



COOPERATIVE EXTENSION


UNIVERSITY OF HAWAII AT MĀNOA
COLLEGE OF TROPICAL AGRICULTURE AND HUMAN RESOURCES



An Overview
of Hawai'i's
Wildfire
Problem



Learning Objectives



know the **size + scope** of the problem

learn the **causes + conditions**

understand the **consequences** of wildfire

size + scope

Hawai'i has a **devastating** wildfire problem.

Hawai'i is burning



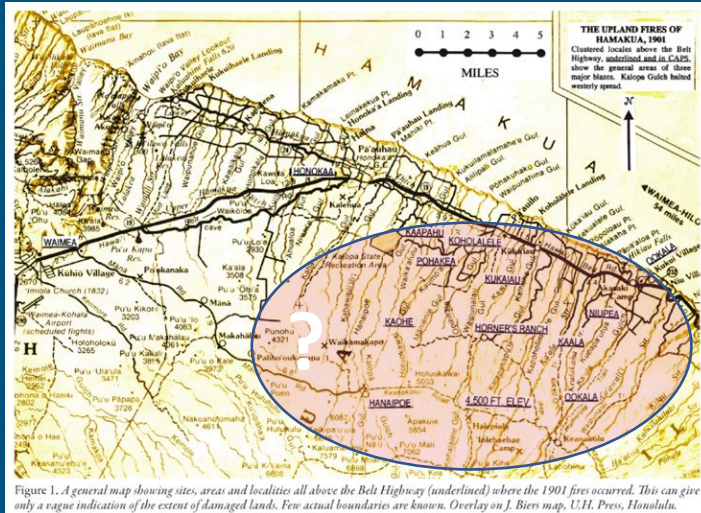
because of people & non-native grasses



& the problem is growing.



Hawaii's Big Burn - 1901 Hamakua Fire



Values at Risk:

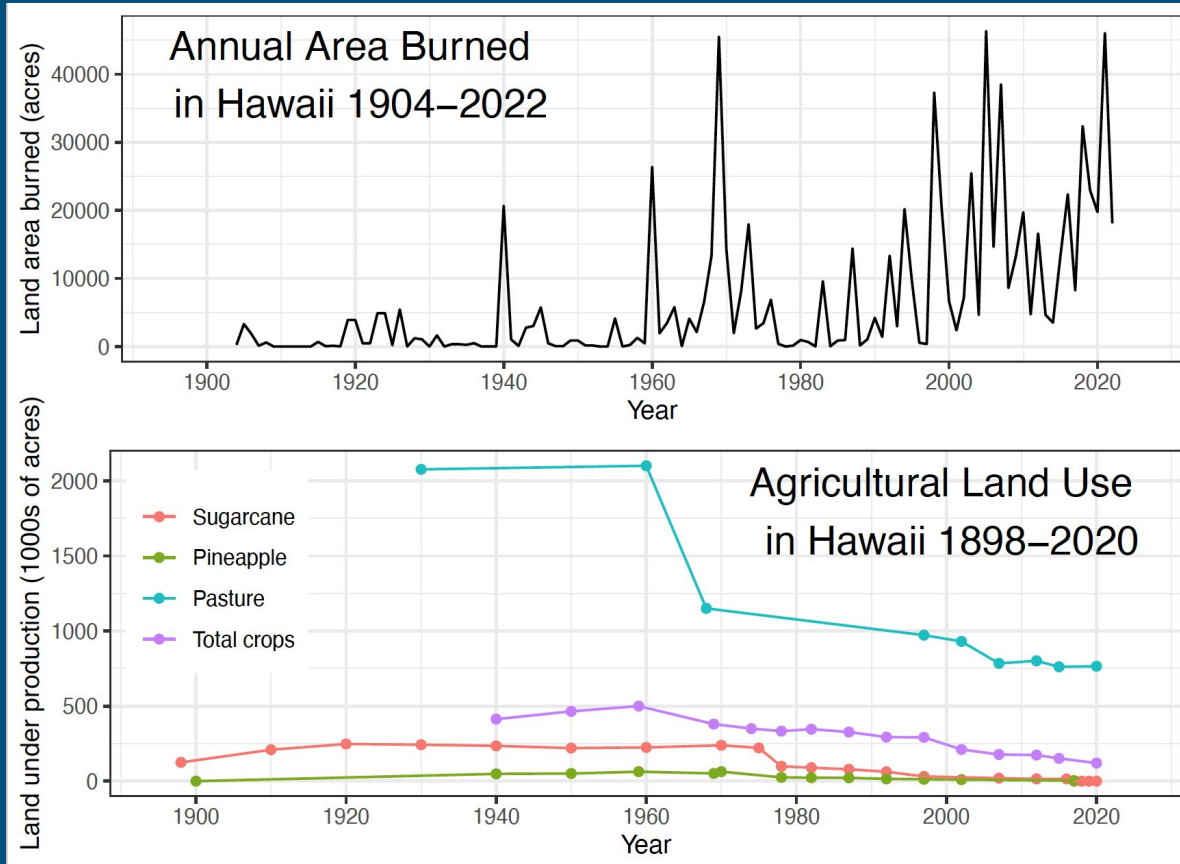
“the whole problem is conserving the water supply which depends on the preservation of the existing forests and restocking some of the denuded slopes...”

