

History of the Delaware Native Plant Society (DNPS) Reforestation Projects

At its inception, one of the primary aspirations of the Delaware Native Plant Society was to do its part in curbing the loss of forest in Delaware. The principal method we wanted to use to achieve this objective was through the reforestation of fallow fields that were already retained in conservation status. Over the years, many people have contributed, and many hours have been spent in the implementation of this goal. This report is a summary of our efforts up to this point.

The First Exploratory Steps

A letter was written on **24 April 1999** by then DNPS President Keith Clancy on behalf of the DNPS to Mr. Andy Manus, the then Director of the Division of Fish and Wildlife (DFW), explaining our interest in doing a reforestation project and requesting the assistance of DFW in selecting a site for a reforestation project in a state wildlife area.

Another letter was written on **8 July 1999** by Keith Clancy to Mr. Nick DiPasquale, then Secretary of DNREC discussing the possibility of undertaking a reforestation project on state lands. Keith requested that this topic be an item on the agenda for the **14 July 1999** meeting with the State's conservation groups. Keith Clancy attended this meeting and secured a positive endorsement from Secretary DiPasquale for our reforestation plans.

Prime Hook State Wildlife Area, Sussex County

This reforestation site was our first project, and is located in the State Wildlife Area on Prime Hook, just off Little Neck road. The site is a previously farmed field that is approximately 1.0 acre in size and is bordered by mature forest, and another reforestation site that was planted by wildlife area staff with 2-3 year old hardwood seedlings.

Delaware Native Plant Society members Rick McCorkle and Keith Clancy met with Rob Gano, manager of the Prime Hook State Wildlife Area, on **12 January 2000** to look at a site for reforestation within the Wildlife Area borders. Mr. Gano detailed out the area that would be flagged off for our reforestation efforts and the area was surveyed for nut availability.

Armed with only pocket knives and buckets, seed collecting and reforestation began on **15 October 2000**. On this day approximately nine volunteers collected seeds in the forest adjacent to the reforestation plot in the morning and after a lunch break, directly seeded the reforestation site. The method used to plant the seeds was one that was devised by Keith Clancy, DNPS President at that time. His methodology consisted of using flags that were placed in the ground in a randomized fashion and then four seeds per flag were planted (one seed in each of the cardinal directions, N, S, E, and W around the flag) approximately 12 inches away from the flag. This method was used in each one of our four reforestation sites. Most of the seeds collected and planted were various oak species (primarily white, red, and, southern red) with only a small percentage that included hickories, tulip poplars, and other hardwoods. Lynn Parks of the News Journal, wrote an excellent article on the DNPS and this project, which appeared in the 18 October 2000 issue. We planted approximately 1800 nuts at 450 flags this day.

Society member Eric Zuelke and another DNPS member inventoried seedlings on **20 May 2001**. The seeding effort at this site was quite productive, as nearly 300 seedlings had sprouted.

Tree tubes were installed on various dates in **June and July 2001** by Rick McCorkle and Keith Clancy around approximately 200 seedlings, and some of the volunteer sweet gum seedlings were removed.

On **28 May 2003**, Eric Zuelke and another DNPS member cut down non-natives and invasive plants in a three-foot radius around each oak seedling to give them room to grow and compete.

Eric Zuelke and Angel Babb (2005 DNPS intern) removed tree tubes from some of the larger oaks on **10 May 2005** and cut down non-natives and invasive plants in a three-foot radius around each oak seedling. Approximately 60 oaks and hickories were discovered this day, of which at least 50 were from seeds that were planted in October of 2000. This was clear because tree tubes were still around them. There were also numerous tulip trees, most of which are presumably volunteers. By far the most numerous tree species on the site is the sweet gum, with a ratio of approximately 15:1 to the oaks. The site is becoming a dense pole forest, which can be a typical scenario for this type of reforestation project.

