FNR-193-W

Purdue University
Forestry and Natural Resources
Wildlife Management

The Basics of Managing Wildlife on Agricultural Lands

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Introduction

All wildlife species require four basic components: food, cover, water, and space. The proper types, amounts, and arrangement of these requirements vary among species. Species utilize an area if supplied with the right types, sufficient amounts, and proper arrangement of these components at correct times of the year. Properties that have an insufficient arrangement or quantity of any one of these necessities will not support a given wildlife species. The quality of food, water, and cover can also influence the survival and productivity of wildlife – higher quality habitat will support a higher density of animals. Decide what types of wildlife you want to attract, determine which of their basic four requirements could be improved on your property, and then develop a plan to provide these requirements.

Once you decide what species or group of species you wish to manage, you need to identify the food, water, cover, and space requirements for those species. Identify the amount and arrangement of each of these on your property; determine which requirement is limiting, and determine the best way to supply the limiting requirement. For example, you may have decided to manage for wild turkey on your property. You learn that good turkey habitat is comprised of an approximate 50/50 mix of mature oak-hickory forest stands with early successional openings and croplands. Forest openings and other early-successional habitats that contain herbaceous (non-woody) plants are important brood cover for turkeys. These areas supply an abundance of insects, the primary food of turkey poults, and provide habitat where turkey poults can feed in close proximity to cover. However, your property lacks quality herbaceous areas. Therefore, the first step in attracting turkeys to your property would be to provide this habitat either by establishing permanent forest openings or other herbaceous cover on areas adjacent to your woods.

Many times, a species that you are interested in attracting to your property is abundant in areas around your land but rarely if ever uses your property. This is often the case for wild turkeys. Releasing birds on your land is not the best way to increase the population. Wildlife released on your land rarely survives long and will not stay on your land if the habitat is unsuitable. Rather, you should provide proper amounts of food, cover, and water on your property that may be of limited supply in the environment. If you build it, they will come. Many state and federal programs offering technical and cost-share assistance exist to assist you in establishing wildlife habitat on your land. This publication summarizes some of the most common wildlife habitat practices available through federal and state programs, and helps direct you to sources of additional information.

Where Do I Begin?

Any wildlife management plan for a specific species or group of species must be tailored to each property. This plan must take into consideration the landowner's objectives, existing habitats, natural features on the property, property size, wildlife species present in your area, and habitats and natural features on surrounding properties. Fortunately, there is help available. In Indiana, there are 22 state wildlife management biologists (district wildlife biologists) available to assist private landowners. You can locate the wildlife management biologist nearest to you by contacting the Indiana Department of Natural Resources (IDNR), Division of Fish and Wildlife or your county Extension Educator. Your state district forester, Natural Resources Conservation Service (NRCS) wildlife biologist or resource conservationist, or a private wildlife consultant certified by The Wildlife Society can also assist you. Many of these agencies offer cost-share assistance that can make these practices listed below more attractive and affordable. For a complete list and description of forestry and wildlife assistance available to private landowners, see *FNR-87*.

The natural resources professional will ask several questions that will assist in the design of a management plan for your property. Common questions are: 1) What are your goals and objectives for your property? 2) What species or group of species do you wish to encourage? 3) How much time and money are you willing to spend? By being prepared to answer these questions before the initial meeting with a natural resources professional, your wildlife management plan will best reflect your wishes and will be

compatible with all of your short- and long-term goals. See *FNR-175-W* for more information about assessing your land's potential for wildlife.

Farm Bill programs such as the Conservation Reserve Program (CRP) (see *FNR-157*), the Wetlands Reserve Program (WRP) (see *FNR-158*), the Environmental Quality Incentives Program (EQIP) (see *FNR-169*), and the Wildlife Habitat Incentives Program (WHIP) (see *FNR-168*) offer up to 50-100 percent cost-share incentives for the establishment of a variety of land management practices. The primary purpose of many of these conservation practices is to reduce soil erosion and improve water quality. However, they can also be established and maintained in a manner that will maximize their benefit to wildlife while meeting soil and water conservation goals.

Cost-share assistance programs often make wildlife management practices affordable. In many cases, dedicating marginal farmland to wildlife management practices can actually improve the per acre net return. See *FNR-162* to learn more.

Grassed Waterways

Agricultural fields commonly contain natural swales and depressions that concentrate water flow after storm events. Rather than planting row crops, plant grassed waterways on these highly erodible areas. By reducing the rate of surface water flow, grassed waterways can reduce soil erosion and thereby improve water quality. However, grassed waterways can also provide valuable wildlife habitat if you do the following:

1. Avoid planting fescue, a cool-season grass, if wildlife habitat is a priority. If fescue must be planted, a low-endophyte fescue (Johnstone, Fawn, Kenhy, Forager vars.) should be used. Fescue endophyte is a fungus that grows between the cells of a tall fescue plant. High-endophyte fescue (Ky31 var.) has been found to reduce litter sizes in some species such as rabbits.
2. Plant a combination of grasses (Kentucky bluegrass, orchardgrass, perennial ryegrass, redtop, switchgrass, or timothy) with clover, annual lespedeza (southern Indiana only), or partridge pea.
3. Establish filter strips (see below) on each side of the waterway.
4. Minimize or eliminate disturbance (mowing, machine traffic, grazing, etc.) during the nesting season. Repeated mowing during the growing season prior to establishment is necessary for establishment of cool-season grasses and control of weeds. Once established, mow the grassed waterway in a 2 to 3 year rotation so that only 1/2 to 1/3 of it is mowed in a given year. This will maintain the integrity of the waterway while providing some winter cover and early-spring nesting habitat for wildlife. Mow cool-season grass no shorter than 6 inches and native warm-season grass no shorter than 10 inches.

Filter Strips / Buffer Strips

Filter strips are strips of vegetation placed adjacent to streams and watercourses that reduce the amount of nutrients and sediments entering the water from surface runoff and erosion. Grasses, trees, and shrubs are acceptable cover types for this practice. Use all three cover types to enhance wildlife diversity. Filter strips can be enhanced for wildlife by completing one or more of the following steps.

1. The grass species planted depends upon the site conditions, the grade of the slope, and the amount of sediment and contaminants in the runoff. If the slope is relatively steep and/or if the filter strip incurs a high sediment and/or contaminant load, then mixes of sod forming grasses (e.g., switchgrass, redtop, orchardgrass, timothy, or smooth brome) planted at high densities may be necessary. Avoid planting fescue when possible (see grassed waterways above).
2. However, if these conditions are not present, or you wish to further enhance a filter strip for wildlife with additional width, then plant grass mixtures at lower densities or consider selecting other grass mixtures that benefit wildlife such as native warm-season bunch grasses (see Table 1, page 10). Non-profit conservation groups such as *Pheasants Forever* and *Quail Unlimited* may donate grass seed, provide warm-season grass drills, and in some cases, provide planting assistance for specific projects. For more information about warm-season grasses, see *FNR-188-W*.
3. Adding forbs (non-woody plants other than grass, i.e., wildflowers and legumes; See Table 2, page 11 and Table 3, page 12) to grass plantings will enhance its value to most wildlife species. Forbs provide a source of food and structure that attracts insects, while grasses are an excellent source of cover. Bunch grasses are grasses that do not form a sod. Thus, they provide spaces for wildlife to move through (i.e., orchard grass, native warm-season grasses), making them particularly valuable for winter and brood cover.
4. If management of wildlife is your goal, you should plant grass mixtures at a rate of 3.75 to 4.5 PLS (Pure Live Seed; See Box 1, page 3) for warm-season grasses, 5 to 10 PLS for cool-season grasses, and 0.5 to 1.5 PLS for forbs if lower planting rates do not impact the function of the filter strip. In general, the greater number of species you select for your planting, the greater potential benefit that planting has for wildlife. However, you should adjust your planting rates so you do not exceed

Box 1

Most seeding rates are listed in pounds of seed per acre. These rates can be unreliable for some species since they do not take into account the viability (germination rate) of the seed. Also, plants such as native warm-season grasses and some forbs tend to be chaffy, or have a large amount of seed hulls mixed with the viable seed. Thus, it is extremely important that you calculate the pure live seed (PLS) for these species to avoid paying for unviable materials or underestimating your planting rates.

% PLS = percent pure seed x (% germination + % dormant seed)

Example - The tag from a bag of seed would have the following information.

% Pure Seed	96.75	% Germination	75
% Other Crop	.10	% Dormant (Hard)	10
% Inert Matter	2.35	% Total Germ.	85
% Weed Seed	.80	Noxious Weeds	432

The percent PLS for the above seed would be 82%

% PLS = .9675 x (.75 + .10)

% PLS = .9675 x .85 = 82%

Thus, only 82 of the 100 pounds of bulk seed purchased can germinate and produce the desired crop.

To determine the amount of bulk seed required, locate the % PLS of the seed to be planted in the left column and the desired PLS planting rate in the top row.

	Desired pounds PLS per acre									
% Purity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
20	5	10	15	20	25	30	35	40	45	50
30	3	7	10	13	17	20	23	27	30	33
40	3	5	8	10	13	15	18	20	23	25
45	2	4	7	9	11	13	16	18	20	22
50	2	4	6	8	10	12	14	16	18	20
55	2	4	5	7	9	11	13	15	16	18
60	2	3	5	7	8	10	12	13	15	17
65	2	3	5	6	8	9	11	12	14	15
70	1	3	4	6	7	9	10	11	13	14
75	1	3	4	5	7	8	9	11	12	13
80	1	3	4	5	6	8	9	10	12	13
85	1	2	4	5	6	7	8	9	11	12
90	1	2	3	4	6	7	8	9	10	11
95	1	2	3	4	6	6	7	8	9	11

the PLS guidelines for either warm-season or cool-season grass mixes. This is important because mixtures for wildlife are planted at relatively lower rates to allow for the growth of forbs and the movement of animals such as bobwhite quail. See *FNR-192-W* for more information about bobwhite quail management in Indiana.

5. Left unmanaged, woody vegetation eventually invades a grass planting. Maintain grass plots by mowing (cool-season grasses) and burning (warm-season grasses). Repeated mowing during the growing season prior to establishment may be necessary for establishment of cool-season grasses and control of weeds. Only mow in years when it is needed. Mowing is only needed to suppress noxious weeds and woody growth. Burning helps to encourage the growth of warm-season grasses and discourage invasion by woody plants. Depending upon the soil fertility and climate, you should mow or burn every 1 to 4 years. Rather than mowing or burning all of your plantings in the same year, mow or burn on a rotational basis. Always leave some cover undisturbed.

