

Approaches, Advantages, and Challenges to Early Restoration

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July 20, 2011

NRDA Overview

- Release of contaminants causes harm to natural resources – “injury”
- Harm to natural resources can cause a loss of benefits (or services)
 - e.g., biological, cultural
- Losses are addressed through restoration



Early Restoration

- Conduct injury determination and restoration planning in parallel (rather than sequentially)
- Consistent with regulations (DOI and OPA)
 - Assessment Phase (DOI)
 - Restoration Planning Phase (OPA)



Administrative Process (DOI)

- Preassessment Screen
- Assessment Plan
- Assessment Phase
 - Injury determination
 - Injury quantification
 - Damage determination
 - Restoration planning
 - Restoration and Compensation Determination Plan (RCDP)
- Report of Assessment
- Post Assessment Phase
 - Restoration Plan
 - Implementation of restoration



Advantages to Early Restoration

- Goal of NRDA is to restore injured resources in order to make the public whole
- Early restoration provides greater benefits (greater “credit”)



Advantages to Early Restoration (cont.)

- Coordination with response actions
 - Maximize efficiency, minimize costs
- May facilitate implementation of time-sensitive projects
- Provides a “road test” for cooperative assessments
- No commitment required



Approaches to Early Restoration

- Habitat Equivalency Analysis (HEA)
 - Make simplifying assumptions
 - Assume reasonable worst-case scenarios
 - Easier if injuries and damages are relatively small



Challenges to Early Restoration

- RPs typically seek (and deserve) credit for early restoration
- May be difficult to agree on amount and approach prior to completing the NRDA
 - How to quantify benefits and scale prior to determining and fully quantifying injuries?
- May be challenging if multiple parties involved



Challenges to Early Restoration (cont.)

- May be challenging for Trustees to prioritize projects prior to knowing full scope of
 - Injuries (type and spatial, temporal extent)
 - Remedial actions (benefits and timing)
- May be challenging for multi-agency Trustee groups to agree on early restoration priorities



Early Restoration: Summary

- There are advantages and challenges to early restoration
- May not be feasible in all cases
- Provides the possibility for early progress and success, without commitment requirements



Climate Change and NRDA and Restoration

What Climate Change Impacts Should Trustees Worry About?

- Sea level rise
 - Projections for 2100 range from 28 to 150 cm (or more)
 - Storm surges magnify the impacts of sea level rise
 - Impacts on coastal ecosystems, coastal populations, saltwater intrusion into freshwater systems, barrier islands



What Climate Change Impacts Should Trustees Worry About (cont.)?

- Temperature increase
 - Decrease in snow and ice cover
 - Changes in snowmelt timing
 - Changes in species distributions
 - Insect outbreaks



What Climate Change Impacts Should Trustees Worry About (cont.)?

- Changes in precipitation
 - Changes in timing and intensity
 - Intensification of drought cycles
 - Increased flooding risks
 - Changes in surface water and groundwater recharge/discharge



Potential Impacts of Climate Change on NRDAR

- Potential for increased releases of hazardous substances:
 - Pipelines, coastal terminals may be vulnerable to effects of sea level rise, storm surges
 - Flooding/erosion may expose previously sequestered chemicals
 - Capacity exceedences of treatment plants, other facilities



Potential Impacts of Climate Change on NRDAR (cont.)

- Changes in environmental pathways and exposure:
 - Alteration of surface water – groundwater interactions due to precipitation changes, sea level rise
 - Changes in spatial distribution of habitats
 - Alteration of spatial distribution of species



Potential Impacts of Climate Change on NRDAR (cont.)

- Increases in the effects of contaminant exposure:
 - Lower stream flow = higher contaminant concentrations
 - Organism biochemical response to contaminants affected by temperature, changes in salinity, other stressors
 - Contaminants may become more bioavailable (e.g. mercury methylation)



Potential Impacts of Climate Change on NRDAR (cont.)

