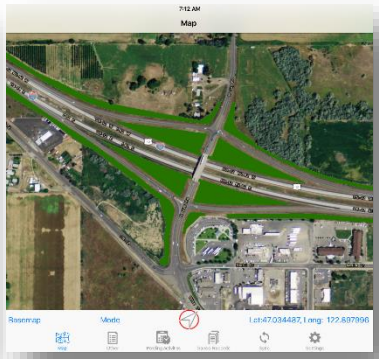
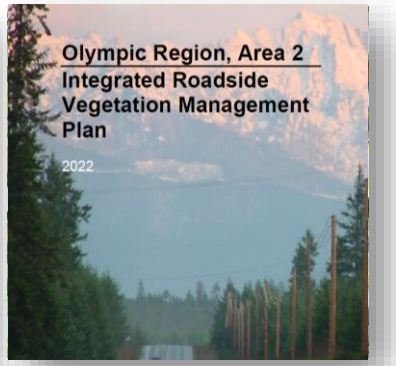
Roadside Fire Risk and Prevention Strategies

National Research Strategy and Lessons Learned in the Pacific Northwest

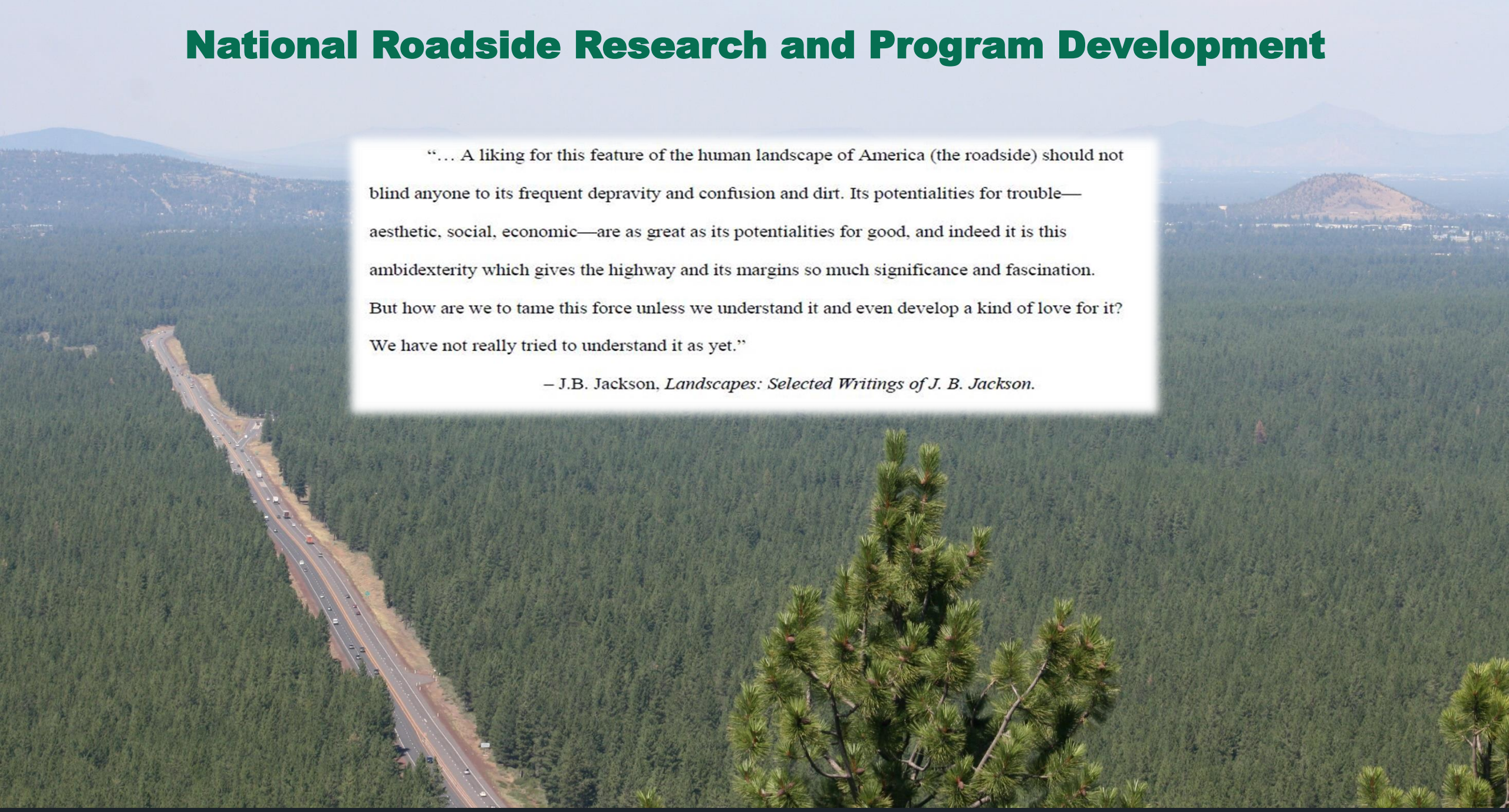




Raymond Willard, PLA
State Roadside Asset Manager
ray.willard@wsdot.wa.gov

Transportation Research Board Webinar
Sponsored by the Standing Committee on Roadside Maintenance Operations (AKR20)
July 7, 2022

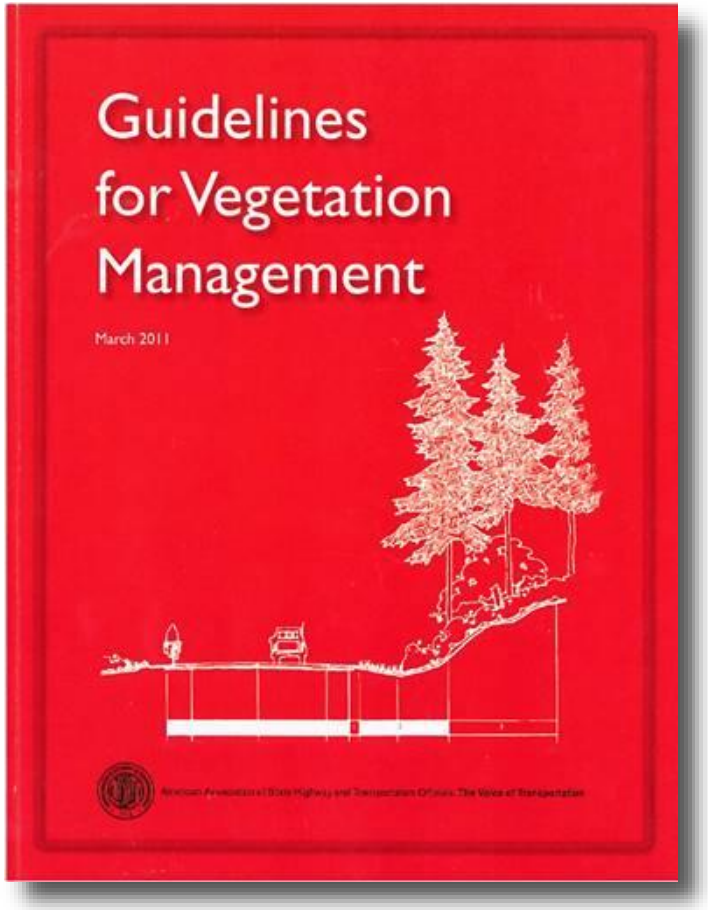
National Roadside Research and Program Development

