

Forest Wildlife Habitat Stewardship Management Plan

Sand Creek Wildlife Management Area
Ringgold and Decatur Counties

Developed by

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2015



INTRODUCTION

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The Sand Creek WMA is located in Sections 12 and 13 of Union Township in Ringgold County and in Sections 6, 7, 17, 18, 19, and 20 of Richland Township in Decatur County, Iowa.

According to 2012 land and canopy cover data, Sand Creek WMA comprises 3,601.2 total acres with 2,227.6 acres of it being forested (62%).

The Sand Creek WMA Forest Wildlife Habitat Stewardship Management Plan is the result of over two years of forest inventory data collection, forest stand mapping, and data analysis. This is a cooperative work between the Iowa DNR Forestry and Wildlife Bureaus. Additionally, special recognition goes to Dave Whittlesey (retired NWTf Wildlife Biologist) and Jim Coffey (Iowa DNR Wildlife Technician) for their many hours spent assisting the DNR District Forester with stand mapping and forest inventory data collection. Also, special thanks go out to retired Iowa DNR Wildlife Biologist, Melvin Moe, who had the “vision” for enlarging Sand Creek WMA and pioneered the land acquisition process.

The Iowa DNR’s *Iowa Wildlife Action Plan* (IWAP) identifies certain wildlife species as species of “greatest conservation need”. Species for the Sand Creek WMA are listed on pages 15 and 16 of this plan. Additionally, Sand Creek WMA is part of Sand Creek Woodland-Savanna Bird Conservation Area (BCA). Since a major purpose of a BCA is to provide a focal area for more effective and targeted bird conservation management, this particular effort fits well with implementation objectives of the IWAP, providing an opportunity to develop an integrated, cooperative approach to delivering on-the-ground conservation, especially for Species of Greatest Conservation Need and also to “keep common species common.”

Generally, the DNR Wildlife Bureau manages state-owned forest lands for wildlife habitat diversity, recreation, and aesthetics. The Sand Creek Forest Wildlife Habitat Stewardship Plan (FWHSP) recognizes and prioritizes the identified wildlife “species of greatest conservation need” and their habitat needs and incorporates those needs into forest management decisions.

Other stewardship considerations that are incorporated into forest management decisions are the protection of identified threatened and endangered plant and wildlife species, best management practices (BMP’s) to protect soil and water quality, forest health considerations, and the protection of any identified “special sites”. These considerations are detailed in the “General Forest Management Considerations” section of this plan (page 7).

The Sand Creek WMA Forest Wildlife Habitat Stewardship Plan will begin with a general forest resource and soil type description of the Sand Creek WMA. Next, forest management objectives will be stated followed by general description of recommended management activities

(Management Systems) designed to meet those objectives. Following this, “General Forest Management Considerations” are outlined. Finally, specific stand level forest management activities are recommended for each stand, according to management priorities and recommended time lines for completing the management work, when applicable.

The Sand Creek FWHP is a generalized guideline for recommended management work. Detailed silvicultural prescriptions will be developed immediately prior to doing scheduled or recommended management practices in order to take into account unique stand conditions and more specific targeted wildlife habitat needs. These prescriptions will be in the form of detailed practice project plans developed with collaboration between the DNR District Forester and DNR Wildlife Biologist. A record of completed management activities will be kept on file at the area manager’s office so that practice evaluations can be made and compared to determine if management objectives are being met and proper practice follow-up is done to determine if and when more management is needed.

Forest Resource Description

The following Forest Wildlife Habitat Stewardship Management Plan details forest management recommendations for 2, 127.7 forested acres. The Sand Creek WMA forest management area has been divided into 33 upland oak-hickory forested stands (1,900.6 acres) and 6 bottomland hardwood forested stands (227.1 acres) for management purposes. The remainder of Sand Creek WMA consists of wildlife food plots, crop fields, native grasses, ditches, and streams. See the attached photo map for specific forest stand locations on page 20.

Upland Forested Stands

The 33 upland oak-hickory forested stands range in size from 4.1 acres to 251.7 acres. These stands are dominated by different mixtures of oaks and shagbark hickories. Generally, stands are either dominated by white oaks, red oaks, and shagbark hickories, or bur oaks, black oaks, shingle oaks, and shagbark hickories. Of course, there are variations of these. Other tree species that make up the bulk of the tree composition in the upland stands are elm, hackberry, ash, black cherry, and scattered honeylocusts.

Most of the upland oak-hickory stands are classified as being “pole- timber sized” or “pole-sized”, having an average overall crop tree diameter of 6-10 inches dbh (diameter breast height from the ground). These pole-sized trees are usually mixed with scattered small to larger diameter “sawlog-sized” trees. The average age of representative dominant canopy level pole-sized white and red oak crop trees (10-12 dbh) is about 75 years. This is evidence that most of the upland stands were harvested (by clearcutting) during the late 1930’s or early 1940’s. Evidence of past livestock grazing and some selective tree harvesting is seen throughout some of the stands by the scattering of larger diameter older oaks and hickories and pockets of smaller diameter younger pole-sized trees existing together.

With an average stand basal area (a measure of tree stocking in sq. ft. per acre) of 98 sq. ft. per acre and average dbh of 10 inches, the stands are fully stocked at the 80% level according to the Upland Central Harwood Stocking Guide. Observed current growth rates for upland oaks (not yet under management) are about 13 growth rings per inch, equating to a 2 inch dbh tree diameter increase every 13 years on the best upland growing sites.

