

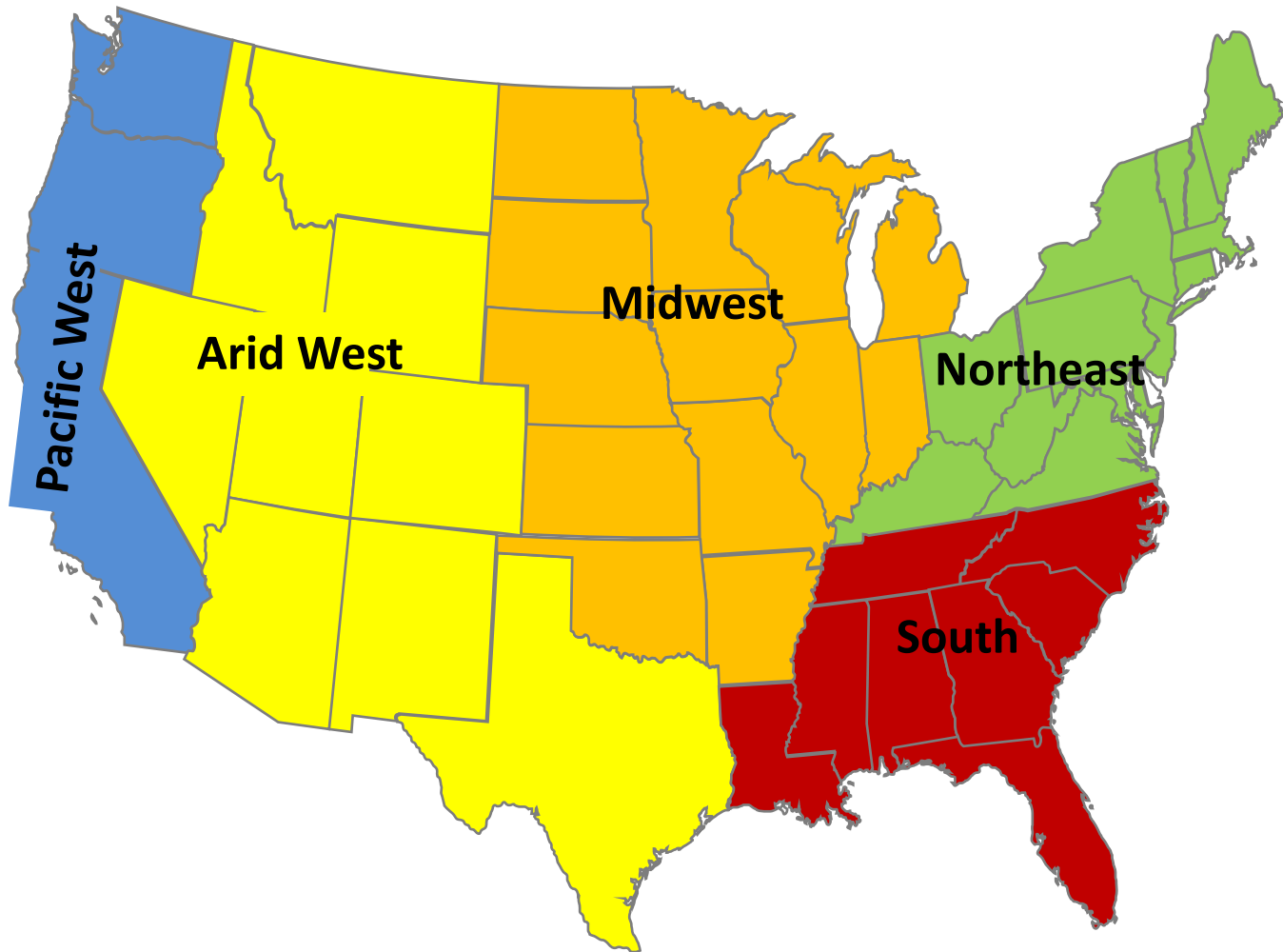
**ICTB 2013**  
**Las Vegas, Nevada**

# **Inspection of Timber Bridges in the Pacific