For example, if you have a field >10 acres, consider mowing 1/3 each year (Figure 1). This provides a diversity of growth stages in the same field (1/3 is 1 year old, 1/3 is 2 years old, and 1/3 is 3 years old), and reduces the amount of mowing you need to do in any given year. Mow cool-season grass no shorter than 6 inches and native warm-season grass no shorter than 10 inches.

5. The minimum width of the filter strip depends upon the percent slope of the drainage area above the filter strip. However to benefit wildlife, you should plant filter strips as wide as possible. The old adage of bigger is better applies here. Many wildlife species utilize filter strips for nesting, cover, and travel ways. Filter strips need to be wide enough to allow nesting animals a chance to hide from predators that travel the edges of these areas. Filter strips 66 feet wide or greater on each side of the waterway provide good cover for wildlife, while meeting the setback requirement on the atrizine label.
6. Select shrub species suited to your soil type that also provide food and nesting habitat for wildlife (see Table 4, pages 13-16). The state nursery provides a selection of shrubs for this purpose. Placing one row of shrubs closest to the stream helps stabilize the stream bank while providing a setback for the first row of trees. This is a concern to landowners along watercourses with heavy scour erosion. In these situations, trees that are set back from the stream edge are less likely to fall into the stream in later years; however, they are still close enough to provide shade to the stream. The minimum spacing for planting shrubs is 6' by 6'. Design plantings with irregular edges when possible. Before purchasing your seedlings, contact your county NRCS office or drainage board for any restrictions on tree or shrub plantings near regulated drains.
7. Select tree species that provide food and/or cover for wildlife (see Table 5, pages 17-22). For example, many native tree species adapted to soil conditions along streams are excellent wildlife trees. A tree planting containing many species provides a diversity of food and structure. Thus, it becomes more valuable for wildlife than a planting that only contains one or two tree species. Planting a variety of tree species also minimizes the chance of incurring a high mortality rate due to environmental variability because it can be difficult to predict which tree species competes best on a given site.

   Oaks are a very important food source for many wildlife species. When selecting oak species, select a variety of both white and red oak group species. The acorns of trees in the white oak group mature in one year, while acorns of trees in the red oak group mature in two years. Therefore, every autumn trees in the red oak group have small immature acorns on the current year's growth and mature acorns on previous year's growth. Species in the red oak group can provide an acorn crop in years with a late spring freeze that might have destroyed that year's white oak (and next year's red oak) acorn crop. A ratio of about 2:1 to 3:1 red oaks to white oaks is recommended to prevent a total mast failure of your plantings in a given year while maximizing your total annual mast production.

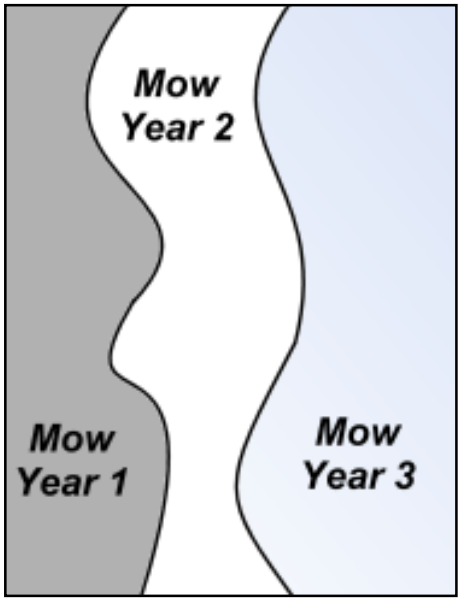

Figure 1. Rotational mowing of a grass planting. *Mowing is conducted only to maintain the area in a grass/forb mixture, not for aesthetic purposes. Note the irregular shape of each management unit.*

Depending on your goals, the spacing of trees in plantings will vary. Wildlife plantings are usually spaced at 400 to 500 trees per acre; however, if you are planting in a bottomland, or you are interested in managing your tree planting for timber, you may have to plant as many as 900 trees per acre. If you plan to purchase trees from the state nursery, call the Vallonia nursery at (812) 358-3621, or the Jasper-Pulaski nursery at (219) 843-4827, or order online from the IDNR, Division of Forestry Web site *www.state.in.us/dnr/index.html*.

The deadline for ordering trees from the state nursery is in October of each year and seedlings are available the following March. Your District Forester or Consulting Forester can assist you with tree planting and maintenance. A consulting forester may be needed to plant large areas requiring machine planting. See *FNR-134* and *FNR-135* for more information about tree planting.

Wetland Restoration and Enhancement

Wetland benefits and values include storm water storage, ground water recharge, nutrient recycling, sediment filtering, and wildlife habitat. Over 87 percent of Indiana's wetlands have been degraded or destroyed. Wetland restoration aims to restore drained or degraded wetlands to the point that soils, hydrology, vegetation, and biological habitats are returned to their natural condition or as close as possible. You should obtain the required local, state, and federal permits before beginning any wetland restoration project (see *FNR-171* for more information). Often, blocking drainage tile or installing a basic water control structure (wetland video) can restore a wetland. The USFWS (812-334-4261) can provide technical and financial assistance at little or no cost to you for many wetland restoration projects. Also, contact your county NRCS office or see *FNR-87*. The following guidelines can make a wetland more beneficial to wildlife.

Design

Different types of wetlands attract different communities of wildlife. Therefore, your wetland should reflect your management goals. For example, if you would like to manage for waterfowl, then a wetland with a 50/50 mix of open water and aquatic emergent plants is ideal. The water depth for dabbling ducks (mallards, teal, wood duck, etc.) should not exceed 18 inches and should include depths <12inches. Generally, aquatic emergent plants grow in shallow areas less than 18inches in depth. They are important because these plants provide food and cover for many species of wildlife such as waterfowl, reptiles, amphibians, and the invertebrates they depend on for food. Deep-water areas provide habitat for diving ducks and many fish species. They are important to migrating (waterfowl, water birds) and overwintering (fish) wildlife. Predators of mosquitoes require deeper water refuges (usually > 8 feet that won't dry out easily. Many birds, frogs, fish, and insects (dragonflies, damselflies, water striders, backswimmers, and diving beetles), all natural enemies of mosquitoes, inhabit wetlands having these characteristics (IDNR undated; also see *FNR-69*).

Managing wetlands for fish populations is not compatible for all management goals. For example, fish management is compatible with waterfowl management, but not for amphibian species since fish are one of their primary predators. Also, having fish in a wetland will not necessarily enhance wildlife use of the wetland. It is important to discuss your goals and possible tradeoffs of design options with the professionals overseeing your wetland restoration project.

The best rule to follow when designing your wetland is more diversity equals more wildlife. Therefore, increasing the size, the diversity of water depths, and the number of plant species maximizes its value for wildlife. Cole et al. (1996) recommended the following design considerations.

- Install water control structures. They can be used to more accurately control water levels, and to allow for drawdowns to control or enhance wetland vegetation.
- Larger wetlands generally support more diverse plant and wildlife communities. Wetlands ranging in size from 0.5 to 5.0 acres can be expected to support a reasonably diverse wildlife community.
- Irregular shapes promote more structural diversity in and around the wetland basin. Coves, peninsulas, islands, and rough shorelines provide more habitat types.
- Gentle slopes (1:10) result in exposed mudflats and a diversity of emergent plants. These areas are used by many bird, amphibian, and reptile species. Plan for a high diversity of slopes with a higher percentage of gentle slopes.
- Providing variety of depths results in a diversity of plant communities, and subsequently, wildlife. Emergent plants favor depths less than 18 inches and are favorite habitats of dabbling ducks, herons, and frogs. Submergent and floating plants prefer water depths 18 to 48 inches. Depths greater than 6 feet provide permanent water. However, wildlife tends to be much more diverse and abundant in wetlands that are dominated by shallow (<3 feet) water.

If you are working in wetland soils or participate in farm programs, there are a few regulations or permits that may apply. See *FNR-171* for details or contact your county NRCS office.

Plant Establishment

Most wetlands do not require planting. Once wetland hydrology is restored, wetland vegetation become established naturally from seeds already present in the soil, bird droppings, wind dispersal, and seeds caught in the fur and feathers of wildlife that utilize the wetland. Many landowners simply let nature take its course and do not introduce plants into a wetland. However, when you allow wetland plants to naturally establish themselves, you do not choose the species composition. If invasive exotic species (purple loosestrife, reed canary grass, common reed) or aggressive native species (cattail) overrun the site, then it may be necessary to supplement natural plant colonization with nursery stock. Selection of plants depends upon the hydrology and soil conditions of the site. Plant stock can be purchased from private nurseries or transplanted from other wetlands (see Appendix A, pages 24-36 for potential sources). Damage from Canada geese may be a problem when establishing wetland plants in this manner. For more information about preventing Canada goose damage, see *FNR-FAQ-8-W*.

Buffer Strips

Establish an undisturbed grass/forb buffer strip around the wetland (see filterstrip section above). A strip 66 to 99 feet in width provides excellent nesting cover for waterfowl, and it reduces bank erosion (especially before the wetland is completely vegetated) and chemical and nutrient runoff. Because Canada geese are attracted to open water surrounded by very short vegetation, an unmowed strip of native grasses and forbs around your wetland may also reduce your risk to damage from unnaturally large groups of Canada geese. It provides nesting cover for many birds and other wetland species. To maximize nesting potential for ground nesting ducks (e.g., mallards and teal), establish buffer areas >3 to 4 times the wetlands.

Special Features

One or a group of small islands in the center of a wetland provides ideal nesting habitat for many species of waterfowl. Unless your wetland is large (2 acres or more), islands will attract primarily Canada geese rather than ducks. Also, if your wetland is >1/4 acre, you can place wood duck nest boxes, goose tubs, or brush islands for nesting waterfowl in your wetlands (plans can be attained from your District Wildlife Biologist or County Extension Office, also see *NCR-338, Shelves, Houses, and Feeders for Birds and Mammals* and *FNR-129, Canada Geese in the Mississippi Flyway*).

