Ruben Lopez

Fermilab Research paper

Over the summer I was presented a task to create a land management plan for the shrubland area (also known as the sparrow hedge) at Fermilab. This area sits next to Lake Law and south of the village. It is home to many species of songbirds, insects, and plants. While many species are perfectly happy with the current situation of the shrubland, others are not. In fact, there are three native songbirds that have been rapidly declining in population. These three birds are known as the Yellow-breasted chat, the Bells vireo, and the Willow flycatcher. Historically, these birds have been popular on site, but over the last decade the population has been declining to very low numbers. The Yellow-breasted chat was last seen in 2016 and the other two songbirds are becoming rarer. While there are many reasons as to why the birds are declining in population, it is safe to say that the most impactful reason is because the area does not offer a suitable habitat for these songbirds. The land management plan focuses on reestablishing a healthy native shrubland in hopes of bringing back the birds that have been driven away.

To establish an understanding of what I am working with, I researched the birds and read multiple studies on what type of habitat the birds prefer and if there is any way to replicate that into the shrubland area. I also got a great foundation of knowledge from my supervisor on the history of the area and what challenges may come with this restoration. I made myself familiar with the birds first and then with the land. This was mostly because it was a remote internship, so I only had an aerial view of the land. Once I had a strong foundation on the specific requirements these songbirds have for a habitat, I then spoke to a passionate bird watcher and many others who understand the urgency of the shrubland restoration plan. Here I learned about the impact and the importance of the work I was doing. I also got a lot of information on what people thought would help.

When making this plan, I set a few goals that should be accomplished while restoring the area. The primary goal is to create and restore a suitable and sustainable habitat for the native songbirds. Currently, the shrubland does not offer this because it has been allowed to grow and slowly transition into a woodland. This is normal because a shrubland is the transition from a grassland to a woodland but due to limited space and the necessity of this type of land, it is important to keep it at this stage. A secondary goal is to remove all the trees on this site and remove the non-native shrubs so that they provide less than five percent coverage. The reason for this is because a healthy native shrubland does not have trees and has little to no non-native shrubs. While talking to people who have visited this site, I was able to come across the fact that the main shrubs in this area were common buckthorn and honeysuckle. After doing some research and communicating to the ecologist of Fermilab, I learned that overtime these shrubs harm this area. I researched a study on common buckthorn done by a forest preserve and was able to confirm my supervisor’s comments on the fruit provided by this shrub. The berry yielded by the common buckthorn acts as a diarrhetic which in turns hurts the environment over time due to the amount of waste it causes birds to produce. Therefore, it needs to be removed and replaced by native shrubs such as the Wildplum which also produces fruit, but it does not have the downside of the non-native shrubs. After discussing the current shrubs on site, my supervisor and I also concluded that honeysuckle shrubs make it difficult for other shrubs to grow. Over time these non-native plants will cause an unhealthy shrubland and this called for their removal as a secondary goal. When these goals are met, the land should be a native healthy shrubland that accommodates the requirements native songbirds have for a suitable habitat.

When learning more shrublands and after communicating to experts about the status of the sparrow hedge, my supervisor and I came to the conclusion that a set of strategies can help us meet the goals labeled in this restoration plan. Due to the build up of wildflowers and other tall grasses, it was clear that a prescribed burn would need to happen first to remove the build up from previous years. Prescribed burns are dangerous but with the conditions met such as temperature, wind, and humidity the fire can be guided and controlled much easier. It would not be ideal to burn the whole area at once. It is best to burn about one quarter of the area at a time and after the area is burned then the replacement of non-native shrubs and with the removal of tress, the shrubland can make a slow and effective transition to a healthy sparrow hedge. This area is slightly overdue for a burn, since the most recent one was about four years ago. After discussing this in a meeting with other people who are interested in the habitats for the birds, they advised me to make sure I make it clear to recommend a burn once birds migrate out of the area. This will minimize the damage to the species that inhabit the shrubland as well as make it effective. It will also prevent driving away the existing population that are already present. It is very beneficial to do the prescribed burn because not only will it clear up the vegetation between shrubs, it will increase the mobility workers will have when removing them along with trees. Also, burning this area will weaken the shrubs and trees making it easier to remove with tools.

There are many different methods that can be used when removing shrubs and trees such as using chainsaws, yanking them out, running over them with a mower, or spraying herbicides. These are all techniques I recommended using for their removal. These are also possible because these are the same techniques used by the lab when treating other areas of Fermilab. Spraying herbicides should be done following the safety guidelines and should be used depending on the situation. Using herbicides in the winter would be a very effective way to kill off these plants that grow year-round. This is because in the winter, once the weather begins getting too cold for plant life, the trees and shrubs carry the nutrients from the whole plant to the roots and stores it until it becomes warm again. If herbicides are sprayed when the timing is right and after they have been cut, then the plants will absorb it into its roots and can kill them off from the ground up. Because the removal of shrubs will happen post a prescribed burn then using a mower will also be effective because the shrubs will be weak. Once they are cut at the base the spraying of herbicides after mowing will prevent sprouting and can eliminate the plant as well. It is important that the worker not miss a non-native shrub because these plants, due to their berries, can spread relatively easy.

Once the quarter of the shrubland is burned and has been rid of its non-native shrubs, new native shrubs will be planted. The ecologist at Fermilab advised me to make note that a variety of shrubs should be planted not just in species but in height and age. The species that will be sought after are wild berry shrubs, elderberry, and gray dogwood. These offer a great structural habitat for the native songbirds and most offer fruits. Shrubs that offer fruits are very desirable because the fruit is a secondary diet for the birds, and they attract insects which are a bird’s primary diet due to the dense protein. Getting a variety of native shrubs will offer various types of potential homes for the birds and there should also be a variety of ages of shrubs. A range of shrubs from fully grown (max 13-15 feet tall) to weeks old shrubs should be planted providing multiple different types of habitats. Volunteers can also collect seeds from existing native shrubs on site and plant them to create a cost-effective plan. Also, shrubs should be planted about 15-20 meters away from each other for half of the site. This is because some native songbirds, such as the yellow-breasted chat, prefer to have space from other shrubs and other birds’ nests. For the other half of the site, shrubs should be plated about 10-15 meters from each other and there should also be a few clumps of shrubs. This is because I was informed by bird watchers that some songbirds prefer a large clump of shrubs so that they do not have to travel far from their nest. The bird watchers who informed me of this have been studying birds for about two decades, so I trust their opinions to a certain degree.

Along with prescribed burnings, spraying of herbicides and using other tools to remove trees and non-native shrubs and replace them with native shrubs, another technique I investigated was prescribed mowing. During the last two weeks of this internship, I was lucky enough to visit the site and see the shrubland in person. Here I used my time to see what specific problems the site has and what tools were in store to deal with them. I got to witness how a prescribed mowing is done from far away and knew that I could implement this into my work. Prescribed mowing is an effective way to control the vegetation between shrubs. In can help manage the height of wildflowers and even get rid of medium sized shrubs. These techniques can help reach the goals made in the land management plan and create a healthy native shrubland. The length of this plan is about fifteen to twenty years. This because it takes about 15 years for shrubs to reach adulthood and it gives a nice timeframe to slowly transition and observe how the existing species respond.

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