



# Where has solar been developed with respect to land use in Massachusetts?

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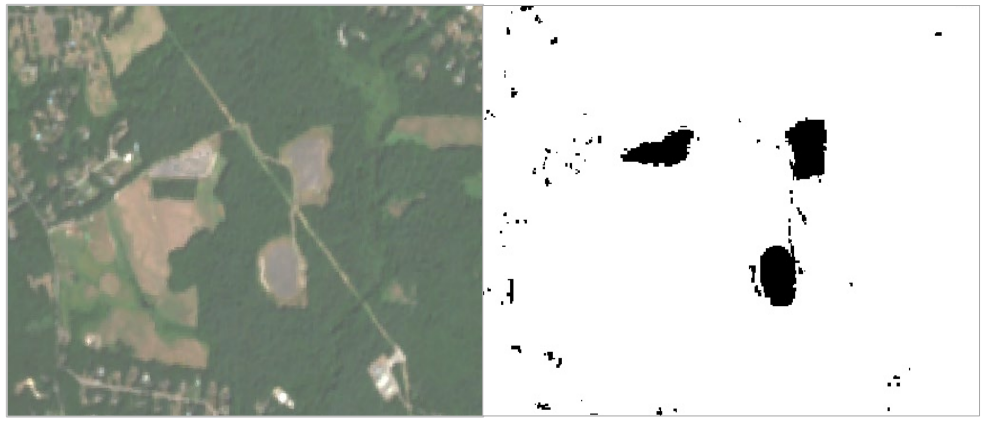
# Mapping Solar Installations using Satellite Imagery

- Solar installations are detected using Sentinel-2 (10 m) imagery collected in summer months
- Used a computer model to determine solar and non-solar in the landscape (2001-2022)
- Polygons for solar panels (a); and the solar installation with the surrounding cleared area (b)



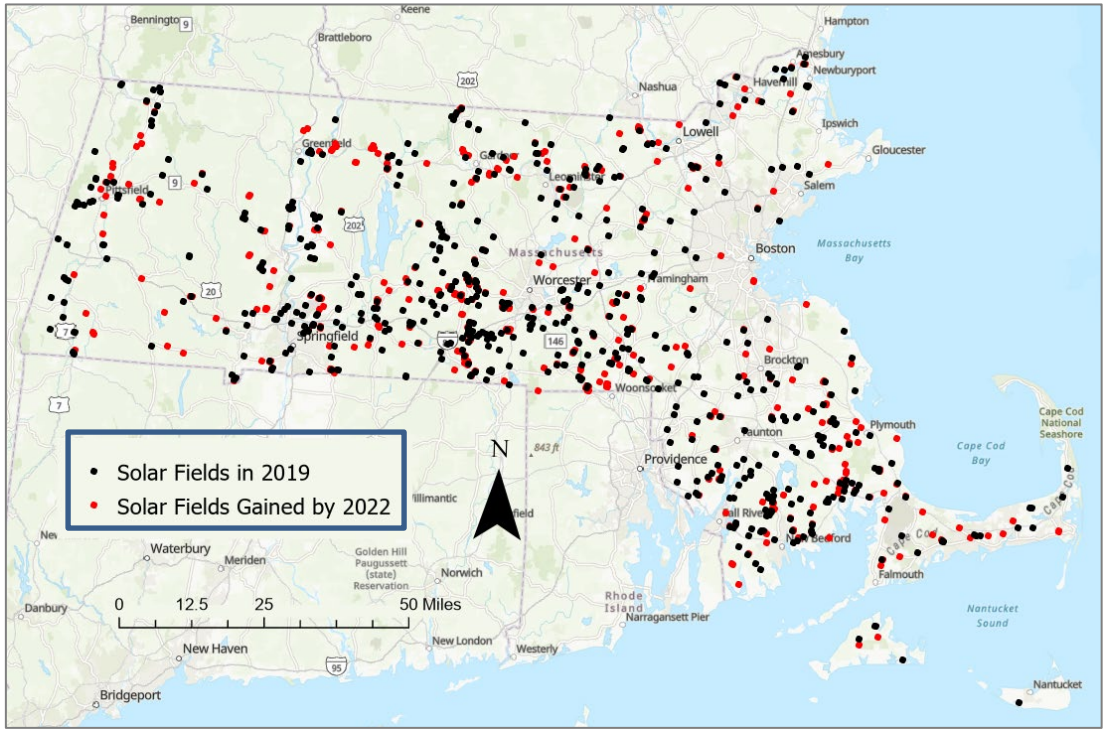
**Satellite image of solar panels (left) and the random forest classification (right)**