Conservation Cover

Conservation cover is the establishment and maintenance of a perennial vegetation cover to protect soil and water resources on land retired from agricultural production. Conservation cover is an eligible practice for many cost-share programs including CRP and WHIP.

The species and arrangement you select depend upon your management goals. In general, planting few plants or mixtures in large blocks has minimal value to most wildlife species (Figure 2). However, some species of wildlife (e.g., bobolink and upland sandpipers) require large blocks of grassland. You can maximize benefits to most wildlife species by planting many small blocks or strips of a variety of species and/or habitat types (Figure 3). This increases the amount of edge (transitional areas among two or more habitat types) in the planting, and they provide habitat to the largest diversity of wildlife.

Other than noxious weeds, any plant cover can be established and maintained. Native plants adapted to the site conditions like those listed in Tables 1-6, pages 10-23, benefit wildlife. A mixture of plant species and habitat types such as grassland, old-field/brushland, and forestland provide escape, nesting, and foraging cover for a wide variety of wildlife species. You should select plants that meet the basic requirements of the wildlife species you wish to attract. Your NRCS Representative or District Wildlife Biologist can assist you in selecting the best species for your property. The size of your plantings also varies depending upon the species you wish to attract. A common shortfall in the majority of wildlife plantings by landowners is the lack of proper maintenance. Once your planting is established, it requires some form of disturbance (mowing, burning, thinning, disking, etc.) every 1 to 5 years to maintain its composition and structure (see Maintenance Provisions).

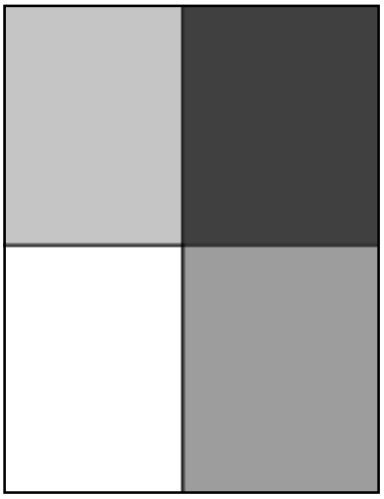

Figure 2. Planting arrangements with low diversity and edge.

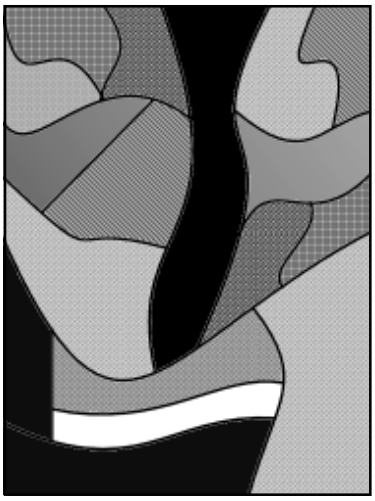

Figure 3. Planting arrangements with high diversity and edge.

Pasture and Hay Planting / Management

Converting fescue pastures or hayfields into warm-season grasses or a mix of warm-season grasses and forbs provide nesting, brood, and winter cover for many species of game and non-game birds. Warm-season grasses provide quality forage in July and August when cool-season grasses have shut eMwn.

Another benefit of warm-season grasses is that they can vastly improve the organic matter throughout the soil profile. Cool-season grasses have a shallow-root system, usually no more than 18 inches. Warm-season grasses have very deep root systems that can reach depths of 10 feet or more.

Burning a field planted to warm-season grasses reduces competition from weeds and woody plants while stimulating growth of the warm-season grasses. You should plant small blocks (1 to 2 acres) of warm-season grasses divided by firebreaks at least twice the height of your planting. Firebreaks can be planted to cool-season grass mixes, legumes, or winter wheat. Contact your local NRCS office for more information about burning warm-season grass plantings.

Cool-season hayfields can be attractive nesting habitat for some species of grassland birds (e.g., bobolink) although the

timing and frequency of mowing during the nesting season often results in high losses. Establishing undisturbed grassland cover near hayfields can henp draw broods away from nesting in hayfields and minimize nest losses.

Food Plots

Food plots are an important component to many wildlife management plans. The selection of plants (Table 6a and Table 6b, page 23 for species selection and planting rates) for your food plot depends upon the species you are managing for, the amount of annual snow fall, and the types, amounts, and arrangement of food and cover on your property. Many plants such as soybeans, millets, wheat, rye, and buckwheat provide an excellent source of food. However, they tend to lodge and get buried in the snow and then rot, making them an unreliable food source in late winter or early spring. You can plant mixtures of these species with plants that do not readily lodge, such as corn and grain sorghum. While grazing of food plots is generally not recommended, you should note that grain sorghum can be poisonous to livestock after frost or drought.

Just as for any agricultural crop, seedbed preparation and correct fertilization is essential for the successful establishment of any food plot. However, high yields are not the goal of food plots, so herbicides should be used sparingly and only when necessary to produce a crop. Weedy food plots often provide secondary benefits to wildlife, including cover and insect food.

After you determine the species of plants for your food plot, determine the size and location of the food plot. In general, food plots should be about 1/4 to 1 acre in size. Planting larger food plots is not recommended since wildlife tend to use primarily the outer edge of plantings close to cover rather than the interior. The amount of value gained by planting larger food plots usually does not justify its cost. However, larger food plots (blocks of 3 to 10 acres) are justified in areas that receive large amounts of blowing snow as found in the Northern Plains. These food plots require a cover component; otherwise, the food is buried by the snow.

Whenever possible, locate food plots adjacent to adequate cover on the windward side (see *FNR-189-W*). In Indiana, the prevailing winter wind is from the northwest. If this is not possible, plant corridors of cover between food plots and winter cover. Corridors should be at least 50 feet in width and include at least three rows of shrubs and two rows of trees. You can also construct brush piles adjacent to the food plot. A minimum of six or more brush piles should be located around each food plot. See *http://www.conservation.state.mo.us/landown/benefit/* for more information about brush pile construction. Typically, one food plot per 40 acres of farmland or forestland is a minimum and should not exceed 5 percent of the total acreage.

Rather than replanting the same food plot every year, allow old food plots to stand 3 to 4 years prior to replanting. The resulting habitat will provide nesting cover and insect foraging habitat that will benefit ground nesting bird species like bobwhite quail.

Maintenance Provisions

Habitat maintenance is just as important as establishing good wildlife habitat, yet it is frequently overlooked. Would you plant a new lawn and not mow, water, or fertilize it? The same is true for other habitats. Without proper maintenance, plantings may lose their vigor, become overrun by invasive species, or convert to a less desirable stage of development.

The timing and methods you select depend upon the long-term management objectives for your property. However, some common maintenance provisions are briefly described below. In general, all maintenance is done on a rotational basis. This promotes a diversity of habitat types and provides food and cover during the winter and early spring.

Disking - Disking breaks up grass plantings that have become too overgrown. Many species of wildlife such as quail require habitat that they can walk through, but it still provides overhead cover. Infrequent disking promotes annual food plants and a mix of grasses, forbs, and shrubs. Disk strips 3 to 4 inches deep and about 10 to 20 feet wide. Disk strips on a 4- to 5-year rotation from January to March.

Burning - Prescribed burning of native warm-season grasses removes excess litter (which can limit wildlife movements), stimulates new and vigorous growth, and prevents excessive woody growth. Divide your planting into small units (<5 acres) with firebreaks. Fire breaks, which are typically bare ground, cool-season grass/legume mix, small grains, or existing roads, should be at least 20 feet in width. Burn the units on a 3-year rotation, burning 1/3 of the total area each year. See Appendix B, page 23 for a list of private consultants that provide prescribed fire assistance.

Mowing - Mowing cannot be used as a substitute for disking or burning. It does not remove old growth and litter like burning or disking. Repeated mowing creates a grass-dominated system that lacks woody shrubs, vines, and bare ground. A mixture of these habitat components is important to a variety of wildlife. For example, research has demonstrated that the majority of quail nests are built at the base of brambles, sumac, sassafras, and other woody plants on sites that contain about 30 percent bare ground.

Mowing can be a substitute for disking on highly erodible slopes or burning on areas near buildings, or to control tree invasion on a spot-basis. Mow these areas on a 4- to 5-year rotation in August, mowing 1/5 of the units each year. This maintains the area in a mix of grasses, forbs, and shrubs; but it prevents tree invasion.

Endangered Species

Many landowners are concerned about endangered and threatened (listed) species. In most cases, the presence of listed species does directly impact the landowners. Several programs exist to assist private landowners in their efforts to manage for listed species. For example, Safe Harbor Agreements allow private and other non-federal landowners to manage their land in a way that restores, enhances, or maintains habitat for rare plants and animals while still meeting other management goals – all without incurring additional land-use restrictions. See *FNR-172* for more information about endangered species, Safe Harbor Agreements, and more.

Nuisance Wildlife

Occasionally, wildlife management practices attract unwanted species, leading to problems for landowners. For example, increased deer populations can inhibit the growth of food plots or tree and shrub plantings (see *FNR-136* for suggestions on how to minimize this type of damage), or nuisance Canada geese (see *FNR-FAQ-8-W*) can damage plantings for wildlife, winter wheat, or landscaping around the home.

Properly planned management can still encourage wanted wildlife species while minimizing nuisance wildlife problems. Strategies vary on a case-by-case basis. However, successful plans include taking steps to prevent damage *before* the damage occurs, monitoring for signs of new damage, and minimizing further damage through a combination of approved techniques. You will rarely be able to eliminate nuisance wildlife, and minimizing nuisance wildlife is an ongoing process. For information on managing nuisance wildlife problems, contact the USDA Wildlife Services/IDNR wildlife conflicts hotline at 1-800-893-4116. If you have a nuisance wildlife problem, you will find that many of the nuisance animals are regulated and protected by federal, state, and/or local regulations. For more information about rules and regulations in Indiana, see *FNR-FAQ-16-W*.

Who Do I Call?

"What kinds of assistance are available to me, and from whom?" "Is there money available to help me?" "Where do I go to get help with my wildlife resource problems?" These are questions frequently asked by Indiana landowners. The answer to these questions can be quite complicated because programs that assist landowners are implemented by a number of public and private organizations. The best place to start for answers to your questions is with your county Cooperative Extension Service Educator. For more information about forestry and wildlife assistance available to Indiana landowners, see *FNR-87*. Your county Educator will assist you in contacting the appropriate person and/or agency administering the assistance programs best suited to your needs. The address and phone number for your county's Cooperative Extension Service Office can be found in the telephone directory under "County Government Office," or they may be listed in the white pages under the name of your county. You can also call 1-888-EXT-INFO.

