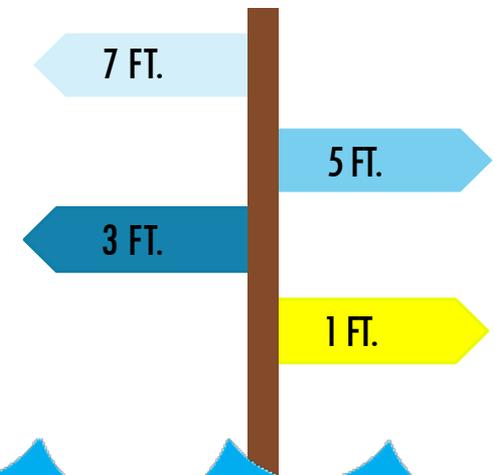


SOCIOECONOMICS OF SEA LEVEL RISE

RI DEPARTMENT OF ADMINISTRATION— DIVISION OF PLANNING
KIRSTEN BRYAN

KIRSTEN.BRYAN@DOA.RI.GOV

DECEMBER 2, 2016



INTRODUCTION

SOCIOECONOMICS OF SLR

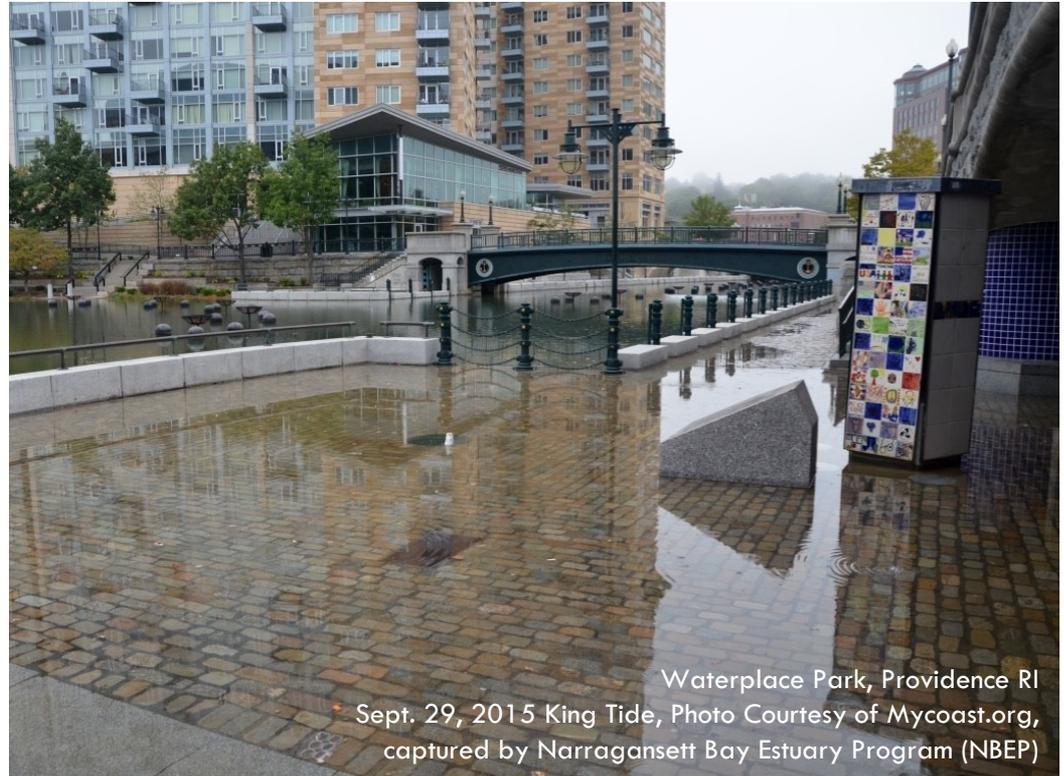
- Continuation of SLR Research Efforts
- Objective
 - Learn WHO is located in these areas
 - Generate data & info to guide
- Focus
 - Long-term SLR planning, data reflects daily tidal activity
 - Unique focus on who, and how many people and businesses are within SLR Inundation zones 1, 3, 5, 7 FT.
 - Title VI/Environmental Justice populations
 - CRMC, OHCD-DR, DEM, RI SEA GRANT/CRC



MAP: RI'S 21 COASTAL
COMMUNITIES (BLUE)

PURPOSE

- **RECOGNIZE SLR AS THREAT**
- **PROVIDE**
 - **Information** that may have been **inaccessible** locally (time, resources, etc.)
 - **Resources** to local officials for capital improvement planning, transportation planning, and overall long-range planning in communities
 - **Information to target** potential funds/resources via **grants** in the future
 - **Data/content** for newest chapters required for municipal comprehensive plans



Waterplace Park, Providence RI
Sept. 29, 2015 King Tide, Photo Courtesy of Mycoast.org,
captured by Narragansett Bay Estuary Program (NBEP)

METHODOLOGY

RESIDENTIAL UNITS

- GIS analysis: Selected e911 residential (and commercial) points (SF/MF) touched by SLR inundation (blue)
- Census geography data touched by SLR zone to (pink) determine:
 - Occupancy rate

POPULATION ESTIMATE

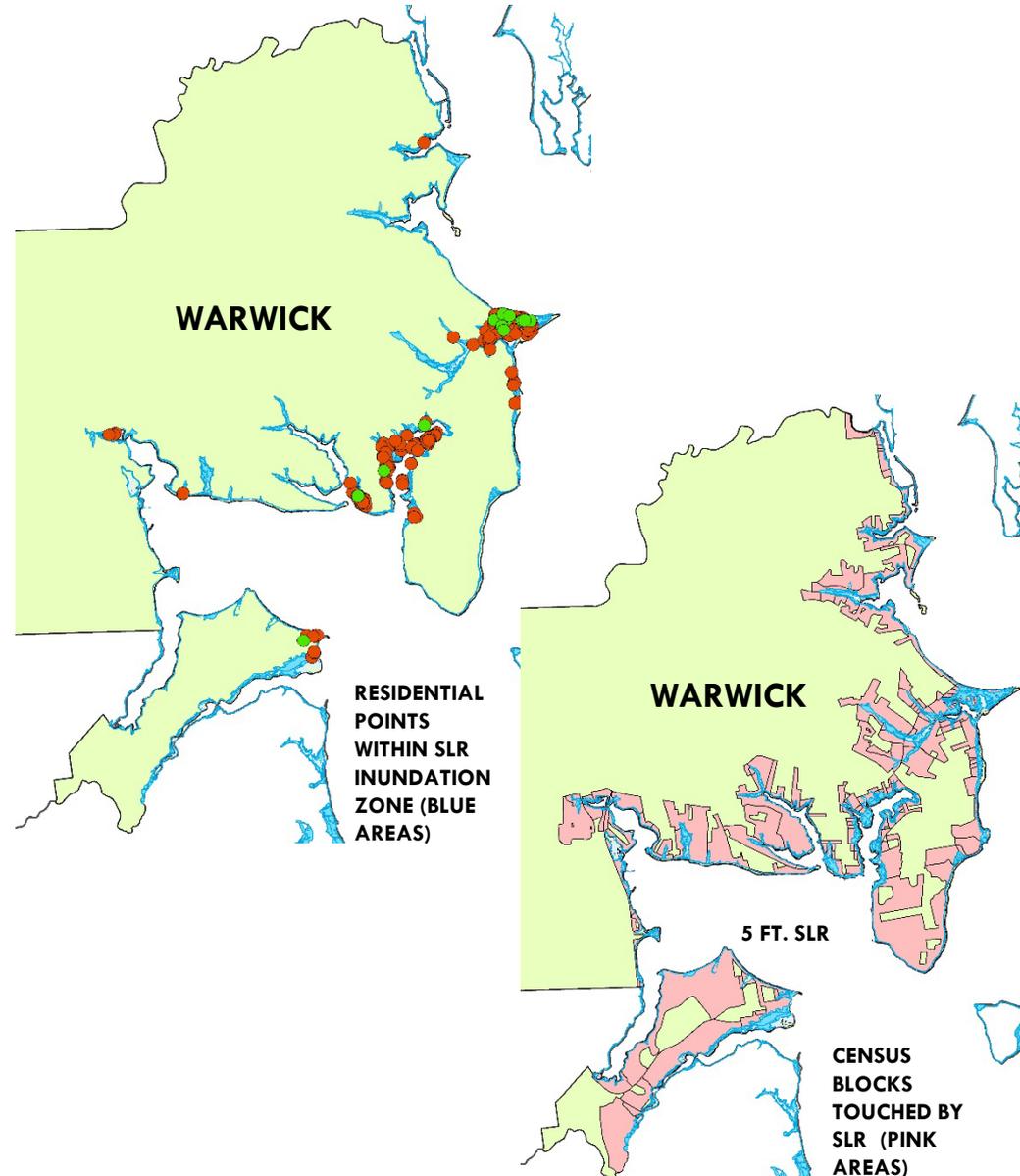
- Multiplied Occupied HH Units by Avg. HH Unit Size

SOCIOECONOMIC VARIABLE ESTIMATES

- Applied variable percentages in block/BG selection to population estimates

LIMITATIONS

- Data is approximate, best available, MOE
- Best attempt to identify **WHO** using most reliable data



RI (21) COASTAL



BARRINGTON



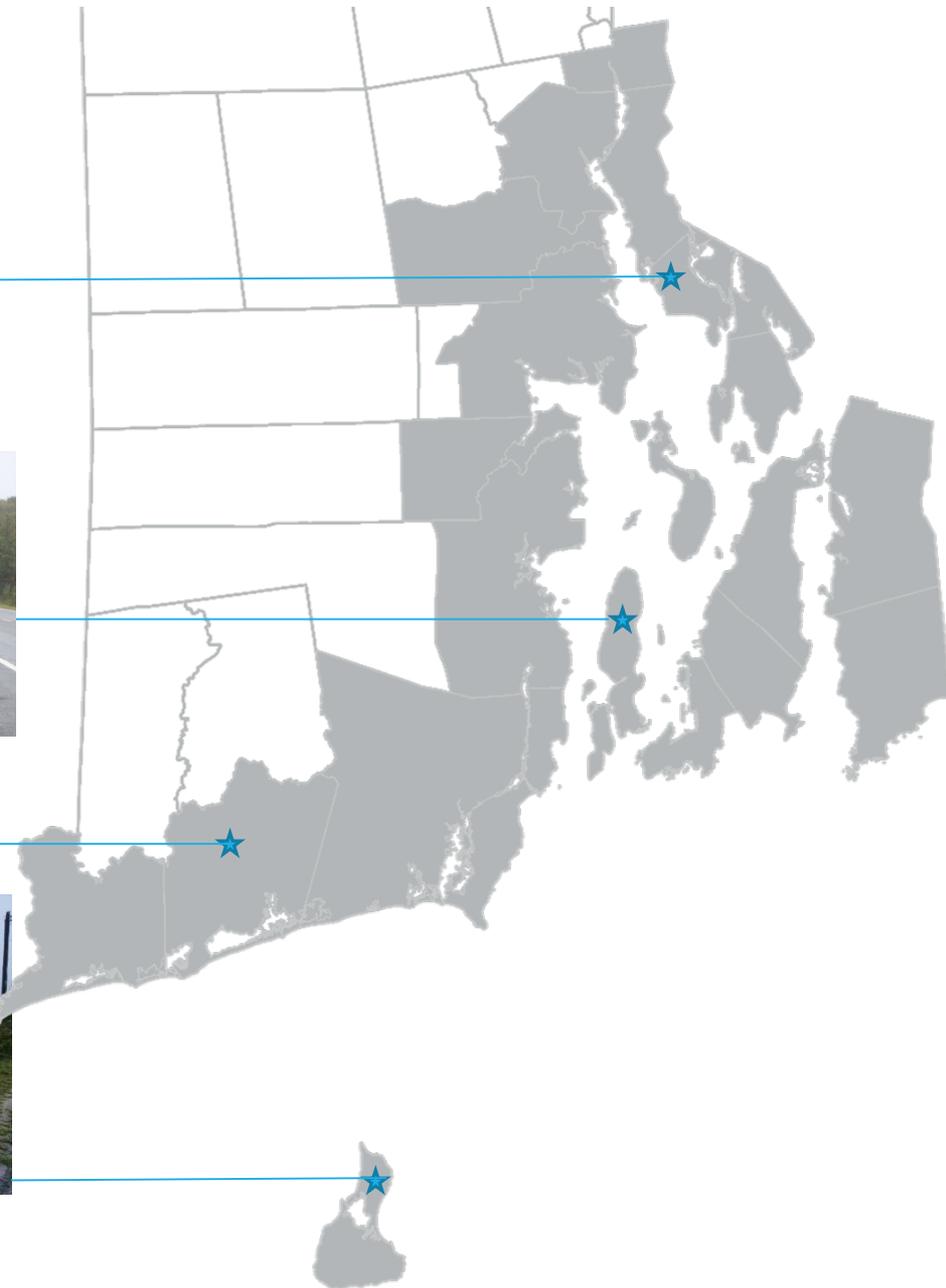
JAMESTOWN



CHARLESTOWN



NEW SHOREHAM



RI (21) COASTAL

TOTAL E-911 RESIDENTIAL UNITS



TABLE 2: TOTAL RESIDENTIAL UNITS – 21 COASTAL

SLR SCENARIO	R1: SINGLE FAMILY	R2: MULTIFAMILY	R3: MOBILE HOME	TOTAL	PERCENT CHANGE
1FT	9	1	1	11	2927.27% (1-3FT)
3FT	300	18	15	333	467.87% (3-5FT)
5FT	1646	203	42	1891	117.82% (5-7FT)
7FT	3642	430	47	4119	

INCREASE IN UNITS PER INUNDATION SCENARIO.
PERCENT CHANGE DECREASES IN POSITIVE VALUE AS SLR INCREASES.

