Reforestation and Risk Management at Cuyamaca Rancho State Park

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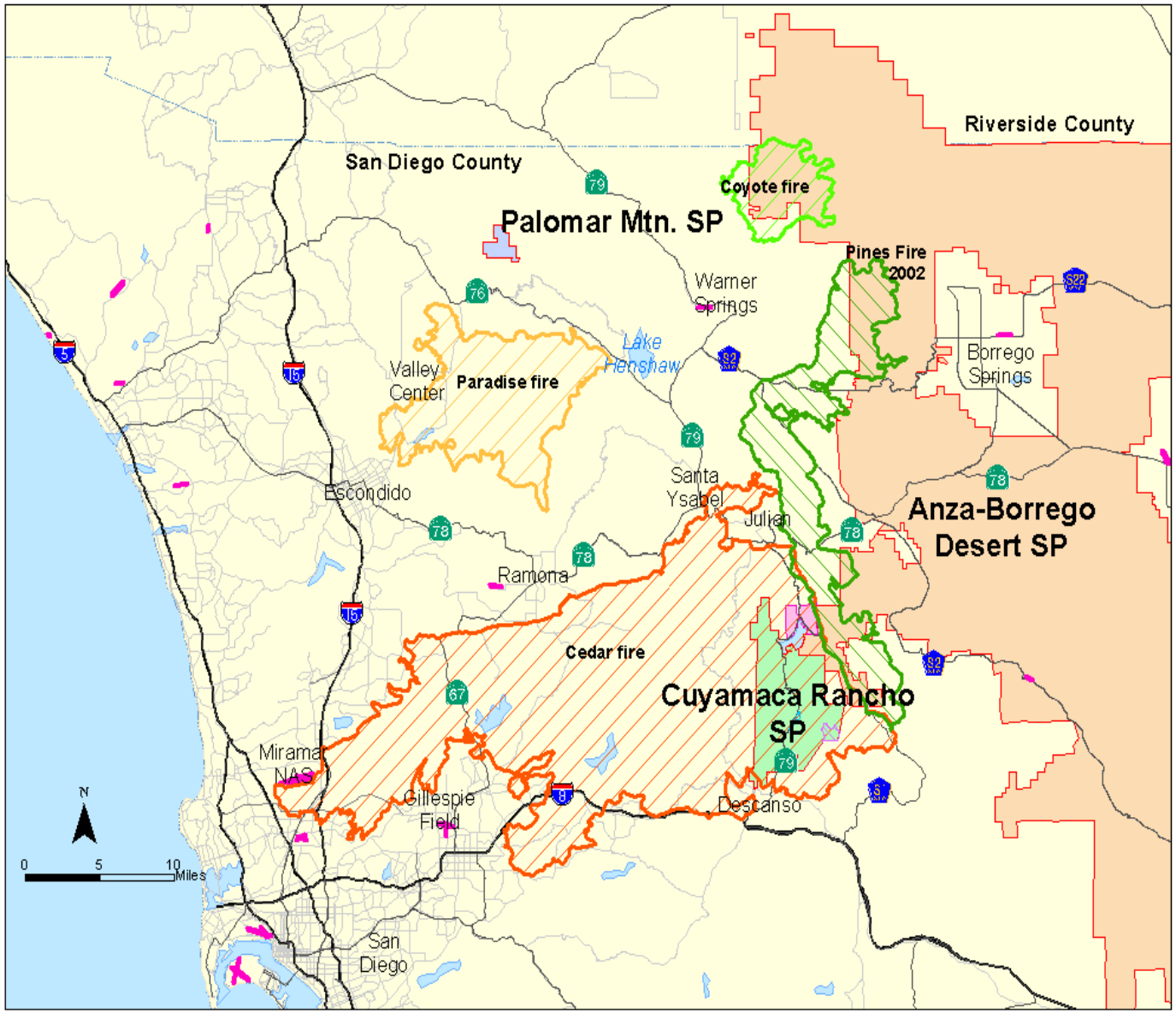
Riverside County
San Diego County
Coyote fire
Palomar Mtn. SP
Pines Fire
2002
Warner
Springs
Lake
Henshaw