- Edward Griffiths, US Bureau of Forestry, 1902



Burned for 3 months,
affected 30,000 acres

Declining agriculture fuels the problem....



The average area burned per year in Hawai‘i has increased **300%** over the past century.

Wildfire is on the rise in Hawai'i.

Large wildfires are increasing every year

Average every year: ~1,000 fires, ~20,000 acres (up to 45,000)

Every island has at least a 1,000 acre fire every year.



Wildfire is on the rise in Hawai'i.

Large wildfires are increasing every year

...with severe consequences.

Damage spreads quickly from summit to sea, and impacts air, land, and water causing catastrophic impacts to Hawai'i's irreplaceable natural resources and to human health and safety.



Causes & Conditions

The main causes & conditions of wildfire involve
people, climate & vegetation.



The main causes & conditions of wildfire involve **people, climate & vegetation.**

↑ **HUMAN-CAUSED
IGNITIONS**



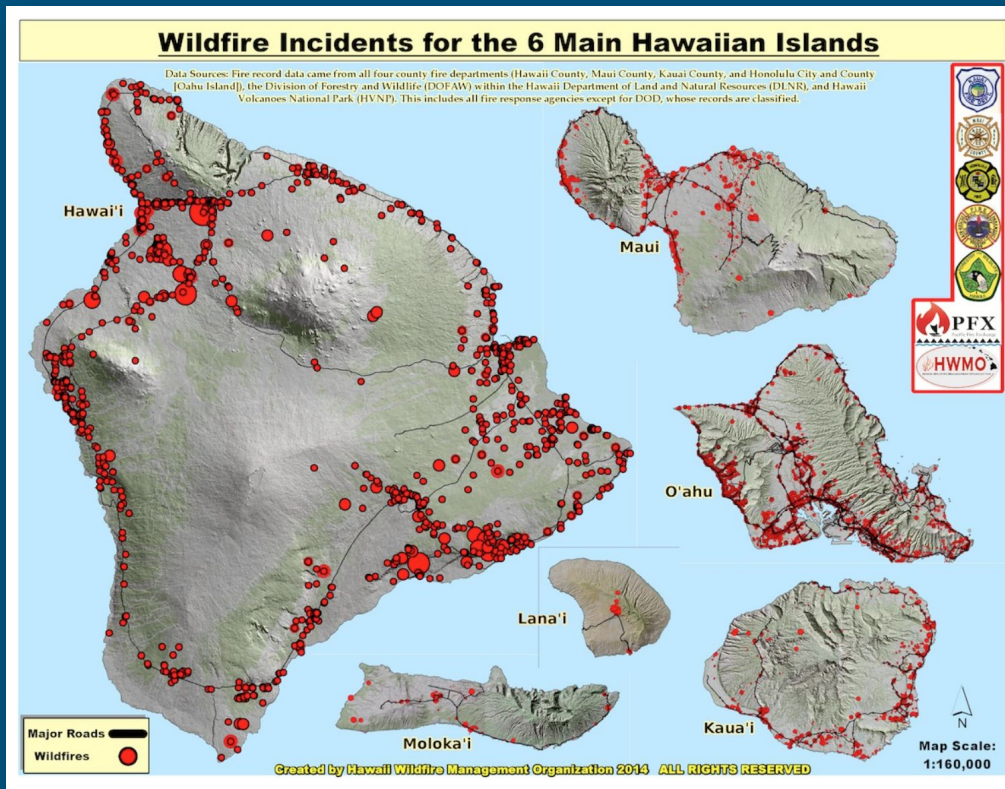
↑ **DROUGHT**



↑ **GRASSLAND &
SAVANNA
EXPANSION**
(the grass-fire cycle)