RI (21) COASTAL

GREATEST/FEWEST E-911 RESIDENTIAL UNITS



TABLE 3: TOTAL E-911 HOUSING UNITS PER COMMUNITY

COMMUNITY	1FT	3FT	5FT	7FT
Barrington	0	19	85	263
Block Island - New Shoreham	0	3	10	19
Bristol	0	10	59	119
Charlestown	0	39	185	396
Cranston	0	1	8	22
East Greenwich	0	0	0	1
East Providence	0	0	0	5
Jamestown	0	0	8	28
Little Compton	0	0	5	12
Middletown	0	0	0	3
Narragansett	0	56	153	421
Newport	0	14	225	438
North Kingstown	1	7	84	235
Pawtucket	0	0	0	0
Portsmouth	0	13	103	216
Providence	0	0	0	2
South Kingstown	7	62	229	429
Tiverton	2	25	61	89
Warren	0	8	181	368
Warwick	0	15	179	497
Westerly	1	61	316	556

PAWTUCKET— 0 RESIDENTIAL UNITS IN ANY SCENARIO
 E. GREENWICH — 1 RESIDENTIAL UNIT IN 1 SCENARIO

S. KINGSTOWN — MOST RESIDENTIAL UNITS IN 1FT & 3FT SCENARIO
 WESTERLY— MOST RESIDENTIAL UNITS IN 5FT & 7FT SCENARIO

RI (21) COASTAL

WE HAVE COASTAL VARIABLE DATA, BUT WHAT DOES IT MEAN CONTEXTUALLY?

3 FT. SLR SCENARIO

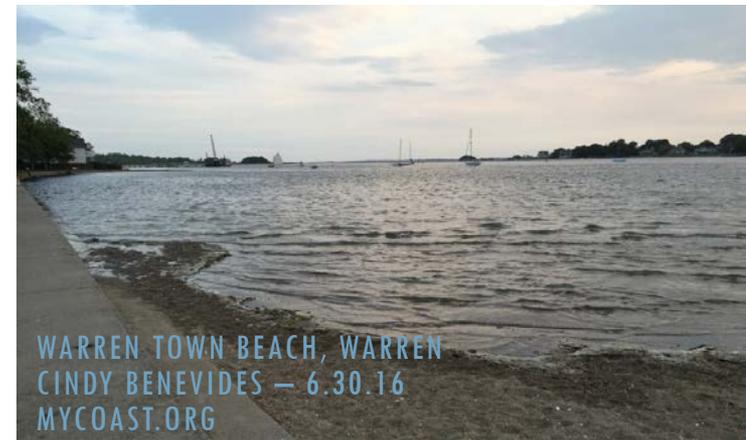


CURRENT STATE VALUES



RI (21) COASTAL

COMPARATIVE DATA EXERCISE



3 FT. SLR SCENARIO – RI (21) COASTAL	CURRENT RI STATEWIDE DATA – ALL MUNICIPALITIES
RACE & HISPANIC ETHNICITY	
96% White	81% White
2% Hispanic	12% Hispanic
5% Minority	24% Minority

IN THE 3 FT. SLR SCENARIO:

- GREATER % OF WHITES
- 10% FEWER HISPANICS
- 19% FEWER MINORITIES

RI (21) COASTAL

COMPARATIVE DATA EXERCISE



3 FT. SLR SCENARIO – RI (21) COASTAL	CURRENT RI STATEWIDE DATA – ALL MUNICIPALITIES
AGE	
34% Age 45-64	28% Age 45-64
10% Age ≥75	7% Age ≥75
EDUCATIONAL ATTAINMENT	
34% Associate's/Bachelor's	28% Associate's/Bachelor's
EMPLOYMENT	
7% Unemployed	9% Unemployed

IN THE 3 FT. SLR SCENARIO

- GREATER % OF 45-64 COHORT
- GREATER % OF ASSOCIATE'S & BACHELOR'S HOLDERS
- FEWER UNEMPLOYED

RI (21) COASTAL



3 FT. SLR SCENARIO – RI (21) COASTAL

CURRENT RI STATEWIDE DATA – ALL MUNICIPALITIES

HOUSEHOLD INCOME

Most housing units (24%) earn \$125,000 and greater annually

Population: 9% Below Poverty Level

Most housing units (23%) earn less than \$24,999 annually

Population: 14% Below Poverty Level

IN THE 3 FT. SLR SCENARIO:
 HIGHEST INCOME BRACKET=MAJORITY
 FEWER INDIVIDUALS LIVING BELOW POVERTY LEVEL
 CURRENT STATE DATA:
 LOWEST INCOME BRACKET=MAJORITY

CULMINATING FINDS



RI (21) COASTAL PREDOMINANT CHARACTERISTICS ACROSS ALL COASTAL SLR SCENARIOS:

- WHITE
- AGE 45-64
- HOLD ASSOCIATE'S/BACHELOR'S DEGREE
- EMPLOYED
- ANNUAL HOUSEHOLD INCOME OF \geq \$75,000 OR MORE
- RESIDE IN OWNER-OCCUPIED UNITS

DELIVERABLES

RISE PLAN
RISPP
RISPP

RI (21) COASTAL SOCIOECONOMICS OF SEA LEVEL RISE COASTAL FACTSHEET



PROJECT OVERVIEW

Rhode Island's municipalities are in the preliminary stages of integrating planning for sea level rise and climate change into their comprehensive planning process. To support those planning efforts of RI cities and towns, RISPP developed the Socioeconomics of Sea Level Rise project. The project aims to assist coastal municipalities in their long-term planning by attempting to identify population characteristics of the people located within sea level rise (SLR) inundation zones 1, 3, 5 and 7 FT. The data presented in this factsheet places a focus on Environmental Justice and Title VI populations.

METHODOLOGY

The RISPP utilized 2010 Decennial Census data and the latest American Community Survey (ACS) estimates to conduct an extensive data analysis. Staff also utilized CRMC's STORMTOOLS GIS shapefiles to identify the SLR inundation zones. In addition, RI Geographic Information Systems (IGIS) a-111 data was utilized to identify single family, multi-family and mobile home residential points located within each SLR inundation zone. For more information on the methodology, please reference the [full report](#) on our website.

RI (21) COASTAL QUICK FACTS

709,853
2010 Census Population

2010 Census Population

42.8
2010 Census Median Age

2010 Census Median Age

\$69,296
2014 ACS Median Household Income

2014 ACS Median Household Income

21 COASTAL OCCUPIED RESIDENTIAL UNITS & POPULATION ESTIMATES

Of all municipalities in Rhode Island, 54%, or 21 of 39 are coastal communities. All but one of the coastal communities feature residential units in at least one inundation zone with the exception of Pawtucket.

The 21 Coastal Communities' average household size ranges from 1.96-2.50 per SLR scenario. The average household size and the percentage of occupied housing units were used to calculate population estimates per inundation scenario. Approximately 70-73%

of the residential units located within SLR inundation zones 1, 3, 5 and 7 FT. are occupied units. Residential units were identified in GIS using the a-111 shapefile. A combination of single family, multi-family and mobile home residential units were identified throughout the various SLR inundation zones, the majority of the units are single family. There is a significant change between the estimated population located in the 3 and 5 FT. SLR inundation zone, with an additional 2494 people estimated in the 5 FT. zone. The 7FT. inundation zone has the greatest population and number of residential units, with 6945 people estimated within the zone, and 3321 occupied residential units.

Wata Hill Historic District, Westerly, RI
September 2015 King Tide, Photo Courtesy of Mycoast.org,
submitted by David Prescott



SLR INUNDATION ZONES

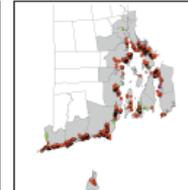
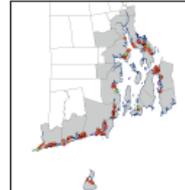
The maps above illustrate each of the SLR inundation zones. Single family units are represented by orange points in the SLR inundation zone maps, while multi-family units are represented by green points. Purple points signify mobile home units. Purple points signify mobile home units.

SLR 1 FT.

SLR 3 FT.

SLR 5 FT.

SLR 7 FT.



SLR Inundation Zone	Residential Units	Occupied Unit Calculation (Total Units x) Occup. Housing Unit Rate in SLR zone	Population Calculation (Occupied Units x) RI Coastal Community Avg. HH Size
1FT.	9 SF, 1 MF, 1 Mobile	8 (70% occ. HU)	20
3FT.	300 SF, 18 MF, 15 Mobile	246 (70% occ. HU)	481
5FT.	1646 SF, 203 MF, 42 Mobile	1487 (71% occ. HU)	2975
7FT.	3642 SF, 430 MF, 47 Mobile	3321 (70% occ. HU)	6945

RISE PLAN
RISPP
RISPP

RI (21) COASTAL SOCIOECONOMICS OF SEA LEVEL RISE COASTAL FACTSHEET



SLR 1

EST. POPULATION: 20
EST. OCCUPIED HOUSEHOLDS: 8

98% or 18 - White
0% - Black
0% - American Indian/Alaska Native
1% or 0.1 - Asian
1% or 0.3 - Hispanic
3% or 1 - Minority

9%
or 2 - Age 75 or older

8% or 1 are Individuals with Disabilities

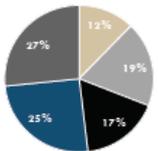
0% are Limited English Proficiency Households

8% or 1 are Unemployed

6% or 1 are Individuals Below Poverty Level

4% or 0.3 Households receive SSI

- In Estimated Occupied Housing Units



■ Less than 24,999K ■ 25,000 to 49,999 ■ 50,000 to 74,999 ■ 75,000 to 124,999 ■ 125,000 and up

- Percent of Population in Housing Type

18% Renter Occupied
20% Owned Outright

62%
Owned with Mortgage/Loan

SLR 3

EST. POPULATION: 481
EST. OCCUPIED HOUSEHOLDS: 246

96% or 461 - White
1% or 5 - Black
1% or 2 - American Indian/Alaska Native
1% or 5 - Asian
2% or 8 - Hispanic
5% or 26 - Minority

10%
or 50 - Age 75 or older

7% or 21 are Individuals with Disabilities

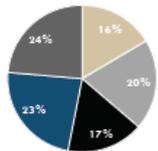
1% or 3 are Limited English Proficiency Households

7% or 27 are Unemployed

9% or 43 are Individuals Below Poverty Level

4% or 8 Households receive SSI

- In Estimated Occupied Housing Units



■ Less than 24,999K ■ 25,000 to 49,999 ■ 50,000 to 74,999 ■ 75,000 to 124,999 ■ 125,000 and up

- Percent of Population in Housing Type

26% Renter Occupied
19% Owned Outright

56%
Owned with Mortgage/Loan

SLR 5

EST. POPULATION: 2975
EST. OCCUPIED HOUSEHOLDS: 1487

94% or 2802 - White
2% or 47 - Black
1% or 15 - American Indian/Alaska Native
1% or 34 - Asian
3% or 81 - Hispanic
7% or 221 - Minority

9%
or 282 - Age 75 or older

8% or 157 are Individuals with Disabilities

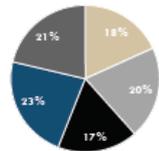
1% or 18 are Limited English Proficiency Households

8% or 189 are Unemployed

9% or 276 are Individuals Below Poverty Level

5% or 59 Households receive SSI

- In Estimated Occupied Housing Units



■ Less than 24,999K ■ 25,000 to 49,999 ■ 50,000 to 74,999 ■ 75,000 to 124,999 ■ 125,000 and up

- Percent of Population in Housing Type

30% Renter Occupied
17% Owned Outright

53%
Owned with Mortgage/Loan

SLR 7

EST. POPULATION: 6945
EST. OCCUPIED HOUSEHOLDS: 3321

94% or 6535 - White
2% or 111 - Black
0.4% or 31 - American Indian/Alaska Native
1% or 88 - Asian
3% or 189 - Hispanic
7% or 514 - Minority

9%
or 620 - Age 75 or older

8% or 362 are Individuals with Disabilities

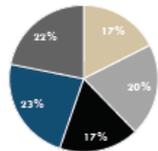
1% or 43 are Limited English Proficiency Households

