



Data Interactions with Optimization

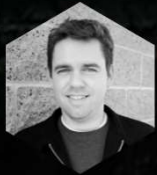
User Group Meeting September 17, 2019 | Louisville, Kentucky



Moulton Falls Bridge | Washington
National Parks Service | Eastern Federal Lands

Some interactions we have learned working with several states.

CONTACT



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 **Jira Service Desk**

<https://bridgware.atlassian.net/servicedesk/customer/portals>

Moulton Falls Bridge | Washington
National Parks Service | Eastern Federal Lands



**CULVERT DECK
AREAS**

**NBI
DETERIORATION
CLIFFS**

**ELEMENT RATE
OF CHANGE**

**ELEMENT
CONVERSION**

**NETWORK
POLICIES**

CULVERT DECK AREAS

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Inspection > Inventory > Design

Deck

Deck Structure Type (107): N N/A (NBI) ▼

Deck Surface Type (108A): N N/A (no deck (NBI)) ▼

Deck Membrane Type (108B): N N/A (no deck (NBI)) ▼

Deck Protection (108C): N N/A (no deck (NBI)) ▼

Curb Sidewalk width/Left (050A): 0.000 ft

Curb Sidewalk width/Right (050B): 0.000 ft

Deck Width (052): 0.000 ft

Bridge Median (033): 0 No median ▼

Deck Area: 1571.800 (SF)

Structure Status

Bridge Status: 3 Active ▼

Bridge Lifecycle Phase: null (FIX PARAM VALUE ▼)

Spans

Number of Main Spans (045): 3

Main Spans Material (043A): 1 Concrete ▼

Main Spans Design (043B): 19 Culvert ▼

Number of Approach Spans (046): 0

Approach Span Material (044A): Unknown (NBI) ▼

Approach Span Design (044B): Unknown (P) ▼

Skew (034): 0

Structure Flared (035): 0 No flare ▼

Length

Maximum Span Length (048): 9.843 ft

Structure Length (049): 32.152 ft

Total Length: 32.152 ft

Structure Units

	Key	Unit	Type	Default	Elements (#)	Description	Notes
✗	0	0	M Main ▼	<input checked="" type="checkbox"/>	26	-1	
✗	1	1	M Main ▼	<input type="checkbox"/>	0	-1	

First, as a reminder, be aware the optimization uses the bridge.deck_area field because this process pre-dates the FHWA deck area formula. You might not have populated this field for culverts. If you use another program (inspecttech, inspect-x, or a custom inspection solution, make sure this field is being populated.

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Programs > Performance Measures

Performance Measures

Program: 2019-08 Culvert Example Scenario: Without Culvert Deck Area

Select Performance Measures

Performance Measures	Best Value	Worst Value		
Health Index	100.00	0.00		
Pct. Good (Surface-Based)	100.00	0.00		
Pct. Poor (Surface-Based)	0.00	100.00		

- Pct. Poor (Surface-Based) ▾
- Culvert NBI Rating
- Database Field Performance
- Deck NBI Rating
- Pct. Good (Count-Based)
- Pct. Good/Fair (Count-Based)
- Pct. Good/Fair (Surface-Based)
- Pct. Poor (Count-Based)
- Pct. Poor (Surface-Based)
- Substructure NBI Rating
- Superstructure NBI Rating

0.00	0.00		
------	------	--	--

Health Index	Pct. Good (Surface-Based)	Pct. Poor (Surface-Based)	Utility (Default)
--------------	---------------------------	---------------------------	-------------------

Min: <input type="text"/> Target: <input type="text"/>	Target: <input type="text"/>	Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>
--	------------------------------	------------------------------	--

Save Cancel

This deck area is used for the performance measures based on surface areas.

CULVERT DECK AREAS

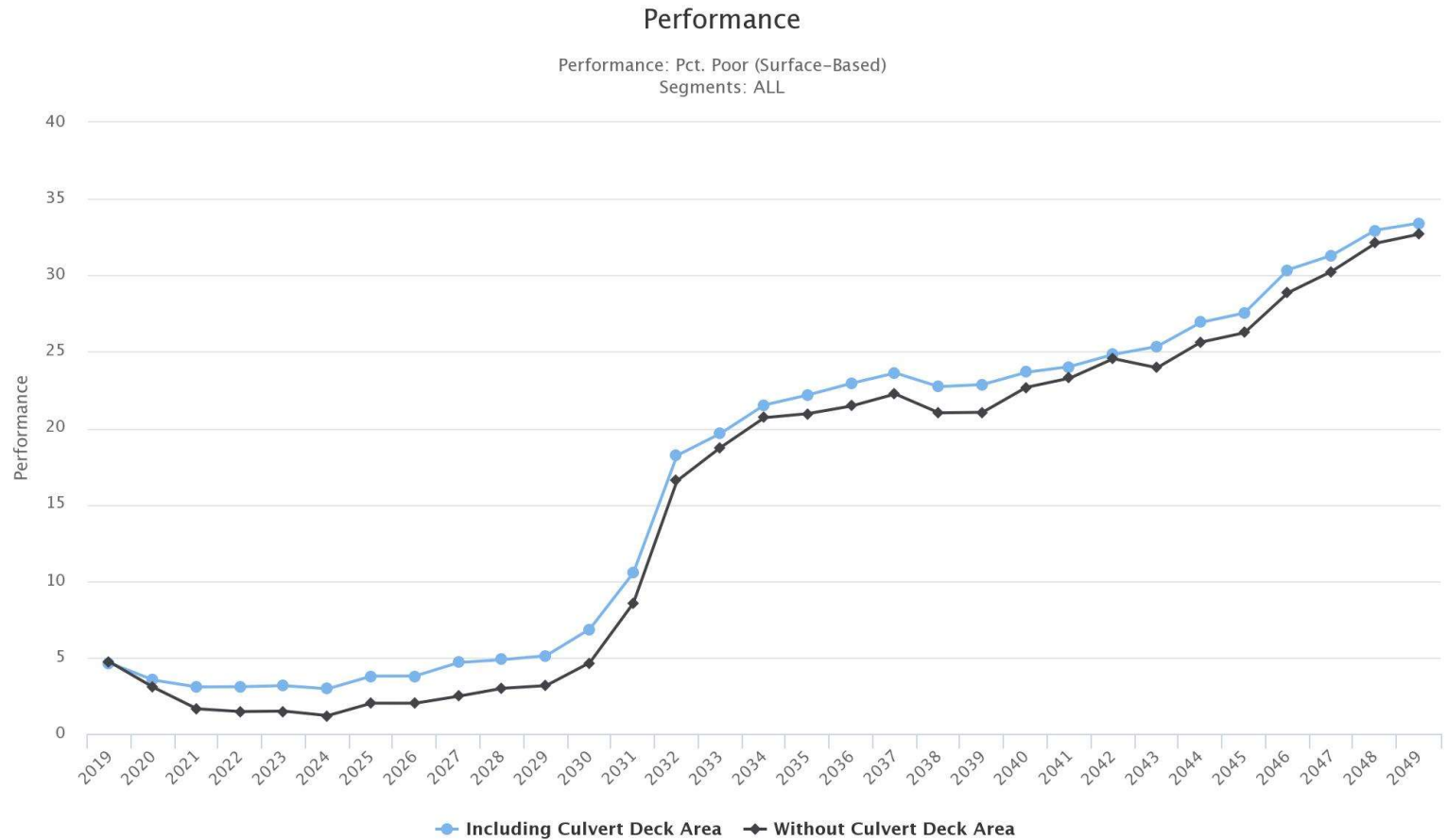
CULVERT DECK AREAS

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Note here, in a state with 4% poor by deck area outside of BrM, that not including the culverts leads to a 2% better (or inaccurate) performance measure.

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USER, PONTIS Admin > Modeling Config > Action Defs

Metric English

Benefit Groups

Please Select Add

Replace Culvert X

Overriding Direct Cost (overrides unit-costs) -

Enabled	Field Name	Cost Per Unit	Unit
<input type="checkbox"/>	Deck Area	\$	sq.ft

Unit Costs -

ID	Element Name	Separated	Cost Per Unit	Unit	?	
240	Steel Culvert (Replace)		\$ 15000	ft	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
241	Re Conc Culvert (Replace)		\$ 10000	ft	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
242	Timber Culvert (Replace)		\$ 10000	ft	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
243	Other Culvert (Replace)		\$ 10000	ft	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
244	Masonry Culvert (Replace)		\$ 10000	ft	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
245	Pre Concrete Culvert (Replace)		\$ 10000	ft	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Indirect Cost -

Enabled	Component	Estimation Method
<input checked="" type="checkbox"/>	Total Indirect Cost	Percentage 20

Deferment Rules -

Action Name	Deferment Interval (Years)
-------------	----------------------------

Save

That missing deck area can also affect the costs-per-deck-area.



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Bridge: 0001-185.012 Name: Facility Carried (007): ND HIGHWAY 1 Feature Intersected (006A): CREEK Metric English

Analysis > LCCA

Run Analysis Analysis last run on 8/23/2019 1:13:26 PM on "Alternative 1".

Short-Term Work Items Existing For Selected Bridge

Display System Recommendations
 Display Work Candidates
 Display Zero Cost Recommendations
 Display Zero Cost Work Candidates
 Alternative 1 [New Alternative](#)

Sel.	Short-Term Work Item	Action	Base Utility	Utility (Change)	Cost	Benefit / Cost (\$k)	Cost (\$k) / Benefit	Target Year	Condition (Change)	LifeCycle (Change)
	Last inspection		96.37	96.37 (0.00)	\$0			0	90.93 (0.00)	100.00 (0.00)
<input type="checkbox"/>	System Generated	Rehab Culvert - Network	96.37	96.40 (0.03)	\$20,000	.0015	\$667	2019	91.01 (0.08)	100.00 (0.00)
<input type="checkbox"/>	System Generated	_Rehab Culvert	96.37	96.40 (0.03)	\$20,000	.0015	\$667	2019	91.01 (0.08)	100.00 (0.00)
<input type="checkbox"/>	System Generated	_Replace Bridge	96.37	68.33 (-28.04)	\$394,530	-0.0711	-\$14	2019	90.93 (0.00)	53.26 (-46.74)
<input type="checkbox"/>	System Generated	Replace Structure - Network	96.37	54.41 (-41.96)	\$631,248	-0.0665	-\$15	2019	100.00 (9.07)	24.01 (-75.99)
<input type="checkbox"/>	System Generated	_Replace Culvert	96.37	40.00 (-56.37)	\$4,332,000	-0.13	-\$77	2019	100.00 (9.07)	0.00 (-100.00)

Navigation icons: back, forward, search, refresh

Page size: 10

5 items in 1 pages

[Add to New Project](#)

It will also affect the cost-benefits of work when you look at the LCCA page for the single structure.

