



Wildlife Habitat Evaluation Program

WHEP Manual

(Condensed version specifically for Delaware)

Listed below are links to various portions of the New WHEP Manual.



[Section A – Introduction](#)



[Section B - Delaware Regions](#)



[Section C - Southeast Mixed and Outer Coastal Plain Forest](#)



[Section D - Urban](#)



[Section E – Wetlands](#)



[Section F – Wildlife Management Practices](#)



[Section G – Interpreting Aerial Maps](#)



[Section H – Definitions of Food Groups](#)



[Section I – Glossary](#)

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Introduction

The National 4-H Wildlife Habitat Evaluation Program is designed to teach youth about the fundamentals of wildlife science and management. The National Invitational Judging event is open only to senior division 4-H members. Junior division 4-H members are eligible to compete at county, regional, and state events. Natural resources management is learned through participation in the event and the associated educational programs. Additional benefits are the development of life skills and meeting other young people and professionals from around the country who have interests in natural resources.

In this program, youth learn that management for wildlife includes management of habitat and populations. The information found in this handbook is provided for learning wildlife habitat management concepts in both urban and rural settings and to prepare participants for 4-H natural resources competitive events. The handbook and activities are focused not only on increasing knowledge in the wildlife management field, but also in developing skills in applying that knowledge. The Invitational addresses these concepts with the four activities below:

1. [Wildlife Identification and general species knowledge.](#)
2. [On-site recommendation of wildlife management practices.](#)
3. [Written wildlife management plan.](#)
4. [Oral defense of written plan.](#)

Before making recommendations on habitat management, one must know all possible information about the life requirements of the specific animal(s) for which the area is being managed. The Concepts, Wildlife Species, and Foods sections of this handbook can help participants learn the life requirements of some wildlife species.

The manager must be able to inventory and evaluate the present condition of the habitat and explain the condition to landowners and other interested parties. The aerial photography information is designed to develop an understanding of this inventory and evaluation process.

Once the inventory is complete, the manager decides which management practices can be applied to improve the habitat for specified wildlife species. The on-site management recommendation activity gives the participant some experience with this decision-making process.

Finally, so that others can clearly understand the proposed management decisions, the wildlife manager must explain the decisions on paper and locate them on aerial photos or some other type of map. The written management plan activities encourage participants to explain and illustrate their decisions so that others can understand and carry out the recommendations.

About the Handbook

The handbook is divided into the following major sections:

1. [Wildlife Management Concepts](#) introduces basic wildlife management principles. These concepts are the basis for the remainder of the handbook. Participants should be prepared to use the wildlife management concepts and terms in their oral presentation and in the written plans as appropriate.
2. [Regions](#) identify areas of the United States with distinctly different habitats and wildlife. This section gives a brief description of the habitats found in the regions, explains typical stages of plant succession, lists wildlife species to be used in national events and summarizes habitat management practices that can be used for species in each region. A foods chart that includes each species in the eco-region is also included.

3. [Wildlife Species](#) provides information about habitat requirements and practices used in managing habitat for the various species. The foods each species utilizes are listed again.
4. [Wildlife Management Practices](#) explains each of the management practices discussed in the Wildlife Species section.
5. Interpreting Wildlife Habitat from [Aerial Photography](#) explains how to evaluate wildlife habitat using aerial photographs. Examples on how to rank photographs, identify features, and measure interspersions are included.
6. The [Activities](#) section of the manual refers to the competitive component of WHEP and provides resources to help contestants and coaches prepare for a WHEP contest. This section also contains information on how the National contest will be scored. In national events all of the activities and scorecards will be used as printed specifically for the region(s), species, and management techniques in this handbook. However, they may be modified for local and state events.
 - a. [Activity I - Wildlife Identification and General Species Knowledge](#): describes how this portion of the contest will be conducted.
 - b. [Activity II - On-site Habitat Management Recommendations](#): provides blank score sheets for each region for use in the contest and explains how this portion of the contest will be conducted.
 - c. [Activity III and III-B - Wildlife Management Plans and Oral Presentation](#): explains the appropriate format for writing management plans and includes score sheets for the plans and the oral defense.
7. [Scoring the Contest](#) explains the scoring procedure for the National Competition.
8. [Glossary and Appendix](#) defines some of the technical words used in the handbook and explains the various food categories referred to on the foods charts in each region.
9. [Bibliography](#) lists the sources that were used in development of the handbook.

How to use the handbook

Leaders and participants should first learn the wildlife habitat concepts and terms, then locate and mark the materials that are pertinent to the region(s) they are studying. The basic steps are:

1. Determine which region(s) to use. This may be where participants live or other areas where local, state, or national contests are going to be held. Maps and region descriptions found in the Regions section can be used when making this decision. *The wetlands and urban regions are applicable to all regions.*
2. Determine which wildlife species will be used. A list of recommended species accompanies the description of each region. There are many field guides and websites that provide photos of the applicable wildlife species. Students should learn to identify species from many different sources. They should be prepared to identify the male, female, juvenile, and adult of a species.
3. Locate and mark the selected species in the Wildlife Species section of the handbook. Read the species information and identify the recommended habitat management practices.
4. Locate and mark the appropriate management practices in the Wildlife Management Practices section. Please note that all wildlife management practices listed in the manual are not necessarily used for all regions.
5. Information from the Species section will be used on the General Knowledge section of the National Contest. Because wildlife foods are so important to the success of a management program we have included basic definitions of the food groups used in WHEP. These definitions can be part of the general knowledge test. Species to be studied for the National Invitational are those listed for the region designated for each year's National contest. Urban species are also included.

Preparing for Contests

Participants should first read and understand the [Concepts and Terms](#) section of the handbook. Leaders should explain the concepts and when needed, provide local examples to clarify any misunderstandings. This section is important because the activities require understanding of these concepts and terms. Students should use these terms and concepts in their presentations at the contest.

Once the concepts are understood, the leader should review the appropriate regional information with the participants. Leaders have the flexibility to use any of the information about regions that they feel is appropriate. Participants and leaders should review plant succession processes, special habitats such as riparian, common plants, wildlife species, and management practices. Specific information about habitat requirements and recommended management practices are found in the Wildlife Species section where wildlife species are listed in alphabetical order by the accepted common name. Whenever possible participants should go to the field and find examples of the principles and practices found in these sections. Leaders can use “quiz bowls” and question/answer sessions to measure learning.

Following the above exercises, leaders can introduce participants to the various [activities](#) found in the handbook. Conducting practice sessions using aerial photographs and outdoor sites will be helpful. Start with only two or three wildlife species, adding more as participants become more knowledgeable. Obtain several [aerial photographs](#) (local Natural Resource Conservation Service office) preferably with a scale of 8 inches equal to 1 mile, and discuss their features. Explain to participants how these features are important to wildlife. Identify the habitat requirements that are available for the animals selected. Then ask participants to identify what needs are missing.

Videos, textbooks and other teaching materials may be used to further learning. State Cooperative Extension Wildlife Specialists and 4-H offices have information regarding the availability of such materials. Local and state events may use different wildlife species and activities from those recommended in the handbook. *However, in the national event all activities and only the wildlife species and wildlife management practices listed in this handbook will be used.*

Beginning and young 4-H'ers are not expected to perform all the activities. Organizers of state and local events may wish to limit the activities for junior division participants. [Written management](#) plans and oral reasons may not be appropriate for this age group. Participants in the national event (14 to 19 years old as of January 1) will be asked to perform all of the activities in this handbook.

General Rules and Guidelines

The National Invitational event will comply with all Policies and Guidelines for National 4-H Competitive Events.

I. Contestants and Eligibility:

- A. Each state is allowed to enter only one team or up to two individual contestants. A team will consist of no less than three and no more than four official entrants who are 4-H members in their state during the current year. If a state is unable to assemble a team, it may send up to two contestants to the individual events only.
- B. All contestants must be at least 14 years of age as of January 1st of the year of the contest and must not be older than 19 years of age as of December 31st of the contest year.
- C. An individual or team may enter the National 4-H Wildlife Invitational event only once during his/her 4-H career.
- D. The team of contestants must be certified as the official state entry by the State Extension Director or by a person designated by the Director. The individuals or team may be selected by any procedures which a state considers appropriate. It is required that each state obtain medical authorizations for participants and accompanying adults.

Contestants in the National 4-H Wildlife Invitational must not have participated in official post-secondary (university, college, junior college, or technical school) competitive events of a similar nature in the same subject matter area. Neither can participants be a member of a post-secondary team undergoing training in preparation for an event. For example, a contestant who has competed in an official collegiate wildlife contest, on or off campus, is ineligible to compete. The State 4-H Program Leaders are responsible for determining the eligibility for participants in National 4-H Competitive Events from their respective states.

II. General Contest Rules and Information:

The dates, location, and the contest eco-region(s) for the National Invitational will be announced no later than May 1st, after the 4-H WHEP National Committee's spring meeting. When wetlands or urban areas are designated as the contest eco-region, the animal and fish species from the eco-region in which the contest is being held will also be eligible to be used.

- A. State team entries must be submitted through the official entry process
- B. Each team shall have no more than two adults at least 21 years of age accompanying the team to the Invitational.
- C. Although there will be educational opportunities before the contest begins, all contestants should study this handbook and be prepared before coming to the national event. Questions will not be allowed during the contest except for those relating to contest procedure.
- D. A materials packet to supplement this handbook will be available for leaders and participants well in advance of the national event. The packet will contain information on which regions and wildlife species will be used in the upcoming event. The materials packet will be supplied by the Wildlife Extension Specialist, 4-H office or other qualified personnel from the state hosting the national event
- E. No use of alcohol, tobacco, or drugs will be allowed during the event. Contestants will be required to adhere to the host state's Code of Conduct.
- F. Contestants are required to take part in all phases of the National Invitational including the Opening Ceremony, Educational Programming, the Contest, Fun Activities and Awards Banquet.

On Contest Day:

- A. All Contestants must provide their own pen or pencil and clipboard.
- B. No electronic devices of any kind are allowed at the contest site. This includes, but is not limited to cell phones.
- C. Absolutely no talking by contestants will be allowed during the contest except when working on designated team activities..
- D. Anyone caught cheating will be disqualified.
- E. All adults, except contest officials, will be separated from contestants at all times while the contest is in progress. All adults must participate in the designated "coaches" activity during contest day.
- F. Contestants will work independently on Activity I and II, Activity III is a team event. Preparation for Activity III-B may also be done as a team. Scorecards will be turned in to an official committee member immediately after each event. .
- G. An official committee will score the contest and analyze results. Their decision is final.
- H. The team score will be the sum of the three highest accumulative scores in each of Activities, I, and II, plus the team scores for Activities III.
- I. After the event, individual and team scores will be made available to the teams. Contest score sheets will not be distributed.
- J. Distribution of awards is determined by the state host. However, every National Invitation will recognize the:
 - First Place Team
 - Second Place Team
 - Third Place Team
 - First Place High Individual
 - Second Place High Individual
 - Third Place High Individual

Wildlife Management Concepts and Terms

Before an individual can evaluate wildlife habitat and make management recommendations, some basic concepts about habitat and its relationship to different wildlife species should be understood. In this section, some of the basic concepts are described. Since most of the contest will be based on these concepts, it is important that you study and understand them.

Wildlife management is both an art and a science that deals with complex interactions in the environment. For the purposes of this program, a number of assumptions and simplifications have been made to make the materials more understandable. In actual management cases, trained, experienced professionals should assist you in making the proper decisions to meet your goals and objectives.

Look up the definitions of words or terms you do not understand in a dictionary or in the glossary found at the back of this handbook.

Concepts

[Habitat Requirements](#)

[Featured Species](#)

[Species Richness](#)

[Plant Succession and Its Effect on Wildlife](#)

[Vertical Structure \(Layering\)](#)

[Arrangement and Interspersion](#)

[Edges and Contrast](#)

[Area Sensitive Species](#)

[Migration and Home Range](#)

[Carrying Capacity](#)

[Pond Dynamics and Balance](#)

[Wildlife Damage Management](#)

[Food Webs](#)

Concept 1

Habitat Requirements

Wildlife species have life requirements that must be supplied by the habitat to ensure their well being. These are known as habitat requirements. The four basic habitat requirements are food, water, usable space (the area required to accommodate necessary movements of an animal – for example: breeding range, brood range, fall feeding area), and cover (shelter or protection from predators, severe weather, etc.). Each species has its own set of specific requirements. For example, the gray squirrel uses acorns for food, while the woodpecker eats insects. Mallards use thick grass and forb cover for nesting, while brown thrashers nest in shrubs. Habitat requirements for wildlife change during the seasons of the year. The food they eat in the winter may be much different than what is eaten in the summer. For example, white-tailed deer eat leafy herbaceous plants in the summer and switch to woody stems, buds, and acorns in winter. The cover deer need for rearing their young may be much different than the cover needed for protection from a winter storm.

Concept 2

Featured Species

There are two basic goals in wildlife habitat management. One is to provide the best habitat possible for a particular featured wildlife species. The other, which is explained later in this handbook under the concept of Species Richness, is to provide habitat for as many different wildlife species as possible in an area.

When evaluating habitat for featured species, one must first decide which species are to be favored. This can be done in several ways. Landowners may have specific objectives for certain wildlife species, or the general public may have concerns about a particular game or endangered species. Once the species are selected, identify the habitat requirements for each particular species and evaluate the capability of the habitat or landscape to provide the requirements. If one or more of the habitat requirements is in short supply or lacking, than different habitat management practices may be used to improve the area's ability to supply the needed requirements. Occasionally, the desired species may be totally incompatible with the available habitat and management goals must be changed. For example, a farm with 100 acres of crop and hay fields would not be suitable habitat for managing for gray squirrels that require mast producing trees in mature forests or woodlots.

It is usually best to select management practices that provide the habitat requirements that are most lacking and thus are limiting the population (limiting factors). For instance, if a species requires trees for cover with water nearby and the habitat you are evaluating has plenty of trees but no water, a management practice that supplies water will improve the habitat more effectively than planting trees. When determining which management practices to apply, remember that management practices that improve habitat for some wildlife species may be detrimental to other wildlife species. It is impossible to manage habitat for any one species or group of species that require similar habitats without influencing other species in some manner. For example, if you plan a clear-cut in a deciduous forest area to benefit ruffed grouse, you may also benefit American woodcock, wild turkey, deer, and rabbits who utilize similar cutover areas for habitat, while populations of species like ovenbirds, wood thrushes, and worm-eating warblers, which prefer unbroken mature deciduous forests, may decline.

Concept 3

Species Richness

"Species richness" is the number of different kinds of wildlife species that are found in an area. One goal in wildlife habitat management may be to provide habitat for as many species and as many individuals within a species as possible, as contrasted to managing for a featured species as explained in Concept 2.

Lands that are high in species richness usually have many of the following characteristics:

1. A mixture of different habitat types in various successional stages.
2. A balance of edge with unbroken blocks of vegetation in one successional stage.
(see Concepts 6 & 7)
3. Unfragmented blocks of habitat at least 10 to 40 acres in size.
4. Edges with low contrast. (see "soft edges" in Concept 7)
5. Diverse vertical layering. (shrub layer, mid-story layer, lower canopy, upper canopy, etc. (see Concept 5)

These characteristics can be used to estimate the relative number of different wildlife species that may be present in separate areas. They can also be used to identify management practices that could increase species richness. By creating a variety of successional stages within an area you will provide the habitat requirements for many different wildlife species as well as attract more species. For example, consider an area that is in stage 6 of plant succession (mature woodland - see Concept 4). It has been proposed to improve the habitat by harvesting the trees and by clear-cutting 1/2 of the area. Clear-cuts of 40-acres that

leave adjacent unharvested areas of 40 acres in size would be desirable. Strips or corridors of trees that link the larger unharvested areas together could be left uncut and clear-cuts could be designed with irregular shapes (see Wildlife Management Practice 6 and 7). However, if species which require lots of edge and mixed age classes are desired, then a plan could be designed to harvest several 10 acre clear-cuts well distributed throughout the area to maximize the edge effect. Remember, when managing habitat for species richness, the goal is to provide some habitat for as many species as possible.

Concept 4

Plant Succession and Its Effect on Wildlife

Vegetation and water form the critical components of wildlife habitat. Every acre of soil and water has a definite sequence in plant cover that occurs over time. The different stages of this sequence are called "successional stages". We can generally predict the type of vegetation that will occur in each stage until a final or "climax" stage is reached. If not disturbed, the climax vegetation will remain the same for long periods of time. However, if people or nature disturb the vegetation, soil, or water level, then succession may be set back to an earlier stage and the cycle will continue forward from the new starting point. Note that different wildlife species are often associated with the different stages of plant succession. Not all species require the climax stage. In fact, most species require two or more successional stages to meet all of their life requirements.

In this handbook, areas in different stages of plant succession are often referred to as areas with different vegetation types or habitat types. In general, the stages of plant succession that occur on land are as follows:

- Stage 1 Bare ground**
- Stage 2 Annual forbs and/or grasses**
- Stage 3 Perennial forbs and grasses**
- Stage 4 Shrubs**
- Stage 5 Young woodland or trees**
- Stage 6 Mature woodland or trees**

In some regions, natural factors such as the soil or the climate will prevent succession from proceeding past a certain stage. For instance, in the Great Plains Shortgrass Prairie Region, lack of precipitation often prevents succession from proceeding past stage 3. In this case, stage 3 would be considered the climax stage. Many wildlife species found in this region do not require trees.

Descriptions of typical successional stages found in different regions of the United States can be found in the Regions section of this handbook. A description of the typical successional stages occurring in relation to water can be found in the Wetland Region description.

A single step in plant succession may take weeks, months, years, or even centuries, depending on a variety of natural and human-caused factors. If vegetation is disturbed, succession will revert to an earlier stage and begin again. Some wildlife species require



periodic habitat disturbance to create conditions needed to survive. Disturbance can be caused by natural factors such as insect or disease outbreaks, tornadoes, ice storms, hurricanes, avalanches, or lightning fires.

However, succession is more frequently altered by humans through a variety of habitat management practices: plowing (agriculture), prescribed burning, cutting of forests, grazing, and clearing shrubby areas, all of which may mimic natural disturbances in many cases.

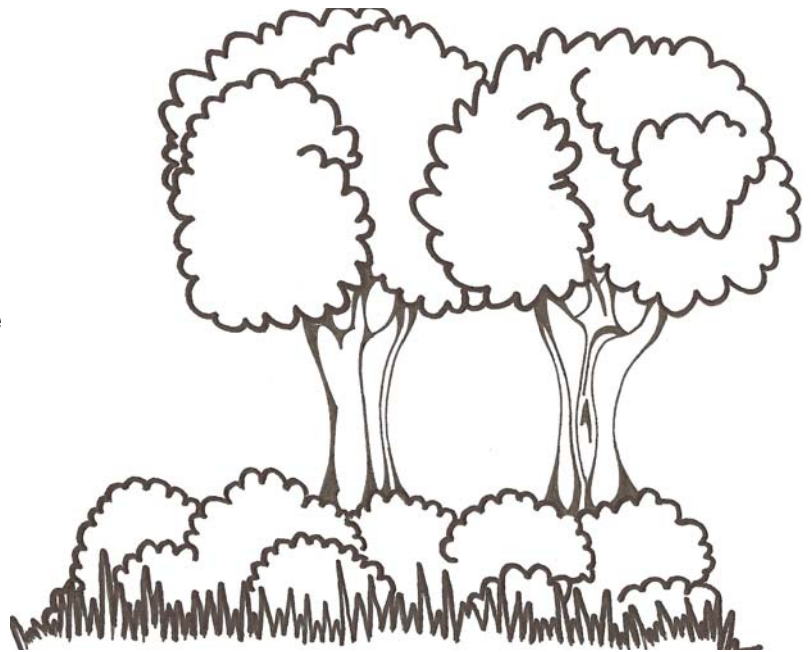
Nature never gives up. Even abandoned concrete parking lots are eventually taken over by plants. Plants begin growing in the cracks and around the edges; if left alone for a long time, a concrete parking lot will eventually become “habitat” for some wildlife species.

Concept 5

Vertical Structure (Layering)

Vegetation can be classified by how it grows. Grasses and forbs generally grow close to the ground and make up the ground layer (up to 3 ft above the ground). The next higher level is usually composed of woody shrubs and is called the shrub layer (3 ft to 10 ft above ground). The next layer is called the mid-story and is comprised of small diameter trees and larger shrubs (10 ft to 30 ft above ground). The tallest stratum is composed of trees and is called the tree canopy layer. This layer can sometimes be further delineated as the lower canopy (trees that are not the dominant trees in the stand) and the upper canopy (trees that are dominant with their entire crowns receiving sunlight).

How the different layers of vegetation are arranged in relation to each other is important to many wildlife species. For instance, some species may require an herbaceous layer for food but also need a tree canopy for cover. Not all areas in a single stage of succession are alike. For Example, one woodland in stage 6 of succession may have a variety of vertical layers comprised of grasses, forbs, shrubs, and trees, while another stage 6 woodland may have only one distinct layer of tall trees. Also, the trees may be widely spaced or close together, with or without a shrub layer. (see illustration on next page)



Concept 6

Arrangement and Interspersion

How different successional stages or vegetation types are situated in relation to each other (for example, size, shape, distribution of habitats) is often referred to as horizontal arrangement or juxtaposition. While some wildlife species obtain all their habitat requirements from only one successional stage many wildlife species need more than one successional stage to provide all their habitat requirements. For example, wild turkeys utilize mature woodlands (stage 6) for feeding, roosting at night, and living in most of the year, but they often nest in or at the edge of dense brushy cover (stage 4 & 5) created by clear-cuts. They also need grassy fields or grass/forb habitat (stage 2 & 3) for brood rearing and insect foraging.

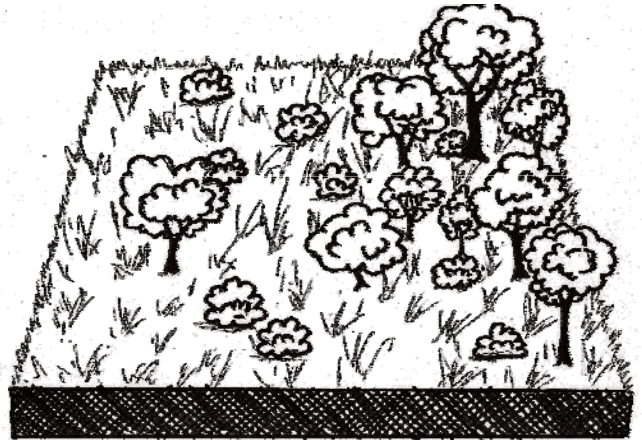
To be of value to a wildlife species, the required successional stages must be close to each other (within the

species “home range”) or linked by corridors to allow for safe travel to and from the different habitats. Managing for areas of different successional stages within a landscape is called “interspersions.” Usually, more interspersions supports a greater variety of wildlife. A way to measure interspersions is explained in the Activities section. The size and shape of different successional stages also influences the amount of edge habitat created and the stage’s usefulness for wildlife (see stage 7).

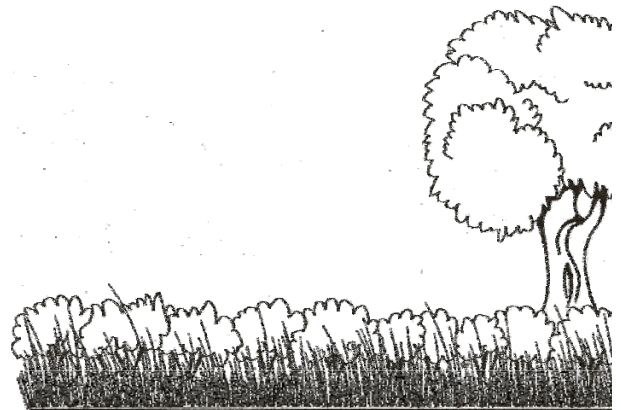
Concept 7

Edges and Contrast

The boundary where two or more types of vegetation or successional stages meet is called “edge.” Sometimes there is an abrupt change where one type of vegetation stops and another begins (see Figure 1), or the change can be less distinct, with a gradual transition from one stage to another (see Figure 2). In places where a gradual change occurs, the edge is wide and has characteristics of multiple successional stages or vegetation types. Where abrupt changes occur, the edge is narrow. Edges attract many different wildlife species because the variety of food, cover, and other habitat requirements associated with each stage are arranged close together.



Edges that are produced when extremely different successional stages of vegetation meet are defined as having high contrast and are referred to as “hard edges”. There is high contrast where an area in stage 2 (annual forbs and grasses) meets an area in stage 6 (tall mature trees) of plant succession. An edge between stages 2 and 3 has low contrast and is called a “soft edge” because one stage gradually transitions into the other. Edges with low contrast may have more different species (species richness) of wildlife than edges with high contrast. Edges with low contrast will benefit those wildlife species that need interspersions of several successional stages. In general, edge may benefit wildlife species that have low mobility and do not require large areas. However, creation of edge may be detrimental to some wildlife species, particularly area sensitive species (see Concept 8) or species requiring large tracts of unfragmented habitat in one successional stage.



Concept 8

Area Sensitive Species

Edge is not beneficial for all wildlife. Some wildlife species need large, unbroken (unfragmented) areas in a certain successional stage to provide some or all of their habitat requirements. Such species are referred to as area sensitive. For these species, large areas of vegetation in one successional stage are desirable. A forest or rangeland in one successional stage that has at least 100 acres of unfragmented area is considered to be the minimum requirement for many area sensitive species. However, some species may require 1,000 acres or more at a minimum.

Fragmentation is the disruption of areas of large, continuous habitat types either by man-made or natural processes.

Concept 9

Migration and Home Range

Some wildlife species travel during different seasons of the year and times of day. These actions are called daily or seasonal movements and occur within a given species' home range. Deer and bear move, but they don't migrate. Ducks, geese, some songbirds, and American woodcock migrate. Daily and seasonal movements should not be confused with migration. Wildlife are considered to migrate when they move from one type of habitat to a completely different type of habitat. Migration distances may be short or very long depending on the species. This requires that necessary habitats are available along the route. For many species, corridors that provide areas for safe travel are very important during migration. Two examples of migration are:

1. Hummingbirds fly from the East Coast of the United States down to South America for the winter months.
2. Ducks that nest in the northern United States must fly south to warmer climates to find food sources and wetlands that are not frozen during winter.

Other animals reside in the same area all year. The area of constant use is referred to as an animal's home range. For example, in average habitat, a northern bobwhite spends most of its life on an area of approximately 80 acres. If the habitat requirements of a species are met in a smaller area (i.e., the habitat is better) in a given locale, then the home range would be smaller.

Concept 10

Biological Carrying Capacity

There is a limit to how many animals can live in a habitat. That limit is called the habitat's "carrying capacity." The quantity and quality of food, water, cover, and space determines the carrying capacity. If one of these basic requirements is in short supply, the carrying capacity is lowered. By adding the missing ingredient, a manager can increase the habitat's carrying capacity.

Carrying capacity varies from year to year and from season to season. It is usually greatest from late spring through fall when plant vegetation, insects, and other food supplies and cover are most abundant. This is when most young are born and grow. With the coming of winter or summer drought, food and cover gradually diminish, as does the habitat's carrying capacity.

More animals are produced each year than will survive to the next. Surplus animals are generally lost to starvation, disease, and/or predation. Young wildlife and animals in poor health experience the highest death rates. Harvesting of game or fish for human consumption is one way to utilize the annual surplus. The obvious way to increase the number of animals is to increase the number born and reduce the number that die. However, if the habitat cannot support any more animals, those efforts will fail. A long-term increase in population can be accomplished only by increasing the habitat's carrying capacity.

