EPA Office of Brownfields and Land Revitalization

Region 9 Climate Training

January 31, 2024
9:30-11:30 am PST

Purpose

This training will…

- Increase participant understanding of regional climate risks to contaminated sites and communities at large
- Identify climate adaptation and resilience strategies to consider in planning efforts, including, but not limited to, revitalization and redevelopment
- Raise awareness of resources and tools available to help identify climate risks and incorporate climate adaptation measures into decision-making

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Agenda

Introduction	10 min
Importance of Considering Climate Change in the Brownfield Process	20 min
Wildfire	35 min
Sea Level Rise and Inland Flooding	35 min
Reflections and Close	15 min

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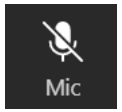
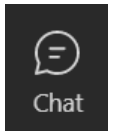
Housekeeping Rules

- Please mute your microphone 

- To ask a question, type into the chat box 

- Technical issues with Teams or Mural?
  - Chat or email Fiona.Price@icf.com
- Sessions will be recorded
- Closed captions will be available in Spanish

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Introductions

EPA R9

Jennifer Tung, Brownfields Project Officer

Brooklyn James, Brownfields Project Officer

Daniel Moher, Brownfields Project Officer

ICF Team

Brenda Dix, Climate Resilience Director

Kim Irby, Senior Climate Resilience Specialist

Emily Blanton, Senior Environmental & Urban Planning Specialist

Case Study Speakers

Jason Muir, PE, GE, Senior Engineer, GEOCON

Amy Kesler-Wolfson, City Planner, City of Grass Valley

David Froehlich, Project Manager, San Francisco Recreation and Parks

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Introductions

- State your organization and role
- What are you hoping to take away from this training?

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Code: 3661 6677

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Importance of Considering Climate Change

Brownfields and Climate Change

Climate change impacts pose a significant risk to brownfield sites. Considering climate change during brownfields assessment, clean up, and redevelopment is essential to reduce climate impacts and support climate resilience.

Brownfield revitalization with climate in mind may bolster resilience and help minimize health, economic, and displacement impacts on residents.

The first step is identifying potential climate impacts both at individual sites and across your community.

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The Cost of Inaction

- If resilience measures are not considered, it's likely the site will become costlier to finance, insure, maintain, and sell.
- Climate impacts can leave brownfield sites susceptible to increased and repeated damage, which will reduce the long-term protectiveness of the remedy and redevelopment.
- Abandoned and underused brownfield sites already pose financial risks to communities because they do not contribute to property or utility taxes.

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Benefits of Investing in Climate Resilience

Financial/Economic

- Increase job opportunities (including building new skills) and boost the local economy
- Attract additional green investments
- Increase property values

Environmental

- Increase trees and vegetated community spaces
- Improve water quality associated with reduced runoff from stormwater sources

Infrastructure

- Increase infrastructure resilience and reduce maintenance and repair costs
- Reduce energy demand and material consumption

Health

- Reduce or eliminate exposure to contamination
- Improve air quality; reduce ground-level ozone and particulate pollution
- Reduce the impact of urban heat islands on vulnerable populations
- Reduce or eliminate stagnant water that may support vector-borne disease insects

Community

- Enhance neighborhood walkability, including improving public transportation
- Improve environmental justice and community resilience

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Vulnerable Communities & Cumulative Impacts

Most vulnerable include:

- Low-income communities
- Tribal communities
- Small or rural communities
- Communities of color
- Children
- Pregnant people, mothers
- Disabled people
- Elderly people
- People taking certain medications / suffering from chronic disease

Vulnerable communities around a brownfield site are impacted by stressors that impact health outcomes:

- **Chemical stressors**: exposure to hazardous substances, pollutants, contaminants, petroleum
- **Non-chemical stressors**: built environment, safety, social and cultural wellbeing, socio-economic factors (e.g., housing and job stability)
- **Climate risks**: climate disasters, stress associated with the disasters and climate concern

The compounding nature of multiple stressors is called **cumulative impacts**.

Investments in climate resilience and addressing chemical and non-chemical stressors can reduce impacts

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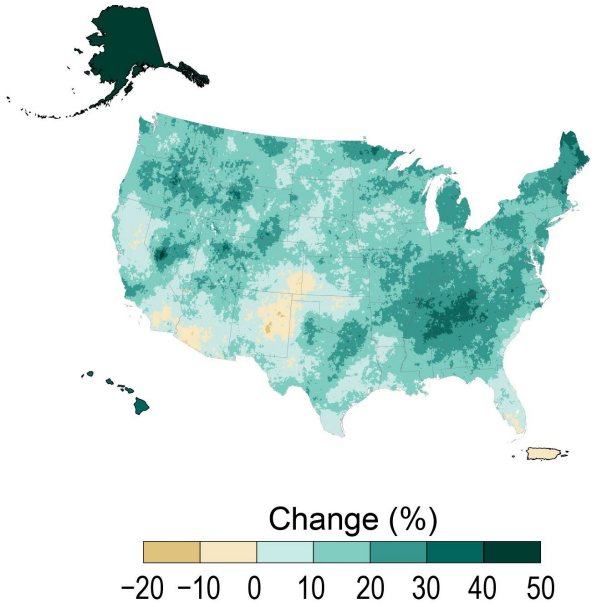
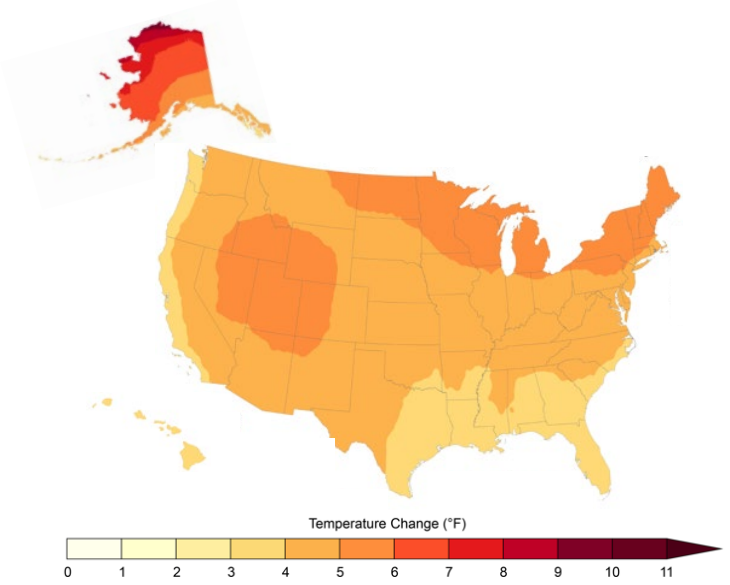
How is the climate changing?

Increasing heavy precipitation and floods



Projected Change (%) in Total Precipitation on the Heaviest 1% of Days under 2.0˚C of Global Warming relative to 1991-2020
Source: USGCRP 2023

More extreme heat waves and higher average temperatures



Projected Change in Annual Average Temperature under 2.0˚C of Global Warming relative to 1851-1900
Source: USGCRP 2023

Continued sea level rise and increased coastal flooding

Projected flooding at 10ft of sea level rise
Source: NOAA SLR Viewer

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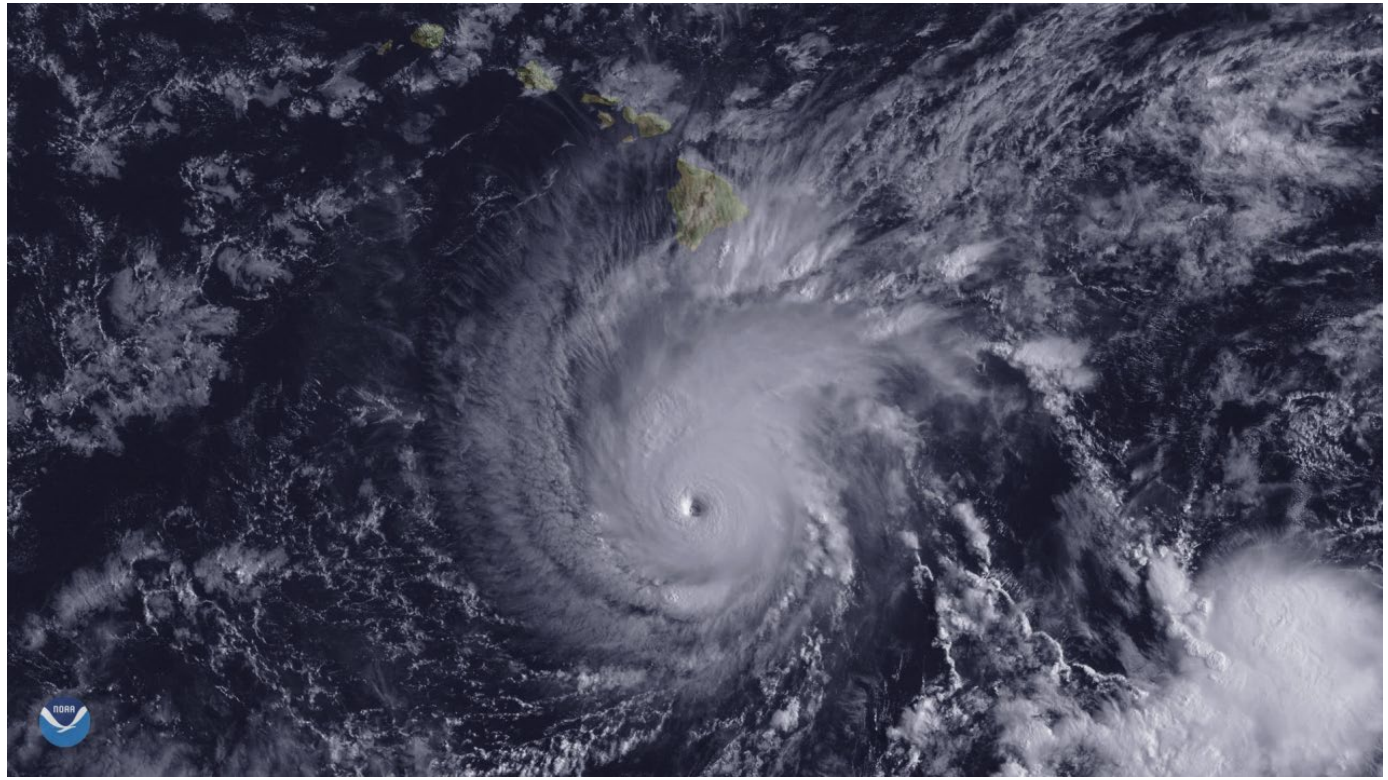
Climate Impacts to Brownfield Sites and Communities

Climate hazards affecting brownfield sites and communities:

Wildfire | Flooding | Sea Level Rise | Tropical Cyclones | Extreme Heat | Drought

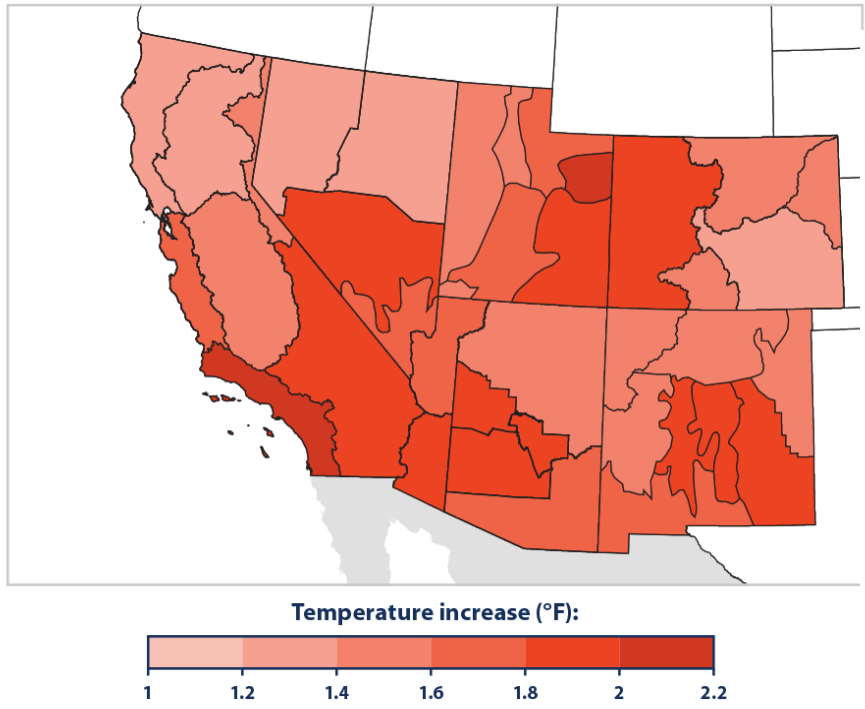
Climate Impacts: Tropical Cyclones

- Throughout Hawai'i and the Pacific Islands, tropical cyclone frequency is expected to decrease
- However, associated wind speeds, rainfall rates, and storm surge heights are projected to increase
- Tropical cyclones can cause:
  - Damage to infrastructure and flooding
  - Increased food-/water-borne pathogens
  - Reduced access to emergency services
  - Loss of electricity

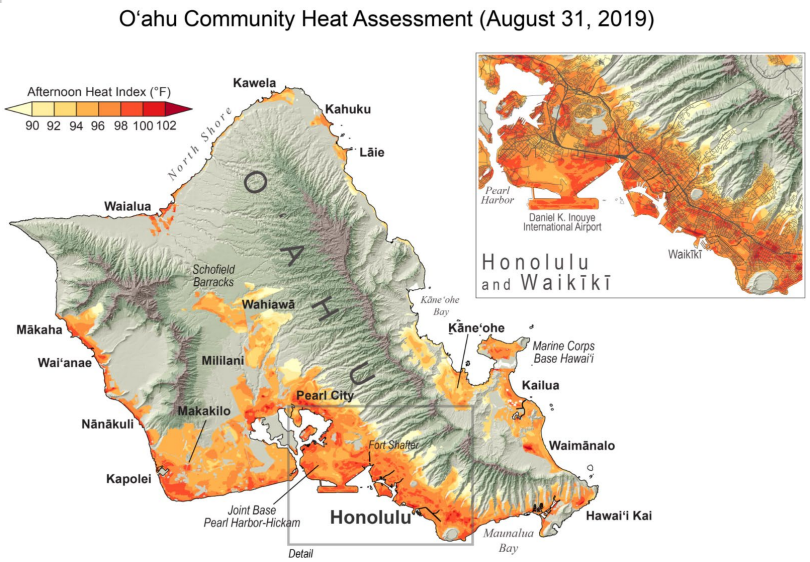


Climate Impacts: Extreme Heat

- Average annual temperatures are increasing
- The number of days above 100°F are increasing
- Heat waves are increasing in length and frequency
- Extreme heat events can worsen the urban heat island (UHI) effect, posing various health risks to communities
    - Disadvantaged communities are especially vulnerable to UHI impacts



Average Temperatures in the Southwestern United States, 2000-2020 Versus Long-Term Average
Source: NOAA 2021



Afternoon Heat Index and Hotspots for O'ahu
Source: USGCRP

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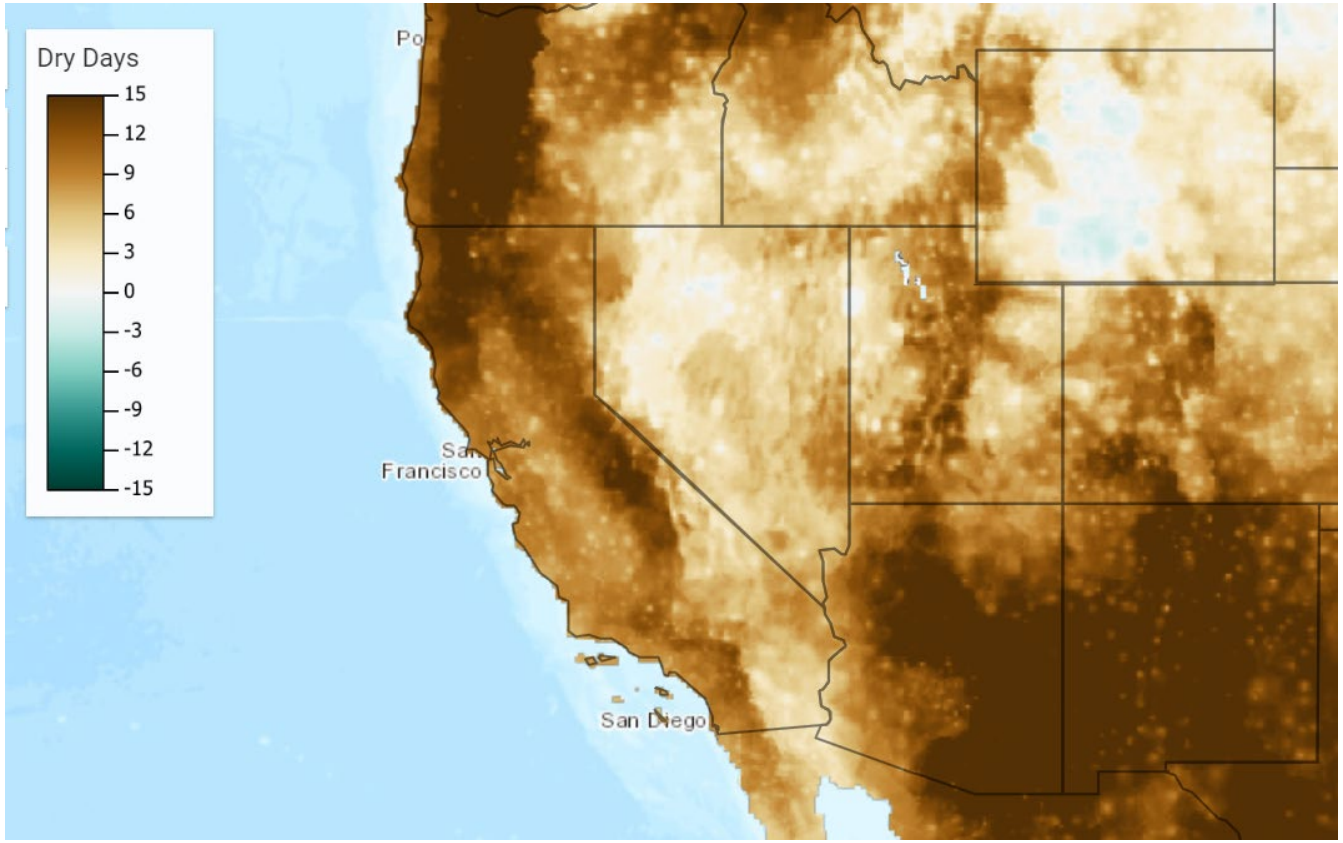
Climate Impacts: Drought

- Drought is projected to increase in frequency and severity in the Southwest and Hawai'i
- Some islands (like American Samoa) may see a decrease in drought
- Flash droughts are also projected to increase
- Drought conditions can impact vegetation at a brownfield site; vegetation helps with erosion control, reducing flooding, etc.
- Drought poses a major threat to agricultural yields



Projected Change in the Number of Dry Days by 2090
under a High Emission Scenario
Source: The Climate Explorer

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Incorporating Climate Resilience

How can Brownfield Redevelopment support Community Climate Resilience?

Resilience:

The capability to **anticipate, prepare for, respond to, and recover from significant multi-hazard threats** with minimum damage to social well-being, the economy, and the environment.

Why consider resilience?

Minimize brownfield cleanup and redevelopment vulnerabilities to climate change and extreme weather

Many members of vulnerable populations live close to brownfields, and brownfield redevelopment creates opportunities to improve the quality of life for these populations while mitigating the impacts of climate change

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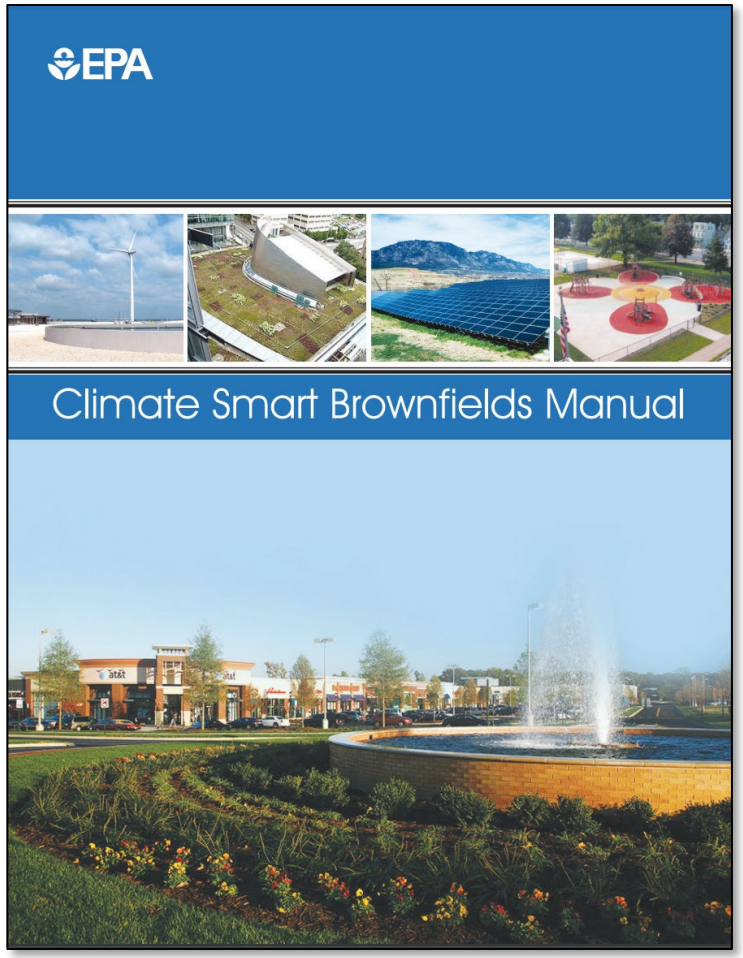
Climate Smart Brownfields Manual



Goal 1. Help communities think about climate adaptation, mitigation, and resiliency throughout the brownfield redevelopment process

- Consider climate projections when performing assessments, evaluating brownfield cleanup alternatives, and planning for redevelopment
- Reduce emissions through sustainable approaches on brownfield sites throughout cleanup, redevelopment, and reuse of the property

Goal 2. Provide references and tools that brownfield practitioners, community members, and state and local governments can use

Specific examples of how municipalities have used climate smart strategies for brownfield redevelopment are included throughout the manual

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Example Strategies to Adapt and Mitigate Climate Impacts (Appendix A)

1 Planning

Strategies for the planning stage of a brownfield project:

Strategy	Adaptation	Mitigation
Adopt climate-conscious building codes	✓	
Offer tax incentives/rebates	✓	✓
Zoning ordinances	✓	✓
Update floodplain management plans	✓	✓
Update coastal and wetland management plans	✓	✓
Update hazard mitigation plans	✓	✓
Engage the community in planning	✓	✓

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Example Strategies to Adapt and Mitigate Climate Impacts (Appendix A)

1 Planning

2 **Assessment**

Strategies for the assessment stage of a brownfield project:

Strategy	Adaptation	Mitigation
Conduct climate-focused Phase I and II ESAs	✓	✓
Identify interim uses	✓	✓
Evaluate reuse options that are climate conscious	✓	✓
Identify potential risk factors and vulnerabilities	✓	✓
Follow assessment-relevant ASTM Guidelines for Greener Cleanups		✓
Conduct analysis of Brownfield Cleanup Alternatives (ABCA)	✓	✓

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Example Strategies to Adapt and Mitigate Climate Impacts (Appendix A)

1 Planning

2 Assessment

3 **Demolition**

Strategies for the demolition stage of a brownfield project:

Strategy	Adaptation	Mitigation
Identify opportunities for deconstruction		✓
Plan early		✓
Reduce energy use		✓
Reuse/recycle materials		✓

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Example Strategies to Adapt and Mitigate Climate Impacts (Appendix A)

1. Planning
2. Assessment
3. Demolition
4. **Cleanup**

Strategies for the cleanup stage of a brownfield project:

Strategy	Adaptation	Mitigation
Reduce energy use and emissions		✓
Reduce water use and impacts to water sources	✓	✓
Reduce waste and manage materials sustainably		✓
Minimize unnecessary soil and habitat disturbance or destruction	✓	✓
Use native species to support habitat	✓	✓
Select onsite remediation approaches		✓

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Example Strategies to Adapt and Mitigate Climate Impacts (Appendix A)

1 Planning

2 Assessment

3 Demolition

4 Cleanup

5 **Redevelopment**

Strategies for the redevelopment stage of a brownfield project:

Strategy	Adaptation	Mitigation
Install green infrastructure	✓	✓
Incorporate renewable energy development	✓	✓
Incorporate green building techniques (e.g., green roofs, energy and lighting efficiency, passive survivability, flood protection)	✓	✓
Complete streets	✓	✓
Incorporate multi-modal transit	✓	✓
Promote accessibility and community social cohesion	✓	✓

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Climate Requirements in EPA Brownfields Grants

New

"Describe how the proposed project will **improve local climate adaptation/ mitigation capacity and resilience** to protect residents and community investments. If applicable, describe how the reuse of the priority site(s) will **facilitate renewable energy** from wind, solar, or geothermal energy; or will **incorporate energy efficiency** measures."