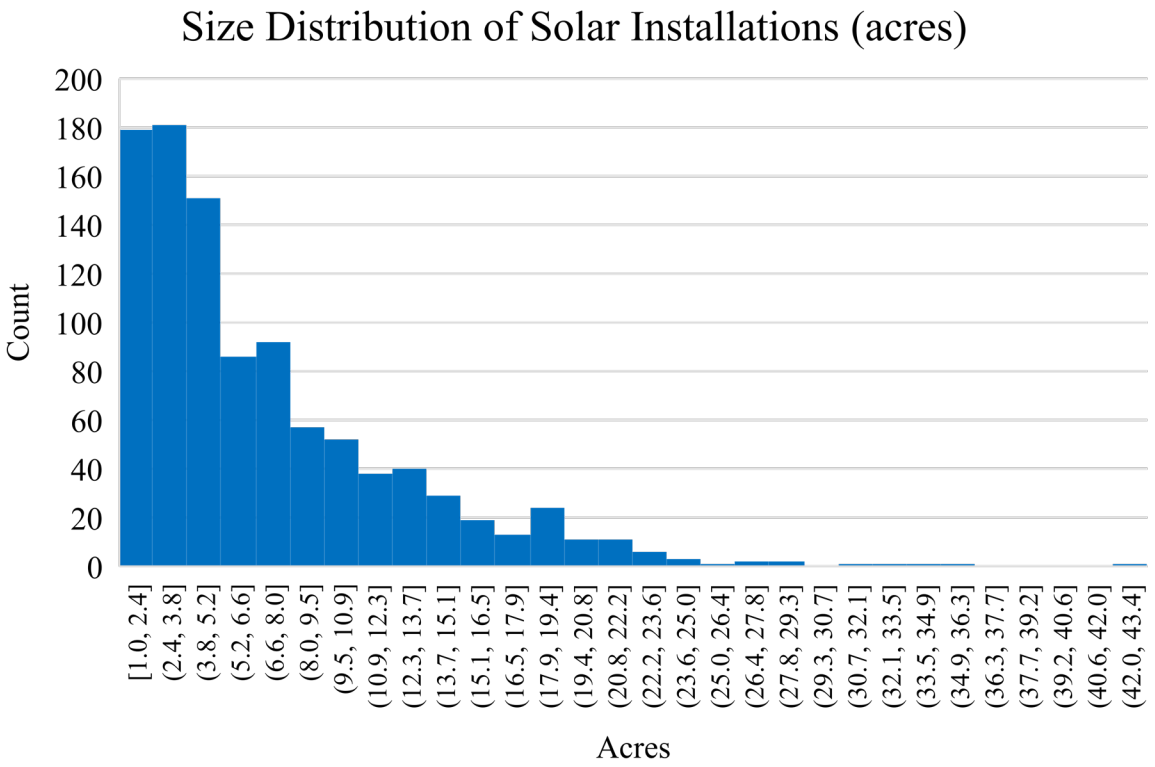
**(a) Solar panel polygon**

**(b) Cleared area polygon**

# Solar Installation Count and Acreage (as of August 2022)

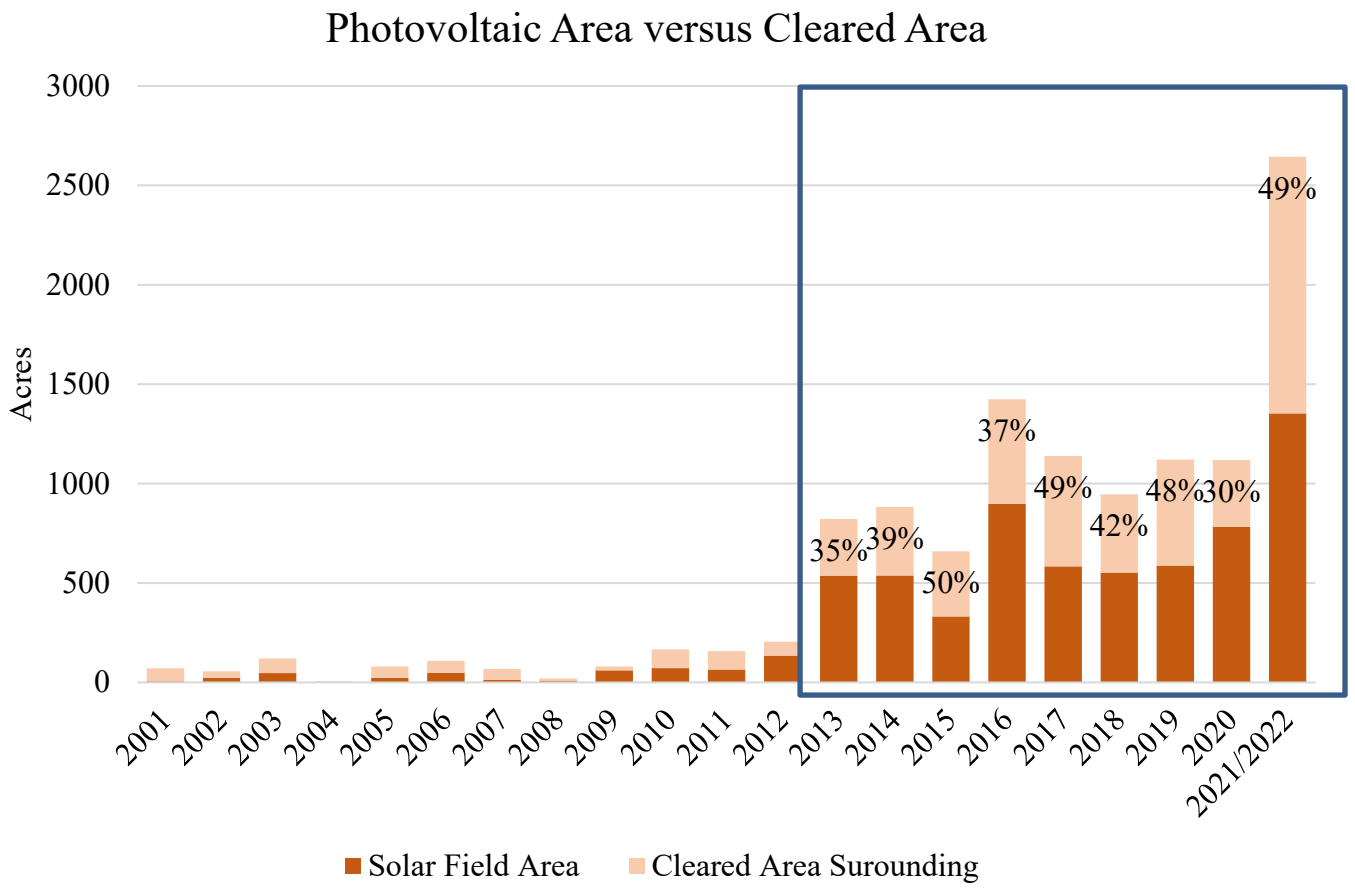
- There are **1000** solar installations as of August 2022 in Massachusetts.
- Between 2019 and 2022, **250** new solar installations were added.




- The solar installation area is **7,000 acres** as of 2022 with a gain of **1,850 acres** since 2019.
- The mean area for solar installations is **5.27 acres** and the median is **5.1 acres**.

# Solar Installation and Cleared Area



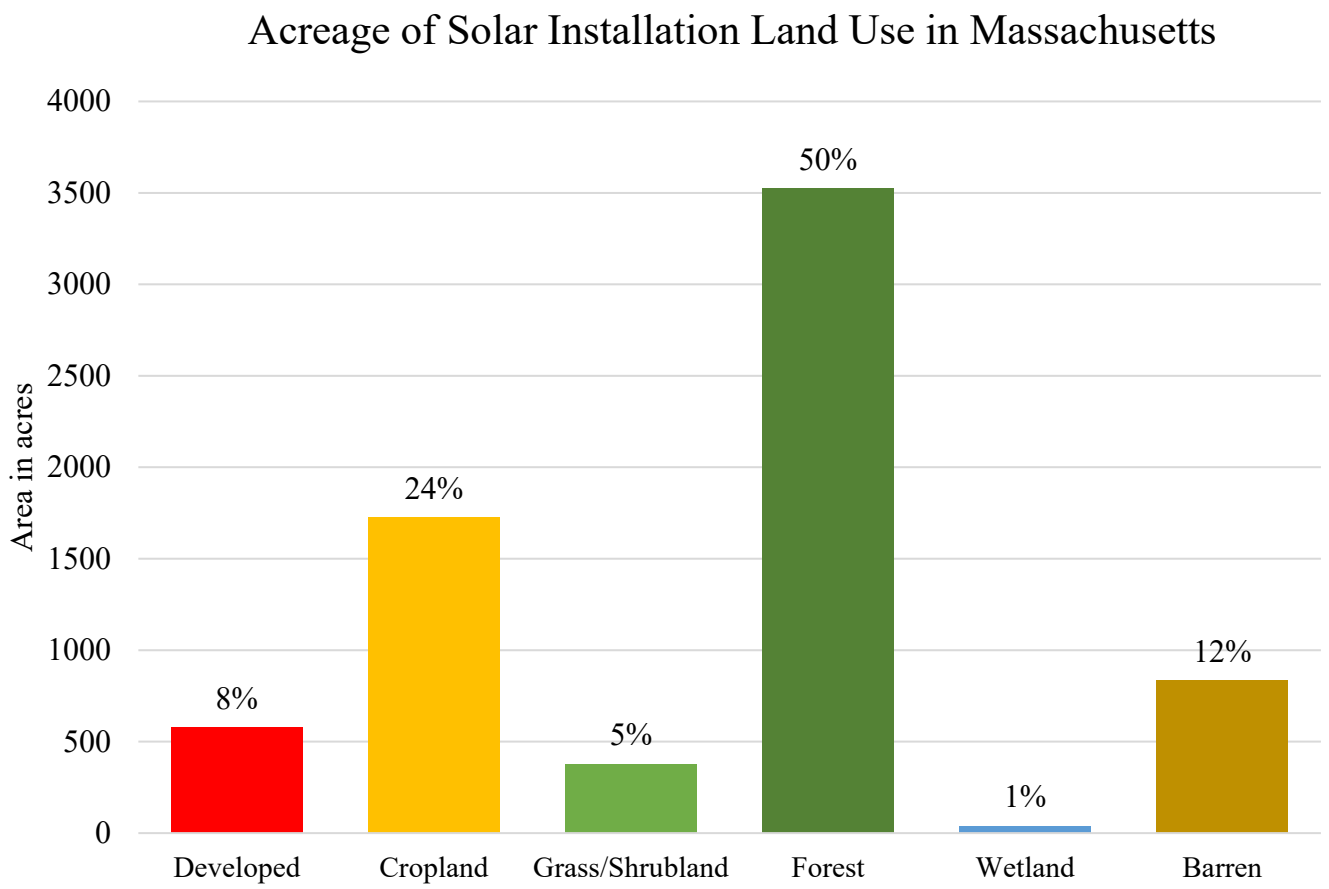

- Solar field installations have been increasing in total acreage since 2013.
- The cleared area surrounding is defined as the mowed area around the panels themselves.
- As seen in the figure to the left, **the cleared area takes up a large portion of the total area covered.**
- Since 2013, the area surrounding solar panels has been **approximately 40%** of the total area taken over by the entire solar installation.



