Brayton Memorial Forest Management Plan

December 2007

Prepared by:

Jesse A. Randall
Assistant Professor & Extension Forester
Natural Resource Ecology & Management
339 Science II
Ames, IA 50011

History of Brayton Memorial Forest

Emma L. Brayton donated the 306.7 acre tract of land in Delaware County, Iowa to ISU in 1949 to be used as a demonstration / experimental forest by the Forestry Section of the Iowa State Agricultural Experiment Station (former Forestry Department – current Natural Resource Ecology & Management Department). The Brayton family purchased the land in 1883 to add to their vast 3600 acre landholding in northeast Iowa. Emma was the owner of record from 1912 until her death in 1949.

The original survey in 1839 showed the forest to be dominated by oaks (red, white, black, and bur), and by the 1850's most of the forest had been logged to extract the oak for railroad ties and to support the growing rail towns. The 1875 survey indicated a more diverse forest stand consisting of oaks, hickory, black walnut, butternut, soft and hard maple, and ash. Although there are no written records that indicate that the Brayton tract was actively grazed, I find it hard to believe that the forest did not receive some level of grazing.

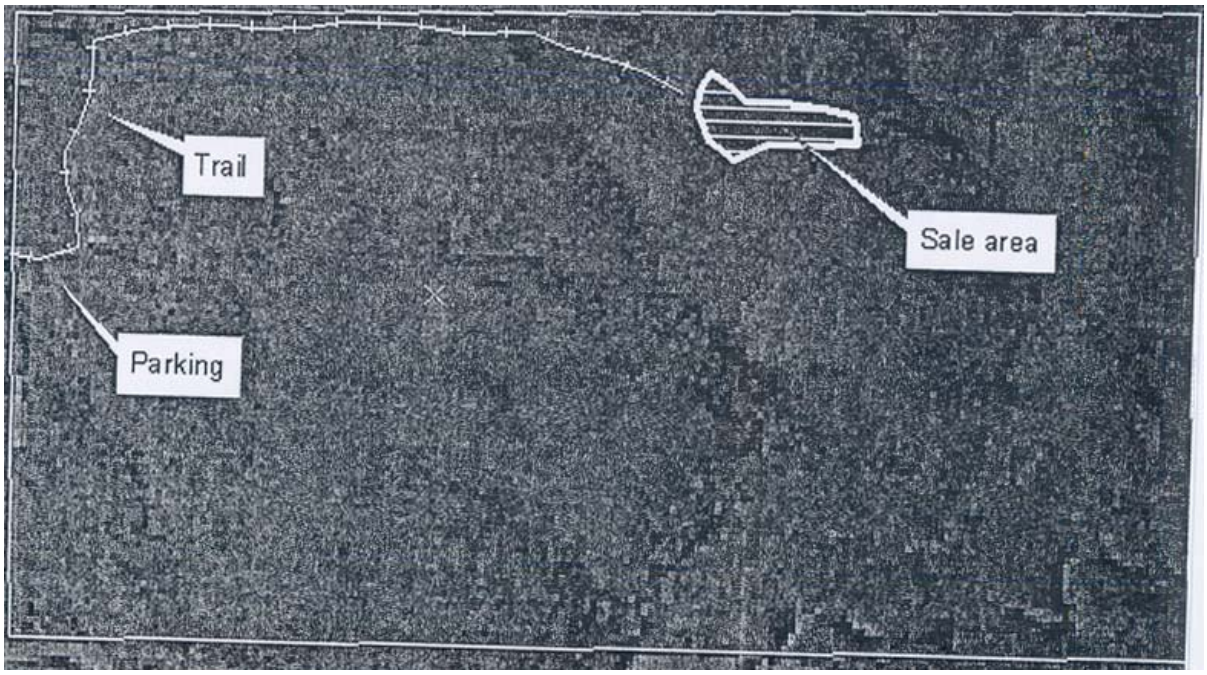
Our understanding of the land management and regenerating forest from 1875 to the first university sanctioned survey in 1950 leaves a substantial gap in our working knowledge of the forest. Following the 1950 survey, Iowa State Purchased a ten acre parcel in the southeast corner to complete the forest tract at 316.7 acres.

