

Finding Meaning in the Mess: Rising to the Challenge of Reforestation in a Changing Climate



Christy Brigham Ph.D.

Chief of Resources Management and Science

Sequoia and Kings Canyon National Parks

The Mess, Finding Meaning, and Tools

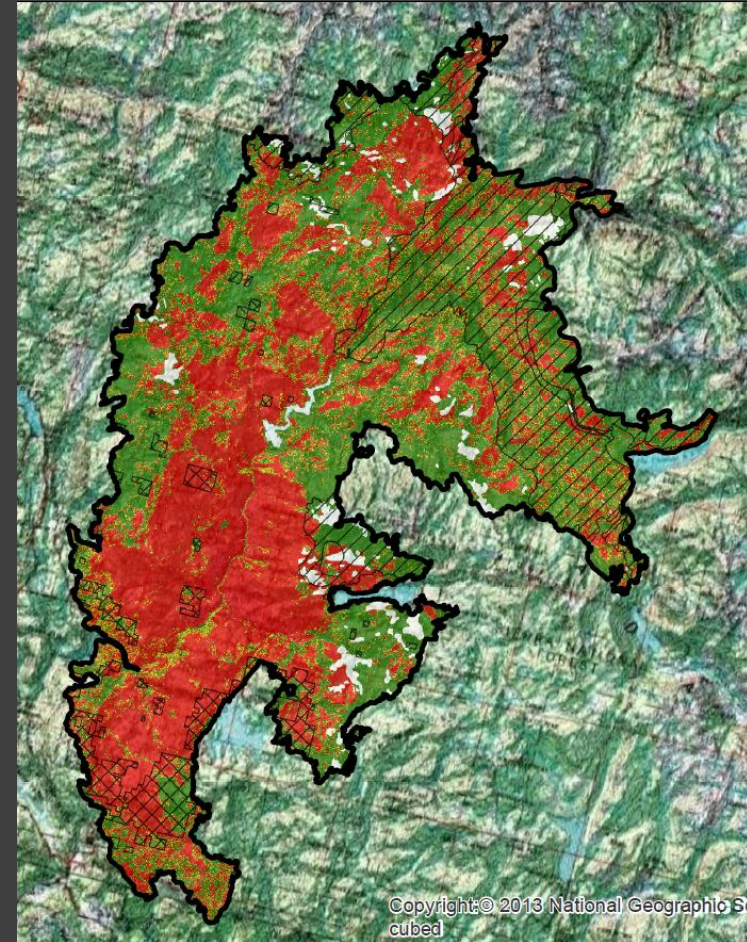
- This story
- A little bit about the mess
- A little bit about multiple meanings
- Tools/Approaches for rising to meet these challenges
- Conclusion



The Whole Thing in One Slide

- Forests in California
 - 33 million acres
 - 1/3 land area
 - 60% publicly owned
- Importance
- Changes
- What it will take/what we can do
 - Science
 - Courage
 - Real adaptive management
 - Conversation
 - Innovation
 - Not forgetting what we know
 - Being open to and observing change

• Thank you



Soil burn severity 2020 Creek Fire





“I wish it need not have happened in my time,” said Frodo. “So do I,” said Gandalf, “and so do all who live to see such times. But that is not for them to decide. All we have to decide is what to do with the time that is given us.”

J.R.R. Tolkien, *The Fellowship of the Ring*

Mess (complexity): 1) Past Practice

- Fire exclusion in most places
- Logging in some areas
- Replanting in some areas



NPS Photo

Mess (complexity): 2) Current Conditions

- Burned/Unburned/Severity all spatially variable
- Possible different genetic structuring dependent on past practice and conditions
- Different levels of tree mortality
- Different levels of fuels
- Different biotic interactions
- Different levels of change in precip, temperature