The main cause (95%) is **human ignitions.**



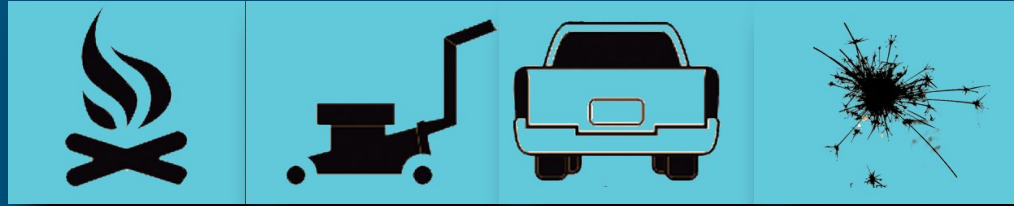
*of the 10% of >10,000 fires (reported between 2002-2012) with a **determined cause:**

Accidental 76%

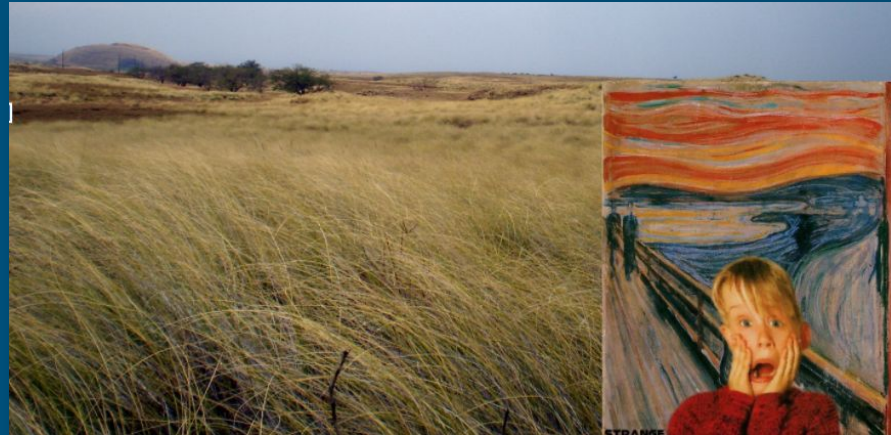
Intentional 19%

Lava/Lightning 5%

Accidental ignitions (75%) are top cause:
campfires, equipment, vehicles, fireworks

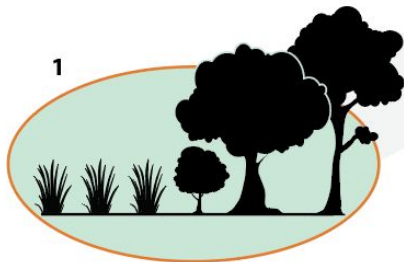


26%+ of the state (1 million acres) has been invaded by
nonnative, fire-prone grasses & shrubs.

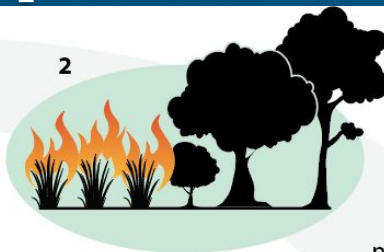


Thinking about the
fuels side

The grass-fire cycle perpetuates the problem.



Grasses can carry fire from grass-dominated areas into forested and woodland areas³, as well as to communities where people live.



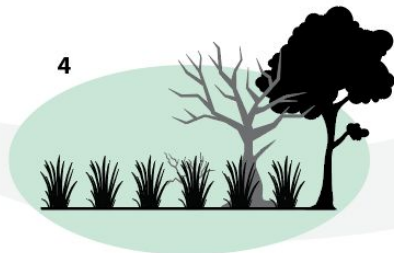
Many native trees and shrubs of Pacific Island forests are killed by repeated fires⁴. The negative impacts of even one single high-intensity fire can last for decades⁵.

Recurrent fires reduce the size of remnant forests, further increasing the area of grasslands¹.

THE GRASS-FIRE CYCLE ON PACIFIC ISLANDS



The spread of grasses increases the likelihood and size of future fires.