In more urban areas, the biological carrying capacity may be able to support a given number of animals, however the human factor may demand that the population of a given wildlife species be lower because of wildlife damage issues. For example, white-tail deer populations can thrive in urban areas and thus the biological carrying capacity is very high because deer have adapted to feed successfully on ornamental plant material. However, home owners have low tolerance for deer feeding on expensive landscape plants and therefore the population of deer must be reduced to limit the damage. In this case, the cultural carrying capacity is much lower than the biological carrying capacity.

Concept 11

Pond Dynamics and Balance

A properly managed pond can provide excellent fishing and can be a benefit to many species of wildlife. The basics of a well-managed pond are proper stocking of the right species and number, a balanced harvest of fish, a correct fertilizer scheme, a stable water level, and aquatic weed control.

Pond balance occurs when a balance between prey and predator fish is established and maintained. In most warm water ponds, the bluegill sunfish is the prey species and the largemouth bass the predator species. In coldwater ponds, the trout is usually the predator species and insects and small fish are the prey. Balance between predator and prey is achieved by establishing an adequate food chain for the prey species and controlling the prey and predator species numbers through fishing.

Phytoplankton (microscopic algae) are the base of the pond food chain. Zooplankton and aquatic insects feed on phytoplankton and they in turn are eaten by small fish. Small fish are eaten by larger fish and so on. Managing phytoplankton through fertilizing and liming (if necessary) is the key to producing abundant and healthy fish populations. Suspended mud in ponds blocks sunlight, and algal blooms cannot be established. Excessive exchange of water through the pond prevents adequate phytoplankton blooms due to dilution of fertilizer additions.

Low water levels can cause significant problems as well. Improperly constructed or damaged spillways can lead to excessive erosion to the dam. Low water levels, due to either damaged spillways or improperly sloped banks, can lead to excessive aquatic vegetation along the margins.

Stream Habitats

A stream can be defined as a body of water moving in a more or less definite pattern and following the course of least resistance to a lower elevation. Because water volume and rate of land erosion fluctuate along the course of the stream, the bottom and shoreline are relatively unstable. As the water moves, it carries materials such as gravel, sediment, or debris that have been picked up and redistributed them along the stream course. When water flow is restricted to a narrow area, the stream can create more erosion resulting in deeper areas or pools. As the stream passes through wider passages, the water flow slows and material is deposited to form areas known as riffles.

These pools and riffles are important habitat types for the various fish species that inhabit streams. Pools provide areas for fish to feed and find refuge from fast moving water that requires more energy for swimming. Riffles are usually preferred habitat for spawning.

It is important that fish have the ability to move freely between these various habitats in the stream. While some species of fish can complete their life cycle within a small portion of the stream, other species such as salmon must migrate to the ocean and return to the stream to spawn.

Concept 12

Wildlife Damage Management

Professional wildlife biologists often have to manage wildlife to reduce or eliminate damaging behaviors or health hazards. Increasingly, wildlife damage management is most common in urban and suburban areas, where frequent interactions between humans and wildlife are due to their close proximity to each other. Examples of wildlife damage are coyotes that prey on livestock or pets, raccoons in chimneys or bats in attics, deer eating ornamental plants or colliding with vehicles, skunks under the house, snakes in the house, bird strikes at airports, herons eating catfish fingerlings at a fish farm, or starlings sitting in urban trees or dairy barns and defecating, creating a health hazard.

Wildlife damage management practices are divided into 2 general categories – lethal and non-lethal. Lethal practices are intended to kill wildlife in a manner that is quick and does not cause suffering. Lethal management practices include body-gripping traps, trapping and euthanizing (humanely putting to death), shooting, and poisoning. Non-lethal management practices are intended to reduce or eliminate wildlife damage or wildlife-caused health hazards using management practices that do not kill. Non-lethal management practices include noise-making harassment techniques (for example, propane cannons), visual harassment techniques (for example, eye-scare balloons or predator decoys), or techniques that combine both noise and visual harassment (for example, dogs), exclusion methods like fencing and chimney caps, taste and odor repellents, live trapping and relocation, habitat modification to deter damage-causing wildlife or to attract predators that prey on damage-causing wildlife, or changing human behaviors that attract damage-causing wildlife. Additional wildlife damage techniques that can be used fall into either the lethal or non-lethal category, depending on your point of view. These techniques are used to control reproduction in wildlife populations, and include sterilization, birth control, and abortion-causing agents. Some reproductive control methods can only be used for research purposes, and all are relatively expensive.

There are advantages and disadvantages to using lethal and non-lethal management techniques. One advantage of lethal management practices is that they can permanently decrease the numbers of animals in a population that are causing damage or health hazards, thereby reducing the amount of damage. In some cases, one or a few animals are causing the problem, and lethal management can then eliminate the damage once the individuals causing the damage are killed. Non-lethal management techniques typically force the animals causing the problems to move to other locations. Although non-lethal techniques may reduce or eliminate the problem at the first location, the animals causing the problems may relocate and cause the same problems at a different location. One advantage of non-lethal techniques is that they are generally more accepted by the public than lethal techniques are, and they can be used in areas with high human density.

Regardless of what management practice is used to reduce or eliminate wildlife damage or health hazards, there are some general guidelines that can increase the success of a wildlife damage management program. Be absolutely positive that you have correctly identified the type of wildlife causing the damage. An integrated wildlife damage management program is strongly recommended, meaning the combination of 2 or more wildlife damage management practices. Wildlife are very much creatures of habit, and will get used to a foreign object in their area the longer that object is left there (this is called habituation). The more diverse and varied the management techniques used, the less chance for habituation to occur and the more successful the wildlife damage management program. Another factor that will increase the success of a wildlife damage management program and combat habituation is randomness. The more random the application of the wildlife management techniques, the more the successful one will be in reducing or eliminating damage because the wildlife will never be sure when it is safe to be in the area. Not all wildlife damage management practices are equally effective or applicable in all areas; many times it is necessary to develop a wildlife damage management program specific to the area where the problem is occurring. And finally, make sure you know all of the local, state, and sometimes federal laws that regulate the wildlife you are trying to manage, especially when using lethal management techniques.

Wildlife damage management may be recommended in addition to the practice of increasing bag/creel limits if individual animals are causing damage or health hazards.

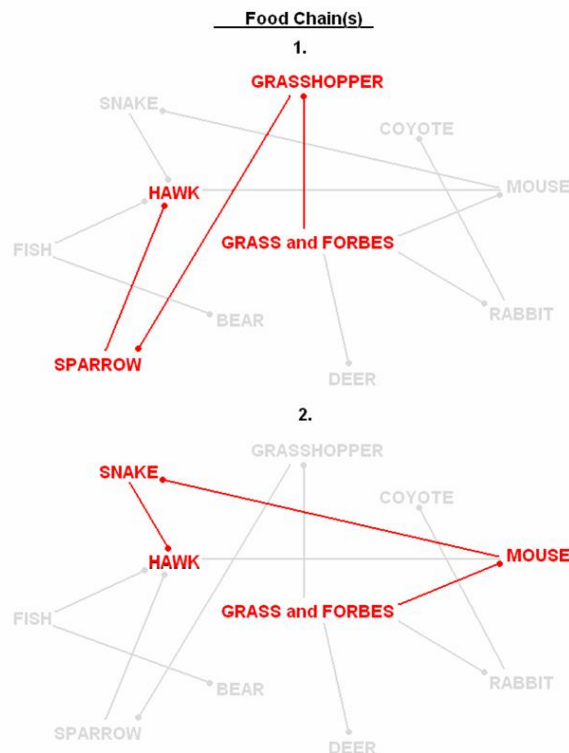
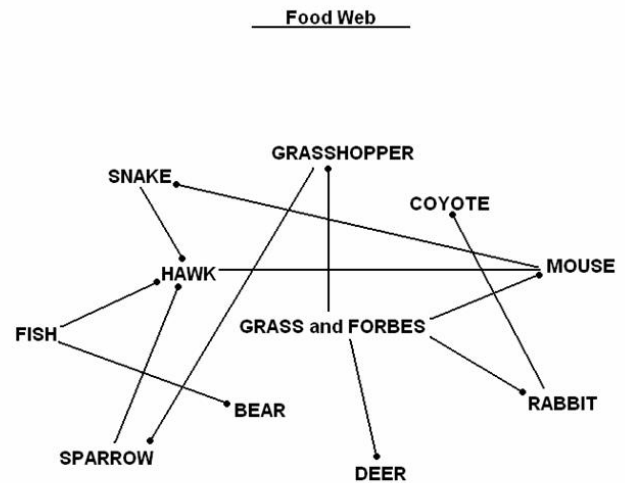
- Predator control techniques like relocation, trapping, toxicants on livestock collars, and selectively shooting only problem animals are commonly used and are effective.
- Non-lethal methods of predator control include livestock confinement and herding, use of guard dogs, and the use of exclusion fences.
- Methods of controlling herbivores (deer, rabbits, etc.) include exclusion, taste and odor repellents, harassment techniques, habitat modification, changing human behaviors that attract problem-causing wildlife, and shooting. Trapping and relocating large animals like deer and elk is not cost effective.
- Methods of bird control include exclusion, taste and visual repellents, harassment techniques, habitat modification, changing human behaviors that attract damage-causing wildlife, trapping and relocating or euthanizing, and shooting.

Concept 13

Food Webs

A food web is a network of interconnected food chains, which are the step-by-step passage of matter and energy (food) through an ecosystem. Plants are primary producers in a food chain because they supply food at the lowest level of the food chain. It takes an enormous number of individual plants to support the other parts of a food web. At the next level of a food chain are primary consumers, that is, plant-eating animals or herbivores. Primary consumers include rabbits, mice, deer, and certain other mammals, some insects and fish, and dabbling ducks, geese, and certain other birds.

Primary consumers are eaten by secondary consumers, or carnivores (meat-eaters). This group includes predators such as birds of prey, snakes, foxes, wild cats, and people. Secondary consumers are eaten by tertiary consumers, which may be predators or scavengers such as turkey vultures, crabs, and sometimes people. Note that these categories are very broad and general. Many animals fit into more than one group, and there are more complex levels of the web.



Any of the food web components mentioned above can be broken down by decomposers, organisms such as bacteria and fungi that reduce dead plant or animal matter into smaller particles. A decaying plant, for example, will be broken down into nutrients that enrich the soil. This process supports the growth of more plants.

8 Y'Uk Uf Y'Regions

Areas of the country can be separated into regions having similar climate, vegetation, and wildlife. They are described in very general terms. The Wetland and Urban Regions should be used in any of the regions where they occur.

The regions below most nearly describe our local area, state, and the area where the national contest will be held.

At the end of each region's description is a list of the wildlife species recommended to use while evaluating habitat in that region. You can use any or all of the listed species, or when applicable, use species listed under other regions. Some of the species listed are considered to be a nuisance in some areas and circumstances, but they also have significant roles in habitats. Contest organizers may wish to exclude such species from local activities or center the activities on why the species are pests and what can be done to decrease problems.

Each region's description is followed by a table that identifies some of the practices used to manage habitat for the species listed. Specific information on recommended habitat management practices for each species can be found in the Wildlife Species section of this handbook. A foods chart is also included that indicates the food types eaten by the region's highlighted wildlife species.

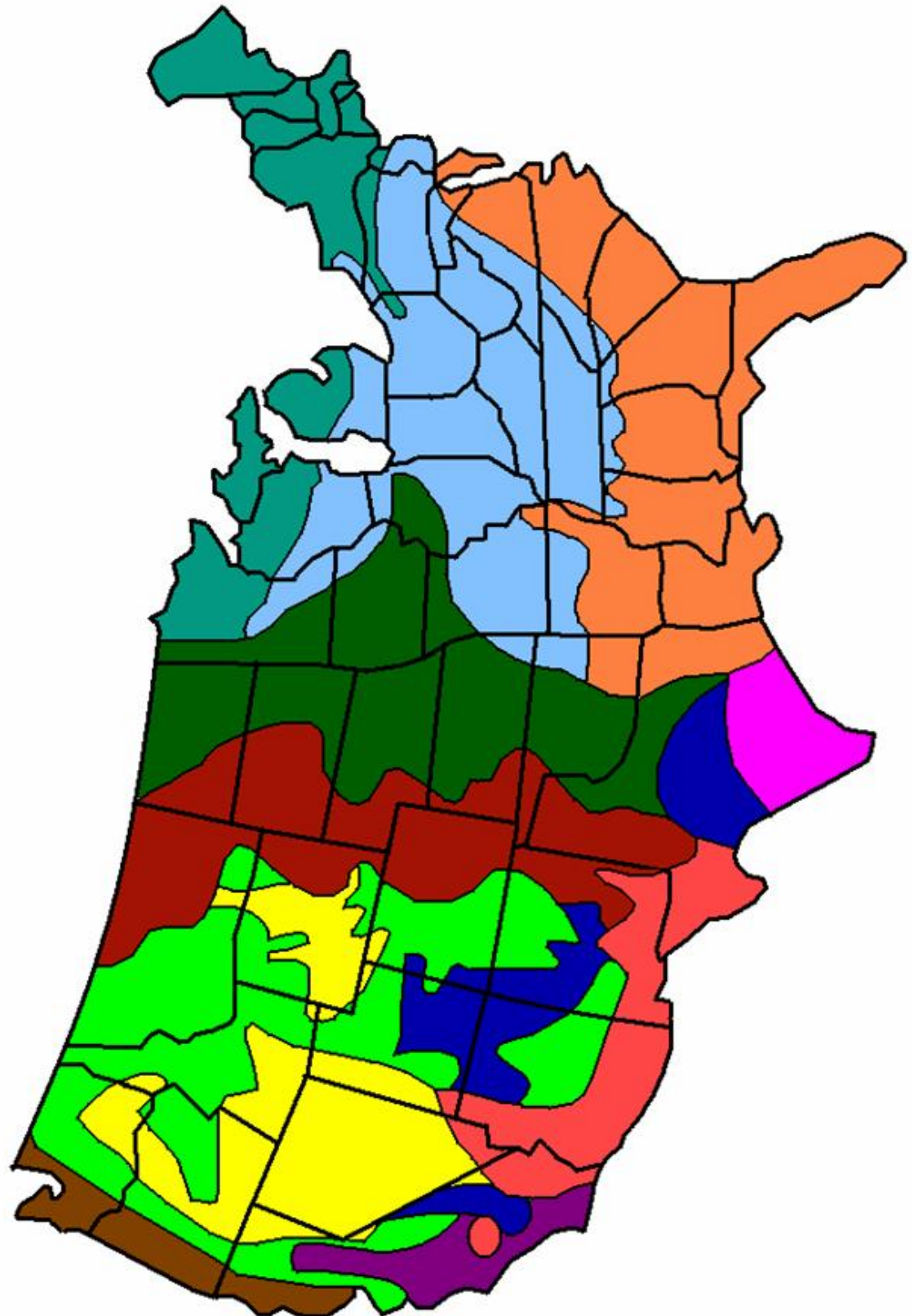
Index to Delaware Regions

[Southeast Mixed and Outer Coastal Plain Forest](#)
[Urban Areas](#)
[Wetlands](#)

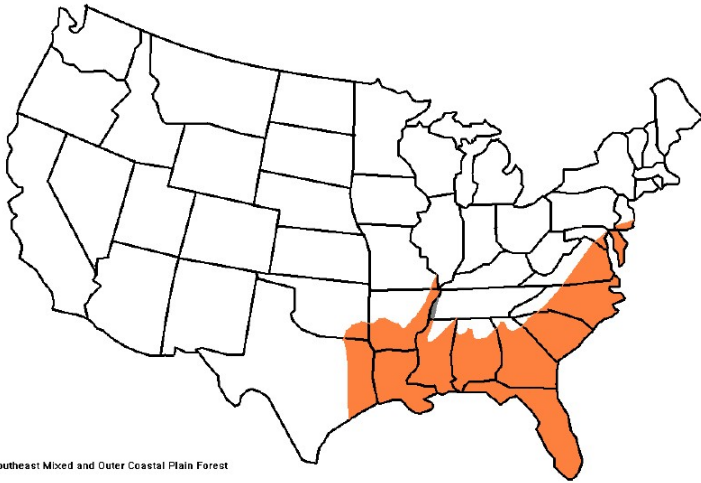
Map of Regions

Great Plains Grassland-Tallgrass/Mixed Prairie
 Northeast Mixed Forest
 Prairie Brushland
 Mediterranean Zone
 Southeast Mixed and Outer Coastal Plains Forests
 Woodland

Eastern Deciduous Forest
 Great Plains Grassland-Shortgrass Prairie
 Hot Desert
 Intermountain-Foothills; Montane; Subalpine
 Intermountain-Sagebrush
 Pacific Coastal Forest



Southeast Mixed and Outer Coastal Plain Forest



Southeast Mixed and Outer Coastal Plain Forest

Physical Description:

The terrain is rolling hills to mostly flat. Marshes, lakes, and swamps are numerous on the coastal plains. The average annual precipitation ranges from 40 to 60 inches. Precipitation is received throughout the year. Summers are hot and winters are mild.

Dominant Vegetation:



Photo Courtesy of
USDA NRCS

The final successional stage of vegetation usually consists of deciduous trees such as oak, hickory, beech, blackgum, red maple, redbay, southern magnolia, laurel oak, American holly, and winged elm, or occasionally coniferous trees such as loblolly pine. Pines such as loblolly, longleaf, and shortleaf are common on sites where prescribed burning is used; pines likely were the most common trees in these regions before the days of fire suppression. Planted loblolly pine is widespread over much

of the region. Lower-story trees can include American hornbeam, redbud, shadbush, dogwood, and hawthorns.

Forbs and grasses are common understory plants. Vines such as Virginia creeper, trumpet creeper, grape, greenbriar, and dewberry or shrubs such as sumac, viburnum, haw, and blueberry are also common especially in the third or fourth successional stages.

Gum and cypress trees are dominant on moist areas along the Atlantic Coast and Gulf Coastal Plain.

Farming and Ranching:

Many wetlands along major river courses have been drained and forests cleared to grow crops such as tobacco, cotton, soybeans, corn, and other grain crops. Large areas of forests have also been cleared and planted to grasses and legumes to provide forage for livestock.



Photo Courtesy of
USDA NRCS

Plant Succession Stages:

Stage 1 — bare ground; Stage 2 — annual forbs and grasses; Stage 3 — perennial grasses and forbs; Stage 4 — shrubs; Stage 5 — young woodland; Stage 6 — mature woodland, usually deciduous.

Species Recommended for Judging:

- American kestrel
- Black Bear
- Bluegill
- Brown thrasher
- Coyote
- Eastern bluebird
- Eastern cottontail
- Eastern gray squirrel
- Great horned owl
- Hairy woodpecker
- Largemouth bass
- Lark Bunting
- Mallard (winter habitat)
- Mourning dove
- Northern bobwhite
- Raccoon
- Red-eyed vireo
- White-tailed deer
- Wild turkey
- Wood duck



Photo Courtesy of
USDA NRCS

Southeast Mixed & Outer Coastal Plain Forest	American Kestrel	Black Bear	Bluegill	Brown Thrasher	Coyote	Eastern Bluebird	Eastern Cottontail	Eastern Gray Squirrel	Great-Horned Owl	Hairy Woodpecker	Largemouth Bass	Lark Bunting	Mallard (Winter)	Mourning Dove	Northern Bobwhite	Raccoon	Red-Eyed Vireo	White-Tailed Deer	Wild Turkey	Wood Duck
Aquatic Plant			x										x							x
Bark							x											x		
Birds	x				x				x		x					x				
Buds							x	x							x			x	x	
Carrion		x			x											x				
Centipedes & Millipedes						x									x		x		x	
Crayfish											x		x			x				x
Earthworms						x					x		x		x	x			x	x
Eggs					x			x			x					x				x
Ferns		x																x	x	
Fish			x						x		x					x				x
Forbs		x					x					x			x			x	x	x
Frogs & Salamanders									x		x		x			x			x	x
Fungi		x						x										x	x	
Grain				x			x	x				x	x	x	x	x		x	x	x
Grass		x					x											x	x	
Hard Mast		x		x				x		x					x	x		x	x	x
Insects	x	x	x	x	x	x		x	x	x	x	x	x		x	x	x		x	x
Leaves & Twigs							x											x	x	
Lichens																				
Lizards	x				x				x							x			x	
Mammals	x				x				x		x					x				
Mussels																x				
Nectar																				
Scorpions																				
Seeds				x		x		x		x			x	x	x				x	x
Snails						x							x		x	x			x	x
Snakes	x				x				x		x					x			x	
Spiders	x		x			x				x	x	x			x		x		x	x
Soft Mast		x			x	x	x	x		x				x	x	x	x	x	x	x
Tubers																			x	
Turtles																				

Southeast Mixed and Outer Coastal Plain Forest		American Kestrel	Black Bear	Bluegill	Brown Thrasher	Coyote	Eastern Bluebird	Eastern Cottontail	Eastern Gray Squirrel	Great-horned Owl	Hairy Woodpecker	Largemouth Bass	Lark Bunting	Mallard (winter)	Mourning Dove	Northern Bobwhite	Raccoon	Red-eyed Vireo	White-tailed Deer	Wild Turkey	Wood Duck
1. Decrease Harvest			X	X		X		X	X			X		X	X	X	X		X	X	X
2. Increase Harvest			X	X		X		X	X			X		X	X	X	X		X	X	X
3. Establish Native Grasses and Forbs		X				X	X	X		X		X	X	X	X	X	X		X	X	
4. Fish or Wildlife Survey		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5. Grain: Leave Unharvested			X											X	X	X	X		X	X	X
6. Harvest Timing													X			X				X	
7. Manipulation of Succession		X			X		X	X					X		X	X	X			X	
8. Nesting Structures		X					X		X												X
9. Plant Food Plots			X					X						X	X	X			X	X	
10. Plant Trees			X						X										X	X	X
11. Plant Shrubs (Create Hedgerows)		X	X		X	X	X	X		X	X				X	X	X	X	X	X	X
12. Pond Construction				X								X		X	X						X
13. Ponds: Deepen Edges				X								X									
14. Ponds: Fertilize				X								X									
15. Ponds: Reduce Turbidity				X								X									
16. Ponds: Repair Spillway				X								X		X	X						X
17. Ponds: Restock				X								X									
18. Retain Snags & Down Woody Material		X	X				X			X									X		X
19. Riparian Buffers			X											X			X		X	X	X
23. Tillage Management													X			X				X	
24. Timber Management Techniques		X	X		X	X	X	X	X	X					X	X	X	X	X	X	X
25. Water Level Manipulation Techniques				X								X		X			X				X
26. Water Developments for Wildlife																					
27. Wildlife Damage Management			X			X					X						X		X		

American Kestrel

(Region: Southeast)

General Habitat Preference:

American kestrels are found year-round throughout all of America. Kestrels use stages 2 and 3 of plant succession for feeding, and stages 4, 5, and 6 for roosting and nesting. Kestrels use both natural and artificial cavities for nesting. They eat small mammals, other birds, and insects.

Habitat Requirements:

- Diet: Primarily insects and small mammals associated with open areas.
- Water: Kestrels obtain necessary water from Diet, and do not need water for drinking.
- Cover: Kestrels nest in tree cavities and other sites including holes in cliffs, canyon walls, and artificial nesting boxes.

Management Practices:

- Manipulation of Succession brush chop, chain, or roller beat small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 4 (shrubs) vegetation; prescribed burning.
 - Grazing management should leave enough herbaceous canopy to support insects and small rodents. Manage livestock grazing to maintain trees in riparian areas.
 - Timber Management Techniques: Clear-cut small areas in large expanses of stage 5 and 6 woodlands.
 - Establish Native Grasses and Forbs: to provide habitat for rodent prey. Maintain areas of stage 5 and 6 vegetation interspersed with stage 2 and 3 vegetation.
 - Plant trees and Plant Shrubs (create hedgerows): in large open areas (irrigate if necessary) on idle lands.
 - Nesting Structures: provide kestrel nesting boxes in areas lacking adequate nesting cavities. Boxes can be placed on fence posts in open areas.
-



American Kestrel, adult male



American Kestrel, adult female

Click below to play sound of this species:

http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/American_Kestrel.html#fig1

Black Bear

(Region: Southeast)

General Habitat Preference:

Black bears are found in the forested portions of North America (although they have been extirpated from some parts of the central and eastern U.S.). They are generally secretive animals who prefer to avoid human contact; however, bears are highly adaptable and may occur in and around human dwellings. Preferred habitat is mature deciduous or mixed deciduous/coniferous forest, often with some interspersed grassy herbaceous openings, cutover timber areas, riparian corridors, shrub thickets and dense early successional brushy cover. Throughout North America black bears hibernate in the winter (even in warm climates like Florida and Louisiana). Bears use a variety of den sites that range from rock crevices, brush piles, excavations, hollow trees, dense mountain laurel/rhododendron thickets, and even under human dwellings (crawl spaces, porches, etc). Bears require stages 2, 3, 4, and 6 of plant succession. Black bears are primarily nocturnal but may be seen at anytime during the day.

Habitat Requirements:

- Diet: Bears are omnivorous, however over 90% of their Diet consists of vegetative matter. Spring food sources are typically scarce and consist of early developing plants such as skunk cabbage, squaw root, grasses, and insects (ants, grubs, bee hives, etc.). Occasionally, bears will feed on deer fawns and young livestock (calves and lambs). When natural foods are scarce bears often feed on bird seed, dog/cat food, garbage, etc. making them unwelcomed guests around human residences. During summer and early fall black bears feed on a variety of fruits and berries such as blackberry, blueberry, Juneberry, black cherry, pokeweed, sassafras, etc. During late fall bears will feed heavily on oak acorns, beechnuts, hickory nuts and other hard mast fruits, as well as field corn, soybeans, etc. which are all highly nutritious as the bears prepare for hibernation. During winter hibernation bears don't feed but live off their stored body fat reserves.

- Water: Bears utilize numerous sources for water, such as: streams or creeks, ponds, lakes, rivers, waterholes and spring seeps. In summer they will often lounge in shallow water sources to cool off and get away from biting insects. Hence the term "bear wallows".
- Cover: As mentioned above black bears use hardwood or mixed hardwood/conifer forests for habitat. Within these habitats black bears utilize large home ranges (several square miles). The size of a bears home range will vary based on sex and age of the animal and/or time of the year (for example: breeding season, fall foraging areas, denning habitat, etc.). In general, adult male bears use home ranges that are much larger than females (up to 50 sq. mi.), while solitary females and females with cubs use home ranges that are considerably smaller (15 sq. mi.).

Wildlife Management Practices:

Mature hardwood or hardwood/conifer forests provide the essential elements of black bear habitat. However, within these areas bears will utilize dense brushy areas as escape cover and feeding sites (production of soft mast fruits and berries, insects, etc). Generally, water sources are not a concern because bear are very mobile. Denning sites also are quite variable and generally not a problem.