Ongoing

In the **Analysis of Brownfield Cleanup Alternatives (ABCA)** grant recipients "**must** also consider the **resilience** of the remedial options to address potential adverse impacts caused by extreme weather events (e.g., sea level rise, increased frequency and intensity of flooding, etc.)."

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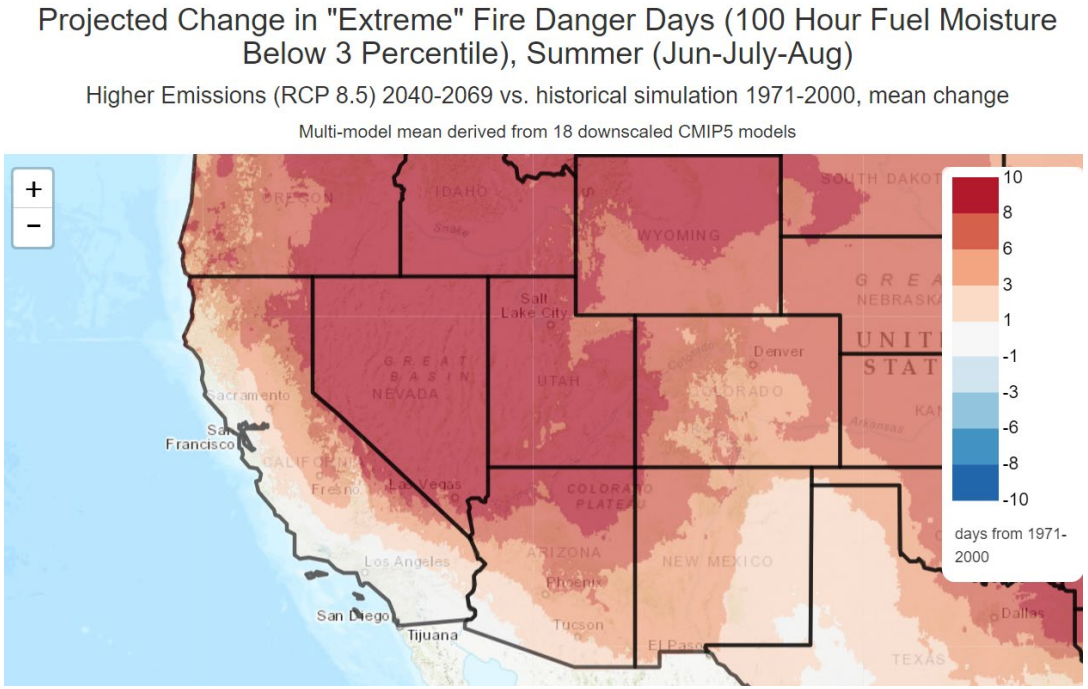
Wildfire

Climate Impacts: Wildfire

- Wildfires are becoming more frequent, with longer seasons and larger burned areas
- By late-century, the length of extreme wildfire season is projected to be prolonged by over 20 days for the Southwest
- Wildfires can spread toxic contaminants from brownfield sites, posing various health risks to surrounding communities



Projected Change in Extreme Fire Danger Days through Late Century under a High Emissions Scenario
Source: Climate Mapper, https://climatetoolbox.org/tool/climate-mapper

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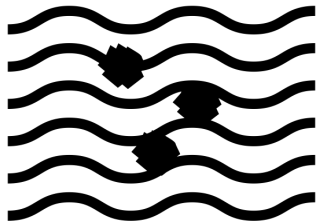
Wildfire Risks to Brownfield Sites and Communities



Reduced air and water quality

Damage to buildings

Damage to critical infrastructure

Creation of new brownfield sites

Major Contributors to Wildfire

Increased Temperatures

Drying Conditions

Expansion of Development

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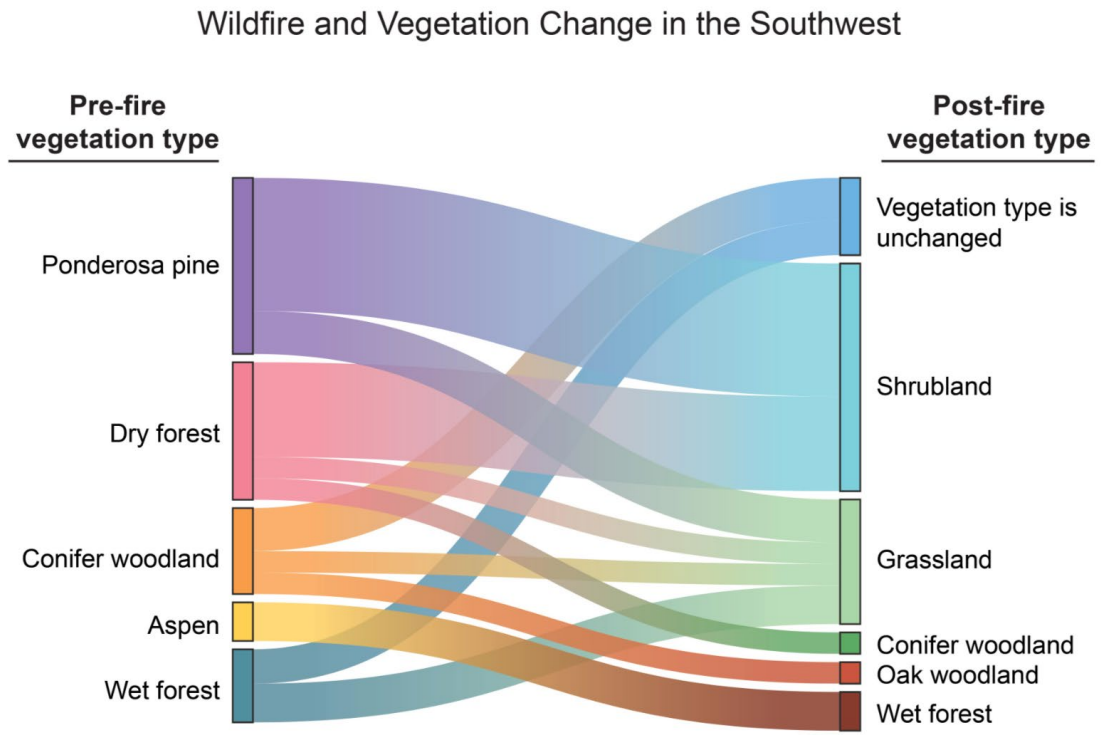
Major Contributors to Wildfire

- Climate change has caused warming temperatures and drier conditions with periods of extended droughts
  - Reductions in snowpack and summer precipitation also contribute to wildfire risk
- Warm, dry conditions create more fuel for wildfires
- Annual area burned has increased eightfold in the West since 1985
- Human infrastructure can exacerbate wildfire risk (ex: fires caused by electrical transmission lines)



Shifts in Vegetation Patterns Resulting from Larger and Hotter Wildfires
Source: USGCRP 2023

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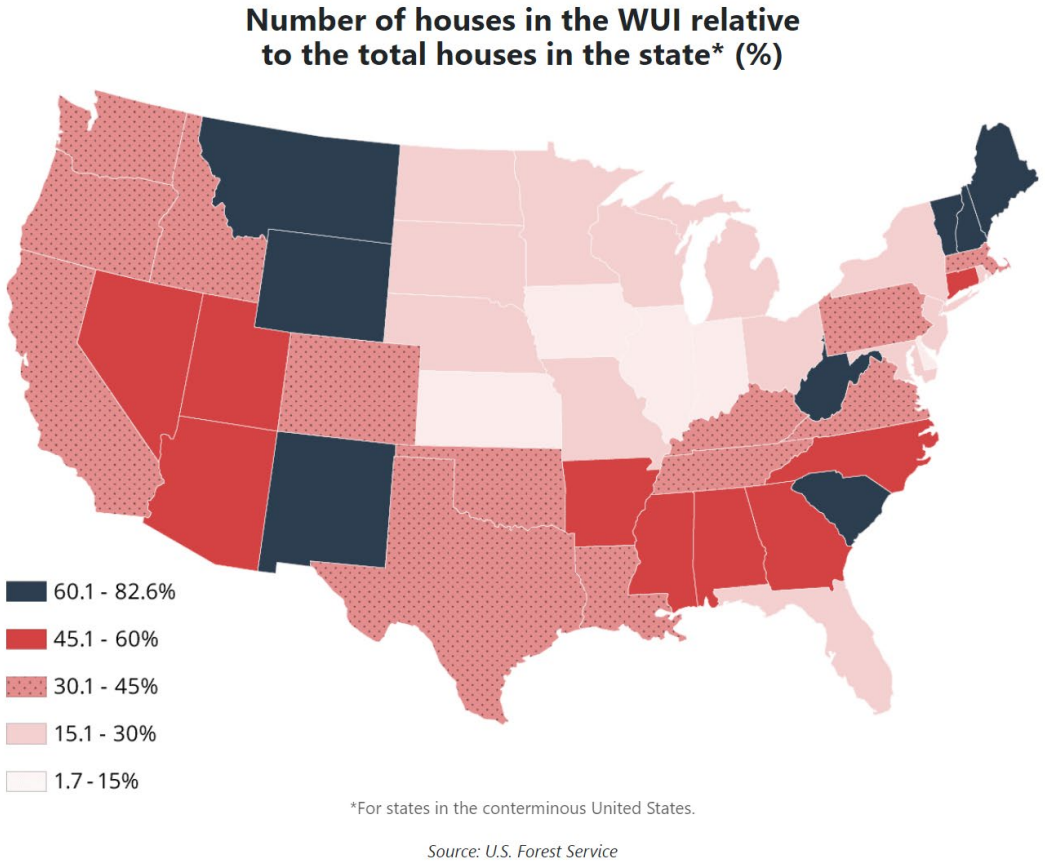
Wildland Urban Interface

- The Wildland Urban Interface (WUI), the zone of transition between undeveloped and developed land, grows by approximately 2 million acres per year
- Between 2002 and 2016 over 3,000 structures per year were lost to wildfires in the WUI across the U.S.
- WUI population has risen fastest in the Southwest (where wildfire risk is greatest)



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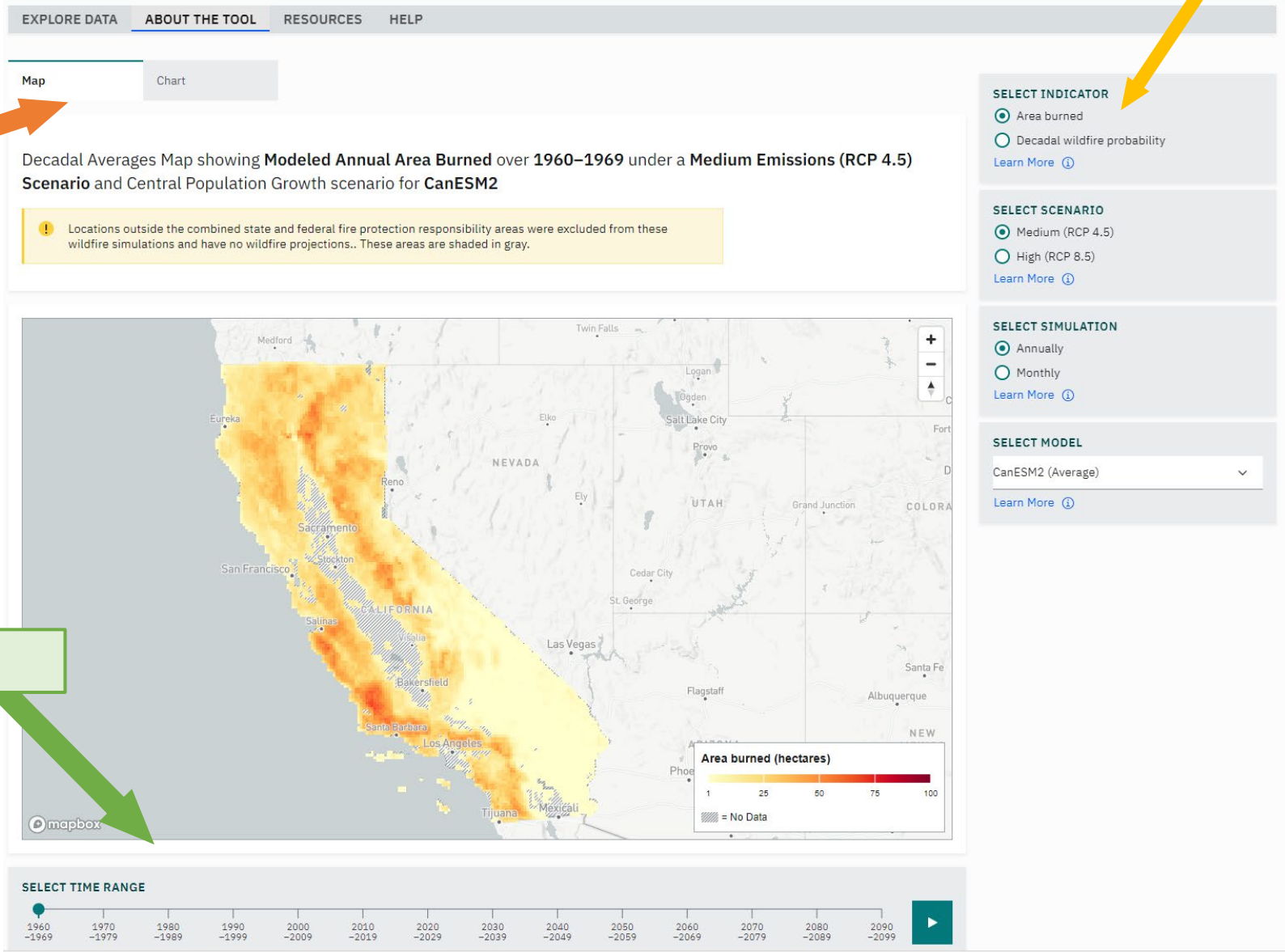
Cal-Adapt

Select indicator, scenario, simulation, and model

Can view data in chart format or map format

Select time range



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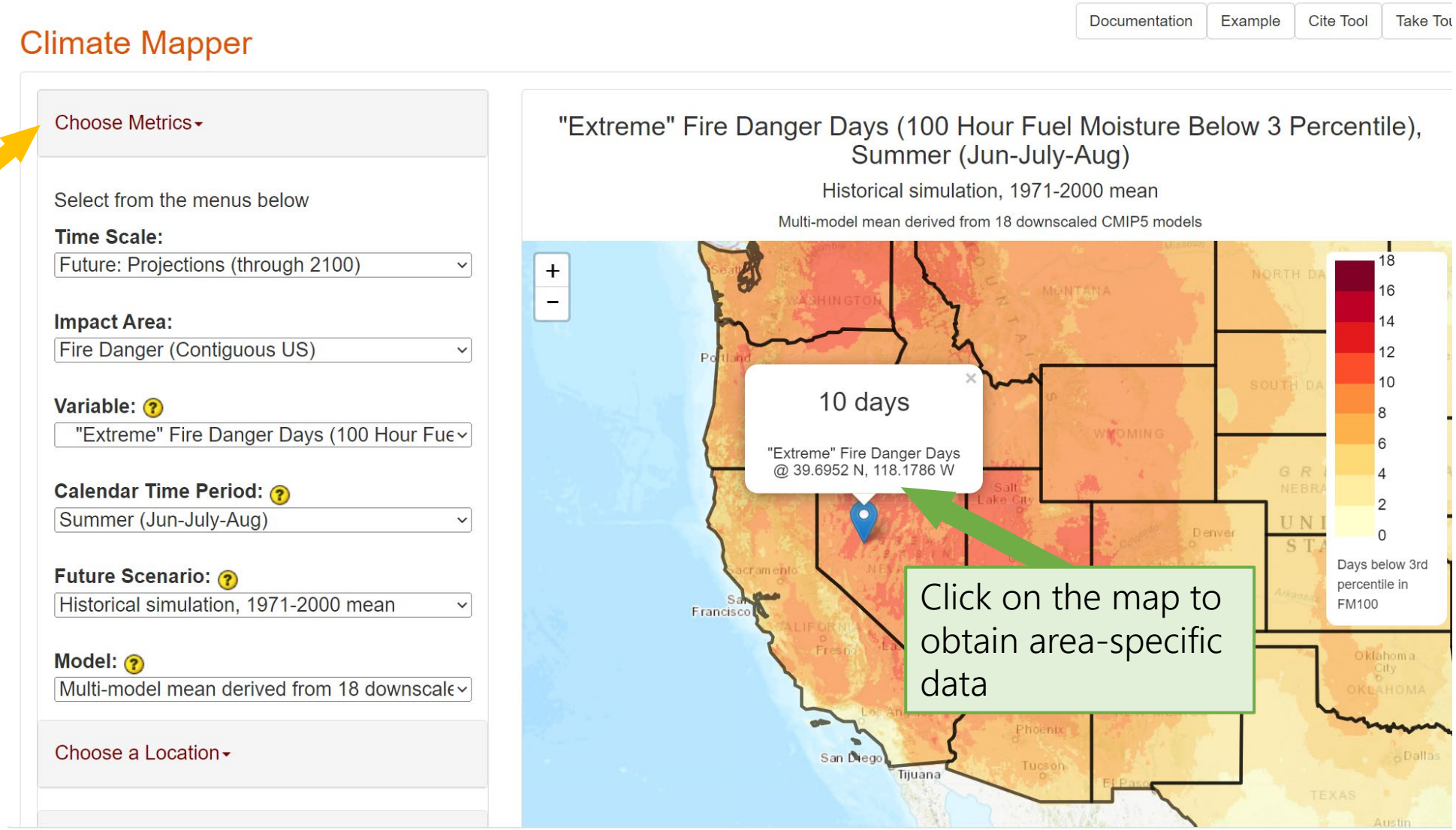
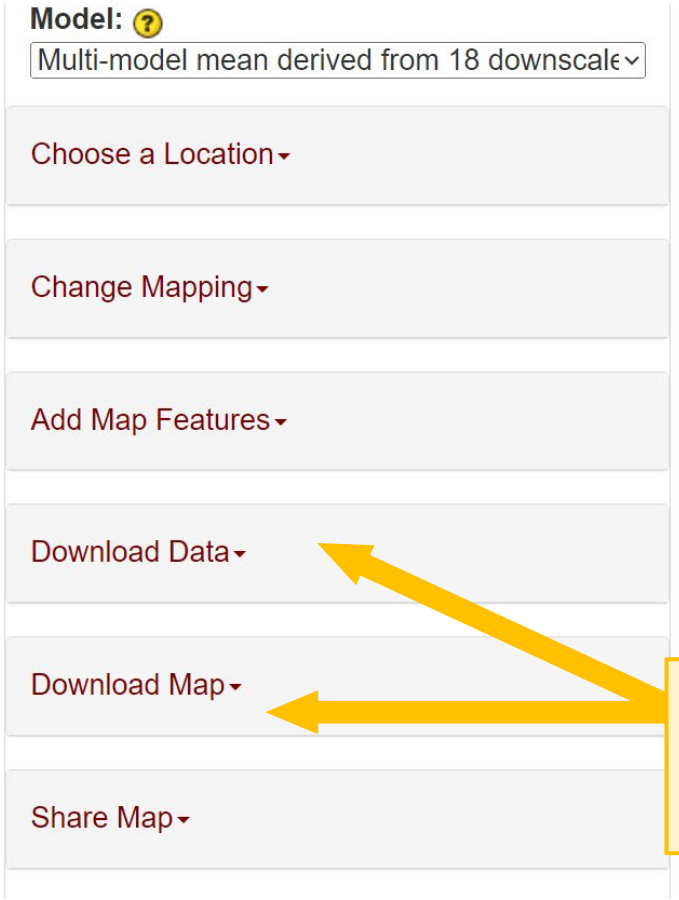
Climate Mapper: Wildfire Danger Days

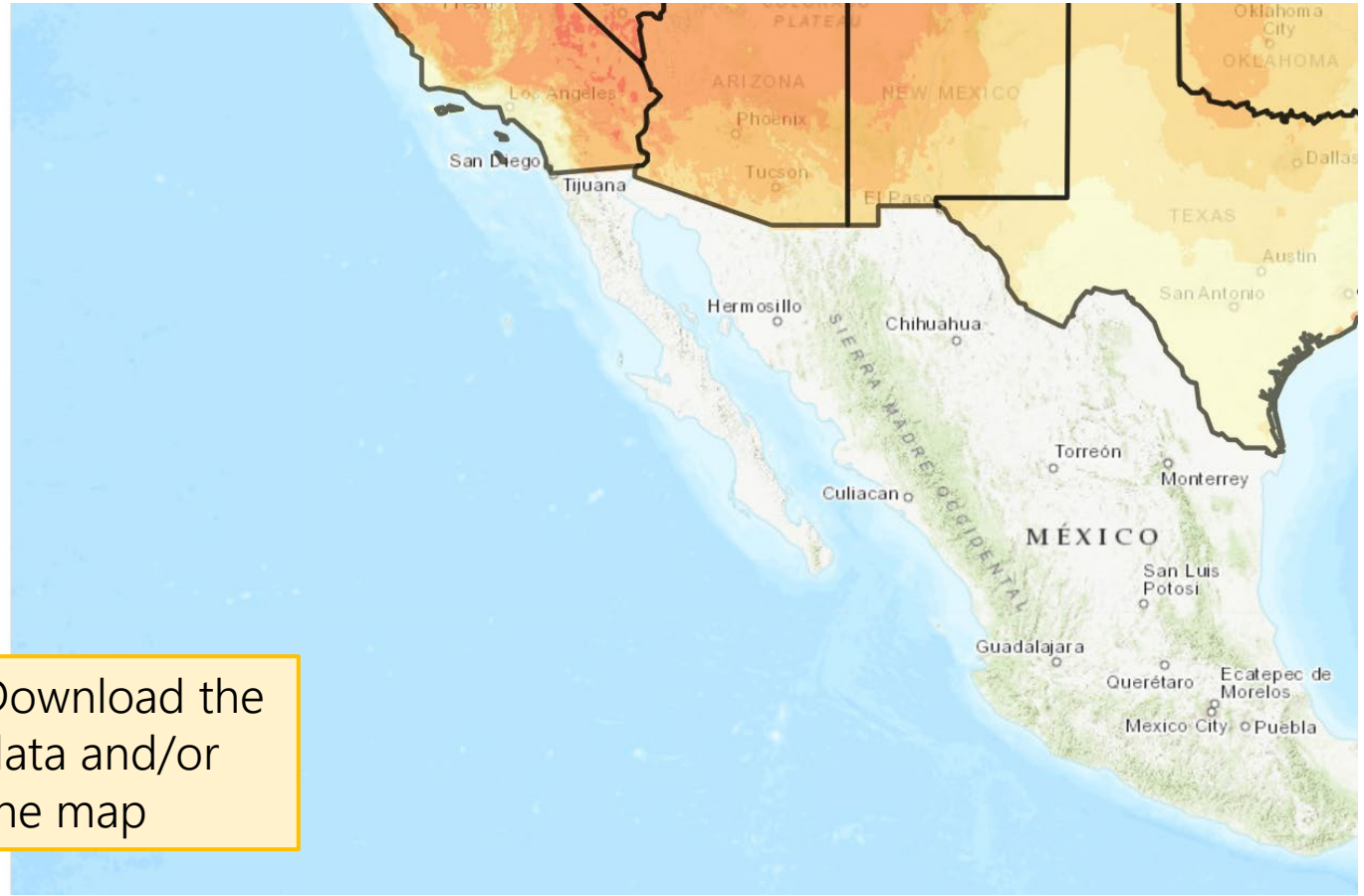
Select time scale, impact area, variable, calendar period, scenario, and model