Past Harvests

Since 1949, the forest has received 15 harvests (most recent to oldest)

- *2005 Walnut Salvage*

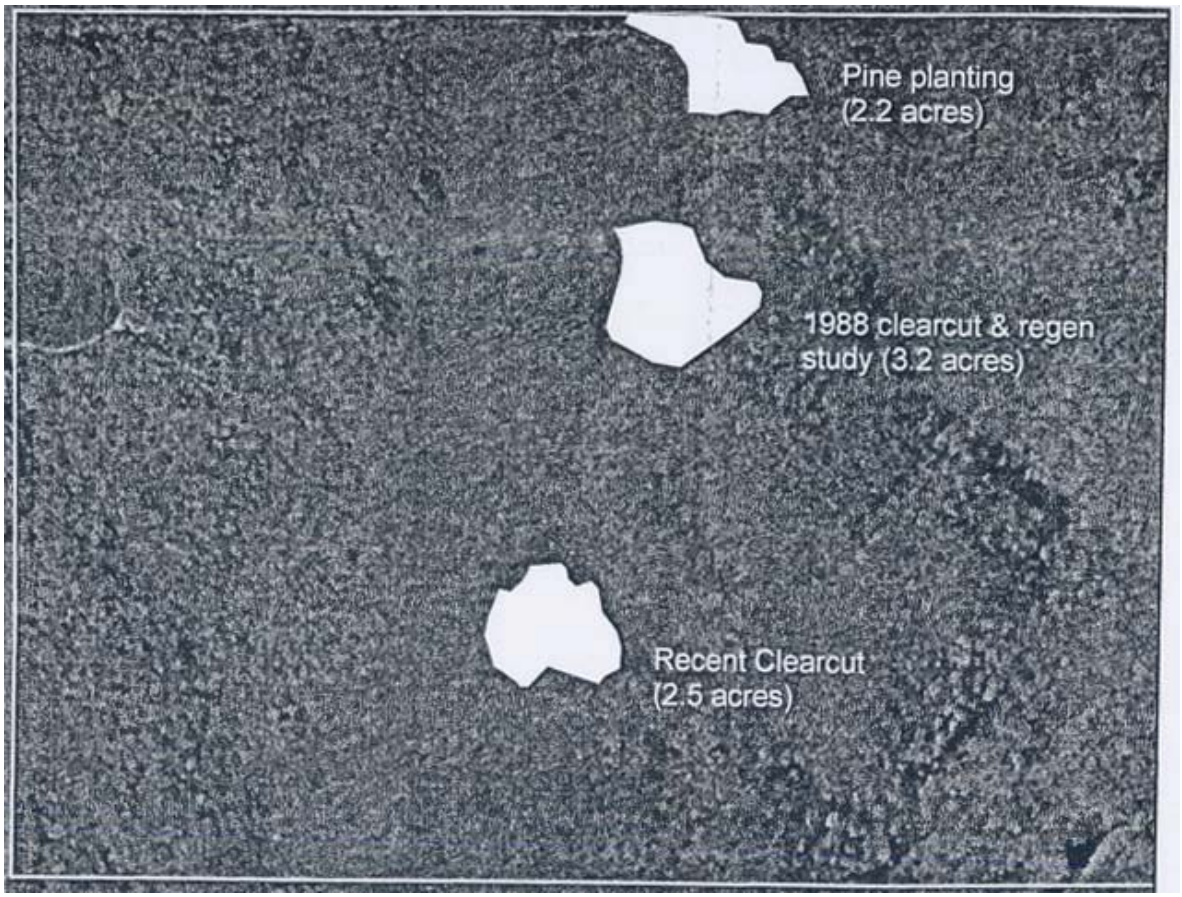
The salvage area included 14 walnut trees that were selected because of their recent crown damage cause an ice storm and the expectation that the tree values would decline. These 14 trees produced 3,620 bd. ft. and income from this sale will fund two undergraduate summer workers in '08 and needed equipment and maintenance supplies.



