Bridge Preservation Performance Measures

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Bridge Preservation

Actions or strategies:
- Prevent, delay or reduce deterioration of bridges or elements
- Restore the function of existing bridges
- Keep bridges in good condition
- Extend bridge life

Preservation actions may be preventive or condition-driven.

AASHTO (2011). *Adoption of an AASHTO Bridge Preservation Definition.* Policy Resolution PR-3-11, 2p.

Performance Measures

	Source			
	MTKN	**NCHRP 20-24(37)E**	**AASHTO Roundtable**	**BPETG Questionnaire**
DOTs Represented, count	36	39	33	17
Performance Measure	*Performance Measure Use, % of DOTs*			
Bridge Condition	56	56	55	64
Bridge Program	33	10	18	7
Functional Obsolescence	14	26	15	29
Weight Restriction	3	10	18	7
Maint. & Operations	22	3	12	7
Structural Deficiency	39	56	52	50
Sufficiency Rating	-	10	9	7

National Performance Management Measures

$$Pct\ Good = 100 \times \frac{\sum_{g=1}^{GOOD}[Length \times Width]_{Bridge\ g}}{\sum_{s=1}^{TOTAL}[Length \times Width]_{Bridge\ s}}$$

$$Pct\ Poor = 100 \times \frac{\sum_{p=1}^{POOR}[Length \times Width]_{Bridge\ p}}{\sum_{s=1}^{TOTAL}[Length \times Width]_{Bridge\ s}}$$

Performance, What to Measure

Inventory:	Good / Fair	*Keep bridges in good condition*
Deterioration:	Transitions of condition	*Extend bridge life, Reduce deterioration*
Risk:	Element to element	*Prevent, delay deterioration*

Performance Measures – Inventory

Preservation Candidates

Bridges, count	3200
Deck area, SY	3,140,000
% of State-owned structures	93%

Preservation Impact

Average GCR	+ 0.6
Bridges ≥ GCR 6	+ 23%
Bridges ≥ GCR 5	+ 17%

Preservation Need

Bridges, count	50
Deck area, SY	49,100
RC deck, Epoxy bars, SY	10,200
Compression joints, Ft	6,040

Preservation Candidates
Annual Preservation
not preserved
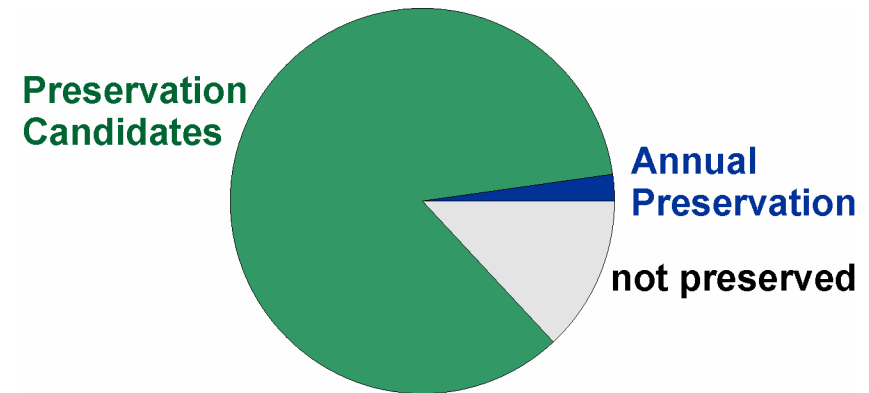
Hearn,G., Juntunen,D., Ahmad,A.S., and Johnson,B.V. (2013). *Performance Measures for Bridge Preservation*. Trans. Res. Rec. 2360, p45–51.