Climate Mapper: Wildfire Danger Days



Download the data and/or the map



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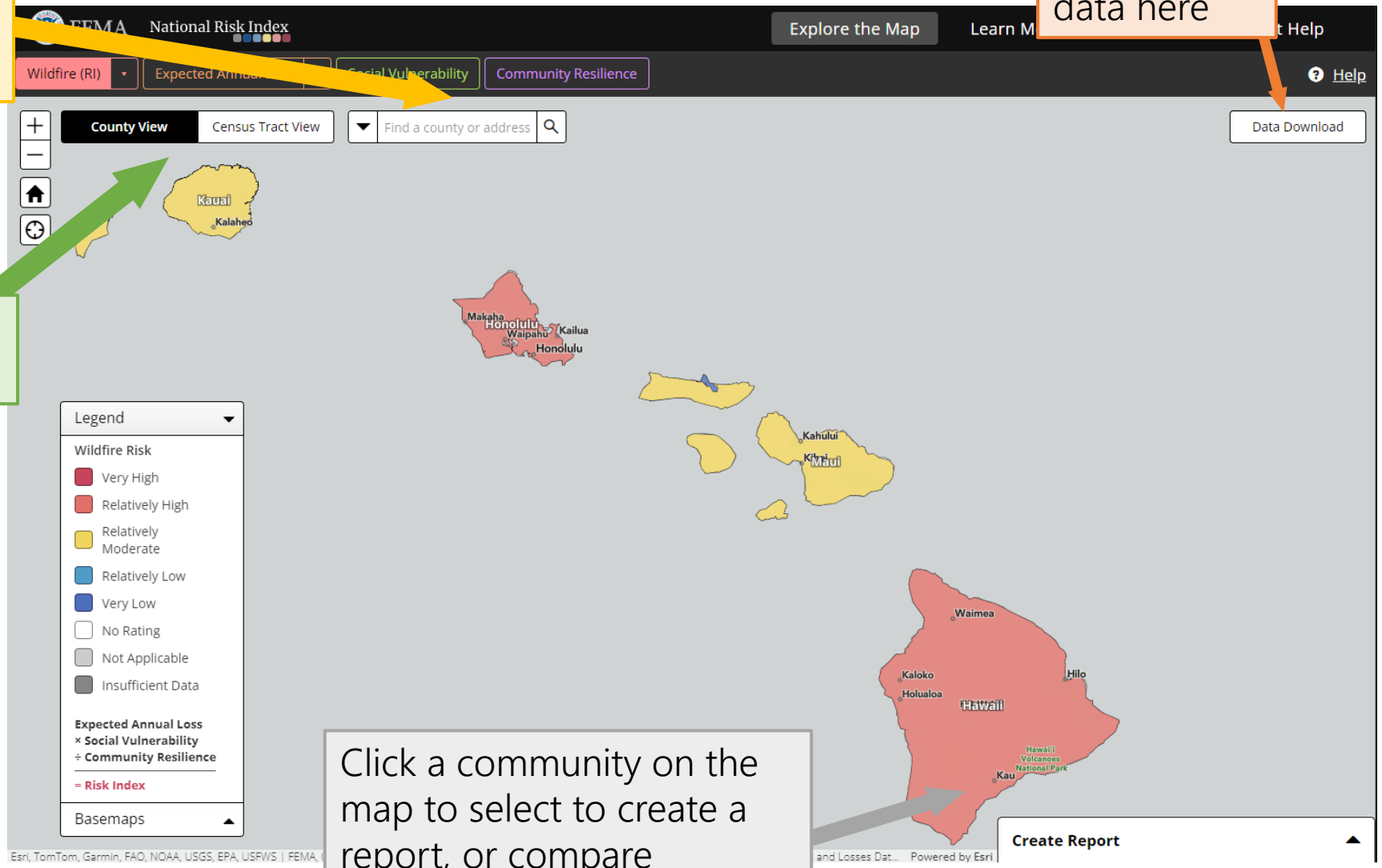
FEMA National Risk Index

Enter a county or address

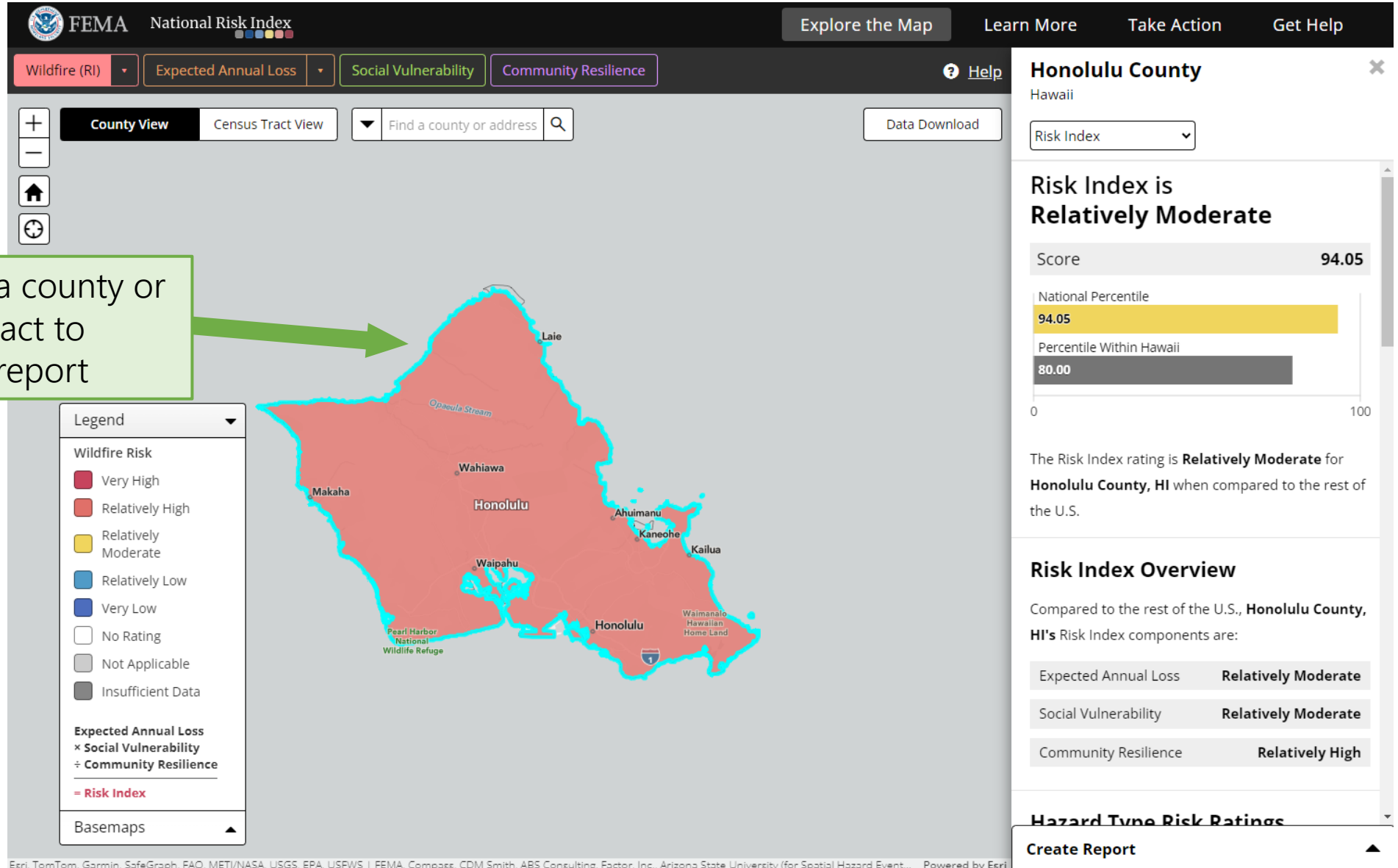
Download data here



View by county or census tract

Click a community on the map to select to create a report, or compare multiple communities

FEMA National Risk Index



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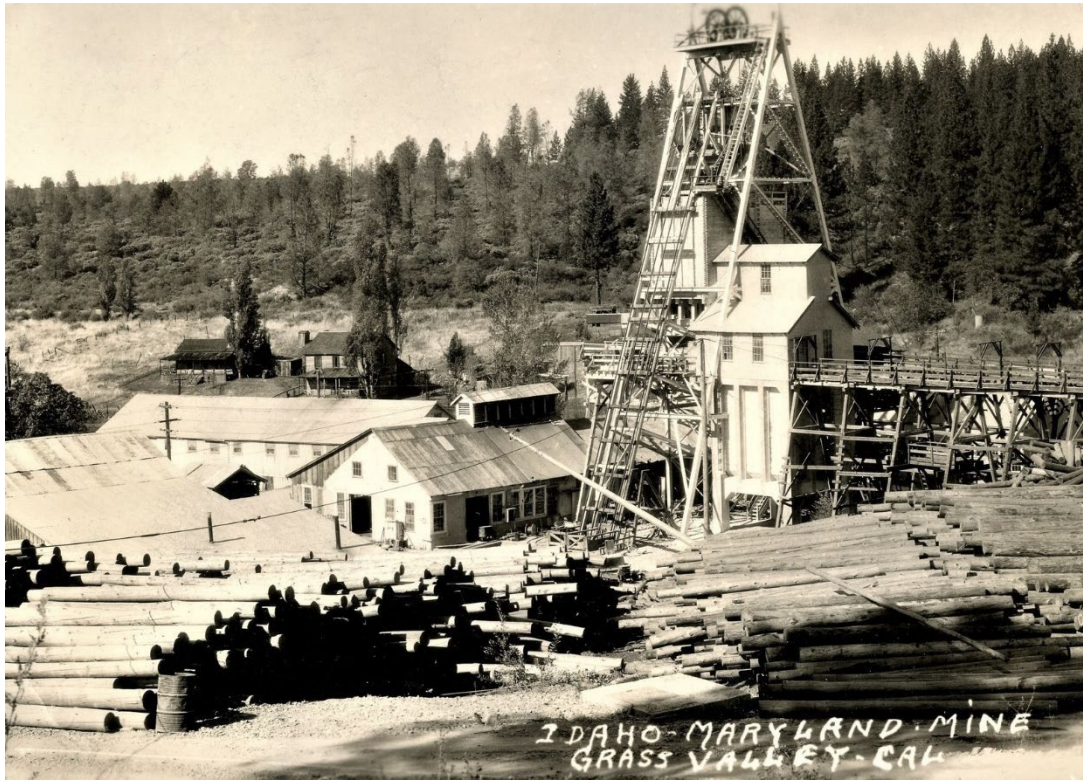


GRASS VALLEY
CLIMATE CHANGE AND BROWNFIELDS
USEPA REGION 9
JANUARY 31, 2024

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

CITY OF GRASS VALLEY NEVADA CO. CALIF.

GEOCON

20 THE SIERRA FUND
THE SIERRA FUND CELEBRATING 20 YEARS

California Department of Toxic Substances Control

2022 Community-Wide Assessment
EPA Brownfield Grant #98T42301

Project Manager

Amy Kesler-Wolfson
City Planner

Funding Agency

Scott Stollman
EPA Project Officer

Lead Regulatory Agency

California Department of Toxic Substances Control

Meghan Hearne/Lora Jameson
Unit Chiefs

Technical Manager

GEOCON

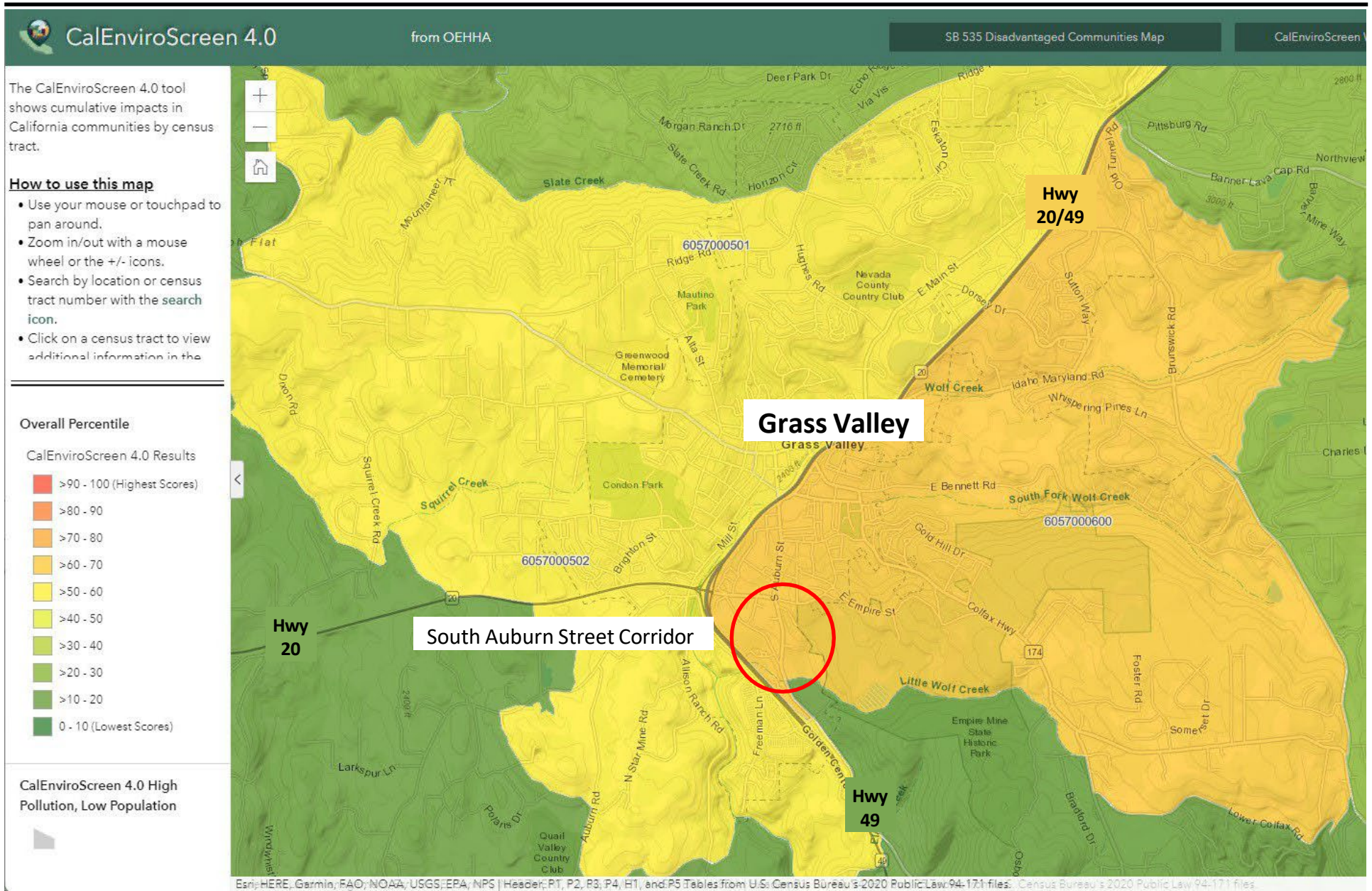
Jason Muir, PE, GE
Senior Engineer

Community Outreach

THE SIERRA FUND
CELEBRATING 20 YEARS

Carrie Monohan, PhD
Program Director

Grass Valley Climate Change and Brownfields
Community Demographics



Grass Valley Climate Change and Brownfields
Community Demographics

CalEnviroScreen 4.0 from OEHHA

SB 535 Disadvantaged Communities Map

CalEnviroScreen

Census Tract: 6057000600 (Population: 6,943)

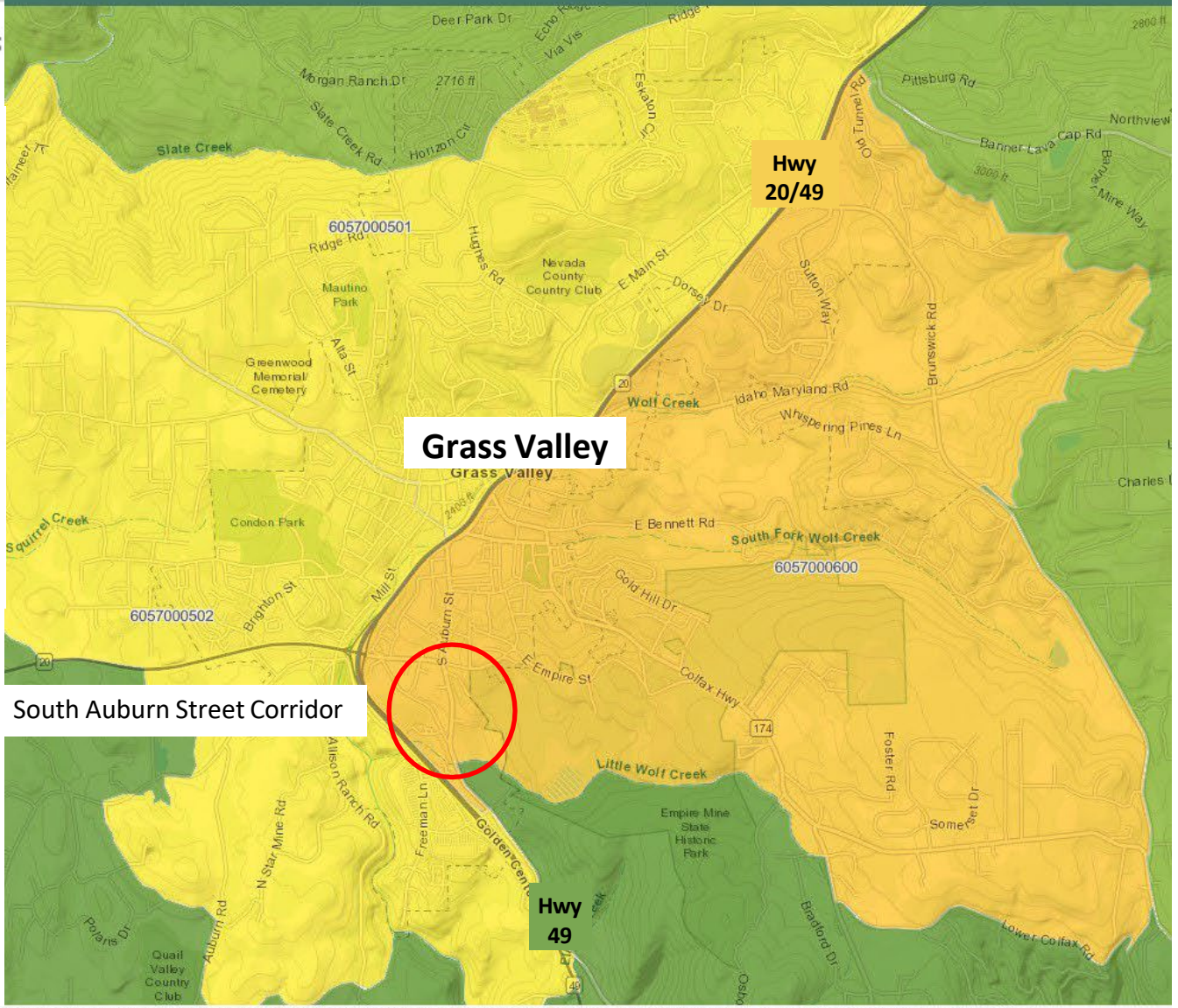
Overall Percentiles	
CalEnviroScreen 4.0 Percentile	69
Pollution Burden Percentile	66
Population Characteristics Percentile	63

Exposures	
Ozone	80

Environmental Effects	
Cleanup Sites	99
Groundwater Threats	85
Hazardous Waste	66
Impaired Waters	12
Solid Waste	89

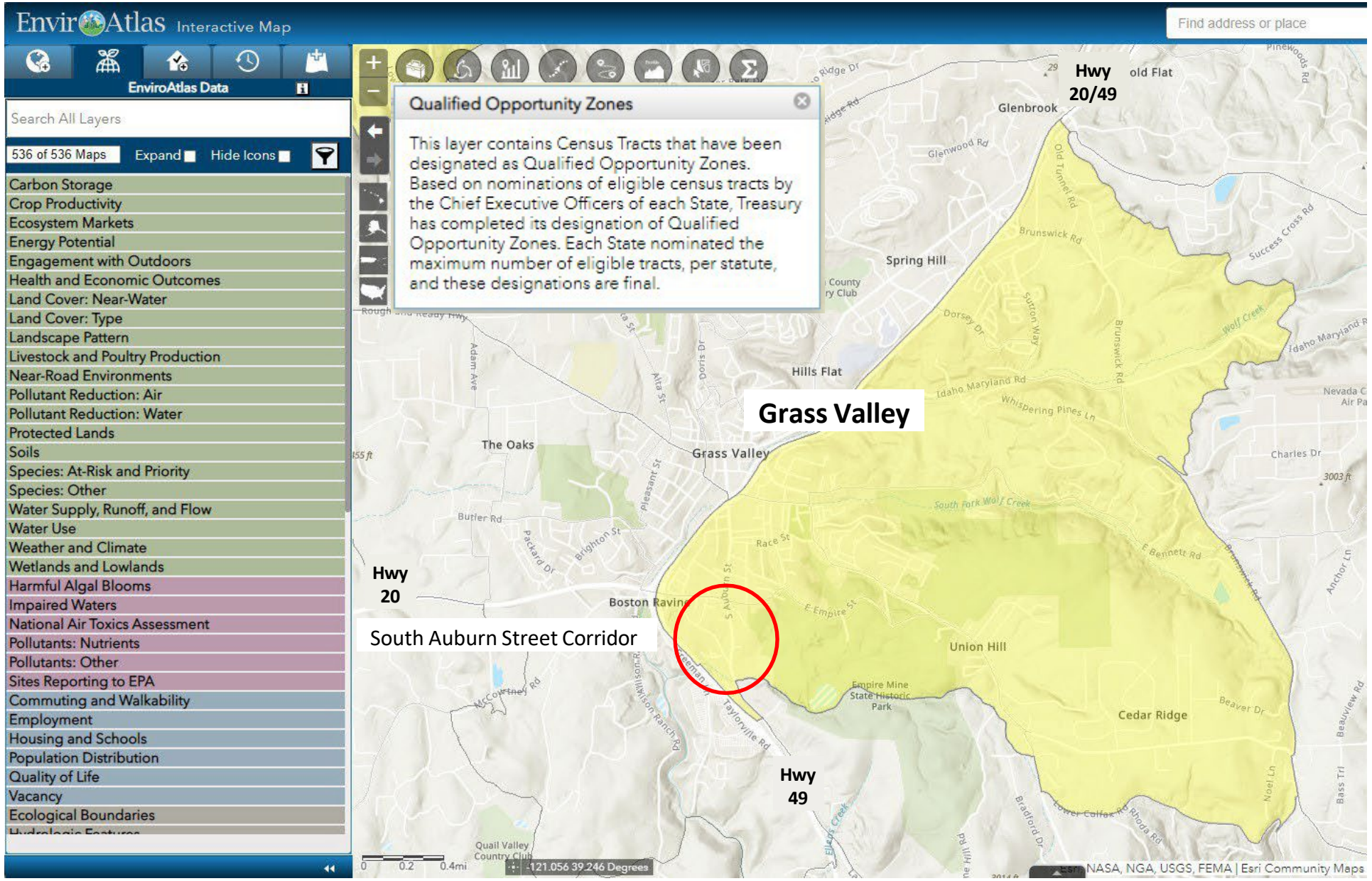
Sensitive Populations	
Asthma	75
Low Birth Weight	58
Cardiovascular Disease	50