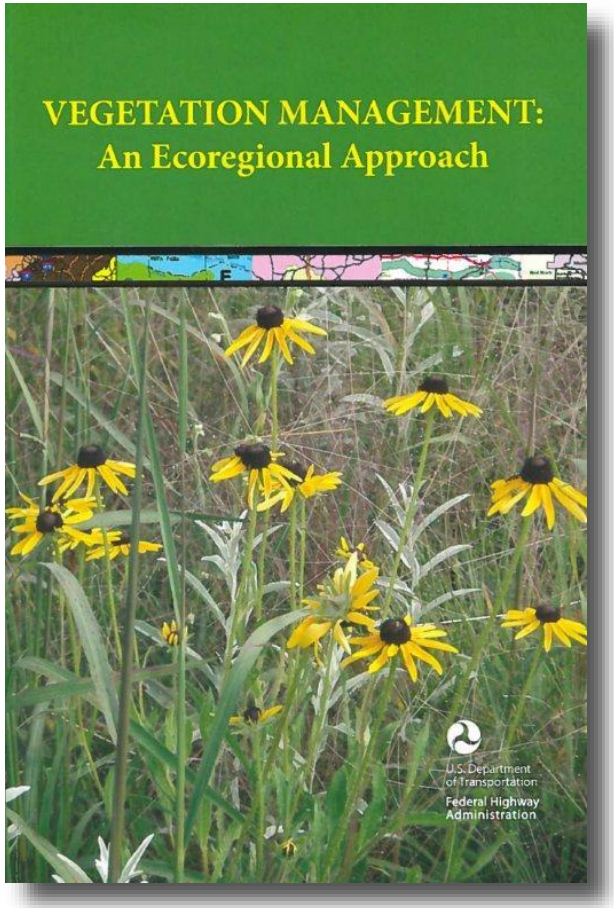


"… A liking for this feature of the human landscape of America (the roadside) should not blind anyone to its frequent depravity and confusion and dirt. Its potentialities for trouble—aesthetic, social, economic—are as great as its potentialities for good, and indeed it is this ambidexterity which gives the highway and its margins so much significance and fascination. But how are we to tame this force unless we understand it and even develop a kind of love for it? We have not really tried to understand it as yet."

– J.B. Jackson, *Landscapes: Selected Writings of J. B. Jackson.*

National Roadside Research and Program Development





https://sites.google.com/view/trbmocommittee

National Roadside Research and Program Development

NCHRP 14-47 Tools and Technology for Roadside Asset Management

Guidance for the state DOTs on how to develop and integrate Roadside Landscape Asset Management Systems as part of each agency's other Transportation Infrastructure Asset Management Systems. This will provide a consistent national template for the state DOTs to map their inventory of required roadside management treatments, explain and measure the condition (state of repair) of their roadsides, and then demonstrate the funding and resources needed to fully restore and then continue to maintain each state's roadsides in a state of good repair. These systems will also serve as a basis for the annual planning and tracking of maintenance accomplishments and efficiencies.

Defining a "State of Good Repair" for Transportation Roadsides

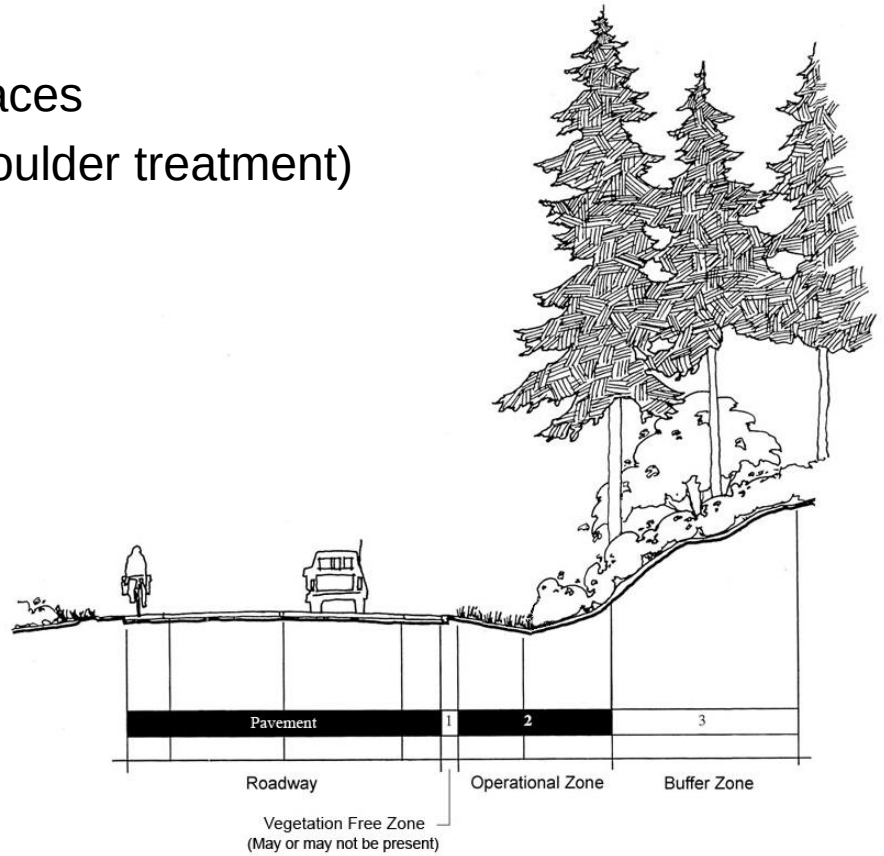
Designing, Constructing, and Maintaining Sustainable, High-Performance Roadsides

Management of the land used for building and maintaining highway corridors utilizes three distinct vegetation control strategies:

Industrial Strategy = Pavement, Structures, and other hardened surfaces
Residual Herbicide Application (Bare ground shoulder treatment)

Agronomic Strategy = Routine Seasonal Maintenance Actions
Hedging/Edging/Mowing
Blanket Treatments
Irrigation may be required
Predictable Maintenance Cost/Budget

Ecological Strategy = Integrated Vegetation Management (IVM)
Precise/Selective/Properly-Timed Treatments
Multi-Year/Site-Specific Treatment Plans
Monitoring Results and Adjusting Treatments
Maintenance Costs Go Down over Time



Vegetation Free Zone
Gravel Shoulder
Maintained in designated locations using mechanical and chemical methods for sight distance, to improve drainage, and to preserve pavement and roadside hardware.

Operational Zone
Low Vegetation
Maintained with mowing and IVM treatments for sight distance, safe errant vehicle recovery, and weed control.

Buffer Zone
Native/ Natural Vegetation
Where adequate right of way exists, maintained using IVM to encourage desirable vegetation in self-sustaining plant communities.

