Conceptual aspects related to forest disturbance-damage reporting (Chapter 2 of planned report)

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Objective and out line for presentation

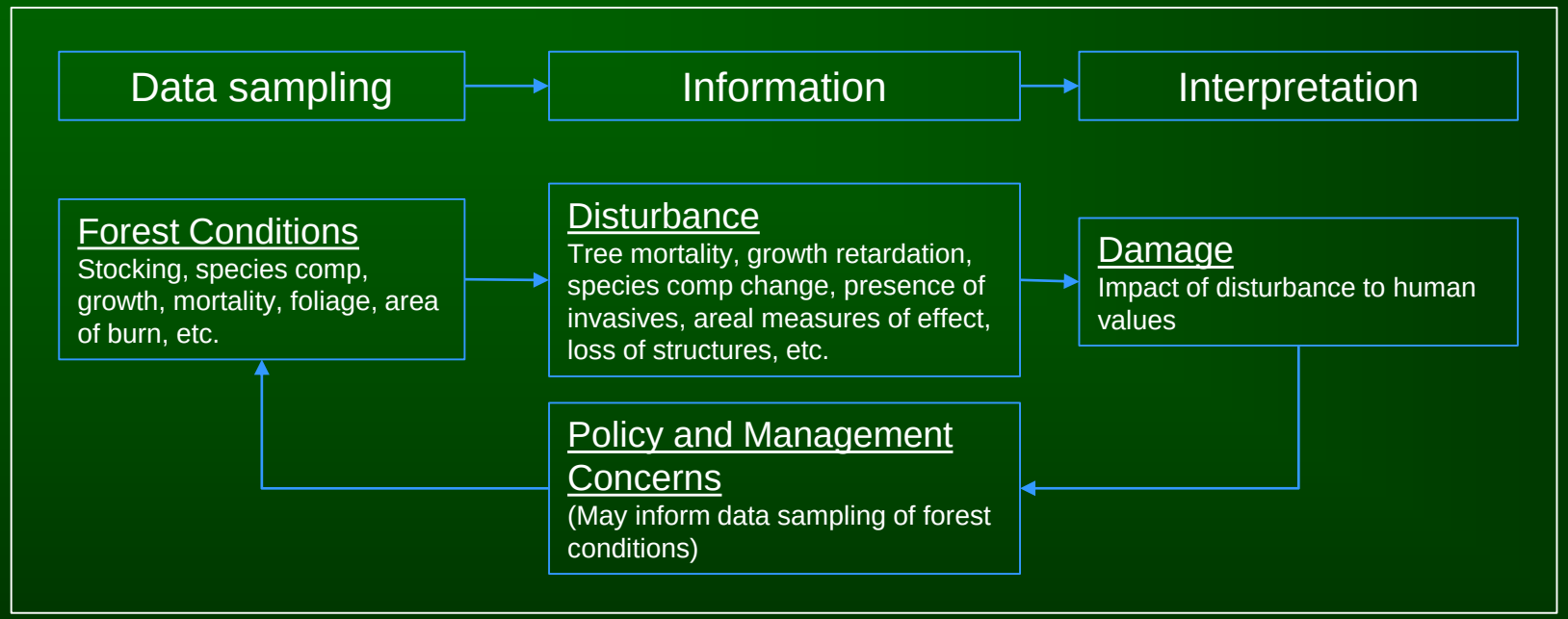
Objective:

Describe anticipated content of Chapter 2 of planned report ("Conceptual Issues and Framework")

Outline for presentation:

- Conceptual issues in defining "disturbance" and "damage"
- Issues and implications for measurement and interpretation
- Some specific examples from the USA (time allowing)

Conceptual Model



- Sampling is opportunistic vs. purpose-driven?
- Statistically consistent?
- Scale (temporal and spatial)?
- Absolute vs. relative to baseline or goal?
- Aggregation and "lowest common denominator effect"

Why is the distinction between disturbance and damage important?

"Disturbance" and "damage" are often used interchangeably in practice. However, this model stresses the fact that "damage" represents the application of human values.
"Disturbance" is (ideally) value neutral.

Purpose of forest disturbance/damage Reporting (conceptual)

- Identify sources and extent of harm
- Identify major departures from expected forest system conditions and dynamics (notably under Climate Change)
- Identify and trigger specific policies and management responses

Ultimately...