Socioeconomic Factors	
Education	43
Linguistic Isolation	8
Poverty	87
Unemployment	69
Housing Burden	71

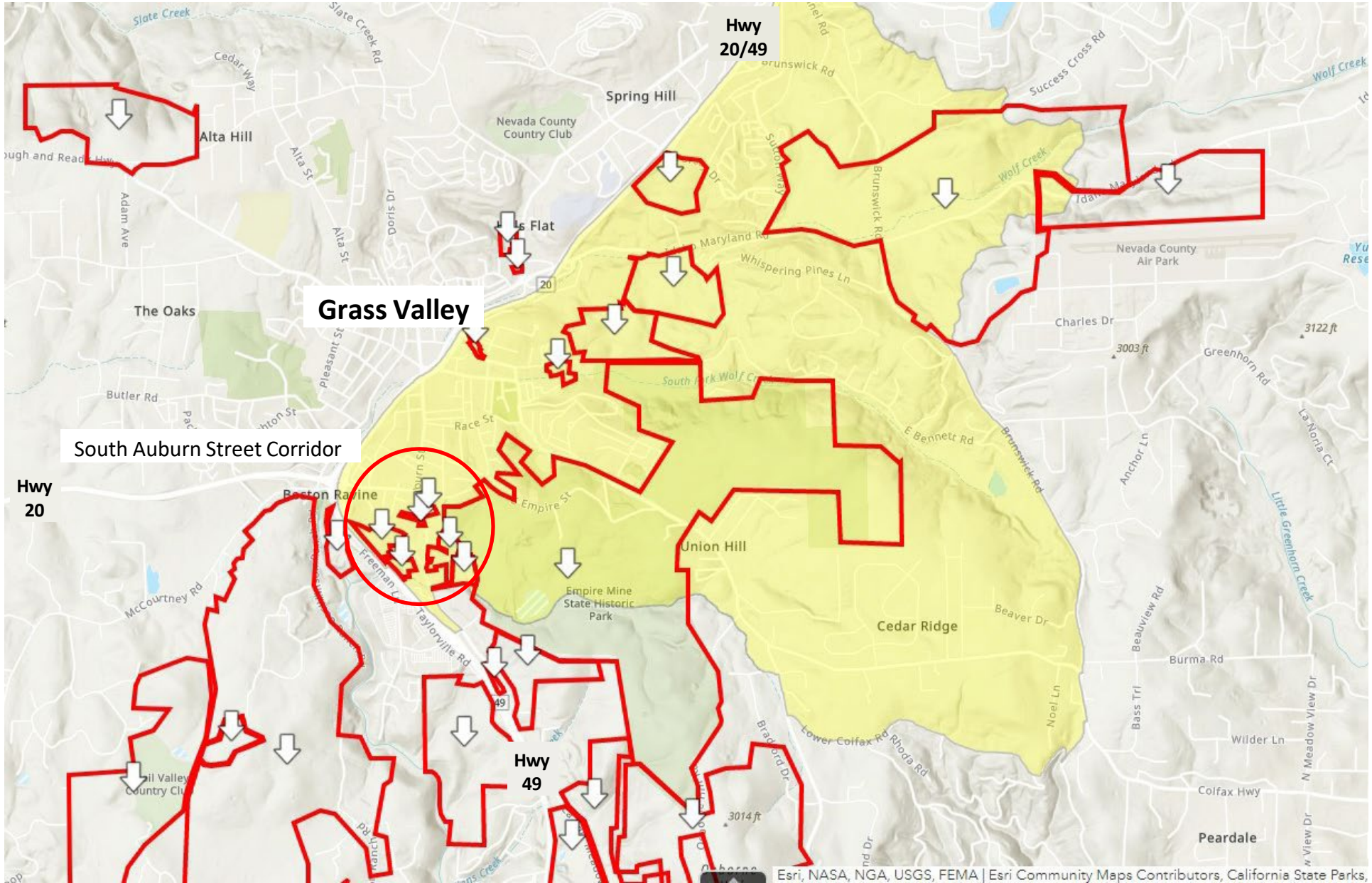


Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS | Header, P1, P2, P3, P4, H1, and P5 Tables from U.S. Census Bureau's 2020 Public Law 94-171 files.

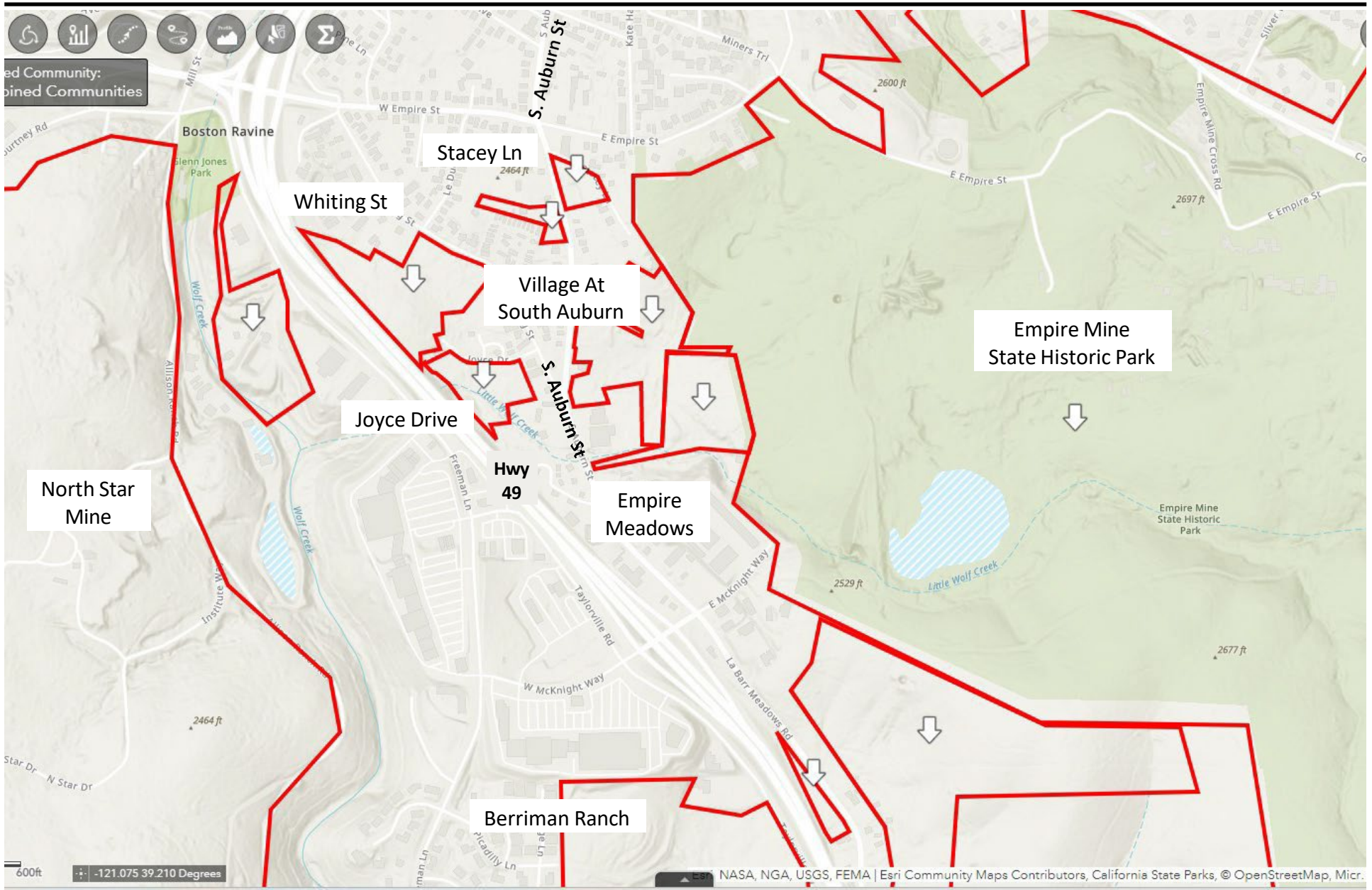
Grass Valley Climate Change and Brownfields
Community Demographics



Grass Valley Climate Change and Brownfields
Cleanup Sites

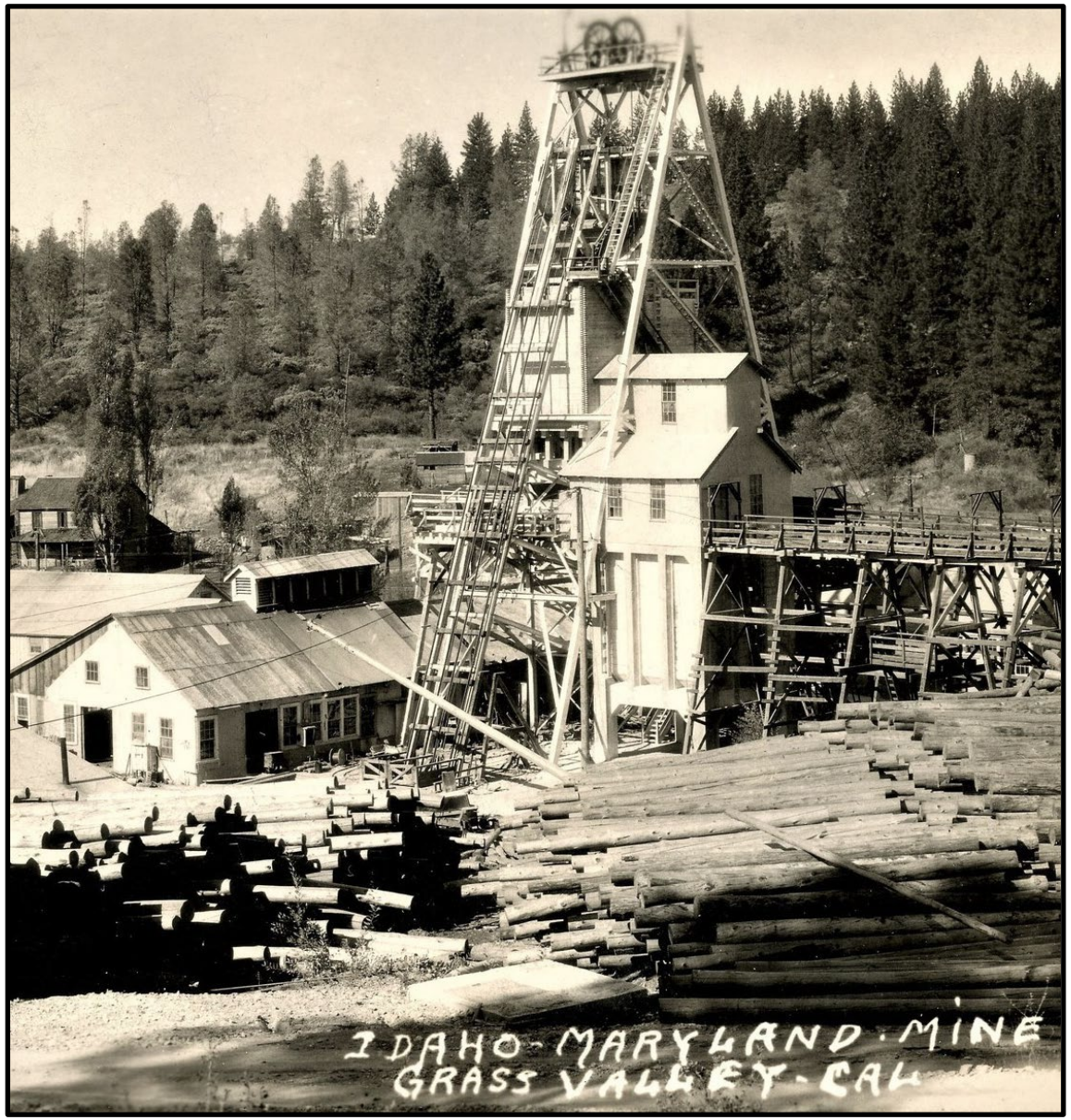


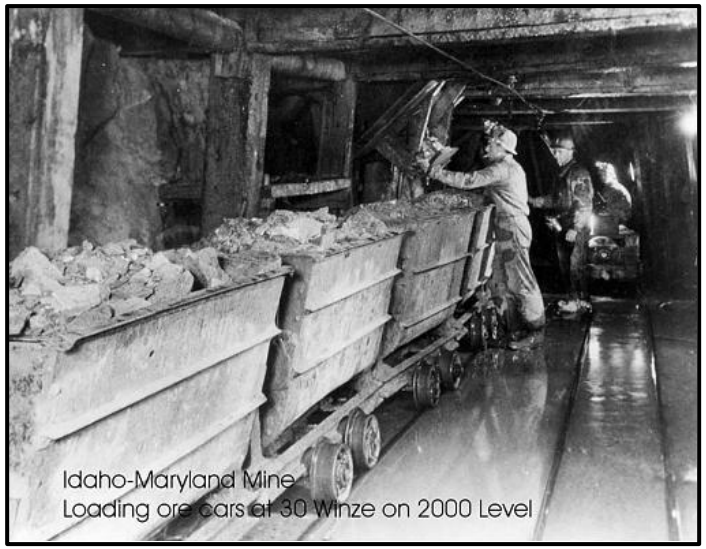
Grass Valley Climate Change and Brownfields
Cleanup Sites

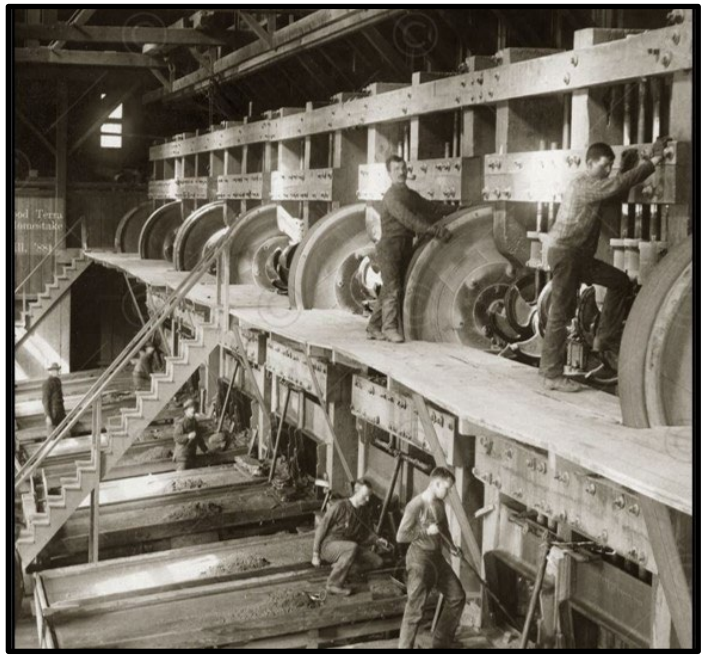


Grass Valley Climate Change and Brownfields

Historical Gold Mining

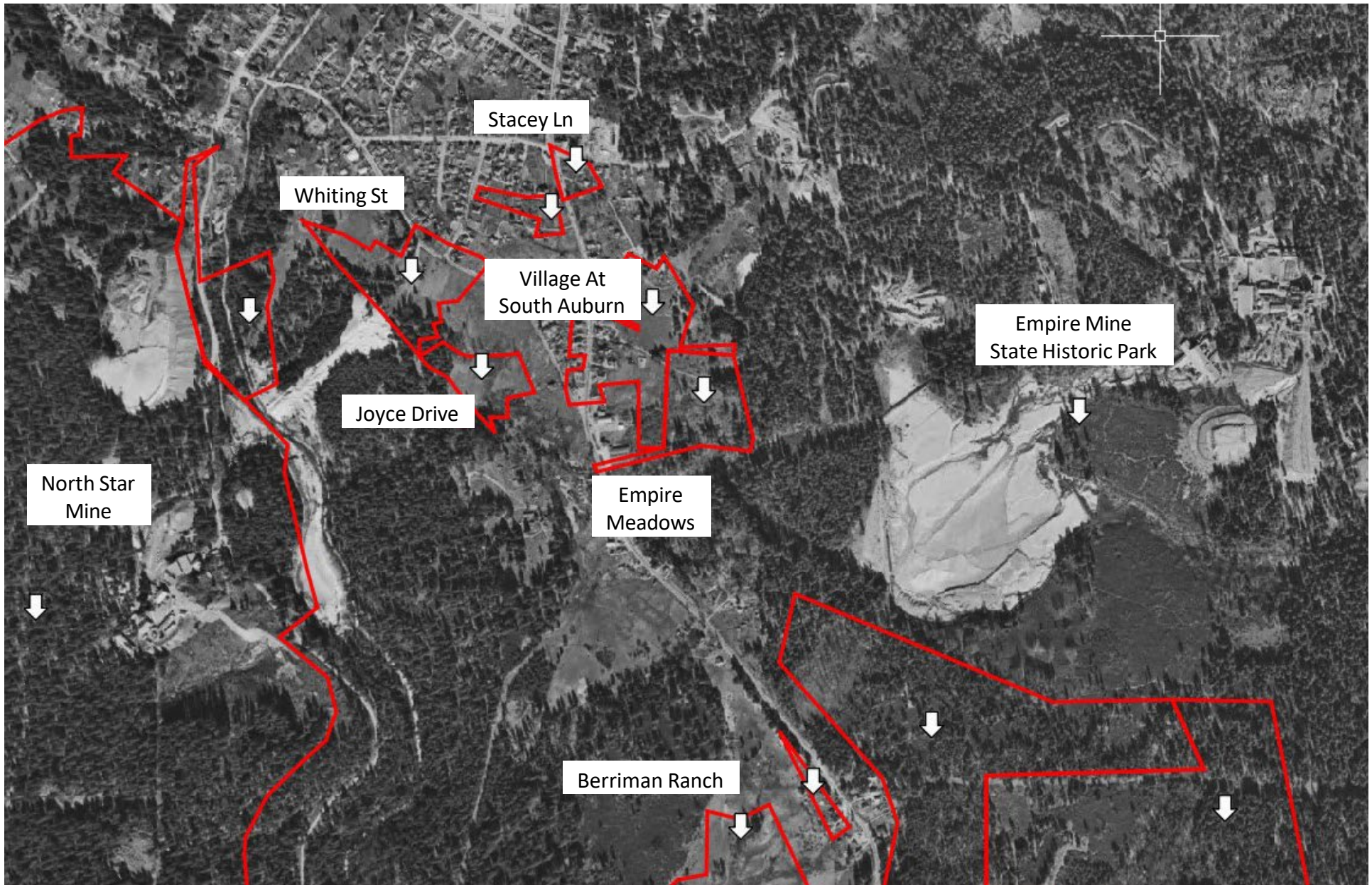



Idaho-Maryland Mine
Loading ore cars at 30 Winze on 2000 Level



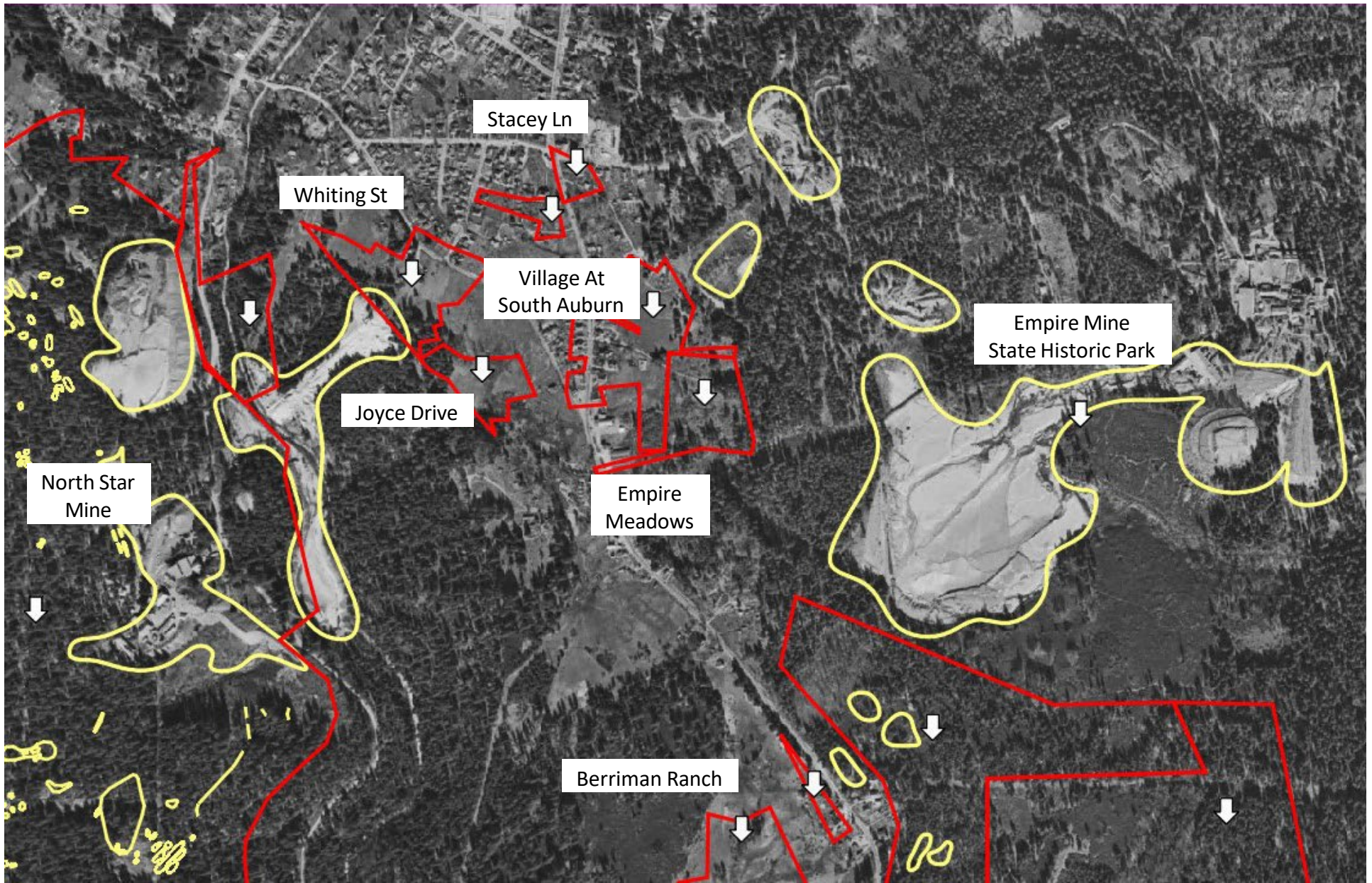
Grass Valley Climate Change and Brownfields