NRCS, along with FSA, provides leadership for Farm Bill programs. Contact your local USDA Service Center for more information. They will assist you with determining the eligibility of your land, the development of a conservation plan, and the application process. In addition, they can put you in touch with your District Forester or District Wildlife Biologist. They will provide assistance in developing more detailed management plans and in selecting cost-share and incentive programs that can make wildlife management on your property more attractive and affordable.

References

Cole, A. C., T. L. Serfass, M. C. Brittingham, and R. P. Brooks. 1996. *Managing your restored wetland*. Pennsylvania State University, Cooperative Extension Service, University Park, PA.

IDNR, Division of Fish and Wildlife. *Did you know?... Healthy wetlands devour*

Mosquitoes. Indiana Wetlands Conservation Plan Fact Sheet.

INPAWS. *Landscaping with Plants Native to Indiana*. Indiana Native Plant and Wildflower Society.

Pitts, D. E. and B. McGuire. 1999. *Wildlife Management for Missouri Landowners*, 2nd edition. Missouri Department of Conservation.

USDA. 2000. *Upland wildlife habitat management*. NRCS Conservation Practice Standard 645.

USDA-NRCS. NRCS - Wildlife Habitat Management Institute Leaflets. (*www.ms.nrcs.usda.gov/whmi/technotes.htm*).

Additional Information

For additional information on assistance with conservation planning, cost-share opportunities, and wildlife incentive programs, see the following publications available from your county Extension office, online at *www.agriculture.purdue.edu/fnr/* and click on "extension," or order by contacting Agricultural Communication Media Distribution Center, Purdue University, 1187 SERV Building, West Lafayette, IN 47907-1187, Toll Free: 1-888-EXT-INFO, Local: (765) 494-6794; Fax: (765)-496-1540.

A list of companies that sell plants native to Indiana is provided in Appendix A, pages 19-22. A list of companies

who are licensed to conduct prescribed fires on private lands in Indiana is provided in Appendix B, page 23.

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Related Publications

Visit *www.agcom.purdue.edu/agcom/Pubs/* to view and download the Purdue Cooperative Extension Service publications found below and more, or call 1-888-EXT-INFO (398-4636) for ordering information.

FNR-69	Fish kills in Indiana: their causes and prevention.
FNR-87	Forestry and wildlife management assistance available to Indiana landowners: *providers, organizations, and programs.*
FNR-102	Woodland wildlife management.
FNR-134	Planting hardwood seedlings.
FNR-135	Weed control for tree and shrub seedlings.
FNR-136	Electric fences for preventing browse damage by white-tailed deer.
FNR-141	Wildlife, the other agriculture crop.
FNR-157	New CRP provisions provide good return on marginal acres while providing wildlife habitat.
FNR-158	The wetlands reserve program.
FNR-168	The Wildlife Habitat Incentives Program (WHIP) Provides technical assistance and funds to improve wildlife habitat.
FNR-169	EQIP: Opportunities for wildlife management on your land.
FNR-171	Wetland, regulations, and you: what every Indiana farmer needs to know.
FNR-172	Conserving endangered species on private land.
FNR-173	Snakes of Indiana.
FNR-175W	Assessing your land's potential for wildlife.
FNR-188W	Warm-season grasses: why all the fuss?
FNR-189W	Windbreaks for farms and wildlife.
FNR-192W	Enhancing your farm for northern bobwhite quail.
FNR-FAQ-8W	Urban Canada goose management.
FNR-FAQ-16W	Animal damage management – rules and regulations in Indiana.

IDNR. Wildlife habitat cost share project. Indiana Dept. of Natural Resources, Division of Fish and Wildlife, Indianapolis, IN. (317-232-4080)

IDNR. Classified wildlife habitat act. Indiana Dept. of Natural Resources, Division of Fish and Wildlife, Indianapolis, IN. (317-232-4080)

USFWS. Restoring wetlands for wildlife in Indiana. United States Fish and Wildlife Service, Dept. of the Interior. (812-334-4261)

Web Sites of Interest

IDNR, Division of Fish and Wildlife
www.state.in.us/dnr/fishwild/index2.htm

Purdue University, Department of Forestry & Natural Resources
www.agriculture.purdue.edu/fnr/

Purdue University Cooperative Extension Service
www.ces.purdue.edu

USDA, Natural Resources Conservation Service
www.nrcs.usda.gov

USDA-NRCS. *Wildlife Habitat Management Institute Leaflets*
www.ms.nrcs.usda.gov/whmi/technotes.htm

USDA-NRCS. *Indiana NRCS Technical Guides*
www.in.nrcs.usda.gov/planningandtechnology/FOTG/section4/section4.htm

USDA, Farm Service Agency
www.fsa.usda.gov

U.S. Fish and Wildlife Service
www.fws.gov

Table 1. Examples of native warm-season grass, legume, and forb species mixes (Adapted from NRCS Practice Standard 645, Upland Wildlife Habitat Management). Note: these mixes and planting rates may not be appropriate for some conservation practices.

Species	PLS rates per acre		Species	PLS rates per acre	
	Wildlife	Vegetative		Wildlife	Vegetative
QU Mix IA[1]					
Big Bluestem			[2] Big Bluestem	0.75	1
Indiangrass			Indiangrass	0.75	1
Little Bluestem	4.5	6.5	Little Bluestem	1.75	2.5
Sideoats Grama			Sideoats Grama	1	1.5
Switchgrass			Annual Lespedeza	2	1
Wildflower Mix					
QU Mix IB[1]					
Big Bluestem			[2] Little Bluestem	2.5	4
Indiangrass			Indiangrass	0.75	1
Little Bluestem	4.25	6.25	Sideoats Grama	0.75	1
Sideoats Grama			Annual Lespedeza	2	2
Switchgrass					
Wildflower Mix					
QU Mix II[1]					
Big Bluestem			[2] Switchgrass	1.75	2
Indiangrass	4.25	6.25	Big Bluestem	1	2
Little Bluestem			Indiangrass	0.5	1
			Annual Lespedeza	2	2
QU Mix III[1]					
Little Bluestem			[2] Big Bluestem	1	1.5
Indiangrass	3.75	5.75	Indiangrass	1.5	2
Sideoats Grama			Little Bluestem	1	0.5
Wildflower Mix			Sideoats Grama	0.5	0.5
			Annual Lespedeza	2	2

[1] Quail Unlimited Premixed Mixtures; rates are for entire mixtures.
[2] Mix can be used on poorly drained sites.
Note: 2-8 oz of any single, or a combination of forb species listed in Table 2 can be added to any of the above mixtures for added wildlife or aesthetic benefits, or substituted for annual lespedeza.

Table 2. Selected species of forbs beneficial to wildlife (Adapted from Upland Wildlife Habitat Management, NRCS Practice Standard 645, and Landscaping with Plants Native to Indiana, *Indiana Native Plant and Wildflower Society***).**

Blue False Indigo	*Baptisia australis*	Blue	May-June
Blue-Stemmed Goldenrod	*Solidago caesia*	Yellow	August-October
Butterfly Weed	*Asclepias tuberosa*	Orange	June-September
Button Blazing Star	*Liatris aspera*	Purple	August-September
Cardinal Flower	*Lobelia cardinalis*	Red	July-September
Culver's Root	*Veronicastrum virginicum*	White	June-September
Dense Blazing Star	*Liatris spicata*	Purple	July-September
Rosinweed	*Silphium integrifolium*	Yellow	July-September
Gray Goldenrod	*Solidago nemoralis*	Yellow	July-November
Gray-Headed Coneflower	*Ratibida pinnata*	Yellow	June-September
Illinois Bundleflower	*Desmanthus illinoensis*	White	June-August
New England Aster	*Aster novae-angliae*	Purple	August-October
Partridge Pea	*Cassia fasciculata*	Yellow	July-September
Prairie Dock	*Silphium terebinthinaceum*	Yellow	August-October
Purple Coneflower	*Echinacea purpurea*	Purple	June-October
Queen-of-the-Prairie	*Filipendula rubra*	Pink	June-August
Royal Catchfly	*Silene regia*	Red	June-August
Saw-Toothed Sunflower	*Helianthus grosseserratus*	Yellow	July-October
Short's Aster	*Aster shortii*	Lavender	August-October
Smooth Aster	*Aster laevis*	Blue	August-October
Spotted Joe-Pye-Weed	*Eupatorium maculatum*	Pink	July-September
Stiff Goldenrod	*Solidago rigida*	Yellow	August-October
Summer Phlox	*Phlox paniculata*	Purple	July-October
Sunflower Heliopsis	*Heliopsis spp.*	Yellow	July-September
Tall Coreopsis	*Coreopsis tripteris*	Yellow	July-October
Violet Lespedeza	*Lespedeza violacea*	Purple	July-September
Virginia Mountain Mint	*Pycnanthemum virginianum*	White	July-September
Wild Bergamot	*Monarda fistulosa*	Lavender	July-August

Table 3. Selected mixes of cool-season grasses, legumes, and forbs (Adapted from NRCS Practice Standard 645 Upland Wildlife Habitat Management).

