



# ***The Oregon Bridge Program: How modelling established the context***

Presentation to the Fourth Oregon Symposium  
On Integrating Land Use and Transportation Models  
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# Presentation Outline

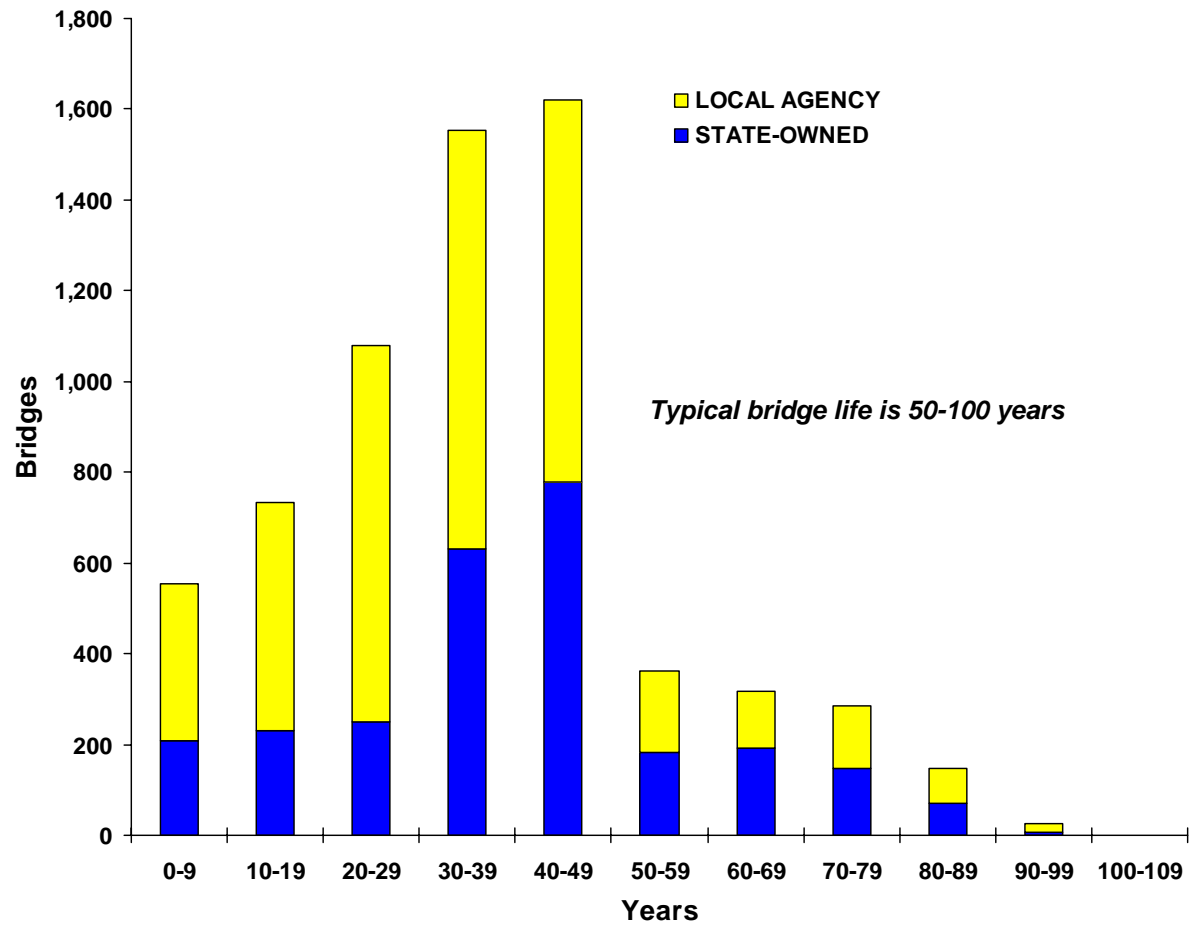
- Oregon's bridge problem and the realization that integrated modelling could help the development of a solution
- Bridge issues and how the model was used to address them
- How the results of integrated modeling influenced bridge policy



***Oregon's bridge problem  
and the realization that  
integrated modelling could  
help the development of a  
solution***



# Aging bridges





## Realization of a problem

- 1997 – No emergency repairs, 42 load restrictions
- 2000 – 13 emergency repairs, 49 load restrictions
- 2001 – 18 emergency repairs, 68 load restrictions
- 2001 - Wide incidence of reinforced concrete deck girder cracking found
- 2002 – Bridge Strategy Task Force