Borrego
Springs
Valley
Center
Paradise fire
Escondido
Santa
Ysabel
Julian
Anza-Borrego
Desert SP
Ramona
Cedar fire
Cuyamaca Rancho
SP
Mirama
NAS
Gillespie
Field
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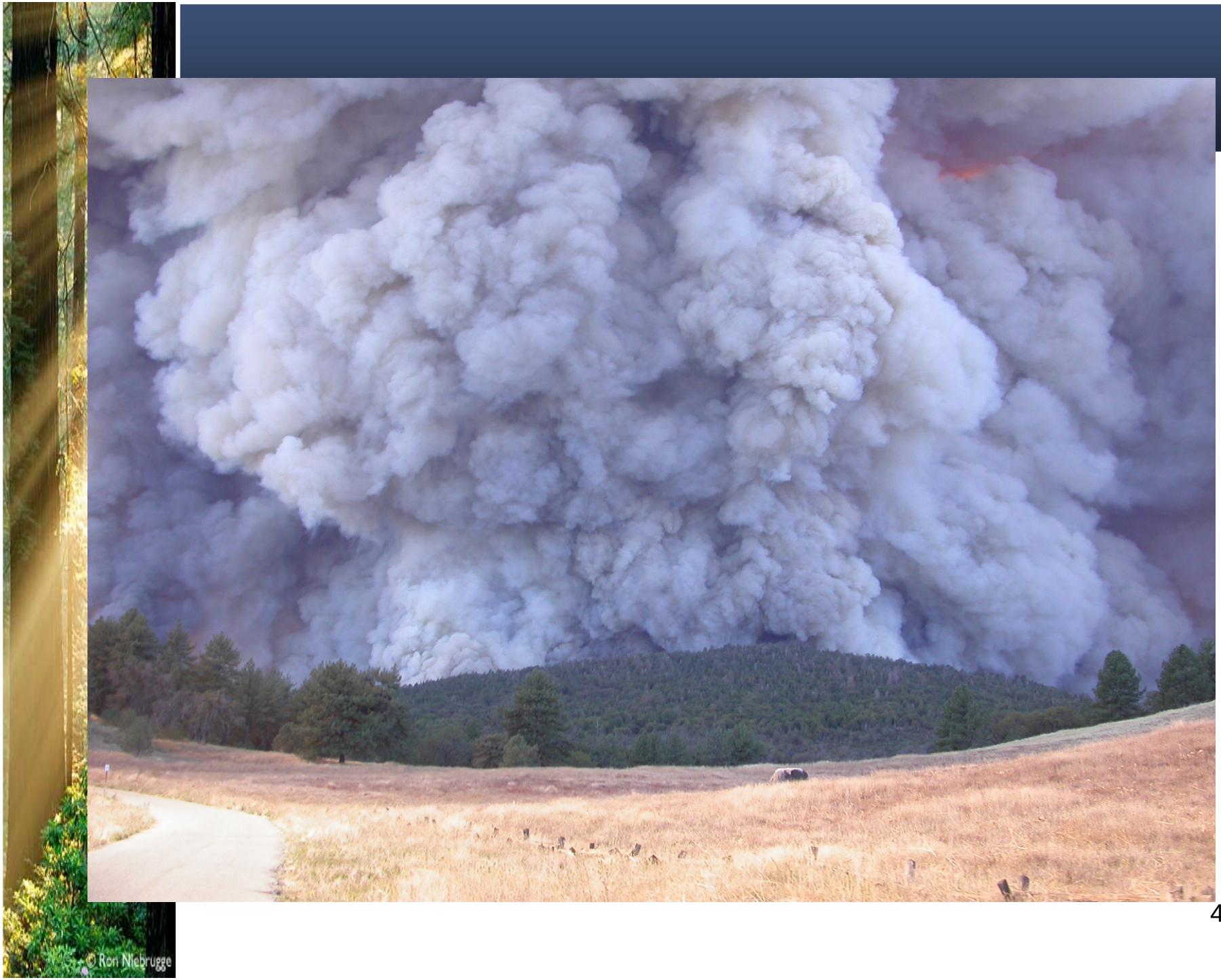
0
5
10
Miles