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```

UPDATE bridge
SET deck_area= CASE WHEN length <=0 THEN NULL
                WHEN deckwidth > 0 THEN length * deckwidth
                WHEN (SELECT x.roadway_gd FROM roadway x WHERE
                    x.bridge_gd= bridge.bridge_gd and x.on_under='1') IS
                    NULL THEN NULL
                WHEN (SELECT x.roadwidth FROM roadway x WHERE
                    x.bridge_gd= bridge.bridge_gd and x.on_under='1') <= 0
                    THEN NULL
                ELSE (length * (SELECT x.roadwidth FROM roadway x WHERE
                    x.bridge_gd = bridge.bridge_gd and x.on_under='1'))
                END
UPDATE bridge SET deck_area = (ROUND(deck_area, 1));
    
```

Here is a quick SQL script to populate your deck areas with the FHWA formula if needed.



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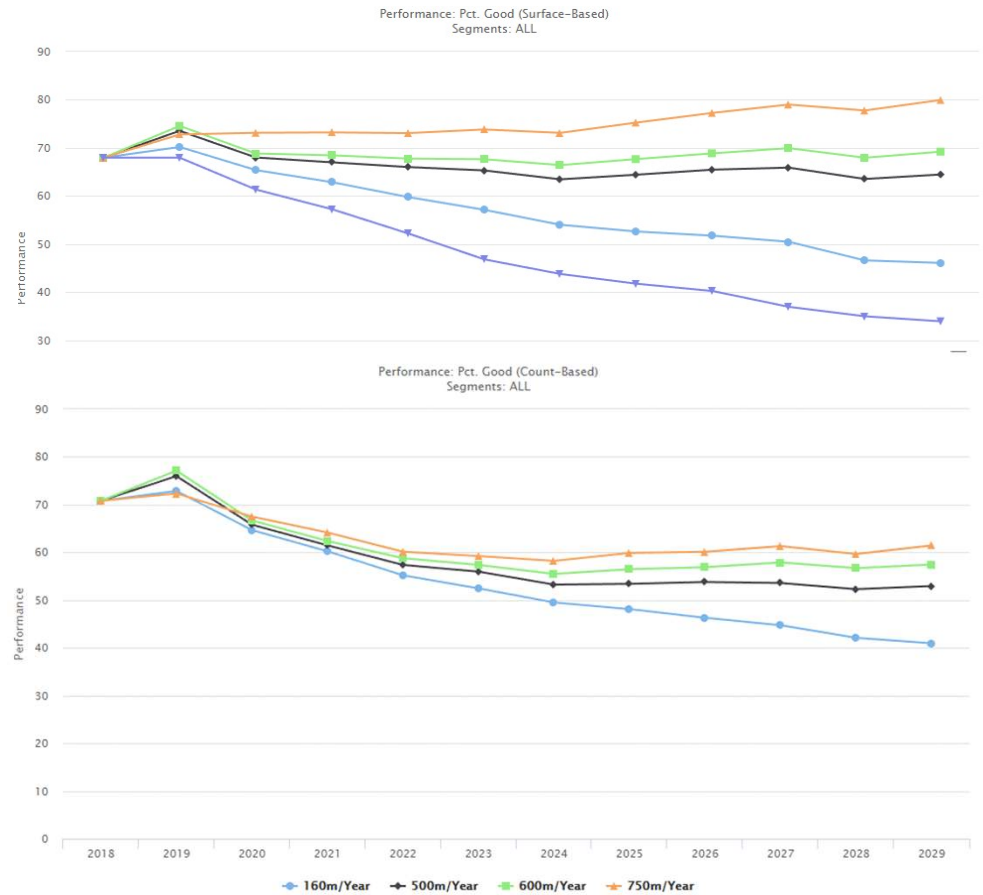
ELEMENT CONVERSION

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Consider this example early draft run from a DOT:

At no funding, low funding or current funding, the % Good area drops quickly (10% in 3 years)

The Count Good drops very quickly no matter the funding.



NBI DETERIORATION CLIFFS

CULVERT DECK AREAS

NBI DETERIORATION CLIFFS

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Admin > Modeling Config > NBI Deterioration Models

Components

Component Name
Deck
▶ Superstructure
▶ Substructure
▶ Culvert

Component Specification

Name:

Description:

Category:

Table Name: Column Name:

Min NBI Value: Max NBI Value:

Component Deterioration Modeling

Model

Model Parameters

NBI Transition Time in Years 9 :

NBI Transition Time in Years 8 :

NBI Transition Time in Years 7 :

NBI Transition Time in Years 6 :

NBI Transition Time in Years 5 :

NBI Transition Time in Years 4 :

NBI Transition Time in Years 3 :

NBI Transition Time in Years 2 :

NBI Transition Time in Years 1 :

NBI deterioration is a monotonically decreasing number. Meaning it's a fixed number of years as a 5 before dropping to a 4.

NBI DETERIORATION CLIFFS

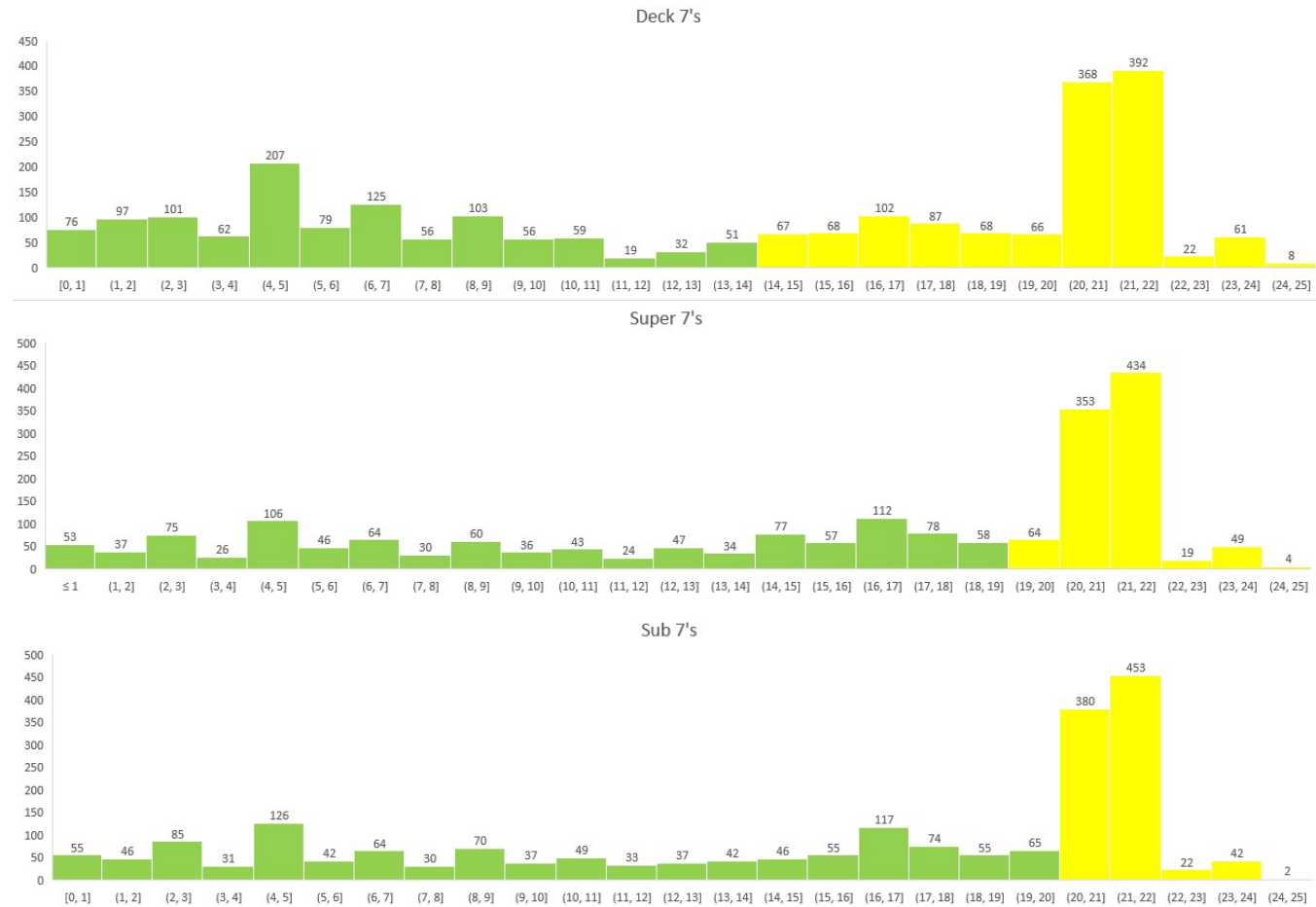
CULVERT DECK AREAS

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We went and looked into how long a structure has been in a certain condition. In this case, a large number of them have always been 7's as far back as the state has data.

NBI DETERIORATION CLIFFS

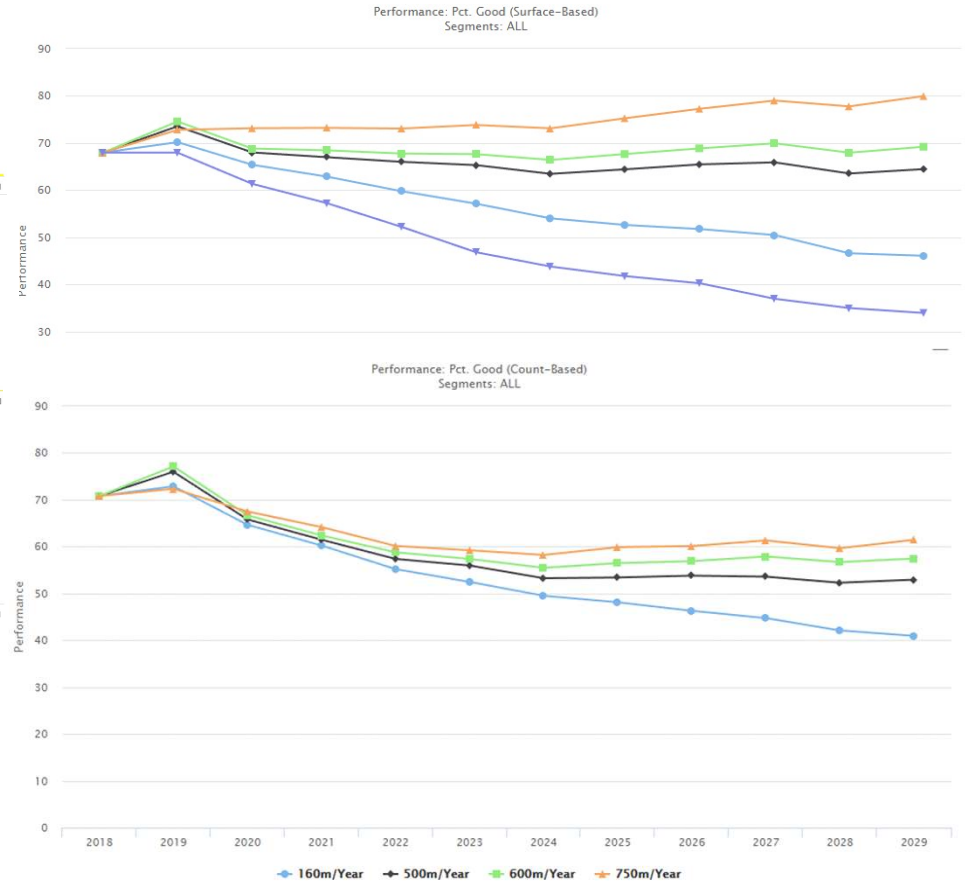
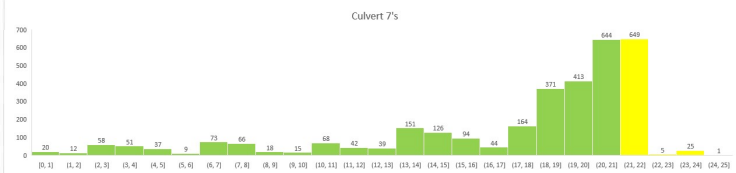
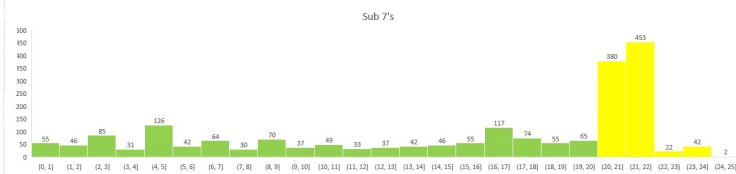
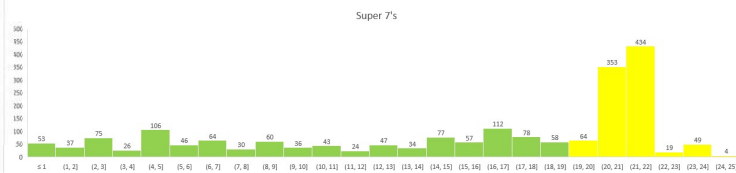
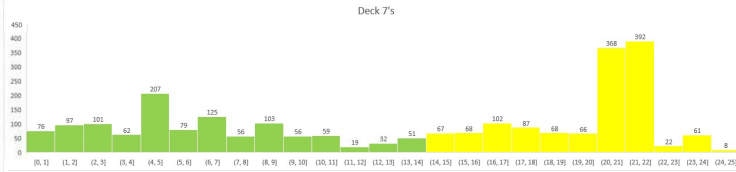
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These large flocks of structures deteriorating to fair at the same time causes this step dropoff in deterioration.