8% or 422 are Unemployed

9% or 612 are Individuals Below Poverty Level

5% or 137 Households receive SSI

- In Estimated Occupied Housing Units



■ Less than 24,999K ■ 25,000 to 49,999 ■ 50,000 to 74,999 ■ 75,000 to 124,999 ■ 125,000 and up

- Percent of Population in Housing Type

29% Renter Occupied
16% Owned Outright

54%
Owned with Mortgage/Loan

RACE & AGE

SOCIAL CHARACTERISTICS

HOUSEHOLD INCOME

HOUSEHOLD CHARACTERISTICS

RI (21) COASTAL

HOUSING UNITS & POPULATION	2010 Census		2010 Census		2010 Census		2010 Census		2010 Census																																																																																																																																																																																																																		
	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010																																																																																																																																																																																																																	
HOUSING UNITS	12	351	204	1487	3321	73%	11.3	1487	3321	6943																																																																																																																																																																																																																	
POPULATION	8	246	1487	71%	3321	73%	11.3	1487	3321	6943																																																																																																																																																																																																																	
DEMOGRAPHIC	<table border="1"> <thead> <tr> <th>Category</th> <th>2010</th> </tr> </thead> <tbody> <tr> <td>Total Population (in Occupied Housing Units)</td> <td>20</td> <td>100%</td> <td>461</td> <td>100%</td> <td>2772</td> <td>100%</td> <td>6945</td> <td>100%</td> <td></td> <td></td> </tr> <tr> <td>White</td> <td>30</td> <td>98%</td> <td>461</td> <td>98%</td> <td>2802</td> <td>98%</td> <td>6535</td> <td>94%</td> <td></td> <td></td> </tr> <tr> <td>Black or African American</td> <td>0</td> <td>0%</td> <td>5</td> <td>1%</td> <td>47</td> <td>2%</td> <td>111</td> <td>2%</td> <td></td> <td></td> </tr> <tr> <td>American Indian and Alaska Native</td> <td>0</td> <td>0%</td> <td>2</td> <td>1%</td> <td>15</td> <td>1%</td> <td>21</td> <td>0%</td> <td></td> <td></td> </tr> <tr> <td>Asian</td> <td>0</td> <td>0%</td> <td>2</td> <td>1%</td> <td>34</td> <td>1%</td> <td>88</td> <td>1%</td> <td></td> <td></td> </tr> <tr> <td>Some Other Race</td> <td>0</td> <td>0%</td> <td>2</td> <td>0%</td> <td>25</td> <td>1%</td> <td>22</td> <td>1%</td> <td></td> <td></td> </tr> <tr> <td>Hispanic</td> <td>0</td> <td>0%</td> <td>8</td> <td>2%</td> <td>81</td> <td>3%</td> <td>189</td> <td>3%</td> <td></td> <td></td> </tr> <tr> <td>Non-Hispanic, White Population</td> <td>19</td> <td>97%</td> <td>455</td> <td>97%</td> <td>2754</td> <td>97%</td> <td>6421</td> <td>93%</td> <td></td> <td></td> </tr> <tr> <td>Minority Population (Total Population minus Non-Hispanic, White Population)</td> <td>1</td> <td>3%</td> <td>26</td> <td>5%</td> <td>221</td> <td>7%</td> <td>514</td> <td>7%</td> <td></td> <td></td> </tr> </tbody> </table>										Category	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	Total Population (in Occupied Housing Units)	20	100%	461	100%	2772	100%	6945	100%			White	30	98%	461	98%	2802	98%	6535	94%			Black or African American	0	0%	5	1%	47	2%	111	2%			American Indian and Alaska Native	0	0%	2	1%	15	1%	21	0%			Asian	0	0%	2	1%	34	1%	88	1%			Some Other Race	0	0%	2	0%	25	1%	22	1%			Hispanic	0	0%	8	2%	81	3%	189	3%			Non-Hispanic, White Population	19	97%	455	97%	2754	97%	6421	93%			Minority Population (Total Population minus Non-Hispanic, White Population)	1	3%	26	5%	221	7%	514	7%																																																																																																					
Category	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010																																																																																																																																																																																																																	
Total Population (in Occupied Housing Units)	20	100%	461	100%	2772	100%	6945	100%																																																																																																																																																																																																																			
White	30	98%	461	98%	2802	98%	6535	94%																																																																																																																																																																																																																			
Black or African American	0	0%	5	1%	47	2%	111	2%																																																																																																																																																																																																																			
American Indian and Alaska Native	0	0%	2	1%	15	1%	21	0%																																																																																																																																																																																																																			
Asian	0	0%	2	1%	34	1%	88	1%																																																																																																																																																																																																																			
Some Other Race	0	0%	2	0%	25	1%	22	1%																																																																																																																																																																																																																			
Hispanic	0	0%	8	2%	81	3%	189	3%																																																																																																																																																																																																																			
Non-Hispanic, White Population	19	97%	455	97%	2754	97%	6421	93%																																																																																																																																																																																																																			
Minority Population (Total Population minus Non-Hispanic, White Population)	1	3%	26	5%	221	7%	514	7%																																																																																																																																																																																																																			
SOCIAL	<table border="1"> <thead> <tr> <th>Category</th> <th>2010</th> </tr> </thead> <tbody> <tr> <td>Total Population (in Occupied Housing Units, age 16-64)</td> <td>10</td> <td>100%</td> <td>304</td> <td>100%</td> <td>1899</td> <td>100%</td> <td>4490</td> <td>100%</td> <td></td> <td></td> </tr> <tr> <td>Individuals with Disabilities</td> <td>1</td> <td>8%</td> <td>21</td> <td>7%</td> <td>127</td> <td>7%</td> <td>342</td> <td>8%</td> <td></td> <td></td> </tr> <tr> <td>Limited English Proficiency (LEP)</td> <td>0</td> <td>0%</td> <td>0</td> <td>0%</td> <td>0</td> <td>0%</td> <td>0</td> <td>0%</td> <td></td> <td></td> </tr> <tr> <td>Estimated Occupied Housing Units</td> <td>8</td> <td>100%</td> <td>246</td> <td>100%</td> <td>1487</td> <td>100%</td> <td>3321</td> <td>100%</td> <td></td> <td></td> </tr> <tr> <td>Limited English Proficiency Households</td> <td>0</td> <td>0%</td> <td>0</td> <td>0%</td> <td>0</td> <td>0%</td> <td>0</td> <td>0%</td> <td></td> <td></td> </tr> </tbody> </table>										Category	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	Total Population (in Occupied Housing Units, age 16-64)	10	100%	304	100%	1899	100%	4490	100%			Individuals with Disabilities	1	8%	21	7%	127	7%	342	8%			Limited English Proficiency (LEP)	0	0%	0	0%	0	0%	0	0%			Estimated Occupied Housing Units	8	100%	246	100%	1487	100%	3321	100%			Limited English Proficiency Households	0	0%	0	0%	0	0%	0	0%																																																																																																																																																	
Category	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010																																																																																																																																																																																																																	
Total Population (in Occupied Housing Units, age 16-64)	10	100%	304	100%	1899	100%	4490	100%																																																																																																																																																																																																																			
Individuals with Disabilities	1	8%	21	7%	127	7%	342	8%																																																																																																																																																																																																																			
Limited English Proficiency (LEP)	0	0%	0	0%	0	0%	0	0%																																																																																																																																																																																																																			
Estimated Occupied Housing Units	8	100%	246	100%	1487	100%	3321	100%																																																																																																																																																																																																																			
Limited English Proficiency Households	0	0%	0	0%	0	0%	0	0%																																																																																																																																																																																																																			
ECONOMIC	<table border="1"> <thead> <tr> <th>Category</th> <th>2010</th> </tr> </thead> <tbody> <tr> <td>Total Population (in Occupied Housing Units, age 25-64)</td> <td>17</td> <td>100%</td> <td>386</td> <td>100%</td> <td>2396</td> <td>100%</td> <td>5616</td> <td>100%</td> <td></td> <td></td> </tr> <tr> <td>Employed</td> <td>15</td> <td>92%</td> <td>343</td> <td>92%</td> <td>2102</td> <td>92%</td> <td>4913</td> <td>92%</td> <td></td> <td></td> </tr> <tr> <td>Unemployed</td> <td>1</td> <td>8%</td> <td>27</td> <td>7%</td> <td>189</td> <td>8%</td> <td>422</td> <td>8%</td> <td></td> <td></td> </tr> <tr> <td>Unemployed (in Occupied Housing Units)</td> <td>1</td> <td>100%</td> <td>27</td> <td>100%</td> <td>189</td> <td>100%</td> <td>422</td> <td>100%</td> <td></td> <td></td> </tr> <tr> <td>Total Population (age 25 and employed)</td> <td>16</td> <td>100%</td> <td>359</td> <td>100%</td> <td>2369</td> <td>100%</td> <td>5191</td> <td>100%</td> <td></td> <td></td> </tr> <tr> <td>Agriculture, forestry, fishing & hunting, mining</td> <td>0</td> <td>0%</td> <td>1</td> <td>1%</td> <td>16</td> <td>1%</td> <td>27</td> <td>0%</td> <td></td> <td></td> </tr> <tr> <td>Construction</td> <td>1</td> <td>2%</td> <td>19</td> <td>6%</td> <td>119</td> <td>6%</td> <td>271</td> <td>5%</td> <td></td> <td></td> </tr> <tr> <td>Manufacturing</td> <td>1</td> <td>1%</td> <td>28</td> <td>8%</td> <td>191</td> <td>8%</td> <td>444</td> <td>9%</td> <td></td> <td></td> </tr> <tr> <td>Wholesale trade</td> <td>0</td> <td>0%</td> <td>6</td> <td>2%</td> <td>41</td> <td>2%</td> <td>96</td> <td>2%</td> <td></td> <td></td> </tr> <tr> <td>Retail trade</td> <td>2</td> <td>11%</td> <td>38</td> <td>11%</td> <td>238</td> <td>11%</td> <td>532</td> <td>10%</td> <td></td> <td></td> </tr> <tr> <td>Transportation & warehousing, utilities</td> <td>0</td> <td>0%</td> <td>10</td> <td>3%</td> <td>67</td> <td>3%</td> <td>158</td> <td>3%</td> <td></td> <td></td> </tr> <tr> <td>Information</td> <td>0</td> <td>0%</td> <td>5</td> <td>1%</td> <td>30</td> <td>1%</td> <td>73</td> <td>1%</td> <td></td> <td></td> </tr> <tr> <td>Finance & insurance, real estate, rental & leasing</td> <td>1</td> <td>8%</td> <td>23</td> <td>7%</td> <td>147</td> <td>7%</td> <td>349</td> <td>7%</td> <td></td> <td></td> </tr> <tr> <td>Professional, scientific, management, administrative, waste management services</td> <td>1</td> <td>9%</td> <td>35</td> <td>10%</td> <td>214</td> <td>10%</td> <td>510</td> <td>10%</td> <td></td> <td></td> </tr> <tr> <td>Educational services, health care, social assistance</td> <td>5</td> <td>29%</td> <td>97</td> <td>28%</td> <td>580</td> <td>25%</td> <td>1364</td> <td>28%</td> <td></td> <td></td> </tr> <tr> <td>Arts, entertainment, recreation, accommodation & food services</td> <td>2</td> <td>12%</td> <td>48</td> <td>14%</td> <td>300</td> <td>13%</td> <td>642</td> <td>13%</td> <td></td> <td></td> </tr> <tr> <td>Other services (except public administration)</td> <td>1</td> <td>5%</td> <td>14</td> <td>4%</td> <td>84</td> <td>4%</td> <td>191</td> <td>4%</td> <td></td> <td></td> </tr> <tr> <td>Public administration</td> <td>1</td> <td>5%</td> <td>17</td> <td>5%</td> <td>104</td> <td>5%</td> <td>244</td> <td>5%</td> <td></td> <td></td> </tr> </tbody> </table>										Category	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	Total Population (in Occupied Housing Units, age 25-64)	17	100%	386	100%	2396	100%	5616	100%			Employed	15	92%	343	92%	2102	92%	4913	92%			Unemployed	1	8%	27	7%	189	8%	422	8%			Unemployed (in Occupied Housing Units)	1	100%	27	100%	189	100%	422	100%			Total Population (age 25 and employed)	16	100%	359	100%	2369	100%	5191	100%			Agriculture, forestry, fishing & hunting, mining	0	0%	1	1%	16	1%	27	0%			Construction	1	2%	19	6%	119	6%	271	5%			Manufacturing	1	1%	28	8%	191	8%	444	9%			Wholesale trade	0	0%	6	2%	41	2%	96	2%			Retail trade	2	11%	38	11%	238	11%	532	10%			Transportation & warehousing, utilities	0	0%	10	3%	67	3%	158	3%			Information	0	0%	5	1%	30	1%	73	1%			Finance & insurance, real estate, rental & leasing	1	8%	23	7%	147	7%	349	7%			Professional, scientific, management, administrative, waste management services	1	9%	35	10%	214	10%	510	10%			Educational services, health care, social assistance	5	29%	97	28%	580	25%	1364	28%			Arts, entertainment, recreation, accommodation & food services	2	12%	48	14%	300	13%	642	13%			Other services (except public administration)	1	5%	14	4%	84	4%	191	4%			Public administration	1	5%	17	5%	104	5%	244	5%		
Category	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010																																																																																																																																																																																																																	
Total Population (in Occupied Housing Units, age 25-64)	17	100%	386	100%	2396	100%	5616	100%																																																																																																																																																																																																																			
Employed	15	92%	343	92%	2102	92%	4913	92%																																																																																																																																																																																																																			
Unemployed	1	8%	27	7%	189	8%	422	8%																																																																																																																																																																																																																			
Unemployed (in Occupied Housing Units)	1	100%	27	100%	189	100%	422	100%																																																																																																																																																																																																																			
Total Population (age 25 and employed)	16	100%	359	100%	2369	100%	5191	100%																																																																																																																																																																																																																			
Agriculture, forestry, fishing & hunting, mining	0	0%	1	1%	16	1%	27	0%																																																																																																																																																																																																																			
Construction	1	2%	19	6%	119	6%	271	5%																																																																																																																																																																																																																			
Manufacturing	1	1%	28	8%	191	8%	444	9%																																																																																																																																																																																																																			
Wholesale trade	0	0%	6	2%	41	2%	96	2%																																																																																																																																																																																																																			