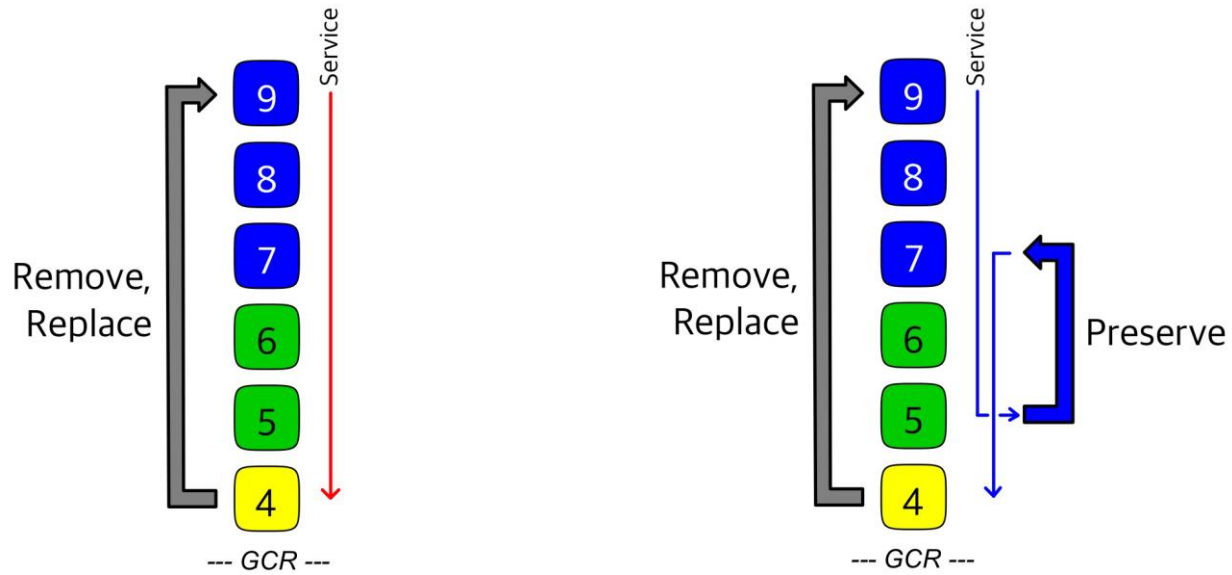# General Condition – Progression
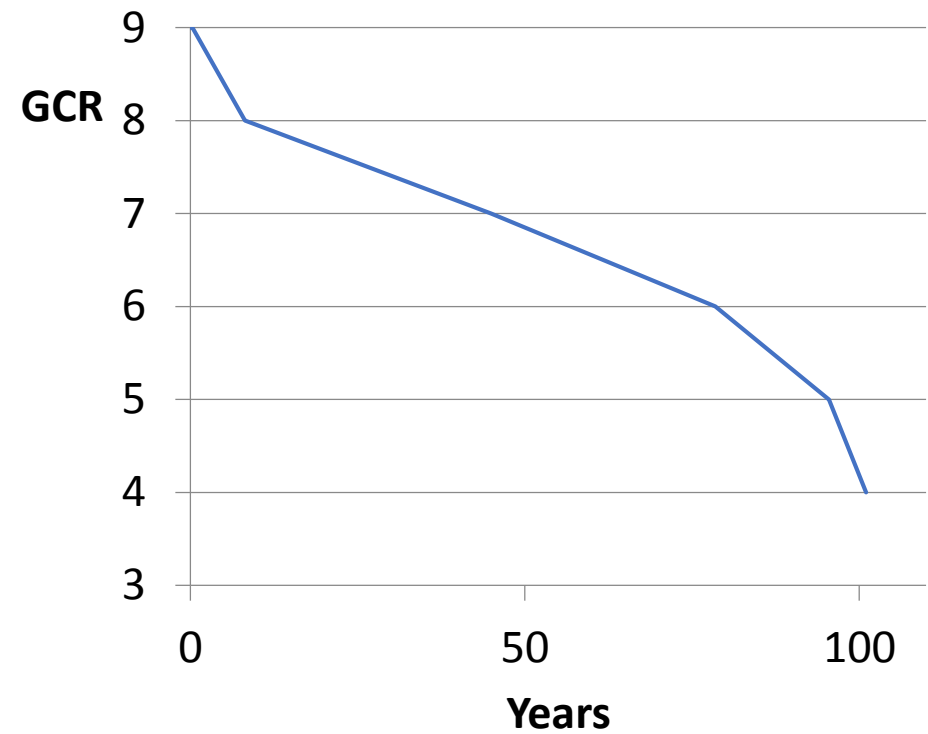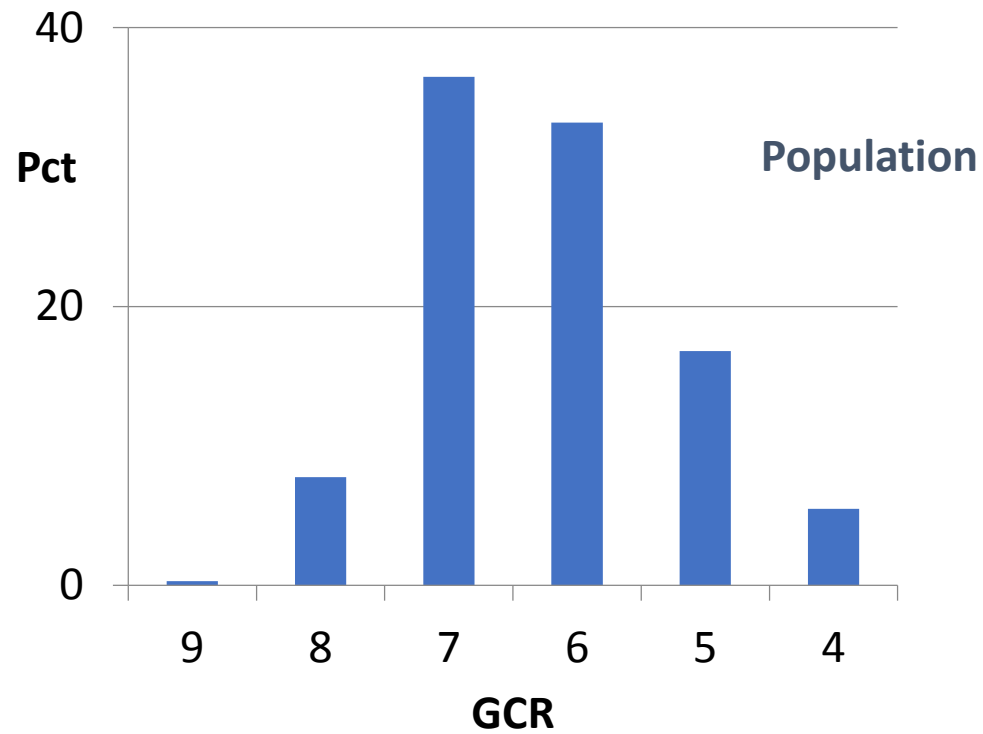
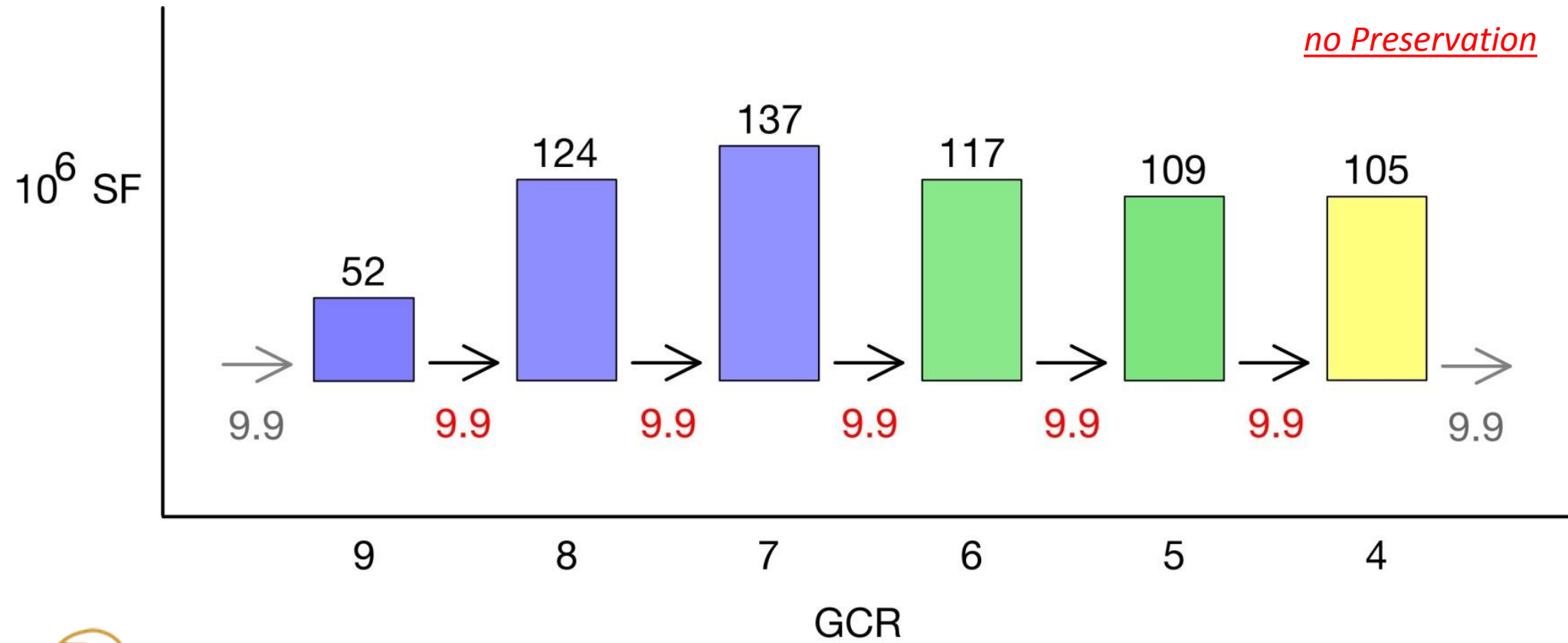Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming

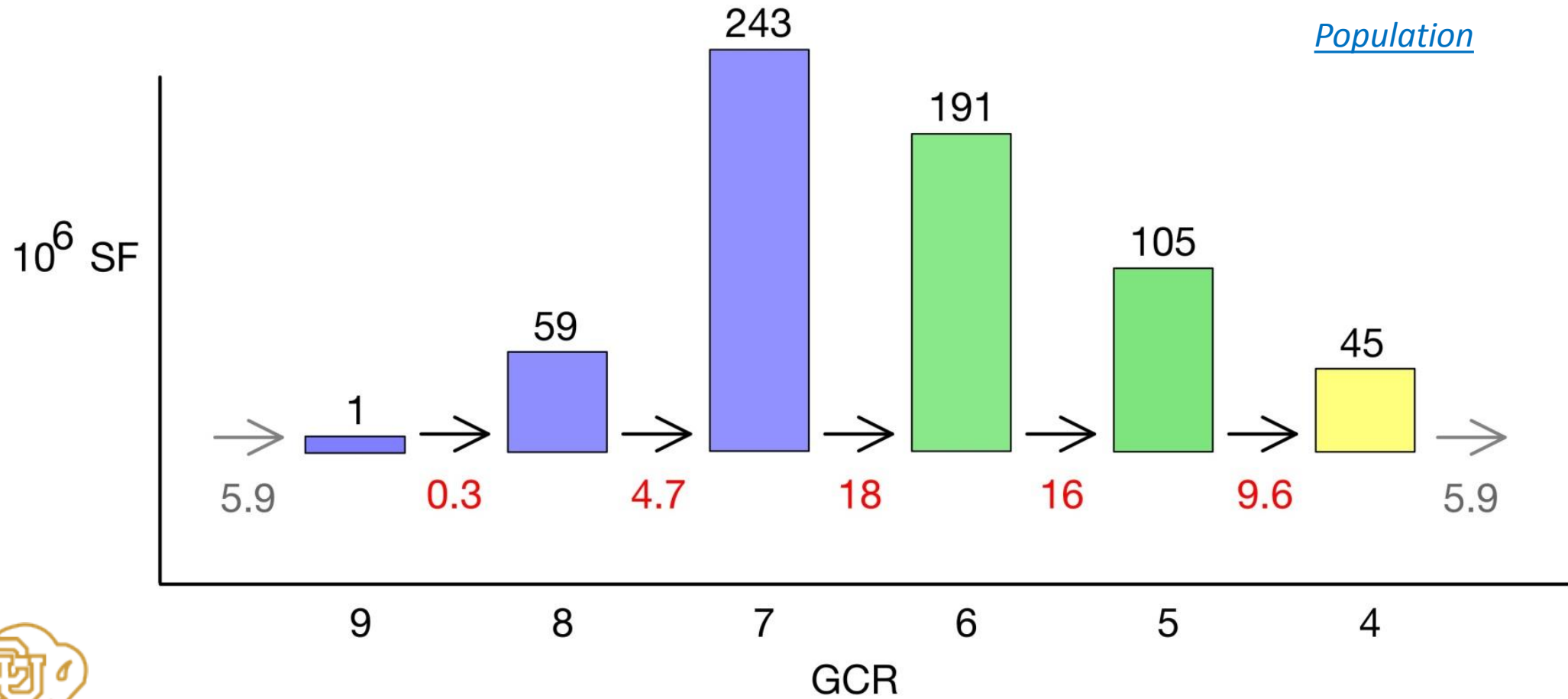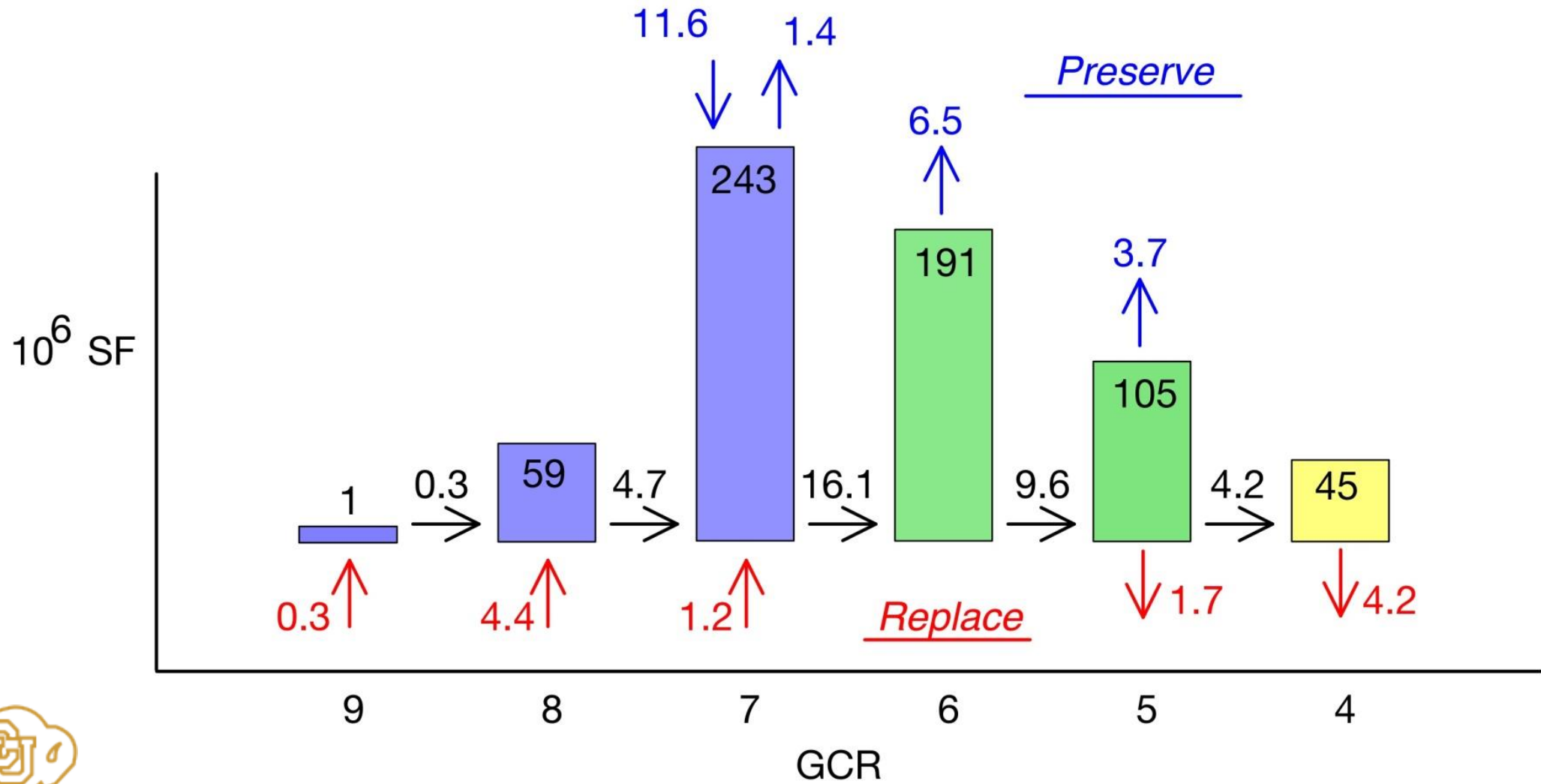# General Condition – Progression