West**

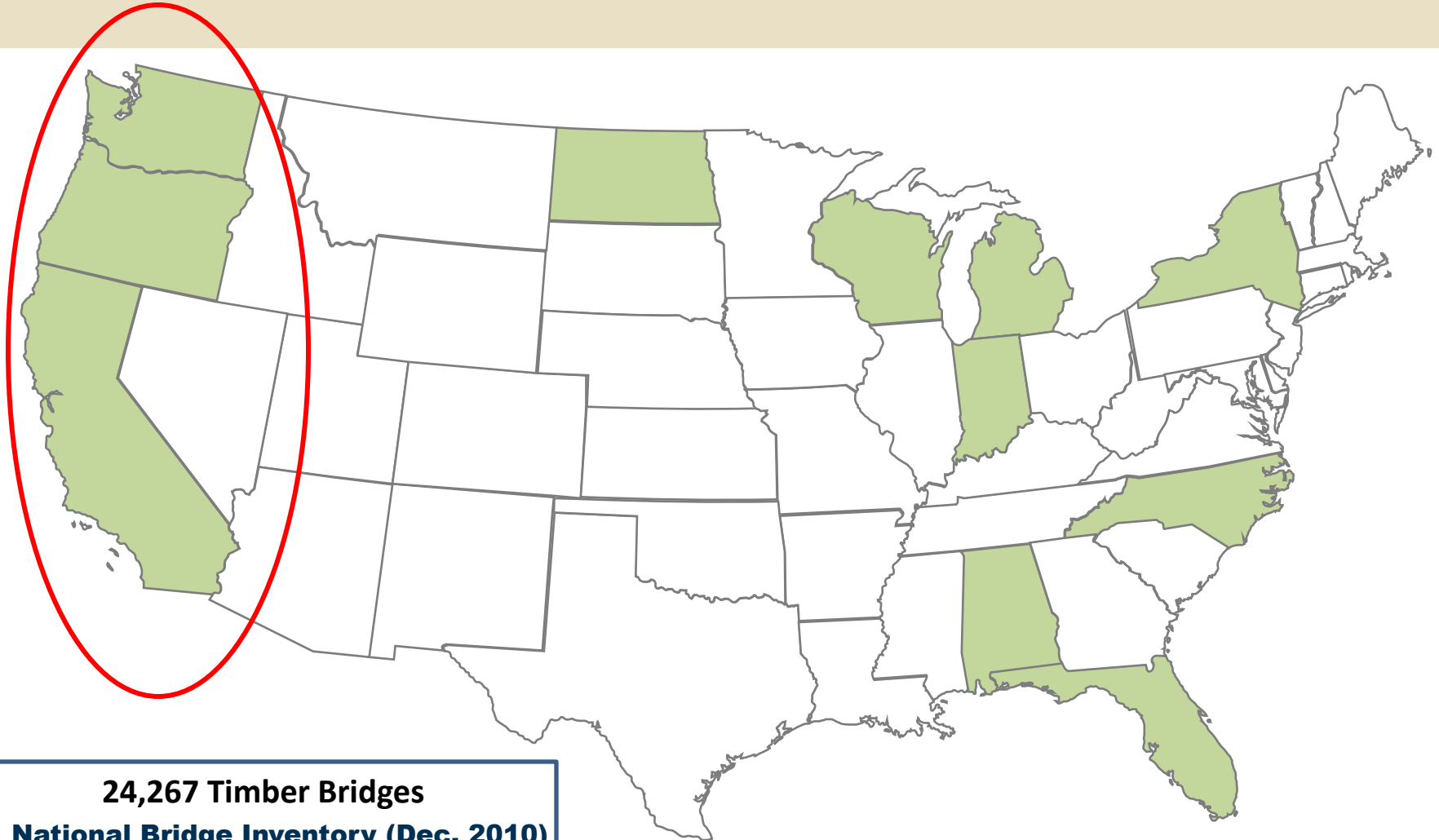
**Tom Williamson, P.E.**  
**Lola Coombe, P.E.**  
**David Strahl, P.E.**