- Impacts to restoration projects:
 - Restored habitat may become vulnerable to new invasive species as a result of temperature or precipitation changes
 - Sea level rise may result in loss of restored coastal wetlands

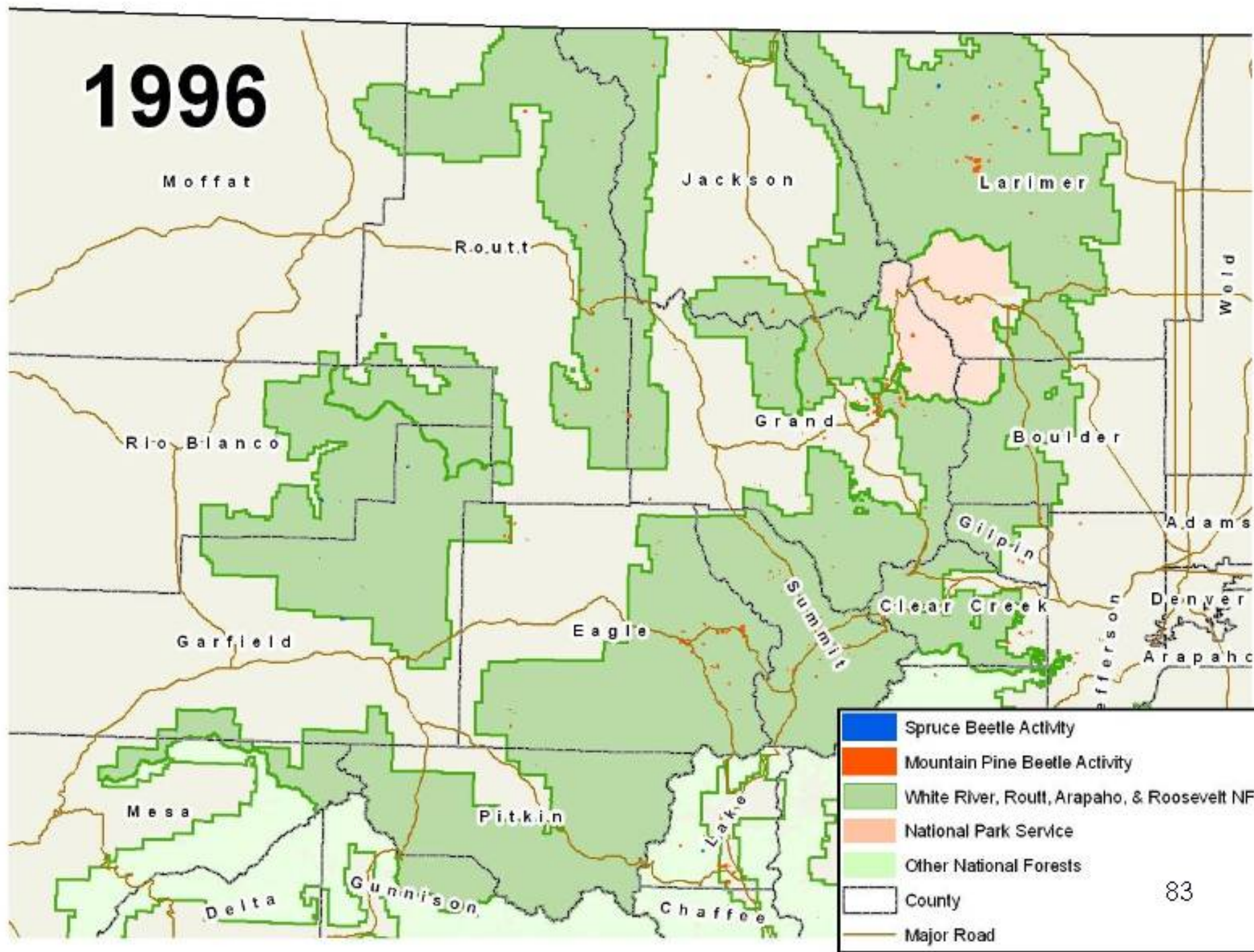


