Climate Change: Predictions, Impacts, and Responses

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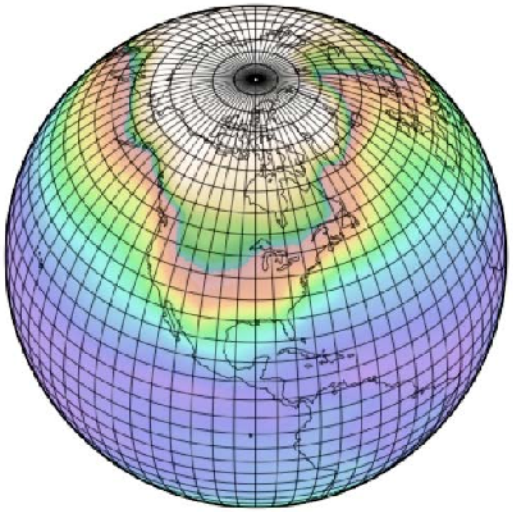
National Wildlife Federation

Climate Models

Global Climate Models (GCMs)



Models are selected based on their ability to simulate the observed record of climate related data

Original set of 36 models → Rigorous assessment of model performance → Selection of 14 models

Emissions Scenarios

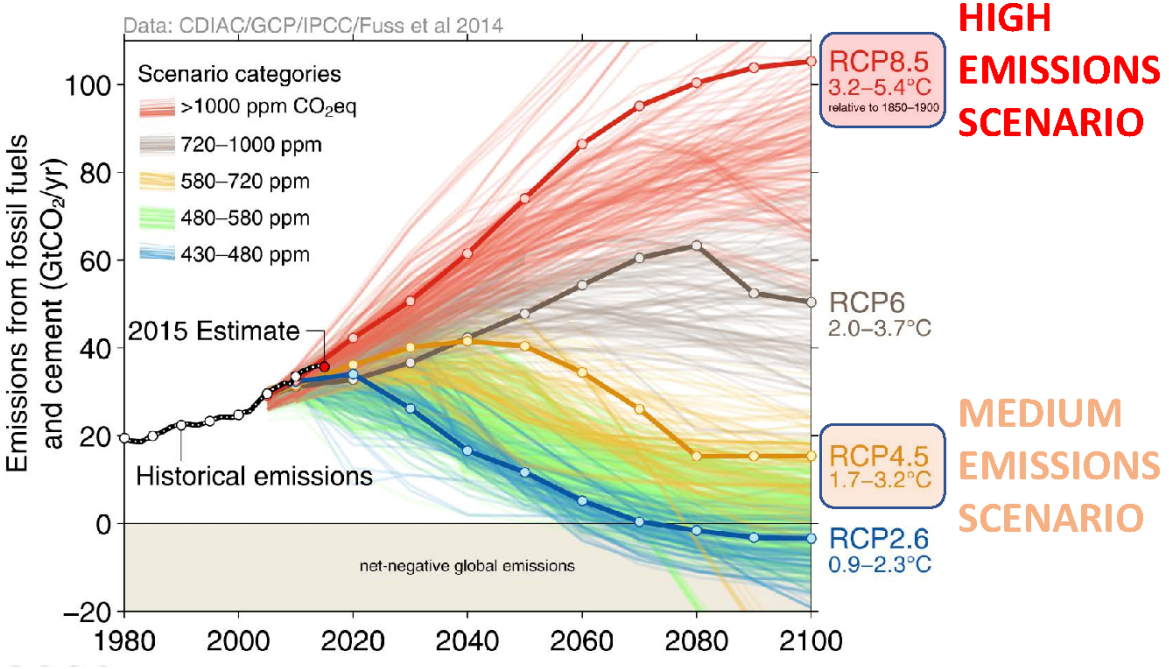
RCP, what's it to me?

Complicated name, simple concept.

The number after "RCP" represents a specific hypothetical future.

The higher the number, the higher the emissions.

RCP8.5 sometimes referred to as "business as usual".