Photo courtesy of USFS Region 5

During 2012-2016 Drought
Spatially variable water stress

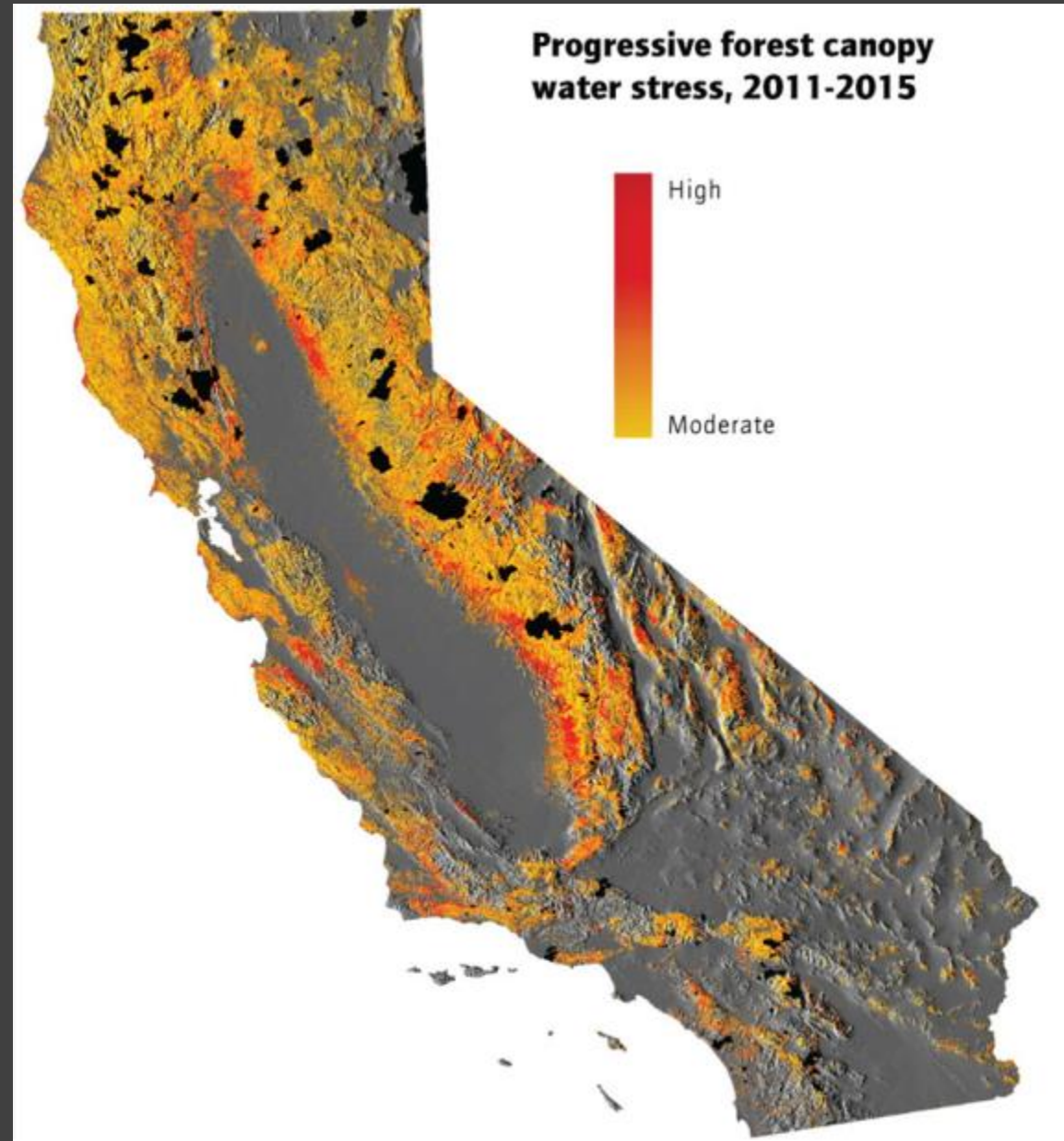
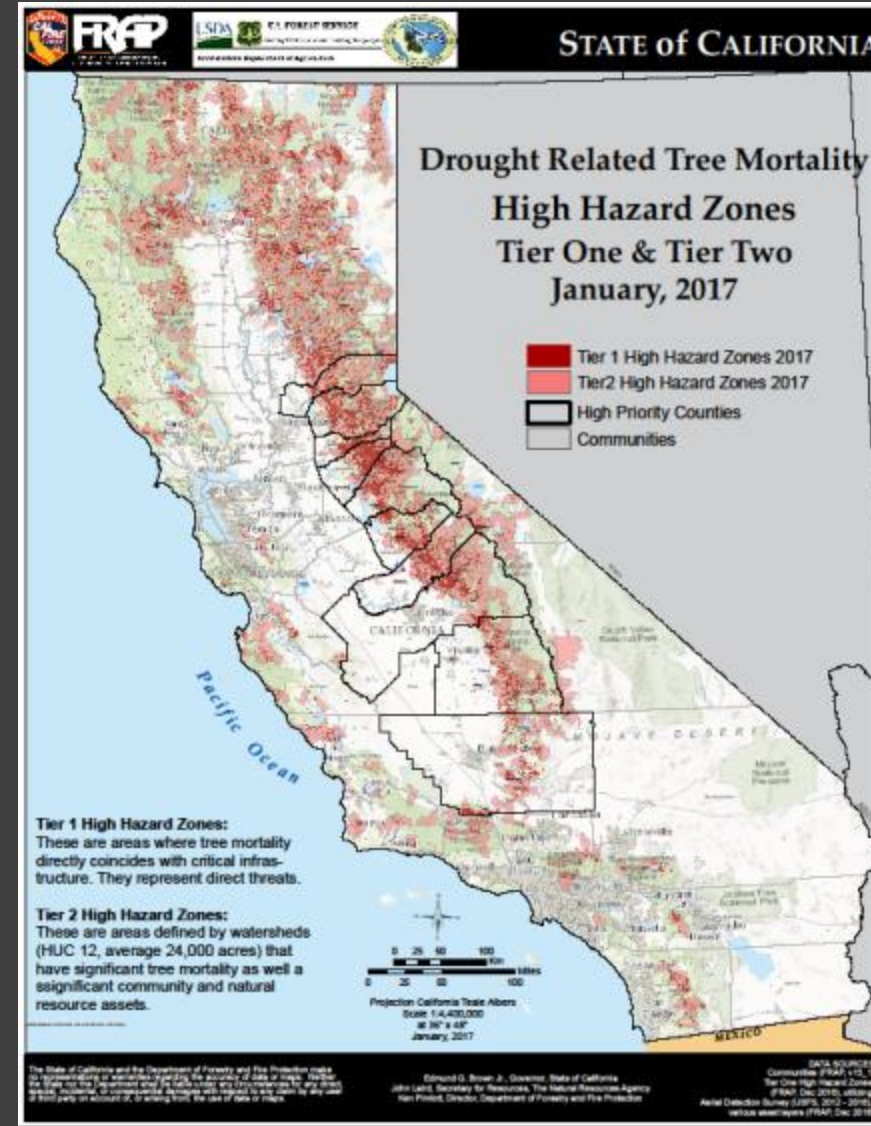
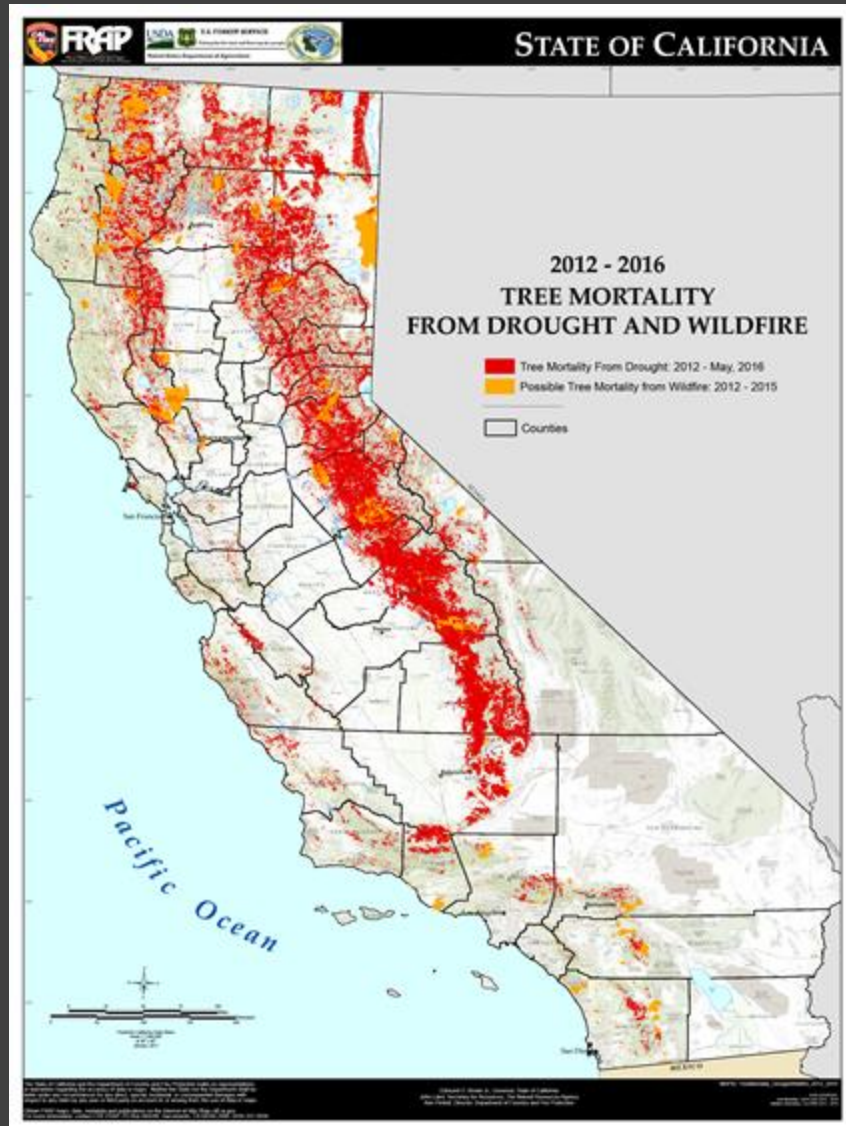