Example of Insect Outbreaks in Just 10 Years in Colorado

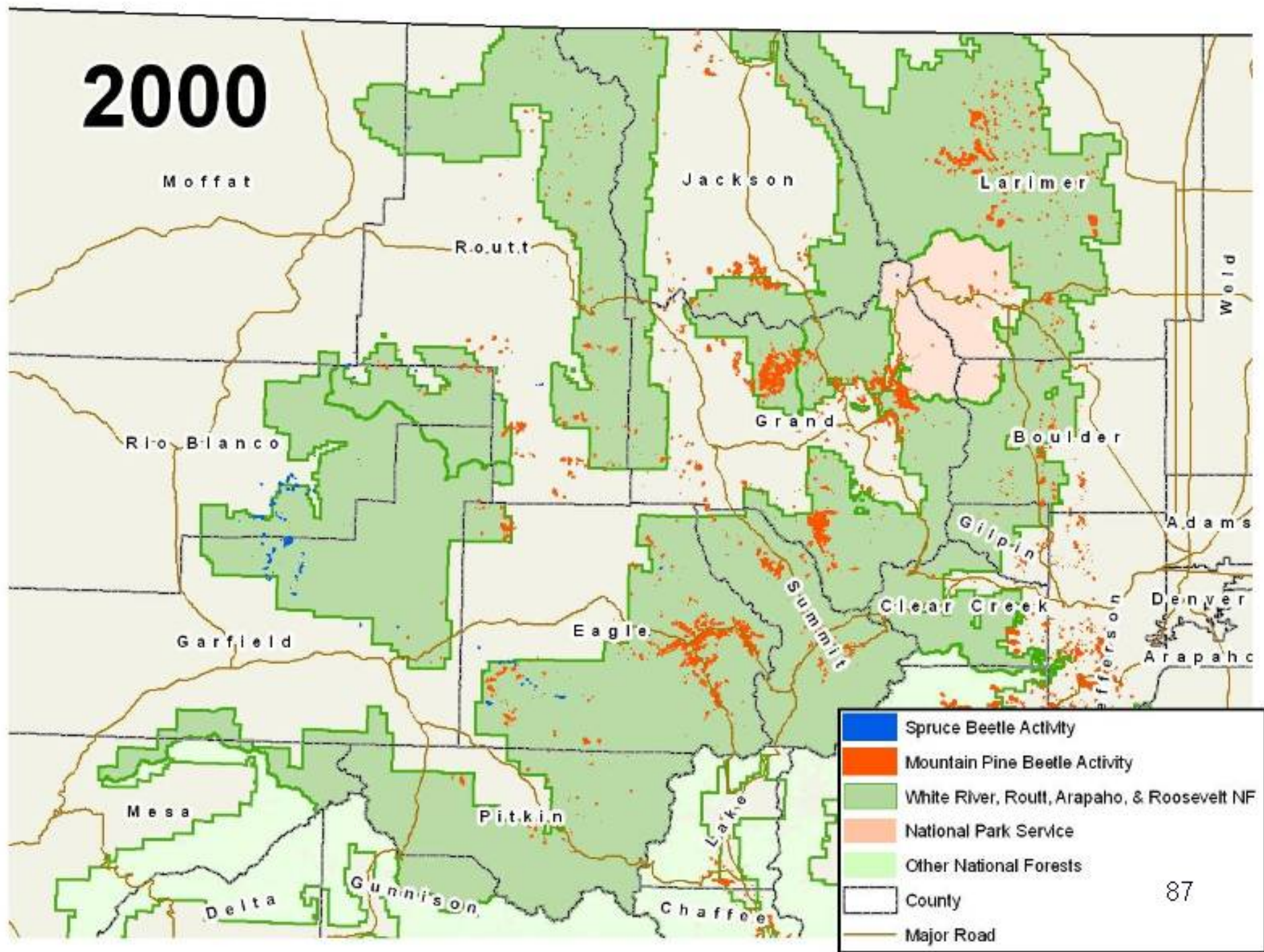
- Next set of slides shows how insect outbreaks can dramatically change a forest landscape in just 10 years
- Data source: USDA Forest Service aerial survey data



