

Lahaina Wildfire Study: Impacts of Post-Disaster Housing Programs on Maui's Economy

Maui County, HI

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Context

- In August 2023, wildfires destroyed more than 4,000 housing units in Maui County, Hawai‘i, primarily in the town of Lahaina. One hundred and two people were killed, making it the deadliest wildfire in the United States in more than a century.¹ The fire displaced 13,000 people; 5,000 found new housing without government assistance, and 8,000 applied for assistance.²
- Federal, state, local, and not-for-profit entities quickly implemented several housing assistance programs amid uniquely complex cultural, geographic, and socio-economic factors. The state requested direct housing assistance, which FEMA approved based on the information available at the time. Direct Lease was identified as the form of Direct Temporary Housing Assistance that would best meet survivor needs in the community. In Direct Lease, FEMA enters into lease agreements with property owners on behalf of disaster survivors.
 - Hawai‘i’s remoteness limited the feasibility of using Temporary Transportable Housing Units and the already constrained long-term rental market limited the utility of Continued Temporary Housing Assistance, where FEMA provides financial assistance to disaster survivors for market-rate rentals.
 - FEMA targeted short-term rentals for Direct Lease due to their abundance and availability, as demonstrated through high short-term rental vacancy rates on Maui. Additionally, FEMA assumed that the short-term and long-term rental markets were not intertwined so leasing short-term rentals would limit inflationary pressures from Direct Lease in the long-term rental market.

Study Background and Methodology

- Shortly after Direct Lease started, concerns emerged from state and local officials that Direct Lease was causing long-term rents to increase to a point of unaffordability for disaster survivors and other residents. Officials were also concerned that the Direct Lease could cause a decrease in tourism by displacing visitors who normally stay in short-term rentals and could cause an increase in evictions by landlords seeking higher rents paid for by FEMA. As a result of these concerns, in February 2024, FEMA requested that Argonne National Laboratory (Argonne) conduct this study to better understand how temporary housing assistance programs were impacting Maui’s economy to inform FEMA’s approach to housing assistance moving forward.
- The research objectives of the study were to do the following:
 - Evaluate the impacts of post-disaster housing programs, including FEMA’s housing assistance, on Maui’s economy. This necessitated an understanding of both the pre-disaster housing context—including the housing emergency, regulation of short- and long-term rentals, and tourism—and the post-disaster housing situation.
 - Examine the tradeoffs between FEMA Direct Lease and building alternative housing units, including time, cost, economic, environmental, and cultural factors.
 - Evaluate the timing and interaction of housing assistance activities, including assessing gaps between shelter, temporary housing, and long-term housing efforts and assessing FEMA’s role in addressing Maui’s long-term affordable housing challenges.

- Argonne interviewed representatives from more than 30 federal, state, and local government and non-profit organizations to gather information on the pre-fire conditions in Lahaina and the impacts of the fire. Argonne performed additional desktop research to build on the information gathered through interviews including policies and regulations affecting local housing, environmental and historic preservation issues, and the delivery of post-disaster assistance.
- Argonne combined the interview and desktop research data with quantitative data from multiple sources including the U.S. Census Bureau (Census); Bureau of Labor Statistics; the State of Hawai‘i Department of Business, Economic Development and Tourism (DBEDT); Maui County; and the University of Hawai‘i’s Economic Research Organization (UHERO). Argonne used multiple modeling techniques, including supply-demand modeling and simulations of recovery and rebuilding timelines to evaluate changes in the Maui rental market, reconstruction durations, and timelines for long-term rental market stabilization following the fire.
- After the initial round of interviews, Argonne researchers identified several factors that affect how people viewed the success of the recovery efforts:
 - West Maui is generally considered a distinct and somewhat self-contained geographic location. Commuting to West Maui from other parts of Maui is challenging, so many people both live and work in West Maui. Being a West Maui resident is an important part of people’s identity. In addition, Lahaina was one of the few areas in Maui County where working-class people could afford to live near the water.
 - Stakeholders have different definitions of what successful recovery should be (e.g., Native Hawaiian cultural sites are restored; Lahaina grows as a tourism destination; the state-wide housing crisis is solved; or people who want to move back to Lahaina can do so). The definitions are not mutually exclusive but also are not fully aligned.
 - The term “temporary” has a different meaning depending on the stakeholder. In typical housing operations, FEMA approves its temporary housing program on an 18-month timeline with the option to extend in 6-month increments. However, Maui County and the State of Hawai‘i spoke of temporary solutions in terms of several years. FEMA has acknowledged the longer-than typical timeframe and is adjusting its timeframes accordingly. FEMA, the state of Hawai‘i, and Maui County officials are coordinating to align program timelines with unified housing goals but it is important to understand how the same word can have different meaning depending on the user’s perspective.
- Argonne provided an advanced draft copy of this report to state, local, and other stakeholders. As feasible, comments were addressed prior to finishing this report.

Geographic Focus

- This report includes a wide variety of data sources from federal, state, local, and non-governmental sources. As feasible, Argonne sought to include data down to the census tract level for the three most affected census tracts, shown in Figure 1. Where necessary due to data constraints, Argonne provided information at the county level.
- The Census provides demographic data in a wide variety of geographic extents (e.g., state, county, place, zip code, tract, block). In some cases, these geographic extents overlap (such as tracts and zip codes), meaning that numbers may appear slightly different depending on the level of analysis. To meet the research objectives of this report, Argonne elected to analyze demographics using the 2022 American Community Survey 5-year estimates at the tract level. Unless otherwise noted, demographic statistics throughout this report are from the 2022 American Community Survey at the tract level.
 - The U.S. Department of Housing and Urban Development (HUD) and other stakeholders have used similar data, but at different geographic extents. As a result, statistics may vary.