Currently, upland oak-hickory forest stand understories are comprised of buckbrush, scattered multiflora rose, honeysuckle (some stands), gooseberry, and prickly ash. Many of the stands have substantial populations of ironwood, both as understory and midstory components that are shading out less shade-tolerant understory vegetation (wildlife cover) and desirable natural tree reproduction such as oaks, hickories, and black walnuts.

Upland forest soil types are mostly Lindley Clay Loam on 18-40% slopes. Other, less dominant soil types are Weller, Keswick, and Pershing soils on 5-14% slopes. All but the Pershing soil type are well suited to growing oaks with site indexes ranging from 65-75, especially on north and east facing slopes and along drainage benches. The soils are characterized as being well to moderately well-drained, neutral to slightly acidic, and have an 18 -35% internal clay content. These soil types are well suited to quality tree growth for both wildlife mast (nut, acorn) and sawtimber production. The role of management is to capitalize on the maximum growth potential of the soil types by keeping the forested sites properly stocked with desirable tree species.

Bottomland Forested Stands

The 6 bottomland hardwood forested stands range in size from 16.9 acres to 50.9 acres. The bottomland stands are dominated by mixtures of elm, boxelder, ash, mulberry, sycamore, silver maple, eastern cottonwood, hackberry, basswood, bitternut hickory, and buckeye with scatterings of black walnut, bur oak, honeylocust, and red oak.

These stands have more mixtures of pole-sized trees and sawtimber-sized trees than the upland stands, with average stand diameters of 12 inches dbh. With an average basal area of 92 sq. ft. per acre, these stands are considered to be fully stocked at the 72% stocking level according to the Bottomland Hardwood Stocking Guide. Stand 22 is a fully-stocked to slightly over-stocked stand of coppiced (sprout origin from past logging or tree removal) Eastern cottonwood.

Currently, the bottomland stand understories are comprised of buckbrush, scattered multiflora rose, gooseberry, prickly ash, and buckeyes. Typically, these understories are very “brushy” and “weedy”, making excellent travel corridors for many wildlife species. The presence of buckeyes will be a detrimental factor for the natural establishment of more shade-intolerant desirable natural bottomland tree species, if and when any timber harvesting is done.

The dominant bottomland soil types are the Nodaway and Nodaway-Klum-Lawson (channeled) types on 0-2% slopes. As with the upland soil types, these soils are moderately well-drained, slightly acidic, and have an 18 -35% internal clay content. They are very well suited to growing bottomland hardwoods with site indexes of 75 or greater. The only thing impeding tree growth and vigor is crowding, especially of pole-sized black walnuts and some oaks.

Forest Management Objectives

The primary management objectives for the Sand Creek WMA are to improve wildlife habitat for a variety of wildlife species, to provide recreational opportunities, to provide clean water, and to protect endangered wildlife species and “species of greatest conservation needs”. Keeping and improving the health and vigor of a diverse (tree species diversity) forest ecosystem is the key to optimizing benefits for the widest variety of wildlife species.

Due to the diverse oak resource and primary recreational needs of the Sand Creek WMA, white-tailed deer, squirrels, turkeys, Bobwhite quail, and American Woodcock are targeted as primary game management species. Non-game birds such as the Black Billed Cuckoo, Yellow-billed Cuckoo, and the Red-headed Woodpecker, are also targeted as primary management species.

Maintaining healthy, diverse oak-dominated stands with good reproductive potential is essential to the successful management of the Sand Creek WMA. Management targeted to keeping forested stands at proper tree stocking levels will improve and maintain forest health and sustained, long-term wildlife mast (nuts, acorns) production.

Periodic forest overstory thinning and weed tree removal will improve forest health and vigor and can improve wildlife mast production by as much as seven-fold in one thinning cycle. Oak crop tree diameter growth rates can also be doubled in one thinning cycle, also improving tree health, vigor, and mast production.

Management treatments such as periodic suppressed tree canopy level thinning and periodic controlled forest understory burning will help control undesirable and invasive plant species and increase forest understory light levels to improve wildlife understory cover and make conditions more favorable for the natural reproduction of desirable tree species such as oaks, hickories, and black walnuts.

Finally, when timber harvesting is recommended as a forest regeneration system, even-aged harvest systems such as “shelterwood”, “group selection”, and “patch clearcutting” are the best methods to use for regenerating the majority of the crop tree species found on the Sand Creek WMA, and for maintaining a healthy, diverse, and quality forest ecosystem. All commercial timber sales will be planned and conducted according to the current Iowa DNR policy, “Conducting Timber Sales on State Lands”, found on pages 17 – 19 of this plan.

Management Systems

The decision on what management system to be used depends upon overall area management objectives and individual stand (management area) objectives. The individual forest stand management objectives for the Sand Creek WMA were/are determined by consultation between the DNR District Forester and the DNR Wildlife Biologist, taking into account how each management stand fits into the overall management objective for the entire area.

Even-Aged:

All forested stands on the Sand Creek WMA will be managed as even-aged stands. This is mainly due to the forest composition of climax shade-intolerant tree species, past timber harvesting practices, and producing the greatest number of sustainable long term habitat benefits for the most wildlife species.

Even-aged stands are characterized as having an overstory canopy of trees that are all nearly the same age, even though diameter classes may be different due to stand tree stocking levels and individual tree species growth rates.

Even-aged management, when applied at the appropriate scale, can have positive effects on improving habitat for many wildlife species. Larger stands can be divided into smaller stands or blocks to provide for age class diversity when needed. Even-aged management creates stages of excellent habitat for deer, turkeys, and other wildlife species and is essential for the regeneration of oaks, hickories, and black walnuts, which require full sunlight.