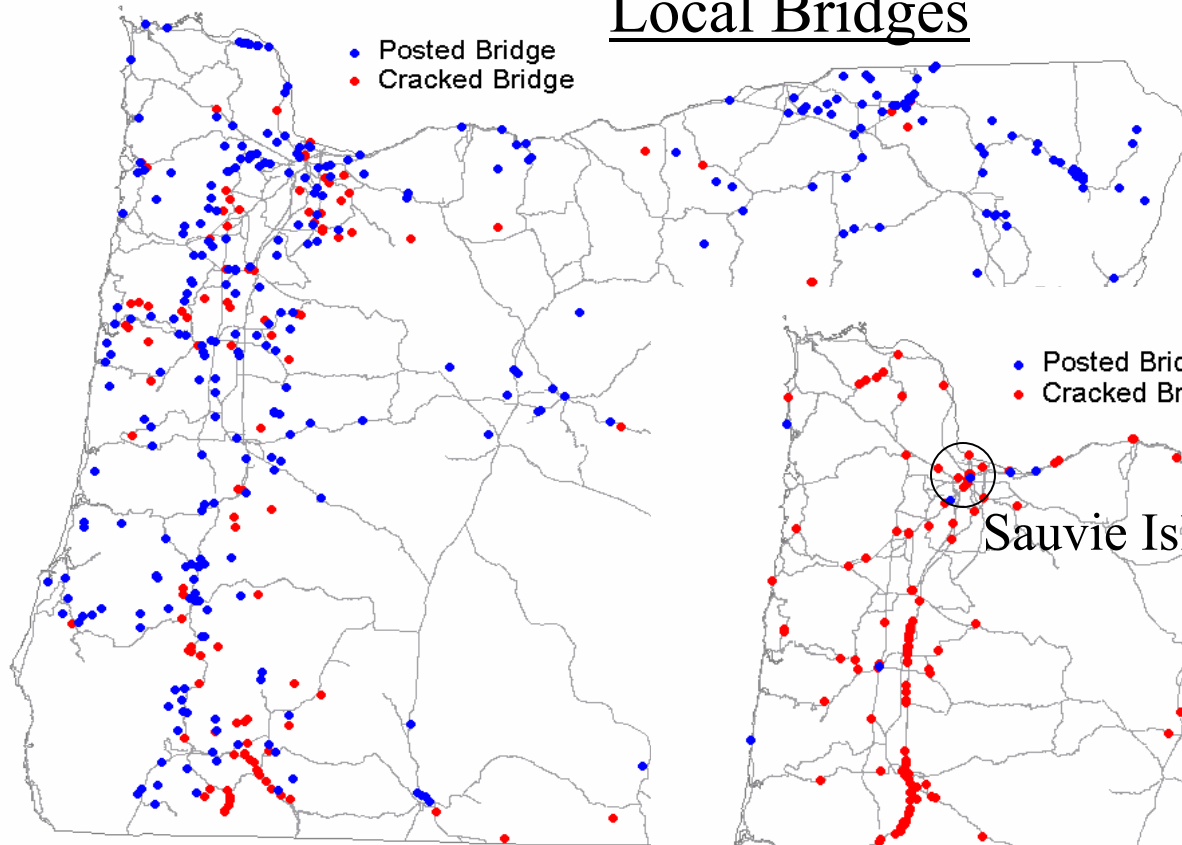


# Realization that the bridge problem is an economic and livability problem

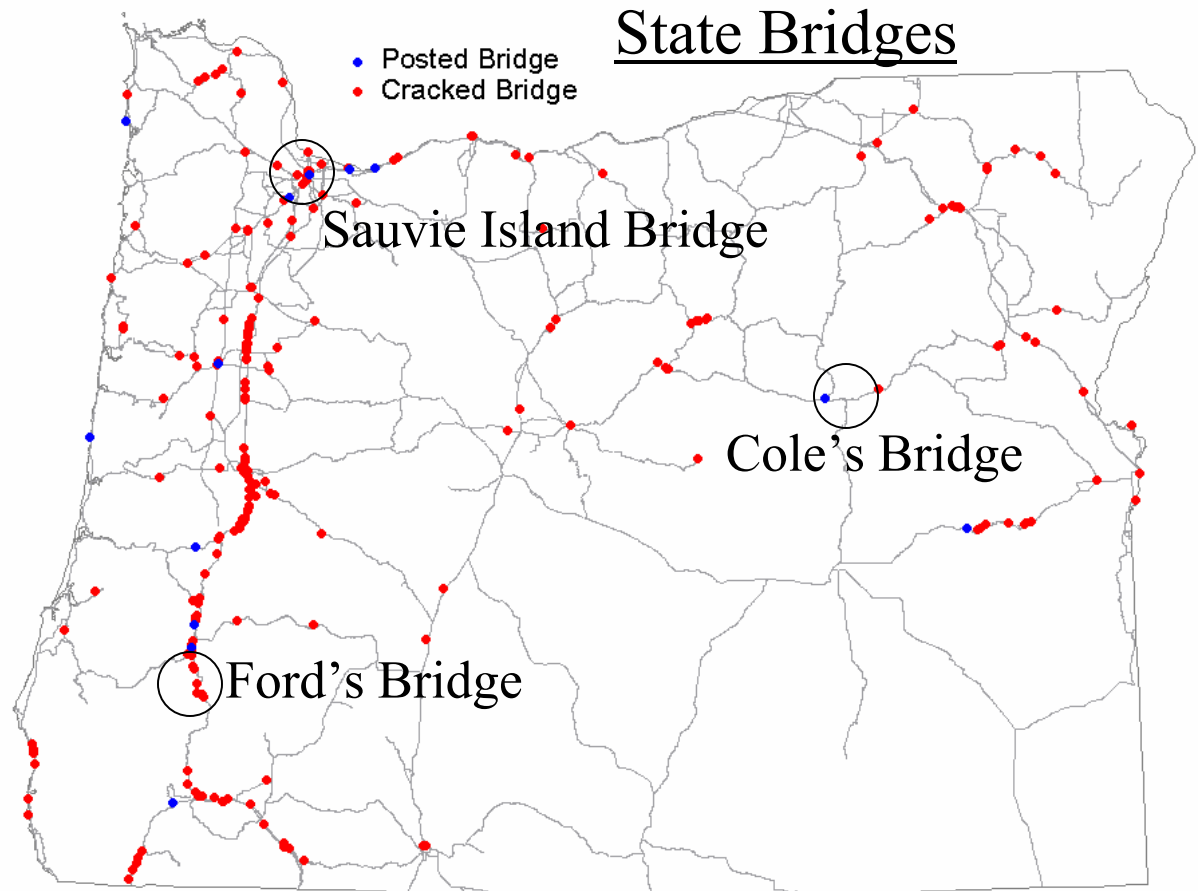
- A large portion of cracked bridges are located on interstate highways
- A large percentage of goods in Oregon (~30%) are carried by trucks over 80,000 pounds
- Heavy trucks are particularly important for moving resource-based commodities
- Emergency truck detours adversely affect communities

