

Brayton Memorial Research Forest: Management Activities

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Billy Beck, assistant professor and extension forestry specialist
Department of Natural Resource, Ecology, and Management
ISU Extension and Outreach
Troy Heeren, agricultural specialist
ISU Research Farms and Department of Natural Resource, Ecology, and Management

Introduction

Billy Beck was hired August 2019 as the ISU Extension and Outreach (ISUEO) forestry specialist and assistant professor in the Department of Natural Resource, Ecology, and Management (NREM). Beck, motivated to create a new vision for the Brayton Forest, is working directly with Troy Heeren, ISU staff forester, plus ISU and ISUEO faculty and staff, Iowa Department of Natural Resources (IDNR), and a wide variety of state and regional natural resource partners to craft this vision and further the forest's extension, research, and teaching missions. Beck is humbled to continue the extensive commitment that his predecessors, including Jesse Randall and Paul Wray, as well as Troy Heeren, have provided to the forest.

In addition to Beck's hire, ISU NREM hired Zach Nie as an undergraduate forestry research assistant in January 2020. Nie works closely with Beck and Heeren on a wide range of research and extension efforts, including management and maintenance activities within the forest. Although Nie will work on-site during specific periods of spring and fall semester, the bulk of his Brayton Forest activity will occur during summer semester.

Working with Jeff Goerndt (State Forester, IDNR), ISU currently is revising the existing forest management agreement between the

two entities. Revisions of the agreement include a request for IDNR to provide maintenance of fence, specifically in proximity to the western entrance and public parking area, in order to prevent equestrian and ATV trespassing. In addition, IDNR is requested to increase conservation law enforcement presence on-site (i.e., regular patrols), specifically intended to reduce vandalism and illegal dumping near the western access. Both IDNR and ISU are working to create a unified voice to reach out to Delaware County and the Iowa Department of Transportation to secure adequate maintenance of the western access road. These additions will strengthen the ISU/IDNR partnership regarding the forest, and ensure the forest meets the public access, research, and demonstration missions outlined in the original agreement. Thus, revisions to the agreement are critical in order to maintain a high-quality resource in the long-term.

In February 2020, Beck and Heeren, along with Miranda Curzon (silviculturalist, ISU NREM), and Goerndt, walked a majority of the forest to assess current conditions, view the results of recent management activities, and share ideas for future extension, research, and teaching opportunities. Future collaborations between ISU, IDNR, and other state and regional natural resource partners also were discussed. The time spent afield, as well as the resulting discussion, will be invaluable to Beck and partners as they work to create and pursue the overall extension, research, and teaching visions of the forest.

During summer 2020, Nie and summer forestry intern Everett Johnson, received training on silvicultural practices and resulting impacts to forest ecology, post-harvest timber management, chainsaw operation and safety (e.g., tree felling, bucking), and heavy

equipment operation (e.g., forestry mower). Experiential learning opportunities such as this hold great importance in Beck's overall vision for the forest. The forest also acted as a source of remote/virtual learning during the 2020 pandemic, as Tom Isenhardt (ISU NREM) provided his fire ecology students the opportunity to investigate potential fire behavior in the forest using BehavePlus, a USDA-forest service fire modelling system.

Lastly, a solid connection recently has been formed between ISU and the State Hygienic Laboratory (University of Iowa) in regard to Plum Creek aquatic biota sampling. Plum Creek, which flows along the forest's southern border, serves as a permanent aquatic biota monitoring site for the lab. Recent connections and conversations between Beck and lab staff will provide opportunity for aquatic biota and surface water quality data to be coupled with forest management data, further enhancing the research impact of the forest. Beck is especially positive about this new relationship as it is directly in line with his forestry-water quality overall extension and research visions.

Management Activity Summary

2007 – 2011. A biomass feedstock research project was undertaken, to investigate biofuel production potential in Iowa hardwood forests. The project involved removing stems <12 in diameter, which were later chipped and weighed.

During 2011, the forest was included in a large-scale project entitled "Carbon Assessment of ISU Forest Lands." Project objectives included calculation of a baseline estimate of the total amount of carbon stored on all of ISU's acres of farm and forest property, as well as assessment of carbon sequestration rates associated with current land use.

2012-2014. Little activity occurred within the forest during these years, with the exception of trail maintenance.