NBI DETERIORATION CLIFFS

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Admin > Modeling Config > NBI Deterioration Models

Components

Component Name

- Deck
- Superstructure
- Substructure
- Culvert

Component Specification

Name: Deck

Description:

Category: Decks/Slabs

Table Name: Inapoint

Column Name:

Min NBI Value: 1

Max NBI Value: 9

Component Deterioration Modeling

Model

Model Parameters

NBI Transition Time in Years 9 : 2

NBI Transition Time in Years 8 : 21

NBI Transition Time in Years 7 : 24

NBI Transition Time in Years 6 : 18

NBI Transition Time in Years 5 : 15

NBI Transition Time in Years 4 : 8

NBI Transition Time in Years 3 : 4

NBI Transition Time in Years 2 : 0

NBI Transition Time in Years 1 : 0

Network NBI Rating distributions

Bridge Filter: Entire Network [Re-estimate results](#)

Component: Bridge-Level

	Latest Inspection Reported	Current	+5 Years	+10 Years
NBI Rating 9	1	0	0	0
NBI Rating 8	1521	992	604	298
NBI Rating 7	5539	3728	2213	2092
NBI Rating 6	1248	3330	5006	5168
NBI Rating 5	415	575	741	824
NBI Rating 4	131	156	146	220
NBI Rating 3	3	55	75	118
NBI Rating 2	0	10	26	22
NBI Rating 1	1	0	8	14
NBI Rating 0	0	13	40	103

Component Deterioration Modeling

Model

Model Parameters

- NBI Transition Time in Years 9 : 2
- NBI Transition Time in Years 8 : 21
- NBI Transition Time in Years 7 : 24
- NBI Transition Time in Years 6 : 18
- NBI Transition Time in Years 5 : 15
- NBI Transition Time in Years 4 : 8
- NBI Transition Time in Years 3 : 4
- NBI Transition Time in Years 2 : 0
- NBI Transition Time in Years 1 : 0

So if you chose to use NBI (or GCR) deterioration, be aware of the quirks in your data which may cause step deterioration rates.



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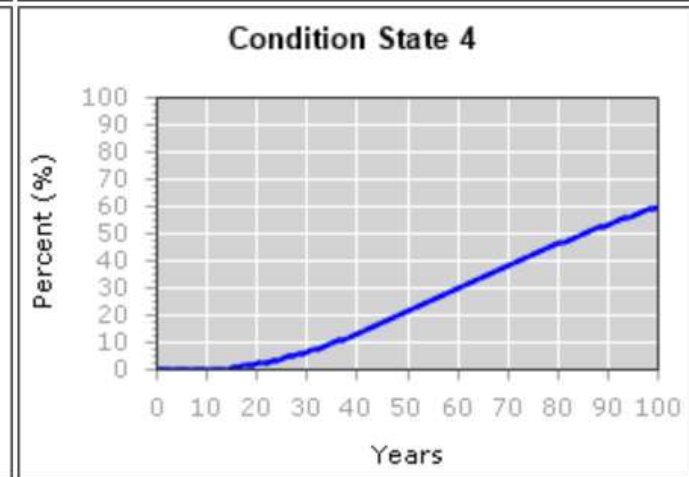
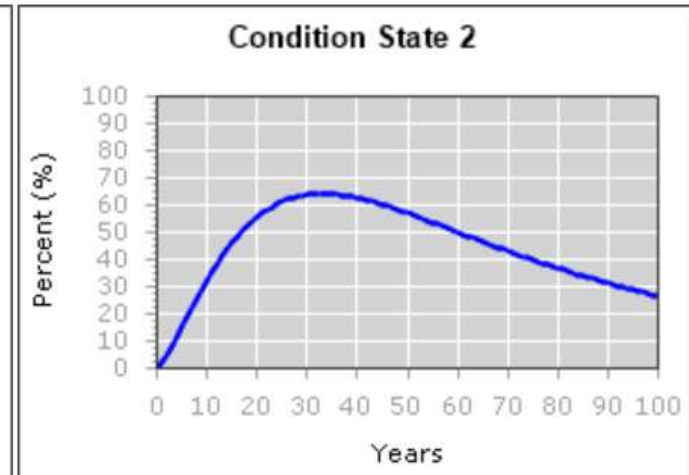
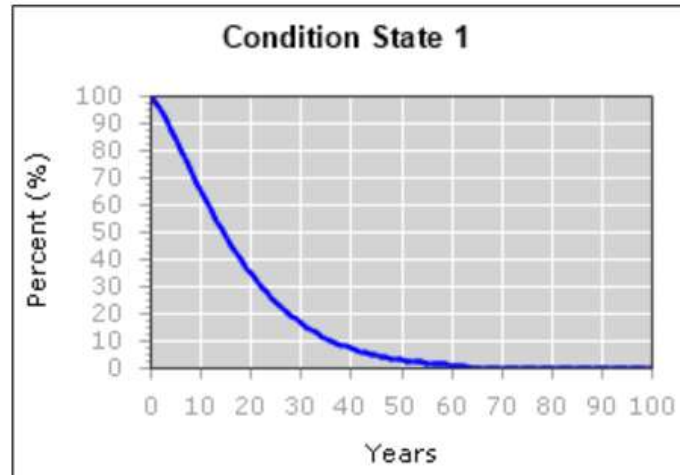
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This is the markovian deterioration – the ideal of what we expect from elements.

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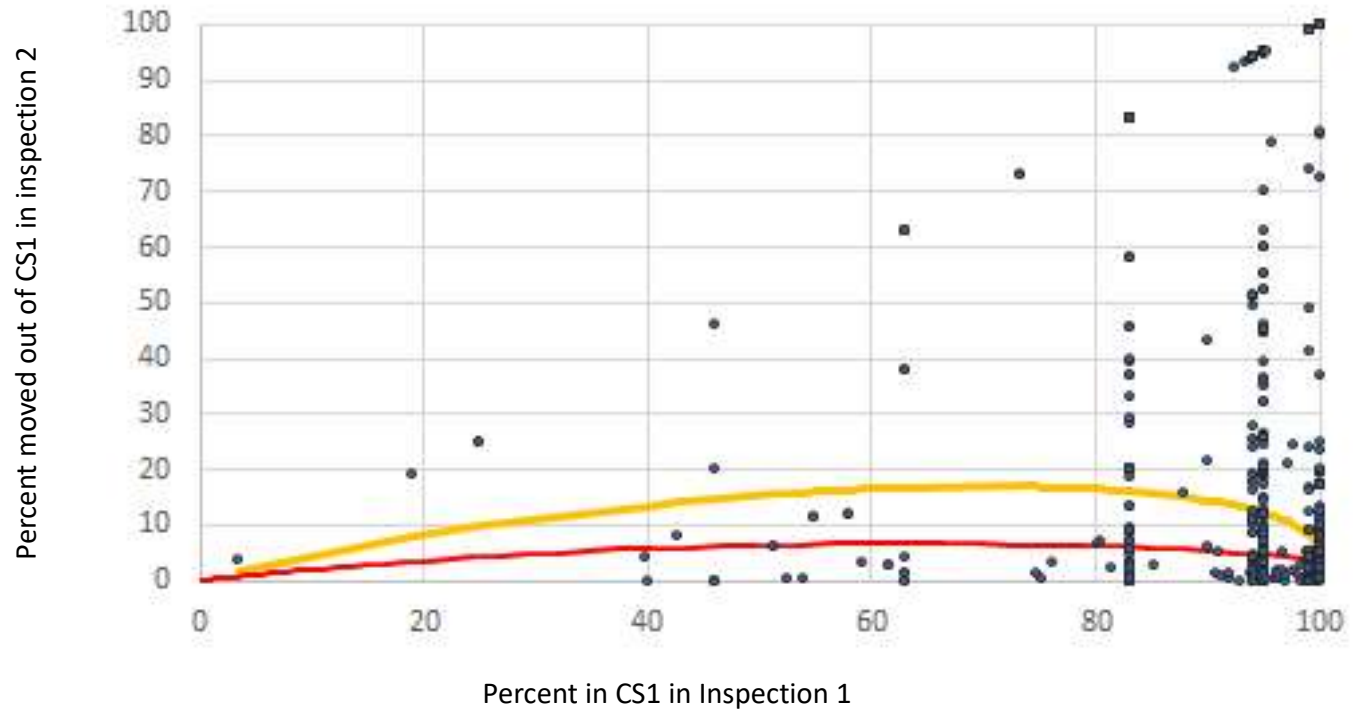
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CS1 Calibration - 2 Years Inspections



Comparing the rate of deterioration from two inspections in a state produces this interesting graph.

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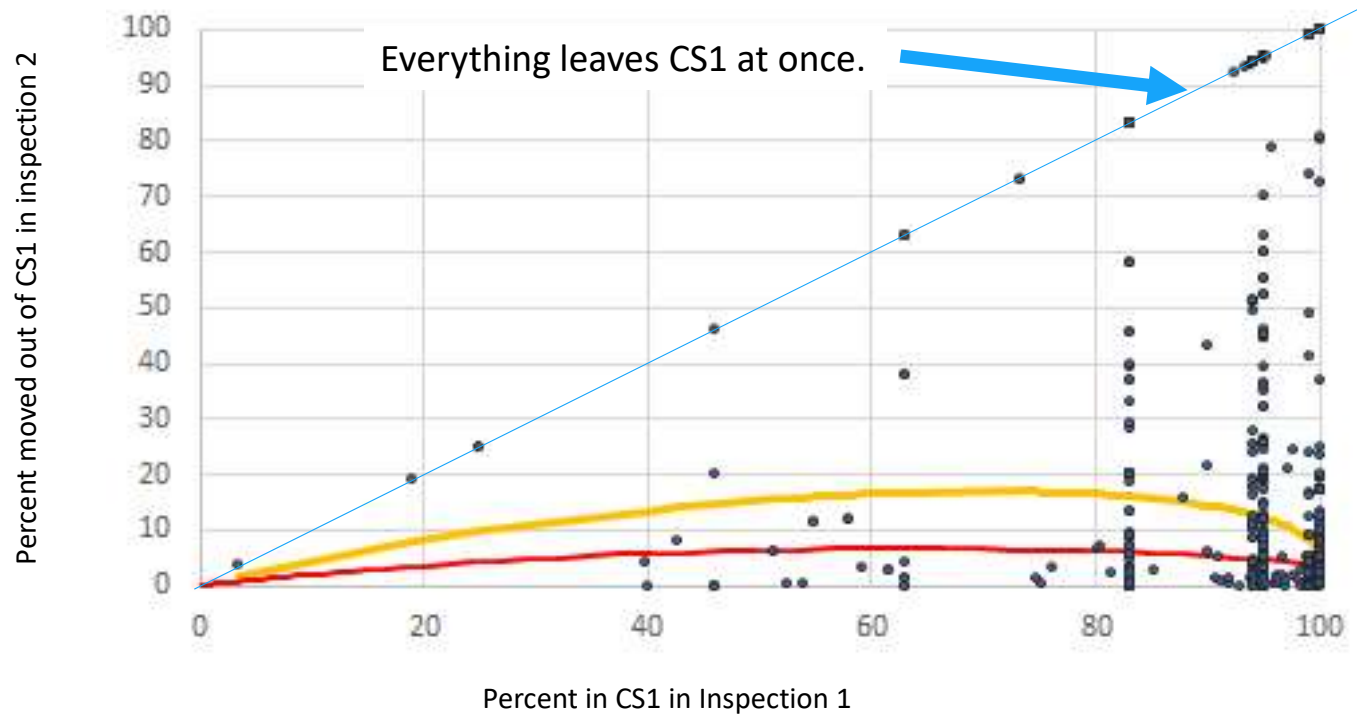
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CS1 Calibration - 2 Years Inspections



It was more frequent than expected that all of CS1 would leave in an inspection.

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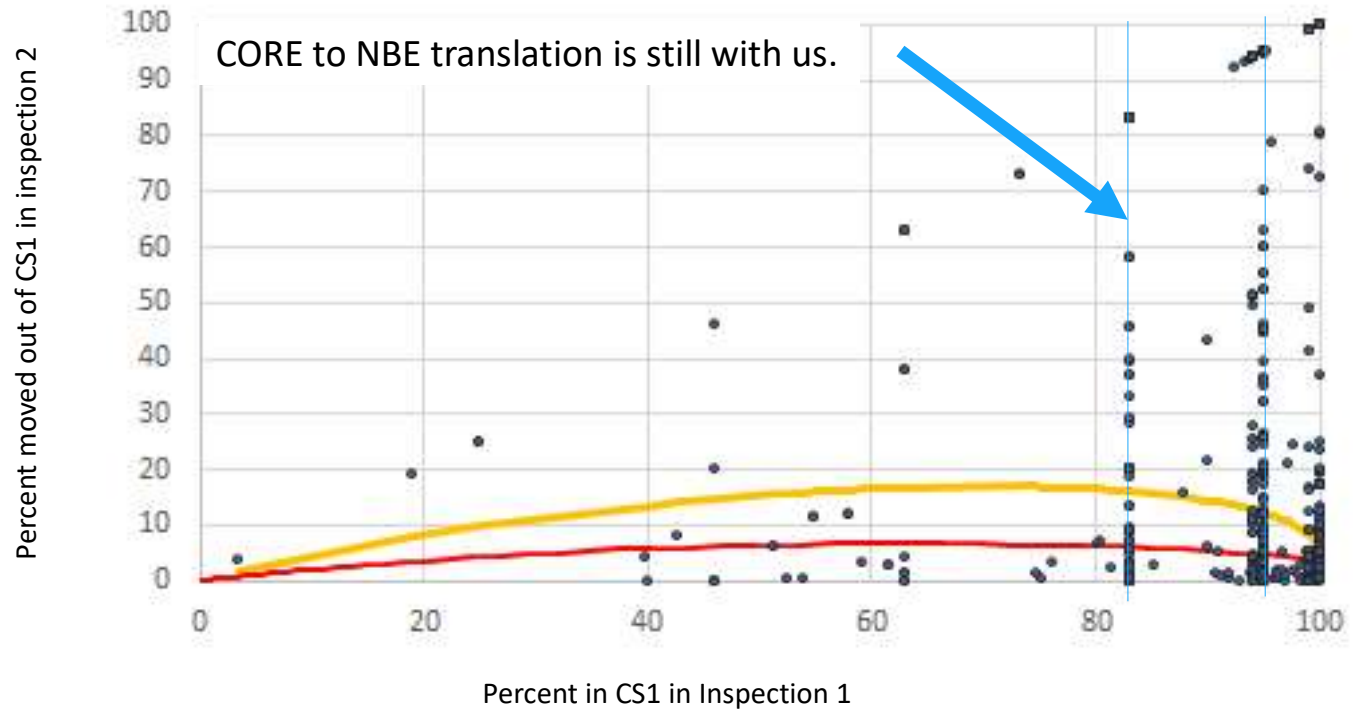