Retail trade	2	11%	38	11%	238	11%	532	10%																																																																																																																																																																																																																			
Transportation & warehousing, utilities	0	0%	10	3%	67	3%	158	3%																																																																																																																																																																																																																			
Information	0	0%	5	1%	30	1%	73	1%																																																																																																																																																																																																																			
Finance & insurance, real estate, rental & leasing	1	8%	23	7%	147	7%	349	7%																																																																																																																																																																																																																			
Professional, scientific, management, administrative, waste management services	1	9%	35	10%	214	10%	510	10%																																																																																																																																																																																																																			
Educational services, health care, social assistance	5	29%	97	28%	580	25%	1364	28%																																																																																																																																																																																																																			
Arts, entertainment, recreation, accommodation & food services	2	12%	48	14%	300	13%	642	13%																																																																																																																																																																																																																			
Other services (except public administration)	1	5%	14	4%	84	4%	191	4%																																																																																																																																																																																																																			
Public administration	1	5%	17	5%	104	5%	244	5%																																																																																																																																																																																																																			
HOUSING	<table border="1"> <thead> <tr> <th>Category</th> <th>2010</th> </tr> </thead> <tbody> <tr> <td>Total Housing Units</td> <td>11</td> <td>100%</td> <td>351</td> <td>100%</td> <td>2025</td> <td>100%</td> <td>4413</td> <td>100%</td> <td></td> <td></td> </tr> <tr> <td>Occupied Housing Units</td> <td>7</td> <td>63%</td> <td>204</td> <td>58%</td> <td>1282</td> <td>64%</td> <td>2977</td> <td>67%</td> <td></td> <td></td> </tr> <tr> <td>Vacant Housing Units</td> <td>4</td> <td>37%</td> <td>147</td> <td>42%</td> <td>722</td> <td>36%</td> <td>1441</td> <td>33%</td> <td></td> <td></td> </tr> <tr> <td>Estimated Occupied Housing Units</td> <td>8</td> <td>100%</td> <td>246</td> <td>100%</td> <td>1487</td> <td>100%</td> <td>3321</td> <td>100%</td> <td></td> <td></td> </tr> <tr> <td>Owner-Occupied Housing Units</td> <td>5</td> <td>71%</td> <td>141</td> <td>57%</td> <td>863</td> <td>58%</td> <td>1999</td> <td>60%</td> <td></td> <td></td> </tr> <tr> <td>Renter-Occupied Housing Units</td> <td>1</td> <td>13%</td> <td>47</td> <td>23%</td> <td>387</td> <td>26%</td> <td>866</td> <td>26%</td> <td></td> <td></td> </tr> <tr> <td>Total Population (in Occupied Housing Units)</td> <td>20</td> <td>100%</td> <td>461</td> <td>100%</td> <td>2772</td> <td>100%</td> <td>6945</td> <td>100%</td> <td></td> <td></td> </tr> <tr> <td>Population in Group Quarters</td> <td>1</td> <td>3%</td> <td>18</td> <td>4%</td> <td>102</td> <td>4%</td> <td>264</td> <td>4%</td> <td></td> <td></td> </tr> <tr> <td>Total Population (age 25-64)</td> <td>0</td> <td>0%</td> <td>0</td> <td>0%</td> <td>0</td> <td>0%</td> <td>0</td> <td>0%</td> <td></td> <td></td> </tr> <tr> <td>Population in Group Quarters</td> <td>0</td> <td>0%</td> <td>0</td> <td>0%</td> <td>0</td> <td>0%</td> <td>0</td> <td>0%</td> <td></td> <td></td> </tr> </tbody> </table>										Category	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	Total Housing Units	11	100%	351	100%	2025	100%	4413	100%			Occupied Housing Units	7	63%	204	58%	1282	64%	2977	67%			Vacant Housing Units	4	37%	147	42%	722	36%	1441	33%			Estimated Occupied Housing Units	8	100%	246	100%	1487	100%	3321	100%			Owner-Occupied Housing Units	5	71%	141	57%	863	58%	1999	60%			Renter-Occupied Housing Units	1	13%	47	23%	387	26%	866	26%			Total Population (in Occupied Housing Units)	20	100%	461	100%	2772	100%	6945	100%			Population in Group Quarters	1	3%	18	4%	102	4%	264	4%			Total Population (age 25-64)	0	0%	0	0%	0	0%	0	0%			Population in Group Quarters	0	0%	0	0%	0	0%	0	0%																																																																																										
Category	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010																																																																																																																																																																																																																	
Total Housing Units	11	100%	351	100%	2025	100%	4413	100%																																																																																																																																																																																																																			
Occupied Housing Units	7	63%	204	58%	1282	64%	2977	67%																																																																																																																																																																																																																			
Vacant Housing Units	4	37%	147	42%	722	36%	1441	33%																																																																																																																																																																																																																			
Estimated Occupied Housing Units	8	100%	246	100%	1487	100%	3321	100%																																																																																																																																																																																																																			
Owner-Occupied Housing Units	5	71%	141	57%	863	58%	1999	60%																																																																																																																																																																																																																			
Renter-Occupied Housing Units	1	13%	47	23%	387	26%	866	26%																																																																																																																																																																																																																			
Total Population (in Occupied Housing Units)	20	100%	461	100%	2772	100%	6945	100%																																																																																																																																																																																																																			
Population in Group Quarters	1	3%	18	4%	102	4%	264	4%																																																																																																																																																																																																																			
Total Population (age 25-64)	0	0%	0	0%	0	0%	0	0%																																																																																																																																																																																																																			
Population in Group Quarters	0	0%	0	0%	0	0%	0	0%																																																																																																																																																																																																																			
JOBS	<table border="1"> <thead> <tr> <th>Category</th> <th>2010</th> </tr> </thead> <tbody> <tr> <td>Total Population (in Occupied Housing Units)</td> <td>20</td> <td>100%</td> <td>461</td> <td>100%</td> <td>2772</td> <td>100%</td> <td>6945</td> <td>100%</td> <td></td> <td></td> </tr> <tr> <td>Population in Property Owned with mortgage or loan</td> <td>12</td> <td>62%</td> <td>248</td> <td>54%</td> <td>1579</td> <td>57%</td> <td>3742</td> <td>54%</td> <td></td> <td></td> </tr> <tr> <td>Population in Property Owned free and clear</td> <td>4</td> <td>20%</td> <td>90</td> <td>20%</td> <td>607</td> <td>22%</td> <td>1363</td> <td>20%</td> <td></td> <td></td> </tr> <tr> <td>Population in Renter-Occupied Units</td> <td>4</td> <td>18%</td> <td>124</td> <td>26%</td> <td>827</td> <td>30%</td> <td>2058</td> <td>30%</td> <td></td> <td></td> </tr> <tr> <td>Employment and Business Unit Detail</td> <td colspan="10"> <table border="1"> <thead> <tr> <th>Category</th> <th>2010</th> </tr> </thead> <tbody> <tr> <td>Average Employment - Municipality</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>16181</td> </tr> <tr> <td>Number of Units (Business - Private and Government)</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>1089</td> </tr> <tr> <td>Average Number of Workers per Unit (Business - Private and Government)</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>15</td> </tr> <tr> <td>Workers Per Commercial Unit</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>11.7</td> </tr> <tr> <td>#/1 Commercial Unit Tot</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>627</td> </tr> <tr> <td>Average Number of Workers/Job per Commercial Unit</td> <td>74</td> <td>1480</td> <td>5374</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>11947</td> </tr> </tbody> </table> </td> </tr> </tbody> </table>										Category	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	Total Population (in Occupied Housing Units)	20	100%	461	100%	2772	100%	6945	100%			Population in Property Owned with mortgage or loan	12	62%	248	54%	1579	57%	3742	54%			Population in Property Owned free and clear	4	20%	90	20%	607	22%	1363	20%			Population in Renter-Occupied Units	4	18%	124	26%	827	30%	2058	30%			Employment and Business Unit Detail	<table border="1"> <thead> <tr> <th>Category</th> <th>2010</th> </tr> </thead> <tbody> <tr> <td>Average Employment - Municipality</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>16181</td> </tr> <tr> <td>Number of Units (Business - Private and Government)</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>1089</td> </tr> <tr> <td>Average Number of Workers per Unit (Business - Private and Government)</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>15</td> </tr> <tr> <td>Workers Per Commercial Unit</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>11.7</td> </tr> <tr> <td>#/1 Commercial Unit Tot</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>627</td> </tr> <tr> <td>Average Number of Workers/Job per Commercial Unit</td> <td>74</td> <td>1480</td> <td>5374</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>11947</td> </tr> </tbody> </table>										Category	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	Average Employment - Municipality	0	0	0	0	0	0	0	0	0	16181	Number of Units (Business - Private and Government)	0	0	0	0	0	0	0	0	0	1089	Average Number of Workers per Unit (Business - Private and Government)	0	0	0	0	0	0	0	0	0	15	Workers Per Commercial Unit	0	0	0	0	0	0	0	0	0	11.7	#/1 Commercial Unit Tot	0	0	0	0	0	0	0	0	0	627	Average Number of Workers/Job per Commercial Unit	74	1480	5374							11947																																																																		
Category	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010																																																																																																																																																																																																																	
Total Population (in Occupied Housing Units)	20	100%	461	100%	2772	100%	6945	100%																																																																																																																																																																																																																			
Population in Property Owned with mortgage or loan	12	62%	248	54%	1579	57%	3742	54%																																																																																																																																																																																																																			
Population in Property Owned free and clear	4	20%	90	20%	607	22%	1363	20%																																																																																																																																																																																																																			
Population in Renter-Occupied Units	4	18%	124	26%	827	30%	2058	30%																																																																																																																																																																																																																			
Employment and Business Unit Detail	<table border="1"> <thead> <tr> <th>Category</th> <th>2010</th> </tr> </thead> <tbody> <tr> <td>Average Employment - Municipality</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>16181</td> </tr> <tr> <td>Number of Units (Business - Private and Government)</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>1089</td> </tr> <tr> <td>Average Number of Workers per Unit (Business - Private and Government)</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>15</td> </tr> <tr> <td>Workers Per Commercial Unit</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>11.7</td> </tr> <tr> <td>#/1 Commercial Unit Tot</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>627</td> </tr> <tr> <td>Average Number of Workers/Job per Commercial Unit</td> <td>74</td> <td>1480</td> <td>5374</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>11947</td> </tr> </tbody> </table>										Category	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	Average Employment - Municipality	0	0	0	0	0	0	0	0	0	16181	Number of Units (Business - Private and Government)	0	0	0	0	0	0	0	0	0	1089	Average Number of Workers per Unit (Business - Private and Government)	0	0	0	0	0	0	0	0	0	15	Workers Per Commercial Unit	0	0	0	0	0	0	0	0	0	11.7	#/1 Commercial Unit Tot	0	0	0	0	0	0	0	0	0	627	Average Number of Workers/Job per Commercial Unit	74	1480	5374							11947																																																																																																																																				
Category	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010																																																																																																																																																																																																																	
Average Employment - Municipality	0	0	0	0	0	0	0	0	0	16181																																																																																																																																																																																																																	
Number of Units (Business - Private and Government)	0	0	0	0	0	0	0	0	0	1089																																																																																																																																																																																																																	
Average Number of Workers per Unit (Business - Private and Government)	0	0	0	0	0	0	0	0	0	15																																																																																																																																																																																																																	
Workers Per Commercial Unit	0	0	0	0	0	0	0	0	0	11.7																																																																																																																																																																																																																	
#/1 Commercial Unit Tot	0	0	0	0	0	0	0	0	0	627																																																																																																																																																																																																																	
Average Number of Workers/Job per Commercial Unit	74	1480	5374							11947																																																																																																																																																																																																																	



LOCATION: SUCCOTASH ROAD - NARRAGANSETT, RHODE ISLAND - SEPTEMBER 2015
MFOCAST.ORG - SUBMITTED BY DAWN K.