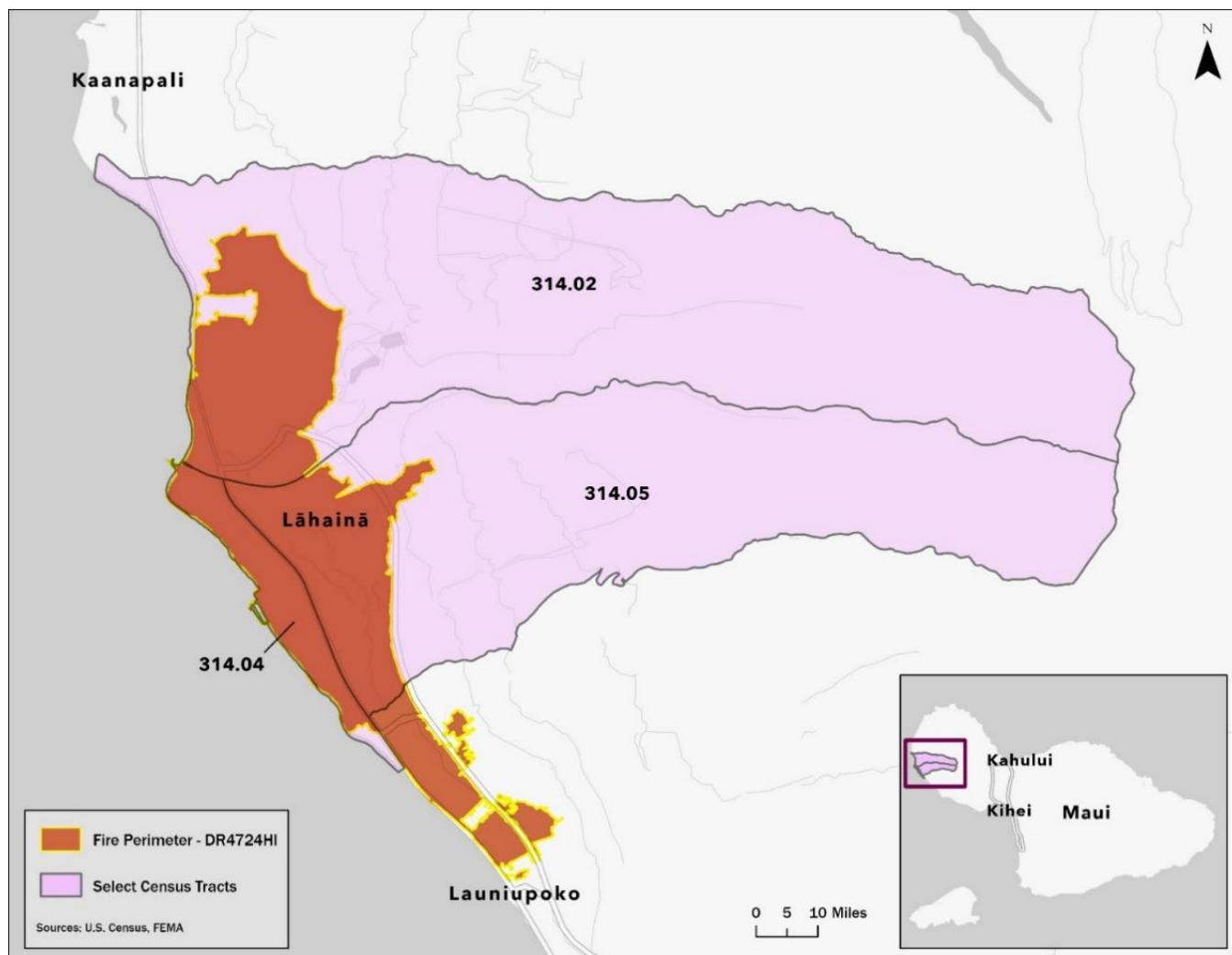


Figure 1: Most Affected Census Tracts

Demographics

- **People:** About 7% of Maui County's population lived in the three census tracts most heavily impacted by the wildfire. Table 1 presents key demographics of these three tracts compared to the county and nation.
- **Income:** The per capita income in these tracts is 13% to 24% lower than the county and national per capita incomes indicating this was an area where residents may have struggled economically.
- **Household Size:** Within the affected area, 25% of the households were multi-generational households, compared to 9% statewide and 5.5% nationally.³ Larger households were also common.
 - Interviewees spoke of overcrowding and/or doubling up both because of lack of affordable housing options and because of the [cultural preferences](#) of Native Hawaiians and of Southeast Asian and Central American immigrants.
- **Citizenship:** Many of the people living in the affected area were foreign-born; almost half of the foreign-born population were not U.S. citizens and therefore not eligible for FEMA assistance. More than 20% of people also identified as having Native Hawaiian heritage.

Table 1: Demographics for Maui County in 2022⁴

DEMOGRAPHIC	TRACT 314.02	TRACT 314.04	TRACT 314.05	MAUI COUNTY	USA
Total Population	3,208	3,223	6,280	164,754	333M
Percentage of Households With One or More People Under 18 years	34.9%	39.8%	48.1%	33.3%	31.4%
Percentage of Households With One or More People Over 60 Years	40.4%	36.0%	50.2%	48.1%	38.7%
Percentage of Householder Living Alone and 65 Years or Older	3.5%	10.5%	5.3%	9.4%	10.7%
Percent of Households where English is Spoken Less Than "Very Well" ⁵	16.5%	10.7%	25.5%	9.4%	8.2%
Percent of Population Native Hawaiian and Pacific Islander Alone ⁶	14.9%	9.2%	8.7%	12.1%	0.2%
Percent of Population that is Foreign-born	26%	21%	44%	17%	14%
Percent of Foreign-born Residents that are U.S. Citizens	44.9%	53.8%	54.7%	60.8%	52.3%
Percent of Foreign-born Residents from Philippines ⁷	43%	29%	69%	56%	4%
Percent of Foreign-born Residents from Mexico	11%	18%	8%	4%	24%
Percent of Foreign-born Residents from Oceania not elsewhere classified (i.e., Fiji, Marshall Islands, Micronesia)	27%	2%	2%	4%	0%
Per Capita Income in the Past 12 Months ⁸	\$35,974	\$32,700	\$34,826	\$42,607	\$41,261

Housing

- **Pre-Existing Conditions:** Housing supply and affordability were both issues in Maui County before the fire, with an estimated 10,400 units, including 5,000 affordable housing units, needed to meet demand.⁹ These issues were not isolated to Maui County; in July 2023, Governor Green issued an Emergency Proclamation Relating to Housing meant to increase the rate and amount of residential construction throughout the state. The governor issued an additional proclamation following the fire specific to Lahaina.
- **Occupancy:** According to the Census, there were 54,728 occupied housing units in Maui County as of 2022. Of those, 35,758 (65.3%) were owner occupied and 18,970 (34.7%) were renter occupied.¹⁰ Additionally, 17,073 housing units were vacant, of which 6,974 were for rent county-wide.
 - Lahaina's unique community composition makes it difficult to pinpoint the exact number of housing units that were renter occupied, owner-occupied, or both before the fire. According to the Census, 48% of all occupied housing units in the three most impacted census tracts were renter occupied, and 52% were owner occupied. At the same time, 25% of all households are multi-generational, and it is possible that some of these households would be a combination of owners and renters. Likewise, doubling up and overcrowding were a common occurrence. Finally, 77% of the approximately 4,000 FEMA applicants approved for some type of FEMA assistance were renters. Taken together, it is likely that the actual number of housing units with renters was higher than Census estimates indicate.
- **Housing Costs:** When accounting for renters, owners with a mortgage, and owners without a mortgage, 42% of all households in Lahaina are cost burdened, defined as households who expended more than 30% of their annual income on housing. Table 2 provides additional detail by occupancy type and shows that housing cost burden is generally higher in Lahaina than the national average.¹¹ It is especially acute in tracts 314.02 and 314.04.

Table 2: Cost Burden by Occupancy Type

COST BURDEN BY OCCUPANCY TYPE	TRACT 314.02	TRACT 314.04	TRACT 314.05	MAUI COUNTY	USA
% Cost-Burdened Renters	55.7%	56.7%	49.8%	52.9%	49.9%
% Cost-Burdened Owners with Mortgage	48.0%	54.2%	23.3%	43.7%	27.3%
% Total Cost-Burdened Owners Without a Mortgage	1.6%	33.3%	3.5%	11.3%	13.6%

- Based on data from Zillow, rents rose 28% in the Kahului-Wailuku-Lahaina metropolitan area between April 2021 and July 2023 compared to a national rate of 22.4%.¹² Similarly, rental data from Craigslist collected by UHERO indicates that rents rose 25% in Lahaina as well as Maui County between 2021 and 2023.¹³ Cost burden is likely to increase given the observed increase in rents since the fire.
- **Short-term Rentals:** The number of housing units occupied by long-term renters decreased by 17% between 2017 and 2022.^{14,15,16} More than 10% of housing units in Maui County in 2022 were unavailable to the resident housing market because they were held for seasonal use compared to 3% nationally. Maui County has more than 16,000 units (e.g., apartments, condos, houses) legally eligible to operate as transient vacation or short-term (less than 6 months) rentals without a short-term rental permit.¹⁷ These units generally are in districts zoned for hotel use, but some are in apartment districts or other areas. Unlicensed short-term units

were reported to be prevalent, but the county and state lack definitive data on the number or location of such units; the county has limited capacity and capability to enforce regulations against the conversion of housing units to short-term rental units.

