

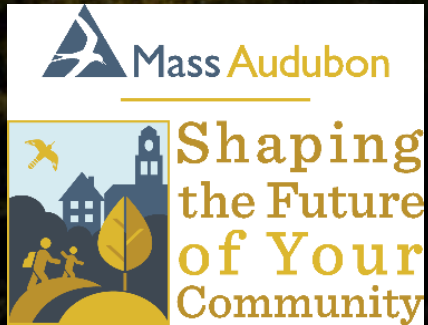
# Broadening Support for Land Conservation Through Economic Messaging: Valuing Ecosystem Services in the Narragansett Bay Watershed

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MLCC 2020

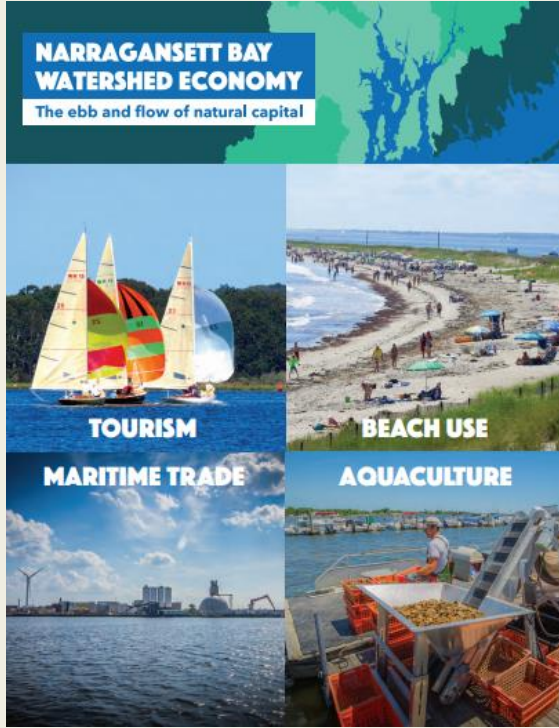


# The Narragansett Bay Watershed

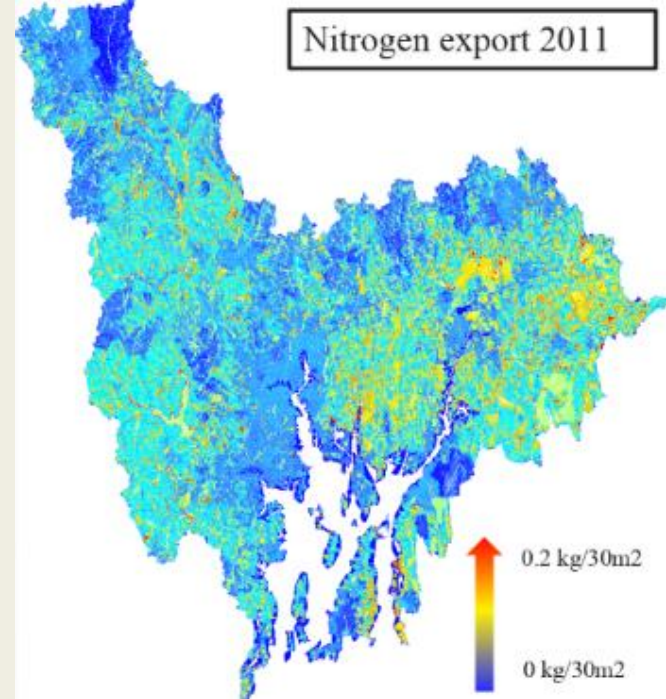
- Home to ~2 million people
- 60% MA, 40% RI
- Dramatic reductions in pollution by wastewater treatment facilities – now other challenges
  - NBEP *State of the Narragansett Bay and its Watershed* report



# Project Elements & Roles



Valuation of economic sectors  
[nbweconomy.org](http://nbweconomy.org)



Modeling of land use changes, sediment/nutrient transport, wellbeing changes & value

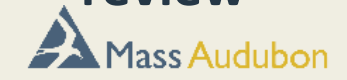


**SNEP Ecosystem Service Valuation Database**

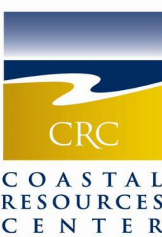
In 2008, EPA's SNEP Watershed Research Group (RC) and Mass Audubon developed a database of ecosystem service valuations (ESV) studies. The database includes 63 valuations both inside and outside of the SNEP region. For Massachusetts and Rhode Island (see below release of the SNEP report), we included 28 studies that included a total of 55 ecosystem service values that are included in the table below. In addition to the fields, the database needs a link to the study.