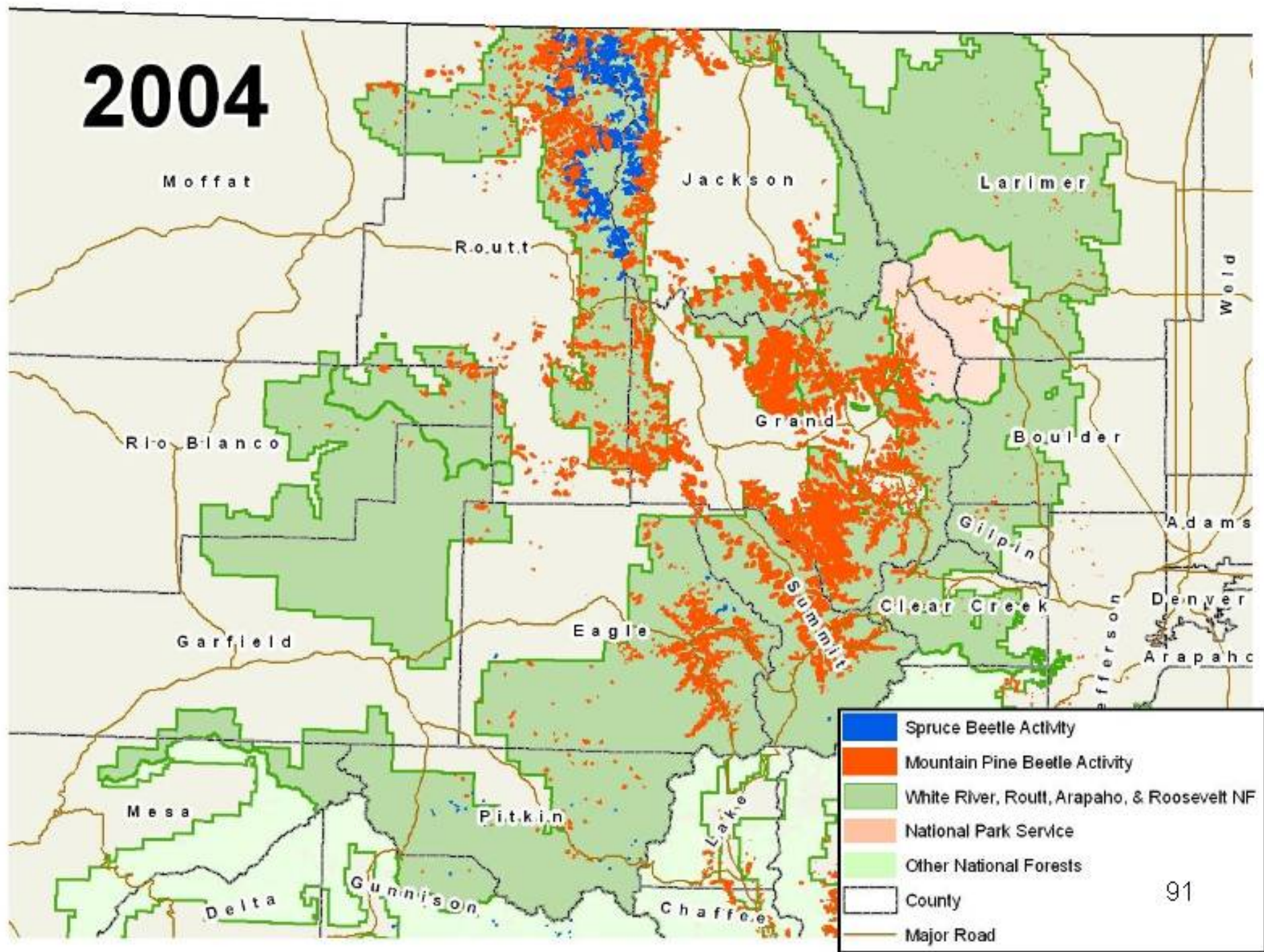
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2000