# Study Regions



# States with 500 - 1,000 Timber Bridges



**24,267 Timber Bridges**  
**National Bridge Inventory (Dec. 2010)**

# Wood Decay Hazard Map

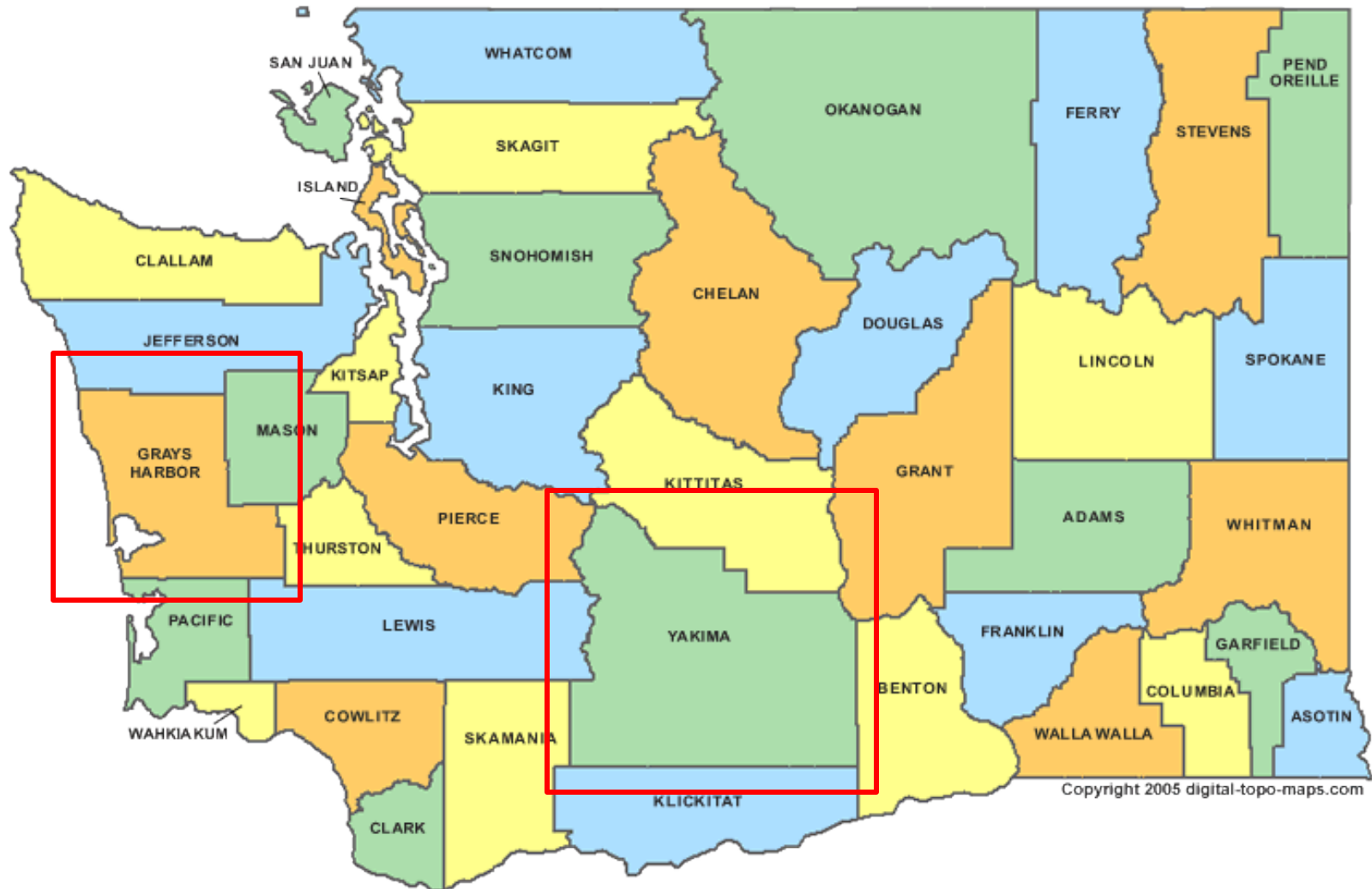
FROM AWPA STANDARDS



# NBI Bridge Condition Code Ratings Description

- 8 VERY GOOD CONDITION - No problems noted.**
- 7 GOOD CONDITION - Some minor problems but no structural defects at critical locations (wood decay is a defect).**
- 6 SATISFACTORY CONDITION - Structural elements show some minor defects and/or deterioration at critical locations. No measureable section loss.**
- 5 FAIR CONDITION - All primary structural elements are sound but may have minor to moderate defects and/or deterioration with measurable section loss at critical locations. No significant reduction in primary structural member load carrying capacity.**

# Washington



# Grays Harbor, WA

Bridge ID	Superstructure Type	Year Built	# spans	Span Lengths, m	ADT	Width (m)/ # lanes	Wearing surface	NBI Rating		Repair comments
								Girders	Deck	
Garrard Creek	Sawn timber girders and timber deck	1970	3	5.6	225	7.7/2	Asphalt	7	6	No repairs to superstructure
Middle Branch Wildcat Creek #2	Sawn timber girders and timber deck	1951	3	5.2	600	7.4/2	Asphalt	6	6	No repairs to superstructure
Middle Branch Wildcat Creek #3	Sawn timber girders and timber deck	1951	2	5.3	650	6.5/2	Asphalt	7	6	No repairs to superstructure
Sylvia Creek	Sawn timber girders and concrete deck	1935	3	6.8	4250	16.3/2	Asphalt	7	6	No repairs to superstructure



# Grays Harbor County, WA

## Sylvia Creek Bridge

- Erected in 1935 - in continuous service for 78 years
- Carries an ADT of over 4000 vehicles
- 3 spans with a total of 169 sawn timber girders - no signs of significant decay or deterioration
- NBI rating of 7 for the sawn timber girders





