Wildfire Modeling and Emergency Response Plan Coordination on O‘ahu

Michael Cubas

October 16, 2025

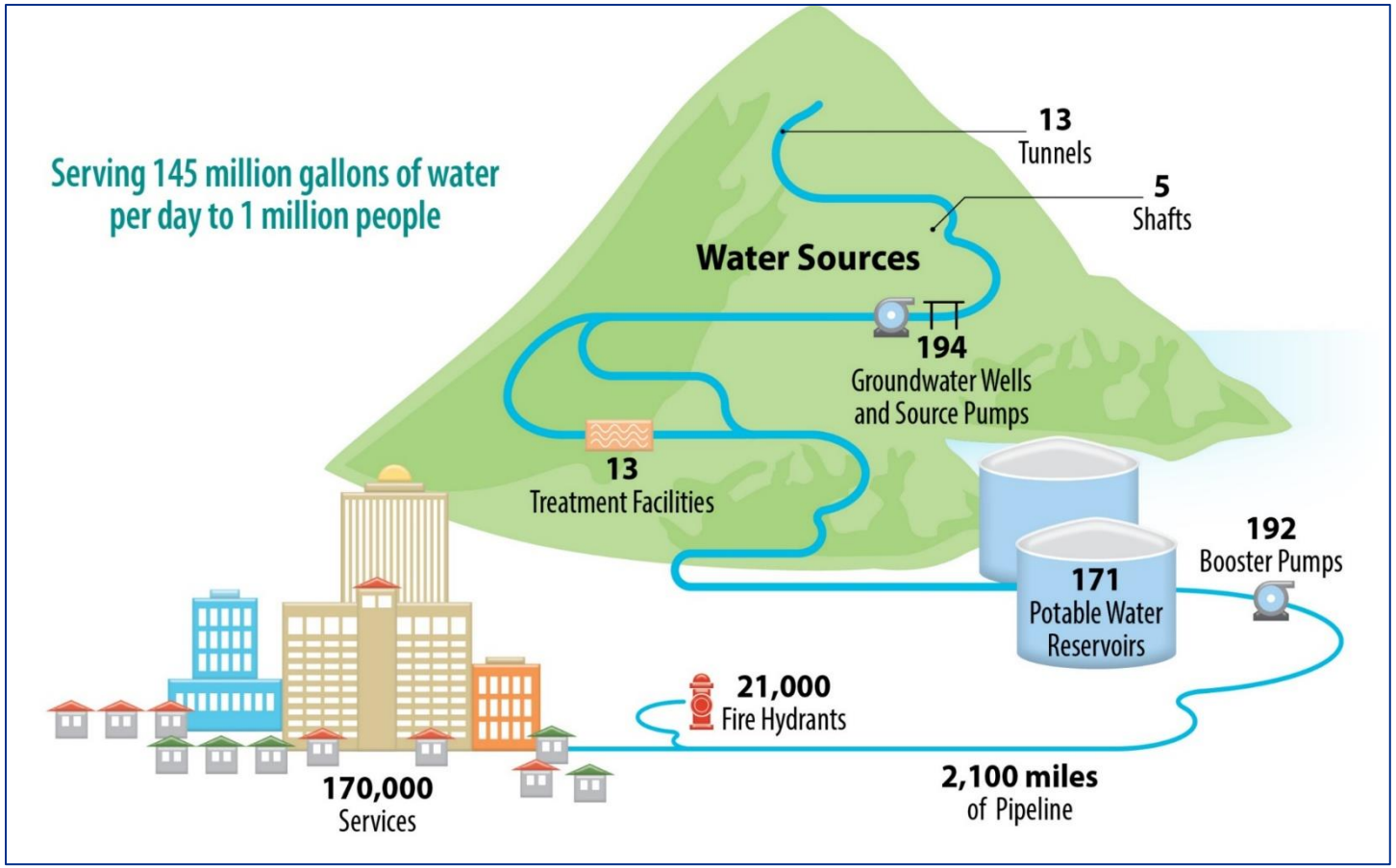
CDM Smith

Outline

1. The Honolulu Board of Water Supply's (BWS) Role in Fire Response
2. What is a Wildland Urban Interface Event
3. Wildland Fire Modeling & Urban Conflagration
4. Wildfire Response Planning Workshops