- *2003 Clearcut, Replant Demonstration, and Crop Tree Release*

This 2.5 acre area was harvested because of a sparse understory dominated by ironwood, hackberry and elm. A total of 108 trees (primarily black walnut, red oak and white oak) were harvested from the clearcut area. The sale totaled 20,060 bd. ft. and funds were used to purchase and replant the area using a mix of oak species. Although this work was designed solely as a demonstration planting we are investigating future research uses for the area. The area is in need of some follow-up work that will be conducted in the summer of ’08.

The sale also funded a forestry consultant who conducted crop tree release treatments in two parcels (a 25-30 yr old pine/hardwood planting & 1988 clearcut area w/wo scarification).

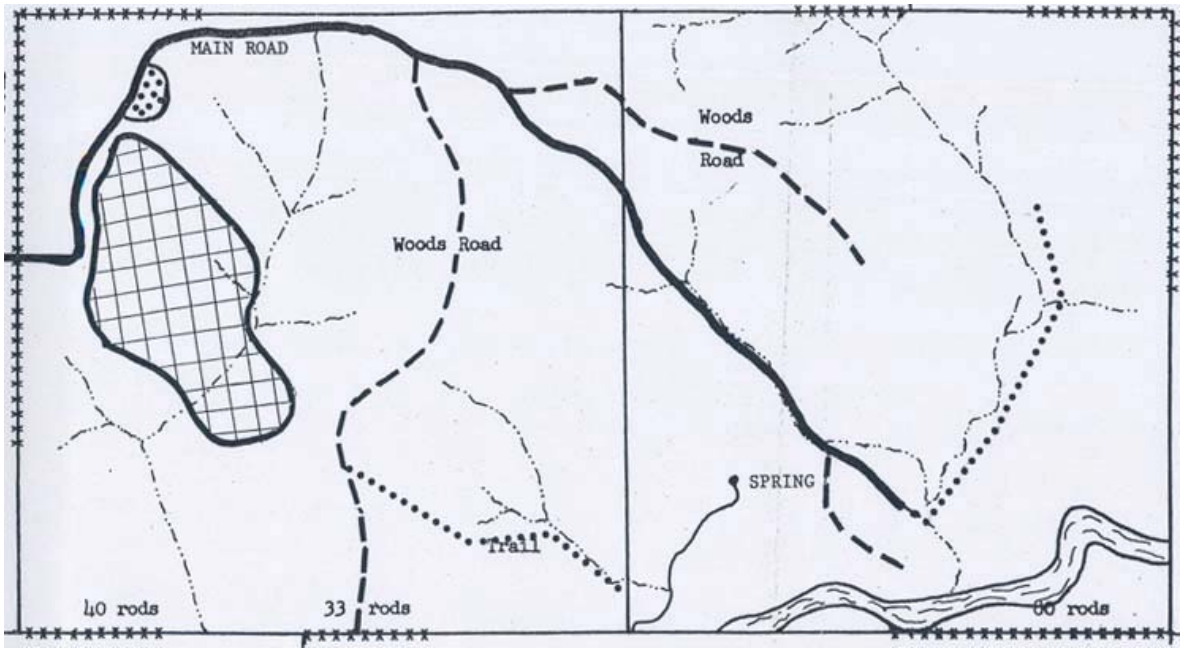


- *1988 Oak Regeneration Study Harvest*

This harvest had three- 2acre treatments (Clearcut, Shelterwood, & Understory Removal) and a control. The combined harvest totaled 8,320 bd. ft. The study received very little follow-up work since harvest and will be surveyed for regeneration. The clearcut treatment area has since received another treatment (crop tree release) in ’05 and this will be taken into account when the survey is conducted. These areas will be highlighted during extension field days as they are ~20 years post initial treatment.

