

An aerial photograph of a mountainous landscape. In the foreground, a small, calm lake is nestled within a valley, surrounded by dense green forest. The surrounding hills and mountains are covered in a mix of green vegetation and brown, rocky terrain, suggesting a post-fire restoration project. The sky is blue with scattered white clouds. The text "November 2022" is centered in the upper part of the image.

November
2022

Post Fire-Restoration in Santa Clara Canyon

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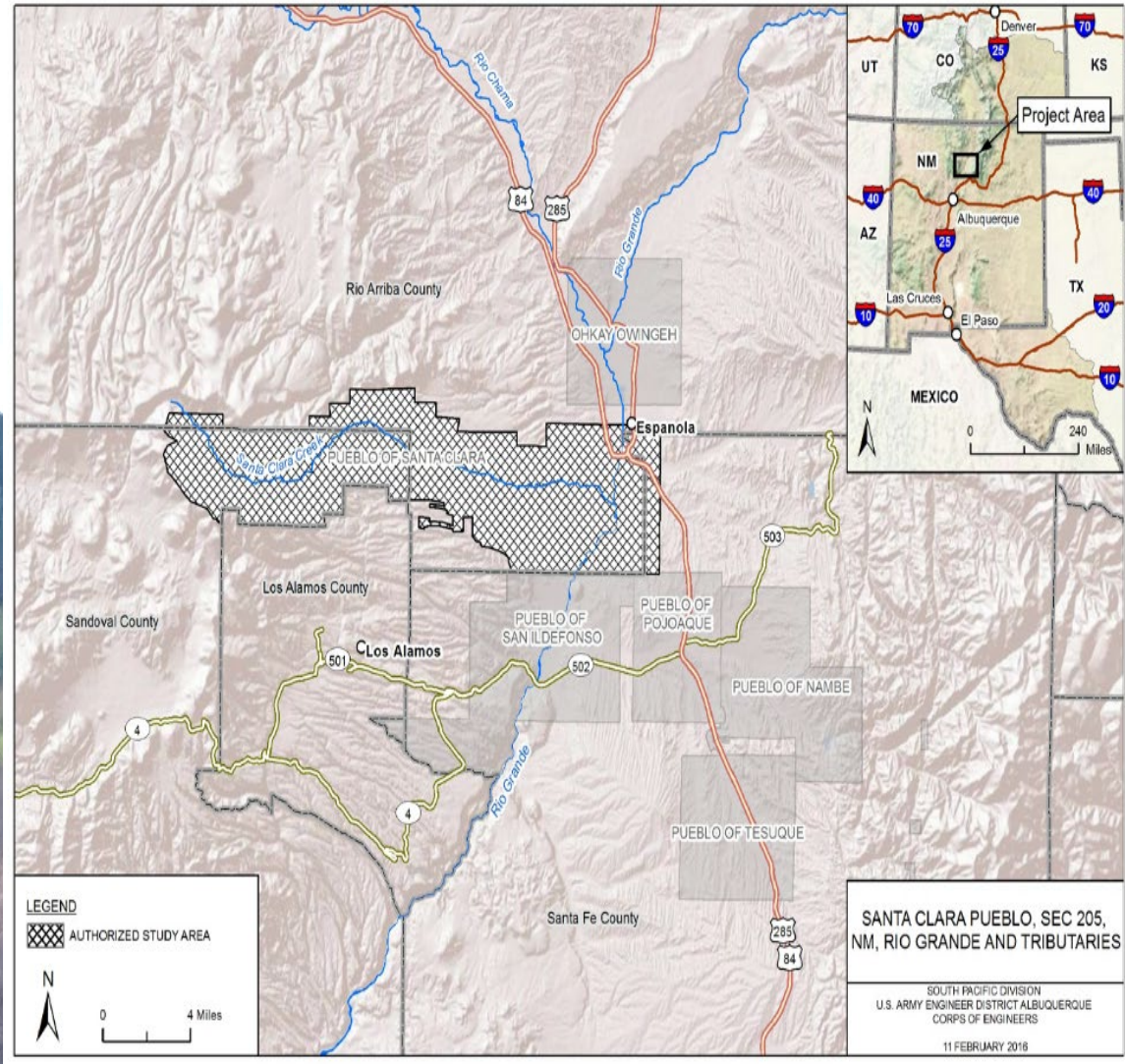
Overview: Santa Clara Pueblo