- **Sale Prices:** The residential sales prices reflect the constrained housing supply. The median sales price for a single-family home in Maui County in 2023 was \$1.2 million and \$848,000 for a condominium; the 2023 median sale price is a 126% increase from 2013 and exceeds the national median of \$417,000.¹⁸
- **Cultural Norms:** The importance of ‘*ohana*, or an idea of family that extends beyond the traditional American nuclear family and implies an obligation and desire to care for one another, was mentioned often by interviewees. Many in Lahaina were part of multi-generational families or other communal households (approximately 25% of households in the affected area). Interviewees also noted that living in West Maui is an important part of many people’s identity, and the loss of the ability to live there has had social and mental health implications.
- **Home Modifications:** It was common for single family homes in Lahaina to be modified to include additional bedrooms or Accessory Dwelling Units, also called *Ohanas*. These modifications were typically not permitted or regulated and did not include necessary utility upgrades.

Barriers to Residential Development

- **Regulatory Requirements:** For any development to occur in Maui County, the project must align with several layers of regulation, which include state environmental review, state land-use designations, the countywide policy plan, island plan, community plan, zoning code, and potentially any historical or environmental district overlays. Finding parcels that already have the appropriate alignment of entitlements at all levels is difficult.
- **Permitting Process:** The permitting process is also lengthy, which significantly limits the housing development process. According to Maui County’s website, it took an average of 300 days to approve a permit in 2021 and 2022.¹⁹ Factors include resubmittal requests and a decentralized process that involves almost every department in the county government coupled with county capacity constraints.
 - In March 2024, the Maui County Council passed legislation to expedite emergency building permits for alterations, repairs, reconstruction, and new construction of residential structures in disaster affected areas. The resulting changes along with other County efforts have led to an average permitting time of 15 days for housing permits submitted within the burn scar as of July 2024.
- **Water and Wastewater Access:** As part of the entitlement and permitting process, developers must also be able to demonstrate access to a long-term, reliable source of potable water as well as an ability to appropriately dispose of wastewater. The Hawaii Commission on Water Resource Management has jurisdiction over existing and new water use permits in West Maui.
 - Surface water sources, which are particularly vulnerable to drought, supply 65% of water systems in West Maui.²⁰ Most water systems in West Maui are privately owned; the county provides about 24% of the water supply, which limits its ability to plan or instigate new development in most of the region. In addition, the Lahaina Wastewater Reclamation Facility cannot sustain additional development without additional infrastructure.

- **Construction Costs:** Construction costs are also high in Hawai‘i due to site conditions (e.g., volcanic rock requires blasting to grade the site) and higher-than-national average supply and labor costs. Residential construction costs in Honolulu increased 7% to 10% between 2022 and the first quarter of 2024 and range from \$310-\$580/square foot for single family construction to \$275-\$470 for multi-family construction. These costs exceed all major metro areas except for New York, San Francisco, and Chicago.²¹ Interviewees noted the cost to build in Maui County has historically been more expensive than Honolulu. They estimated construction costs to be \$300–\$500/square foot prior to the fire. They noted, however, that some survivors have been quoted as high as \$800–\$1,000/square foot to rebuild after the fire.

Temporary Housing Assistance

- **Fire Impact to Housing:** The State of Hawai‘i estimates that a total of 4,005 housing units and 800–1,100 non-residential structures were destroyed in the fire.²²
 - More than 8,000 survivors were placed in hotels through the state-run Non-Congregate Sheltering effort. More than 4,000 households were approved for assistance through FEMA’s Individuals and Households Program.
 - Eighty percent (80%) of eligible FEMA applicants were renters, which is significantly higher than is typical of FEMA temporary housing operations. This is noteworthy because, unlike property owners, renters do not control the rebuilding of housing they previously occupied. The state and several community-based organizations have also provided housing assistance to more than 500 households affected by the disaster.
- **Debris and Impact to Utilities:** The water, wastewater, and electrical systems were damaged throughout Lahaina. Substantial parts of the systems have been repaired to at least temporary working conditions as of April 2024. Removal of fire-generated debris must be completed before permits can be issued and repair work on public and private property can begin. As of July 2024, approximately 75% of residential parcels have been cleared of debris and released for rebuilding; given the rate of progress, most single-family residential properties are expected to be cleared by the beginning of August 2024. Some HUD-assisted multi-family developments are expected to be cleared in September and October 2024.²³

Direct Lease

- **Decision to Authorize Direct Lease:** FEMA approved a direct temporary housing mission for the Lahaina Fire (DR-4724), including Direct Lease and Multi-family Lease and Repair, on September 13, 2023. Interviewees indicated that the unique nature of the housing market in Maui County, and the concentration of available short-term rentals in West Maui coupled with survivor preference to remain in West Maui, led to Direct Lease being the most feasible and efficient option to meet interim housing needs. Further, based on the high number of apartment-hotels, vacation properties, and timeshares, FEMA and its federal, state, local, and non-profit partners prioritized securing short-term rentals based on the assumption that the short-term rental market and the long-term rental market were not intertwined and, therefore, that securing short-term rentals would not have a significant impact on long-term rental rates. The State of Hawai‘i and Maui County coordinated to implement tax relief measures for property owners who made their units available for Direct Lease.

- **Direct Lease Units Secured:** FEMA secured 1,362 units for the Direct Lease program. Monthly rents were negotiated unit-by-unit and based on what an owner could expect to receive if the unit operated as a short-term vacation rental. FEMA stakeholders noted that FEMA also pays homeowner's association fees, cleaning fees, and utility fees in addition to monthly rental rates. Of the units secured, approximately 50% are in West Maui in or near Lahaina. The remainder of units are located primarily in central Maui and south Maui.
 - As of July 2024, FEMA has licensed households into 1,217 Direct Lease units.²⁴ FEMA stakeholders indicated that it has taken some time to match available units to survivor households. Matching a unit to a household can be particularly challenging for families requiring larger units, those with pets, and survivors with access and functional needs. In addition, FEMA has deferred heavily to survivor preference, offering as many as four different units to survivors in need of housing. This has meant that some units have necessarily been vacant for weeks or months.
 - For property owners that agreed to participate in programs to house survivors, including Direct Lease, Maui County offered an 18-month tax exemption. Of those receiving the tax exemption, Maui County reported that 370 units were previously non-short term rental units (e.g., previously long-term rentals or owner-occupied homes).²⁵
- **Targeting Short-Term Rentals for Direct Lease:** FEMA undertook communications and outreach efforts targeted towards securing short-term rentals, including hosting multiple industry days with property owners, management companies, and other stakeholders. FEMA also undertook several efforts to prevent long-term rental property owners from unlawfully ending leases in order to participate in the Direct Lease program.
 - For example, in consultation with the State of Hawai'i and other non-profits, FEMA included messaging in materials and public meetings indicating that property owners who ended long-term leases would not be considered for Direct Lease. In cases where FEMA directly received a complaint about a property, they coordinated with the Attorney General's Office to investigate and adjudicate the complaint. As of May 2024, there were fewer than 10 cases where FEMA determined that a property owner in the Direct Lease program wrongfully ended a lease. In all cases, FEMA terminated the lease.
 - While FEMA undertook efforts to prevent landlords who wrongly terminated a lease from participating in Direct Lease, anecdotal reports from stakeholders and data from the State of Hawai'i indicate that some landlord behavior may have changed. Following the first of the emergency proclamations related to the fire, the Hawai'i Office of Consumer Protection landlord-tenant information center recorded a significant increase in call volume related to rent increases, lease terminations, needed repairs, or security deposits on the Island of Maui. The Hawai'i Office of Consumer Protection received nearly 700 calls related to the emergency proclamations by April 2024; nearly 450 of those calls concerned lease terminations.²⁶
 - The Attorney General's Office opened 193 cases resulting in 137 investigations. Of those investigations, 79 were found not to be a violation, 25 violations were corrected, and 33 investigations are ongoing as of May 2024.
- **Renter Cost Burden:** As noted earlier, approximately 42% of all households in Lahaina were housing cost burdened before the fire. Further, more than 55% of renters were cost burdened in two of the three most impacted census tracts.