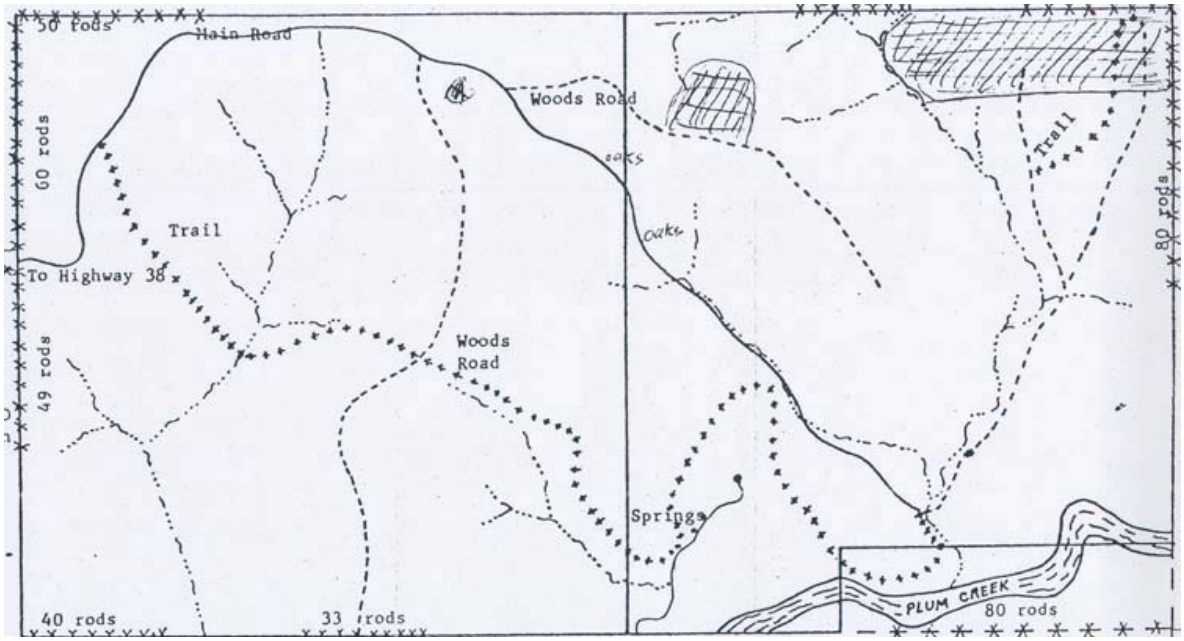
- *1981A Oak Timber Sale*

115,000 bd. ft. of red, black, and white oak were harvested to the east of the main woods road at the entrance of the property. Having recently cruised this area the oak component has failed to regenerated and is currently dominated by hackberry and dying elm. There are a few low timber valued “wolf” oak trees in the overstory but this area is in need of substantial restoration and will be addressed in the current and future planning section.