Calculated using Ye's disturbance and 2000 landcover maps

# Solar Installations and Land Use in Massachusetts

- Solar installations have converted forest by **50% of the total land use (3500 acres)**.
- Cropland is the second most abundant land use type at **24% (1700 acres)**.
- Finally, barren or dirt ground is the third most abundant land use type at **11% (830 acres)**.

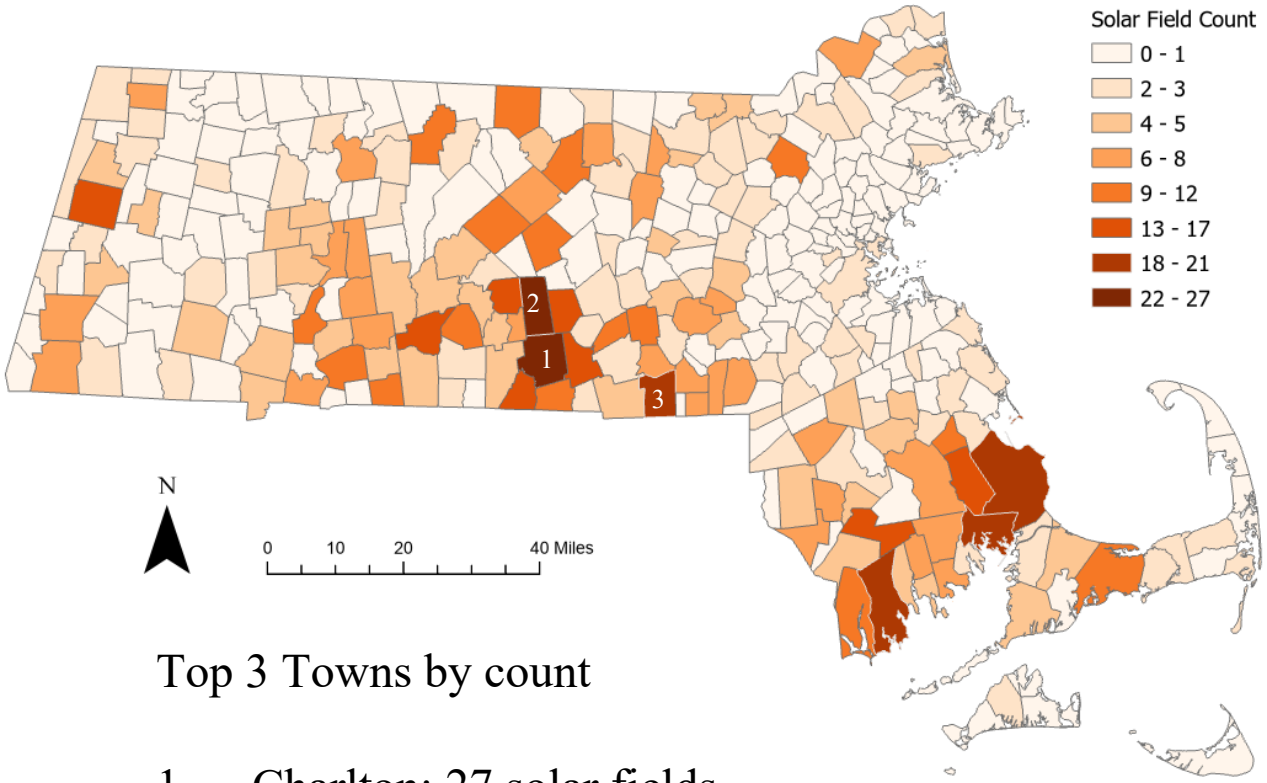





Calculated using Su Ye's 2000 landcover maps

# Solar Installations by Town

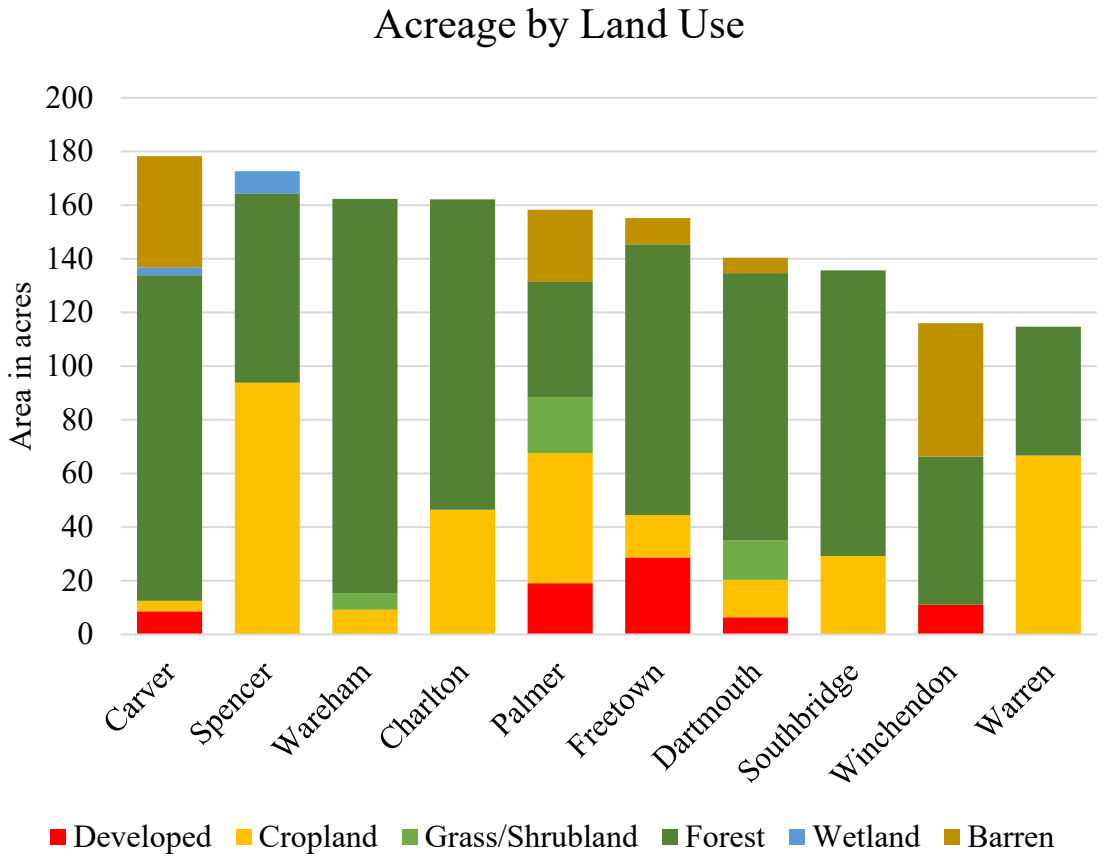
## Distribution of solar installations by town