- Argonne evaluated income for households eligible for or already leased into FEMA Direct Lease units in relationship to current long-term rental rates. Approximately 80% of households were renters pre-fire and had a median income below the county-wide median income. Argonne found that households in Direct Lease would be severely rent burdened if they did not have access to FEMA assistance.

Alternative Temporary Transportable Housing Units

- **Alternative Temporary Transportable Housing Unit Decision:** FEMA approved the State of Hawai‘i’s request for Alternative Temporary Transportable Housing Units (ATTHUs) as a supplement to Direct Lease on December 8, 2023. FEMA is already constructing a group site north of Lahaina at Kilohana that will support up to 169 ATTHUs. Site preparation activities are underway, and a request for proposal for ATTHUs has been released. The current group site design is intended to accommodate as many units as possible. Kilohana is located on land that is currently owned by the Hawai‘i Housing Finance and Development Corporation and is adjacent to the State of Hawai‘i’s temporary housing site. FEMA is considering additional opportunities to place ATTHUs on private sites or other group sites.
- **State and Non-Profit Programs:** The State of Hawai‘i, Maui County, and multiple non-profit organizations such as Council for Native Hawaiian Advancement and The Family Life Center, have also initiated housing assistance programs intended to support displaced households not eligible for FEMA assistance. The state and Maui County have announced plans to establish the Kala’iola group site consisting of 450 modular units on land adjacent to FEMA’s planned Kilohana group site. The state anticipates the first 270 units to be available in August 2024. Unit sizes will range from studios to three bedrooms.
- **Site Locations:** Both the Kilohana group site and Kala’iola group site are located on or adjacent to land that is understood to be intended for transfer to the Department of Hawaiian Home Lands for future use as homesteads for native Hawaiians.

Economy

- **Employment Center:** West Maui has been the center of gravity for the visitor economy in Maui County with many of the hotels, short-term vacation rentals, and tour companies concentrated there. Many of those employed in the visitor economy also lived in West Maui to be close to their jobs. For instance, more than 2,500 people, or approximately 57% of Lahaina’s workforce, were employed in Lahaina or in other parts of West Maui.²⁷
- **Unemployment:** Since the onset of the COVID-19 pandemic, several of Maui County’s visitor-related industries have seen sustained drops in employment (e.g., accommodation sector employment is 16.2% below pre-pandemic levels). The overall unemployment rate for the year before the fire had been low with rates between 2.5% to 3.9% but increased to 8.3% in the month following the fire. This increase was lower than some predictions and has improved in the months since the fire. As of April 2024, the unemployment rate was 4.3% for Maui County.²⁸
- **Tourism Impacts:** Through the end of April 2024, visitor arrivals to Maui were down 35% since the fire compared to the same period the prior year; while the state also experienced a decline in visitors, the decrease was only 3%.²⁹ Visitor spending in Maui County at the end of 2023 appeared to be down about 1.5% points compared to the end of 2022. Maui County’s average year-to-date hotel occupancy rate in May 2024 was 65.4%, or an increase of .22% points compared to the same time period in 2023.³⁰ Maui County’s vacation

rental unit year-to-date occupancy rate in May 2024, however, was down by 7.9% points compared to the same period in 2023.³¹

Findings: Economic Impacts from Housing Programs and Recovery Outlook

- This section describes Argonne's findings based on the review of pre-fire housing conditions, the impacts to housing from the fire, the federal, state, local and non-governmental housing assistance programs available, time-to-recovery modeling, and supply-demand modeling.

Finding 1: Changes to Rental Costs

- Median rent increased from \$2,500 a month in early 2023 to approximately \$3,600 per month as of June 2024, based on data collected from public sources (Figure 2).
 - To estimate changes in median rent, Argonne used pre-fire data that UHERO collected from Craigslist. For post-fire estimates, Argonne used data that the Council for Native Hawaiian Advancement collected from Craigslist, rent.com, and Trulia in October 2023, December 2023, and February 2024. Additionally, Argonne collected data from Craigslist, rent.com, Trulia, and Apartments.com in April 2024 and June 2024. Argonne cleaned data to remove duplicates (as determined by address, unit number, and other unit characteristics) prior to estimating median rent.
 - Argonne also reviewed Zillow's Observed Rent Index (ZORI), which measures the mean of listed rents that are within the 35th to 65th percentile of all rental units in a given region.³² They estimate that typical rents increased from \$3,331 to \$3,775 over the same time period.
 - The sample size for post-fire observations is small (average n=102 for October 2023 – February 2024, average n=355 for April – June 2024). As such, it is likely that they do not capture the full breadth of the rental market inventory.