Downscaling

OK, but what does this tell me about my community?

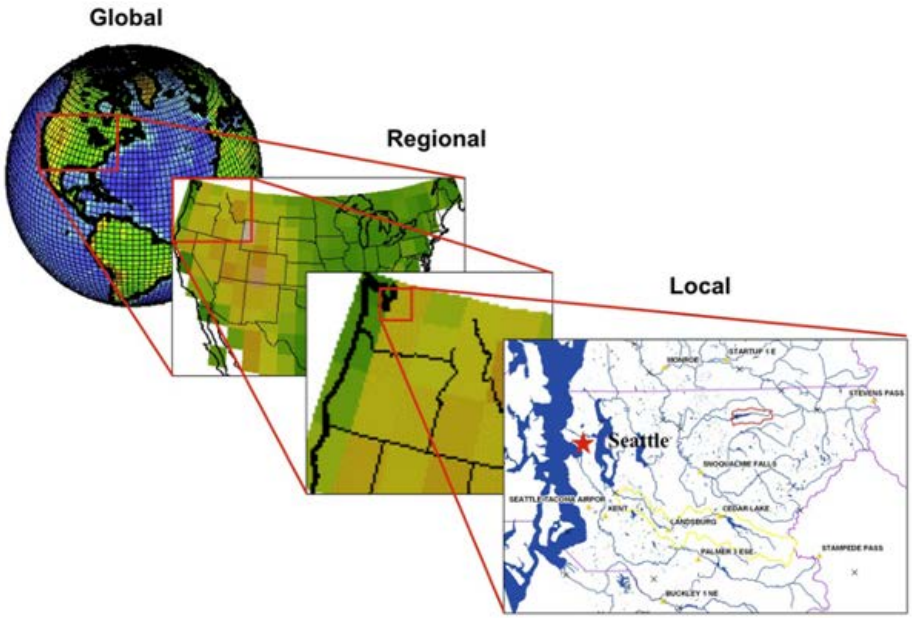
The process by which information available at large scale is used to make predictions at local scales.

Why do we need to downscale?

- Global climate data is too coarse

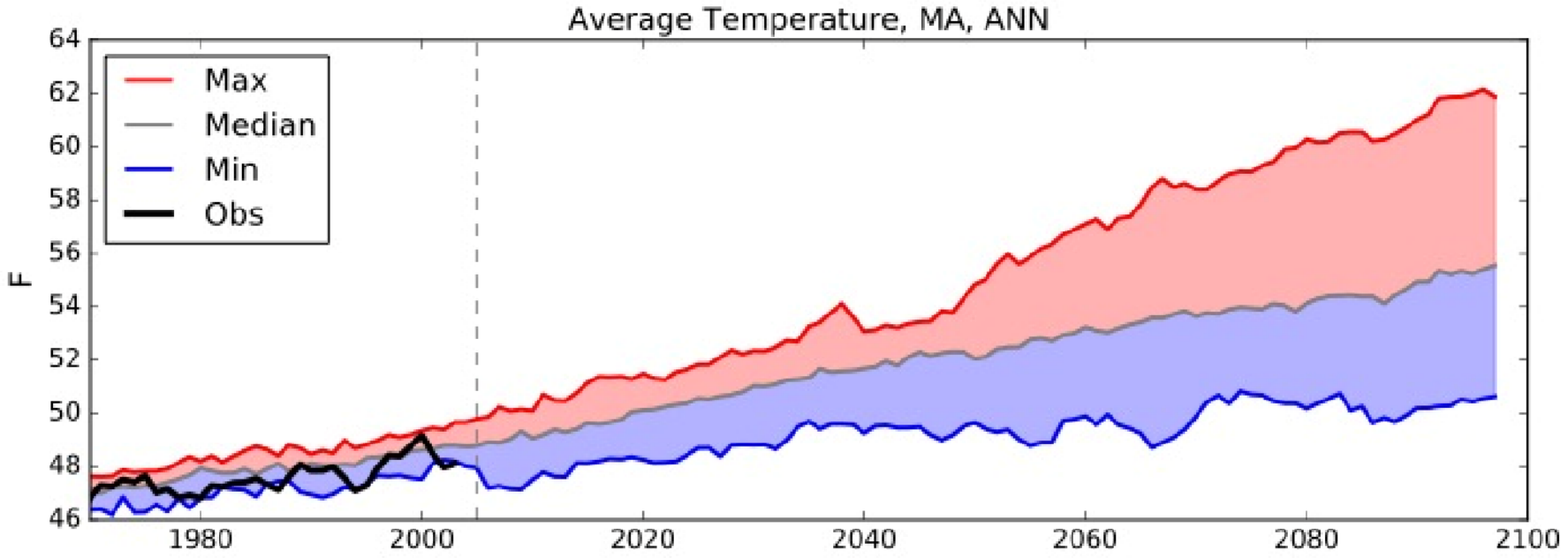
How do we downscale?