Ecosystem Service Valuation	Coastal or Inland	Habitat or Land Use Type	Geographic Region	Value	Methodology
Carbon Sequestration*	Coastal and Inland	Wetlands	Attleboro, MA 2010-2030	\$990,000/yr	Benefit Transfer
Carbon Sequestration*	Coastal and Inland	Forest and Wetlands	The Long Island Sound Basin	\$12.2 - \$120.8/yr	Benefit Transfer
Carbon Sequestration*	Coastal	Aquaculture (production of 12 ecosystem types)	Boston Harbor	\$50-100/yr	Benefit Transfer
Commercial Fishing, Food Production, and Recreation	Coastal and Inland	Green Space	Provincetown, MA	\$15.8/yr	Travel Cost
Cultural Value, Food Production, and Recreation Package	Inland	Farmland	All of RI	CI coefficients	Change-based method
Fishing-Commercial	Coastal	Ocean	Off the coast of MA and RI	\$14 million	Travel Cost
Flood Reduction*	Coastal and Inland	Wetlands	Attleboro, MA	\$3.2 million/yr	Replacement Cost
Flood Reduction*	Coastal and Inland	Wetlands	Attleboro, MA	\$2.3 million/yr	Benefit Transfer
Flood Reduction*	Coastal	Wetlands	North Attleboro, MA, including CI, RI and MA	\$623 million	Replacement Cost
Flood Reduction*	Inland	Farmland	All of RI	CI coefficients	Change-based method
Flood Reduction*	Coastal	Ocean	Fishing areas of RI coast	CI coefficients	Change-based method
Flood Reduction*	Coastal	Ocean	MA state waters	\$97.4 million/yr	Travel Cost
Improved Water Quality	Inland	Forest	Woods-Panama City Watershed	CI coefficients	Change-based method
Improved Water Quality	Inland	Wetlands	Blackstone River Watershed	\$288 to \$490 million/yr or \$11.2 to \$16.2 million/yr to \$100 million/yr	Change-based method
Improved Water Quality	Coastal and Inland	Wetlands	Attleboro, MA	\$2.8 million/yr	Benefit Transfer
Improved Water Quality	Coastal and Inland	Wetlands	Hyattsville, MA	CI coefficients	Change-based method
Improved Water Quality	Coastal	Farmland, Water Shed	Provincetown, MA	CI coefficients	Change-based method
Improved Water Quality	Coastal	Wetlands	Narragansett	\$50-70 million	Change-based method
Increased Property Values	Coastal and Inland	Wetlands	Attleboro, MA	\$10.4 million	Benefit Transfer
Increased Property Values	Coastal and Inland	Green Space	Boston, MA	\$724 million	Travel Cost