# ***Large Numbers of Bridges are Affected***

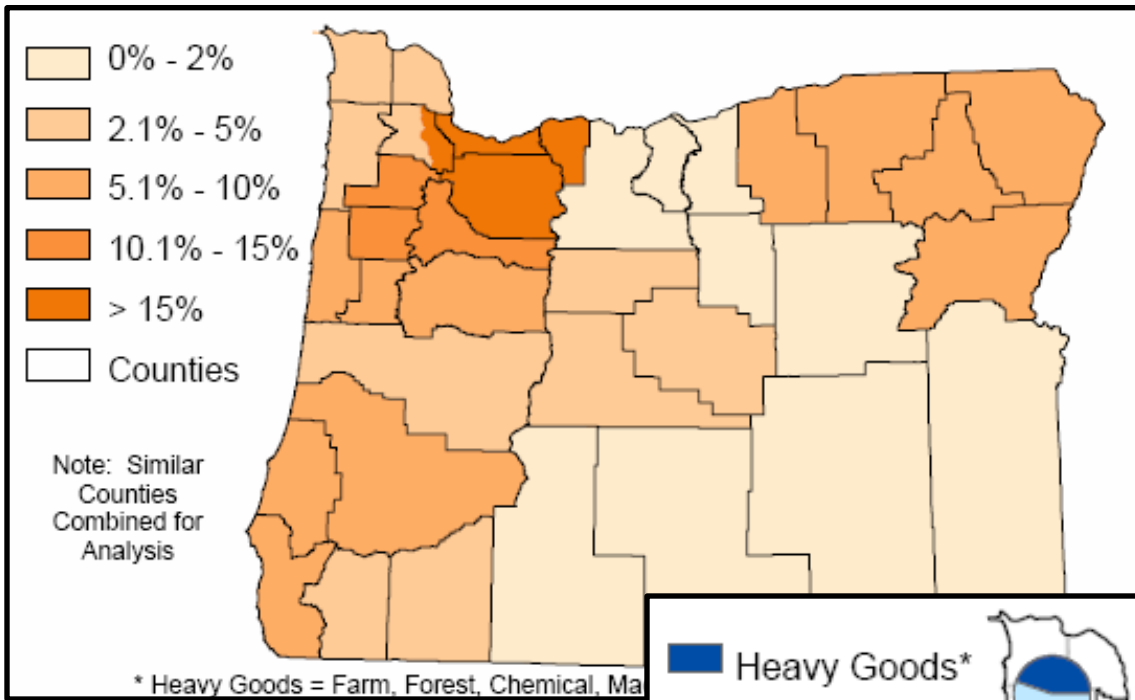
## Local Bridges



## State Bridges

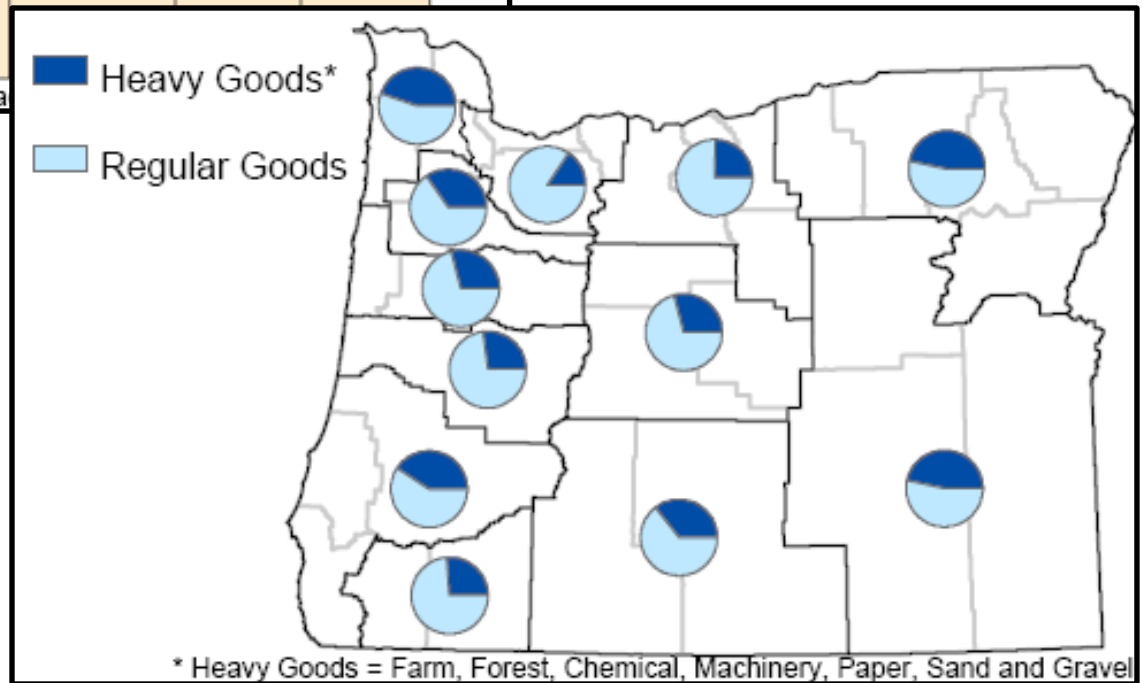


\* Medium and high crack density



Proportion of Statewide Heavy Goods Movement

Proportion of Regional Heavy Goods Movement







# Realization that the Statewide Integrated Model can help evaluate the problems and develop a solution

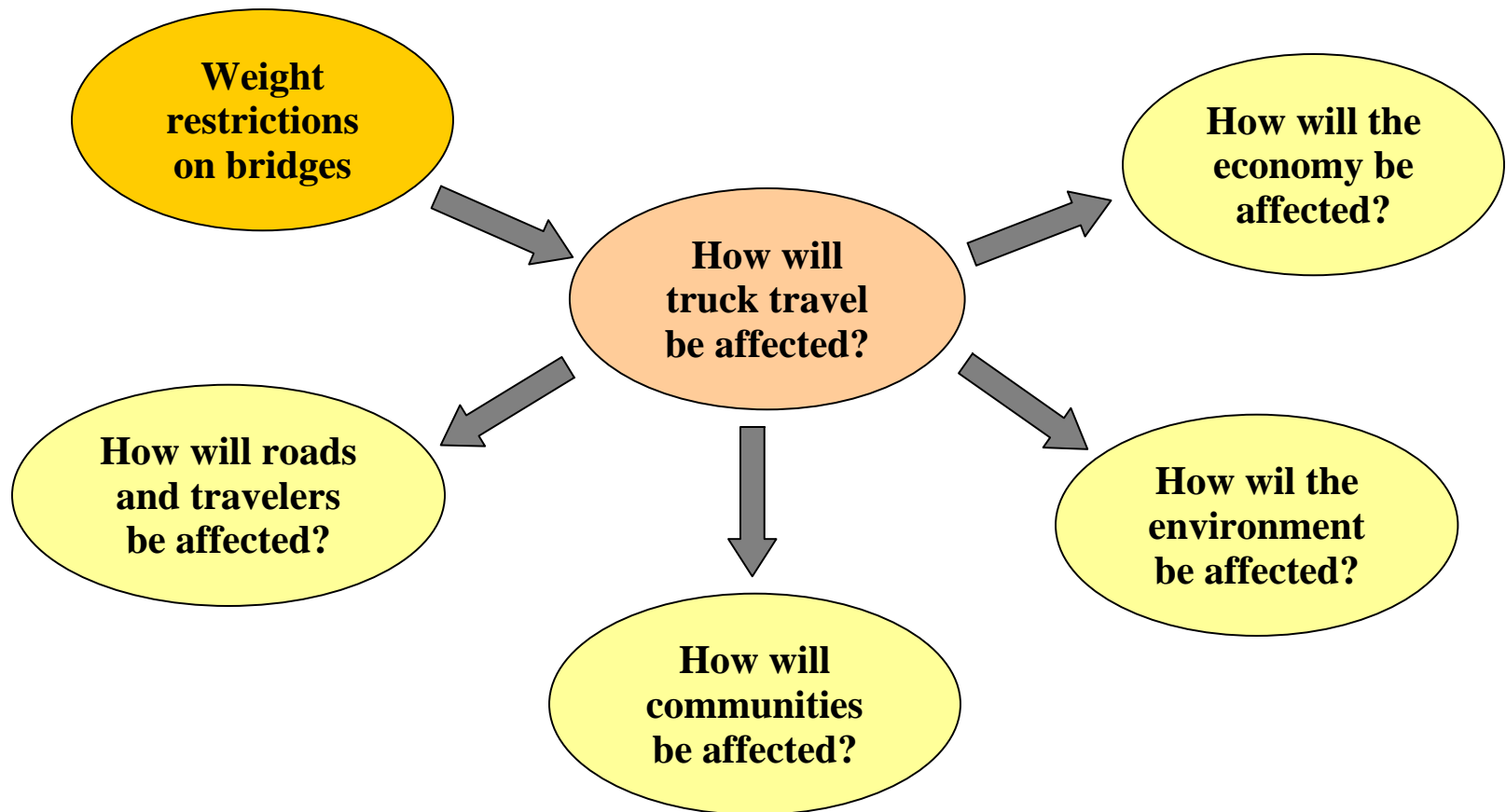
- Can evaluate the effect of truck weight restrictions on truck movements
- Can assess truck effects on transportation costs and the economy
- Can be used to assess alternative policy approaches



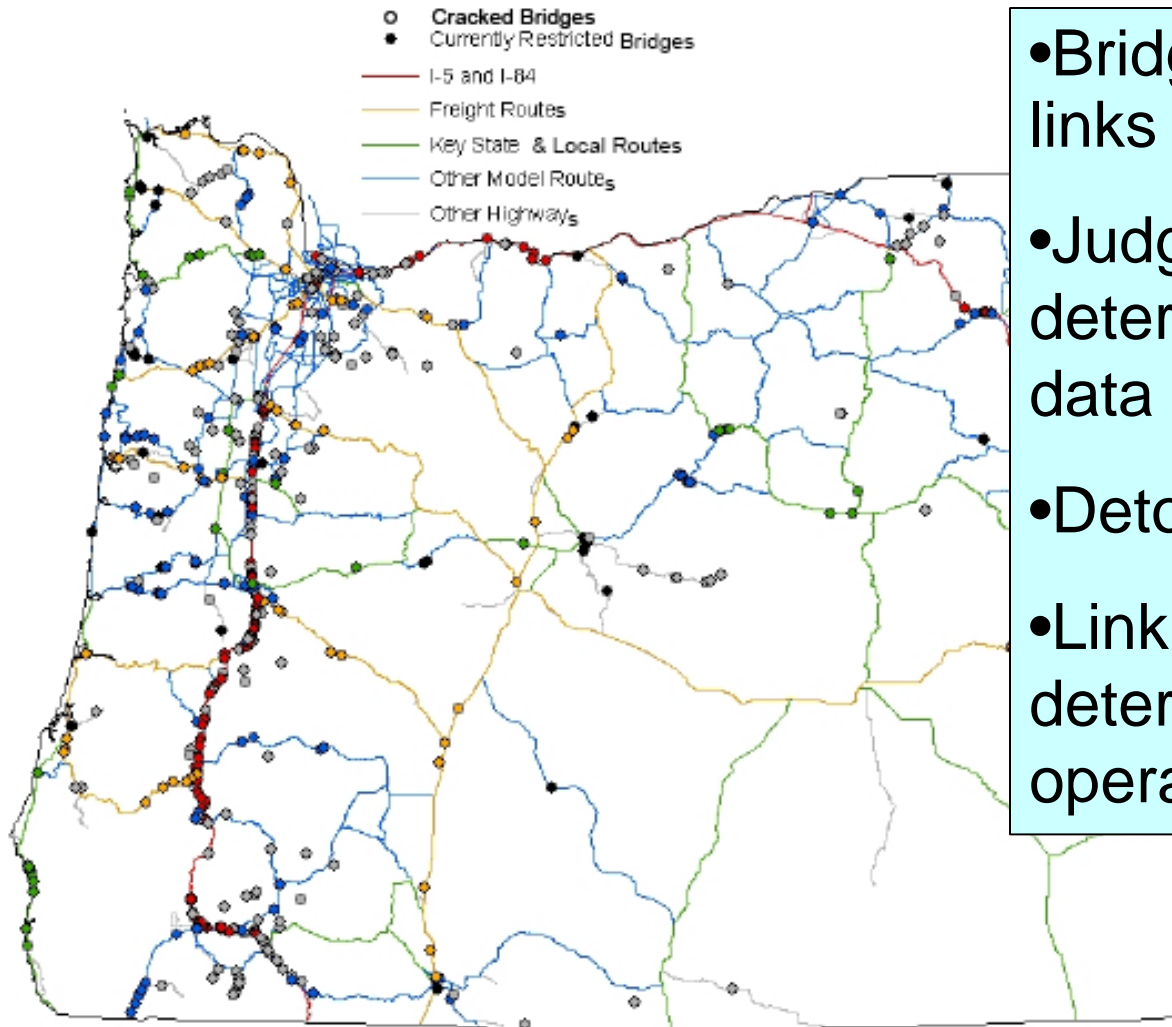
***Bridge issues and how the model was used to address them***