Image courtesy of Dr. Greg Asner

Spatially Variable Sierra Nevada Tree Mortality



Mess (complexity): 3) Social Factors

- Differing management goals
- Differing levels of public trust
- Differing values
 - Economic
 - Wilderness (untrammelled?)
 - Spiritual
- Differing social understanding of causes
- Differing acceptance of types of treatments



Mess (complexity): 4) New Phenomena

- New mortality – pests
- New mortality – torching
- Conifer type conversion/regen failure
- New drought response, major foliage dieback
- Non-fire mass cone release



Images courtesy of Dr. Nate Stephenson

Mess (complexity): 5) Uncertainty

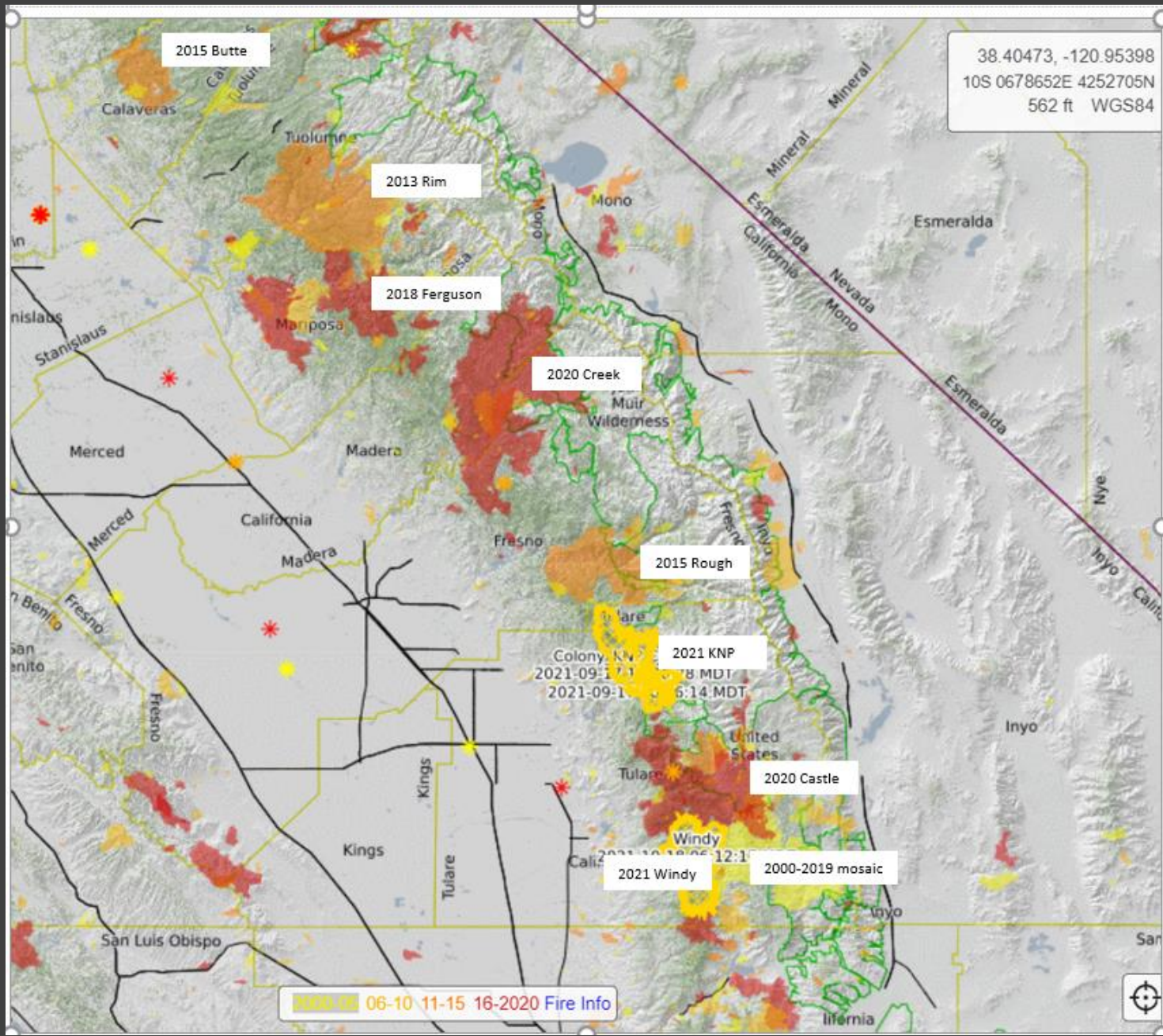
- Future climate
- Current biotic interactions
- Future biotic interactions
- Interactions of genotypes and environment
- What will human choices be in the future and how will they impact our forests?
- Lots of other things...(will I get hit by a bus tomorrow?)