SOCIOECONOMICS OF SEA LEVEL RISE REPORT RHODE ISLAND

RHODE ISLAND STATEWIDE PLANNING PROGRAM
RHODE ISLAND DEPARTMENT OF ADMINISTRATION
DIVISION OF PLANNING
STATEWIDE PLANNING PROGRAM
ONE CAPITOL HILL - PROVIDENCE, RHODE ISLAND - 02908-5870
WWW.PLANNING.RI.GOV

LAUNCH

- ANTICIPATED LAUNCH ON DIVISION WEBSITE IN DECEMBER 2016
- DOWNLOADABLE REPORT
- 20 INDIVIDUAL COASTAL COMMUNITY FACTSHEETS & DATA PROFILES
+ RI (21) COASTAL FACTSHEET AND DATA PROFILE



NEXT: SEA LEVEL RISE VULNERABILITY: MUNICIPAL
TRANSPORTATION ASSETS

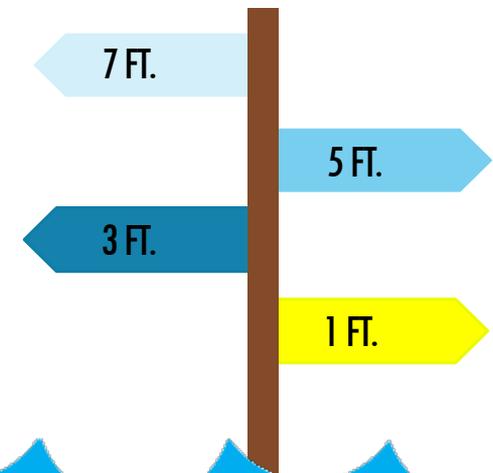
MUNICIPAL TRANSPORTATION ASSETS VULNERABILITY TO SEA LEVEL RISE AND STORM SURGE

RI DEPARTMENT OF ADMINISTRATION — DIVISION OF PLANNING

BENJAMIN JACOBS

BENJAMIN.JACOBS@DOA.RI.GOV

DECEMBER 2, 2016



PURPOSE

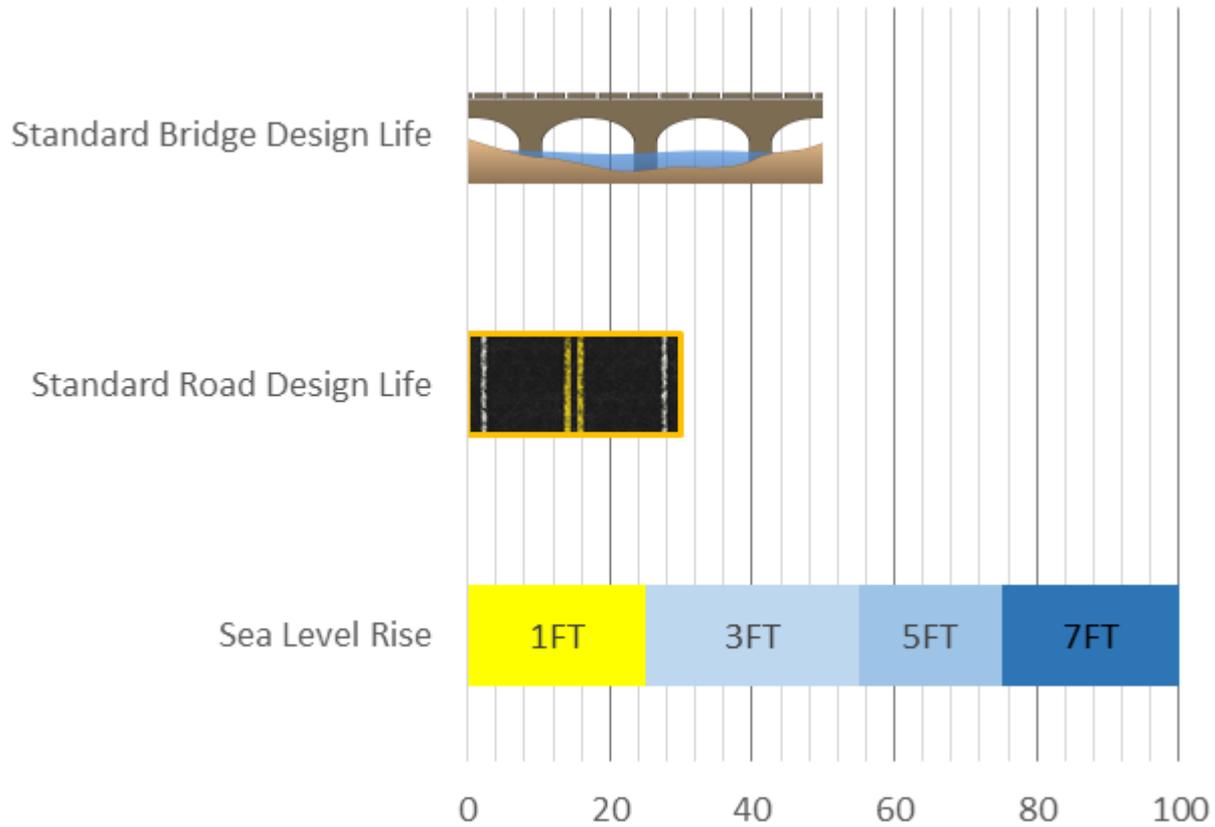
- **Create** replicable methodology and usable data
- **Identify** municipal transportation assets exposed to SLR
- **Prioritize** vulnerability of exposed assets
- **Communicate** findings



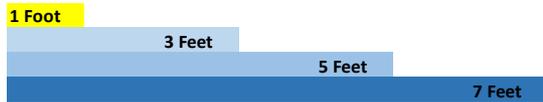
Bridge in Westerly, RI
Photo Courtesy – RIDOA

RELEVANCE

ASSETS BEING CREATED NOW WILL STILL BE AROUND WHEN SEA LEVEL RISE BEGINS TO HAVE AN IMPACT



EXAMINED SCENARIOS



SEA LEVEL RISE



TYPE	ASSET	CURRENT	1 FT.	3 FT.	5 FT.	7 FT.
SLR	Road		X	X	X	X
	Bridge					X
SURGE	Road	X	X	X	X	X
	Bridge					X

INITIAL FINDINGS

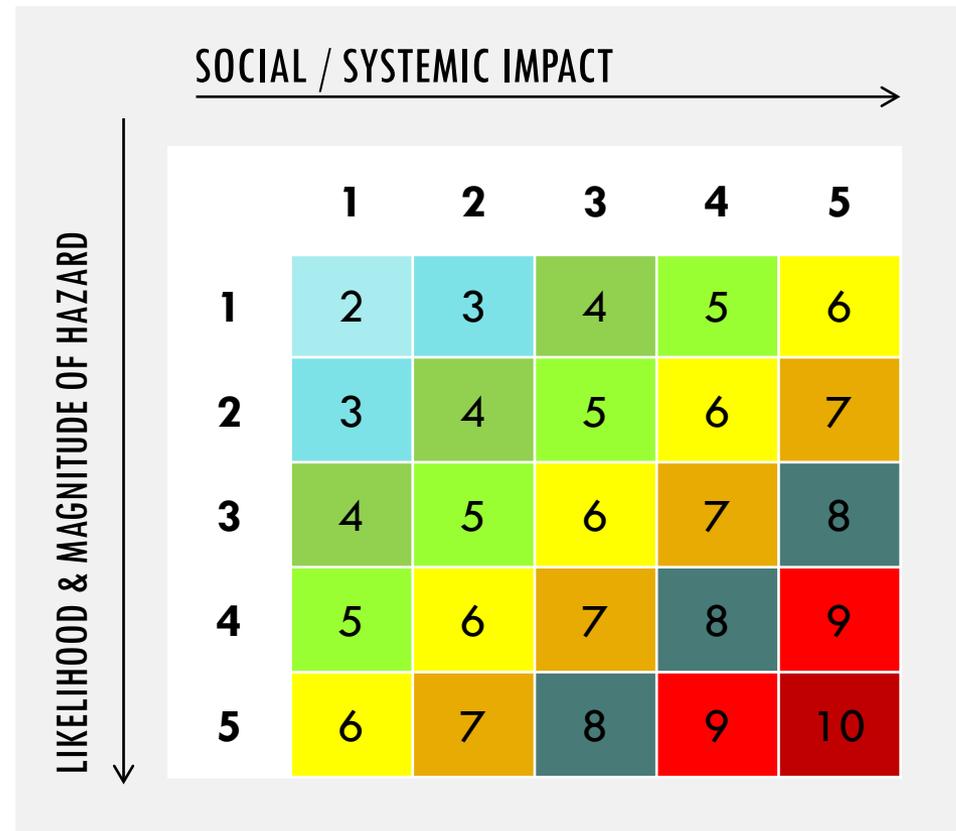


- 175 MILES OF ROAD CENTERLINE EXPOSED TO SLR
- 573 MILES TO STORM SURGE + SLR
- 70% OF EXPOSED ROADS ARE LOCAL
- 90 BRIDGES EXPOSED TO SLR
- 148 BRIDGES EXPOSED TO STORM SURGE + SLR

VULNERABILITY ASSESSMENT

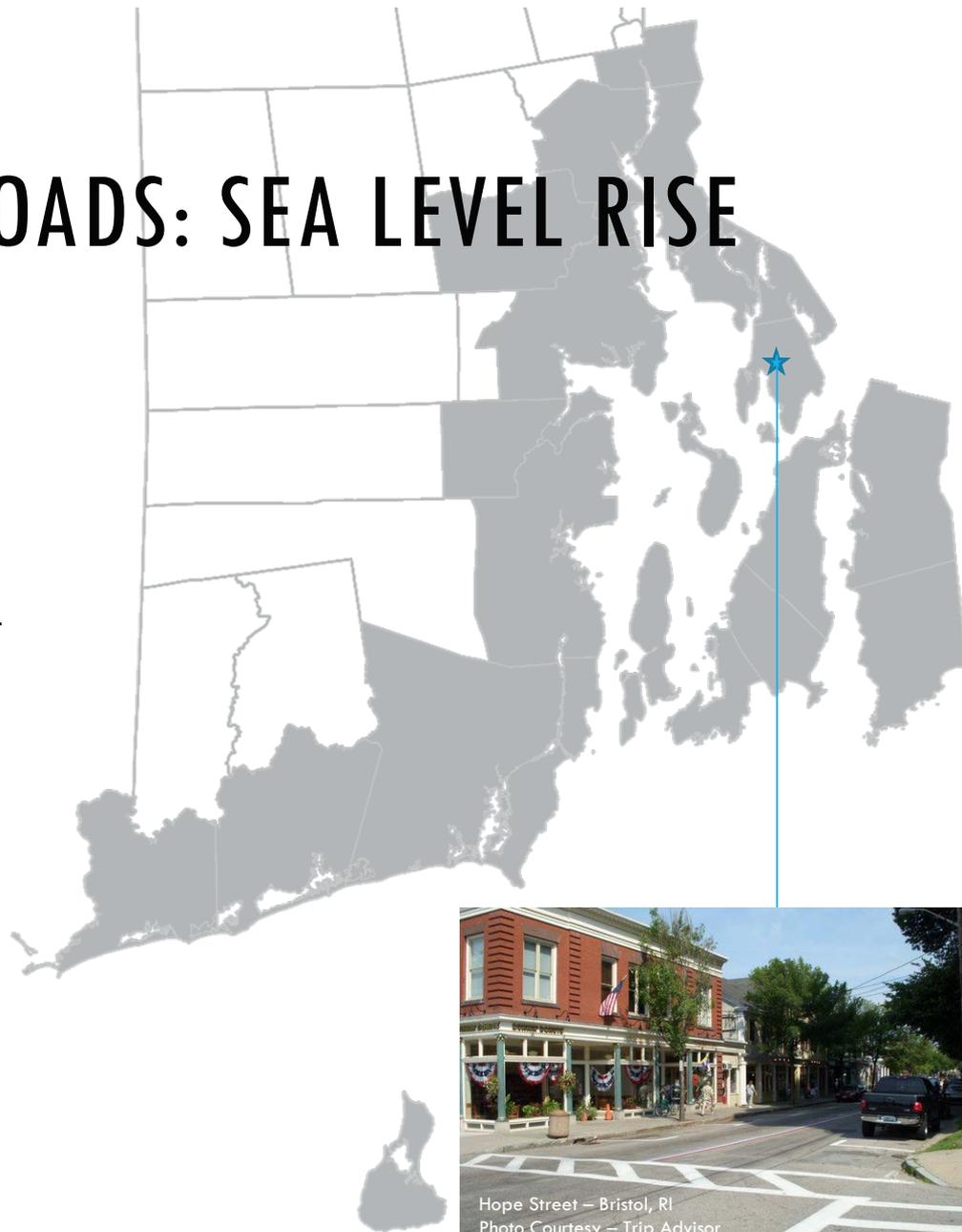
A way to prioritize response to the results of exposure