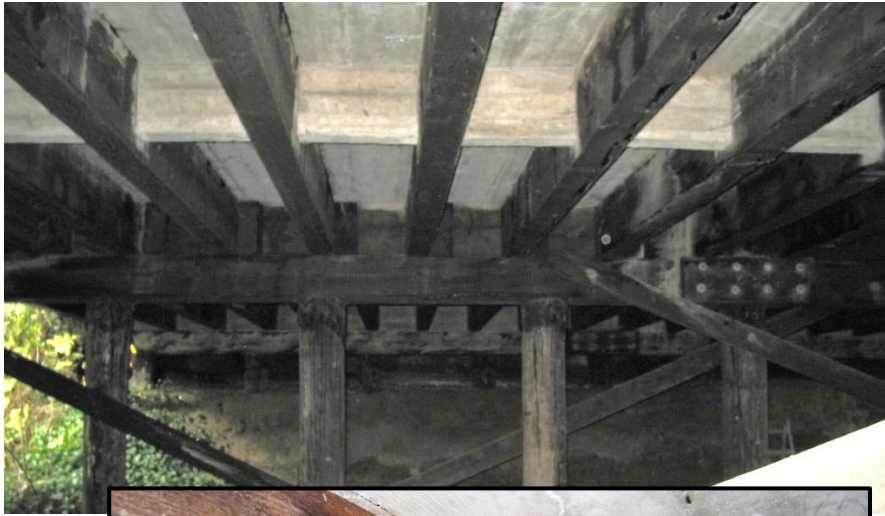
# Grays Harbor County, WA

## Sylvia Creek Bridge



# Grays Harbor County, WA

## Sylvia Creek Bridge





# Grays Harbor County, WA

## Sylvia Creek Bridge



# Yakima County, WA

Bridge ID	Superstructure Type	Year Built	# spans	Span Lengths, M	ADT	Width (m) # lanes	Wearing surface	NBI Rating		Repair comments
								Girders	Deck	
508	Sawn timber girders and timber deck	1965	2	5.9	10	7.4/2	Chip and seal with gravel	Ext. 5 Int. 6	5	No repairs to superstructure
509	Sawn timber girders and timber deck	1965	1	7.1	60	7.1/2	Chip and seal with gravel	7	6	No repairs to superstructure
521	Sawn timber girders and timber deck	1959	3	5.6	30	7.1/2	Chip and seal with gravel	7	6	No repairs to superstructure
724	Sawn timber girders and timber deck	1959	1	6.8	105	7.1/2	Chip and seal with gravel	5	4	No repairs to superstructure
738	Sawn timber girders and timber deck	1938	2	4.4	1605	7.7/2	Asphalt	7	6	No repairs to superstructure
739*	Sawn timber girders and timber deck	1939	4*	5.6	1605	7.7/2	Asphalt	6	6	One girder repaired with a helper beam
740	Sawn timber girders and timber deck	1939	2	5.9	3375	7.7/2	Asphalt	6	6	No repairs to superstructure

# Yakima County, WA

## Bridge 724

- Erected in 1959 – in service for 54 years
- **Untreated** DF girders and deck
- No asphalt wearing surface
- Lowest recorded NBI ratings of all bridges inspected in this region





# Yakima County, WA

## Bridge 724



# Yakima County, WA

## Bridge 739

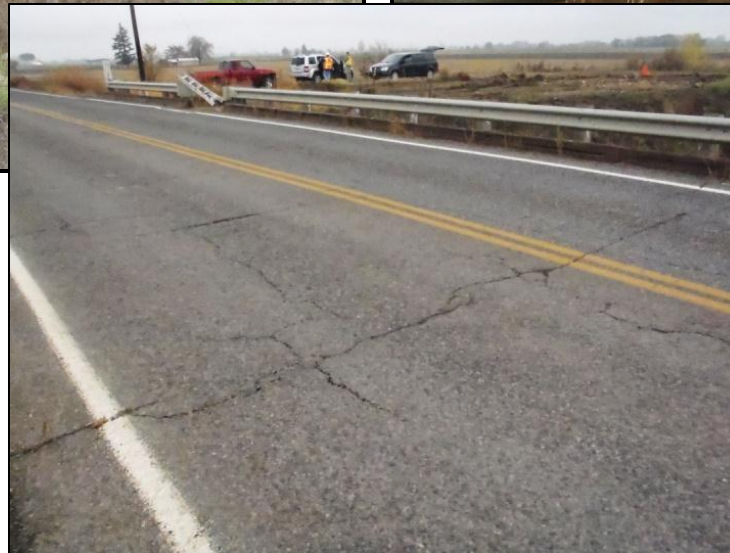
- Erected in 1939 – in service for 74 years
- 4 spans with total length of 22 m or 75 ft.
- Carries an ADT of over 1600 vehicles
- NBI ratings of 6 for deck and girders