- Enhance understanding of forest ecosystems to guide policy and management action

General categorization of types of impacts from forest damage

Will be defined by human values and needs to be comprehensive—though not necessarily exhaustive:

- Aesthetics
- Biodiversity conservation and related values
- Other ecosystem values, outputs and services
- Direct economic loss (e.g. timber, recreation activity, property)
- Pecuniary (market impacts)
- Human health and safety

- Overarching or composite goals (sustainability & resilience)

Potential role of forest management in addressing forest damage

Before disturbance event

Disturbance event

After disturbance event

- **Precaution**—activity undertaken when the risk is imperfectly known (e.g. forest fuel reduction, fire-wise building materials)
- **Prevention**—specific action to avoid harm (e.g. initial fire suppression)
- **Combat**—response to active disturbance process (e.g. major fire response activities)
- **Restoration**—activities to promote recovery (e.g. replanting)
- **Adaptation**—long-term response to repeated disturbance events (e.g. land-use regulations governing building in fire prone areas)

Measurement and reporting (theoretical)

- Units of analysis (e.g. trees, hectares, animal populations, timber stocking, etc.)
- Reference levels (absolute levels, historical norms, management expectations, desired future condition)
- Complexity (multiple interacting disturbance causes, heterogeneity of disturbance agents, complex life-cycles and dynamics, sampling protocols)
- Statistical consistency or validity (comparability across time and space, causal attribution, random sample frame?)
- Social and organizational aspects of information gathering and reporting

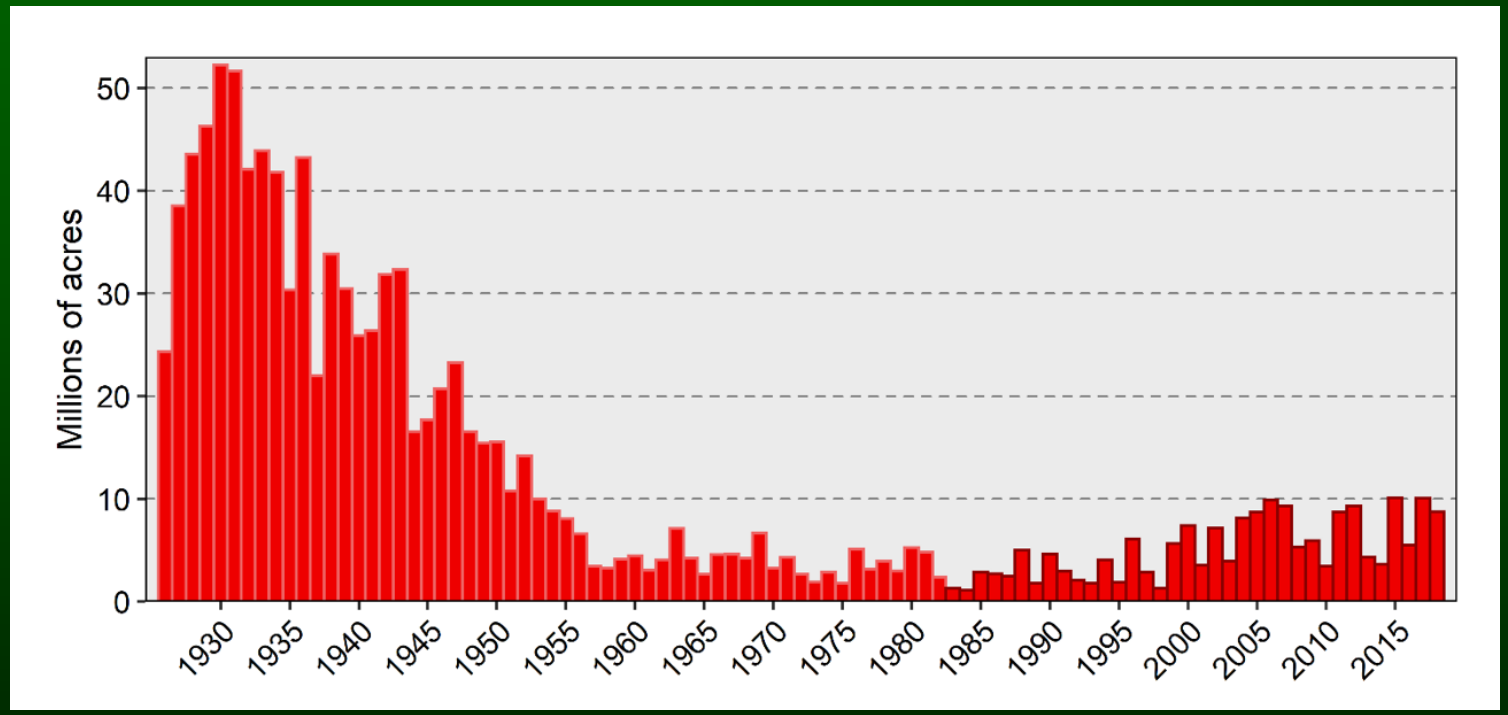
Approaches to measuring damage/disturbance