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CS1 Calibration - 2 Years Inspections



And notice that high percentages of CS1 in the CORE translation zones are still with us.

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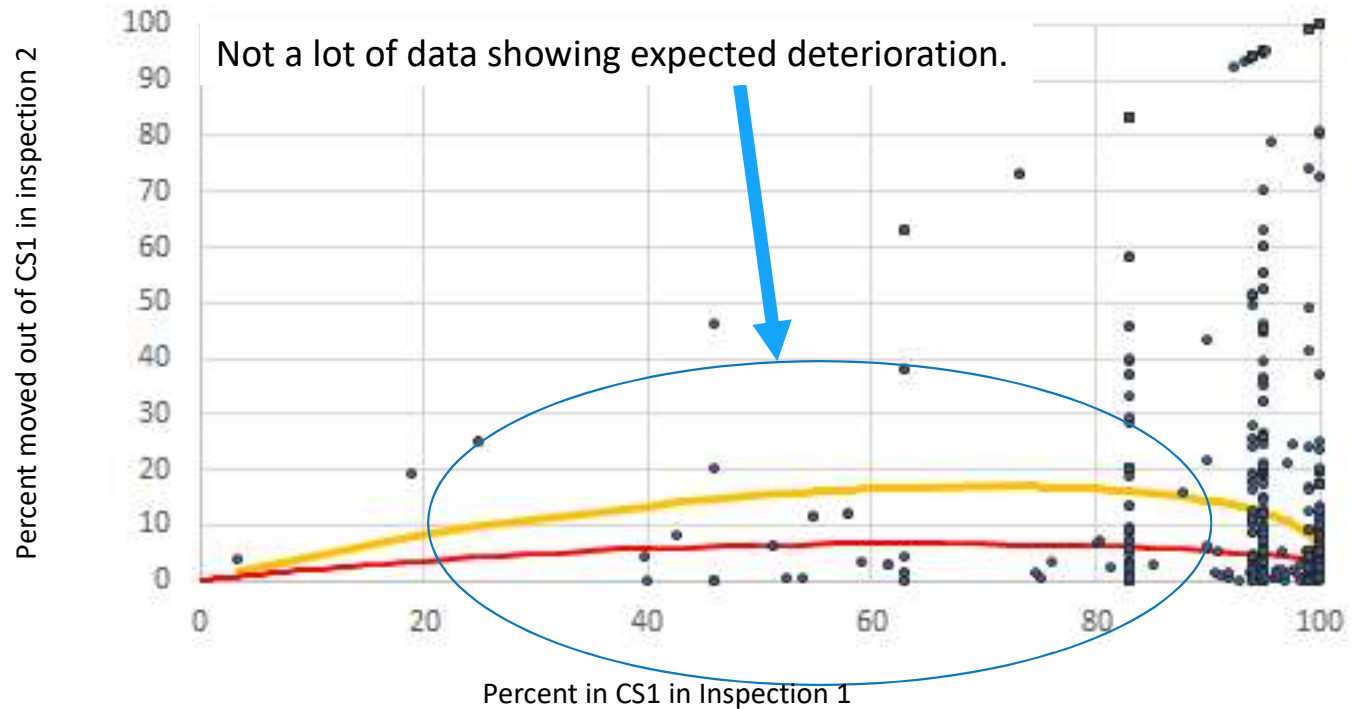
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CS1 Calibration - 2 Years Inspections



This is where we would expect the deterioration signal, and there wasn't a lot there.

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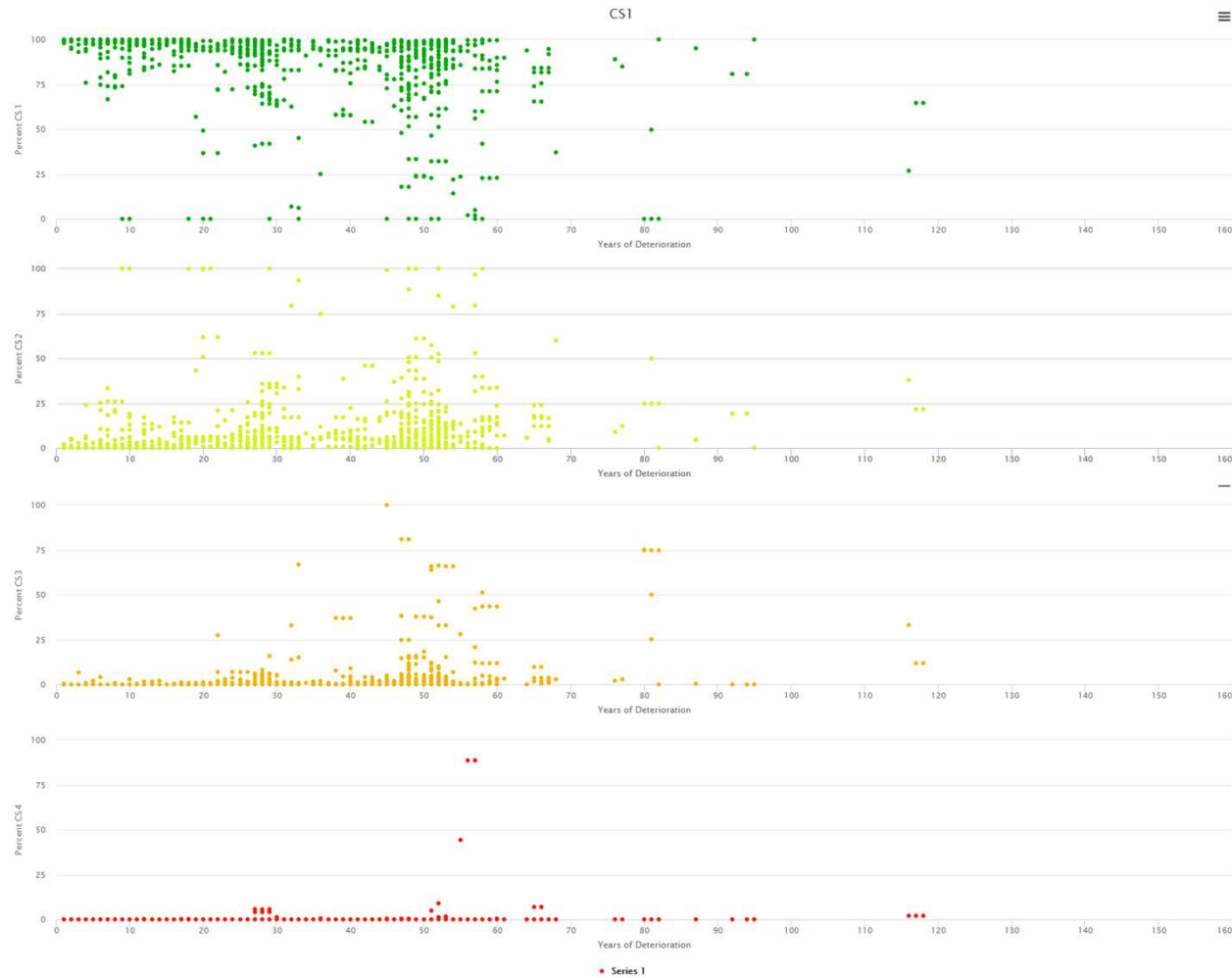
ELEMENT CONVERSION

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RIDOT Element 12 Data

Filtered to:

- Inspections since 2015
- Deck areas greater than 1k sqft.
- Year built is not before inspection
- Newest of year built or year reconstruct



Graphing instead age vs. amount in each condition state, with some basic filters.

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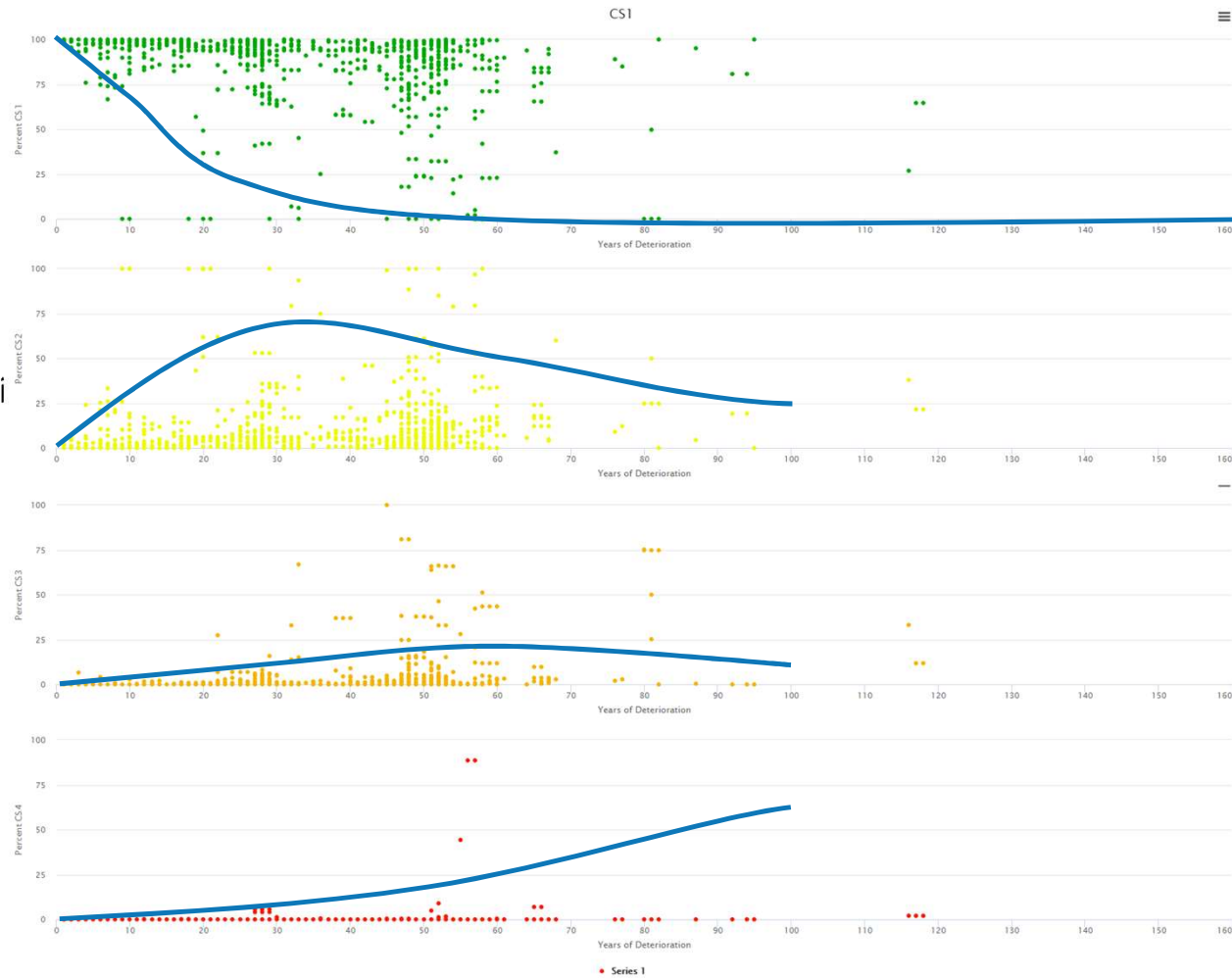
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2015+ RIDOT Element 12

- Not zero deck area
- Year built is not before i
- Newest of year built or



We would expect curves something like this.

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- RIDOT NBE Element 215
- Year built is not before inspection
 - Newest of year built or year reconstruct
 - 1k+ deck area



Taking out some of the filters, just shows the match is pretty hard. Computer methods cannot find the pattern in here. Even talking to statisticians, the best we can do for now is apply human's best expectations of deterioration.



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Generic Deck Superstructure Substructure Culvert

Generic Upper Limits

Group enabled
Method of CS average: Element weighting

NBI	Enabled	CS1 %	CS2 %	CS3 %	CS4 %
9	<input checked="" type="checkbox"/>	100	1	1	1
8	<input checked="" type="checkbox"/>		5	5	1
7	<input checked="" type="checkbox"/>		20	5	2
6	<input checked="" type="checkbox"/>			10	3
5	<input checked="" type="checkbox"/>			20	5
4	<input checked="" type="checkbox"/>				15
3	<input checked="" type="checkbox"/>				100
2	<input type="checkbox"/>				
1	<input type="checkbox"/>				

ELEMENT CONVERSION

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Category	Deck																																					
	9	8	7	6	5	4	3	2	1	9	8	7	6	5	4	3	2	1	9	8	7	6	5	4	3	2	1	9	8	7	6	5	4	3	2	1	0	
NBI	1								2								3								4													
CS	0	2	19	142	252	254	88	17	3	5	129	365	413	181	91	41	9	4	4	149	523	868	665	375	93	19	8	6	154	538	924	768	466	150	20	8	3	3
2	1	0	1	0	1	1	0	0	0	0	13	61	88	28	3	0	0	0	0	2	12	45	54	21	2	1	0	0	0	1	11	23	12	5	1	1	0	0
4	0	0	0	0	1	0	0	0	0	0	1	11	31	22	5	1	1	0	0	1	1	8	27	14	1	0	0	0	0	0	1	2	4	1	0	0	0	0