Historical Gold Mining



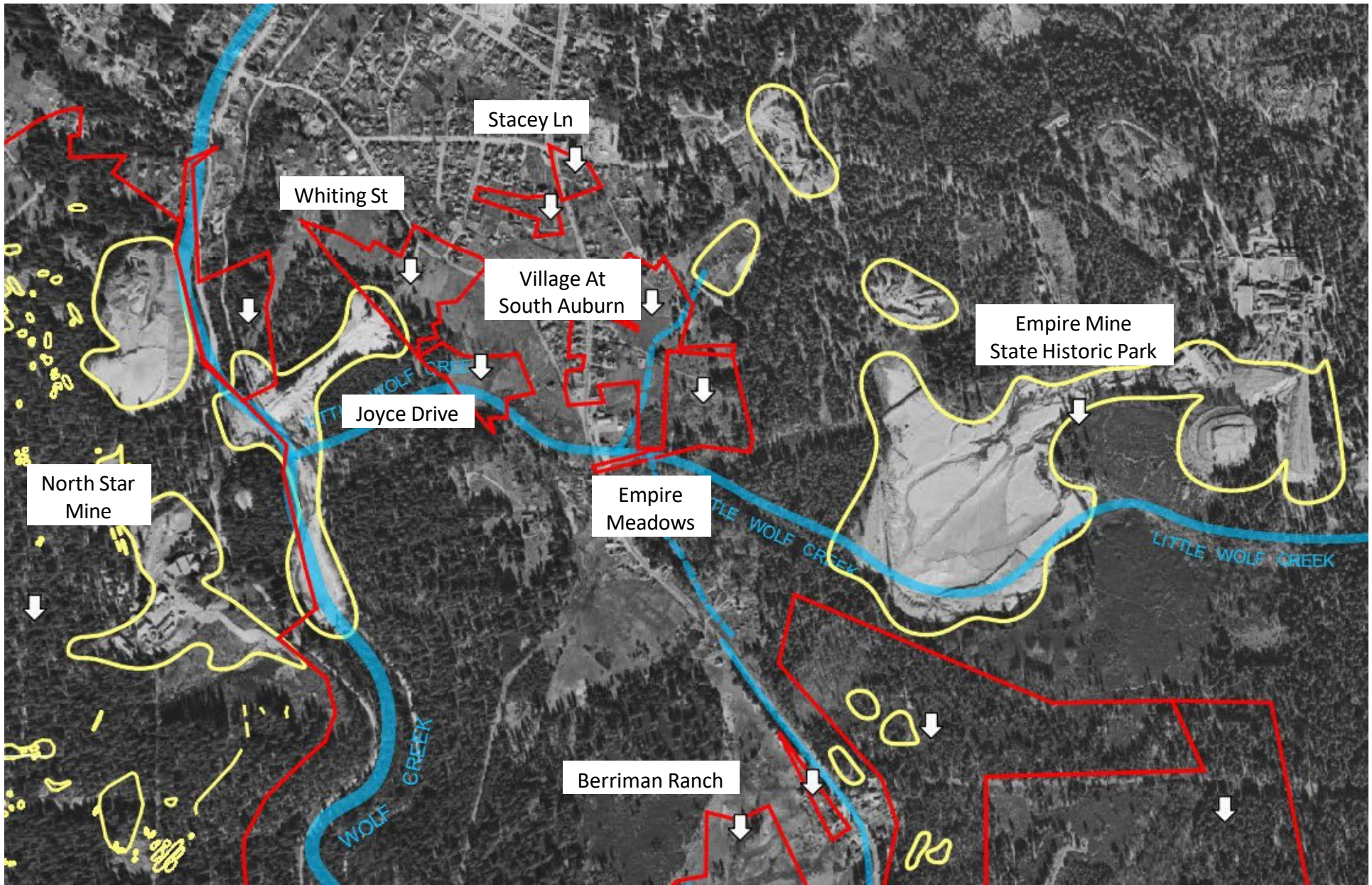
Grass Valley Climate Change and Brownfields

Historical Gold Mining



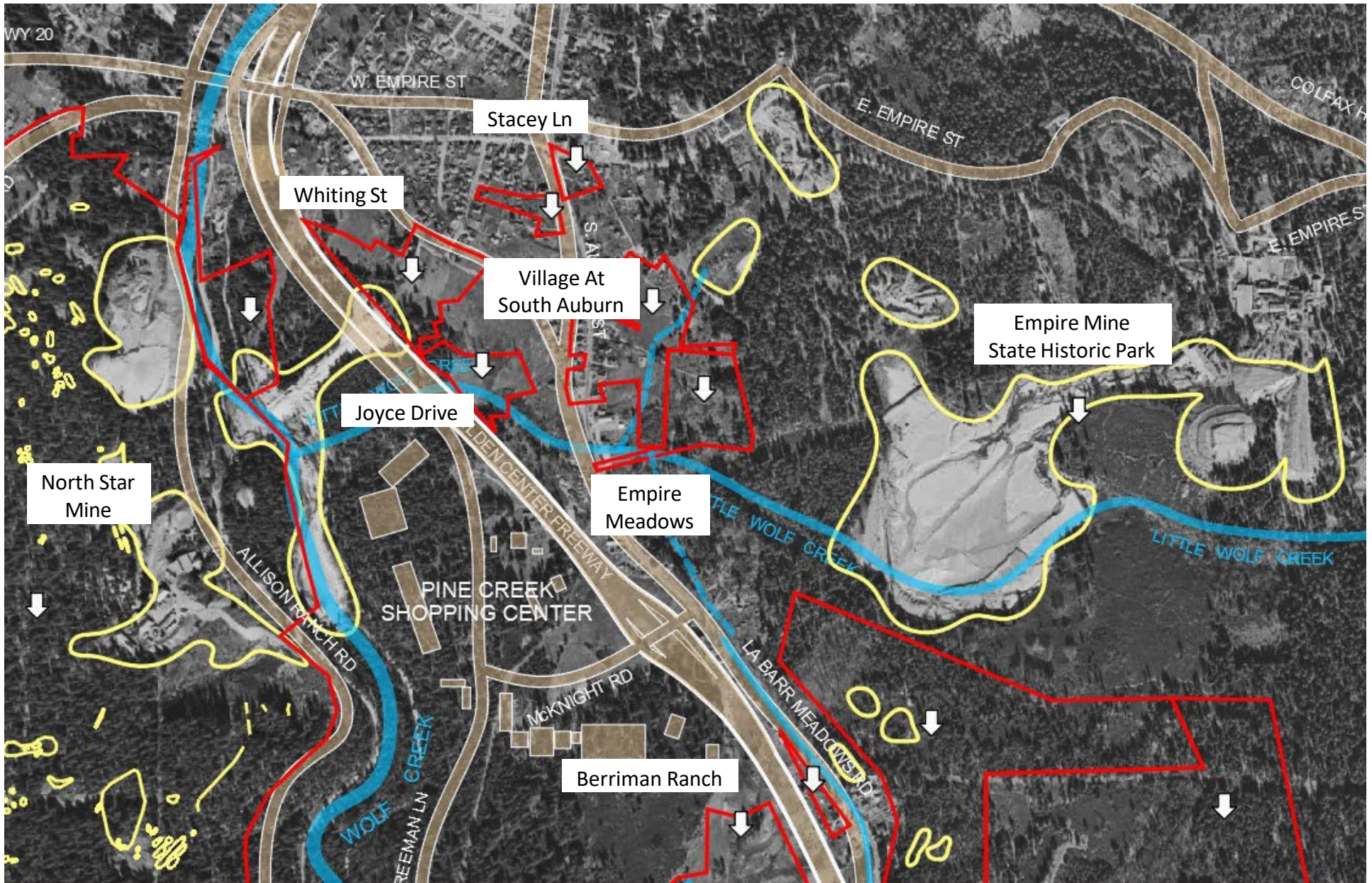
Grass Valley Climate Change and Brownfields

Historical Gold Mining

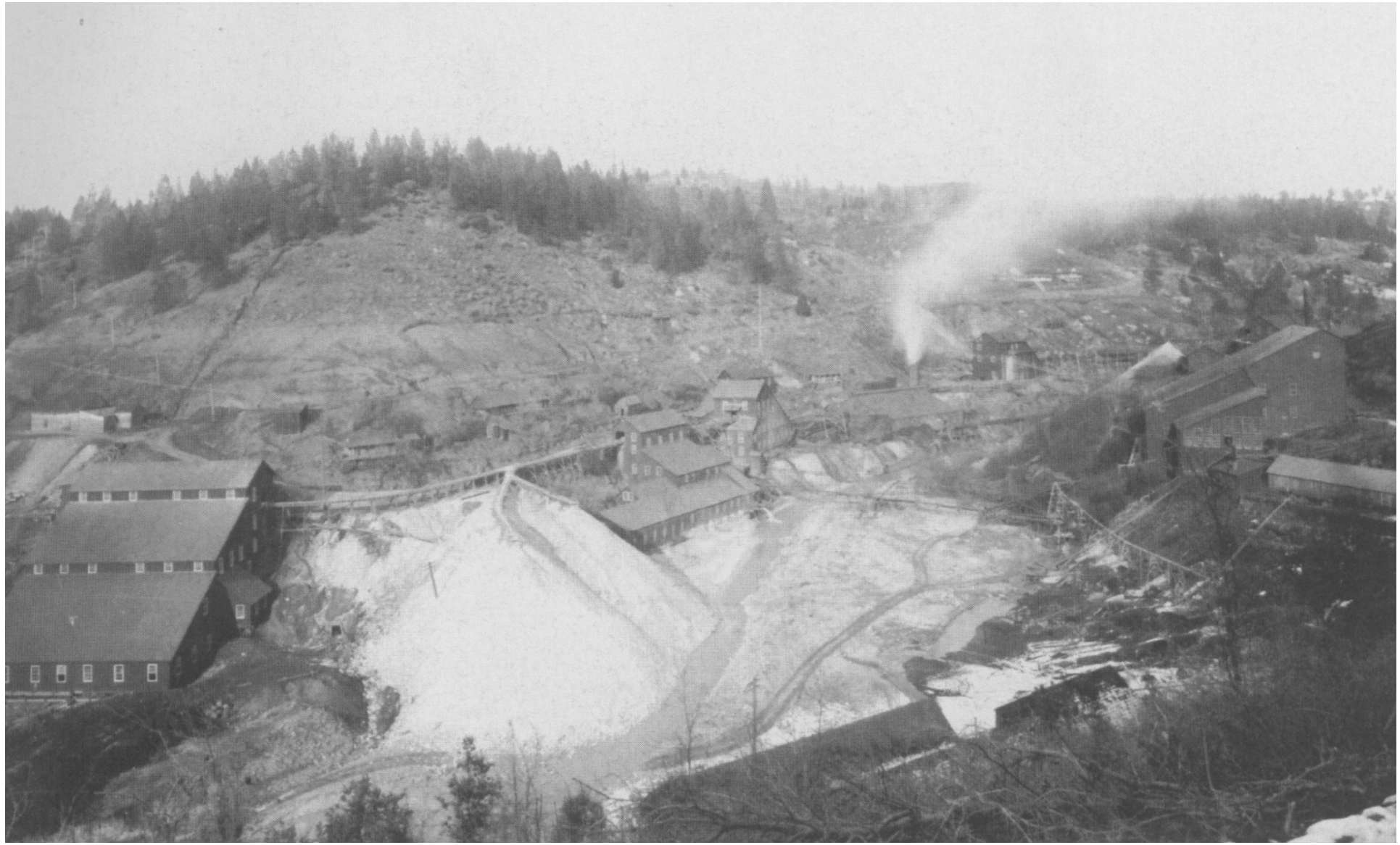


Grass Valley Climate Change and Brownfields

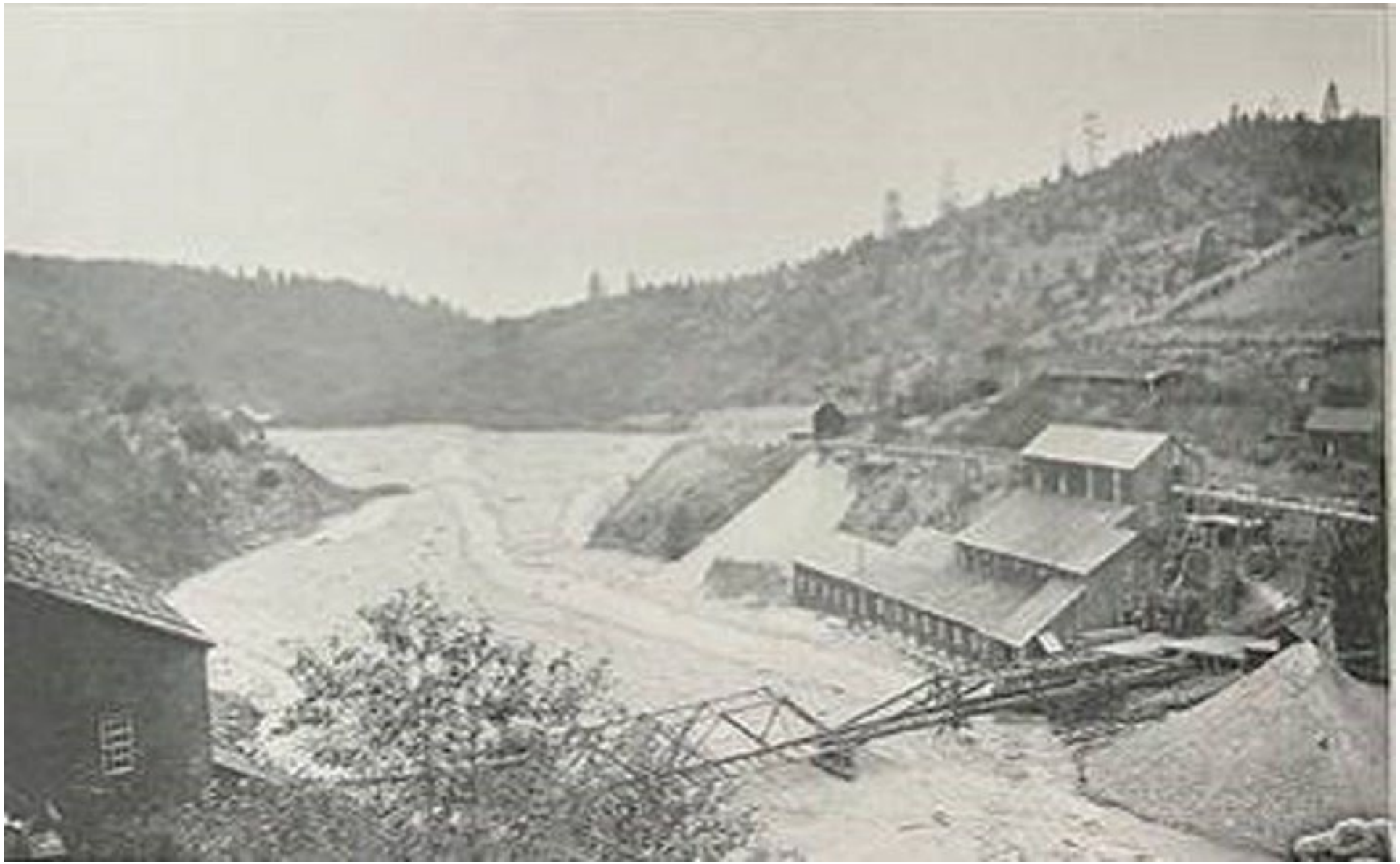
Historical Gold Mining



Grass Valley Climate Change and Brownfields
Historical Gold Mining



Grass Valley Climate Change and Brownfields
Historical Gold Mining



Grass Valley Climate Change and Brownfields
Historical Gold Mining

Grass Valley Climate Change and Brownfields
Site Assessment

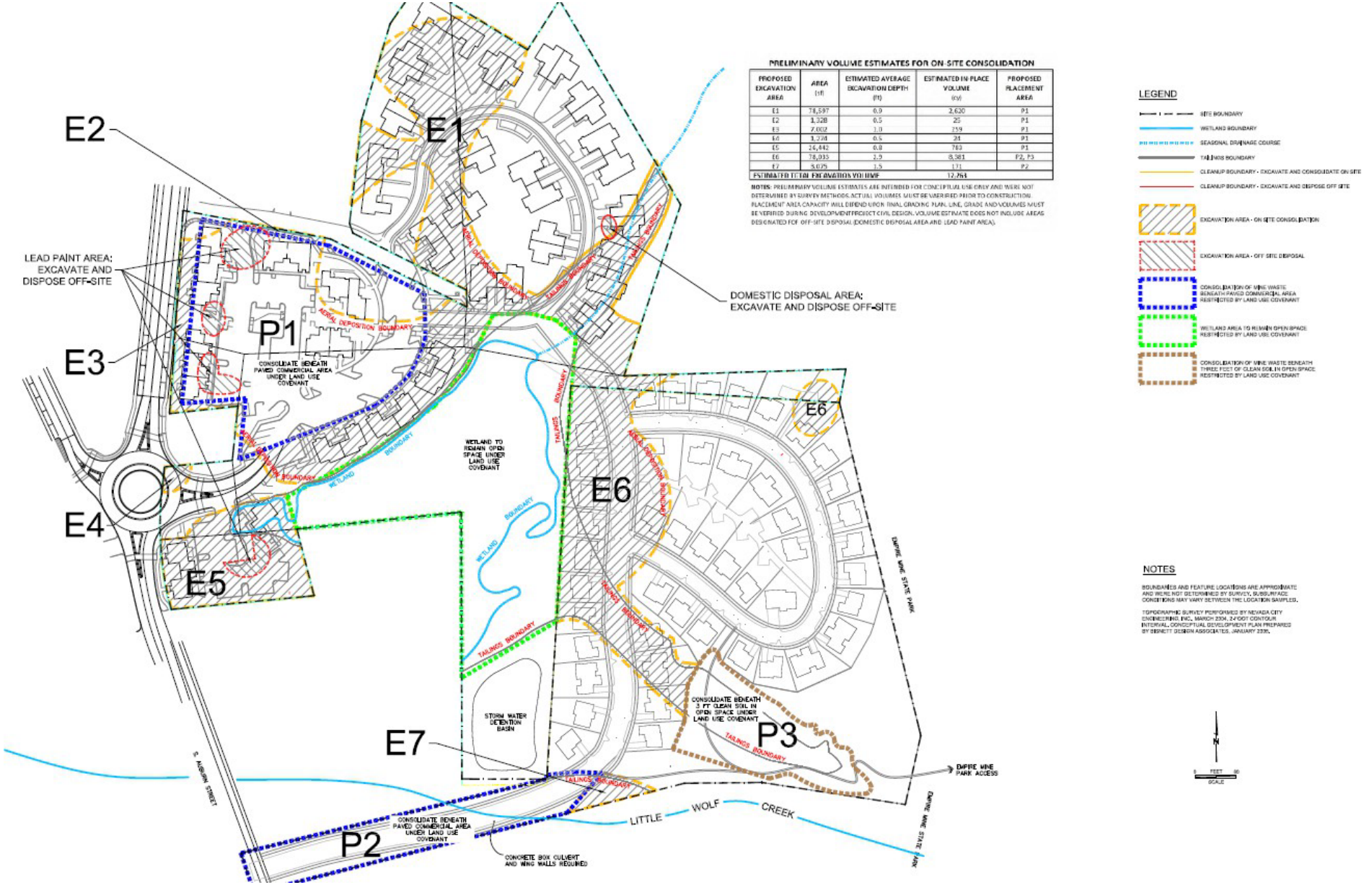
Grass Valley Climate Change and Brownfields
Site Assessment

Grass Valley Climate Change and Brownfields
Site Assessment

Grass Valley Climate Change and Brownfields
Site Assessment

Grass Valley Climate Change and Brownfields
Current Conditions – South Auburn Street

Grass Valley Climate Change and Brownfields
Conceptual Revitalization



PRELIMINARY VOLUME ESTIMATES FOR ON-SITE CONSOLIDATION

PROPOSED EXCAVATION AREA	AREA (sf)	ESTIMATED AVERAGE EXCAVATION DEPTH (ft)	ESTIMATED IN-PLACE VOLUME (cy)	PROPOSED PLACEMENT AREA
E1	78,597	0.9	2,620	P1
E2	1,328	0.5	25	P1
E3	7,002	1.0	259	P1
E4	1,224	0.6	24	P1
E5	24,442	0.8	783	P1
E6	78,033	2.9	8,381	P2, P3
E7	3,075	1.5	171	P2
ESTIMATED TOTAL EXCAVATION VOLUME			12,264	

NOTES: PRELIMINARY VOLUME ESTIMATES ARE INTENDED FOR CONCEPTUAL USE ONLY AND WERE NOT DETERMINED BY SURVEY METHODS. ACTUAL VOLUMES MUST BE VERIFIED PRIOR TO CONSTRUCTION. PLACEMENT AREA CAPACITY WILL DEPEND UPON FINAL GRADING PLAN, LINE, GRADE AND VOLUMES MUST BE VERIFIED DURING DEVELOPMENT/PROJECT CIVIL DESIGN. VOLUME ESTIMATE DOES NOT INCLUDE AREAS DESIGNATED FOR OFF-SITE DISPOSAL (DOMESTIC DISPOSAL AREA AND LEAD PAINT AREA).