Eric Zuelke and Lauren Lyles (2006 DNPS intern) removed tree tubes from some of the larger oaks on **14 May 2006** and cut down non-native and invasive plants in a three-foot radius around each oak seedling. Approximately 60 oaks were again discovered, of which at least 50 were from seeds that were planted in October 2000. There were also numerous volunteer tulip trees, and sweet gum is quite numerous and outnumbers the oaks. These results were similar to what was found in 2005, except all the plants are just a couple of feet taller now. The tallest oak that we observed was approximately 15 feet tall. Unfortunately, in the fall of 2005, the Wildlife Area maintenance crew mowed strips in over 2/3 of the reforestation area. They did not realize that this site was a DNPS reforestation site. The mowing did help to clear out many of the sweet gums, but also mowed down many of the oak seedlings that had probably reached heights of 3 to 6 feet based on the size of cut bases.

Prime Hook National Wildlife Refuge Site, Sussex County

This reforestation site is located east of Deep Branch Road (north of the Route 16/Route 1 intersection, east of Waples Pond) on Prime Hook National Wildlife Refuge. The site is approximately 18 acres in size and is part of a long-term project by the Refuge in establishing a “legacy, or centennial forest.”

Field work for this site took place over a five-week period (**5 October 2003-16 November 2003**) and resulted in the planting of 14,740 seeds at 3,685 flags. Most of the seeds planted were oaks and hickories, but we also planted flowering dogwood, and tulip poplar. Seeds were collected in the forested areas within the borders of the Refuge. Approximately 25 volunteers helped with seed collecting and/or planting. To make things fun, we had our first day of planting during the refuge’s Annual Waterfowl Festival which also was part of the hundredth anniversary of the National Wildlife Refuge system. During a light drizzle we planted the field as it and our efforts were blessed by a chief of the Lenape tribe.

On **21 May 2004**, Keith Clancy and George O'Shea (Refuge biologist who spent many hours on his own collecting and planting seeds) performed independent surveys of the germination success and each came up with results that averaged out to a germination success of 1 to 4 seedlings at 71% of the flags.

From **31 July-7 August 2004**, approximately 75 volunteers and 4 Refuge employees installed 1,316 tree tubes.

There were approximately 600-700 tree tubes still in place on **23 April 2005** and no direct management efforts were conducted this day. This number of tree tubes is only approximately half of what was installed in 2004 and it's not clear what happened to the other tree tubes. The following description of the field work in 2006 may be part of the answer. Other reasons for the decline in the number of tree tubes located could be human sampling error, gusts from storms blowing them away, or perhaps even animals carrying them away.

After an inspection of this site on **9 September 2006**, it appears the area is showing signs of maturing. However the northern half of the site is having some problems, but the southern half is in good shape. The northern half is densely populated with sweet gum. This half is adjacent to surrounding forest and is further away from the grassy access road leading to the site. Because of its location, fewer volunteers ventured this far into the site to install tree tubes and because of that, and the density of the sweet gums, it was very difficult to locate any of our seedlings. Undoubtedly, some there are still growing, but it is not known how many. Sweet gum is also well established in the southern half of the site but there are far fewer than found in the northern half and they are young enough that the oak seedlings can compete. Of the 600-700 tree tubes located in 2005, approximately 200 were located on this date. Most of those tree tubes were left in place, but tubes that had fallen over, or were otherwise impeding the growth of a tree were removed. Only a small percentage of the tubes still standing lacked seedlings, so the majority of the tubes had a healthy tree still inside them. There were also a handful of oaks and hickories located that did not have a tree tube around them and they were surviving just as successfully as individuals with tree tubes. There were just about as many hickories as there were oaks growing (about 50% each spp.). There are also a moderate number of loblolly pines growing here, which will ultimately make this a more diverse forest. There are a large number of tulip trees and sweet gum growing at this site (particularly the north half), and it is on its way to becoming a sweet gum/tulip tree pole forest, much like the Prime Hook Wildlife Area site. Other species encountered were cherry trees, sumac, and eastern red cedar.