[1,2]	Orchardgrass	2	6	[4] Redtop	1	2
	Timothy	1	2	Timothy	1	2
	Annual Lespedeza	2	4	Alsike Clover	1	2
	Ladino Clover	0.25	0.25	Birdsfoot Trefoil	2	4
[1]	Redtop	1	2	[1] Redtop	1	2
	Orchardgrass	2	6	Kentucky Bluegrass	1	3
	Annual Lespedeza	2	4	Annual Lespedeza	2	4
	Ladino Clover	0.25	0.25	Ladino Clover	0.25	0.25
[1]	Redtop	1	2	[1] Orchardgrass	1	6
	Timothy	1	2	Timothy	1	2
	Red Clover	1	2	Red Clover	1	2
	Annual Lespedeza	2	4	Ladino Clover	0.25	0.25
				Annual Lespedeza	2	4
	Orchardgrass	2	6	[3] Smooth Bromegrass	5	10
	Timothy	1	2	Timothy	1	2
	Alfalfa	3	6	Ladino Clover	0.25	0.25
	Ladino Clover	0.25	0.25	Birdsfoot Trefoil	2	4
[3]	Smooth Bromegrass	5	10	Orchardgrass	2	6
	Alfalfa	3	6	Timothy	1	2
	Ladino Clover	0.25	0.25	Red Clover	1	2
	Birdsfoot Trefoil	2	4	Sweet Clover	1.5	3
[4]	Timothy	1	2	Timothy	1	2
	Smooth Bromegrass	5	10	Kentucky Bluegrass	1	3
	Alsike Clover	0.5	1	Annual Lespedeza	2	4
	Birdsfoot Trefoil	2	4	Red Clover	1	2
[1]	Timothy	1	2	Orchardgrass	2	6
	Kentucky Bluegrass	1	3	Timothy	1	2
	Annual Lespedeza	2	4	Ladino Clover	0.25	0.25
	Birdsfoot Trefoil	2	4	Birdsfoot Trefoil	2	4

[1] Better suited for southern Indiana
[2] Can by used on dry sites
[3] Better suited for northern Indiana
[4] Can be used on wet sites

Table 4. Selected shrub species (Adapted from NRCS Pra2ctice Standard 645, Upland Wildlife Habitat Management)

Species	[1]Soil Moisture Tolerance	Average Mature Height (ft.)	Wildlife Benefits	General Comments
Alternate-Leaf Dogwood (Cornus alternifolia)	SPD-WD	18	Fruit eaten by birds. Twigs browsed by deer and rabbits.	Blue-black fruit with red stems. Leaves not opposite.
American Plum (*Prunus americana*)	MWD-ED	30	Fruit eaten by birds and mammals. Recommended for quail.	Fruit is a reddish drupe.
Arrowwood (*Viburnum dentatum*)	MWD-WD	9	Fruit eaten by songbirds.	Drupe blue-black, 1/4" long.
Black Chokeberry (*Aronia melanocarpa*)	SPD-WD	10	Fruit eaten by songbirds.	Fruit dark purple, 1/3" long.
Blackhaw (*Viburnum prunifolium*)	MWD-WD	20	Fruit eaten by songbirds, quail, and fox.	Drupe dark blue, 1/2" long.
Bladdernut (*Staphylea trifolia*)	SPD-WD	10		3 lobed, papery capsule.
Buttonbush (*Cephalanthus occidentalis*)	VPD-WD	5	Seeds eaten by waterfowl. Beneficial structure for many amphibians.	Round nutlets; best on wet sites. Wilted leaves may be toxic to livestock.
Chokecherry (*Aronia melanocarpa*)	SPD-WD	18	Fruit eaten by songbirds, grouse, fox, and rabbit.	Dark purple, 1/3" long fruits persistent through winter; grows in a wide variety of site conditions.
Coralberry (*Symphoricarpos orbiculatus*)	MWD-WD	5	Fruit eaten by songbirds, grouse, and quail.	Coral to purple fruits persistent through winter.
Devil's Walkingstick (*Aralia spinosa*)	SPD-MWD	20	Fruit eaten by songbirds and some mammals.	Stout stems with spines; showy white flowers produce a black drupe. Wildlife value relatively low.

[1] Listed in order from driest to wettest soils: ED = Excessively Drained; WD = Well Drained; MWD = Moderately Well Drained; SPD = Moderately Poorly Drained; PD = Poorly Drained; VPD = Very Poorly Drained

Species	[1]Soil Moisture Tolerance	Average Mature Height (ft.)	Wildlife Benefits	General Comments
Eastern Wahoo (*Euonymus atropurpureus*)	SPD-WD	12		Four-lobed red capsule, sometimes with winged stem.
Elderberry (*Sambuscus canadensis*)	VPD-WD	9	Fruit eaten by many birds in summer including pheasant, dove, and turkey. Plant contains hydrocyanic acid. Recommended for quail.	Showy, flat clusters of white flowers followed by dark fruits. High wildlife value.
Flowering Dogwood (*Cornus florida*)	MWD-WD	30	Fruit eaten by quail, songbirds, turkey, and some small mammals.	Glossy red drupes ripen in late fall and are available through fall. Attractive white flowers in the spring.
Gray Dogwood (*Cornus racemosa*)	SPD-WD	8	Fruit eaten by quail, songbirds, turkey, raccoon, and fox.	Red pedicles in winter, white drupe.
Hazel Alder (*Alnus serrulata*)	VPD-WD	18	Bud and catkin eaten by grouse, seeds eaten by some songbirds.	Grows best in wet to moist soils. Long lenticles on the stem.
Hazelnut (*Corylus americana*)	MWD-WD	15	Small nut and catkin eaten by squirrels, deer, grouse, quail, and pheasant. Good cover and nesting sites.	Often forms large colonies. Grows well on woods borders and fencerows.
Highbush Cranberry (*Viburnum trilobum*)	VPD-WD	9	Fruit eaten by grouse, pheasant, and songbirds.	Clusters of red fruits.
Indigobush (*Amorpha fruticosa*)	VPD-WD	10	Legume, fixes Nitrogen in soil.	Small pods with 1-2 seeds, flowers purple spikes.
Leadplant (*Amorpha canescens*)	WD-ED	3	Legume, fixes Nitrogen in soil.	Small erect prairie shrub with purple flowers.
Nannyberry (*Viburnum lentago*)	SPD-WD	18	Fruit eaten by songbirds, game birds, and fox.	Dark blue fruits similar to raisins.
New Jersey Tea (*Ceanothus americanus*)	WD-ED	3	Quail and wild turkey eat the 3-celled capsule that matures in the fall.	Prairie plant with white flower in dense heads. Leaves were used for tea in 19th Century.

[1] Listed in order from driest to wettest soils: ED = Excessively Drained; WD = Well Drained; MWD = Moderately Well Drained; SPD = Moderately Poorly Drained; PD = Poorly Drained; VPD = Very Poorly Drained

Table 4. Continued

Species	[1]Soil Moisture Tolerance	Average Mature Height (ft.)	Wildlife Benefits	General Comments
Ninebark (*Physocarpus opulifolius*)	VPD-WD	10	Some cover value for songbirds.	White to pinkish flowers followed by small, dry fruits that persist through winter.
Pawpaw (*Asimina triloba*)	SPD-WD	20	Fruit eaten by opossum, squirrels, raccoon, and fox.	Large leaves, prefers deep, moist soils.
Prairie Crab (*Malus ioensis*)	PD-WD	30		Small fruit, showy flowers.
Prickly Ash (*Zanthoxylum americanum*)	SPD-WD	9		Dense growth with prickly leafstalks. Small reddish-brown pods.
Red Osier Dogwood (*Cornus stolonifera*)	VPD-WD	10	Fruit eaten by songbirds, grouse, and quail. Twigs browsed by deer and rabbits.	Red stem, white drupe; attractive winter plant.
Redbud (Cercis canadensis)	MW-WD	30	Seeds eaten by a few songbirds.	A legume, pod 2-3" long, pink flowers, heart-shaped leaves.
Rough-Leaved Dogwood (*Cornus drummondii*)	PD-WD	18	Fruit eaten by songbirds, grouse, quail, turkey, and pheasant. Browsed some by rabbits and deer.	White drupes.
Serviceberry (*Amelanchier spp.*)	MW-WD	30	Recommended for quail.	White flowers bloom in April. Dark red fruit ripens in early summer.
Shining Sumac (*Rhus copalina*)	MW-ED	8	Fruit eaten by some songbirds, quail, dove, and pheasant. Twigs sometimes browsed.	Clusters of red, fuzzy fruits ripen in fall and remain available through the winter.
Shrubby St. Johnswort (*Hypericum prolificum*)	SPD-WD	6		Bright yellow flowers, 3-chambered capsule.
Silky Dogwood (*Cornus amomum*)	VPD-WD	10	Sometimes browsed by rabbits and deer. Fruit eaten by quail, songbirds, turkey, raccoon, and fox.	Bluish fruit, prefers moist soils and partial shade.

[1] Listed in order from driest to wettest soils: ED = Excessively Drained; WD = Well Drained; MWD = Moderately Well Drained; SPD = Moderately Poorly Drained; PD = Poorly Drained; VPD = Very Poorly Drained

Species	[1]Soil Moisture Tolerance	Average Mature Height (ft.)	Wildlife Benefits	General Comments
Smooth Sumac (*Rhus glabra*)	MWD-ED	12	Twigs and fruit sometimes eaten by songbirds, quail, dove, and pheasant. Recommended for quail.	Clusters of red, fuzzy fruits ripen in fall and remain available through the winter.
Spicebush (*Lindera benzoin*)	VPD-WD	9	Twigs and fruit eaten by songbirds, deer, rabbit, opossum, quail, and grouse.	Often forms large colonies. Red fruit.
Spirea (*Spirea alba, S. tomentosa*)	VPD-WD	4	Bud eaten by grouse, twigs browsed by deer and rabbit.	Pink flowers. Also called meadowsweet or hardack.
Staghorn Sumac (*Rhus typhina*)	MWD-ED	15	Fruit sometimes eaten by songbirds, quail, dove, and pheasant. Twigs sometimes browsed by rabbits and deer.	Clusters of red, fuzzy fruits ripen in fall and remain available through the winter. Tolerant of dry, infertile soils.
Washington Hawthorn (*Crataegus phaenopyrum*)	SPD-ED	30	Fruit eaten by deer, fox, rabbit, grouse, pheasant, and songbirds. Excellent nesting cover for songbirds.	Red fruit ripens in the fall and is persistent into the winter. Dense branching with heavy foliage. Twigs armed with thorns.
Wild Blackberry (*Rubus allegheniensis*)	MWD-WD	5	Fruit eaten by songbirds, game birds, and many mammals. Excellent cover for birds and mammals.	Excellent summer food source for wide variety of wildlife. Upright, arching structure forms dense, thorny thickets.
Wild Raspberry (*Rubus occidentalis*)	MWD-WD	5	Fruit eaten by songbirds, game birds, and many mammals. Excellent cover for birds and mammals.	Excellent summer food source for wide variety of wildlife. Upright, arching structure forms dense, thorny thickets.
Wild Sweet Crabapple (*Malus coronaria*)	SPD-ED	30	Fruit eaten by fox, raccoon, and upland game birds.	Yellow-green edible fruit with highly fragrant flowers.
Winterberry (*Ilex verticillata*)	VPD-SPD	10		Erect structure with small greenish white flowers and bright red berries that persist through winter. Dioecious; require male and female plants for propagation.
Witch-Hazel (*Hamamelis virginiana*)	SPD-WD	18	Seeds, buds, and twigs eaten by deer, rabbit, quail, and pheasant.	Pale yellow flowers followed by pods with seeds available fall to winter.