Management practices included with even-aged management include the following:

Periodic overstory thinning to reduce crowded stands to the proper stocking levels. Usually, specific practices include basal area thinning, crop tree release thinning, and weed tree removal. These practices improve crop tree diameter growth rates, mast production, and improve overall forest health and vigor to help minimize forest insect and disease problems.

Periodic suppressed canopy tree removal is prescribed to improve forest understory light conditions; usually in pole-sized tree stands to improve understory cover for wildlife. For stands being considered for sawtimber harvesting, suppressed canopy tree removal and weed tree removal are necessary pre-harvest or post-harvest treatments to help make conditions favorable for the establishment of desirable tree species, both natural and planted.

Periodic controlled understory burning is prescribed to improve wildlife ground cover and to help control unwanted and invasive tree and plant species in forest understories or along forest edges.

Shelterwood, clearcutting, and group selection tree harvest systems, with or without additional tree planting, are recommended as the only suitable harvest systems for regenerating oaks. The Shelterwood system is really a two-cut harvest system that is often used to help develop a population of desirable tree seedlings on the ground before the final overstory removal cut.

Savannas and stands composed of coppiced (sprout origin) hardwoods are also types of even-aged management systems.

Viewshed:

Viewshed areas are typically steep slopes and areas along streams which are fragile sites and best left to naturally progress through succession or only receive light, less invasive management. Areas having observed and documented endangered plant or animal species existing are candidates for viewshed management.

Early Successional ES:

Species of birds such as ruffed grouse, American woodcock, gold winged warbler, blue winged warbler, black billed cuckoo, yellow billed cuckoo, and eastern towhee are dependent on the young, dense woody growth. High stem densities of trees and shrubs provide suitable nesting habitat and protection from predators. These stands are usually associated with aspen stands, but in the absence of aspen can be any

hardwood stand of mixed or pure species that will be managed for 15-20 year rotations by clearcutting and allowed to re-sprout.

Edge feathering is a type of ES management along forest / field edges where tree cover is periodically cut (felled) to promote a transition of weedy, brushy cover between forest and field cover. This typically benefits Bobwhite Quail and sometimes Woodcock.

Savanna:

The savanna management system is used to restore or create a forest overstory component that is less than 50% canopy cover, usually oaks or oaks and hickories, and an understory composed of native plants and shrubs. The savanna understory is periodically managed by controlled burning to maintain and improve native understory plant diversity.

General Forest Management Considerations

Regardless of specific management objectives, active management is needed to keep Iowa forests healthy, sustainable, and renewable. Keeping state-owned forest properly stocked with desirable tree species and protected from external damaging influences is key to the sustainability of Iowa's forest resources. General practices to follow include:

- 1). Continue to protect SCWMA from livestock grazing. Livestock grazing, especially in a closed-canopy forest ecosystem, causes long term soil compaction that slows tree growth and over time, impairs overall forest health and tree vigor. Grazing destroys diverse wildlife ground cover and hinders the natural production of desirable tree species such as oaks, hickories, and black walnut trees. Grazing also greatly limits the effectiveness of woodland improvement practices such as thinning and weed tree removal.
- 2). Monitor the forest for obvious damaging disease and insect problems. Take special note of trees dying in pockets or groups. Currently, Dutch Elm Disease (DED) and Oak Wilt are the two major tree diseases observed on the Sand Creek WMA. While not much can be done about controlling DED, and these two diseases are somewhat normal occurrences in forests in southern Iowa, steps can be taken to lessen the spread of the oak wilt pathogen. Limiting the cutting or wounding of oaks to the time period of October 1 to March 31 each season is the prescription to follow for both TSI (timber stand improvement) and timber harvesting work. Black oak, one of the most susceptible species to oak wilt, is a component of almost all of the forest stands on the Sand Creek WMA.

With the advent of discovering the Emerald Ash Borer in Iowa, the real threat to the ash trees on our state- owned lands is not yet known. Consequently, we will be vigilant in monitoring any ash decline on the SCWMA. Currently, most forested stands have an ash (mostly green ash) component of between 1-5%. Stand 4 has a 13% ash component and Stand 14 has a 17% ash component. These two stands will be monitored more extensively.

- 3). The cutting (felling) of shagbark and shellbark hickories (dead or alive) and/or the felling or wounding of oaks is prohibited from April 1 through September 30 each year to protect potential Indiana Bat summer habitat. Other suitable bat habitat trees that must be protected during that time period are dead deciduous trees with slabs or plates of loose peeling bark on the trunks or limbs, or dead snags with deep cracks or splits. Implementing these practices and adhering to the state Indiana Bat Summer Habitat protection guidelines will also protect the Northern Long-eared Bat.

4). The state-Endangered red-shouldered hawk is known to nest in the SE portion of the WMA in the vicinity of forest stand B1 (Map, page 21). In general, this species requires at least 250 acres of medium-to-mature, even-aged floodplain forests dominated by maple or cottonwood trees that have not been logged in 45 to 55 years. To avoid potential impacts to this species, limit disturbance of known nesting sites by providing a ½ mile protective buffer zone around nests. Details regarding known nest sites locations will be provided as needed during the Natural Areas Review.

5). Every effort will be made to identify and protect “special sites” before and during forest management work. These historical and cultural resources include such things as buildings and structures of historical significance, human burial sites, special land features, and artifacts. If such things are ever observed or discovered, those sites will be located, preserved, and avoided when implementing forest management activities.

