2021/22 Stand 12 Sparta Mountain Wildlife Management Area Report

January 2025

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Site Description and History

This site is located along the west side of Sparta Mountain Wildlife Management Area (SMWMA), south of Edison Road, north of Collins Pond, east of the powerline, and accessed using an existing unpaved road from Edison Road to and through the site (Fig. 1). The parcel that includes this site was mined for iron in the 1800s through 1900s, then limestone in the early 1900s. In fact, multiple mines have been documented less than ½ mile from this site. As a result, all the trees were cut, rocks were blasted, and processing plants, roads, railroads, and the steam shovel were built to transport all the material. This parcel continued to be privately owned by multiple mining companies mining for zinc and other materials through at least the 1960s. The parcel was then managed for timber in the 1980s and was purchased by the state and NJ Audubon in 1994 to prevent it from being developed.

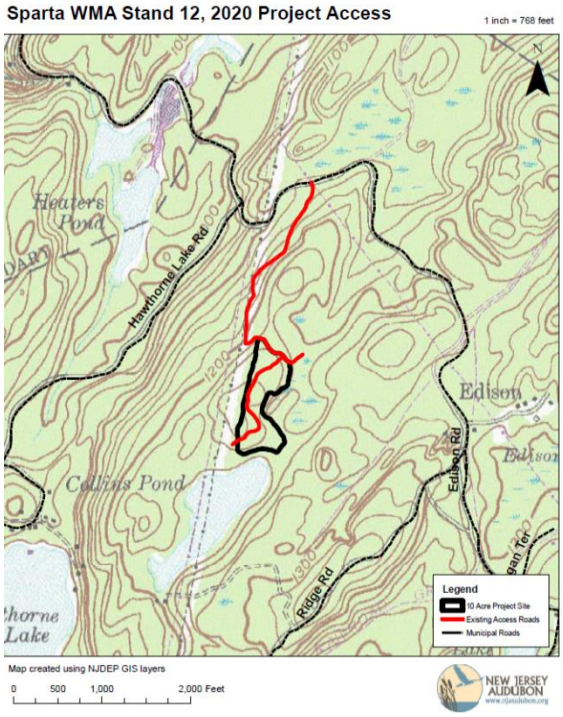

Figure 1. Map of the location of the site in Stand 12 (black bold) and existing unpaved access roads (red) on SMWMA.

Before treatment, this site consisted of a maturing mixed upland oak forest, about 80-90 years of age, with an average 663 trees per acre and average diameter of about six inches. Most canopy trees on the site consisted of red oak and mockernut hickory, but most of the saplings consisted of maples, indicating the oak forest is converting to a northern hardwood forest (Fig. 2). Seedling regeneration was present but generally suppressed due to too much shade from the high density of trees. Non-native invasive plants were observed on the site and included Japanese barberry (< 8 plants), ailanthus (3 stems), and multiflora rose (1 plant).

Figure 2. Photo of the forest in the site in Stand 12 on SMWMA prior to treatment (May 2020). Trees with orange markings were retained during treatment.

It is concerning that the oak forest is converting to a northern hardwood forest. Northern hardwood trees (American beech, sugar maple, sweet birch) are generally shade-tolerant, meaning they grow well under a closed forest canopy, but do not grow well in warmer and drier conditions, which is what is predicted for the growing season in NJ as the climate changes. Northern hardwood trees also are not drought tolerant and not adapted to fire so will be less likely to survive as the climate changes as well. Oak trees struggle growing under a closed forest canopy but will grow well in warmer and drier conditions, and they are much more likely to survive droughts and fires. Managing this site to promote oak trees will help keep the forest as a forest

into the future and help the wildlife that depend on oak trees as a food source. Not only do oak trees produce acorns, but they also support the majority of moth and butterfly species.

2020/2021 Treatment

Activities proposed for this year were one year behind the schedule in the 2017 Sparta Mountain WMA Forest Stewardship Plan and included a modified seed tree treatment on 10-30 acres in Stand 12, a shelterwood treatment on 10-30 acres in Stand 22, and an overstory removal in ½ acre in the wetlands of Stand 23.