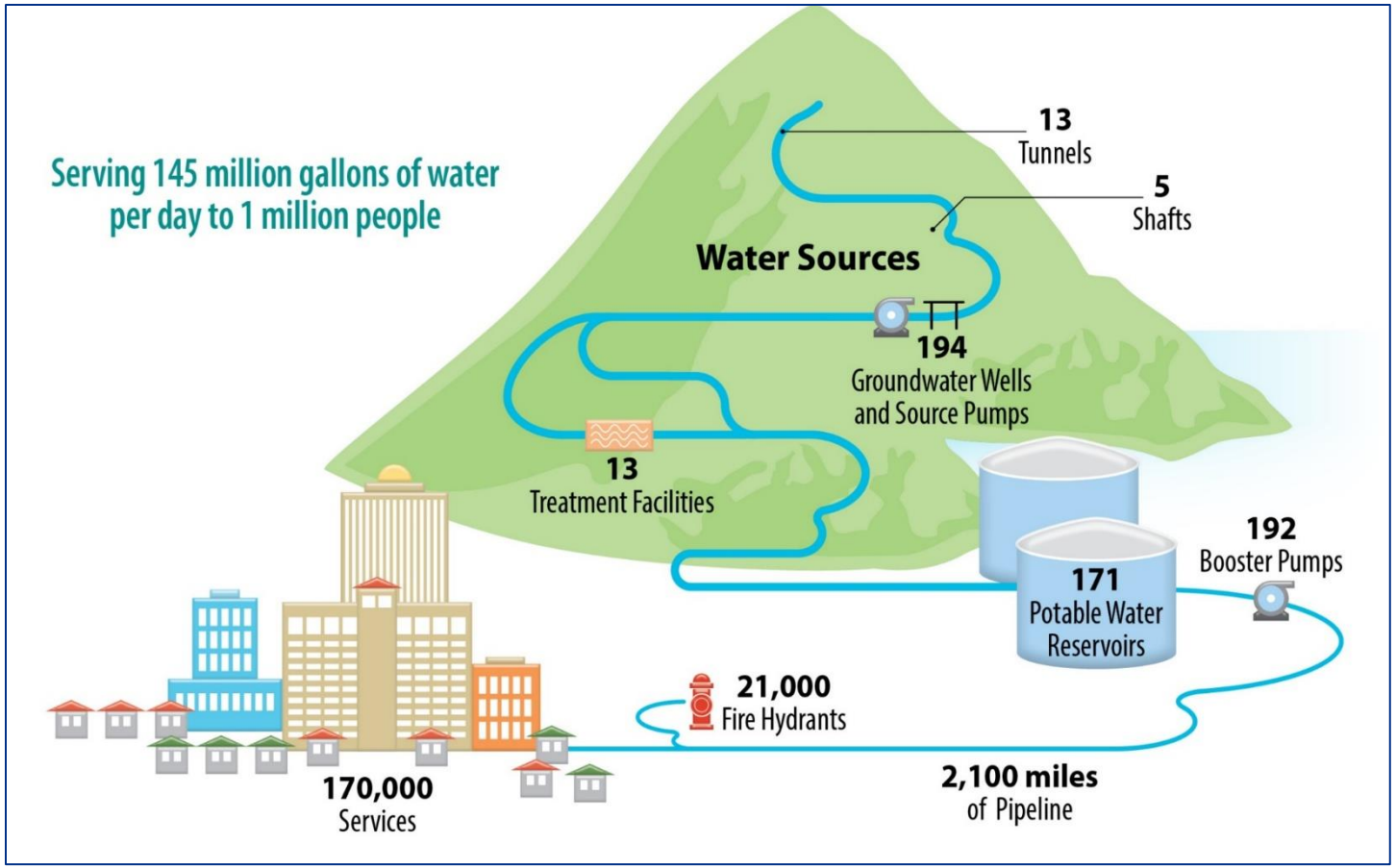
The BWS's Role in Fire Response

BWS Infrastructure



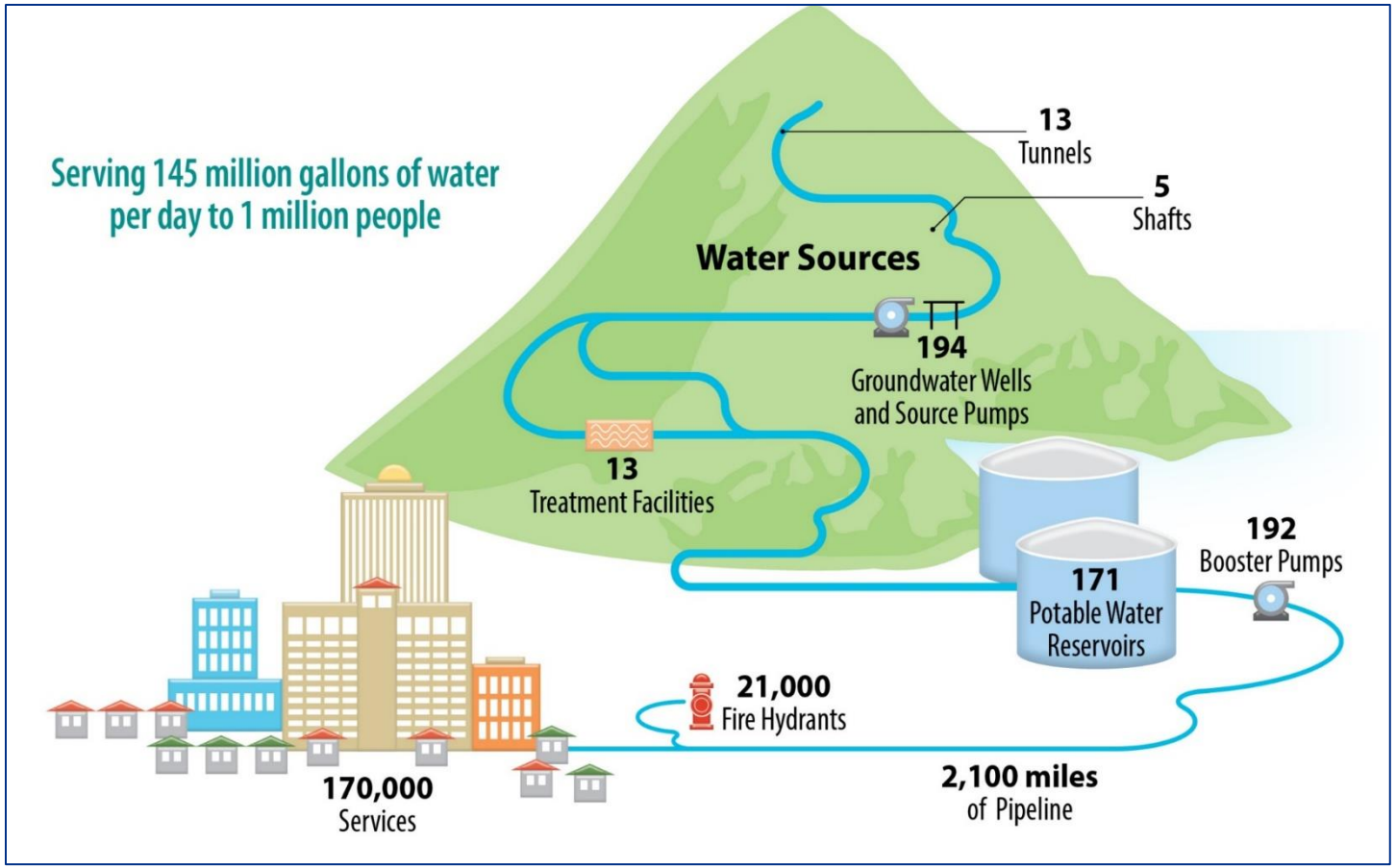
- Hydrants provide coverage to most developed areas
- Communications with Honolulu Fire Dept. (HFD) on needed infrastructure for wildfire response (hydrants, connections for dip tanks)

