

APPENDIX A – SCORING TABLES

Vulnerability Assessment Scoring Data

Extreme Heat

Extreme Heat – Track

Background

- 95 degrees Amtrak is under an alert
- >98 degrees F – slow to 100 MPH
- >102 degrees F – slow to 80 MPH

Assumptions

- Exposure – Using 100 F as the threshold – 130 F track temp
- Sensitivity – incorporate tree assumption which mitigates heat impacts

Score	Exposure	Sensitivity	Adaptive Capacity
0	0	0 – area with trees (New England Division; Lancaster to Harrisburg)	0
1	>0-3 Days/year increase over 100	1 – all other areas	1
2	>3-6 Days/year increase over 100		1
3	>6 to 10 Days/year increase over 100		1
4	>10 to 15 Days/year increase over 100		1
5	15+ or more Days/year increase over 100		1

Extreme Heat – Catenary

Assumptions:

- Sensitivity –tension systems in place/not impacted by heat (1 for North of NY)

Score	Exposure	Sensitivity	Adaptive Capacity
0	0	0 – if Exposure is 0 1 – North of NY 5 – South of NY	0 – if Exposure is 0 1 (Washington to NY) 5 (North of NY)
1	>0-3 Days/year increase over 100		
2	>3-6 Days/year increase over 100		
3	>6 to 10 Days/year increase over 100		
4	>10 to 15 Days/year increase over 100		
5	15+ or more Days/year increase over 100		

Extreme Heat – Signals (Instrument House)

Assumptions:

- Most do not have A/C; New England Division has more issues
- Data includes cases and instruments

Score	Exposure	Sensitivity	Adaptive Capacity (same grid as track)
0	0	Follows exposure score unless in New England Division; New England Division follows exposure score plus 1, to a maximum score of a 5	0
1	>0-3 Days/year increase over 100		1
2	<3-6 Days/year increase over 100		1
3	<6 to 10 Days/year increase over 100		1
4	<10 to 15 Days/year increase over 100		1
5	15+ or more Days/year increase over 100		1

Extreme Precipitation

Extreme Precipitation – Track

Assumptions

- Data threshold - Increase of days with 2 inches of rain
- Some drainage, starting at 2 inches operations restricted.
- No runoff to be conservative (without full drainage study)
- Designing to 100 year in general. Daily max precip (NYC is 8.2 inches)

Score	Exposure	Sensitivity	Adaptive Capacity
0	0 days per year	0	0
1	>0-0.5 Days/year increase days with 2 inches	1	1
2	>0.5 – 1 Days/year increase days with 2 inches	1	1
3	>1 – 1.5 Days/year increase days with 2 inches	Aligns with exposure score	1
4	>1.5-2 Days/year increase days with 2 inches	Aligns with exposure score	1
5	>2+ Days/year increase days with 2 inches	Aligns with exposure score	1

Extreme Precipitation – Tunnels

Assumptions

- Aligns with track but higher sensitive

Score	Exposure	Sensitivity	Adaptive Capacity
0	0 days per year	0	0
1	>0-0.5 Days/year increase days with 2 inches	1	1
2	>0.5 – 1 Days/year increase days with 2 inches	1	1
3	>1 – 1.5 Days/year increase days with 2 inches	Aligns with exposure score +1, to a max score of 5	1
4	>1.5-2 Days/year increase days with 2 inches		1
5	>2+ Days/year increase days with 2 inches		1

Extreme Precipitation – Buildings

Score	Exposure	Sensitivity	Adaptive Capacity
0	0 days per year	0	0
1	>0-0.5 Days/year increase days with 2 inches	1	3
2	>0.5 – 1 Days/year increase days with 2 inches	1	3
3	>1 – 1.5 Days/year increase days with 2 inches	Aligns with exposure score	3
4	>1.5-2 Days/year increase days with 2 inches	Aligns with exposure score	3
5	>2+ Days/year increase days with 2 inches	Aligns with exposure score	3

Extreme Precipitation – Substations

Assumptions:

- All components are 1 foot above ground

Score	Exposure (Daily max precip in inches)	Sensitivity	Adaptive Capacity
0	0 days per year	0	0
1	>0-0.5 Days/year increase days with 2 inches	1	1
2	>0.5 – 1 Days/year increase days with 2 inches	1	1
3	>1 – 1.5 Days/year increase days with 2 inches	Aligns with exposure score	1
4	>1.5-2 Days/year increase days with 2 inches	Aligns with exposure score	1
5	>2+ Days/year increase days with 2 inches	Aligns with exposure score	1

Extreme Precipitation (Signals/Switch Machines & Interlocking)

Assumption:

- Follows track

Score	Exposure	Sensitivity	Adaptive Capacity
0	0 days per year	0	0
1	>0-0.5 Days/year increase days with 2 inches	1 (if critical add 2 to exposure score)	1
2	>0.5 – 1 Days/year increase days with 2 inches	1 (if critical add 2 to exposure score)	1
3	>1 – 1.5 Days/year increase days with 2 inches	Aligns with exposure (if critical add 2 to a max score of 5)	1
4	>1.5-2 Days/year increase days with 2 inches	Aligns with exposure (if critical add 2 to a max score of 5)	1
5	>2+ Days/year increase days with 2 inches	Aligns with exposure (if critical add 2 to a max score of 5)	1

Wind

Wind – Track

Assumptions:

- 56 MPH sustained winds (72.8 MPH gust) – limited operations
- 74 MPH sustained (96.2 MPH gust) – operations stops
- Conversion to gust is 1.3 times sustained wind

Score	Exposure (MPH gust)	Sensitivity (inverse of extreme heat)	Adaptive Capacity
0	0	1 – area with trees (New England Division, Lancaster to Harrisburg) 0 – all other areas	0
1	>0-49.4		1
2	>49.4-58.5		1
3	>58.5-71.5		1
4	>71.5-78		1
5	(78+ gust)		1

Wind – Buildings

Assumptions:

- 39 MPH is start of the Tropical Storm
- Modified from Beaufort Scale (aligns with other scales)

Score	Exposure (MPH gust)	Sensitivity	Adaptive Capacity
0	0	0	3
1	>0-49.4	1	3
2	>49.4-58.5	Follow exposure score + 1 to a max score of 5	3
3	>58.5-71.5	Follow exposure score + 1 to a max score of 5	3
4	>71.5-78	Follow exposure score + 1 to a max score of 5	3
5	(78+ gust)	Follow exposure score + 1 to a max score of 5	3

Wind – Catenary

Assumptions:

- 20 MPH sustained noted as when impacts start
- 60 is a threshold for when you're definitely seeing impacts

Score	Exposure (MPH gust)	Sensitivity	Adaptive Capacity
0	0	1 – area with trees (New England Division; Lancaster to Harrisburg) 0 – all other areas	1
1	>0-49.4		1
2	>49.4-58.5		1
3	>58.5-71.5		1
4	>71.5-78		1
5	(78+ gust)		1

Sea Level Rise

Sea Level Rise – Track

Assumptions

- Assumes SLR is there to stay
- Sensitivity is 5 because any salt is ultimately a problem
- 4 inches of water is when operations are halted

Score	Exposure	Sensitivity	Adaptive Capacity
0	0	0	0
1	0.1 - 1 inches	5	1
2	1.1 - 2 inches	5	1
3	2.1 - 3 inches	5	1
4	3.1 - 4 inches	5	1
5	>4 inches of inundation	5	1

Sea Level Rise –Tunnels

Assumptions

- Same as track;
- Not a drainage study-level analysis

Score	Exposure	Sensitivity	Adaptive Capacity
0	0	0	0
1	0.1 - 1 inches	5	1
2	1.1 - 2 inches	5	1
3	2.1 - 3 inches	5	1
4	3.1 - 4 inches	5	1
5	>4 inches of inundation	5	1

Sea Level Rise – Catenary

Score	Exposure	Sensitivity	Adaptive Capacity
0	0	0	0
1	0.1 - 1 inches	5	1
2	1.1 - 2 inches	5	1
3	2.1 - 3 inches	5	1
4	3.1 - 4 inches	5	1
5	>4 inches of inundation	5	1

Sea Level Rise – Buildings

Assumptions

- Estimated FFE
- ~12 inches is where impacts are; electrical system
- AC – simple measures to employ to manage (e.g., sand bags)

Score	Exposure	Sensitivity	Adaptive Capacity
0	0	Follow exposure score	3
1	0.1 - 3 inches	Follow exposure score	3
2	3.1 - 6 inches	Follow exposure score	3
3	6.1 - 9 inches	Follow exposure score	3
4	9.1 - 12 inches	Follow exposure score	3
5	>12 inches of inundation	Follow exposure score	3

Sea Level Rise – Substations

Assumptions

- Assume everything is 1 foot above ground
- Sensitivity – CCV stations are critical; access is also an issue (thus went all 5's for converters substations)
- AC – CCV stations are critical (lose one, many impacts. Can lose one and be ok but hard/expensive to move)

Score	Exposure	Sensitivity	Adaptive Capacity
0	0	Converter substation = 5 All others = 0	Converter substation = 1 All others = 3
1	0.1 - 3 inches		
2	3.1 - 6 inches		
3	6.1 - 9 inches		
4	9.1 - 12 inches		
5	>12 inches of inundation		

Sea Level Rise – Signals – Switch Machines and Interlockings

Score	Exposure	Sensitivity	Adaptive Capacity
0	0	0	0
1	0.1 - 3 inches	Follows exposure (if critical interlocking add 2)	1
2	3.1 - 6 inches	Follows exposure (if critical interlocking add 2)	1
3	6.1 - 9 inches	Follows exposure (if critical interlocking add 2)	1
4	9.1 - 12 inches	Follows exposure (if critical interlocking add 2)	1
5	>12 inches of inundation	Follows exposure (if critical interlocking add 2)	1

APPENDIX B – MAPS

Heat Maps



Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Heat Event
 Moderate Emissions (RCP 4.5)
 Year 2050



Catenary Vulnerability Score

- 0
- 1
- 2
- 3
- 4

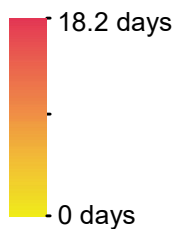


Stations

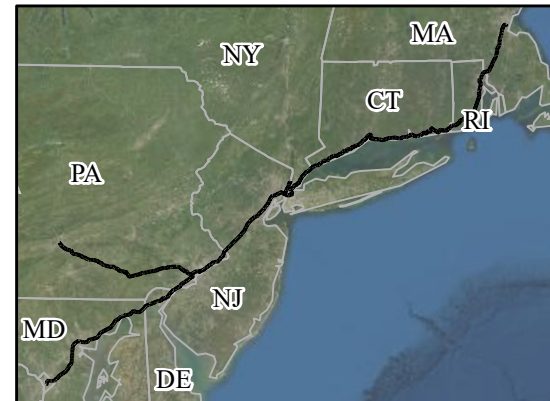


Amtrak Line

Increase in Days Above 100° F from Present



Maximum Number of Days: 4.1





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Instrument Houses Vulnerability Score

- 0
- 1
- 2
- 3
- 4

Stations

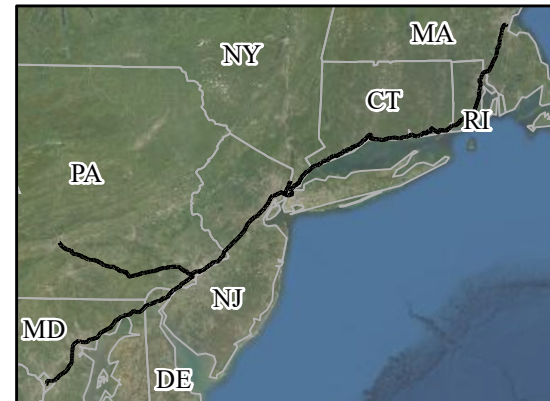
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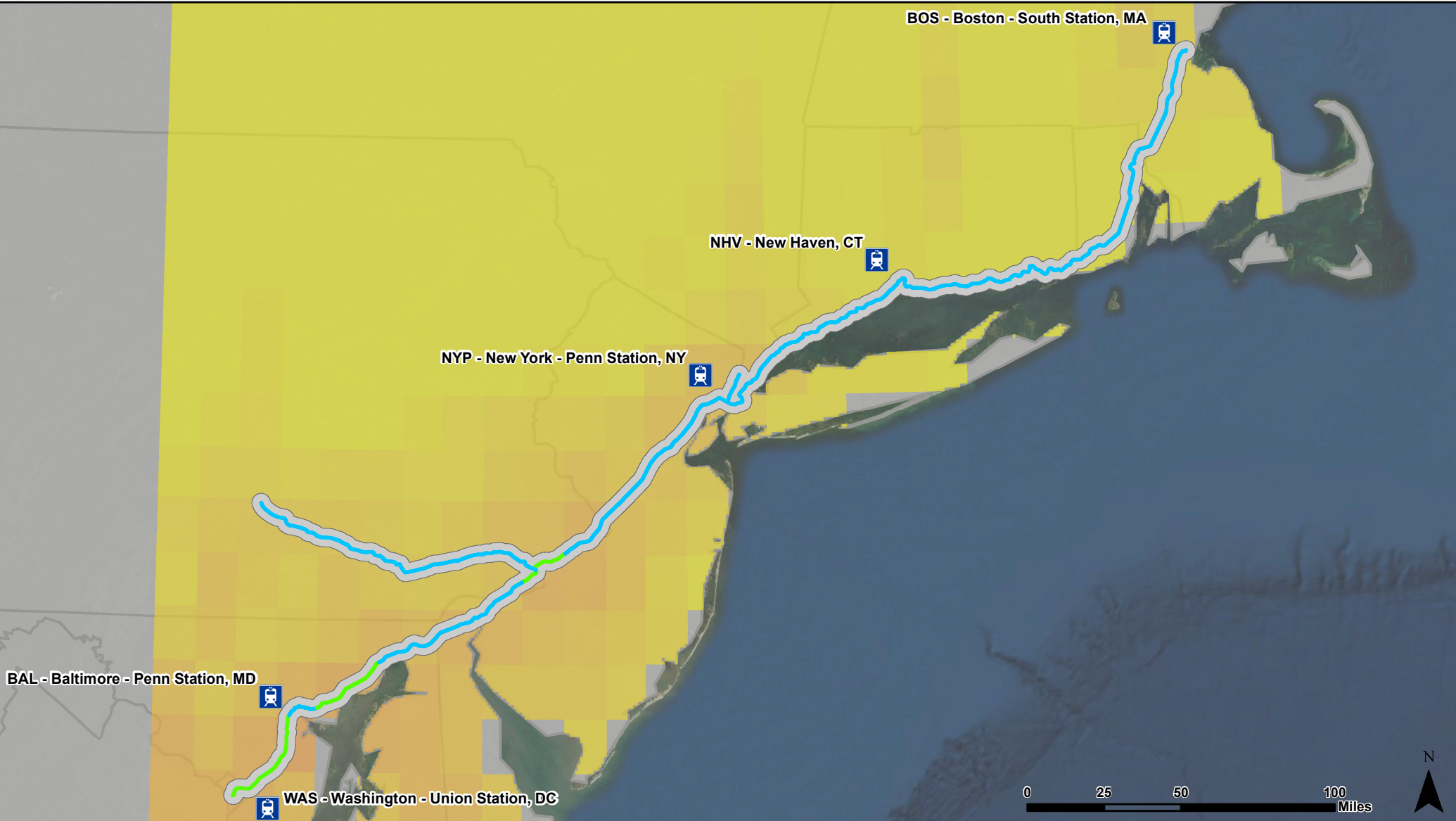
Increase in Days Above 100° F from Present

18.2 days

0 days

Maximum Number of Days: 4.1



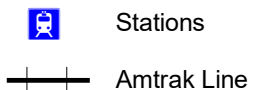


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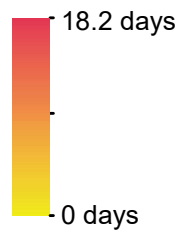
Northeast Corridor (NEC) Study
 Extreme Heat Event
 Moderate Emissions (RCP 4.5)
 Year 2050



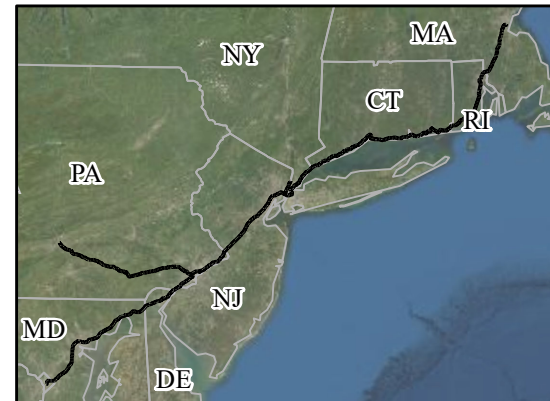
Track Vulnerability Score

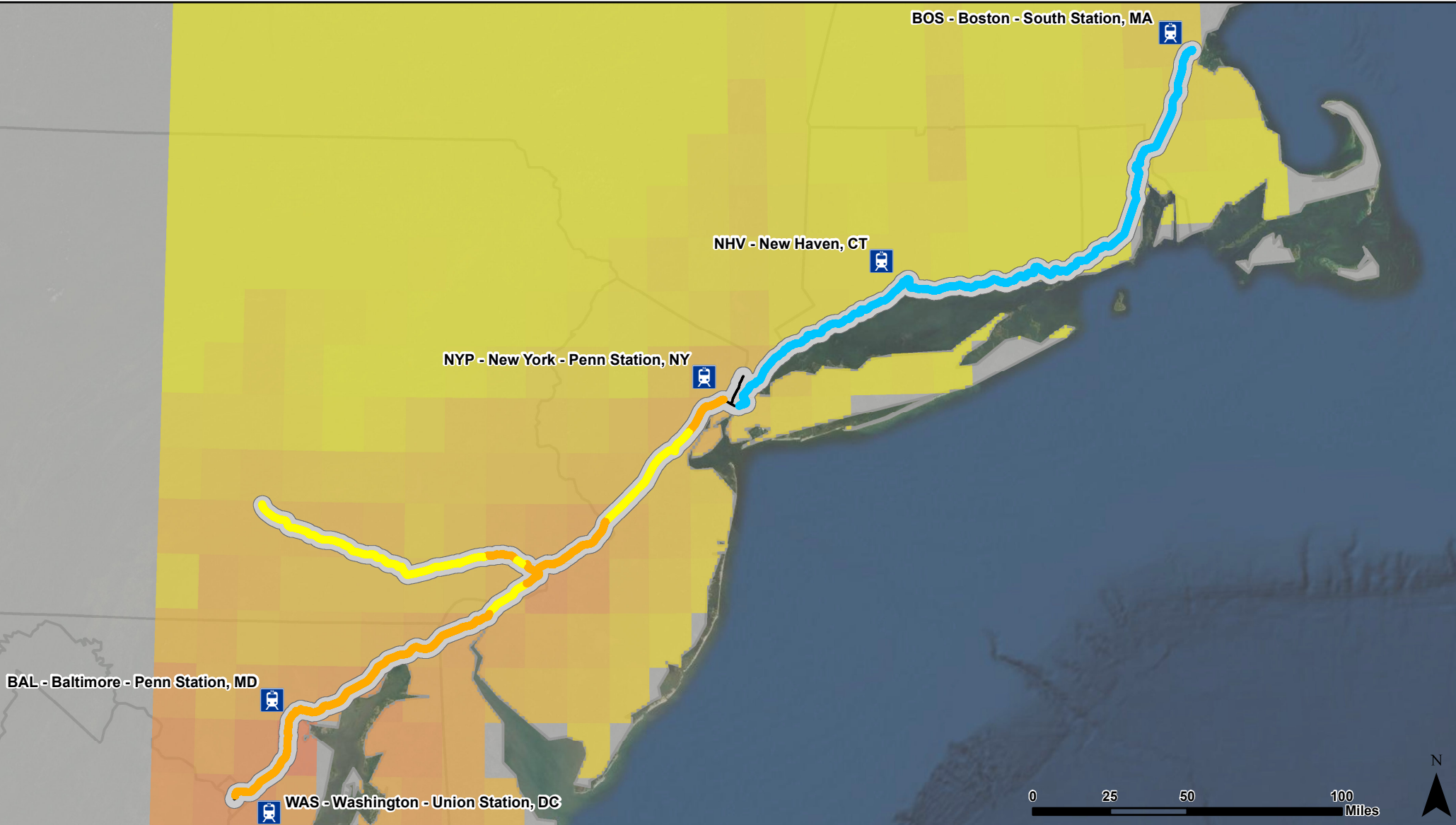


Increase in Days Above 100° F from Present



Maximum Number of Days: 4.1





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 Moderate Emissions (RCP 4.5)
 Year 2100



Catenary Vulnerability Score

- 0
- 1
- 2
- 3
- 4

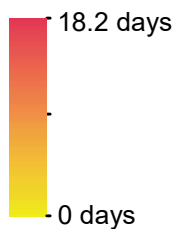


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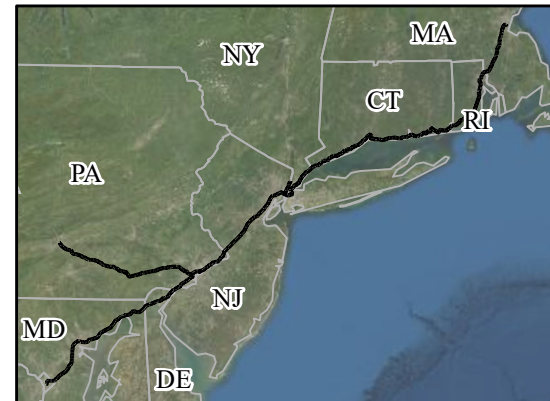


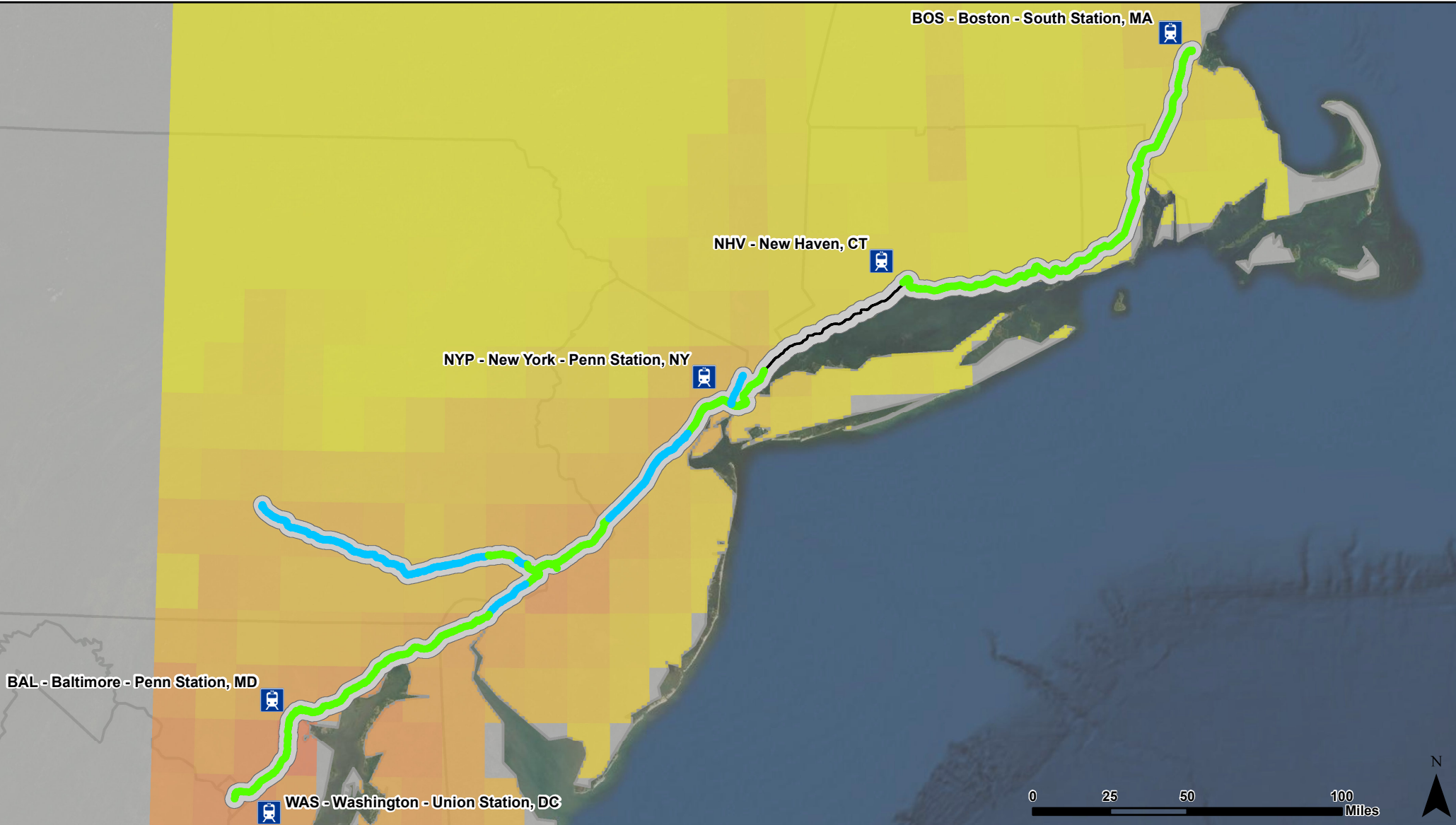
Amtrak Line

Increase in Days Above 100° F from Present



Maximum Number of Days: 5.8





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Instrument Houses Vulnerability Score

- 0
- 1
- 2
- 3
- 4

Stations

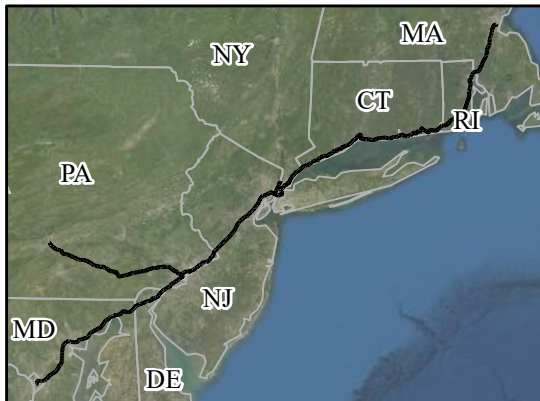
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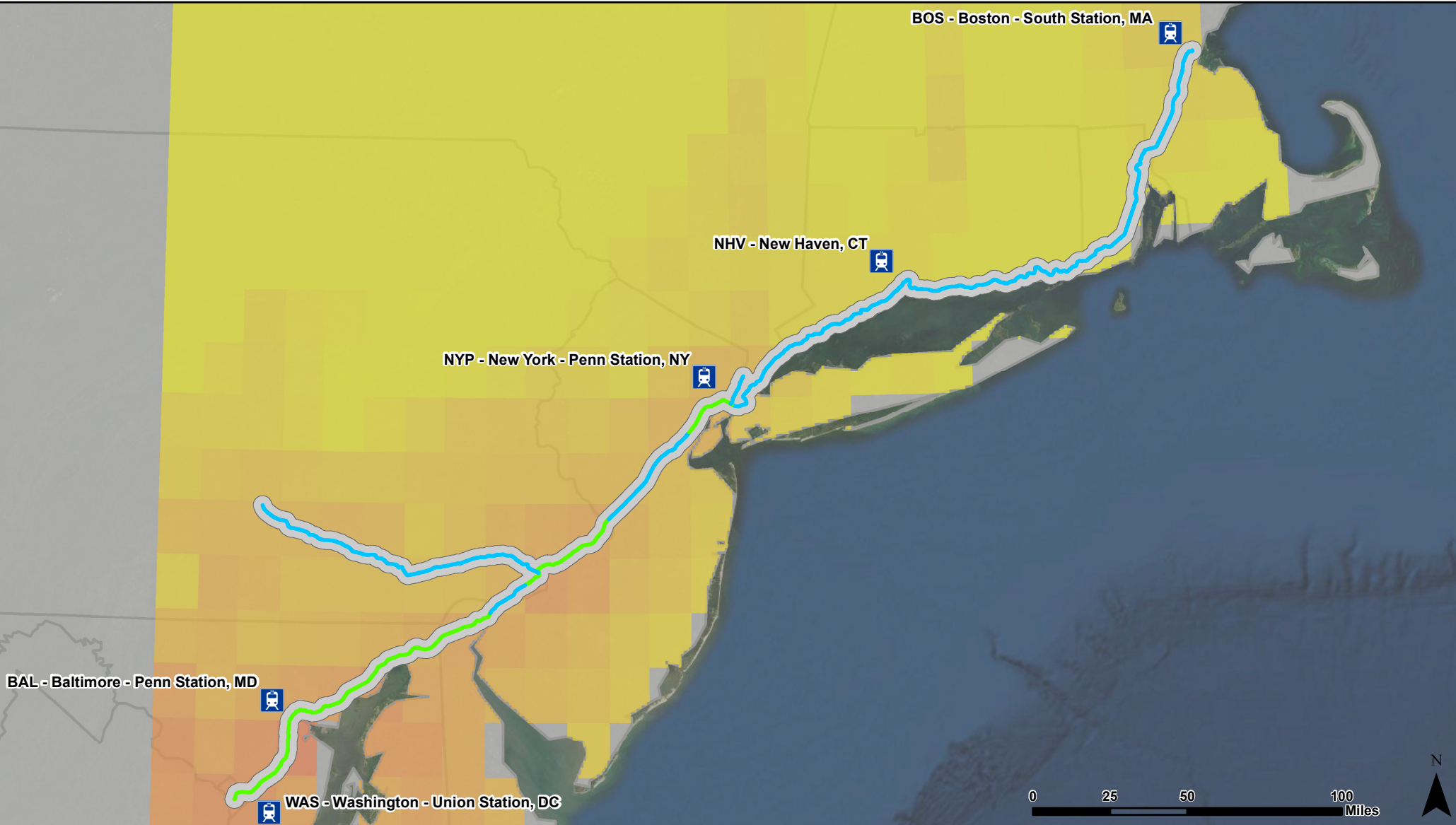
Increase in Days Above 100° F from Present

18.2 days

0 days

Maximum Number of Days: 5.8



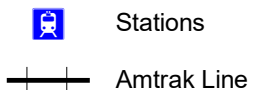


Amtrak Climate Change Vulnerability Assessment

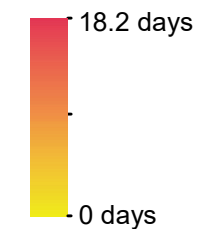
Northeast Corridor (NEC) Study
 Extreme Heat Event
 Moderate Emissions (RCP 4.5)
 Year 2100



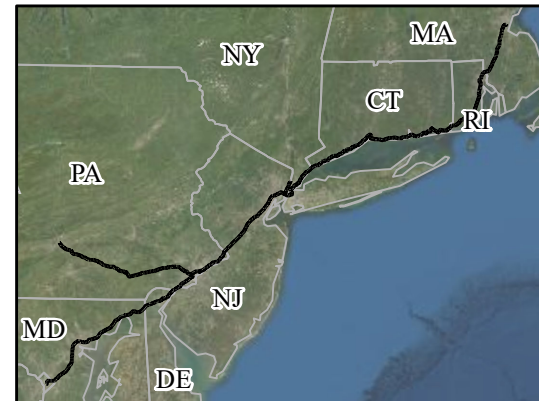
Track Vulnerability Score

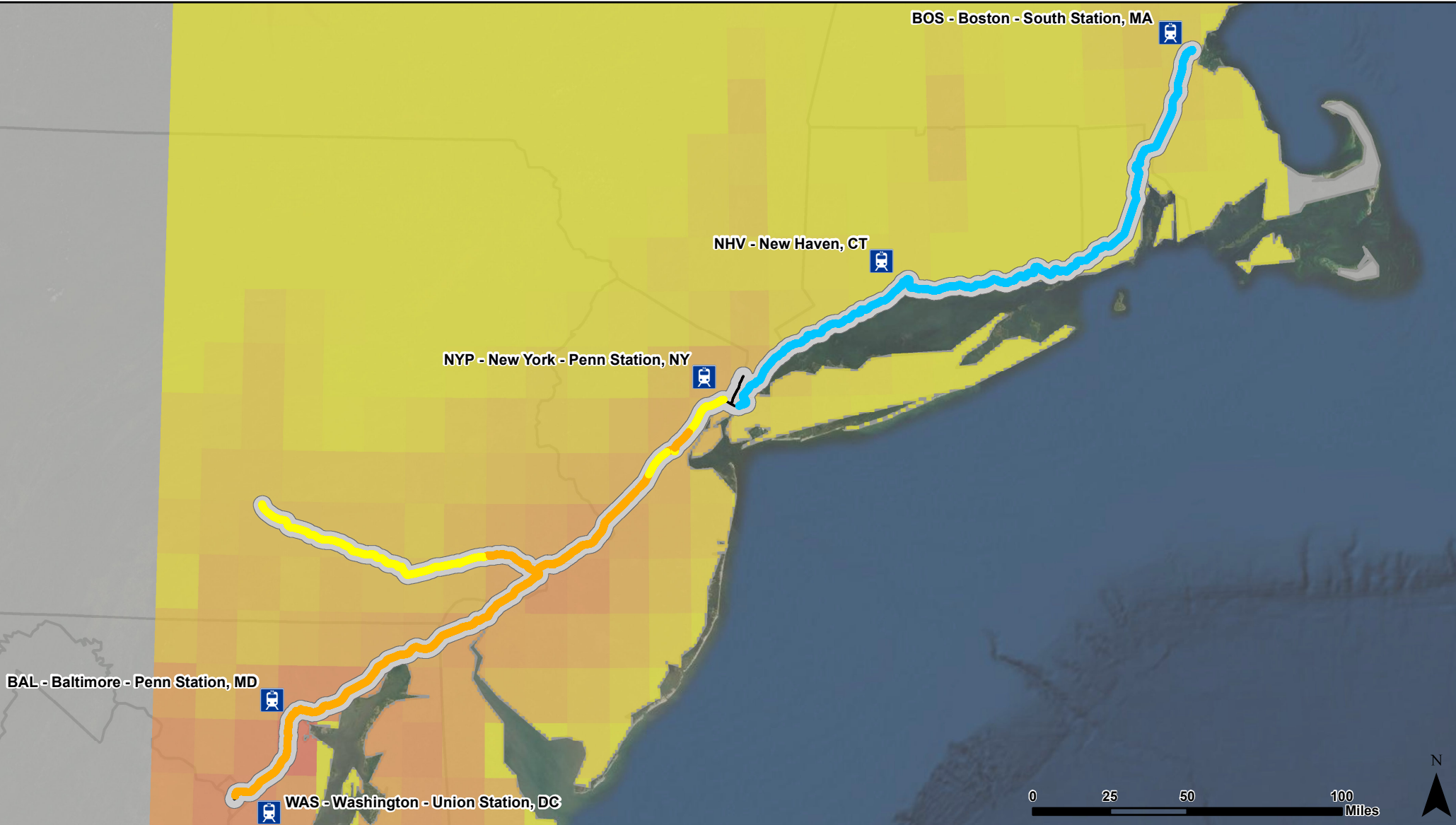


Increase in Days Above 100° F from Present



Maximum Number of Days: 5.8





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 High Emissions (RCP 8.5)
 Year 2050



Catenary Vulnerability Score

- 0
- 1
- 2
- 3
- 4

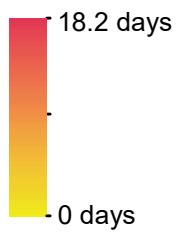


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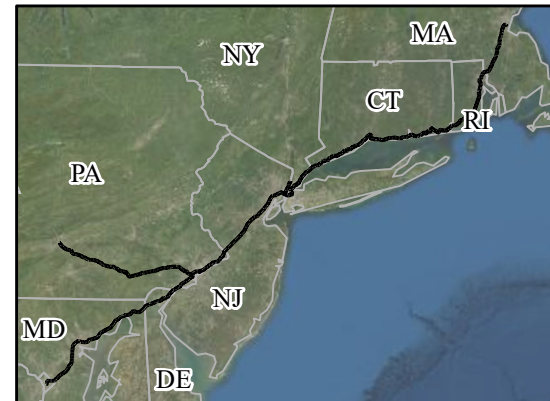