# Overview of issues



# ***Connecting Bridge Deterioration Assumptions to the Model***



- Bridges tied to network links
- Judgement of bridge deterioration from crack data (no formal model)
- Detour links added
- Link categories determine allowed operators.



*How will  
truck travel be  
affected?*

**Issues**

Will trucks need to travel longer distances?

Will more trucks be needed?

Will some areas become inaccessible to indivisible loads?

**Measures**

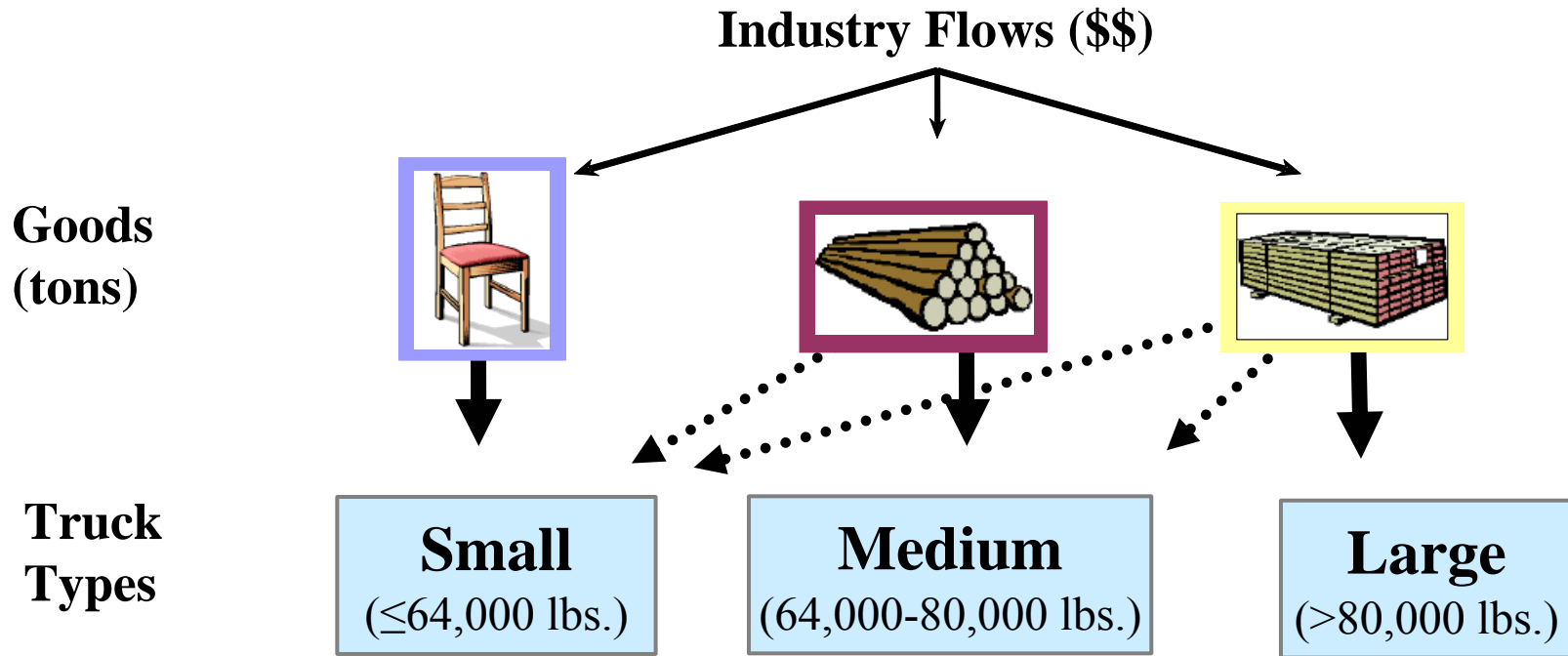
Truck trips by truck type

Average trip length

Detour lengths

Percent of trips that are blocked

# ***Modelling Truck Responses***



- Payload Capacity (tons)
- Fuel Consumption (gal/mile)
- Mileage Cost (\$/mile)
- Fuel Cost (\$/gal)
- Time Cost (\$/hr)
- Load/Reload Cost (\$/trip)



*How will the economy be affected?*

**Issues**

How would shipping costs be affected?

How would Oregon's growth be affected?

How would different economic sectors be affected?

How would different portions of the state be affected?

