

Refuge Grass Planting Nearing Completion

by Dan R. Kunkle

Two biplane crop dusters broke the dawn silence at the refuge, roaring through Lehigh Gap and over the ridge during the last two weeks of March, signaling the beginning of the full-scale implementation of the re-vegetation project begun at the Lehigh Gap Refuge in 2003. About 350 acres of the refuge and another one to two thousand acres in the Palmerton area are contaminated with metals and in need of revegetation.



The biplane crop duster soars over Lehigh Gap

The U.S. Environmental Protection Agency (EPA) oversees the work at the Superfund site and must approve all remediation methods used in the area. Its “Record of Decision” (ROD) requires that native species be used, that erosion be halted, and that, to the greatest extent possible, the metals should be left in the soil and not mobilized into the food chain and other parts of the environment through uptake by the plants. Inquiries by Center staff led us to Bill Mineo of the Delaware & Lehigh National Heritage Corridor (D&L), who advised us to use native warm season grasses. He also introduced us to John Dickerson, formerly of USDA-NRCS, who had done extensive work reclaiming mined lands in the Northeast U.S. using these grasses.

In 2002, we took our plans to the EPA and to CBS Operations (formerly Viacom) and asked that these grasses be used on our refuge to

re-vegetate the barren, eroding slopes. Viacom (now CBS) had become a responsible party in the Superfund process at Palmerton through a series of corporate mergers and acquisitions.

CBS assigned an environmental engineering firm, Frank and West Environmental Engineers (F&W), to work with us and our advisors to take our plan from a concept to an on-the-ground remedy that meets the goals of the ROD. The warm season (prairie) grasses we are using are native to the U.S. (most are native to the site), form deep roots that very effectively check erosion, grow

in these inhospitable conditions, and over time build rich soil that supports a thriving ecosystem. Importantly, these grasses take up only small amounts of the metals, thus helping us meet the third goal of the ROD.

Beginning in 2003, CBS’s engineers began implementing the Wildlife Center’s remediation methods. Jim Frank and Chris West of F&W both were involved in developing the planting methods, and West oversaw the operation at the Refuge that year. Two planting methods were utilized that spring and summer to spread the mix of compost, fertilizer, lime, and grass seed over 56 one-acre test plots. An aerospreader truck blew



The crop duster reloads at Slatington Airport

the mix from the abandoned Lehigh and New England Railroad bed to test plots along the bed. A Caterpillar Challenger tractor with rubber treads pulled a spreader that distributed the same mix on areas away from the rail bed. These plots proved very successful, with excellent establishment

the first year, and considerable spreading of the grasses into new areas the second year.

Since the test plots were germinating successfully, we tried an experiment on the steep, rocky slopes above the test plot area. Mineo and Sherry Acevedo of D&L led a work crew from the Lehigh Valley Juvenile Probation office on a trek up the mountain with sacs of warm season grass seed, which they spread by hand, using no other amendment. This experiment also was successful, as the grass germinated and sprouted from between the rocks and boulders on the mountainside. This led CBS and its engineers to devise a third planting method using the crop dusters to drop seed and fertilizer from the air. A test planting of the seed and fertilizer in 2004 with a biplane was successful in getting grass to germinate. A test application of lime applied in the aerial zone led to the adding of lime to the aerial application mix. Compost was still excluded because of its volume, weight, and moisture content.

In the establishment year of the test plantings, two “bridge species” dominated the plots: coastal panicgrass and sand lovegrass. These species are native to the United States, but not to the specific location at Palmerton. They were used because they both are able to colonize barren, sandy soils with little moisture and few nutrients. Our plan used them to create the conditions in which the locally native species – big and little bluestem, indiagrass, switchgrass, and Eastern gamagrass could flourish. And this is exactly what happened. In year 2 we saw more of the local natives becoming established. By year 3 (2005), we found a great diversification of species, with the bridge species significantly diminishing in abundance.

Evaluation of the test plantings through 2005

by EPA, CBS, and the Wildlife Center resulted in agreement to plan for full-scale implementation of the warm season grass remediation in 2006.

Once again, all three planting methods were employed, this time with F&W engineer, Wade Meteer, in charge of the operation. The two crop dusters led off with the early spring planting, flying as many as 40 flights each in one day from Slatington Airport to the refuge lands. This resulted in planting of all steep slope areas. As soon as that was completed, the operation moved to the land-based techniques on the Refuge. Two local

men were hired by F&W to operate the equipment and spread the seed mix over the remaining acreage. As this issue goes to press in late-July, that operation was completed on the Lehigh Gap Refuge and the crew had moved to private lands on the east side of Lehigh Gap to seed those areas with the same techniques. The list of species for

<p>Native Grasses (original plantings) Big Bluestem Little Bluestem Switchgrass Indiagrass Eastern Gamagrass *Sand Lovegrass *Sand Bluestem *Coastal Panicgrass **Canada Wild Rye (added in 2006) Purpletop Deertongue Broomsedge *Midwestern “bridge” species, expected to die out. **Cool season native</p>
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Planting with the Challenger and spreader

2006 plantings was refined, eliminating one “bridge species” that was not effective, adding one cool season native, and adding three additional warm season species.