6	0	0	0	1	0	1	0	0	0	0	2	41	136	138	68	15	0	0	0	2	0	4	3	9	1	0	0	0	0	0	1	1	1	1	1	0	0	0
8	0	1	1	1	1	0	0	0	0	0	3	7	15	27	6	1	0	0	0	1	1	7	5	2	0	0	0	0	0	0	0	1	1	1	0	0	0	0
10	0	0	0	0	1	1	0	0	0	0	0	5	13	20	4	2	0	0	0	0	1	1	4	5	0	0	0	0	0	0	0	0	1	1	1	0	0	0
12	0	0	1	1	1	2	1	0	0	0	1	2	14	13	3	1	0	0	0	0	0	2	3	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	1	1	1	0	0	0	0	0	0	2	7	10	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	1	7	14	4	0	0	0	0	0	0	1	2	3	1	0	0	0	0	0	0	0	0	0	0	1	0	0
18	0	0	1	0	0	0	0	0	0	0	1	5	7	29	33	20	2	1	1	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	1	0	0	0	0	0	0	1	7	5	4	1	0	0	0	0	0	0	3	2	1	0	0	0	0	0	0	0	0	1	0	0	0	0
80	0	1	6	10	2	2	0	0	0	0	0	0	1	3	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
82	0	1	7	7	5	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	
84	1	5	7	32	28	16	1	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
86	0	1	6	11	4	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
88	0	2	7	9	2	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
90	1	2	14	12	5	1	0	0	0	0	0	0	0	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
92	1	7	14	23	6	1	0	0	0	0	0	0	0	2	3	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
94	2	7	15	30	6	1	0	0	0	0	0	1	0	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
96	3	40	141	136	69	12	1	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
98	1	11	33	26	3	0	0	0	0	0	0	0	1	8	8	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
100	141	423	484	174	40	1	1	2	0	0	3	18	137	223	191	36	5	1	1	0	1	2	12	36	32	1	1	0	0	0	0	4	1	5	1	3	7	

More states than expected have these unusual inspections, where element and NBI ratings do not match up.

ELEMENT CONVERSION

CULVERT DECK AREAS

NBI DETERIORATION CLIFFS

ELEMENT RATE OF CHANGE

ELEMENT CONVERSION

NETWORK POLICIES

Category	Deck																																																																																											
	9	8	7	6	5	4	3	2	1	9	8	7	6	5	4	3	2	1	9	8	7	6	5	4	3	2	1	9	8	7	6	5	4	3	2	1	0																																																							
NBI																																																																																												
CS	1								2								3								4																																																																			
0	2	19	142	252	254	88	17	3	5	129	365	413	181	91	41	9	4	4	149	523	868	665	375	93	19	8	6	154	538	924	768	466	150	20	8	3	3																																																							
2	1	0	1	0	1	1	0	0	0	13	61	88	28	3	0	0	0	0	2	12	45	54	21	2	1	0	0	0	1	11	23	12	5	1	1	0	0																																																							
4	0	0	0	0	1	0	0	0	0	1	11	31	22	5	1	1	0	0	1	1	8	27	14	1	0	0	0	0	0	1	2	4	1	0	0	0	0																																																							