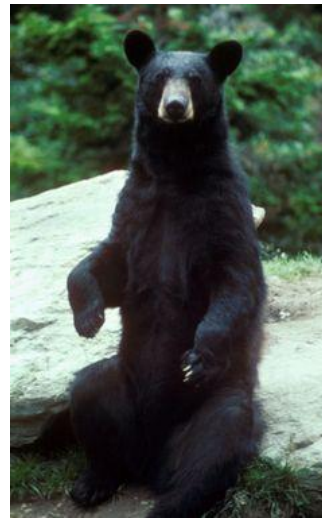
- Timber Management Techniques:
Timber Stand Improvement or Timber Harvest, Selective Cut practices in small amounts in Stage 5 and 6 can improve habitat by allowing the growth of dense understory cover, while enhancing the growth on many fruit and nut species. Thinning forest stands can also increase the hard mast (acorn, hickory, beech) production thereby improving fall food sources. Den sites may also be created by brushpiles of tree limbs. Timber Harvest, clear-cut within the forest habitat can create dense escape and loafing cover for bears (stage 4). These cutover areas typically create an abundance of soft mast food (grape, pokeweed, blackberry, sassafras, etc.), which bears utilize from spring to fall. Cuts should be widely dispersed throughout the forest and be no larger than 25 acres in

size and have an irregular design. This practice is also useful in regenerating hard mast trees (oak, hickory, etc) when the mature trees are beginning to die out. Den sites may also be created by brush piles of tree limbs.

- Retain Snags and Down Woody Material: Retention of Den Trees within forest stands while doing timber stand improvement or clear cutting will create potential den sites for bears and many other forest wildlife species.
- Grain (leave unharvested): This practice, while not widely used, can provide an additional food source for black bears. Where farmers are currently planting crops such as corn or soybeans (stage 2), strips of these crops should be left standing to provide a food source close to cover. Plots should be large (2 acres) in size and well dispersed throughout the habitat.
- Decrease or Increase Harvest: This practice will influence how the bear population in an area will grow. Typically, it is the responsibility of the respective state wildlife agency to set the length of the hunting season and the season bag limit to control bear harvest. However, landowners can choose to take the maximum allowed or something less than that depending on their personal management objective. Three population objectives can be achieved through the controlled harvest of bears: increase, stabilize or decrease the population. However, liberalizing or restricting the harvest of female bears will also influence population growth and the rate of that growth. Regulation of bear population densities will be influenced by tolerance of the public toward bear/ human conflicts, property damage, livestock and agricultural damage and the desire to see bears in an area. Access to public and private land for bear hunting will also influence bear harvests in an area.
- Plant Food Plots: This practice is not widely used but can provide an additional food source for black bears (Stage 2). Soil fertility may dictate whether this practice is feasible, since poor soils will require significant fertilizer and lime to produce abundant crops. This practice will require expenditure of money and use of farm equipment. Food

plots should be large (2 acres) in size and well dispersed throughout the habitat. Plants that are high in protein such as alfalfa, clover, and soybeans, or grains high in energy such as corn, should be preferred seeds to plant.

- Plant Trees and/or Plant Shrubs within forest openings can provide additional food sources for black bears. Fruit species such as apple, pear, cherry, peach as well as other soft mast species like autumn olive, crab apple, hawthorn, dogwood, etc. will create abundant food sources. Stage 4 and 5 plant succession.
- Manipulation of Succession
Prescribed Burning can stimulate understory grasses and forbs on which bears will feed (Stage 3). This practice, if hot enough, will also kill some overstory vegetation thereby stimulating development of understory shrubs and sprouts (Stage 4).
Riparian Buffers provide travel corridors for bears to move between forest habitats besides providing areas for bears to secure water. These areas generally have abundant trees and shrub species that produce much food and serve as feed areas for bears. Stage 4, 5, and 6.



PLAY AUDIO 



Wildlife Biologist
Inspecting Newborn Black
Bear Cubs, Yukon Flats
National Wildlife Refuge
This Photo Credit: US Fish
& Wildlife Service From
the Alaska Image Library

Bluegill

(Region: Southeast, Wetlands)

General Habitat Preference:

Ponds, lakes, and slow moving rivers.

Habitat Requirements:

- **Food:** Bluegill eat a variety of zooplankton (microscopic animal life), insects, tadpoles, small minnows, and crayfish.
- **Cover:** Bluegill are often found near submerged rocks, stumps, shrubs, and near aquatic vegetation where small fish (used for food) hide.
- **Water:** Fish need water of a certain quality. Some of the basic requirements are: dissolved oxygen - minimum of 4 parts per million (ppm); carbon dioxide - should not exceed 20 ppm; pH should range between 6.5 and 9.0; and water temperature should reach at least 70 degrees Fahrenheit sometime during the summer (one foot below surface in shade). Test the water to see if it meets requirements. Aerate pond to increase oxygen and decrease carbon dioxide.

Management Practices:

Decrease or Increase Harvest based on seine sample results.

- **Fish or Wildlife Survey:** to determine pond balance.
- **Manipulation of Succession**
Grazing Management: Manage livestock grazing to maintain thick herbaceous vegetation surrounding the pond and in the watershed that drains into the pond. Develop livestock watering facilities away from pond or allow access to only a small part of the pond.
- **Ponds:**
Construction: Artificial reefs constructed of rock piles, sections of plastic or cement pipe (a minimum of 6 inches in diameter and 18 inches long), and brush piles and tires (sunk with weight) can be used for additional cover. These practices are recommended for ponds larger than 10 surface acres in size.
Deepen Edges: Deepening the pond edges to 2 feet deep or more discourages rooted aquatic vegetation growth.

Fertilize: In clear water, fertilizer may be added to increase or promote phytoplankton. Lime ponds (agricultural limestone) to increase soil pH if total alkalinity is below 20 ppm. **Reduce Turbidity:** Prevent or clear up enough that a white disk cannot be seen 24 inches deep). The color is caused by phytoplankton (microscopic plant life-algae). Reseed watershed to establish thick herbaceous vegetation surrounding the pond in the watershed that drains into the pond. **Repair Spillway:** Repair the spillway if needed and remove trees near the dam or dikes. Stop other pond leaks if and when they occur. **Restock:** Determine pond balance using a minnow seine and catch records. A bass to bluegill ratio of 3 to 6 pounds of bluegill to one pound of bass is considered a good fish population balance. If restocking is necessary, remove existing fish and restock at the appropriate rate.

- **Water Level Manipulation Techniques:** Add water control structures if needed.



Brown Thrasher

(Region: Southeast)

General habitat preference:

Brown thrashers occur in the eastern two thirds of the country. They require stages 3 and 4 of plant succession. Brown thrashers are normally found in shrub thickets, hedgerows, shelterbelts, young forests, forest edges and brushy riparian areas. Brown thrashers forage on or near the ground for food. Their nest is usually found in bushes or small trees 1-10 feet above the ground. They have adapted to suburban gardens and plantings.

Habitat requirements:

- Diet: Invertebrates and plant seeds are the principal foods, but fruits, berries and nuts are also eaten. Brown thrashers forage primarily on the ground, and use their bills to turn over leaves and debris looking for food. More food is available when there is substantial ground litter. The management practices listed under "Cover" will usually supply sufficient food.
- Water: Water requirements are not known.
- Cover: Nesting and hiding cover are supplied by dense shrubs with some trees, stages 3 and 4 of plant succession. Brown thrashers will use areas that have only shrubs. They need a minimum of 2.5 acres of woody vegetation to support a breeding population.

Wildlife Management Practices:

- Manipulation of Succession through mowing, chaining, roller beating and/or controlled burning can be used to maintain and rejuvenate areas of stage 4 vegetation when habitat quality begins to decline. Grazing management should exclude livestock from riparian areas and other woody areas to allow shrubs and trees to regenerate and ground litter to develop.
- Plant trees and Plant shrubs (create hedgerows): (shelterbelts, field borders and riparian areas) to promote stage 4 and create additional cover for nesting/foraging.
- Timber Management Techniques: Timber Harvest methods can be implemented to improve vegetation structure for nesting

and foraging and stimulate additional stage 4 vegetation within large areas of stage 6 forest where regeneration is needed.

Timber Stand Improvement practices in stage 5 and 6 can improve habitat by stimulating understory development.



Brown Thrasher adult



Brown Thrasher eggs

Click below to play sound of this species:

http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/Brown_Thrasher.html#fig1

Coyote

(Region: Southeast)

General Habitat Preference:

Coyotes are found throughout the continental United States. Coyotes have also been observed in large cities and urban areas. Stages 2, 3, and 4 are primary coyote habitats, particularly grasslands and areas where timberlands have been cleared for agriculture. They may occasionally be seen in woodlands. Coyotes den in a wide variety of places, including brush-covered slopes, steep banks, rock ledges, thickets, and hollow logs. Coyotes may be active throughout the day but tend to be more active during the early morning, around sunset, and at night. Coyotes may live in packs, alone, or in mated pairs depending on the time of year.

Habitat Requirements:

- **Diet:** Coyotes eat, insects, rodents, birds, rabbits, deer, small mammals, carrion, and fruit. Livestock and wild ungulates (deer, elk, pronghorn) are represented in coyote stomachs PRIMARILY as carrion. However, in some cases, coyotes have been shown to prey heavily on deer and pronghorn fawns; limiting reproductive success. In 16 studies, coyotes were responsible for 82% of all sheep losses that were due to predators, but it is important to stress that only a few flocks typically showed sizeable losses. Often it is individuals that cause large livestock losses and control of that individual is warranted. It is also important to consider that coyote predation is not the major cause of loss in many cases.
- **Water:** Water requirements for coyotes are not well documented. Much of their water requirements should be met in their **Diet**.
- **Cover:** This species is highly adaptable and is found in varied habitats and plant succession states. However, they do tend to favor areas dominated by grasses and shrubs (stages 2-4). This is probably due to higher prey densities in these areas. Den sites for raising pups are often selected in banks, ledges, or under abandoned buildings.

Wildlife Management Practices:

- **Timber:** harvest using small clear-cuts can increase prey abundance.
- **Manipulation of Succession**
Grazing management: Manage livestock grazing so that adequate cover for prey is retained.
- **Plant Trees and Plant Shrubs** (create hedgerows): Plant shrubs where cover is sparse.
- **Special:** In some instances the predatory habits of the coyote can be a problem for wildlife managers and livestock producers; therefore wildlife damage management may be necessary.



Photo Source: National Geographic



William W Dunmire, National Park Service



Click below to play sound of this species:

<http://209.85.50.7/~skookum/media/sounds/animal/coyote3.wav>

Eastern Bluebird **Western Bluebird**

(Region: Urban and Southeast)

General habitat preference:

Bluebirds are found in open habitats (stages 2 and 3) interspersed with woods and shrubs (stages 4, 5, and 6), which are used for perching and nesting (where cavities are available). Large open areas without interspersed hedgerows, fencerows, and woodlots may not receive as much use by bluebirds as those areas with more structural diversity.

Habitat requirements:

- Diet: Bluebirds primarily eat insects and spiders. Small amounts of fruit may also be eaten. Bluebirds forage in open areas, but typically near trees, shrubs or a fence that provide perches.
- Water: Bluebirds obtain necessary water from their diet but may use other water sources when available.
- Cover: Bluebirds nest in cavities of trees and fence posts. Old woodpecker cavities are especially important. Bluebirds readily nest in nest boxes, which have had a major impact in restoring bluebird populations in some areas.

Wildlife Management Practices:

- Manipulation of succession through mowing, chaining, roller beating, controlled burning, disking, and chemical application should be used to maintain and rejuvenate areas of stages 2 – 4 when habitat quality begins to decline.
- Grazing management should prevent livestock from damaging trees and shrubs planted to benefit bluebirds.
- Establish native grasses and forbs when less than 75 percent of the area is comprised of stages 2 – 4 and where non-native grasses and forbs dominate stages 2 – 3.
- Nesting structures: should be erected where scarcity of natural cavities may be limiting the bluebird population. Nest boxes should be approximately 5 feet high with an entrance hole 1½ inches in diameter. Nest boxes should be placed no closer than 80

yards apart to limit territorial fighting among males.

- Plant Trees and Plant Shrubs (create hedgerows): where needed to provide perches for bluebirds. Hedgerows may be established across open fields larger than 4 acres.
- Retain snags and down woody material: when harvesting timber or implementing timber stand improvement practices.
- Timber Management Techniques: Timber Harvest will create foraging habitat for bluebirds 1 – 3 years after harvest as the stand regenerates. This practice should be recommended in large areas of stage 6 forest where regeneration is needed. Remember, this practice is not intended to create “openings” and some mature trees may provide cavities for bluebirds.
- Use pesticides carefully in urban areas and implement wildlife damage control measures to reduce/eradicate European starlings and house sparrows as they out-compete and replace bluebirds

Eastern bluebird *Sialia sialis*

male



female



Eastern Cottontail

(Region: Southeast, Urban)

General Habitat Preference:

As their name implies, Eastern Cottontails occur in the eastern half of the country. They prefer stages 3 and 4 of plant succession. Ideally, habitat components made up of 1/3 grassland, 1/3 cropland, and 1/3 shrub cover all interspersed together. Eastern cottontails may live in urban areas as well, and may be found in parks, golf courses, and stream corridors. When overabundant, they can cause damage to ornamental and garden plants and may require wildlife damage management.

Habitat Requirements:

- Diet: A variety of forbs and grasses are eaten from spring through fall. In winter bark of shrubs and trees are often eaten.
- Water: Necessary water is obtained from Diet.
- Cover: Cottontails use thick shrub or herbaceous vegetation (stages 3 & 4) for hiding and resting cover.

Wildlife Management Practices:

- Plant food plots: Plant 1/8 to 1/4 acre annual food plots (grain sorghum is good) in areas with too little cropland; one plot per 15 acres maximum. Plant 1/8 to 1/4 acre perennial food plots (grass and clover) in areas with too little grassland, again, one plot per 15 acres maximum.
- Manipulation of Succession Brush chopping, chaining/roller beating and prescribed burns can be used to maintain or rejuvenate small areas of stage 3 and 4 vegetation. In areas dominated by mesquite, root plowing combined with the seeding of grasses and legumes may be the best way to maintain small areas in stage 3 vegetation.
Livestock grazing management to avoid use of food and cover plots, and leave ample amounts of herbaceous vegetation in other areas used by cottontails for food and cover.
- Timber Management Techniques:
Timber harvest: Clear-cut small areas (10 acres maximum) in large expanses of stage 5 and 6 woodlands.

- Plant Trees and Plant Shrubs (create hedgerows): Plant shrubs in large areas of stage 2 and 3 of plant succession, or in agricultural areas having few trees or shrubs. Plant along field borders, fence rows, or other idle land areas. This is also appropriate for open areas in urban settings.



U.S. Fish and Wildlife



Eastern Gray Squirrel

(Region: Southeast, Urban)

General habitat preference:

The eastern gray squirrel lives primarily in stage 6 deciduous forests and woodlands. They also forage along the edge of crop fields, especially harvested cornfields. These squirrels have adapted to parks and other urban areas where mature trees are available.

Habitat requirements:

- **Diet:** Squirrels eat a variety of acorns, nuts, miscellaneous seeds, grains, buds, and mushrooms. Squirrels spend most of their time foraging on the ground, but also forage in trees where they collect fruits, nuts, and buds that haven't yet fallen to the ground.
- **Water:** Water requirements are generally met through the food consumed; however, squirrels will drink free-standing water.
- **Cover:** Squirrels den in tree cavities and build nests out of leaves and twigs. Nests are generally more than 30 feet aboveground.

Wildlife Management Practices:

- **Grain:** Leave Unharvested (especially corn) so squirrels can glean waste grain from the field. This is especially important during years of poor mast production.
- **Manipulation of Succession**
Livestock grazing management should protect trees and shrubs planted for squirrels and protect woods from overgrazing.
- **Plant Trees and Plant Shrubs** (create hedgerows): to create hedgerows across large fields and in "odd areas" of crop fields that are not planted to crops. Plant mast trees where stages 5 and 6 represent less than 50 percent of the area considered and where stages 5 and 6 forest contain few or no mast-producing trees.
- **Retain snags and down woody material:** when implementing Timber Stand Improvement practices.
- **Tillage Management:** eliminate tillage in the fall, especially in cornfields adjacent to stage 5 and 6 forest.
- **Timber Management Techniques:** timber stand improvement will encourage larger crowns of mast-producing trees and enable

oaks, hickories, beech, and others to produce more mast.

- **Wildlife damage management:** may be required if squirrels become a nuisance around houses.



Eastern Gray Squirrel Drey (nest)
[Hear the sound of the Eastern Grey Squirrel](#)

Great Horned Owl

(Region: Southeast)

General habitat preference:

The great horned owl is found throughout North America in a wide variety of habitats, but mainly open stage 6 woodlands, interspersed with areas of stages 2, 3, and 4, including orchards, farm woodlots, and city parks. They are also occasionally found in rocky canyons away from forest cover. The great horned owl is nocturnal and roosts during the day in trees or on sheltered rocky ledges.

Habitat requirements:

- Diet: Great horned owls forage at night. The Diet is extremely varied, but commonly includes small- to medium-sized mammals, including rabbits, skunks, squirrels, and others, as well as reptiles, amphibians, large insects, and fish. Great horned owls rarely consume carrion.
- Water: These birds obtain necessary water from their Diet.
- Cover: Great horned owls nest in abandoned nests of hawks, crows, or herons, and in large tree cavities, crotches, stumps, caves, and ledges.

Wildlife Management Practices:

- Manipulation of succession through mowing, chaining, roller beating, controlled burning, disking, chemical application, and grazing should be used to maintain and rejuvenate areas of stages 2 – 4 when habitat quality begins to decline for a number of prey species.
- Establish native grasses and forbs when less than 25 percent of the area is comprised of stages 2 – 4 and when non-native grasses and forbs dominate stages 2 – 3.
- Plant Trees and Plant Shrubs (create hedgerows): where less than 25 percent of the area is comprised of stages 4 – 6.
- Retain snags and down woody material: when regenerating stands with Timber: Harvest and when implementing Timber Stand Improvement practices.
- Timber Management Techniques: Timber harvest should be implemented to

regenerate stands in large areas of stage 6 forest and provide additional cover for a variety of prey species.

Timber stand improvement will encourage understory development and enhance habitat for a variety of prey species.

- Wildlife damage management: may be necessary in some if owls begin to depredate free-ranging poultry.



Great Horned Owl

Click below to play sound from this species:

http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/Great_Horned_Owl.html#fig1

Hairy Woodpecker

(Region: Southeast)

General Habitat Preference:

Stages 4, 5, and 6 of plant succession are best habitat. Hairy woodpeckers will forage in areas of stage 3 of plant succession if areas with mature trees are nearby. They also use wooded urban and riparian areas.

Habitat Requirements:

- Diet: Hairy woodpeckers feed primarily on insects such as ants, beetle larvae, caterpillars, and adult beetles. The Diet is supplemented with fruits and nuts. They forage on a variety of places such as tree trunks, stumps, snags, downed logs, and the ground. Where adequate cover exists, food is usually not a limiting factor.
- Water: Not limiting, these birds probably obtain necessary water from their Diet.
- Cover: Hairy woodpeckers are cavity nesters; holes are excavated in mature and dying trees and snags for nesting. Management efforts related to cover should focus on maintaining or creating areas with large mature and dying trees, especially in open areas. Within wooded areas, create or maintain at least one large snag per acre.

Wildlife Management Practices:

- Plant Trees and Plant Shrubs (create hedgerows): primarily softwood trees. Establish corridors.
 - Manipulation of Succession
Grazing management for livestock should be done in riparian areas to maintain trees. Grazing when woody vegetation is not growing rapidly (fall and winter) usually does less damage to woody vegetation than at other times of the year.
-



Hairy Woodpecker, male



Hairy Woodpecker, female

Click below to hear sound from this species:

[Hairy woodpecker Picoides villosus](#)

Largemouth Bass

(Region: Southeast, Wetlands)

General Habitat Preference:

Ponds, lakes, and slow moving rivers.

Habitat Requirements:

- **Diet:** Young bass eat insects and other invertebrates (worms, crayfish, and zooplankton). These invertebrates depend on phytoplankton for food. Adult bass eat other small fish such as bluegill and a variety of minnows, tadpoles, and crayfish, and even ducklings.
- **Cover:** Bass are often found near submerged rocks, stumps, shrubs, and near aquatic vegetation where small fish (used for food) hide.
- **Water:** Fish need water of a certain quality. Some of the basic requirements are: dissolved oxygen - minimum of 4 parts per million (ppm); carbon dioxide - should not exceed 20 ppm; pH should range between 6.5 and 9.0; and water temperature should reach at least 70 degrees Fahrenheit sometime during the summer (one foot below surface in shade). Test the water to see if it meets requirements. Aerate pond to increase oxygen and decrease carbon dioxide.

Wildlife Management Practices:

Decrease or Increase Harvest based on seine sample results.

- **Fish or Wildlife Survey:** to determine pond balance.
- **Manipulation of Succession**
Grazing Management: Manage livestock grazing to maintain thick herbaceous vegetation surrounding the pond and in the watershed that drains into the pond. Develop livestock watering facilities away from pond or allow access to only a small part of the pond.
- **Ponds:**
Construction: Artificial reefs constructed of rock piles, sections of plastic or cement pipe (a minimum of 6 inches in diameter and 18 inches long), and brush piles and tires (sunk with weight) can be used for additional cover. These practices are recommended for

ponds larger than 10 surface acres in size.

Deepen Edges: Deepening the pond edges to 2 feet deep or more discourages rooted aquatic vegetation growth. **Fertilize:** In clear water, fertilizer may be added to increase or promote phytoplankton. Lime ponds (agricultural limestone) to increase soil pH if total alkalinity is below 20 ppm. **Reduce Turbidity:** Prevent or clear up muddy water (brown or gray color). Muddy water blocks sunlight needed in producing phytoplankton. Maintain a green color in pond water (green enough that a white disk cannot be seen 24 inches deep). The color is caused by phytoplankton (microscopic plant life-algae). Reseed watershed to establish thick herbaceous vegetation surrounding the pond in the watershed that drains into the pond.

Repair Spillway: Repair the spillway if needed and remove trees near the dam or dikes. Stop other pond leaks if and when they occur. **Restock:** Determine pond balance using a minnow seine and catch records. A bass to bluegill ratio of 3 to 6 pounds of bluegill to one pound of bass is considered a good fish population balance. If restocking is necessary, remove existing fish and restock at the appropriate rate.

- **Water Level Manipulation Techniques:** Add water control structures if needed.



Lark Bunting

(Region: Southeast)

General Habitat Preference:

This species prefers short grass prairies during the breeding season, although it is also found in mixed grass prairies. It migrates into the southern Great Plains and Mexico during winter where it is found in grasslands, deserts, shrublands, and cultivated fields. Successional stages 2-4 are primarily used by this species.

Habitat Requirements:

- Diet: Insects are an important component of the Diet of this bird when available. Seeds, some fruit, and grain are consumed as well, especially during the winter.
- Water: This species obtains necessary water from food.
- Cover: Adequate grass cover is necessary for the species, particularly during the nesting season. This species nest on the ground primarily in native prairie.

Wildlife Management Practices:

- Manipulation of Succession (ideally with prescribed fire) is an important component of maintaining native prairie habitat for this and many other grassland birds. This ensures both adequate cover and food resources. Grazing management for livestock should be implemented so that adequate nesting habitat exists for this species.
- Establishment of Native Grasses and Forbs may be necessary where large prairie conversions have taken place.
- Harvest Timing of hay until after nesting is complete is beneficial.



Click below to play sound from this species:

http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/Lark_Bunting.html#fig1

Mallard (Winter Habitat)

(Region: Southeast)

In some areas, large flocks of mallards can be a nuisance; therefore wildlife damage management may be necessary.

General Habitat Preference:

Mallards prefer to spend the winter in wetlands that contain all 4 Wetland stages including Stage 1 (open water) and Stage 4 (harvested grain crops). In addition, riparian areas with open water may be used. Mallards are an example of a dabbling duck. These birds feed at or near the surface of the water by filtering food items such as invertebrates, seeds and other plant materials from the water. Dabbling ducks are often seen tipping upside down in the water to reach food at the bottom of a pond. Unlike diving ducks, they feed in much shallower water and will not dive under to obtain food.

Habitat Requirements:

- **Diet:** Mallards feed on a variety of plant and animal matter; preferred foods include waste grain from agriculture, aquatic plants, and invertebrates. Mallards will fly long distances to feed; however, the closer the food is to protective cover the more valuable and useful it becomes.
- **Water:** Mallards use water as described above.
- **Cover:** Mallards rest on open water bodies such as streams, rivers, and warm-water sloughs that are not frequently disturbed. They also rest on the ice in the middle of lakes.

Wildlife Management Practices:

- **Tillage Management:** eliminate fall tillage so as to provide waste grain in the winter.
- **Grain:** leave unharvested.
- **Water Level Manipulation Techniques:** Small Dikes for Temporary Flooding of grain fields, planted food plots, and oak woodlands in winter.
- **Plant food plots:** In the Hot Desert Region, planting food plots is beneficial if adequate moisture is available.

- **Ponds:**
Construction: reservoirs, and warm-water sloughs.
- **Water Developments for Wildlife:** dugouts and catchment ponds constructed for livestock drinking are also used for resting.
- **Manipulation of Succession**
Grazing management: livestock should be managed so that some cover is retained in shallow areas.
- Keep human disturbance to a minimum.



Mallard, adult male, breeding plumage



Mallard female



Click below to hear sound from this species:

<http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/Mallard.html#fig1>

Mourning Dove

(Region: Southeast)

General Habitat Preference:

Mourning doves may be found over much of the lower 48 states. They prefer stages 2 and 3 of plant succession for feeding with some shrubs and trees nearby for roosting.

Habitat Requirements:

- **Diet:** Mourning doves often use agriculture areas for feeding and a variety of grass and forb seeds. They will forage on waste grain from cropland and livestock feed lots. In addition, small areas of bare ground are also beneficial for the birds to obtain grit (small gravel) to help in digesting food.
- **Water:** Mourning doves require water daily. They prefer shorelines and banks without vegetation.
- **Cover:** Mourning doves prefer tall shrubs and trees for nesting and loafing. Nests are made of twigs placed on branches of shrubs or trees. Nests are also placed on the ground.

Wildlife Management Practices:

- **Tillage Management.**
Grain: leave unharvested for a variety of small grain crops such as wheat, barley, millet, milo, or oats.
- **Manipulation of Succession** Disk areas to provide bare ground; Brush Chop, Chain/Roller Beat small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 4 vegetation; prescribed burning of small areas (40 acres maximum, 10 to 20 acres preferred) in large areas of stage 4 and 5 of plant succession.
Livestock grazing management can be used to keep some areas in stage 2 and 3 vegetation.
- **Plant Food Plots:** in areas lacking grain.
- **Timber Management Techniques:**
Timber harvest - Clear-cut small areas (40 acres maximum, 10 to 20 acres preferred) in large areas of stage 5 and 6 woodland.
- **Water Developments for Wildlife:** where water is limited or absent, development of water sources is desirable. Some examples are: catchment ponds, guzzlers, windmills.

- **Plant Trees and Plant Shrubs** (create hedgerows): in large areas of stage 2 and 3 of plant succession or in agricultural areas having few trees or shrubs. Plant on field borders, along fence rows, or on any other idle land area.
- **Nesting structures:** Mourning doves often construct loose, flimsy nests. High winds and rainstorms often destroy many of them. To provide secure nesting sites, wire cone nesting structures can be placed where tree limbs fork 6 to 15 feet above the ground. This practice is most useful in regions where high winds and large open areas are common.