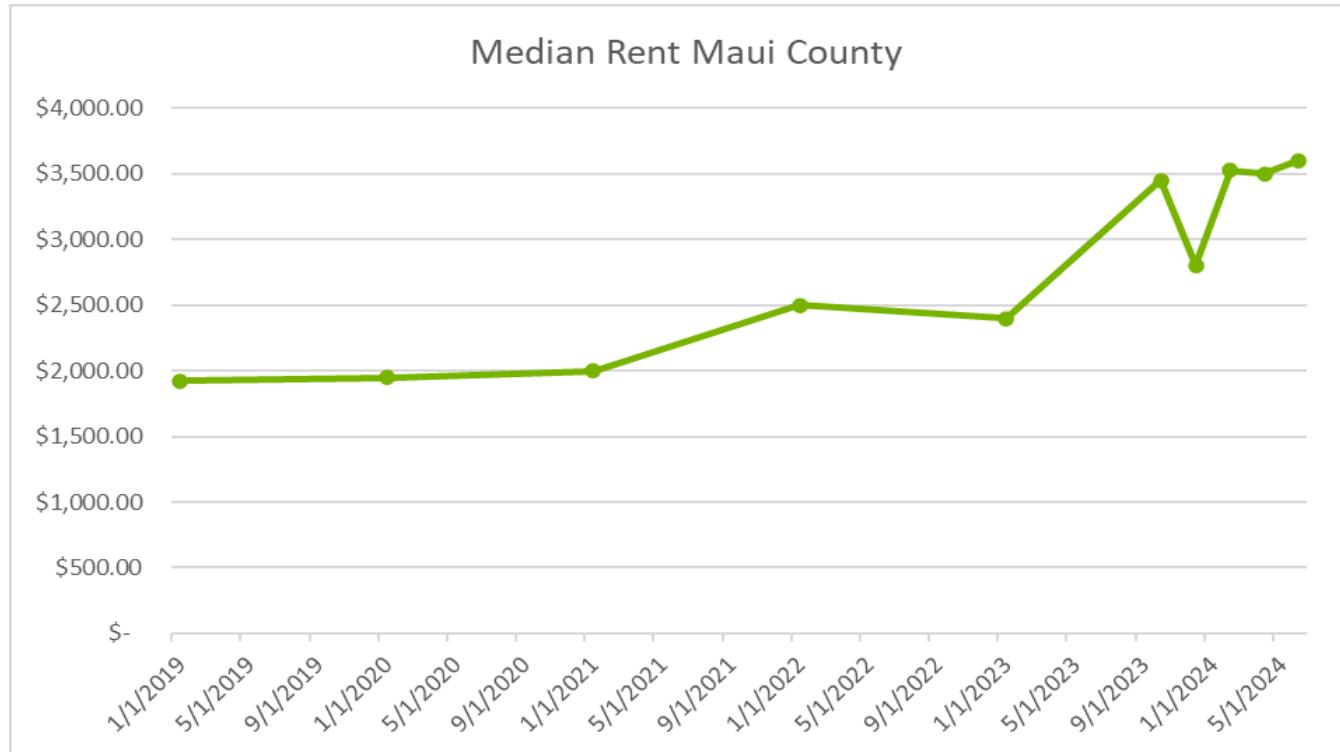


Figure 2: Median Rent from Public Websites³³

- The fire affected an area that was one of the most affordable for renters in Maui County. According to data from the Census, tracts 314.04 and 314.05, where the majority of homes were lost, had pre-fire rents that were 18% and 1% below county-wide averages, respectively.
- The post-fire rent increases, driven by the loss of a significant amount of affordable housing, are intensifying market conditions that triggered a housing emergency before the fire. They are especially acute for fire-affected households that rent. Median household income for families who have qualified for any type of FEMA housing assistance is well below the county average per year, meaning that median rent under current market conditions would result in those households being severely rent burdened and likely unable to afford market-rate rents.³⁴ As a result, they will likely require housing assistance for a prolonged period.

Finding 2: Loss of Housing Supply Drives Rent Increases

- Argonne assesses that the primary driver of the increase in median rent is the loss of housing supply, especially the loss of a significant amount of affordable rental housing in Lahaina. Argonne could not quantitatively detect specific rental price impacts from FEMA Direct Lease and related state or non-profit efforts to date.
- Using publicly available pre- and post-fire data, listed in Table 3, Argonne developed a supply-demand model (Figure 3) to assess any changes in the county-wide rental market that could have been induced by the influx of assistance, including Direct Lease, as well as similar efforts from state and non-governmental organizations.

Table 3: Model Variables and Data Sources

VARIABLE	DATA SOURCE
Occupied Housing Units	ACS 2022 5-Year Estimates, Table S2501
Renter Occupied Housing Units	ACS 2022 5-Year Estimates, Table S2501
Vacancy Status	ACS 2022 5-Year Estimates, Table B25004
Monthly Rental Costs (pre-fire)	Craigslist (collected by UHERO)
Monthly Rental Costs (post-fire)	Craigslist, realtor.com, Trulia (collected by CNHA and Argonne)

- To estimate demand, Argonne evaluated multiple factors that could both increase and decrease demand. For example, a factor that might increase demand includes homeowners who lost their homes in the fire and are now looking for rental resources. A factor that might decrease demand could include individuals seeking housing off-island. FEMA's data indicates that 49 individuals accepted FEMA assistance to move off-island. Impacts to demand were considered to be relatively small resulting in the assumption in the model that demand for rental units was the same pre -and post-fire. Factors of demand continue to warrant further monitoring.
- With a consistent level of demand, as supply of rental units in the market decreases, the equilibrium cost increases.
- To estimate supply post-fire, Argonne applied a linear regression that used the percentage of renter-occupied housing units and the long-term rental vacancy percentage rate as independent variables to predict median monthly rent cost. Because post-fire renter occupancy and vacancy data is not yet available from the Census, Argonne imputed those rates based on the estimated number of rental occupied housing units lost in the fire.
- Argonne performed a series of tests to inform both supply and demand side elasticity, or a measure of how responsive an economic variable is to change. These tests were used to validate results from the regression of vacancy and rental share in the supply demand model.
- Demand side elasticity measured the sensitivity of renters on the island to make the choice to rent a unit or make another housing decision (e.g., move in with family members, move off island), as a function of income and renter share of the housing market over time.
- Supply side elasticity measured the sensitivity of property owners to make the choice to offer their property as a long-term rental unit or offer it as another type of housing (e.g. short-term rental, leave vacant), as a function of vacant units in the market related to units used as long-term rentals. Argonne also evaluated the pricing of short-term rentals versus long-term rentals over time to contextualize landlord behavior (supply side elasticity) in pricing long term rental units.
- Model results are presented in Figure 3. For the model, Argonne used a lower bound of 48% of destroyed housing units that were renter occupied, consistent with Census estimates of renter-occupied housing units in the three most impacted census tracts. Argonne used an upper bound of 70% of destroyed housing units that were renter-occupied based on the recognition that some housing units in Lahaina were a mix of owner and renter-occupied. The shaded area on the chart represents the range of potential rental price increases based on the supply shock from the fire.