Research on Roadside Fire

Source of Ignition (Highway Traffic) + Fuel (Roadside Vegetation) = Wildfire

Research on Roadside Fire

Wildfire + Fire-Break (Vegetation-free Highway Corridor) = Fire Control

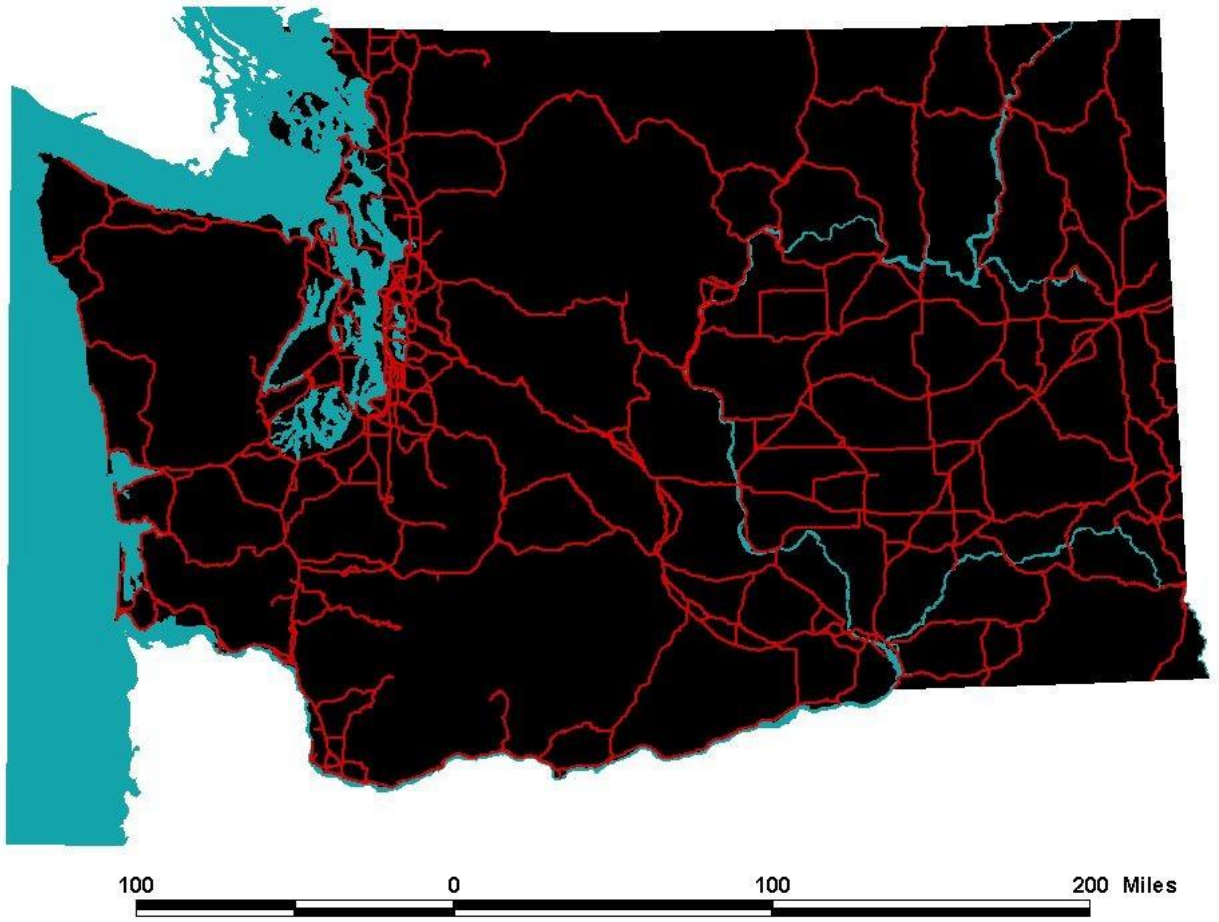
Research on Roadside Fire

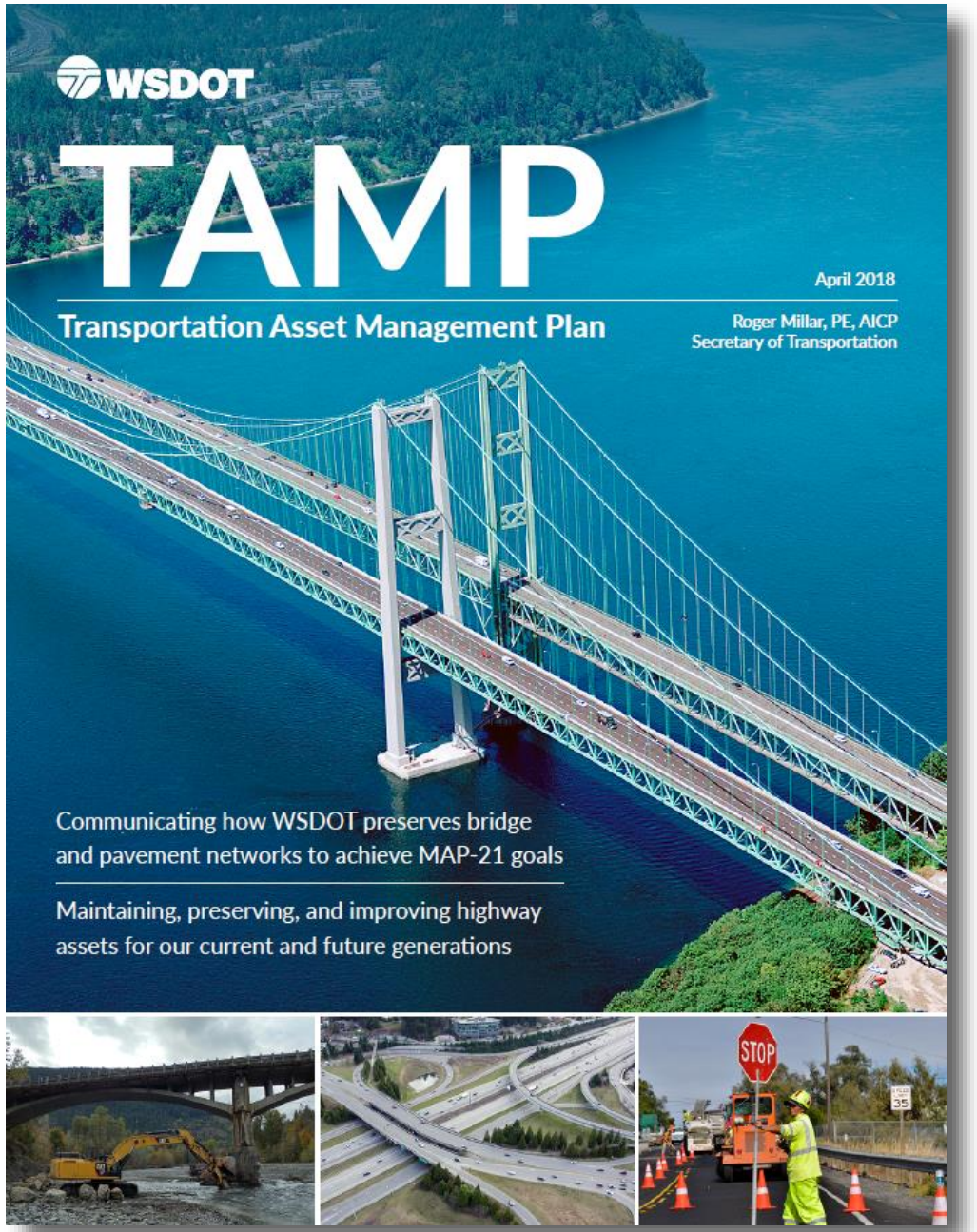
Wildfire + Fire-Break (Vegetation-free Highway Corridor) = Fire Control