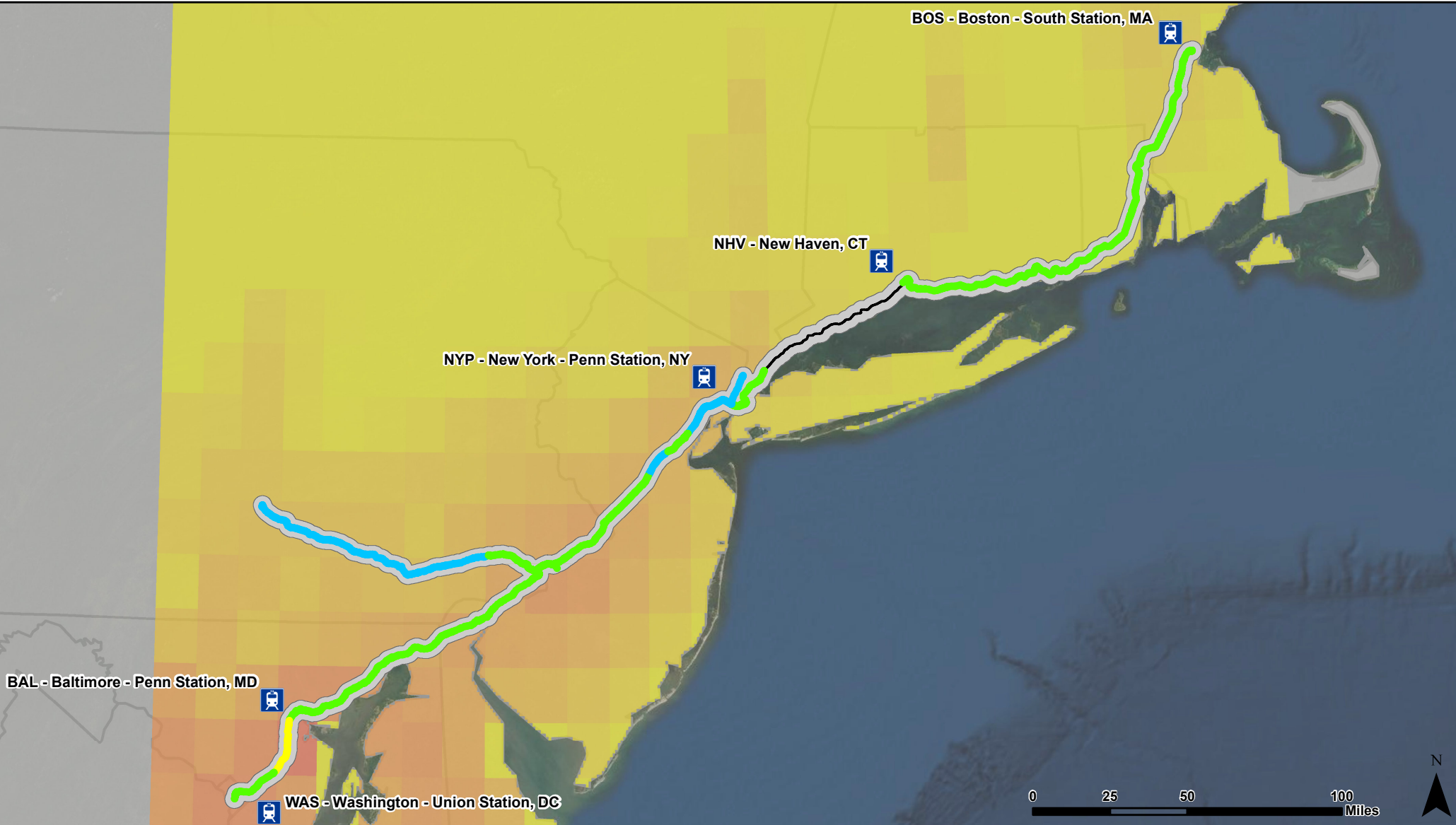
Amtrak Line

Increase in Days Above 100° F from Present



Maximum Number of Days: 6.4





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Instrument Houses Vulnerability Score

- 0
- 1
- 2
- 3
- 4

Stations

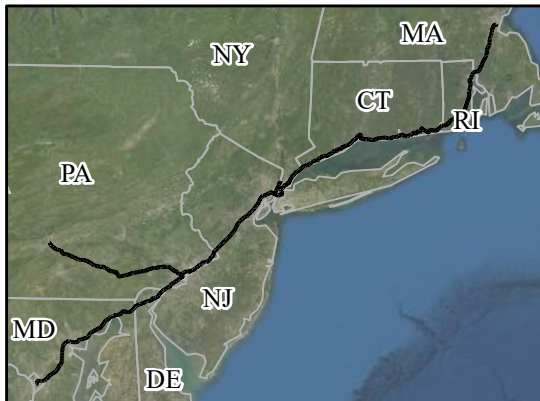
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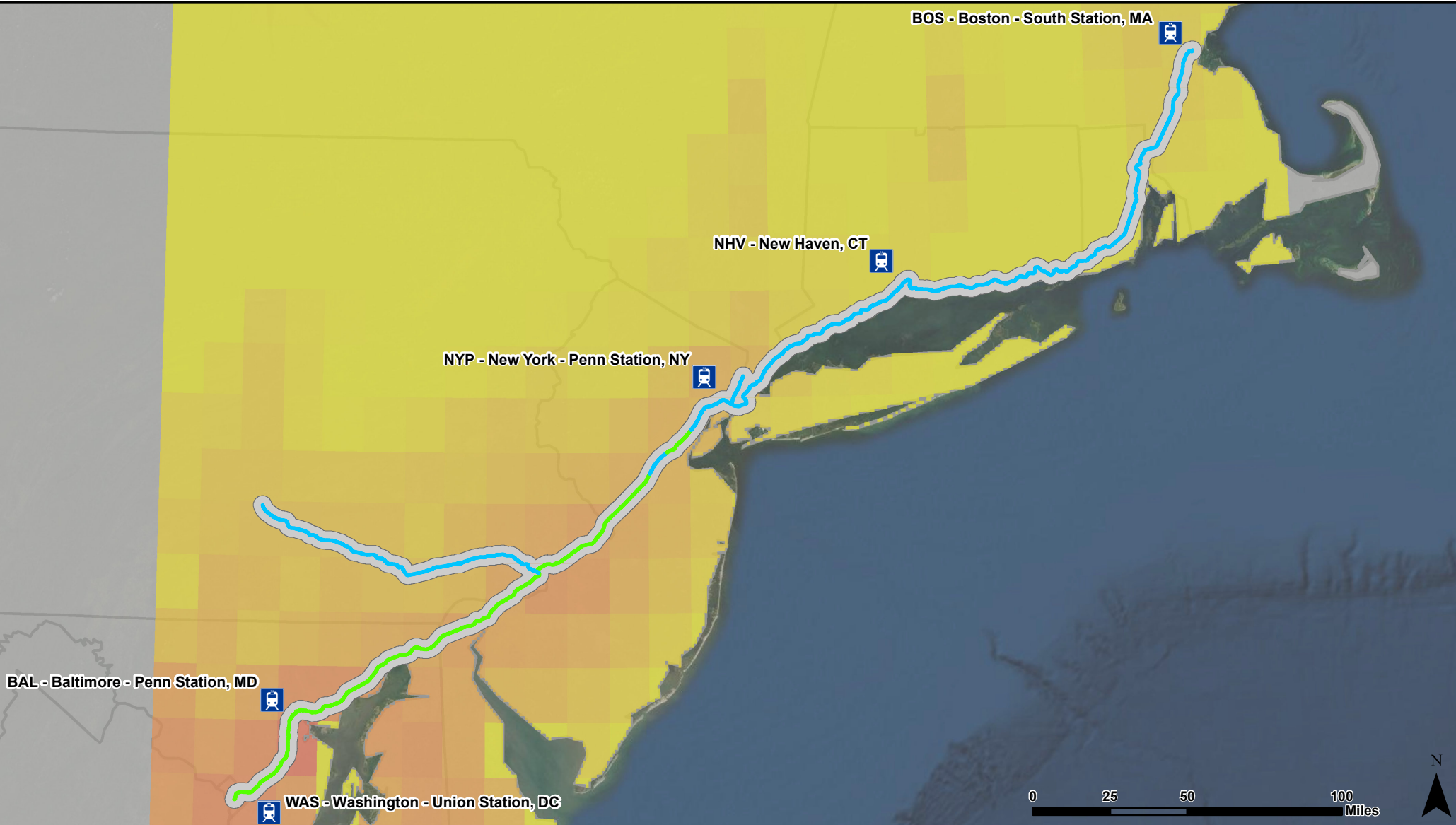
Increase in Days Above 100° F from Present

18.2 days

0 days

Maximum Number of Days: 6.4



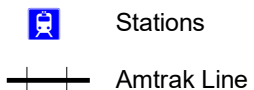


Amtrak Climate Change Vulnerability Assessment

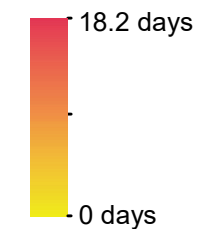
Northeast Corridor (NEC) Study
 Extreme Heat Event
 High Emissions (RCP 8.5)
 Year 2050



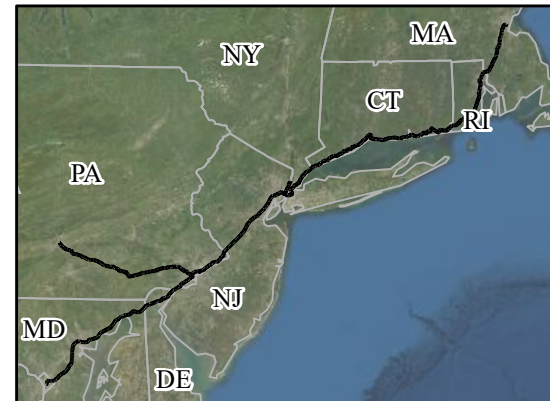
Track Vulnerability Score

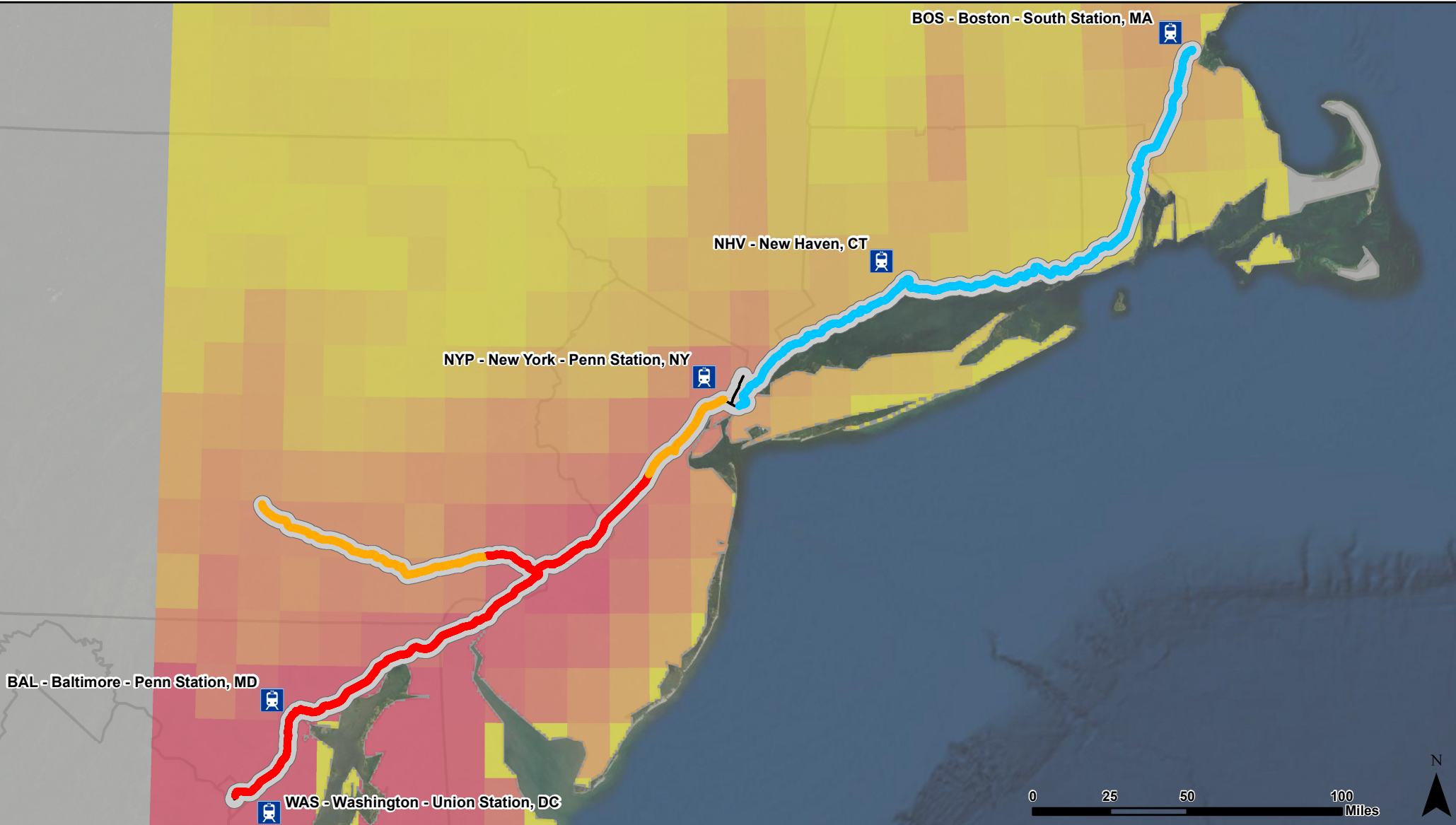


Increase in Days Above 100° F from Present



Maximum Number of Days: 6.4





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 Extreme Heat Event
 High Emissions (RCP 8.5)
 Year 2100



Catenary Vulnerability Score

- 0
- 1
- 2
- 3
- 4

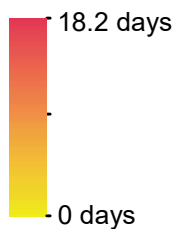


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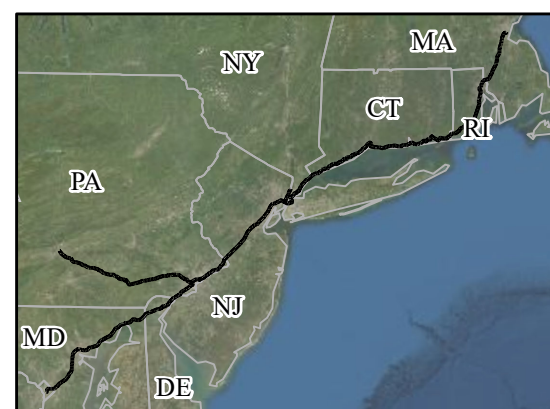


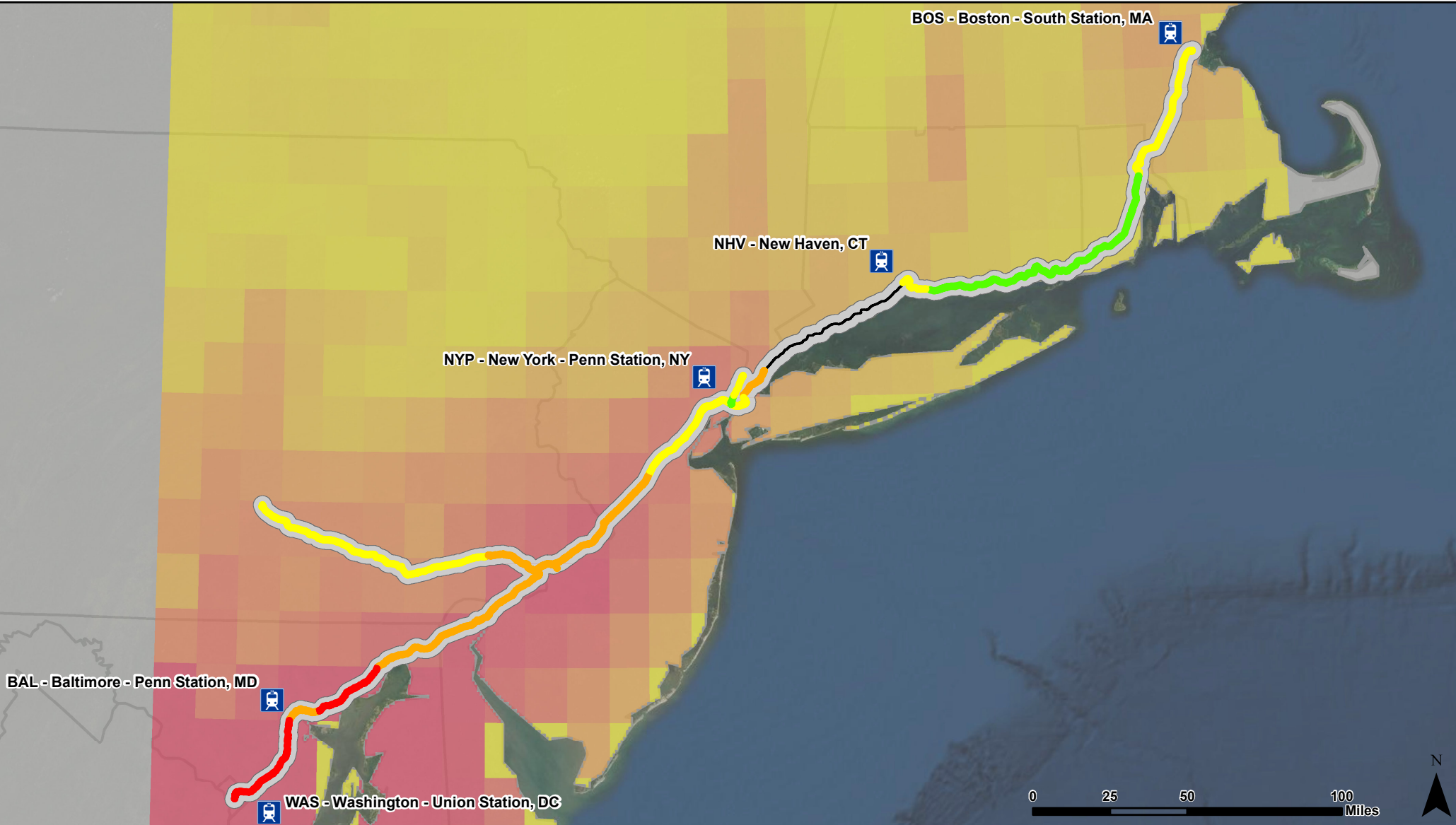
Amtrak Line

Increase in Days Above 100° F from Present



Maximum Number of Days: 18.2





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 High Emissions (RCP 8.5)
 Year 2100



Instrument Houses Vulnerability Score

- 0
- 1
- 2
- 3
- 4

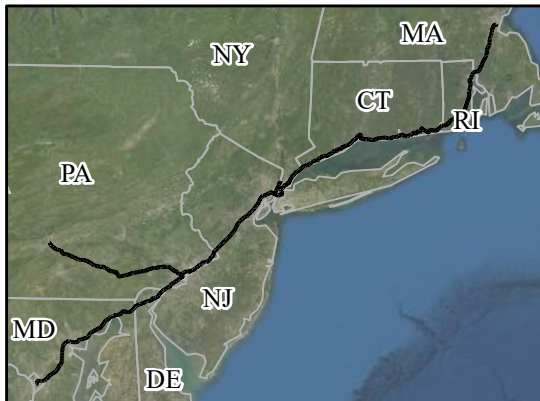
Stations
 Amtrak Line

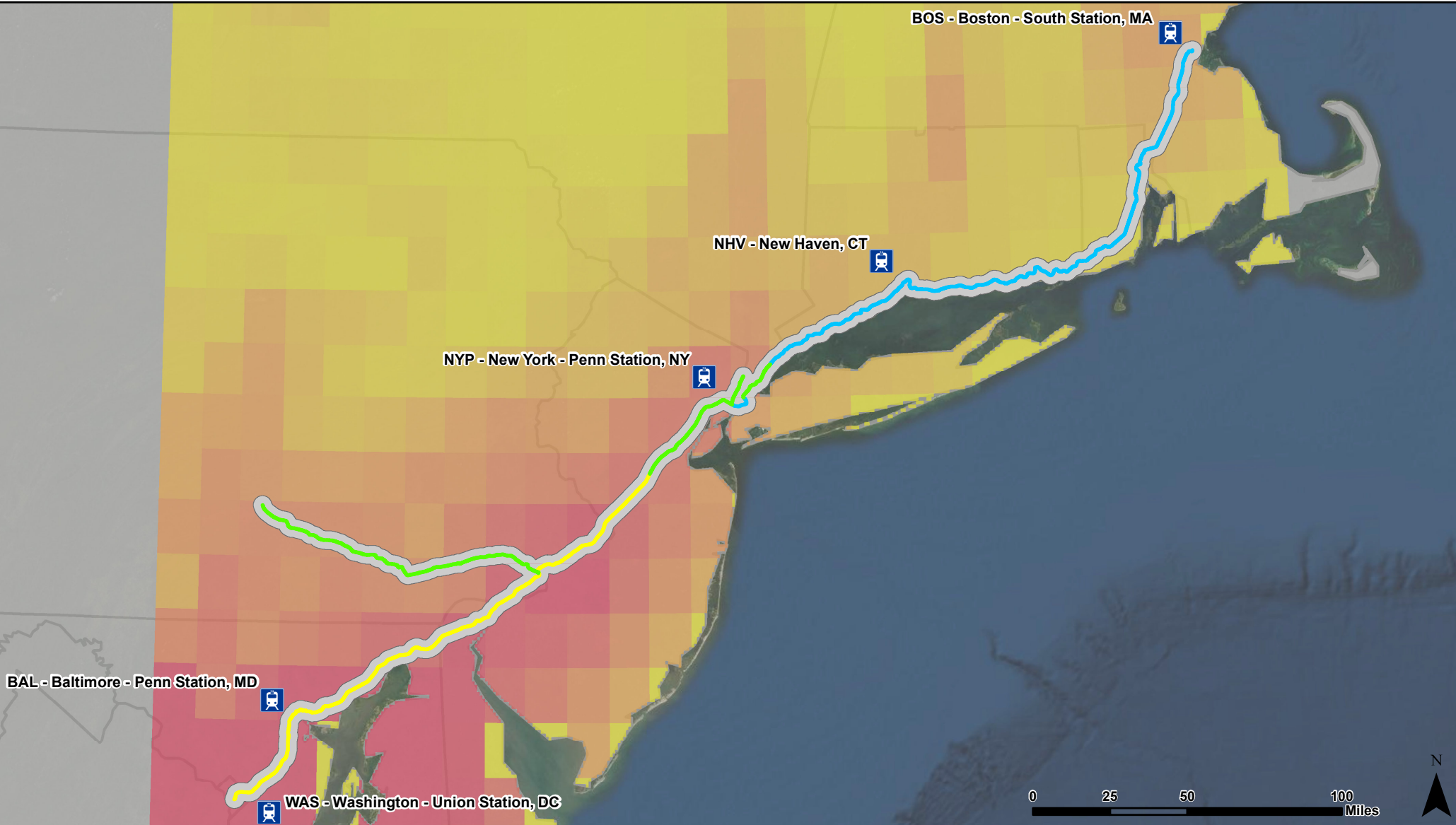
Increase in Days Above 100° F from Present

18.2 days

0 days

Maximum Number of Days: 18.2





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 High Emissions (RCP 8.5)
 Year 2100



Track Vulnerability Score

- 0
- 1
- 2
- 3
- 4

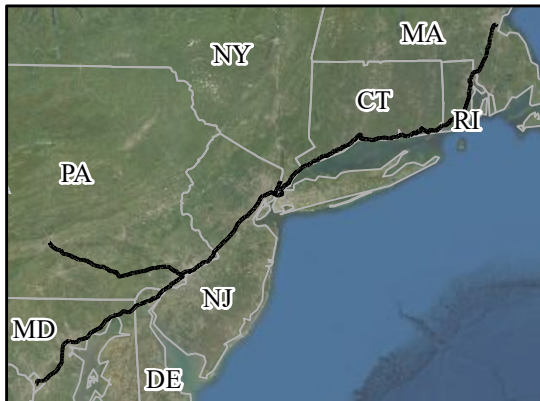
Stations

Amtrak Line

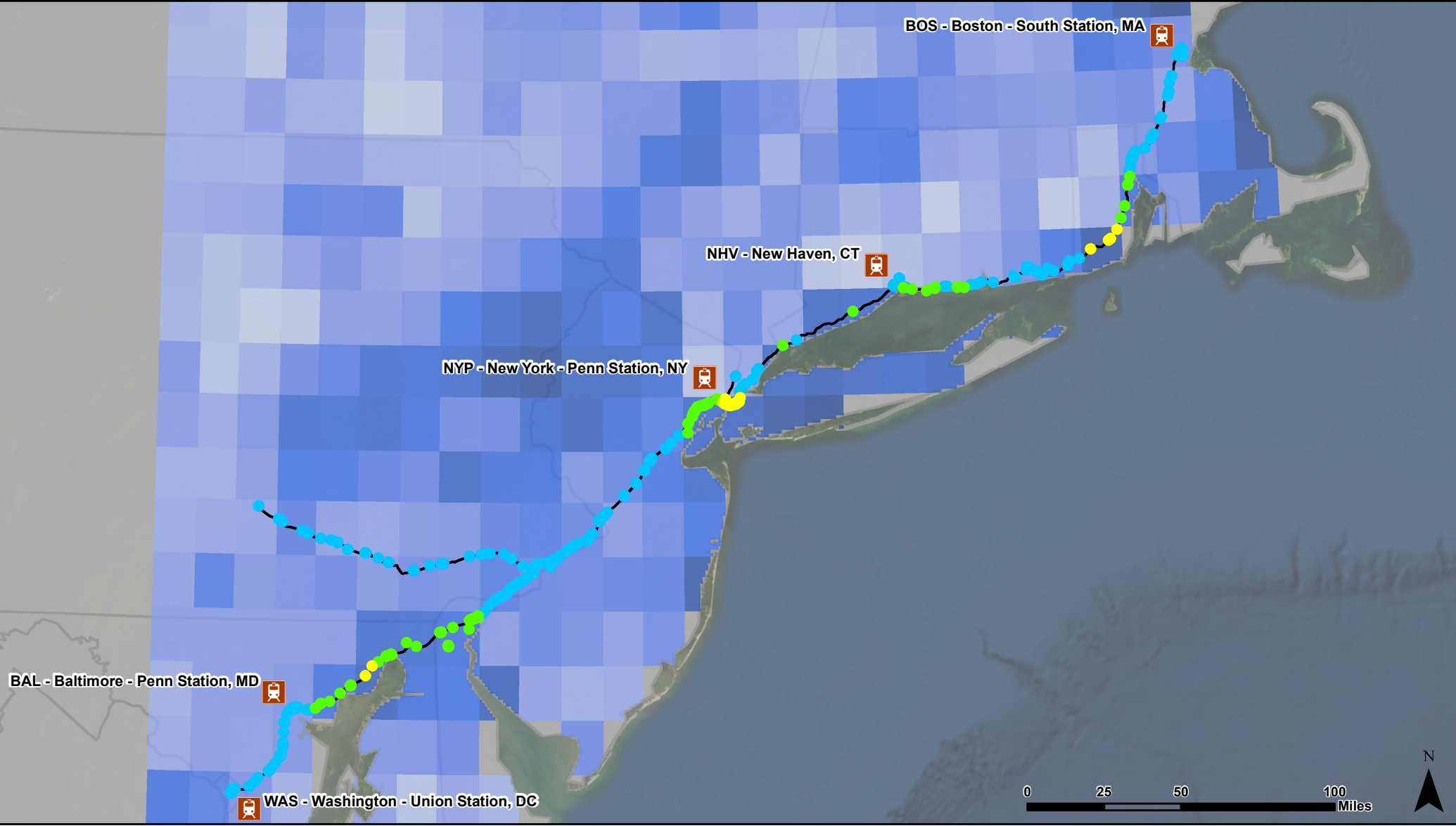
Increase in Days Above 100° F from Present

█ 18.2 days
█ 0 days

Maximum Number of Days: 18.2



Precipitation Maps



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 Extreme Precipitation Event
 Moderate Emissions (RCP 4.5)
 Year 2050



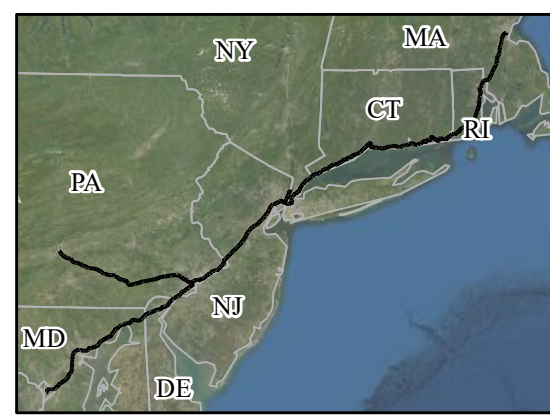
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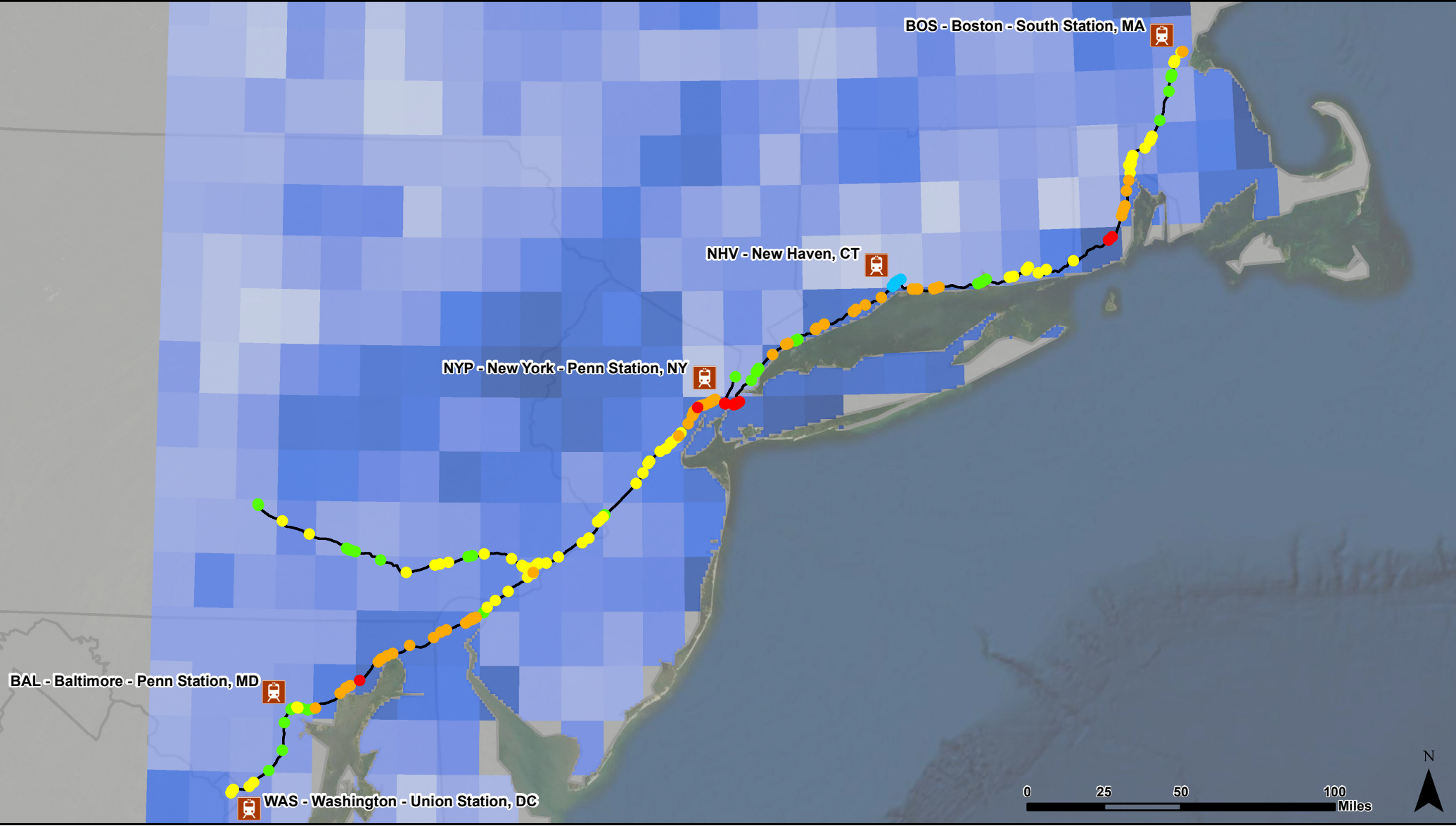
- 0
- 1
- 2
- 3
- 4

Stations
 Amtrak Line

Increase in Days Receiving at Least 2 inches from Present

3.5 days
 0 days
Maximum Number of Days: 3.5





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Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 Moderate Emissions (RCP 4.5)
 Year 2050



Interlockings Vulnerability Score

- 0
- 1
- 2
- 3
- 4

Stations

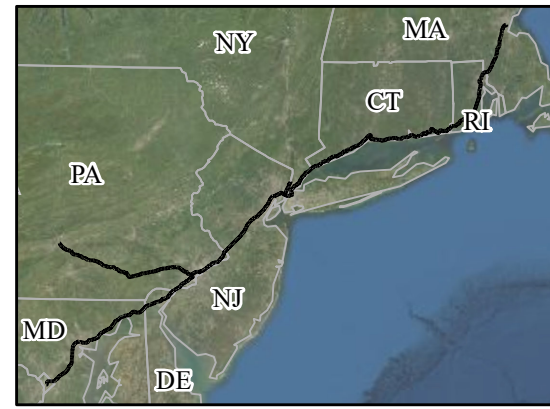
Amtrak Line

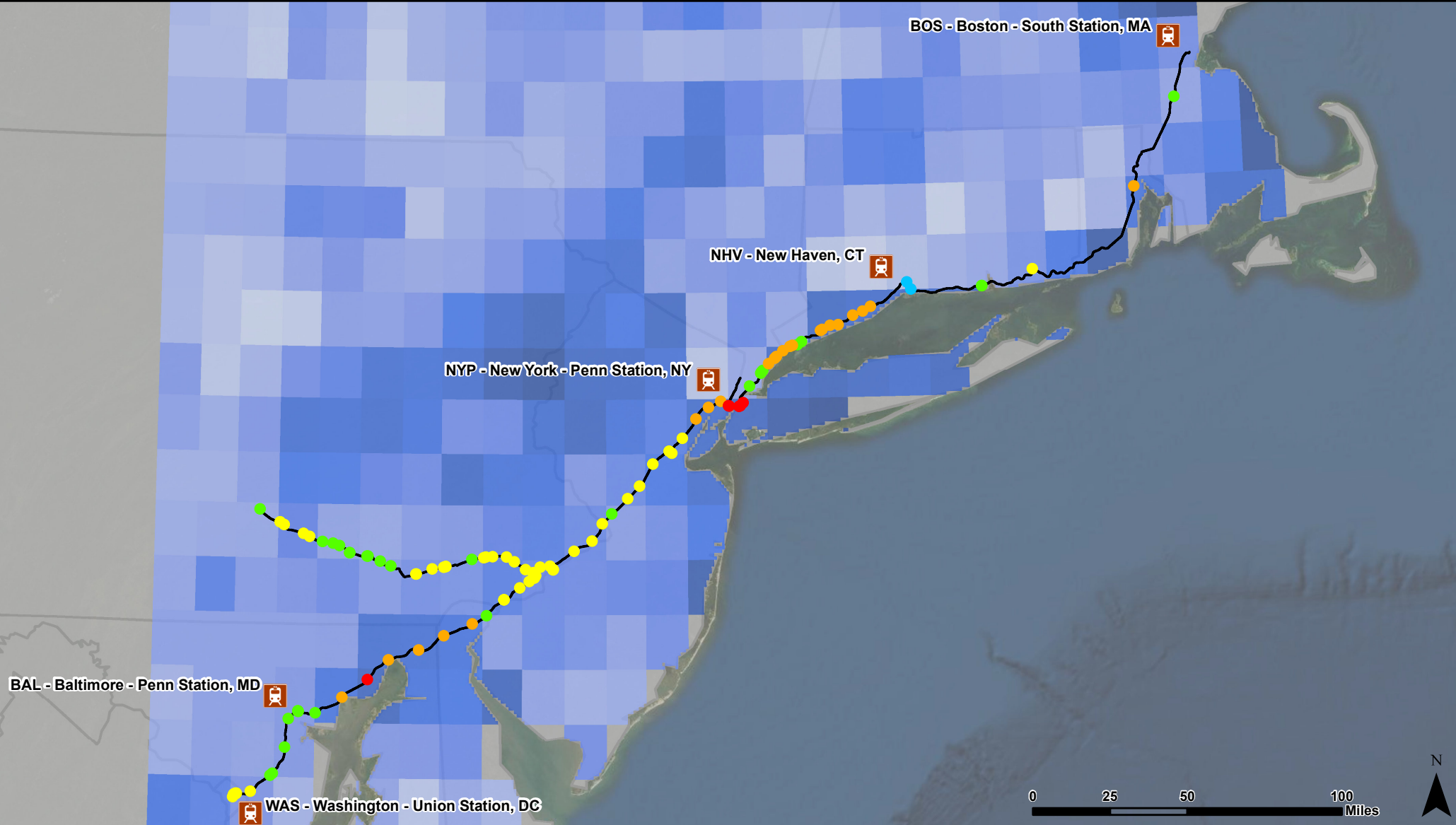
Increase in Days Receiving at Least 2 inches from Present

3.5 days

0 days

Maximum Number of Days: 3.5





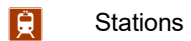
Amtrak Climate Change Vulnerability Assessment

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 Extreme Precipitation Event
 Moderate Emissions (RCP 4.5)
 Year 2050