Human remains that are discovered or accidentally uncovered must be reported to local law enforcement officials. This reporting is required by Iowa Code 558.69. Discovered artifacts or structures of suspected historical significance will be reported to the State Archaeologist and the discovery will be protected.

The following are practices that will help minimize the chances of accidentally destroying items of cultural or historical significance when doing forest management work:

- Thoroughly inspect a project area before working. Look for unusual looking areas such as obvious mounds or groups of mounds, or square and rectangular shaped depressions or extrusions.
- Minimize ground disturbance when tree planting, logging, and doing forest stand improvement work. Cut trees and use heavy equipment only when the ground is frozen, dry, or firm.
- Be especially careful of disturbing soil around streams and riparian (stream bank) areas.
- Locate trails and management access roads along natural land contours.

6). Periodically control the encroachment of undesirable tree species or invasive unwanted plant and shrub species in the forest stands if they are competing with desirable tree species and/or impeding the natural reproduction of desirable tree species. Periodic controlled burring is one of the best practices to control multiflora rose, prickly ash, ironwood, and honeysuckle to manageable levels.

7). All timber harvesting will be done to promote the sustainability of future forest benefits according to SCWMA management objectives. All commercial timber harvesting planning and work will be done according to state-owned land guidelines, policies, and rules, under the supervision of the Iowa DNR Forestry Bureau and the Sand Creek WMA Supervisor. The current policy for conducting timber sales on state land is listed on pages 17-19 of this plan.

8). Selecting and leaving adequate numbers of wildlife den trees and snags will be done whenever possible during the implementation of forest management practices to facilitate improving habitat for cavity nesting birds and mammals.

9). All pesticides will be stored, handled, and applied according to product labeling to maximize effectiveness and to minimize damage to the environment and danger to applicators. It is a violation of Federal Law to store, handle, and apply pesticides inconsistent with product labeling. For all pesticide treatments, always try to minimize chemical contact with non-target plant, animal, and bird species

10). BMP's (best management practices) will be implemented when doing woodland management work. The following are examples of practices called BMP's (Best Management Practices). Below, are some general considerations to be aware of to minimize soil erosion originating from a forest:

- Eliminate livestock grazing from woodland management areas.
- Limit road access for management purposes to ridge tops if possible. If not, route them along or following natural land contours.
- Minimize the use of heavy, rubber-tired equipment in management areas.
- Protect sensitive areas like stream banks (riparian areas) by leaving forested buffer strips from 50 to 150 feet wide (depending on stream width and topography) next to streams. Management in these SMA's (stream bank management areas) should be limited to woodland understory and midstory tree manipulation and selective overstory harvesting. Always try to maintain a minimum of 70% overstory canopy cover in SMA areas.
- Route trails along natural land contours.
- Minimize soil disturbance during logging or when implementing woodland improvement practices by cutting and dragging trees when the ground is dry, firm, or frozen. Felled tree tops can be left randomly scattered for short term wildlife habitat. Felled tree stems should be broken down into chunks that make complete ground contact for rapid decomposition to occur. If some are utilized for fuel wood, limit access to the area by tractors and vehicles to times when the ground is dry or frozen.
- Avoid piling trees and branches in stream channels.
- If bare soil areas are created or existing trails are not properly constructed, use soil stabilization practices to minimize the existing erosion hazard. These may include mulching, seeding, and building sediment control structures.

Individual Stand Management Recommendations

(Please refer to the attached photo for stand locations on page 20)

High Priority Management Upland Oak-Hickory Stands: 4 (108.5 ac), 6 (171.9 ac), 9 (162.3 ac), 10 (251.7 ac), 12 (67.5 ac), 15 (9.1 ac), 17 (38.4 ac), 18 (19.0 ac), 23 (33.3 ac), 24 (48.0 ac), 25 (9.7 ac), 26 (37.5 ac), 26A (45.0 ac).

Forest Description: Upland oak-hickory stands with over 20% white oak component. White oak component ranges from 22% – 70%, with the average around 51%. Average stand Basal Area (BA) is 100 Sq. ft. per acre, with an average crop tree diameter of 10.4 inches overall. Stands are at 82% full stocking level.

Dominant tree species include white oak, northern red oak, bur oak, black oak, green ash, elm, shagbark hickory, black cherry, bitternut hickory, and hackberry. Forest understory plants include buckbrush, gooseberry, prickly ash, ironwood, scattered multiflora rose, and in some stands, encroaching honeysuckle.

Management System and Recommendations: Even-Aged Mgt.

These stands should be first management priority due to the white oak component of each stand which is a favored mast by many wildlife species and because they are crowded pole-sized to small sawlog sized stands. Recommend crop tree release or BA thinning of stand overstories to regulate stand stocking back to “B” level stocking on the “Upland Central Hardwood stocking Guide”, favoring white oaks and red oaks as crop trees when possible. The non-commercial overstory thinning will improve long-term mast production and somewhat improve forest understory light conditions to improve wildlife ground cover.

Periodic suppressed canopy tree removal, weed tree removal, and controlled understory burning are also recommended to further improve wildlife ground cover and/or help control unwanted vegetation such as honeysuckle, ironwood, multiflora rose, and prickly ash.