[1] Listed in order from driest to wettest soils: ED = Excessively Drained; WD = Well Drained; MWD = Moderately Well Drained; SPD = Moderately Poorly Drained; PD = Poorly Drained; VPD = Very Poorly Drained

Table 5. Selected tree species (Adapted from NRCS Practice Standard 645, Upland Wildlife Habitat Management)

Species	[1] Soil Moisture Tolerance	Wildlife Benefits	General Comments
American Beech (*Fagus grandifolia*)	WD	High wildlife value. The small, triangular nuts are highly preferred and eaten by wood ducks, ruffed grouse, squirrels, chipmunks, and some songbirds. The tendency for mature trees to form cavities in the trunk make it valuable cover for raccoons, squirrels and chipmunks.	Common, medium sized tree of moist, well-drained soils. Easily recognized by its smooth, gray bark.
American Hornbeam (*Carpinus caroliniana*)	W, WD	Seeds and catkins eaten by songbirds and squirrels.	Shrub or small tree in the birch family. Also called musclewood due to the smooth gray, striated bark. Common in floodplains.
American Sycamore (*Platanus occidentalis*)	W, WD	Minimal food value to wildlife. However, forms an important structural component of bottomlands and floodplains.	One of our largest trees capable of heights over 100 feet.
Ash, Green (*Fraxinus pennsylvanica*)	W, WD	Seeds eaten by squirrels, quail, and songbirds.	Medium sized tree. Common component of swamps and floodplains.
Ash, Pumpkin (*Fraxinus tomentosa*)	W		Large tree of swamps and floodplains. Range limited to southern Indiana.
Ash, White (*Fraxinus americana*)	WD		Common tree of upland forests. Forms a large straight bole with interlacing bark as it matures.
Baldcypress (*Taxodium distichum*)	W, WD	Seeds are occassionally eaten by waterfowl. Also serves as perching areas for songbirds and wading birds.	One of two deciduous conifer trees native to Indiana. Extremely flood tolerant.
Birch, River (*Betula nigra*)	W, WD	Stands serve as important cover for riparian dwelling mammals.	Small to medium sized tree of floodplains. Attractive cinnamon colored, exfoliating bark.
Blackgum (*Nyssa sylvatica*)	A	Fruit eaten by songbirds, turkeys, and pileated woodpeckers.	Medium sized tree. Thrives in upland and wetland conditions. Foliage turns an attractive red color in fall.

[1] W = Wet; WD = Well Drained; D = Dry; A = All

Species	[1] Soil Moisture Tolerance	Wildlife Benefits	General Comments
Black Cherry (*Prunus serotina*)	WD	Fruit eaten by many species songbirds, ruffed grouse, and pheasant.	Valuable timber species. Produces attractive white flowers and edible fruits.
Black Walnut (*Juglans nigra*)	WD	Nuts eaten by squirrels.	Medium sized tree typical of central hardwood forests. Valuable timber species.
Butternut (*Juglans cinerea*)	WD	Nuts eaten by squirrels.	A rare, medium sized tree with gray interlacing bark. Produces an oblong fruit similar to that of the black walnut.
Catalpa (*Catalpa speciosa*)	WD		Medium sized tree with large, heart-shaped leaves and elongated seed pods.
Cottonwood, Eastern (*Populus deltoides*)	A	Twigs and bark eaten by deer and beavers. Buds and catkins eaten by ruffed grouse.	Large tree typical of riverbanks. The triangle-shaped leaves, that flutter in the wind, give this tree its name.
Cottonwood, Swamp (*Populus heterophylla*)	W, WD		Similar to the eastern cottonwood, but more southern in distribution. The leaves are egg-shaped with a white tone on the undersides.
Hackberry (*Celtis occidentalis*)	W, WD	Fruits are sparingly consumed by songbirds, including cedar waxwings, mockingbirds, and robins through the winter.	Small to medium sized tree of calcareous soils and floodplains. The fruits are similar to dates in taste, but contain a large seed.
Hawthorn, cockspur (*Crataegus crus-galli*)	W, WD	Fruits are an important food source for many species of songbirds and ruffed grouse.	Large shrubs or small trees that usually bear stout spines. Attractive white flowers are followed by small, apple-like fruits. Common in disturbed woodlands that have been pastured by livestock.
Hawthorn, Washington (*Crataegus phaenopyrum*)	W, WD		
Hawthorn, Green (*Crataegus virdis*)	W, WD		
Hickory, Bitternut (*Carya cordiformis*)	WD	Hickory nuts are a very important food source for squirrels. The nuts are also eaten in some quantity by wood ducks and wild turkeys.	Medium sized tree of moist woodlands. Winter buds are sulfur yellow.
Hickory, Mockernut (*Carya tomentosa*)	WD, D		Small to medium sized hickory. Its name is derived from the relatively small size of the sweet kernel.

[1] W = Wet; WD = Well Drained; D = Dry; A = All

Table 5. Continued

Species	[1] Soil Moisture Tolerance	Wildlife Benefits	General Comments
Hickory, Pignut (*Carya glabra*)	WD, D	Hickory nuts are a very important food source for squirrels. The nuts are also eaten in some quantity by wood ducks and wild turkeys.	Medium sized tree of well-drained soils. The common name is derived from the better taste of the nut.
Hickory, Shagbark (*Carya ovata*)	WD		Medium sized tree typical of well-drained soils throughout Indiana.
Hickory, Shellbark (*Carya laciniosa*)	W, WD		Similar to shagbark hickory, but found on poorer soils.
Kentucky Coffeetree (*Gymnocladus dioicus*)	WD	Fruits relished by squirrels, opossum, raccoon, and songbirds.	Uncommon, medium sized tree with gray, scaly bark. Fruit is a thick, brown pod with inedible green pulp surrounding the seeds.
Maple, Black (*Acer nigrum*)	WD	Samaras are widely consumed by birds and squirrels. New growth is browsed by deer.	Medium sized tree very similar to sugar maple, but is usually found in more moist soils. The leaves tend to be mostly 3-lobed and somewhat pubescent.
Maple, Red (*Acer rubrum*)	W, WD		Common, medium sized tree of wet soils, but is also found in dry, upland conditions. Leaves turn an attractive scarlet red in fall. Flowers early in the spring.
Maple, Silver (*Acer saccharinum*)	W, WD		Very fast-growing, medium sized tree of floodplains and poorly drained soils. Small flowers appear very early in the spring.
Maple, Sugar (*Acer saccharum*)	WD		Very common, medium sized tree of well-drained woodlands. Important timber species and also yields maple syrup.
Northern White-Cedar (*Thuja occidentalis*)	A	Foliage often browsed by deer in late winter as an emergency food source.	Medium sized evergreen tree. Planted as an ornamental or part of a windbreak or shelterbelt.

[1] W = Wet; WD = Well Drained; D = Dry; A = All

Species	[1] Soil Moisture Tolerance	Wildlife Benefits	General Comments
Hickory, Pignut (*Carya glabra*)	WD, D	Hickory nuts are a very important food source for squirrels. The nuts are also eaten in some quantity by wood ducks and wild turkeys.	Medium sized tree of well-drained soils. The common name is derived from the better taste of the nut.
Hickory, Shagbark (*Carya ovata*)	WD		Medium sized tree typical of well-drained soils throughout Indiana.
Hickory, Shellbark (*Carya laciniosa*)	W, WD		Similar to shagbark hickory, but found on poorer soils.
Kentucky Coffeetree (*Gymnocladus dioicus*)	WD	Fruits relished by squirrels, opossum, raccoon, and songbirds.	Uncommon, medium sized tree with gray, scaly bark. Fruit is a thick, brown pod with inedible green pulp surrounding the seeds.
Maple, Black (*Acer nigrum*)	WD	Samaras are widely consumed by birds and squirrels. New growth is browsed by deer.	Medium sized tree very similar to sugar maple, but is usually found in more moist soils. The leaves tend to be mostly 3-lobed and somewhat pubescent.
Maple, Red (*Acer rubrum*)	W, WD		Common, medium sized tree of wet soils, but is also found in dry, upland conditions. Leaves turn an attractive scarlet red in fall. Flowers early in the spring.
Maple, Silver (*Acer saccharinum*)	W, WD		Very fast-growing, medium sized tree of floodplains and poorly drained soils. Small flowers appear very early in the spring.
Maple, Sugar (*Acer saccharum*)	WD		Very common, medium sized tree of well-drained woodlands. Important timber species and also yields maple syrup.
Northern White-Cedar (*Thuja occidentalis*)	A	Foliage often browsed by deer in late winter as an emergency food source.	Medium sized evergreen tree. Planted as an ornamental or part of a windbreak or shelterbelt.

[1] W = Wet; WD = Well Drained; D = Dry; A = All

Table 5. Continued

Species	[1] Soil Moisture Tolerance	Wildlife Benefits	General Comments
Oak, Bur (*Quercus macrocarpa*)	A	Acorns of oaks constitute perhaps the most important food source for a wide variety of wildlife including wild turkeys, woodpeckers, squirrels, and deer. Small acorns (pin oak) are also eaten by pheasants and waterfowl.	Medium to large sized tree. Typically found in mesic woodlands and along floodplains. Very drought and fire tolerant. Stout branches and large acorns with fringed caps are easy to identify.
Oak, Black (*Quercus velutina*)	WD, D		Medium sized tree of well-drained soils. Very similar to red oak in appearance; however, the leaves of black oak have pubescent undersides.
Oak, Cherrybark (*Quercus pagoda*)	W, WD		Large tree of bottomlands and well-drained soils. In Indiana, found only in the extreme southwestern part of the state.
Oak, Chinkapin (*Quercus muehlenbergii*)	WD		Small to medium sized tree of calcareous soils and well-drained bottomlands. Bark is scaly with a yellow cast.
Oak, Pin (*Quercus palustris*)	W, WD		Common medium sized oak of poorly drained soils and floodplains. Acorns are relatively small. Branches typically grow at right angles to the trunk.
Oak, Northern Red (*Quercus rubra*)	WD		Common medium to large sized tree of mesic woodlands. Bark is blocky at the base of old trees while the upper portion of the trunk is streaked with flat ridges.
Oak, Scarlet (*Quercus coccinea*)	WD		Medium sized tree of dry ridges. Leaves turn a brilliant scarlet color in autumn.
Oak, Shingle (*Quercus imbricaria*)	WD		Small to medium sized tree of mesic woodlands. Unlobed leaves remain on tree through winter.
Oak, Shumard (*Quercus shumardii*)	W, WD		Large sized tree of well-drained soils and bottomlands. Closely resembles northern red oak, but is usually found in bottomland areas.