Impacts of Cedar Fire to CRSP October 25 – December 5, 2003

- Total acreage burned – 280,057 acres
- Cuyamaca Rancho State Park – 24,414 acres
- Acres of woodland and forest burned at CRSP – 17,409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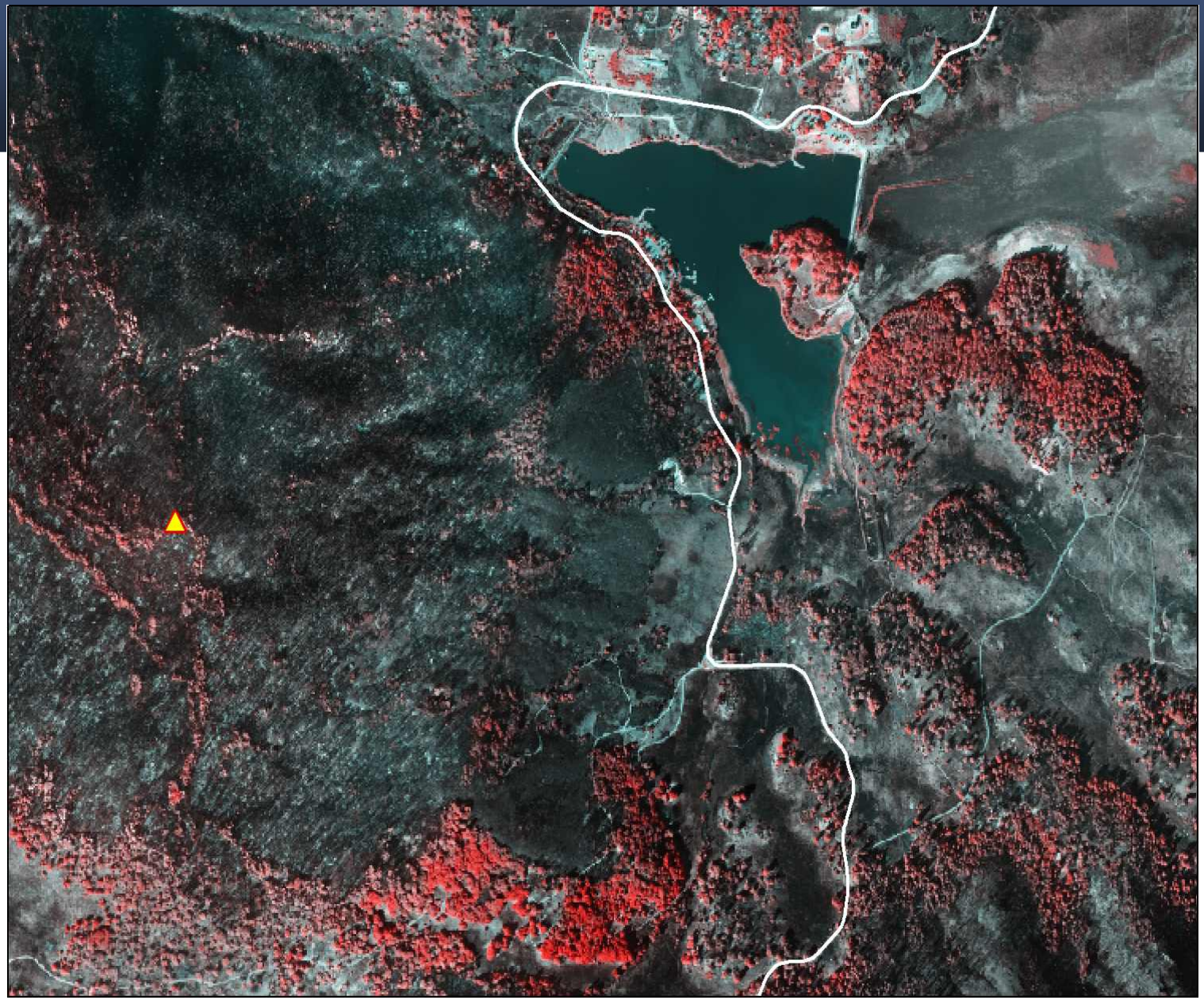