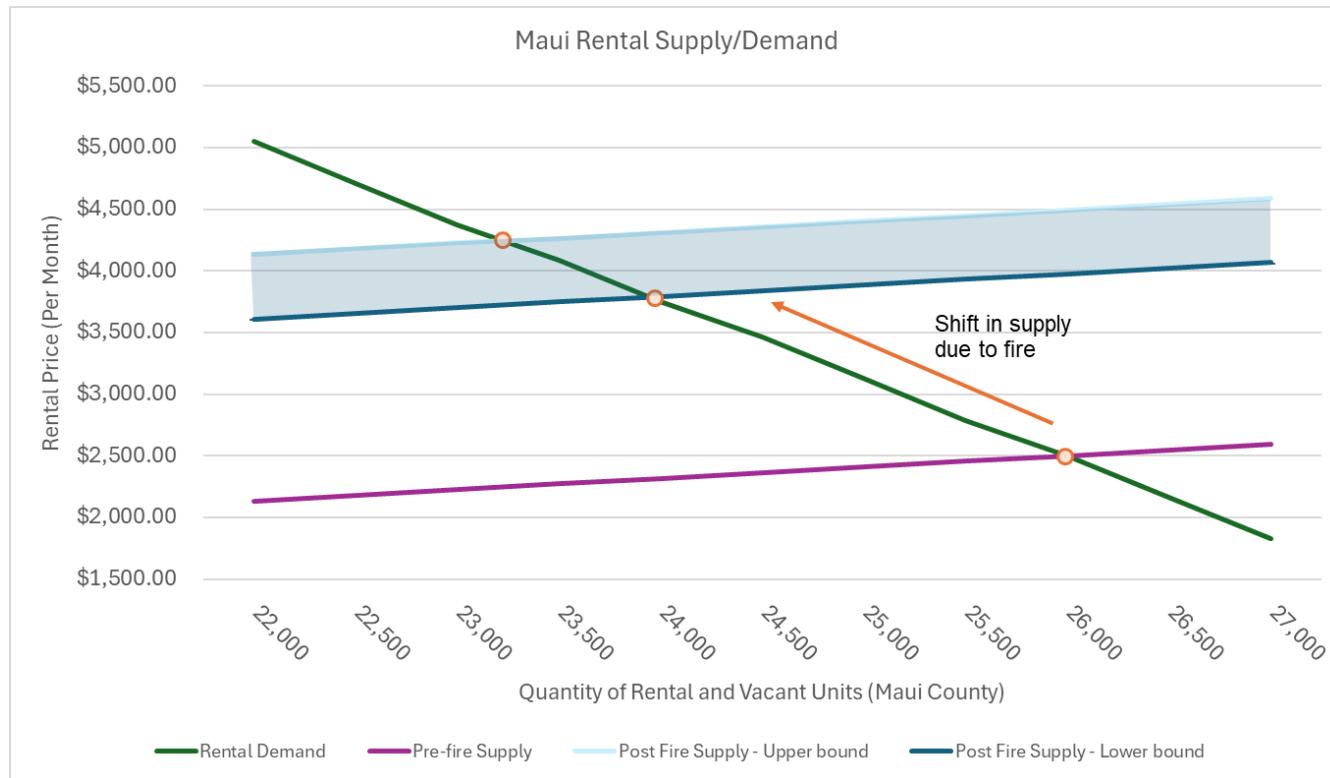


Figure 3: Rent Supply-Demand Model Results

- As previously noted, Census data indicates that there were approximately 18,970 renter occupied units in Maui County and an additional estimated 6,974 units for rent. If 48% of the 4,005 housing units lost in the fire were renter occupied, county-wide rental unit supply decreased by approximately 1,900 units, or 7% of total rental housing in Maui County. Under those conditions, the supply-demand model results indicate that county-wide median rent could increase to as much as \$3,800 per month.
- If 65% of the units lost in the fire were renter occupied, that would mean that approximately 2,600 units, or 10% of long-term rental housing in Maui County was lost in the fire. Under those conditions, the supply-demand model indicates that county-wide median rent could increase to as much as \$4,400 a month.
- As previously mentioned, median rent increased from \$2,500 a month in early 2023 to approximately \$3,600 per month as of June 2024, based on data collected from public sources (Figure 2). While high, this increase is still below the range of modeled potential cost increases based on the potential loss 7-10% of all rental housing units, including a large proportion of affordable housing, in Maui County.
- The supply-demand model has some important limitations.
 - First, the amount of data available post-fire is small, meaning that the full breadth of market dynamics, including effects from housing recovery assistance programs, are difficult to quantitatively detect but might become more apparent over time. For example, it does not take into account units in the Direct Lease program that may have previously been owner-occupied or long-term rental units.
 - Maui County provided information after the modeling for this study was completed indicating that 370 units receiving tax exemptions were not previously operating as short-term rentals.

While Argonne has not yet had the opportunity to review the data to date, it will be the subject of additional evaluation.

- The model also could not detect potential effects from landlords ending leases or raising rents on properties that are not in the Direct Lease program, both of which have been raised by stakeholders and described in more detail below.
- Longer-term monitoring and analysis, informed by a greater quantity of data, will likely provide better insight into the full set of dynamics affecting the rental market, including potential effects from recovery assistance.
- Technical documentation of the supply-demand model is available upon request.

Finding 3: Changes to Landlord Behaviors

- Argonne detected possible changes in landlord behavior since the fire that are likely attributable to rental rates that FEMA and other assistance programs paid.
 - The State of Hawai‘i Office of Consumer Protection landlord-tenant information center logged nearly 700 calls concerning the emergency proclamations between August 2023 and April 2024, with most relating to lease termination or rent increases.³⁵ Because the Office of Consumer Protection does not have enforcement authority, they refer complaints where illegal behavior is possible to the State of Hawai‘i Attorney General’s Office for investigation. Of the 137 cases investigated by the Attorney General’s office, 79 were found not to be a violation, 25 violations were corrected, and 33 investigations are ongoing as of May 2024.³⁶
 - These numbers are notable because the governor’s [post-fire emergency proclamation](#) temporarily prohibits rent increases and the termination of leases, even in cases where a lease is month-to-month, except for the following circumstances:
 - Termination with cause (e.g., damage to the property);
 - Sale of the property;
 - Renovation of the property; and
 - Cases where a property owner plans to re-occupy the property.
 - The number of complaints and subsequent investigations may indicate that while price increases could not yet be attributed to Direct Lease in the supply-demand model, the behavior of some landlords may have changed leading to secondary displacement or increased costs for some renter households outside of the burn area.
 - As noted previously, FEMA terminates leases in cases where they determine, through coordination with the Attorney General’s Office, that a landlord has wrongfully ended a lease in order to participate in Direct Lease. To date, there have been fewer than 10 instances of leases needing to be terminated.

Finding 4: Changes to Tourism

- Tourism rates have significantly decreased since the fire. Data analysis could not substantiate a specific correlation to FEMA Direct Lease.

- Tourism to Maui County significantly dropped following the fires. As of the end of 2023, visitor spending decreased by 1.5% year over year from 2022. When comparing visitor expenditures since the fire through the end of April 2024 to the same time period the previous year, visitor expenditures in Maui are down 27%. County gross domestic product dropped 7% post-fire and has not yet recovered.³⁷ According to data from DBEDT, daily passenger counts, visitor days, and visitor spending rates from January 2024 to May 2024 have all decreased about 24% compared to the same period in 2023.³⁸
- FEMA has secured leases for 1,362 units, or approximately 10% of the current short-term rental stock. Year-to-date occupancy rates for short-term rentals in Maui County remain around 57.7% as of May 2024, below 2023 occupancy rates of 65.6%, indicating that inventory for tourists currently exists.
- Approximately 50% of the 1,362 Direct Lease units FEMA secured are in or near Lahaina. Short-term rental options, especially two-bedroom units, in West Maui may be limited in the near term as a result.
- Longer term, UHERO forecasts that daily visitors will likely increase from 48,500 daily visitors as of February 2024 to 52,000 in the summer of 2024 and 57,000 by the summer of 2025.³⁹ The State of Hawaii, Maui County, and other organizations are actively promoting tourism statewide and in Maui.
- The combination of the number of units under contract with FEMA, as well as the possible reduction of short-term vacation rental inventory due to Senate Bill 2919 and proposed follow-on regulation from Maui County, might result in a tighter accommodation market and constraints to tourism in Maui, particularly in West Maui where many of the Direct Lease units are located. Senate Bill 2919, signed by Governor Green in May 2024, clarifies the counties' authority to use land use regulations to regulate short-term rentals.

Finding 5: Changes to Short-term Rental Availability

- Based on current short-term rental stock and vacancy rates, Argonne does not foresee a near-term challenge for FEMA in securing units for Direct Lease. However, Senate Bill 2919 and proposed follow-on regulation from Maui County could reduce the short-term rental supply and impact the availability of Direct Lease units beyond 2026. In addition, some property owners may not continue to participate in Direct Lease if tax exemptions do not extend beyond the current 18 months.
- As of May 2024, data from DEBDT indicate that even with units secured through Direct Lease, there is currently a lower occupancy rate in the county-wide short-term rental market than before the fire. Based on this assumption, even if owners currently participating in Direct Lease decided not to renew a lease with FEMA, other units should be available currently. Stakeholders noted that vacation rental statistics are an average value and do not specifically account for individual higher demand days, such as weekends or holidays, meaning there may be times where occupancy rates are higher than monthly statistics capture.
- A long-term Direct Lease program may have negative secondary effects. For example, a survivor household may be required to move at the end of a current lease if the property owner decides not to renew its agreement with FEMA, which could result in additional disruptions. Furthermore, a long-term Direct Lease effort could continue to incentivize adverse landlord behavior to end long-term leases with Maui residents in favor of the possibility of participating in Direct Lease.