[1] W = Wet; WD = Well Drained; D = Dry; A = All

Species	[1] Soil Moisture Tolerance	Wildlife Benefits	General Comments
Oak, Swamp Chestnut (*Quercus michauxii*)	W, WD	Acorns of oaks constitute perhaps the most important food source for a wide variety of wildlife including wild turkeys, woodpeckers, squirrels, and deer. Small acorns (pin oak) are also eaten by pheasants and waterfowl.	Medium to large sized tree of poorly-drained soils. Bark is very similar in appearance to that of white oak, but the coarsely serrated margins of its leaves are distinct.
Oak, Swamp White (*Quercus bicolor*)	W, WD		Medium sized tree of poorly-drained soils. The leaves are dark and shiny above, and dull and white on the undersides.
Persimmon (*Diospyros virginiana*)	WD	Large fruit are readily eaten by raccoons, fox, some songbirds, and deer. The twigs and buds are browsed by deer.	Small to medium sized tree found in bottomlands and old fields. The orange fruit is edible by humans when ripe.
Pine, Eastern White (*Pinus strobus*)	WD	In general, pines make excellent winter cover and roosting trees for many species of birds. Seeds eaten by a wide variety of birds, squirrels and small mammals.	Large tree capable of attaining heights of over 200 feet in ideal conditions. Needles grow in groups (fascicles) of five. In Indiana, native to west-central part of the state.
Pine, Virginia (*Pinus virginiana*)	WD, D	In general, pines make excellent winter cover and roosting trees for many species of birds. Seeds eaten by a wide variety of birds, squirrels and small mammals.	Small sized tree. Needles grow in groups (fascicles) of two. Cones bear sharp prickles.
Serviceberry (*Amelanchier arborea*)	WD	Purplish fruits rapidly consumed by many species of birds. Recommended for quail.	Small, uncommon tree or large shrub of well-drained woodlands. White flowers bloom in April. Fruit ripens in early summer.
Sweetgum (*Liquidambar styraciflua*)	W, WD	Seeds consumed by "northern" finches in winter.	Large tree common in bottomlands of southern Indiana. Leaves are palmately, five-lobed. Fruit is a prickly ball with multiple seed capsules.

[1] W = Wet; WD = Well Drained; D = Dry; A = All

Table 5. Continued

Species	[1] Soil Moisture Tolerance	Wildlife Benefits	General Comments
Tamarack (*Larix larcina*)	W, WD		Small to medium sized tree found in northern Indiana bogs and swamps. The only deciduous member of the pine family found in Indiana. Small cones grown upright along twigs.
Tuliptree (*Liriodendron tulipifera*)	WD	Moderate significance to wildlife overall. Value is that some of the seeds persist in the cones through winter. Seeds eaten by songbirds and squirrels.	Common, large sized tree of the magnolia family. Boles are typically very straight and free of branches for 2/3 the height of the tree. Fruits are upright, aggregates of samaras ("cones"), which remain on the twig through winter.
Willow, Black (*Salix nigra*)	W	Buds, catkins, and tender twigs eaten by ruffed grouse. Bark and wood readily consumed by beaver.	Medium sized tree common along rivers and in wet soils. Narrow, elongate leaves are light green with persistent stipules.

[1] W = Wet; WD = Well Drained; D = Dry; A = All

Table 6a. Annual food plots planting rates (Adapted from NRCS Practice Standard 645, Upland Wildlife Habitat Management)

Species	Single Species (lbs. per acre)	Multiple Species[1] (lbs. per acre)	Wildlife Species Benefited
Milo	15	4	Deer, quail, wild turkey, pheasant, dove, songbirds
Corn	10	4	Deer, quail, wild turkey, pheasant, squirrels
Grain Sorghum	12	4	Deer, quail, wild turkey, pheasant, dove, songbirds
White Proso Millet	15	4	Quail, wild turkey, pheasant, dove, songbirds
German/Pearl Millet	10	2	Deer, quail, wild turkey, pheasant, dove, songbirds
Oats	50	10	Deer, quail, wild turkey, pheasant, songbirds
Sunflowers	6	2	Deer, quail, wild turkey, pheasant, dove, songbirds
Cowpeas	20	5	Deer, quail, wild turkey, pheasant, dove
Soybeans	45	8	Deer, quail, wild turkey, pheasant
Partridge Pea	10	2	Quail, wild turkey, pheasant
Buckwheat	40	8	Deer, quail, wild turkey, pheasant, songbirds
Wheat	50	10	Deer, quail, wild turkey, pheasant, dove, songbirds

[1] Total mix not to exceed 20 lbs. per acre.

Table 6b. Perennial green browse food plot planting rates (Adapted from NRCS Practice Standard 645, Upland Wildlife Habitat Management)

Species[2]	Single Species (lbs. per acre)	Wildlife Species Benefited
Alfalfa	15	Deer, quail, wild turkey, pheasant
Alsike Clover	6	Deer, quail, wild turkey, pheasant
Ladino Clover	5	Deer, quail, wild turkey, pheasant
Red Clover	10	Deer, quail, wild turkey, pheasant

[2] These are usually mixed with a thin stand of cool-season grass or inter-seeded into an existing stand of cool-season grass.

Appendix A

Sources for seeds and plants native to Indiana. Note: This appendix is not an inclusive list of all companies that sell plants native to Indiana. This list is provided as a service only and inclusion of any company should not be interpreted as an endorsement by Purdue University or the quality of service they provide. (Adapted from Landscaping with Plants Native to Indiana, Indiana Native Plant and Wildflower Society.)

Company	Address	City	State	Zip	Phone	Web
Agrecol Corporation	1984 Berlin Rd.	Sun Prairie	WI	53590	(608) 825-9765	
AgVenture D&M Seeds	Box 102	Kentland	IN	47951	(800) 933-0259	
Altum's Horticultural Center	11335 N. Michigan Rd.	Zionsville	IN	46077	(317) 733-4769	
Applewood Seed Co.	5380 Vivian	Arvada	CO	80002	(303) 431-7333	www.applewoodseed.com
Arrowhead Alpines	P.O. Box 857	Fowlerville	MI	48836	(517) 223-8750	
Beineke's Nursery	513 Sharon Rd.	West Lafayette	IN	47906	(765) 463-2994	
Berg-Warner Nursery	P.O. Box 259	Lizton	IN	46149	(317) 994-5487	www.berg-warner.com
C.M. Hobbs & Sons, Inc.	P.O. Box 31227	Indianapolis	IN	46321	(317) 247-4478	
Central Indiana Supply Co. (CISCO)	3610 Shelby At.	Indianapolis	IN	46227	(800) 888-2986	
Cherryhill Aquatics, Inc.	2627 N. County Line Rd.	Sunbury	OH	43074	(740) 965-2798	www.cherryhillaquatics.com
Crystal Palace Perennials	P.O. Box 154	St. John	IN	46373	(219) 374-9419	www.crystalpalace perennial.com
Country Road Greenhouses, Inc.[1]	19561 E. Twombly	Rochelle	IL	61068	(815) 384-3311	www.prairieplugs.com
CRM Ecosystems, Inc.	9738 Overland Rd.	Mt. Horeb	WI	53572	(608) 437-5245	
Designs on Nature	202 Lincolnway East	Mishawaka	IN	46544	(574) 256-2242	
Earthly Goods Ltd.	P.O. Box 614	New Albany	IN	47150	(812) 944-2903	www.earthlygoods.com
Edge of the Prairie Wildflowers	1861 Oak Hill Rd.	Crawfordsville	IN	47933	(765) 362-0915	
Enders Greenhouse	104 Enders Dr.	Cherry Valley	IL	61016	(815) 332-5255	
Flick Brothers Seed Co.	1764 NW 50 P.O. Box 128	Kingsville	MO	64061	(866) 328-0494	www.seedguys.com
Genesis Nursery[1]	23200 Hurd Rd.	Tampico	IL	61283	(815) 438-2220	
Hamilton Seeds	16786 Brown Rd.	Elk Creek	MO	65464	(417) 967-2190	www.hamiltonseed.com
Heartland Restoration Services, Inc.	349 Airport North Office Park	Fort Wayne	IN	46825	(260) 489-8511	
Hartmann's Plant Company	P.O. Box 100	Lacota	MI	49063	(616) 253-4281	www.hartmannsplant company.com
Hoham, Smith, & Co.	104 Walnut P.O. Box 710	Auburn	IN	46706	(888) 262-2214	