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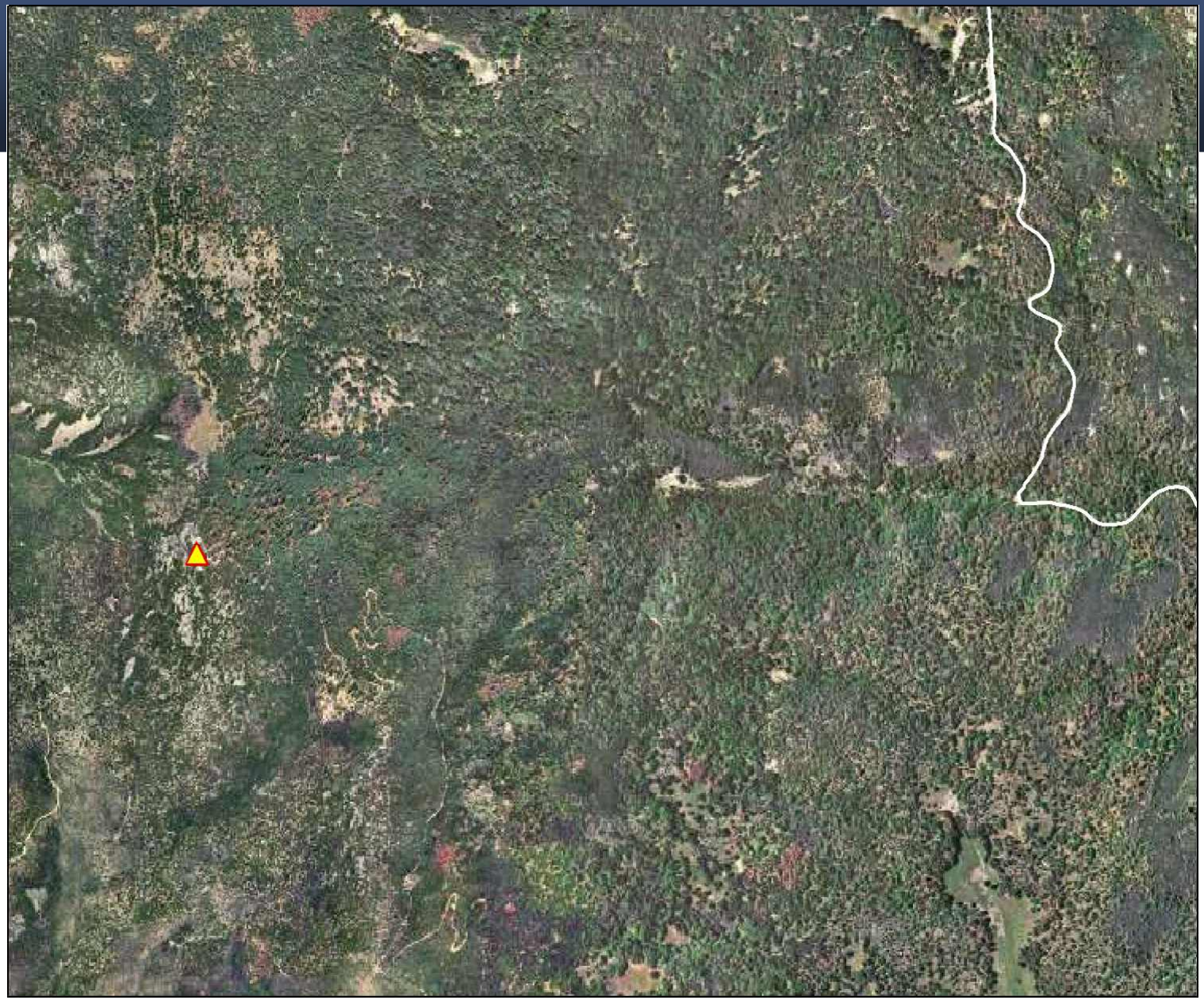

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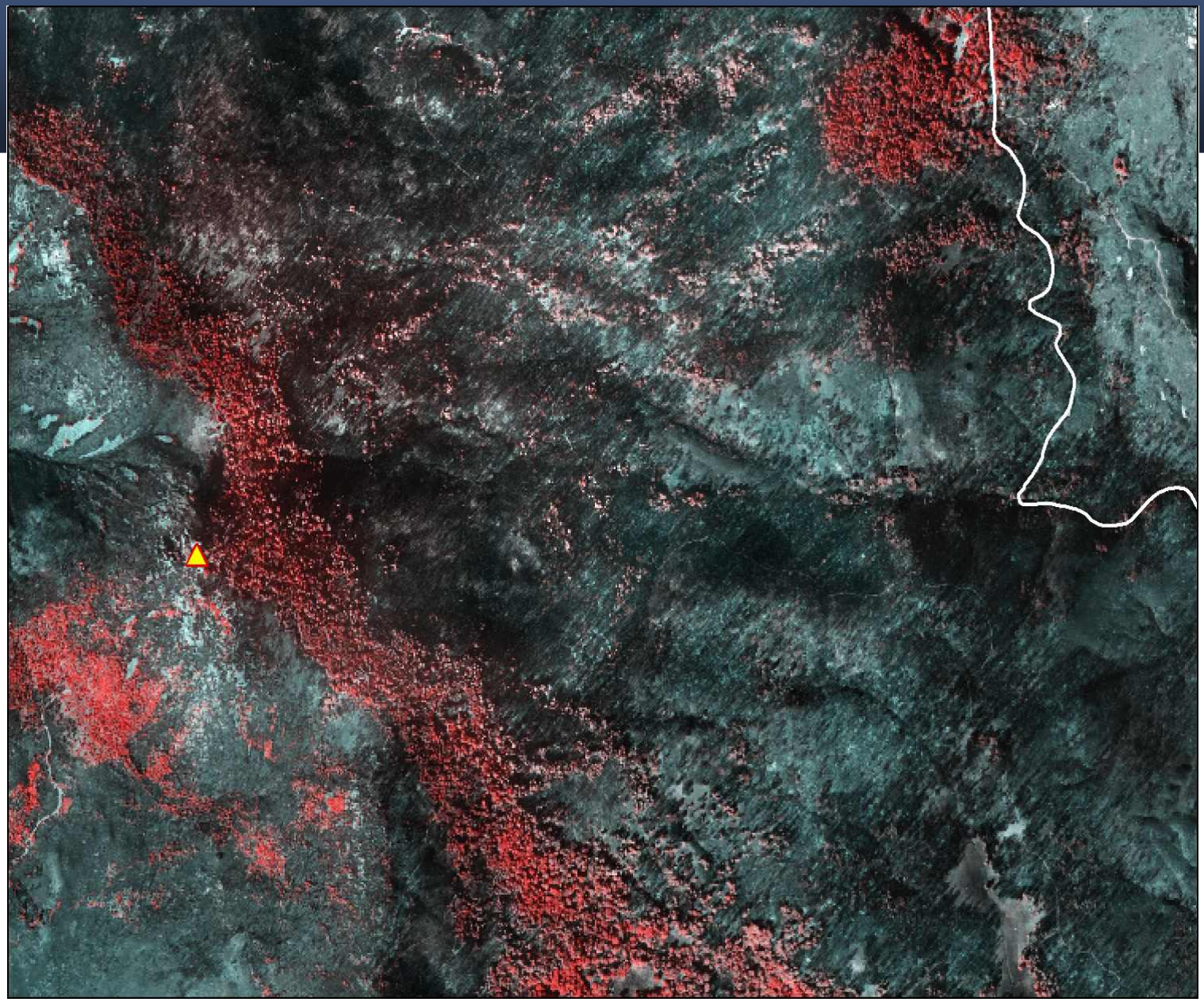