BWS Infrastructure



- Hydrants provide coverage to most developed areas
- Communications with Honolulu Fire Dept. (HFD) on needed infrastructure for wildfire response (hydrants, connections for dip tanks)
- ***Why not just design the water system to fight an extreme wildfire event?***

BWS Infrastructure



- Hydrants provide coverage to most developed areas
- Communications with Honolulu Fire Dept. (HFD) on needed infrastructure for wildfire response (hydrants, connections for dip tanks)
- Limits: extent of the system, sustaining pressure in high demand, single points of failure

HFD Objectives During an Emergency

1. ***Life safety*** – rescuing and/or evacuation
2. ***Incident stabilization*** – helping control the incident
3. ***Property conservation*** – Protecting homes and other structures

How can BWS support HFD in achieving these objectives?

How BWS Objectives Line Up with HFD Objectives

1. ***Life Safety*** of BWS employees
   - Field safety and PPE
2. ***Incident stabilization***
   - Ensure adequate water supply
   - Ensure collaborative response
3. ***Property conservation***
   - Recovery of the water system and water quality
   - Providing emergency water service to designated locations

What is a Wildland Urban Interface (WUI) Event

Wildland Urban Interface

Wildland Urban Interface (WUI): Zone where human development meets undeveloped wildland

2023 Lahaina Fire Statistics

- 2 days: August 8th, 2023 – August 9th, 2023
- Approximately 2,170 acres burned
- Urban conflagration: 2,207 structures damaged or destroyed
- Disaster level event
- Extreme weather: high winds, low humidity
- Fast moving embers and destruction

Source: Star Advertiser

2023 Mililani Mauka Fire Statistics

- 2 weeks: October 30th, 2023 – November 12th, 2023 – “slow-moving” event
- By November 7th, 2023: HFD contained 90% of fire and transferred command to U.S. Fire and Wildfire Service
- Mililani seen as a wet area of the island – Koʻolau Mountains
- No water system in the area