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Mourning Dove, adult male



© Kevin T. Karlson

Mourning Dove, female



© Gregg Lee

Mourning Dove nest

Click below to hear sound from this species:

[Mourning dove](#)

Northern Bobwhite

(Region: Southeast)

General Habitat Preference:

Stages 2, 3, and 4 of plant succession interspersed. Ideally, habitat components are made up of scattered patches of shrubby cover with diverse native stands of grass and forbs. Bunch grasses such as bluestems are used for nesting cover, while more recently disturbed sites that are rich in forbs and insects are used for brood rearing. In some parts of the country savannah habitat provides excellent habitat. This savannah forest (stage 5 or 6) should consist of very few trees with an understory of grass and forbs maintained by frequent fire (2-4 years). This savannah may be pine (as in the Southeast Mixed and Outer Coastal Plain Forest), or oak (as in the Cross Timbers portion of the Great Plains). Some agricultural crops can provide seasonal food for bobwhite quail, but they are no substitute for diverse native plant communities.

Habitat Requirements:

- **Diet:** Young quail eat insects. Adult quail eat a variety of seeds, green vegetation (mostly forbs), insects, and small grains.
- **Water:** Bobwhites do not require free-standing water. They obtain all water from native vegetation.
- **Cover:** Thick shrubs for hiding and roosting cover; dense perennial grasses for nesting.

Wildlife Management Practices:

- **Manipulation of Succession**
Prescribe burn small areas (40 acres or less) in large expanses of stage 3 and 4 vegetation. Annual burning in stage 5 and 6 woodlands is also beneficial to create savannah habitat. Prescribed burning is the most important tool for quail management and should be used if possible; disk small areas in large expanses of stage 3 and 4 to encourage annual forbs and grasses used by bobwhite. Disking should be avoided in native rangelands. Fire will encourage similar plant communities without soil disturbance and at a lower cost; brush chop, chain, root plow, or roller beat small areas (40 acres or less) in large expanses of stage 4 vegetation.

- **Grazing management:** Keep livestock from grazing planted food plots. Ample amounts of herbaceous vegetation used for food by quail should be left in appropriate areas. This is especially important in riparian areas. Livestock grazing also can be used to revert or maintain vegetative succession in stages 2 and 3 vegetation. Livestock management should be used to encourage a uniform structure of plants across the landscape so that all the seasonal needs of quail are met. Uniform clipping of vegetation by cattle across large areas leaves no nesting cover and does not encourage annual forb production. Cattle grazing in combination with prescribed burning is good quail management strategy that mimics historic natural disturbance events. Manage livestock grazing to maintain dense shrub and herbaceous cover in some areas. However, up to 1/3 of an area can be grazed more intensively to encourage annual forb production for brood habitat assuming that the same areas are not repeatedly grazed the same way. In other words, grazing pressure should be rotated over time.
- **Harvest Timing:** Time haying to protect nesting areas in May and June.
- **Grain:** leave unharvested - Leave some grain unharvested in agricultural areas.
- **Tillage Management:** Eliminate fall tillage.
- **Plant food plots:** Plant 1/8 to 1/4 acre perennial food plots in areas with too little permanent food and cover, again, one plot per 15 acres maximum.
- **Timber Management Techniques:** Timber harvest - Clear-cut small areas (small 40 acre patches or strips) in large expanses of stage 5 and 6 woodland; selective-cut stage 6 woodlands.
- **Establish native grasses and forbs** if they are absent. Often, the use of fire will release native seeds so that reseeding is not necessary.
- **Plant Trees and Plant Shrubs** (create hedgerows): in areas where cover is scarce. If shrub patches are within 30-75 m of each other, additional shrub cover is not needed.



Male



Female

Click below to play sound from this species:

[Northern bobwhite](#)

Raccoon

(Regions: Southeast, Wetlands, Urban)

General Habitat Preference:

Raccoons are very common throughout most of the United States except in certain parts of the Rocky Mountains, Nevada, Utah, and Arizona. Raccoons are most abundant near water, riparian areas and lands adjacent to wetlands. They are also found in urban areas. They prefer areas interspersed with different successional stages. Riparian areas in stages 5 and 6 of plant succession are ideal. Raccoons nest in hollow trees, underground dens, or in chimneys, attics, and crawl spaces of houses and buildings. They are omnivorous and eat a wide range of foods.

Raccoons can become pests in urban areas and in wetlands where waterfowl nesting is important. In such instances, the management objectives may be to make the habitat less suitable for raccoons. They are also major predators of quail and turkey nests in the southeast. Wildlife damage management may be necessary.

Habitat Requirements:

- **Diet:** Raccoons eat a wide variety of foods consisting of garbage, birds, eggs, fish, small mammals, insects, crayfish, grains, seeds, fruits, and foods prepared for human and pet consumption.
- **Water:** Raccoons require water frequently during warm seasons.
- **Cover:** Raccoons nest and rest during the day in natural tree cavities, dens in the ground, underbrush and junk piles, in old abandoned buildings, and rocky cliffs and ledges.

Wildlife Management Practices:

- **Manipulation of Succession**
Prescribed burns and brush chopping can be used to rejuvenate old decadent wetland vegetation. These practices along with chaining, roller beating and root plowing can be used to revert succession from stages 5 and 6 vegetation to stages 2, 3, and 4 in appropriate regions.
Grazing management: Manage livestock grazing to maintain healthy vegetation along the banks and shores of streams, rivers, and

other wetlands. In some regions this may include the development of livestock watering facilities in uplands to discourage congregation in and overuse of riparian areas.

- **Water Level Manipulation Techniques:**
Water control structures: Control water levels with water control structures. Provide areas in wetland with water less than 2 feet deep where aquatic emergent vegetation can grow. Provide shallow water areas in existing ponds and wetlands where emergent vegetation can grow.
- **Ponds:**
Construction: Ponds and wetlands can be constructed with shallow water areas where emergent aquatic vegetation can grow.
- **Grain:** leave unharvested: Leave small areas of grain crops adjacent to woodlands unharvested.
- **Plant food plots:** Plant annual food plots to grains.
- **Timber Management Techniques:**
Timber harvest: Clear-cut small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 5 and 6 vegetation. Selective-cut timber management.
- **Plant Trees and Plant Shrubs** (create hedgerows): Plant and maintain large deciduous trees especially in riparian areas and areas adjacent to wetlands. Maintain corridors. Riparian buffers.
- **Water developments for wildlife:** Provide pools of water in urban areas.
- **Wildlife damage management:** may be necessary if raccoons invade garbage cans, occupy residences or buildings, or cause depredation of poultry. Exclusion is a cost-effective management practice. Harassment can be effective. Cultural modification like using wildlife-proof trash cans is very effective. Trap and relocate or trap and euthanize is effective for problem raccoons



[Hear the sound of the Raccoon](#)

Photo Source: National Geographic

Red-eyed Vireo

(Region: Southeast)

General Habitat Preference

Associated with stages 5 and 6 of plant succession. The red-eyed vireo inhabits open deciduous and mixed forests with dense understory of saplings, in wooded clearings, or borders of burns. It is found in both upland and river bottom forests and sometimes in residential areas where abundant shade trees provide a continuous canopy. It is seldom found where conifers make up 75 percent or more of the basal area.

Habitat Requirements:

- Diet: Mainly insects gleaned from leaf surfaces in mid to upper tree canopies. The red-eyed vireo also eats spiders, a few snails, wild fruits, and berries.
- Water: They obtain necessary water from Diet.
- Cover: These birds nest in deciduous or coniferous trees or shrubs. They suspend deep cup nests from a horizontal fork of a slender branch, usually in dense foliage five to ten feet above the ground, but sometimes as high as 60 feet.

Wildlife Management Practices:

- Timber Management Techniques:
Timber Harvest: Selective-cut forest management in large expanses of stage 6 woodland can increase the amount of insects.
 - Manipulation of Succession
Grazing management: Livestock grazing has little or no effect on this species.
 - Plant Trees and Plant Shrubs (create hedgerows): in large areas of stages 3 and 4 of plant succession.
-



Red-eyed Vireo adult



Bird in Nest

Click below to play sound from this species:

[Red-eyed vireo Vireo olivaceus](#)

White-tailed Deer

(Region: Southeast)

General Habitat Preference:

White-tailed deer occur in the eastern two-thirds of the country. They prefer stages 3, 4, and 5 of plant succession, all interspersed together.

White-tailed deer can be a nuisance when their habitat and home range overlap areas occupied by people. Therefore, wildlife damage management techniques apply in some cases.

Habitat Requirements:

- **Diet:** White-tailed deer prefer a variety of shrubs, forbs, grasses, and waste grain. Acorns and nuts from mast trees are favorite foods. In the northern parts of the range for white-tailed deer, they will browse on conifer trees in the winter.
- **Water:** White-tailed deer drink free water when it is available. They obtain most of their water from food items. Water developments are especially important in more arid regions.
- **Cover:** White-tailed deer use woodlands and tall shrubs for hiding and travel cover. They also use tall emergent aquatic vegetation in riparian areas and brushy upland drainages for cover in the Great Plains Grassland Region.

Wildlife Management Practices:

- **Timber Management Techniques:**
Timber harvest: Clear-cut small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 5 and 6 woodlands. Selective-cut timber management of stage 5 and 6 woodlands.
- **Plant food plots:** Plant several one acre perennial food plots of grass and clover in large expanses of stage 5 and 6 woodland. Plant annual food plots to grain.
- **Grain:** leave unharvested: in small areas of cropland adjacent to woodlands.
- **Tillage management:** eliminate fall tillage of grain crop residue adjacent to woodlands. Establish native grasses and forbs: in fields in large expanses of stage 4, 5, and 6 vegetation.
- **Manipulation of Succession**
Prescribed burning at three-year intervals in

stage 5 pine woodlands or periodically in stage 3 and 4 vegetation. Brush chop, chain/roller beat small areas to maintain stage 3 and 4 vegetation. In areas dominated by mesquite, root plowing combined with the seeding of grasses and legumes may be the best way to maintain small areas in stage 3 vegetation.

Livestock grazing management should be used to leave some forbs, grasses, shrubs, and trees available for food and cover. This is particularly important in riparian areas in the Great Plains Grassland Region.

- **Ponds:**
Construction: You may need to include the development of livestock watering facilities in upland areas to discourage congregation of livestock and overuse in riparian areas. This is the only situation where you would construct ponds.
- **Water Level Manipulation Techniques:**
Control water levels with water control structures, or use small dikes for temporary flooding of areas to encourage the growth of tall emergent aquatic vegetation.
- **Plant Trees and Plant Shrubs** (create hedgerows): in ravines, along field borders, and other idle land areas. Provide corridors for travel lanes in open areas.
- **Harvest Timing:** of crops and hay so that fawning sites are not disturbed.
- **Special:** Deer can seriously degrade habitat when overpopulated. Increasing or Decreasing Harvest is essential for proper management.



[Hear the sound of the White-tailed Deer](#)



Wild Turkey

(Region: Southeast)

General habitat preference:

Wild turkeys are found in a wide variety of forest types across the U.S. They are limited only by tree cover for roosting. Optimum habitat composition may be one third to one half in stage 6 forest containing an abundance of hard- and soft-mast producers, well interspersed with stages 2, 3, and 4.

Habitat requirements:

- Diet: Wild turkeys eat a wide variety of acorns, nuts, miscellaneous seeds, insects and other invertebrates, soft mast, and waste grain (especially corn and wheat).
- Water: Wild turkeys obtain water from their Diet, but will use free-standing water when available.
- Cover: Wild turkeys nest in mature forest, regenerating forest, brushy thickets, and old-fields with rank cover. The nest is a shallow depression on the ground lined with leaves and/or grass. It is usually well concealed amongst vegetation or against some object (e.g., a tree, log or brush). Wild turkeys roost in trees or tall shrubs (if no trees are present) at night.

Wildlife Management Practices:

- Manipulation of succession through mowing, chaining, roller beating, controlled burning, disking, chemical application, and grazing should be used to maintain and rejuvenate areas of stages 2 – 4 when habitat quality begins to decline.
- Livestock grazing management should prevent livestock from degrading habitat by overgrazing and damaging trees and shrubs planted to benefit wild turkeys.
- Establish native grasses and forbs: where less than one quarter of the area is comprised of stages 2 and 3 and where non-native grasses and forbs dominate stages 2 and 3.
- Grain: Leave Unharvested (especially corn): so wild turkeys can glean waste grain from the field. This is especially important during years of poor mast production.

- Plant food plots where grain crops and quality forages (such as clovers) are lacking to provide a supplemental food source and additional areas for brood rearing.
- Plant Trees and Plant Shrubs (create hedgerows): where additional soft mast is needed and to develop hedgerows across fields greater than 4 acres. Plant mast trees where stages 5 and 6 represent less than one third of the area considered and where stages 5 and 6 contain few or no mast-producing trees.
- Tillage Management: Eliminate in the fall to provide additional waste grain, especially adjacent to stages 5 and 6 cover.
- Timber Management Techniques: Timber harvest methods in large areas of stage 6 can enhance nesting habitat, provide additional brood cover, soft mast, and miscellaneous seed for 2 – 3 years after harvest. Timber stand improvement practices can be used to improve the structure of the understory for nesting and brood rearing, increase production of soft mast and miscellaneous seed, and enable the crowns of desired trees to grow and produce additional mast.
- Water developments for wildlife: can be useful when there is little or no free-standing water on the property. Wildlife damage management: may be necessary in rare instances when wild turkeys.



Male displaying



Female

Click below to play sound from this species:

http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/Wild_Turkey.html#fig1

Wood Duck

(Regions: Southeast, Wetlands)

General habitat preference:

Wood ducks are primarily found along rivers and large creeks within bottomland hardwood forests, stage 3 wetlands and swamps with emergent woody vegetation adjacent to stage 2 wetlands, and shallowly flooded stage 5 and 6 hardwood forest.

Habitat requirements:

- **Diet:** Acorns are the primary Diet item of wood ducks in fall and winter. They also eat other nuts, various miscellaneous seeds and fruits, as well as waste grain (especially corn), all depending upon availability. Insects and other invertebrates are most important for wood duck chicks and hens prior to and during the nesting season.
- **Water:** Wood ducks spend most of their lives in water, drink regularly, and obtain water through their Diet.
- **Cover:** Wood ducks nest in tree cavities in stage 6 hardwood forest. Usually, nest sites are within or adjacent to flooded timber; however, wood ducks have been known to nest up to 1 mile from water. Cavity availability is critical. Thus, artificial cavities are readily used by wood ducks and have been, most likely, the number one reason for the increase in wood duck populations over the past 50 years. Nest boxes for wood ducks should be at least 100 yards apart and should not be placed within sight of each other if possible.

Wildlife Management Practices:

- **Grain:** Leave unharvested: to provide additional food source for wood ducks. This is especially important in fields that can be flooded and those adjacent to a water source used by wood ducks.
- **Livestock management** should prevent livestock from overgrazing in woodlots and protect trees and shrubs planted for wood ducks.
- **Nesting structures:** nest boxes should be erected where suitable habitat for wood ducks exist or where planned.

- **Plant Trees and Plant Shrubs** (create hedgerows): where there is a lack of emergent woody vegetation in open areas that can be flooded to create more usable space for wood ducks. Plant mast trees adjacent to or within open areas that are suitable for flooding if there is a lack of mast-producing trees in areas that can be flooded.
- **Retain snags and down woody material:** when implementing Timber Stand Improvement to provide potential cavity nesting sites.
- **Timber Management Techniques:** Timber stand improvement practices in bottomland hardwoods that can be flooded can lead to larger crowns of favored trees and increased mast production. Woody stem density should increase following TSI and improve cover for wood ducks in those stands that can be flooded.
- **Water Level Manipulation Techniques:** water control structures should be installed in existing dikes if there are none present. Water developments for wildlife, specifically shallow impoundments, should be created where topography allows to create feeding and nesting space for wood ducks.



Wood Duck, male, breeding plumage



Wood Duck, female

Click below to play sound from this species:

[Wood duck](#)

Urban



Denver Museum of Nature & Science

Physical Description:

According to the United States Census Bureau, 80% of the American population lived in or near an urban area as of 2005. The Census Bureau defines an urban area as a large central place with a total population of at least 50,000. In addition to a sizeable human population, urban areas are characterized by residential and commercial development connected and criss-crossed by infrastructure like roads, train tracks, and utilities. Areas like neighborhood parks offer the best example of contiguous wildlife habitat within an urban environment.



Sisters, Oregon

Dominant Vegetation:

Because urban areas are found in all regions of the United States, it is difficult to identify dominant vegetation that is common across all regions. However, urban regions typically contain stage 1 in the form of bare ground and paved areas, annuals (stage 2) and perennials (stage 3), mostly in the form of forbs, flowers, and grass, shrubs (stage 4), and young (stage 5) and mature (stage 6) trees. The vegetation is as likely to be an introduced species as it is a native species. Additionally, vegetated areas are typically manipulated in a landscaped manner versus “letting nature take over” as in rural areas. Interspersion is an important concept to understand in urban areas due to the fragmented landscape from residential and commercial development.

Species Recommended for Judging:

- American Robin
- Big Brown Bat
- Bluebirds
- Butterflies
- Common/Lesser Nighthawk
- Cottontails
- European Starling
- Frogs
- Gray Squirrel
- House Finch
- House Sparrow
- House Wren
- Hummingbird
- Northern Flicker
- Raccoon
- Rock Dove
- Song Sparrow



Photo Courtesy of
elkrose.com

Urban	American Robin	Big Brown Bat	Bluebirds	Butterflies	Common/Lesser Nighthawk	Cottontails	Eastern Gray Squirrel	European Starling	Frogs	House Finch	House Sparrow	House Wren	Hummingbird	Northern Flicker	Raccoon	Rock Dove	Song Sparrow
Aquatic Plant									x								
Bark						x	x										
Birds															x		
Buds						x	x			x	x						
Carrion																	
Centipedes & Millipedes	x		x				x	x	x			x		x			x
Crayfish									x						x		
Earthworms	x		x					x	x		x	x		x	x		
Eggs							x		x						x		
Ferns																	
Fish															x		
Forbs						x					x						
Frogs & Salamanders									x						x		
Fungi							x										
Grain						x	x	x			x				x	x	
Grass						x											
Hard Mast							x								x		
Insects	x	x	x		x		x	x	x	x	x	x	x	x	x		x
Leaves & Twigs						x											
Lichens																	
Lizards															x		
Mammals															x		
Mussels															x		
Nectar				x									x				
Scorpions																	
Seeds						x	x	x		x	x			x	x	x	x
Snails								x	x						x		
Snakes									x						x		
Soft Mast	x		x	x		x	x	x		x	x			x	x		x
Spiders	x		x					x	x		x	x		x			x
Tubers																	
Turtles									x								

Urban	American Robin	Big Brown Bat	Butterflies	Com/Less Nighthawk	Cottontail	Eastern Bluebird	Eastern Gray Squirrel	European Starling	Frogs	House Finch	House Sparrow	House Wren	Hummingbirds	Northern Flicker	Raccoon	Rock Dove	Song Sparrow
3. Establish Native Grasses and Forbs					X	X											
4. Fish / Wildlife Survey	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7. Manipulation of Succession	X			X	X	X				X			X	X		X	
8. Nesting Structures		X	X	X		X	X					X				X	
10. Plant Trees							X										
11. Plant Shrubs (Create Hedgerows)	X	X			X	X	X			X		X		X	X		
12. Pond Construction									X								
14. Ponds: Fertilize									X								
16. Ponds: Repair Spillway									X								
19. Riparian Buffers		X			X				X						X		X
21. Streams: Dams, Boulders, or Logs									X								
25. Water Level Manipulation Techniques									X								
27. Wildlife Damage Management		X			X		X	X			X			X	X	X	
U1. Artificial Feeders			X			X	X			X			X	X		X	X
U2. Do Not Disturb Nesting Sites	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X
U4. Plant Flowers			X										X				
U3. Mowing	X			X	X	X				X			X	X		X	X
U5. Plant Food Plots			X		X								X		X		
U6. Rooftop / Balcony gardens			X	X									X				
U7. Use pesticides carefully	X	X	X	X		X			X	X		X		X			X

American Robin

(Region: Urban)

General Habitat Preference:

Robins use a wide assortment of habitats, from open and mowed grassy areas (Stage 2) to forested areas (Stage 6). In urban settings, robins use large open areas and nearby trees and shrubs. Parks, golf courses, and lawns in residential areas are favorite places to inhabit. Robins are found throughout North America, although they may migrate out of northern latitudes during winters with sustained cold and snow. Robins build a nest of grasses and mud on a limb of woody vegetation, but will occasionally nest on building ledges. Robins spend a considerable amount of time on the ground feeding on earthworms, but will also perch on branches to eat berries, fruit, and insects.

Habitat Requirements:

- Diet: Insects and worms in warm seasons. Fruits and berries from shrubs and trees in winter. Do not often use artificial feeders.
- Water: Robins require water daily in warm seasons. They obtain water from yard irrigation, grain-filled gutters, low-lying areas, ponds, etc.
- Cover: Nesting sites and hiding areas in shrubs, evergreen trees, and broad-leaf trees. Evergreen trees are preferred for early nests. Robins will use nesting platforms.

Wildlife Management Practices:

- Plant Trees and Plant Shrubs (create hedgerows): that produce fruit and berries in all 4 seasons. Examples include sumac, Nanking cherry, golden currant, and winterberry. Include some evergreen trees in plantings.
- Manipulation of Succession mow areas to provide short grass and forbs and use insecticides only when necessary. Nesting Structures: provide platforms in areas lacking nest sites.
- Water Developments for Wildlife: Birdbaths and pans of water can be provided. Do not place water in areas where cats and other pets can catch the birds.



Click below to play sound from this species:

http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/American_Robin.html#fig1

Robin (click for sound)

Big Brown Bat

(Region: Urban)

General Habitat Preference:

Big brown bats are 1 of 46 bat species found in North America. They inhabit nearly all of the United States, except for south Florida and south-central Texas, and utilize a variety of habitats, ranging from farmland (stage 2) to deciduous forests (stage 6). Big brown bats are very common in urban areas, including cities, parks, and suburban neighborhoods, and frequently use buildings and houses for summer roosts and winter hibernaculums. Big brown bats are insectivores. Females usually give birth to 1-2 pups in a maternity colony, often situated in a building. Big brown bats, as with all other bat species, are nocturnal and are the only truly flight-capable mammals.

Habitat Requirements:

- **Diet:** Big brown bats are insectivores. Most of their diet consists of night-flying insects, especially beetles. Lactating females will eat their weight in insects daily. Big brown bats hibernate in the winter in northern latitudes and therefore do not actively feed during winter months but instead rely on stored fat reserves.
- **Water:** Big brown bats will drink “on-the-wing” by dipping their lower jaw into a water source. Big brown bats require Water daily when they are active.
- **Cover:** Big brown bats need cover for day-time roosting, hibernation, and birthing pups. Day-time roosting and hibernation generally occurs in the attic of a building or house. To a lesser extent, day-time roosting may occur in hollow trees, and hibernation may occur in caves, mines, and other areas that offer protection from predators and inclement weather. Bat houses also provide necessary roosting cover. Male and female bats often do not roost together. Males and females may roost individually or in small numbers, but larger numbers of females may roost together in a maternity roost during the time that the pups are born and nursing.

Wildlife Management Practices:

- **Manipulation of Succession** to maintain some open areas for bats to forage.
- **Plant Trees and Plant Shrubs** (create hedgerows): to promote growth of deciduous trees to stage 5 and 6 for roosting and foraging sites.
- **Retain Snags and Down Woody Material:** Bats will use snags for roosting. Only leave snags standing in areas where they pose no danger to human structures or human health if they fall.
- **Water Developments for Wildlife:** in areas where available water is not present. Any water developments established for bats should be constructed with nothing above the water (for example, fencing or bracing) so bats have an unobstructed flight path to and from the water source.
- **Wildlife Damage Management:** may be necessary to rid bats from structures occupied by humans.
- **Do Not Disturb Nesting Places:** Big brown bats should not be disturbed or excluded from roosting areas from May-July in order to avoid disturbing or separating lactating females from their pups.
- **Use Pesticides Carefully:** as bats rely on a variety of insects for their food.



<http://www.shockwave-sound.com/sound-effects/bat%20sounds/big-brown-bat-search.wav>

Eastern Bluebird **Western Bluebird**

(Region: Urban and Southeast)

General habitat preference:

Bluebirds are found in open habitats (stages 2 and 3) interspersed with woods and shrubs (stages 4, 5, and 6), which are used for perching and nesting (where cavities are available). Large open areas without interspersed hedgerows, fencerows, and woodlots may not receive as much use by bluebirds as those areas with more structural diversity.

Habitat requirements:

- **Diet:** Bluebirds primarily eat insects and spiders. Small amounts of fruit may also be eaten. Bluebirds forage in open areas, but typically near trees, shrubs or a fence that provide perches.
- **Water:** Bluebirds obtain necessary water from their diet but may use other water sources when available.
- **Cover:** Bluebirds nest in cavities of trees and fence posts. Old woodpecker cavities are especially important. Bluebirds readily nest in nest boxes, which have had a major impact in restoring bluebird populations in some areas.

Wildlife Management Practices:

- **Manipulation of succession** through mowing, chaining, roller beating, controlled burning, disking, and chemical application should be used to maintain and rejuvenate areas of stages 2 – 4 when habitat quality begins to decline.
- **Grazing management** should prevent livestock from damaging trees and shrubs planted to benefit bluebirds.
- **Establish native grasses and forbs** when less than 75 percent of the area is comprised of stages 2 – 4 and where non-native grasses and forbs dominate stages 2 – 3.
- **Nesting structures:** should be erected where scarcity of natural cavities may be limiting the bluebird population. Nest boxes should be approximately 5 feet high with an entrance hole 1½ inches in diameter. Nest boxes should be placed no closer than 80

yards apart to limit territorial fighting among males.

- **Plant Trees and Plant Shrubs** (create hedgerows): where needed to provide perches for bluebirds. Hedgerows may be established across open fields larger than 4 acres.
- **Retain snags and down woody material:** when harvesting timber or implementing timber stand improvement practices.
- **Timber Management Techniques:** Timber Harvest will create foraging habitat for bluebirds 1 – 3 years after harvest as the stand regenerates. This practice should be recommended in large areas of stage 6 forest where regeneration is needed. Remember, this practice is not intended to create “openings” and some mature trees may provide cavities for bluebirds.
- **Use pesticides carefully** in urban areas and implement wildlife damage control measures to reduce/eradicate European starlings and house sparrows as they out-compete and replace bluebirds

Eastern bluebird *Sialia sialis*

male



female



Butterflies

(Region: Urban)

General Habitat Preference:

There are hundreds of butterfly species in America that occupy nearly every ecotype available. In urban areas butterflies are found in gardens, yards, and parks planted with shrubs and flowers that attract butterflies. They often lay eggs on a specific kind of plant. They eat food in liquid form.

Habitat Requirements:

- **Diet:** Usually consists of sweet liquids such as nectar from flowers.
- **Water:** Some butterflies can be seen collecting on moist sand or mud around water puddles.
- **Cover:** Butterflies need shelter from wind. Plant the above in areas sheltered from the wind.

Wildlife Management Practices:

- **Plant Trees and Plant Shrubs** (create hedgerows): Plant and maintain bushes and flowers that attract butterflies. Some examples are aster, verbena, zinnia, marigold, lilac, bush cinquefolia, and butterfly plant.
- **Plant flowers:** Plant and maintain specific types of plants for butterflies to lay eggs on: dogbanes, milkweeds, asters, goldenrods, wintercress, vetches, blackberries, sunflowers, iron weed, and verbenas. Rooftop and balcony gardens planted with some of the plants mentioned above may attract butterflies.
- **Use pesticides carefully.**
- **Water developments for wildlife:** Providing an area with shallow water puddles may attract groups of these butterflies.