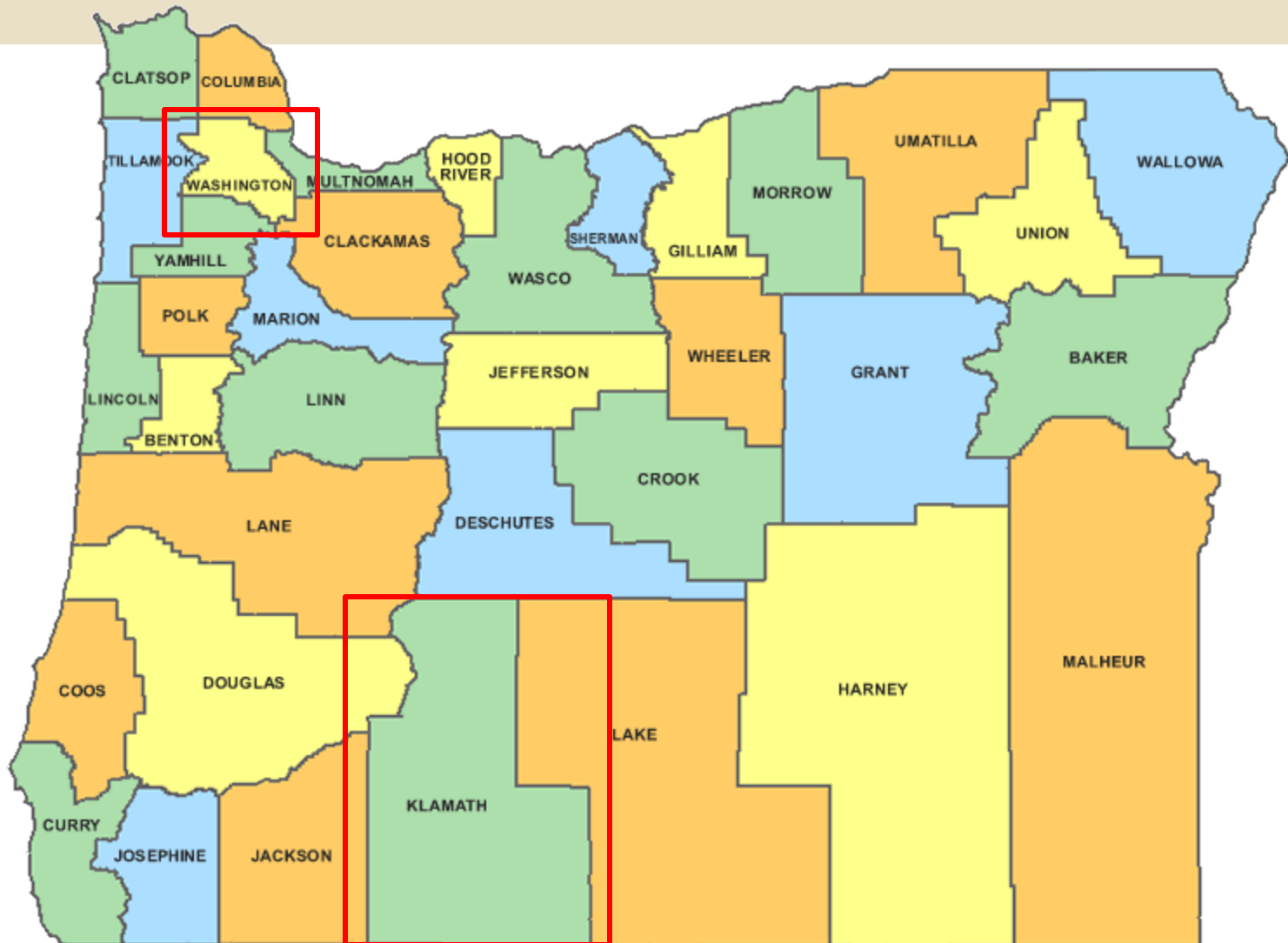


# Yakima County, WA

## Bridge 739



# Oregon



# Washington County, OR

Bridge ID	Superstructure Type	Year Built	# spans	Span Lengths, m	ADT	Width (m)/ # lanes	Wearing surface	NBI Rating		Repair comments
								Girders	Deck	
1228	Sawn timber girders and timber deck	1975	3	5.3	1010	5.9/2	Asphalt	6	7	No repairs to superstructure
1232	Sawn timber girders and timber deck	1959	4	4.7	280	5.9/2	Asphalt	6	6	One outside girder replaced / several deck boards replaced
1293	Sawn timber girders and timber deck	1960	2	4.7	55	6.5/2	Asphalt	6	6	One outside girder replaced
1298	Sawn timber girders and timber deck	1960	3	4.7	1130	5.9/2	Asphalt	7	7	One outside girder replaced
1302	Sawn timber girders and timber deck	1960	5	4.7	1130	5.9/2	Asphalt	Ext. 4 Int. 6	6	No repairs to superstructure
1358	Longitudinal glulam deck	1992	3	7.4	1520	7.7/2	Asphalt		8	No repairs to superstructure
1360	Longitudinal glulam deck	1992	1	7.4	390	8.3/2	Asphalt		8	No repairs to superstructure