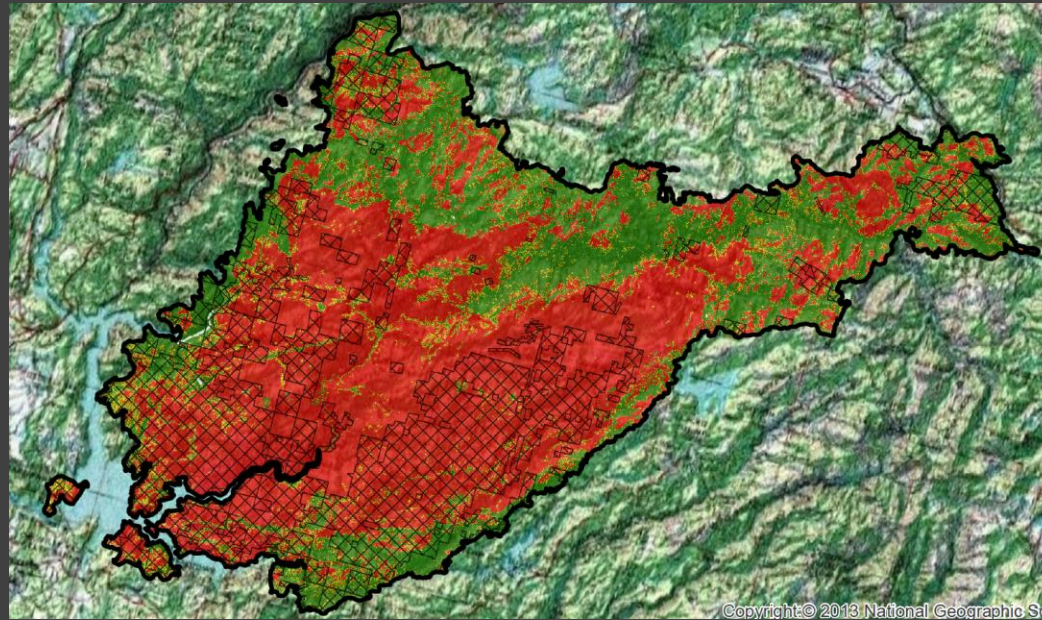
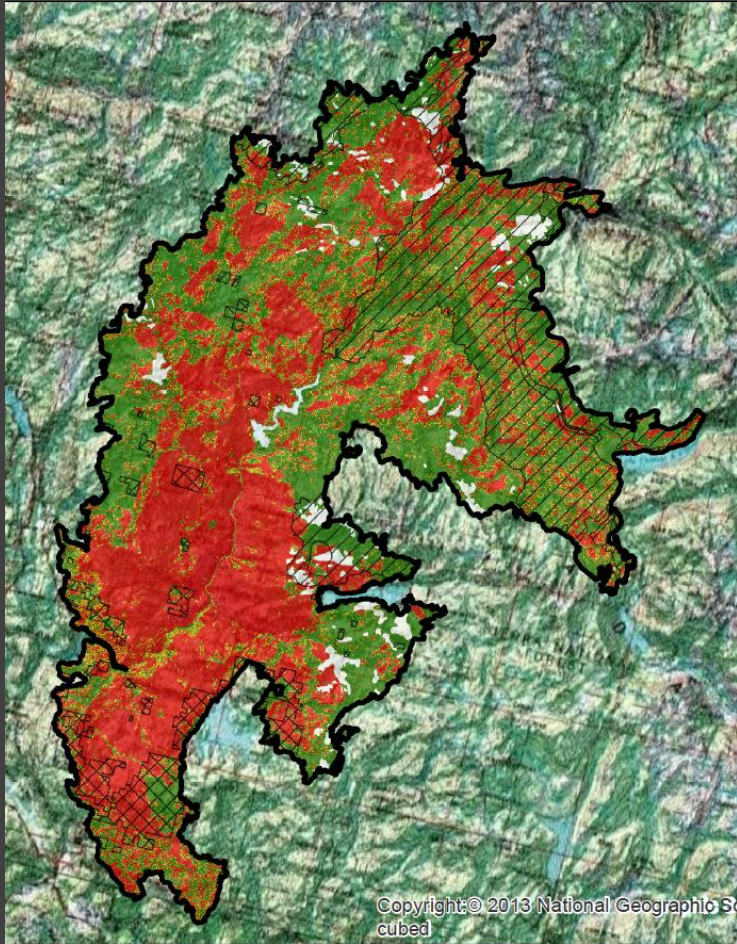
The Mess (complexity) in a Few Images





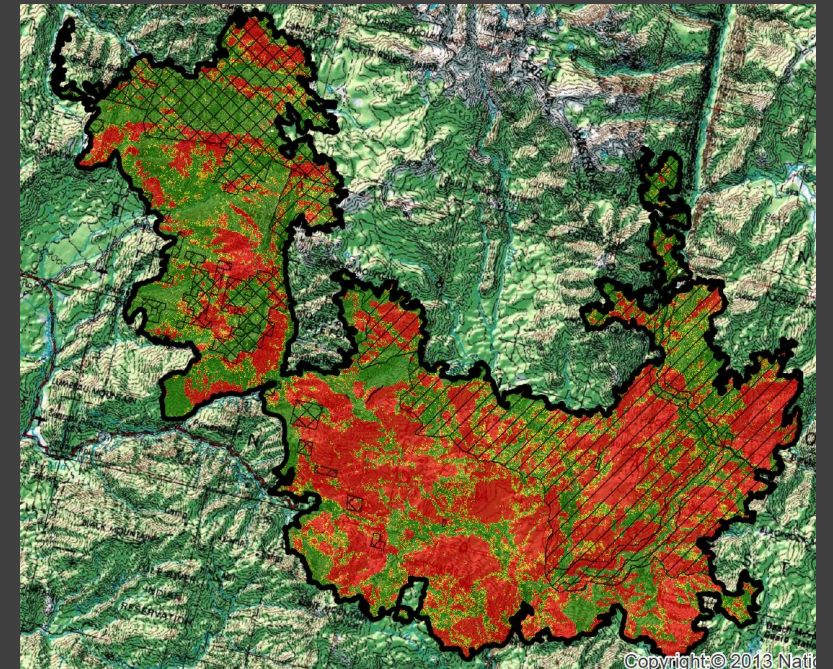


Creek Fire,
Sierra NF



North Complex,
Plumas NF

SQF Complex,
Sequoia NF



Mortality Rates

Normal background mortality: 0.1-0.2% per year

As high as 1% after first entry prescribed burn

Pre-2015 wildfire mortality ranges from 0% to 9.5% (Pierce Fire).