Stations Vulnerability Score

- 0
- 1
- 2
- 3
- 4

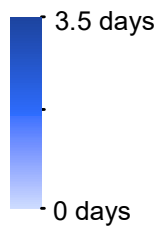


Stations

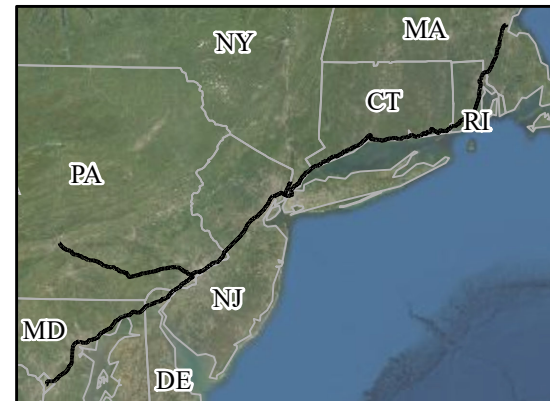


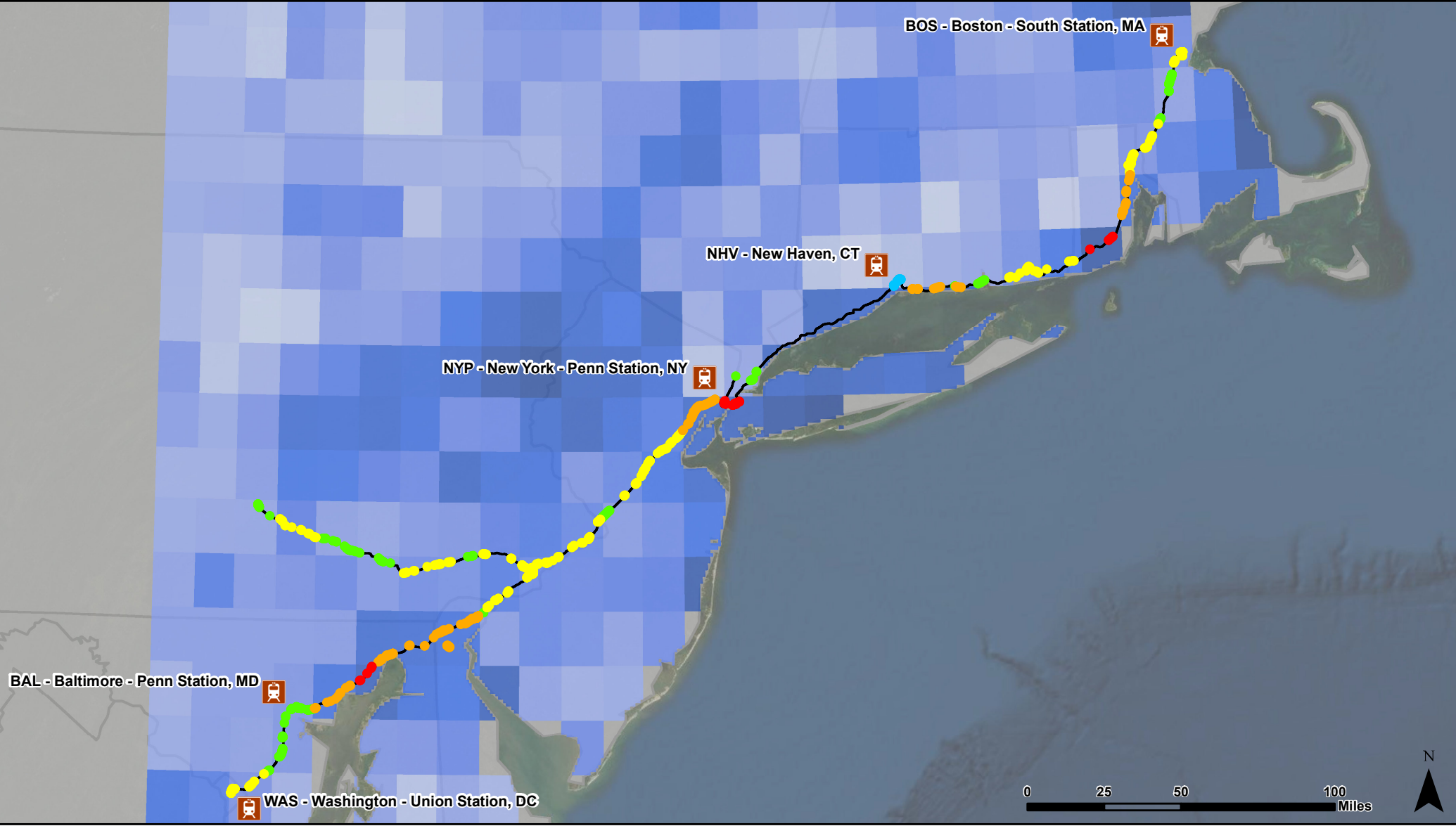
Amtrak Line

Increase in Days Receiving at Least 2 inches from Present



Maximum Number of Days: 3.5





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 Moderate Emissions (RCP 4.5)
 Year 2050



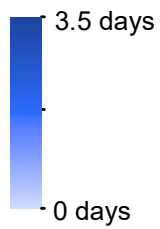
Switch Machines Vulnerability Score

- 0
- 1
- 2
- 3
- 4

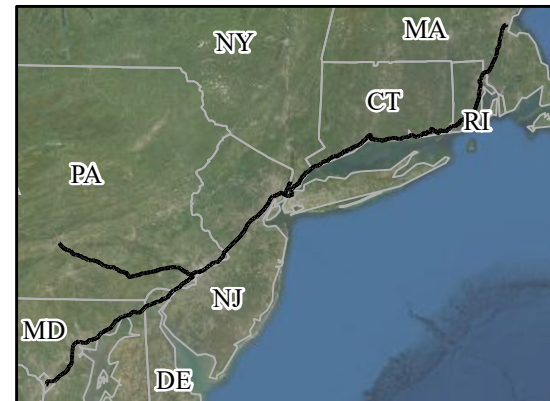
Stations

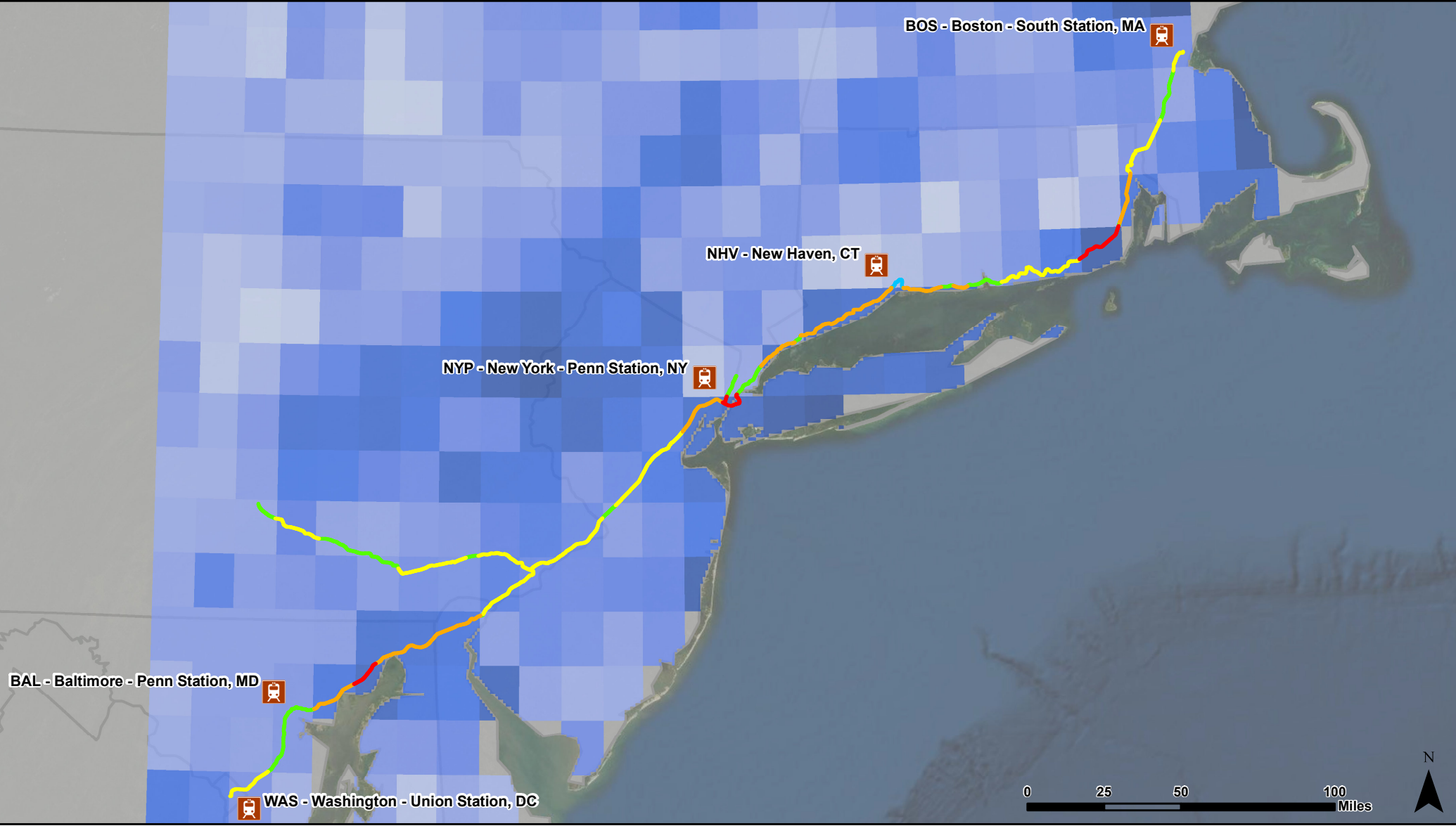
Amtrak Line

Increase in Days Receiving at Least 2 inches from Present



Maximum Number of Days: 3.5





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 Moderate Emissions (RCP 4.5)
 Year 2050



Track Vulnerability Score

- 0
- 1
- 2
- 3
- 4

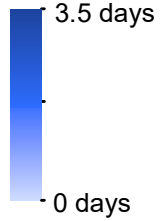


Stations

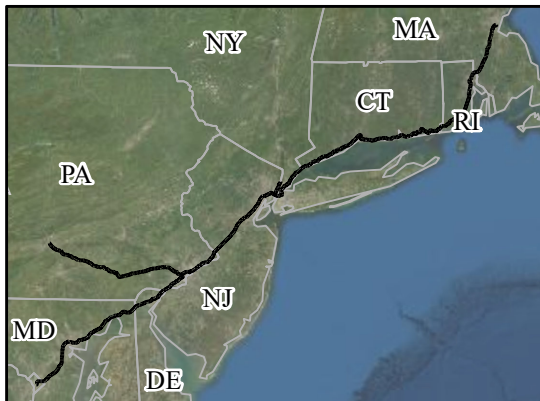


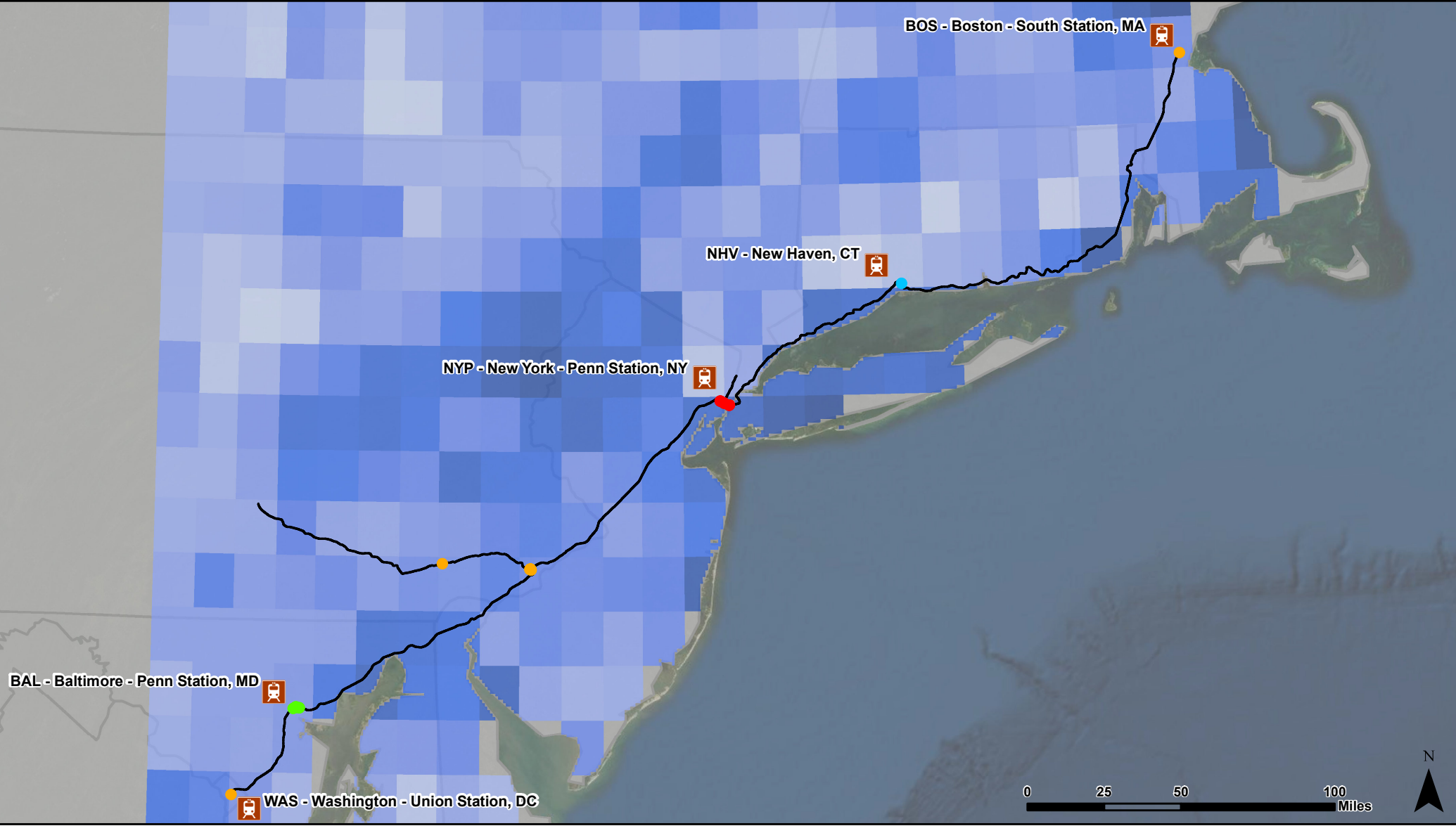
Amtrak Line

Increase in Days Receiving at Least 2 inches from Present



Maximum Number of Days: 3.5





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 Moderate Emissions (RCP 4.5)
 Year 2050



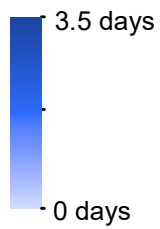
Tunnels Vulnerability Score

- 0
- 1
- 2
- 3
- 4

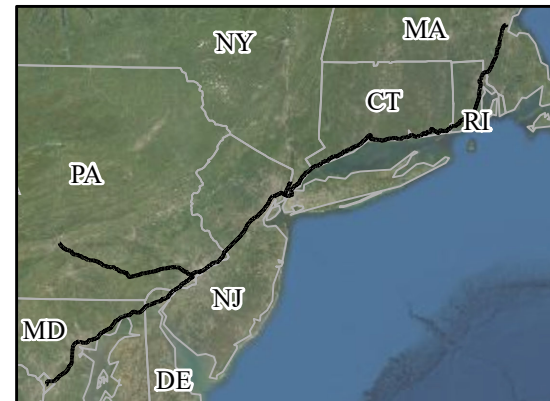
Stations

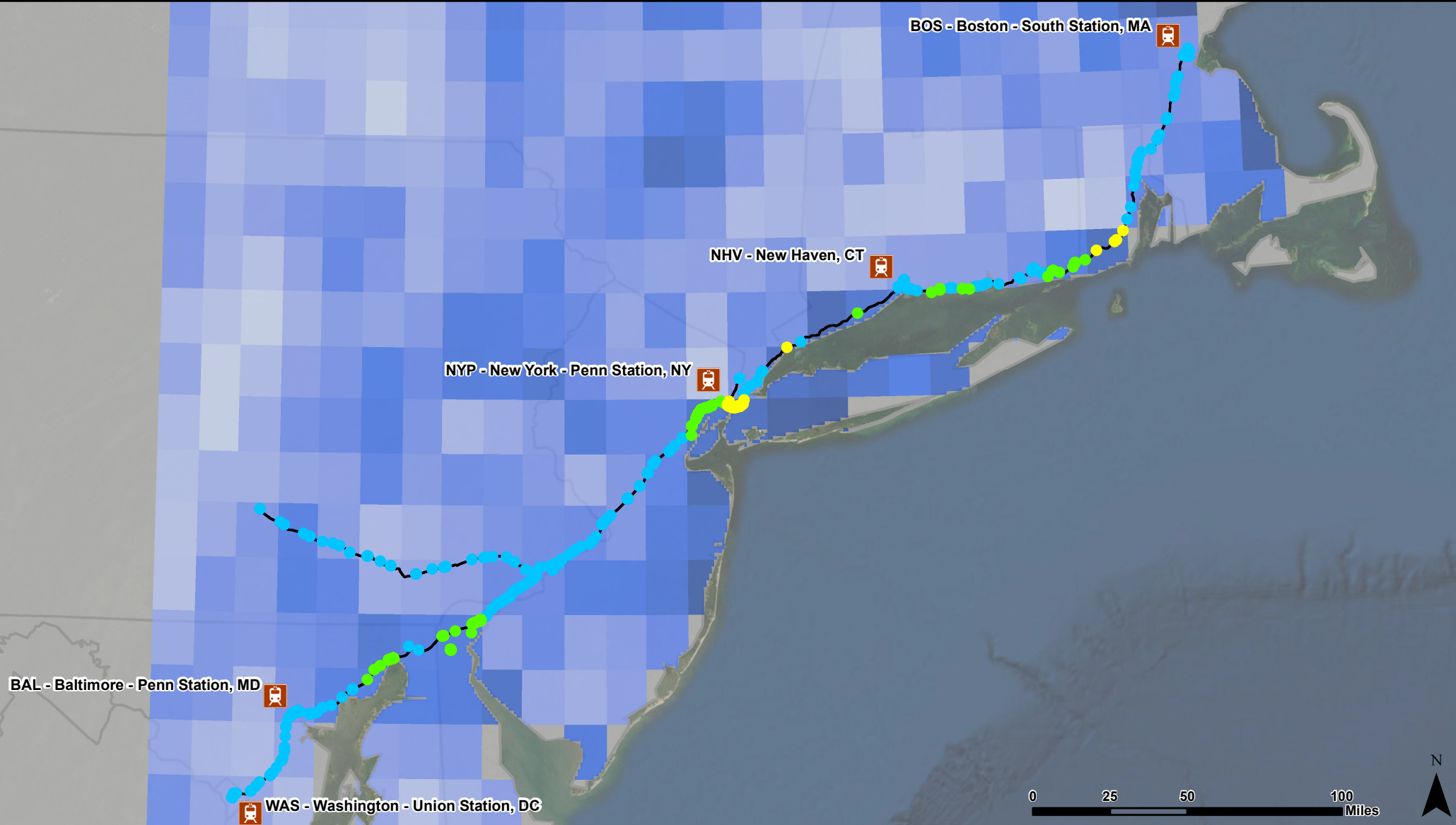
Amtrak Line

Increase in Days Receiving at Least 2 inches from Present



Maximum Number of Days: 3.5





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 Moderate Emissions (RCP 4.5)
 Year 2100



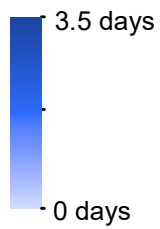
Buildings Vulnerability Score

- 0
- 1
- 2
- 3
- 4

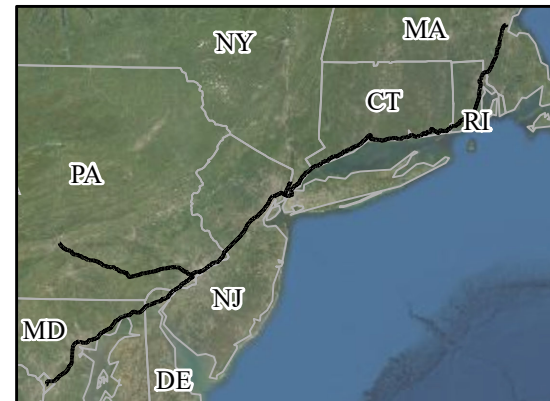
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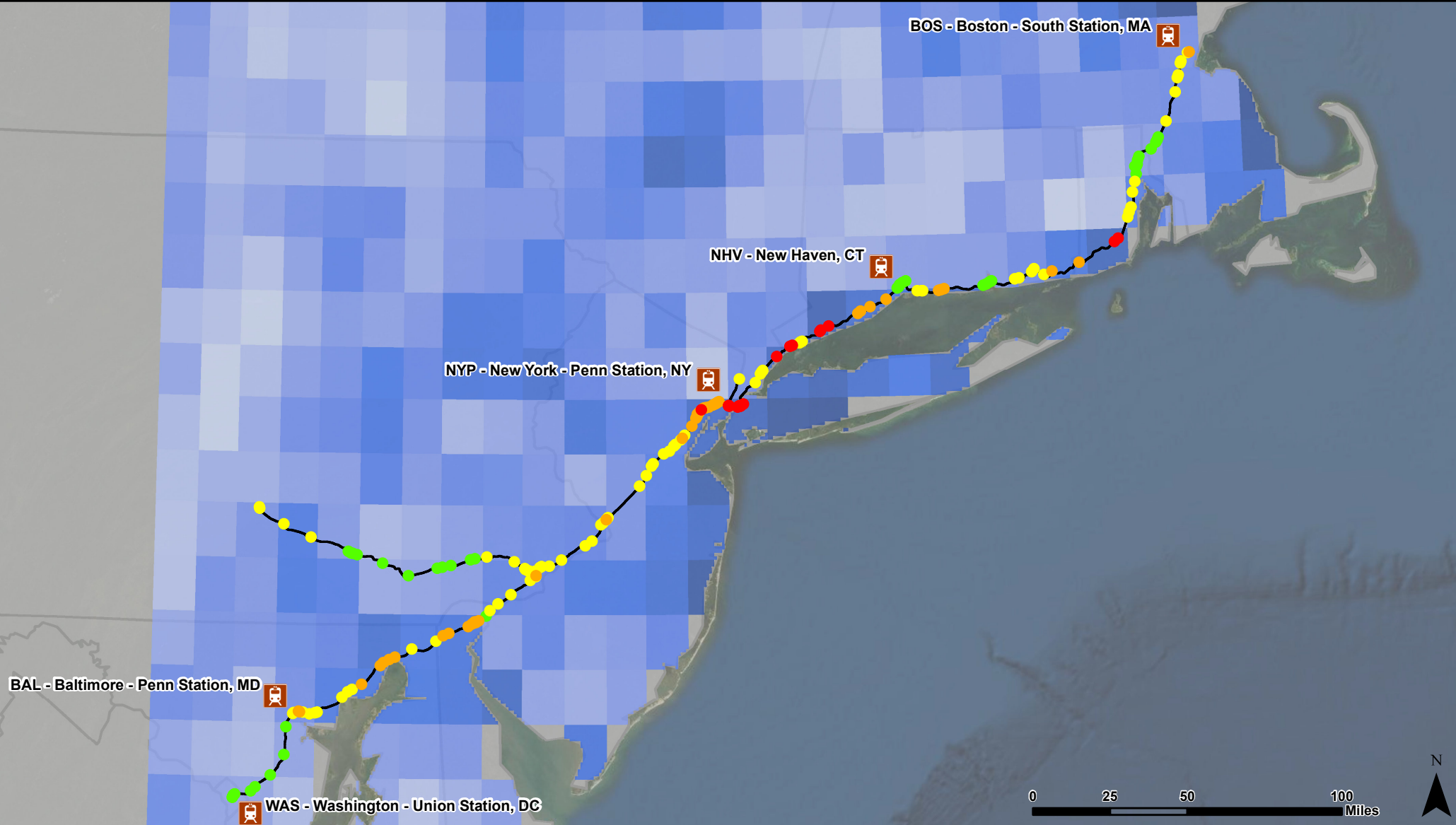
Amtrak Line

Increase in Days Receiving at Least 2 inches from Present



Maximum Number of Days: 3.1





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 Moderate Emissions (RCP 4.5)
 Year 2100



Interlockings Vulnerability Score

- 0
- 1
- 2
- 3
- 4

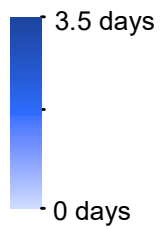


Stations

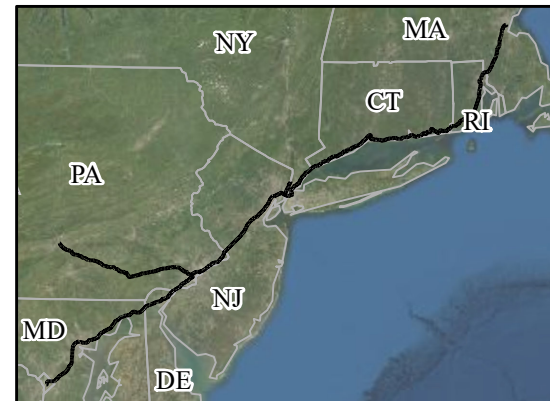


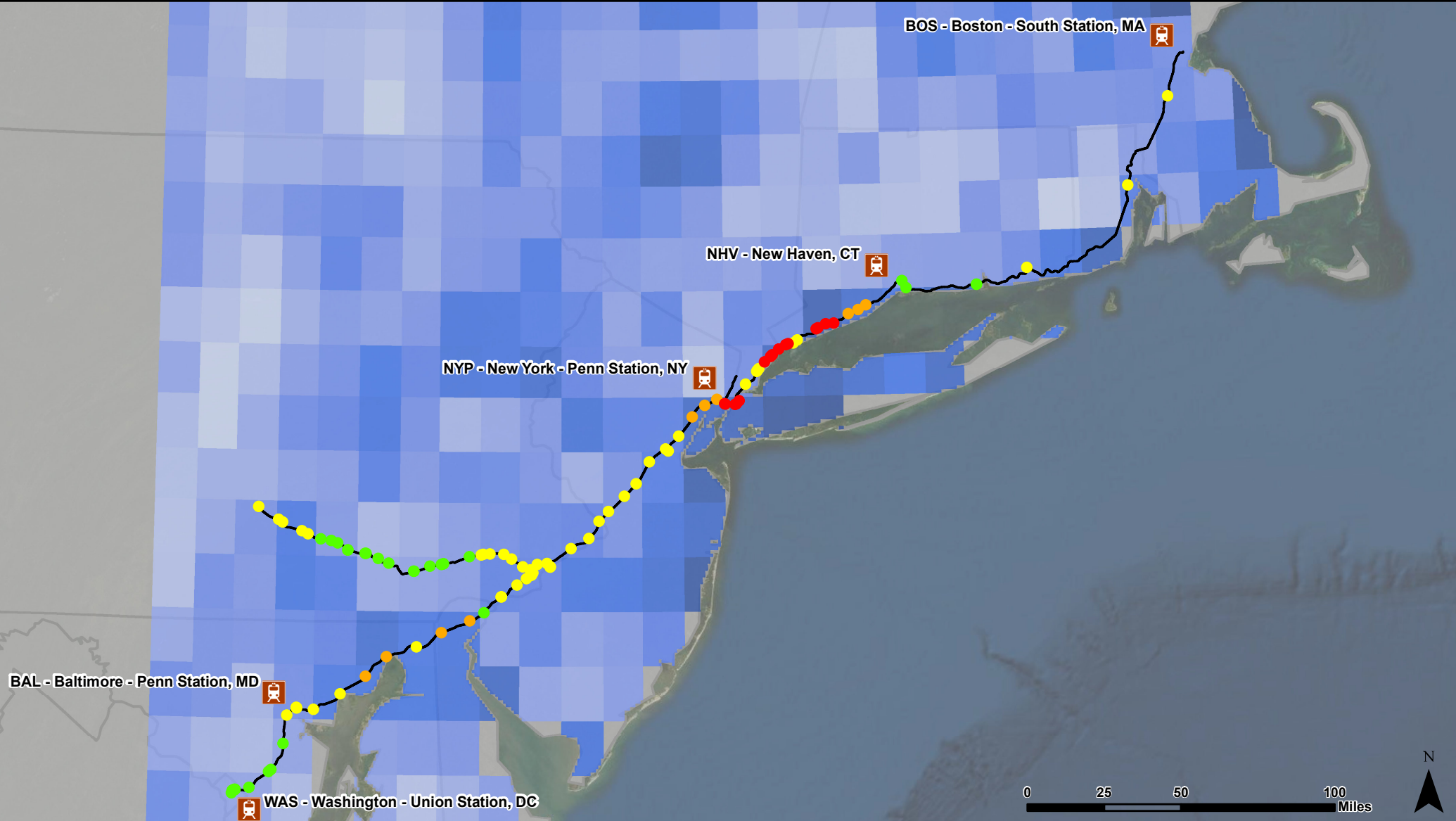
Amtrak Line

Increase in Days Receiving at Least 2 inches from Present



Maximum Number of Days: 3.1





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 Moderate Emissions (RCP 4.5)
 Year 2100



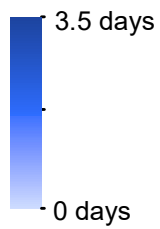
Substations Vulnerability Score

- 0
- 1
- 2
- 3
- 4

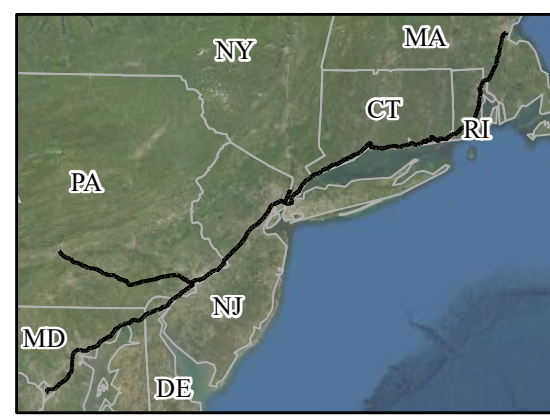
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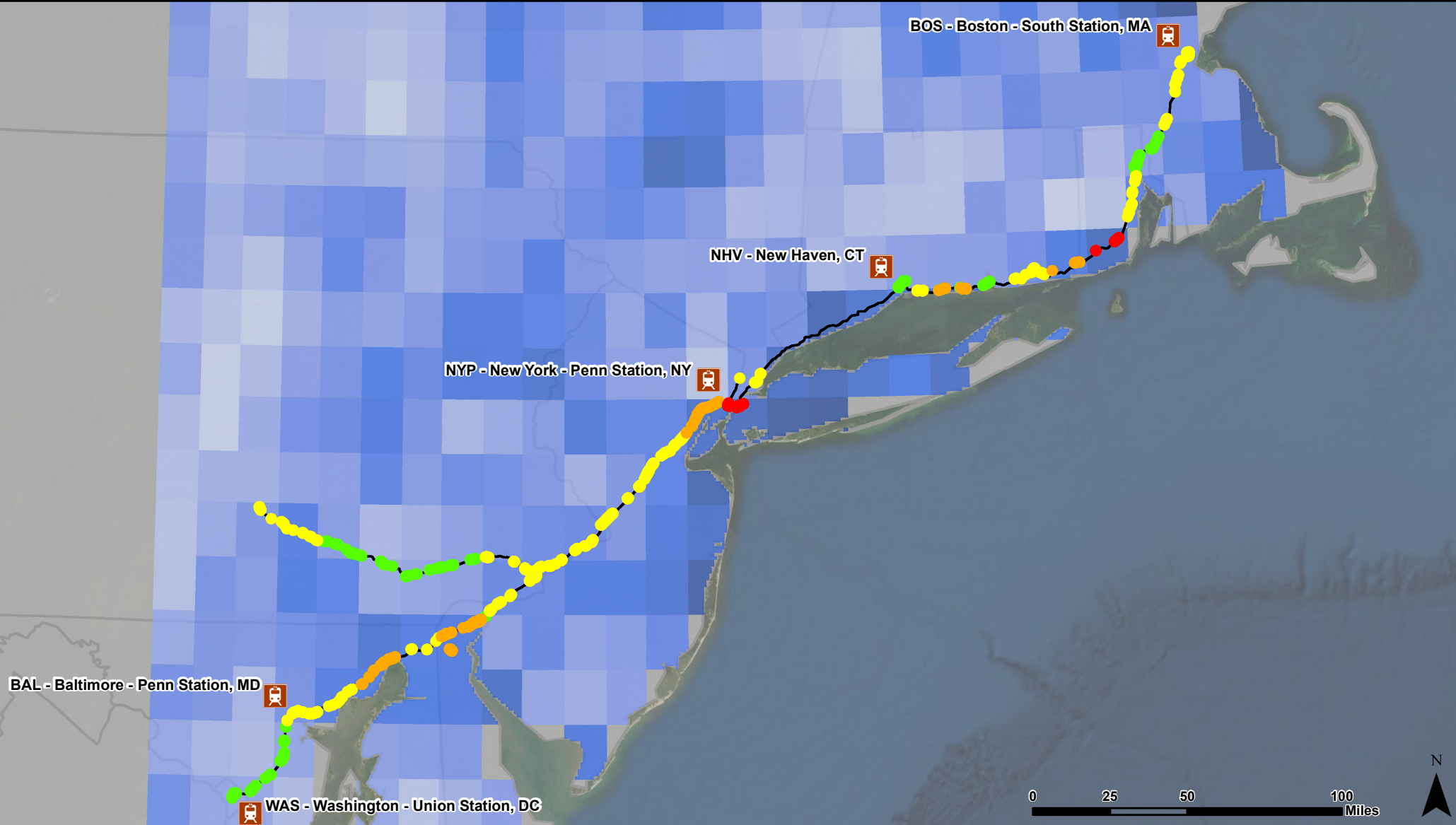
Amtrak Line

Increase in Days Receiving at Least 2 inches from Present



Maximum Number of Days: 3.1





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 Moderate Emissions (RCP 4.5)
 Year 2100



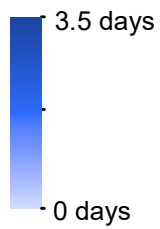
Switch Machines Vulnerability Score

- 0
- 1
- 2
- 3
- 4

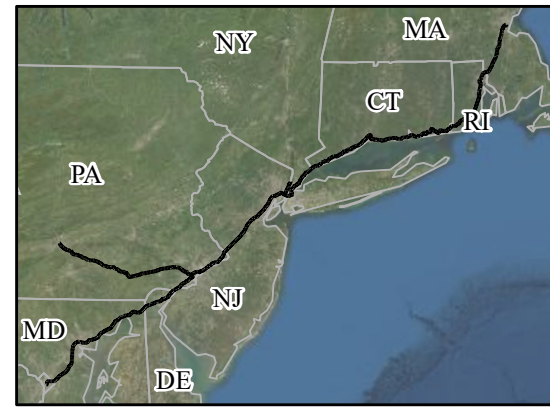
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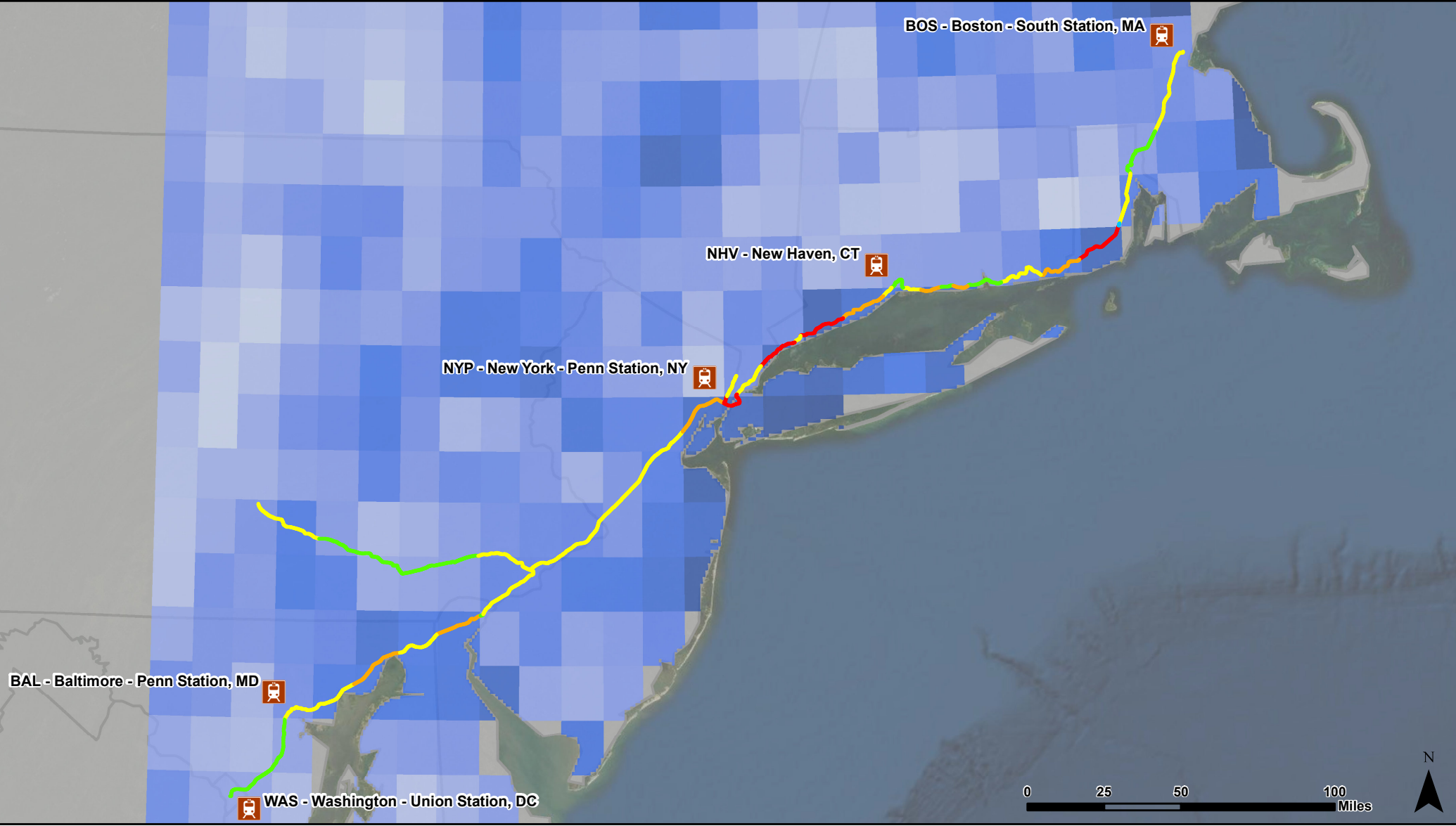
Amtrak Line