Facts about Washington's Transportation Roadside Assets

- **Annual Roadside Maintenance Expenditures – $20 million (including Litter Control)**
- **Corridor Miles – 7,000**
- **Vegetated Shoulder Miles – 16,500**
- **Acres of Unpaved Right of Way – 100,000**
- **Acres of Pavement – 60,000**

100,000 acres is equivalent to 75,757 football fields laid end to end

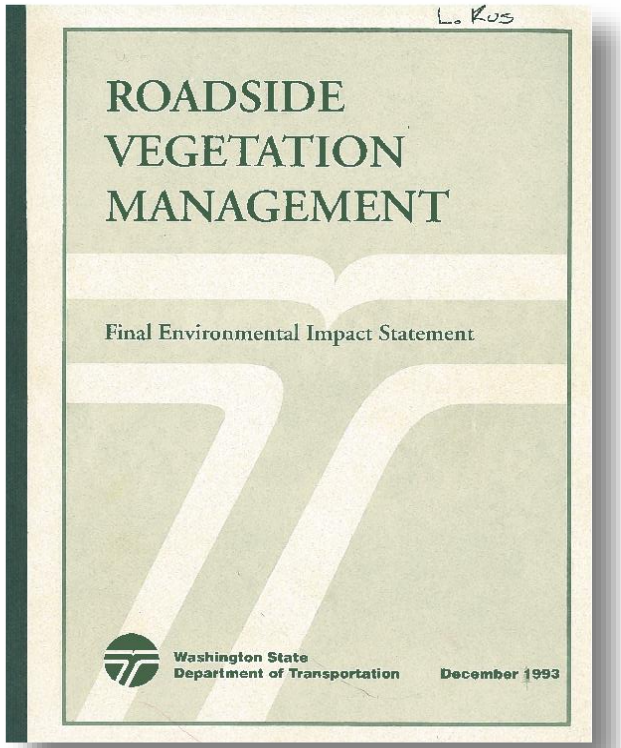


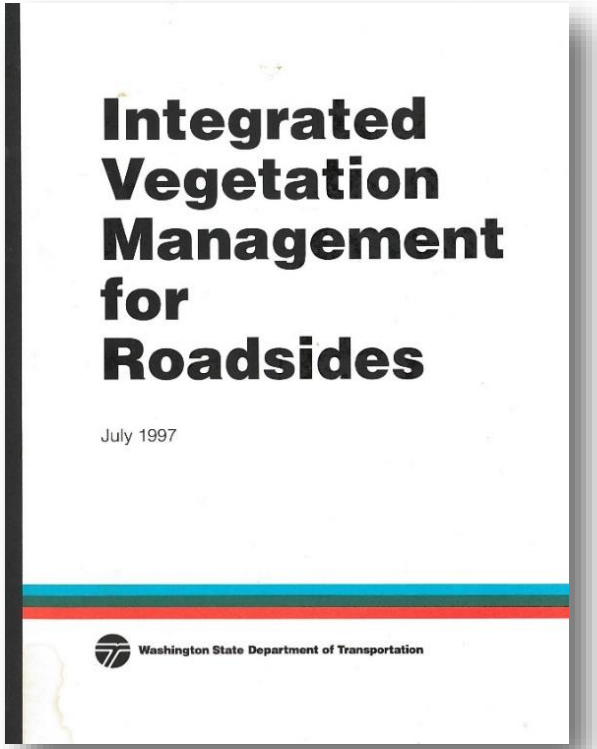


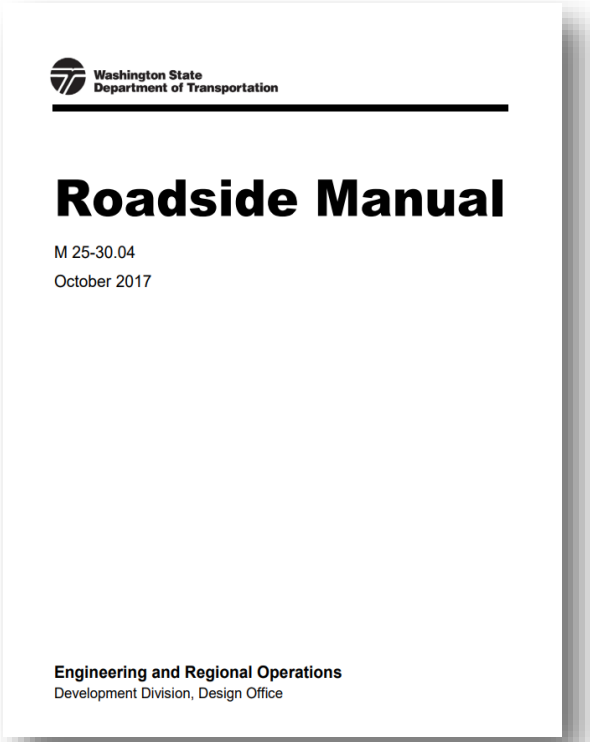
WSDOT

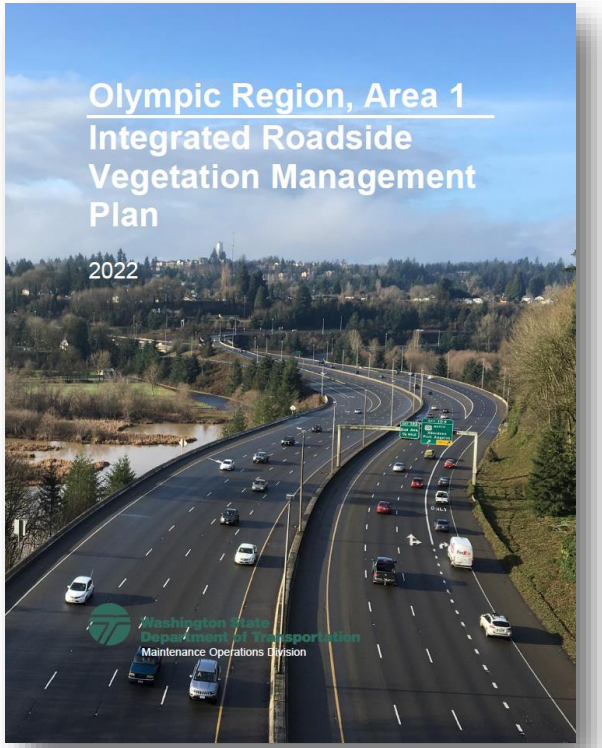
Roadside Land Use Executive Summary
Asset Management Document

Washington State Roadside Research and Program Development









www.wsdot.wa.gov/maintenance/roadside

Washington State Roadside Research and Program Development

Assessment of Alternatives in Roadside Vegetation Management

by

Kristina Hill, Ph.D.
Associate Professor

Richard Horner, Ph.D.
Research Associate Professor

Department of Landscape Architecture
University of Washington, Box 355734
Seattle, Washington 98195