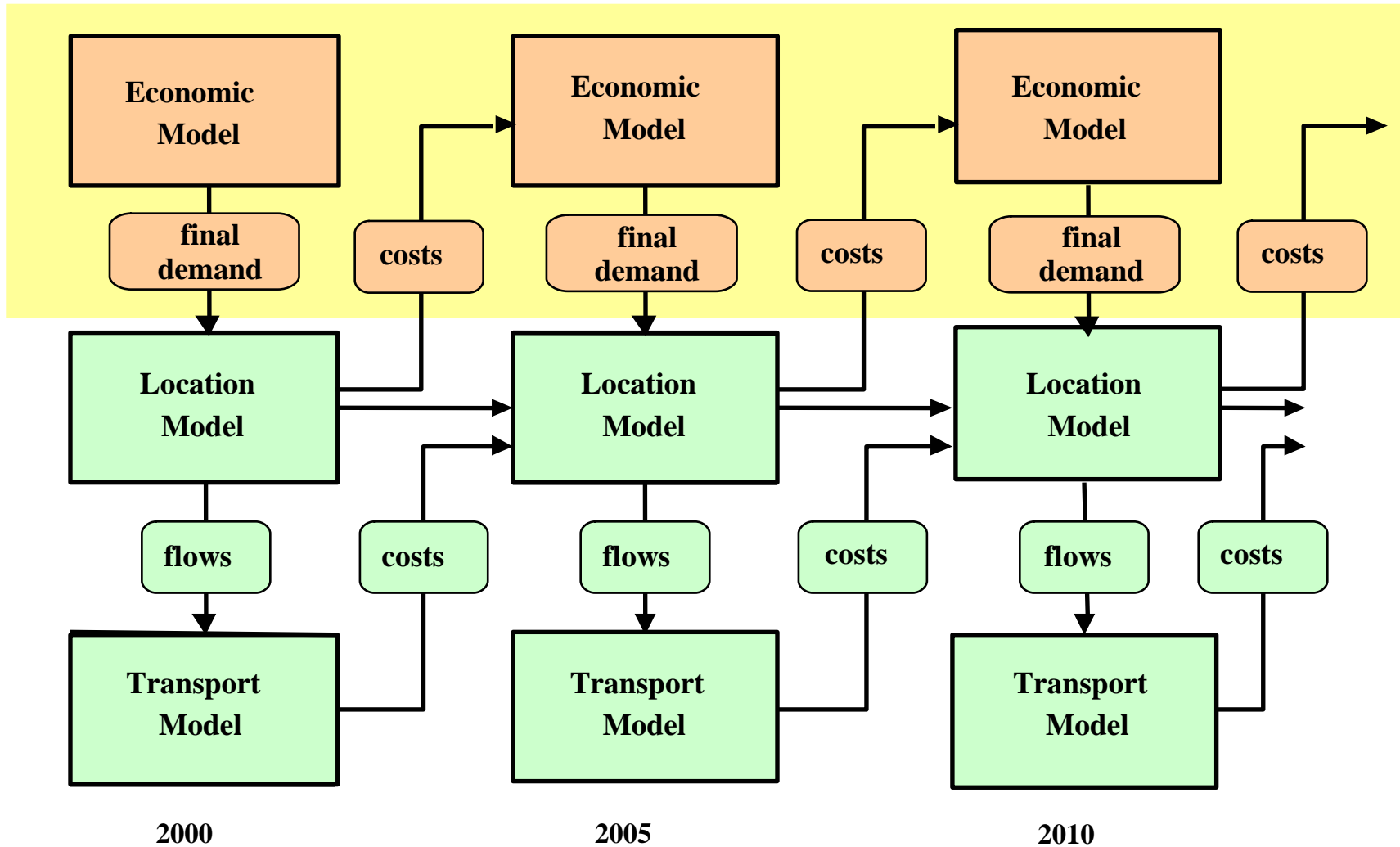
**Measures**

Growth of:

- Production in dollars
- Employment

For the state as a whole, for regions of the state and for economic sectors.

# ***Modelling the Economy***







## Issues

Would trucks be rerouted onto roads that are less capable of accommodating them?

- Inadequate pavements
- Inadequate geometry
- Congestion

*How will roads  
and travellers be  
affected?*

## Measures

Growth of truck VMT on:

- Lower functional class roads
- Restricted geometry road seg.
- Limited passing road seg.
- Congested road seg.



**Issues**

Will communities be exposed to more truck traffic?

Will downtowns be exposed to more truck traffic?

Will local roads carry more truck traffic?

*How will  
communities  
be affected?*

**Measures**

Growth of truck VMT:

- In cities over 50,000 pop.
- In cities under 50,000 pop.
- In downtown areas



### Issues

Will environmentally sensitive areas be more exposed to materials spills from truck accidents?

Will energy consumption increase?

Will air quality be harmed?

### Measures

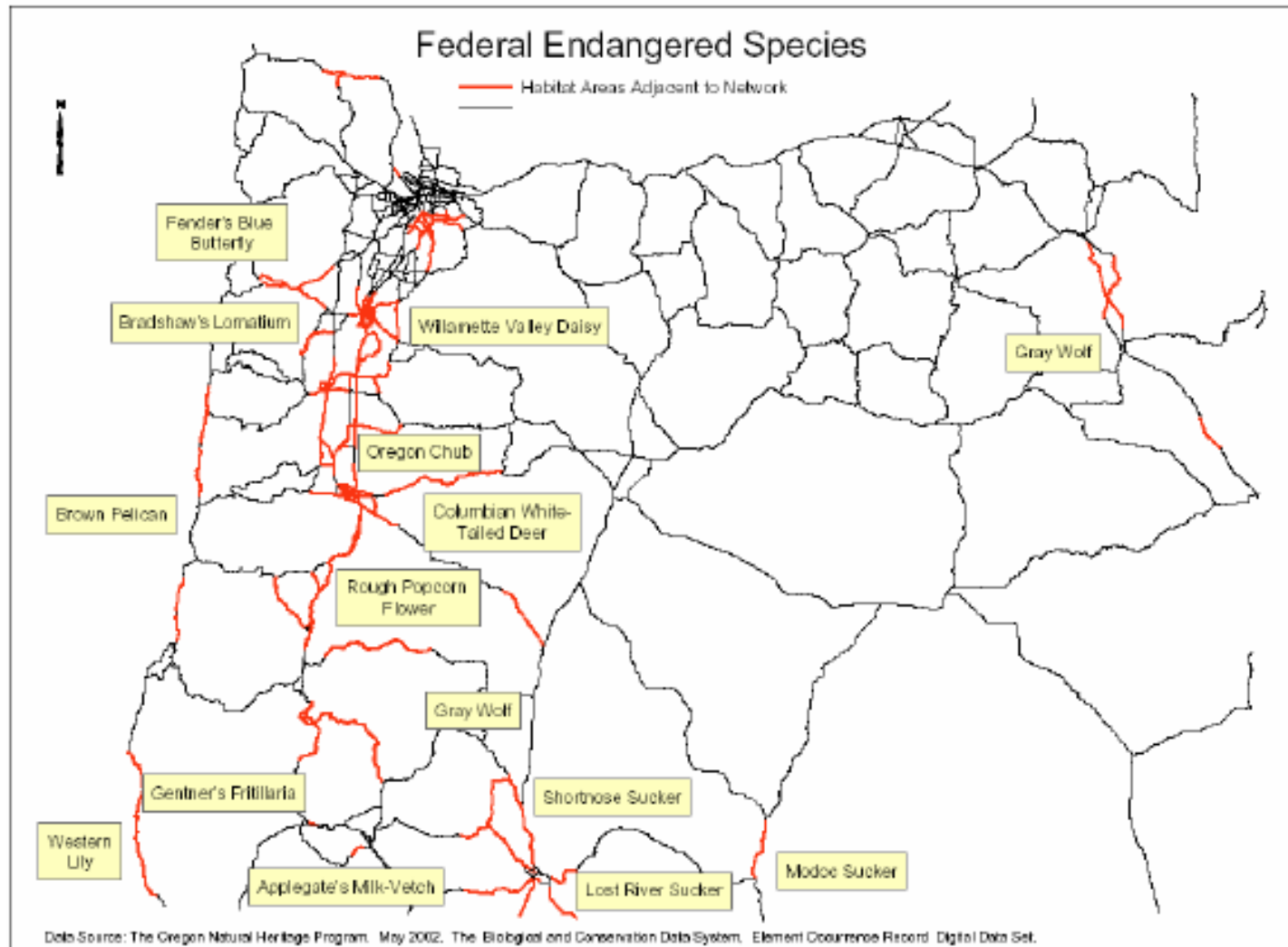
Growth of truck VMT on highways in environmentally sensitive areas.

Growth of truck VMT in air quality non-attainment and maintenance areas.

Truck energy consumption.