NJ DEP Fish & Wildlife incorporated site-specific feedback provided during months of stakeholder engagement and planning. Changes based on this feedback included not conducting the shelterwood or overstory removal treatments and reducing the size of the seed tree treatment to 9.2 acres to provide a greater buffer to a wetland and to avoid an area with large mountain laurel, a common native plant. A state-approved forester provided the details of the 9.2-acre seed tree prescription in accordance with the approved 2017 Forest Stewardship Plan. The intent of a seed tree treatment is to open the forest canopy by 60-90% to enable the regeneration of shade-intolerant and mid-tolerant native vegetation (such as oak trees) while also maintaining mature "seed" trees. The objectives for this activity are to increase structural and age-class diversity of forests across the larger landscape scale, regenerate the oak-hickory forest type, and create critical habitat for rare, endangered, and declining wildlife. The seed tree treatment was conducted in the winter and completed March 2021.

The treatment involved cutting most of the trees across all size classes (Fig. 3) while retaining the healthier mature oak and hickory canopy trees (Fig. 4). After treatment, about 12 large trees per acre (average 17 inches in diameter), mostly oak and hickory, were retained on site. The residual basal area was approximately 21 ft^2/ac. Only trees which were removed off site were measured (n=40) and averaged 16.5 inches in diameter with an average age of 95 years, and about 20% of the 40 trees sampled exhibited signs of fungal rot.

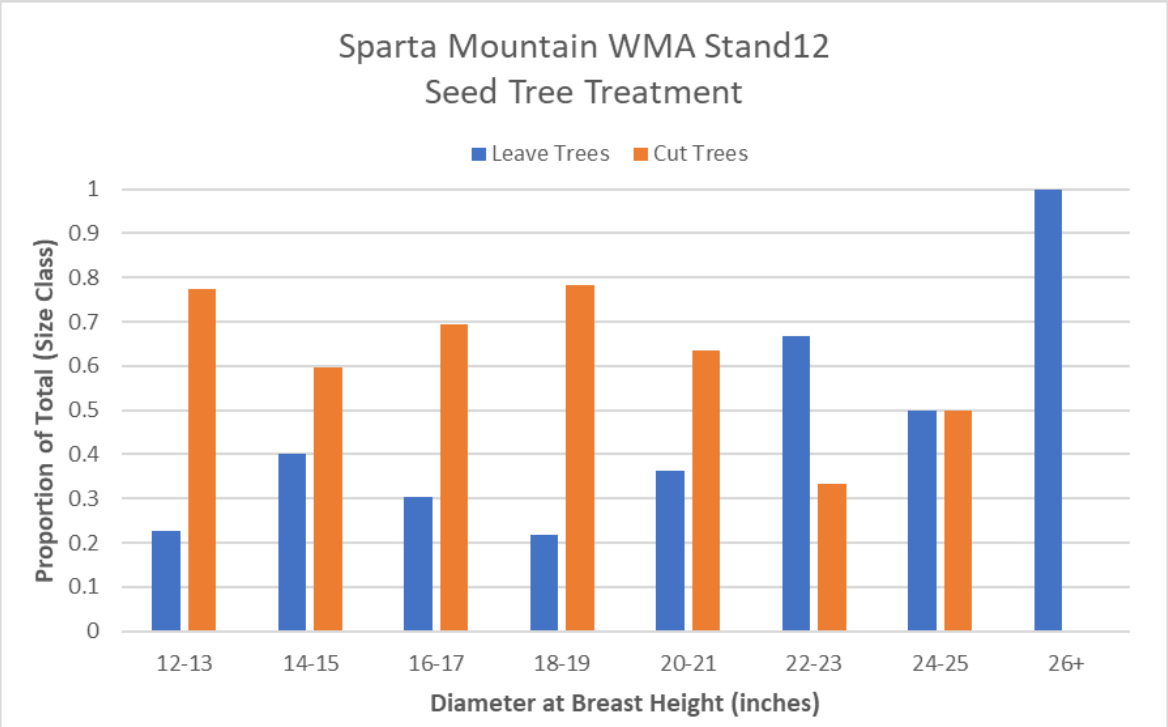

Figure 3. Proportion of trees retained (blue) vs cut (orange) by diameter size class for the 2020/21 seed tree treatment in Stand 12 on SMWMA.