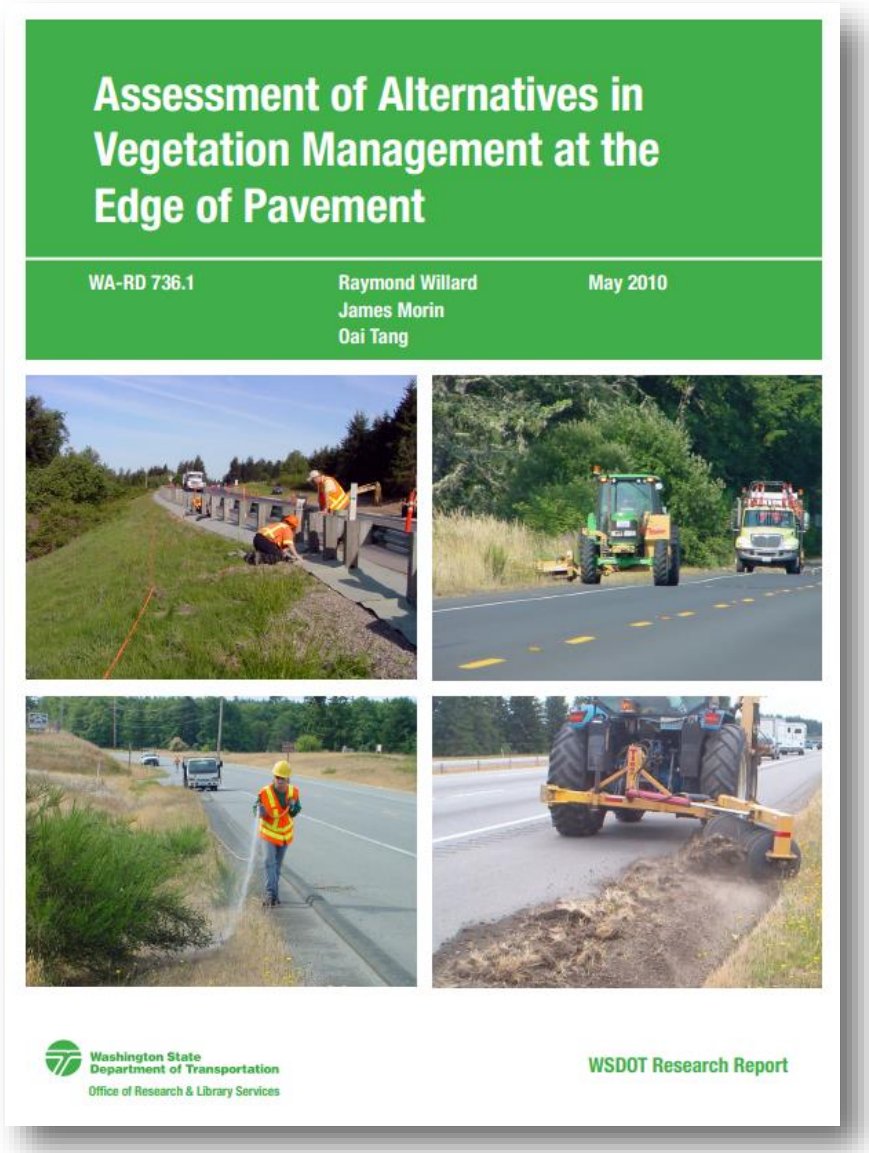
Washington State Transportation Center (TRAC)
University of Washington, Box 354802
1107 NE 45th Street, Suite 535
Seattle, Washington 98105-4631

Washington State Department of Transportation Technical Monitor
Ray Willard, Roadside Maintenance Program Manager
WSDOT Headquarters Maintenance Office
Olympia, Washington

Prepared for

Washington State Transportation Commission
Department of Transportation
and in cooperation with
U.S. Department of Transportation
Federal Highway Administration

September 2005



https://www.digitalarchives.wa.gov/do/CE357ACD9DFF19CC407CBC21086CECCE.pdf

Planning for a State of Good Repair on Highway Roadsides

Planned Roadside Vegetation Treatments	Geographic Inventory of Workload	Tracked Accomplishments
Linear Edge Treatments  	Residual Herbicide Application Spray Zone 1 Reference Edge Mowing/ Trimming Mowing Zone 2 Reference	Acres Sprayed Acres Mowed/ Trimmed/Sprayed
Spot Treatment for Noxious Weed Control 	Class A Noxious Weed Control Priority EDRR Noxious Weed Planned Treatment All other Noxious Weeds Noxious Weed Control General Reference	Acres Sprayed and Acres Manual/Mechanical
Large Area Treatments  	Zone 3 Restoration Zone 3 Nuisance Reference Formal Landscape Maintenance Landscape Maintenance Reference	Acres Sprayed and Acres Manual/Mechanical Total Acres Maintained

VISUALIZING ROADSIDES AS TRANSPORTATION ASSETS

WSDOT owns and maintains approximately 100,000 acres of unpaved land.
As part of the agency's overall Transportation Asset Management Plan, WSDOT has classified and mapped roadside land use areas as shown on this poster.
This geographic inventory of six specific roadside land use types provides the basis for budgeting, planning, tracking, monitoring, and evaluating maintenance actions, and for measuring agency performance.

FORMAL LANDSCAPE

Only maintained along some urban freeway corridors and around Safety Rest Area facilities. Plantings are designed as public amenities, and constructed to be routinely maintained in a set condition which provides for both safe highway operation and safety for controlled public access.

AVERAGE COST/ACRE/YEAR $7,759

TOTAL ACRES 1,100

ZONE 1

Vegetation-free edge, maintained as required where shoulders are designed for stormwater sheet flow.

AVERAGE COST/ACRE/YEAR $200

TOTAL ACRES 6,500

ZONE 2

Low-growing vegetation, maintained throughout the system, width is determined by highway design and local site constraints.

AVERAGE COST/ACRE/YEAR $239

TOTAL ACRES 33,500

ZONE 3

Present where there is extra right of way beyond the outside edge of Zone 2, between divided highway alignments, and at freeway interchanges.

AVERAGE COST/ACRE/YEAR $18

TOTAL ACRES 55,000

RESOURCE CONSERVATION AREAS

Relatively undisturbed natural areas adjacent to the right of way, purchased for preservation during construction of the interstate system. These areas require little to no maintenance.

AVERAGE COST/ACRE/YEAR $0

TOTAL ACRES 820

ENVIRONMENTAL MITIGATION

Sites maintained for 10+ years, in response to highway construction environmental permit requirements (Once permit requirements are fully met, sites are classified and maintained as part of Zone 3).