- Earlier exposure vs later exposure
- Used by a larger number of people
- Greater risk vs lower risk
- Damage more severe vs less severe
- Assets that serve wider social priorities

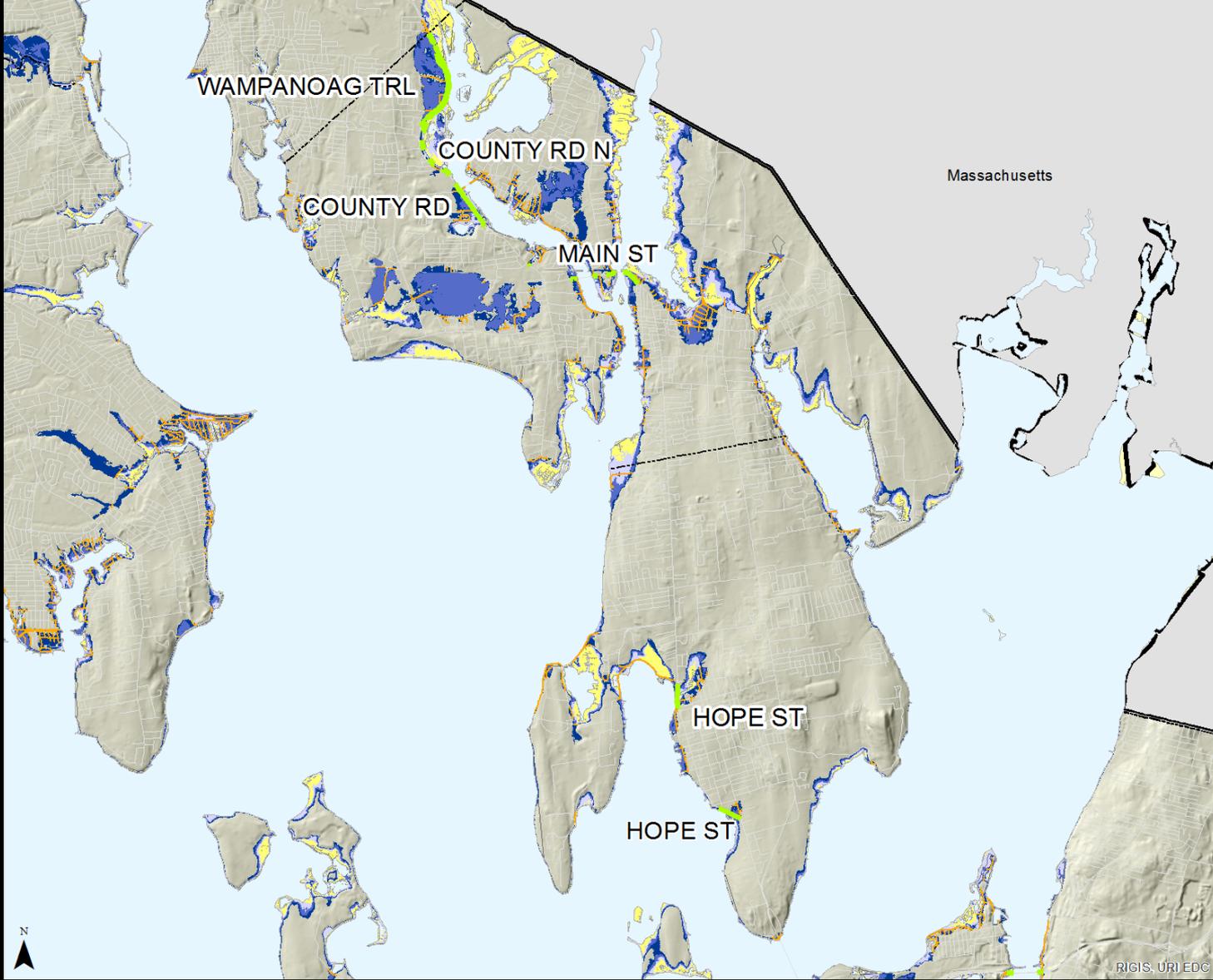


MOST VULNERABLE ROADS: SEA LEVEL RISE

RANK	MUNICIPALITY	ROAD NAME
1	BRISTOL	HOPE ST
2	NEWPORT	MEMORIAL BLVD
3	BARRINGTON	WAMPANOAG TRAIL
4	JAMESTOWN	CONANICUS AVE
5	BARRINGTON	COUNTY RD N
6	JAMESTOWN	NORTH RD
7	BARRINGTON	COUNTY RD
8	NARRAGANSETT	BEACH ST
9	WARREN	MAIN ST
10	TIVERTON	STATE HWY 24 S



Hope Street – Bristol, RI
Photo Courtesy – Trip Advisor



Selection of Roads Most Vulnerable to Sea Level Rise

Map Legend

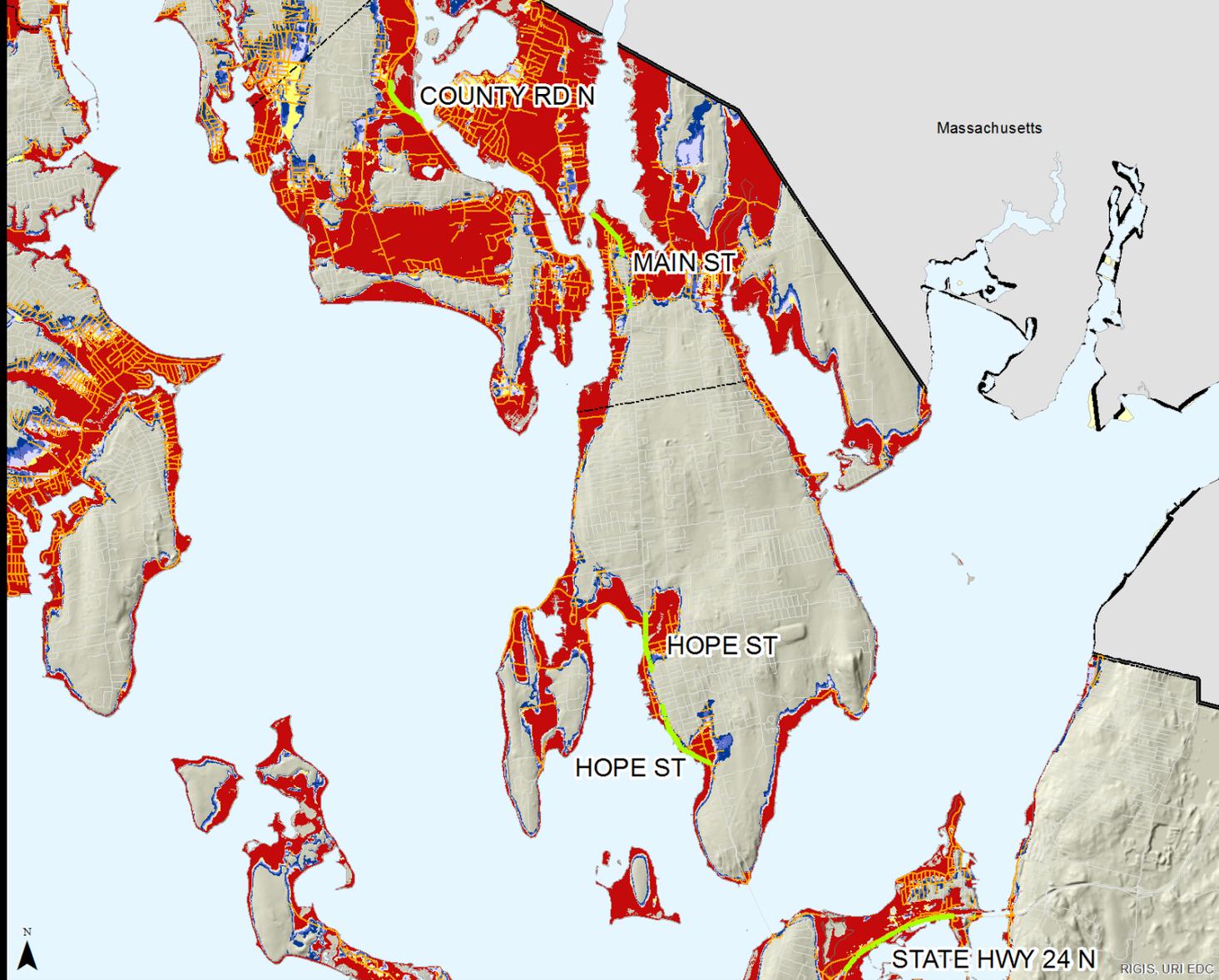
	Current Mean Higher High Water		Exposed Roads in the Top 10		City and Town Boundaries
	1Ft Sea Level Rise		Potentially Exposed Roads		Roads
	3Ft Sea Level Rise				
	5Ft Sea Level Rise				

MOST VULNERABLE ROADS: 100 YEAR STORM + SEA LEVEL RISE

RANK	MUNICIPALITY	ROAD NAME
1	BARRINGTON	COUNTY RD N
2	NORTH KINGSTOWN	PHILLIPS ST
3	NEWPORT	AMERICAS CUP AVE
4	NEWPORT	ON RAMP RI-138 W
5	BRISTOL	HOPE ST
6	PORTSMOUTH	STATE HWY 24 N
7	WARWICK	CENTERVILLE RD
8	NARRAGANSETT	NARRAGANSETT AVE
9	WARREN	MAIN ST
10	JAMESTOWN	STATE HWY 138 W



County Road North – Barrington, RI
Photo Courtesy – Google Maps



Selection of Top Roads Vulnerable to 100 Year Storm Surge Event Plus Sea Level Rise

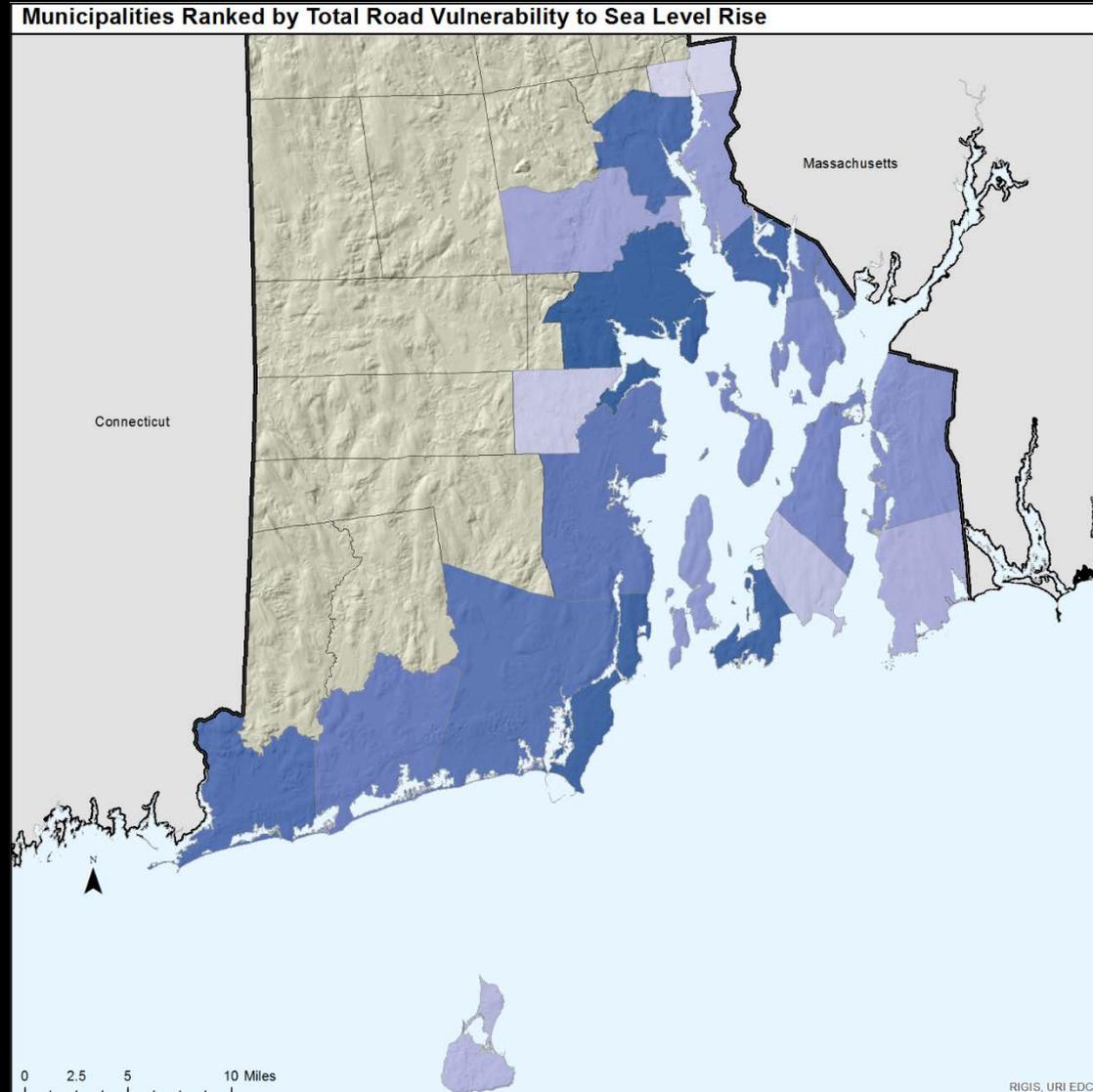
Map Legend

- | | | |
|--|---|--|
|  Current Ponds & Mean Higher High Water |  Exposed Roads in the Top 10 |  City and Town Boundaries |
|  100-Year Storm Event |  Potentially Exposed Roads |  Roads |
|  100-Year Plus 1 | | |
|  100-Year Plus 3 | | |
|  100-Year Plus 5 | | |