'Astyanax' Red-spotted Purple



Monarch



Red Admiral



Zebra Swallowtail



Pearl Crescent

Common/Lesser Nighthawk

(Region: Urban)

General Habitat Preference:

Common and Lesser Nighthawks use bare ground (Stage 1) for nesting. Stages 2 and 3 of plant succession interspersed with areas in stages 4 and 5 of plant succession are used for foraging and cover. Common Nighthawks are found throughout the United States during the breeding season, but migrate to South America during the winter. Common Nighthawks are common visitors to grasslands, open woodlands, cities, and towns. In cities and towns they are often seen flying over city parks and other open areas in late evening and early morning. Lesser Nighthawks are found primarily in the southwestern United States (New Mexico, Arizona, and Texas) during breeding and will migrate further south during winter months. Lesser Nighthawks inhabit rivers, ponds, and arid scrub areas. Common Nighthawks nest on the ground on gravel and bare soil areas common in fields or on rooftops. Lesser Nighthawks nest on the ground in desert and arid areas or on canyon ledges. Both species are nocturnal and feed “on the wing” on flying insects.

Habitat Requirements:

- Diet: These birds eat flying insects captured on the wing. Flying ants, mosquitoes, moths, and June bugs are examples.
- Water: Nighthawks do not drink water often. They obtain ample water from their diet, but water sources will attract insects, which provide food for nighthawks.
- Cover: They do not build nests, but lay their eggs on the ground, often gravelly or sandy, and on flat roofs of buildings. Riparian areas, ridge tops, and other places with numerous sand and gravel areas are favorite nesting locations.

Wildlife Management Practices:

- Manipulation of succession use insecticides only when necessary. Carefully follow the directions on the label; mow areas to provide short grasses and forbs; leave areas with no vegetation for nesting.

- Do not disturb nesting sites: nesting season for the nighthawk, May through June. Stay off roof tops that are used for nesting.
 - Plant trees and Plant Shrubs (create hedgerows): to provide stage 4 and 5 vegetation.
-

http://www.birds.cornell.edu/AllAboutBirds/audio/Common_Nighthawk.html



Eastern Bluebird **Western Bluebird**

(Region: Urban and Southeast)

General habitat preference:

Bluebirds are found in open habitats (stages 2 and 3) interspersed with woods and shrubs (stages 4, 5, and 6), which are used for perching and nesting (where cavities are available). Large open areas without interspersed hedgerows, fencerows, and woodlots may not receive as much use by bluebirds as those areas with more structural diversity.

Habitat requirements:

- Diet: Bluebirds primarily eat insects and spiders. Small amounts of fruit may also be eaten. Bluebirds forage in open areas, but typically near trees, shrubs or a fence that provide perches.
- Water: Bluebirds obtain necessary water from their diet but may use other water sources when available.
- Cover: Bluebirds nest in cavities of trees and fence posts. Old woodpecker cavities are especially important. Bluebirds readily nest in nest boxes, which have had a major impact in restoring bluebird populations in some areas.

Wildlife Management Practices:

- Manipulation of succession through mowing, chaining, roller beating, controlled burning, disking, and chemical application should be used to maintain and rejuvenate areas of stages 2 – 4 when habitat quality begins to decline.
- Grazing management should prevent livestock from damaging trees and shrubs planted to benefit bluebirds.
- Establish native grasses and forbs when less than 75 percent of the area is comprised of stages 2 – 4 and where non-native grasses and forbs dominate stages 2 – 3.
- Nesting structures: should be erected where a scarcity of natural cavities may be limiting the bluebird population. Nest boxes should be approximately 5 feet high with an entrance hole 1½ inches in diameter. Nest boxes should be placed no closer than 80

yards apart to limit territorial fighting among males.

- Plant Trees and Plant Shrubs (create hedgerows): where needed to provide perches for bluebirds. Hedgerows may be established across open fields larger than 4 acres.
- Retain snags and down woody material: when harvesting timber or implementing timber stand improvement practices.
- Timber Management Techniques: Timber Harvest will create foraging habitat for bluebirds 1 – 3 years after harvest as the stand regenerates. This practice should be recommended in large areas of stage 6 forest where regeneration is needed. Remember, this practice is not intended to create “openings” and some mature trees may provide cavities for bluebirds.
- Use pesticides carefully in urban areas and implement wildlife damage control measures to reduce/eradicate European starlings and house sparrows as they out-compete and replace bluebirds

http://www.birds.cornell.edu/AllAboutBirds/audio/Eastern_Bluebird1.html

male



female



Eastern Cottontail

(Region: Southeast, Urban)

General Habitat Preference:

As their name implies, Eastern Cottontails occur in the eastern half of the country. They prefer stages 3 and 4 of plant succession. Ideally, habitat components made up of 1/3 grassland, 1/3 cropland, and 1/3 shrub cover all interspersed together. Eastern cottontails may live in urban areas as well, and may be found in parks, golf courses, and stream corridors. When overabundant, they can cause damage to ornamental and garden plants and may require wildlife damage management.

Habitat Requirements:

- Diet: A variety of forbs and grasses are eaten from spring through fall. In winter bark of shrubs and trees are often eaten.
- Water: Necessary water is obtained from Diet.
- Cover: Cottontails use thick shrub or herbaceous vegetation (stages 3 & 4) for hiding and resting cover.

Wildlife Management Practices:

- Plant food plots: Plant 1/8 to 1/4 acre annual food plots (grain sorghum is good) in areas with too little cropland; one plot per 15 acres maximum. Plant 1/8 to 1/4 acre perennial food plots (grass and clover) in areas with too little grassland, again, one plot per 15 acres maximum.
- Manipulation of Succession Brush chopping, chaining/roller beating and prescribed burns can be used to maintain or rejuvenate small areas of stage 3 and 4 vegetation. In areas dominated by mesquite, root plowing combined with the seeding of grasses and legumes may be the best way to maintain small areas in stage 3 vegetation.
Livestock grazing management to avoid use of food and cover plots, and leave ample amounts of herbaceous vegetation in other areas used by cottontails for food and cover.
- Timber Management Techniques:
Timber harvest: Clear-cut small areas (10 acres maximum) in large expanses of stage 5 and 6 woodlands.

- Plant Trees and Plant Shrubs (create hedgerows): Plant shrubs in large areas of stage 2 and 3 of plant succession, or in agricultural areas having few trees or shrubs. Plant along field borders, fence rows, or other idle land areas. This is also appropriate for open areas in urban settings.



U.S. Fish and Wildlife



Eastern Gray Squirrel

(Region: Southeast, Urban)

General habitat preference:

The eastern gray squirrel lives primarily in stage 6 deciduous forests and woodlands. They also forage along the edge of crop fields, especially harvested cornfields. These squirrels have adapted to parks and other urban areas where mature trees are available.

Habitat requirements:

- Diet: Squirrels eat a variety of acorns, nuts, miscellaneous seeds, grains, buds, and mushrooms. Squirrels spend most of their time foraging on the ground, but also forage in trees where they collect fruits, nuts, and buds that haven't yet fallen to the ground.
- Water: Water requirements are generally met through the food consumed; however, squirrels will drink free-standing water.
- Cover: Squirrels den in tree cavities and build nests out of leaves and twigs. Nests are generally more than 30 feet aboveground.

Wildlife Management Practices:

- Grain: Leave Unharvested (especially corn) so squirrels can glean waste grain from the field. This is especially important during years of poor mast production.
- Manipulation of Succession
Livestock grazing management should protect trees and shrubs planted for squirrels and protect woods from overgrazing.
- Plant Trees and Plant Shrubs (create hedgerows): to create hedgerows across large fields and in "odd areas" of crop fields that are not planted to crops. Plant mast trees where stages 5 and 6 represent less than 50 percent of the area considered and where stages 5 and 6 forest contain few or no mast-producing trees.
- Retain snags and down woody material: when implementing Timber Stand Improvement practices.
- Tillage Management: eliminate tillage in the fall, especially in cornfields adjacent to stage 5 and 6 forest.
- Timber Management Techniques: timber stand improvement will encourage larger crowns of mast-producing trees and enable

oaks, hickories, beech, and others to produce more mast.

- Wildlife damage management: may be required if squirrels become a nuisance around houses.



Eastern Gray Squirrel

[Hear the sound of the Eastern Grey Squirrel](#)

European Starling

(Region: Urban)

General Habitat Preference:

European starlings are found throughout North America. They prefer older suburban and urban residential areas with large trees (Stages 5 and 6) and shrubs (stage 4) interspersed with open areas (stages 2 and 3), but are also abundant in agricultural settings. Starlings are cavity nesters and nest in large trees or old buildings. Starlings are ground feeders and eat a variety of insects, seeds, and fruit. Starlings were introduced to the United States from Europe and are considered pests, as they are numerous and often out-compete native birds for available habitat. In such situations the management objectives may be to reduce the quality and quantity of available habitat.

Habitat Requirements:

- Diet: Insects, fruit, seeds, human garbage, even dog and cat food.
- Water: They require water during warm seasons.
- Cover: They nest in cavities in trees, old buildings, and old houses.

Wildlife Management Practices:

- Artificial feeders: Starlings will eat seed and suet from artificial feeders to the extent that repelling starlings from feeders may be necessary.
- Nesting Structures: Nest boxes should not be used to attract starlings as they already out compete native cavity-nesting species and providing nest boxes for starlings will only increase this invasive species' population.
- Plant Trees and Plant Shrubs (create hedgerows): Plant and maintain deciduous trees.
- Water developments for wildlife: Birdbaths, pans of water, or puddles of water can attract starlings.
- Wildlife Damage Management: Starling populations often grow to levels where they are causing wildlife damage or will cause detrimental conditions for native wildlife by out competing native species for habitat requirements. Therefore, wildlife damage management will most likely be necessary in

almost all situations, especially in suburban/urban and agricultural areas.

Exclusion practices to prevent starlings from accessing an area are effective.

- Habitat management to attract starlings should not occur. Remove food, water, and cover available to starlings. Various harassment practices may be effective. Trap and euthanasia may be appropriate to reduce starling populations.

European starling *Sturnus vulgaris*

male with breeding plumage



non-breeding plumage



Frogs

(Region: Urban)

General Habitat Preference:

There are many frog species that inhabit wetland areas throughout the United States. Weeds and aquatic vegetation on the edges of ponds, lakes, and slow moving streams are preferred areas. Mud bottoms are needed so frogs can bury themselves for hibernation during the winter. Frogs typically breed in water and lay their eggs in water. Frogs are carnivorous and eat a varied diet of insects.

Habitat Requirements:

- Diet: Insects.
- Water: Frogs need water to hide. Many kinds of frogs will dry up and die if their skin is not kept moist. (See discussion in "Cover" section.)
- Cover: Thick herbaceous vegetation on bank or shore adjacent to water. Frogs also hide among floating vegetation in the water next to the shore.

Wildlife Management Practices:

- Use pesticides carefully.
 - Ponds: Construction: Construct mud-bottomed ponds and wetlands. Both shallow Water to encourage emergent aquatic vegetation and deep water for hibernation are desired. Small backyard pools are often adequate.
 - Water Level Manipulation Techniques: Water control structures: Control water levels with water control devices to insure adequate water depth for hibernation. This is also useful for encouraging emergent aquatic vegetation.
-



A spadefoot frog peers into the camera lens. Photo by John White.

<http://contest.thinkquest.jp/tqj2000/30404/frog1.wav>

House Finch

(Region: Urban)

General Habitat Preference:

House finches are native to the western United States but are an introduced species in the eastern United States. Their current range is the entire United States. They are found in a wide variety of urban, suburban, and agricultural areas that have trees (stages 5 and 6), shrubs (stage 4), and some open areas (stages 2 and 3). They are also found in canyons and semi-arid regions in the western part of the country. House finches nest in a variety of raised locations and make a nest from assorted vegetation. Finches eat a variety of seeds, fruits, and buds from both the ground and in trees.

Habitat Requirements:

- Diet: Soft fruits, buds, and weed seeds. In the warm season house finches eat some insects.
- Water: They require water daily in warm seasons.
- Cover: These birds prefer nesting sites on low branches of trees, on branches of bushes, in natural cavities, in old holes excavated by woodpeckers, and any projection or ledge they can find on houses and buildings. They prefer to place the nest from five to seven feet above the ground. The nest is built of weed stems, small branches, and leaves.

Wildlife Management Practices:

- Artificial feeders: They use artificial feeders of all types. Millet and sunflower seeds are favorites.
- Plant Trees and Plant Shrubs (create hedgerows): Plant shrubs adjacent to open areas for nesting and hiding cover.
- Mowing: areas to provide vegetation in stages 2 and 3.
- Do not disturb nesting sites: found on houses and buildings unless they are causing a problem such as plugging a rain gutter.
- Water developments for wildlife: Birdbaths and pans of Water can be provided, or a low area in the yard can be filled with Water. Try not to place Water in areas where cats and other pets can catch the birds.

male



female



[House finch](#) (click for sound)

House Sparrow

(Region: Urban)

General Habitat Preference:

House sparrows' range encompasses the entire United States. They are an introduced species from England (thus their other name of English sparrow) and are found in a wide variety of urban habitats that have buildings, trees (stages 5 and 6), shrubs (stage 4) and some open areas (stages 2 and 3). House sparrows are also very common in and around agricultural buildings. House sparrows are cavity nesters and will frequently occupy buildings and houses to nest within the eaves or other areas with a cavity or opening. House sparrows feed on the ground and above the ground in woody vegetation for seeds, insects, and fruit.

They compete with native house finches and other birds for habitat requirements. They can become a nuisance, and management objectives may be to reduce the quality and quantity of available habitat. In the inner city, management for wildlife may be limited to this species and a few others. Wildlife damage management may be needed in some areas.

Habit Requirements:

- Diet: House sparrows eat a variety of insects, fruits, buds, weed seeds, and waste grain.
- Water: House sparrows require water daily in warm seasons.
- Cover: They nest on low branches of trees, on bushes, in natural cavities, in old holes excavated by woodpeckers, and on any projection or ledge they can find on buildings or other structures. They prefer to place nest from five to seven feet above the ground. Nests are built of weed stems, small branches, and leaves.

Wildlife Management Practices:

- Artificial feeders: They will use artificial feeders of all types. Millet and sunflower seeds are favorites.
- Plant Trees and Plant Shrubs (create hedgerows): Plant shrubs adjacent to open areas for nesting and hiding cover.


- Do not disturb nesting sites found on houses and buildings unless they are causing a problem such as plugging a rain gutter.
- Water developments for wildlife: Birdbaths and pans of water can be provided, or a low area in the yard can be filled with water. Try not to place water in areas where cats and other pets can catch the birds.
- Wildlife Damage Management: House sparrow populations often grow to levels where they are causing wildlife damage or will cause detrimental conditions for native wildlife by out competing native species for habitat requirements. Therefore, wildlife damage management will most likely be necessary in almost all situations, especially in suburban/urban and agricultural areas. Exclusion practices to prevent house sparrows from accessing an area are effective.
- Habitat management to attract house sparrows should not occur. Remove food, water, and cover available to house sparrows. Various harassment practices may be effective. Trap and euthanasia may be appropriate to reduce house sparrow populations.



male



female

[Birdsong](#) ([help](#) [info](#)) 

House Wren

(Region: Urban)

General Habitat Preference:

House wrens are found throughout the United States during the breeding season, and migrate to the deep southern United States during winter months. In urban settings, house wrens prefer older residential areas with large shrubs (stage 4) and trees (stages 5 and 6). Wrens also use forested (stages 5 and 6) and open areas (stages 2 and 3) at higher elevations, as well as stands of aspen (Stages 5 and 6). House wrens nest in a variety of elevated cavities as high as 30 feet above the ground. Wrens primarily eat insects and forage on the ground as well as above the ground.

Habitat Requirements:

- **Diet:** Spiders, grasshoppers, crickets, beetles, caterpillars, ants, bees, ticks, and millipedes. Artificial feeders are usually not used.
- **Water:** These birds obtain necessary Water from their Diet. They do not need to drink Water.
- **Cover:** House wrens nest in natural cavities in trees, old buildings and other structures. They will use artificial nest boxes.

Wildlife Management Practices:

- **Plant Trees and Plant Shrubs** (create hedgerows). Use pesticides carefully: Use insecticides only when necessary. Carefully follow instructions on the label.
 - **Nesting structures:** Provide nest boxes where adequate nesting sites are lacking. Boxes should be placed high on a tree trunk or under the eaves of a house. The hole should be small to keep out house sparrows, starlings, and other birds. For specifics on nest box design and placement, visit your local Cooperative Extension office. **Do not disturb nesting sites** found on houses and buildings unless they are causing a problem.
-



House wren

Hummingbird

(Region: Urban)

General Habitat Preference:

There are 18 species of hummingbirds found in North America. Other than a couple of exceptions, hummingbirds migrate into Central and South America during the winter months. Hummingbirds are found in or near mixed woodlands and forests rich in flowering plants. They prefer stages 5 and 6 of plant succession mixed with areas in stages 2, 3, and 4. In urban settings, they prefer areas with large trees and nearby flowering plants. A hummingbird's nest is a small cup built of lichens and other vegetation and suspended from a forked branch. Hummingbirds feed primarily on nectar, but will also eat small insects.

Habitat Requirements:

- **Diet:** Nectar from flowers and insects found on flowers. Hummingbirds require high energy foods. Nectar is high in sugars that supply needed energy. Insects are an important source of protein.
- **Water:** Hummingbirds obtain necessary Water from Diet. They do not need to drink Water.
- **Cover:** Hummingbirds construct small nests on tree branches, usually 5 to 20 feet above the ground. Occasionally they build nests in secluded areas on houses and buildings. The nest is made out of leafy materials and spider silk.

Wildlife Management Practices:

- **Plant flowers:** Hummingbirds seem to be attracted to the color red. Some preferred flowers are petunias, gladiolus, nasturtiums, begonias, morning glory, evening primrose, columbine, and cardinal flower.
- **Plant Trees and Plant Shrubs** (create hedgerows): Plant flowering shrubs, vines, and trees. Favorites are hibiscus, trumpet vine, lilac, flowering dogwood, and various fruit trees. Trees with rough bark are preferred.
- **Artificial feeders:** Hummingbirds use artificial feeders filled with sugar-Water (1 part sugar to 4 parts boiled Water). Place multiple feeders in an area to diminish

territoriality between hummingbirds. Keep feeders clean. Never give honey-Water to hummingbirds. Honey ferments faster than sugar and quickly develops a mold that kills hummingbirds. For specifics on artificial feeder design and placement visit your local Cooperative Extension office.

- **Use pesticides carefully:** Use insecticides only when necessary. Carefully follow instructions on the label.
- **Do not disturb nesting sites** found on houses and buildings unless they are causing a problem such as plugging a rain gutter.

[Ruby-thr. hummingbird](#)



Ruby-throated Hummingbird, adult male



Ruby-throated Hummingbird, adult female



Ruby-throated Hummingbird eggs

Northern Flicker

(Region: Urban)

General Habitat Preference:

Northern flickers occupy all of North America, and inhabit most of the United States year-round. Flickers use open areas in stages 2 and 3 of plant succession interspersed with areas of stages 5 and 6 of plant succession. Northern flickers are often found in riparian and urban areas. They prefer older urban residential areas with large trees, golf courses, and parks. Flickers create cavities in trees for nesting and will occasionally use nest boxes. Flickers eat insects, especially ants, as well as fruit berries, and seeds. Flickers can become problems in urban areas where they may create holes in wood siding on houses or damage ornamental trees. Wildlife damage management may be necessary.

Habitat Requirements:

- **Diet:** Ants are a favorite food source and make up about 50 percent of their diet. They also eat seeds, fruits, and berries and are partial to the fruit of poison ivy. Flickers usually feed in open areas and will utilize artificial feeders.
- **Water:** Not much is known about daily water requirements. They probably obtain sufficient water from diet.
- **Cover:** Holes are excavated in trees for nesting. They use softwood trees like poplar, cottonwood, and willow and prefer old mature trees that show signs of dying or rotting. In treeless areas, they will nest in posts, holes in banks, and holes in houses and structures.

Wildlife Management Practices:

- **Timber Management Techniques:** timber harvest - Clear-cut small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 5 and 6 forests. Selective-cut timber management in stages 5 and 6 of plant succession.
- **Manipulation of Succession** Mow herbaceous vegetation to keep relatively short in height for foraging.
- **Grazing management:** Manage livestock grazing, so that herbaceous vegetation is kept at medium to short heights.

- **Artificial feeders:** are used in urban areas. They prefer suet feeders fastened to tree trunks.
- **Use pesticides carefully:** and with caution in urban areas.
- **Retain snags and down wood material:** Maintain some large mature and standing dead trees (snags) when harvesting timber.
- **Plant Trees and Plant Shrubs** (create hedgerows): In large expanses without trees, plant softwood trees.
- **Wildlife Damage Management** may be necessary to prevent damage from flickers foraging, drumming, and excavating wood-built buildings. Exclusion practices to prevent flickers access to buildings may be effective. Harassment may be effective to repel flickers from an area. Habitat management may be effective by providing flickers alternative food sources (suet) or nesting cover (nest box) to draw flickers away from buildings. Special: European starlings often take over flicker cavities for their own nests. Be vigilant and take appropriate action to prevent starlings from occupying nesting cavities of flickers or other cavity-nesting wildlife.



female



male

http://www.birds.cornell.edu/AllAboutBirds/audio/Northern_Flicker1.html

Raccoon

(Regions: Southeast, Wetlands, Urban)

General Habitat Preference:

Raccoons are very common throughout most of the United States except in certain parts of the Rocky Mountains, Nevada, Utah, and Arizona. Raccoons are most abundant near water, riparian areas and lands adjacent to wetlands. They are also found in urban areas. They prefer areas interspersed with different successional stages. Riparian areas in stages 5 and 6 of plant succession are ideal. Raccoons nest in hollow trees, underground dens, or in chimneys, attics, and crawl spaces of houses and buildings. They are omnivorous and eat a wide range of foods.

Raccoons can become pests in urban areas and in wetlands where waterfowl nesting is important. In such instances, the management objectives may be to make the habitat less suitable for raccoons. They are also major predators of quail and turkey nests in the southeast. Wildlife damage management may be necessary.

Habitat Requirements:

- Diet: Raccoons eat a wide variety of foods consisting of garbage, birds, eggs, fish, small mammals, insects, crayfish, grains, seeds, fruits, and foods prepared for human and pet consumption.
- Water: Raccoons require water frequently during warm seasons.
- Cover: Raccoons nest and rest during the day in natural tree cavities, dens in the ground, underbrush and junk piles, in old abandoned buildings, and rocky cliffs and ledges.

Wildlife Management Practices:

Manipulation of Succession

Prescribed burns and brush chopping can be used to rejuvenate old decadent wetland vegetation. These practices along with chaining, roller beating and root plowing can be used to revert succession from stages 5 and 6 vegetation to stages 2, 3, and 4 in appropriate regions.

Grazing management: Manage livestock grazing to maintain healthy vegetation along the banks and shores of streams, rivers, and other wetlands. In some regions this may include the

development of livestock watering facilities in uplands to discourage congregation in and overuse of riparian areas.

● Water Level Manipulation Techniques:

Water control structures: Control water levels with water control structures. Provide areas in wetland with water less than 2 feet deep where aquatic emergent vegetation can grow. Provide shallow water areas in existing ponds and wetlands where emergent vegetation can grow.

● Ponds:

Construction: Ponds and wetlands can be constructed with shallow water areas where emergent aquatic vegetation can grow.

● Grain: leave unharvested: Leave small areas of grain crops adjacent to woodlands unharvested.

● Plant food plots: Plant annual food plots to grains.

● Timber Management Techniques:

Timber harvest: Clear-cut small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 5 and 6 vegetation. Selective-cut timber management.

● Plant Trees and Plant Shrubs (create hedgerows): Plant and maintain large deciduous trees especially in riparian areas and areas adjacent to wetlands. Maintain corridors. Riparian buffers.

● Water developments for wildlife: Provide pools of water in urban areas.

● Wildlife damage management: may be necessary if raccoons invade garbage cans, occupy residences or buildings, or cause depredation of poultry. Exclusion is a cost-effective management practice. Harassment can be effective. Cultural modification like using wildlife-proof trash cans is very effective. Trap and relocate or trap and euthanize is effective for problem raccoons



Photo Source: National Geographic

[Hear the sound of the Raccoon](#)

Rock Dove (Pigeon)

(Region: Urban)

General Habitat Preference:

Rock doves are an introduced species and are found year-round throughout urban and agricultural areas in the United States. They particularly like large buildings, parks and open areas. Rock doves create a shallow nest of sticks, leaves, and other vegetation and nest above the ground and on or around buildings. Rock doves primarily feed on the ground on small grains, seeds, crumbs, and garbage. In some areas rock doves become so numerous that they are considered pests. In such situations the management objectives may be to reduce the quality and quantity of available habitat or reduce damage.

Habitat Requirements:

- **Diet:** Rock doves forage on the ground. They prefer waste grain and weed seeds. In urban areas they live mostly on human handouts.
- **Water:** They require water frequently in warm seasons. They usually can fly far enough to find water.
- **Cover:** They nest on window ledges, roof tops, bridges, and a variety of structures.

Wildlife Management Practices:

- **Artificial feeders:** For artificial feeding, small grains, millet, and sunflower seeds can be spread on the ground, preferably in parks and vacant lots, or on roof tops of buildings.
- **Wildlife Damage Management:** Rock dove populations often grow to levels where they are causing wildlife damage or will cause detrimental conditions for native wildlife by out competing native species for habitat requirements. Therefore, wildlife damage management will most likely be necessary in almost all situations, especially in suburban/urban and agricultural areas. Exclusion practices to prevent rock doves from accessing an area are effective. Habitat management to attract rock doves should not occur. Remove food, water, and cover available to rock doves. Various harassment practices may be effective. Trap and euthanasia may be appropriate to reduce rock dove populations.



http://www.birds.cornell.edu/AllAboutBirds/audio/Rock_Dove.html

Song Sparrow

(Region: Urban)

General Habitat Preference:

Song sparrows inhabit all of America, but will migrate from the extreme northern areas during colder months of the year. Song sparrows occupy edge areas where stage 2 and 3 vegetation is present with nearby shrubs (stage 4) and small areas of stages 5 and 6. Often nest along forest edges in a cup nest of grass and leaves on or near the ground. Song sparrows primarily feed on the ground and eat seeds, insects, and fruit.

Habitat Requirements:

- Diet: Weed seeds and insects of all kinds are used as a food source, as are fruit when available. Artificial feeders placed on the ground can be used.
- Water: Frequent water in warm seasons is required.
- Cover: Thick shrubs for nesting and hiding. The nest is often placed on the ground under a shrub or in thick herbaceous cover and made of grass, leaves, and weeds.

Wildlife Management Practices:

- Plant Trees and Plant Shrubs (create hedgerows): that provide fruit in all 4 seasons. Artificial feeders: Millet and sunflower seeds are favorites.
 - Use pesticides carefully: Use insecticides only when necessary. When using insecticides, carefully follow the directions on the label.
 - Do not disturb nesting sites. Establish native grasses and forbs for cover and nesting.
 - Harvest Timing: should be delayed to prevent nest destruction.
 - Water development for wildlife: Birdbaths and pans of water can be provided. Remember, try to place water in areas where cats and other pets can't catch the birds.
-



Utah Division of Wildlife Resources



[http://www.nps.gov/archive/wica/Sounds/Song Sparrow.wav](http://www.nps.gov/archive/wica/Sounds/SongSparrow.wav)

Wetlands



Physical Description:

Wetlands can be described as the zone between deep water and upland habitats. They are characterized by various amounts of open water, aquatic vegetation, and soil that is often wet or covered with shallow water.