Stand 12 Bird Survey Results (2021 – 2024)

Figure 4. Photo of the forest in the 10-acre site in Stand 12 on SMWMA after treatment (May 2021).

This site was surveyed for all bird species during the breeding season (May 15 – June 15) before treatment and once a year after treatment using the same protocol. Before treatment, four species of birds were observed, two of which were Species of Greatest Conservation Need (SGCN), giving the site a bird conservation score of 12. A few months after treatment, the total number of species, number of SGCN, and conservation scores more than tripled, and three years later was at 32 bird species (15 SGCN) and a bird conservation score of 158 (Fig. 5). Most of bird species observed before treatment were also observed after treatment, while birds like the eastern towhee and other species that have been steeply declining and considered to be at their Tipping Point, were observed afterwards because of the treatment done.

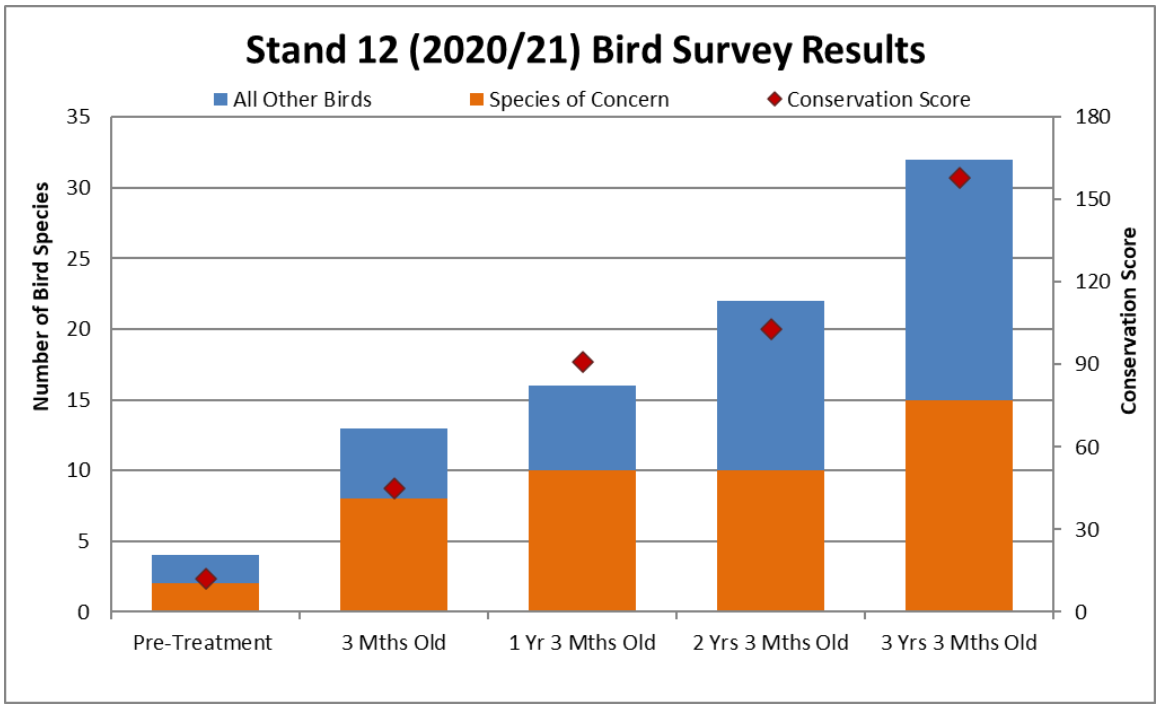

Figure 5. Number of bird species of concern (orange bar), all other bird species (blue bar), and bird conservation score (red) observed during breeding bird surveys in Stand 12 on SMWMA. Bird conservation scores are the sum of the scores of each individual bird species detected, which were determined for each species based on federal, state, and regional statuses and rankings.