Short discussion of general categories to be further explored in subsequent chapters

- Large-scale forest inventories (NFIs)
- Dedicated inventories (e.g. ICP Forest)
- Targeted damage category inventories
- Targeted Surveys
- Remote Sensing
- Other data sources (e.g. fire suppression costs, insurance payouts)?

Example: Fire, Endemism, Departure and Dynamic Change

Total Acres Burned in USA From Montréal Process Abiotic Disturbance Indicator 3.b

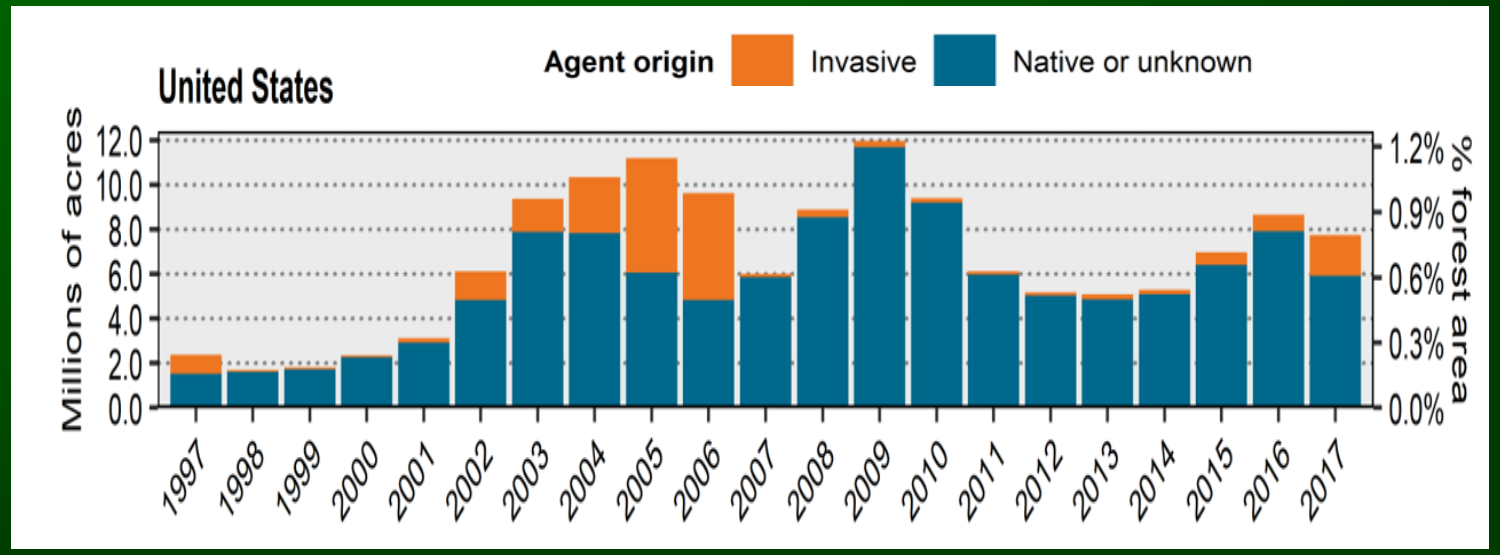


All lands, including grasslands. Data prior to 1983 were not compiled under the current reporting process; some information sources are unknown or unconfirmed.
Data source: National Interagency Coordination Center at the National Interagency Fire Center (NIFC).
Prepared by Frank Koch, USFS

- Fire is endemic to many forest ecosystems in the USA
- Fire suppression (a form of damage prevention) was applied extensively in last century resulting in major changes in forest structure, stocking and fuel loading
- Recent trends point to increasing fire extent and severity
- Is this the result of climate change? Management legacy? (almost certainly both)
- Note that interpretation of these data series will depend on divergent values associated with forests and fire

