RHODE ISLANDVIEW 2021 - 2022

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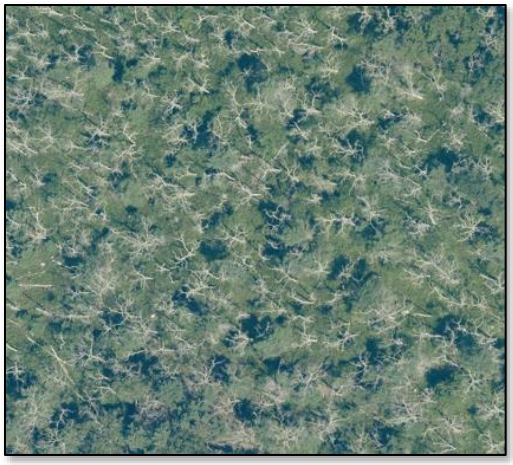
RHODE ISLANDVIEW 2021 - 2022 ACTIVITIES

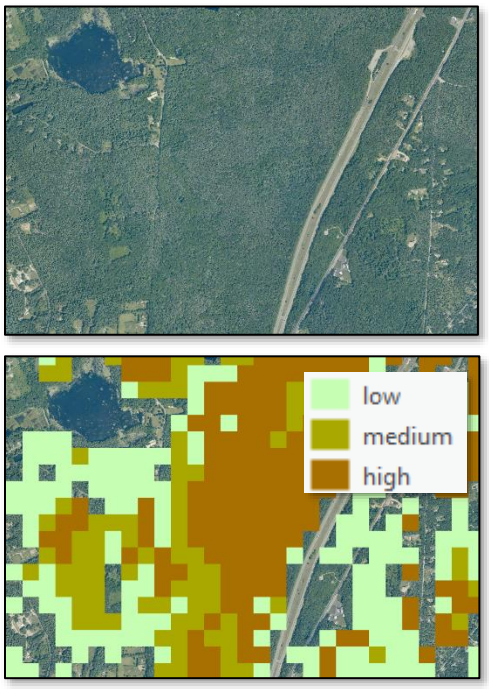
Rhode IslandView study predicts tree mortality from spongy moth outbreaks in Rhode Island.

Spongy (a.k.a. gypsy) moth is an invasive insect that had outbreaks in southern New England between 2015 and 2017 and in northern New England over the past two years. During outbreaks, the insects cause widespread defoliation of deciduous trees and extensive tree mortality in the southern New England region. Satellites, such as Landsat, allow the extent of severe canopy defoliation to be monitored. However, GIS modeling was needed to estimate the amount of tree mortality that resulted from the defoliation.



High tree mortality in Rhode Island resulting from the 2015-2017 spongy moth outbreak.

With AmericaView support, the University of Rhode Island recruited and mentored graduate and undergraduate students to create a GIS model that predicted the severity of tree mortality resulting from the spongy moth outbreaks in Rhode Island. The model predictions were based on defoliation, mapped with Landsat imagery, and other GIS data representing soil conditions, forest type, drought severity, terrain, and other environmental factors.



Tree mortality predictions (bottom) compared to summer aerial imagery.

The model predicted 3 classes of tree mortality (low, medium, high) with 62% accuracy or 2 classes of mortality (low, high) with 78% accuracy. We found that defoliation was by far the most important factor in predicting tree mortality. Important secondary factors included:

- Distance from coast,
- Forest canopy density,
- Drought condition,
- Distance to developed areas,
- Forest type (deciduous vs. coniferous).

According to our model:

- 21% of Rhode Island forests experienced moderate tree mortality (3-10 canopy trees/ha)
- 23% of Rhode Island forests experienced severe tree mortality (> 10 canopy trees/ha)
- At least 500,000 canopy trees were killed by the outbreak.

Rhode IslandView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.

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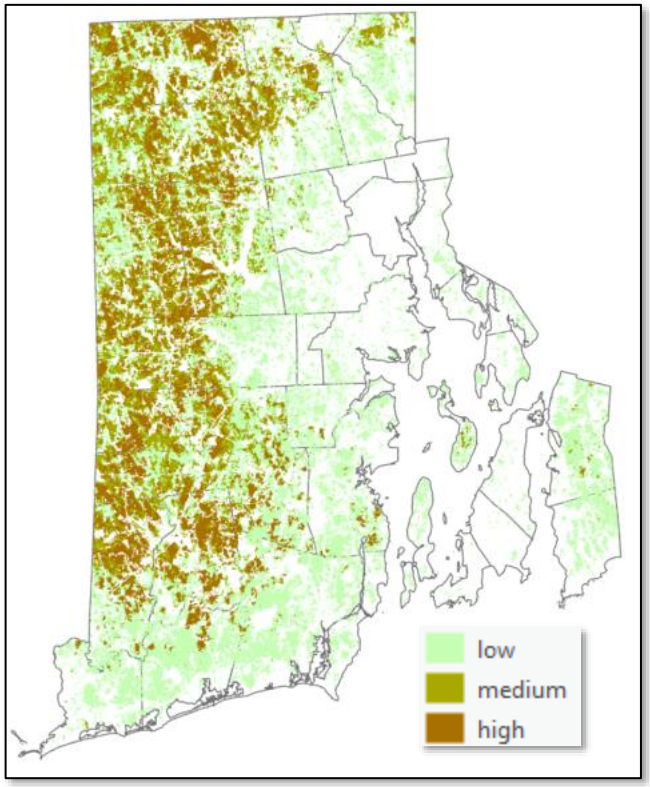
Benefits to Rhode Island

The tree mortality model will help land managers protect public safety and create habitat for wildlife conservation.

The model output will show citizens and land managers where to focus efforts on dead tree removal to reduce threats to motorists, powerlines, and recreational users of the forest. Wildlife managers can manage forests in some of the high tree mortality areas to create early successional habitat which is uncommon in the state but needed for the survival of many wildlife species. The study demonstrated the capabilities of Landsat and geospatial modeling to predict tree mortality resulting from pest outbreaks.

The Rhode IslandView activities supported one graduate and one undergraduate research assistant during the spring and summer of 2022. They gained valuable experience in learning how to find and work with satellite and aerial imagery and use machine learning tools through the Environmental Systems Research Institute (ESRI)'s ArcGIS Pro software. The students developed skills in communicating technical remote sensing material to non-technical audiences through oral and poster presentations. They will bring the skills and knowledge gained to their professional communities upon entering the workforce.



Statewide tree mortality predictions.

Rhode IslandView Consortium Membership

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