Source: Star Advertiser

Wildland Fire Modeling & Urban Conflagration

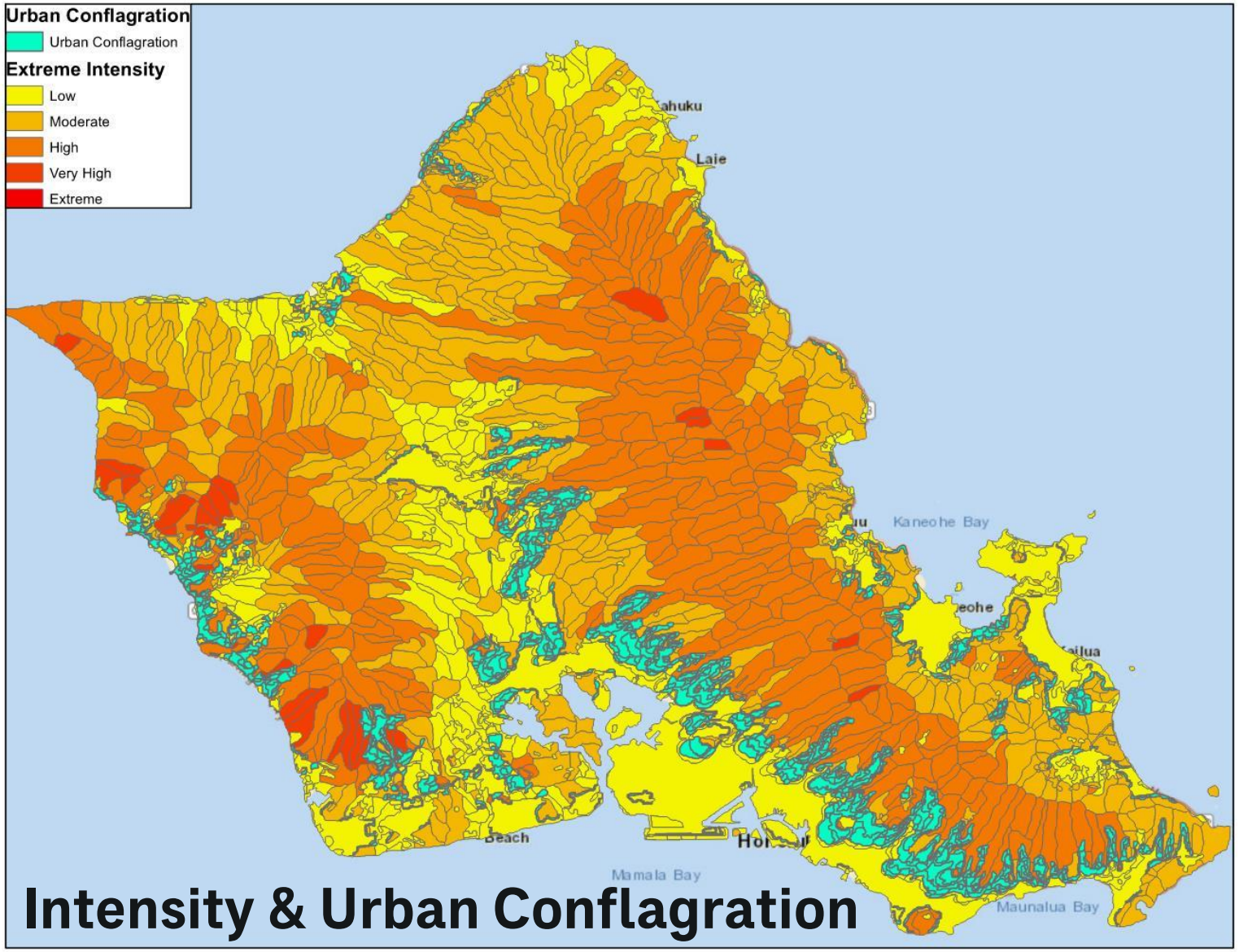
Wildfire Risk in a Baseline Scenario

- Baseline Scenario includes 92nd percentile wind and drought conditions
- Your “everyday” wildfire

6 Major Parameters in the Model (22 minor parameters)

- Frequency (Likelihood)
- Community
- Severity
- Damage
- Mitigation
- Suppression

Wildfire Risk in an Extreme Scenario



Intensity & Urban Conflagration

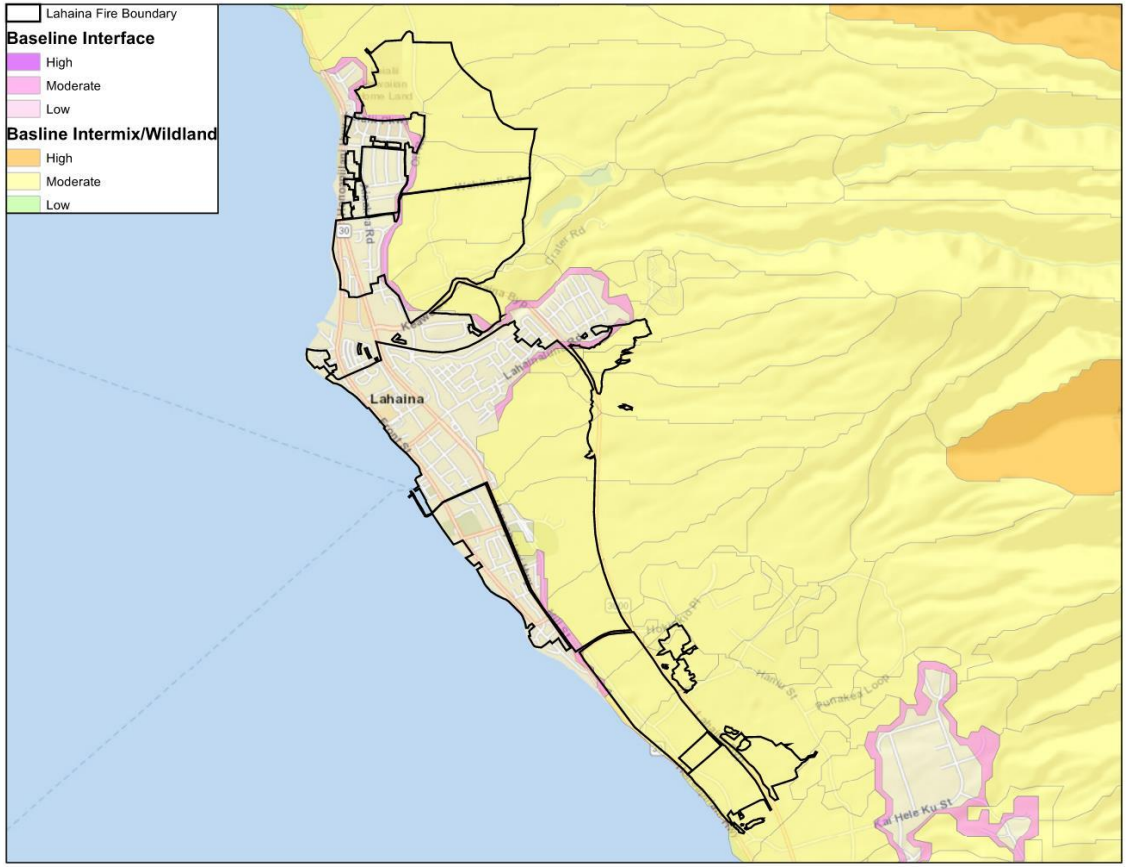
- The Extreme model uses 99th percentile drought and wind conditions (like Lahaina and LA fires)
- In the extreme event, Suppression is non-existent:
  - Frequency (likelihood)
- Community (infrastructure)
- Severity
  - Damage
  - Mitigation
  - ~~Suppression~~
- Urban Conflagration