LEGEND

- SITE BOUNDARY
- WETLAND BOUNDARY
- SEASONAL DRAINAGE COURSE
- TAILINGS BOUNDARY
- CLEANUP BOUNDARY - EXCAVATE AND CONSOLIDATE ON SITE
- CLEANUP BOUNDARY - EXCAVATE AND DISPOSE OFF SITE
- EXCAVATION AREA - ON SITE CONSOLIDATION
- EXCAVATION AREA - OFF SITE DISPOSAL
- CONSOLIDATION OF MINE WASTE BENEATH PAVED COMMERCIAL AREA RESTRICTED BY LAND USE COVENANT
- WETLAND AREA TO REMAIN OPEN SPACE RESTRICTED BY LAND USE COVENANT
- CONSOLIDATION OF MINE WASTE BENEATH THREE FOOT OF CLEAN SOIL IN OPEN SPACE RESTRICTED BY LAND USE COVENANT

NOTES

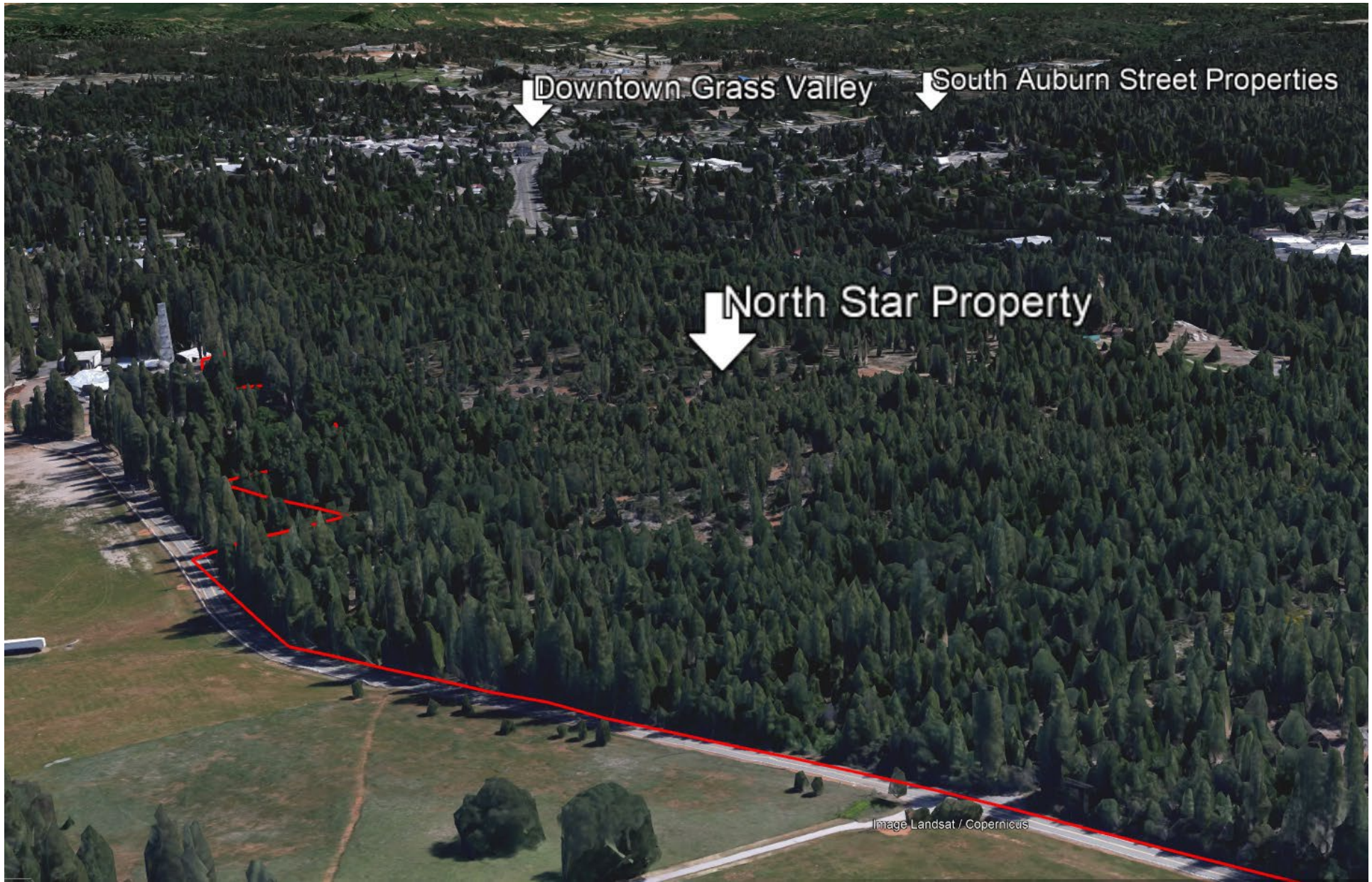
BOUNDARIES AND FEATURE LOCATIONS ARE APPROXIMATE AND WERE NOT DETERMINED BY SURVEY. SUBSURFACE CONDITIONS MAY VARY BETWEEN THE LOCATION SAMPLED.

TOPOGRAPHIC SURVEY PERFORMED BY NEVADA CITY ENGINEERING INC., MARCH 2004. 2-FOOT CONTOUR INTERVAL. CONCEPTUAL DEVELOPMENT PLAN PREPARED BY BENNETT DESIGN ASSOCIATES, JANUARY 2006.

N

0 FEET 80
SCALE

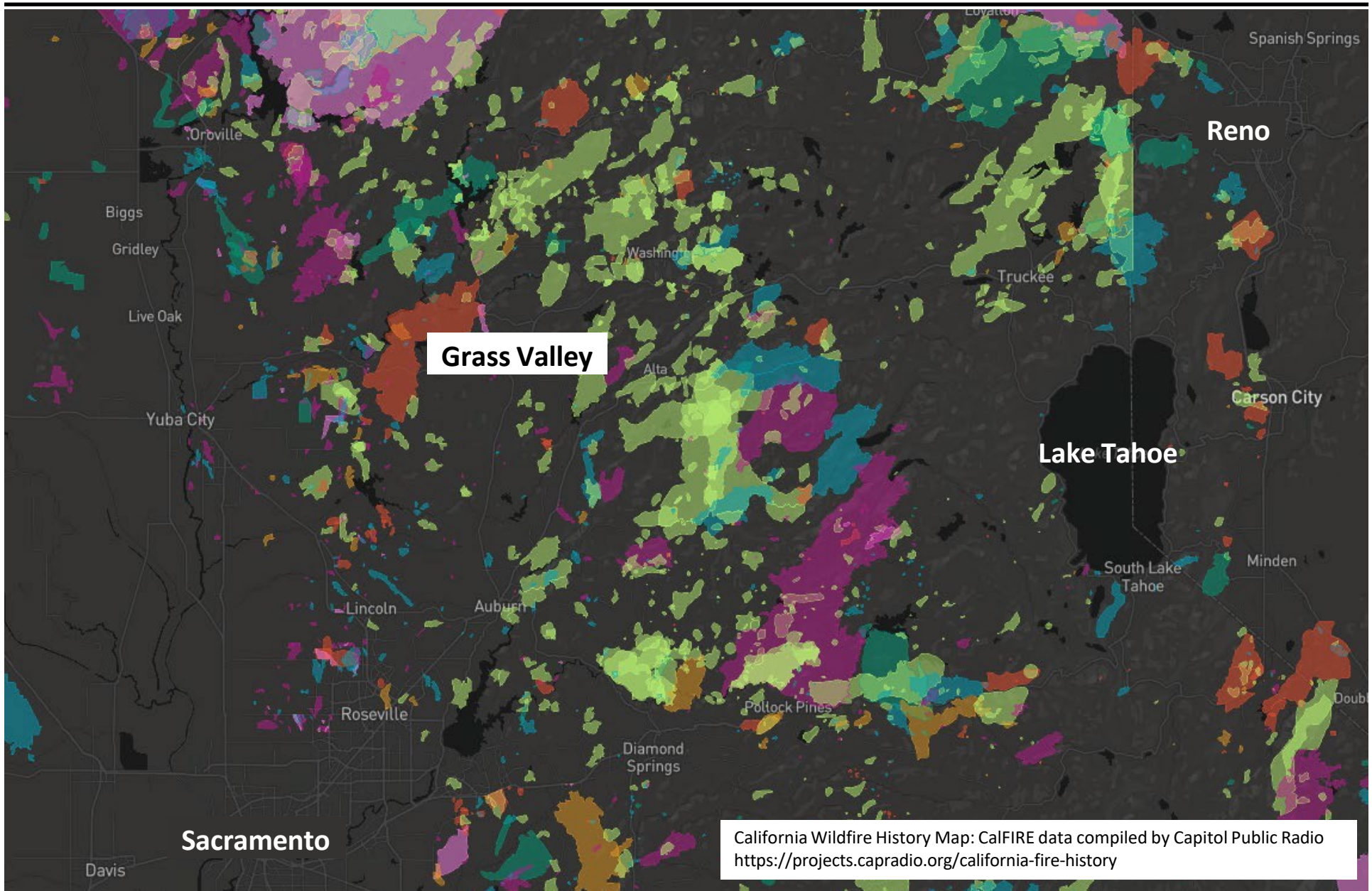
Grass Valley Climate Change and Brownfields
Current Conditions – North Star Mine



Grass Valley Climate Change and Brownfields
Conceptual Revitalization

Grass Valley Climate Change and Brownfields

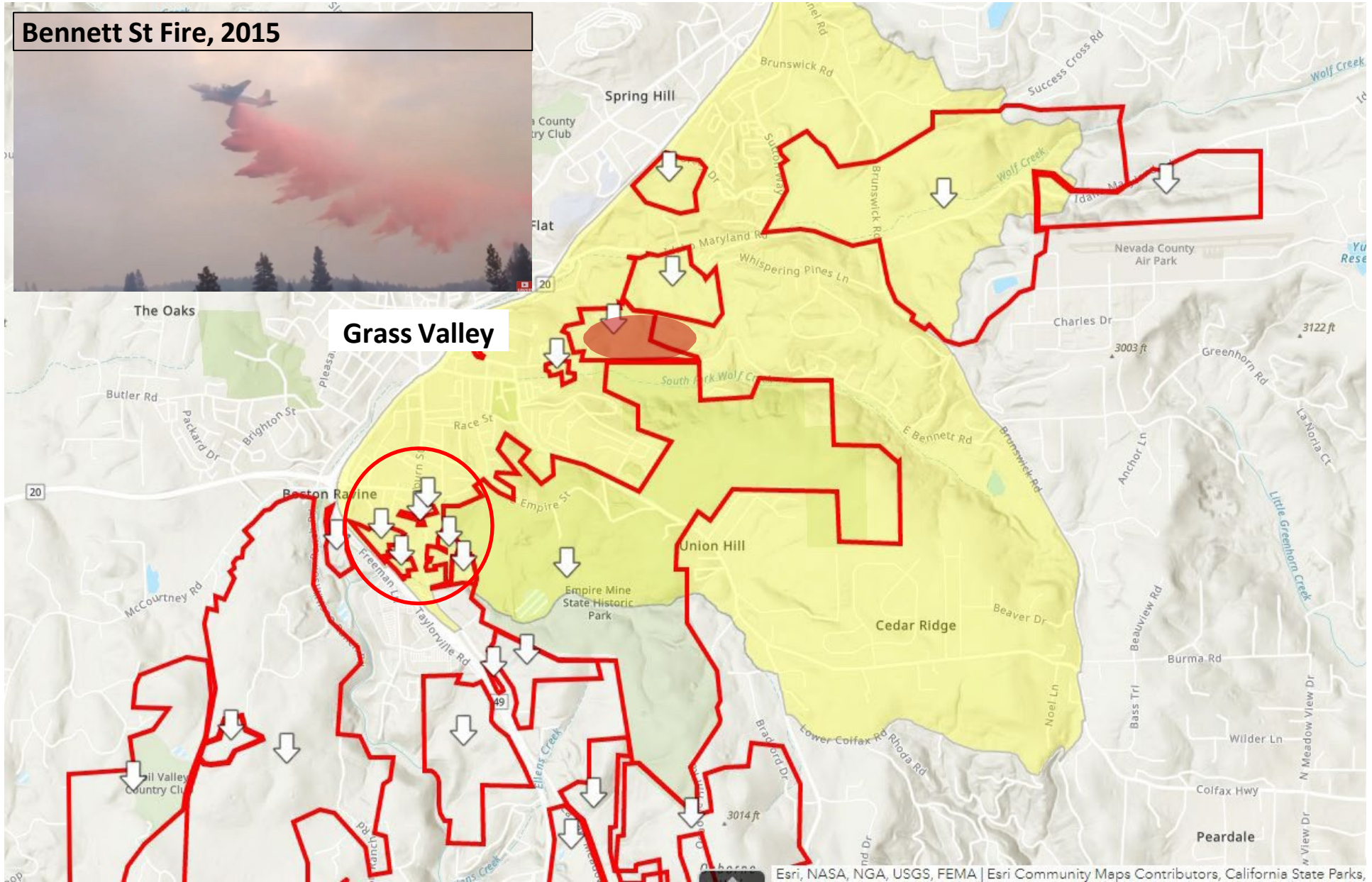
Regional Wildfire History



California Wildfire History Map: CalFIRE data compiled by Capitol Public Radio
https://projects.capradio.org/california-fire-history

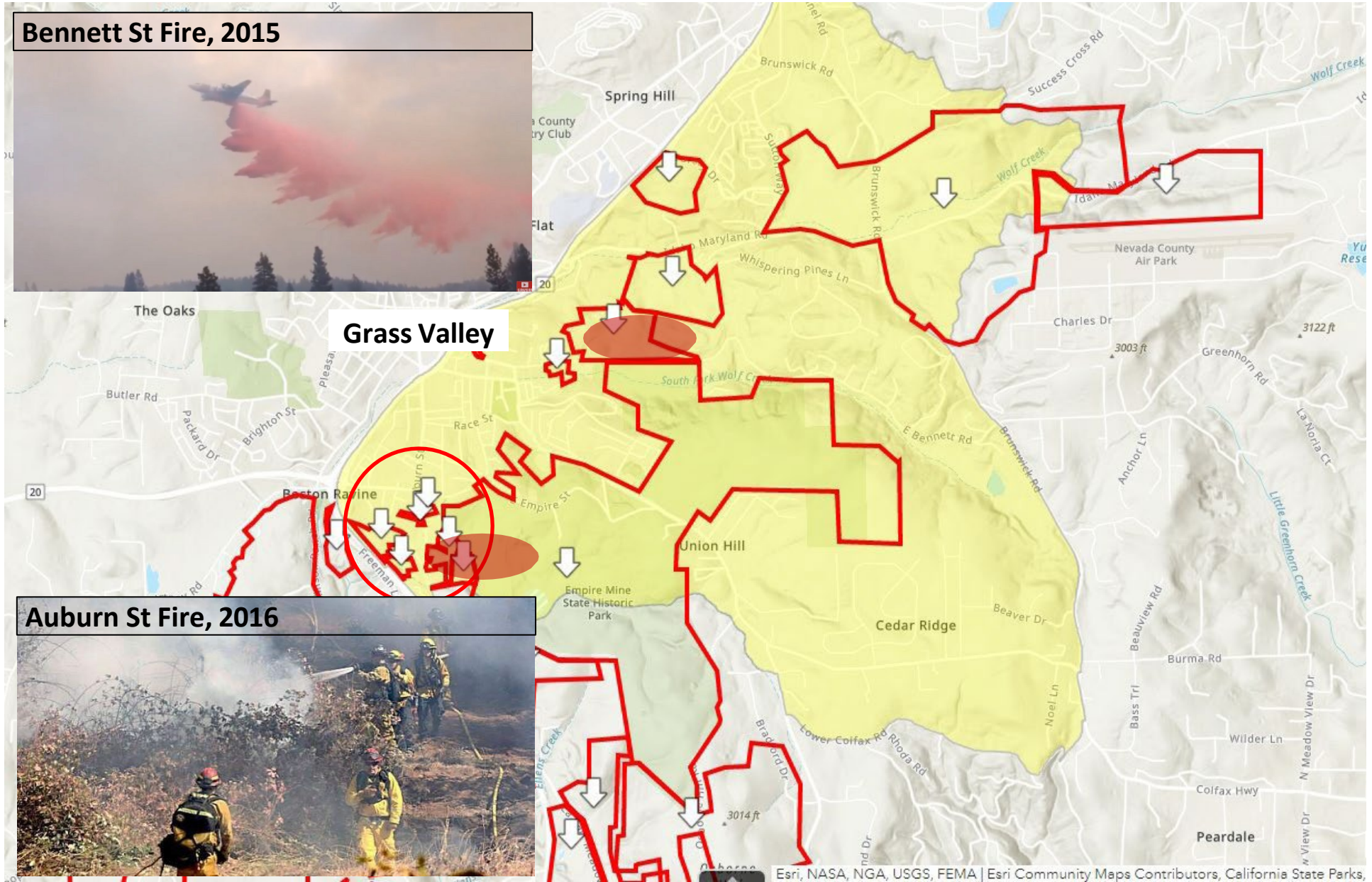
Grass Valley Climate Change and Brownfields

Recent Local Wildfires



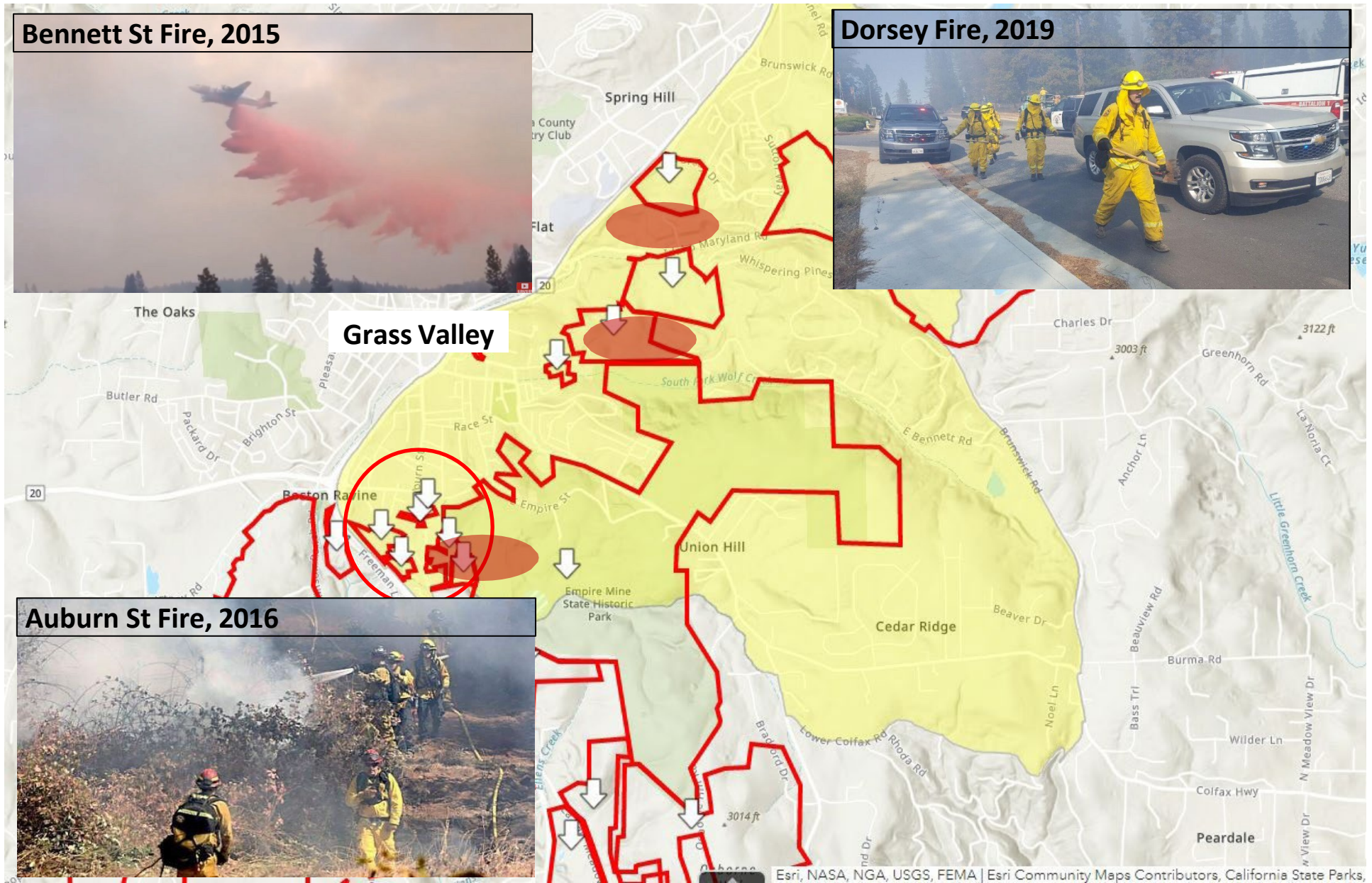
Grass Valley Climate Change and Brownfields

Recent Local Wildfires



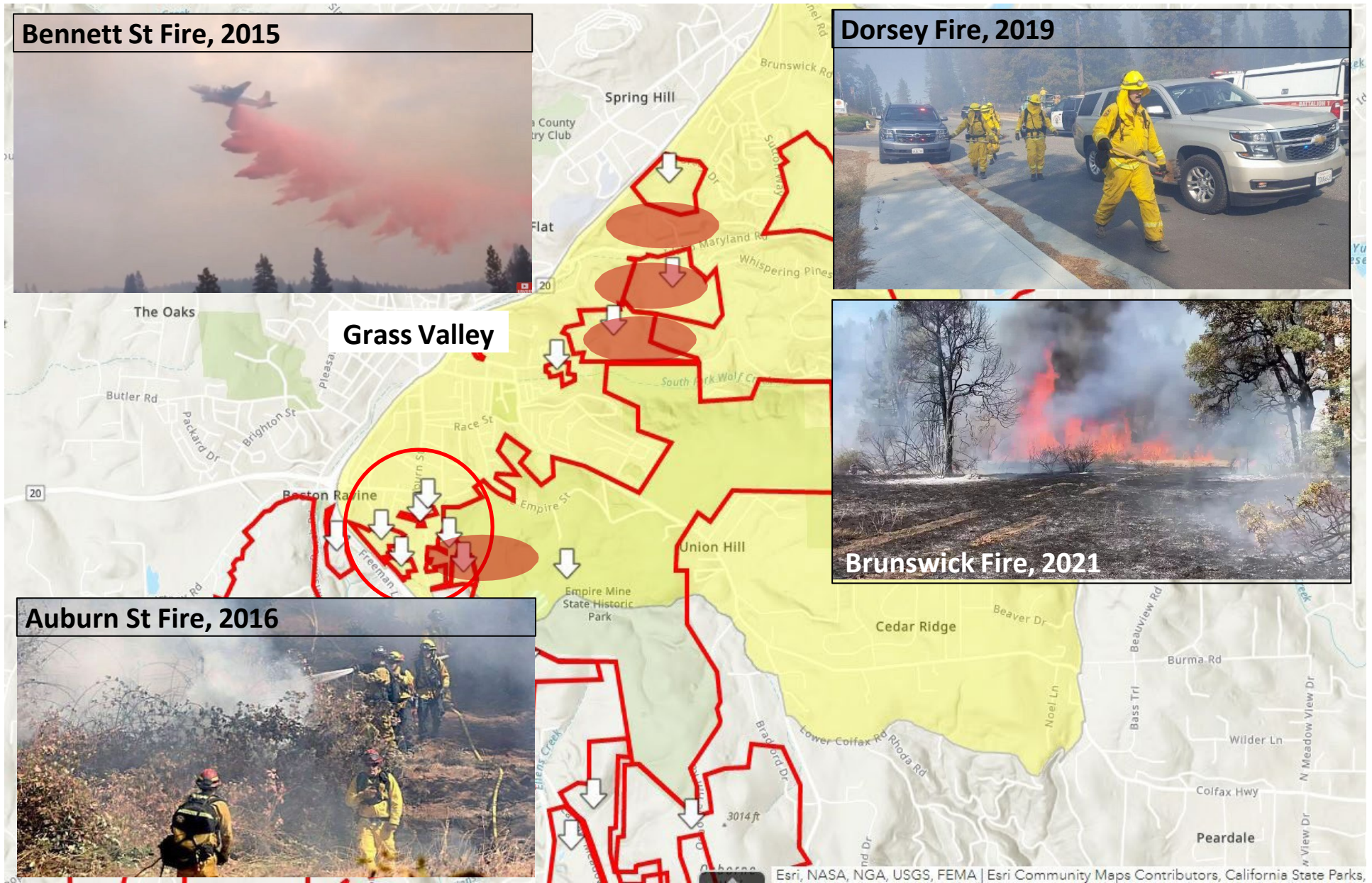
Grass Valley Climate Change and Brownfields

Recent Local Wildfires



Grass Valley Climate Change and Brownfields

Recent Local Wildfires



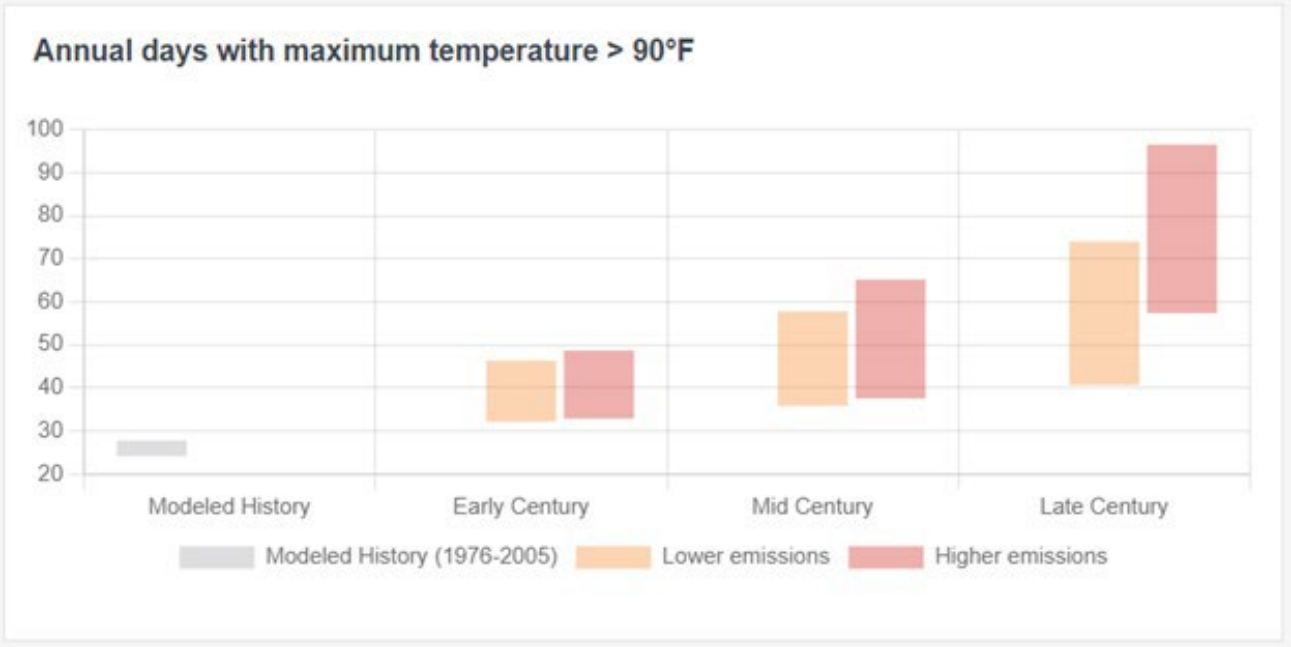
Grass Valley Climate Change and Brownfields

Recent Local Wildfires

Grass Valley Climate Change and Brownfields

Climate Change

- Dry Summers: we typically have 250 days without rain. No significant changes are predicted for rainfall distribution.
- Hotter Temperatures: Historically, temperatures exceeded 90°F only 20 to 28 days per year. By the late century, models that assume higher GHG emissions predict that 90°F will be exceeded 60 to 95 days per year.