6	0	0	0	1	0	1	0	0	0	2	41	136	138	68	15	0	0	0	2	0	4	3	9	1	0	0	0	0	0	1	1	1	1	1	0	0	0																																																							
8	0	1	1	1	1	0	0	0	0	3	7	15	27	6	1	0	0	0	0	1	1	7	5	2	0	0	0	0	0	0	1	1	1	0	0	0	0																																																							
10	0	0	0	0	1	1	0	0	0	0	5	13	20	4	2	0	0	0	0	1	1	4	5	0	0	0	0	0	0	0	0	1	1	1	0	0	0																																																							
12																																																																																												
14	<input type="checkbox"/> Generic <input type="checkbox"/> Deck <input type="checkbox"/> Superstructure <input type="checkbox"/> Substructure <input type="checkbox"/> Culvert																																																																																											
16	Generic Upper Limits <input checked="" type="checkbox"/> Group enabled Method of CS average: <input type="text" value="Element weighting"/>																																																																																											
18	<table border="1"> <thead> <tr> <th>NBI</th><th>Enabled</th><th>CS1 %</th><th>CS2 %</th><th>CS3 %</th><th>CS4 %</th></tr> </thead> <tbody> <tr> <td>9</td><td><input checked="" type="checkbox"/></td><td>100</td><td>1</td><td>1</td><td>1</td></tr> <tr> <td>8</td><td><input checked="" type="checkbox"/></td><td></td><td>5</td><td>5</td><td>1</td></tr> <tr> <td>7</td><td><input checked="" type="checkbox"/></td><td></td><td>20</td><td>5</td><td>2</td></tr> <tr> <td>6</td><td><input checked="" type="checkbox"/></td><td></td><td></td><td>10</td><td>3</td></tr> <tr> <td>5</td><td><input checked="" type="checkbox"/></td><td></td><td></td><td>20</td><td>5</td></tr> <tr> <td>4</td><td><input checked="" type="checkbox"/></td><td></td><td></td><td></td><td>15</td></tr> <tr> <td>3</td><td><input checked="" type="checkbox"/></td><td></td><td></td><td></td><td>100</td></tr> <tr> <td>2</td><td><input type="checkbox"/></td><td></td><td></td><td></td><td></td></tr> <tr> <td>1</td><td><input type="checkbox"/></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>																																NBI	Enabled	CS1 %	CS2 %	CS3 %	CS4 %	9	<input checked="" type="checkbox"/>	100	1	1	1	8	<input checked="" type="checkbox"/>		5	5	1	7	<input checked="" type="checkbox"/>		20	5	2	6	<input checked="" type="checkbox"/>			10	3	5	<input checked="" type="checkbox"/>			20	5	4	<input checked="" type="checkbox"/>				15	3	<input checked="" type="checkbox"/>				100	2	<input type="checkbox"/>					1	<input type="checkbox"/>				
NBI	Enabled	CS1 %	CS2 %	CS3 %	CS4 %																																																																																							
9	<input checked="" type="checkbox"/>	100	1	1	1																																																																																							
