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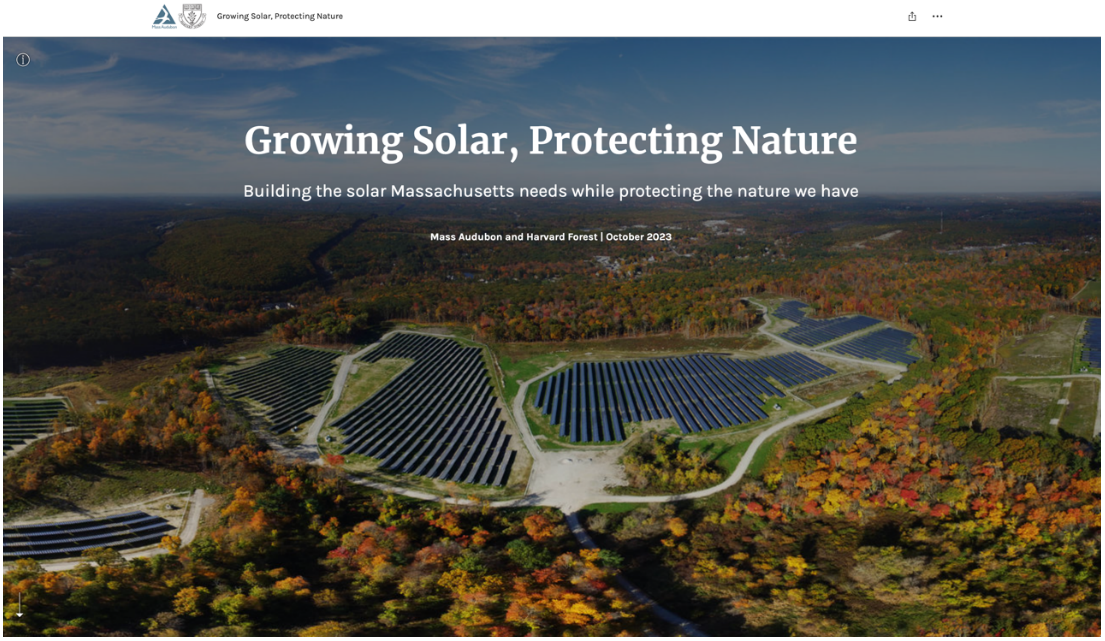
Mass. Audubon and Harvard Forest, October 2023



Massachusetts' forests are our primary and only means of carbon removal.[1]

As we scale up our deployment of solar, **we must also recognize the instrumental role that natural and working lands play in stabilizing our climate system**. More than 60 percent of Massachusetts is covered by diverse forests, which are storehouses of carbon. Our trees alone contain the equivalent amount of carbon as in five years' of statewide fossil fuel emissions. 5 Forest soils contain a similar amount. 6 Beyond storage, forests are also actively capturing carbon from the atmosphere at a rate equivalent to 10 percent of our current GHG emissions. 7 **In addition, forests and natural ecosystems provide valuable, irreplaceable public goods: biodiversity, drinking water filtration, wildlife habitat, recreation, and resilience to impacts of climate change such as flooding and extreme heat.**

However, our clean energy and land policies are still not doing enough to safeguard natural ecosystems and working lands. Under current siting practices, thousands of acres of forests, farms, and other carbon-rich landscapes are being converted to host large-scale solar. Mass Audubon's 2020 *Losing Ground* analysis showed this recent

shift: starting around 2010, clearing for ground-mount solar became one of the leading drivers of land-use change in Massachusetts.[10] Over 85 percent of surveyed residents in Massachusetts believe that solar should be built on rooftops, parking lots, landfills, and other developed areas, rather than on cleared forests and on top of productive farmland.

Challenge: Forest Loss and Fragmentation

Forests not only remove carbon from the atmosphere, they also filter drinking water, provide flood control, cooling and shade, wildlife habitat, and areas for outdoor recreation. However, some solar siting practices are putting Massachusetts' forests at serious risk.

From 2010-2020, nearly half of ground mount arrays (3,753 of 7,900 acres) were sited in forested areas. This resulted in a loss of over 500,000 metric tons of CO_2, equivalent to the annual emissions of more than 110,000 passenger cars. South-central Massachusetts is home to most of these projects, accounting for 37 percent of overall forest loss in the State.