Increase in Days Receiving at Least 2 inches from Present



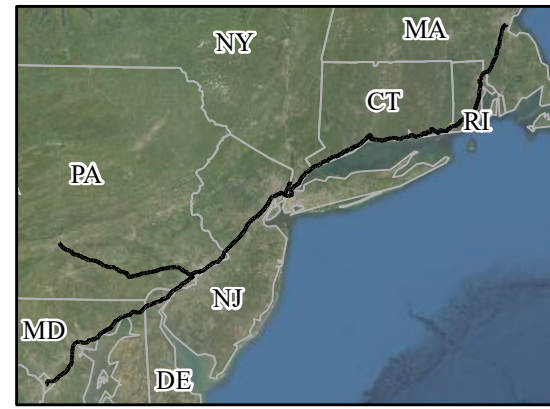
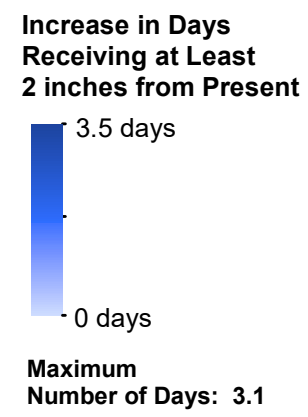
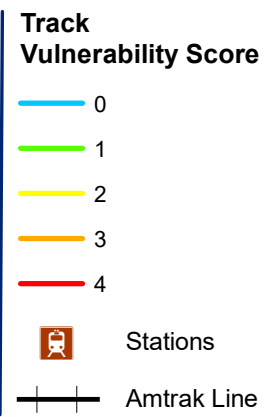
Maximum Number of Days: 3.1

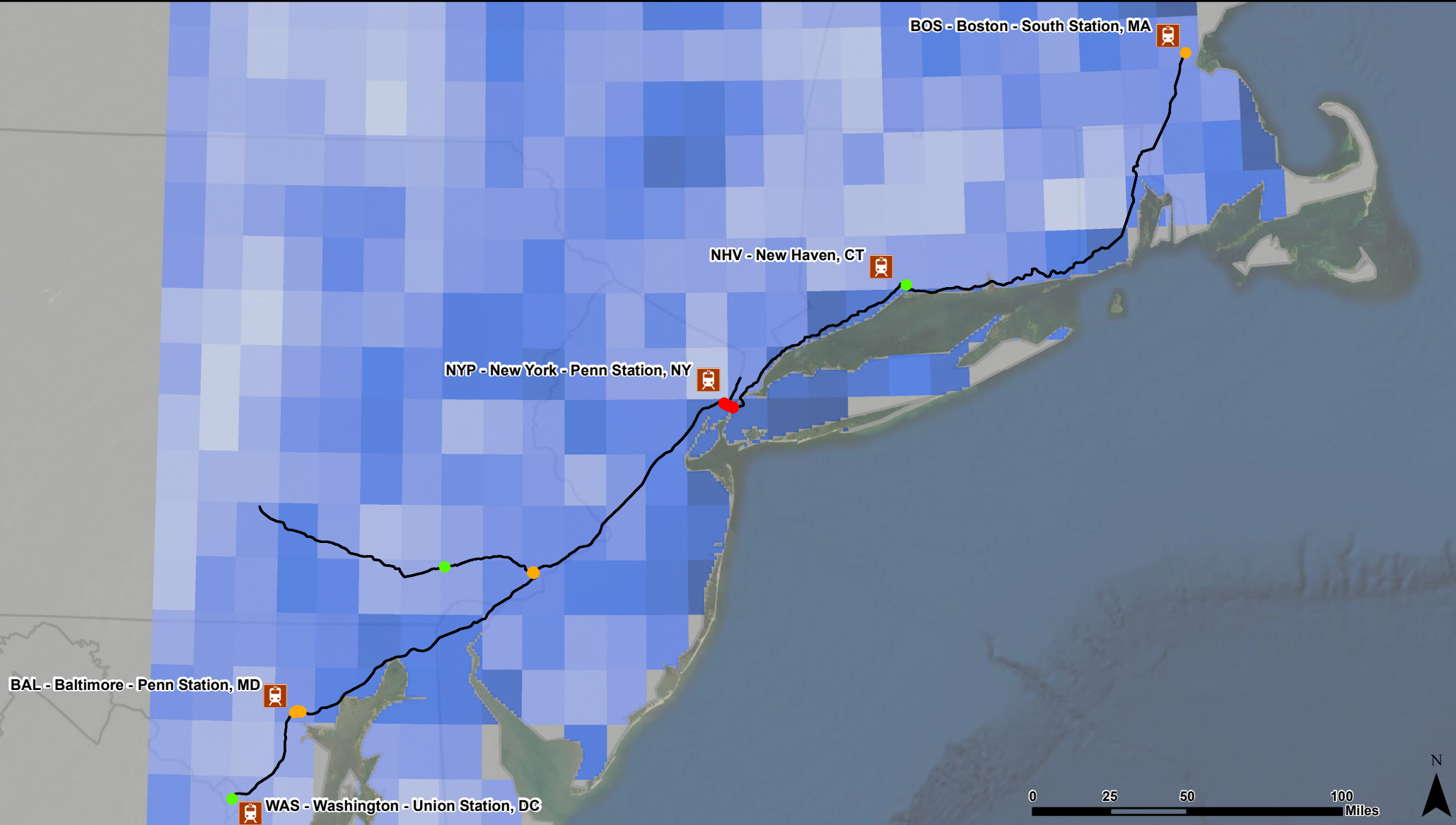




Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 Moderate Emissions (RCP 4.5)
 Year 2100





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 Moderate Emissions (RCP 4.5)
 Year 2100



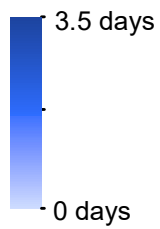
Tunnels Vulnerability Score

- 0
- 1
- 2
- 3
- 4

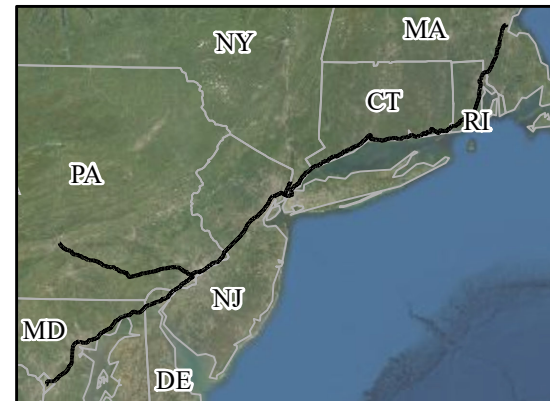
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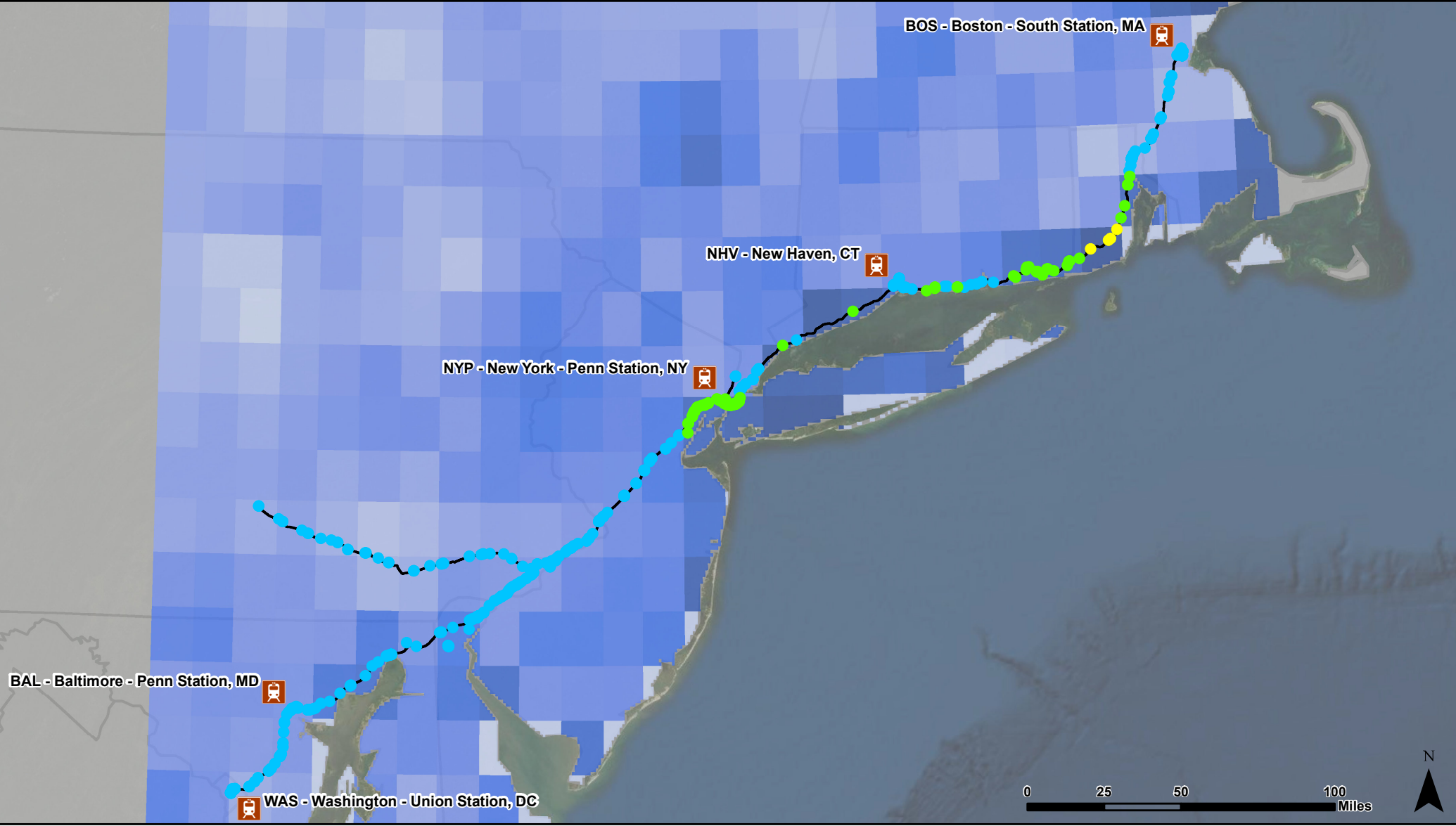
Amtrak Line

Increase in Days Receiving at Least 2 inches from Present



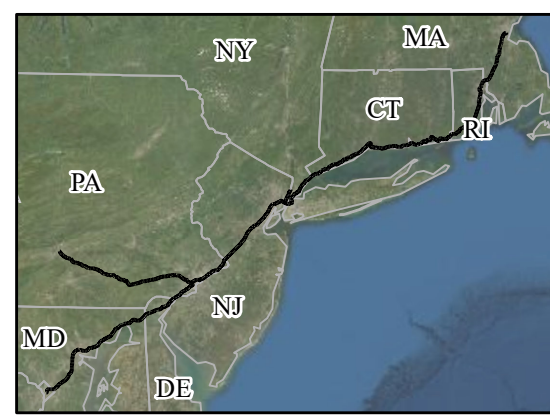
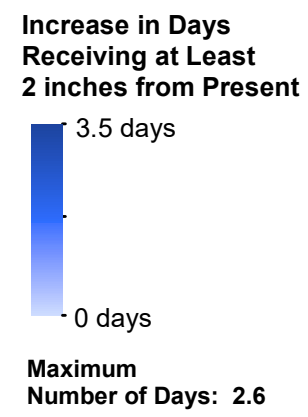
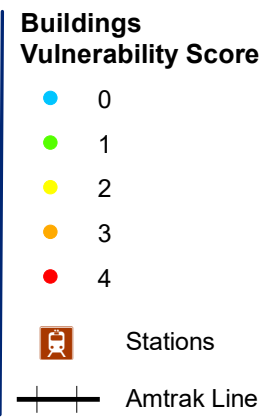
Maximum Number of Days: 3.1

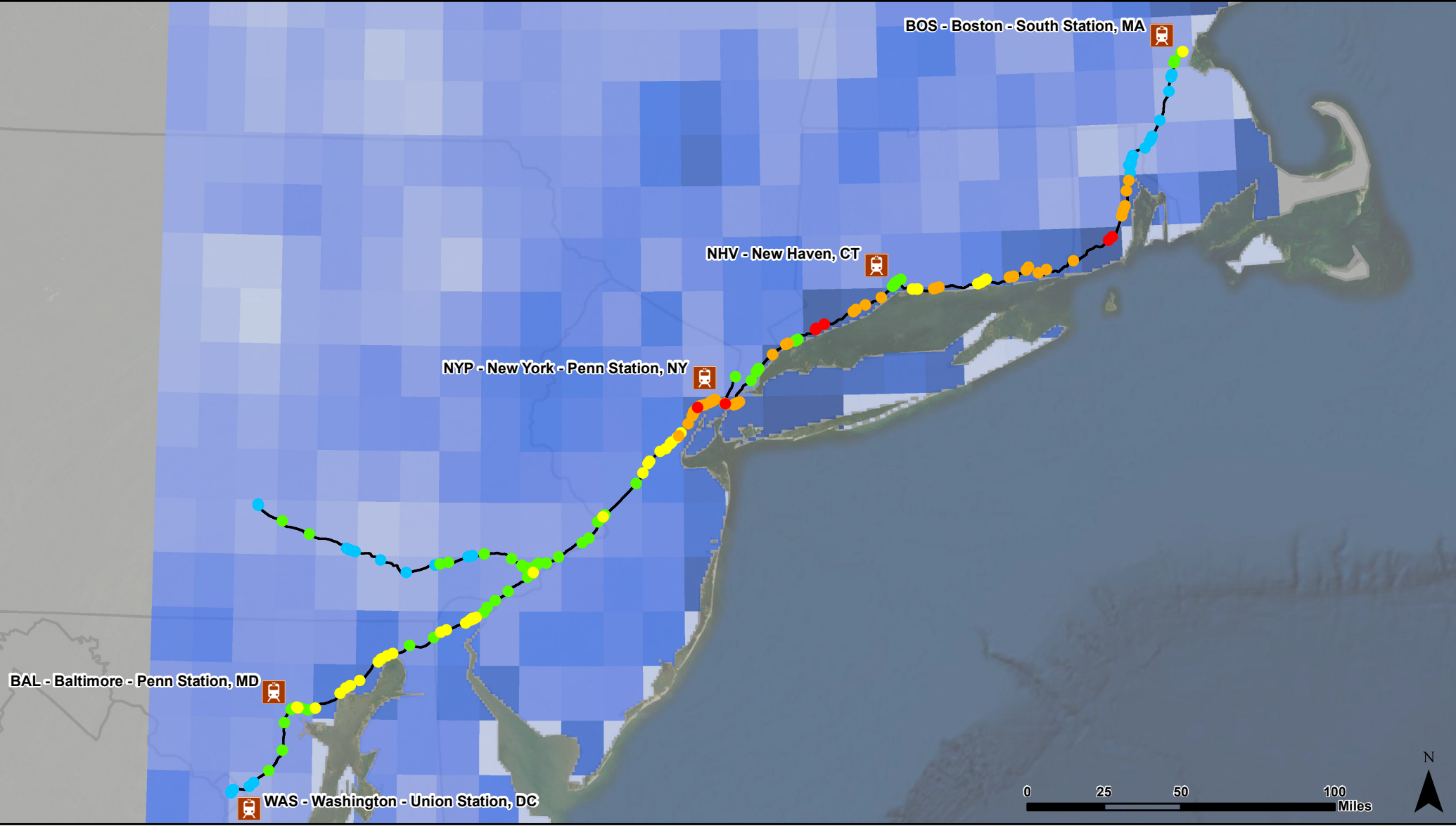




Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 High Emissions (RCP 8.5)
 Year 2050





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 High Emissions (RCP 8.5)
 Year 2050



Interlockings Vulnerability Score

- 0
- 1
- 2
- 3
- 4

Stations

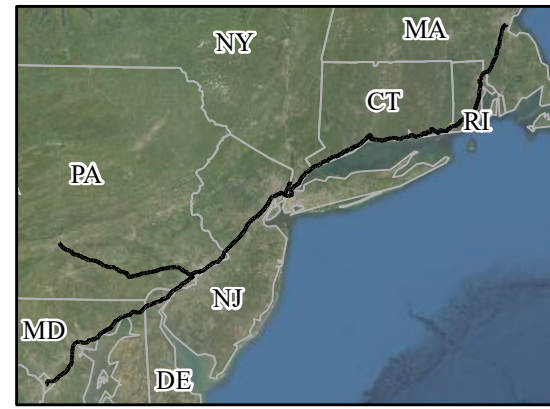
Amtrak Line

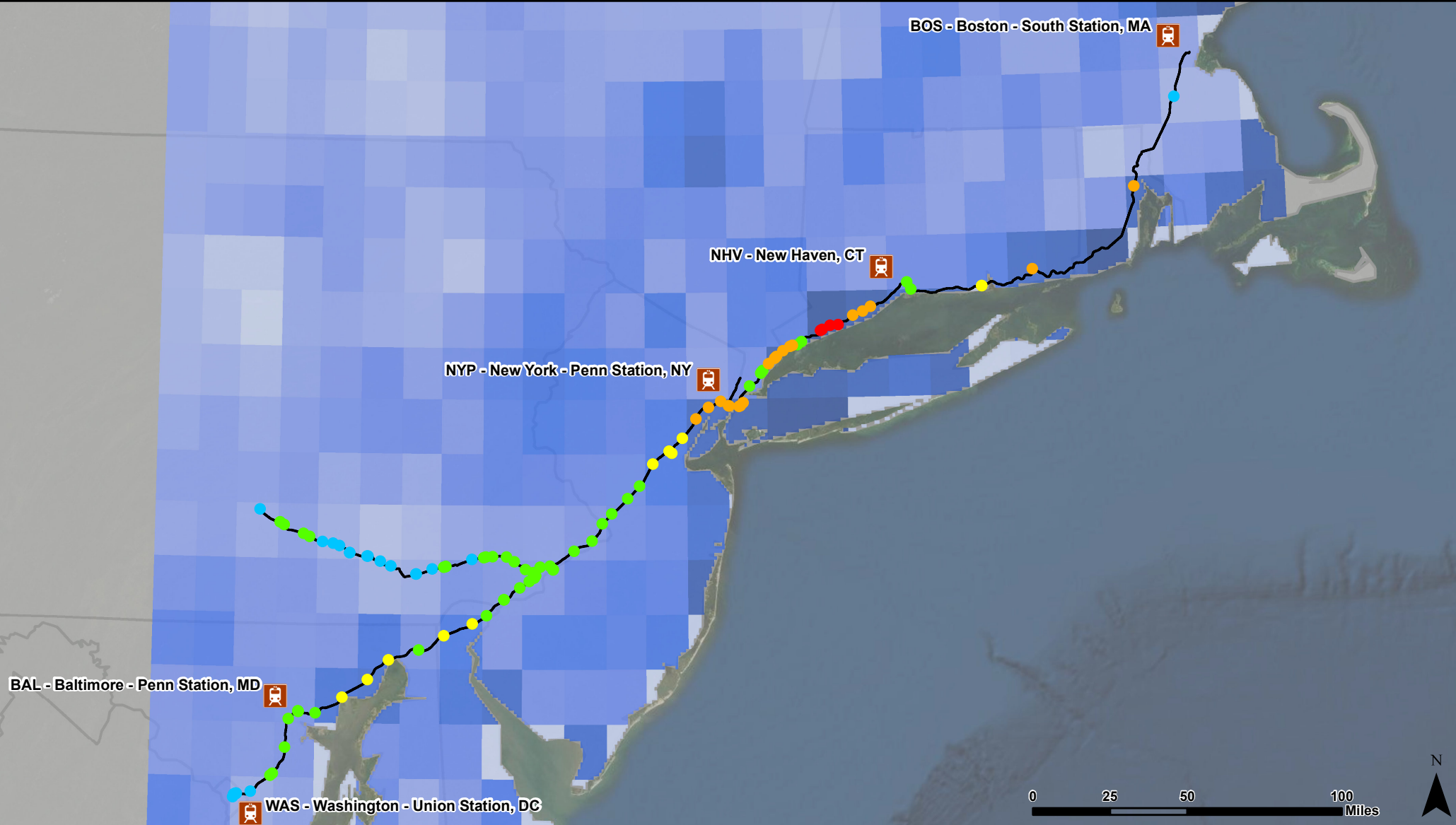
Increase in Days Receiving at Least 2 inches from Present

3.5 days

0 days

Maximum Number of Days: 2.6





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 High Emissions (RCP 8.5)
 Year 2050



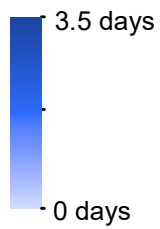
Substations Vulnerability Score

- 0
- 1
- 2
- 3
- 4

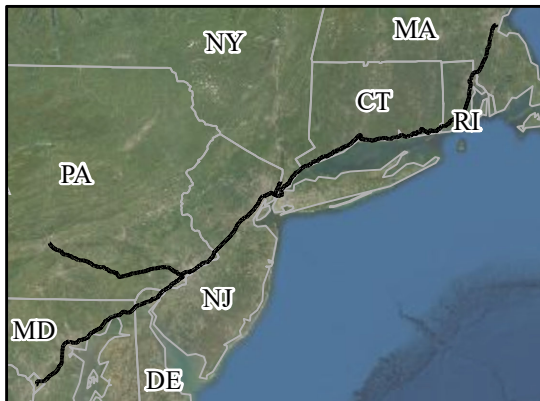
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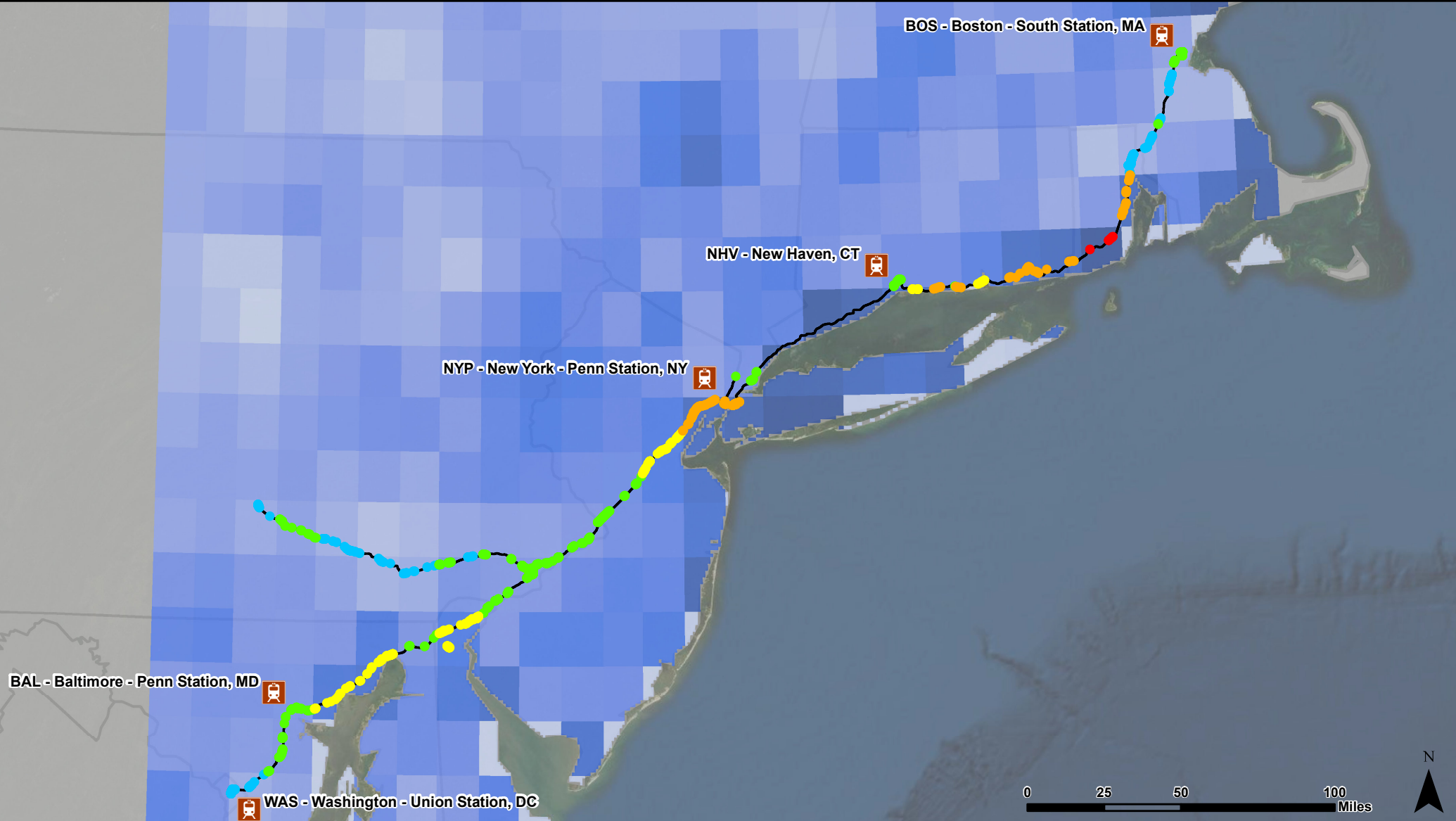
Amtrak Line

Increase in Days Receiving at Least 2 inches from Present



Maximum Number of Days: 2.6





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 High Emissions (RCP 8.5)
 Year 2050



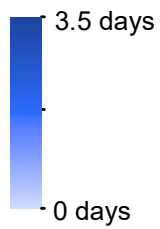
Switch Machines Vulnerability Score

- 0
- 1
- 2
- 3
- 4

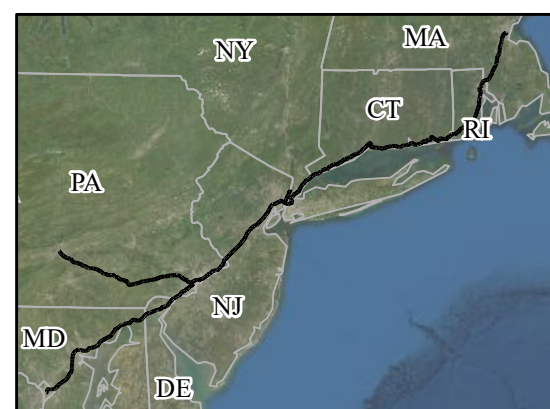
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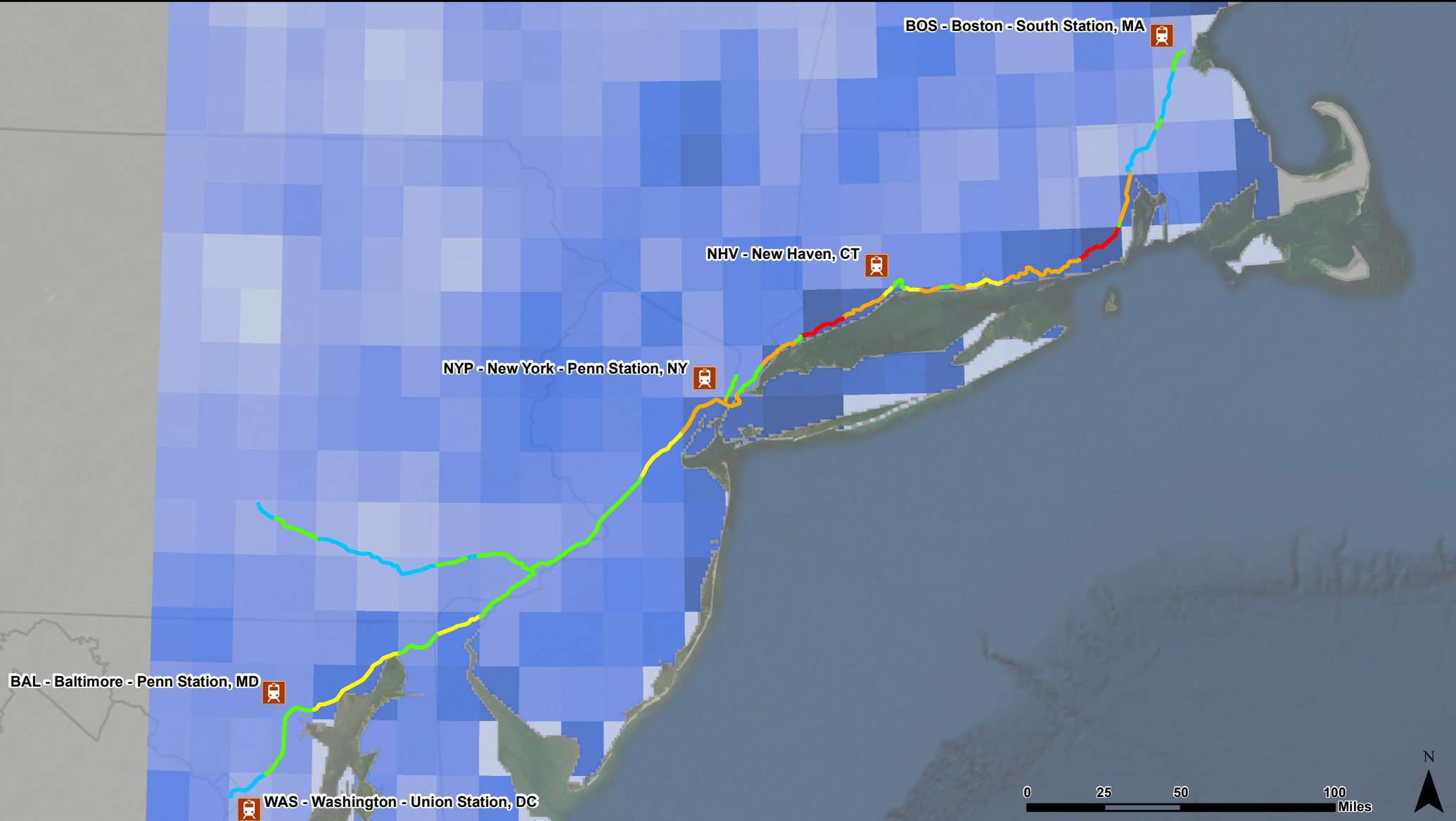
Amtrak Line

Increase in Days Receiving at Least 2 inches from Present



Maximum Number of Days: 2.6





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 High Emissions (RCP 8.5)
 Year 2050



Track Vulnerability Score

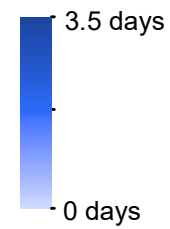


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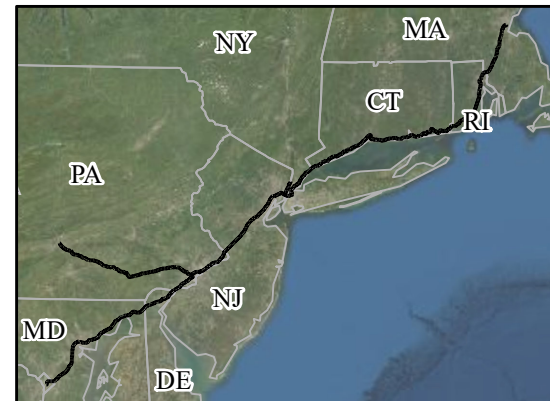


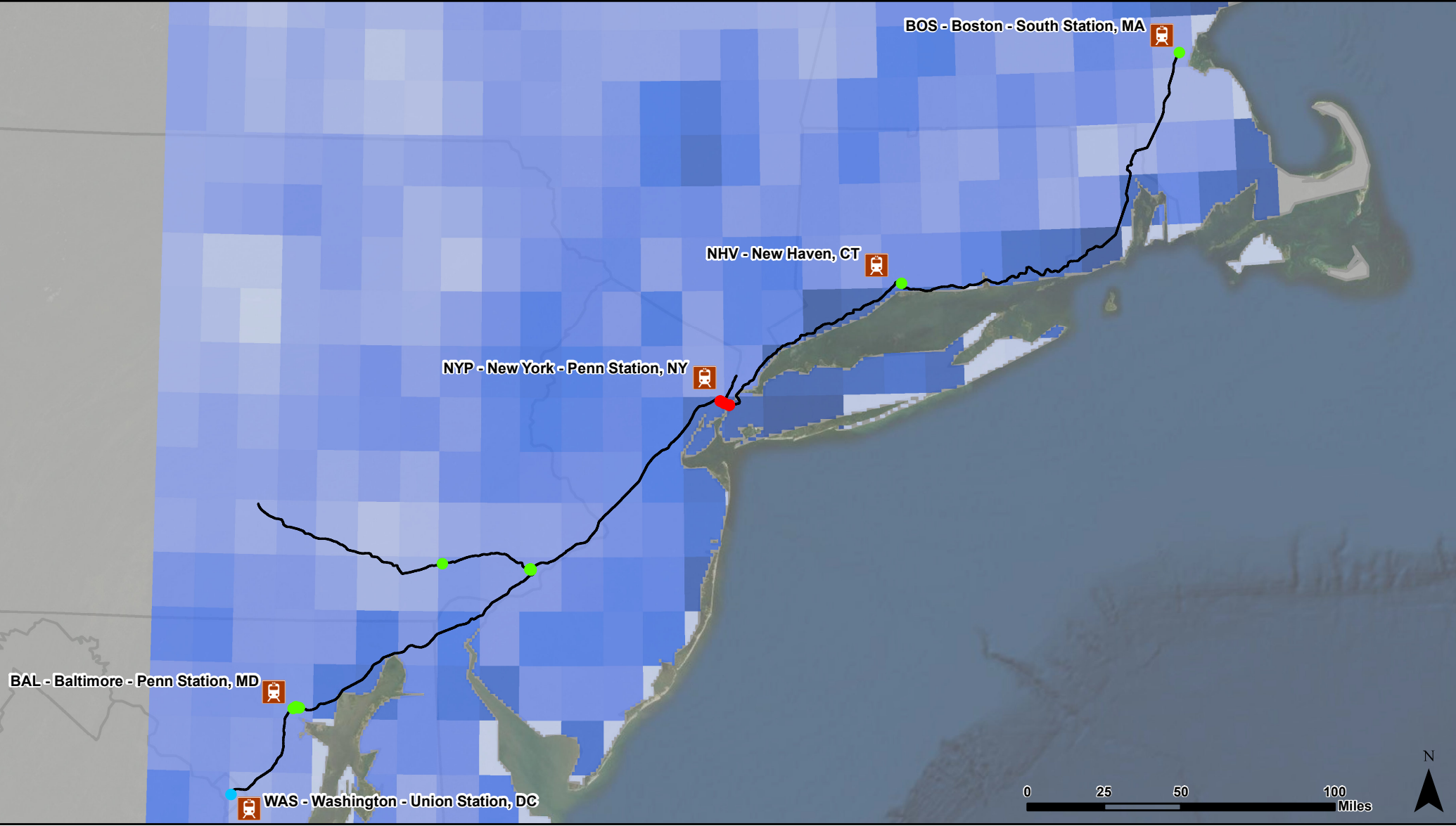
Amtrak Line

Increase in Days Receiving at Least 2 inches from Present



Maximum Number of Days: 2.6





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 High Emissions (RCP 8.5)
 Year 2050