Top 3 Towns by count

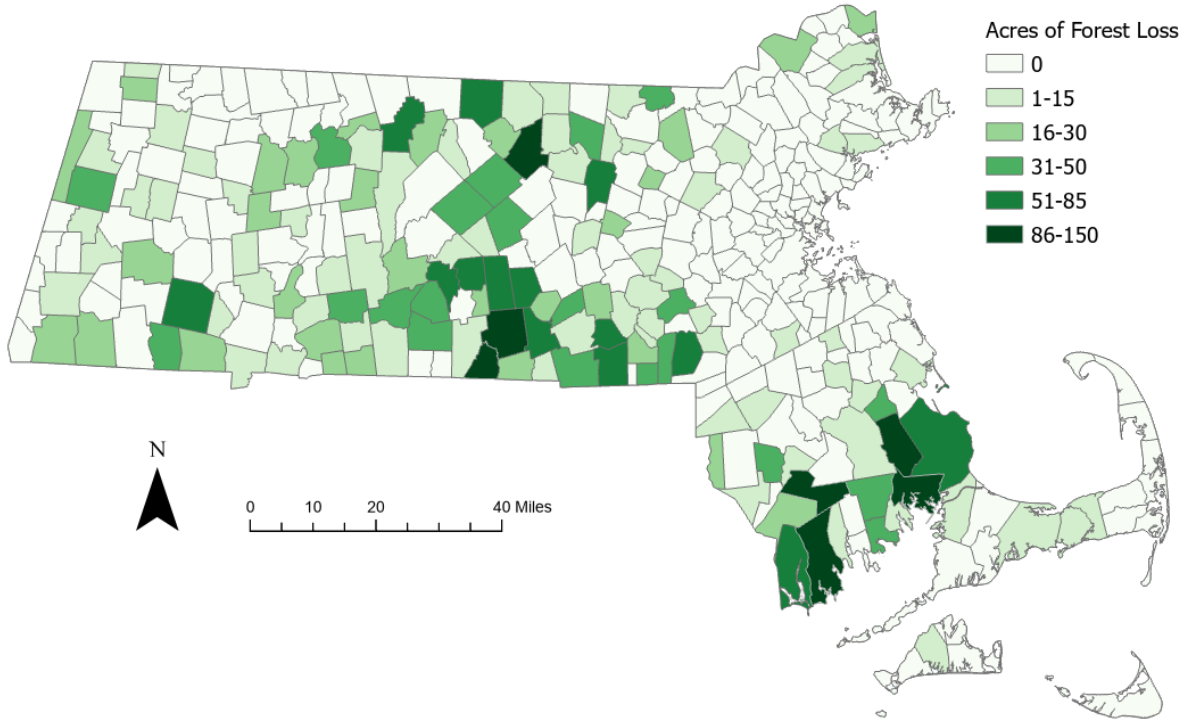
1. Charlton: 27 solar fields
2. Spencer: 22 solar fields
3. Uxbridge: 21 solar fields

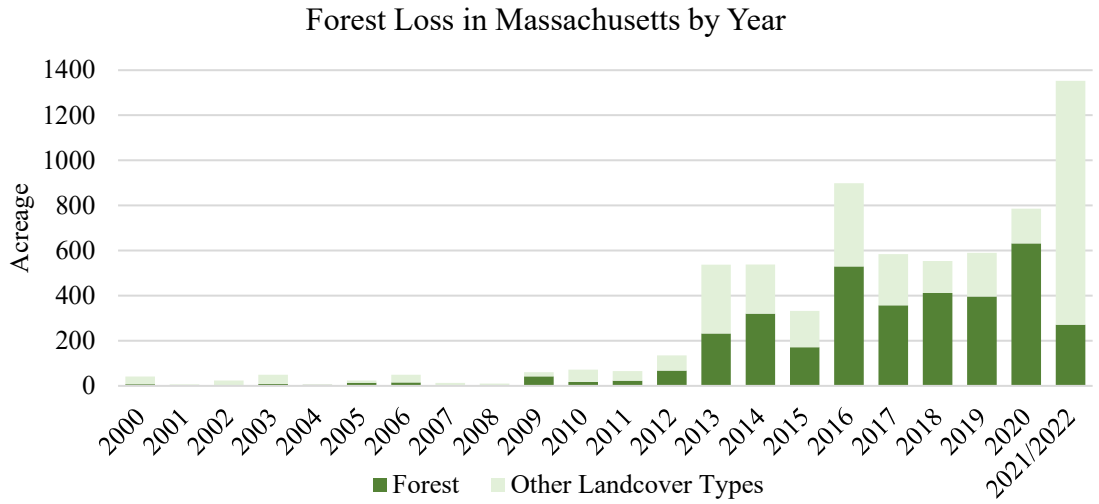
## Top 10 Towns

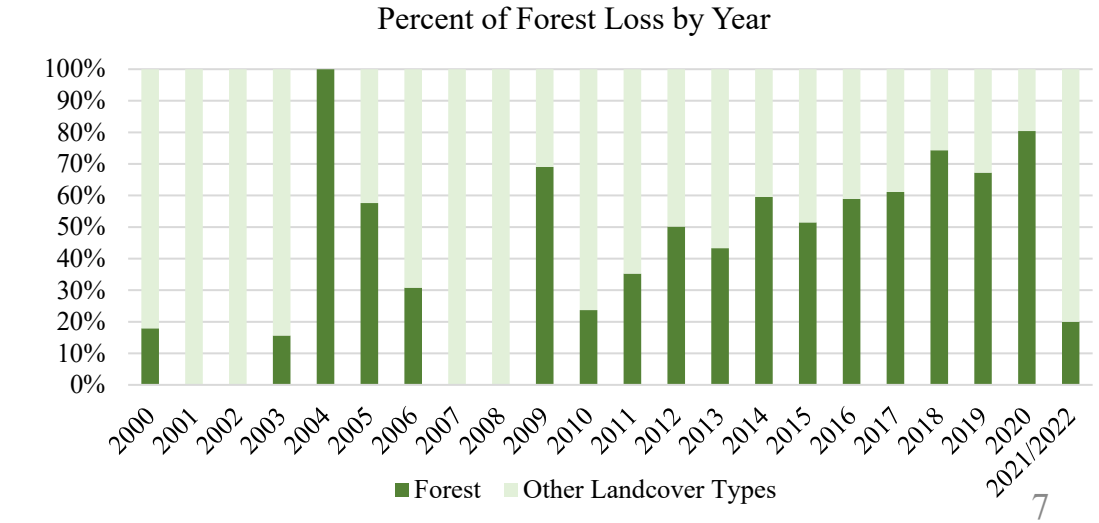


# Forest Loss Due to Solar Installations

- The charts (right) compare the acreage and percentage of forest loss due to solar compared to the other landcovers each year.
- The map (below) displays the total acreage of forest loss due to solar in each town.