Blackbird Creek Delaware National Estuarine Research Reserve (DNERR) Site, New Castle County

The Blackbird Creek DNERR site is located near the Union Church Road and Rte 9 intersection in the lower end of the Blackbird Creek watershed. The DNERR staff arranged to provide a field of approximately 1.5 acres for reforestation. This field is located on the northeast side of Beaver Branch, a small tributary of Blackbird Creek. The field is bordered by a narrow wooded hedgerow on the northwest side immediately adjacent to Union Church Road, a narrow forested fringe of the Beaver Branch on the southwest, and private lands on the southeast and northeast

sides. These private lands consist of grasslands and a planted lawn and garden. Reforestation will provide an important buffer to Beaver Branch and Blackbird Creek, and habitat for wildlife.

The site has two distinct soil and moisture profiles. The upper half, which is closest to the adjacent private grassland is drier, while the lower half, closer to the forested edge and the Beaver Branch, is moister. The transition slope is an elevation drop of approximately 15-20 feet.

Work on the project began in **February of 2002** with the writing of a grant proposal, which was later approved.

Field work was anticipated to begin in **September of 2002**, but climate conditions of the summer and early autumn of 2002 resulted in poor mast production, so DNPS requested, and was granted a one-year extension for the field work.

A meeting with Jim Dobson, manager of Blackbird State Forest was held on **22 September 2003** to discuss details of collecting nuts in the state forest to use at the reforestation site.

The site was mowed on **1 October 2003** for the final time by staff of the St. Jones DNERR Reserve.

Nut collecting took place between **2 October through 12 October 2003** at various sites in the Blackbird State Forest and direct seeding was done at the reforestation site. The nuts were planted in a randomized fashion with 4 nuts to a flag. Most of the nuts collected and planted were of various oak species (primarily white, and southern red) with a small percentage of hickories, tulip poplars, other hardwoods, and some shrubs. A total of 1,984 nuts at 496 flags were planted.

Germination success was assessed on **23 May 2004** by Keith Clancy and 47 tree tubes were installed around germinated seeds, of which the majority were oaks. We also discovered a handful of the shrubs seeds that we planted (namely dogwood) in October 2003 had germinated as well.

On **16 April 2005**, 65 healthy trees (oaks and hickories) were counted. In addition, tree tubes were adjusted, grass was cleared from inside the tubes, and 20 additional scarlet oak seedlings were planted from the DNPS nursery. A few of the original shrubs were also still growing. It was noted that the most successful part of the site is in the lower half, where the soil is more consistently moist.

From the original seeding effort, there were 11 oaks with tree tubes still living on **1 July 2006**, as well as one oak that was about 4 feet tall. Two hickories and one four-foot flowering dogwood (which we planted) were also found and two additional hickories were planted in the upper half of the site. The upper half of the site has lost most of the original seedlings because it is too dry. The lower half has dozens of volunteer hickories, and a few volunteer oaks from the forest edge. The site has quite a large number of multiflora rose shrubs, and sweet gums (many of which were cut down during this years management efforts), but also numerous small tulip trees. The upper half of the site is succeeding into the same type of pole forest that is currently established

at the Prime Hook Wildlife Area site. The lower half of the site is going to contain the greatest number of desirable species (the oaks and hickories) and should be the core of the site from which the upper half will ultimately get its source of seeds. As the trees from the lower half mature, they will shade the upper half and help to retain moisture, to ultimately make it successful. Until then, human efforts to reforest the upper half will most likely be futile.

Cedar Creek Natural Area Site, Sussex County

The Cedar Creek Natural Area, managed by the Delaware Division of Parks and Recreation, is located approximately 1 mile west of Route 1 on Brick Granary Rd. The site is approximately 18 acres in size and is bordered by the lawn of a church on one side, houses and a thin row of trees and shrubs on one side, and mature forest on the other two sides.