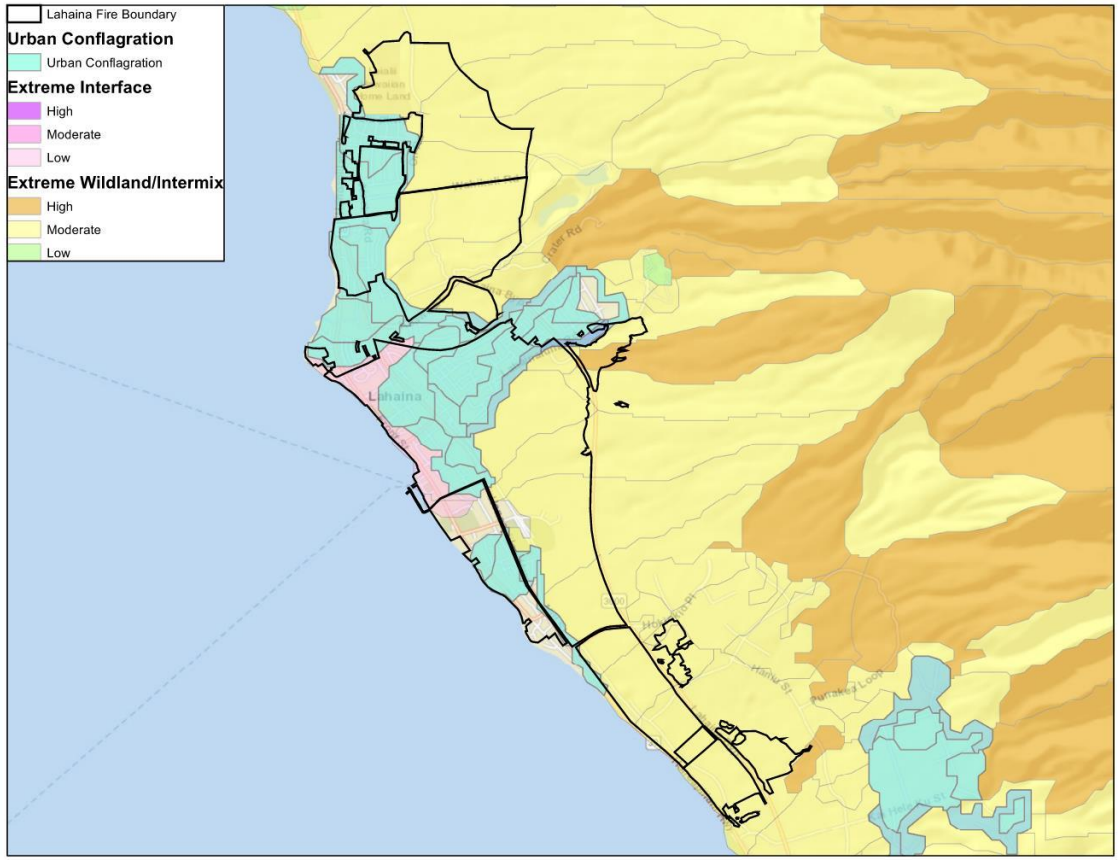
Wildfire Extreme Models Predicts Urban Conflagration