- Develop local statistical models for the relationship between local, climate influenced variable (e.g. water temperature and precipitation) and apply these local models to the information derived from global climate models.



Local Climate Predictions for Massachusetts

Average Temperature



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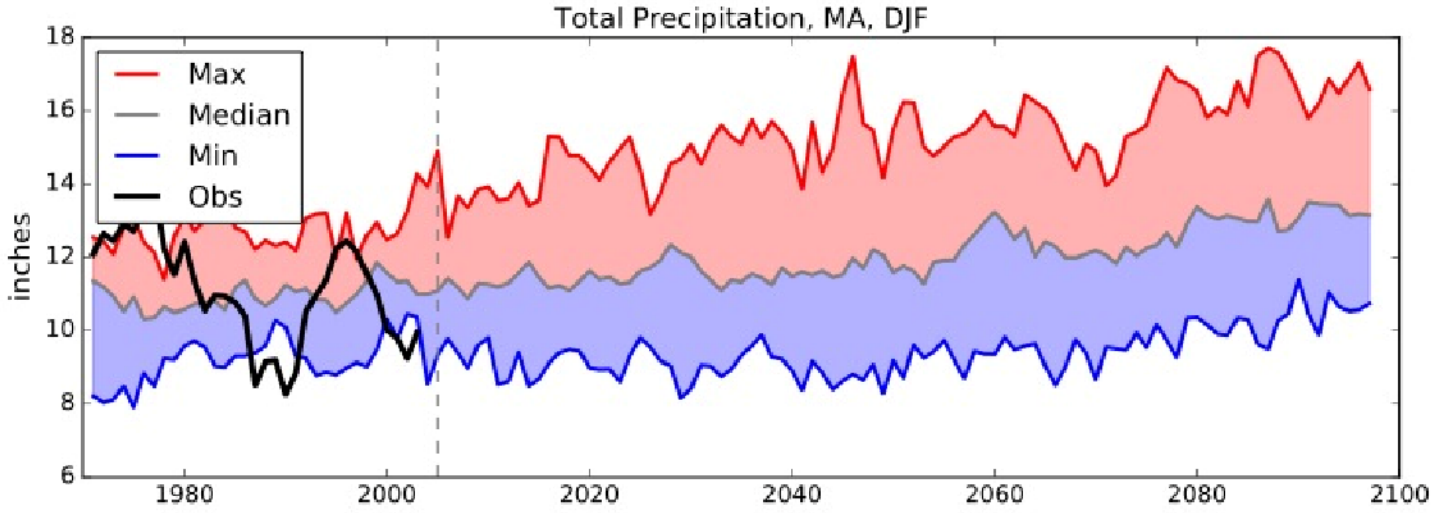
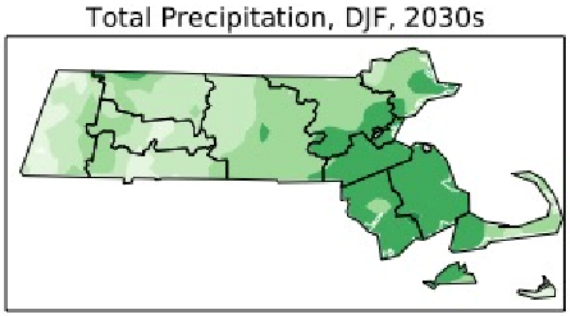
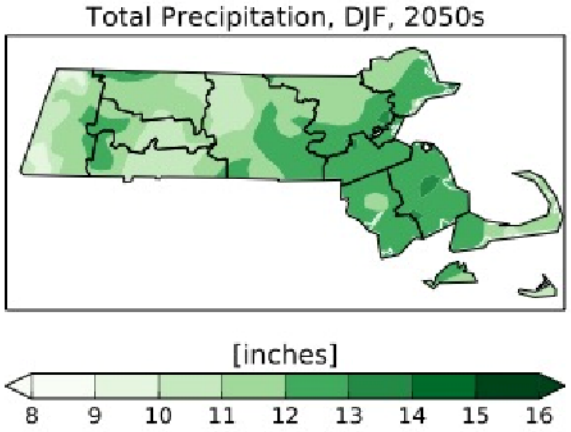
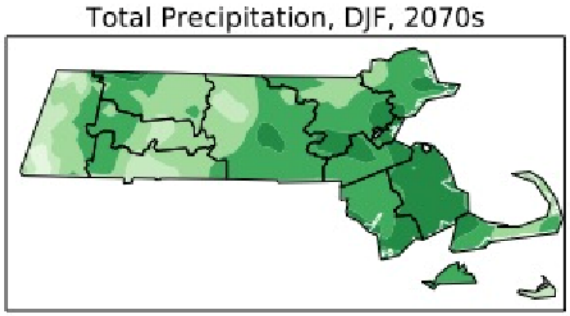
Winter (DJF) Precipitation