Castle Fire Mortality Rates

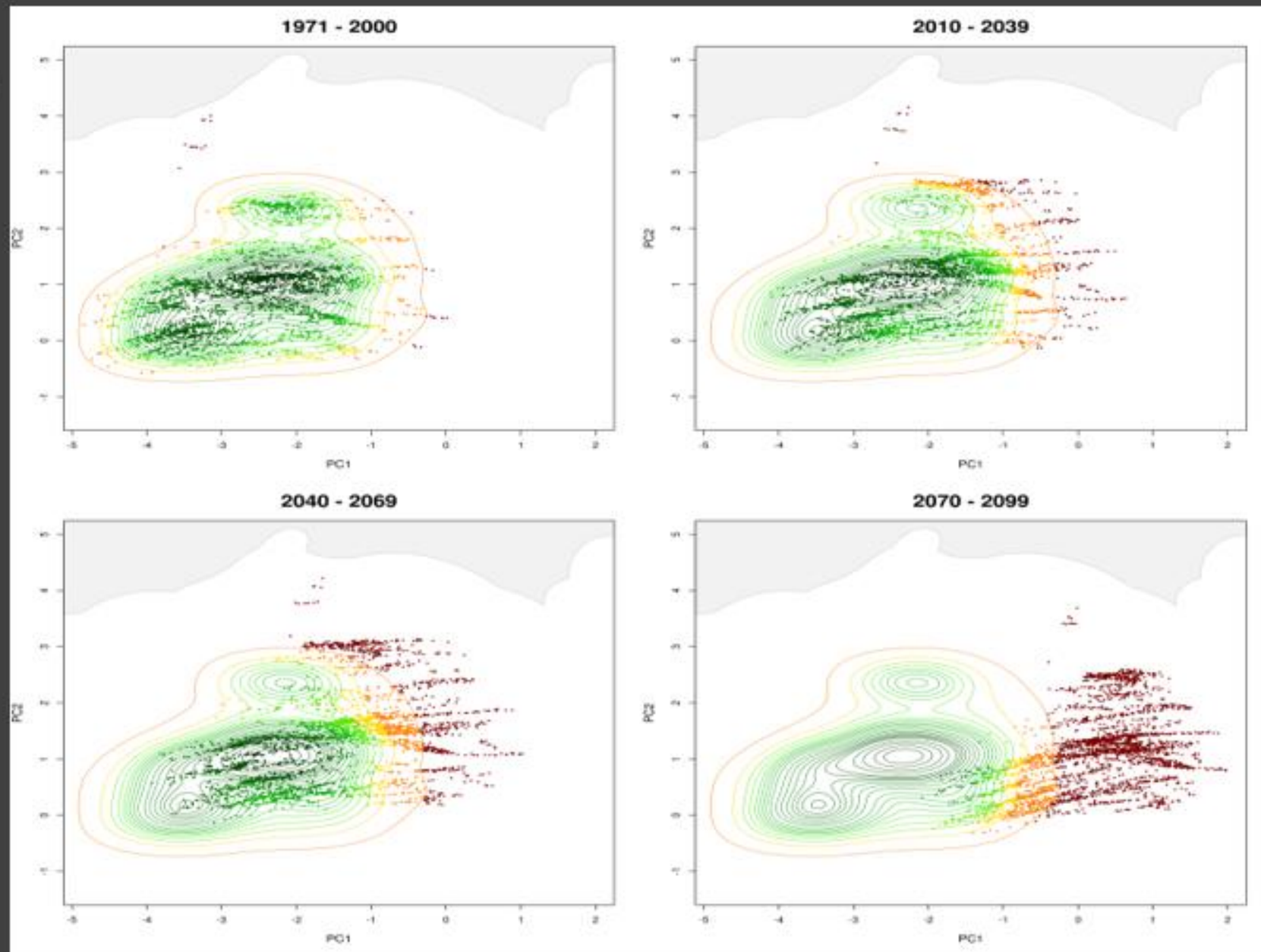
Upper Dillonwood Grove: 36.3%

Homer's Nose Grove: 51.9%

Board Camp Grove: 73.1%

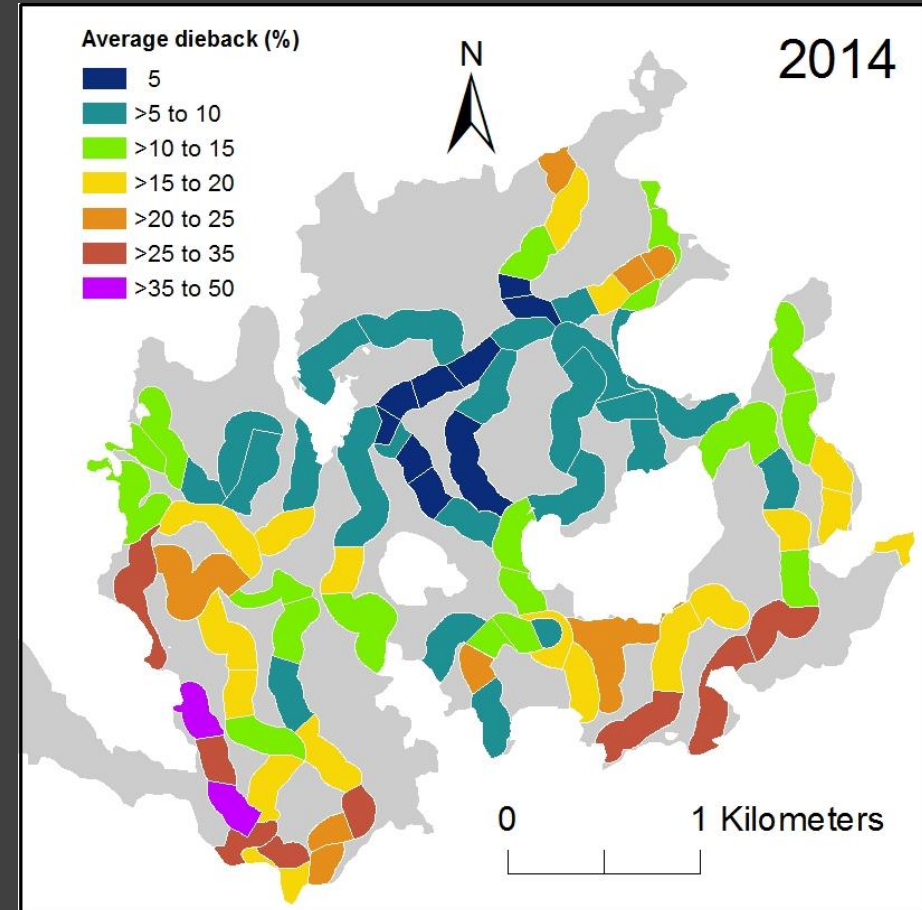
Climate Exposure for Giant Sequoia

Scenario 1 –
Much warmer, drier
GFDL-A2



Meaning: 1) Scientific Understanding

- What will climate change mean for our forests?
- How do we understand current changes as indicators of the future (are they?)?
- How do we understand complex interactions within our systems?



Map courtesy of Dr. Nate Stephenson,
USGS

Meaning: 2) Personal Meaning

- Loss – how do we accept loss and keep going?
- The personal importance of this work – why do you do what you do?
- Communicating personal meaning to the public
- Acknowledging the difficulty of doing this work at this time



Meaning: 3) Social Meaning

- Competing social values of our forests + future needs
- Root causes
- How do we intersect our work with other related sectors?
- Social understanding and response to changes



Tools

- Past research
- Indigenous knowledge
- Current research



NPS Photo

Tools

- Adaptive management
- Community engagement
- Community science



NPS Photo

Tools

- GTR 270 Restoration Opportunities
- Resist / Accept / Direct framework



NPS Photo

Approaches

- Landscape-scale
- Research / Adaptive Management to address uncertainty
- Multi-pronged / Multi-factor to address interactions
- Multi-agency
- Public Involvement



Landscape-Scale

- Problems are landscape-scale
 - Forest health
 - Wildfire
 - Climate change
- Increased learning
- Increased efficiency
- Better prioritization
- Better resource-sharing



Research/Adaptive Management

- Consensus on some issues
 - Impacts of heavy fuel loading
 - Effectiveness of treatments under most conditions
- Uncertainty in other areas
 - Climate change
 - Reburn severity
 - Wildlife impacts
- Urgency
- Urgency + uncertainty = adaptive management
 - Monitoring
 - Involvement of research partners
 - Feedback loops
 - Pilot programs



Multi-Pronged/Multi-Factor

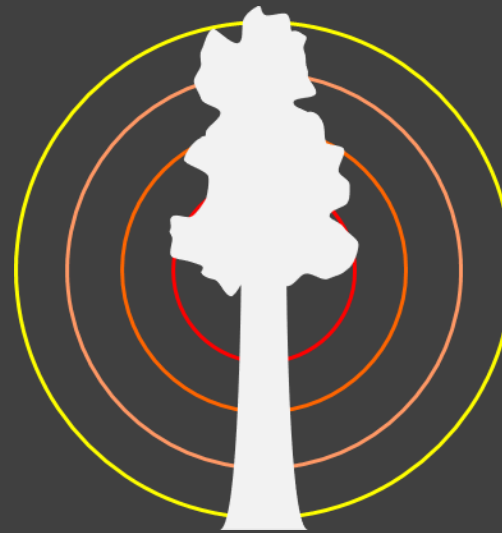
- Resist – Accept – Direct in restoration planning
 - Assisted adaptation / gene pool
 - Future locations outside of current range
 - Social dialogue about actions
 - Many areas will see no action and can serve as controls
- Interactions are important



Multi-Agency

- To work at scale
- Different management entities have different expertise
- Different agencies have different mission statements
- Examples:
 - Giant Sequoia Lands Coalition
 - Southern Sierra Leadership Forum

Giant Sequoia Lands Coalition



Public Involvement and Story-telling

- Volunteerism / stewardship
- Active forest management requires public support
- Climate change is a global problem
- Hope comes from action/ participation in solutions



To Preserve the Forests We Love and Their Values

- Learn
- Prioritize
- Take action
 - to protect remaining old growth forests
- Take action
 - to restore resilience and forest function where possible



In the Face of Climate Change, Uncertainty, Social Complexity...