*Not compared to total forest loss, just the acreage taken over by solar

# Losing Ground (sixth edition)

**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**

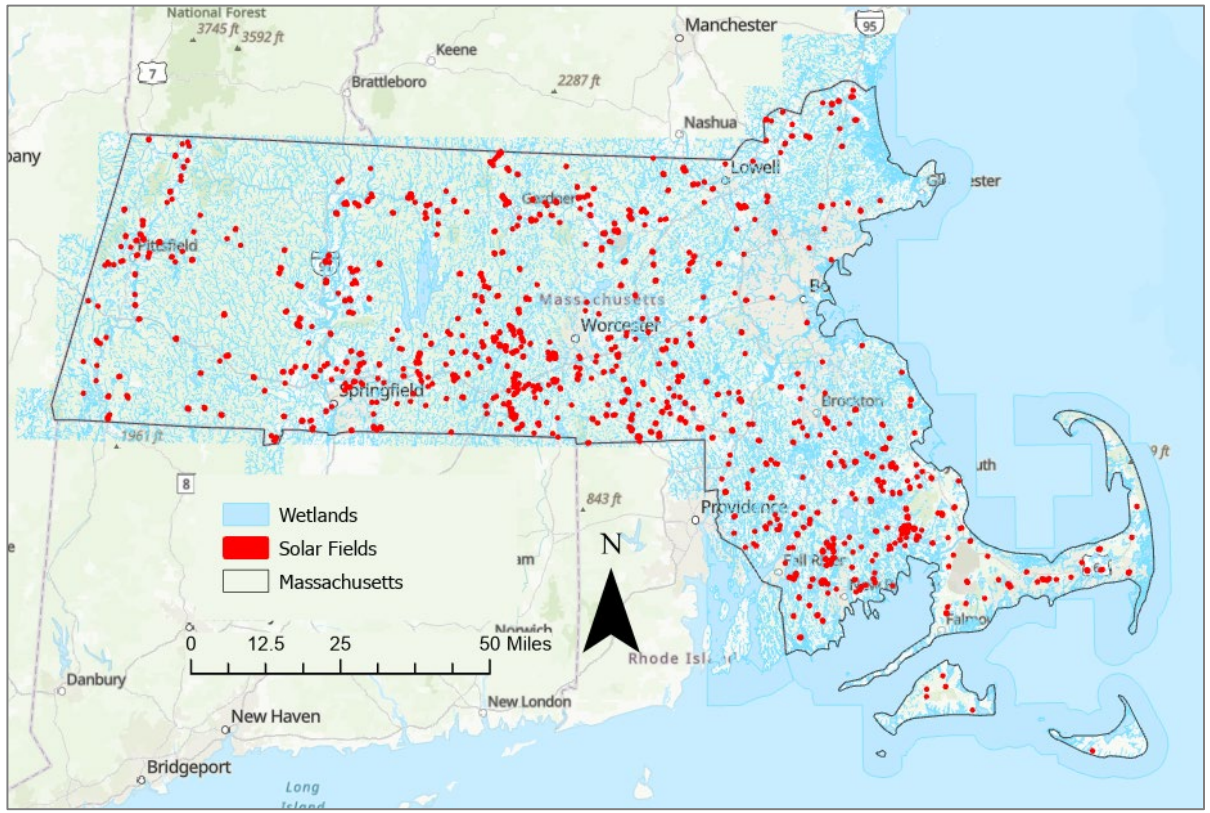
COULD BE SUPPORTED BY
solar capacity on existing rooftops

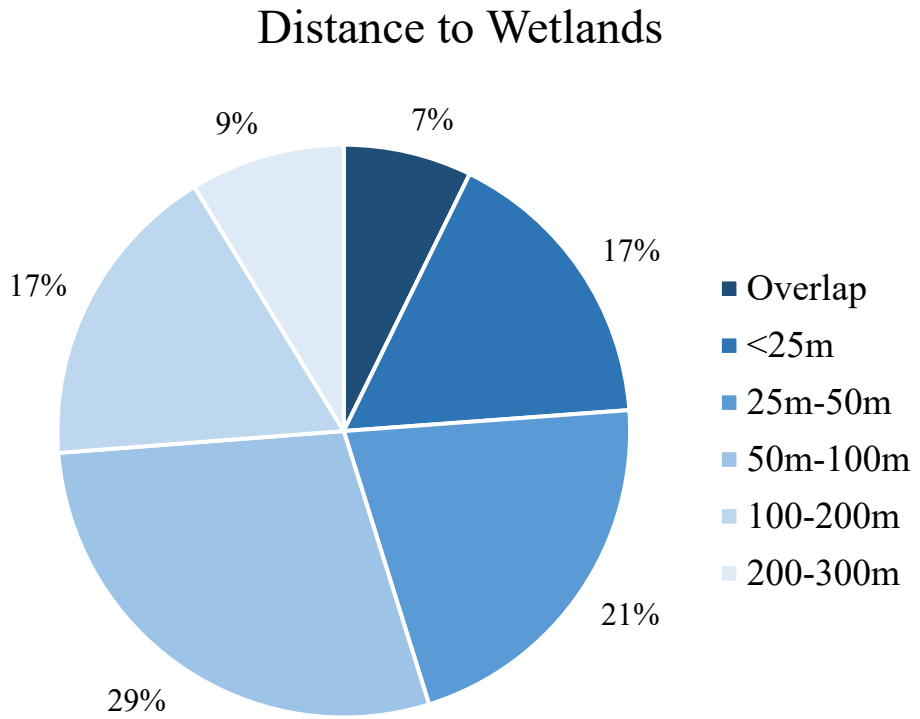
A large solar photovoltaic canopy was installed over a parking lot in Framingham, MA.

Mass Audubon

# Solar Installations Proximity to Wetlands

- There are 73 solar sites that overlap with wetlands which includes lakes, river, and streams.
- The average distance to wetland for all solar sites is 56 meters (183 ft).




45% of solar installations are within 50 meters (164 ft) of a wetland

Source of wetland information: National Wetlands Inventory

# Summary

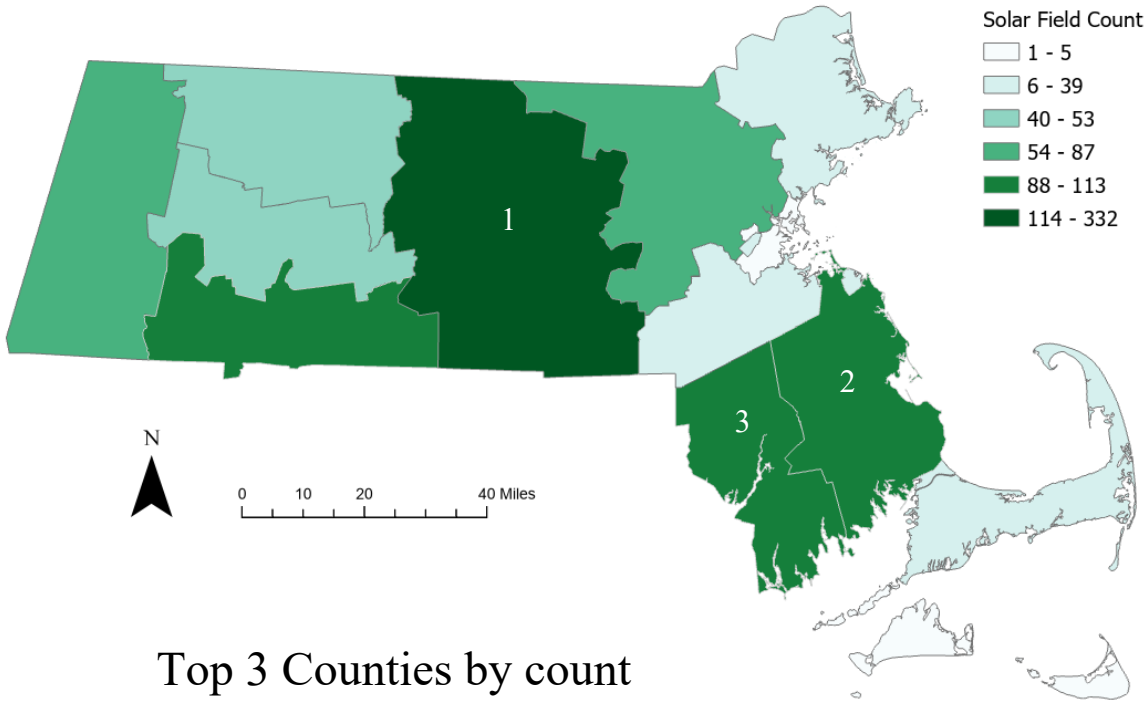
Solar Installations in Massachusetts as of August 2022