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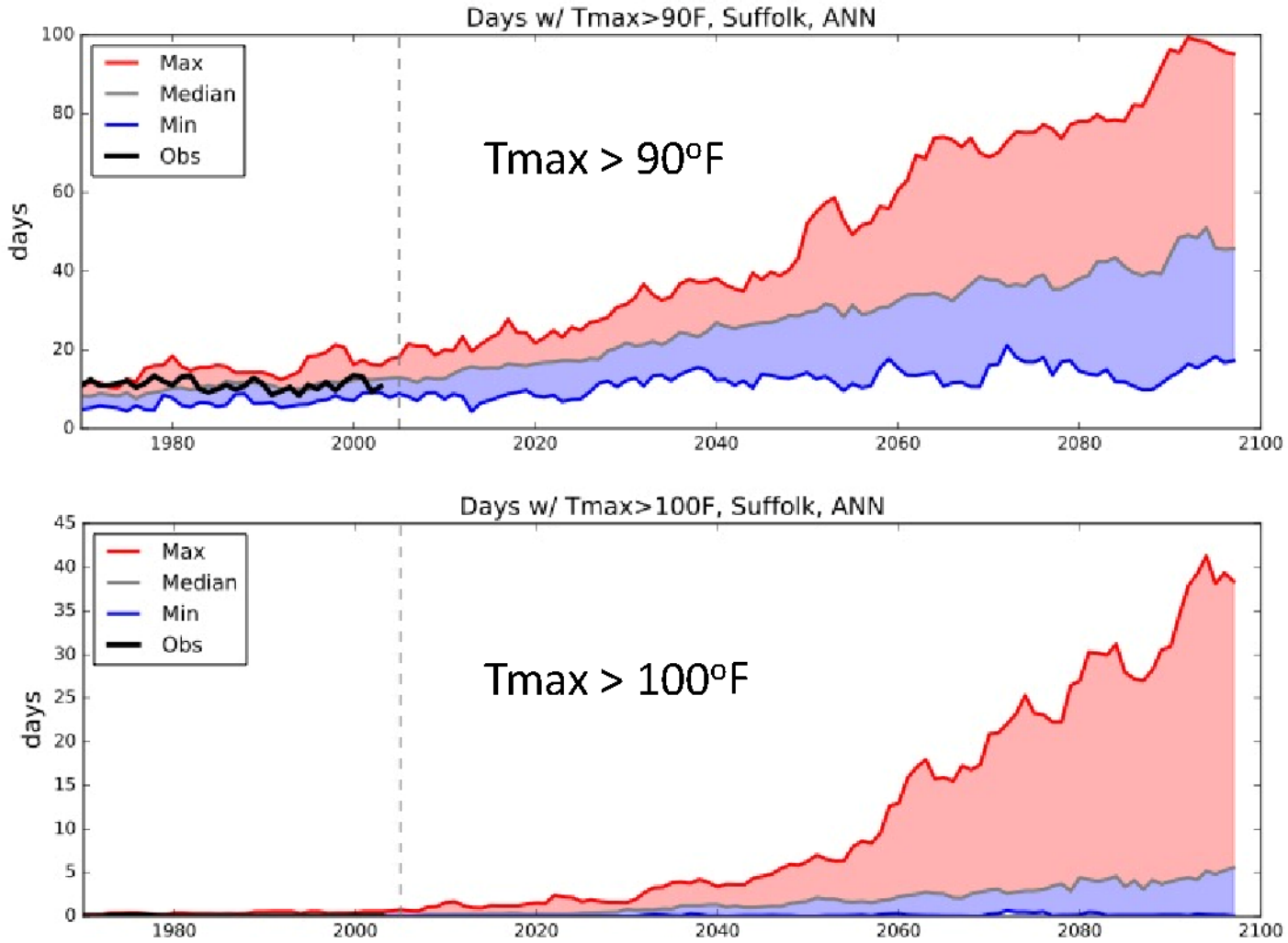
Hot extremes