AVERAGE COST/ACRE/YEAR $4,600

TOTAL ACRES 2,000

Factors of Increasing Wildfire Risk in the Landscape

Factors of Increasing Wildfire Risk in the Landscape

Factors of Increasing Wildfire Risk in the Landscape

Factors of Increasing Wildfire Risk in the Landscape

Factors of Increasing Wildfire Risk in the Landscape

Factors of Increasing Wildfire Risk in the Landscape

Factors of Increasing Wildfire Risk from Traffic

Factors of Increasing Wildfire Risk from Traffic

Factors of Increasing Wildfire Risk from Traffic

Factors of Increasing Wildfire Risk from Traffic

Factors of Increasing Wildfire Risk from Traffic

Factors of Increasing Wildfire Risk from Maintenance Treatments

Factors of Mitigated Wildfire Risk from Maintenance Treatments

Factors of Mitigated Wildfire Risk from Maintenance Treatments

Factors of Mitigated Wildfire Risk from Maintenance Treatments

Factors of Mitigated Wildfire Risk from Maintenance Treatments

ROADSIDE FIRE RISK & PREVENTION STRATEGIES

Ken Murray, Senior Landscape Architect

Caltrans

Fire Prevention and Response Along Roadsides

- *1 – Vegetation Treatment Strips*
- *2 – Defensible Space*
- *3 – Fuels Reduction*
- *4 – Hurdles*
- *Internal*
- *External*
- *5 – Partner with other State Agencies to maximize resources and expertise*
- *6 – Adjacent Property Owners*
- *7 – GIS*

Vegetation Treatment Strips

- *Roadside edge treatment*
- *Primary reason for edge treatment?*
- *Who performs the work?*
- *Who prepares the VegCon Plan?*
- *Purpose of edge treatments?*
- *What is the secondary objective of edge treatments?*
- *Budget Change Proposal for increased resources for addressing fire risk*
- *Mowing schedules*
- *Local Partners*

Defensible Space

- *Creation of space*
- *Site Analysis*
- *Selection of Materials*
- *Primary Function*
- *Partnerships*
- *Service Contracts*

Caltrans

Fuels Reduction

- *Removal of Vegetation*
- *Understory*
- *Defensible Space*
- *Invasive Species Impacts*
- *Partnering*
- *Other types of fuels reduction options*

Hurdles

- *Internal*
  - *Management*
  - *Resources*
  - *Conflicting Priorities*
- *External*
  - *Advocacy Groups*
  - *Degradation of forest health*
  - *Permitting Compliance*
  - *Regulatory Agencies*
  - *Requests to approve new products*
  - *Political Inquiries*

Internal Hurdles

- *What successful strategies have you implemented to increase awareness of the importance of vegetation management for your management team?*

Internal Hurdles

- *What successful strategies have you implemented to address the lack of equipment, material, resources for keeping crews up and running?*

Internal Hurdles

- *What successful strategies have you implemented to address the conflict with other maintenance activities (Snow Removal, time of year)?*

External Hurdles

- *Do you have advocacy groups trying to force the elimination of pesticides in your vegetation management activities?*

External Hurdles

- *What if anything has your State done to try and address the degradation of Forest Health?*

External Hurdles

- *Are you required to report on your vegetation management activities as part of your NPDES (National Pollutant Discharge Elimination System) Permit compliance?*

External Hurdles

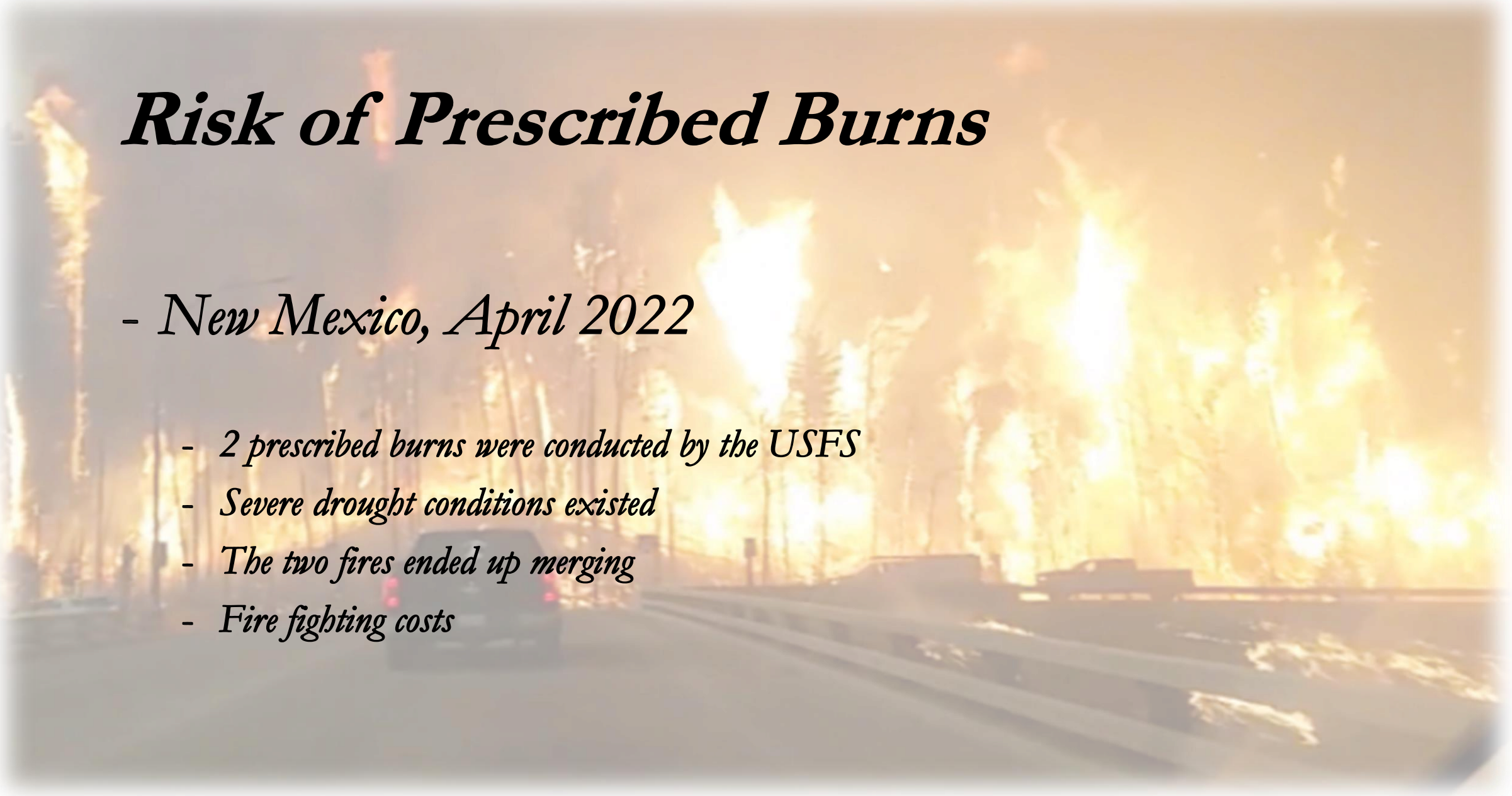
- *Do you need permission from Regulatory Agencies to implement fire as a tool for vegetation management?*

External Hurdles

- *Have you experienced pressure from private companies to use products that haven't been tested/approved by your Department?*

External Hurdles

- *Are you required to address requests from your legislative body about the use of products/materials for addressing fire abatement activities?*



Risk of Prescribed Burns

- New Mexico, April 2022

- *2 prescribed burns were conducted by the USFS*
- *Severe drought conditions existed*
- *The two fires ended up merging*
- *Fire fighting costs*

Evolution of Forest Management

- Poor Forest Management Practices
- Elimination of Fire
- Buildup of Understory
- Evolution of plants with fire
- Do Humans know Better?