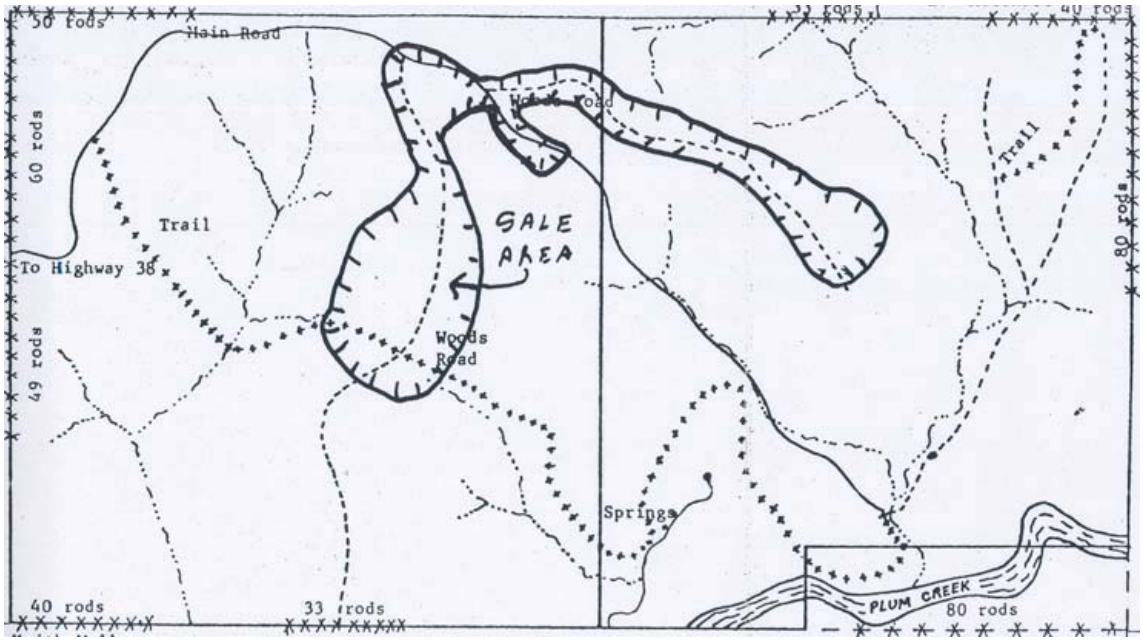
- 1981B Walnut Timber Sale

There is little information to accompany this timber sale. From the bid sheet I ascertained that 39 walnut were sold (27 of which were below average in terms of their potential economic return, size <21 DBH). The sale totaled 9,150 bd. ft. of lumber and was from the NE quadrant of the property. This harvest was in a known oak wilt outbreak area and it is possible that the sale of timber also raise funds to place oak wilt controls in the forest.



- *1978 Mixed Hardwood Timber Sale*

This sale consisted of just under 40,000 bd. ft. with 91% of the harvest being oak. Again this sale has no associated research or demonstration projects so a conversation with Paul Wray is needed



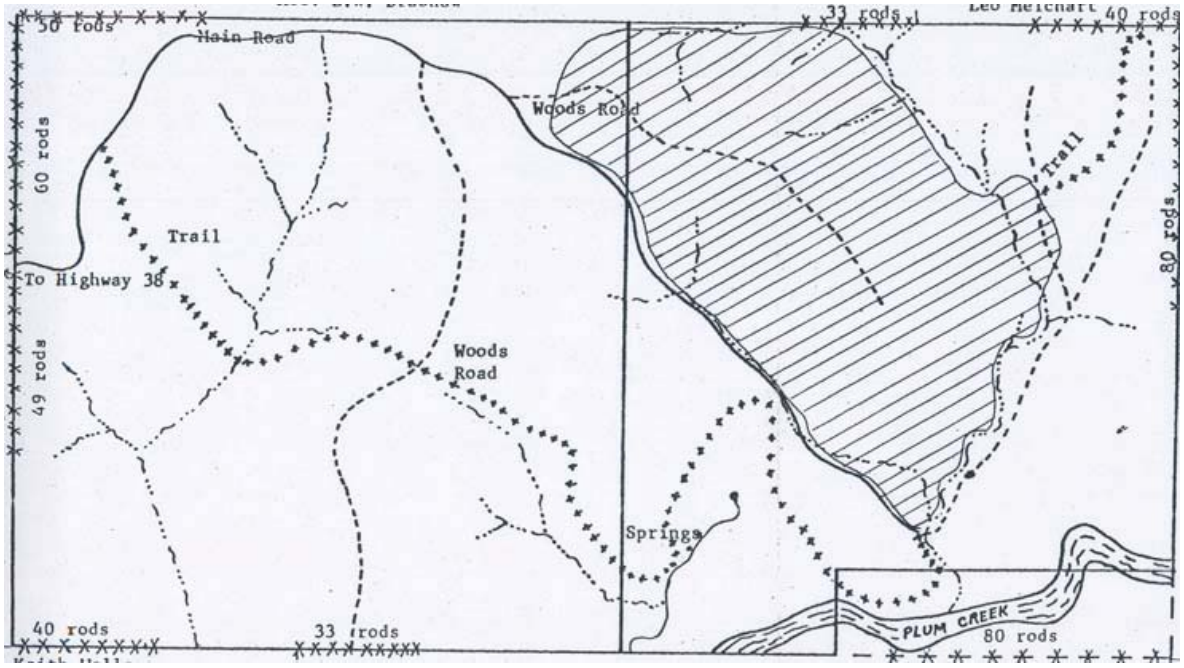
- *1976 Mixed Hardwood Timber Sale*

This timber sale generated ~18,000 bd ft (91% of which was oak). The map associated with this harvest is also missing. I will continue to search the records and cross reference the most recent official management plan written for Brayton (1978) with the harvest records.