- Because of limited inventory in West Maui, 50% of currently secured Direct Lease units are not located near Lahaina. A long-term Direct Lease effort could lead to households being disconnected from local schools, places of employment, services, and their community, for a period of years.
- Stakeholders noted that FEMA's programs are designed for interim needs and therefore Direct Lease participation requires regular recertifications. Households will continue to need to demonstrate that they are attempting to secure permanent housing. At the same time, current housing market conditions are such that securing permanent housing will be challenging for many households.
- Some state, local, and non-profit administered programs are authorized for 1 year or less and will require continued funding to meet longer-term interim housing needs. If new funds are not secured, populations not eligible for FEMA assistance will experience disruptions in assistance before they can secure permanent housing.

Finding 6: Anticipated Time to Rebuild

- Argonne's estimates come from a time-to-recovery model whose inputs include the following:
 - **Available parcels:** Affected structures or parcels in the burn area that are zoned for residential use as documented in Maui County tax records. Parcels are considered available for permitting and reconstruction once debris-removal activities are complete.
 - **Permits:** Argonne reviewed both historical and current permitting times; Argonne incorporated the county's recent progress with implementing the expedited 15-day permit processing time into the model.
 - **Construction:** Argonne based estimates of construction timelines on both Maui County annual permit volume, as well as qualitative information collected from construction industry stakeholders.
 - Industry stakeholders specifically pointed out that there are long lead times for materials that need to be shipped from the continental United States to Maui via Honolulu. In addition, they noted that the industry faces some labor constraints, especially for skilled labor (e.g., electricians and plumbers).
 - **Cost:** Cost estimates are calculated using square-foot estimates for single family, multi-family, hotel, commercial, and industrial development. Estimates were taken from the Rider, Levett, Bucknall Construction Cost Calculator for Honolulu and adjusted for increased construction costs post fire.
- Argonne developed three scenarios to explore potential rebuilding timelines. For this model, Argonne researchers assumed that most permitting and construction activities will begin in early 2025. Argonne selected this date based on the status of debris clearance and utilities restoration efforts in April 2024.
 - **Baseline Reconstruction:** Results in an approximately 6-year timeline to rebuild all allowable structures in Lahaina. This scenario assumes that the number of units to be rebuilt will be the maximum allowed under current zoning in Lahaina. This means that fewer units will exist post-disaster than pre-disaster due to the number of unpermitted structures that previously existed; the scenario assumes up to 2,000 parcels will be rebuilt. This scenario assumes a maximum of 1,000 housing projects island-wide underway at any given time.
 - **Enhanced Reconstruction:** Results in an approximately 4.5-year timeline to rebuild. This scenario incorporates incremental infrastructure improvements, specifically a 15% reduction in construction time

due to improvements in construction labor availability and supply-chain enhancements. The number of units under construction at any time is 50% higher than the baseline reconstruction scenario.

- **Optimized Reconstruction:** Results in an approximately 3-year timeline to rebuild. In addition, this scenario incorporates an additional 25% reduction in construction completion time due to significant enhancements in the availability of labor, supply chain, and inspection timeliness during the construction process. This scenario also considers significant improvements to water and wastewater infrastructure, which enables the construction of more units than other scenarios.
- Stakeholders pointed to additional factors may have impacts on reconstruction timelines, including:
 - **Recovery Funding:** Stakeholders indicated that additional federal appropriations will be needed to meet recovery needs.
 - **Underinsurance:** Interviewees expressed concern that even those families that have insurance are likely underinsured; for example, without inflation riders, it is likely that insurance covered the value of the home 10-20 years ago and will be insufficient to cover the cost of construction today given the rate of inflation in construction costs. In addition, insurance costs are rising.
 - **Concentration of rental units:** Stakeholders noted that there was a high concentration of rental units pre-fire, and that renters are not able to control the rebuilding timeline.
- Based on the factors considered in the model, Argonne estimates that rebuilding housing stock will take 3–6 years or longer. However, fewer rental units will likely be available post-fire under current zoning and development conditions. Without intervention, the rental market will take years longer to stabilize.
 - Preliminary time-to-recovery modeling indicates based on current policy, capacity, and other factors, it will likely take 6 years for most affected structures to be rebuilt within Lahaina. To stabilize the rental market, additional new development may be required, either through increased density in Lahaina or other new development in West Maui.
 - Factors that influence residential development, redevelopment, or rebuilding include the following:
 - Availability of water, wastewater, and other infrastructure (e.g., roads, traffic lights);
 - Strict and extensive land use and development regulations by both county and state government;
 - Capacity of county government to process and oversee development permits;
 - Availability and cost of financing for developers and home buyers; and
 - Construction supply chains and labor force capacity.

Finding 7: Comparison between Group Sites and Direct Lease

- Based on current estimates, group sites will take longer than Direct Lease units to become available to survivor households, and the cumulative costs of ATTHUs are generally more expensive than Direct Lease units. When accounting for site preparation, procurement, and shipping, it will take approximately 1 year from the fire for the first units to be complete at Kilohana, while Direct Lease units are available now. Any additional group sites may take another 12–18 months.

- If survivors moved into ATTHUs from Direct Lease units, it could free up short-term rental units for tourists and alleviate concerns related to tourism impacts discussed earlier in the report. It could also increase housing supply resulting in some price moderation and alleviate potential for secondary displacement caused by landlords seeking higher rents. Direct Lease units, on the other hand, are likely to have more amenities than ATTHUs and may be preferable to disaster survivors. The Direct Lease units also do not come with the potential for extensive improvement in infrastructure and utilities, as those are already in place.
 - Utilization of ATTHUs by survivors may depend on where ATTHU group sites are located and whether applicants are willing to relocate outside of West Maui. If most applicants want to live in West Maui, they may not want to relocate to group sites outside of West Maui. Additionally, if they do not relocate, they may have a tougher time finding alternative housing resources in West Maui, which will further delay their long-term temporary housing and permanent housing plans.

Finding 8: Temporary Housing Timeframes

- The cost and complexity of developing new affordable housing in Maui, and West Maui in particular, means that temporary construction is likely to remain in place long term. Due to the constraints on rebuilding and new development highlighted in previous findings, it will likely take many years for the rental market to stabilize enough for many survivors who rented to be able to re-enter the rental market.
- Many individuals in the burn area, especially renters, had a high rent burden before the disaster. Argonne anticipates this burden for lower income individuals will be exacerbated by the continued deficit in affordable housing stock resulting in people potentially needing to use temporary disaster housing for long-term use.
- Both the FEMA group site at Kilohana and the adjacent State of Hawai‘i group site are located on or adjacent to land that will eventually be transferred to the state’s Department of Hawaiian Homelands for future use as homesteads for Native Hawaiians.

Finding 9: Resilient Recovery Requires Addressing Root Causes

- Addressing underlying root causes of Maui’s housing crisis may help to improve recovery timelines, survivor outcomes, and Maui’s long-term resilience. Multiple actions such as streamlining of the development and permitting process, infrastructure improvements, new infrastructure development, and construction supply chain and labor interventions are not within the scope of interim housing programs that could help to address longstanding barriers to affordable housing in West Maui. Additional policy actions such as rental market regulation and renter protection policies also may alleviate impacts to renters. Given the high concentration of renters whom the fire impacted, these interventions could be critical to a more expedient and resilient recovery process.
- Following the completion of this report, Argonne will continue to support FEMA’s work with Maui County to identify and implement specific interventions that could be considered to address root causes of the housing crisis and enhance the recovery process. Argonne will provide analysis of these potential interventions, including feasibility considerations and tradeoff analysis to FEMA and Maui County to help inform their efforts to prioritize recovery actions. Examples of interventions are shown in Table 4, below.