*How will the environment be affected?*

# Connecting the Model and Highway Databases



ODOT Transportation Planning & Analysis Unit 09/2002

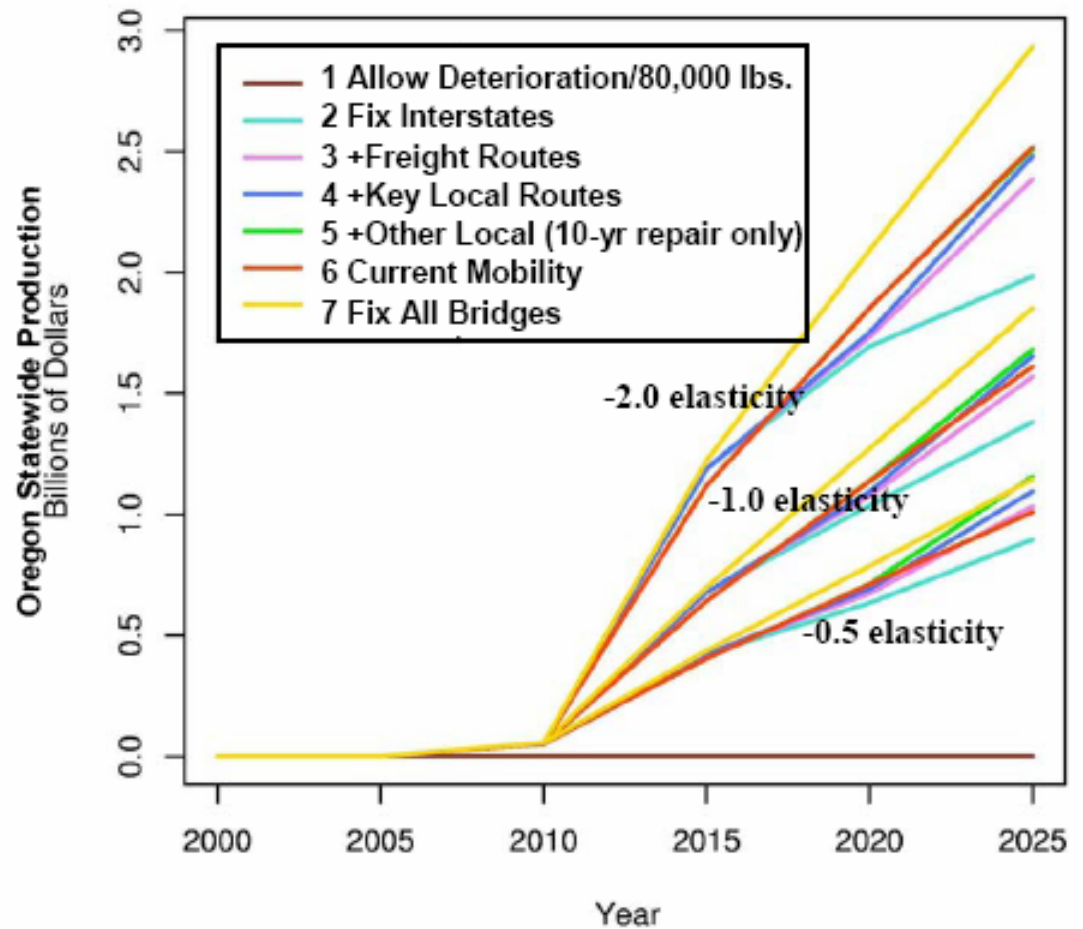
# ***Model Automation to Improve Responsiveness to Questions***

## **Model Automation Greatly Facilitated:**

Model setup testing

Policy sensitivity testing

Quick responses to policy-maker questions





***How results of integrated  
modelling influenced bridge  
policy***



## Integrated modelling:

- Showed how this was more than just a technical bridge problem
- Provided objective data for trade-off discussions on high-level policy questions
- Estimated the general magnitude of the economic effects of restricting freight mobility



# Integrated modelling:

- Showed how highways, communities and the environment would be affected
- Identified which regions and economic sectors would be most affected by various investment approaches

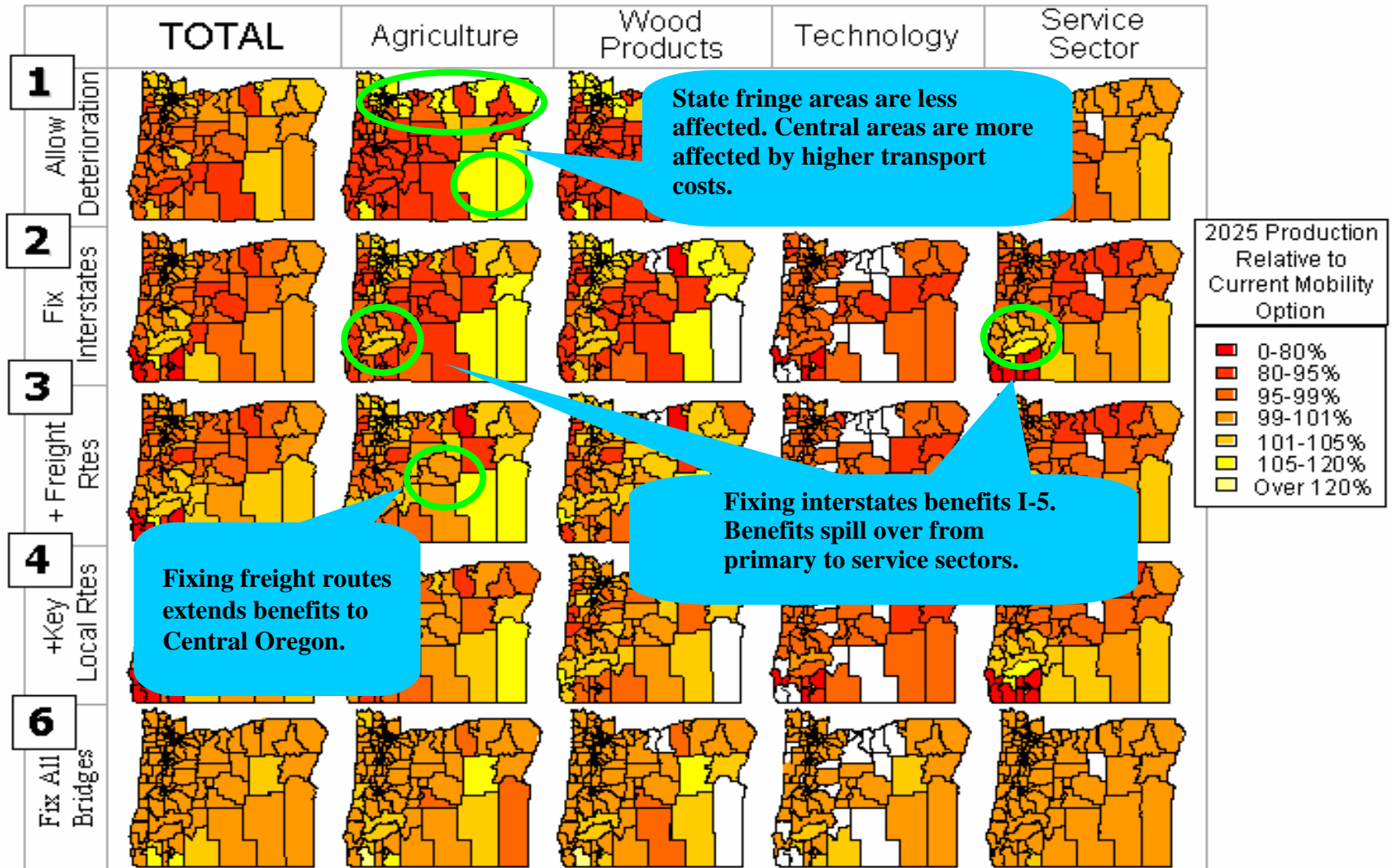




## The model helped make the case that it was important to do something

- Bridge deterioration and weight restrictions increase the truck volumes and the miles they travel.
- 80,000 lb restriction impacts 30% truck tons
- 64,000 lb restriction impacts 90% truck tons
  - 8-fold increase in state economic impacts
  - Economic impact \$14B in 2025, \$122B over 25 years

# ***Model showed that investment approaches have strong regional effects***





## The model also showed that

- Bridge weight restrictions will increase truck travel:
  - On minor roads: increasing safety & maintenance costs
  - In communities and their downtown areas
  - On highways in sensitive habitat areas
- Weight restrictions would also increase truck energy consumption



# The Bridge Program

- **2003 legislature approved 10-year \$2.5B program **Oregon Transportation Investment Act (OTIA) III****
  - \$1.3 billion for state bridges
  - \$300 million for local bridges
  - \$361 million for local maintenance & preservation
  - \$500 million for state modernization
- 5-stage strategy