There are many different types of wetlands including beaver ponds, potholes, playas, man-made ponds, small lakes, marshes, rivers, streams, and swamps. They are found in all of the previously mentioned regions.

Dominant Vegetation:



Photo Courtesy of
USDA NRCS

To describe wetland vegetation, the distinction between aquatic vegetation and upland vegetation must be made.

Aquatic Vegetation can survive in the water or on lands flooded or saturated with water for extended lengths of time.

Upland Vegetation cannot tolerate areas saturated or flooded with water for long periods.

The vegetation found in association with wetlands varies depending on factors such as: permanence of the water, depth of water, salinity, and the substrate (bottom).

Wetlands with deep permanent water typically have less emergent (above the water surface) aquatic vegetation and more floating or submerged (below the water surface) aquatic vegetation. As the water depth decreases, emergent aquatic vegetation becomes more dominant.

Less vegetation is found on rock and gravel bottoms than on bottoms that have characteristics more like those of soil such as the presence of silt, clay, and organic (dead plants and animals that are decomposed) matter.



Maryland Marsh

Emergent aquatic vegetation includes trees, shrubs, grass, and grasslike plants. Some examples of trees often found in wetlands are willows, cottonwood, oaks, various gum trees, tamarack, cypress, mangroves, red bay, black spruce, Atlantic white cedar, and pond pine.

Shrubs commonly found in and adjacent to wetlands include willows, alders, bog birch, bog laurel, Labrador tea, coastal sweetbells, inkberry, sea myrtle, and marsh elder.

Grass and grass-like vegetation such as cattails, bulrushes, saltgrass, cordgrass, saw grass, sedges, arrow grass, shoal grass, eel grass and wild rice are also examples of emergent aquatic vegetation found in wetlands.

Water lilies, pond weeds, wild celery, water milfoil, duckweeds, and coontails are examples of floating and submerged aquatic vegetation.



Texas Marsh

The amount of open water and vegetation is important in determining how suitable the wetland is for different wildlife species. For instance, young ducks need open water and emergent vegetation

for hiding. Floating and submerged vegetation supports large amounts of food high in protein such as snails, mollusks, and crustaceans that the young ducks need for fast growth.

Emergent vegetation may supply nesting areas such as trees for wood ducks, grass for mallards, and cattails for red-winged black birds and muskrats.

Wetlands that have stable, non-flowing water levels go through successional stages of vegetation development similar to those found on adjacent upland areas. The open water areas fill in with silt and dead vegetation allowing emergent aquatic vegetation to become dominant. As the wetland continues to fill in, it becomes drier, allowing upland vegetation to become dominant.

Plant Succession Stages:

Typically succession would proceed in the following order: Stage 1 — deep water with little vegetation; Stage 2 —shallow water dominated by submerged and floating aquatic vegetation; Stage 3 — very shallow water or wet ground dominated by any variety of emergent aquatic vegetation; Stage 4 — ground becomes drier and upland vegetation similar to the surrounding area becomes dominant.

This type of succession proceeds slowly in wetlands with large amounts of deep water or a rocky bottom. Fluctuations in water levels can cause final stages of this succession to regress to earlier stages. For instance, if a wetland in stage 3 of succession is flooded with deep water for a period of time, the aquatic emergent vegetation may die leaving a wetland in stage 1 or 2 of succession. The extent of this regression depends on the length of time the wetland is flooded with deep water, how much the water level changes, and the extent (length of time) that the present vegetation can survive in the changed water level.

Management of water levels is an important tool in managing wetlands for wildlife habitat. The succession process described above is often not applicable to wetlands with constantly moving water such as rivers, streams, and tidal areas.

Species Recommended for Judging:

Beaver
Bluegill
Bullfrog
Canada goose (breeding habitat)
Largemouth bass
Mallard (breeding habitat)
Mink
Muskrat
Raccoon
Redhead Duck
Red-winged blackbird
Wood duck



Photo Courtesy of USDA NRCS

Wetlands	Beaver	Bluegill	Bullfrog	Canada Goose (Breeding)	Largemouth Bass	Mallard (Breeding)	Mink	Muskrat	Raccoon	Redhead Duck	Red-Winged Blackbird	Wood Duck
Aquatic Plant	x	x	x	x		x		x		x		x
Bark	x											
Birds			x		x		x		x			
Buds	x											
Carrion									x			
Centipedes & Millipedes			x									
Crayfish		x	x	x	x	x	x	x	x			x
Earthworms		x	x		x	x	x		x			x
Eggs			x				x		x			x
Ferns												
Fish		x	x		x	x	x	x	x			x
Forbs	x			x								x
Frogs & Salamanders		x	x		x	x	x	x	x			x
Fungi												
Grain				x		x			x		x	x
Grass				x								
Hard Mast									x			x
Insects		x	x	x	x	x	x		x	x	x	x
Leaves & Twigs	x											
Lichens												
Lizards			x									
Mammals			x		x		x		x			
Mussels						x	x	x	x			
Nectar												
Scorpions												
Seeds						x			x	x	x	x
Snails			x	x		x			x			x
Snakes			x		x		x		x			
Spiders		x	x	x	x	x	x				x	x
Soft Mast						x	x		x		x	x
Tubers								x				
Turtles					x							

Wetlands	Beaver	Bluegill	Bullfrog	Canada Goose (Breeding)	Largemouth Bass	Mallard (Breeding)	Mink	Muskrat	Raccoon	Redhead Duck	Red-winged Blackbird	Wood Duck
1. Decrease Harvest	X	X	X		X		X	X	X	X		X
2. Increase Harvest	X	X	X		X		X	X	X	X		X
3. Establish Native Grasses and Forbs				X		X						
4. Fish / Wildlife Survey	X	X	X	X	X	X	X	X	X	X	X	X
5. Grain: Leave Unharvested						X				X		
6. Harvest Timing						X						
7. Manipulation of Succession				X		X	X	X	X	X	X	
8. Nesting Structures				X		X						X
10. Plant Trees												X
11. Plant Shrubs (Create Hedgerows)	X								X		X	X
12. Ponds: Construction		X	X	X	X	X	X	X	X	X	X	X
13. Ponds: Deepen Edges		X			X							
14. Fertilize Ponds		X			X							
15. Ponds: Reduce Turbidity		X			X							
16. Ponds: Repair Spillway		X	X	X	X	X	X	X	X	X	X	X
17. Ponds: Restock		X			X							
18. Retain Snags & Down Woody Material									X			
19. Riparian Buffers	X	X	X	X	X	X	X	X	X	X	X	X
24. Timber Management Techniques									X			X
25. Water Level Manipulation Techniques		X	X	X	X	X	X	X	X	X	X	X
27. Wildlife Damage Management	X			X				X	X		X	

This species is often a pest in agricultural areas and forests. In such situations, management objectives may be to reduce the quality and quantity of habitat. It is often more appropriate to manage for this species in urban wetlands and areas where agriculture crops are not commonly grown.

American Beaver

(Region: Wetlands)

General Habitat Preference:

The American Beaver occurs throughout most of North America. They are found in riparian areas in stages 4 and 5 of plant succession and wetlands that have permanent Water with a variety of shrubs and trees adjacent to the Water. They were once such a valuable fur resource that trapping led to their extirpation in many parts of their former range. The biological pendulum has now swung in the opposite direction and the lack of a viable fur market has led to increased American beaver populations throughout many areas of the United States. In some areas they have become a nuisance, cutting down trees, along with damming up ditches and streams in undesirable places. This causes cropland flooding, destabilization of road edges, and flooding of timber stands. Their presence is often a threat to timber interests where many acres of flooded timber die each year.

Habitat Requirements:

- **Diet:** Primarily the bark and wood of shrubs and trees, also some forbs and grasses. Beavers store shrub and tree cuttings in caches (piles of branches) for use during the winter.
- **Water:** Prefer slow-moving or still water with a constant level water should be of sufficient depth (5 feet) to allow free movement under the ice in winter.
- **Cover:** Beaver construct lodges from sticks and mud or dig burrows in banks of streams and rivers. Beaver prefer slow-moving or still Water with a constant Water level. They will build dams from tree branches, shrubs, and mud to form ponds which stabilize Water levels, slow Water movement, and provide shelter beneath the ice in winter. In some instances, beaver dams should be protected and maintained. When beavers construct dams in places that cause problems for people, removal of the beaver is usually the best solution. If the dam is destroyed and the beaver remain, they will usually build the dam again. Where dams are to be maintained, provide dam building material such as precut

logs and branches in areas where such materials are scarce.

Wildlife Management Practices:

- Manipulation of Succession grazing management: livestock grazing should be maintained so that shrubs and trees are maintained adjacent to waters that may be used by beavers. This may include developing livestock watering facilities in upland areas to discourage congregation in and overuse of riparian areas.
- Plant Trees and Plant Shrubs (create hedgerows): plant willows, other shrubs and deciduous trees near Water that can be used by beaver for food and dam construction. If beaver are already in the area, new plantings will need protection or the beaver will need to be temporarily removed while plantings become established. Riparian buffers: maintaining trees and shrubs along creeks, streams, and lakes will encourage beavers to inhabit the area.
- Increase Harvest and Decrease Harvest: beaver can become too numerous and eat all available shrubs and trees. To prevent this it may be necessary to periodically remove some beaver from certain areas.
- Wildlife Damage Management: should be practiced where beavers are causing problems to standing timber by girdling of individuals trees or flooding standing timber stands.

<http://www.nicerweb.com/sketches/sounds/Chor data/Mammalia/beaver.wav>



Bullfrog

(Region: Wetlands)

General Habitat Preference:

The bullfrog's native range extends from the Atlantic Coast eastward to eastern Colorado and eastern Mexico, and from southern Colorado south to northeastern Mexico. This species is not native west of the Rocky Mountains, but has been successfully introduced in many localities. Bullfrogs inhabit permanent bodies of standing or slow-moving Water. They prefer shorelines with dense vegetation (stages 3 and 4 of wetland succession), adjacent to shallow open Water areas (stage 2) dominated by floating and submerged aquatic vegetation. All habitat requirements are often found in and around a single pond.

Habitat Requirements:

- Diet: Major components of the diet are snails, insects, crayfish, other frogs, fish, reptiles, and occasionally small mammals and birds.
- Water: Bullfrogs need stable water levels for hibernation and egg development. water levels should be maintained at a constant level when possible.
- Cover: Bullfrogs use dense emergent aquatic and upland herbaceous vegetation adjacent to water for hiding and foraging.

Wildlife Management Practices:

- Ponds: Construction: when ponds are constructed, provide for shallow water areas. In some areas of the pond, this will require foregoing the practice of deepening pond edges.
- Ponds: Repair Spillways: spillways should be maintained to allow ponds to stabilize to proper Water levels following large rainfall events.
- Riparian Buffers: vegetation should be maintained along creeks, streams, lakes, and ponds to provide habitat for bullfrogs.
- Water Level Manipulation Techniques:
Water Control Structures: should be in place and operative in order to hold Water levels at desired shallow Water depths for optimum bullfrog habitat.

<http://dustyhawk.250free.com/soundeffects/bfrog.wav>



Canada Goose **(breeding habitat)**

(Region: Wetlands)

General Habitat Preference:

The breeding range of the Canada goose extends across the northern half of the United States across all of Canada and Alaska. Although an increasing number of Canada geese choose to winter in Canada, especially in urban areas, the majority fly south to southern areas of the United States and even Mexico. Many southern areas of the United States have year-round resident populations of Canada geese. Canada geese nest and rear young in or near stage 2 wetlands interspersed with some stage 3 wetlands. Wetlands containing 20 percent tall emergent aquatic vegetation and 80 percent open Water are usually good habitat, as are frequent riparian areas adjacent to rivers.

Habitat Requirements:

- Diet: During the nesting season and summer, Canada geese prefer new green forbs and grasses. They also eat some aquatic insects and pond weeds.
- Water: see cover requirements below.
- Cover: nest in a variety of places such as mats of bulrushes, tops of muskrat houses, in trees, and most of all, on islands. Usually nest within 200 feet of Water's edge.

Wildlife Management Practices:

- Manipulation of Succession burn or brush chop small areas (40 acres maximum, 10 to 20 acres preferred) every three to five years. Burning produces preferred lush green vegetation.
- Grazing Management: livestock grazing management is another method to produce the lush green vegetation Canada geese prefer.
- Nesting Structures: provide artificial nest structures, preferably on islands and/or peninsulas surrounded by open Water.
- Establish Native Grasses and Forbs: provides feeding areas for Canada geese.
- Ponds (Construction): ponds should be constructed along with stage 2 and 3 wetlands for Water needs.

- Water Level Manipulation Techniques: Small Dikes for Temporary Flooding can be used to provide for stage 2 and 3 wetlands. Water Control Structures should be installed and properly maintained to provide 80 percent open Water and 20 percent emergent vegetation.
- Wildlife Damage Management: In some areas Canada geese have become a problem, causing damage.

<http://www.saskschools.ca/~gregory/animals/cg/cg.wav>



Largemouth Bass

(Region: Southeast, Wetlands)

General Habitat Preference:

Ponds, lakes, and slow moving rivers.

Habitat Requirements:

- **Diet:** Young bass eat insects and other invertebrates (worms, crayfish, and zooplankton). These invertebrates depend on phytoplankton for food. Adult bass eat other small fish such as bluegill and a variety of minnows, tadpoles, and crayfish, and even ducklings.
- **Cover:** Bass are often found near submerged rocks, stumps, shrubs, and near aquatic vegetation where small fish (used for food) hide.
- **Water:** Fish need water of a certain quality. Some of the basic requirements are: dissolved oxygen - minimum of 4 parts per million (ppm); carbon dioxide - should not exceed 20 ppm; pH should range between 6.5 and 9.0; and water temperature should reach at least 70 degrees Fahrenheit sometime during the summer (one foot below surface in shade). Test the water to see if it meets requirements. Aerate pond to increase oxygen and decrease carbon dioxide.

Wildlife Management Practices:

Decrease or Increase Harvest based on seine sample results.

- **Fish or Wildlife Survey:** to determine pond balance.
- **Manipulation of Succession**
Grazing Management: Manage livestock grazing to maintain thick herbaceous vegetation surrounding the pond and in the watershed that drains into the pond. Develop livestock watering facilities away from pond or allow access to only a small part of the pond.
- **Ponds:**
Construction: Artificial reefs constructed of rock piles, sections of plastic or cement pipe (a minimum of 6 inches in diameter and 18 inches long), and brush piles and tires (sunk with weight) can be used for additional cover. These practices are recommended for ponds larger than 10 surface acres in size.

Deepen Edges: Deepening the pond edges to 2 feet deep or more discourages rooted aquatic vegetation growth.

Fertilize: In clear water, fertilizer may be added to increase or promote phytoplankton. Lime ponds (agricultural limestone) to increase soil pH if total alkalinity is below 20 ppm.

Reduce Turbidity: Prevent or clear up muddy water (brown or gray color). Muddy water blocks sunlight needed in producing phytoplankton. Maintain a green color in pond water (green enough that a white disk cannot be seen 24 inches deep). The color is caused by phytoplankton (microscopic plant life-algae). Reseed watershed to establish thick herbaceous vegetation surrounding the pond in the watershed that drains into the pond.

Repair Spillway: Repair the spillway if needed and remove trees near the dam or dikes. Stop other pond leaks if and when they occur.

Restock: Determine pond balance using a minnow seine and catch records. A bass to bluegill ratio of 3 to 6 pounds of bluegill to one pound of bass is considered a good fish population balance. If restocking is necessary, remove existing fish and restock at the appropriate rate.

- **Water Level Manipulation Techniques:** Add water control structures if needed.



Mallard (*breeding habitat*)

(Region: Wetlands)

General Habitat Preference:

The Mallard has one of the most extensive breeding ranges of any duck in North America, extending across the northern one-third of the USA, and up to the Bering Sea. As migratory Waterfowl, they winter south of Canada, throughout the United States south to Central America. Mallards are dabbling ducks that nest in tall forbs and grass vegetation or in shrubby cover. They need open Water (stage 2 of wetland succession) with associated emergent aquatic vegetation (stage 3) to raise young.

Habitat Requirements:

- Diet: Aquatic plants and insects are common foods. Ducklings eat mostly aquatic insects. Most food is associated with wetlands.
- Water: see cover requirements below.
- Cover: Mallards nest in grass and forb vegetation (sometimes they nest under shrubs) preferably within ½ mile of a wetland that provides open Water with some adjacent emergent aquatic vegetation. After ducklings hatch they use open Water and adjacent emergent aquatic vegetation for protection from predators. Ideally, wetlands will have a minimum of 50 percent open Water and 10 to 20 percent emergent vegetation.

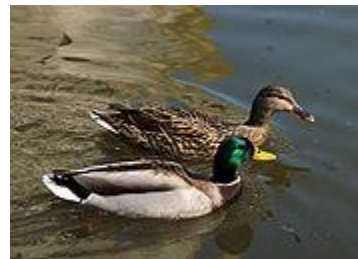
Wildlife Management Practices:

- Manipulation of Succession use prescribed burns, brush chopping, or livestock grazing management to rejuvenate dense stagnant vegetation in nesting areas. Burn or chop every three to five years in spring before nesting begins. These practices can be used to increase or maintain proper Water and vegetation interspersed in wetlands. Livestock grazing should be managed to provide areas with tall, healthy, herbaceous vegetation that are not disturbed during the nesting season.
- Harvest Timing: harvesting of hay and crops adjacent to wetlands should be done after nesting season.

- Nesting Structures: used occasionally to provide additional nesting areas. Establish Native Grasses and Forbs: grasses and forbs (legumes) should be established within ½ mile of wetlands that meet the criteria described under cover.
- Ponds: Construction: used in areas without wetlands. Ponds and reservoirs should be built with gently sloping banks.
- Riparian Buffers: establish where cover is limited. Water Level Manipulation Techniques: Small Dikes for Temporary Flooding: provide temporary open Water areas mixed with aquatic emergent vegetation. Water Control Structures: provide some shallow Water areas (less than two feet deep) adjacent to deep Water where emergent and submergent vegetation can grow.

Click below for Mallard sound:

<http://www.birds.cornell.edu/AllAboutBirds/audio/Mallard.html>



Mink

(Region: Wetlands)

General Habitat Preference:

Mink are found in Alaska, Canada and across most of the United States. They prefer habitat associated with stream and river banks and the shores of a variety of wetlands.

Habitat Requirements:

- **Diet:** The mink is strictly carnivorous. Rabbits, mice, Waterfowl, muskrats, fish and crayfish are all used for food, depending on availability. Most food is found in close association with dense vegetation along the shores of wetlands.
- **Water:** Mink are found in association with Water. See cover requirements below. **Cover:** Mink use dens made in log jams, under tree roots, old muskrat burrows, and rock piles. The availability of den sites is considered to be a key factor in determining how many mink use an area. Areas with lots of trees and shrubs and limited livestock grazing near shorelines usually have more potential den sites.

Wildlife Management Practices:

- **Manipulation of Succession** use prescribed burns and brush chopping to rejuvenate old decadent wetland vegetation that in turn can improve the habitat for the animals that mink use for food. **Grazing Management:** manage livestock grazing to maintain healthy vegetation along the banks and shores of streams, rivers, and other wetlands. In some regions this may include the development of livestock Watering facilities in uplands to discourage congregation in and overuse of riparian areas.
- **Ponds:** Construction: construct ponds with shallow Water areas where emergent vegetation can grow.
- **Water Level Manipulation Techniques:**
Small Dikes for Temporary Flooding: small dikes can be used to temporarily flood areas which can improve habitat for animals mink use for food. **Water Control Structures:** control Water levels to promote the growth

of emergent aquatic vegetation adjacent to open Water.

- **Wildlife Damage Management:** mink can eat significant numbers of upland nesting Waterfowl or game bird young, especially in areas where nesting habitat is limited. In such cases, favorable habitat can be reduced or a trapping program can be implemented to utilize the valuable fur resource that mink provide.

http://www.ferris.edu/htmls/news/card/Kids_Corner/sounds/mink.au



Muskrat

(Region: Wetlands)

General Habitat Preference:

Musk rats are found throughout the United States where sufficient Water is available. They prefer stage 2 and 3 wetlands interspersed (mixed) together.

Habitat Requirements:

- **Diet:** Muskrat eat the roots, tubers, and green vegetation of emergent aquatic vegetation such as cattails and bulrushes.
- **Water:** Musk rats need Water of sufficient depth (4 feet) or flowing Water that allows free movement under ice during the winter. During warm seasons, they prefer Water one to two feet deep, with around 20 percent of the wetland comprised of open Water free of emergent aquatic vegetation. Controlling the Water level when possible can be a beneficial management practice.
- **Cover:** Muskrat build lodges out of bulrushes and cattails, which are usually placed in dense growths of cattails and bulrushes. They rest on open shorelines, floating logs, or on tops of lodges. They also make dens in banks.

Wildlife Management Practices:

- **Manipulation of Succession** use prescribed burns and brush chopping to rejuvenate old, decadent wetland vegetation. **Grazing Management:** manage livestock grazing to maintain healthy vegetation along the banks and shores of streams, rivers, and other wetlands. In some regions this may include the development of livestock Watering facilities in uplands to discourage congregation in and overuse of riparian areas.
- **Ponds:** Construction: ponds and wetlands can be constructed with shallow Water areas where emergent aquatic vegetation can grow.
- **Water Level Manipulation Techniques:**
Small Dikes for Temporary Flooding: small dikes can be used to temporarily flood areas to promote the growth of cattails and bulrushes. **Water Control Structures:** used to control Water levels for providing areas in wetlands with Water less than two feet deep

where cattails and bulrushes can grow. Up to 80 percent of the wetland should be able to grow such vegetation.

- **Wildlife Damage Management:** burrowing and denning activities can cause problems in flooded agricultural areas such as rice fields. In such instances, populations can be reduced by managing against preferred habitat conditions or by legal harvest during trapping season. This can be done as an economic incentive since muskrat pelts have a value in the fur trade depending on current market conditions.



[Hear the sound of the Muskrat](#)

Raccoon

(Regions: Southeast, Wetlands, Urban)

General Habitat Preference:

Raccoons are very common throughout most of the United States except in certain parts of the Rocky Mountains, Nevada, Utah, and Arizona. Raccoons are most abundant near water, riparian areas and lands adjacent to wetlands. They are also found in urban areas. They prefer areas interspersed with different successional stages. Riparian areas in stages 5 and 6 of plant succession are ideal. Raccoons nest in hollow trees, underground dens, or in chimneys, attics, and crawl spaces of houses and buildings. They are omnivorous and eat a wide range of foods.

Raccoons can become pests in urban areas and in wetlands where waterfowl nesting is important. In such instances, the management objectives may be to make the habitat less suitable for raccoons. They are also major predators of quail and turkey nests in the southeast. Wildlife damage management may be necessary.

Habitat Requirements:

- **Diet:** Raccoons eat a wide variety of foods consisting of garbage, birds, eggs, fish, small mammals, insects, crayfish, grains, seeds, fruits, and foods prepared for human and pet consumption.
- **Water:** Raccoons require water frequently during warm seasons.
- **Cover:** Raccoons nest and rest during the day in natural tree cavities, dens in the ground, underbrush and junk piles, in old abandoned buildings, and rocky cliffs and ledges.

Wildlife Management Practices:

- **Manipulation of Succession:** Prescribed burns and brush chopping can be used to rejuvenate old decadent wetland vegetation. These practices along with chaining, roller beating and root plowing can be used to revert succession from stages 5 and 6 vegetation to stages 2, 3, and 4 in appropriate regions.
- **Grazing management:** Manage livestock grazing to maintain healthy vegetation along the banks and shores of streams, rivers, and

other wetlands. In some regions this may include the development of livestock watering facilities in uplands to discourage congregation in and overuse of riparian areas.

- **Water Level Manipulation Techniques:** Water control structures: Control water levels with water control structures. Provide areas in wetland with water less than 2 feet deep where aquatic emergent vegetation can grow. Provide shallow water areas in existing ponds and wetlands where emergent vegetation can grow.
- **Ponds:** Construction: Ponds and wetlands can be constructed with shallow water areas where emergent aquatic vegetation can grow.
- **Grain:** leave unharvested: Leave small areas of grain crops adjacent to woodlands unharvested.
- **Plant food plots:** Plant annual food plots to grains.
- **Timber Management Techniques:** Timber harvest: Clear-cut small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of stage 5 and 6 vegetation. Selective-cut timber management.
- **Plant Trees and Plant Shrubs** (create hedgerows): Plant and maintain large deciduous trees especially in riparian areas and areas adjacent to wetlands. Maintain corridors. Riparian buffers.
- **Water developments for wildlife:** Provide pools of water in urban areas.
- **Wildlife damage management:** may be necessary if raccoons invade garbage cans, occupy residences or buildings, or cause depredation of poultry. Exclusion is a cost-effective management practice. Harassment can be effective. Cultural modification like using wildlife-proof trash cans is very effective. Trap and relocate or trap and euthanize is effective for problem raccoons



[Hear the sound of the Raccoon](#)

Photo Source: National Geographic

Redhead Duck

(Region: Wetlands)

General Habitat Preference:

The redhead duck ranges over the north-western and central United States and Mexico. They winter in southern areas of the United States into Mexico. They are diving ducks that use stage 2 wetlands for most activities. They usually nest in emergent aquatic vegetation associated with stage 3 wetlands that are adjacent to stage 2 wetlands.

Habitat Requirements:

- **Diet:** Young redhead ducks eat primarily aquatic invertebrates (mollusks, snails, crustaceans) during late spring and early summer. During the rest of the year they prefer aquatic plants such as pond weeds, muskgrass, bulrush seeds, wild celery, Water lily seeds, and coontail.
- **Water:** see cover requirements below.
- **Cover:** Nests are built out of emergent vegetation and usually placed above Water or very near the shore in dense vegetation that provides concealment. Water levels should be controlled in order to promote growth of tall emergent aquatic vegetation. Strive for wetlands comprised of 50 percent stage 3 interspersed with 50 percent stage 2 wetland.

Wildlife Management Practices:

- **Manipulation of Succession** use prescribed burns every three to five years along with brush chopping or mowing to rejuvenate deteriorated vegetation. Livestock grazing management: use to maintain tall emergent aquatic vegetation adjacent to the Water. Prolonged protection of nesting areas from disturbances such as grazing and fire can result in deterioration of the vegetation. Intense grazing of such areas every three to five years (after nesting season) often rejuvenates the vegetation. Usually only 1/3 to 1/2 of the nesting area should be treated during any one year.
- **Ponds:** construction: build ponds / wetlands with a minimum size of one surface acre of Water, and manage Water levels to provide

habitat as described under Water control structures below.

- **Water Level Manipulation Techniques:**
Small Dikes for Temporary Flooding: construct small dikes to temporarily flood areas dominated by tall emergent aquatic vegetation during the nesting season. **Water Control Structures:** since redheads are diving ducks, control Water levels to promote growth of tall emergent aquatic vegetation (stage 3 wetland) adjacent to stage 2 wetlands with an abundance of floating and submerged aquatic vegetation (Water depth three to five feet).

male



female



<http://www.birds.cornell.edu/AllAboutBirds/audio/Redhead.html>

Red-Winged Blackbird

(breeding habitat)

(Region: Wetlands)

General Habitat Preference:

Red-winged blackbirds breed across the United States and throughout central Canada. They winter across the United States and extreme southern Canada. They prefer stage 3 wetlands dominated by emergent aquatic vegetation.