Table 4: Examples of Potential Interventions

ROOT CAUSE /CATEGORY	POTENTIAL INTERVENTION	FEASIBILITY CONSIDERATIONS
Policy, Regulation, and Administrative Capacity	Streamline permitting processes and add staff to reduce permitting timelines	<ul style="list-style-type: none"> Maui county has already undertaken actions, including an expedited permitting process for the affected area, that has reduced permitting approval time to 15 days.
	Develop pattern books or pre-approved designs to streamline reconstruction.	<ul style="list-style-type: none"> This intervention would need to align with the values, priorities, and character of the community. Implementation of this approach could simplify construction processes and create opportunities for bulk ordering, staging, and construction labor optimizations.
	Codify and strengthen appropriate tenant protections	<ul style="list-style-type: none"> This intervention could incorporate best practices from other communities; however, solutions would need to be appropriate for Maui County's unique context. Argonne will evaluate best practices from other communities that have addressed significant rental housing challenges through tenant protections to inform possible actions Maui can take.
Infrastructure and Water Resources	Upgrade the wastewater treatment plant in West Maui to increase capacity, improve reliability, and to enable distribution of both potable and non-potable water.	<ul style="list-style-type: none"> This intervention would be costly and would likely require additional resources to complete.. Building the capability for water reuse for certain applications (e.g., irrigation) could potentially help increase the availability of potable water and enable the development of additional affordable housing.
	Develop infrastructure (e.g., water, wastewater, energy) to facilitate the development of additional affordable housing.	<ul style="list-style-type: none"> This intervention would be resource and time intensive but could result in a longer-term increase in affordable housing supply.
Supply Chain and Labor Enhancements	Explore strategies for bulk ordering and combined materials staging for construction supplies	<ul style="list-style-type: none"> Bulk ordering and combined staging could reduce lag times for material deliveries. Implementing this strategy would require that in some cases, the same or similar materials be used for multiple projects.
	Explore strategies to increase the availability of skilled trades (e.g., coordinating strategies to bring in off-island labor; workforce development)	<ul style="list-style-type: none"> Workforce development could take time to alleviate labor shortages but produce longer-term gains. Coordination between state and local government and the construction industry could improve the ability to leverage off-island skilled labor.
Financing and Underinsurance	Develop and implement financing programs (i.e. reconstruction assistance, down payment assistance, loans or loan guarantees) to rebuild and expand affordable housing.	<ul style="list-style-type: none"> This may require supplemental appropriations for programs such as Community Development Block Grants – Disaster Recovery (CDBG-DR)
	Enable Alternative Dwelling Units (ADU) through zoning and provide financing to acquire and construct ADUs where feasible.	<ul style="list-style-type: none"> Maui County is already undertaking efforts, including the recently launched Ohana Assistance Pilot Program, to increase the supply of ADUs

Conclusions and Potential Additional Areas of Research

- The Lahaina fire is significant to Maui and Hawai‘i for many reasons. It displaced thousands of Maui residents and led to the loss of 102 lives. It took place in the historical seat of the Kingdom of Hawai‘i, affecting lands and resources that are critical to Native Hawaiians and the culture of Hawai‘i. It destroyed 4,005 structures in a community that was at the heart of Maui’s economy, where many workers who powered the tourism economy lived.
- The Lahaina fire took place in a community where significant housing challenges already existed. Most renters were housing cost burdened, as were many homeowners; housing options were limited, and crowding rates were significantly higher than in other areas of the United States.
- An initial assessment of the data could not quantitatively detect impact from temporary housing programs, including Direct Lease, on rental costs across Maui at this time. However, indications exist that lease terminations may have increased since the fire and that the current temporary housing strategy may have influenced the behavior of some property owners. Other effects are possible and could be explored through longer-term research, monitoring, and evaluation.
- Because the fire has reduced housing inventory in a community where a significant deficit of affordable housing already existed, rebuilding Lahaina in a way where residents can fully re-enter the housing market will take more than rebuilding structures in accordance with current zoning. It will require creative solutions to address underlying land availability, natural resources, infrastructure, supply chain, and labor constraints. It will also require community consensus.
- Recovery from the fire is still in the early stages, and the long-term impacts to the housing market are still unknown and dynamic. Circumstances that could influence the housing market recovery and the need for federal disaster housing assistance include the following:
 - **Changes to survivor needs:** The need for Continued Temporary Housing Assistance, Direct Lease, or ATTHUs could change as the market stabilizes and disaster survivors find alternative housing, but it could also increase as insurance benefits or other resources run out.
 - **State modular housing construction:** The state has plans to build 450 units near Lahaina. These additions to the housing supply could make a significant impact on rental prices and need for FEMA’s programs.
 - **Expedited permitting:** Maui County has developed a modified permitting application to consolidate the electrical, plumbing, driveway, grading, and other permits issued by the Department of Public Works and has hired a third-party vendor to supplement its review capacity.⁴⁰ The county also opened a central location for the expedited permitting effort. As of July 2024, These actions have led to a decrease in permitting approval time to 15 days.
 - **Regulatory intervention:** Housing affordability is an issue throughout the State of Hawai‘i. The governor and legislature have taken a range of actions including emergency proclamations and new legislation to address the regulatory environment. Current protections for renters are temporary in nature as they are primarily being done through emergency proclamation by the governor. The county will have

to review and adopt new land use regulations and processes in response to these state-level actions, but what actions the county will take, and the timing of implementation of those actions, are not clear.

- **FEMA Individual Assistance Multi-family Lease and Repair:** FEMA's Individual Assistance program is exploring activating Multi-family Lease and Repair, as part of Direct Temporary Housing Assistance, which would allow FEMA to lease multi-family buildings and make minor repairs to temporarily house eligible households. This program could increase the available housing supply.
- **Disaster settlements:** The state's One 'Ohana Fund was established to help aid the recovery of families who lost a loved one as well as individuals who suffered severe injury in the devastation of last year's wildfires. This fund is not meant to cover property damage, business losses, and physical injuries that did not require a hospital stay or emergency outpatient treatment. Future phases of the One 'Ohana Initiative include many of the recovery programs the state has initiated or that have been launched as part of various efforts to benefit the entire state.⁴¹
- Future research designed to analyze and address these key inhibitors to housing recovery can play a significant role in guiding ongoing policy and resource allocation decisions.

Appendix: List of Interviewees

Agency/Department/Organization
STATE
Office of The Governor
Department of Attorney General, Insurance Division
Department of Commerce and Consumer Affairs, Office of Consumer Protection
Department of Hawaiian Home Lands
Department of Human Services
Hawai'i Emergency Management Agency
Hawai'i Housing Finance and Development Corporation
Hawai'i Tourism Authority
LOCAL
Office of the Mayor
Lāhainā Advisory Team
Maui County Housing Task Force
Maui County Department of Public Works
FEDERAL
U.S. Department of Interior
FEMA
U.S. Department of Housing and Urban Development
U.S. Environmental Protection Agency
U.S. Army Corps of Engineers
U.S. Department of Agriculture
PRIVATE SECTOR/NON-PROFIT ORGANIZATIONS
American Institute of Architecture Honolulu
Building Industry Association of Hawai'i
Council for Native Hawaiian Advancement
Global Empowerment Mission
Maui Chamber of Commerce
Maui Economic Opportunity
National Multifamily Housing Council
National Association of Home Builders
Ohana Hope Community
Pacific Resource Partnership
Roots Reborn Lahaina
RESEARCH ENTITIES
University of Hawai'i, Hulihia Center for Sustainable Systems
University of Hawai'i, Planning/Pacific Disaster Training Center
University of Hawai'i, Economic Research Organization

Endnotes

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