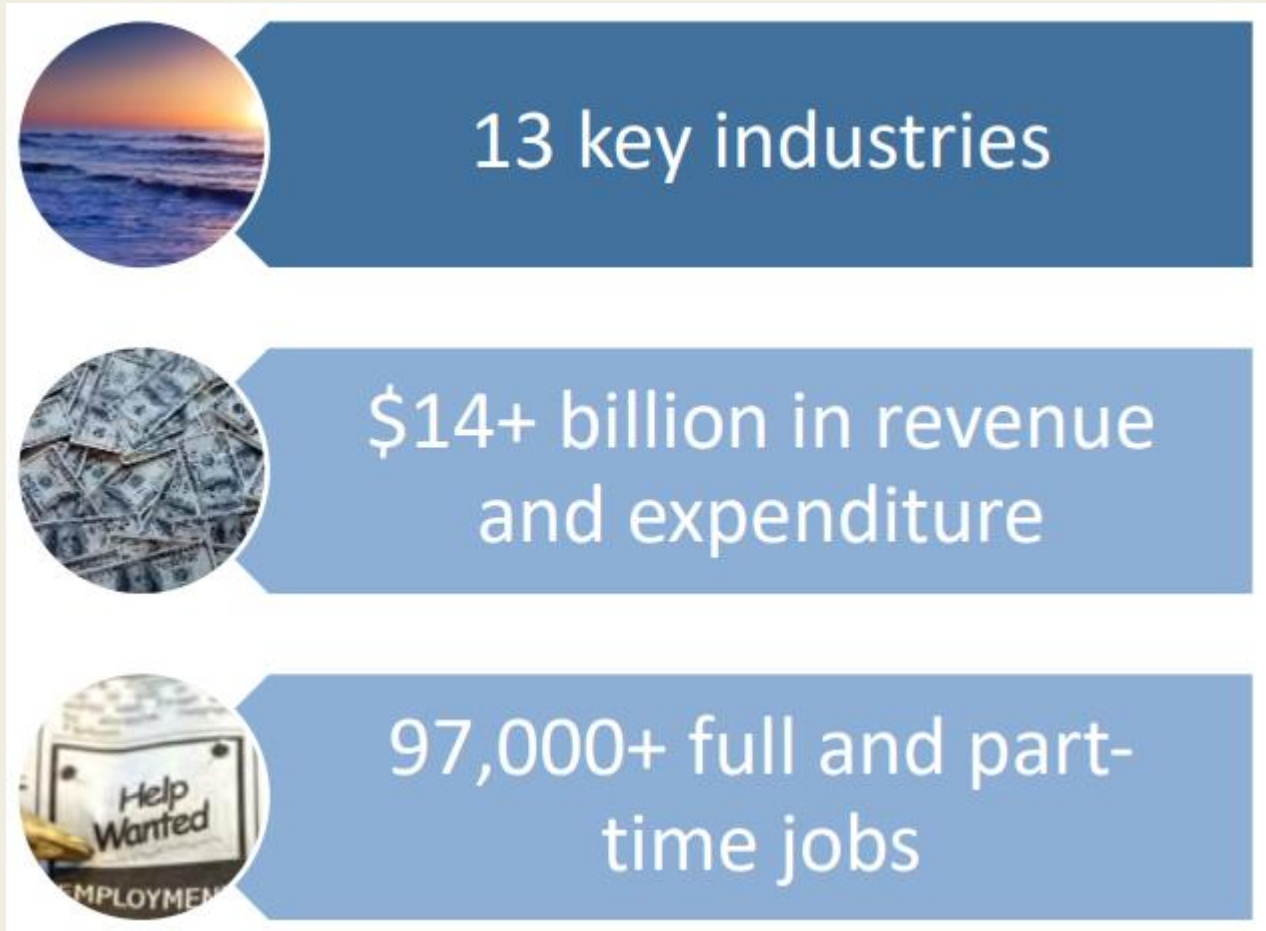
Project organization, stakeholder outreach, materials, literature review



# NBW Economy Project



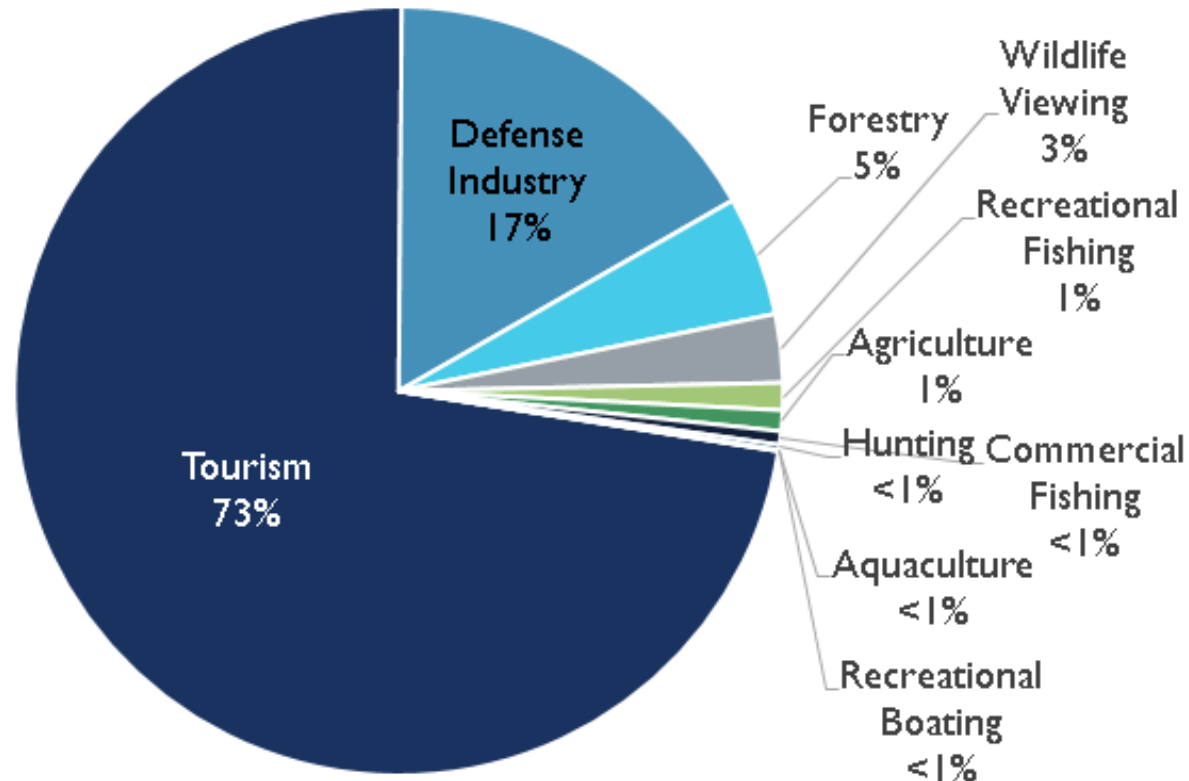
- Economic values of 13 sectors in NBW, most underpinned by natural resources
- Future threats for each industry, especially climate change