Climate Mapping for Resilience Applications (CMRA)

Cleaning up mine-scarred land:

- Reduces toxic exposures,
- Facilitates redevelopment including affordable housing, parks, commercial development, and renewable (solar) energy, and
- Reduces wildfire risk by promoting land reuse and stewardship.

In our densely forested community, brownfield cleanup and wildfire mitigation go hand-in-hand.

With housing shortages and climate change, the need for both is increasing.

Grass Valley Climate Change and Brownfields
For More Information

Amy Kesler-Wolfson, City of Grass Valley
530-274-4711, awolfson@cityofgrassvalley.com

Jason Muir, PE, GE, Geocon
530-913-5996, muir@geoconinc.com

FUNDED BY THE
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

EPA BROWNFIELDS GRANT #98T42301

Example Wildfire Adaptation Strategies

- Reduce hazardous fuels at the site by:
  - Thinning out existing vegetation around structures at the site
  - Replacing highly flammable vegetation with lower growing, less flammable species, and
  - Establishing regular maintenance of vegetation.
- Use non-combustible materials for both construction and landscape design, especially within the 5-foot perimeter surrounding structures.
- Ensure there is sufficient spacing between flammable structures (including trees).
- Use features such as retaining walls, paths, open areas, and fencing to reduce the vulnerability of the site.
- Use wire mesh to cover vents or other openings into structures that embers could get into.

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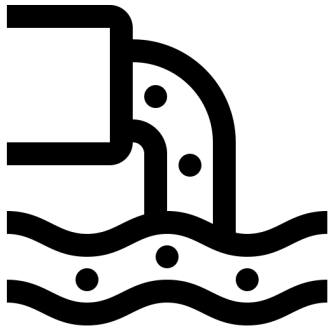
Exercise

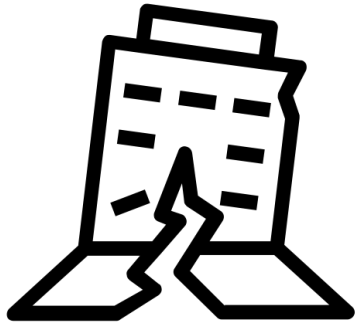
Develop a list of strategies to reduce wildfire risk through brownfield redevelopment.

Sea Level Rise & Inland Flooding

Coastal & Inland Flooding Risks to Brownfield Sites

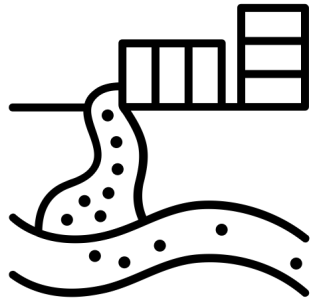


Impeded stormwater drainage



Damage to buildings

Damage to critical infrastructure



Spread debris and contaminants from site to community

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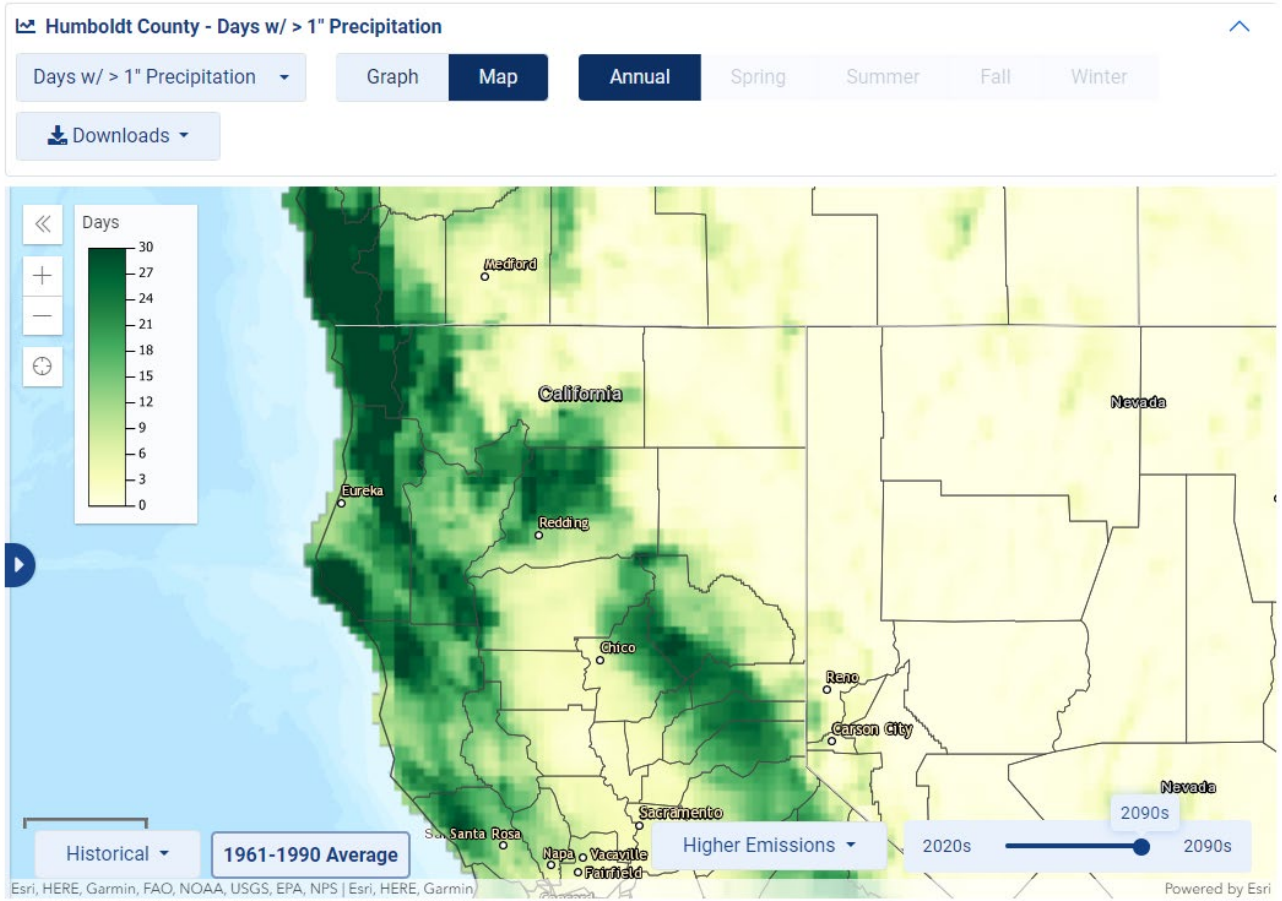
Increased Precipitation

- Extreme precipitation events are increasing in frequency and intensity due to climate change
- Precipitation patterns are also becoming more variable (e.g., longer dry periods between heavy rainfall events)
- Despite aridity in the region, extreme precipitation events and snowmelt conditions are increasing the risk of flooding



Projected Change in Number of Days Per Year with >1 inch of Precipitation through late century under a high emissions scenario

Source: Climate Explorer, https://crt-climate-explorer.nemac.org/

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Impervious Surfaces

Development of urban centers and infrastructure → Increased impervious surface area → Increased runoff and localized flood risk

Source: EPA 2022

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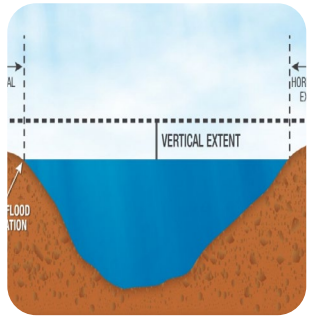
Inland Flooding: Understanding FEMA Resources and Guidance



Federal Flood Risk Management Standard

Flood Maps

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Federal Flood Risk Management Standard (FFRMS)

- Established under executive Order 11988, *Floodplain Management* (1977) to push federal agencies to manage current and future flood risks
  - Revoked then reinstated through EO 14030, *Climate-Related Financial Risk*

- Federally funded buildings and projects are required to use one of three approaches for project siting, design, and construction:

Climate Informed Science Approach (CISA)	Freeboard Value Approach (FVA)	500-Year Floodplain

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FEMA Flood Maps

The FEMA Flood Map Service Center is the official public source for flood hazard information.

The maps are flood insurance rate maps.

- Not forward looking; only reflect past flooding conditions.
- Helpful but not meant to provide complete picture of flood risk.
- Capture river and coastal flooding, not urban and flash flooding from short but high-intensity rainfall events.

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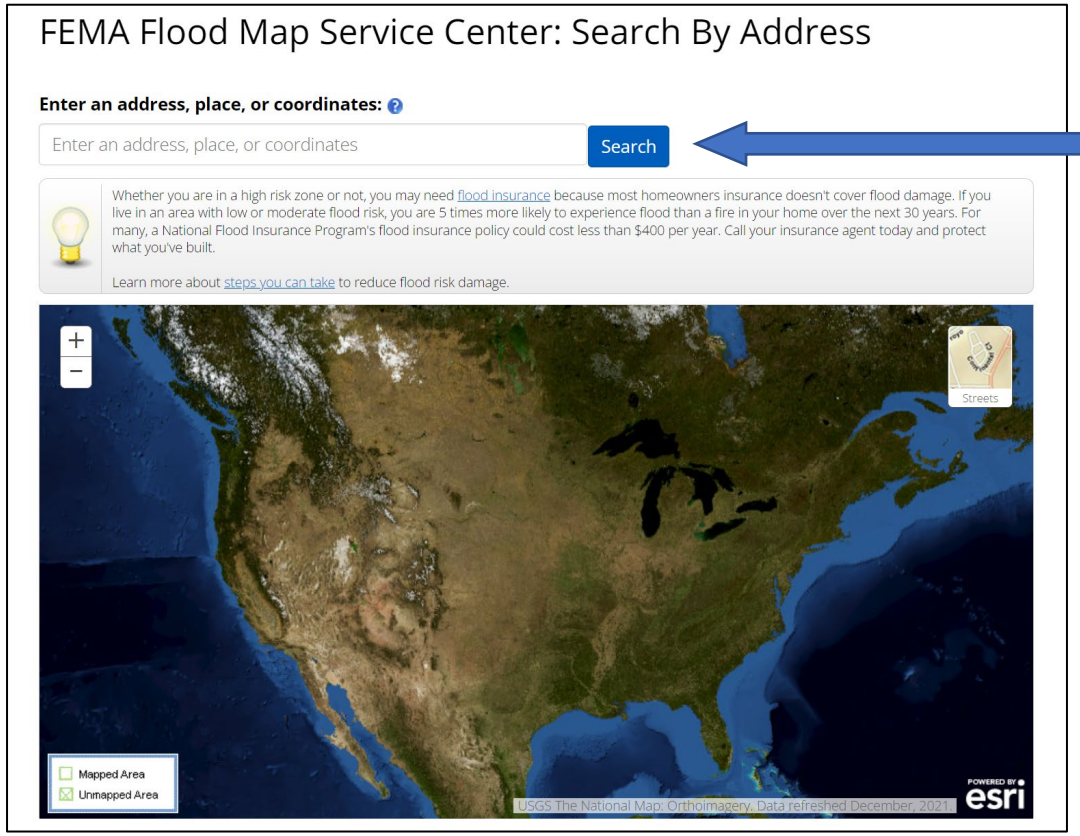
Accessing FEMA Flood Maps

1. Access maps through [Address Search]



Enter an address, place, or coordinates, and press search

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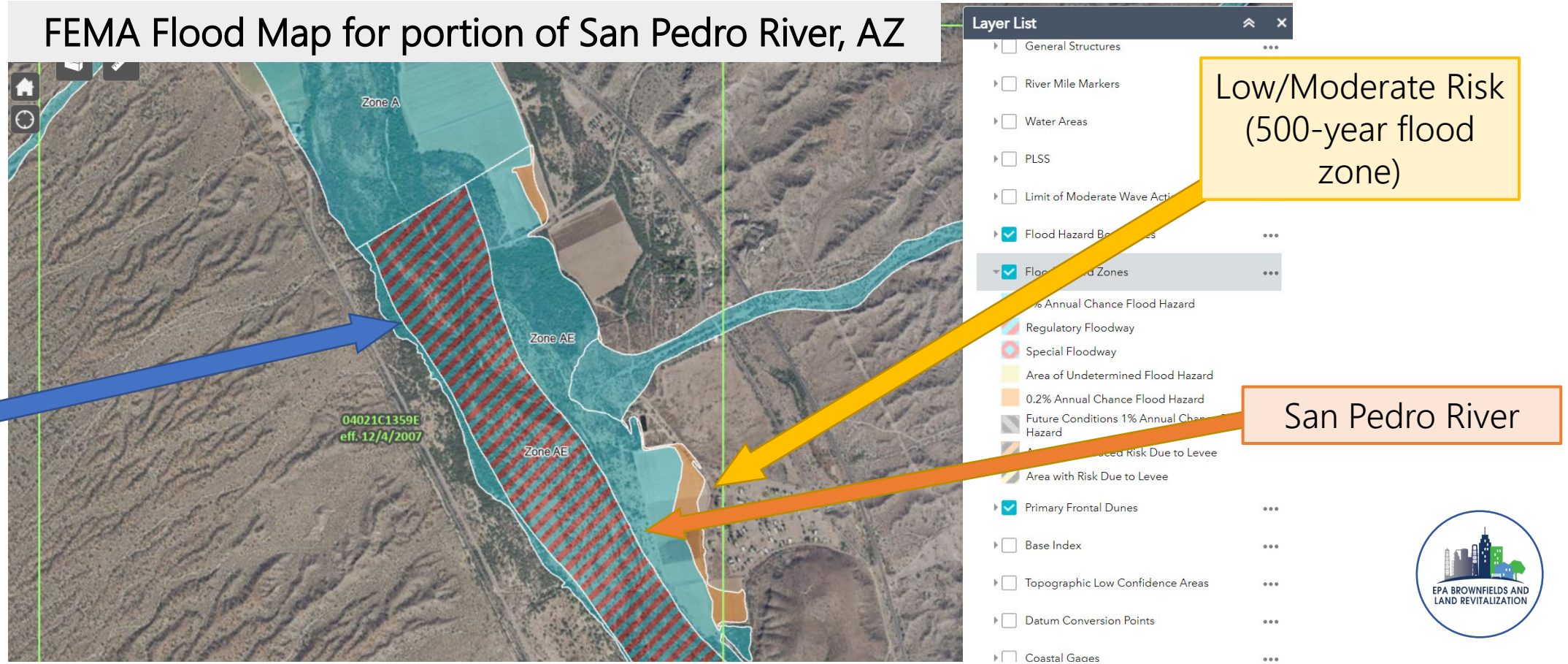
Accessing FEMA Flood Maps

2 Flood maps can be viewed in the National Flood Hazard Layer (NFHL) Viewer, where the user can view, download, and print current flood hazard data in an ArcGIS map.

FEMA Flood Map for portion of San Pedro River, AZ



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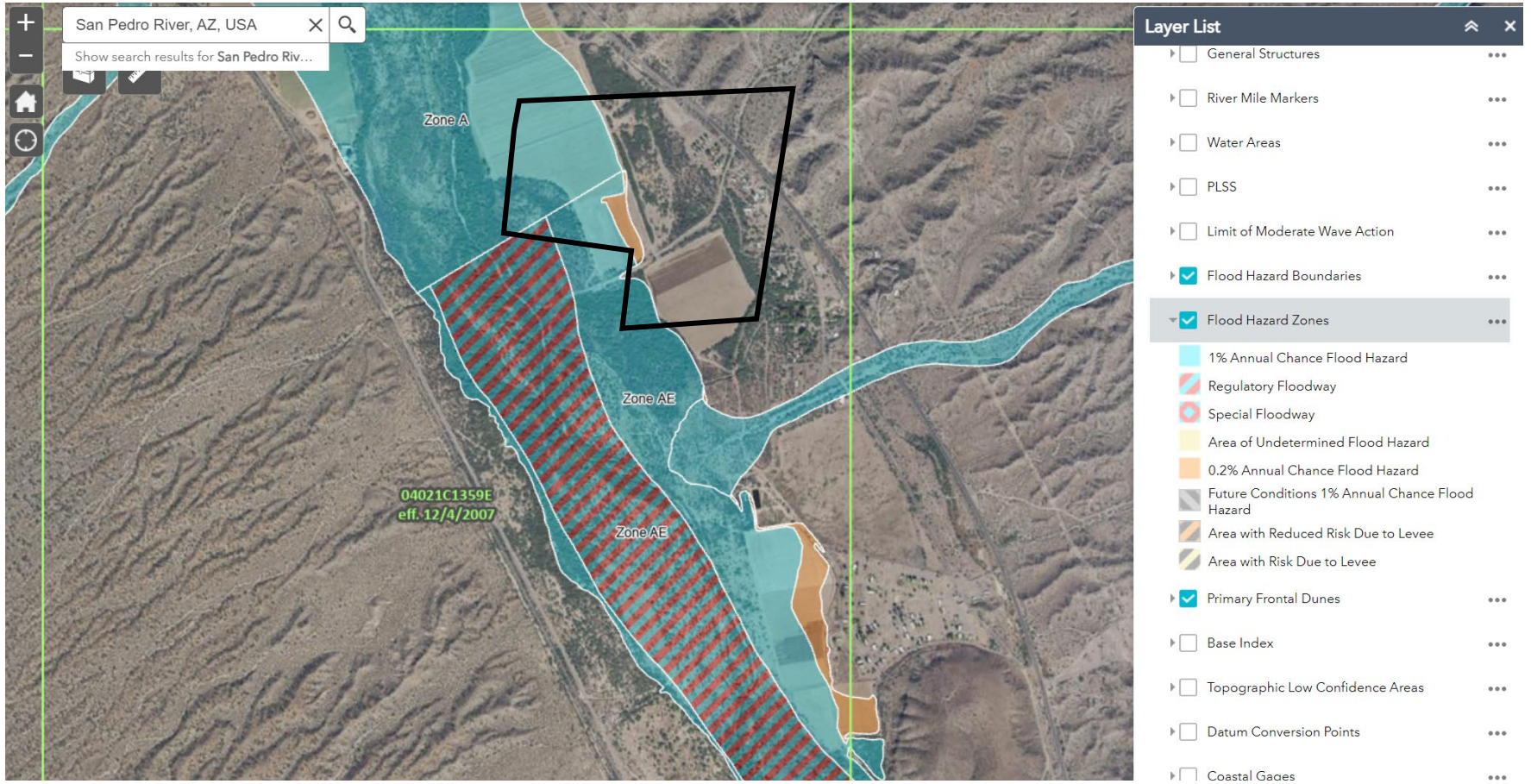
Accessing FEMA Flood Maps

3 Users can overlay the brownfield site and the FEMA flood hazard maps in GIS to see if the site is in the 100- or 500-year floodplain



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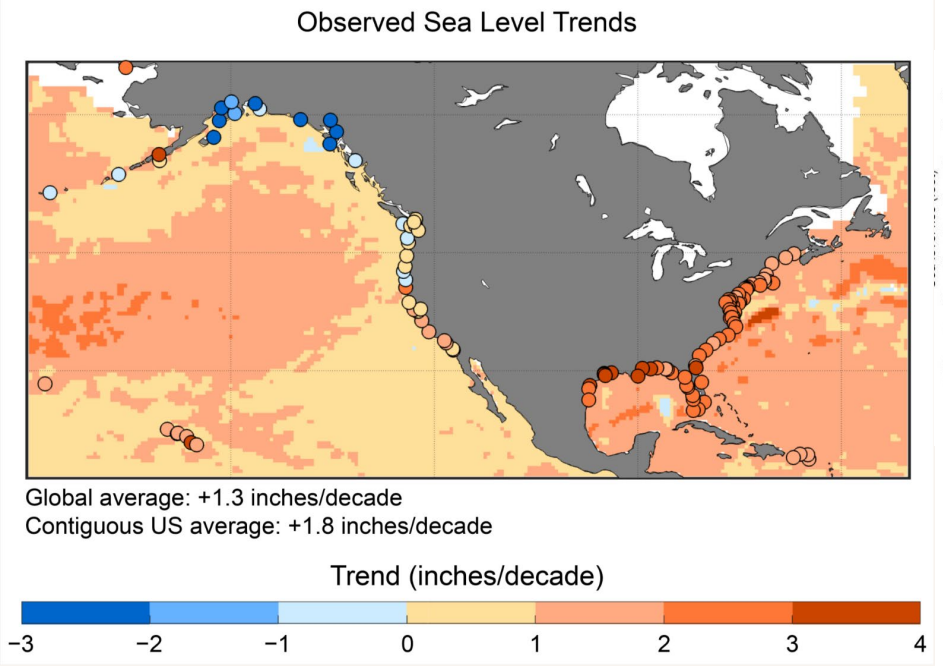
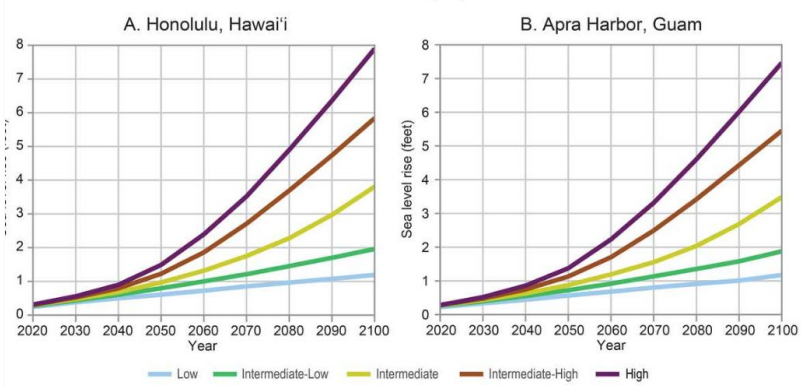
Climate Impacts: Sea Level Rise