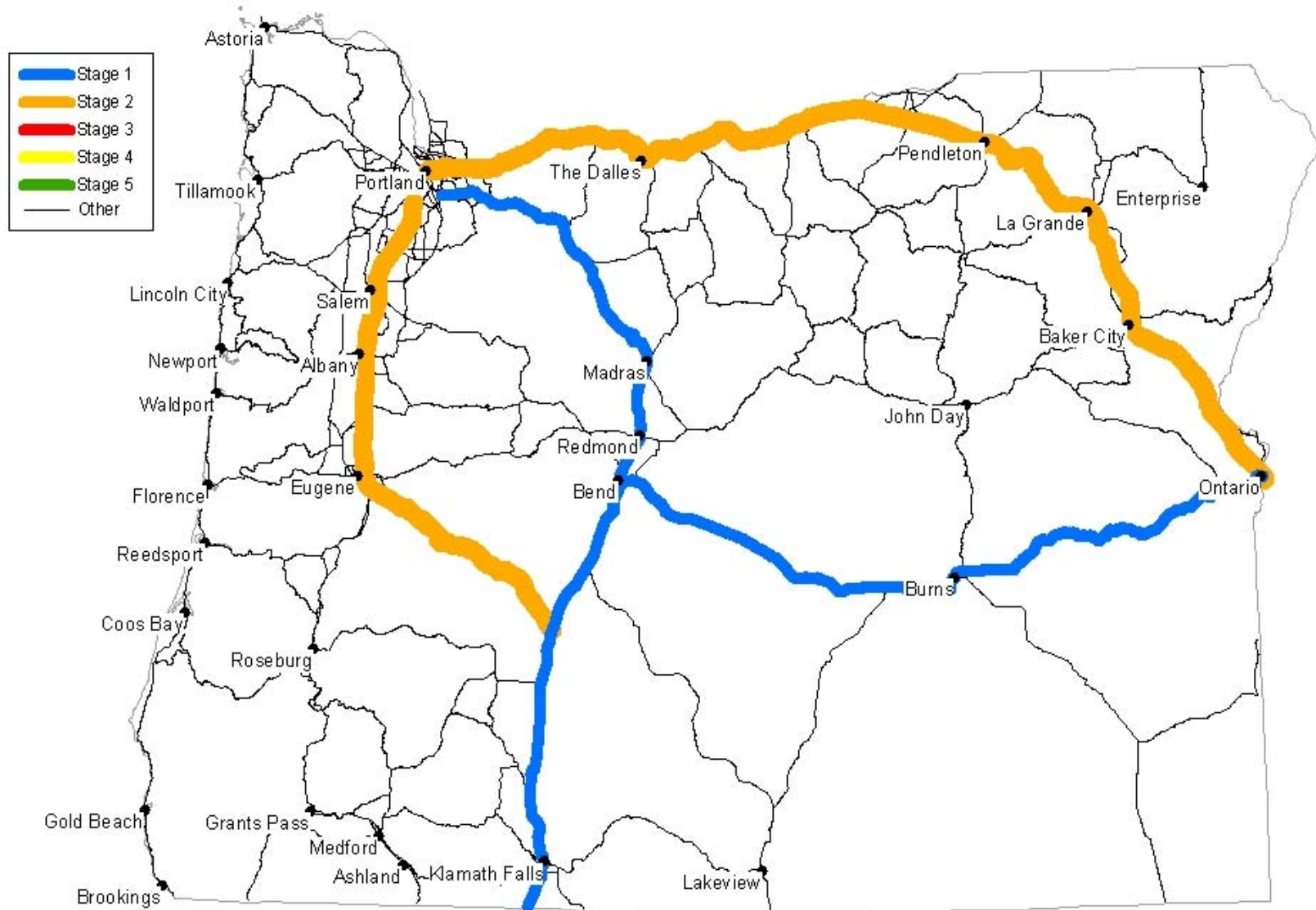


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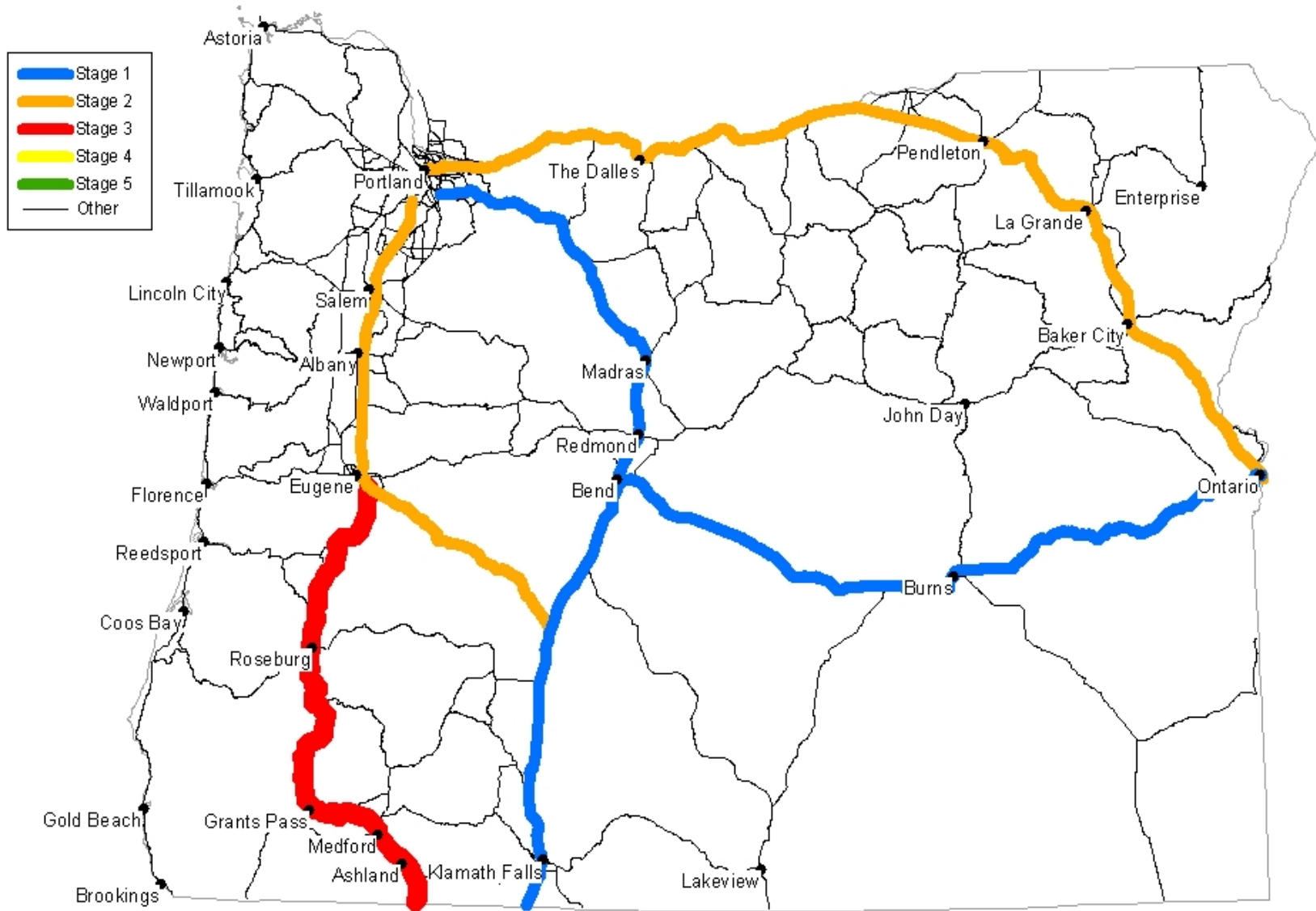