Stand 12 Vegetation Survey Results (2021 – 2024)

Rapid vegetation surveys are conducted during the same time and location as the bird surveys (center of the site) to assess the vegetation cover and dominant species of vegetation before and after treatment (Table 1). Before treatment no non-native invasive plants were observed in the location of the bird survey before treatment and were removed prior to the treatment. The treatment resulted in opening the canopy by about 70%, retaining oak and hickory trees and targeting northern hardwoods (maple, beech) for removal. The shrub and herbaceous cover grew in quickly after treatment (Fig. 6) and consist of a diverse mix of vegetation. Witch hazel and maple-leaf viburnum are still growing on the site but oak and blueberry responded quickly to the increased sunlight, as did cherry and some aspen.

Table 1. Vegetation cover and the dominant trees, shrubs, herbaceous, and non-native invasive plants observed during the rapid vegetation surveys on Stand 12 in SMWMA before and after treatment.

Vegetation Type	Before Treatment	3 Months After Treatment	1 Year 3 Months After Treatment	2 Years 3 Months After Treatment	3 Years 3 Months After Treatment
Tree (% cover)	90	30	30	20	20
Shrub (% cover)	5	5	20	30	50
Herbaceous (% cover)	5	5	30	30	20
Non-native (% cover)	0	0	0	0	0
Dominant 3 Trees	Maple, oak, hickory	Oak, hickory, ash	Oak, hickory	Oak, hickory, cherry	Oak, hickory, cherry
Dominant 3 Shrubs	Viburnum, maple, witch hazel	Blueberry, maple, viburnum	Maple, blackberry, blueberry	Oak, cherry, maple	Blackberry, sweet birch, blueberry
Dominant 3 Herbaceous	Grass/sedge, forb	Forb, grass/sedge, fern	Grass/sedge, forb, fern	Grass/sedge, forb, fern	Forb, grass/sedge, fern
Dominant 3 Non-native Invasive	None Observed	None Observed	None Observed	None Observed	None Observed

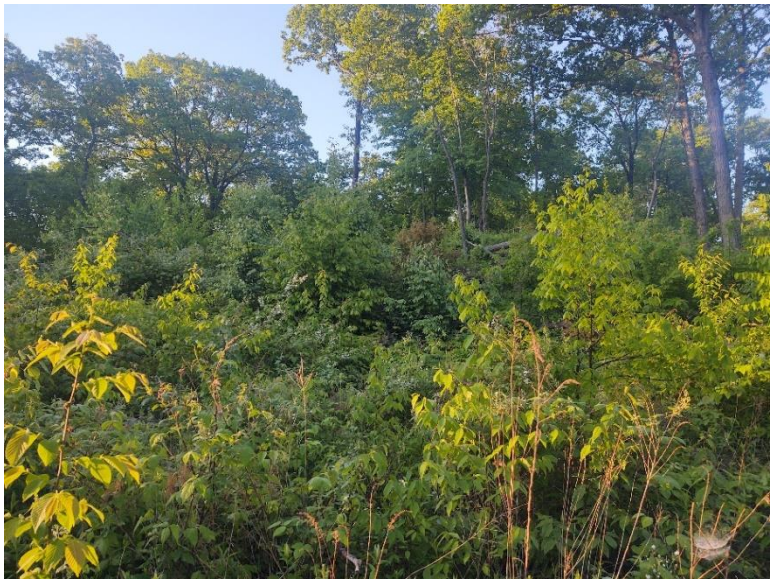

Figure 6. Photo of the forest in the 10-acre site in Stand 12 on SMWMA 3 years, 3 months after treatment (May 2024).

