Narragansett Bay –
“Living and dying by the choices [we’ve] made...”
- George Jones
“This history of ... Narragansett Bay has been the product of circumstances large and small, of the geology of the watershed and the genius of individuals.”

-S.W. Nixon (1990) History of metal inputs to Narragansett Bay
“...the beaches within a quarter of a mile of the sewer outfall are usually covered with foul-smelling slime and collections of sewage refuse.... Before the Fields Point sewage station was put into operation this shoal was a famous natural oyster bed, but it has been abandoned for a number of years.”

(Fuller 1905)
Artificial fertilization of the bay

Figure from Nixon et al. (2008)
Low Oxygen Conditions in Narragansett Bay

August 6, 2002
Minimum Dissolved Oxygen

August 26, 2008
Bottom Dissolved Oxygen

Points surveyed by:
• one boat group
• multiple boat groups

Minimum DO (mg/L)
- ≤ 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- 6 - 7
- > 7

Bottom DO (mg/L)
- < 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- 6 - 7
- > 7

http://www.geo.brown.edu/georesearch/insomniacs
Fish kills in Narragansett Bay

1898

2003

Figure 3

Marine Fauna Die Throughout The Water Column

Marine Fauna Die on the Bottom

Anoxic / Hypoxic Areas in Greenwich Bay
Based on DEM Measurements of August 20, 2003

Nixon 1989

RIDEM 2003
Climate Change and Narragansett Bay: warmer

Total **air** temperature increase across the watershed—1.3 °C to 1.7 °C (1960 – 2015)

Total **surface water** temperature increase – 1.5 to 1.6 °C

Climate Change and Narragansett Bay: wetter and stormier

Average annual rainfall has increased 0.4 to 0.7 inches per decade since 1895

Annual precipitation falling during intense storms has increased 71% since 1965

NBEP (2017)
Oligotrophication of mid-Narragansett Bay

$R^2 = 0.40$

$p < 0.0001$

Data from: http://web.uri.edu/plankton/
Grand Challenge (& Grand Opportunity):

Quantify the impacts of changing climate and decreased nutrient loading.