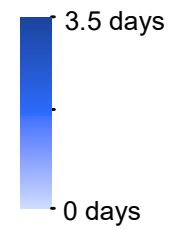


Tunnels Vulnerability Score

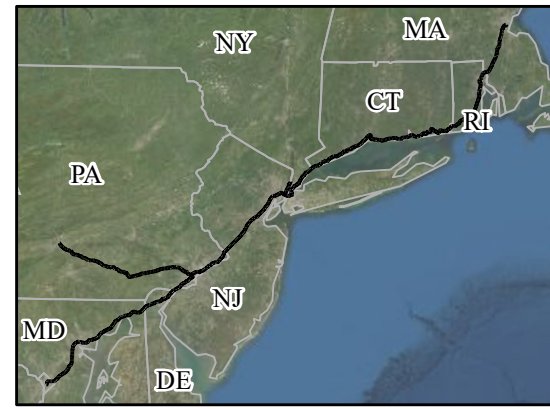
- 0
- 1
- 2
- 3
- 4

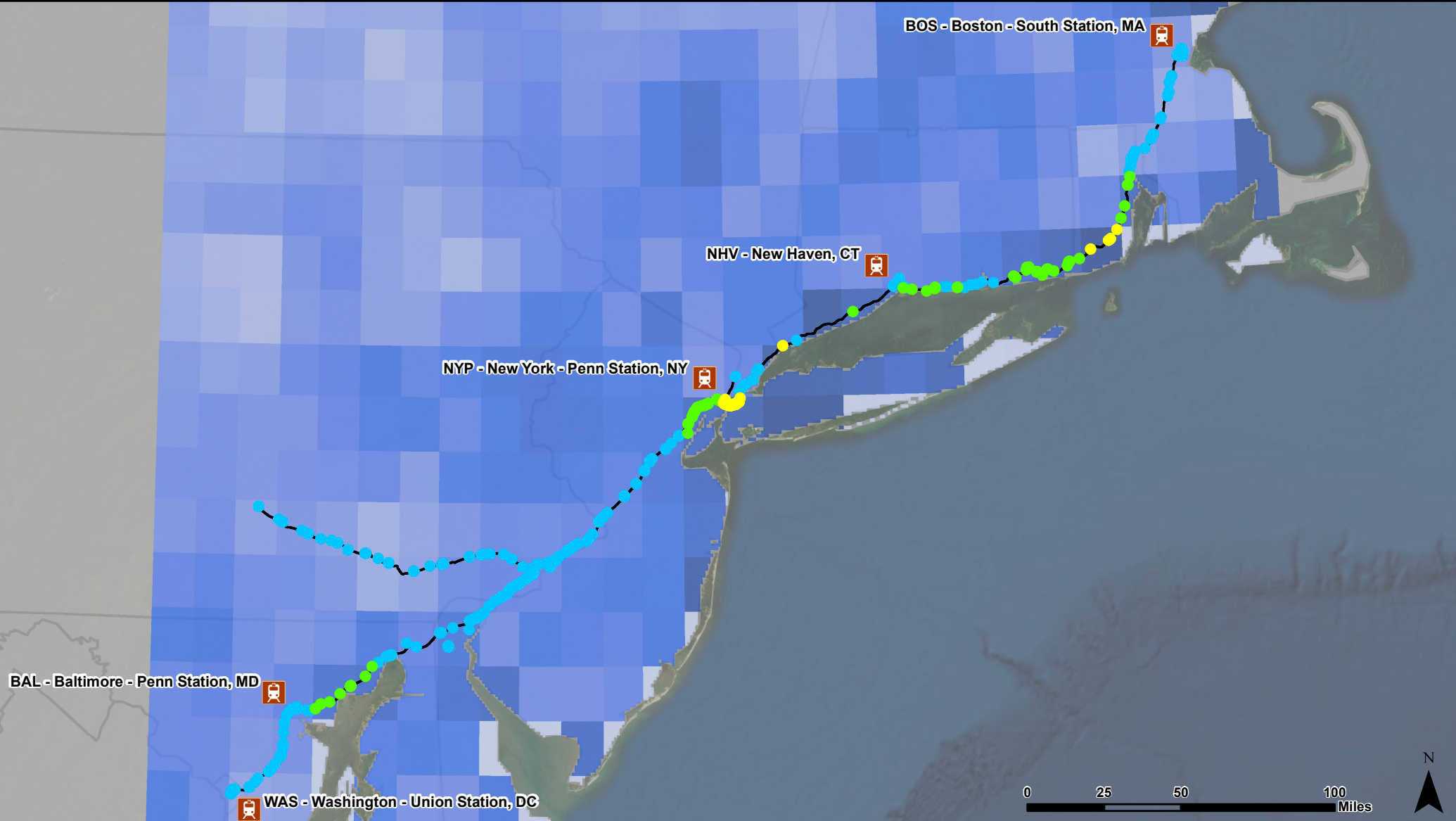
Stations
 Amtrak Line

Increase in Days Receiving at Least 2 inches from Present



Maximum Number of Days: 2.6





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 High Emissions (RCP 8.5)
 Year 2100



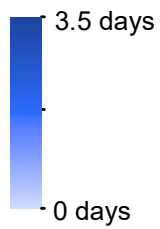
Buildings Vulnerability Score

- 0
- 1
- 2
- 3
- 4

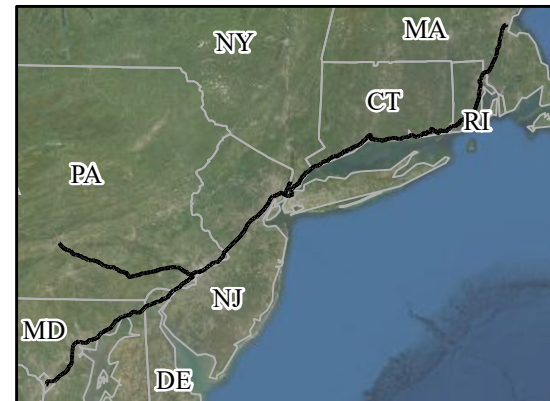
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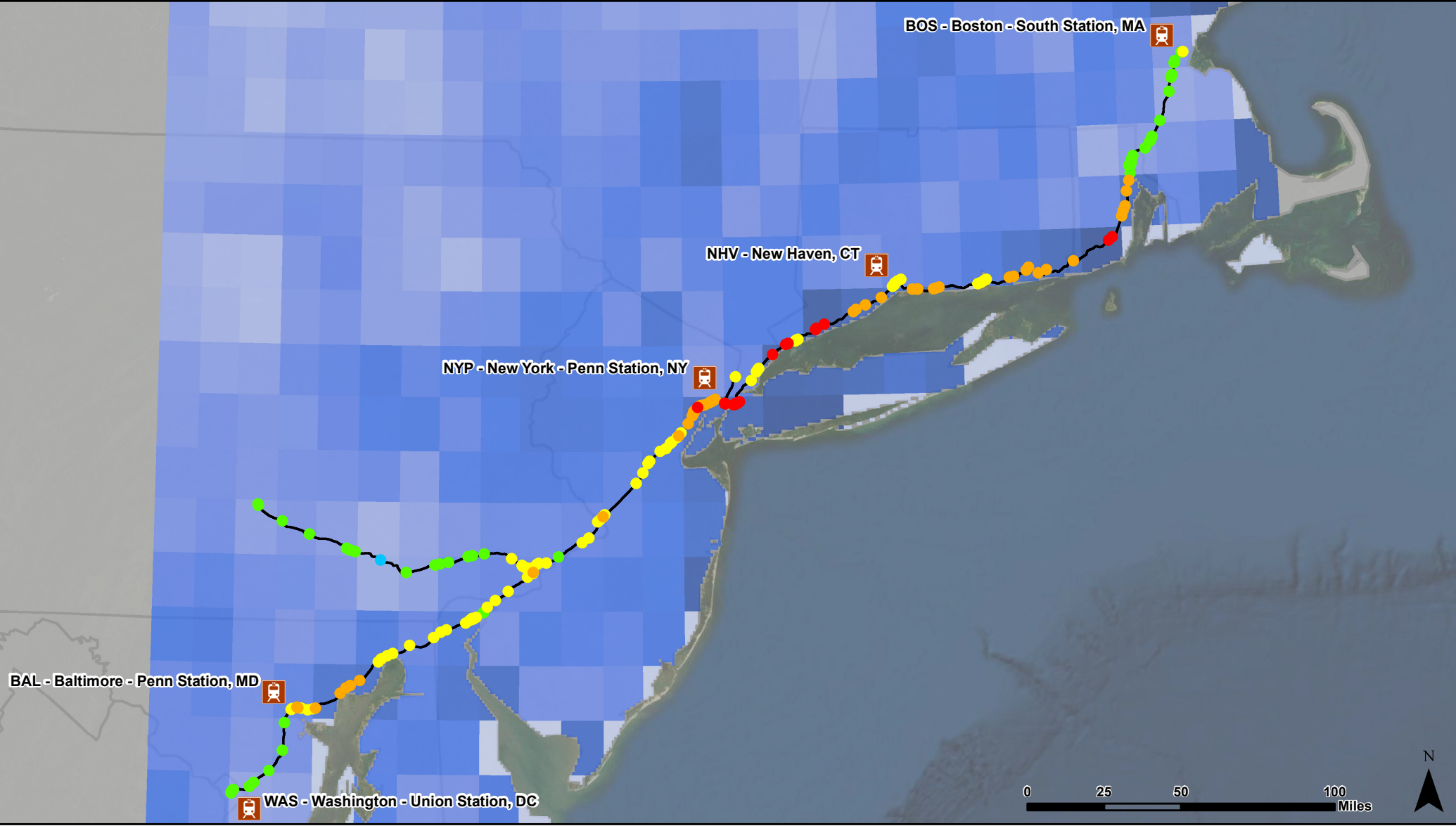
Amtrak Line

Increase in Days Receiving at Least 2 inches from Present



Maximum Number of Days: 2.9





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 High Emissions (RCP 8.5)
 Year 2100



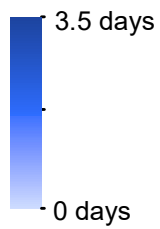
Interlockings Vulnerability Score

- 0
- 1
- 2
- 3
- 4

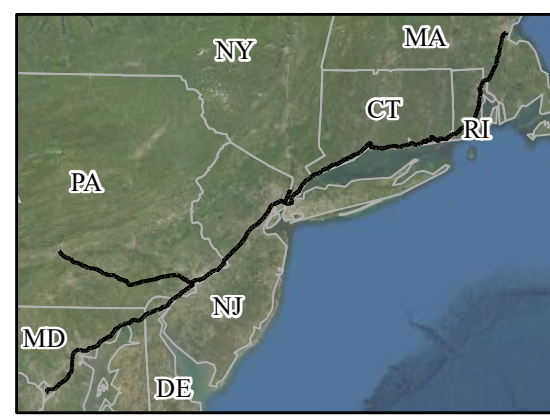
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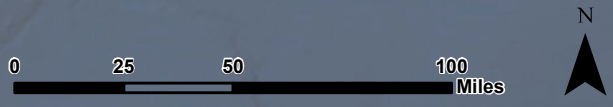
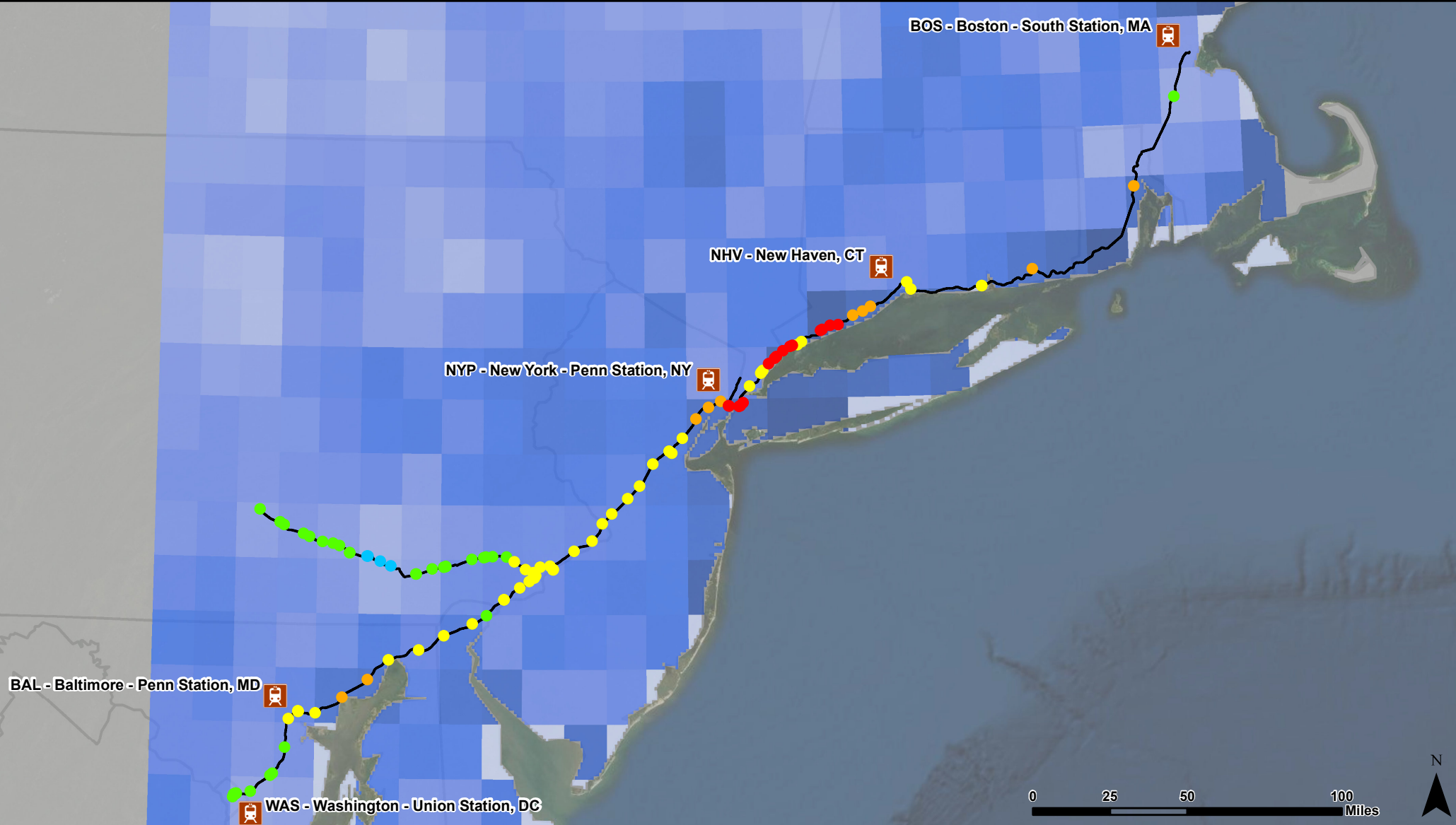
Amtrak Line

Increase in Days Receiving at Least 2 inches from Present



Maximum Number of Days: 2.9





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 High Emissions (RCP 8.5)
 Year 2100



Substations Vulnerability Score

- 0
- 1
- 2
- 3
- 4

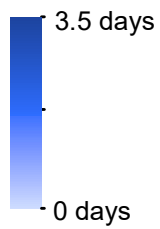


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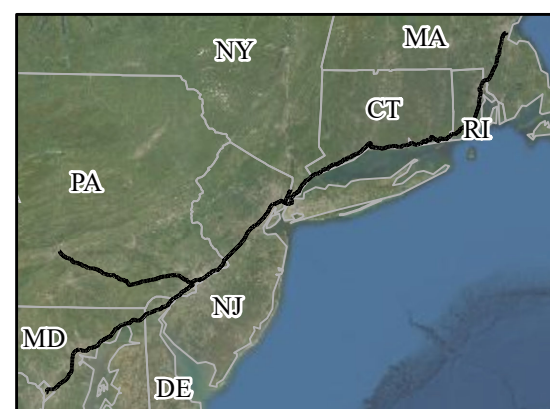


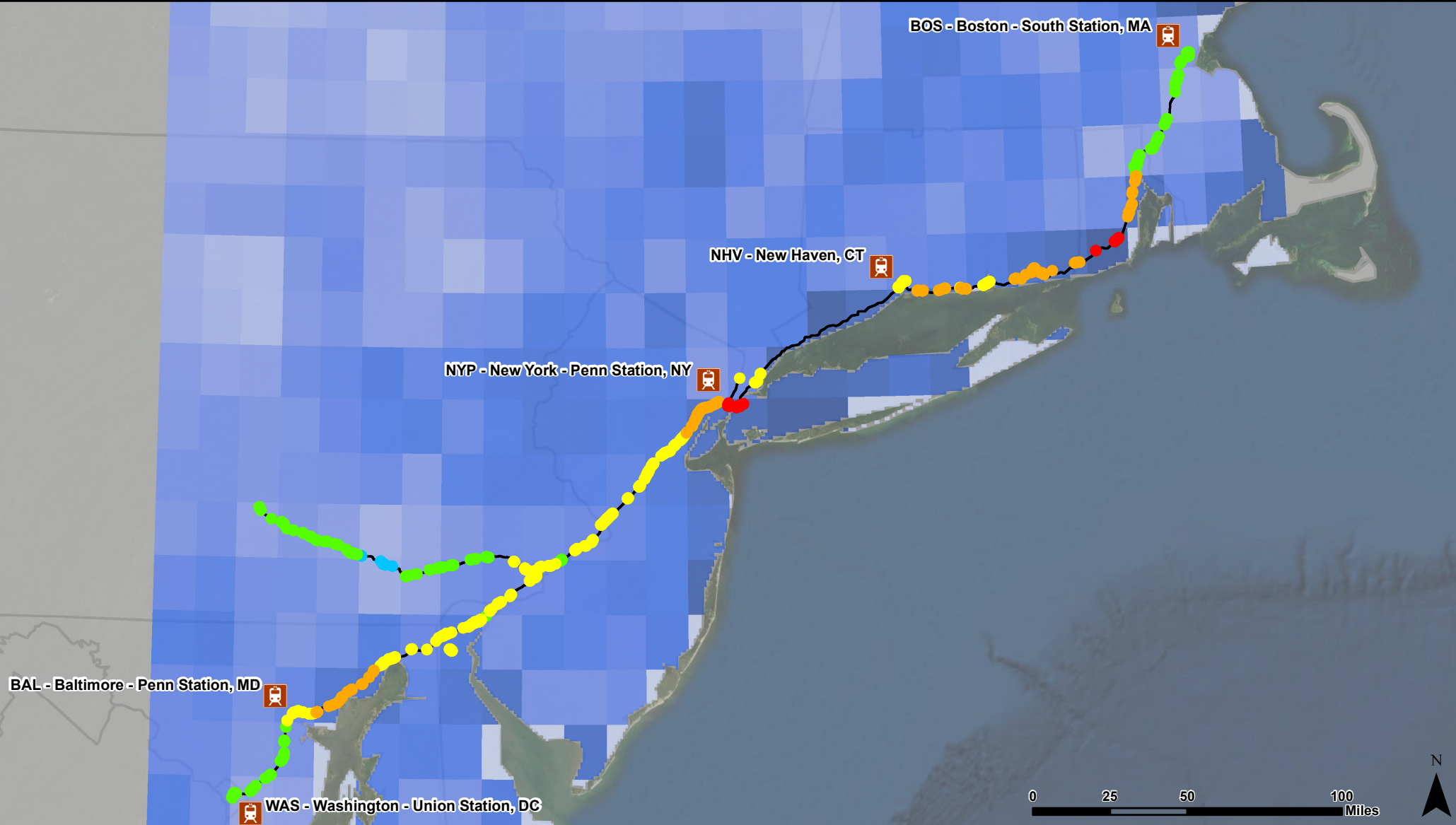
Amtrak Line

Increase in Days Receiving at Least 2 inches from Present



Maximum Number of Days: 2.9





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 High Emissions (RCP 8.5)
 Year 2100



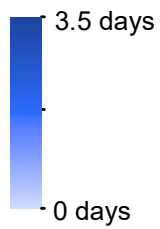
Switch Machines Vulnerability Score

- 0
- 1
- 2
- 3
- 4

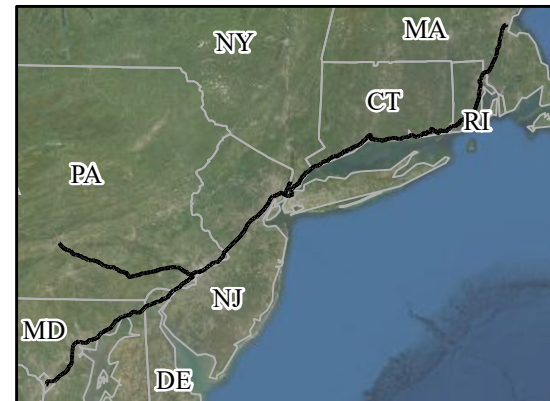
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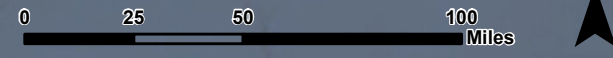
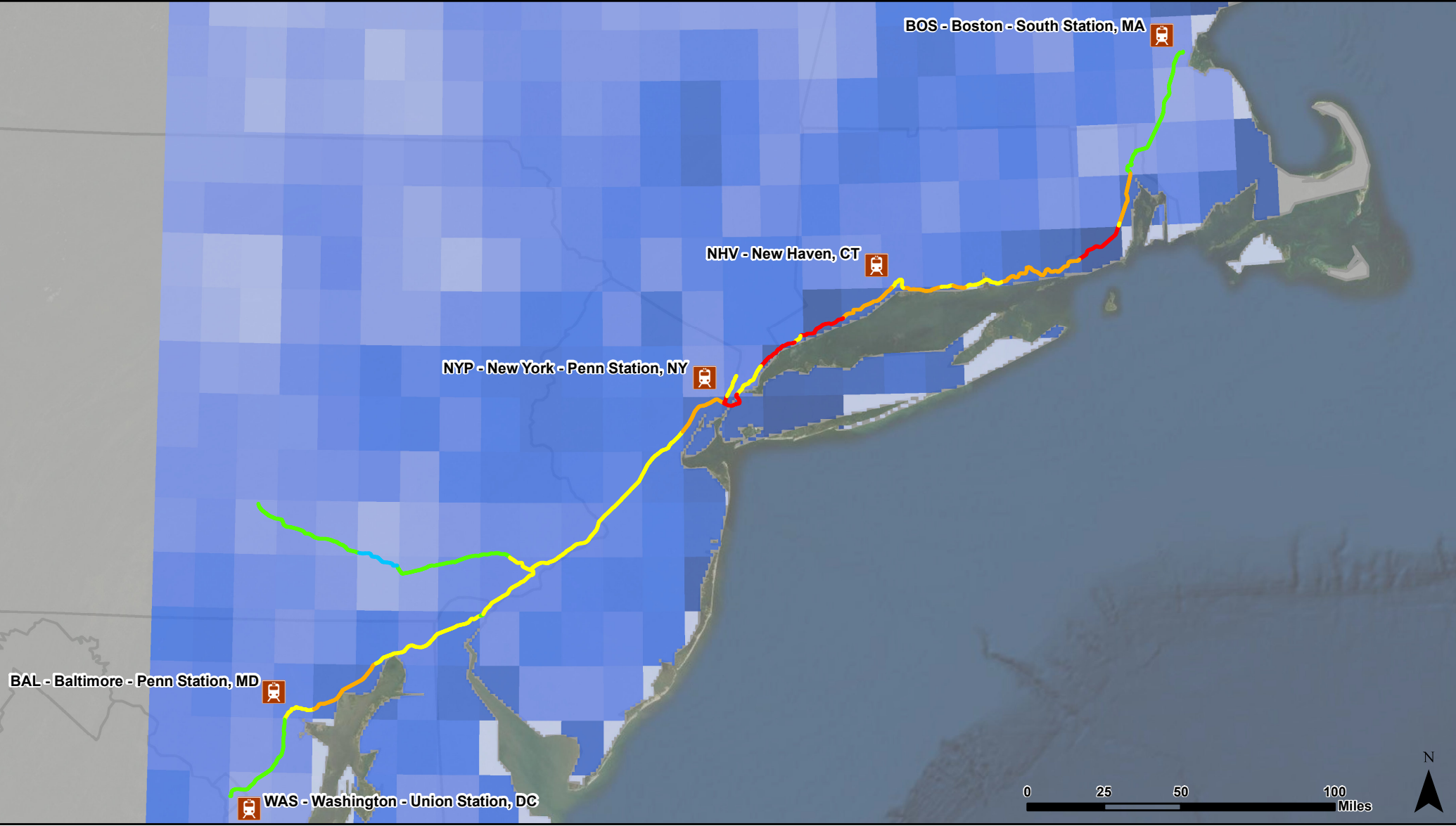
Amtrak Line

Increase in Days Receiving at Least 2 inches from Present



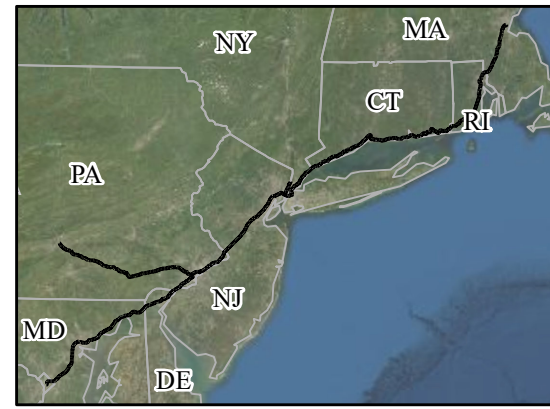
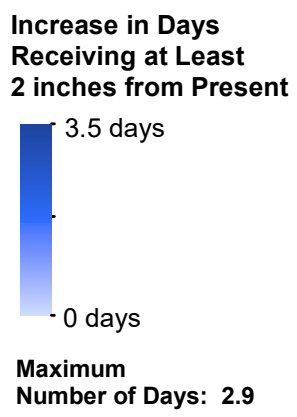
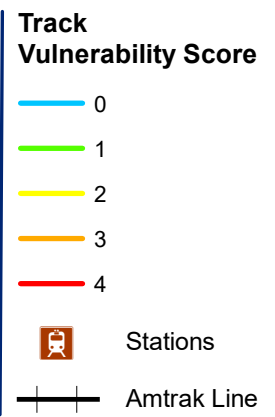
Maximum Number of Days: 2.9

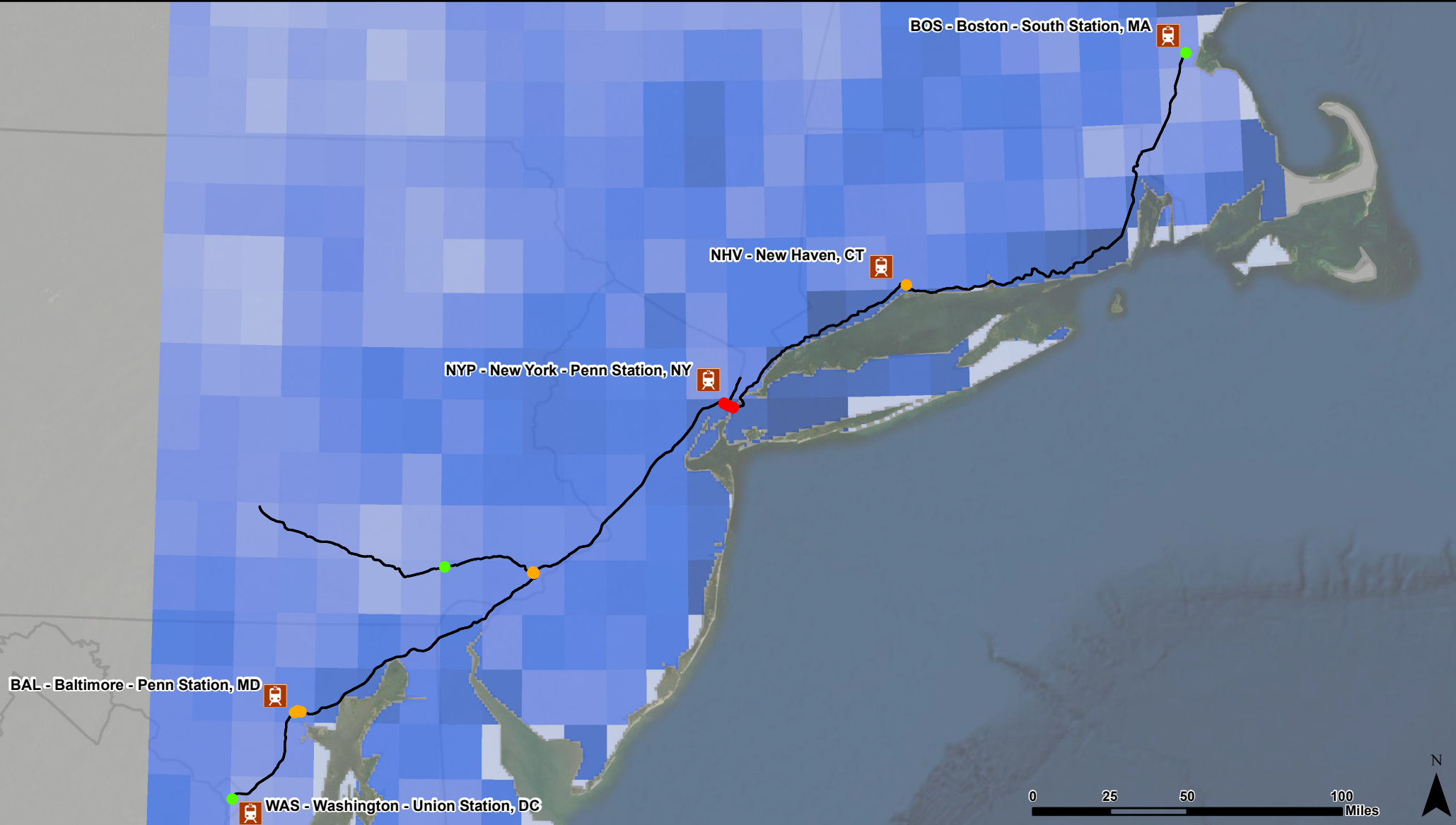




Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 High Emissions (RCP 8.5)
 Year 2100





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Extreme Precipitation Event
 High Emissions (RCP 8.5)
 Year 2100



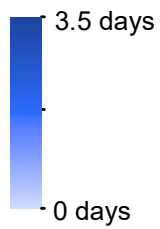
Tunnels Vulnerability Score

- 0
- 1
- 2
- 3
- 4

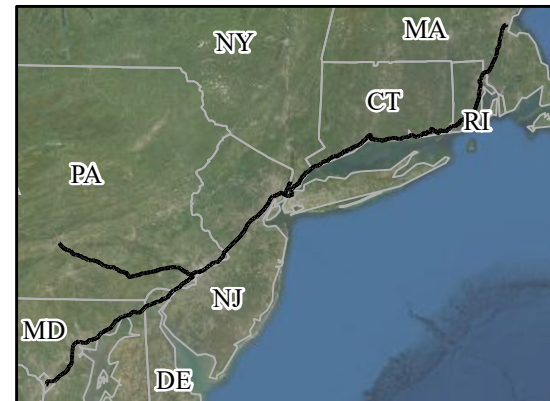
Stations

Amtrak Line

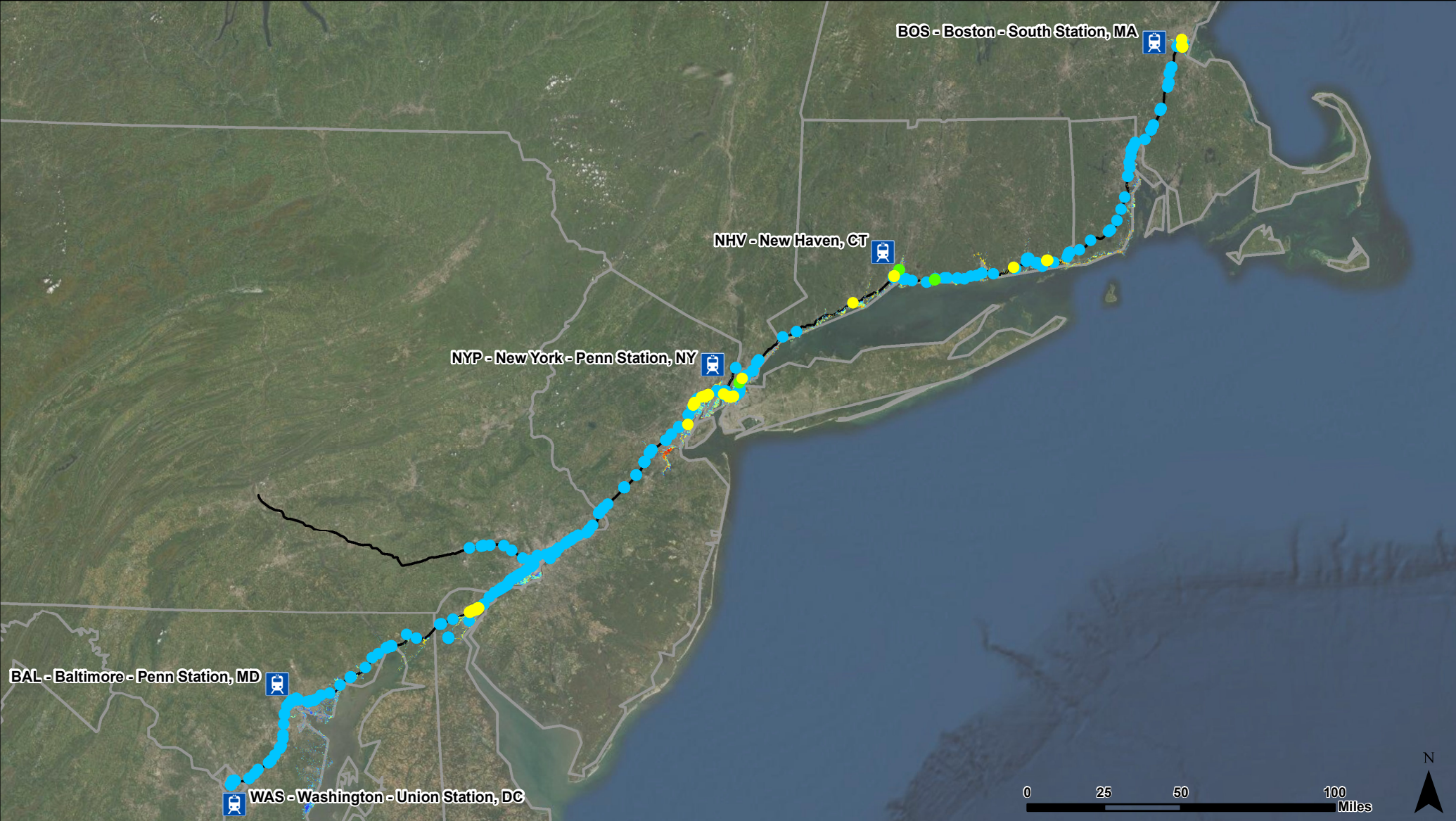
Increase in Days Receiving at Least 2 inches from Present



Maximum Number of Days: 2.9



Sea Level Rise Maps



Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Projected Sea Level Rise with Surge
 High Emissions (RCP 8.5)
 Year 2050



Buildings Vulnerability Score

- 0
- 1
- 2
- 3
- 4



Stations

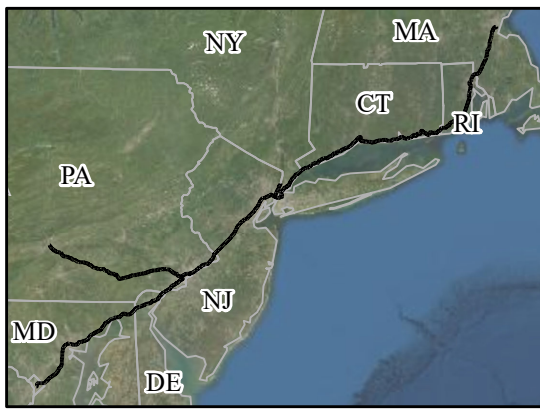


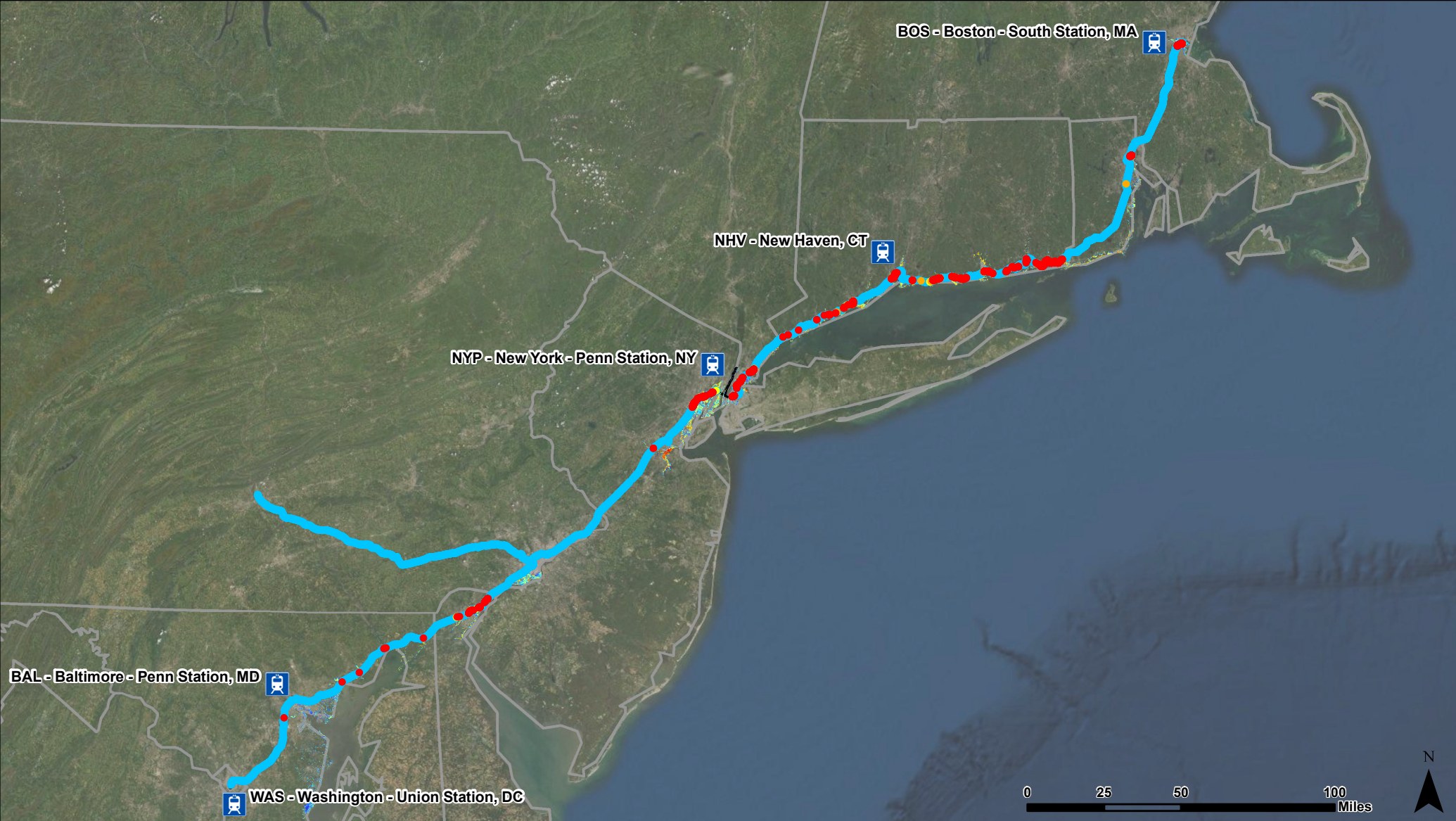
Amtrak Line

Sea Level Rise with Surge Depth



Maximum Depth: 15.3 feet





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Projected Sea Level Rise with Surge
 High Emissions (RCP 8.5)
 Year 2050