- *1973 Mixed Hardwood Timber Sale*

The 1973 harvest was a large sale and was meant as a sanitation harvest. 156,990 bd. ft. of timber was removed from 50-55 acres. 78% of the timber was oak, while 21% was elm. The remaining 1% was a mix of maple, black cherry, basswood, and butternut. The marking guidelines that Upfield wrote to Bill Ritter (DNR District Forester out of Elkader) were as follows.

1) Mark all elm (white and red) down to 12” DBH regardless of condition and mark any elm between 8”-12” as culls. We hope that they will cut the 8”-12” DBH elm but will not figure it into the volume.
2) Mark all red and (black, pin) oak around oak wilt pockets that may become infected.
3) Mark trees of any species except walnut that show signs of major defects (heartrot, broken limbs, fire scars, etc.) this would include wolf trees and trees grossly over-mature even though they appear sound.



- *1959 - 1951*

Following the estate donation to ISU in 1949 which formed the Brayton Memorial Forest, several researchers and agency cooperators joined forces to conduct a yearly cutting cycle for the first 5 years, followed by a planned harvest in year 10 and again in year 15 on a 13 acre parcel. Although there are harvest tallies and letters between the personnel we do not have an exact location of the study area as no map was included in any of the correspondences. What the letters do indicate was that the usefulness of the research was beginning to be called into question. Oak wilt had hit the 13 acres and they were having to harvest more volume than what their original plan called for to control the spread of the disease.

Current Vision

My goal for ISU's Brayton Memorial Forest is to utilize the resource as a working productive forest that closely integrates hands-on demonstrations and applied research while providing the public with a safe multiuse area. This forest was historically dominated by oak, hickory, and walnut and I aim to keep this area in a historically relevant composition. This restoration effort will take a tremendous amount of time and resources but the forest should be and in time, will be a showpiece for Iowa State University and the State of Iowa as a whole.

The removal of ±371,000 bd. ft. of timber from the forest since 1973 coupled with the almost uniform failure of naturally established oak regeneration (deer overbrowsing, harvested trees too old to readily stump sprout), and the lack of active planting/protection of desired tree seedlings has promoted an understory that is almost exclusively elm, hackberry and hard maple over large areas of the forest. We are going to be proactive in dealing with invasive species that are taking over in the understory (garlic mustard, small amounts of multiflora rose). The vast majority of the timber resource is overmature by some 30-40 years and is in decline. It will take a series of harvests, pre and post treatments, and plantings to restore the oak/hickory/walnut forest to dominance. My goal is to set the forest on the path of having a 100 year harvest rotation. If we remove the ±30 acres of natural area (now an elm/hackberry natural area) from the rotation we have ~290 acres to harvest in 100 years. I plan to harvest on a 4 yr schedule (11.5 acres each harvest) allowing me to work in the off years to conduct maintenance on the forest, selectively remove dead and dying stems throughout the forest, weed and treat the elm/hackberry sapling layers etc.

5 yr Management Plan

Winter ′07 - ′08 – Over the last several years, the southwest corner of the forest has undergone white oak decline and dieback. Several lines of evidence have emerged that link this decline/dieback to the emerging problem defined as "Oak Tatters". (Healthy leaf is on the left below and "tattered" leaf is on the right) Given the elevated market conditions for white oak and walnut and the fact that the understory is dominated by elm and hackberry we will begin a salvage operation this winter ('07-'08) on the entire 8.5 acre area followed by a

planting of oak and walnut in ’09 (detailed below).