# NBW Economy Project

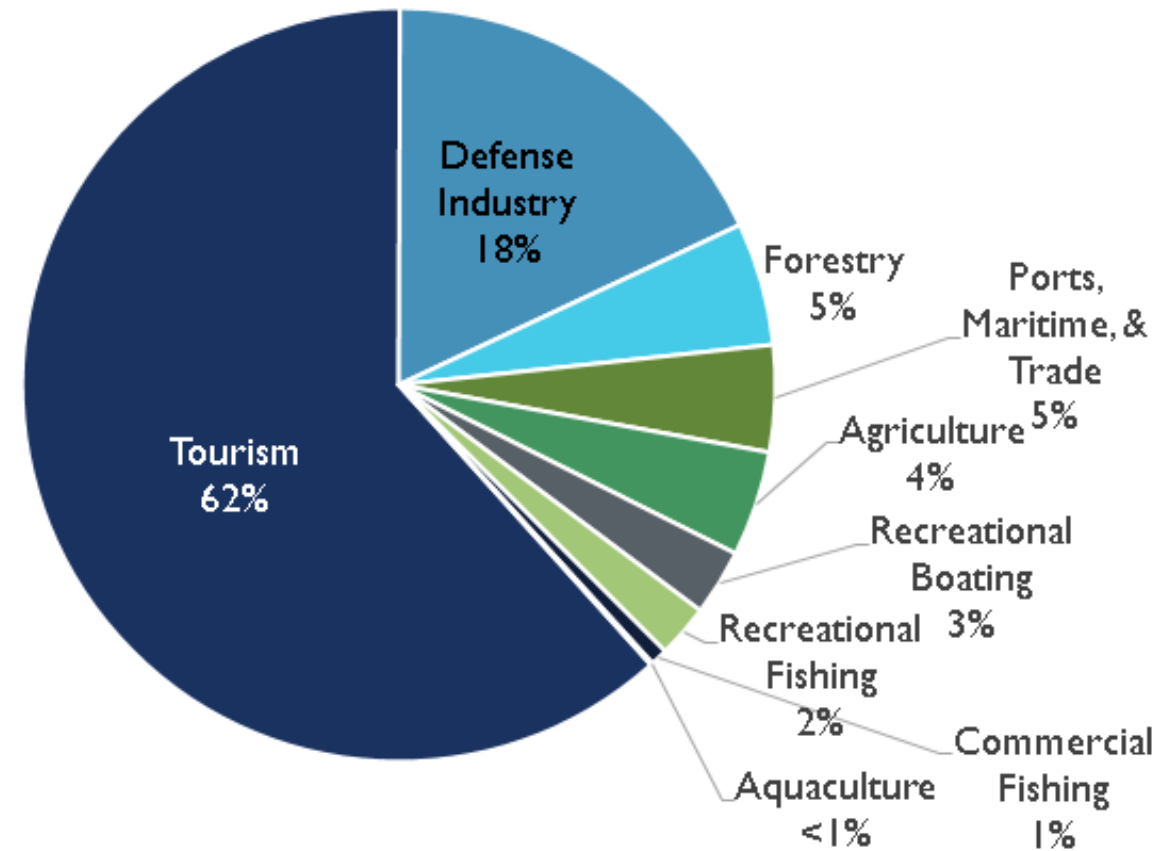


## Sector Revenue



Total annual revenue: \$13.8 billion (2016 US dollars)