Habitat Requirements:

- Diet: Red-winged blackbirds use waste grain and seeds of annual forbs in fall, winter, and early spring. They eat a variety of insects in the summer. Many of the insects used for food are associated with tall emergent aquatic vegetation such as cattails, bulrushes, marsh grass, and a variety of shrubs and trees.
- Water: Red-winged blackbirds frequent areas associated with Water.
- Cover: These birds nest close to the ground or Water in dense clumps of emergent aquatic or other herbaceous vegetation. They often roost (rest) in the same areas or in nearby trees and shrubs.

Wildlife Management Practices:

- Manipulation of Succession use prescribed burns and brush chopping every three to five years to rejuvenate old, decadent, emergent aquatic vegetation. Livestock grazing management: use adjacent to and/or in wetlands to maintain cattails, shrubs, and trees.
- Plant Trees and Plant Shrubs (create hedgerows): plant adjacent to wetlands or ponds but not on the dam or dike.
- Ponds: construction: construct ponds and wetlands with shallow Water (less than 2 feet deep) where tall emergent aquatic vegetation can grow.
- Riparian Buffers: used for roosting habitat and also protects the Water quality of streams and wetlands.
- Water Level Manipulation Techniques:
Small Dikes for Temporary Flooding: use for providing shallow Water where emergent vegetation can grow. Water Control Structures: use for maintaining shallow

Water areas where emergent vegetation can grow.

- Wildlife Damage Management: This species is often a pest in agricultural areas where they may damage crops. In such situations, management objectives may be to reduce the quality and quantity of habitat. It is often more appropriate to manage for this species in urban wetlands and other areas where crop damage is not common.



Utah Division of Wildlife Resources



© Marie Read

[Red-winged blackbird *Agelaius phoeniceus*](#)

Wood Duck

(Regions: Southeast, Wetlands)

General Habitat Preference:

Wood ducks are primarily found along rivers and large creeks within bottomland hardwood forests, stage 3 wetlands and swamps with emergent woody vegetation adjacent to stage 2 wetlands, and shallowly flooded stage 5 and 6 hardwood forest.

Habitat requirements:

- Diet: Acorns are the primary Diet item of wood ducks in fall and winter. They also eat other nuts, various miscellaneous seeds and fruits, as well as waste grain (especially corn), all depending upon availability. Insects and other invertebrates are most important for wood duck chicks and hens prior to and during the nesting season.
- Water: Wood ducks spend most of their lives in water, drink regularly, and obtain water through their Diet.
- Cover: Wood ducks nest in tree cavities in stage 6 hardwood forest. Usually, nest sites are within or adjacent to flooded timber; however, wood ducks have been known to nest up to 1 mile from water. Cavity availability is critical. Thus, artificial cavities are readily used by wood ducks and have been, most likely, the number one reason for the increase in wood duck populations over the past 50 years. Nest boxes for wood ducks should be at least 100 yards apart and should not be placed within sight of each other if possible.

Wildlife Management Practices:

- Grain: Leave unharvested: to provide additional food source for wood ducks. This is especially important in fields that can be flooded and those adjacent to a water source used by wood ducks.
- Livestock management should prevent livestock from overgrazing in woodlots and protect trees and shrubs planted for wood ducks.
- Nesting structures: nest boxes should be erected where suitable habitat for wood ducks exist or where planned.

- Plant Trees and Plant Shrubs (create hedgerows): where there is a lack of emergent woody vegetation in open areas that can be flooded to create more usable space for wood ducks. Plant mast trees adjacent to or within open areas that are suitable for flooding if there is a lack of mast-producing trees in areas that can be flooded.
- Retain snags and down woody material: when implementing Timber Stand Improvement to provide potential cavity nesting sites.
- Timber Management Techniques: Timber stand improvement practices in bottomland hardwoods that can be flooded can lead to larger crowns of favored trees and increased mast production. Woody stem density should increase following TSI and improve cover for wood ducks in those stands that can be flooded.
- Water Level Manipulation Techniques: water control structures should be installed in existing dikes if there are none present. Water developments for wildlife, specifically shallow impoundments, should be created where topography allows to create feeding and nesting space for wood ducks.



Wood Duck, male, breeding plumage



Wood Duck, female

Click below to play sound from this species:

[Wood duck Aix sponsa](#)

Wildlife Management Practices (WMPs)

In this section, various practices used to manage habitat are described in further detail. They are listed in alphabetical order. The descriptions are brief and general and are not meant to be comprehensive.

Identify and learn the practices that are recommended for the species listed in the Regions section. When preparing for a judging event, it is only necessary to learn the information recommended for the particular regions that will be used in the event. Many of these practices are commonly used in certain regions and not others. Study only the appropriate practices that are listed on the chart found for the region that you are studying. It is always wise to learn as much as possible about any practice before implementing it. Additional reading, research, and guidance from other wildlife resources and wildlife management professionals is suggested.

Some of the practices may seem contradictory. For example, Practice 13 - Ponds, Deepen Edges discourages the growth of emergent aquatic vegetation, while Practice 25 - Water Level Manipulation Techniques encourages growth. **Landowner objectives will determine which practices you recommend.** Note that some practices may not be applied in all regions, even though you may be dealing with the same species. For example, Timber Management is not appropriate for Mourning dove in the shortgrass prairie, but it is in other regions. **Remember, when assessing whether or not to recommend a wildlife management practice, you must determine if it needs to be applied within the next year.**

At times, the best habitat management is maintaining an area in its current condition. This can include protecting the area from development and applying various management practices that will help maintain the area in the desired condition.

In this handbook, costs and budgets are not considered when recommending practices. However, in actual situations, wildlife managers must consider economics when planning and recommending management practices.

Index to Wildlife Management Practices (WMPs)

1. *Decrease Harvest*
2. *Increase Harvest*
3. *Establish Native Grasses and Forbs*
4. *Fish or Wildlife Survey*
5. *Grain: Leave Unharvested*
6. *Harvest Timing*
7. *Manipulation of Succession*
8. *Nesting Structures*
9. *Plant Food Plots*
10. *Plant Trees*
11. *Plant Shrubs*
12. *Ponds: Construction*
13. *Ponds: Deepen Edges*
14. *Ponds: Fertilize*
15. *Ponds: Reduce Turbidity*
16. *Ponds: Repair Spillway*
17. *Ponds: Restock*
18. *Retain Snags and Down Woody Material*
19. *Riparian Buffers*
20. *Soil Test*
21. *Streams: Dams, Boulders, or Logs*
22. *Streams: Remove Fish Barriers*
23. *Tillage Management*
24. *Timber Management Techniques*
25. *Water Level Manipulation Techniques*
26. *Water Developments for Wildlife*
27. *Wildlife Damage Management*

- U1. *Artificial Feeders*
- U2. *Do Not Disturb Nesting Sites*
- U3. *Mowing*
- U4. *Plant Flowers*
- U5. *Plant Food Plots*
- U6. *Rooftop / Balcony Gardens*
- U7. *Use Pesticides Carefully*

1. Decrease Harvest

Note: The wildlife specialist will provide clues as to whether or not this practice is necessary.

General Description:

Bass:

Needed when seine samples and fishing records of the pond reveal these situations:

- No recent bluegill hatch.
- Many medium-sized bluegill in poor condition.
- Bass are few in number but large and in good condition.

Bluegill:

Needed when seine samples and fishing records of pond reveal these situations:

- Many recently hatched bluegill.
- Very few medium-sized bluegill.
- Bass less than one pound and in condition.
- No young bass.

Trout:

Needed when seine and fishing records reveal these situations:

- Fish in good condition.
- Few medium and large sized fish.
- Many small fish.

Game birds and mammals:

Regulated hunting is the primary tool used to keep game species within the carrying capacity of the habitat. However, when harvest data, observation data and animal health indicates species populations are low, it is sometimes necessary to decrease harvest levels. Used when surveys show a continual population decline or when hunting success has continued to decline over a long period of time.

Refer to Concept 10, Biological Carrying Capacity.

2. Increase Harvest

Note: The wildlife specialist will provide clues as to whether or not this practice is necessary.

Bass:

Needed when seine samples and fishing records of pond reveal these situations:

- Many recently hatched bluegill.
- Very few medium-sized bluegill.
- Bass less than one pound and in poor condition.
- Few or no young bass.

Increase bass harvest cautiously. Target the bass less than one pound. Spread the harvest over the entire summer.

Bluegill:

Needed when seine samples and fishing records of pond reveals these situations:

- No recent bluegill hatch.
- Many medium-sized bluegill in poor condition.
- Bass few, large, and in good condition.
- Target medium-sized bluegill, using seine harvest or shoreline rotenone.

Trout:

Needed when seine or fish records reveal these situations:

- Many fish, small and in poor condition. In many areas extremely cold water reduces trout growth. In these situations harvesting more may not be of significant benefit.

Game birds and mammals:

Needed when animals show signs of stress and overpopulation, such as any of the following:

- Increase in prevalence of diseases and parasites.
- Destruction of habitat by overgrazing or overbrowsing.
- Poor body condition and weight loss.
- Poor reproduction.
- Few young animals in bag
- Higher percentage of older animals than young in fall population

Regulated hunting is the most effective and efficient practice to remove surplus animals and keep wildlife populations in balance with their habitat. When scientific data indicates animals are above carrying capacity, it is often necessary to increase harvest.

Refer to Concept 10, Biological Carrying Capacity.

3. Establish Native Grasses and Forbs

General Description:

Native grasses and forbs are recommended primarily to provide nesting and escape cover for small game, especially quail and rabbits. They also serve as bedding cover for white-tailed deer, nesting cover for wild turkeys and several songbirds, and as a haven for many small mammals. Warm-season grasses grow during the

warm growing season. Cool-season grasses make primary growth in the spring and fall and often go dormant during the summer.

Introduced grasses (e.g., tall fescue, orchardgrass, bermudagrass) are not recommended because they do not provide suitable habitat structure, and their competitive nature keeps native grasses and forbs from becoming established. Native grasses may be planted, or can be established, by killing existing non-native cover — especially tall fescue, johnsongrass, and crabgrass — with selective herbicides (e.g., imazapic) and allowing seeds lying dormant in the seedbank to germinate. If planted, native legumes (e.g., partridge pea, roundhead lespedeza, and Illinois bundleflower) may be sown with the native grasses. Seed from these legumes are relished by quail and other birds during fall and winter. These plantings should be burned or disked occasionally (every two-to-five years) to prevent deterioration of the vegetative structure through litter buildup and excessive woody plant succession. It is good to have fields or sections of fields that are burned/disked each year to provide a diversity of habitat types to serve the different needs of wildlife. Usually burning/disking are conducted just prior to spring green-up, so that nests and young wildlife are not disturbed. Ideally, native grasses should not be mowed. If used for grazing or haying, paddocks of native grasses should be rotated and not clipped below 6 to 8 inches.

Effect on Habitat :

- Fields of native grasses are particularly useful for wildlife in areas with little acreage in stages 2 and 3 and in areas where the majority of early successional habitat is in hayfields or pastures of non-native forages (e.g., tall fescue, orchardgrass, etc.).
- Fields of native grasses enhance habitat for many wildlife species (e.g., rabbits and quail) by providing winter, nesting and/or roosting cover. Ground-nesting birds usually build their nests at the base of a native grass bunch/clump.
- Fields of native grasses also provide food, through the various forbs present, for many species.
- Fields of native grasses that are burned provide an open structure at ground level, which is excellent brooding habitat for young quail and turkeys, who can walk about easily between the bunches of grasses, picking invertebrates off the vegetation and seed from various forbs off the ground.

- Fields of native grasses that are burned or disked on a two-to-five year rotation provide dead, dry vegetative material that birds use for building nests.

4. Fish or Wildlife Survey

General description:

Note: While fish/wildlife surveys are always important, they should not be recommended if it is stated or the field condition sheet indicates that a survey has recently been completed.

Fish surveys

Population balance is first established in ponds by stocking the correct number of fish. After the first year, check pond balance during early summer by seining at intervals around the pond. Four to five seine sweeps in an average pond is usually enough.

Balance is determined by comparing age groups, condition, and numbers of bass and bluegill caught in the seine and from fishing records. Recent reproduction of both bass and bluegill in the seine indicate that the fish population is balanced. Fish caught by hook-and-line can be evaluated on body condition (fat, skinny, size of head in relation to body, etc.). Trout do not often reproduce in ponds, so overall health of the fish is used as an indicator of pond balance. Unwanted species (bullheads, crappie, etc.) may also be caught in the seine or when fishing, indicating that the pond needs to be poisoned (with Rotenone) or drained.

Seining is usually not effective for collecting fish in streams. Fish in streams are usually collected by fishing or are electro shocked. Electro shocking involves running a small electrical current between two conducting rods which are moved up and down the stream. Fish that are stunned float to the surface and the age, condition, and numbers are recorded to determine the stream balance. The fish are then revived and returned to the stream.

Wildlife surveys

Monitoring wildlife for trends of increasing or decreasing populations or body weights of animals is important for wildlife managers. Data on white-tailed deer, black bear, wild turkeys, ruffed grouse, bobwhite quail, mourning doves and many songbirds are routinely collected by wildlife biologists using infrared triggered cameras, roadside counts, call counts, check stations,

transects and questionnaires. These data are then used to prescribe future harvesting or land management strategies.

5. Grain: Leave Unharvested

General description:

Strips or blocks of grain or other crops (e.g., soybeans) can be left unharvested. This is especially valuable if the strips are left adjacent to cover. This practice should be recommended only if there is an unharvested crop present. It is not applicable to grain food plots.

6. Harvest Timing

General description:

When wildlife is the primary objective, it is often necessary to avoid harvesting crops or hay during nesting and fawning seasons to reduce nest destruction and mortality.

7. Manipulation of Succession - Mechanical, Fire, Livestock, Chemical

General description

Succession is the orderly predictable series of changes in plant species composition through time and occurs in all natural communities. Wildlife habitat is most often managed by setting back succession in an effort to retain successional stages beneficial for the intended wildlife species. Each of these techniques is applicable for manipulating succession in different habitats for various species.

Succession Management - Mechanical

Mowing/Mulching – Mowing is most often done with a large rotary mower mounted behind a tractor. Sometimes, a mulching machine is used to mow large shrubs and small trees. To avoid disrupting nesting birds and destroying cover, mowing should not be conducted until late winter/early spring. When used to manage fields, mowing should be prescribed only when it is apparent that woody species are encroaching in the field. In other words, mowing grassy fields is unnecessary. When possible, prescribed burning and disking should be implemented instead of mowing.

Effect on Habitat:

- Helps keep vegetative succession in stages 2 or 3.
- Sometimes reverts succession from stage 4 to stage 3. Helps remove competition from some kinds of shrubs, allowing grasses and forbs to grow better. Sometimes helps keep vegetative succession in stage 4. Maintains low shrub growth with certain species of shrubs by encouraging resprouting. In stages 2, 3 and 4, helps rejuvenate grasses, forbs and shrubs, which improves nesting habitat for many species of birds.
- May be used to reduce weed competition in forage food plots.
- May be used in wetlands to increase interspersed by reducing vegetative cover.
- Causes thatch build-up, which reduces availability of invertebrates and seed to young quail, grouse and turkeys and other ground feeding birds. Thatch build-up also reduces the ability of these animals to move through the field and suppresses the seedbank.

Chaining/Roller Beating - Chaining utilizes a large chain strung between two bulldozers running parallel to each other (50 to 100 feet apart) to knock down shrubs and small trees. Roller beating utilizes bulldozers pulling a roller with large, sharp metal blades to knock down and chop up large shrubs and small trees. Roller beating is an alternative to chaining and has almost the same effect on vegetation. Both techniques are used where rugged terrain, rocks, or large shrubs prevent the use of a mower or mulcher. This practice is not used to manipulate understory vegetation in woodlands. Prescribed fire is the preferred method to maintain the desired vegetative composition and structure within woodlands.

Effect on Habitat:

- Helps remove competition of some kinds of shrubs, allowing grasses and forbs to grow better.
- Sometimes helps keep vegetative succession in stage 4. Maintains low shrub growth with some kinds of shrubs by encouraging resprouting.
- In stage 5 causes succession to revert back to stage 4.

Disking - Disking mixes the upper soil layer and incorporates organic material into the soil, facilitating decomposition and stimulating the seedbank. Disking is a highly preferred, relatively inexpensive and effective management practice for releasing grass-bound fields, creating bare ground, and encouraging germination and growth of forbs. Areas in successional stages 2, 3 and 4 can be disked to maintain/promote growth of annual and perennial forbs and grasses. Disking should be performed on a rotational basis, usually in winter. In planted pines, diskings can be used in stages 5 and 6 to reduce unwanted woody stems and encourage herbaceous growth. Similar to controlled burning, timing of diskings and diskings intensity strongly influence vegetation composition and structure. Disking should be used instead of mowing when and where possible and should be used where burning is not possible. While diskings is often used to create firebreaks to facilitate controlled burning, it should not be recommended in order to burn. Disking should not be prescribed for fields of perennial non-native grasses (i.e. tall fescue, orchardgrasses, bermudagrass). Fields with these grasses should be converted to native grasses and forbs using herbicides.

Effect on Habitat:

- In stages 2 and 3, maintains herbaceous vegetation.
- Promotes fresh herbaceous growth and enhances foraging habitat for many wildlife species.
- In stage 3, causes succession to revert to stage 2.
- In stage 4, causes succession to revert to stage 2 or 3.

Succession Management - Fire (Prescribed Burning) Prescribed burning can be the most effective and efficient practice for managing one or more habitat types for most wildlife species. Prescribed fire is encouraged to maintain stages 2 – 4 and to influence understory composition and structure within stages 5 and 6 of the Southeast Mixed and Outer Coastal Plain and Eastern Deciduous Forests. Timing of burning and frequency of burning strongly influence vegetation composition and structure. Prescribed fire should be used in fields instead of mowing/mulching whenever burning is possible.

Although a very beneficial practice, prescribed burning may not be applicable in all locations. Sites in close proximity to urban areas, hospitals or busy

roadways may not be suitable for burning due to safety and smoke management concerns.

Burning should be conducted only when danger of wildfire is low (i.e., when the wind, temperature and humidity allow a controlled burn) and should be conducted under the close supervision of forestry or wildlife professionals experienced with prescribed fire.

Effect on Habitat:

- Reduces litter layer (e.g., dead leaves and grass), which reduces chance of wildfire and enables the seedbank to germinate.
- Improves seed and invertebrate availability for many species.
- Scarifies (breaks down outside coating) some seeds so they can germinate.
- Releases nutrients into the soil.
- Burning during the dormant season does not significantly alter vegetation composition. Small woody stems may be top-killed, but usually resprout.
- Burning during the late growing season more effectively kills woody stems and may reduce density of native warm-season grasses and encourage additional forb cover.

Succession Management - Grazing Mgmt.

This practice is for managing the use of vegetation by livestock to enhance wildlife habitat. Only recommend this practice when evidence of livestock use is present or information on livestock usage is provided. Grazing management may be used to exclude livestock from sensitive areas or to manipulate successional stages to benefit wildlife by adjusting stocking rate, season of use, or grazing system. Livestock may be used to manipulate the height and structure of native warm-season grasses providing excellent wildlife habitat. Grazing should not be used to manipulate non-native forage pasture (e.g. tall fescue, orchardgrass, bermudagrass) for wildlife because these grasses are detrimental to wildlife, displacing otherwise suitable habitat. Livestock distribution can be controlled with fencing, herding or fire. Regardless of pasture type, proper stocking rate must be practiced to prevent improper grazing. The term, improper grazing, is used to describe livestock grazing that fails to meet land objectives such as soil conservation, plant species diversity, maintenance of wildlife habitat and adequate livestock nutrition.

Effect on habitat:

- Stocking rate, which is the amount of land allotted to each animal for the entire grazable portion of the year, is the MOST important consideration concerning livestock grazing management.
- Proper stocking rate and/or rotational grazing can be used to alter the vegetation structure and composition to favor wildlife.
- Reducing livestock use of riparian areas may improve the habitat for many wildlife species. Fencing can help reduce siltation, turbidity and stream bank erosion, while reducing stream and pond pollution from livestock wastes.

Succession Management – Chemical

Herbicides are often applied to control unwanted vegetation and encourage plants that are more desirable for wildlife

Effect on Habitat:

- In many habitats, hardwood brush reduces vegetative diversity and limits many plants that are important for wildlife.
- Mowing/mulching and chaining/roller beating stimulate resprouting.
- Proper herbicide applications control unwanted woody growth and encourage more herbaceous groundcover.
- Many areas are covered with non-native grasses and forbs that provide little food or cover for wildlife and exhibit a growth pattern that prevents many wildlife species from using the area. These areas can be sprayed to eradicate the undesirable species and promote desirable native species from the seedbank or desirable species can be seeded if not present in the seedbank.
- Each succession manipulation technique is applicable for manipulating succession in different habitats for various wildlife species. In some instances, more than one technique may be applied. Refer to Concepts 4, 5, 6 and 7.

For the written and oral segments of the contest, you should specify which practice(s) should be used and why that practice is applicable.

8. Nesting Structures

General description:

Some species den, nest and/or roost in cavities they don't excavate themselves (e.g., bluebirds, wood ducks, screech owls). If natural cavities are not available, artificial cavities (nest boxes) can be used. Many species need a certain kind of cavity (e.g., diameter of hole, depth, area) in a certain location (field, woods or water) and at a certain distance above the ground (height in feet). The particular design and placement of nest boxes often determines which wildlife species will use the structures. Contact your county Extension office for specific designs of nest boxes and other artificial nesting/ roosting structures.

Note: Nesting structures for Canada geese or mallards are not recommended in many areas because resident Canada geese have become too numerous and are a nuisance. In addition, nesting structures are not recommended for mallards; instead, creation of quality nesting habitat (native warm-season grasses) is required to impact population recruitment. Nest boxes should be monitored to ensure use by targeted species.

Effect on habitat:

- In open areas (stages 2, 3 and 4) nest boxes are useful for bluebirds unless an abundance of nesting cavities in trees or fence posts are present. Nest boxes for bluebirds should not be placed any closer than 80 yards apart to prevent excessive territorial fighting between males.
- Near water sources, nesting structures provide secure nesting sites for wood ducks where trees with cavities suitable for nesting are absent. Nest boxes for wood ducks should not be placed any closer than 100 yards apart and ideally, should not be visible from one box to another, to prevent dump-nesting by females not incubating a particular nest.

9. Plant Food Plots

General description:

Planting grain and forage food plots can be beneficial for many wildlife species (game and non-game, birds and mammals) primarily by providing supplemental food, but also by providing additional cover in some circumstances. **Grain food plots** are annual warm-season plantings that include corn,

grain sorghum, and millet, as well as other seed, such as buckwheat, sunflowers, soybeans and cowpeas. **Forage food plots** may be annual or perennial, warm- or cool-season plots. Popular forage plantings include clovers, wheat, oats, rape, chicory, winter peas, soybeans, cowpeas and lablab. Food plots should be well dispersed throughout the property being managed.

Generally, 1 to 5 percent of a property being managed for wildlife may be in food plots. Food plots may be long and narrow (300 to 400 feet long and 15 to 20 feet wide) or blocky in shape (depending on wildlife species managed for and the type of food plot planted), preferably located at an edge between two or more habitat types (e.g., between a woodlot and an old-field, perhaps near a creek). If possible, food plots should be located adjacent to natural cover (e.g., brushy fencerows, hedgerows and other thicket-type areas).

Exclusion cages should be erected in all forage plots to monitor planting success and amount of grazing pressure. Food plots are not planted for upland wildlife only (e.g., rabbits, quail, turkeys and deer), but also for waterfowl. Canada geese often feed in warm-season grain food plots and in winter wheat. Plots of millets, corn, rice, or grain sorghum may be flooded a few inches deep during the fall to provide an additional food source for ducks through the winter. For information on recommended plant species, seeding rates, seeding depth and soil type, visit your county Extension office.

It is important to note, food plots should be considered supplemental to the existing natural habitat. The primary objective for food plots should be to provide nutrition for various wildlife species during periods when naturally occurring foods are limited (e.g., late summer and winter). In addition, food plots are often used to facilitate harvest of some wildlife species. Plots should not be placed within view of property lines or public roads.

Effect on Habitat:

- In areas where row-cropping (corn, grain sorghum, soybeans, etc.) is scarce, grain food plots can supply high-energy foods through fall and into late winter.
- In areas where little herbaceous vegetation is present (e.g., large areas of stages 4, 5 and/or 6) and/or where herbaceous vegetation is of no value to wildlife (e.g., fields of tall fescue, orchardgrass, bermudagrass, etc.), forage plots can supply high-protein foods, especially during late summer and through winter and spring.

10. Plant Trees

General Description:

Trees are planted to benefit many species of wildlife and can provide food (hard or soft mast) and/or cover. Trees should be planted in winter while they are still dormant. For specifics about what, when, and how to plant mast trees, contact your county Extension office.

Effect on Habitat :

- A wide variety of tree species may be planted; species used depend on many factors, such as landowner objectives, region, and site.
- A diversity of hard and soft mast producers is recommended where mast is limited.
- Provides additional nesting, perching, denning and roosting cover for many wildlife species.

11. Plant Shrubs

General Description:

When properly located, various shrubs can benefit many species of wildlife. In large open areas, planting multiple rows of shrubs is beneficial for those species requiring additional shrub cover. Fruiting shrubs are especially good when planted in fencerows, hedgerows, field/woods borders, odd areas (e.g., field corners and gullies) and any other areas where soft mast may be lacking. Establishing hedgerows of shrubs to break-up fields is very beneficial, especially when planted adjacent to native grasses and/or a good food source. Plant shrubs in winter while they are still dormant.

Effect on Habitat :

- Can provide additional food and cover for many wildlife species in areas where specific species of shrubs are lacking.
- Shrubs are an important component of travel lanes, which allow wildlife to move safely across open fields between two areas of cover. Establishing hedgerows may be used to increase interspersed cover types.
- Shrub plantings may be useful in some urban settings where desirable cover and/or soft mast are lacking.
- Hedgerows allow animals to find suitable habitat for feeding, nesting or cover.

- Establishing hedgerows increases the amount of edge and creates smaller fields in close proximity that can be managed differently to meet the various food and cover requirements for different wildlife species.

12. Pond: Construction

General Description:

Ponds can be created using dams, dikes, and levees to provide permanent water for fish and wildlife. The design varies, depending on the purpose for constructing the pond and the region where it is constructed. For example, steep sloping sides benefit fish and gentle sloping banks benefit several wildlife species, such as wading birds. Contact your local Cooperative Extension Service or Natural Resource Conservation Service office for design details.

This practice should be recommended for creating **new** ponds with permanent water.

Effect on Habitat:

- Suitable habitat for fish is created by constructing a new pond.
- Although many wildlife species may use ponds for various reasons, this practice is intended primarily for fish habitat. When additional water or wetland habitat is needed for various wildlife species, water developments for wildlife should be marked. Refer to Concept 11.

13. Ponds: Deepen Edges

General Description:

In ponds with excessive aquatic vegetation along the margins of a pond, the edges should be deepened to a minimum of two to three feet with steep side slopes. If the ponds can be drained, this can be accomplished with a bulldozer or tractor with a rear blade. If the pond can not be drained, a backhoe can be operated from the top of the pond bank. Soil can be removed from the site or piled around the bank and then smoothed out and planted to native grasses and forbs. Refer to Concept 11.

Effect on Habitat:

- Reduces rooted aquatic vegetation around the edge of a pond, making prey more easily available to predator fish.