- Avoid hubris
- Work together
- Innovate and test ideas
- Rapid change = NEED MONITORING!!
- Rapid change = NEED ADAPTIVE MANAGEMENT
 - with rigorous measurements, triggers, and feedback loops
- Social complexity = tell your story. Speak your values
- Social complexity = engage the public in dialogue
- Manage without fear



We Have Done Hard Things Before

- Established the USFS with its mandates for wise use, preservation, and recreation
- Established NPS with its mandates for preservation for future generations and visitor enjoyment
- Set aside 1.3 million acres as California State Park units
- Supported working lands with regulation, easements, partnerships and expertise (NRCS, RCDs, others)
- Supported state and private forestry through extension and other research and education programs
- Replanted millions of acres in the past
- A long history of bold conservation decisions
- A long history of science-informed management

We Have Started This Work Already and Have Expertise and Experience

- Long history of reforestation before climate change
- Recent plantings in many areas already
- Provenance studies
- Seed zone work
- Assisted gene flow experiments
- Great fire ecology and restoration work on-going in the Sierra
- Great on-going work by RCDs, universities, nonprofits, extension, and others
- Extensive work done by tribes and others

We Can Do This!



“The future is not yet written. We are writing it now.” – Rebecca Solnit
The future is not yet written...what story will you tell?

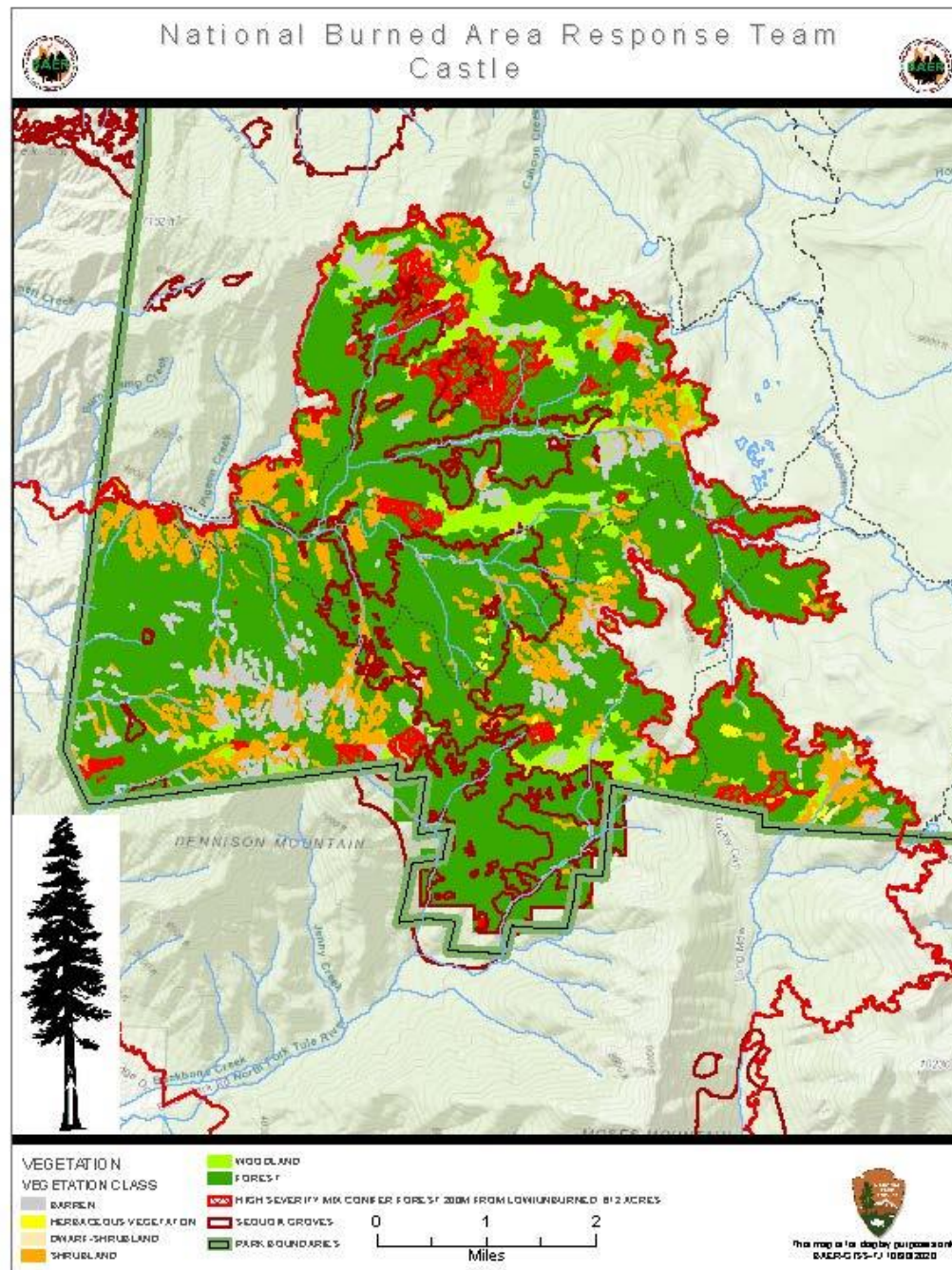
“And if we do act, in however small a way, we don’t have to wait for some grand utopian future. The future is an infinite succession of presents, and to live now as we think human beings should live, in defiance of all that is bad around us, is itself a marvelous victory.”

- Howard Zinn, “The Optimism of Uncertainty

Questions?