Last fall, more than 100 acres of private land were planted on Stoney

Ridge, which runs parallel to the Kittatinny, just north of Palmerton. Some of those areas are very visible from the Refuge, and those plantings are thriving, turning large, formerly barren parts of

the remainder of the summer and into autumn. The Wildlife Center was the catalyst for the plantings, both on the Refuge and on private lands in the area. We are proud to have played that role in getting the Superfund process moving ahead in the area.

Enhancement species

- Partridge Pea
- Wild Senna
- Wild Lupine
- Round-head Lespedeza
- Butterfly Milkweed
- Common Milkweed
- Ox-eye Sunflower
- Black-eyed Susan
- Brown-eyed Susan
- Smooth Blue Aster
- Dense Blazing Star

Our goal for the re-vegetated areas of the Refuge is to restore and maintain a functioning grassland ecosystem on the formerly barren parts of the refuge. We already see signs that a functioning ecosystem has returned to Lehigh Gap. Insect populations are building in the grassland area and a population of small mammals has taken hold. The prey base provided by these herbivores is attracting predators. We regularly see foxes, coyotes, Red-tailed Hawks, and American Kestrels, all of which are reproducing on or near the refuge. Doves, sparrows, bluebirds and mockingbirds are seen frequenting the grassland area, and the addition of nest boxes has been beneficial to the bluebirds, kestrels, and especially the many Tree Swallows that use them.



Black-eyed Susans

While the grasses themselves create a good basis for an ecosystem, many more plant species are needed to create a diverse, stable prairie. With the help of CBS, and with EPA approval, we began adding enhancement plant species this spring to help increase that diversity, providing pollen and nectar for butterflies and bees, as well as seed for birds and mammals. Legumes were planted as well to begin a nitrogen fixation process in the soil. Other species are pioneering the site on their own, including both native and

non-native wildflower species.

In addition to desirable herbaceous species being planted or pioneering their way into the grassland area, other species are arriving as well. Some are pioneering native tree species such as gray birch and quaking aspen. These trees are beginning the process of succession, which will lead eventually to a forest ecosystem. Since grasslands have disappeared all over the eastern U.S., and grassland dependent species, such as certain butterflies and birds, have declined dramatically, the Refuge staff believes that maintaining the recently planted areas as grassland is a worthwhile goal. To achieve that goal, we have to fight off another set of pioneering plants -- invasive alien plant species.

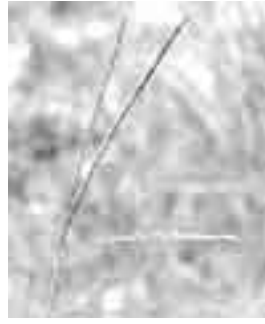
Invasive species have become a worldwide problem for wildlife, equal to loss of habitat by development as a threat to species. The two main invaders at Lehigh Gap are two Asian species – butterfly bush and tree of heaven. Butterfly bush is an ornamental that is sold at many nurseries as a wildlife friendly plant, and its blossoms attract butterflies and bees (although the quality and

quantity of that nectar for our native pollinators is in question). However, no native butterflies utilize it as a food plant, nor do any other insect, so its spread in the grasslands impoverishes the ecosystem and diminishes the health of the food web. If it becomes too abundant, it can be very detrimental to our ecological restoration work. Ailanthus, or tree of heaven, is spreading from naturalized populations near the refuge. This species is very hard to control once it is established and spreading. We are using manual removal techniques and herbicides to control both of these species.

The ultimate control measure, and the one that would also maintain the grassland by killing the woody invasives is fire. While many

people fear fire, it is an important factor in many ecosystems and is an excellent tool when used properly. We plan to have help from experts to use controlled burns in the future to manage our grasslands.

There is no question that without our partnership through the Superfund process with EPA and CBS, far less would have been accomplished with regard to ecological restoration on our Refuge. CBS Vice President/Senior Counsel-Environmental, Jeff Groy has been a very cooperative partner and CBS has been an outstanding corporate citizen in its role as the responsible party at the Palmerton Superfund site. They are to be commended for their eagerness to get the job done, and for their efforts to revegetate



Big Bluestem seed head

the area and restore a functioning ecosystem. I am sure they appreciate our role in getting the stalled Superfund process moving again, and we certainly appreciate their cooperation. EPA Superfund Remedial Project Manager Charlie Root has been equally cooperative and interested in getting the restoration process completed within the requirements of the law. The cooperation between these two and the Wildlife Center has resulted in green mountainsides where barren slopes were the rule for more than half a century. If the Wildlife Center did nothing else, our legacy would loom large in the Lehigh Gap area, helping to bring life back to the once barren Gap area.