Evolution of Forest Management

Old Growth Forest

Newer Growth Forest

Fire as a Tool to Control Vegetation

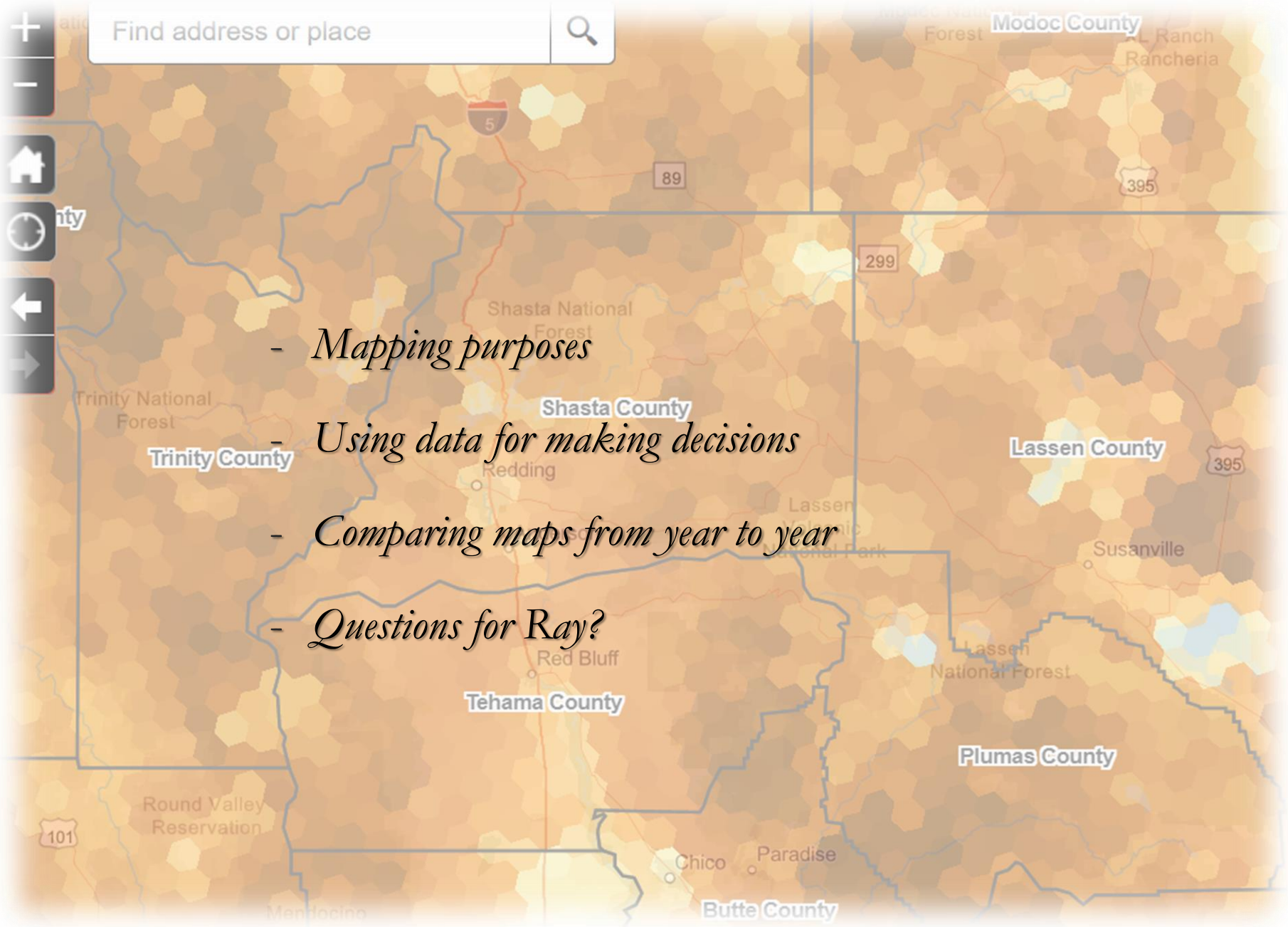
- *Fire can be a useful and successful tool when properly managed*
  - *Prescribed burns*
  - *Climatic conditions*
  - *Equipment*
  - *Mowing Activities*

Partner with other State Agencies to maximize resources and expertise

- *Caltrans focuses the following activities with working with other State Agencies:*
  - *Encroachment permit*
  - *Traffic control services*
  - *Stump removal*
  - *Letter of Consent*
  - *Environmental Support*

Adjacent Property Owners

- *Form for Vegetation Management*
- *Form for Fencing Repair*
- *Weed Management Areas (WMA's)*
- *Working with Local Agencies*
- *Adjacent Land Uses*