[1] Wholesale Only

Appendix A. Continued

Company	Address	City	State	Zip	Phone	Web
IDNR State Tree Nurseries	Jasper-Pulaski Nursery 15508 West 700 North	Medaryville	IN	47957	(219) 843-4827	www.state.in.us/dnr/forestry/index.html
IDNR State Tree Nurseries	Vallonia Nursery 2782 West 540 South	Vallonia	IN	47281	(812) 358-3621	www.state.in.us/dnr/forestry/index.html
Ion Exchange	1878 Old Mission Dr.	Harpers Ferry	IA	52146	(800) 291-2143	www.ionxchange.com
J&J Transplant Aquatic Nursery	W 4980 County Road W P.O. Box 227	Wild Rose	WI	54984	(715) 256-0059	www.tranzplant.com
J.F. New & Assoc., Inc.	708 Roosevelt Rd.	Walkerton	IN	46574	(574) 586-2412	www.jfnew.com
Lafayette Home Nursery, Inc.	R.R. 1, Box 1A	Lafayette	IL	61449	(309) 995-3311	
Mark M. Holeman, Inc.	7871 Hague Rd.	Indianapolis	IN	46256	(317) 849-3120	
Marshland Transplant Aquatic Nursery	P.O. Box 1	Berlin	WI	54923	(920) 361-4200	
Mary's Plant Farm	2410 Lanes Mill Rd.	Hamilton	OH	45013	(513) 894-0022	www.Marysplantfarm.com
Missouri Wildflowers Nursery	9814 Pleasant Hill Rd.	Jefferson City	MO	65109	(572) 496-3492	
Munchkin Nursery & Garden	323 Woodside Dr., N.W.	Depauw	IN	47115	(812) 633-4858	www.munchkinnursery.com
Native Plant Nursery	P.O. Box 7841	Ann Arbor	MI	84107	(734) 677-3260	www.nativeplant.com
Oikos Tree Crops	P.O. Box 19425	Kalamazoo	MI	49019	(616) 624-6233	
Osenbaugh Grass Seeds	R.R. 1, Box 44	Lucas	IA	50151	(800) 582-2788	
Prairie Moon Nursery	R.R. #3, Box 163	Winona	MN	55987	(507) 452-1362	www.prairiemoon nursery.com
Prairie Nursery	P.O. Box 306	Westfield	WI	53964	(608) 296-3679	www.prairienursery.com
Shooting Star Nursery	444 Bates Rd.	Frankfort	KY	40601	(502) 223-1679	www.shootingstar nursery.com
Sharp Brothers Seed Co.	396 SW Davis St. – LaDue	Clinton	MO	64735	(660) 885-7551	
Spence Restoration Nursery[1]	2220 E. Fuson Rd. P.O. Box 546	Muncie	IN	47308	(765) 286-7154	www.spencenursery.com
Springcreek Landscaping and Nursery	1860 North 525 East	Logansport	IN	46947	(574) 722-1128	
Sylvan Gardens	4003 Sylvan Ct.	Floyd Knobs	IN	47119	(812) 923-8132	
Taylor Creek Restoration Nurseries	17921 Smith Rd.	Broadhead	WI	53520	(608) 897-8641	www.appliedeco.com
Vans Pines Nursery, Inc.	14731 Baldwin St.	West Olive	MI	49460	(616) 399-1620	www.vanspines nursery.com
Wetlands Nursery, Inc.	P.O. Box 14553	Saginaw	MI	48601	(989) 752-3492	
Wildlife Nurseries, Inc.	P.O. Box 2724	Oshkosh	WI	54903	(920) 231-3780	
Woods' Edge Farm	532 Stanek Rd.	Muscoda	WI	53573	(608) 739-3527	www.woodsedgefarm.com

[1] Wholesale Only

Appendix A. Continued

	Consulting Services	**Herbaceous Species**	Wildlife Seed Mixes	Cool Season Grasses	Warm Season Grasses	Clovers	Legumes	Grains	Lespedezas	**Woody Species**	Fruit Trees	Shrubs	Deciduous Trees, bare root seedlings	Deciduous Trees, container stock	Coniferous Trees, bare root seedlings	Coniferous Trees, container stock	**Wildflowers & Ferns**	Wildflowers, plants/plugs	Wildflower Seed	Ferns	**Wetland Plants**	Aquatic Plants	Herbaceous Emergent Plants	Shrubs	Trees	Grasses, Sedges, Rushes	Wetland Seed Mixes
Agrecol Corporation	✓	✓	✓	✓	✓		✓										✓	✓	✓		✓					✓	✓
AgVenture D&M Seeds	✓	✓	✓	✓	✓	✓	✓	✓	✓								✓		✓								
Altum's Horticultural Center	✓	✓	✓	✓			✓			✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	
Applewood Seed Co.	✓	✓		✓	✓		✓										✓		✓		✓						✓
Arrowhead Alpines		✓							✓	✓		✓		✓		✓	✓	✓		✓	✓			✓	✓	✓	
Beineke's Nursery	✓									✓		✓	✓	✓	✓	✓											
Berg-Warner Nursery, Inc.	✓									✓		✓		✓		✓											
C. M. Hobbs & Sons, Inc.										✓		✓		✓		✓					✓			✓	✓	✓	
Central Indiana Supply Co., Inc.		✓	✓	✓	✓	✓	✓	✓	✓								✓		✓								
Cherryhill Aquatics, Inc.	✓																				✓	✓	✓			✓	
Crystal Palace Perennials	✓	✓		✓	✓					✓	✓						✓	✓		✓	✓	✓	✓	✓		✓	
Country Road Greenhouses, Inc.[1]	✓	✓			✓		✓		✓								✓	✓			✓		✓			✓	
CRM Ecosystems, Inc.	✓	✓	✓	✓	✓	✓	✓		✓								✓	✓	✓		✓		✓	✓	✓		✓
Designs on Nature	✓		✓		✓		✓		✓	✓		✓	✓				✓	✓	✓		✓		✓	✓	✓		✓
Earthly Goods Ltd.	✓	✓	✓		✓												✓		✓								
Edge of the Prairie Wildflowers	✓	✓	✓		✓												✓	✓	✓								
Enders Greenhouse	✓									✓		✓	✓				✓	✓		✓	✓		✓	✓	✓	✓	
Flick Brothers Seed Co.	✓	✓	✓	✓	✓	✓	✓		✓								✓	✓	✓		✓						✓
Genesis Nursery[1]		✓	✓		✓												✓	✓	✓		✓	✓	✓			✓	
Hamilton Seeds		✓	✓	✓	✓		✓		✓	✓		✓		✓		✓	✓	✓	✓		✓	✓	✓			✓	
Hartmann's Plant Company	✓									✓	✓	✓					✓	✓			✓		✓	✓			
Heartland Restoration Services, Inc.	✓	✓	✓	✓	✓		✓		✓								✓		✓		✓						✓
Hoham, Smith, & Co.		✓	✓	✓	✓	✓	✓										✓		✓		✓						✓
IDNR State Tree Nurseries										✓	✓	✓	✓		✓						✓			✓	✓		

[1] Wholesale Only

Appendix A. Continued

	Consulting Services	**Herbaceous Species**	Wildlife Seed Mixes	Cool Season Grasses	Warm Season Grasses	Clovers	Legumes	Grains	Lespedezas	**Woody Species**	Fruit Trees	Shrubs	Deciduous Trees, bare root seedlings	Deciduous Trees, container stock	Coniferous Trees, bare root seedlings	Coniferous Trees, container stock	**Wildflowers & Ferns**	Wildflowers, plants/plugs	Wildflower Seed	Ferns	**Wetland Plants**	Aquatic Plants	Herbaceous Emergent Plants	Shrubs	Trees	Grasses, Sedges, Rushes	Wetland Seed Mixes
Ion Exchange		✓	✓	✓	✓				✓	✓		✓					✓	✓	✓		✓	✓	✓			✓	✓
J & J Transplant Aquatic Nursery	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
J. F. New & Associates, Inc.	✓	✓	✓		✓		✓		✓	✓		✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lafayette Home Nursery, Inc.	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mark H. Holeman, Inc.	✓									✓	✓	✓		✓		✓	✓	✓		✓	✓		✓	✓		✓	
Marshland Transplant Aquatic Nursery	✓	✓	✓		✓		✓			✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mary's Plant Farm		✓			✓				✓	✓	✓			✓		✓	✓	✓	✓	✓							
Missouri Wildflowers Nursery		✓	✓	✓	✓		✓		✓	✓		✓		✓			✓	✓	✓		✓	✓	✓	✓		✓	
Munchkin Nursery & Garden																	✓	✓	✓	✓							
The Native Plant Nursery	✓	✓	✓	✓	✓		✓		✓	✓		✓		✓			✓	✓	✓		✓		✓	✓		✓	✓
Oikos Tree Crops										✓	✓	✓	✓								✓			✓	✓		
Osenbaugh Grass Seeds	✓	✓	✓	✓	✓	✓		✓	✓								✓		✓		✓						✓
Prairie Moon Nursery		✓		✓	✓		✓		✓	✓		✓	✓				✓	✓	✓	✓	✓					✓	✓
Prairie Nursery	✓	✓	✓		✓												✓	✓	✓								
Shooting Star Nursery		✓	✓		✓					✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sharp Brothers Seed Company		✓	✓	✓	✓	✓	✓		✓								✓		✓		✓						✓
Spence Restoration Nursery[1]		✓	✓		✓					✓		✓					✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Springcreek Landscaping & Nursery	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sylvan Gardens	✓																✓	✓	✓								
Taylor Creek Restoration Nurseries	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓					✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Vans Pines Nursery, Inc.							✓			✓	✓	✓	✓		✓												
Wetlands Nursery, Inc.	✓																				✓	✓	✓	✓		✓	✓
Wildlife Nurseries, Inc.		✓	✓	✓	✓	✓	✓	✓	✓								✓		✓	✓	✓	✓	✓	✓		✓	✓
Woods' Edge Farm										✓		✓					✓	✓	✓	✓							

[1] Wholesale Only

Appendix B

List of consultants that perform prescribed fire assistance in Indiana (updated 4/2002). Note: This list is provided as a service only and inclusion of any company or name should not be interpreted as an endorsement by Purdue University or the quality of service they provide.

Stewart Turner, Consultant Forester
8464 S. 950 E.
Upland, Indiana 46989
Phone: 765-998-1161
Fax: 765-998-7549
Email: stove@netusa1.net

Heartland Restoration Services Inc.
14921 Hand Road
Ft. Wayne, IN 46818
Phone: 219-489-8511
Fax: 219-489-8607

J.F. New & Associates
708 Roosevelt Rd.
Walkerton, IN 56574
Phone: 219-586-3400
Fax: 219-586-3446
Email: dnew@jfnew.com
Web: http://www.jfnew.com

David Howell
(only for Quail Unlimited Members)
Regional Director
Quail Unlimited
10364 S. 950 E.
Stendal, Indiana 47585
Phone: 812-536-2272
Fax: 812-536-2272
Email: dhowell@psci.net

Haubry Forestry Consulting
912 North Drive
Seymour, Indiana 47274
Phone: 812-523-1960
Email: rhaubry@hsonline.net
Web: http://www.haubryforestry.com/home.htm

David Borneman
Borneman Consulting
1123 Mixtwood Street
Ann Arbor, MI 48103
Phone: 734-994-3475
Email: davidborneman@yahoo.com

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