# Washington County. OR

## Bridge 1298

- Erected in 1960 – in service for 53 years
- 3 spans with total length of 14 m or 48 ft.
- NBI ratings of 7 for sawn timber deck and girders
- One outside girder replaced in 2010
- Carries an ADT of over 1100 vehicles



# Washington County. OR

## Bridge 1298





# Washington County, OR Bridge 1358

- Erected in 1992 – in service for 21 years
- 3 spans with total length of 22 m or 75 ft.
- Longitudinal glulam deck with NBI rating of 8
- Carries an ADT of over 1500 vehicles





# Washington County, OR

## Bridge 1358



# Klamath County, OR

Bridge ID	Superstructure Type	Year Built	# spans	Span Lengths, m	ADT	Width (m) # lanes	Wearing surface	NBI Rating		Repair comments
								Girders	Deck	
Anderson Rd.	Sawn timber girders and timber deck	1970	2	5.5	70	8.3/2	Asphalt	7	7	No repairs to superstructure
Hill Rd.	Longitudinal sawn timber slab deck	1965	1	6.8	270	8.3/2	Asphalt		7	No repairs to superstructure
Homedale Rd.	Longitudinal sawn timber slab deck	1963	2	4.7	315	8.3/2	Asphalt		7	No repairs to superstructure
Old Midland Rd.	Longitudinal sawn timber slab deck	1971	1	7.4	375	9.5/2	Asphalt		7	No repairs to superstructure
Summers Lane	Sawn timber girders and timber deck	1982	1	7.4	100	9.5/2	Asphalt	7	7	No repairs to superstructure



# Klamath County, OR

## Homedale Road Bridge

- Erected in 1963 – in service for 50 years
- 2 spans with total length of 13.5 m or 46 ft.
- Longitudinal sawn lumber slab deck with NBI rating of 7
- Carries an ADT of over 300 vehicles