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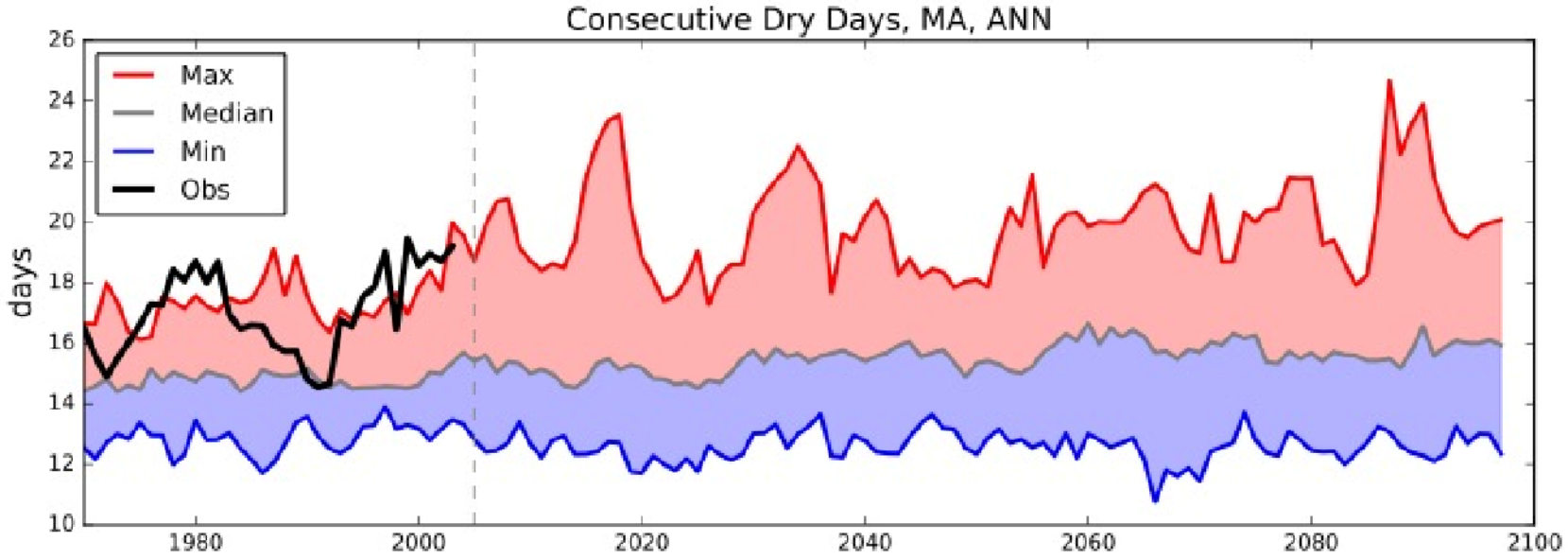
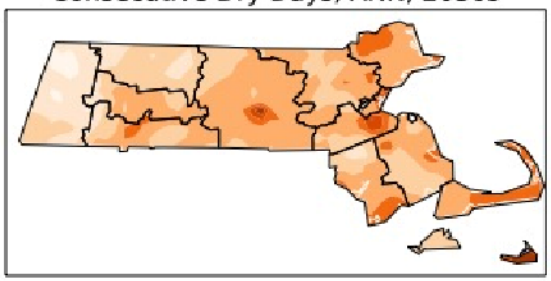
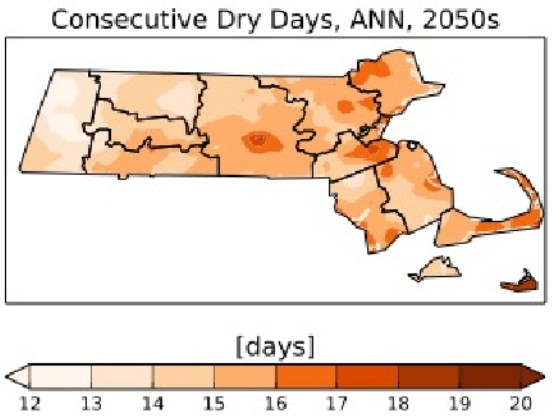
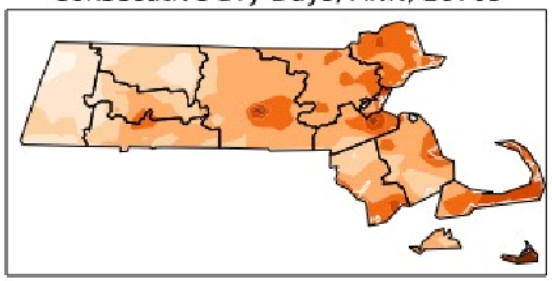
Consecutive Dry Days