- Approximately 1000 solar fields covering 7,000 acres
- Gain of 250 solar fields and 1,850 acres since 2019
- Cleared area surrounding solar fields has taken up 40% of the total area of solar installations since 2013
- At the state, county, watershed, and town level, solar installations have predominantly impacted forested land
- Conversion of forest has declined in the last two years

# Supplementary Slides

# Solar Installations by County

## Distribution of solar fields by county

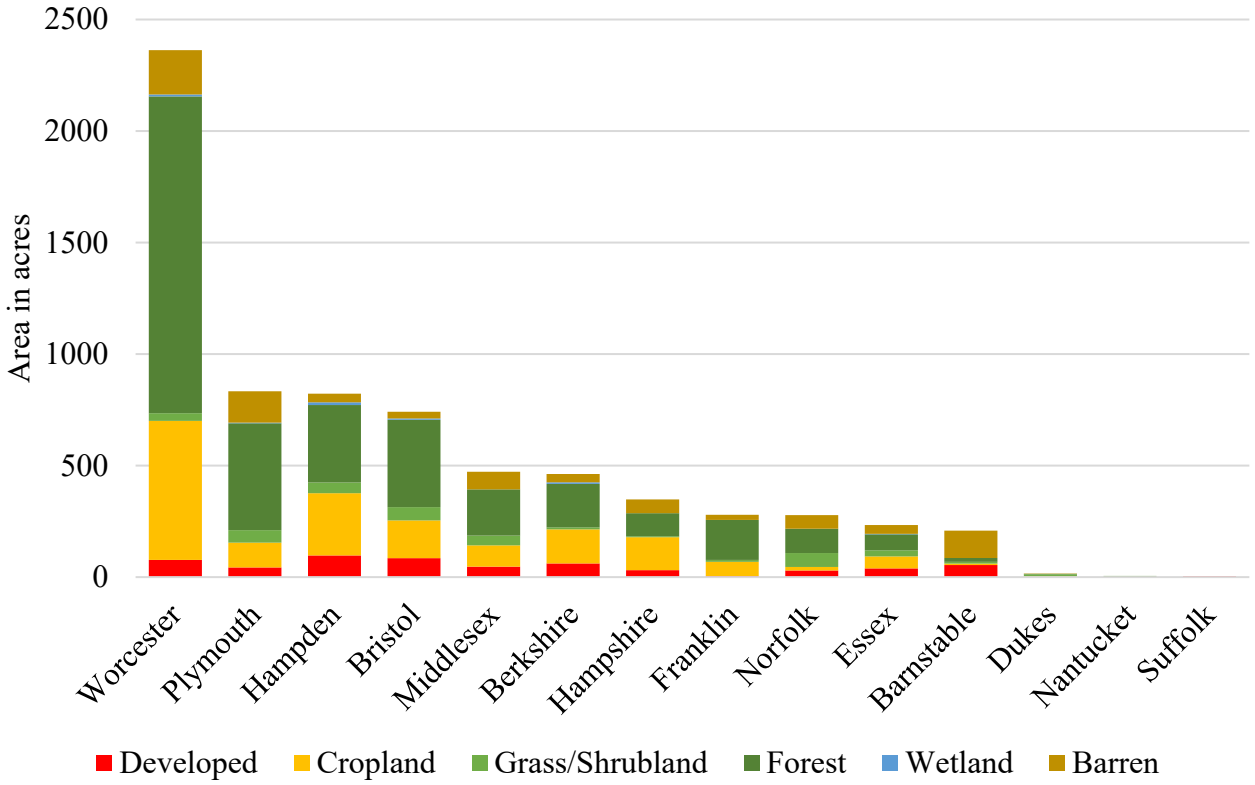



Top 3 Counties by count

1. Worcester: 332 solar fields
2. Plymouth: 113 solar fields
3. Bristol: 104 solar fields

## All Counties in Massachusetts

Acreage of Baseline Land Use

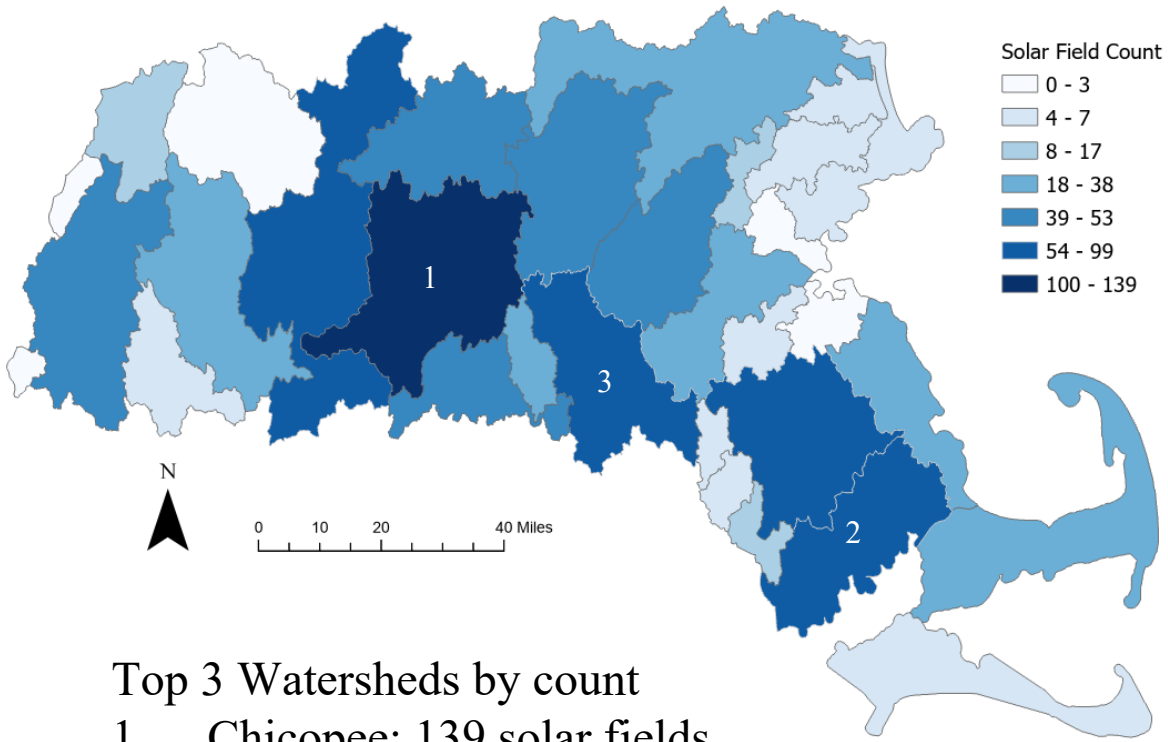





Calculated using Su Ye's 2000 landcover maps and MassGIS Counties

# Solar Installations by Watershed

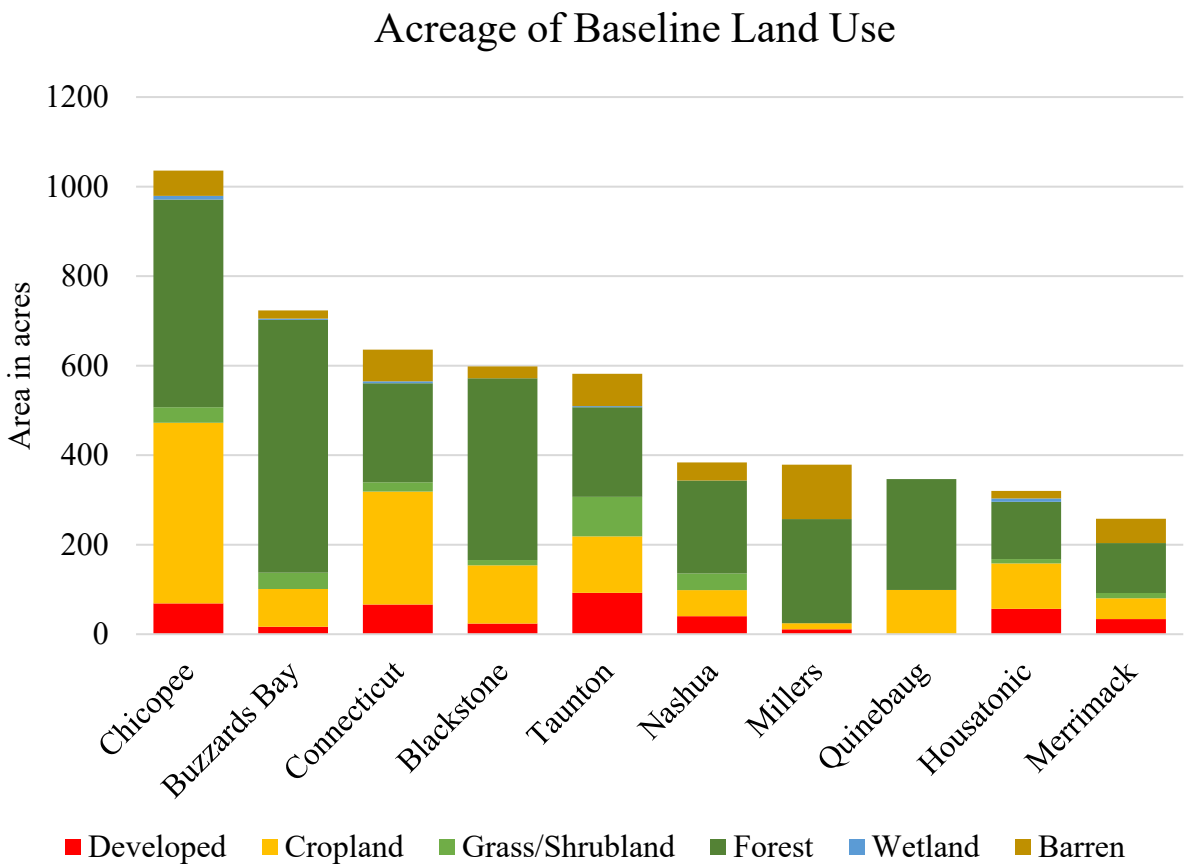
## Distribution of solar fields by watershed