Grasses are able to seed and re-sprout shortly after fire, taking up light, water, and space. This competition for resources limits the ability of native plants to establish and may cause areas to become "stuck" in a grassland state².

the result



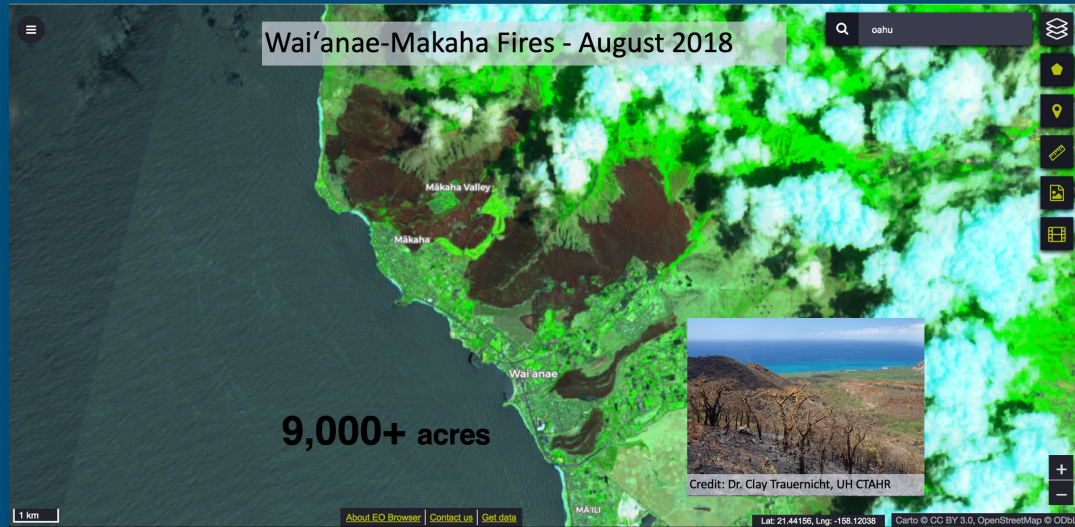
native Hawaiian wilderness

VS.



Hawai'i's modern "wilderness"

Over $\frac{1}{3}$ of Hawaii's neighborhoods are in the **extreme** fire hazard category.

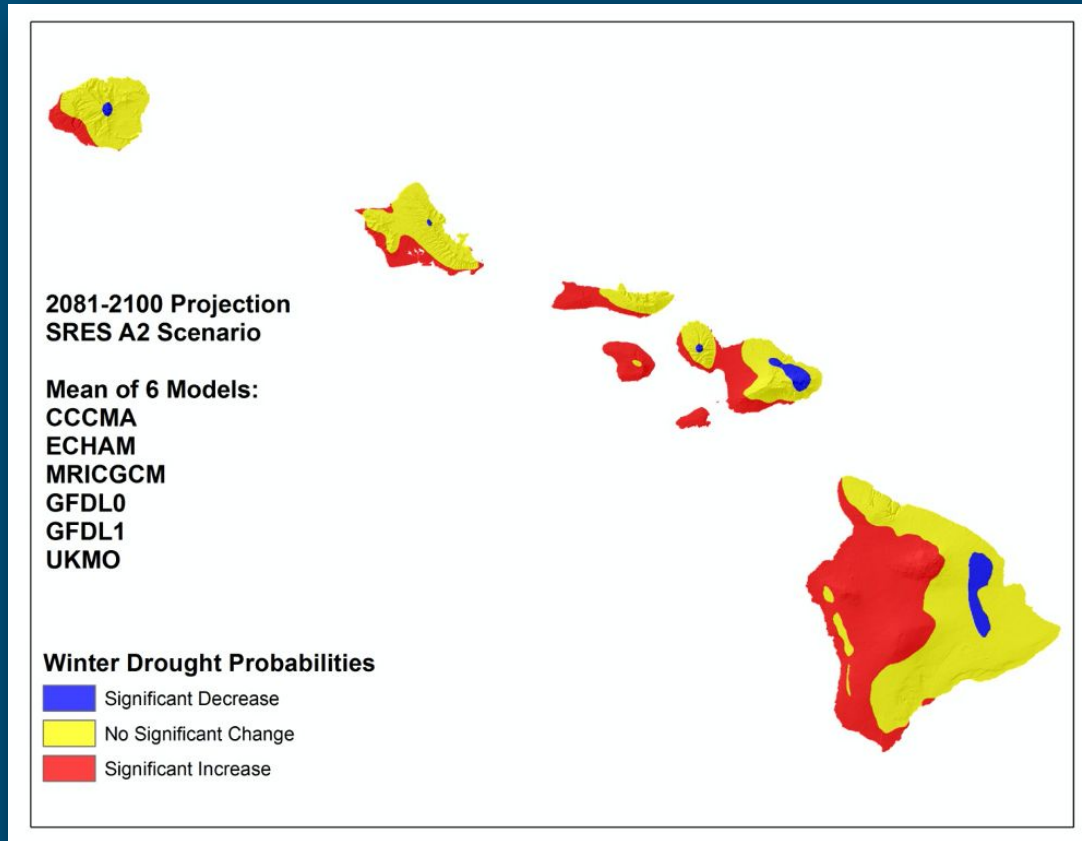


Roads, homes, communities

& places where people go are especially vulnerable.