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Sea-Level Rise

Relative mean sea level (feet NAVD88) for Boston, MA					
Scenario	**Probabilistic projections**	**2030**	**2050**	**2070**	**2100**
Intermediate	Unlikely to exceed (83% probability) given a high emissions pathway (RCP 8.5)	0.7	1.4	2.3	4.0
Intermediate- High	Extremely unlikely to exceed (95% probability) given a high emissions pathway (RCP 8.5)	0.8	1.7	2.9	5.0
High	Extremely unlikely to exceed (99.5% probability) given a high emissions pathway (RCP 8.5)	1.2	2.4	4.2	7.6
Extreme (Maximum physically plausible)	Exceptionally unlikely to exceed (99.9% probability) given a high emissions pathway (RCP 8.5)	1.4	3.1	5.4	10.2

State of Massachusetts 2018

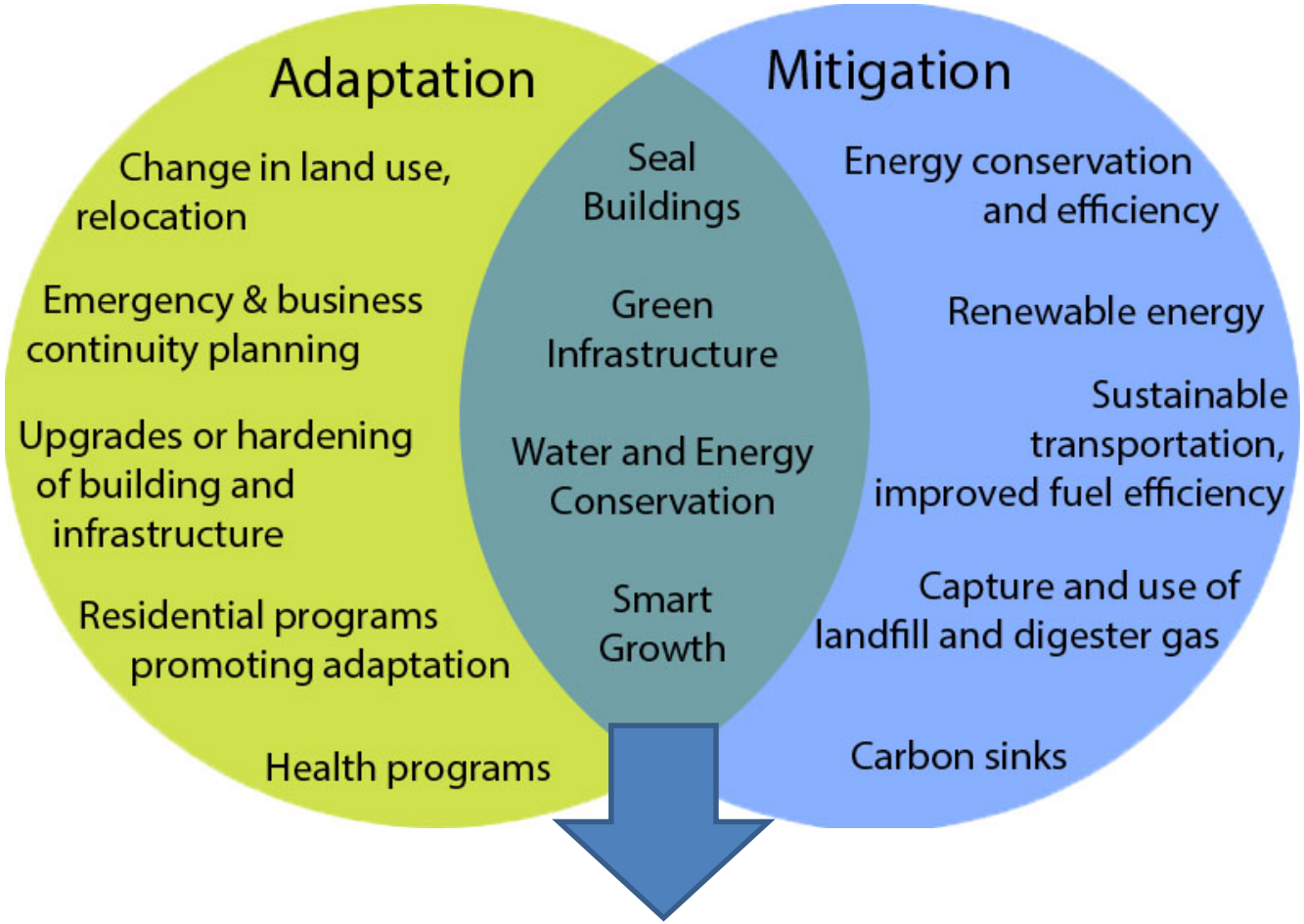
Coastal Storms

STORM RETURN PERIODS, IN YEARS

Year	Category 1	Category 2	Category 3	Category 4	Category 5
2010	12.7	30.7	54	120	325
2020	13.2	31.8	48.8	108.5	294
2030	13.6	33.1	44.2	98.1	266
2040	14.2	34.4	39.9	88.8	240
2050	14.7	35.7	36.1	80.3	217
2060	15.3	37.1	32.7	72.6	196

The computations underlying this analysis were carried out by Dr. Robert Easton, Professor of Applied Mathematics Emeritus, University of Colorado, Boulder

What do we do about it?