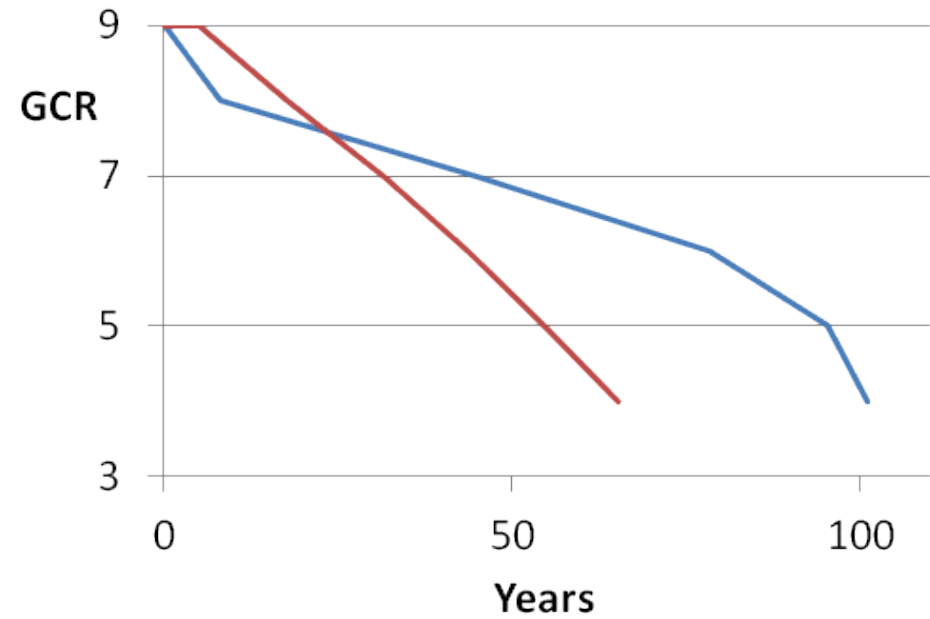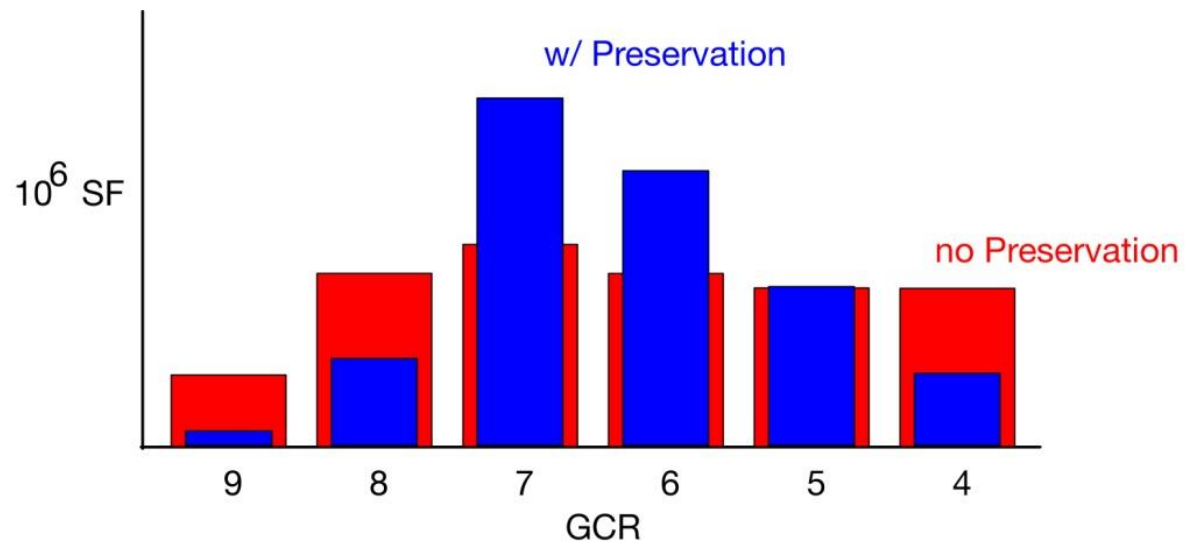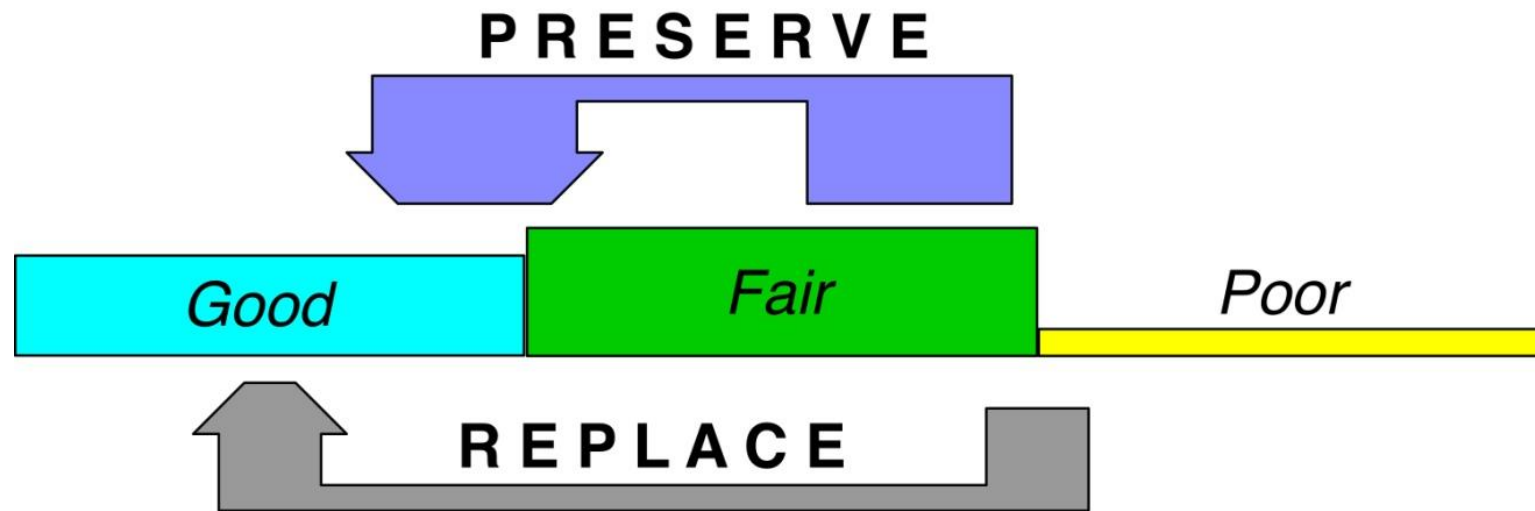