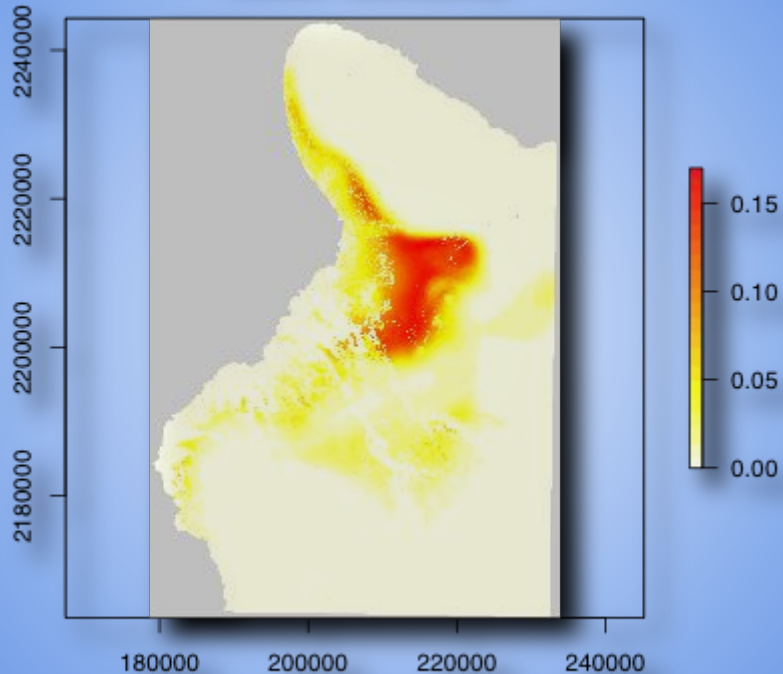


Drought can exacerbate the risk of wildfire.

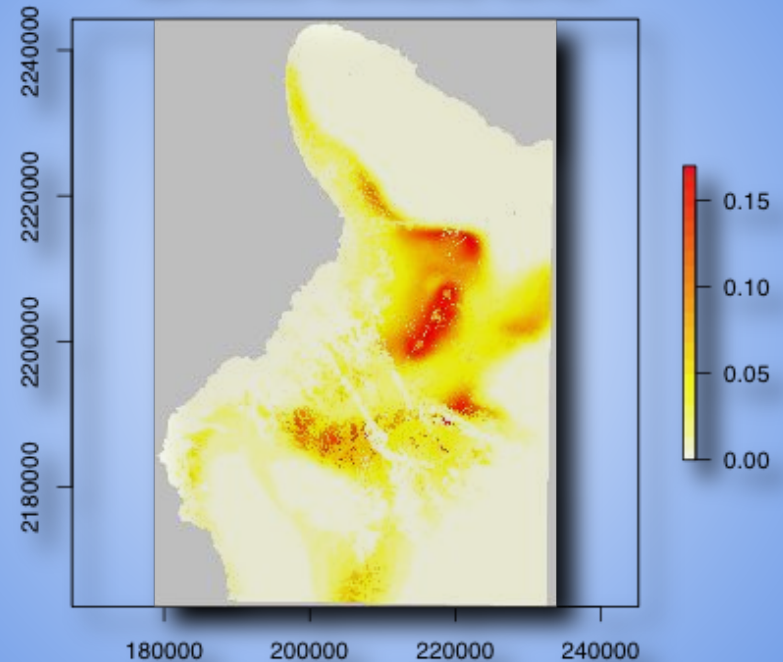


As our **climate changes**, fires in the future may be **bigger, last longer** & spread into new areas.

Current 'flammability'