8	<input checked="" type="checkbox"/>		5	5	1																																																																																							
7	<input checked="" type="checkbox"/>		20	5	2																																																																																							
6	<input checked="" type="checkbox"/>			10	3																																																																																							
5	<input checked="" type="checkbox"/>			20	5																																																																																							
4	<input checked="" type="checkbox"/>				15																																																																																							
3	<input checked="" type="checkbox"/>				100																																																																																							
2	<input type="checkbox"/>																																																																																											
1	<input type="checkbox"/>																																																																																											
20	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																								
80	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																							
82	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																							
84	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																							
86	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																							
88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																							
90	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																							
92	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																							
94	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																							
96	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																							
98	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																							
100	36	5	1	1	0	1	2	12	36	32	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																							

These will not get converted how you would expect when applying FHWA's NBI conversion method. This conversion will probably be greatly improved by adding more controls to the QC process.

ELEMENT CONVERSION

CULVERT DECK
AREAS

NBI
DETERIORATION
CLIFFS

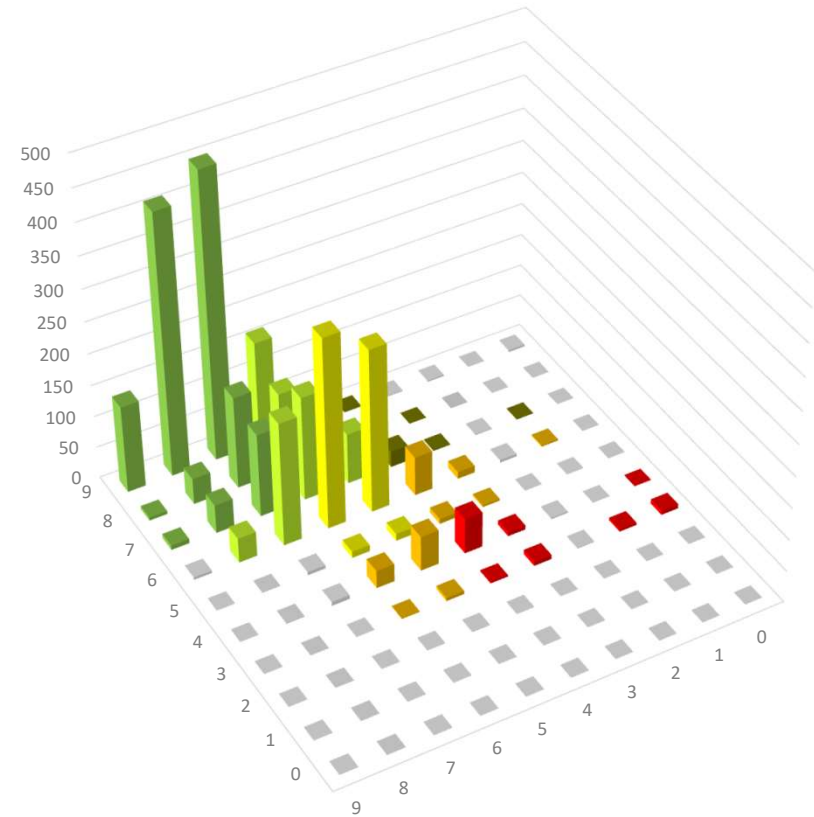
ELEMENT RATE
OF CHANGE

ELEMENT
CONVERSION

NETWORK
POLICIES

		Converted									
Deck	9	8	7	6	5	4	3	2	1	0	
9	138	5	7	4	0	0	0	0	0	0	
8	413	41	45	39	0	1	0	0	0	0	
7	452	146	132	196	5	6	0	0	0	0	
6	164	126	165	302	10	28	1	0	0	0	
5	38	42	80	259	11	55	5	0	0	0	
4	1	7	25	62	8	56	2	0	0	0	
3	1	0	1	11	3	7	7	0	0	0	
2	2	0	1	4	0	2	1	0	0	0	
1	0	0	1	2	0	0	4	0	0	0	
0	3	0	0	0	0	0	7	0	0	0	

Deck Reported NBI vs Converted NBI