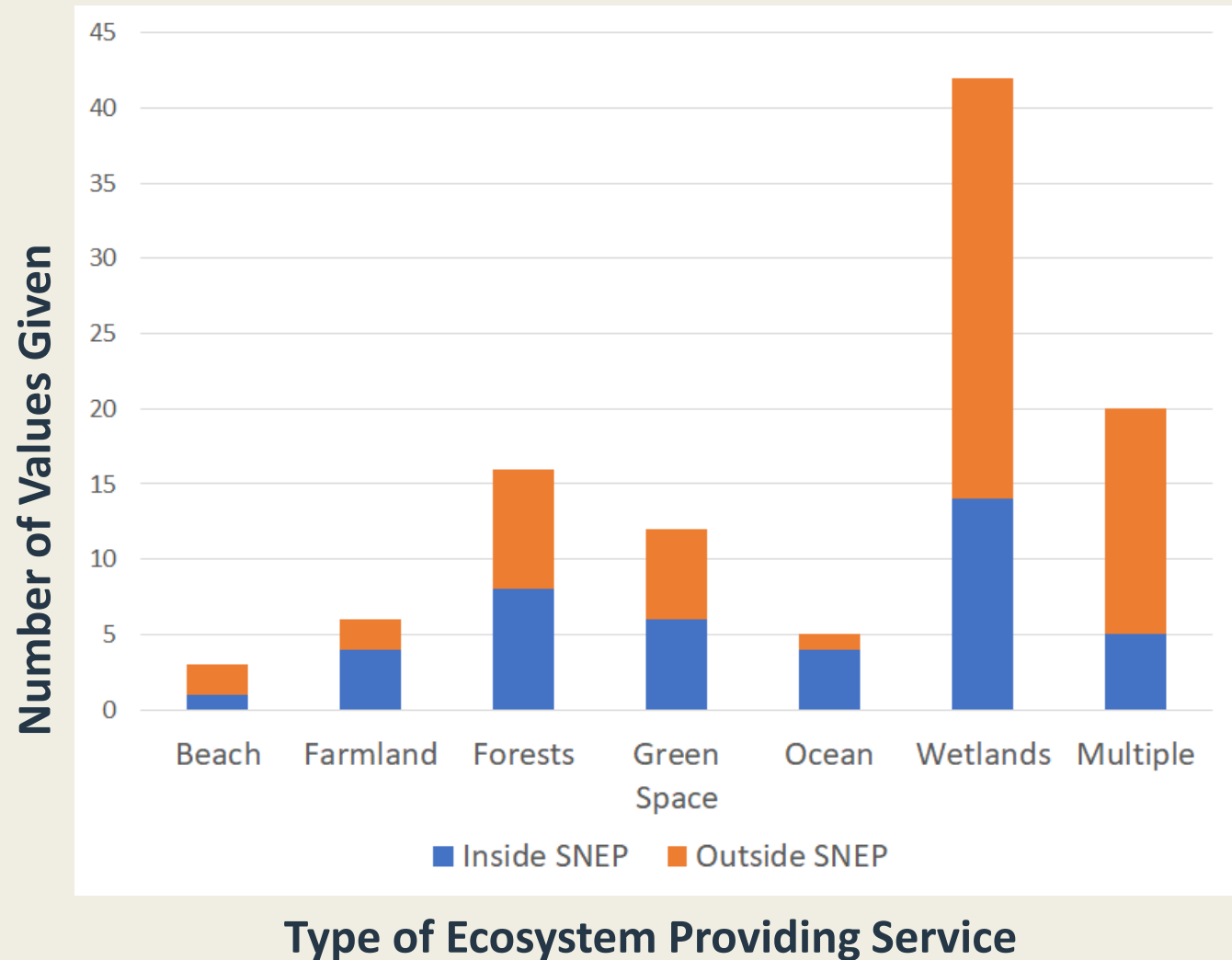
## Sector Employment



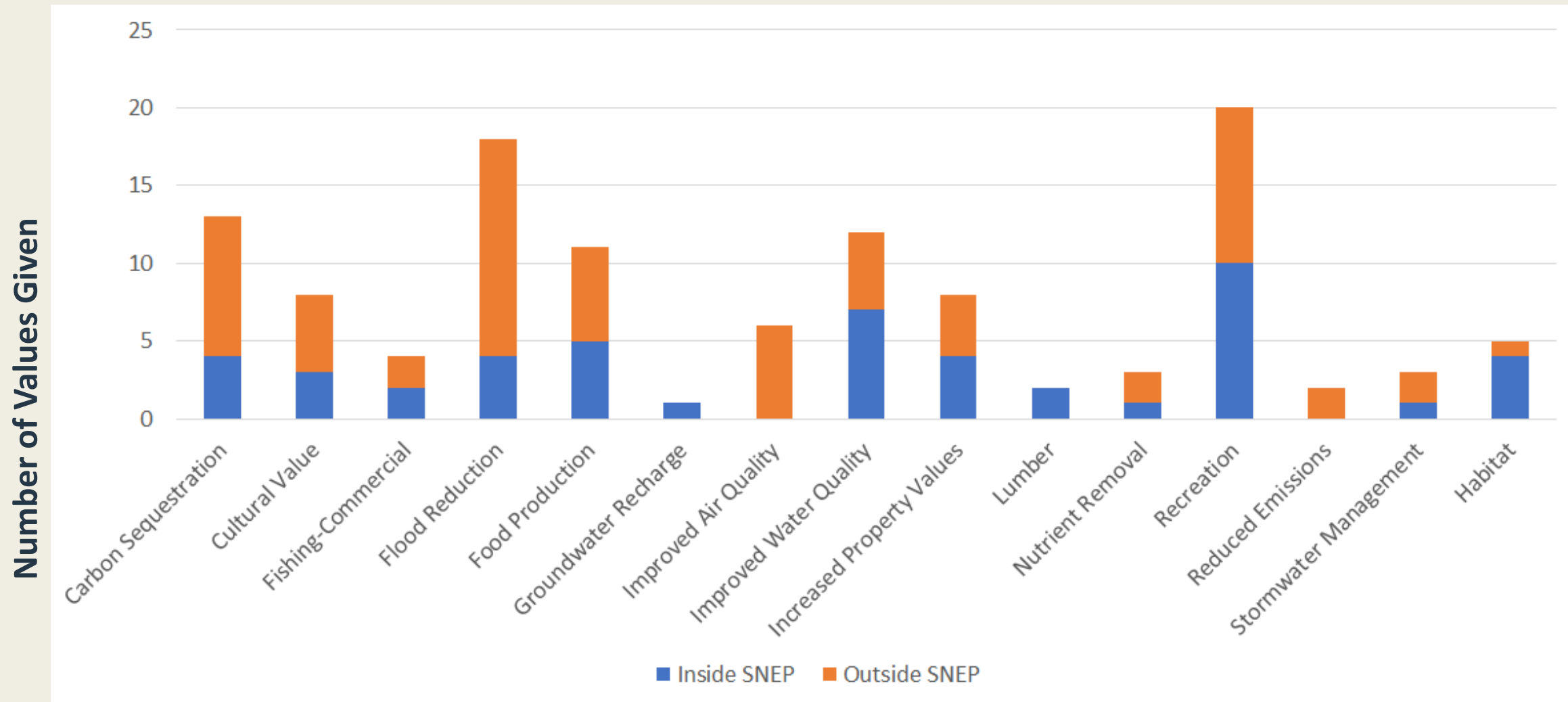
Total annual employment: 97,298

# Literature Review

Mass Audubon and ERG (Eastern Research Group) reviewed 68 ecosystem service valuation studies and created a filterable database



# Literature Review





# Value of Nature fact sheets

1. Forests
2. Coastal
3. Wetlands & Waterways
4. Grasslands & Farmland
5. Urban Green Space

**THE VALUE of Nature**  
massaudubon.org/valueofnature  
#4 OF 5

## Grasslands & Farmlands

In Massachusetts, grasslands are created and maintained by natural or human-caused disturbances. Grasslands provide crucial habitat for wildlife, including pollinators like bees, butterflies and birds. Farms and gardens support local food production.

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**ECONOMIC & HEALTH**

**Community Gardens**  
Help increase community cohesion, connecting people with nature and accessible, healthy food. Additional benefits include their important role in stormwater management.

**POLLINATORS CONTRIBUTE \$24B TO THE U.S. ECONOMY**

**22-35%**  
Profit increase from practicing organic farming instead of conventional, based on 40 years of studies covering 55 crops on five continents.

**\$475K**  
Total market value for agriculture in Massachusetts in 2017.