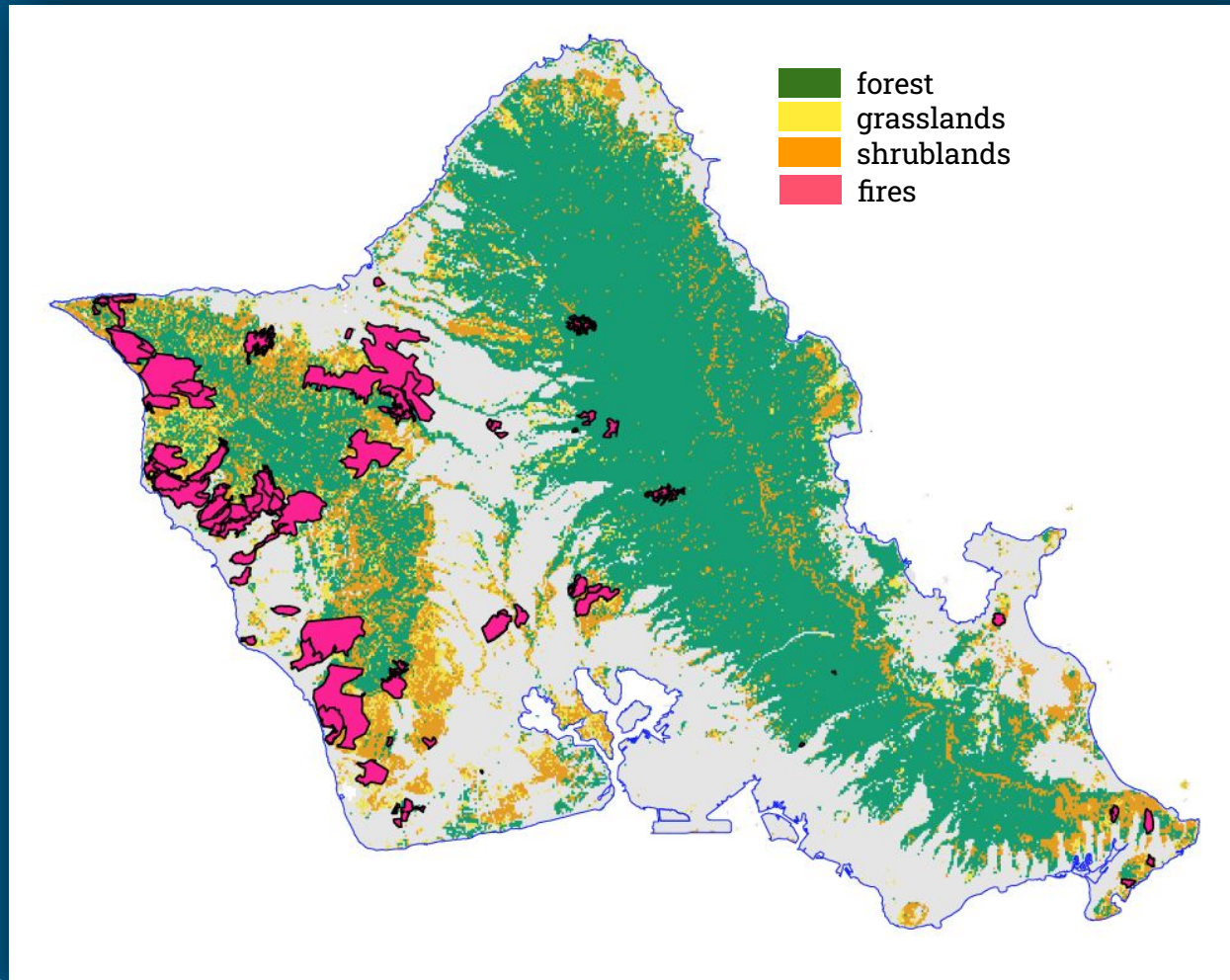
Mid-Century 'flammability' RCP 8.5

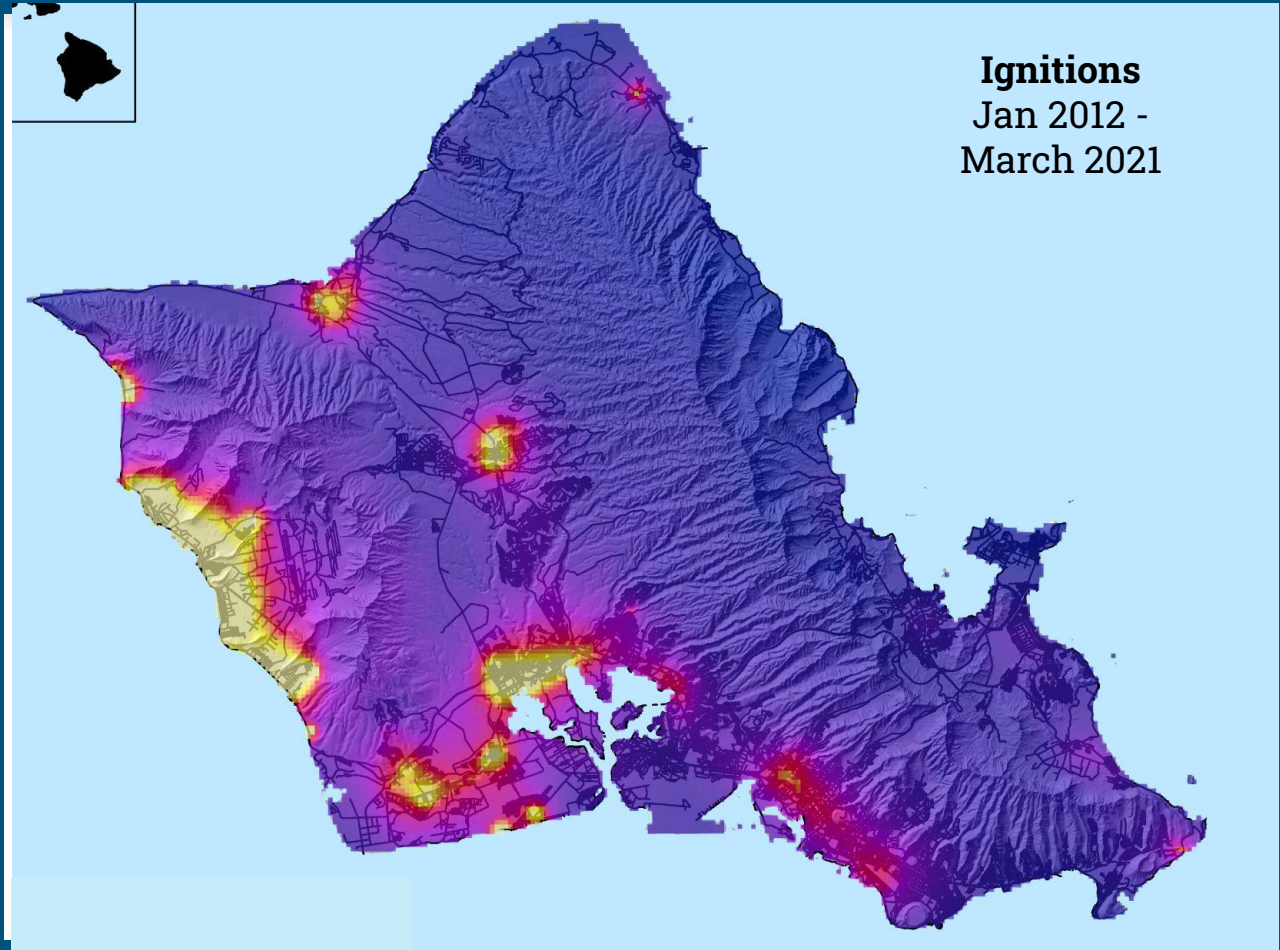


O'ahu

Large Fires

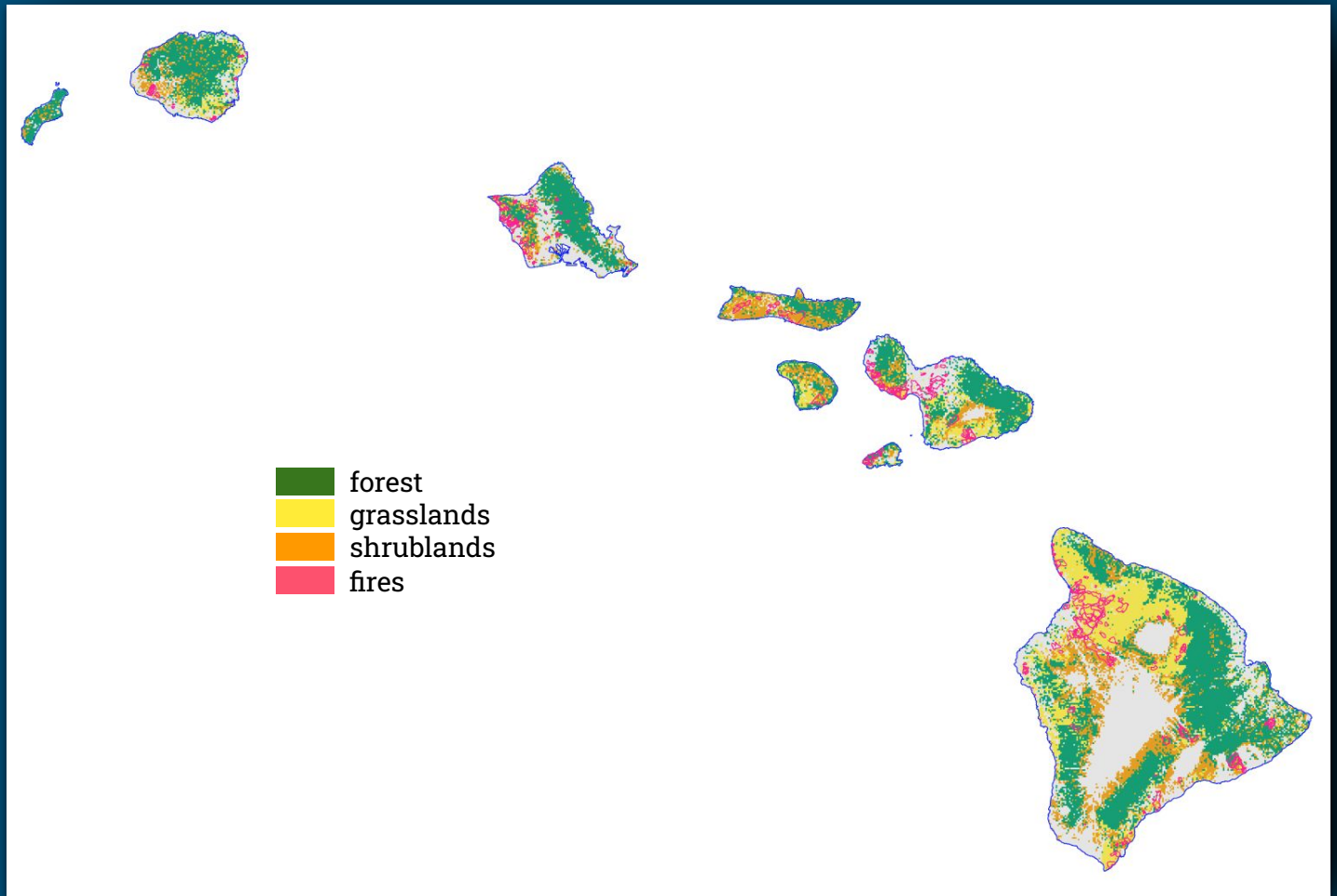
(>50 acres)
1999 - 2019





Hawai'i's Large Fires

(>50 acres)
1999 - 2019



-
- Fires > 100 acres 2002-2011
 - Native forest
 - Mixed/Alien forest
 - Nonnative grassland and shrubland

26% OF STATE LAND AREA

75% OF AREA
BURNED

Revised HI-GAP (Jacobi et al. , 2017)

Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroX, @swmapping, AeroGRID, IGN, IGP, swisstopo, and the @IS User Community

Impacts of Wildfire

consequences

Fires **destroy** irreplaceable natural resources.

Hawaiian ecosystems are NOT fire adapted.

Fire reduces native species' habitat which threatens extinction.

After fires happen, rain & erosion damage land & sea.

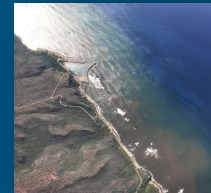
