Restoring Pitch Pine Forests: Simultaneously Creating Resilient Forests and Protecting Stands from SPB

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Rationale for the Formation of a SPB Technical Working Group

- There is a critical need to synthesize knowledge on the interactions of southern pine beetle, pitch pine, climate, and restoration treatments (thinning, prescribed fire) so that adaptable management practices can be developed and applied across at-risk forests.
- Large areas of unmanaged pitch pine, as well as isolated inland barrens, remain on northeastern landscapes and science-based pathways toward restoration are needed in many of these forests. The combination of rapid overstory mortality along with regeneration debit or mismatch threatens the persistence of these forests in areas where they have gone unmanaged.
- A regional knowledge base exists and can assist regional natural resource professionals who are beginning pitch pine management and restoration.

Linkage to NAFSE

Restoring pitch pine barrens and reducing susceptibility to SPB are parallel objectives. Prescribed fire and other silvicultural techniques used to improve conditions in pitch pine forests are key to protecting these areas. These techniques will also be important for protecting stands from excessive SPB damage. However, many unknowns exist in terms of how SPB will respond to stands treated with prescribed fire. Understanding this dynamic is important as pitch pine management increases and SPB continues to spread. Linking the fire community organized by NAFSE to the forest health community in the region is critical to allow for shared expertise across groups and provide a strong knowledge resource moving forward.

Background

Southern pine beetle (SPB, *Dendroctonus frontalis*) is the most destructive bark beetle in eastern North America. Historically associated with southeastern pine forests, SPB was detected in Long Island pitch pine forests in 2014 and estimated to be there for several years prior to detection. Long Island has had persistent damage across eastern Suffolk County Since detection with several years considered to be at outbreak levels. Damage has been extensive on federal, state, tribal, and local municipal lands, often with near complete mortality to overstory pitch pine. Conversion of these damaged forests to hardwood dominated stands is likely without intervention. White pine, while rare on Long Island, has been attacked and killed in the Hamptons and on Brookhaven National Laboratory.

In early 2015, SPB was also found colonizing trees in several stands in Connecticut. This time, red pine was the primary host. Subsequently, Scots pine, pitch pine, and Norway spruce were also found attacked. Host species distribution is limited in Connecticut, and this has resulted in

small infestations found infrequently. However, SPB has been consistently trapped in several portions of the state.

The distribution of SPB in New York and New England has been monitored since the year after detection on Long Island. State agencies and their partners have distributed traps throughout most of the New England states as well as upstate New York. The observed distribution of SPB in this region was mostly static for several years (Figure 1A). However, in 2021, SPB detections occurred further north than previously documented, with SPB captured in upstate NY, Ossipee, NH, and Waterboro, ME (Figure 1B). These detections occurred due to semiochemical detection traps being left out in the field through most of the fall, with all the new detections occurring in October. Previous detection efforts had mostly relied on spring surveys.