After the initial overstory thinning to regulate stand stocking, any further overstory thinning other than periodic weed tree removal should be done by the shelterwood harvesting method as a commercial thinning followed by a second, final cut. The first commercial thinning shelterwood cut can be planned when crop tree diameters average 18” dbh, or be delayed further to capitalize on increasing mast production. Once the first shelterwood cut is made, it should be followed up with a weed tree and suppressed canopy level tree removal and one prescribed burn. Then, the stand should be monitored at three year intervals for adequate natural oak reproduction to be established before implementing the final shelterwood harvest cut. Adequate natural oak reproduction numbers should be determined by a DNR Forester.

Stand Treatment History:

To date, Stands 4, 6, and part of 8 have been thinned by utilizing the BA and/or CTR methods of overstory thinning. Additionally, ironwood control has been done as well as prescribed understory burning. Portions of these stands also have been edge-feathered.

Recommended Treatment Priority:

Overstory thinning should be done by the following priority order: Stand 10, Stand 15, Stand 17 (northern Part), Stand 12, Stand 9, Stand 23, Stand 26, Stand 26A, Stand 18, Stand 25, and Stand 25. For best possible thinning response, all stands should be treated by 2025.

Stands 4 and 6 should be evaluated for further overstory thinning and weed tree removal needs in 2022 or when crop tree crowns begin to touch and crowd.

Lower Priority Management Upland Oak-Hickory Stands: 1 (68.9 ac), 2 (73.8 ac), 5 (158.4 ac), 7 (33.1 ac), 8 (76.0 ac), 11 (39.7 ac), 13 (54.2 ac), 13A (33.6 ac), 14 (47.7 ac), 16 (5.7 ac), 16A (4.1 ac), 19 (12.7 ac), 21 (6.1 ac), 27 (12.8 ac), 29 (5.4 ac), 30 (16.6 ac).

Forest Description: Upland oak-hickory stands with less than 20% white oak component. More mixed oaks and shagbark hickories. Dominant oaks include white oak, red oak, black oak, shingle oak, and bur oak. Average stand Basal Area (BA) is 97 Sq. ft. per acre, with an average crop tree diameter of 9.3 inches overall. Stands are at 86% full stocking level.

Other dominant tree species include, green ash, elm, shagbark hickory, black cherry, bitternut hickory, honeylocust, and hackberry. Forest understory plants include buckbrush, gooseberry, prickly ash, ironwood, scattered multiflora rose, and in some stands, encroaching honeysuckle.

Management System and Recommendations: Even-Aged Mgt.

These stands are lower management priority due to lower white oak numbers and presence of more shagbark hickory, shingle oak, bur oak, and black oak. These stands are mostly pole-sized stands with scattered larger diameter trees. Periodic weed tree removal and crop tree release overstory thinning are recommended to target release oak, hickory, and black walnut crop tree crowns from other tree competition to improve wildlife mast production. Crop tree release intensity will range from selecting and releasing 20 to 30 crop trees per acre. In these stands, an even distribution of oaks, black walnuts, and shagbark hickories should be selected as crop trees.

Periodic suppressed canopy tree removal, weed tree removal, and controlled understory burning are also recommended to further improve wildlife ground cover and/or help control unwanted vegetation such as honeysuckle, ironwood, multiflora rose, and prickly ash.

Following periodic thinning and weeding, with or without ground cover improvement practices, management should be keyed to maximizing crop tree diameter growth rates and tree crown expansion for long-term wildlife mast production. When timber harvesting is needed to regenerate the stands successfully with desirable hardwood tree species, the shelterwood, patch clearcut, or group selection harvest methods should be used. As with the higher priority stands, suppressed canopy tree removal and weed tree removal should be implemented as pre-harvest and post-harvest practices to make forest understory conditions favorable to the establishment of desirable shade-intolerant hardwoods. Adequate natural oak reproduction numbers should be determined by a DNR Forester.

Stand Treatment History:

To date, the west one-half of Stand 8 has been thinned by the crop tree release method and some suppressed canopy tree removal has been done. Additionally, prescribed understory burning has been done and edge-feathering has been done along the west boundary of Stand 8 and along the boundaries of other stands.

Recommended Treatment Priority:

No recommendation is given as to which lower priority management stands should be treated first. However, crop tree release gains will be maximized if the stands are treated before average crop tree diameters reach 12" dbh. According to current non-managed stand growth rates, this would be in about 26-30 years.

Once stand overstories are treated, they should be re-evaluated for further crop tree release needs in about 10 – 15 years following treatment.

Bottomland Hardwood Stands: B1 (50.9 ac), B2 (81.5 ac), B3 (24.1 ac), B4 (31.0 ac), 28A (22.7 ac).

Forest Description: These bottomland stands are dominated by mixtures of elm, boxelder, ash, mulberry, sycamore, silver maple, eastern cottonwood, hackberry, basswood, bitternut hickory, and buckeye with scatterings of black walnut, bur oak, honeylocust, and red oaks. Black walnuts account for 9-15% of the basal area in these stands.

These stands have more mixtures of pole-sized trees and sawtimber-sized trees than the upland stands, with average stand diameters of 12 inches dbh. With an average basal area of 92 sq. ft. per acre, these stands are considered to be fully stocked at the 72% stocking level according to the Bottomland Hardwood Stocking Guide.

Currently, the bottomland stand understories are comprised of buckbrush, scattered multiflora rose, gooseberry, prickly ash, and buckeyes. Typically, these understories are very "brushy" and "weedy", making excellent travel corridors for many wildlife species. The presence of buckeyes will be a detrimental factor for the natural establishment of more shade-intolerant desirable natural bottomland tree species, if and when any timber harvesting is done.

Management System and Recommendations: Even-Aged Mgt.