In summary, while the number of species detected during surveys can vary year to year, there is a treatment effect that results from opening the forest canopy. The bird conservation score, which represents both the number and conservation concern of species observed, is highly correlated with less tree canopy cover (Fig. 7), even before the end of the first growing season post-treatment. The seed tree treatment on Stand 12 in SMWMA opened the forest canopy to allow for herbaceous and small woody vegetation (shrub and saplings) to grow, specifically vegetation that cannot grow or thrive in the shade of closed-canopy forests. This resulted in many more bird species using the area during the breeding season compared to before

treatment, especially SGCN in NJ. This treatment also increased the diversity of vegetation which will help this forest be more resilient and less vulnerable to future climate conditions.

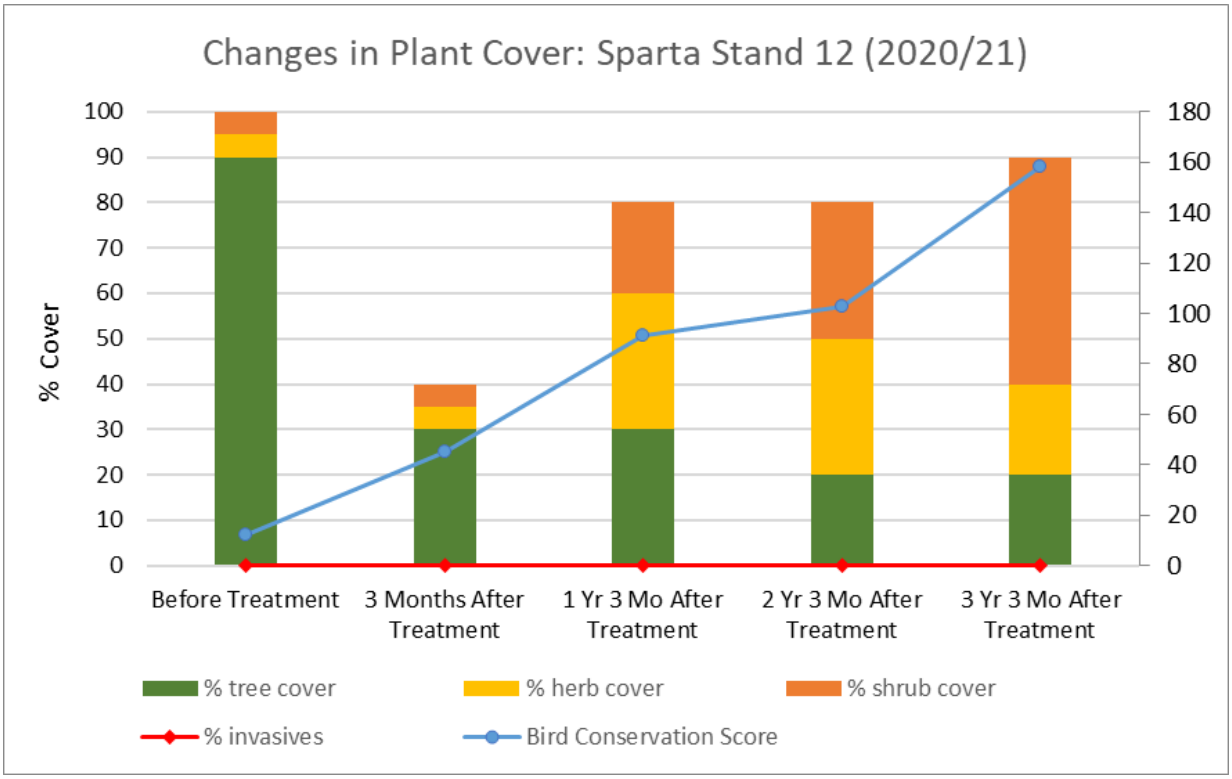

Figure 7. Bird Conservation Score (blue line) and vegetation cover (columns, red line) observed during breeding bird surveys on Stand 12 in SMWMA before and after treatment. Trees include all woody vegetation >4m tall, shrubs include all woody vegetation <4m tall, and herbs are all non-woody vegetation. The red line represents the percentage of the area with non-native invasive plants (tree, shrub, and herb).