Catenary Vulnerability Score

- 0
- 1
- 2
- 3
- 4



Stations

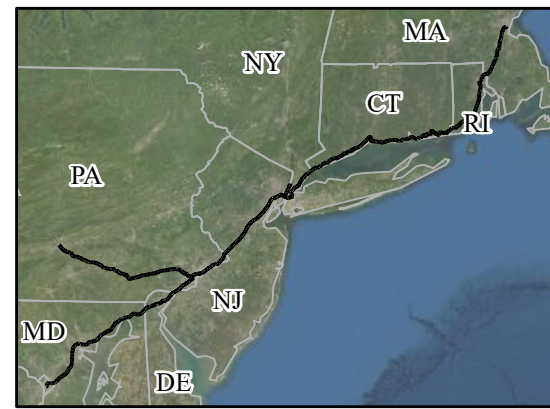


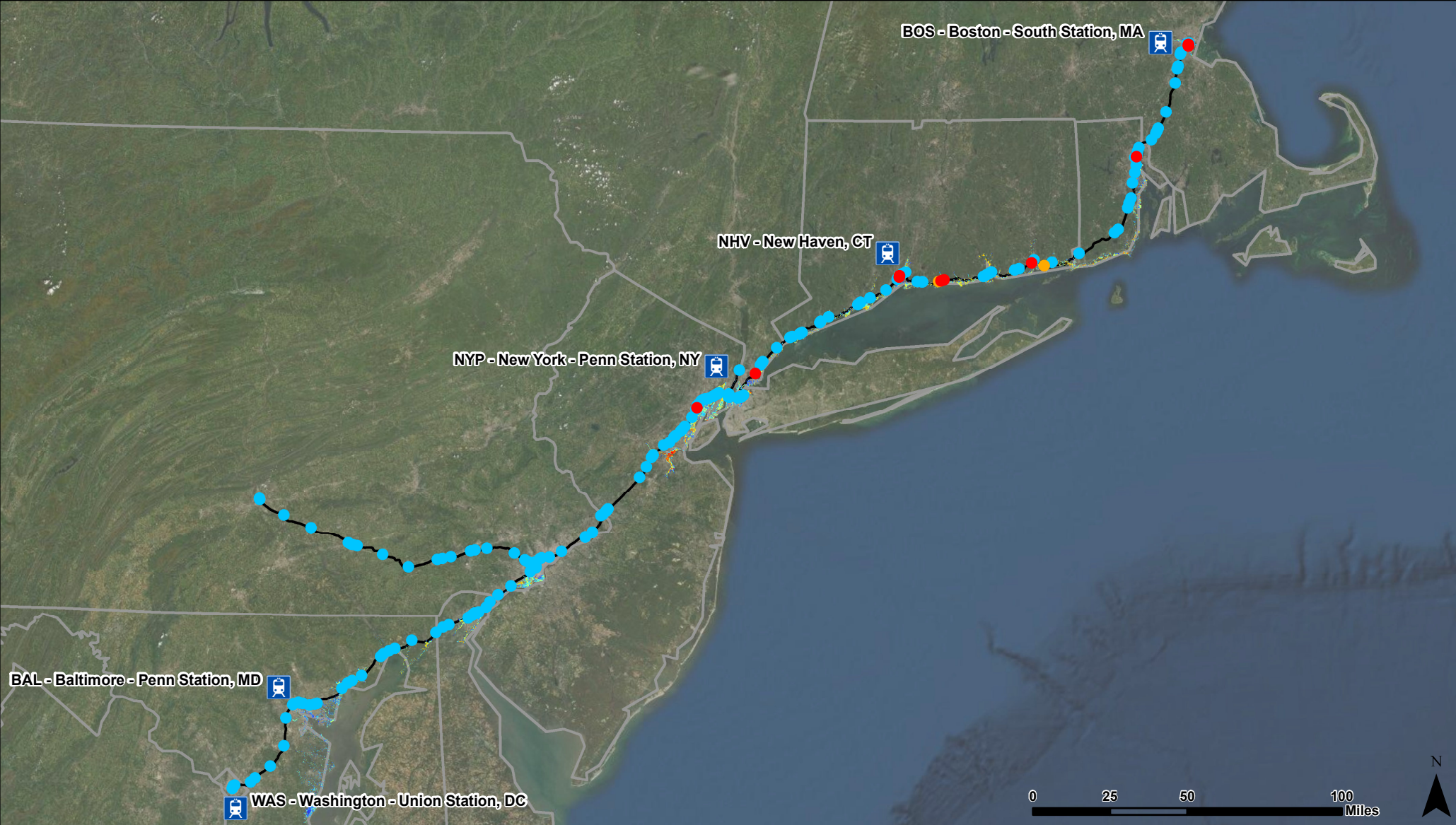
Amtrak Line

Sea Level Rise with Surge Depth



Maximum Depth: 15.3 feet





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Projected Sea Level Rise with Surge
 High Emissions (RCP 8.5)
 Year 2050



Interlockings Vulnerability Score

- 0
- 1
- 2
- 3
- 4



Stations



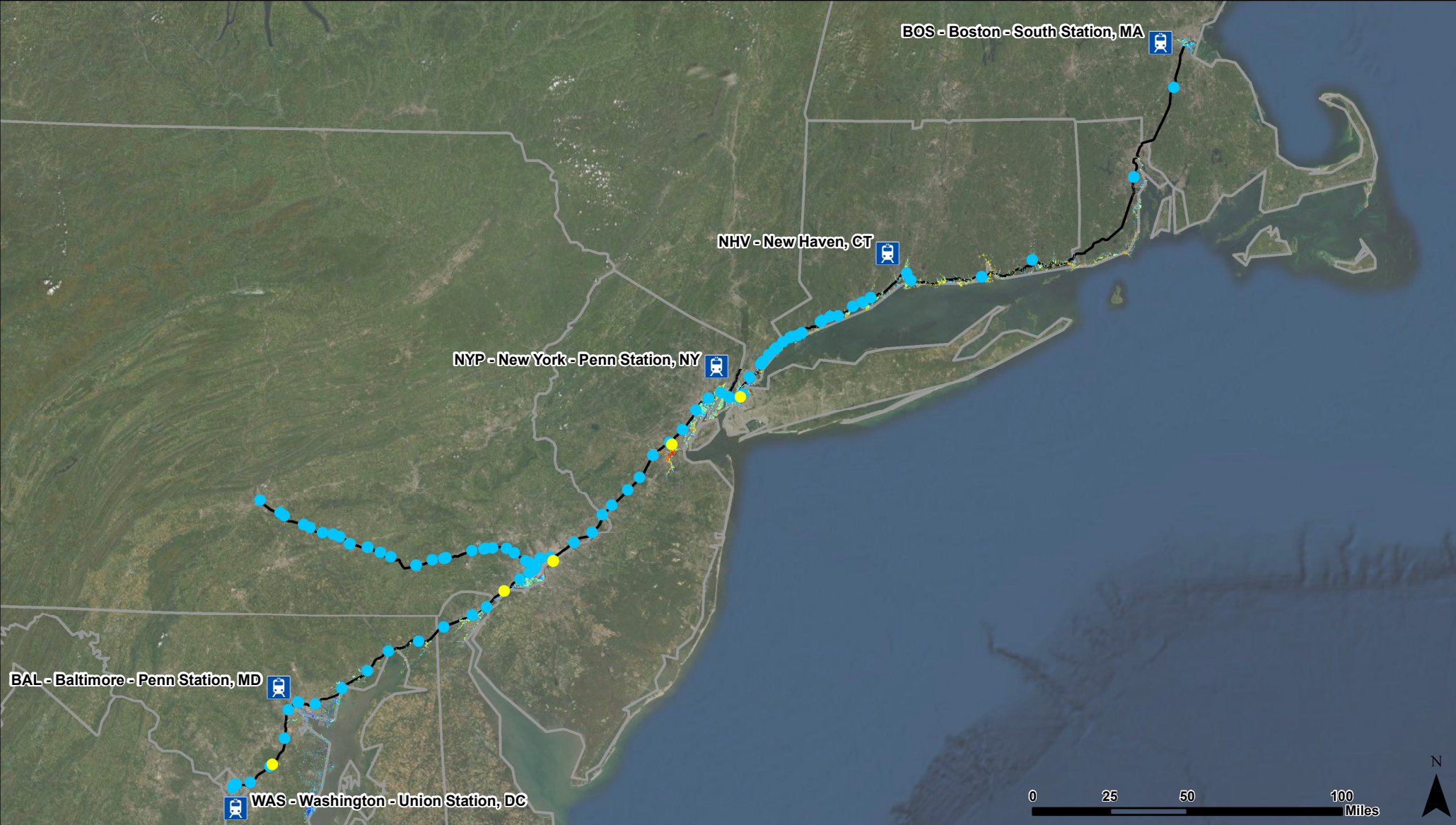
Amtrak Line

Sea Level Rise with Surge Depth



Maximum Depth: 15.3 feet





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Projected Sea Level Rise with Surge
 High Emissions (RCP 8.5)
 Year 2050



Substations Vulnerability Score

- 0
- 1
- 2
- 3
- 4



Stations



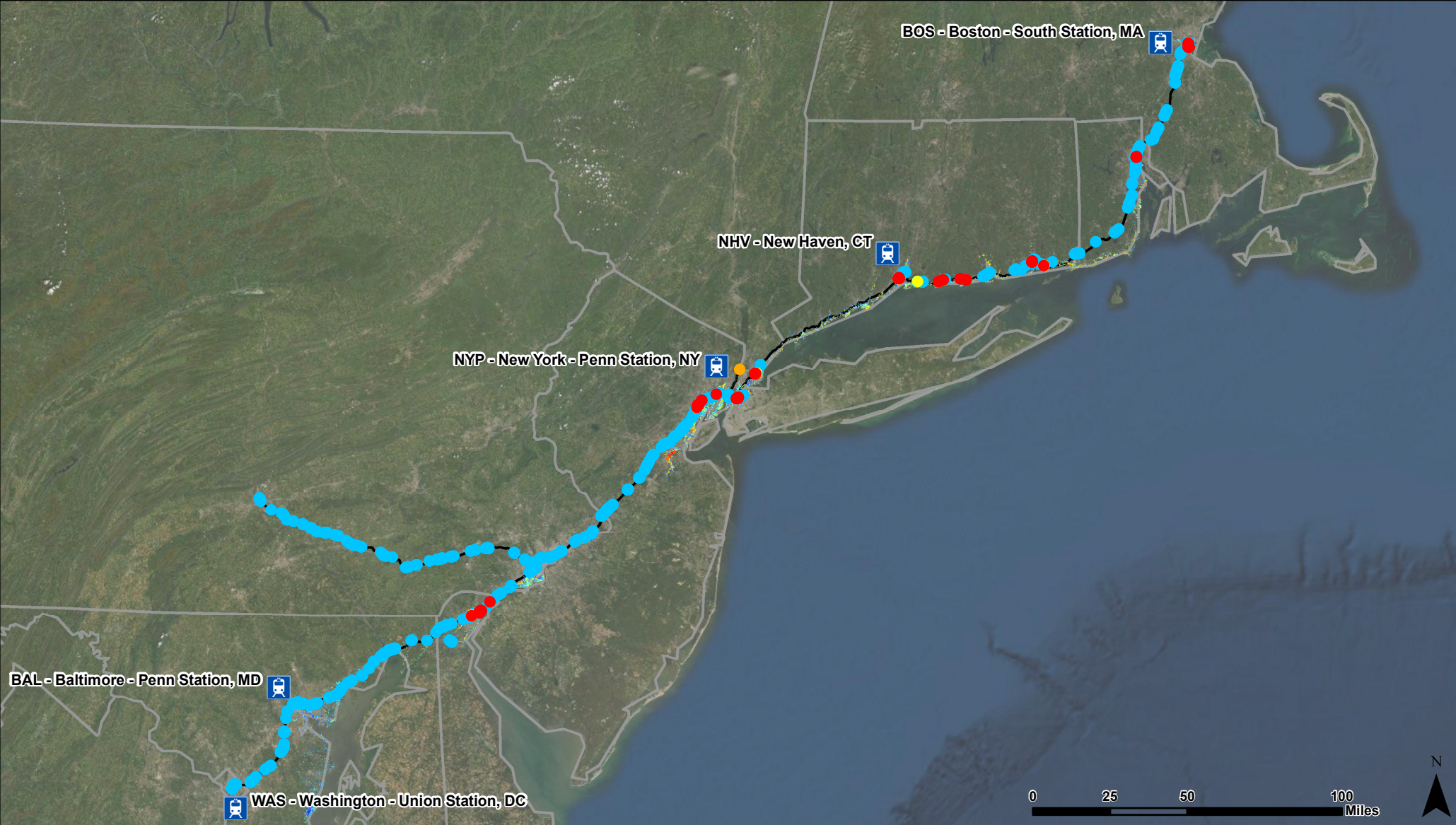
Amtrak Line

Sea Level Rise with Surge Depth



Maximum Depth: 15.3 feet





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Projected Sea Level Rise with Surge
 High Emissions (RCP 8.5)
 Year 2050



Switch Machines Vulnerability Score

- 0
- 1
- 2
- 3
- 4



Stations

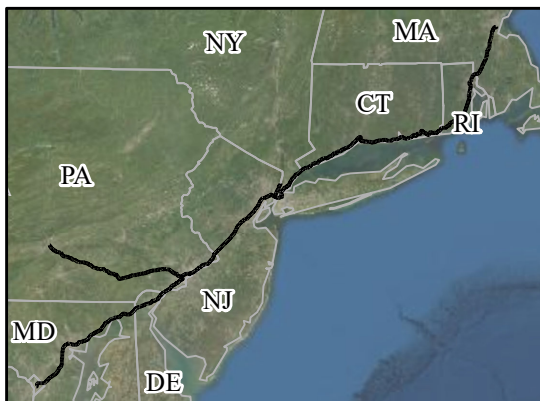


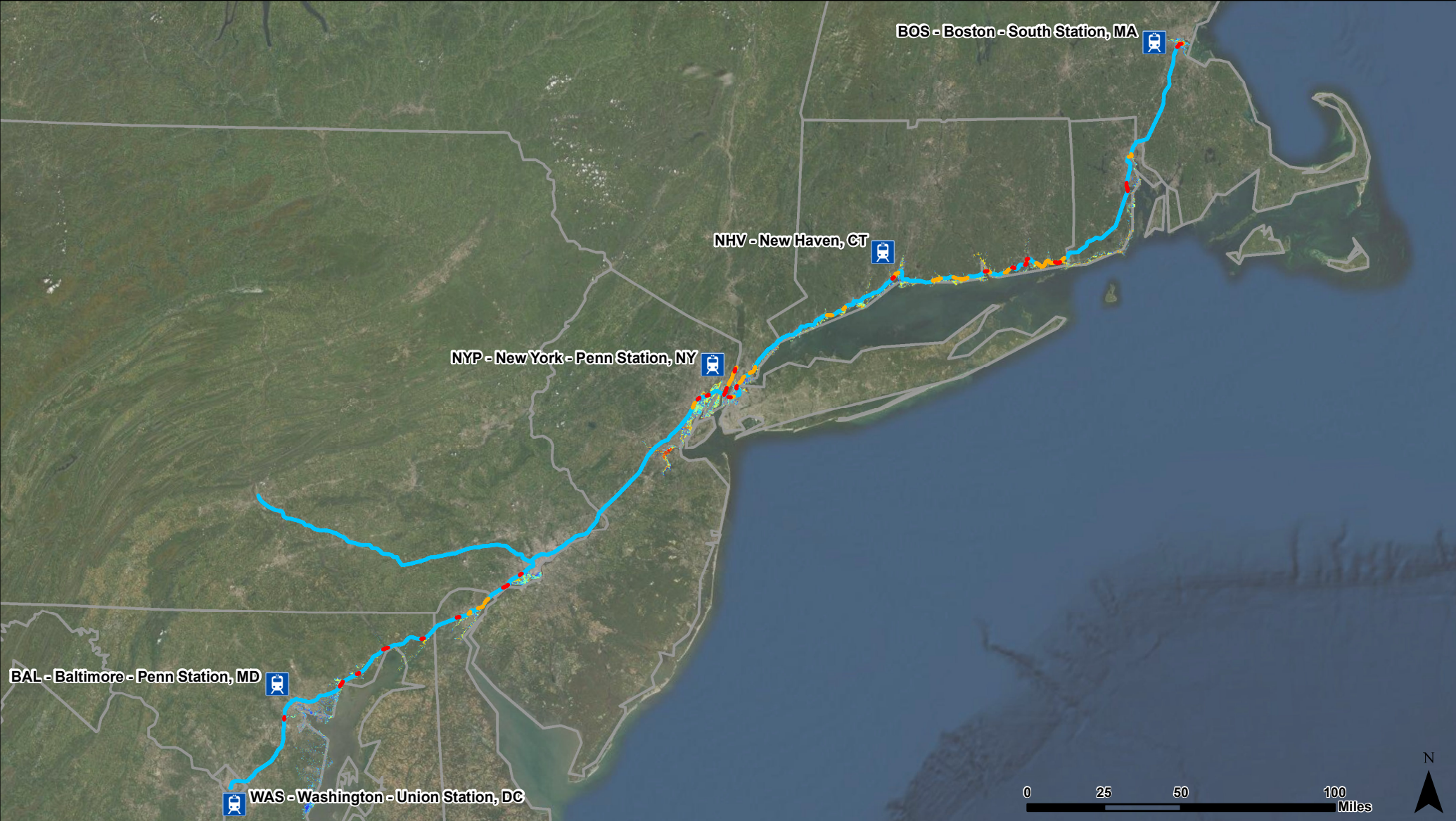
Amtrak Line

Sea Level Rise with Surge Depth



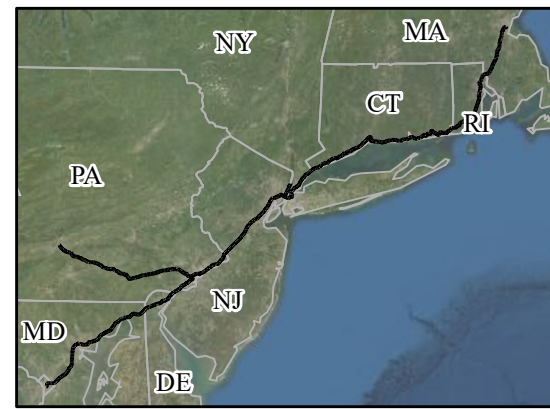
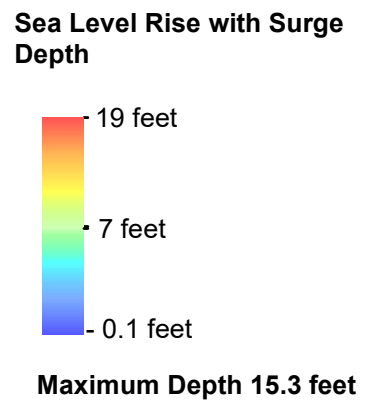
Maximum Depth: 15.3 feet

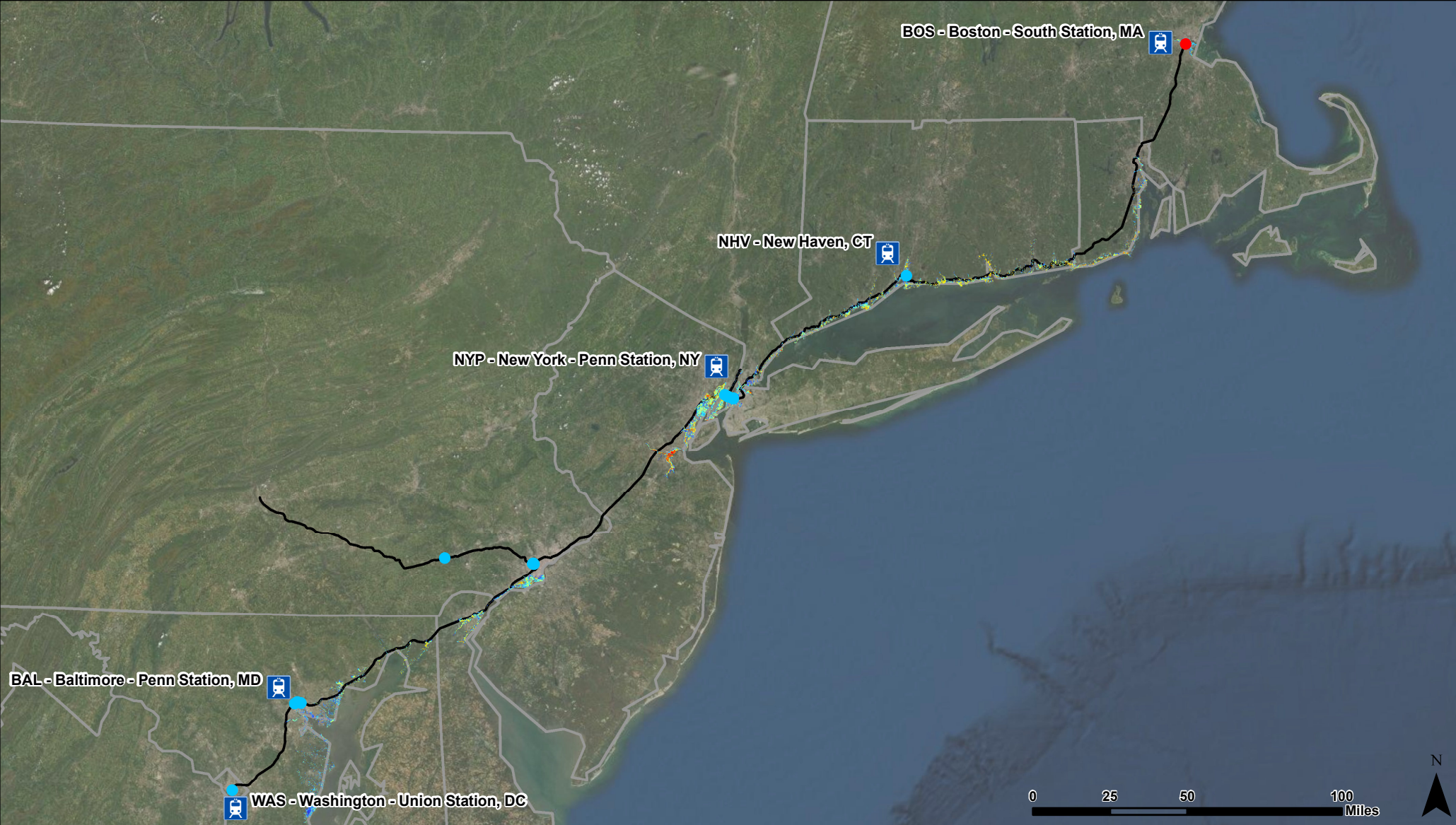




Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Projected Sea Level Rise with Surge
 High Emissions (RCP 8.5)
 Year 2050





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Projected Sea Level Rise with Surge
 High Emissions (RCP 8.5)
 Year 2050



Tunnels Vulnerability Score

- 0
- 1
- 2
- 3
- 4

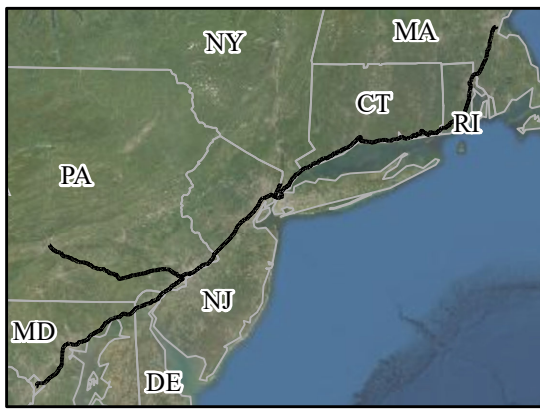
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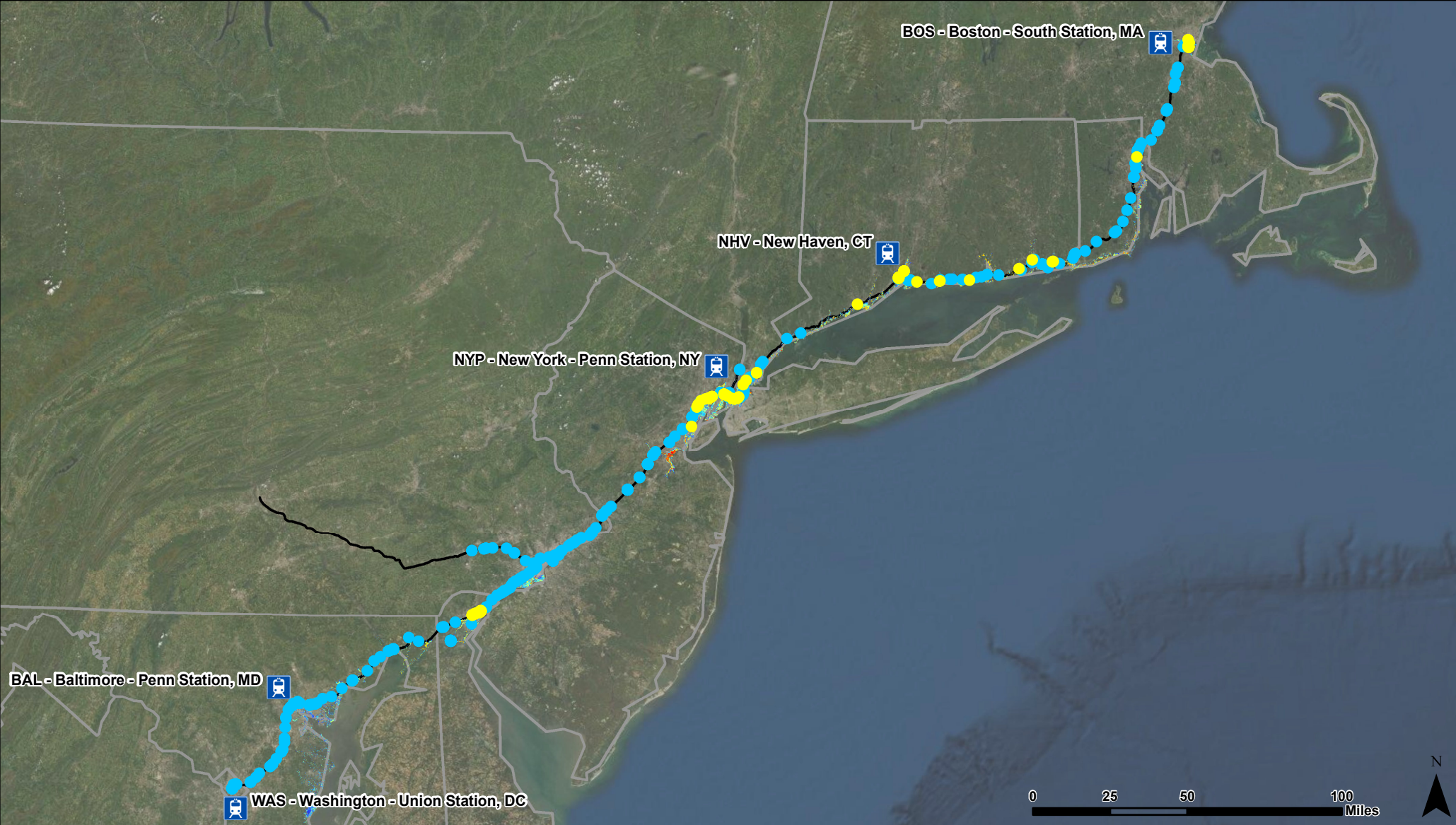
Amtrak Line

Sea Level Rise with Surge Depth

19 feet
7 feet
0.1 feet

Maximum Depth: 15.3 feet





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Projected Sea Level Rise with Surge
 High Emissions (RCP 8.5)
 Year 2100



Buildings Vulnerability Score

- 0
- 1
- 2
- 3
- 4



Stations

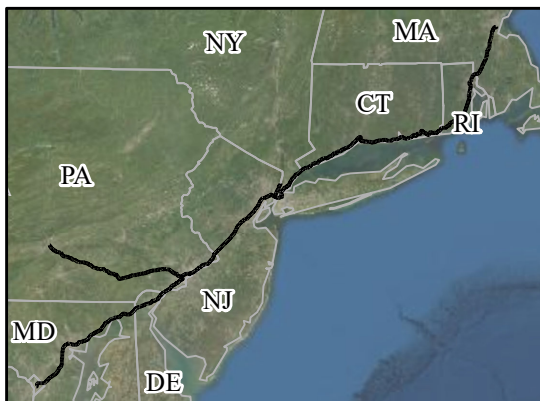


Amtrak Line

Sea Level Rise with Surge Depth



Maximum Depth: 19 feet





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Projected Sea Level Rise with Surge
 High Emissions (RCP 8.5)
 Year 2100



Catenary Vulnerability Score

- 0
- 1
- 2
- 3
- 4



Stations

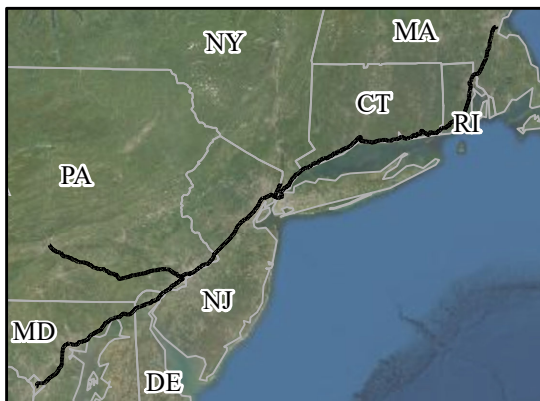


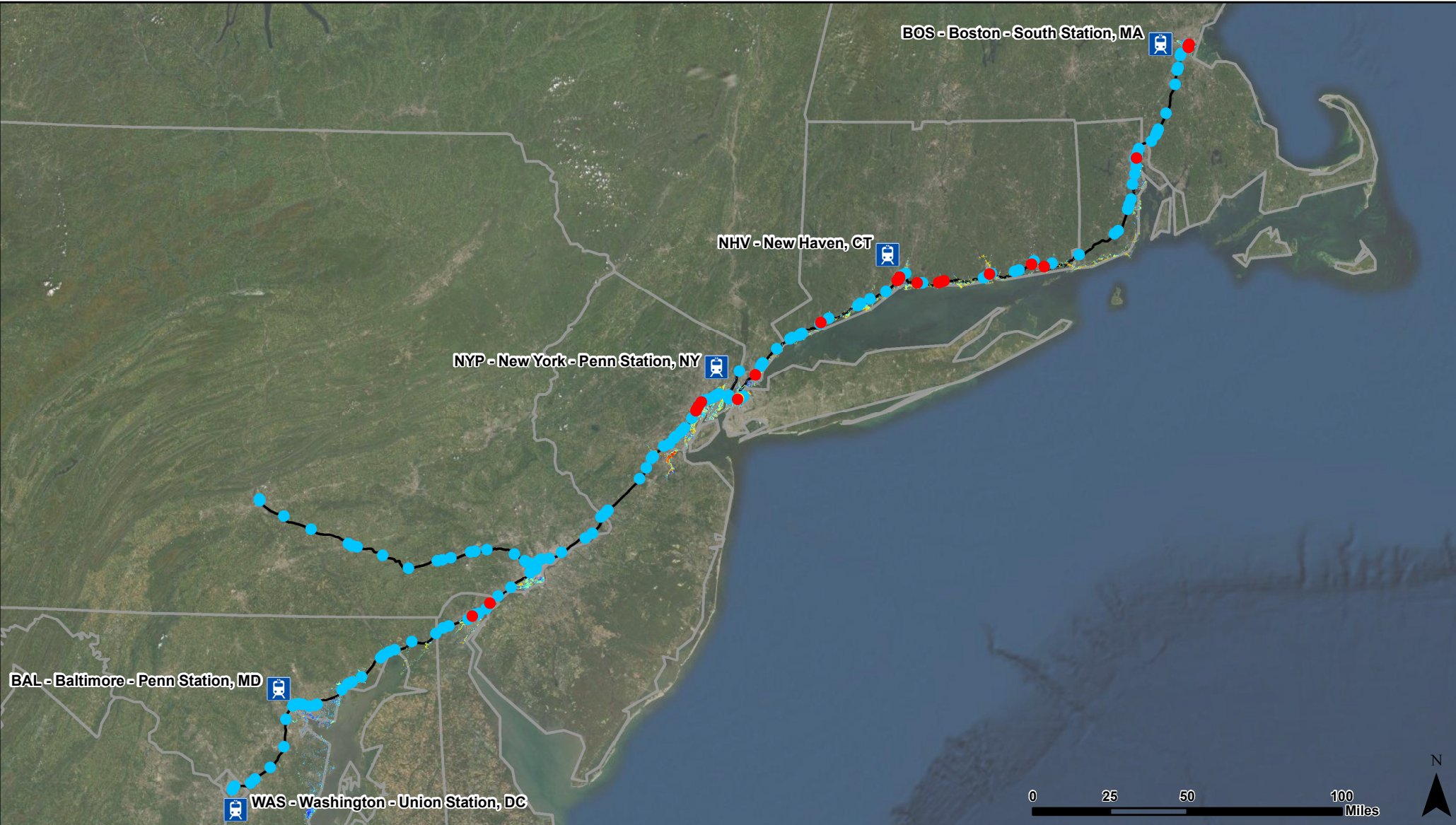
Amtrak Line

Sea Level Rise with Surge Depth



Maximum Depth: 19 feet





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Projected Sea Level Rise with Surge
 High Emissions (RCP 8.5)
 Year 2100