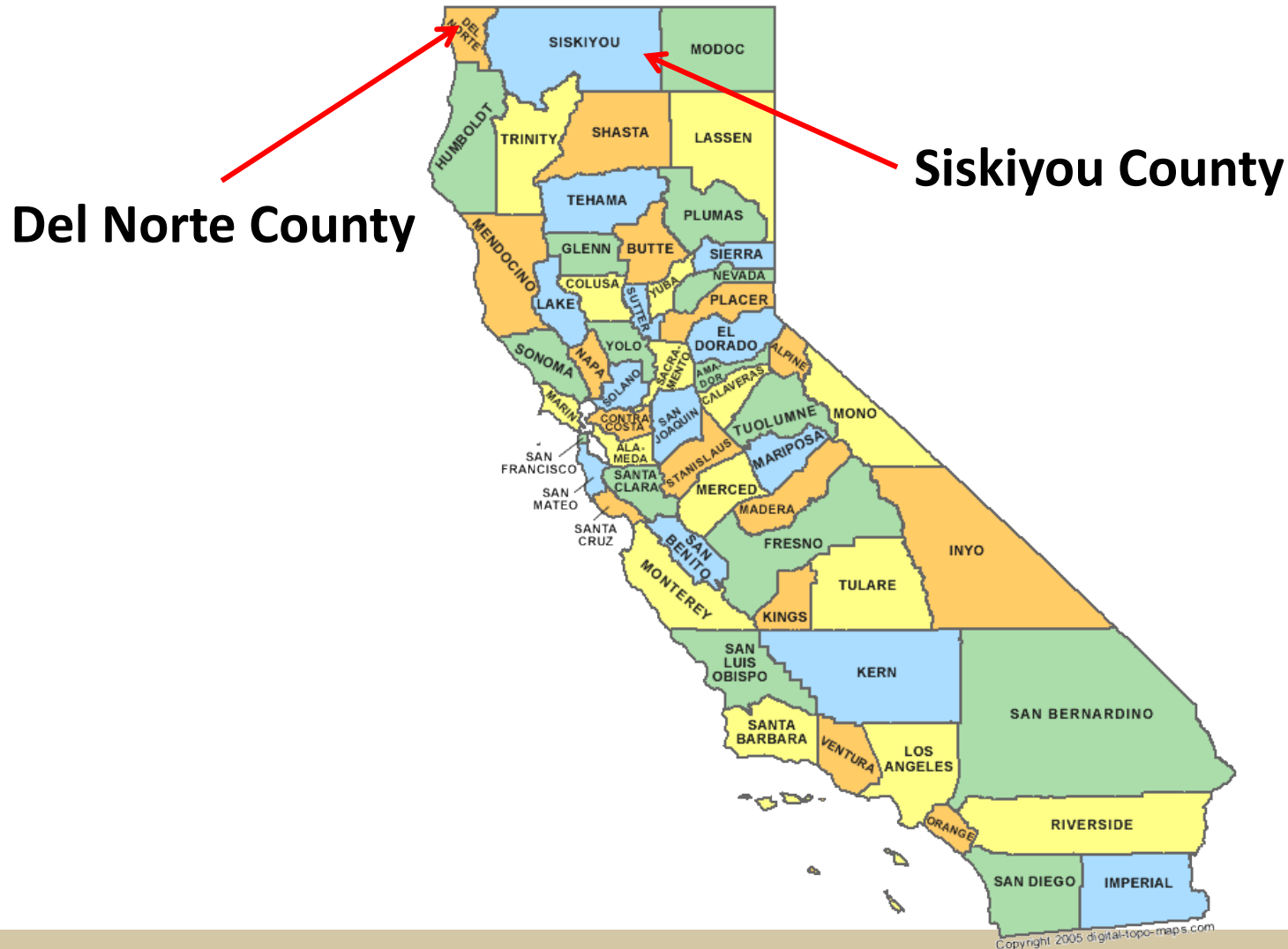


# Klamath County, OR Homedale Road Bridge





# California



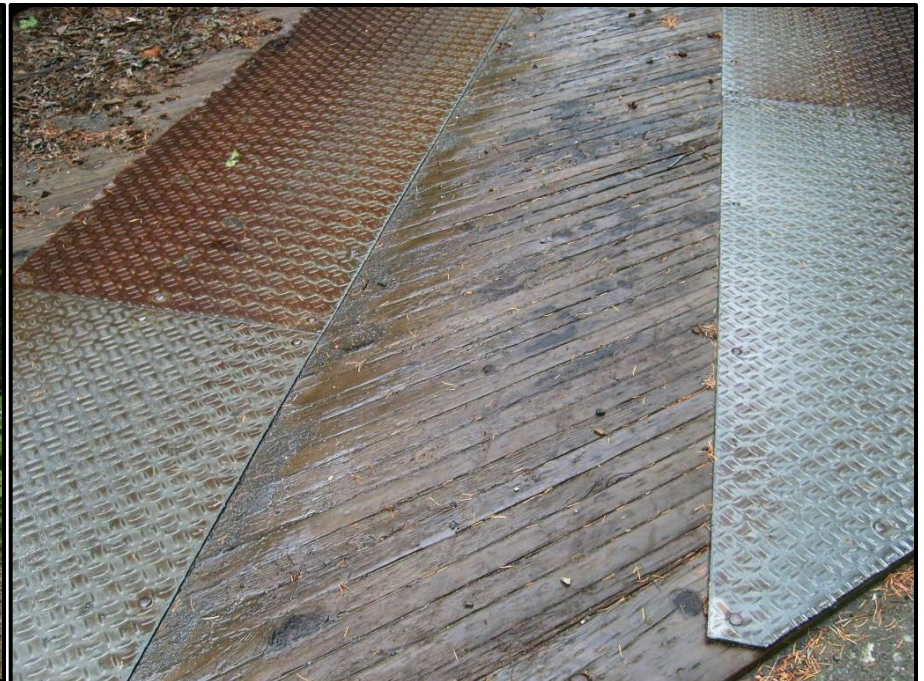
# Del Norte County, CA

Bridge ID	Superstructure Type	Year Built	# spans	Span Lengths, m	ADT	Width (m) # lanes	Wearing surface	NBI Rating		Repair comments
								Girders	Deck	
Knopki	Glulam girders and timber deck	1967	1	13.9	50	4.7/1	Steel running plates	7	8	No repairs to superstructure
Middle Fork Bridge #2	Glulam girders and concrete deck	1973	3	7.4/23.7/7.4	50	4.1/1	Concrete	7	7	No repairs to superstructure
Middle Fork Bridge #1	Glulam girders and concrete deck	1972	2	20.1	50	4.4/1	Concrete	7	7	No repairs to superstructure
Griffin Creek	Glulam girders and concrete deck	1978	2	13.0/21.3	50	5.7/1	Concrete	4	8	No repairs to superstructure