Example: measurement and reporting of insects and disease

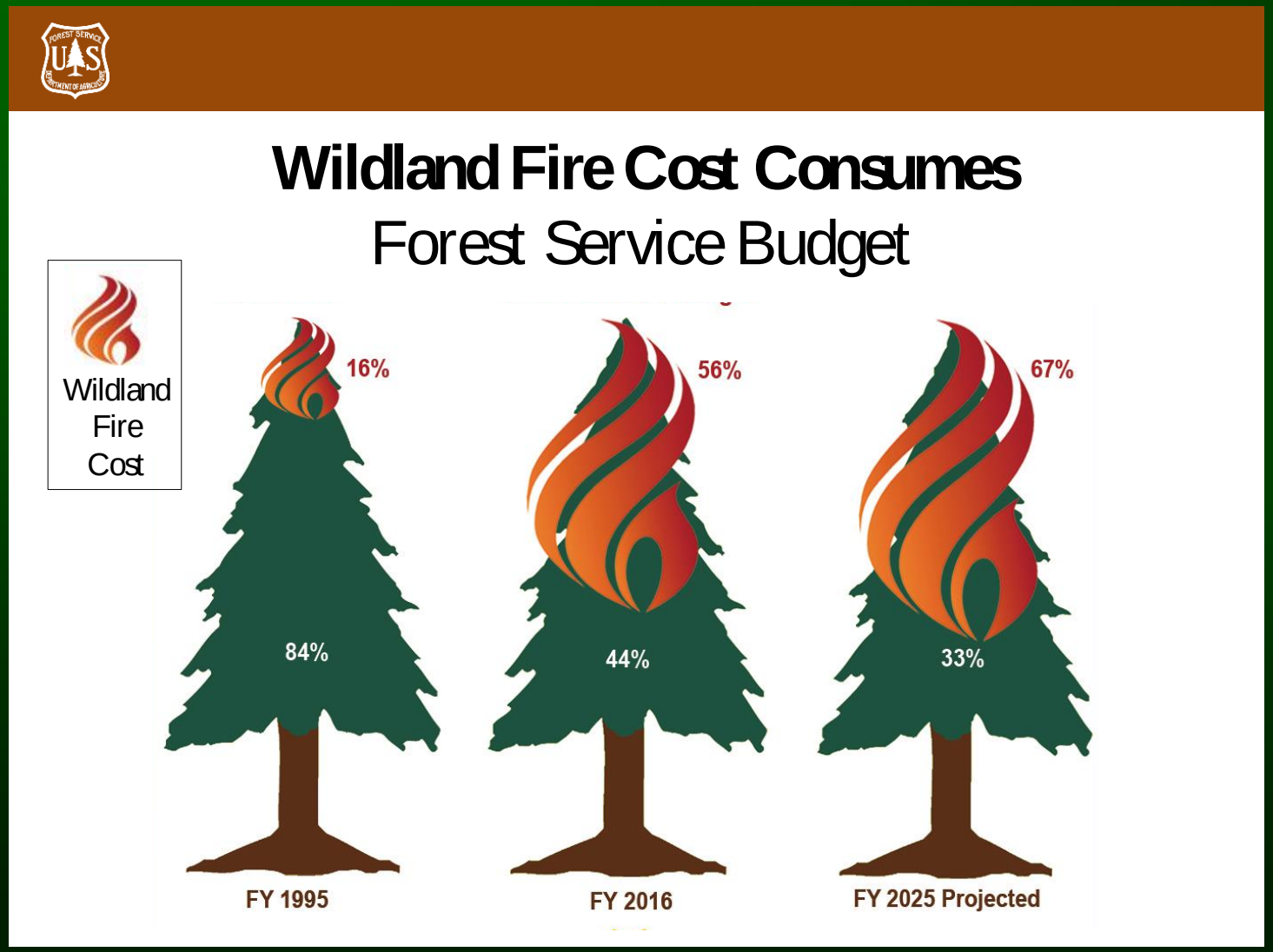
Insect and Disease Mortality in the United States



Forest acres with mortality caused by biotic agents, summarized annually from 1997 to 2017 by agent category (invasive vs. native/non-invasive). Hawaii is included in the totals for the Pacific Coast Region for years when data were reported (2013 and 2015-2017). Agent data source: Forest Health Protection, National Insect and Disease Survey Database. Prepared by Frank Koch, USFS

- Limited time series (baseline not established)
- Directed areal survey (fly where bugs are reported)
- Measurement directed to management response (not aggregate statistical reporting)
- Series often dominated by a single biological agent (e.g. MPB, fir engraver)

Example: impact of fire on US forest service budget



Putting out fires instead of investing in the future (literally)

The End

Thank You