- Average rates of sea level rise have intensified since 1992
- Sea level rise is projected to accelerate throughout the century
- Sea level rise can damage coastal infrastructure and cause saltwater intrusion



Observed Trends in Sea Level Rise Per Decade since 1993
Source: USGCRP 2023



Sea Level Rise Projections for Hawai'i and Guam
Source: USGCRP 2023

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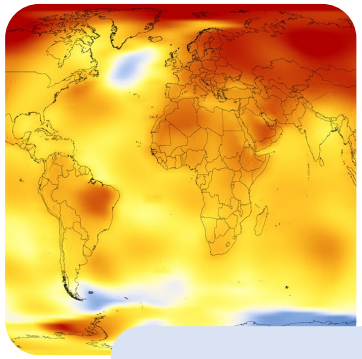
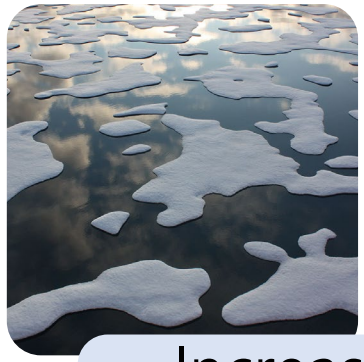
Sea Level Rise Process

Increased global greenhouse gas emissions



Warmer atmospheric temperatures



Increased polar ice melt and thermal expansion

Regional subsidence/ uplift

Global Sea Level Rise

Regional Sea Level Rise

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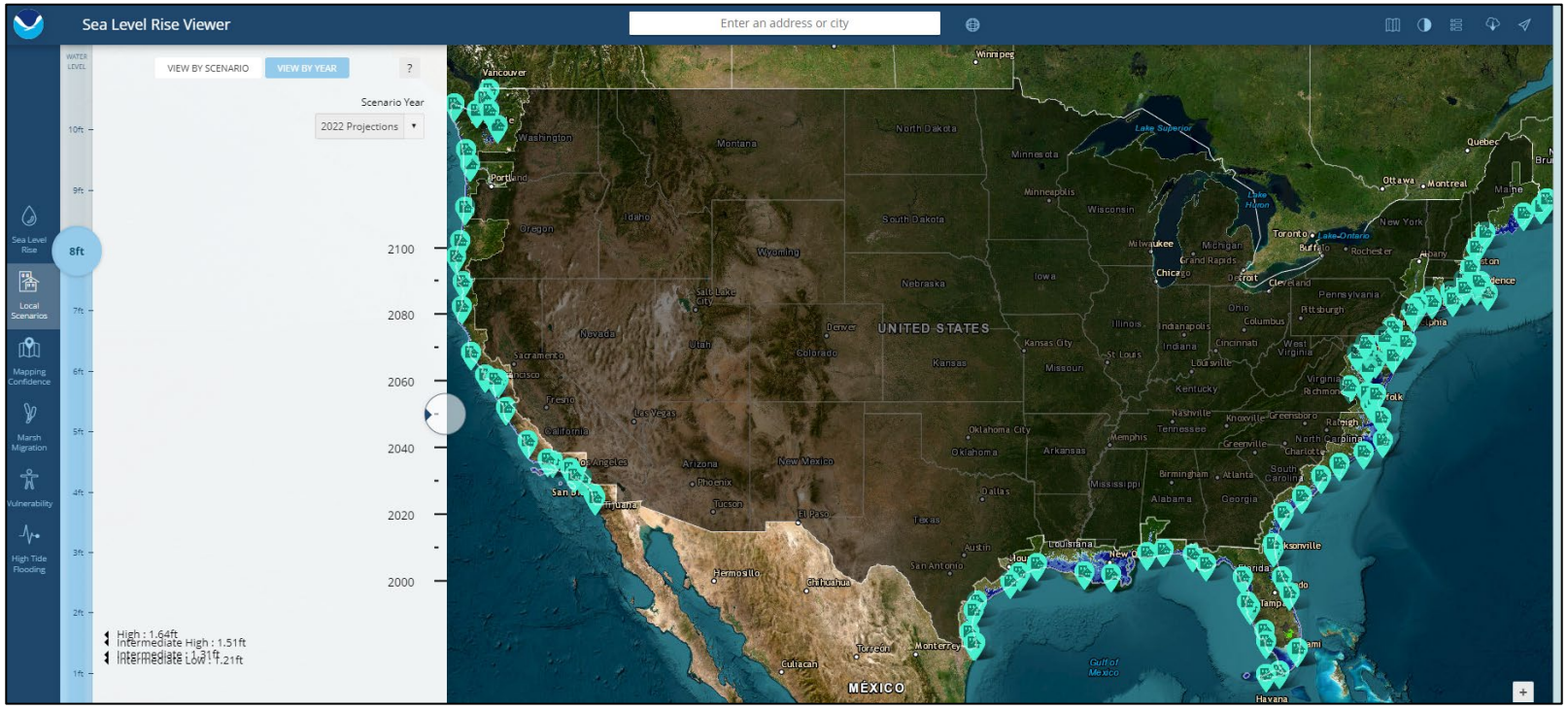
NOAA Sea Level Rise Viewer

Web mapping tool that shows community-level impacts from coastal flooding or sea level rise, with a Local Scenarios option that allows users to see SLR projections at specific future years.

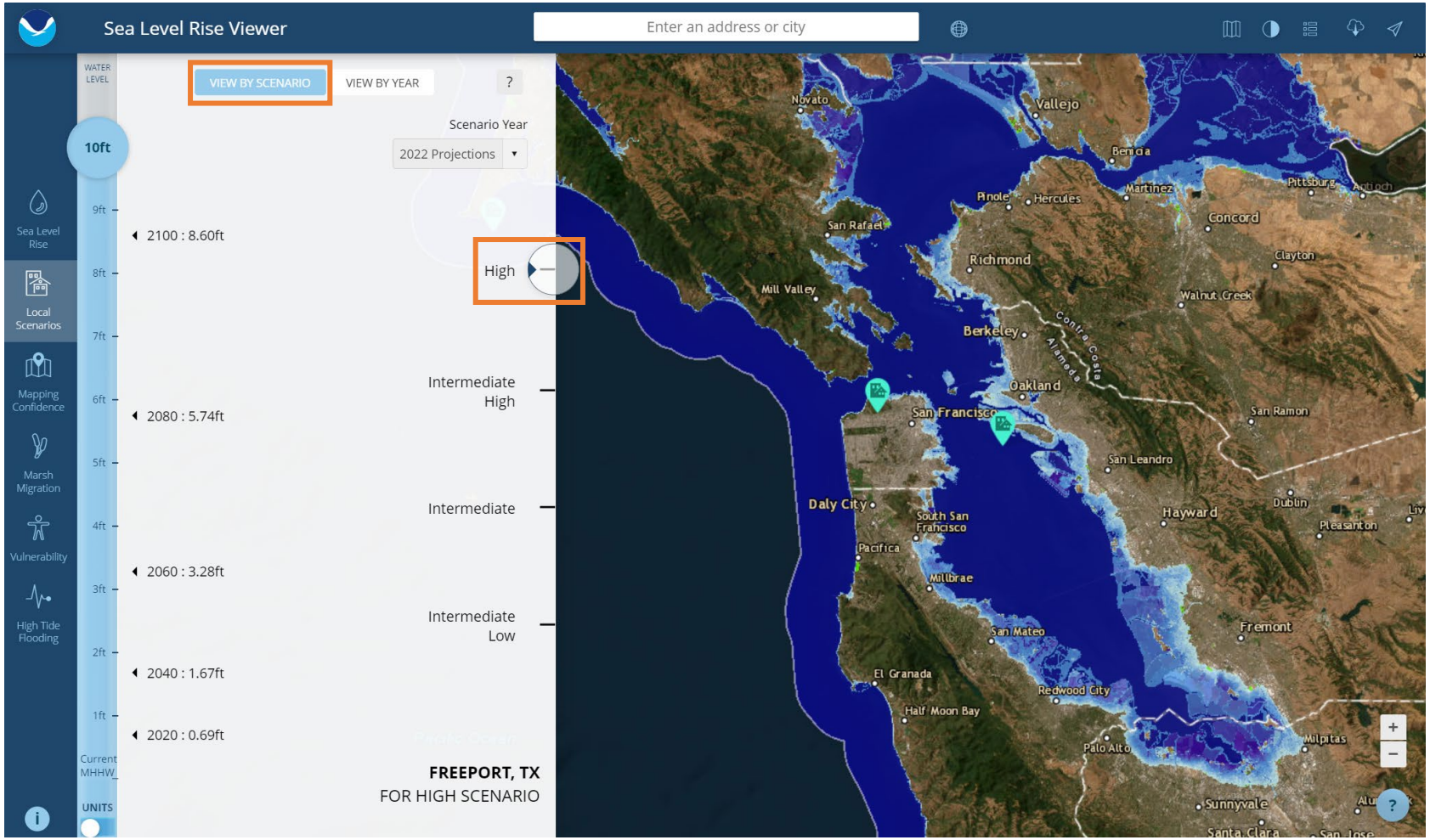
1. Access maps through address search bar or zoom in to area of interest



NOAA Sea Level Rise Viewer

2

Users can view relative sea level rise for different scenarios or years.



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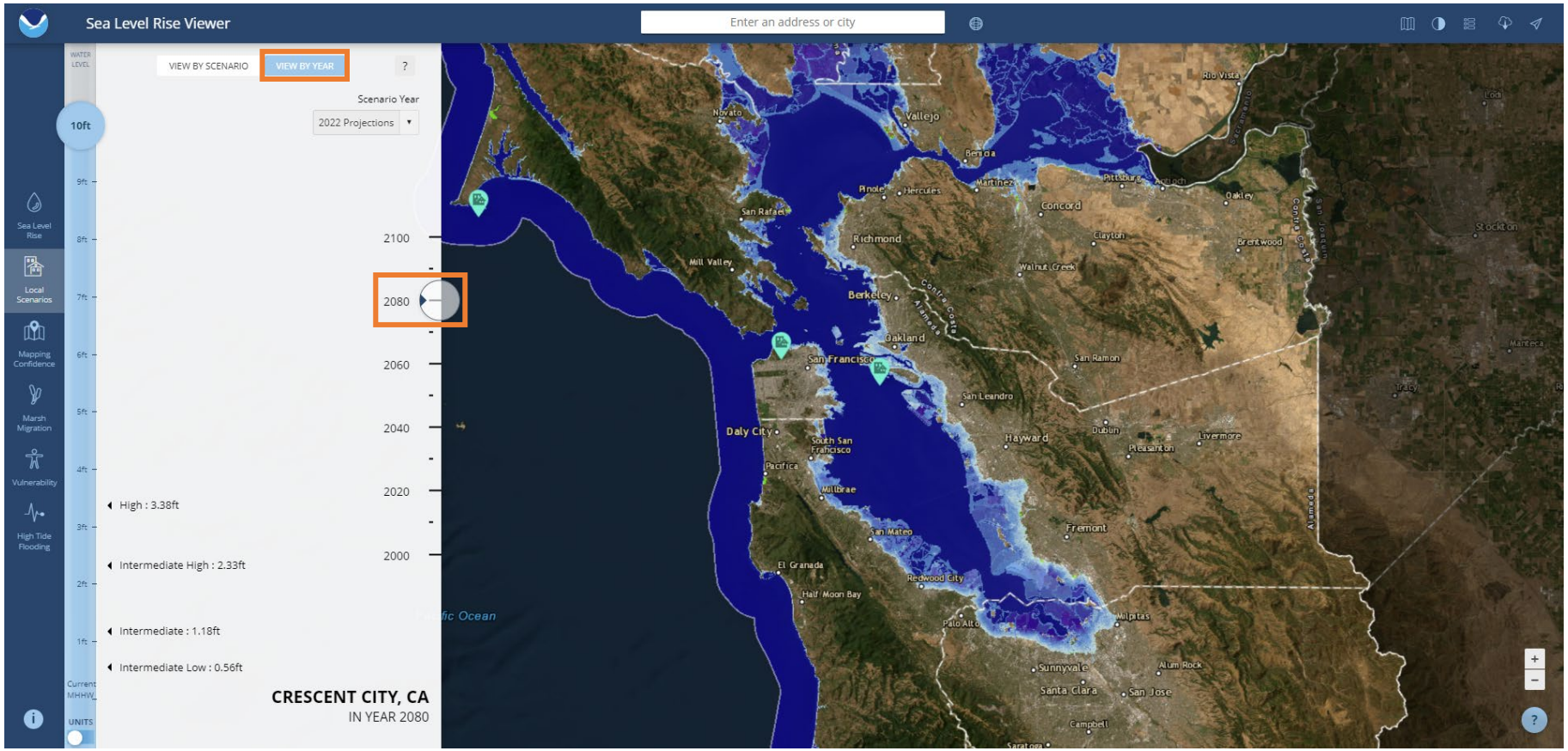
NOAA Sea Level Rise Viewer

2

Users can view relative sea level rise for different scenarios or years.



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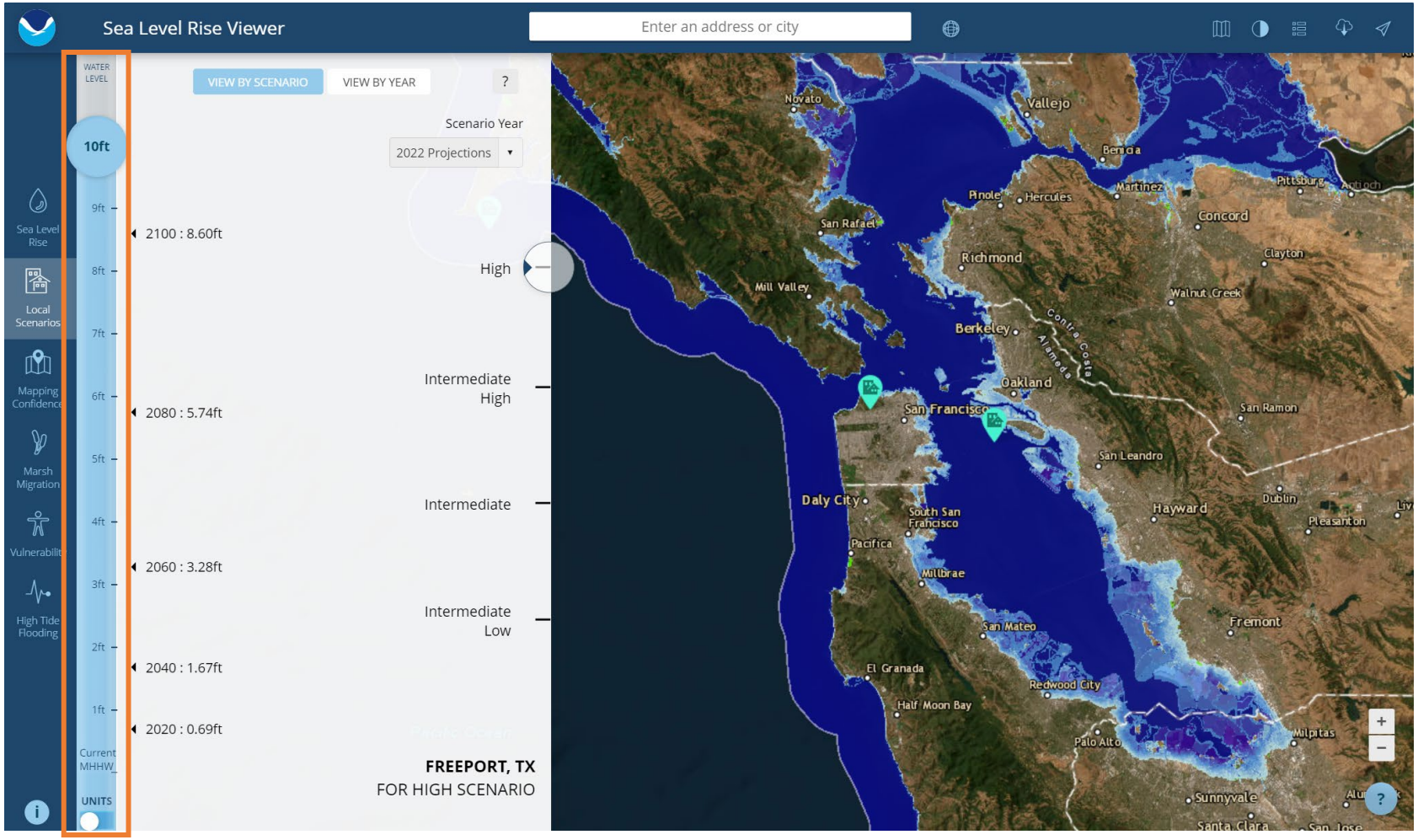
NOAA Sea Level Rise Viewer

3

Slide the water level bar to visualize the different sea level rise amounts



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900 INNES & INDIA BASIN SHORELINE PARK

San Francisco, California

THE TRUST FOR PUBLIC LAND

SF Parks Alliance

APRI San Francisco

SAN FRANCISCO RECREATION & PARKS

Site Location – San Francisco, California

IBSP + 900 Innes = India Basin Waterfront Park

- **OVERALL CLEANUP APPROACH/GOALS**
- Compatible with park/public use
- Remedy provides a high level of health protection
- Remove surface soil (on land) and sediments (in water) across entire site
- Replace surface with clean fill material
- Backfill prevents exposure to underlying native soil

REMEDIATION

REMEDIATION SCOPE

- Demolition of abandoned structures
- Removal of contaminated soil & sediments to depths defined by investigations
- Backfill to eliminate potential exposure pathways / thin 6” offshore cap to facilitate benthic recovery
- Abate Cottage in preparation for restoration to SOI standards

REMEDIATION SCHEDULE

- 9 months

REMEDIATION BUDGET

- $7,099,700

EPA GRANTS

- Brownfields Parcels 1 and 2
- Brownfields Parcels 3A and 3B
- SFBWQIF

900 Innes Pre-remediation

Example Strategies to Reduce Flood Impacts Through Brownfield Redevelopment

- Use nature-based solutions to increase flood water storage capacity (e.g., widen natural flood plains, protect and expand wetlands, restore streambank vegetation).
- Strengthen shorelines by installing structures to stabilize sediment and prevent erosion.
  - Can use plants, sand, or rock to create a "living shoreline" and stabilize the shoreline naturally
- Relocate sites and/or elevate structures out of floodplains.
- Install floodable parks, a type of sustainable urban drainage system which control flood levels.

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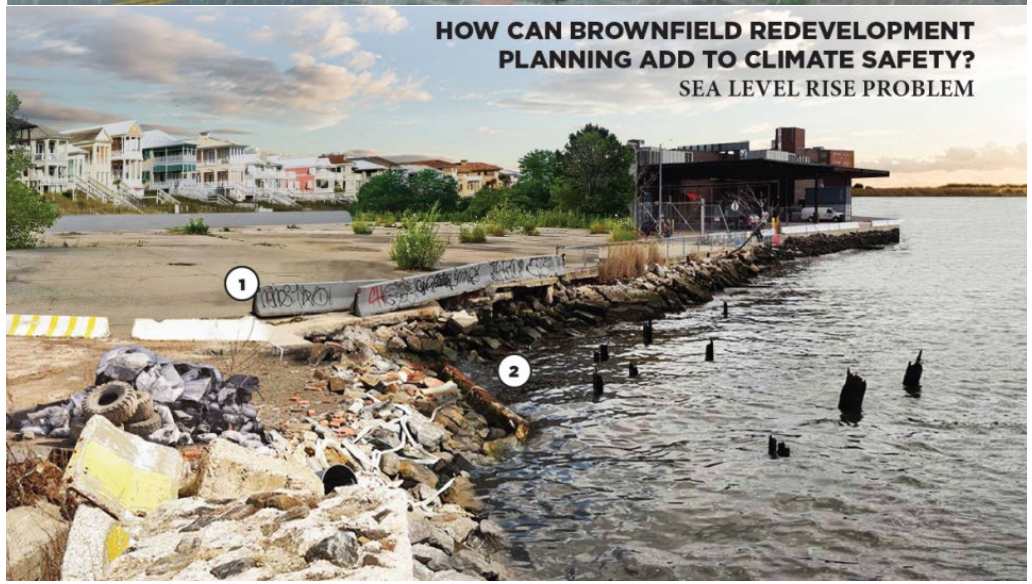
Exercise



Develop a list of strategies to reduce inland & coastal flooding through brownfield redevelopment.

EPA BROWNFIELDS AND LAND REVITALIZATION


HOW CAN BROWNFIELD REDEVELOPMENT
PLANNING ADD TO CLIMATE SAFETY?
FLOODING SOLUTION
ICE CREAM
1
2
3


HOW CAN BROWNFIELD REDEVELOPMENT
PLANNING ADD TO CLIMATE SAFETY?
SEA LEVEL RISE SOLUTION
1
2
3

Resources and Needs

Reflections and Closing Remarks

Poll questions:

- What are you going to take away from this training?
- What adaptation strategies are you most excited to implement?
- What topics would you like to see future trainings on?

www.menti.com
Code: 3661 6677

Q&A

Put your questions in the chat!

EPA Redevelopment Resources

- Climate Smart Brownfields Manual
- 2021 Brownfields Federal Programs Guide
- Brownfield Revitalization in Climate-Vulnerable Areas
- Types of EPA Brownfield Grant Funding
- EPA Cleanup Technology Site
- Implementing Stormwater Infiltration Practices at Vacant Parcels and Brownfield Sites
- EPA Climate Adaptation Website
- EPA Smart Growth: Flood Resilience Checklist
- EPA Green Infrastructure Wizard (GIWIZ)
- Plan for Brownfields Redevelopment Success: Climate-Smart Brownfields Planning Factsheet
- EPA Re-Powering Training
- Re-Powering America's Land Initiative: Program Overview

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Where Can I Find More Information on Climate Risks?

Overarching:

- Fifth National Climate Assessment
- The Climate Explorer
- Climate Mapper
- Climate Mapping for Resilience and Adaptation (CMRA)

Environmental Justice:

- Climate & Economic Justice Screening Tool (CEJST)
- EPA EJ Screen
- EPA EnviroAtlas

Wildfire:

- Cal-Adapt
- Climate Mapper: Wildfire Danger
- FEMA National Risk Index: Wildfire Risk

Inland / Coastal Flooding:

- FEMA Flood Maps
- NOAA SLR Viewer
- NASA SLR Tools

Extreme Heat / Drought:

- Heat.gov
- U.S. Drought Monitor

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Hawai'i and Pacific Island Resources

Overarching:

- Fifth National Climate Assessment
- Climate Explorer
- Climate Mapping for Resilience and Adaptation (CMRA)

Environmental Justice:

- Climate & Economic Justice Screening Tool (CEJST)
- EPA EJ Screen
- EPA EnviroAtlas

Wildfire:

- Hawaii Statewide GIS Program Fire Risk Areas
- Hawai'i Wildfire Data
- The Pacific Fire Exchange

Inland/Coastal Flooding:

- State of Hawai'i Sea Level Rise Viewer
- American Samoa Sea Level Rise Viewer
- Hawaii Flood Hazard Assessment Tool

Extreme Heat/Drought:

- Heat.gov
- U.S. Drought Monitor

EPA BROWNFIELDS AND LAND REVITALIZATION

Thank you!

Questions? Please contact:

EPA Region 9

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Daniel Moher
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