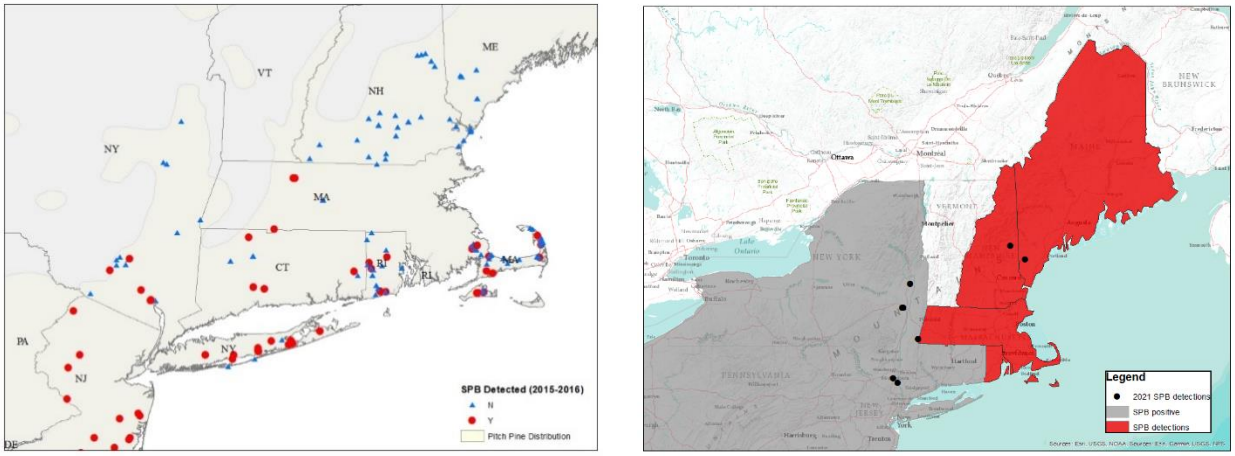

Figure 1. (A) Known SPB detections from trapping surveys in 2015 and 2016. The population extent of SPB remained the same until 2021 when surveys detected beetles further north.

Southern pine beetle is not habitat limited. Hard pines, the preferred hosts, exist in areas outside of SPB's range. Minimum winter temperature has restricted SPB to southeastern and Mid Atlantic forests. Minimum winter temperatures of -16° C can be fatal to SPB. These temperatures are becoming less frequent in southern portions of New England, and with predicted climate changes, SPB will have access to large portions of New England by 2050.

Except for a few areas, pitch pine in New York and New England has largely gone unmanaged in the region. Fire has also been suppressed in many areas and implementation of prescribed fire programs has been limited, although currently expanding. This has led to overstocked stands where the current overstory pitch pine is the last cohort of the species present. These stands are undergoing mesophication and transitioning away from pitch pine towards more fire-intolerant tree species. These stand conditions coupled with the spread of an aggressive bark beetle has led to an ecological meltdown of sorts that is resulting in rapid stand type conversions.

Existing Groups and Networks

There has been significant effort focused on managing SPB since detection on Long Island. The initial response was delimitation and suppression, led by NY DEC with the help of USFS. Since

that time, state forest health programs in MA, CT, RI, NH, ME, and VT have joined efforts to determine the extent of the population. More recently, USFS, UVM, and NAFSE have organized a group of natural resource practitioners concerned about SPB and/or pitch pine forest management and restoration in the northeast. Through this group, we have held a half day workshop followed up by two web-based meetings, as well as a field tour of infested areas and restoration treatments on Long Island.

Building the Technical Working Group

SPB management in pitch pine is multifaceted and benefits from decades of beetle research in the southeastern US and pitch pine research and restoration efforts in the northeast. Previous efforts provided northeastern natural resource managers an advantage in addressing SPB damage for the first time on Long Island. However, many unknowns related to beetle behavior in its expanded range and how it will relate to disturbances during restoration treatments remain. Building a diverse team of natural resource professionals that has experience in bark beetle ecology and management, silviculture, prescribed fire, invasive species, fire ecology, tree physiology, and restoration ecology is needed to address the threats to pitch pine barrens persistence. A strong integration of the existing knowledge in restoration of pitch pine and bark beetle ecology and management are critical to successfully developing landscape level management and restoration plans that are flexible and adaptable.

Priority Areas

The TWG will be tasked with reviewing available information on biology and management of SPB, as well as restoration efforts in pitch pine forests and their relationship with tree health and vigor and identify knowledge gaps that should be addressed.

1. Evaluate and synthesize current SPB work in pitch pine barrens from NY, NJ, and PA as well as any pitch pine restoration research from those same areas. Important information will include (1) SPB basic biology information, (2) the relationship of SPB and pitch pine, and (3) interactions of restoration efforts and bark beetle behavior (this could include other beetles and fire dependent ecosystems).
2. Develop a list of key studies addressing SPB biology and management and pitch pine restoration efforts on stand and tree health that are needed to progress management plans in northeastern forests.
3. Work with the broader SPB community to develop technical fact sheets detailing important components of SPB management related to detection, monitoring, suppression, and prevention.
4. Provide annual SPB assessment reports to regional natural resource professionals.
5. Locate preexisting or new funding streams for research projects focused on our key studies list.
6. Assess current approach to SPB management on Long Island and suggest revisions if needed.
7. Post-SPB restoration objectives