Service Progression
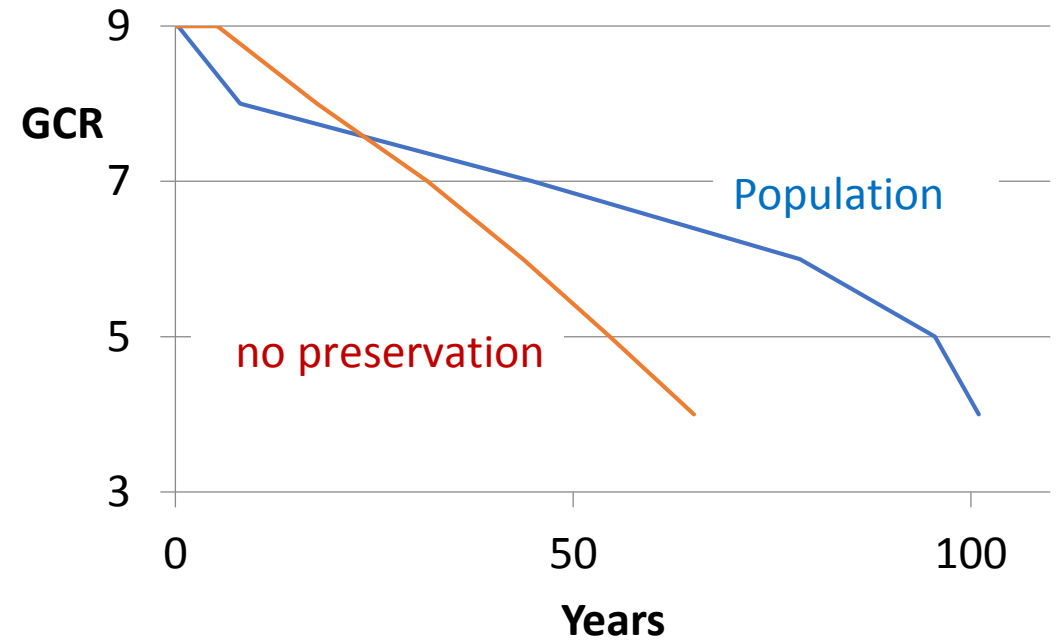
Flow of Inventory