Federally recognized Native American Tribe

Located on the Rio Grande in Northern New Mexico

Population: 2,700

Area: 90 square miles



Water is life

Santa Clara Pueblo Watershed

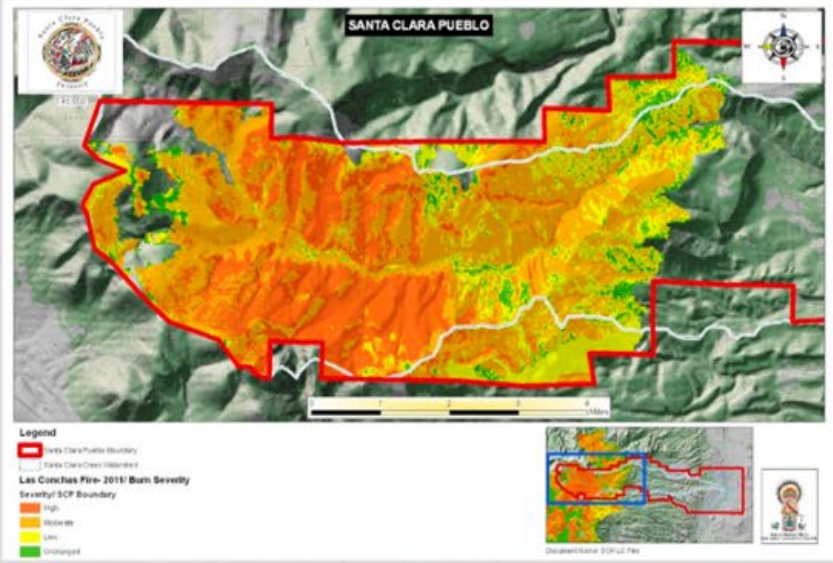
- 32,000 acre watershed
- Central to the Pueblo lands and culture
- 26-mile stream
- Flows perennially from west to east
- Headwaters at 9,000'
- Rio Grande Confluence 5,500'
- Elevation gradient traverses several bioclimatic zones



Natural Disasters

- Unfortunately, wildfires and floods can strike unexpectedly....
- Since 1998, three devastating wildfires have impacted Santa Clara Pueblo
- 90% of Tribal forests burned
- 60% moderate-to-high severity fire
- Resulted in hydrophobic (water repellent) soils
- Devastating erosion events.

More Frequent and Severe Fires
Over the past 20-years, three large wildfires have impacted more than 90% of Santa Clara forests. During the 2011 Las Conchas Fire, at the time the largest in New Mexico state history, 90% of tribal forest burned with roughly 50% of the Santa Clara Creek watershed burned by high intensity fire.



Burn severity map of Santa Clara lands impacted by the 2011 Las Conchas Fire.