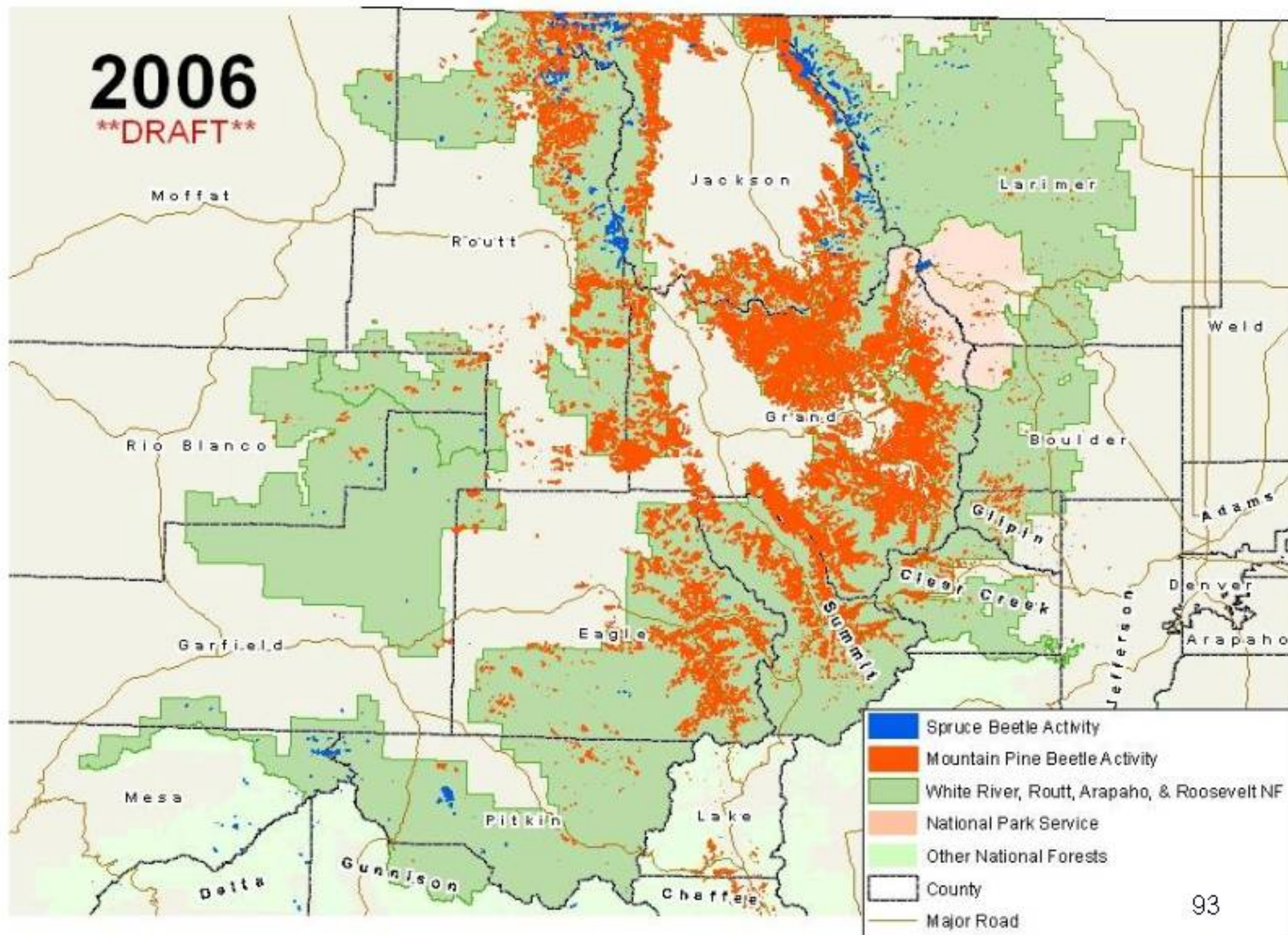


2004

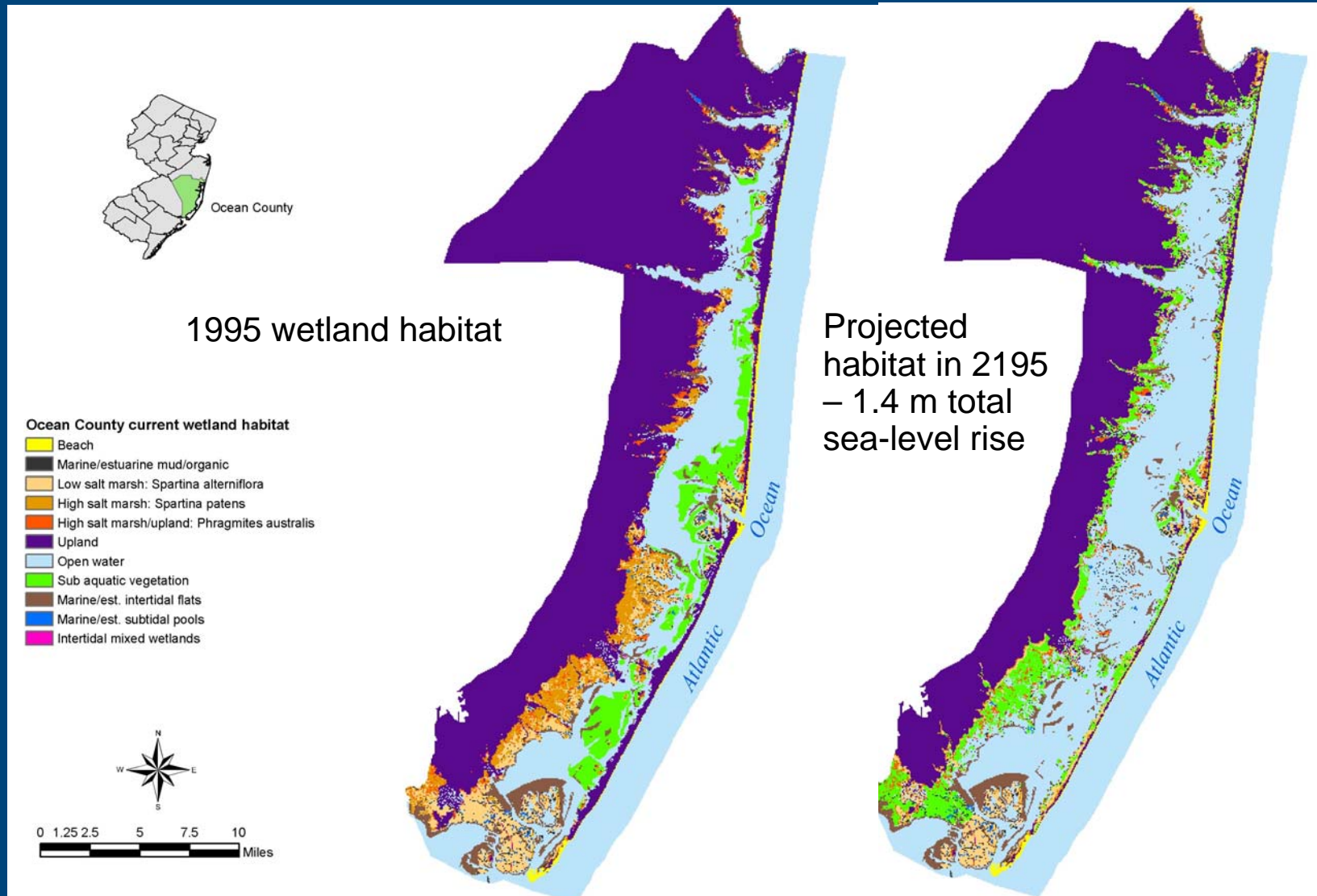


2006

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Example: Coastal Marsh Along the Mid-Atlantic Coast



Extra slides

Invasive Species Control

- Remove invasive species (exotics)
- Replant species of tribal importance
- Long-term management



Invasive Species Control

- Santa Clara Pueblo Tribe, New Mexico
- Restoration of watershed damaged by fire
 - Restored watershed with native plants and conifers (Douglas fir, blue stem willow, Douglas spruce)
 - Removed exotics: tamarisk, Siberian elm, and Russian olive



Habitat Improvement

- Stream channel restoration:
 - Restore stream channel sinuosity and complexity
 - Plant trees for shade
 - Incorporate woody debris
 - Enhances habitat for native species of fish



Habitat Improvement

- Confederated Tribes of the Warm Springs Reservation of Oregon



Habitat Improvement

- Restoration of salmonid spawning and fishery
- Plants of tribal importance
 - Longstem bullrush
 - Native chokecherries
- Cultural uses – tribal youth program: sweatlodge along creek
- Capacity building
 - Tribal members involved in construction process