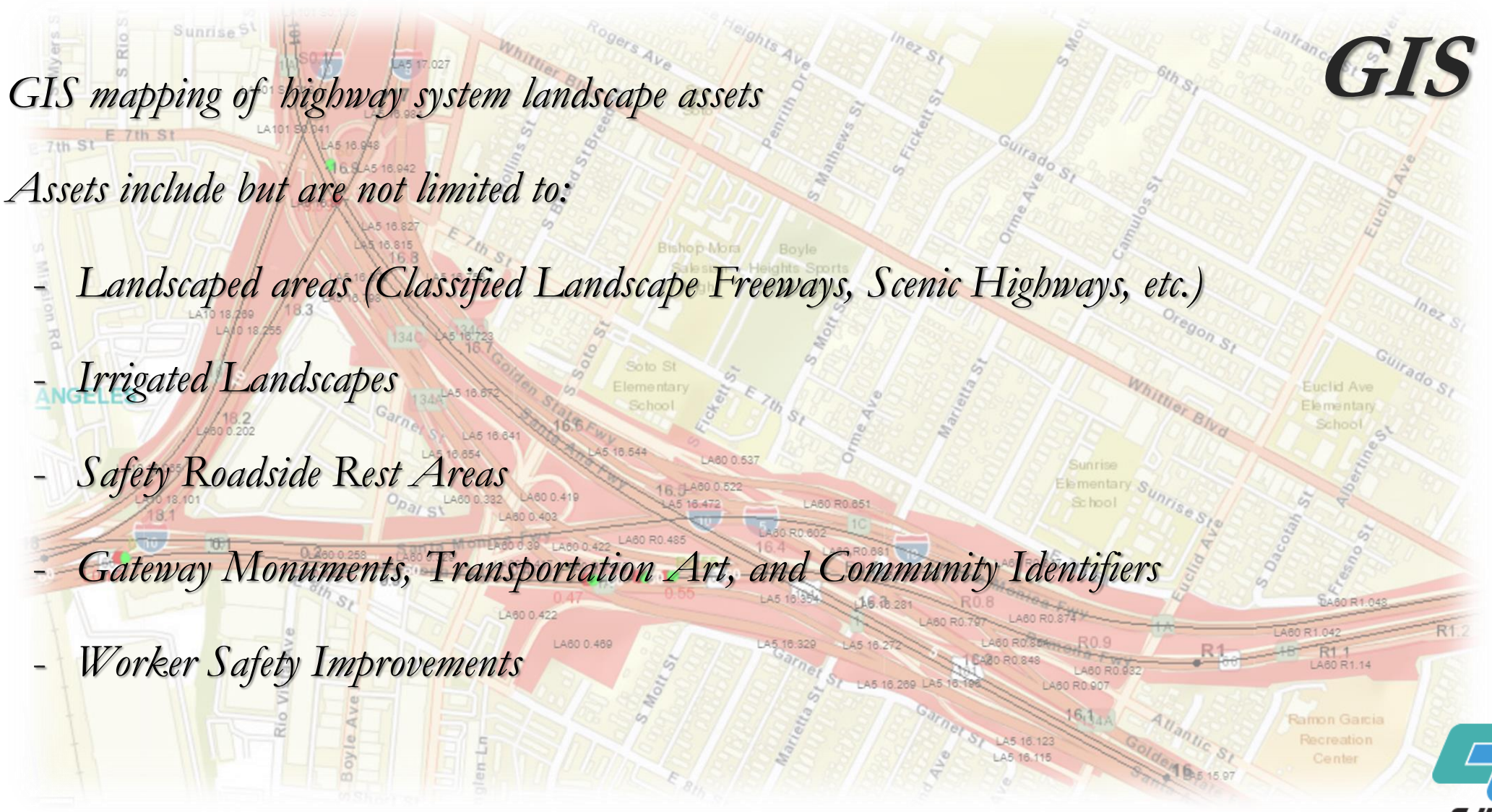
GIS

- *Mapping purposes*
- *Using data for making decisions*
- *Comparing maps from year to year*
- *Questions for Ray?*

Caltrans

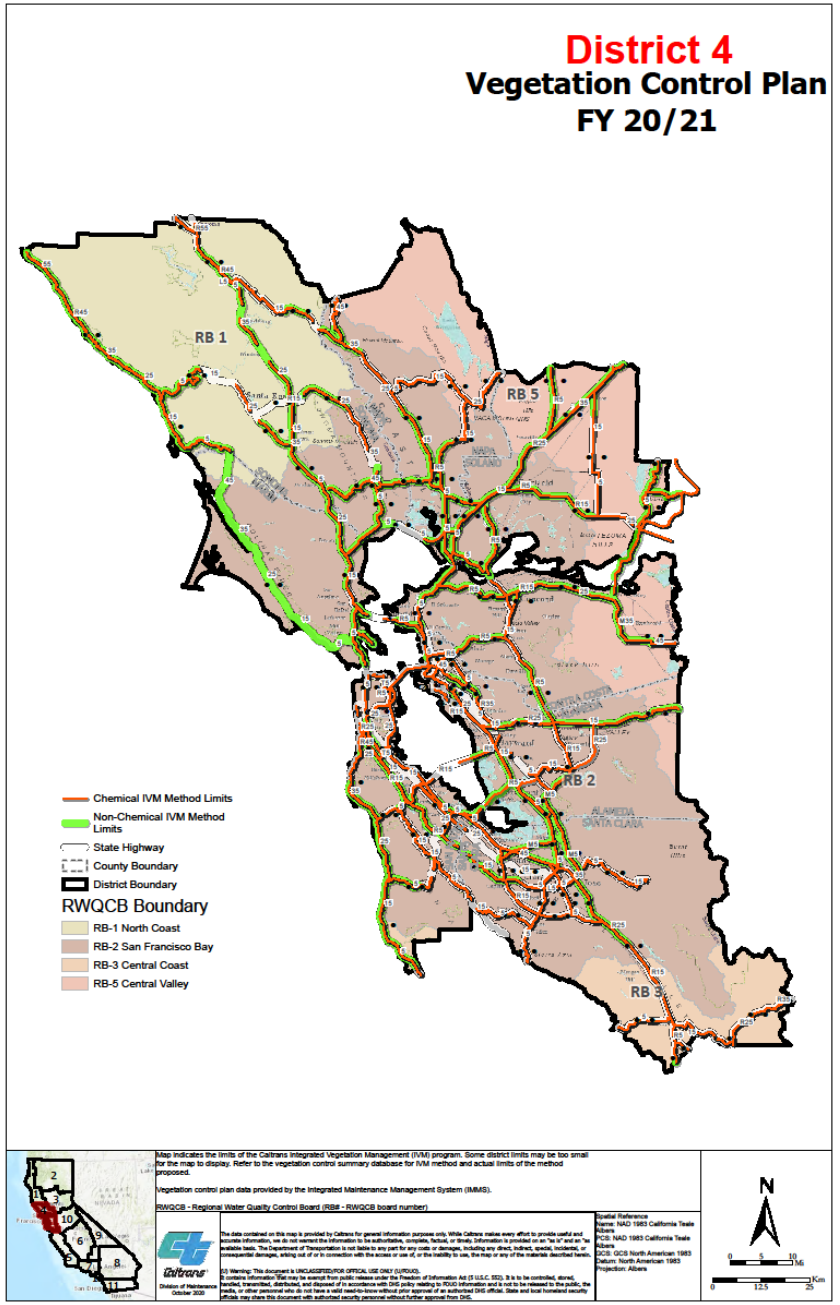
GIS

- *GIS mapping of highway system landscape assets*
- *Assets include but are not limited to:*
  - *Landscaped areas (Classified Landscape Freeways, Scenic Highways, etc.)*
  - *Irrigated Landscapes*
  - *Safety Roadside Rest Areas*
  - *Gateway Monuments, Transportation Art, and Community Identifiers*
  - *Worker Safety Improvements*



GIS

- *GIS mapping of Vegcon Plan*
- *Required for Permit Compliance*

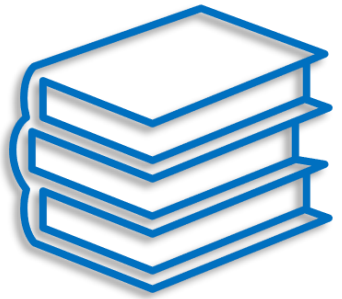


Lessons Learned

- *Road Edge Treatments*
- *Elimination of Chemical Vegetation Control*
- *Why use Chemical Vegetation Control?*
- *Positive outcomes of Integrated Vegetation Control*
- *Partnering for Vegetation and Fire Control Activities*
- *Be on the Same Page*
- *Incidence Response*

Caltrans

Research



- *We have conducted a preliminary investigation on the Surface Applications of Fire Retardants (2020)*
- *Due to the results of the Preliminary Investigation, Caltrans is now conducting a pilot project on potential effects of long-term fire-retardant use on biological resources (2022/23)*
- *We have researched the use of various plant species for mitigating stormwater quality runoff in the roadside (2013)*
- *We have researched Using Green Infrastructure in Highway Roadside Stormwater Management (2018)*
- *Safety and Stability of Stormwater Infiltration BMPs Adjacent to Roadsides (2015)*
- *We are conducting research on Traffic Modeling of Potential Emergency Wildfire Evacuation Routes (2021)*

Caltrans