(Coastal) Resilience

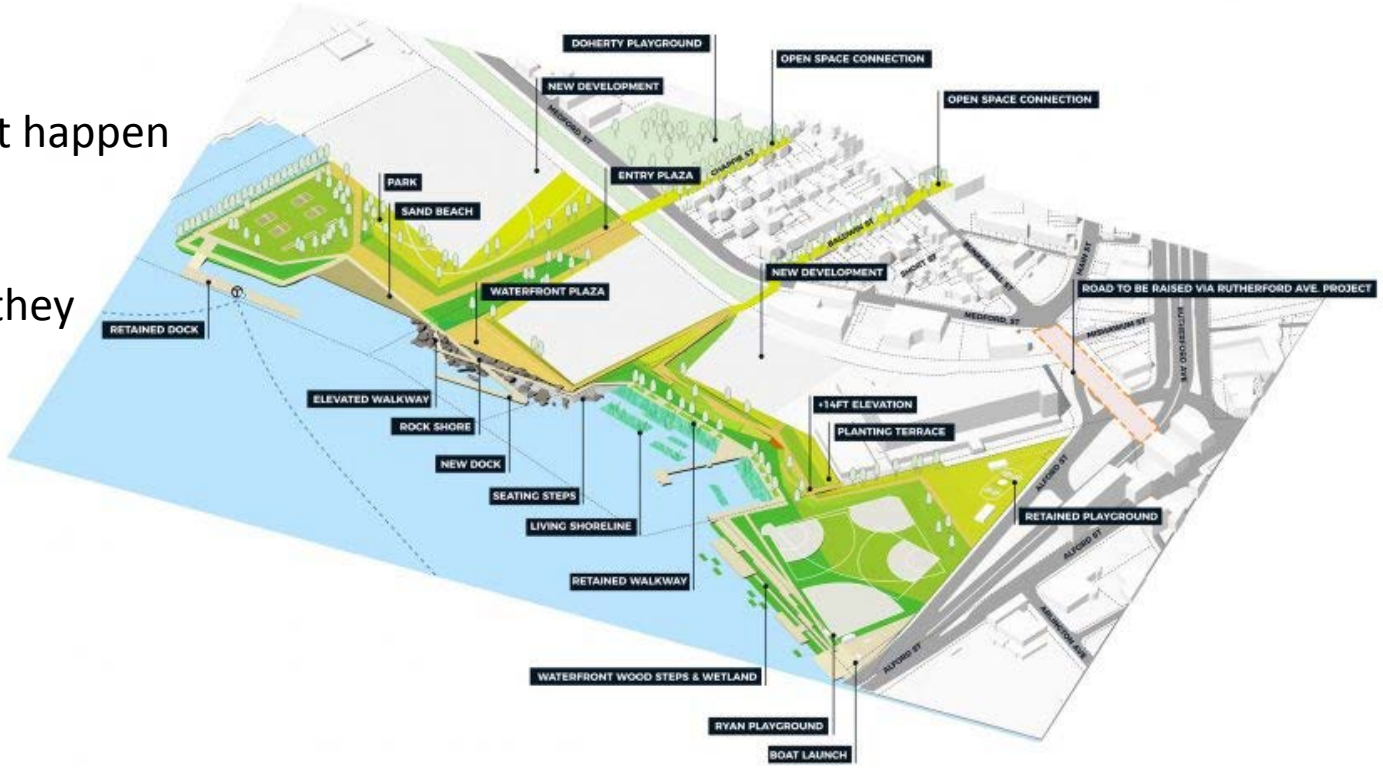
Resilience is an **<u>ability</u>** to:

adapt to changes.

anticipate what might happen next

absorb shocks when they come along

bounce back quickly



Questions?

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