Interlockings Vulnerability Score

- 0
- 1
- 2
- 3
- 4



Stations

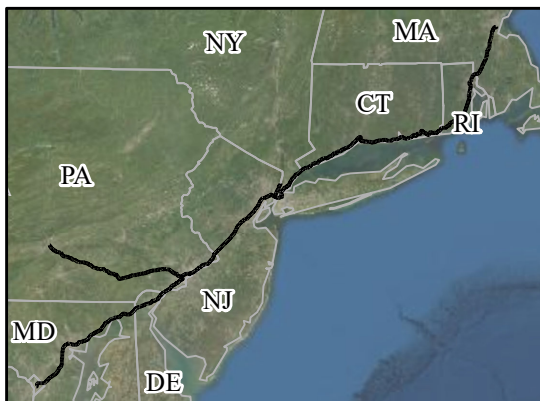


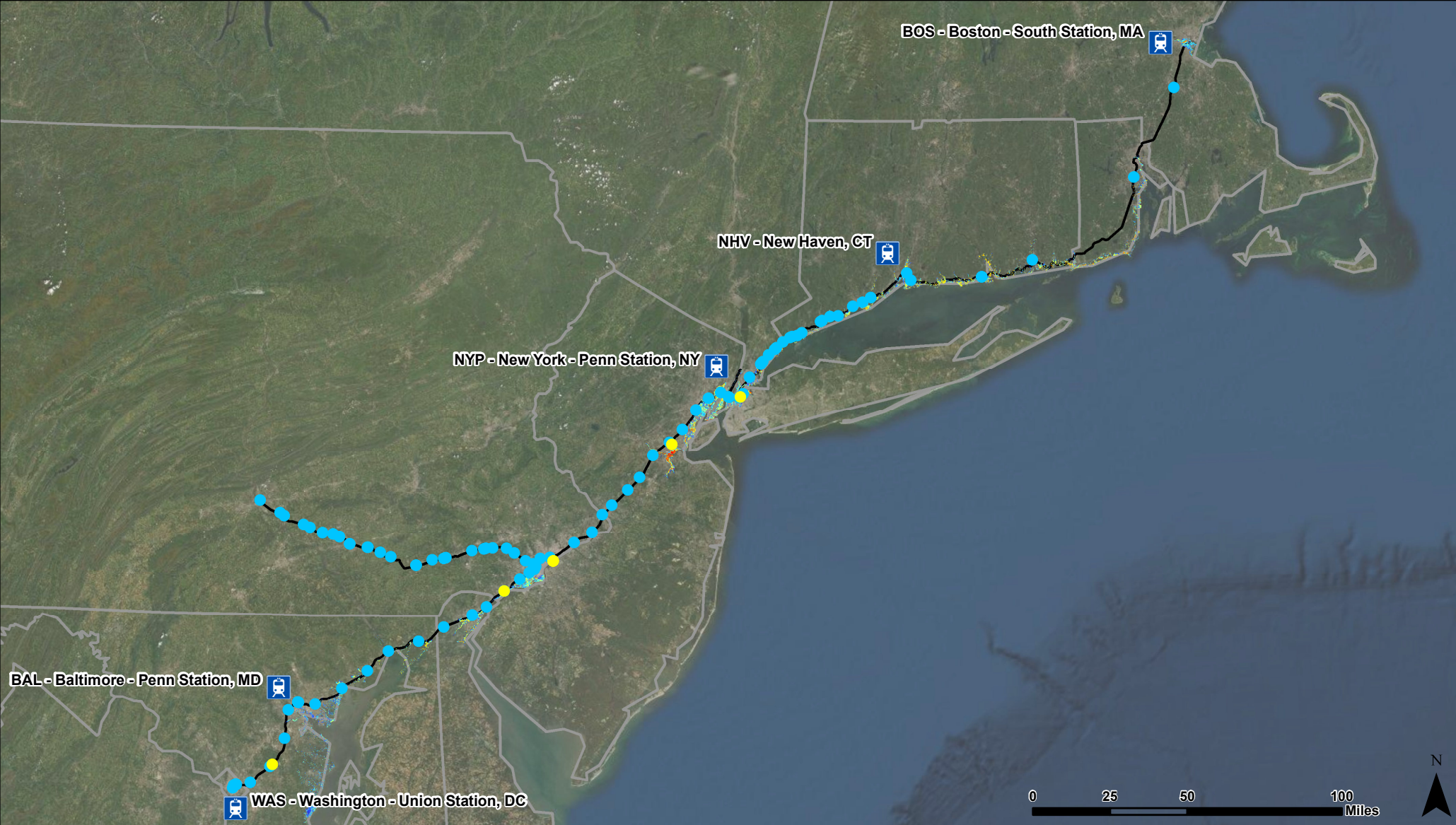
Amtrak Line

Sea Level Rise with Surge Depth



Maximum Depth: 19 feet





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Projected Sea Level Rise with Surge
 High Emissions (RCP 8.5)
 Year 2100



Substations Vulnerability Score

- 0
- 1
- 2
- 3
- 4



Stations

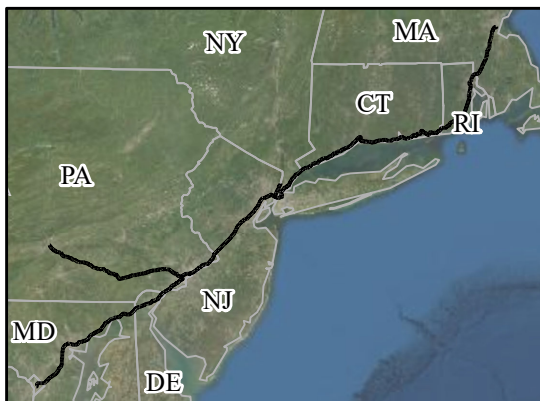


Amtrak Line

Sea Level Rise with Surge Depth



Maximum Depth: 19 feet





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Projected Sea Level Rise with Surge
 High Emissions (RCP 8.5)
 Year 2100



Switch Machines Vulnerability Score

- 0
- 1
- 2
- 3
- 4



Stations



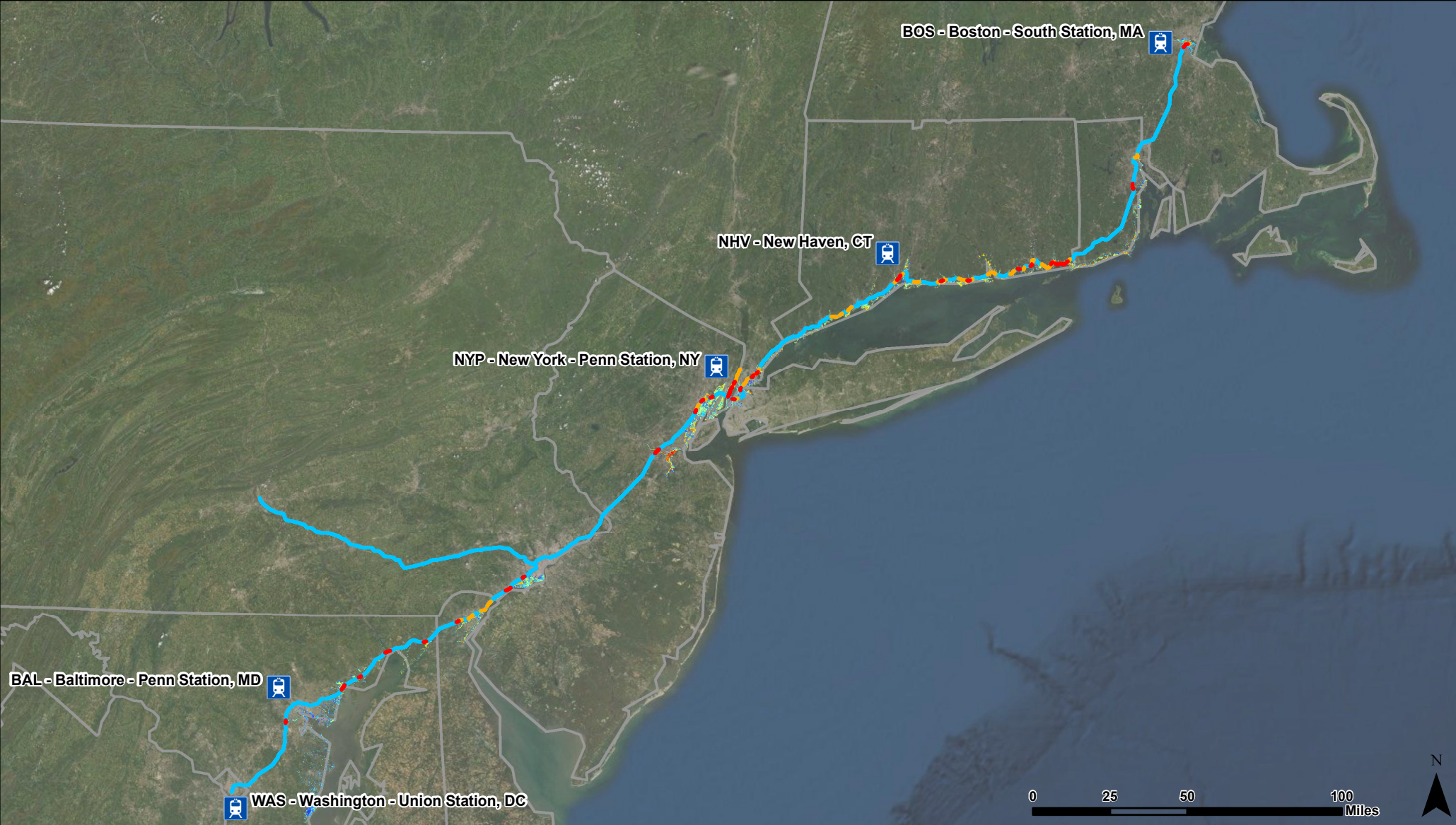
Amtrak Line

Sea Level Rise with Surge Depth



Maximum Depth: 19 feet





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Projected Sea Level Rise with Surge
 High Emissions (RCP 8.5)
 Year 2100



Track Vulnerability Score

- 0
- 1
- 2
- 3
- 4

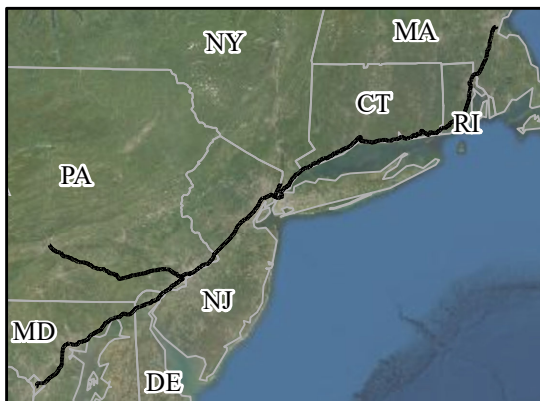
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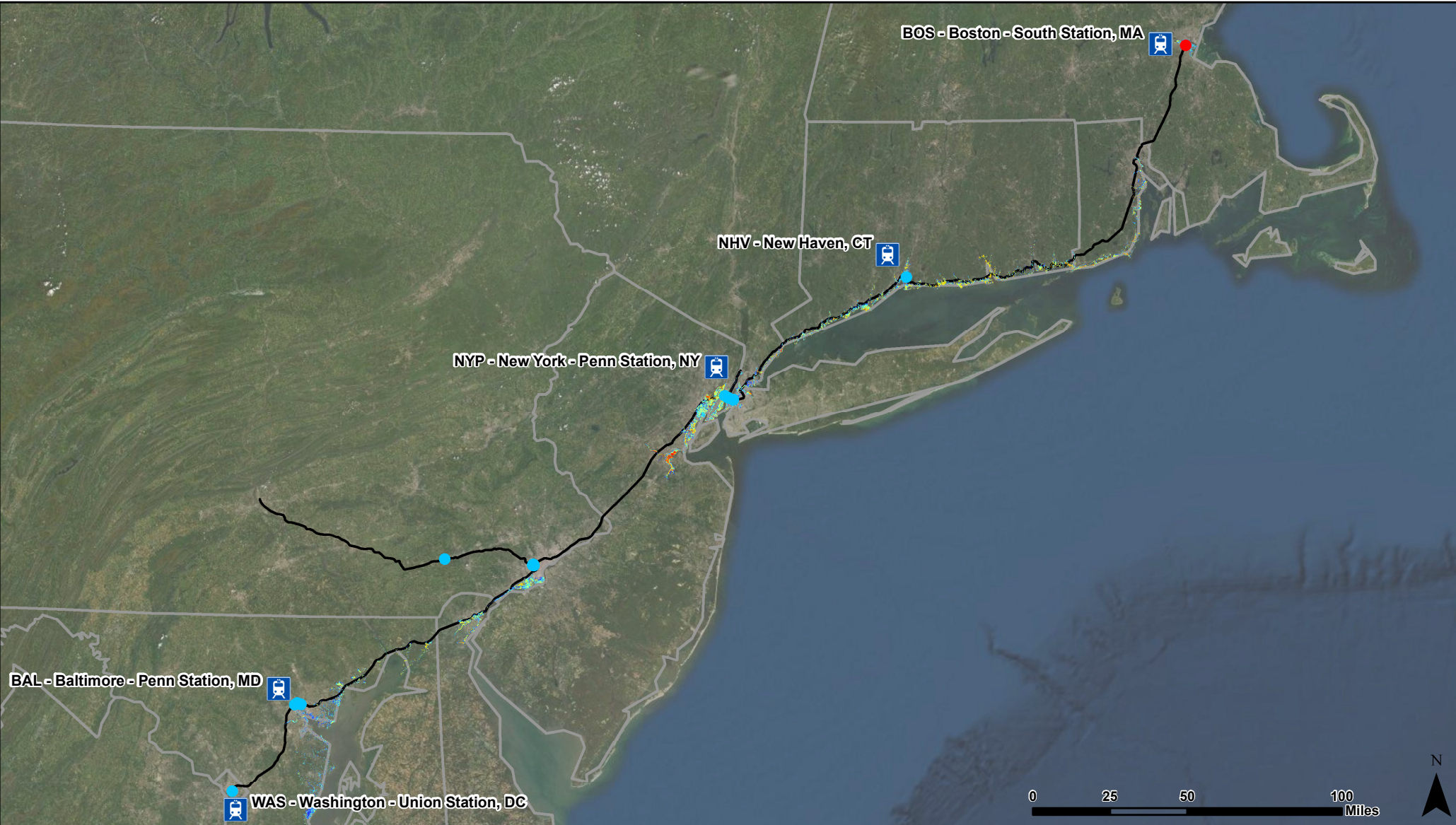
Amtrak Line

Sea Level Rise with Surge Depth



Maximum Depth: 19 feet





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 Projected Sea Level Rise with Surge
 High Emissions (RCP 8.5)
 Year 2100



Tunnels Vulnerability Score

- 0
- 1
- 2
- 3
- 4



Stations

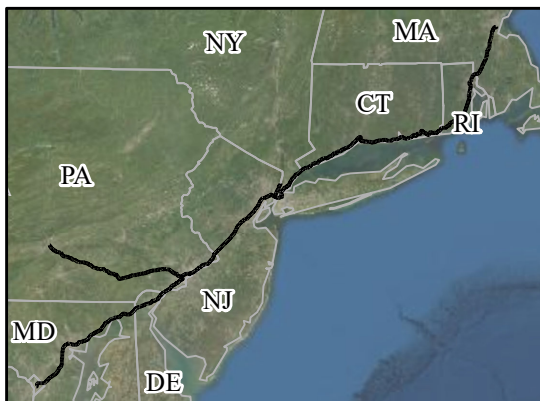


Amtrak Line

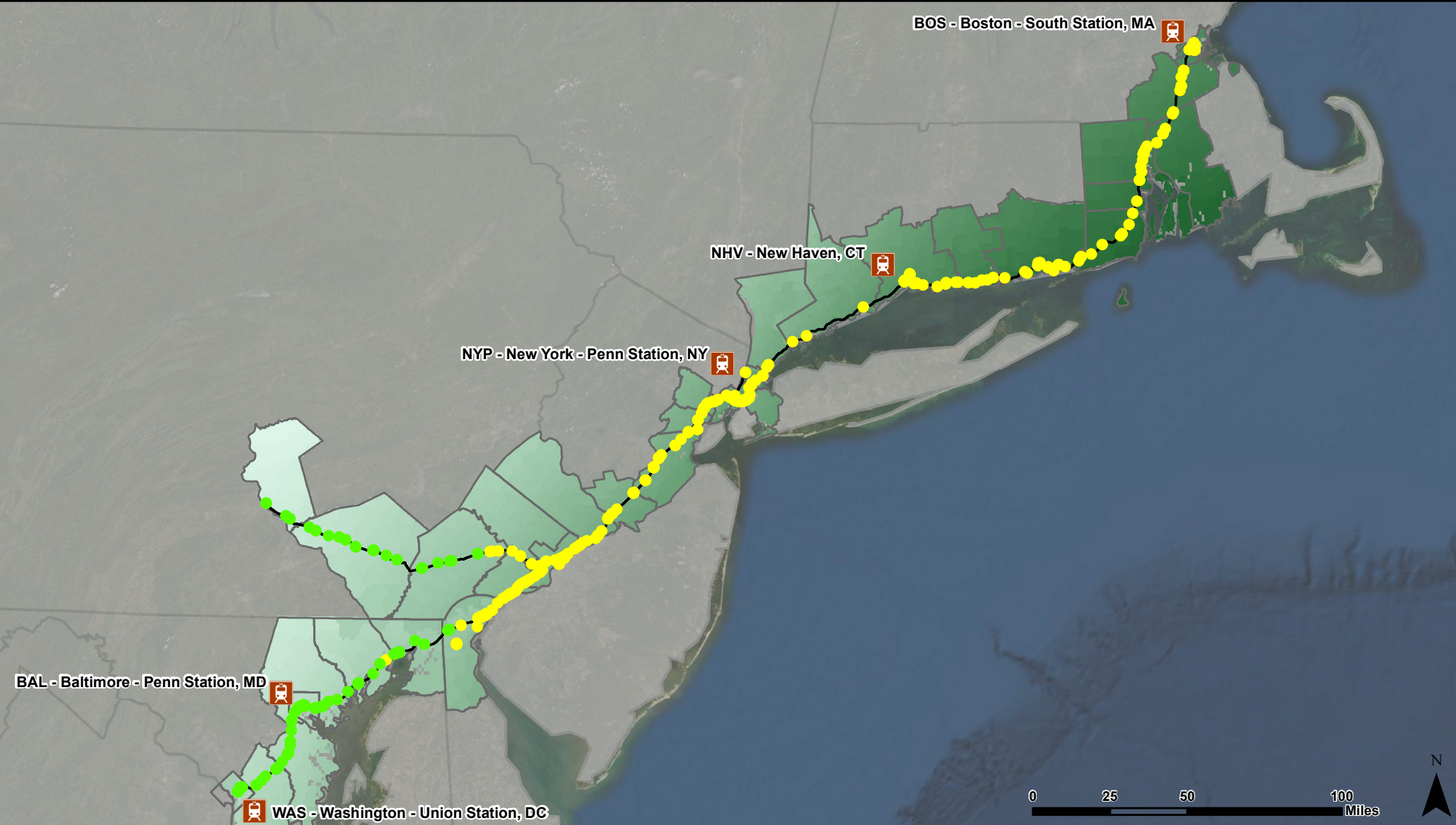
Sea Level Rise with Surge Depth



Maximum Depth: 19 feet



Wind Maps



Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 100 Year Peak Gust Wind Event
 Moderate Emissions (RCP 4.5)
 Year 2050



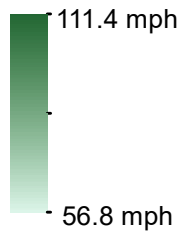
Buildings Vulnerability Score

- 0
- 1
- 2
- 3
- 4

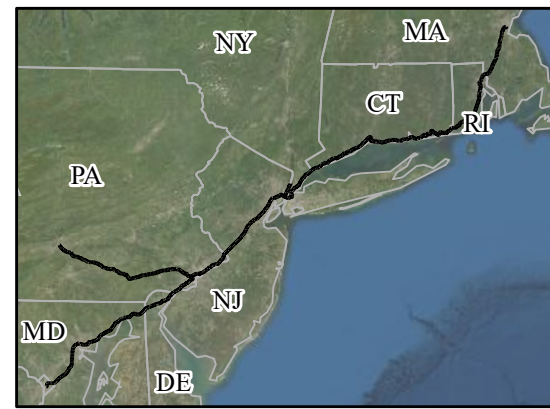
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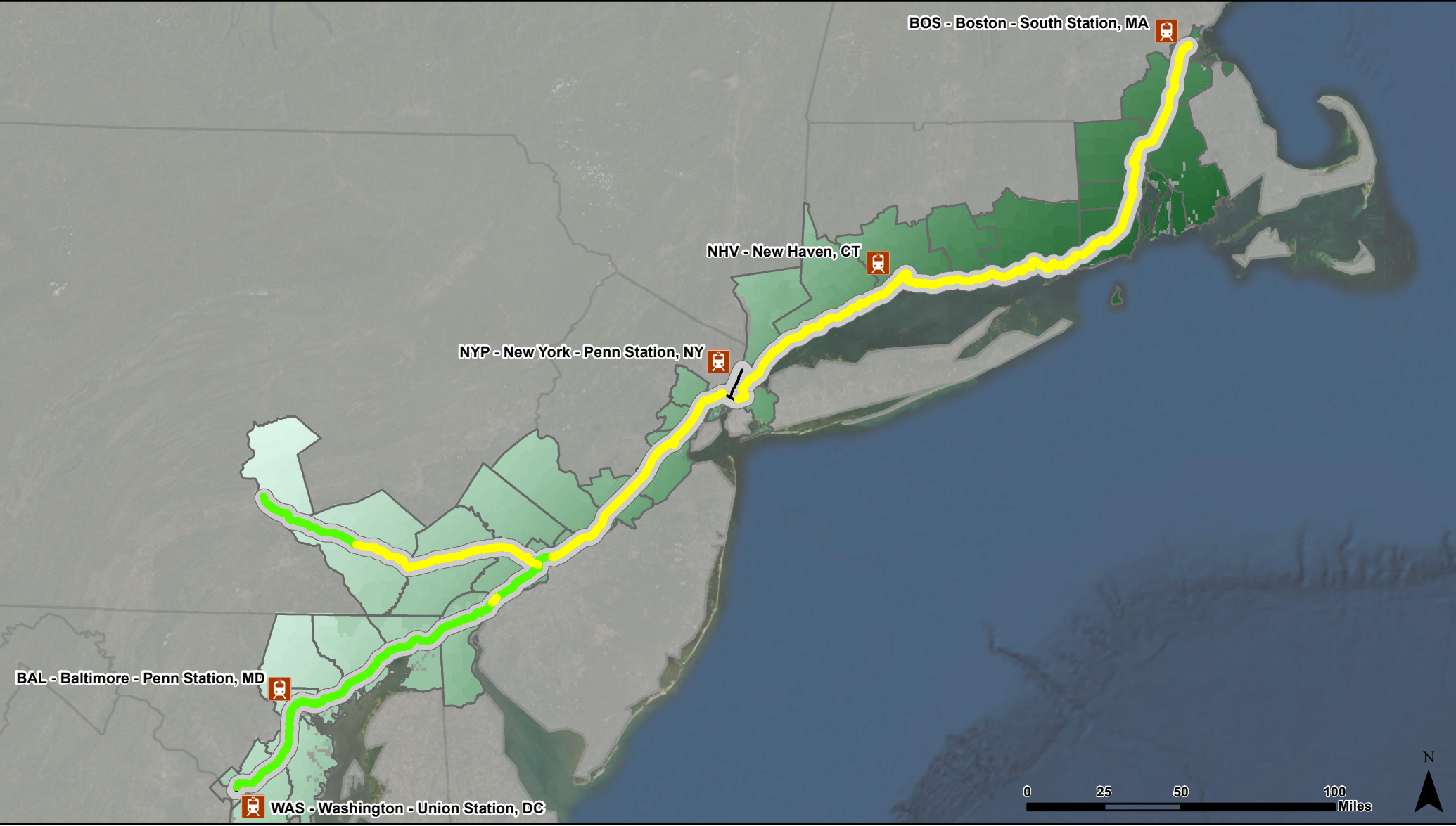
Amtrak Line

Climate Adjusted 100-year Return Period Peak Wind Gust



Maximum Value: 109.6 mph





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 100 Year Peak Gust Wind Event
 Moderate Emissions (RCP 4.5)
 Year 2050



Catenary Vulnerability Score

- 0
- 1
- 2
- 3
- 4

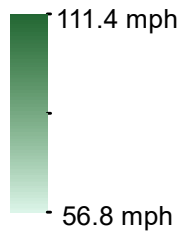


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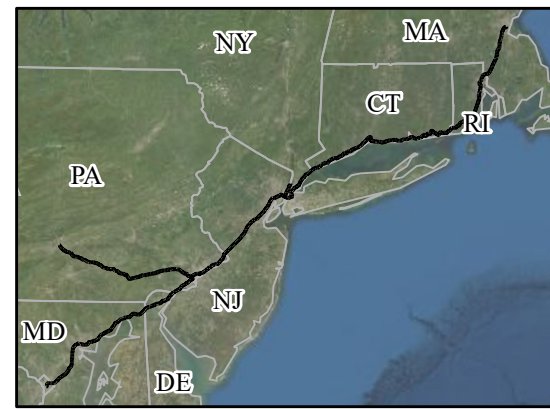


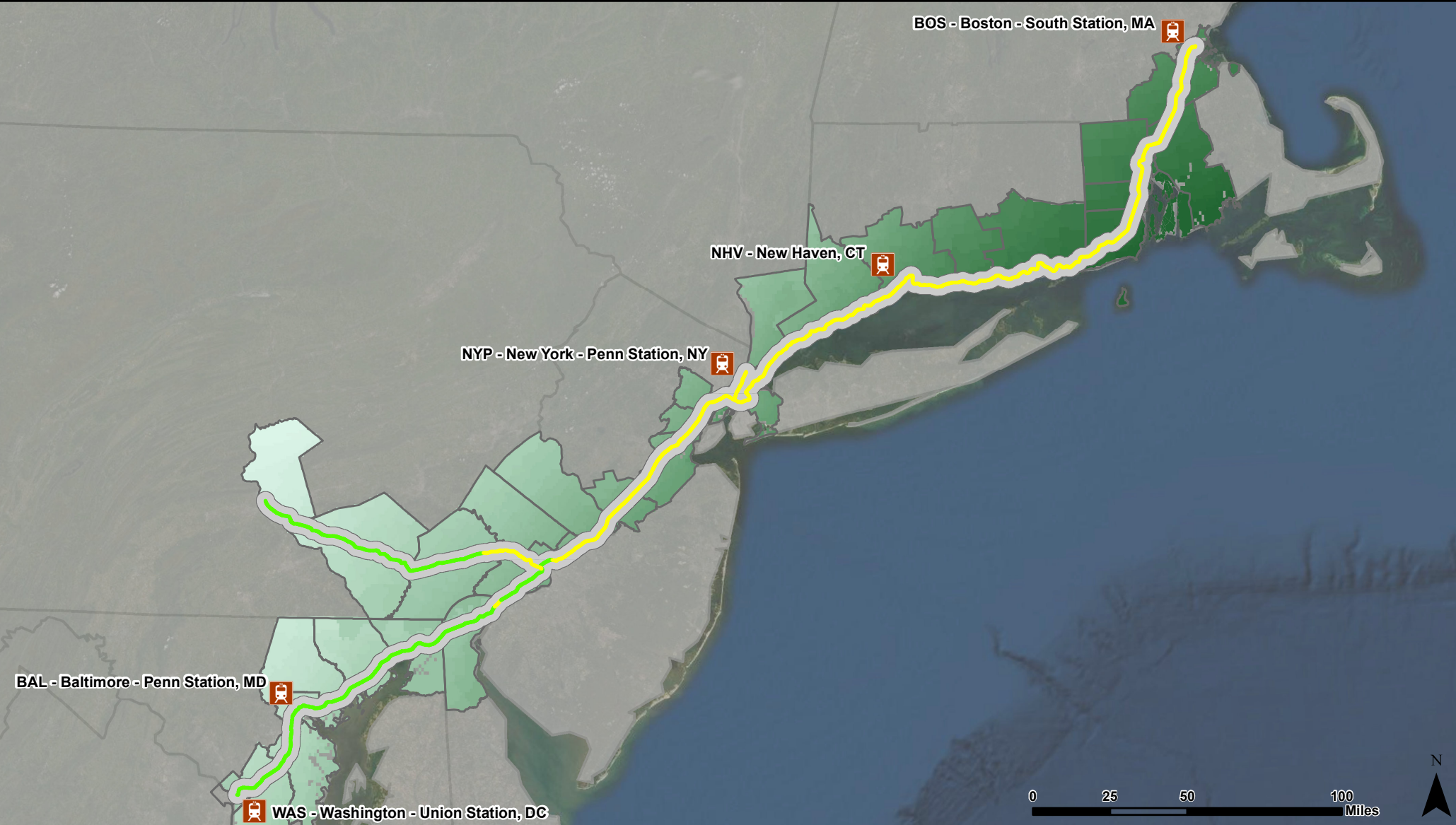
Amtrak Line

Climate Adjusted 100-year Return Period Peak Wind Gust



Maximum Value: 109.6 mph





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 100 Year Peak Gust Wind Event
 Moderate Emissions (RCP 4.5)
 Year 2050



Track Vulnerability Score

- 0
- 1
- 2
- 3
- 4

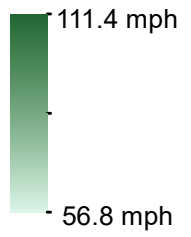


Stations

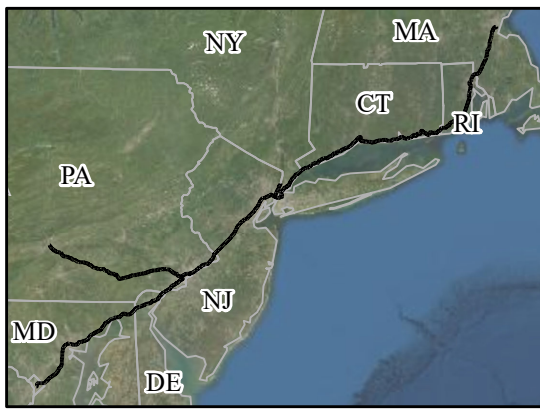


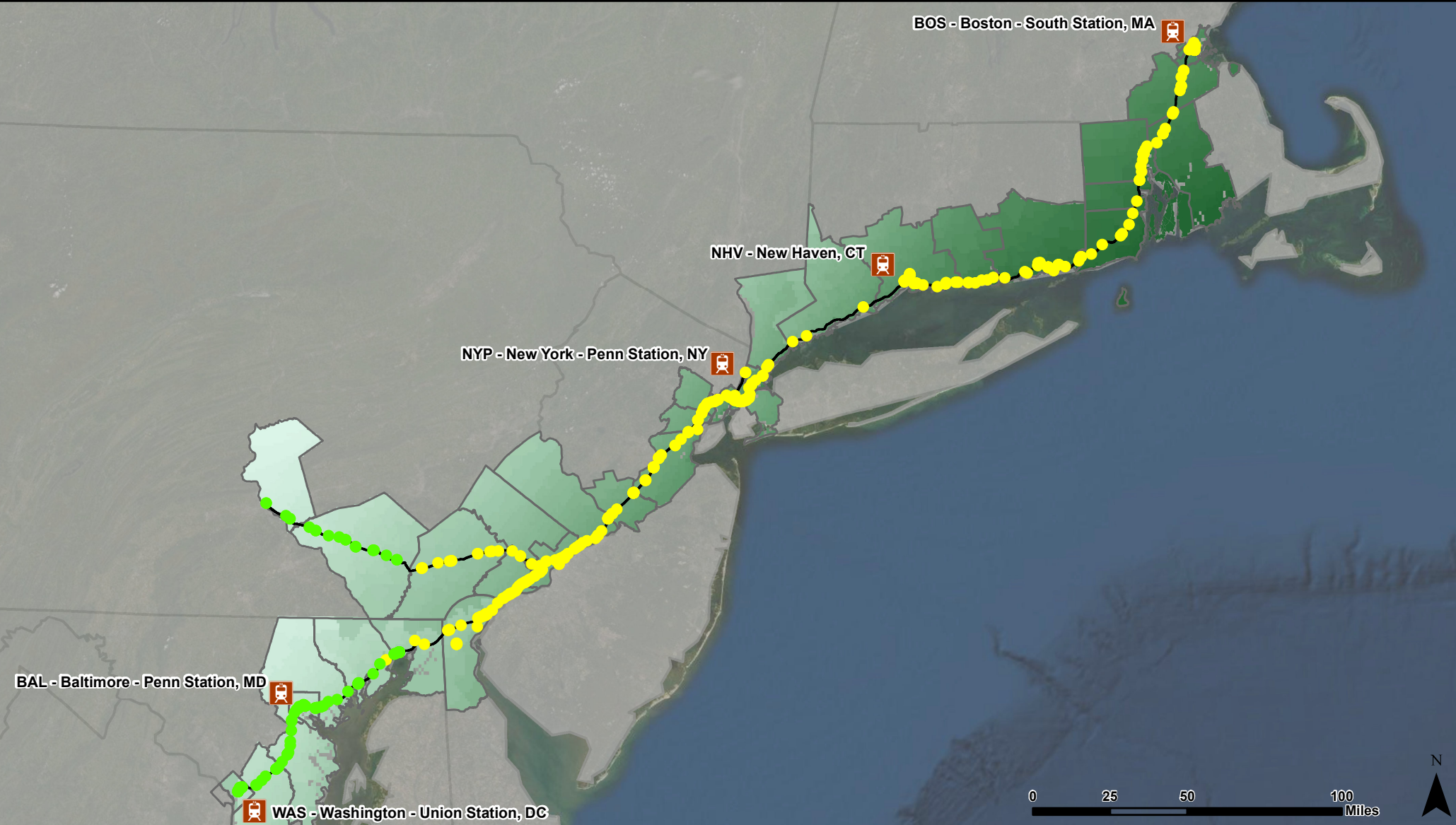
Amtrak Line

Climate Adjusted 100-year Return Period Peak Wind Gust



Maximum Value: 109.6 mph





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 100 Year Peak Gust Wind Event
 Moderate Emissions (RCP 4.5)
 Year 2100



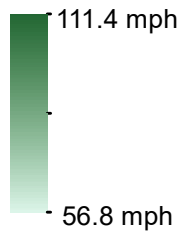
Buildings Vulnerability Score

- 0
- 1
- 2
- 3
- 4

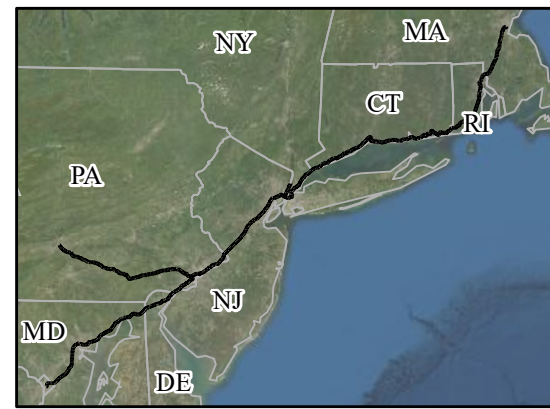
Stations

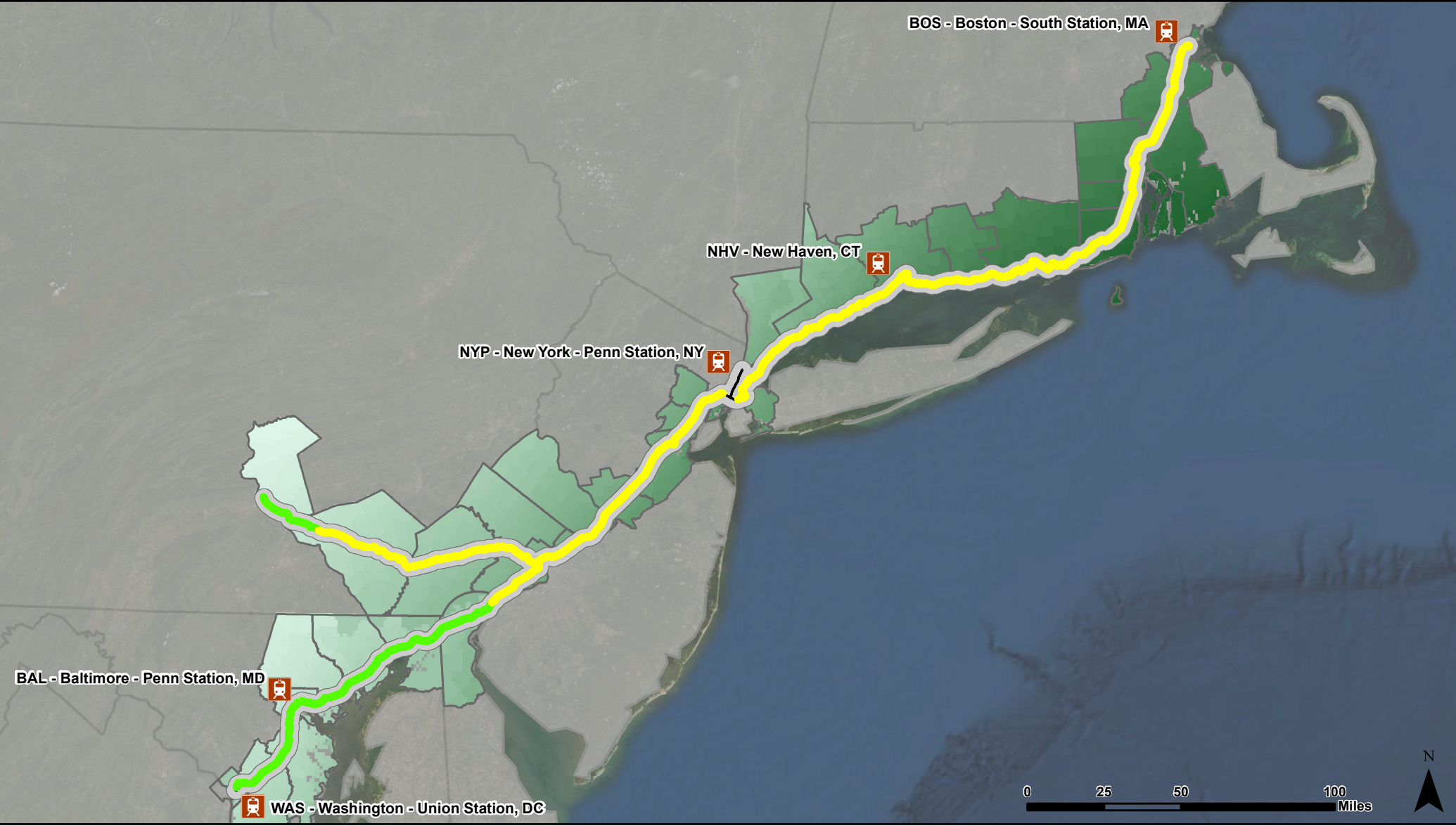
Amtrak Line

Climate Adjusted 100-year Return Period Peak Wind Gust



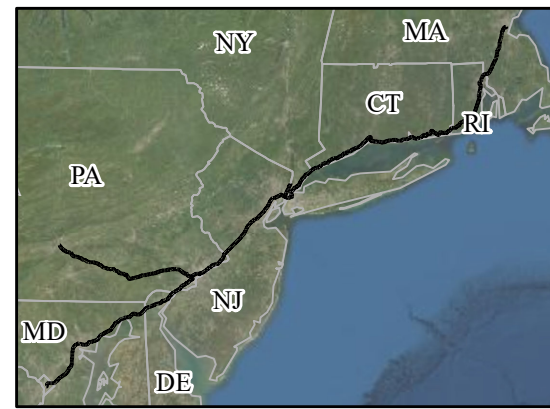
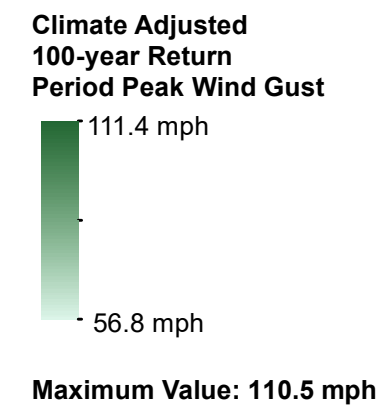
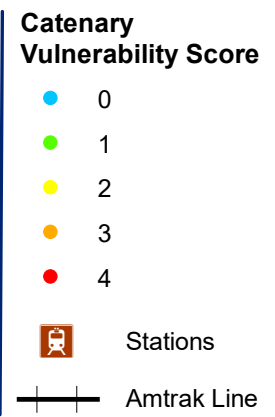
Maximum Value: 110.5 mph