For now, be aware that some bridges will be converted to better conditions and some to worse when using element conversion rates.



**CULVERT DECK
AREAS**

**NBI
DETERIORATION
CLIFFS**

**ELEMENT RATE
OF CHANGE**

**ELEMENT
CONVERSION**

**NETWORK
POLICIES**

NETWORK POLICIES

NETWORK POLICIES

CULVERT DECK
AREAS

NBI
DETERIORATION
CLIFFS

ELEMENT RATE
OF CHANGE

ELEMENT
CONVERSION

NETWORK
POLICIES

Admin > Modeling Config > Network Policies

Network Policy Editor

Network Policy: Replace Bridge [Create New](#)

Network Policy Details

Network Policy Name:

Active:

Actions

[Replace Structure - Network](#)

Details

Action: Replace Structure - Netw Project Category: Select a project category

Action Conditional Rule

Summary

(Column 'dkrating' of Table 'inspevnt' is In Set '1 Imminent failure, 2 Critical, 3 Serious, 4 Poor, 5 Fair, 6 Satisfactory')

Rule Builder

[Add Condition](#) [Add Group](#)

Type: Column Value In Param Set [Remove Condition](#)

Table: inspevnt Column: dkrating Value Is: In Set:

- Unknown (NBI)
- 0 Failed
- 1 Imminent failure
- 2 Critical
- 3 Serious
- 4 Poor
- 5 Fair
- 6 Satisfactory
- 7 Good
- 8 Very Good
- 9 Excellent

Network policies include limitations about which bridges are eligible for this work.

NETWORK POLICIES

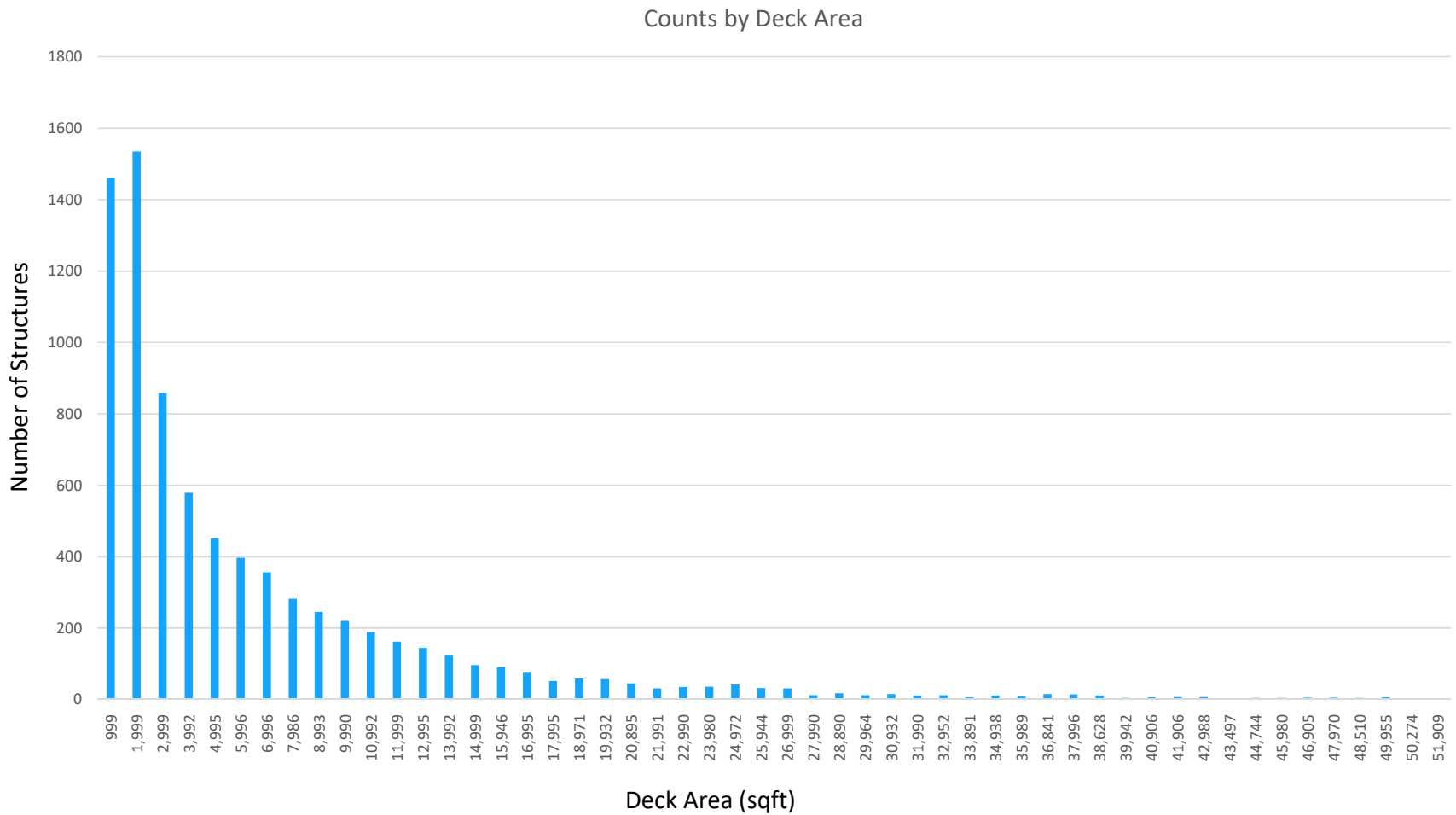
CULVERT DECK AREAS

NBI DETERIORATION CLIFFS

ELEMENT RATE OF CHANGE

ELEMENT CONVERSION

NETWORK POLICIES



One state with this inventory expected more replacements.

NETWORK POLICIES

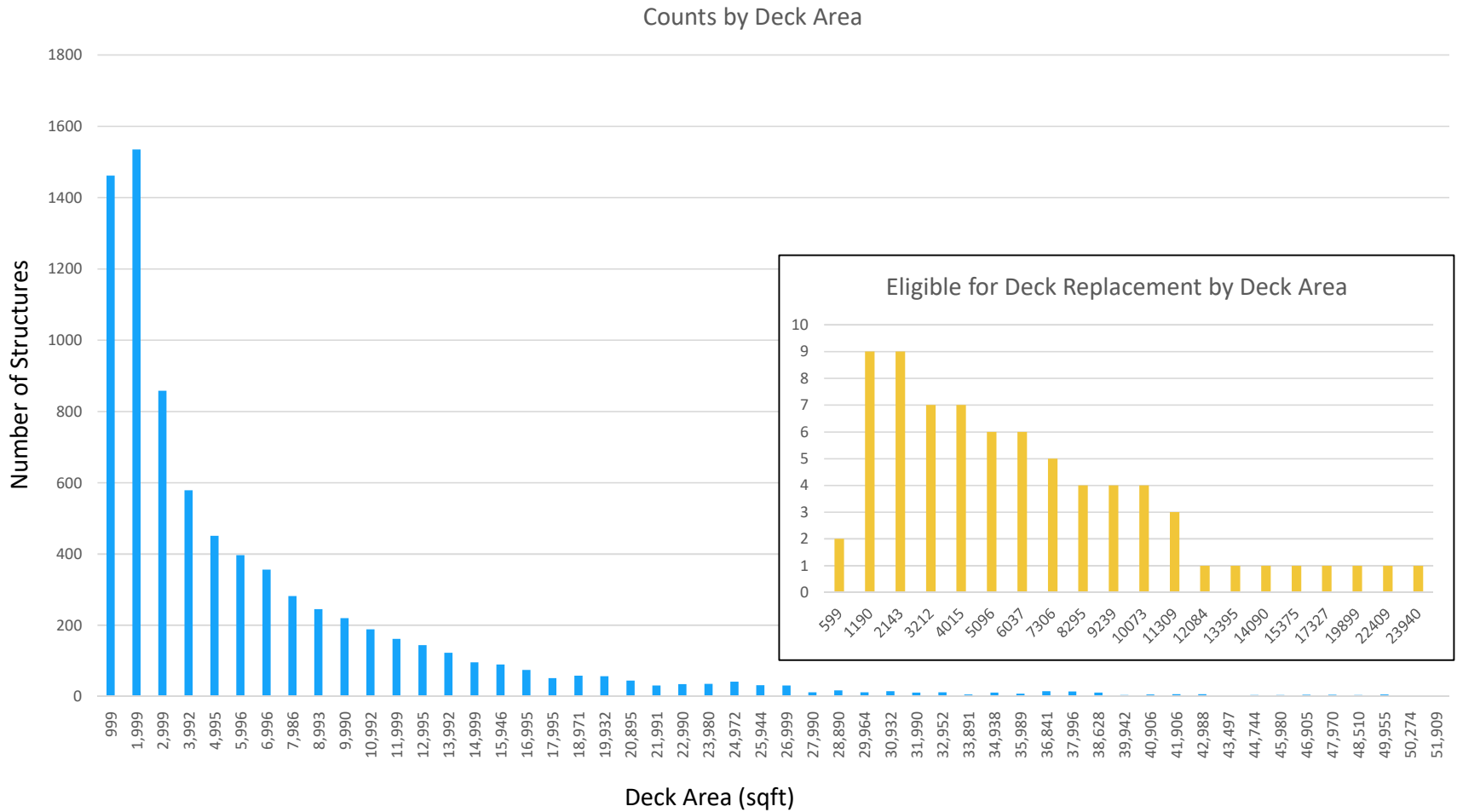
CULVERT DECK AREAS

NBI DETERIORATION CLIFFS

ELEMENT RATE OF CHANGE

ELEMENT CONVERSION

NETWORK POLICIES



What we found was that very few structures are really eligible for replacement based on those rules. We can't even graph them together in a visible way.

NETWORK POLICIES

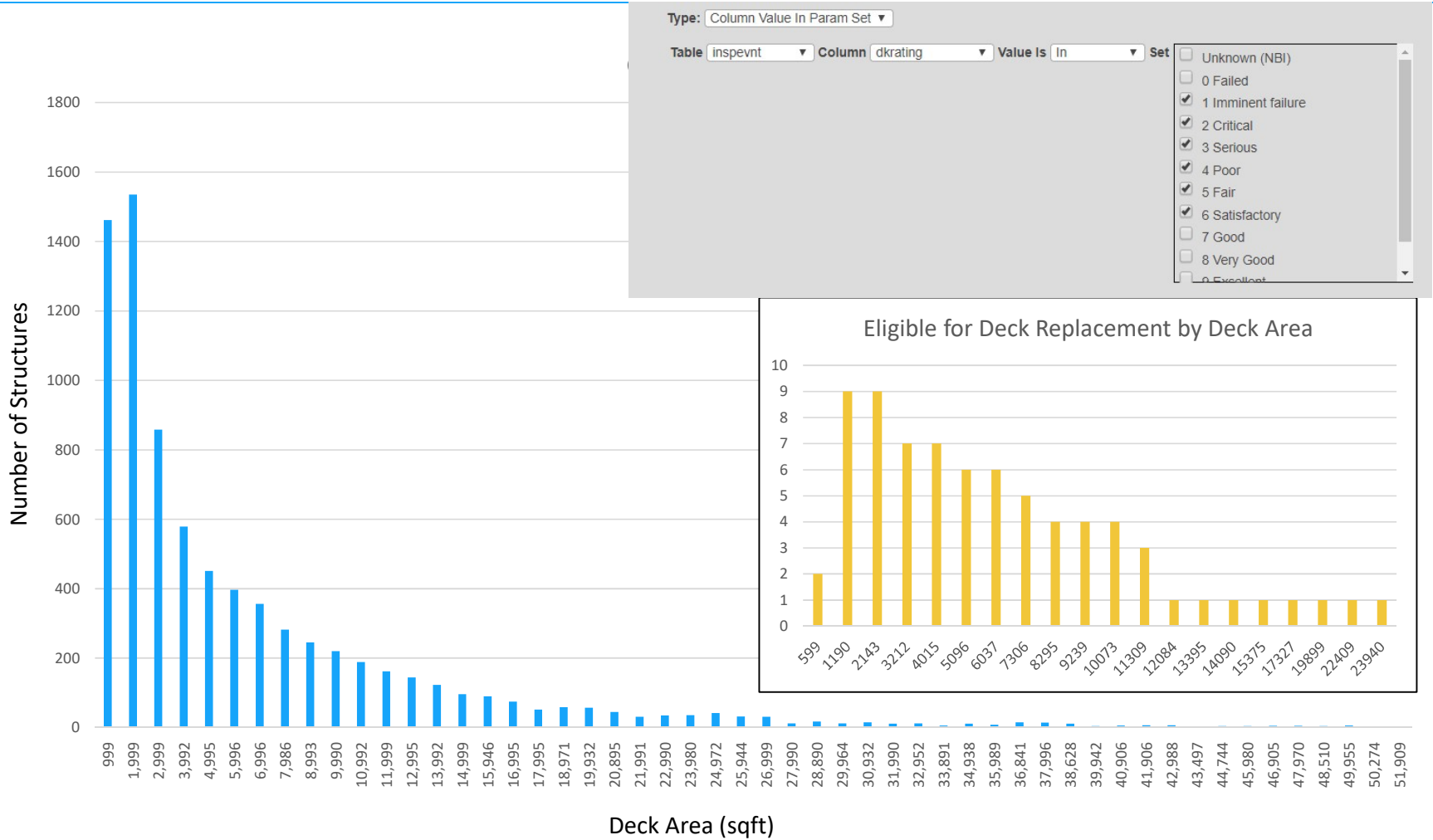
CULVERT DECK AREAS

NBI DETERIORATION CLIFFS

ELEMENT RATE OF CHANGE

ELEMENT CONVERSION

NETWORK POLICIES



So please keep in mind that based on network policies, not all of your bridges are eligible for work. If that is your intent, you may need to expand the limits of your network policies or remove the conditions all together.

NETWORK POLICIES

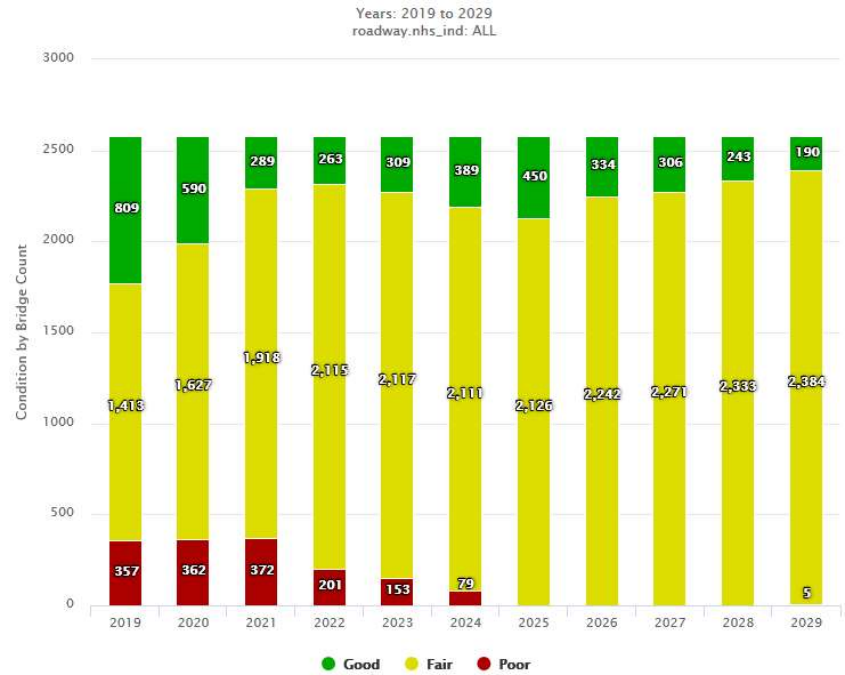
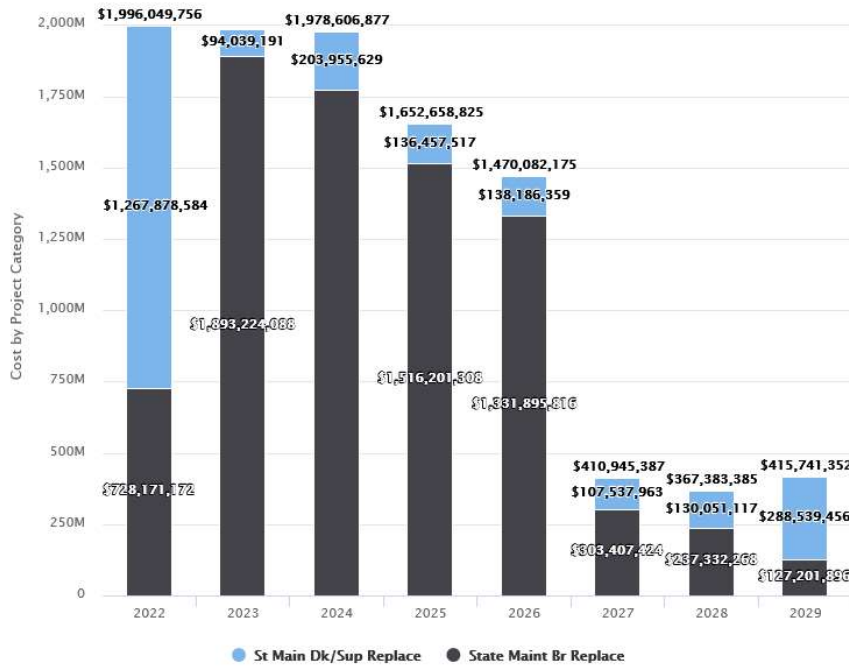
CULVERT DECK AREAS

NBI DETERIORATION CLIFFS

ELEMENT RATE OF CHANGE

ELEMENT CONVERSION

NETWORK POLICIES



In this particular case, the optimizer stopped spending money after a few years. It can only replace things in poor condition, so you see it leaving money on the table after a few years because of this limitation.

CONTACT



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National Parks Service | Eastern Federal Lands