On **4 September 2003**, Keith Clancy met with Rob Line (manager of the Cedar Creek Natural Area) to discuss details of the reforestation project.

Keith Clancy met with Chris Bennett (assistant land manager of the Cedar Creek Natural Area) on **8 September 2003** to perform a site visit and go over details of the project.

In **mid-September 2003**, the site was mowed for the last time by staff of the Division of Parks and Recreation.

Field work at this site was done over a five-week period from **4 October 2003-16 November 2003**, and resulted in the planting of 9,844 seeds at 2,461 flags. Most of the seeds were collected from the adjacent forest along Cedar Creek, but we also collected from other forests within the same watershed. We had numerous volunteers helping with the seeding of this site, including DNPS members, the general public, and even a girl scout troop from Washington DC!

The first survey for germination success, conducted on **15 May 2004**, yielded nothing! Not one seedling was located.

On **17 May 2004** another survey for germination success yielded a few oak seedlings along with one dogwood seedling.

More surveying was done on **30 May 2004** and more seedlings were located and 43 tree tubes were installed.

Fifty more tree tubes were installed on **31 May 2004**.

Additional surveys for seedlings on **5 June 2004** located 662 flags with 404 seedlings. At the time, we extrapolated that data over the entire field, and it yielded a result of approximately 1,485 seedlings existing in the field overall. Seventy-seven seedlings not at flags were also found.

Between **4 July 2004-21 August 2004** volunteers installed 471 tree tubes around seedlings.

Approximately 200-300 tree tubes were still in place on **30 April 2005**, most contained healthy plants. Again, it is not clear what happened to the other half of the tree tubes that were installed in 2004.

Eric Zuelke met with Rob Line on **25 July 2006** and discussed how Mr. Line has been leading the way in management of this site. He and his crews have been targeting select non-native invasive species for eradication. Some of these species include mimosa, locust trees, and multi-flora rose. Mr. Line and Eric perused the site for two hours talking about future management strategies and issues. We noticed that some of the trees previously treated with Garlon (an herbicide applied directly to the bark) did not totally die and we discussed different methods of dealing with these plants. We also targeted a few more species in need of control in order to improve the site. Overall, the site looks good and is well on its way to becoming a mixed loblolly pine/hardwood forest (approximately 50% softwoods & 50% hardwoods). There are some portions of the site that had 0% germination success, and other portions that had upwards of 50%-75% germination success. Additionally, we noticed many volunteer oaks and hickories growing along the edges of the site near the bordering mature forest, so the site is slowly moving in from the edges. Many of the previously installed tree tubes have been removed because they were doing more harm than good to the plants as they had fallen over and were smothering the plants. We felt removing the tree tubes was appropriate because we only observed a small amount of deer browse damage. One DNPS volunteer also arrived to help out with clearing around some of the larger oaks to give them room to grow.

As of **October 2006**, we are generally pleased with the direction our reforestation sites are heading. There is a general consensus between all the experts involved that these four fallow fields we chose to reforest would have eventually become forest anyway, but that we have given them a 10-20 year head start. All of the sites have their pros and cons and they all have future challenges, particularly in terms of handling the rampant growth of sweet gum, and non-native invasive species. Management chores will be an annual undertaking, but we expected that when we started out on these projects, and with our collective knowledge and dedication, we will prevail in our efforts to make these little corners of Delaware beautiful places once again, and we will keep the DNPS members abreast of how things are going on a continual basis.

We extend our deepest thanks to all those individuals, DNPS members and non-members alike, who committed time and sweat to these projects; we could not have done them without your help. In addition, our thanks go out to land managers or agency personnel Rob Line, Mark DelVecchio, Wes Conley, and Rob Gano with DNREC, and Annabella Larsen and George O'Shea at Prime Hook NWR. Their support was invaluable to the success of these projects.