Top 3 Watersheds by count

1. Chicopee: 139 solar fields
2. Buzzards Bay: 99 solar fields
3. Blackstone: 94 solar fields

## Top 10 Watersheds

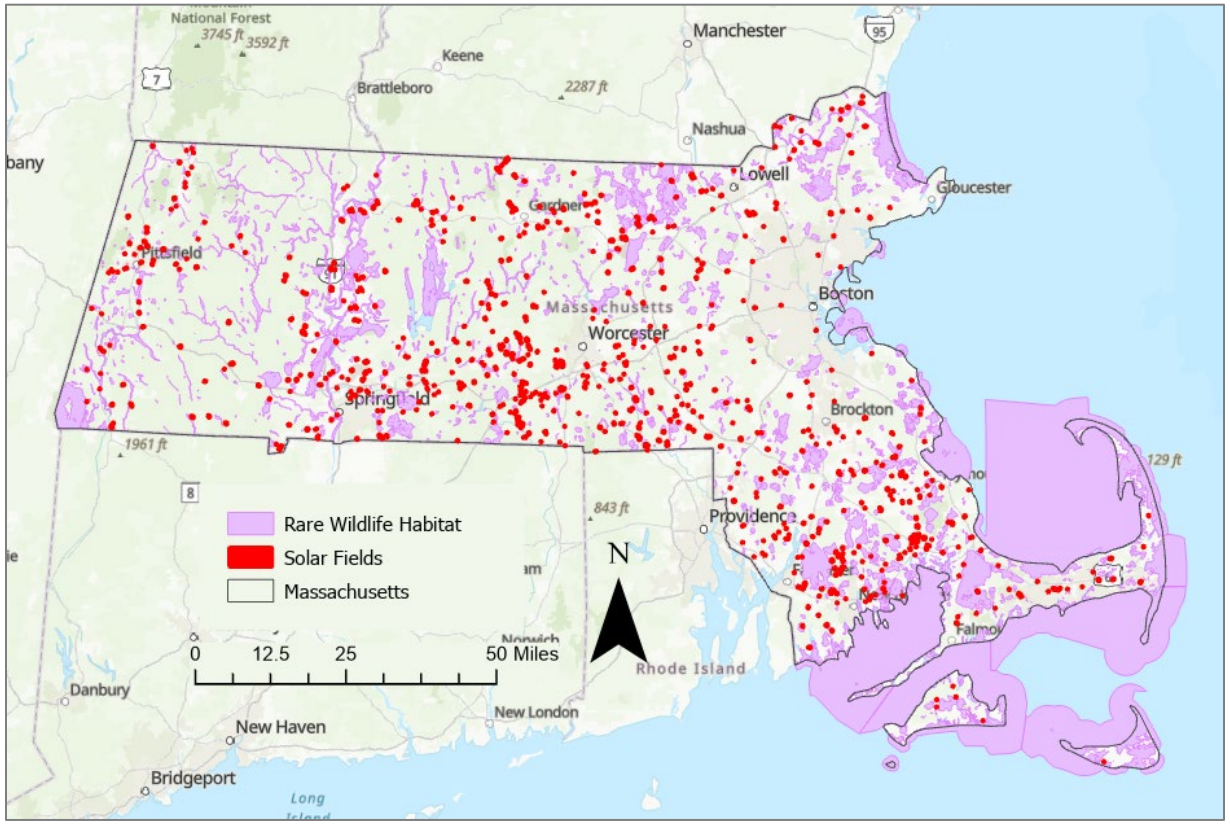


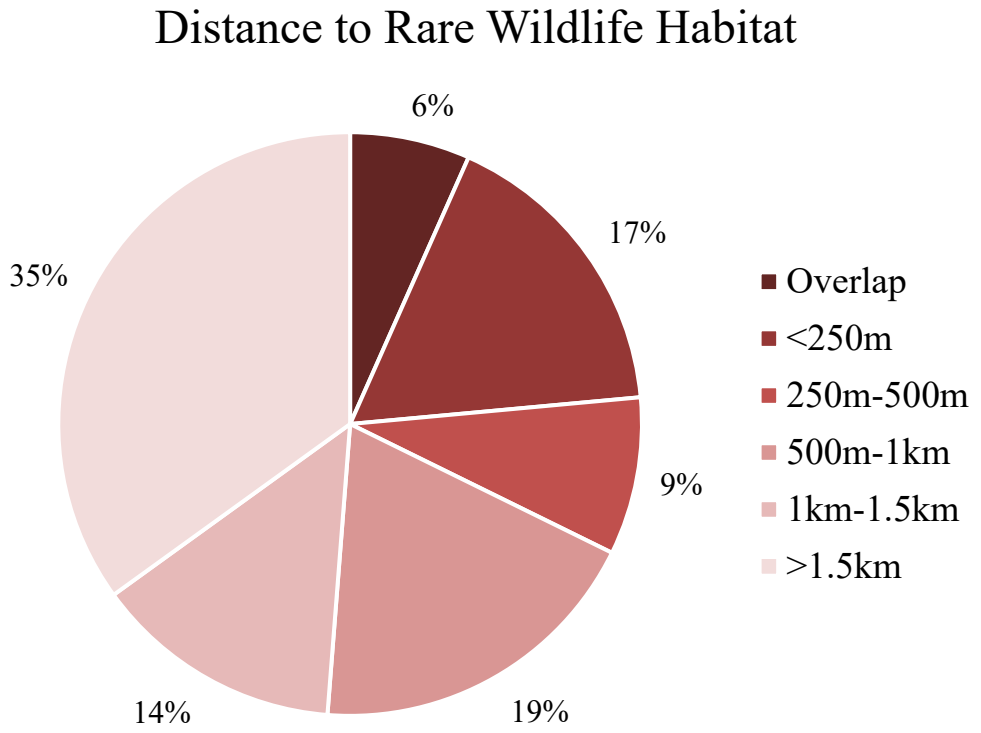



Calculated using Su Ye's 2000 landcover maps and MassGIS Major Watersheds

# Solar Installations Proximity to Rare Wildlife Habitats

- There are 67 solar installations that are within a rare wildlife habitat.
- On average, solar fields are 778 m away from these habitats.