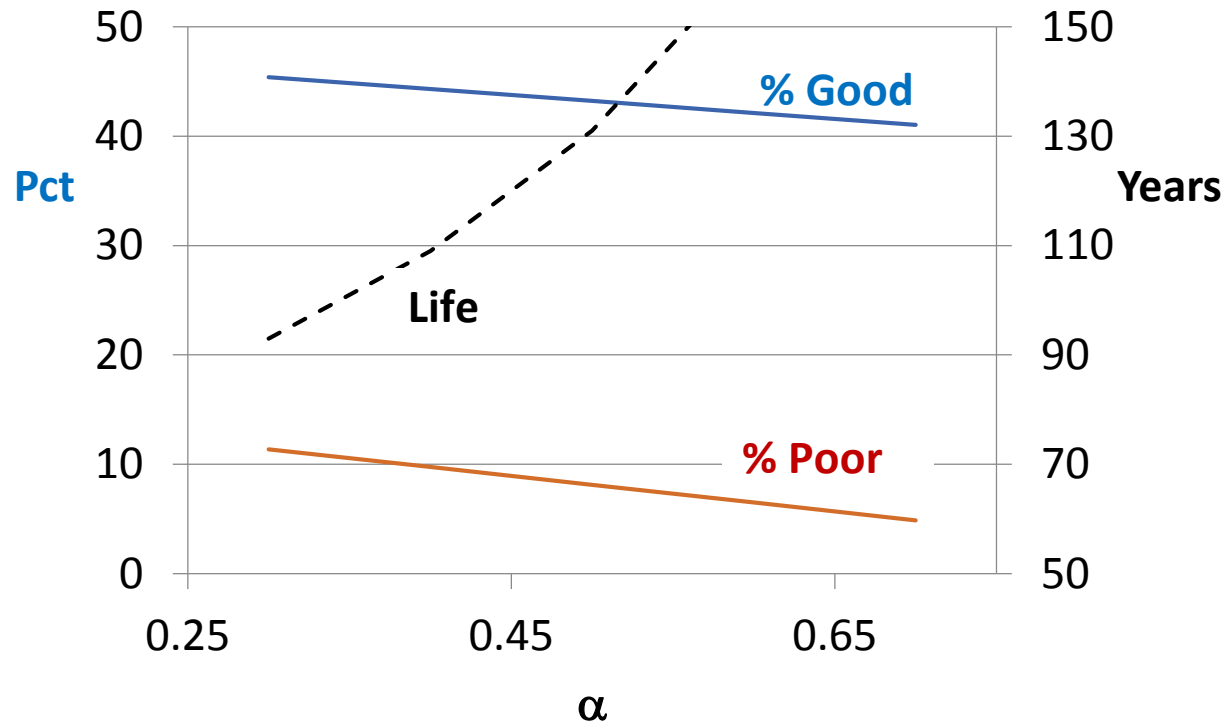
Flow of Inventory
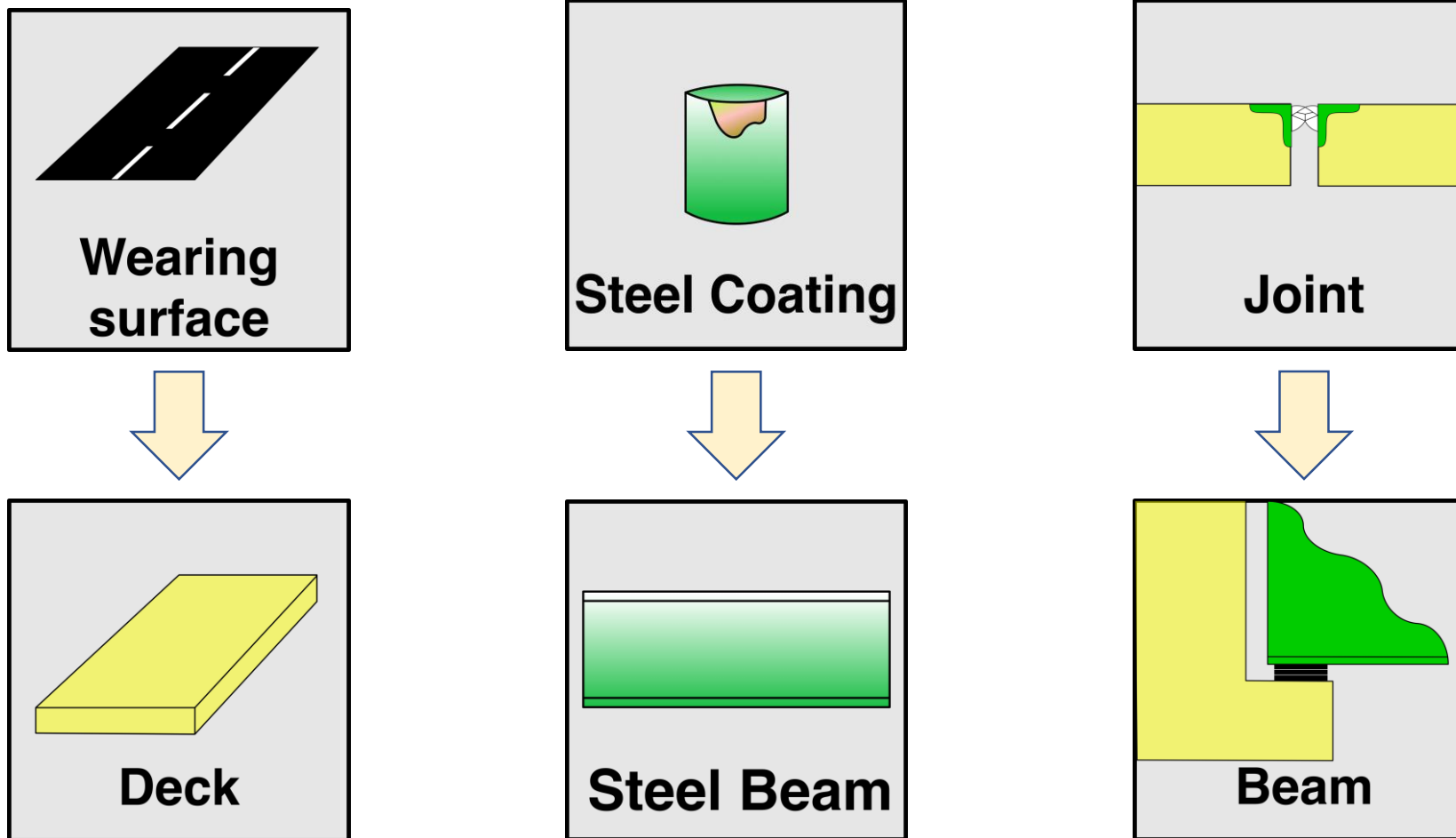
Flow of Inventory