COULTER PINE MONITORING PLOTS

- Six ¼ ha plots Airplane ridge and West Mesa,CRSP. (Wells 2001)
- Near complete mortality following Cedar fire.
- Only three surviving trees out of 628 adult trees
- For five previous fires, a cohort was never wiped out by a single fire
- Complete mortality on 5 of 6 plots
- Limited cone survival
- No initial seedling recruitment

SURVEY

- Franklin et al. resurveyed Krofta's (1995) plots on West Mesa
- High conifer mortality (89%)
- Moderate oak mortality (31%)
- No observed conifer recruitment within plots
- A few hundred seedlings observed outside of plots on West Mesa
- A more complete survey is underway park-wide

Possible Successional Trajectory

- Recruitment of chaparral shrubs
- *Ceanothus leucodermis* and *C. greggii*
- Obligate seeding species are relatively short-lived (40 years)
- Will be succeeded by obligate sprouters that disperse into canopy gaps (Keeley 1986, Wells 1994)
- Type conversion from mixed evergreen to oak savanna/ chaparral

IMPLICATIONS FOR CARBON SEQUESTRATION

- Total estimated fuel loading (biomass) for mature *Ceanothus* chaparral – 32 Mg/ha (Regelbrugge 1997)

- Total estimated fuel load for Sierran mixed conifer forest up to 150 Mg/ha (Hille and Stephens 2005)

Possible Restoration Strategy

- Establish planted patches to mimic refugia left by moderate intensity wildfires
- Locate patches in areas with favorable soil moisture conditions
- Plant shade intolerant species native to area
- Initial planting density and subsequent thinning to create well-spaced, fast growing trees

RISKS

- Dry year causes failure of initial planting
- Climate becomes drier reducing suitable habitat
- Another fire occurs before trees reach reproductive maturity
- Genetic bottleneck reduces reproductive viability
- Climate or ecosystem changes in an unanticipated direction

Risk Mitigation
Climate

Dry year causes failure of initial planting

Climate becomes drier reducing suitable habitat

- Plant in most favorable locations
- Site preparation and irrigation
- Spread planting over several years
- Plant multiple locations
- Collect seed from more xeric local sources
- Model climate change, and species and ecosystem response

Risk Mitigation
Fire

Another fire occurs before trees reach reproductive maturity

- Plant in multiple locations
- Manage local fuels until canopy is established or trees reach reproductive maturity
- Thin shade tolerant species in the forest understory

Risk Mitigation
Genetics

Genetic bottleneck reduces reproductive viability

- Insure seed source has sufficient variability
- Initial planting large enough to be genetically viable
- Monitor rates of survival
- Supplemental planting

Risk Mitigation
Unanticipated Change

Climate or ecosystem changes in an unanticipated direction

- Monitor climate, ecosystem and species response
- Assess model performance
- Periodically reevaluate assumptions
- Be committed to taking a reiterative approach