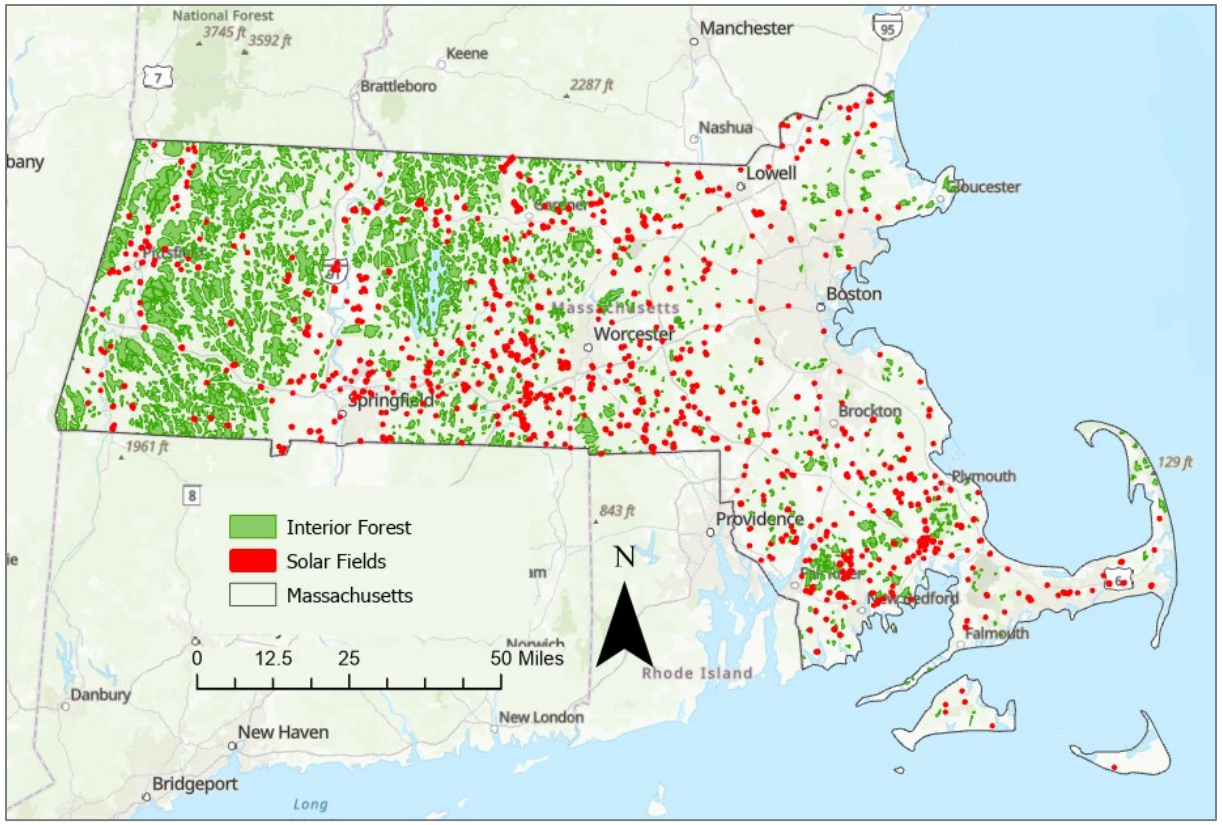

32% of solar fields are within 500 meters of a habitat

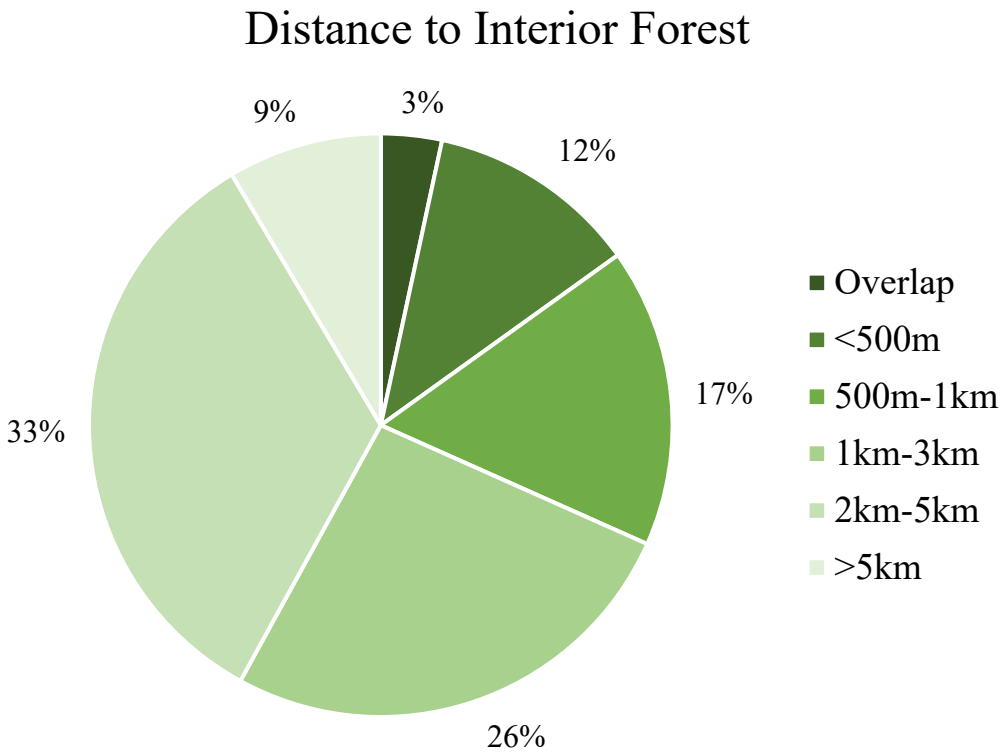


Source of habitat information: NHESP Estimated Habitats of Rare Wildlife

# Solar Installations Proximity to Interior Forest

- There are 34 solar installations within an interior forest.




32% of solar fields are within 1 kilometer of interior forests



Source of interior forest information: MassGIS Data Interior Forest