These stands are lower management priority due to already being very diverse wildlife cover and natural wildlife travel corridors that are hard to improve upon. Areas of these stands could be managed by group selection or patch clearcut harvesting systems when crop trees reach desirable diameter classes. However, most harvest/reproduction areas will have to have extensive overstory and suppressed canopy level weed tree control and probably additional tree planting to successfully establish new stands of desirable tree species. For now, best management would be to go through each stand and remove weed tree species such as larger

diameter buckeyes and Honeylocusts. Then, crowded oaks and black walnuts needing a crown release from other tree competition should be released to improve long-term wildlife mast production. Large scale prescribed understory burning and suppressed canopy tree removal is not recommended until closer to timber harvest time. Leaving larger diameter cottonwoods and silver maples throughout these bottomland areas provide many wildlife dens and serve as turkey roost trees.

Recommended Treatment Priority:

Recommend treating Stand B2 first, then the other bottomland stands. Stand B2 contains the most black walnut trees and oaks.

Upland Viewshed Stands: 20 (14.9 ac), 28 (69.7 ac)

Both Stands 20 and 28 are fully-stocked upland oak-hickory stands that exist on very steep terrain. In Stand 28, the dominant overstory oak is bur oak. In Stand 20, 50% of the overstory basal area is made up of white oaks that average 16-20" dbh. Both stands have ironwood dominated understories. Active management for these stands should be restricted to doing as little as possible to disturb these fragile sites. It is hoped that many neotropical bird species will benefit from these viewshed sites.

Upland Savanna Stands: 3 (88.3 ac), 17 (approx. 15 ac)

Forest Description: Portions of these stands are comprised of mixtures of scattered larger diameter (18" dbh and over) bur oaks and white oaks and pole-sized red oaks, black oaks, elms, shagbark hickories, black cherry, and ash. These areas lend themselves to being managed as Savannas to provide more habitat diversity to the Sand Creek WMA.

Management System and Recommendations: Even-Aged Mgt.

Approximately 45 acres of Stand 3 was upgraded to savanna-level tree stocking in the winter of 2015. An additional treatment of approximately 15 acres is scheduled for the same treatment in the fall of 2015, winter 2016 in Stand 17.

The management prescription is to reduce the existing forest canopy to less than 50% canopy cover, retaining a scattering of most oaks and hickories 20" dbh and above. Smaller diameter oaks and hickories are left in canopy gaps when needed to even up the dominant level tree canopy to produce the desired understory light/shade level for stimulating the establishment and growth of desirable native ground plants. All other suppressed canopy tree cover is cut down (trees down to a 2" dbh). Follow-up management will be periodic weed tree removal, periodic controlled understory burning at least every three years, and continuous monitoring of understory plant species diversity. Hopefully, these areas will serve as models for other savanna restoration work.

Bottomland Hardwood Coppice Stand: 22 (16.9 acres)

Forest Description: This bottomland stand is an overstocked “dog –hair” thick stand of eastern cottonwood that was clearcut several years ago and has sprouted back with multiple stemmed, pole-sized trees.

Management System and Recommendations: Even-Aged Mgt.

Being almost pure eastern cottonwood, this is a low priority management stand. However, even though not apsen, this stand can be periodically clearcut to provide dense, early successional tree growth to improve habitat for wildlife such as grouse, woodcock, and birds needing this special type of habitat. It is recommended that this stand be periodically cut at 8-15 year intervals and allowed to continue to re-sprout.

Upland Early Successional Management Stand: ES (77.0 ac)

Forest Description: This upland hardwood stand is a mixture of sapling and small pole-sized upland hardwoods, fully- stocked to slightly over-stocked with oaks, including many shingle oaks, elms, hickories, black cherries, honeysuckle, ash, mulberry, and hackberry. The stand is also bordered in areas with older shrub plantings. In past years, it was a favored area to quail hunt.

Management System and Recommendations: Even-Aged Mgt.

Strip or group clearcutting with additional edge feathering is recommended at 15-20 year intervals to keep the area in somewhat early successional tree cover to promote quail habitat and hiding cover for other wildlife species. Doing this would improve wildlife habitat diversity between forested Stands 4 and 5 and the Savanna work done in Stand 3.

Sand Creek Species of Greatest Conservation Need

Common Name	Scientific Name	Habitat Preference

Amphibians and Reptiles		
Tiger Salamander	<i>Ambystoma tigrinum</i>	Generalist
Prairie Kingsnake	<i>Lampropeltis calligaster</i>	Open grassland and woodland edge
Bull Snake ^{SC}	<i>Pituophis catenifer sayi</i>	Tallgrass prairie and savannah
Smooth Earth Snake	<i>Virginia valeriae</i>	Moist wooded areas and stream valleys
Northern Prairie Skink	<i>Plestiodon septentrionalis</i>	Open grassland with loose/gravelly soils and rocky areas – tends to choose habitat adjacent to wetlands
Smooth Green Snake ^{SC}	<i>Opheodrys vernalis</i>	Moist grassy areas/prairies or grassland surrounding lakes/impoundments
Smallmouth Salamander	<i>Ambystoma texanum</i>	Woodland pools and open woods
Western Wormsnake ¹	<i>Carphophis amoenus</i>	Rocky woodland
Butterflies		
Zabulon Skipper	<i>Poanes zabulon</i>	Riparian zones, oldfield, woodland edge
Reikerts Blue	<i>Echinargus (Hemiargus) isola</i>	Native prairie
Byssus Skipper ¹	<i>Problema byssus</i>	Tallgrass prairie
Odonates		
Slaty Skimmer	<i>Libellula incesta</i>	Backwater
Sulphur-tipped Clubtail	<i>Gomphus militaris</i>	Lake/pond
Spangled Skimmer	<i>Libellula cyanea</i>	Lake/pond
Vesper Bluet	<i>Enallagma vesperum</i>	Lake/pond
Mammals		
Elliot's Short-tailed Shrew	<i>Blarina hylophaga</i>	Forest, woodland, savanna, grassland
Northern Myotis ^T	<i>Myotis septentrionalis</i>	Forest
Bobcat	<i>Lynx rufus</i>	Forest, woodland, grassland
Spotted Skunk ^E	<i>Spilogale putorius</i>	Grassland, savanna, forest, and farmsteads
Woodland Vole	<i>Microtus pinetorum</i>	Forest
Gray Fox	<i>Urocyon cinereoargenteus</i>	Forest/woodland
Franklin's Ground Squirrel	<i>Spermophilus franklinii</i>	Tallgrass prairie, savanna, roadsides
Prairie Vole	<i>Microtus pinetorum</i>	Upland prairie
Plains Pocket Gopher	<i>Geomys bursarius</i>	Warm season herbaceous grassland, herbaceous wetland, savanna, roadsides
Indiana Bat ^E	<i>Myotis sodalis</i>	Forest