2015. A study was initiated to investigate the effectiveness of triclopyr basal bark application as part of timber stand improvement efforts (TSI). Three treatments were initiated: single chainsaw girdle with picloram herbicide application (control treatment), single chainsaw girdle with triclopyr herbicide treatment, and triclopyr basal bark treatment. Treated trees ranged in size from 2 to 16 in. diameter.

In addition to the herbicide study, a new entry gate was installed at the west parking lot, which is intended to reduce ATV access and trespassing.

2016. A previous tree planting area (10-acre clearcut that occurred in the early 1990s) was revisited and had tree shelters removed. These trees were approximately 20 ft in height, and thus no longer required sheltering. Following shelter removal, individual trees were released (from competition) by killing smaller trees and competing woody vegetation within a 6-10 ft radius. An additional 10 acres of forest were marked for clearcut harvest. Lastly, the 2015-initiated basal bark herbicide study was continued, with data collected within all treatment plots.

2017-2018. Little management activity occurred within the forest during this time period.

2019. The 10-acre stand marked in 2016 was harvested via clearcut in early winter (Figure 1). A significant oak component comprised the harvest, and the clearcut practice was utilized to encourage regeneration of those species. A clearcut harvest often is one of the final steps in a series of management practices intent on promoting regeneration of shade-intolerant species, such as oak. See the *Timber Harvest Record* section for a complete list of timber harvest activities dating back to the 1950s.

2020. The 10-acre clearcut stand, harvested in 2019, had select residual trees removed (via chainsaw girdle coupled with herbicide treatment) to further encourage oak regeneration. The former biomass research sites were determined to have poor regeneration, and thus work was initiated to prepare the site for direct nut seeding of oak and black walnut (Figure 2). Site preparation included mowing and herbicide spray treatment of multiflora rose and prickly ash, both of which have become significantly established. Large debris also were removed, to allow for heavy equipment (i.e., tractor, seeding unit) to navigate the site. Lastly, new fencing was installed in association with the western access and parking lot.

Timber Harvest Record

Since 1949, the forest has had approximately 20 timber harvests and resulting sales. Many of the harvests were triggered by oak wilt, Dutch elm disease, and the presence of over-mature trees. A summary of harvests follows:

2019. A 10-acre stand (primarily white and red oak) was clearcut-harvested in early winter. The harvest produced 73,363 total board feet (bd ft) (Scribner rule) from 398 trees (471 total 16 ft logs). Other species comprising the harvest included hard maple, basswood, hackberry, red elm, aspen, bitternut

hickory, shagbark hickory, black cherry, and black walnut.

2005. 14 mature black walnut trees were harvested because of maturity, recent crown damage, and expected decline. The 14 trees produced 3,260 bd ft of lumber.

2003. A 2.5-acre area was clear cut. A total of 108 trees (primarily black walnut, red oak, and white oak) were harvested, with a yield of 20,060 bd ft. The area was replanted to oaks as a demonstration area.

1988. Three 2-acre areas were cleared and used in an oak regeneration study. The three treatments were clear cut, shelterwood, and understory removal, as well as a control. The harvest produced 8,320 bd ft.

1981. A large area east of the main entrance was harvested for oak (red, black, and white) and produced 115,000 bd ft.

1981. A harvest of 39 walnut trees occurred, yielding 9,150 bd ft.

1978. A mixed hardwood harvest, which consisted of 91 percent oak, occurred along the major roads in the center of the forest. The harvest yielded 40,000 bd ft of lumber.

1976. A mixed hardwood sale of 91 percent oak yielded 18,000 bd ft of lumber.

1973. A sanitation harvest of 156,990 bd ft occurred on 50-55 acres. The harvest consisted of 78 percent oak, 21 percent elm, and 1 percent mixed maple, black cherry, basswood, and butternut. The harvest occurred in the east half of the tract.

1951-1959. Following acquisition in 1949, ISU staff and cooperators harvested trees in years 1-5, 10, and 15 on a 13-acre parcel. Harvest details (e.g., species, yield) are limited.



Figure 1. A 10-acre white/red oak stand was clearcut-harvested in early winter, 2019. The harvest was to encourage regeneration of shade-intolerant oak species and financial income.



Figure 2. Site preparation for future oak and black walnut direct seeding. Site prep activities included mowing and herbicide spray treatment of multiflora rose and prickly ash, and removal of large debris to allow for equipment access.