# Del Norte County, CA

## Knopki Creek Bridge

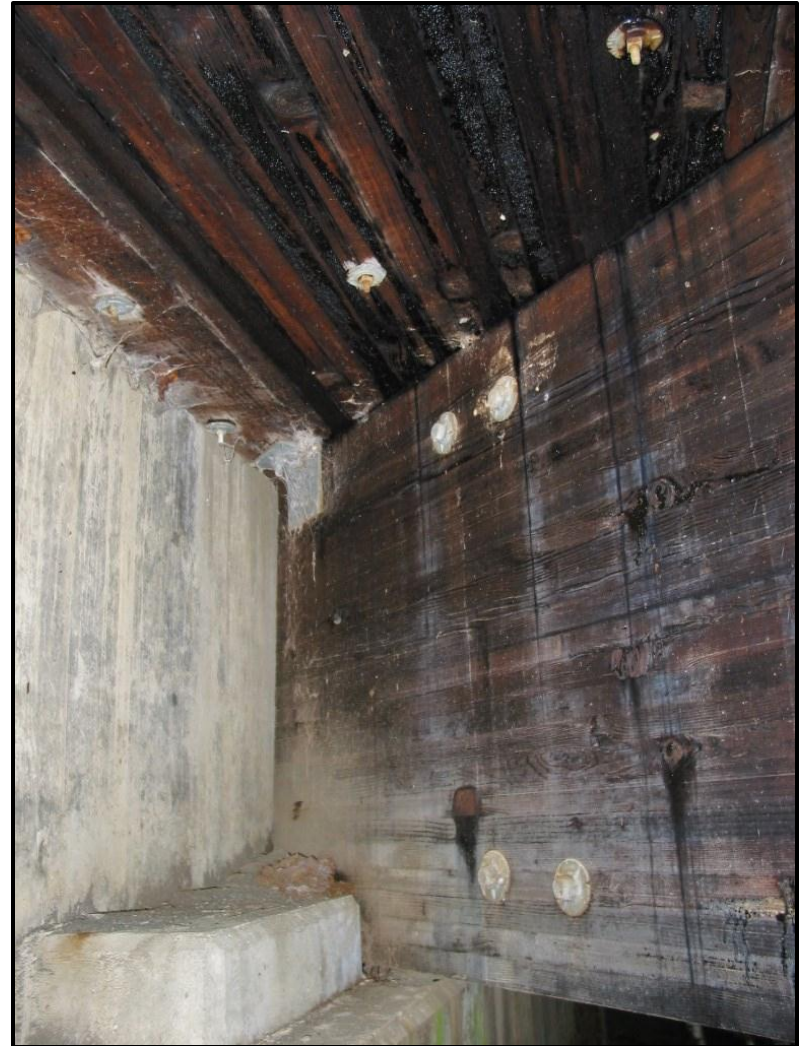
- Erected in 1967 – in service for 46 years
- Glulam girders with transverse sawn timber deck
- Simple span with length of 14 m or 48 ft.
- NBI ratings of 7 for girders and 8 for deck





# Del Norte County, CA

## Knopki Creek Bridge





# Del Norte County, CA

## Middle Fork #2 Bridge

- Erected in 1973 – in service for 40 years
- Glulam girders with cast in place concrete deck
- Three spans with total length of 38.5 m or 130 ft.
- NBI ratings of 7 for girders and deck





# Del Norte County, CA Middle Fork #2 Bridge





# Del Norte County, CA

## Griffin Creek Bridge

- Erected in 1978 – in service for 35 years
- Glulam girders with cast in place concrete deck
- Two spans with total length of 34.5 m or 116 ft.
- Low NBI rating due to shear failure in one girder



# Siskiyou County, CA

Bridge ID	Superstructure Type	Year Built	# spans	Span Lengths, m	ADT	Width (m) # lanes	Wearing surface	NBI Rating		Repair comments
								Girders	Deck	
Red Bridge	Sawn timber girders and timber deck	1959	2	5.3	45	5.3/1	Timber running planks	6	6	No repairs to superstructure
Shovel Creek Bridge	Sawn timber girders and timber deck	1977	1	8.3	40	7.4/2	Timber deck	Ext. 5 Int. 7	5	No repairs to superstructure
Fishhook Bridge	Sawn timber girders and timber deck	1960	1	7.4	225	8.6/2	Asphalt	7	7	No repairs to superstructure



# Siskiyou County, CA

## Red Bridge

- Erected in 1959 – in service for 54 years
- Sawn timber girders with transverse stringers and longitudinal running planks
- NBI ratings of 6 for girders and deck





# Siskiyou County, CA Shovel Creek Bridge

- Erected in 1977 – in service for 36 years
- Sawn timber girders with 6x16 transverse timber deck used as wearing surface
- NBI ratings of 5 for girders and deck





# Siskiyou County, CA

## Fish Hook Bridge

- Erected in 1960 – in service for 53 years
- Sawn timber girders with 5x6 transverse timber deck
- NBI ratings of 7 for girders and deck
- Carries high volume of heavy RV vehicles



# Summary

- **30 bridges inspected**
  - **24 sawn timber bridges**
    - 21 were multiple girder and transverse deck systems
    - 3 were longitudinal slab decks – all in service for over 40 years with NBI ratings of 7
  - **6 glued laminated timber bridges**
    - 4 were longitudinal girder systems with either sawn timber or concrete decks – all in service for over 40 years with NBI ratings of 7
    - 2 were longitudinal slab decks – in service for 21 years with NBI ratings of 8
- **Range of in-service age from 21 years to 78 years**
- **Total of 742 sawn timber girders inspected with only 11 girders showing significant decay and needing replacement – less than 1.5%**
- **Overall conclusion was that timber bridges in this region met or exceeded performance expectations**



# Questions?



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