Common Name	Scientific Name	Habitat Preference
Grassland-shrub nesting birds:		
Northern Bobwhite	<i>Colinus virginianus</i>	
Loggerhead Shrike	<i>Lanius ludovicianus</i>	
Bell's Vireo	<i>Vireo bellii</i>	
Field Sparrow	<i>Spizella pusilla</i>	
Brown Thrasher	<i>Toxostoma rufum</i>	
Woodland-Shrub nesting birds:		
American Woodcock	<i>Scolopax minor</i>	
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	
White-eyed Vireo	<i>Caprimulgus vociferus</i>	
Yellow-breasted Chat	<i>Icteria virens</i>	
Common Yellowthroat	<i>Geothlypis formosus</i>	
Forest Nesting Birds:		
Red-shouldered hawk ^E	<i>Buteo lineatus</i>	
Ruffed Grouse	<i>Bonasa umbellus</i>	
Broad-winged hawk	<i>Buteo platypterus</i>	
Eastern Whip-poor-will	<i>Caprimulgus vociferus</i>	
Chimney Swift	<i>Chaetura pelagica</i>	
Acadian Flycatcher	<i>Empidonax vireescens</i>	
Wood Thrush	<i>Hylocichla mustelina</i>	
Louisiana Waterthrush	<i>Parkesia motacilla</i>	
Kentucky Warbler	<i>Geothlypis formosus</i>	
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	
Eastern Screech Owl	<i>Otus asio</i>	
Northern Flicker	<i>Colaptes auratus</i>	
Eastern Wood-Pewee	<i>Contopus virens</i>	
Eastern Kingbird	<i>Tyrannus tyrannus</i>	

State-listed species (Code of Iowa, Chapter 481B): Special Concern (SC), Threatened (T), and Endangered (E)

Conducting Timber Sales on State Lands

Iowa Department of Natural Resources

Timber sales may be conducted on state owned forested lands in accordance with an approved Forest Management Plan. Once an area has a plan in place, forest management activities (including timber harvesting) may be scheduled and implemented according to the plan.

Management Planning

A District Forester will meet with the Area Manager, stand map and inventory the area, and develop a management plan based upon the Area Manager's management objectives and the current, science based forestry practices that will meet those objectives. Once a plan is developed, it will be sent to the Area Supervisor, Bureau Chief, State Forester and Lands and Waters staff (*currently send to John Pearson, Mark Leoschke and Kelly Poole*) for distribution and review. Once the plan is reviewed and approved by the State Forester, it will be posted on the respective Bureau's website.

Public Meeting

The management plan will be presented at a public meeting.

Natural Areas Review

Planned timber sales must be sent to Land and Waters Bureau staff for review to determine if a natural areas inventory needs to be conducted (*currently send to John Pearson, Mark Leoschke and Kelly Poole for distribution and review*). Land and Waters staff will complete a natural areas review and identify any species of concern; or determine that no inventory is necessary.

Timber Sale Checklist

A timber sale checklist must be completed for the sale using the current template from the Forestry Bureau. The checklist must be completed and signed by appropriate staff (or email confirmation must be attached) before the sale can proceed.

Timber Marking

The District Forester will mark and scale the trees in the timber sale area. A tally of board foot volume and number of trees by species will be completed.

Bid Solicitation

The Area Manager, with the assistance of the District Forester will prepare a "Notice of Timber for Sale". The District Forester will provide a list of Bonded Timber Buyers to whom bid notices can be sent. (*The contract routing process will begin here. Legal approval of the bid notice is needed before it is sent out.*) The bid opening date will be set at least 4 weeks from the date the

bid notices are sent. Bids will be opened locally, and the results will be sent to the Area Supervisor.

Additional Public Meeting

If the timber sale is in a state park or preserve, a public hearing must be conducted prior to the sale if the amount of timber sold exceeds 10,000 board feet in volume, or \$5000 in value. Once the public hearing has been conducted, the sale may proceed (Code of Iowa 461A.31A).

NRC Approval

If the winning bid is \$25,000 or more, the sale must be approved by the Natural Resource Commission prior to executing a contract. The Area Supervisor will prepare the project brief for the NRC agenda if approval is necessary. Once the NRC has either approved the sale, or the sale is under \$25,000 and does not need approval, a contract may be executed.