Challenge: Erosion and Runoff

Removing forest on steep slopes to site solar arrays can lead to serious erosion and sedimentation into sensitive wetlands and streams. In Williamsburg, a solar project sited on a steep slope was assessed over $1 million in penalties for damage to Mill River, a cold-water fishery, due to erosion. Massachusetts Department of Environmental Protection's guidance for stormwater management on solar arrays encourages avoidance of steep slopes but it does not require the same level of treatment as other impervious surfaces. This policy should be revised.

Challenge: Biodiversity Impacts

The Southeast region contains the second largest area of coastal pine barrens in the U.S., supporting more than 200 state-listed species, including globally rare species and habitats.

More than 190 ground mount solar arrays have been built in Plymouth and Bristol Counties across 2,322 acres, resulting in destruction and fragmentation of some of these rare ecosystems. Many more ground-mount projects are planned for this region. Indigenous leaders are concerned about the loss of forests and important cultural sites from ground-mount solar.

KEY FINDING #1

Ground-mount solar systems installed in Massachusetts since 2010 have caused significant losses to forest carbon, biodiversity, and productive farmland. State goals for carbon removal, biodiversity, and climate resilience will be at high risk unless siting of ground-mount solar changes, and quickly.

If current trends of ground-mount solar construction continue, we stand to lose more than 20,000 additional acres of the most valuable wildlife habitat in the state, including 9,000 acres in the globally rare pine barrens habitat of southeastern Massachusetts and another 9,000 acres in largely forested areas of central and western Massachusetts. When left intact and connected, these areas are habitat for most of the Commonwealth's 432 endangered, threatened, and special concern species such as Blue-spotted Salamander, Northern Long-eared Bat, and Eastern Whip-poor-will. Connected forests also support our more common species and provide critical movement corridors for wide-ranging species such as bobcat, fisher, and black bear. Conversion to ground-mount solar, like other forms of development, drastically alters these natural communities, fragments the landscape, and interrupts wildlife movement patterns. These new forest openings also serve as entry points for invasive plants and provide favorable conditions for increased white-tailed deer density which has further negative impacts on the surrounding forest.

Beyond the direct impacts to wildlife, a fragmented landscape is a less resilient landscape, one that is less able to adapt as the climate continues to change. In Massachusetts, more than a quarter of the forest area is within 65 feet of a non-forest edge,[17] so it’s imperative that we keep our remaining forests intact. Connected and resilient landscapes allow for the slow range shifts of plants and animals in response to shifting temperature and precipitation patterns. They are better able to support our communities by absorbing and filtering stormwater, reducing flooding and protecting our rivers and drinking water supplies. By breaking up the landscape, we reduce resilience and put these precious ecosystem services at risk.

KEY FINDING #5

When the true value of carbon removal by forests is considered, the *Current Siting* approach is *more costly* than *Protecting Nature* through 2050.

Nature's prodigious benefits to society are not valued in markets, even though these are critical services that society needs and are not readily replaceable. Carbon removal by forests is just one ecosystem service that fares considerably worse under a continuation of current solar siting practices. The *Current Siting* scenario results in a significant loss of carbon from forests ranging from 5.7 to 5.9 $MMTCO_2e$.[23] This is 4.7 to 4.9 $MMTCO_2e$ *higher* than projected losses of forest carbon under the *Protecting Nature—Mid-Impact* and *Low-Impact* scenarios, respectively. To understand what would be needed to make up for this loss of carbon removal by forests and still meet the 2050 net-zero emissions, we calculated the costs of making up this decrement to forests' carbon removal capacity by achieving other types of GHG emission reductions.

Using an estimate that achieving additional GHG reductions from the energy system in the latter part of this timeframe (2050) will cost approximately \$200/ton CO_2e, replacing this quantity of natural carbon removal alone could cost up to \$940M to \$980M. The cost of replacing carbon removed by forests is actually greater than the difference in the energy costs (in present value terms) between the *Current Siting* and the *Protecting Nature—Mid-Impact* scenario.[24] And because this estimate only reflects losses in carbon, and does not include the costs of losing other services when nature and working lands are converted, like flood protection, drinking water filtration, wildlife habitat, and local food production, it actually *underestimates* the costs to the public of further conversion and fragmentation of forests, other terrestrial ecosystems, and farms.