**45%**  
OF OUR AGRICULTURAL COMMODITIES IN MASSACHUSETTS RELY ON THE RICH DIVERSITY OF POLLINATORS FOR CROP POLLINATION

**FARMING FOR THE FUTURE**

Regenerative agriculture is a crucial piece of the sustainability puzzle. While conventional farming employs large amounts of pesticides, fertilizers, energy, and water, regenerative agriculture centers on soil health and productivity, minimizing environmental impact. This practice often goes hand in hand with "carbon farming" to improve conversion of atmospheric CO<sub>2</sub> to plant material and soil.

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**THE VALUE of Nature**  
massaudubon.org/valueofnature  
#3 OF 5

## Wetlands & Waterways

Wetlands are among the most productive ecosystems in the world, and they often feed into local streams and rivers, playing important roles in water quality, surface and groundwater supplies, and prevention of flooding. These ecosystems range from vernal pools to large rivers.

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**KEY TAKEAWAYS**

**Ecosystem Services:** Nature provides countless benefits to people, along with intrinsic values. These components of nature are enjoyed, consumed, or used by humans to support our wellbeing.

**CLEAN WATER**

**\$157 million**  
Annual filtration cost savings to New England communities provided by wetlands and forests combined - see our Forests fact sheet for more on their benefits.