Execution of Contract

The District Forester will assist the Area Manager with drafting of the timber sale contract. (*The current contract routing process must be followed, including legal approvals and the use of the current timber sale contract template from the Forestry Bureau.*) Once legal has approved the contract, **the timber buyer must sign the contract and pay for the sale in full before any trees are cut.** The timber buyer may proceed with the harvest once the full payment has been received and the contract is signed by the timber buyer and the appropriate DNR signatory.

Follow-up Management

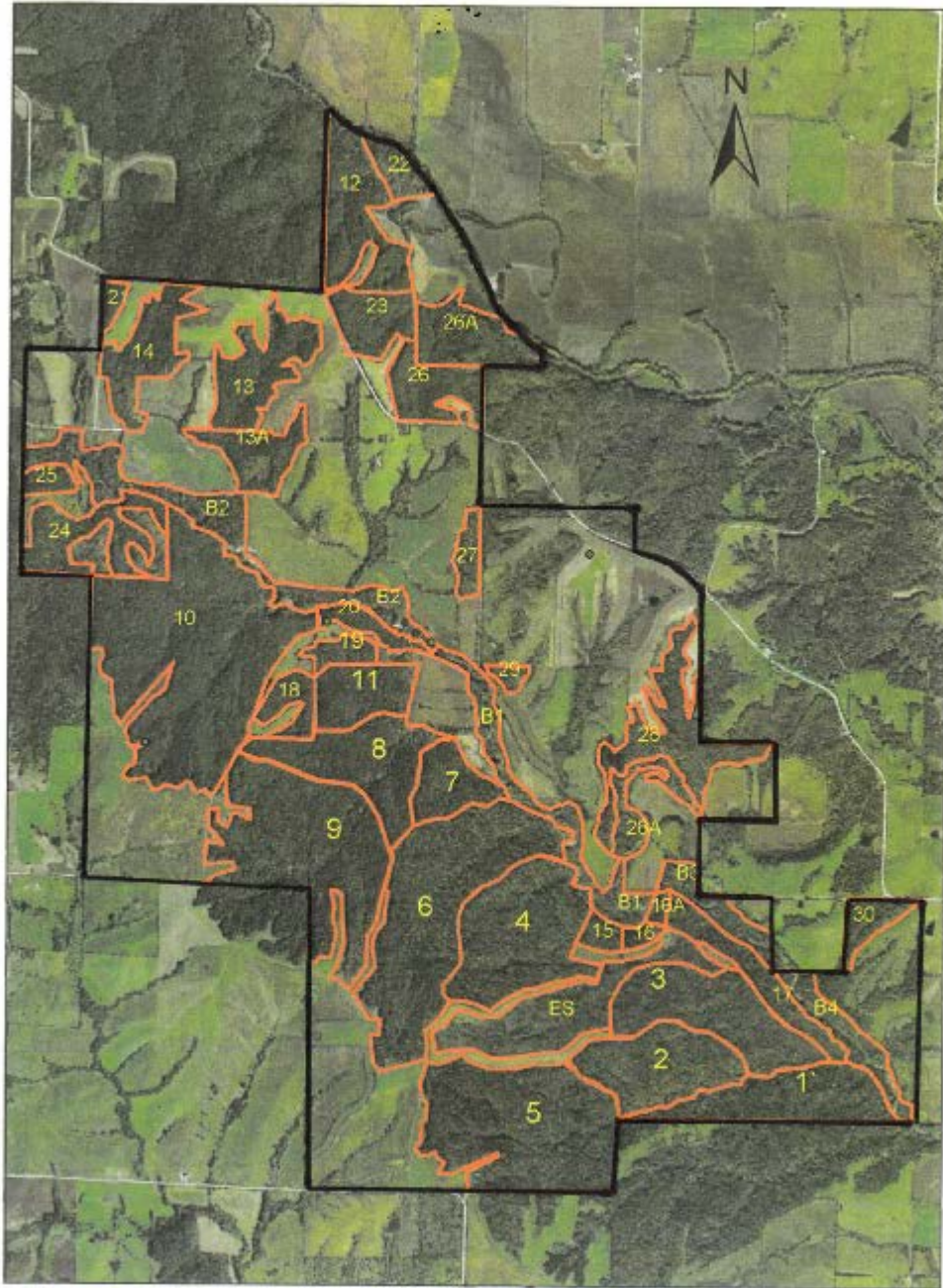
Once the harvest is completed, the District Forester will meet with the Area Manager and assist with implementing the plan for reforestation. Post-harvest work, tree planting, or any other prescribed work will commence during the first year following completion of the harvest.

Checklist for Conducting Timber Sales

Item	Description	Date Completed
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Management Plan	Area Manager and District Forester develop a Forest Management Plan	
Public Meeting	Forest Management Plan is presented at a public meeting	
Natural Areas Review	Land and Waters Bureau staff will review site and conduct a natural areas inventory if required	
Timber Sale Checklist	Checklist is completed and approval signatures or emails are obtained	
Timber marking	District Forester marks and scales the timber and provides volume estimates	
Bid Solicitation	Area Manager and District Forester prepare bid notice, bid notices are sent out and bids are received	
Additional Public Meeting	For state parks and preserves only if sale is over 10,000 board feet or \$5000	
NRC Approval	Required for sales over \$25,000	
Execution of Contract	Contract is drafted, reviewed, and signed by both parties	
Follow-up Management	Reforestation and follow –up work completed following harvest	

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Sand Creek WMA Forest Stand Locations and Area Boundary