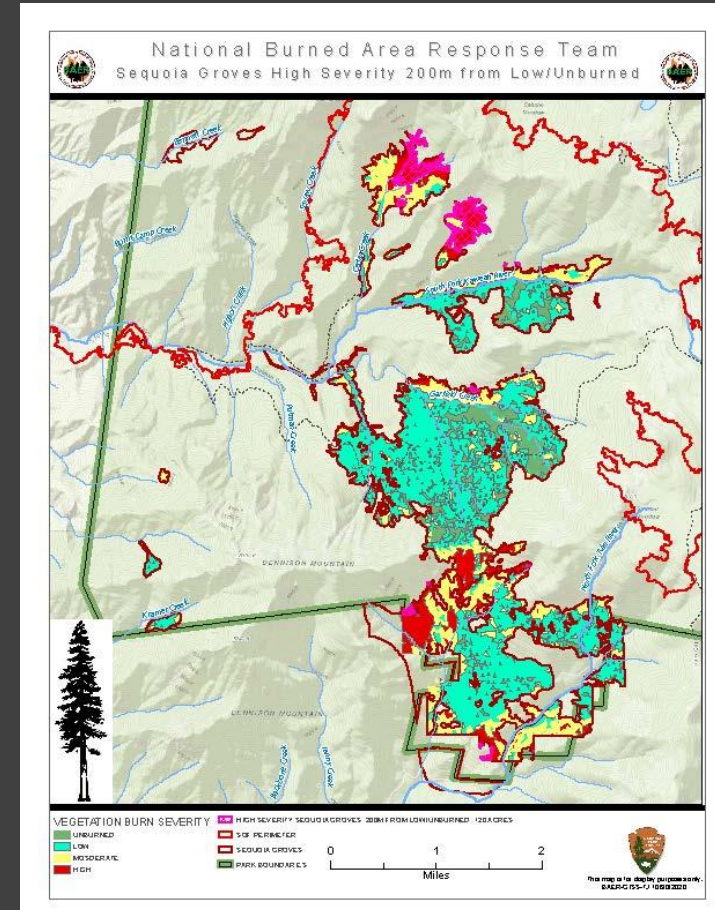


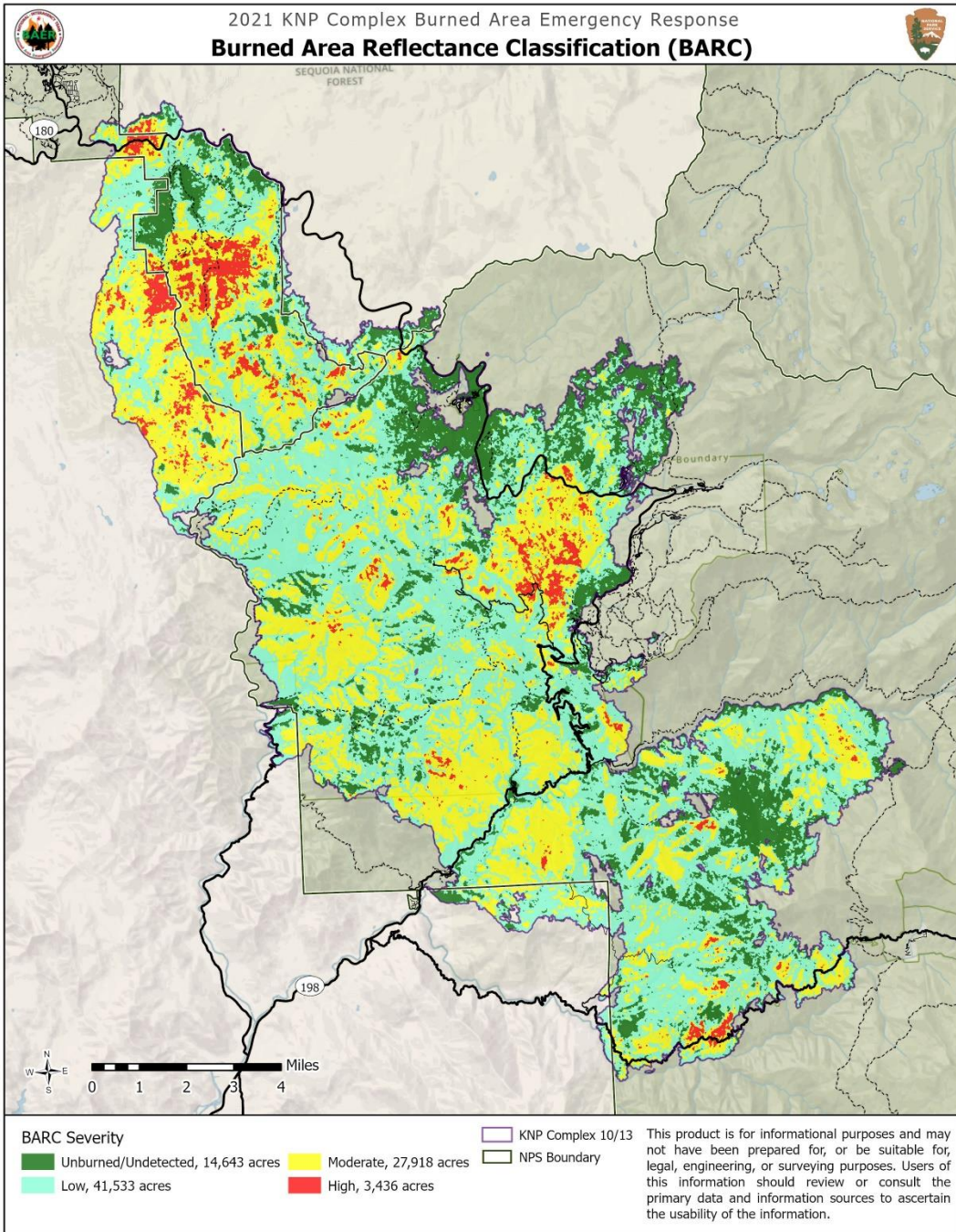
612 acres of possible type conversion in Mixed Conifer Forest