α, Fraction preserved

α & NPMM

Hearn,G., (2016). *Bridge Preservation Index and Its Relation to National Performance Management Measures*. TRB Annual Mtg., Paper 16-2301, 14p.
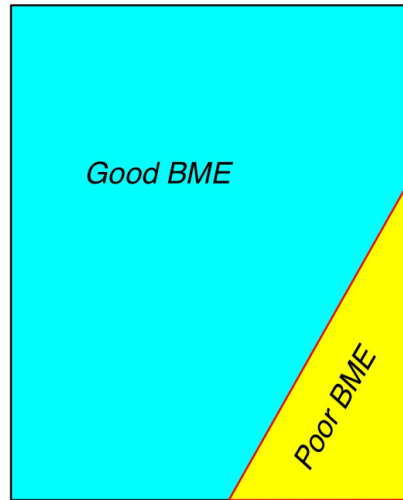
Risk Among Bridge Elements

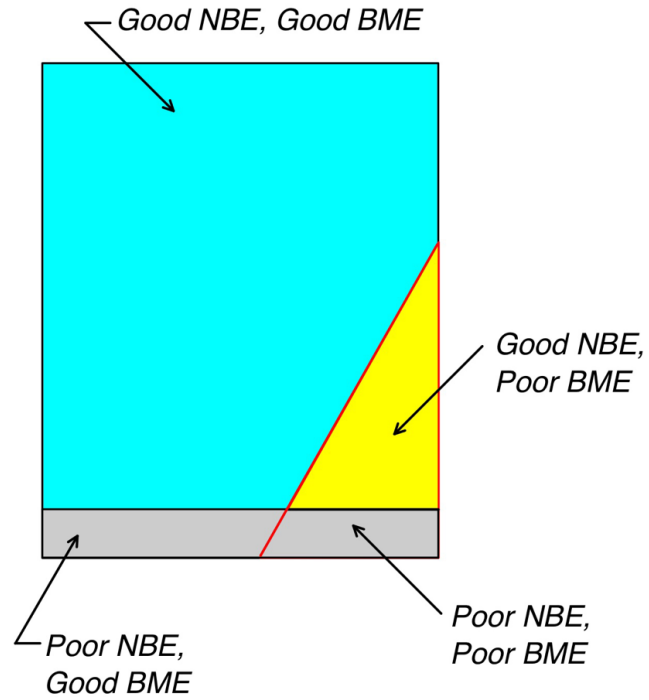Hearn, G., (2015). *Element-Level Performance Measures for Bridge Preservation*. Trans. Res. Rec. 2481, p10-17.
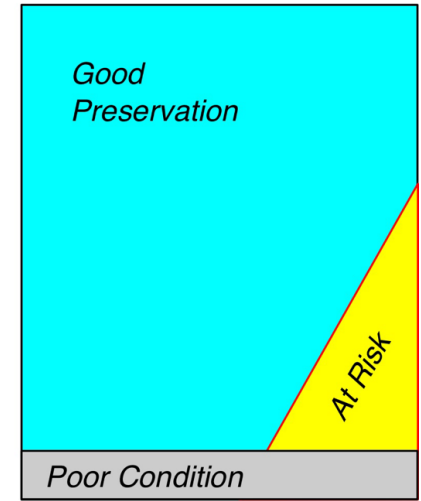
Four Outcomes