Summer ′08 – Funds from this and previous harvests will enable two student workers to be hired and equipment to be purchased to conduct the post-harvest cleanup on the 8.5 acres. We are going to quantify the amount of residual slash following the harvest by skidding all tops to a central landing where they will be chipped, weighed and used on site to side dress woods roads. Following the removal of all tops the area will be separated into blocks and replanted in the spring of ‘09 by a Consulting Forester, to a mixture of white, red, and bur oak, as well as walnut. Within each of these blocks, trees will either be fully protected from deer from the initial planting date or will be assigned a protection date in the future (1 year, 2 years, or 3 years of exposure to deer browsing). The goal of this planting is to regenerate a dying stand of oak and walnut, demonstrate a large clearcut, and evaluate then highlight the biomass potential of the residual tops. Applied Extension oriented research will focus on the long-term impact of deer browsing on the internal wood quality and growth form, biomass potential following harvest, and protection and maintenance of tree seedlings.

Student workers will also assist in constructing signage at the entrance to the forest to highlight ISU, the ongoing forest management, and the multiuse stakeholders that have a hand in managing the Brayton Memorial Forest. They will also work to construct and/or maintain the perimeter fence. Lastly they will assist in the setup and data collection aspects of a stratified understory and overstory flora sampling that is being redesigned from the 1973 survey to track changes in the forest communities across Brayton.

During the spring of ’08 the District Forester and I will delineate a 20 acre unit near the entrance of the forest that has failed to regenerate following several past cuts. This area will be divided into four – 5a acre treatments. One area will be used as a control while the remaining acres will receive different levels of preharvest prescribed fire.

Fall ′08 – Working with Dave Engle's lab (grassland fire experience) and the DNR Fire Unit we will create fire breaks and burn the three – 5 acre burn units in the fall of '08. In '09 two – 5 acres units will be reburned, and lastly in '10, one – 5 acre unit will be burned for the third consecutive year. The different preharvest treatment levels (1, 2, or 3 fires) will enable us to study both the understory flora responses to fire but also the seedling and sapling layer changes. Following the third burn, the entire 20 acres will be harvested. During the following summer ('09) students will again remove all residual harvest biomass to quantify the woody biomass potential and to facilitate the replanting of oak and walnut in the spring of '10. The seedlings will be purchased from the DNR State Nursery, machine planted by a Forestry Consultant, and protected from deer using tree shelters. The need for follow-up weed control around each planted seedling will be determined on a seedling by seedling basis. The applied Extension related material from this work will be the demonstration of varying degrees of prescribed fire, the survival and growth of both naturally establishing (seed) and planted oaks following fire. We will also track wildlife use of the area, specifically birds, amphibians, reptiles, and small mammals.

Fall & Winter ′08 - ′11 Given that the Brayton Forest is declining and breaking up, the District Forester and I have come to a consensus that we need to attempt to selectively salvage timber throughout the entire forest to minimize losses, ensure working capital to replant areas, install erosion control devices, and update infrastructure. The salvage operations will take place in the winters of '08 - '09, '09 - '10, & '11 - '12 and will correspond to the three zones (more or less equal in size) that the District Forester and I will divide Brayton into. We will jointly mark 2 - 4 trees per acre and will represent only those stems that are economically at or just beyond their prime that are showing signs of recent crown damage/decline. This type of sale will generate income that normally would be lost to further damage and decay while the stand is waiting to come into its scheduled harvest rotation. Given that these stands are overstocked to the point of stagnation, and there is little to no understory regeneration, the harvests will not impact the future potential of the stand. As the salvage operation will cover a large area we intend to hire a consulting logger (normally paid by the MBF) to fell and skid the logs to a common landing. We hope to hire an operator with smaller equipment to minimize collateral damage to the surrounding trees, limit the need for major skid trails and reduce the overall visible signs of logging. We will

then scale the decked logs at the landing, announce a lump sum sealed bid for logs and sell the logs to the highest bidder. The one year gap in the salvage operation (winter of ’10 - ’11) will enable us to concentrate on the 20 acre harvest that is scheduled as part of the burn understory study. This logging work will highlight the use of smaller logging operators in Iowa and by inclusion of this harvest area into field days we hope to show a form of lower impact logging. During the actual logging process I hope to obtain video of all aspects of the operation to create a video series to be included on the new Brayton website that is under construction.

This management plan will be updated on a yearly basis to accurately reflect changes in markets, research needs, and significant changes in management ideas caused by the applied research on site.