At Risk for Type Conversion

- NPS Castle Fire
- 120 Acres of Sequoia Groves

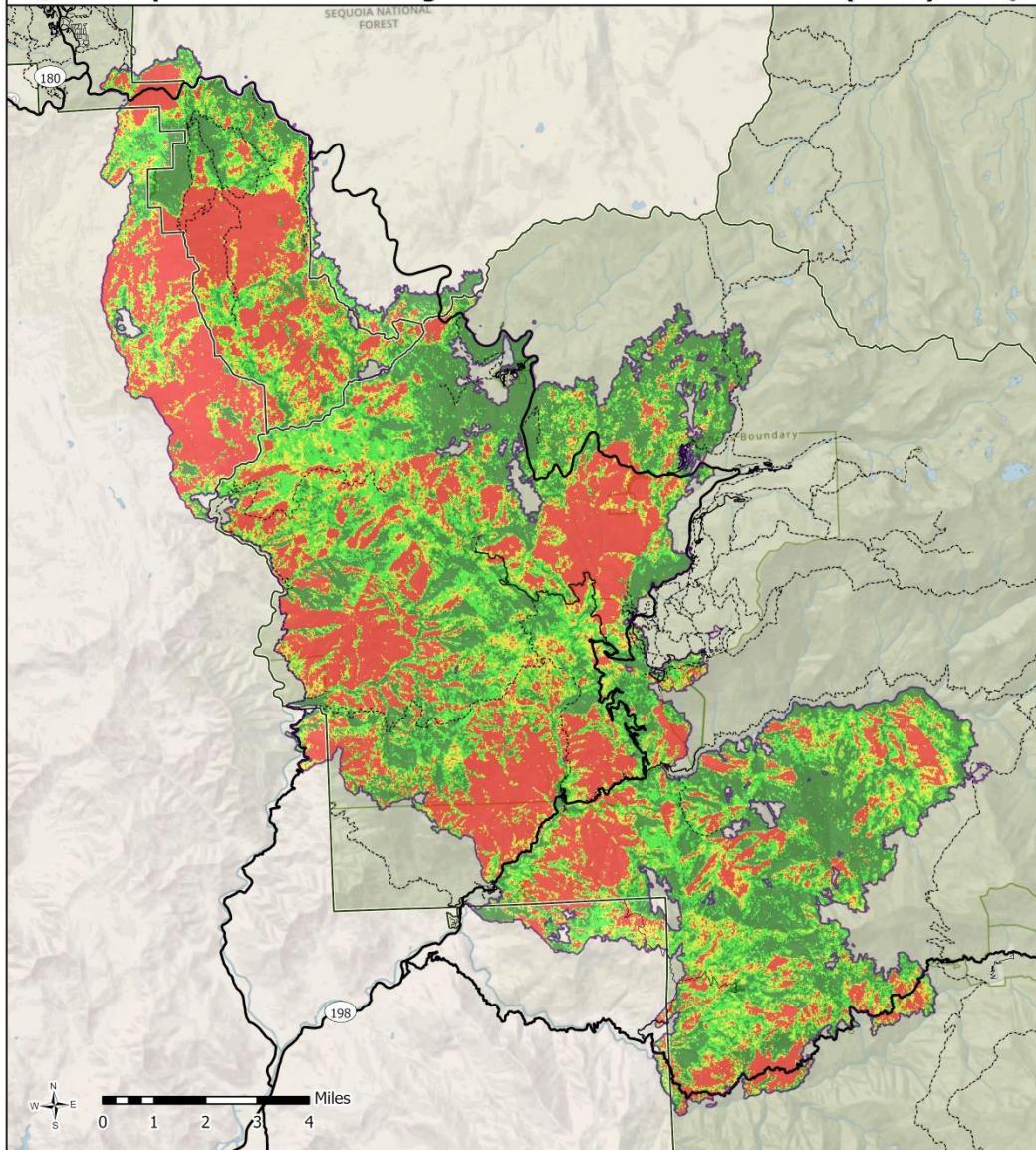




Version: 10/18/2021 5:29 PM

Soil Burn Severity – from Oct. 13 satellite imagery – BARC

BARC Class	Calculated from 10/13 data	
	Acres	Percent
Unburned	14,643	16.7
Low	41,533	47.5
Moderate	27,918	31.9
High	3,436	3.9
Total	87,530	



Basal Area Loss

- 0% - < 25%, 23,346 acres
- 25% - < 50%, 21,028 acres
- 50% - < 75%, 14,500 acres
- 75% - 100%, 28,643 acres

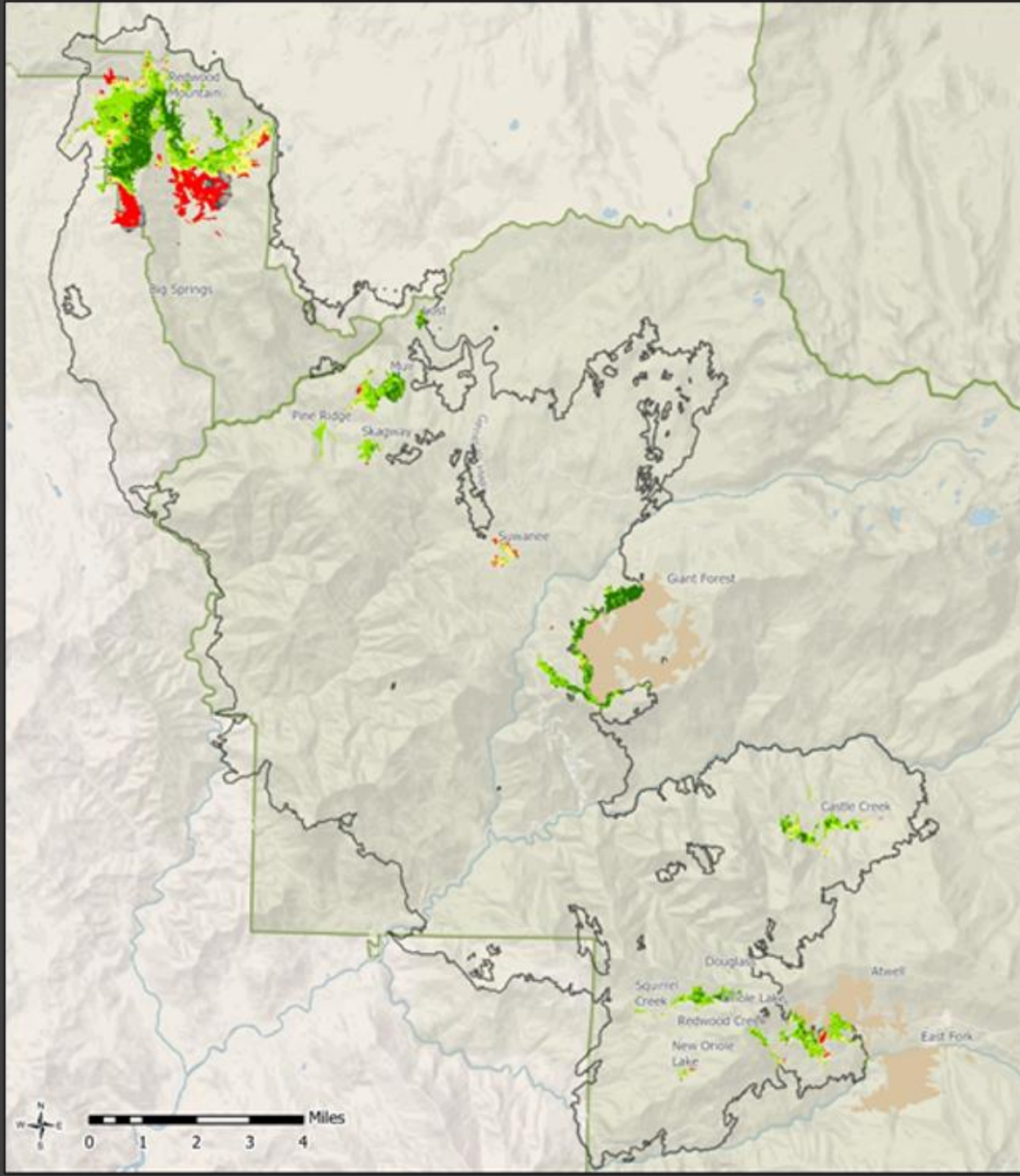
- KNP Complex 10/13
- NPS Boundary

This product is for informational purposes and may not have been prepared for, or be suitable for, legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

RAVG – Vegetation Condition – Basal Area Loss from Oct. 13 satellite imagery

RAVG Basal Area Loss	Calculated from 10/13 data	
	Acres	Percent
0% - < 25%	23,346	26.7
25% - < 50%	21,028	24
50% - < 75%	14,500	16.6
75% - 100%	28,643	32.7
No Data	13	0
Total	87,530	

Potentially
350 acres
of lost
grove area



NPS KNP Complex Conifer forest at risk of regeneration failure

