3-VULNERABILITY SESSION

Session Lead: Koren Nydick, Sequoia & Kings Canyon National Parks
GOAL: This session provides information on the vulnerability of focal resources (i.e., a "defining feature" or "critical attribute") and discussion of vulnerability components (exposure, sensitivity, and adaptive capacity), geospatial information, and uncertainty. Invited oral presentations and resource information briefs assist participants in completing group exercises in the vulnerability and strategy sessions. Focal resources used in this workshop were selected to test the change adaptation framework and pioneer a shared learning process. The intent is not to present a comprehensive or definitive statement about the vulnerability of each resource, but to explore how we collectively can use information on vulnerability for change adaptation planning. The vulnerability session occurs in plenary (large group). Participants sit in tables organized by focal resource.

8:30 – 9:00 am: Vulnerability Assessments: Components and Overview (25 min + 5 Q/A)
Danielle LaRock, CA LCC & USFWS National Conservation Training Center
- Define "vulnerability", including exposure, sensitivity, potential impact, and adaptive capacity.
- Explain the goals and objectives of a vulnerability assessment (e.g., do you need a qualitative, quantitative, or geospatial outcome? What is the scope?)
- Tradeoffs among methods: geospatial vulnerability versus qualitative assessment, etc.
- How to incorporate uncertainty.
- Briefly introduce USFS R5 vulnerability assessment project.

9:00 – 11:20 am: Case study presentations (6 @ 15 min + 5 min Q/A each + 20 min break).
- Identify vulnerability and/or its components: exposure, sensitivity, and/or adaptive capacity
- Be geospatially explicit when possible
- Include your treatment of uncertainty
- As a group, these case studies will demonstrate different types of vulnerability assessment methods.

Resource (Defining Feature or Critical Attribute)	Speaker	Talk Title S/SN = southern/Sierra Nevada
Watershed hydrology	Joshua Viers – UC Davis	Frameworks for freshwater ecosystem management in the SN in an era of hydroclimatic change
Meadows/ Wetlands	Matt Brooks - USGS	History & Vulnerability of Meadows in the SN
Oak woodlands	Susan Antenen - CBI	Climate Vulnerability of Blue Oak Woodlands in the SSN
Forests	Mark Schwartz - UC Davis	Climate Vulnerability of Forests in the SSN
Pacific Fisher	Wayne Spencer - CBI	Competing Risks and Vulnerability of the SSN Fisher Population
Birds	Rodney Siegel -Institute for Bird Populations	A climate change vulnerability assessment for SN birds

11:20 – 12 noon: Interactive Group Mini-Exercise – (40 min).
Goal: The goal of the mini-exercise is to give participants a taste for determining what components of vulnerability are important when thinking about future objectives for the resource (i.e., a "Defining Feature" or "Critical Attribute") as well as strategies to achieve the objectives. How vulnerable is the resource? Where? Why? Are current objectives possible to achieve? If not, what should objectives be?

Process: At focal resource tables, each group will select a note-taker and work together to discuss and fill out a worksheet (see next page with example filled in). The note-taker is responsible for bringing the worksheet to the strategies session in the afternoon. It will be turned in at that time and be used as workshop results that will be synthesized into a post workshop report.

SESSION 3: VULNERABLITY MINI-EXERCISE

Defining Feature or Critical Attribute __Giant Sequoia_____ Table # _____

Names (optional)__**EXAMPLE ONLY**_____

1) **What are the critical components of vulnerability for the resource in the southern Sierra? Do not try to be exhaustive. Focus on what you consider to be the most important agents of change/stressors and the factors that make the "defining feature" or "critical attribute" exposed, sensitive, and adaptive.**

Exposure (stressors)	Sensitivity	Adaptive Capacity
Climate change and its effect on moisture availability: higher climatic water deficit that weakens trees and reduces the probability of successful regeneration and recruitment	Water requirements: Life stage & health of tree. Water availability: density of stand & competition with other vegetation for water; location (latitude, elevation, aspect, slope); groundwater sources	Genetics: some genotypes may be more resistant to drought, pathogens, or ozone than others. Migration potential: suitable soil conditions located upslope adjacent to current groves might allow for some amount of natural movement to future suitable environments
Climate change and its effect on fire regime: more very severe fires that kill mature trees	Resistance/resilience to severe fire: life stage & health of tree Fuel loads: natural variability & past management (below) Probability of ignition: location	Management can increase adaptive capacity by: 1) decreasing competition for water by other vegetation, 2) reducing fuels and facilitating conditions for regeneration to occur, 3) assisting migration to new climatically suited areas.
Fire suppression: reduced regeneration & increased probability of more severe fires	Past management: Fire return interval departure; soil & light conditions; fuel loads; ladder fuels	
Interactions: with effects of air pollutants, pathogens, & other stressors	Location: elevation, latitude	

2) **Given the vulnerability of this "defining feature" or "critical attribute" in the S. Sierra, are current management objectives feasible? Why or why not? (Don't try to be exhaustive. List 1-3 objectives and discuss those).**

Current objectives:

- Restoration of "natural" (preEuropean) fire regimes in giant sequoia groves
- Self-sustaining sequoia population w/ mixed size-class distribution in current grove locations
- Persistence of iconic giant sequoia trees.

No, moving into the future we cannot expect to be able to return to pre-European grove conditions, especially for community composition. A self-sustaining population, persistence of groves, and especially individual trees, in their current locations is likely impossible.

3) **If you answered no above, what should be the "retrofitted objectives" for this "defining feature" or "critical attribute"? (List as many as you want).**

Sequoias persist in the S. Sierra:

- Increase resistance & resilience of selected grove areas (high value &/or likely climate refugia) to maximize regeneration & minimize increase in mature tree mortality - such that groves persist in these select areas.
- Facilitate migration of sequoia to new areas with suitable conditions.