Santa Clara Pueblo Boundary



Oso_Fire_1998



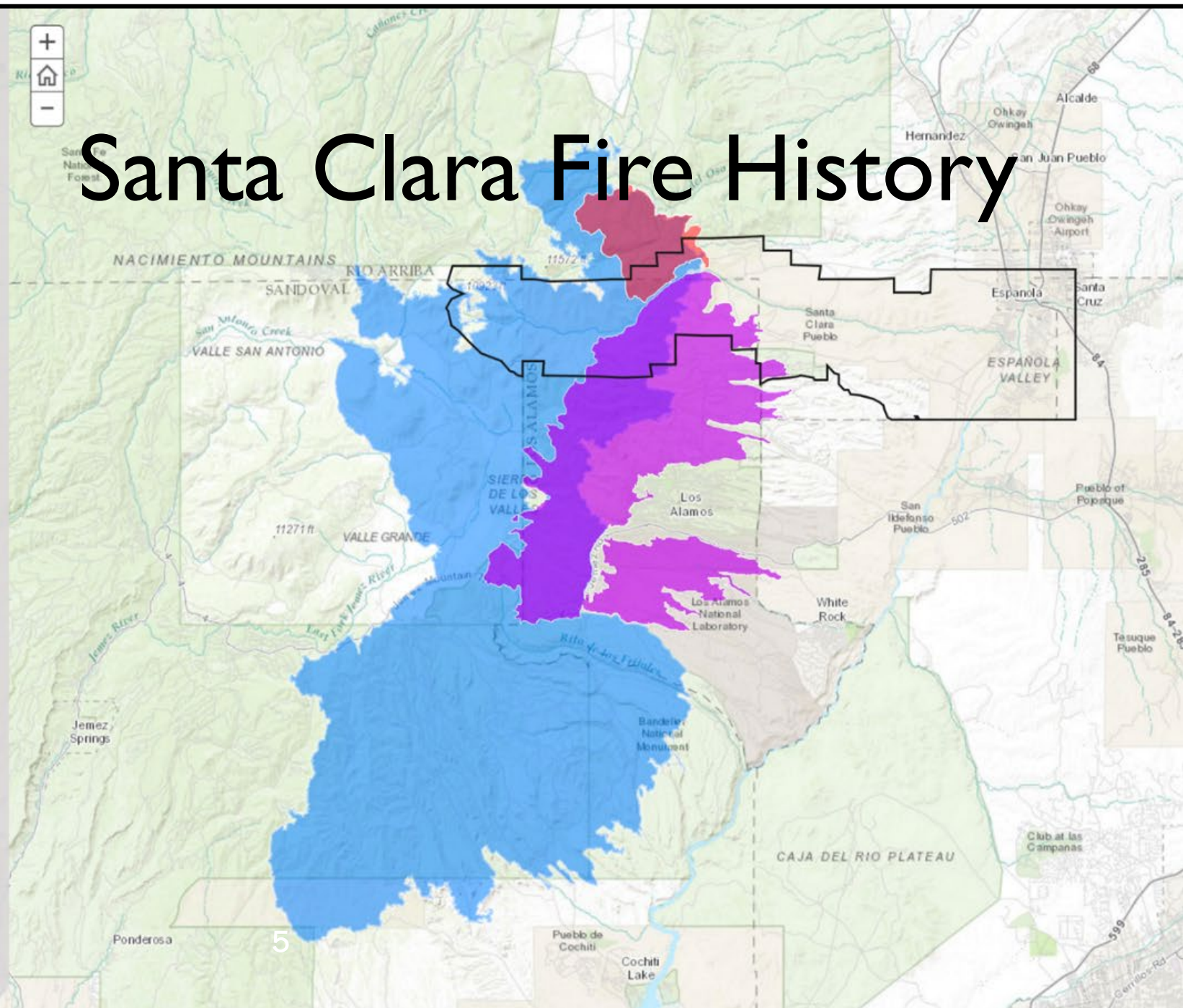
Cerro_Grande_2000



Las_Conchas_Fire_2011

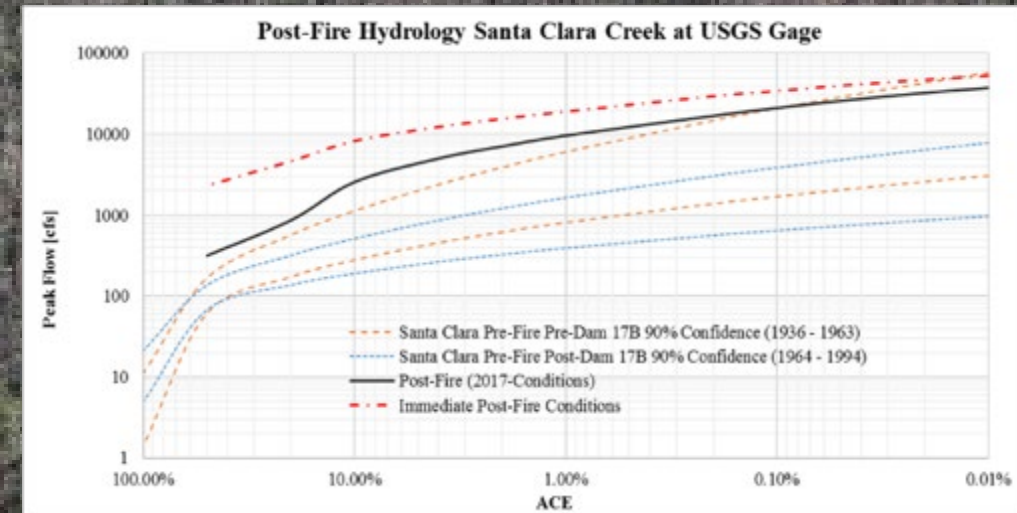


Santa Clara Fire History



Post-fire hydrology:

- Exponential increases in flood magnitude = devastating debris flows
- Decimated existing water control structures (4 recreational ponds)
- 100% fish kill & habitat loss throughout entire Santa Clara Creek
- Impacted the water quality standards identified for high quality cold water fisheries
- Impacted roads, compromised bridges, washed away stream crossings, and recreational facilities (\$200M+)
- Continues to impact natural and cultural resources... our grocery store, clothing store, pharmacy, and biologic classroom.



Simulated 2 year (50%) to 10,000 year (.01% ACE) events

Restoration strategies:

- Implemented 'top-down' approach to treating the watershed:
 - Stabilized sediment sourcing areas in tributaries 2012-2018
 - Creek & riparian restoration beginning in 2018 - current
- Applied Hazardous Fuel Reduction, Reforestation and Bioengineering to:
 - Mitigate future wildfire threat
 - Provide a cost effective restoration approach
 - Utilize abundant natural materials
 - Facilitate reforestation
 - Limit grazing effects
 - Provide bank stabilization and promote habitat complexity
 - Limit erosion and sediment transport



A photograph of three workers in safety gear (hard hats and high-visibility vests) standing in a forest stream bed, looking down at the water. The background shows a dense forest of tall evergreen trees and a rocky stream bed. The text is overlaid on the left side of the image.

Conclusion

Benefits of a naturalistic approach:

Satisfying the cultural wishes of the Santa Clara People while

Promoting ecosystem function & resilience

Emerging at forefront of bioengineering design in fire impacted landscapes

2018 EPA Outstanding Green Infrastructure/Low-Impact Design Award

FEMA endorsing these efforts as Best Practices; USFS Tribal Relationship Managers visit; US State Department tours

Expanding to additional sites and adopting new concepts

- *NRCS, BOR, and USACE coordination*
- *Off-channel lake conceptualization*

Outreach

- *Sharing our story via Story Map: <https://arcg.is/OHGPHf>*
- *Youth integration*
- *Forging a path to the future that is healing our people while restoring our lands.*

A photograph of a small stream flowing over rocks in a lush green forest. The water is clear and shallow, with small cascades over the rocks. The surrounding vegetation is dense and green, with trees and bushes visible in the background. The overall scene is peaceful and natural.

THANK YOU!

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