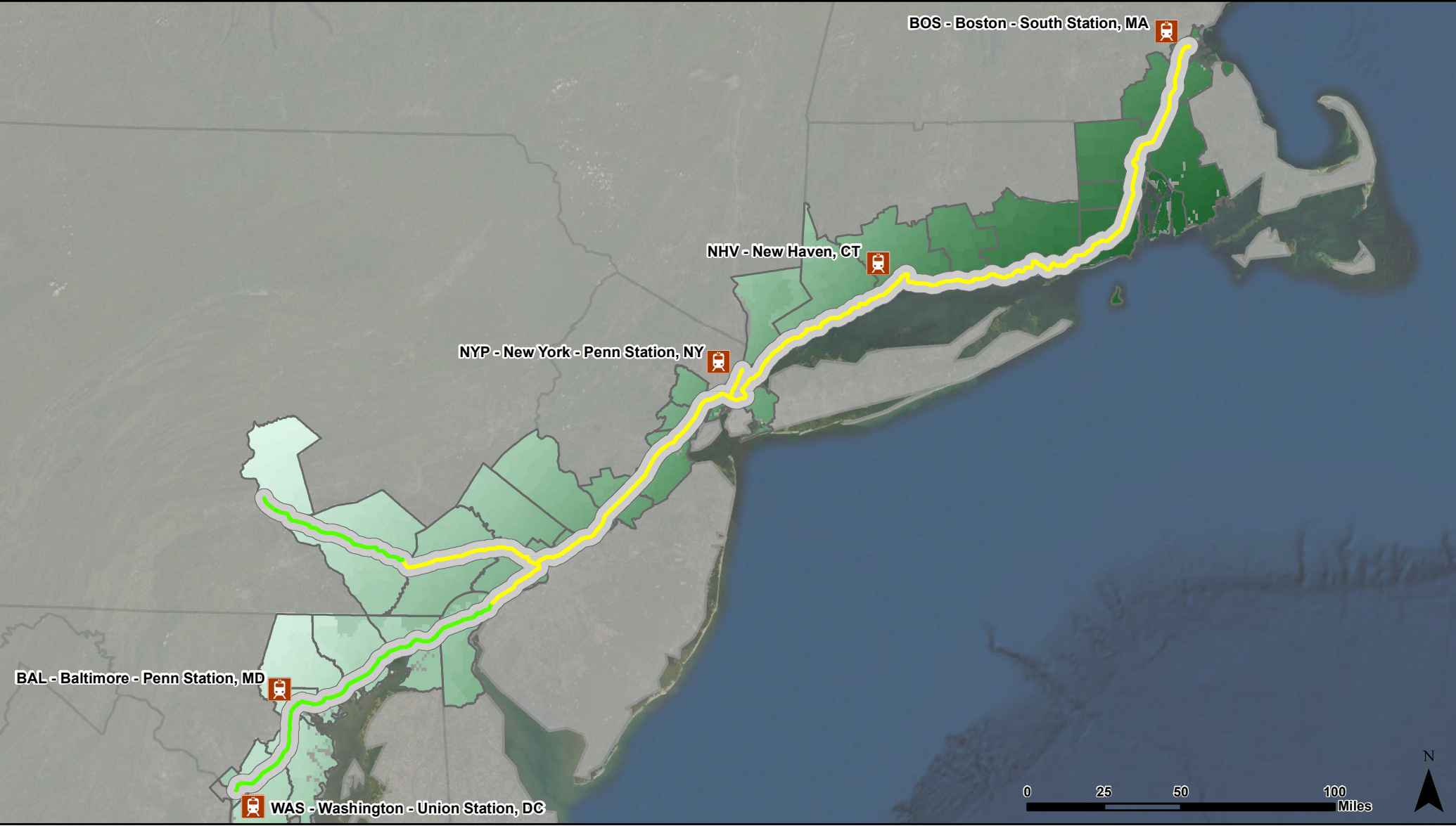




Amtrak Climate Change Vulnerability Assessment

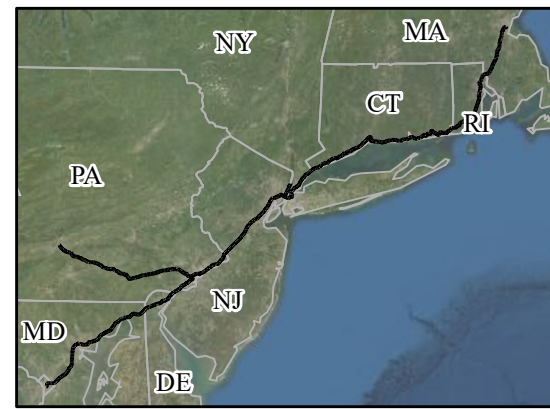
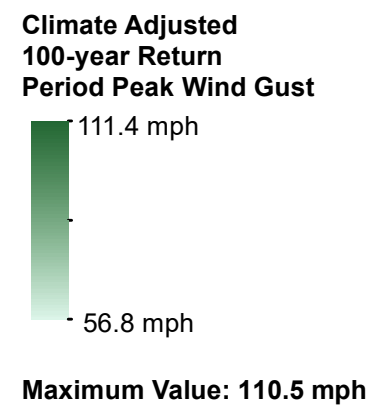
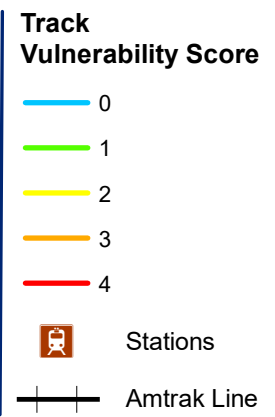
Northeast Corridor (NEC) Study
 100 Year Peak Gust Wind Event
 Moderate Emissions (RCP 4.5)
 Year 2100

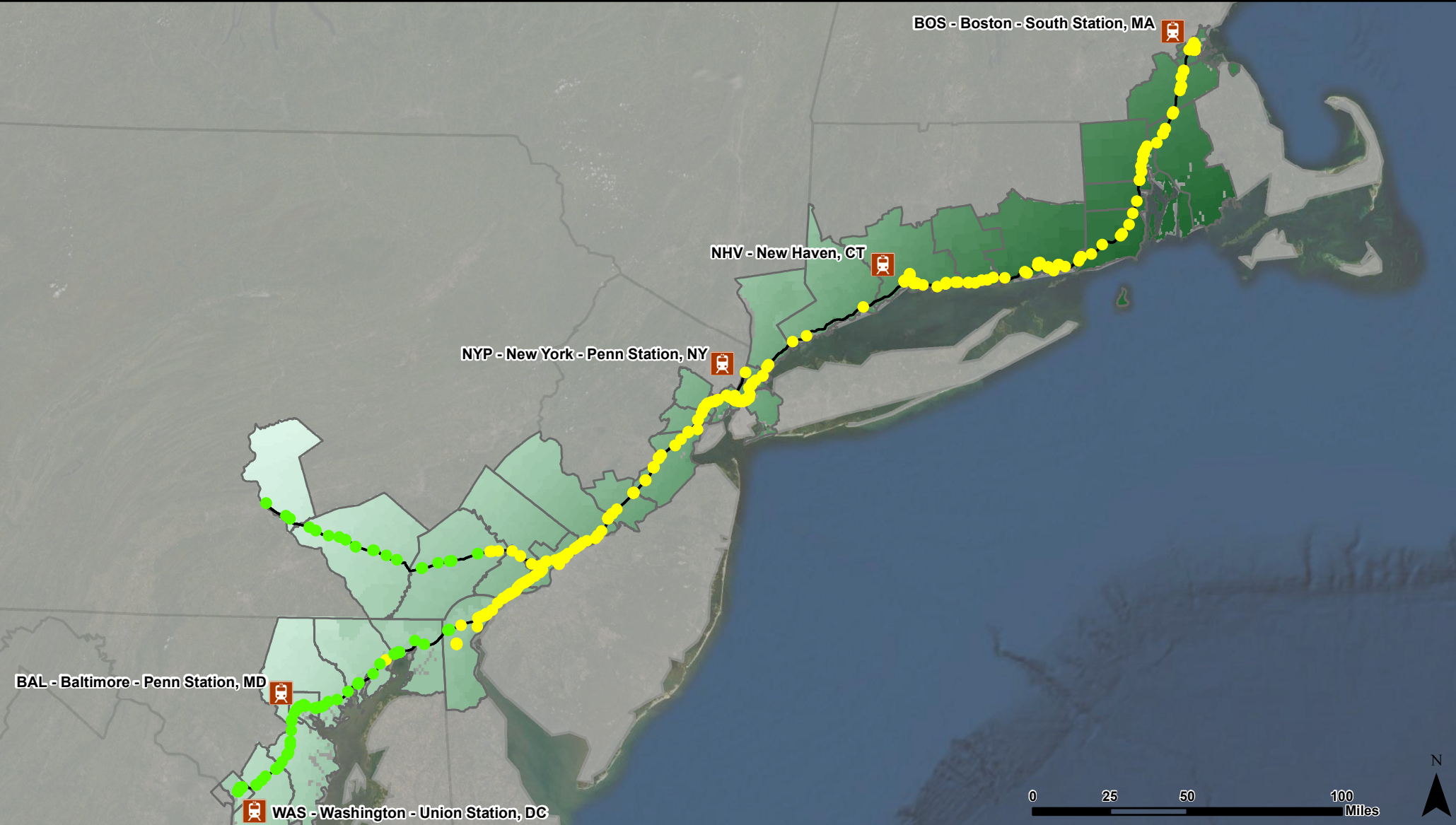




Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 100 Year Peak Gust Wind Event
 Moderate Emissions (RCP 4.5)
 Year 2100





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 100 Year Peak Gust Wind Event
 High Emissions (RCP 8.5)
 Year 2050



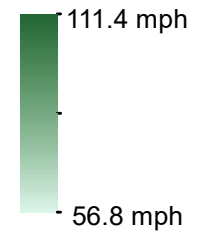
Buildings Vulnerability Score

- 0
- 1
- 2
- 3
- 4

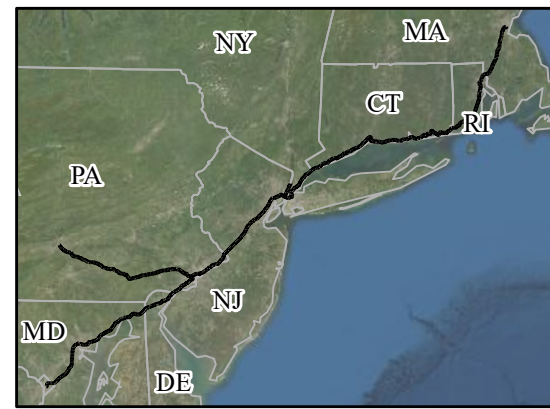
Stations

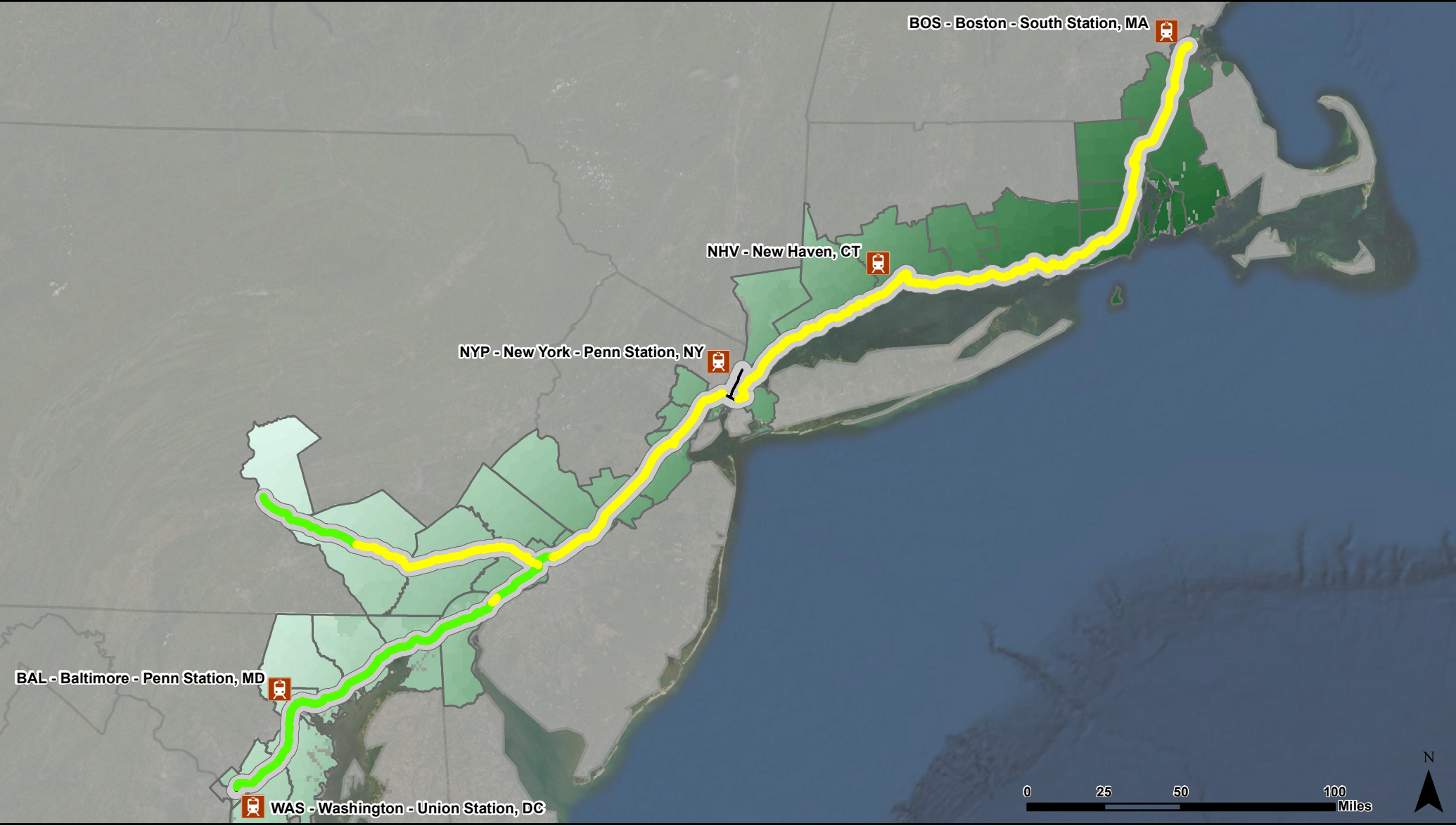
Amtrak Line

Climate Adjusted 100-Year Return Period Peak Wind Gust



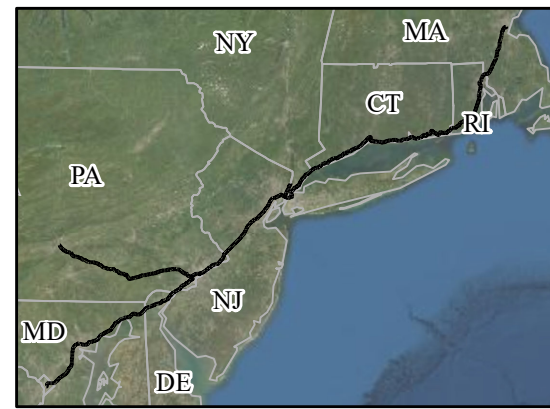
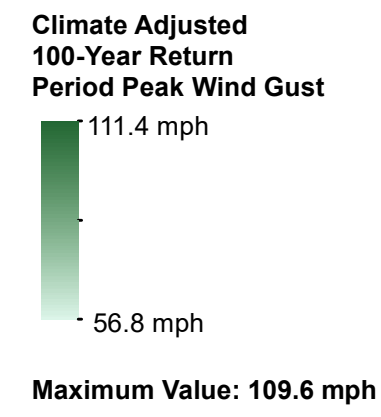
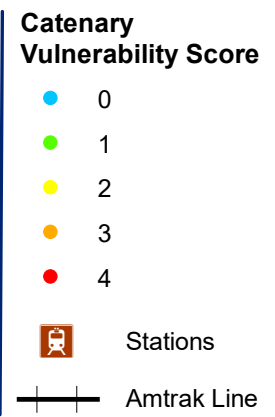
Maximum Value: 109.6 mph

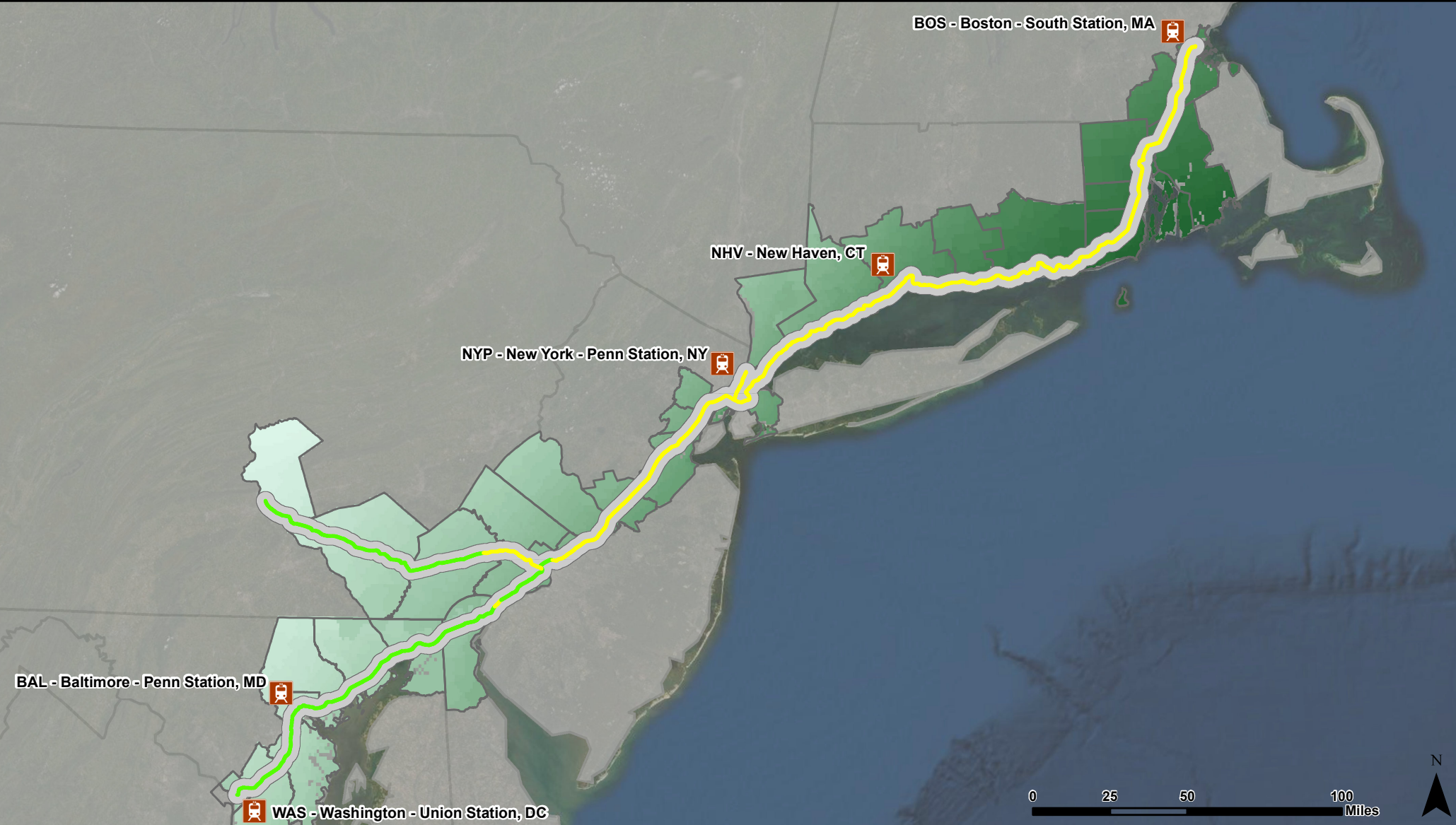




Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 100 Year Peak Gust Wind Event
 High Emissions (RCP 8.5)
 Year 2050





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 100 Year Peak Gust Wind Event
 High Emissions (RCP 8.5)
 Year 2050



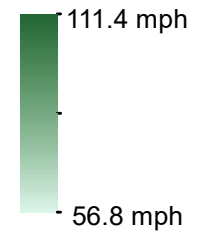
Track Vulnerability Score

- 0
- 1
- 2
- 3
- 4

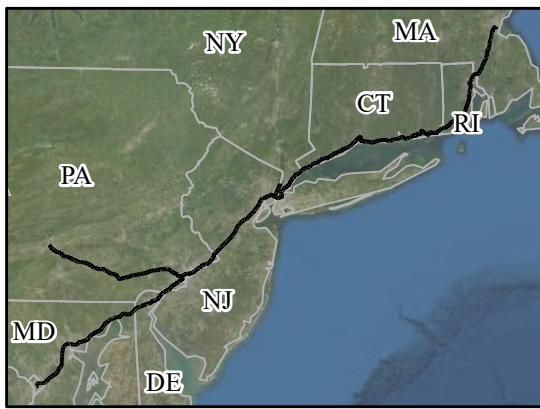
Stations

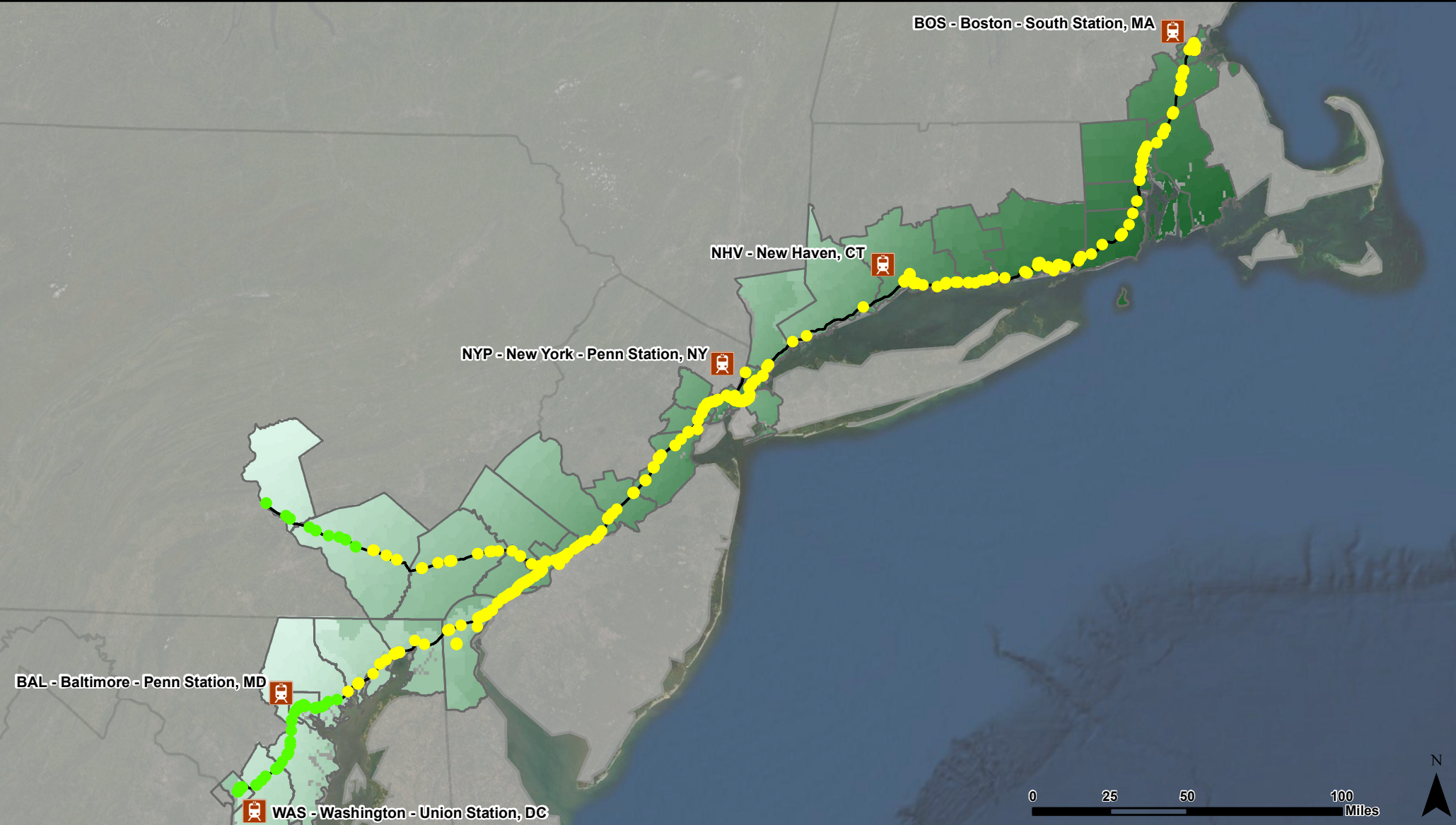
Amtrak Line

Climate Adjusted 100-Year Return Period Peak Wind Gust



Maximum Value: 109.6 mph





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 100 Year Peak Gust Wind Event
 High Emissions (RCP 8.5)
 Year 2100



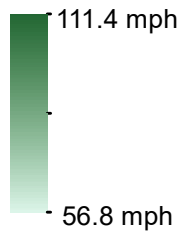
Buildings Vulnerability Score

- 0
- 1
- 2
- 3
- 4

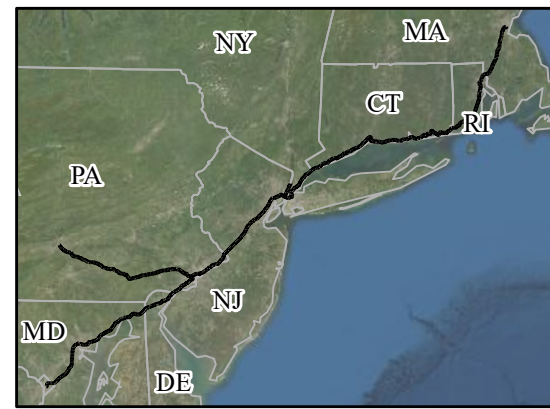
Stations

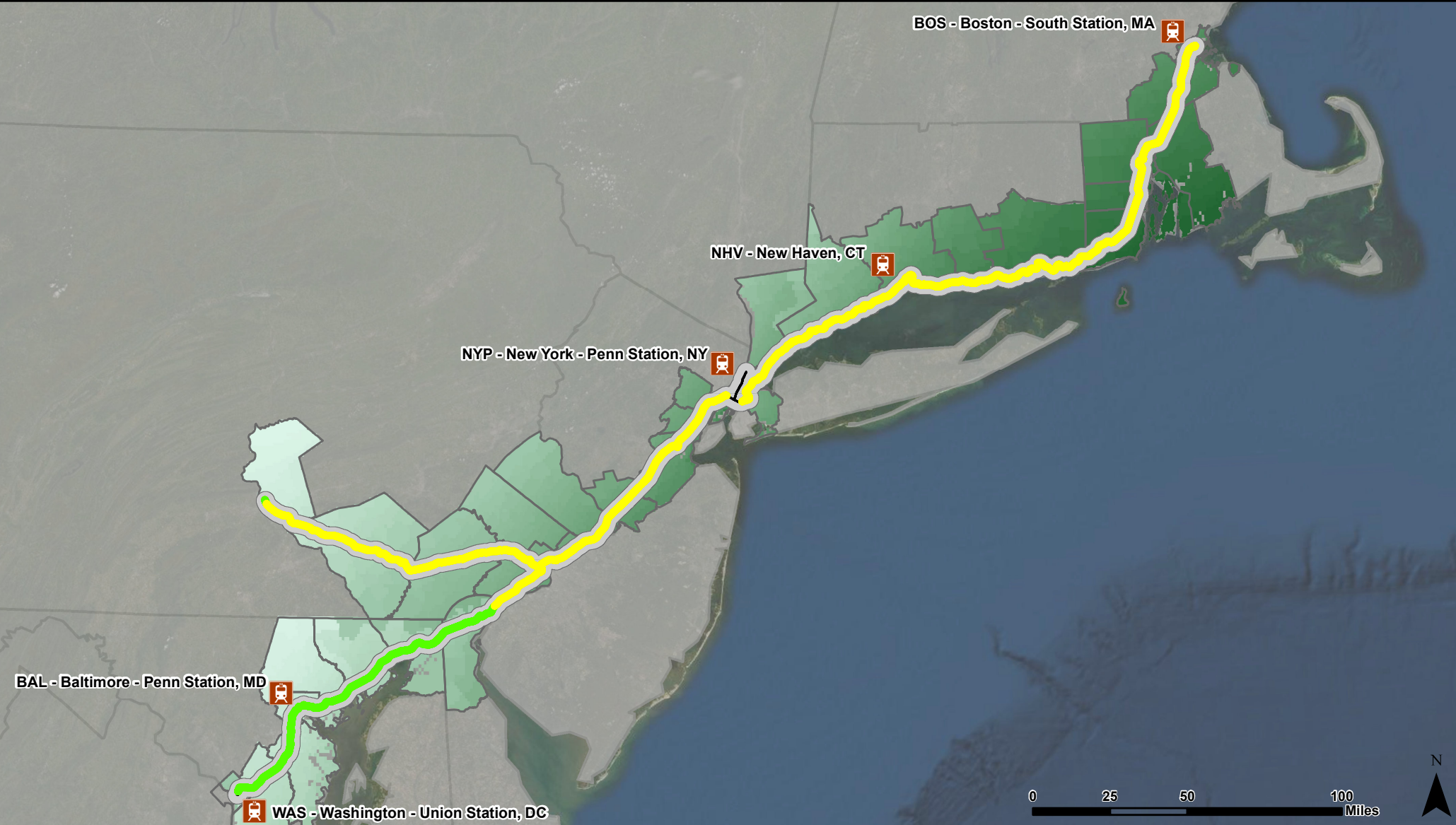
Amtrak Line

Climate Adjusted 100-Year Return Period Peak Wind Gust



Maximum Value: 111.4 mph





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 100 Year Peak Gust Wind Event
 High Emissions (RCP 8.5)
 Year 2100



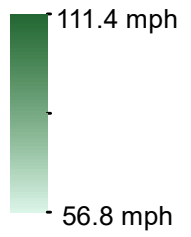
Catenary Vulnerability Score

- 0
- 1
- 2
- 3
- 4

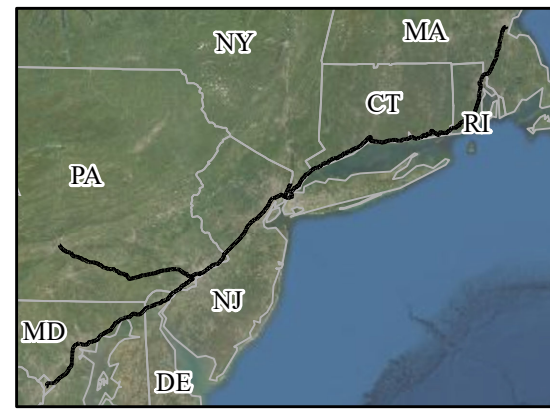
Stations

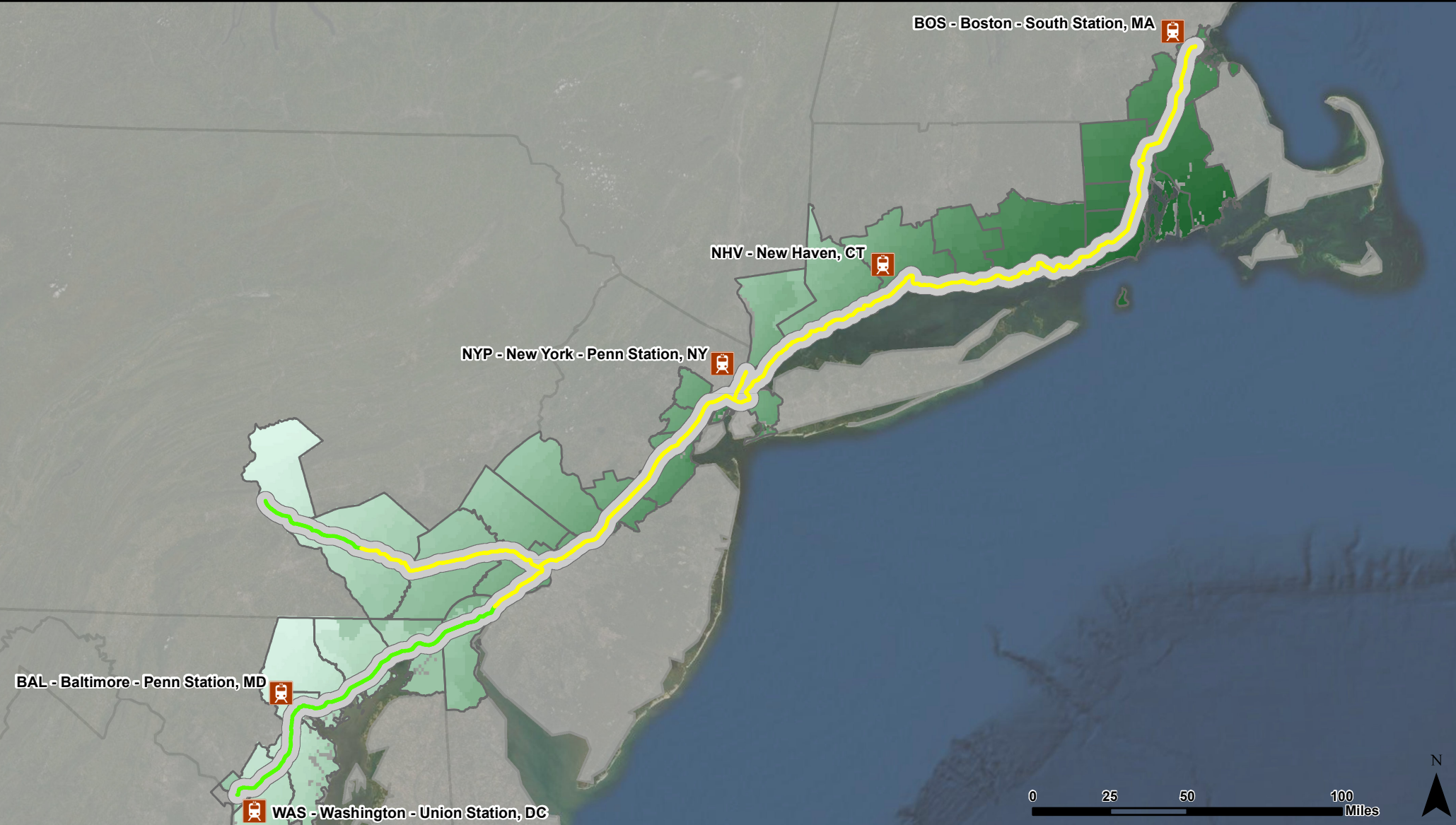
Amtrak Line

Climate Adjusted 100-Year Return Period Peak Wind Gust



Maximum Value: 111.4 mph





Amtrak Climate Change Vulnerability Assessment

Northeast Corridor (NEC) Study
 100 Year Peak Gust Wind Event
 High Emissions (RCP 8.5)
 Year 2100



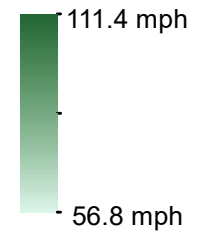
Track Vulnerability Score

- 0
- 1
- 2
- 3
- 4

Stations

Amtrak Line

Climate Adjusted 100-Year Return Period Peak Wind Gust



Maximum Value: 111.4 mph