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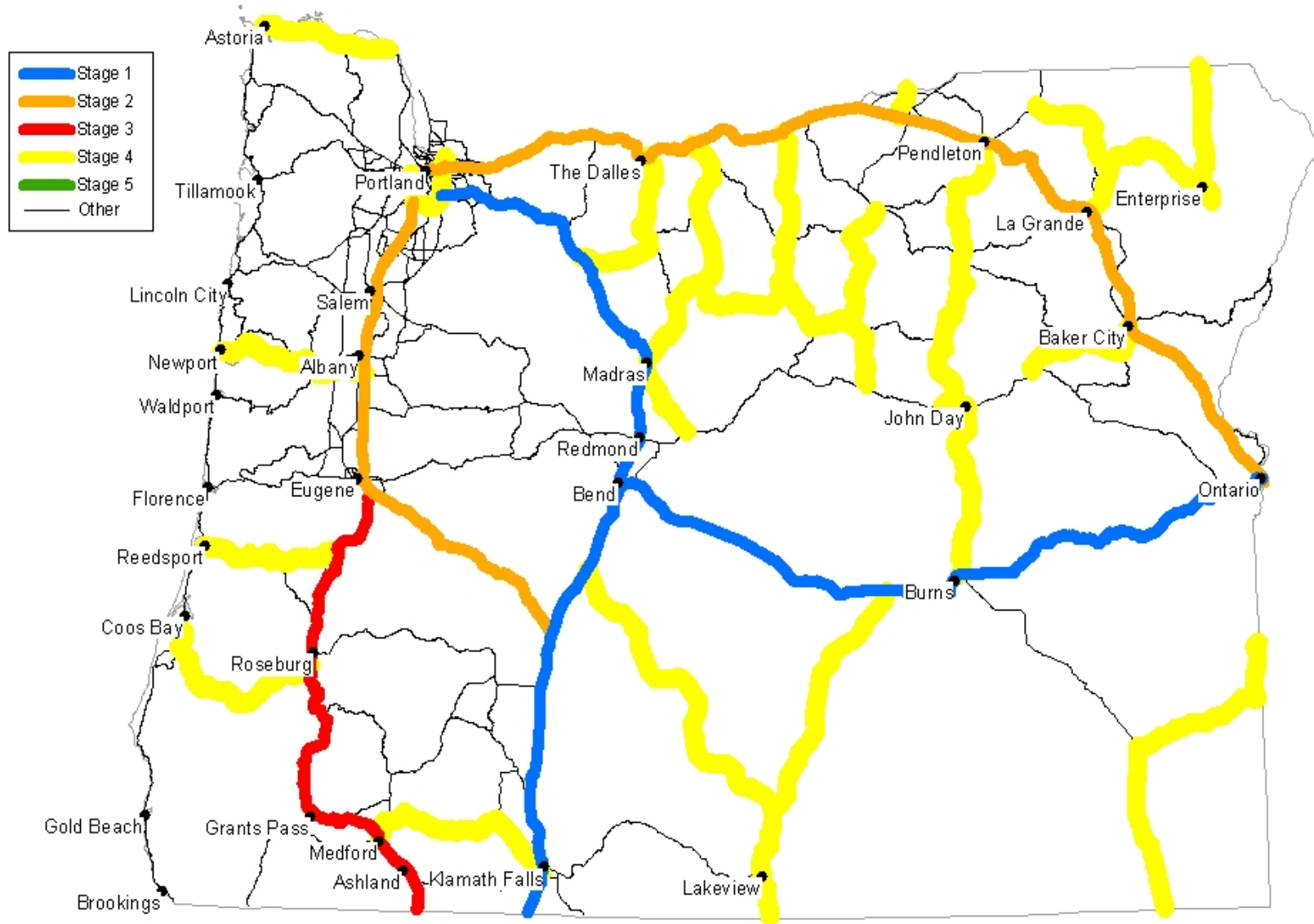


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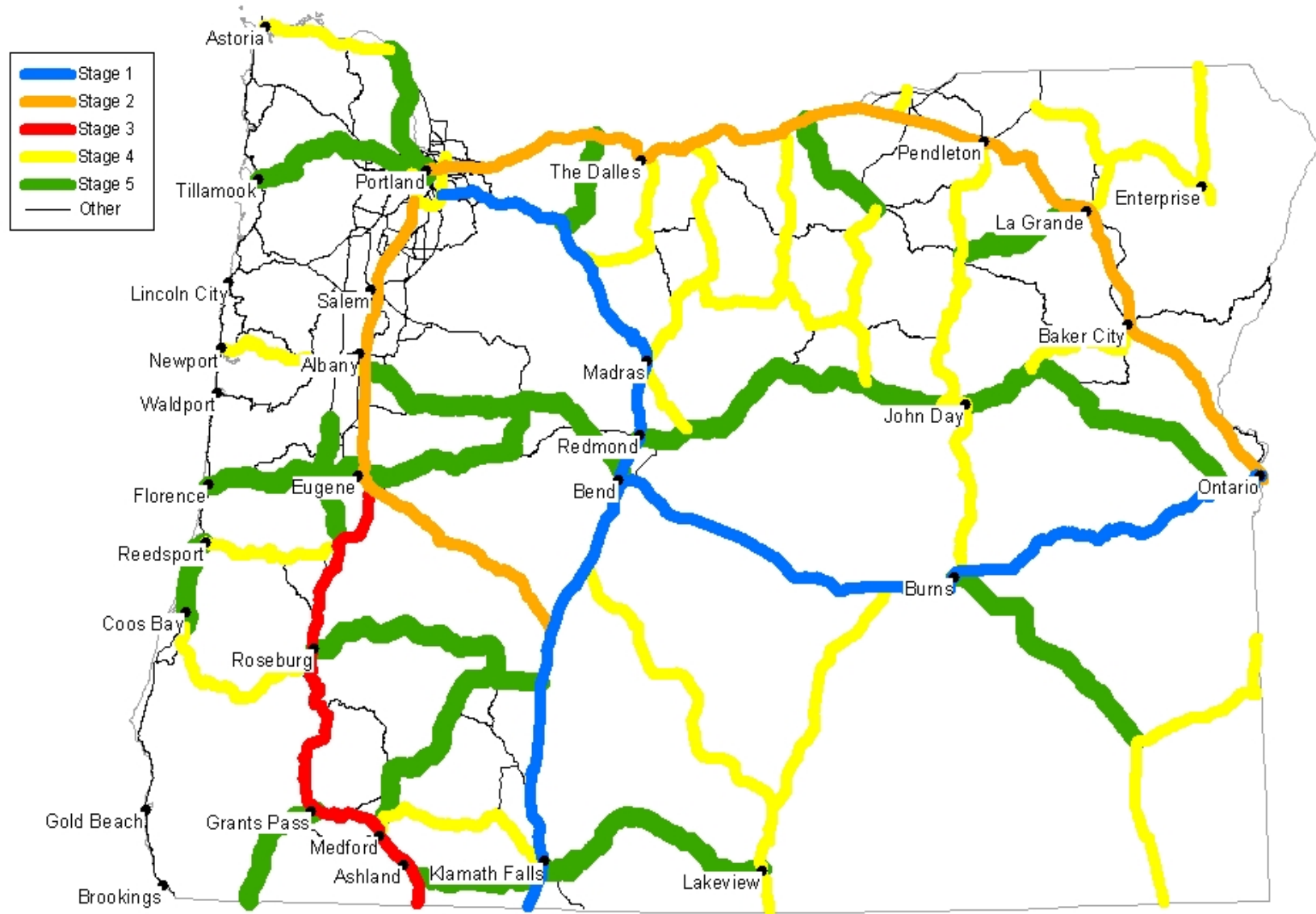
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## The integrated model influenced the development of bridge policy

- Helped create thoughtful pro-active approach rather than 'crisis' approach
- Showed 90% of economic benefits could be had for about half the cost of repairing all bridges
- Showed the importance of off-interstate connections to regional economies
- Helped to create an efficient staging plan, for repairs