ROAD VULNERABILITY: RANKED MUNICIPALITIES

SEA LEVEL RISE

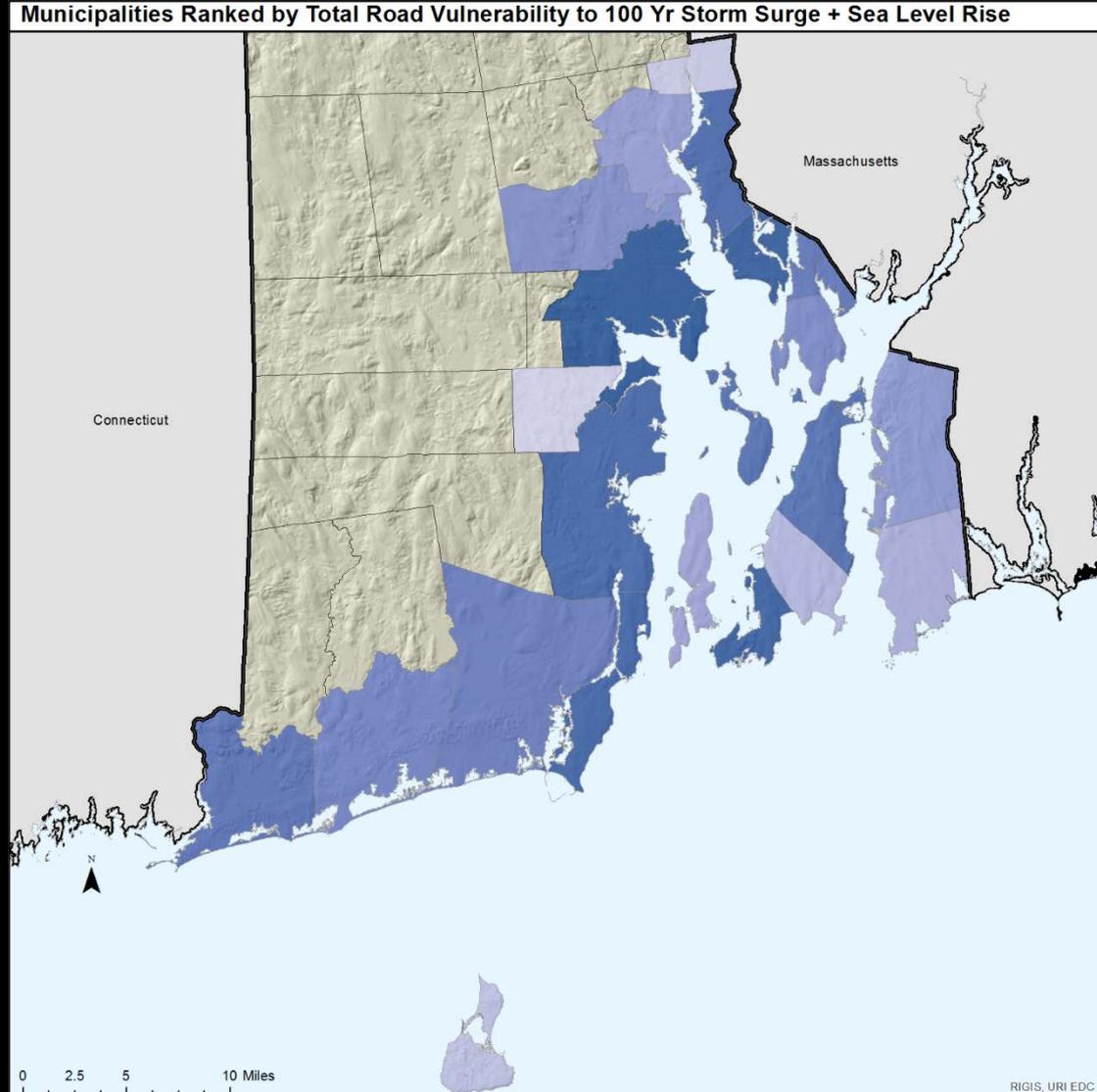
RANK	CITY OR TOWN
1	WARWICK
2	NARRAGANSETT
3	NEWPORT
4	BARRINGTON
5	PROVIDENCE
6	WESTERLY
7	SOUTH KINGSTOWN
8	NORTH KINGSTOWN
9	CHARLESTOWN
10	WARREN
11	PORTSMOUTH
12	BRISTOL
13	TIVERTON
14	JAMESTOWN
15	EAST PROVIDENCE
16	CRANSTON
17	LITTLE COMPTON
18	NEW SHOREHAM
19	MIDDLETOWN
20	EAST GREENWICH
21	PAWTUCKET



ROAD VULNERABILITY: RANKED MUNICIPALITIES

100 YEAR STORM + SEA LEVEL RISE

RANK	CITY OR TOWN
1	WARWICK
2	BARRINGTON
3	NEWPORT
4	NARRAGANSETT
5	NORTH KINGSTOWN
6	EAST PROVIDENCE
7	PORTSMOUTH
8	WESTERLY
9	WARREN
10	SOUTH KINGSTOWN
11	CHARLESTOWN
12	BRISTOL
13	CRANSTON
14	TIVERTON
15	PROVIDENCE
16	JAMESTOWN
17	LITTLE COMPTON
18	MIDDLETOWN
19	NEW SHOREHAM
20	PAWTUCKET
21	EAST GREENWICH

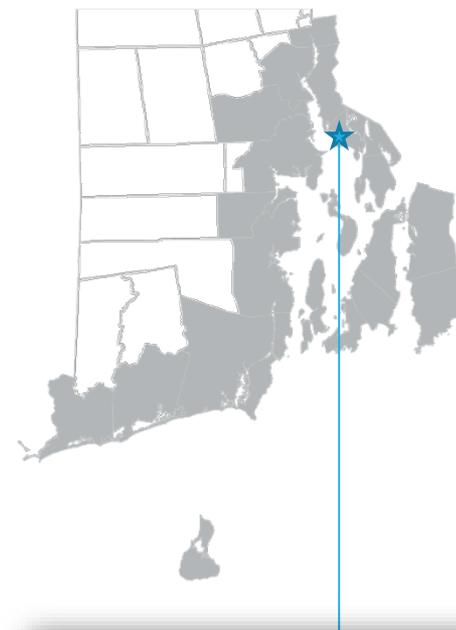


ROAD VULNERABILITY FINDINGS



- SOME CRITICAL FACILITIES EXPOSED
- A LARGE NUMBER OF SMALL FACILITIES EXPOSED

BRIDGE VULNERABILITY FINDINGS: SEA LEVEL RISE

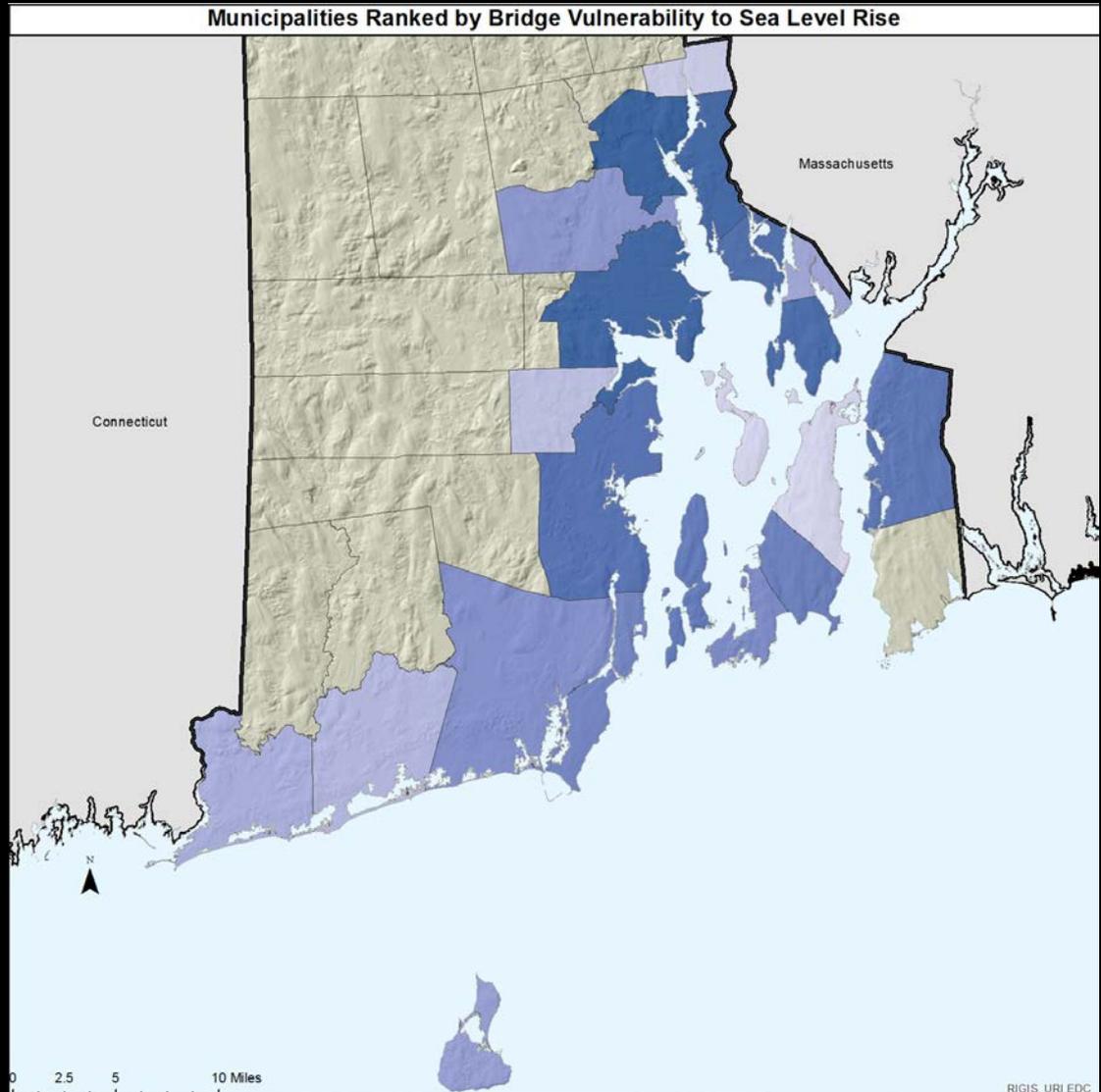


SEA LEVEL RISE				
RANK	BRIDGE NAME	FACILITY CARRIED	FEATURE INTERSECTED	CITY OR TOWN
1	Barrington	RI 114/103 Cnty Rd	Barrington River	Barrington
2	Warren	RI 114/103 Cnty Rd	Warren River	Barrington
3	Silver Creek	RI 114 Hope St	Tidal Inlet	Bristol
4	Apponaug	US 1 Post Rd	Apponaug River	Warwick
5	Apponaug Mill	RI 117 Cntrvlle Rd	Apponaug River	Warwick
6	Easton Beach	RI 138 Memorial Bd	Easton Pond Channel	Middletown
7	C.L. Hussey Memorial	US 1A Bstn Nck Rd	Wickford Cove	North Kingstown
8	Eagle Street	Eagle St	Woonasquatucket River	Providence
9	Round Swamp	North Main Rd	Tidal Inlet	Jamestown
10	Park Street	Park St	Woonasquatucket River	Providence

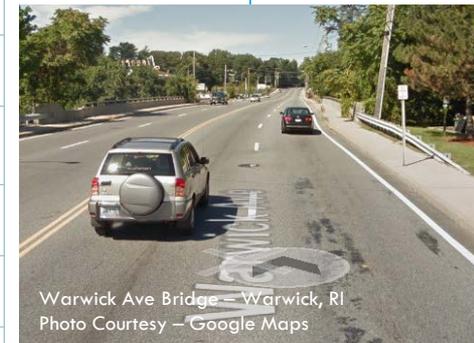
BRIDGE VULNERABILITY: RANKED MUNICIPALITIES