Wildfire Risk “Baseline”

Lahaina Fire, HI 2025

Wildfire Risk “Extreme”

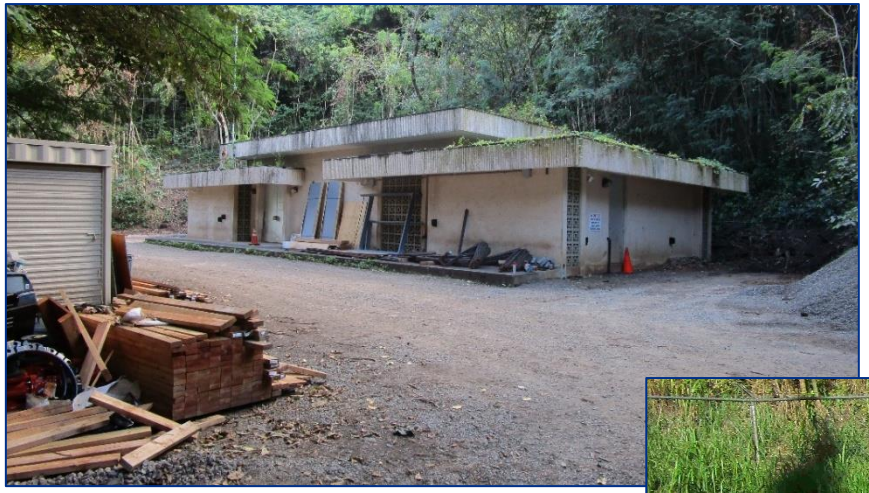




- Extreme fire weather winds, relative humidity and fuel “dryness” (sustained drought)
- Fire is predicted to move faster, be more intense and embers will be more significant and fly further.
- Urban Conflagration is possible 

Vulnerabilities to a Wildfire/Urban Conflagration Event

1. BWS facilities located in high-risk or urban conflagration zones
2. Filtered out facilities based on facility type-area type (e.g., distribution water reservoirs in ember zones)
3. Final list of facilities to conduct site investigations
4. Initial scoping of mitigations based on previous site investigations and photos



In addition to addressing site specific vulnerabilities, a response plan is needed to mitigate risk

Wildfire Response Planning Workshops

Wildfire Response Workshop Materials

Discussed typical issues seen in other water systems when responding to urban conflagration/wildfire response

- Joined by wildfire experts within HFD and DEM
- Breakout groups
- At each table:
  - Large maps of focusing on specific areas
  - Mililani Mauka / Lahaina Active Fire Response
  - Sampling Flow Chart
  - BWS Schematic

Risk Assessment and Emergency Response Plan Results and Next Steps

Results from the Wildfire Preparation

1. List of possible mitigations (capital improvements and O&M strategies) at BWS facilities
2. BWS Wildfire Response Plan (input from HFD, DEM and DOH, sampling guidance, watershed restoration guidance, summary of workshop insights)
3. List of action items from workshops
   - BWS led
   - Collaboration between BWS, HFD and DEM
   - Possible joint mitigation projects

Next Steps

- Combining possible mitigations into capital or programmatic projects
- Continue discussions between HFD, DEM, DOH and HECO on wildfire preparedness
- Continue working through the list of action items from workshops

Questions?