Risk: MidWest States
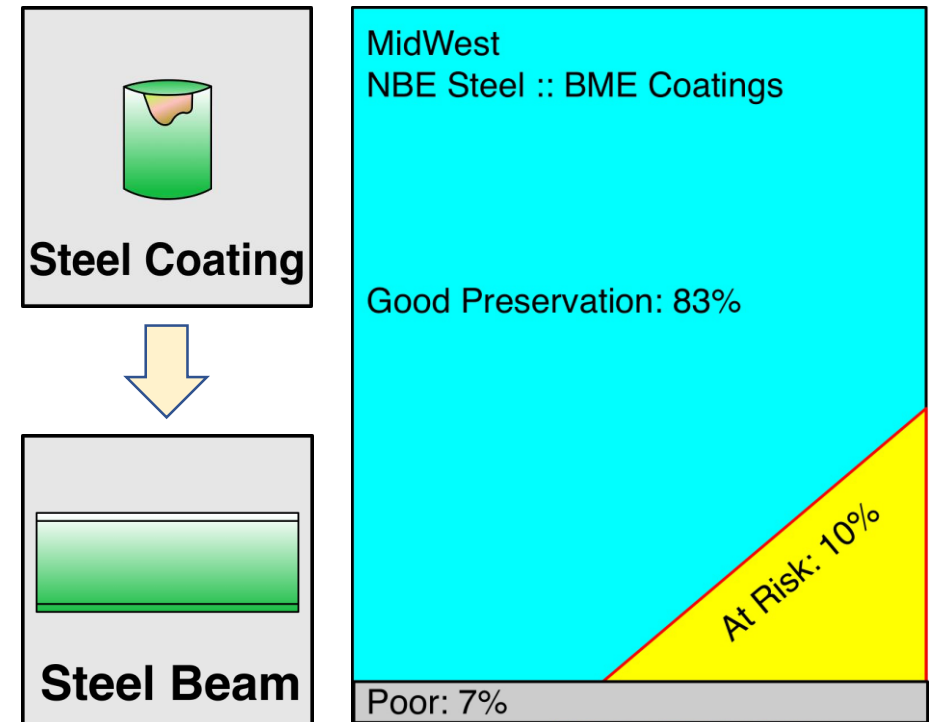

Wearing surface → Deck

MidWest
NBE Deck :: Wearing Surface

Good Preservation: 93%

Poor: 4%

At Risk: 3%

Steel Coating → Steel Beam

MidWest
NBE Steel :: BME Coatings

Good Preservation: 83%

At Risk: 10%

Poor: 7%

Risk: MidWest States

MidWest
Superstructure :: Joint

Good Preservation: 74%

At Risk: 23%

Poor: 3%

MidWest
NBE :: BME

Good Preservation: 56%

At Risk: 15%

Poor: 29%
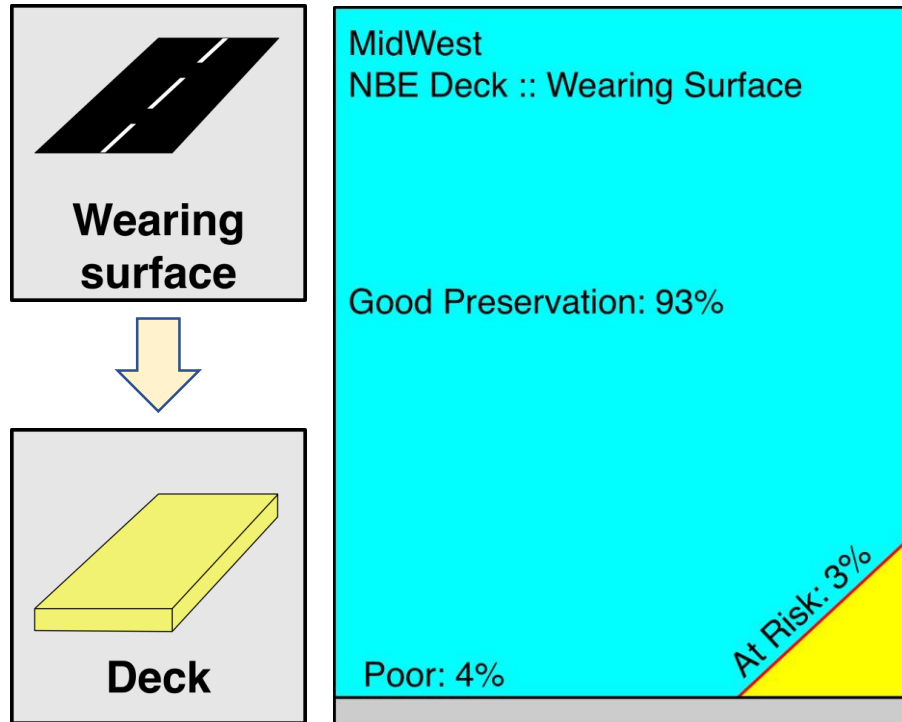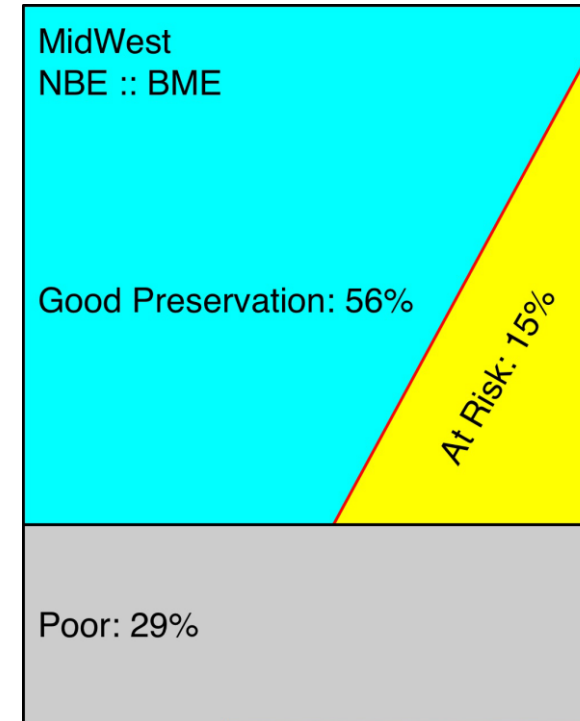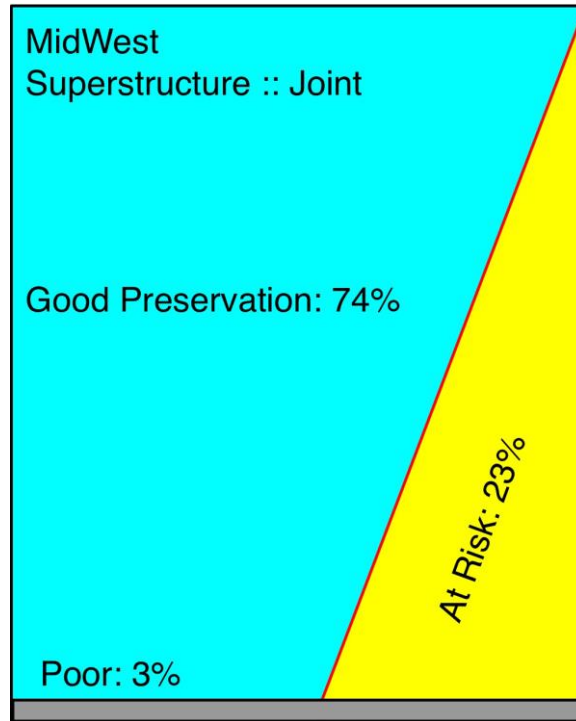
Performance Measures

- Inventory, Condition: Good/Fair

- Transitions, Condition: Preservation fraction α

- Relative condition: Risk

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