**FOR EVERY \$1 SPENT ON SOURCE WATER PROTECTION \$27 SAVED IN WATER TREATMENT COSTS.**

**COMMUNITY SPOTLIGHT**

Wetlands can be so effective at filtering water that they are engineered by humans to treat stormwater and protect water quality. The City of Cambridge created the Alewife Stormwater Wetland to relieve community flooding problems and enhance local water quality. As a result of this project and six others to control combined sewer overflow, overflows to the Alewife Brook will be reduced by 86%.

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**RECREATION AND TOURISM**

Wetlands and waterways support diverse food chains, which are important for commercial and recreational fishing.

**33%**  
INCREASE IN MONTHLY BROOK TROUT MORTALITY IN New England if stream flows continue to decrease at current rates.

**\$100M**  
Wages, salaries, business earnings, and tax revenues brought in by Massachusetts freshwater fisheries, thanks to an enormous quantity and variety of fishing opportunities.

**CARBON CAPTURE & STORAGE**

**20-30%**  
of global soil carbon is held by wetlands, despite their occupying only 5-8% of global land surface. Wetlands in the conterminous U.S. store the equivalent of four years of annual carbon emissions by the nation.

Wetlands of the Eastern Mountains and Upper Midwest (includes Massachusetts/New England) store the most carbon, accounting for nearly half of the carbon stored in wetlands in the U.S.

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**KEY TAKEAWAYS**

**Ecosystem Services:** Nature provides countless benefits to people, along with intrinsic values. These components of nature are enjoyed, consumed, or used by humans to support our wellbeing.

**CLIMATE RESILIENCE:** The ability of a natural or human community to prepare for and respond to the impacts of climate change.

**Shaping the Future of Your Community**



# Value of Nature fact sheets

THE VALUE of Nature

[massaudubon.org/valueofnature](http://massaudubon.org/valueofnature)

#5 OF 5



## Urban Green Space

The value of green space and trees in cities should not be overlooked. Urban green space provides many ecosystem services, including improved health, and it is important to ensure that our most vulnerable communities have fair access to these benefits.

### ECONOMIC & HEALTH

Marginalized and low-income urban communities are often farther away from green space and more negatively impacted by the urban heat island effect and air pollution.<sup>1</sup>

### CARBON CAPTURE & STORAGE



# \$166

ANNUAL VALUE PER ACRE OF FULLY VEGETATED GREEN INFRASTRUCTURE

expected benefit in reduced CO<sub>2</sub> emissions thanks to NYC's green infrastructure plan to improve local water quality.<sup>16</sup>

# 50%

REDUCTION IN INDOOR COURSE PARTICULATE MATTER concentrations observed in one study of roadside street trees' impacts on neighboring houses.<sup>2</sup> Another study found that a single tree lowered concentrations behind it by 15%.<sup>3</sup>

# 85%

OR 10.5 MILLION GALLONS reduction in surface runoff entering Mashapaug Pond after three years thanks to Providence, RI's use of low impact development (see below for more on LID). The practice also reduced phosphorus pollution, which contributes to algal blooms, by 95%.<sup>4</sup>

- 1 RI DEM 2019
- 2 Maher 2013
- 3 Mitchell et al. 2010
- 4 EPA.gov n.d.
- 16 NYC DEP 2010



# *Losing Ground: Nature's Value in a Changing Climate*

## Key Findings

- Land developed: 13.5 acres/day
- Land conserved: 55 acres/day
- 1/4 of new development = ground-mounted solar

## Recommendations

- Get solar off the ground
- 50 by '50
- Update local land use rules

Find out more: [massaudubon.org/losingground](https://massaudubon.org/losingground)