Wildfires **destroy native ecosystems and change soil** which is often **replaced by fire prone vegetation.**



Hawai'i is the world's **endangered species capital.**



Eroding topsoil can lead to **sedimentation** of streams, oceans, eventually **smothering coral reefs** and thereby impacting our fish.



Fires threaten our lives, homes, health, economy & infrastructure.

Impacts from Mauka to Makai



Natural Resources

Photo: E. Masaki

- Hawaii's native ecosystems often require intensive management to recover from fire. More often, **fire-prone exotic plants like nonnative grasses replace native species and increase future fire risk.**

The Ocean Health Connection

Fires expose soil & increase erosion. Sediment and debris carried to the ocean **degrade water quality and negatively impacts**



Communities

Photo: HWMO

- A statewide survey ranked the fire hazard in **over one-third of Hawaii's neighborhoods** as "extreme," with **challenging and dangerous conditions** for fire suppression.
- **Reduced air quality** from smoke and wind-born dust affects human health.



Municipal Costs

Photo: Maui Fire Task Force

- Long-term, fire-driven change from forest to grasslands can **reduce groundwater recharge and increase flood risk.**
- **Traffic and road closures** during fire events and post-fire flooding block access to airports, residences, and work places, and are costly to local governments.



Coral Reefs

Fisheries



Human Health

Nearshore Recreation



Tourism



Key Takeaways

wildfire is a
huge problem
on tropical
islands in the
Pacific

**accidental
ignitions &
unmanaged
vegetation**
(esp.
abandoned
agriculture)
are the main
causes

previously
burned areas
are **more
likely to burn
again**,
perpetuating
the cycle

wildfires
threaten our
lives, health,
natural
resources,
economy &
infrastructure

there are
steps you
can take to
**reduce
wildfires!**