nearest populated place by drive time).

9 CHANGE LOG

The changelog documents changes made to this document after the initial submission.

Date	Location of Change	Author	Description of Change
4/14/2022	-	-	Initial submission
5/09/2022	Title Page	JGD	Add USFS and CALFIRE agency names and logos to title page

THANK YOU

Assessment and Report Contributors:

Jim Napoli
Spatial Wildfire Analyst

Julie Gilbertson-Day
Program Manager

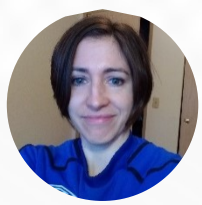
Kevin Vogler
Spatial Wildfire Analyst

Joe H. Scott
Principal Wildfire Analyst

April Brough
Spatial Wildfire Analyst

Chris Moran, PhD
Spatial Wildfire Analyst

Michael Callahan
Software Engineer



Julia Olszewski
Spatial Wildfire Analyst

The California Pilot wildfire risk assessment was conducted by Pyrologix, a wildfire hazard and risk assessment research firm based in Missoula, Montana.

For More Information Please Visit:

www.pyrologix.com

www.wildfirehazard.com