SEA LEVEL RISE

RANK	CITY OR TOWN	EXPOSED BRIDGES
1	Providence	21
2	Warwick	10
3	East Providence	7
4	Bristol	8
5	Barrington	6
6	North Kingstown	5
7	Tiverton	4
8	Jamestown	5
9	Narragansett	3
10	South Kingstown	3
11	Middletown	3
12	Newport	3
13	Warren	2
14	New Shoreham	2
15	Westerly	2
16	Cranston	2
17	Portsmouth	1
18	Charlestown	1
19	Pawtucket	1
20	East Greenwich	1



BRIDGE VULNERABILITY FINDINGS: 100 YEAR STORM SURGE + SEA LEVEL RISE



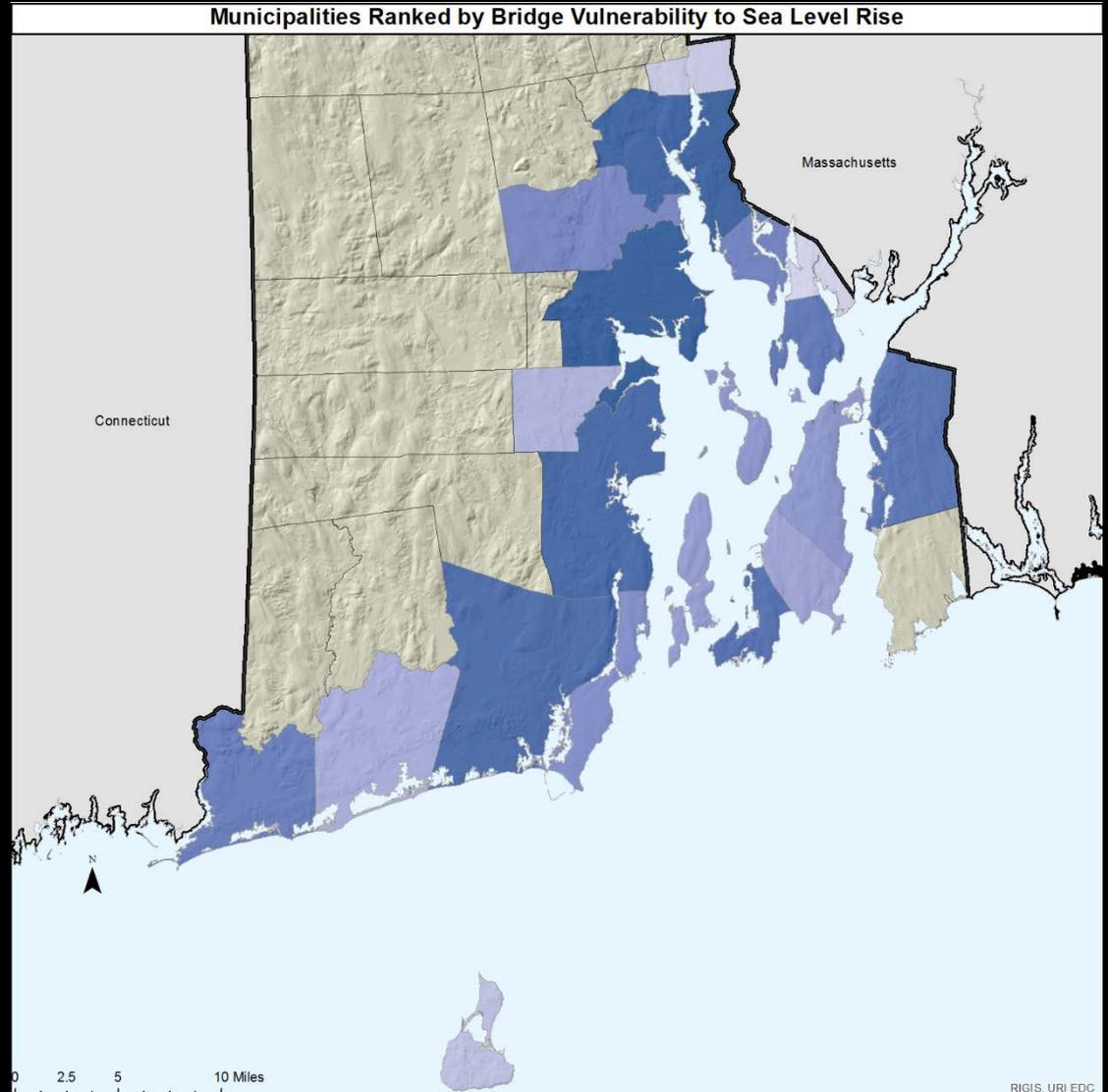
Warwick Ave Bridge – Warwick, RI
Photo Courtesy – Google Maps

STORM SURGE + SLR				
RANK	BRIDGE NAME	FACILITY CARRIED	FEATURE INTERSECTED	CITY OR TOWN
1	Warwick Ave	RI 117 Warwick Av	Pawtuxet River	Cranston
2	Newport Bridge Authority	RI 138	East Passage Narr Bay	Jamestown
3	Silver Creek	RI 114 Hope St	Tidal Inlet	Bristol
4	Easton Beach	RI 138 Memorial Bd	Easton Pond Channel	Middletown
5	Apponaug	US 1 Post Rd	Apponaug River	Warwick
6	Apponaug Mill	RI 117 Cntrvllle Rd	Apponaug River	Warwick
7	Carpenters Corner	RI 117 Cntrvllle Rd	Tuscatucket River	Warwick
8	Cottage Home	RI 117A Warwick Av	Buckeye Brook	Warwick
9	Babbitt Farm	US 1 Post Rd	Cocumcussoc Brook	North Kingstown
10	Barrington	RI 114/103 Cnty Rd	Barrington River	Barrington

BRIDGE VULNERABILITY: RANKED MUNICIPALITIES

100 YEAR STORM SURGE + SEA LEVEL RISE

RANK	CITY OR TOWN	EXPOSED BRIDGES
1	East Providence	19
2	Warwick	20
3	Providence	19
4	North Kingstown	12
5	Newport	8
6	Tiverton	8
7	South Kingstown	9
8	Cranston	6
9	Bristol	7
10	Barrington	6
11	Westerly	7
12	Narragansett	5
13	Portsmouth	5
14	Jamestown	4
15	Middletown	3
16	Warren	2
17	Pawtucket	2
18	East Greenwich	2
19	Charlestown	2
20	New Shoreham	2



INITIAL CONCLUSIONS



- CAUTIOUS OPTIMISM
 - MOST CRITICAL OF FACILITIES ARE WELL PROTECTED
 - THERE IS TIME TO TAKE ACTION
- ACTION SHOULD BE TAKEN NOW
 - DECISIONS IN THE PRESENT ARE RELEVANT

USING THIS DATA

- Municipal Fact Sheets
 - All 21 Coastal Communities
- Technical Paper
- Appendix
 - State, Municipal Data
 - Maps, Tables
- Enhanced Web Site
 - All Division of Planning inundation projects
 - All project materials
 - Web viewer
 - Links to other resources

<http://www.planning.ri.gov/geodeminfo/data/slr.php>

PLANNING FOR SEA LEVEL RISE ON YOUR ROADS

This fact sheet aims to provide municipal leaders and practitioners with a survey of Barrington's transportation infrastructure elements that may be affected by sea level rise and storm surge. In addition to explaining and presenting the data, this fact sheet will outline strategies that may help in adapting to these conditions, and point towards resources that will enable further investigation.

Relevance

The impacts of Sea Level Rise (SLR) are often perceived as distant, but the assets being built today will still be within their design life when future effects of sea level rise are felt. In addition, sea level rise will magnify the impacts of 100-year storm surge events by raising the water level. Though current federal guidelines only require federally funded assets be built to survive a 100-year storm event, the impact of a 100-year storm event is likely to change during the design life of the assets currently under consideration in Rhode Island.

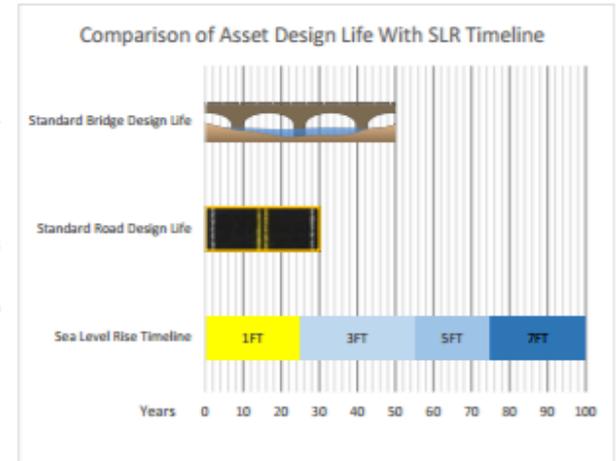


Figure 1

Data and Methodology



Figure 2: Flooding near Saughest Point: June 2013

To help Rhode Island's cities and towns prepare for these changing conditions, the Statewide Planning Program (SPP) has engaged in an effort to analyze the potential impacts created by sea level rise and storm surge. Using data developed under the name "STORMTOOLS" by the Coastal Resources Management Council and the University of Rhode Island, SPP identified the assets that could be impacted (exposure), and their vulnerability. As a result of this analysis, SPP identified the roads and bridges most likely to be impacted by Sea Level Rise, and scored their relative vulnerability based on the severity of the hazard they face and the potential impact of asset damage on the transportation system as a whole.



FURTHER RESEARCH

- Conduct own GIS analysis
 - GIS data on RIGIS
 - Local data sets
 - Local knowledge
- Engineering Studies
 - Use GIS to target resources



GENERAL ADAPTATION STRATEGIES

PROTECT

Armor

Enhance natural protections

ACCOMMODATE

Accommodate in place

Realignment

RETREAT

Find alternate routes

Abandonment

DO NOTHING

INCLUDING SEA LEVEL RISE IN PLANNING PRACTICE

SPENDING

- Asset management
- Project selection (TIP or CIP)
- Construction contracts

PLANNING

- Hazard mitigation plans
- Long range transportation plan
- Local comprehensive plans

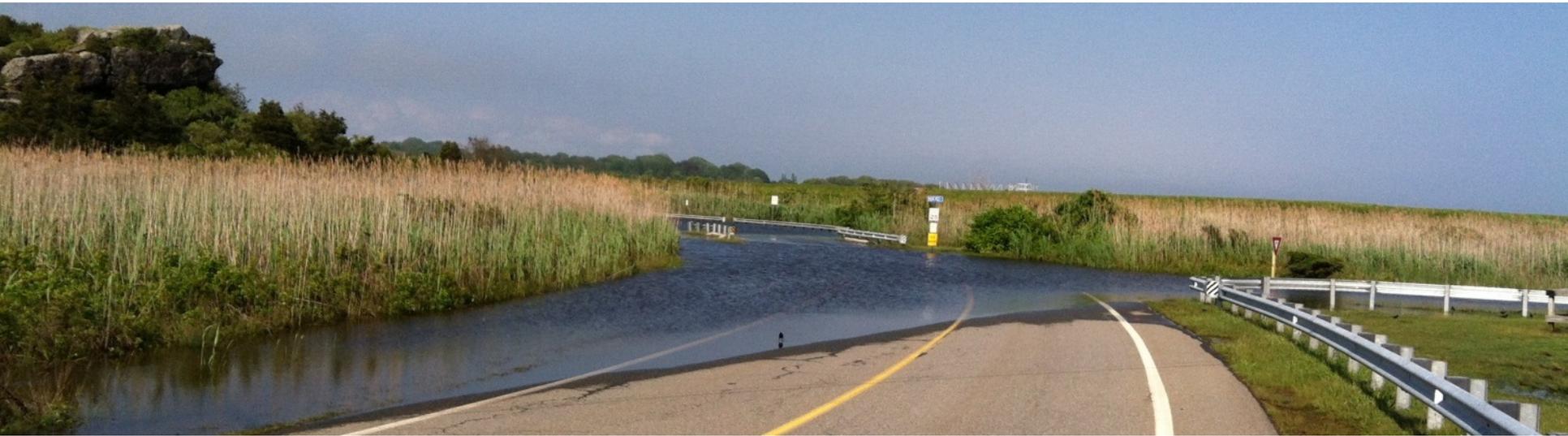
GOAL-SETTING

- MAP-21 performance measures
- Other performance management

INUNDATION RESEARCH OPPORTUNITIES

- New Data
 - Erosion
 - Riverine Flooding
 - Synthetic Interaction Modeling
- Different Asset Classes
 - ~~Transportation~~
 - ~~Vulnerable Populations~~
 - ~~Public Health~~
 - Utilities
 - Wastewater
 - Environmental Systems
 - Industry
- Synthesis





THANK YOU
QUESTIONS & DISCUSSION