Lessons from 15 years of monitoring: SOD & FOREST DYNAMICS IN CALIFORNIA FORESTS

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BASELINE DATA & ECOLOGICAL IMPACTS

American Chestnut Foundation

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SOD DYNAMICS

Sources of heterogeneity

Geographic
Temporal
Disturbance

P. ramorum
Hosts
Environment
Sudden Oak Death
STATE-WIDE MONITORING
STATE-WIDE MONITORING
STANDARDIZED METHODOLOGY
Sudden Oak Death

SOD DYNAMICS

Geographic  Temporal  Disturbance

Sources of heterogeneity

P. ramorum

Hosts

Environment
HETEROGENEITY IN SOD DYNAMICS

- **Hardwood-dominated**
- **Conifer-dominated**

**Geographic**

**Temporal**

**Disturbance**

- Humboldt
- Big Sur
HETEROGENEITY IN SOD DYNAMICS

Multi-year disease progression

Sporulation → Infection → Host Mortality → Community Change

P. ramorum

Sudden Oak Death

Geographic → Temporal → Disturbance

Hosts → Environment
TIME-SCALES OF PATHOGEN & HOSTS

- **Big Sur**
  - Rainy Season Precipitation (mm)
  - Host Stems / ha

- **North Coast**
  - Rainy Season Precipitation (mm)
  - Dead Host Stems / ha
LONG-TERM CLIMATE VARIATION

North Coast May Precipitation Trends

El Niño rain and SOD establishment
LONG-TERM CLIMATE VARIATION

California Mean Annual Temperature Trends

Temperature (°F)

1895

1905

1915

1925

1935

1945

1955

1965

1975

1985

1995

2005

2015

95% Confidence Limits
Trend Line
Annual Temperature
HETEROGENEITY IN SOD DYNAMICS

- Geographic
- Temporal
- Disturbance

P. ramorum

Hosts

Sudden Oak Death

Environment
HETEROGENEITY IN SOD DYNAMICS

Geographic

Temporal

Disturbance

2008 Basin Fire Big Sur, CA
FUELS CHANGE AS SOD PROGRESSES

Early...

More crown fires, scorching, torching

Surface, ladder and aerial fuels
Various stages of fragmentation and decay

...Late

More logs, greater soil burn severity

TANOAKS CARRIED FLAMES

Photos by Howard Kuljian
UNEXPECTED IMPACTS SPILL OVER

Synergistic increase in redwood death

Metz et al. 2013. Ecology
IMPORTANCE OF LONG-TERM STUDIES

- Host responses vary along the strong **climatic and vegetation gradients** found across the predicted range of *P. ramorum*.
- **Inter-annual climate variance** is an overarching driver of disease dynamics and tree mortality.
- Ecosystems are moving toward **novel disturbance regimes** with complex interactions.
- A predictive understanding of disease dynamics and forest resilience **in the face of continued environmental change** requires investment in long-term study.
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