**6,000 ACRES**

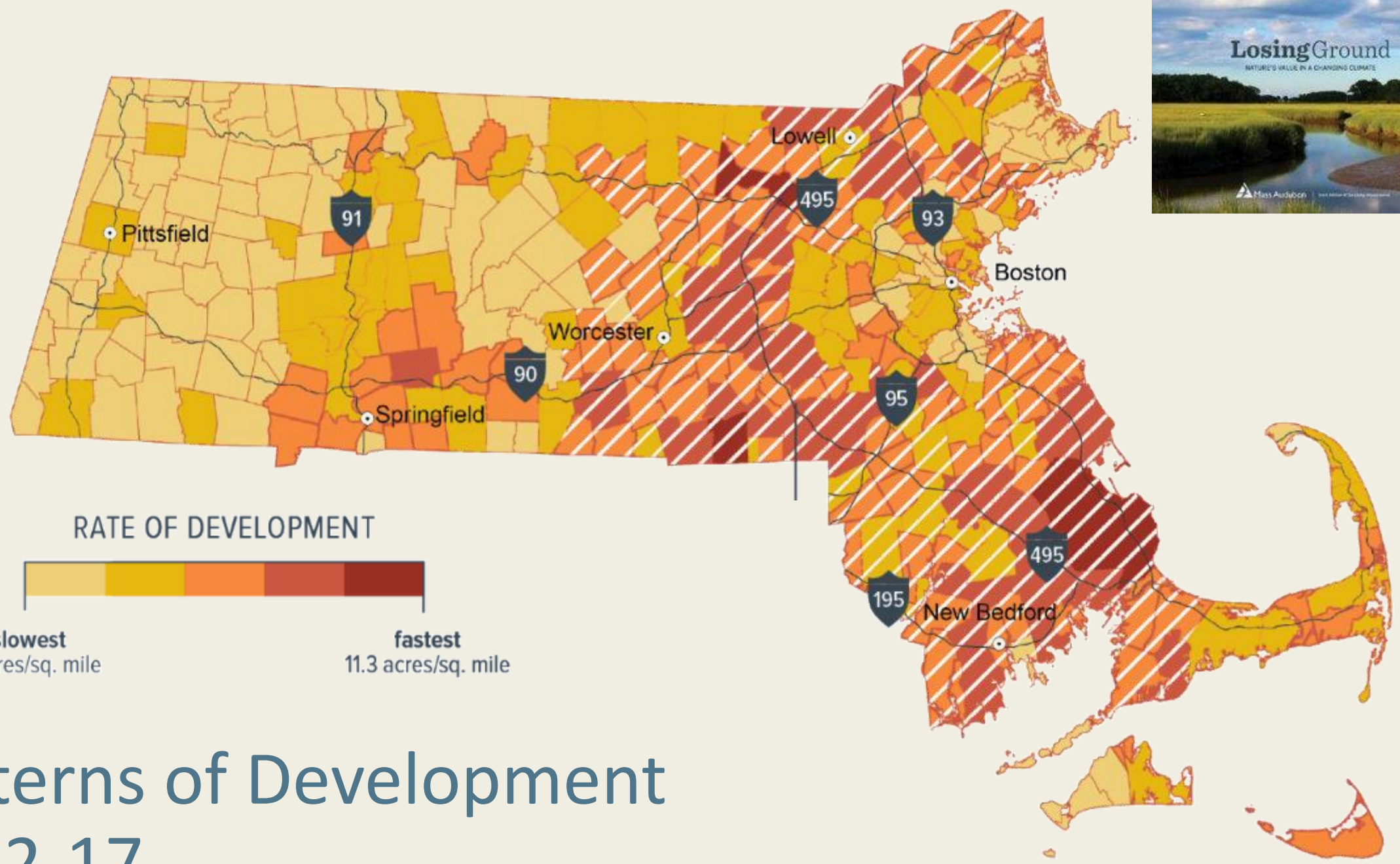
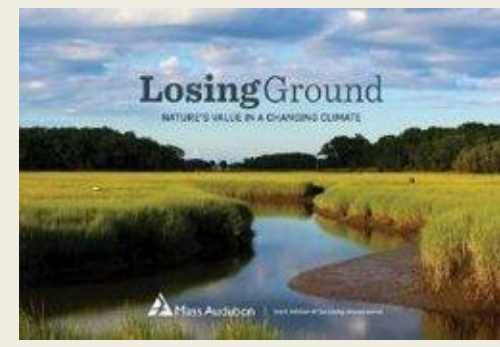
CONVERTED TO SOLAR ARRAYS  
on previously undeveloped land  
since 2012

**150,000 ACRES**

OF LAND COULD BE LOST  
if current trends continue

**47% OF  
ELECTRICAL  
DEMAND**

COULD BE SUPPORTED BY  
solar capacity on existing rooftops



# Patterns of Development 2012-17

# Resources



*Valuing Ecosystem Services in the  
Narragansett Bay Watershed*

[massaudubon.org/valueofnature](http://massaudubon.org/valueofnature)

*URI Narragansett Bay Watershed Economy Project*

[nbweconomy.org](http://nbweconomy.org)

*Losing Ground: Nature's Value in a  
Changing Climate*

[massaudubon.org/losingground](http://massaudubon.org/losingground)

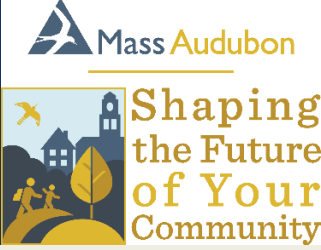
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Shaping the Future of Your Community

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