14. Ponds: Fertilize

General description:

Ponds can be fertilized to increase available natural food organisms and prevent rooted aquatic weeds from becoming established. However, not every pond should be fertilized. Fertilization should **not** be used in ponds infested with weeds, ponds with excessive water flow, turbid (muddy) ponds, or ponds that will not be fished heavily. Fertilization is needed in fish ponds with water clear enough that you can see your hand clearly with your arm underwater at elbow depth (18").

Before beginning a fertilization program, have the total alkalinity and pH of the pond water tested. Ponds that are below 20 mg/l total alkalinity will need liming in order for fertilizers to be effective.

Fish ponds should be fertilized in the spring when the water temperature reaches 60 degrees Fahrenheit. For ponds with moderate hardness (50 – 100 mg/l calcium hardness) apply at the rate of 15 pounds of 12-52-4 (or its equivalent) powder, one gallon of 11-37-0 liquid fertilizer, or 15 pounds of granular (0-46-0) per acre at two-week intervals, or until a good green color (phytoplankton bloom) develops in the pond. Make additional applications of fertilizer (at the same rate per surface acre) every three to four weeks, or when the water clears (becomes less green). Fertilization may be continued until water temperatures drop below 60 degrees Fahrenheit in the fall.

Methods for applying fertilizers vary with the type of fertilizer selected. Granular fertilizer must be distributed from a fertilizer platform. Liquid fertilizer should be mixed with pond water and broadcast from a boat for large ponds or from the bank of small ponds. Water soluble powdered fertilizers can be broadcast from a boat or from the bank.

Effect on Habitat:

- Pond fertilization stimulates phytoplankton production, which is the first step in the food chain of a fish pond.
- Refer to Concept 11.

15. Ponds: Reduce Turbidity

General Description:

Turbid or muddy water limits fish production because natural food organisms need sunlight to grow. Turbidity can be caused by sediment being washed in from the pond banks or watershed, activities of cattle watering in the pond, feeding activities of bottom-dwelling fish such as carp or buffalo fish, or negatively charged clay particles suspended in the water column.

Most events of turbidity are caused by temporary introductions of sediments from the watershed (erosion) or the pond bottom (cattle or fish) and will usually clear in a relatively short period of time. Reducing erosion in the watershed is best accomplished by reseeding the watershed or planting filter strips. Turbidity due to pond sediments can be controlled by restricting cattle to a small area of the pond and eliminating bottom-dwelling fishes.

Turbidity from suspension of negatively charged clay particles is a more difficult problem. The addition of positively charged compounds such as limestone, gypsum, or alum crystals can cause the clay particles to settle. However, the choice of which product and how much to use has to be based on effectiveness, availability, cost, and the ability of the pond owner to apply the product correctly. Refer to Concept 11.

Effect on Habitat:

- Removes/settles silt in the water and allows sunlight to stimulate phytoplankton.
- Improves water quality and provides nesting, brooding, and winter cover for some wildlife.

16. Ponds: Repair Spillway

General Description:

Needed if the spillway in an existing dam or dike is eroding or otherwise damaged, keeping the pond level too low and increasing the chance of the dam washing away during heavy rains. In special cases, leaks around the spillway or levee structure can be stopped with the addition of special clays or plastic liners (this is expensive). Refer to concept 11.

Effect on Habitat:

- Enables pond to fill to appropriate level and precludes vegetation from establishing around the inside perimeter of the pond.

17. Ponds: Restock

General Description:

Restocking a pond is a drastic measure and should only be considered after other management approaches have been attempted. Ponds containing wild fish species such as carp, shad, green sunfish, or bullhead catfish should be restocked with a balanced predator / prey combination. Restocking should be done only after all fish in the pond have been removed, either by draining or applying a fish toxicant. In warmwater ponds, bluegill fingerlings should be stocked in the late fall, and bass fingerlings are stocked the following June. Although various states have different stocking recommendations, typical stocking rates are 1000 bluegill and 100 bass per surface acre if the pond is to be fertilized or 500 bluegill and 50 bass per surface acre if the pond will not be fertilized. Refer to Concept 11.

Effect on Habitat:

- Draining ponds and using fish toxicants remove unbalanced fish populations and allow establishment of desirable balanced populations.

18. Retain/Create Snags and Down Woody Material

General Description:

Snags are standing dead trees. They provide cavities used by many birds and mammals. In forested habitat, snags and down logs of various species with remaining limbs, bark and stumps should be retained for habitat diversity. In the absence of any snags and when managing for species that use snags and down woody material, it may be necessary to create snags by killing some existing trees by girdling the tree with a hatchet or chainsaw and applying herbicide to the wound. In streams, woody material creates stream diversity and structure that may be used as cover.

Effect on Habitat:

- Snags provide roosting and perching sites for many bird species.
- Snags provide woodpeckers with sites for cavity construction. Later, other species (e.g., bluebirds, owls, gray squirrels, and wood ducks) may use these cavities for nesting and roosting.
- Snags provide foraging sites for many species.
- Down woody material provides sites for feeding, reproducing, hiding and resting that are important to numerous species of terrestrial wildlife.
- Down logs provide denning sites for bobcats.
- Down logs provide a rich food source for insect and fungi-eating animals, which may increase available prey for bobcats.
- As down logs decompose, they can hold more moisture, providing an essential cool, moist microhabitat for many species of reptiles, amphibians and small mammals.
- Down logs provide drumming sites that are important for the mating rituals of ruffed grouse.
- Dead and down material provides sites for regeneration of some tree and shrub species.
- Dead and decaying logs serve as sites for nitrogen fixation by some bacteria.
- Logs, large limbs and smaller branches in and near water provide shade, cover and food for aquatic organisms, some of which are food for young fish.

19. Riparian Buffers

General Description:

A riparian buffer is an area of trees, shrubs, forbs and grasses located adjacent to streams, lakes, ponds and wetlands. Riparian buffers are important for providing habitat and protecting water quality in streams and wetlands. The recommended minimum width is 100 feet, however the width may vary based on various factors including the size and order of stream, as well as topography.

Effect on Habitat:

- Riparian buffers provide shade for summer cooling and cover in the stream or wetland.
- They provide corridors for wildlife to move from one habitat to another.
- Buffers slow overland flow of water and help maintain water quality.

- They provide structural diversity both adjacent to and within the stream. As trees die then fall into the stream, the large woody debris helps create pools and riffles and provides cover for fish and other aquatic life.
- Leaves, stems, branches and large woody debris fall into streams, providing nutrition and habitat for aquatic insects, a major food source for fish and amphibians.
- Insects from the trees fall into the stream and provide a food source for fish, amphibians and other aquatic life.
- Tree roots improve soil and stream bank stability.

20. Soil Test

General Description:

Applying fertilizer and lime at environmentally safe rates will improve palatability and production of vegetative habitat and increase cost effectiveness. A soil test is the analysis of a soil sample to determine nutrient content, composition and other characteristics. Tests measure fertility and indicate deficiencies that need to be remedied. **In the absence of a current soil test (one less than 3 years old), a soil test should be obtained in areas where you intend to plant wildlife foods or enhance native vegetation.**

Effect on Habitat:

- Increases growth, production and nutrient availability of food plots.

21. Streams: Dams, Boulders, or Logs

General Description:

Small (less than 1.5 feet high) dams are built across streams to raise the water level and create pools. Large boulders or logs are placed in streams (with hard bottoms) to improve fish habitat. The rocks need to be large enough so that small floods will not move them.

Any structures put in a stream have the potential to alter stream currents in an undesirable manner. The placement and design of such structures should be done with advice from experts in the field.

Effect on Habitat:

- Used to create pools for fish to hide and rest. If designed properly, can be used to reduce some kinds of stream erosion.
- Used in areas with considerably more riffles than pools.

22. Streams: **Remove Fish Barriers**

General Description:

Remove or replace culverts or large dams that prevent fish passage to upstream habitat areas. Culverts with great drops below them or with too fast of water flowing through them, can block fish from upstream habitats. These culverts can be replaced with arched or bottomless culverts or with bridges. In some cases, fish passage around barriers can be provided using a “fish ladder” or steplog structures.

Effect on Habitat:

- Provides more habitat for fish to spawn and rear.
- Allows fish to migrate within the stream system and between the stream and ocean to complete their life cycles.

23. Tillage Management

General Description:

Tillage of cropland may be delayed in spring to allow the use of standing stubble for nesting. Tillage may be eliminated in the fall to allow wildlife access to waste grain. When fall tillage is necessary, avoid inversion tillage (soil is turned over and covers up crop residue), such as moldboard plowing or disking. Instead, till with implements such as chisel plows that can be used without turning the soil over.

Note: Recommend this practice only if a crop is present.

Effect on Habitat :

- Increases supply of waste grain, which is a food source used by rabbits, squirrels, quail, turkeys, deer and many other wildlife species.

24. Timber Management **Techniques**

Timber Harvest

General Description:

Timber management and wildlife management are inseparable partners in forested habitats.

Harvesting timber is one method of enhancing wildlife habitat. Several silvicultural methods are used to regenerate forest stands. The method recommended for a given stand varies greatly depending on forest type and composition and the objectives of the landowner.

- **Clearcut** regeneration method harvests all the trees on a given site. More sunlight is allowed in to the forest floor with this method than with any other. Clearcutting generally releases shade intolerant species (e.g., yellow poplar, black cherry, basswood) when present.
- **Shelterwood** regeneration method removes a pre-determined number of trees from the stand (either in the midstory and/or in the overstory) to allow development of seedlings (regeneration) from beneath. Later (6 to 8 years), the remaining overstory (shelterwood) is removed as the regeneration becomes developed.
- **Seed-tree** regeneration method leaves a few good seed-producing stems per acre to regenerate a new stand. This method is often used in pines and other species with light-weight, wind-carried seeds. The seed trees are usually harvested after the crop of new trees becomes established.

Pines are often planted after harvest to establish a new stand. Hardwood stands are almost always regenerated naturally and are not planted. Whatever the method used, forested land to be harvested should be chosen so that food and cover for wildlife are in close proximity. Tracts harvested should have adjacent unharvested stands to provide travel corridors and space for wildlife that do not use young stands.

Note: Harvesting timber should be recommended as a silvicultural tool to regenerate stands — not merely to create “openings.” Regenerated forests result in new forests, not fields. Where additional fields of native grasses and forbs) are needed, ‘Timber Management: Harvest’ should not be recommended automatically.

Effect on Habitat :

- Harvesting timber generally sets back succession and produces new forest growth with a greater stem density. According to the site and regeneration method, timber harvest reverts stage 6 forest to stages 3 and 4, which will grow into stage 5 within a few years.
- Enhances cover for many prey species, which provides food for predators.
- According to the site and regeneration method, harvesting timber can stimulate forb growth, providing additional food (forage, seeds and insects) and cover many species.
- Retaining snags and cavity trees when harvesting timber provides nesting, roosting, denning and perching sites for those species that use them.

Timber Stand Improvement (TSI)

General Description:

Timber Stand Improvement (TSI) may involve any of several techniques used to improve the quality and composition of forest stands by shifting resources (sunlight and nutrients) toward production of desired products, which include timber and/or wildlife. TSI most often involves some type of **thinning**, which reduces stand density to influence stand growth. Thinnings may be pre-commercial or commercial. Pre-commercial thinnings are conducted before the trees have sale value. Commercial thinnings involve removing at least part of the trees for a useful product. Removing trees increases the amount of sunlight entering the forest canopy and is used to promote increased growth of the remaining trees through changes in stand composition and structure (cover) in the understory and midstory to favor food producing plants, both woody and herbaceous.

Effect on Habitat :

- Increased herbaceous growth in the understory improves brooding habitat cover and provides additional forage.
- Increased woody stem density in the mid story improves cover for certain species, such as ruffed grouse.

25. Water Level Manipulation Techniques

Water Control Structures

General Description:

Various structures made out of concrete, pipes, wood, etc., are used to control the water level in wetlands and ponds. They usually are combined with dams and shallow dikes for water control. Recommend only when inadequate or no structures are present on an existing dam or dike.

Small Dikes for temporary flooding

General Description:

In the fall and winter, small dikes are used to temporarily flood potential feeding areas for waterfowl by holding rainwater on a field or woods. Grain fields (e.g., corn, millets and grain sorghum), in stage 6 hardwood stands are examples of feeding areas that can be flooded to attract waterfowl. In spring and summer, existing wetlands and forested areas can be flooded to provide nesting and brooding habitat for various waterfowl, such as redheads and wood ducks. This practice is recommended in areas where there are potential sites for waterfowl feeding and nesting. A water-control device in the dike allows the water level to be manipulated. The water is removed from the field prior to spring (similar to letting the water out of a bathtub) so the field can be planted again.

Note: When this practice is recommended, it is assumed that adequate water control structures are included and should not be an additional recommendation.

Effect on Habitat :

- Water level manipulation techniques are used to create or improve habitat for wildlife whereas water developments for wildlife are constructed to provide a source of drinking water for wildlife
- Temporary flooding can improve existing wetlands for nesting and brooding for some waterfowl species, such as redheaded ducks , and can improve existing forested areas for nesting and brooding wood ducks.
- Allows management of water levels to increase or decrease the amount and type of aquatic vegetation. Useful for creating a desirable mix (interspersed) of open water and emergent aquatic vegetation.
- Can be used to create shallow water areas.
- Can be used to manage the quality of water and for control of unwanted fish.

- Can be used to control water levels in flooded timber, drawing water down to prevent tree mortality.

26. Water Developments for Wildlife

General Description:

Creating a source of drinking water for wildlife is critical consideration when little or no water source is available. Many different types of water sources are possible, depending on the area and local needs of wildlife.

- **Guzzlers:** Built by covering an area with an apron of fiberglass or some other material that sheds rain. The water is collected in a storage tank and slowly released into a trough from which wildlife can drink.
- **Dugouts:** Basins (dug out with bulldozers or backhoes) designed to collect water from run-off and/or precipitation. Side slopes should be gentle to provide easy access for wildlife.
- **Shallow Impoundments:** Earthen dikes are constructed to retain water (usually run-off water from precipitation) in natural drainage areas. Placement of the dike is critical to avoid damage from floods and also to collect sufficient water. These impoundments are also used by waterfowl for nesting and brood habitat when flooding occurs in spring and summer. Crop fields (e.g., corn, millets, grain sorghum) can be flooded in the fall and winter to provide areas for waterfowl and other wetland species to feed and rest. A water-control device in the dike allows the water level to be manipulated. When this practice is recommended, it is assumed that adequate water control structures are included and should not be an additional recommendation.
- **Birdbaths and Backyard Ponds:** Small ponds can be constructed in backyards and other urban areas to provide water for a variety of wildlife. Birdbaths are also useful for providing water in urban settings.

Effect on Habitat :

- Provides drinking water for wildlife.
- Provide winter food resources if flooding occurs
- Provides a source of prey for many predators

27. Wildlife Damage Management

General Description:

Wildlife managers often have to exclude, trap, relocate, frighten, repel, poison, shoot or otherwise kill individual animals in order to reduce or eliminate damaging behaviors and/or health hazards presented by some wildlife species. Examples of wildlife damage include woodpeckers hammering on the side of the house, squirrels nesting in the attic, deer eating ornamental plants in the yard or feeding in soybean fields, bobcats/coyotes/owls preying on livestock, rabbits/raccoons eating vegetable gardens, beavers killing trees, red-winged blackbirds eating crops, and Canada geese loitering on lawns and golf courses. In additions, starlings roosting in urban trees and defecating on sidewalks can create a health hazard. Wildlife damage management may be recommended in addition to the practice of increasing harvests if special problems exist on the area being evaluated.

- Direct control techniques like shooting, trapping and the use of toxicants to reduce problem animals are commonly used and effective.
- Non-lethal methods of predator control including habitat modification, repellents and the use of exclusion fences or guard dogs are also commonly used.
- Methods of controlling herbivores (deer, rabbits, etc.) include shooting, exclusion fences, taste and area repellents, and scare tactics (such as propane cannons).
- Methods of bird control include frightening devices, exclusion devices and shooting. Refer to concept 12, Wildlife Damage Management.

URBAN WILDLIFE MANAGEMENT PRACTICES

U1. Artificial Feeders

General description:

Artificial feeders are used primarily to feed songbirds and butterflies and should not be used for terrestrial species. A wide variety of feeder designs, methods, and foods are available. Most bird species prefer black-oil sunflower seeds and white proso millet. Species like the hairy woodpecker prefer to eat suet (fat) rather than seeds. Species like the mourning dove prefer to eat on the ground rather than in a tree or on a balcony.

For many people in urban areas, bird feeders are often their only opportunity to view wildlife. This interaction is good; however, it may also be hazardous for birds. Since feeders draw birds close together, disease transmission becomes more problematic. Feeders that are not cleaned properly can regularly promote the spread of various diseases. In addition, feeders can aid predators such as housecats and may lure birds into close proximity with houses and automobiles, which often proves fatal for birds. It is essential that bird feeders be properly maintained and placed in a suitable location.

U2. Do Not Disturb Nesting Sites

General Description:

All wildlife must procreate to sustain their species. Because of this fact and the fact that one or both parents invest a great amount of energy and time in breeding and rearing young, it is important that nest sites not be disturbed. In urban areas increased nest disturbance may be realized due to greater human density. The more a nest site is disturbed, the greater chance the parent will abandon the site and young. Additionally, predators' acute sense of smell can easily pick up human scent left at or near the nest site and can use that as a guide to finding and depredating the nest.

- Keep all cats indoors
- Do not approach or handle nest, eggs, or young

U3. Mowing

General Description:

Mowing is a mechanical method, usually involving a push or riding lawn mower, for maintaining early successional habitat in urban areas. Lawns and park-like settings are the most often mowed areas. Mowing is usually the only practice for managing early successional habitat in urban areas as burning is typically not allowed due to human safety, and chaining/roller beating, disking and grazing are not aesthetically appealing or practical. Chemical application may be appropriate, but is not as cost-effective as mowing. Many wildlife species inhabiting urban areas require early successional habitat interspersed with shrub and forest for foraging purposes and easy travel corridors.

Effect on Habitat:

- Mowing keeps vegetative succession in stages 2 or 3
- Wide expanses of mowed areas may not provide adequate cover for wildlife, so leave some areas unmowed or provide cover using islands of vegetation like shrubs and flowers.
- Periodic de-thatching and aerating of grass and soil, respectively, may be needed to maintain good growing conditions

U4. Plant Flowers

General Description:

Planting annual and perennial flowers provides food and cover for many wildlife species. Additionally, flowers improve the general beauty of an area.

Effect on Habitat:

- Planting annual and perennial flowers can provide stage 2 and 3 vegetation. This can benefit wildlife requiring food and cover in stages 2 and 3
- Plant only native flowers
- Plant a variety of flowers that will provide food and cover in all 4 seasons
- Plantings should be arranged in proximity to other cover so they are accessible to wildlife

U5. Plant Food Plot

General Description:

Planting food plots in urban areas can serve the same purpose as in rural areas (primarily as a food source but also cover provision). Planting food plots in urban areas, however, are not typically done in the same fashion. For example, it would look out of place in an urban setting to plant rows of corn. Instead, food plots in urban areas should serve an aesthetic purpose in addition to providing food and cover and can be thought of as vegetable gardens, flower beds, rooftop gardens, or other landscaped areas.

Effect on Habitat:

- Provides or supplements food sources for a variety of wildlife in urban areas
- Food plots may be most beneficial during times of year when food is less abundant (for example in winter months in northern latitudes or during periods of drought) or in urban areas where green space is not present

U6. Rooftop / Balcony Gardens

General Description:

In urban areas, residential green space may be limited. Instead of creating sprawling planting areas as is done in suburban and rural areas, urbanites create rooftop or balcony gardens. Although limited in space, the goal of rooftop or balcony gardens is to create wildlife habitat, and as such, rooftop or balcony gardens should provide food, water, and cover.

Effect on Habitat:

- An opportunity to provide food, water, and shelter in urban environments to attract wildlife and provide positive opportunities for human-wildlife interactions
- Stages 2, 3, 4, and 5 may be provided through a rooftop or balcony garden, although none in large quantities
- Plant only native species
- Plant vegetation that will provide food and cover year round
- Moving water like a small waterfall or stream will attract more wildlife than water that is stationary

U7. Use Pesticides Carefully

General Description:

No one likes ants invading their picnic or mosquitoes biting when enjoying outdoor activities. But, insects are part of the ecosystem and provide a great benefit to a wide range of wildlife species, primarily as a food source. As insectivores, most bat species rely on insects for their sole food source. Many bird species feed insects to their chicks. Insects are a great source of protein and provide nutritional benefits to wildlife that consume them.

When using pesticides:

- Follow all directions on manufacturer's label
- Use a pesticide that is species-specific so you only target the problem pest and not beneficial invertebrates
- Wear protective clothing when applying pesticides

Interpreting Wildlife Habitat from Aerial Photographs

Using aerial photographs (black and white, color, or infrared) to judge the quality of an area of land for different wildlife species is sometimes used by wildlife managers as a way to get an overview of general habitat types in that area. It is not used as a substitute for evaluating the site on the ground.

For purposes of the 4-H WHEP contest, it will be helpful for contestants to be able to identify certain features on an aerial photo, such as rivers/streams, ponds/lakes, structures (houses, barns, commercial buildings), various successional stages, agricultural land, pasture land, hard edge, soft edge, residential/urban areas, roads, power lines, etc. An aerial photo may be provided for the site for which the management plan is to be written.

When looking at aerial photos, imagine how the countryside would look if you were a bird flying over it. If you have flown in an airplane, you know how it looks. The way a bird or pilot sees land is the way it appears on an aerial photograph. For example, a silo appears round, buildings look like squares or rectangles, woods are rough, and fields are smooth.

When reading aerial photographs, hold them so that shadows of objects fall toward the reader. Otherwise valleys appear as ridges, and vice versa. All objects are small, but you can determine what they are by comparing their size with the size of a known object. Other things that help are tone (shade of gray), shape, and shadow. The length of shadow indicates the height of an object. The tone varies with the seasons of the year, so it is important to know the season when aerial photographs were made. The date the photo was taken is usually in the upper left hand corner. The scale of such photos can vary, but often either 4 or 8 inches on the map equals 1 mile on the ground. Terraserver and google maps are good resources for samples of aerial photos. Your local Natural Resources Conservation Office or government planning office may also be able to provide you with sample aerial photos.

On the following pages are some sample aerial photos with features identified and with justification for the interpretation of the habitat relative to its value to the Eastern Gray Squirrel. Please note that oral reasons as provided are NOT a part of the National WHEP Invitational Contest. They are provided to help understand how to evaluate habitat using an aerial photo. Being able to evaluate habitat and identify features on aerial photos will be important because questions about aerial photos may be a part of the general knowledge quiz.





Photo 1 - Area 1



Photo 2 - Area 2



Photo 3 - Area 3



Photo 4 - Area 4

Sample Reasons for the Eastern Gray Squirrel:

For habitat suitability for the Eastern Gray Squirrel, these photos were ranked **2, 3, 1, 4**.

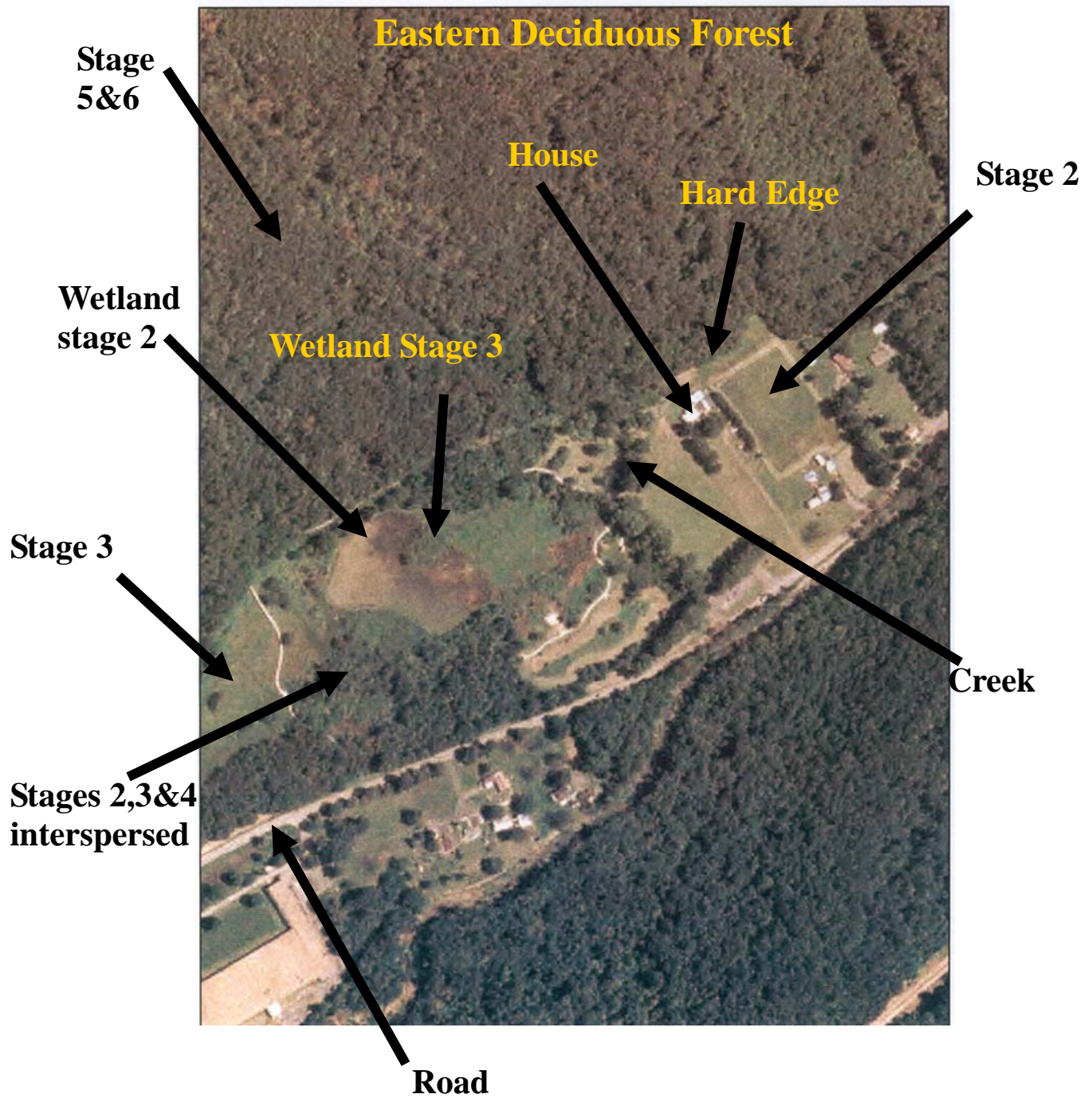
Photo 2 was placed over 3 because area two contained more stage six mature woodland. This is the only habitat type that the eastern gray squirrel requires. The forests in area 2 are deciduous, which means that plenty of mast is available.

Photo 3 was ranked over 1 because area 3 contained more of the preferred habitat for the gray squirrel. Although there are several fields, a large amount of stage 6 is still available in continuous sections. Also beneficial, the trees in area 3 are deciduous and thus likely to include mast producing species.

Area 1 was placed over 4 because area 1 had trees and area 4 was completely encompassed in agricultural land. We grant that area 4 would provide the squirrels with grain as an additional food source, but the lack of usable nesting habitat and protective cover in stages 5 and 6 would prevent gray squirrels from thriving here.

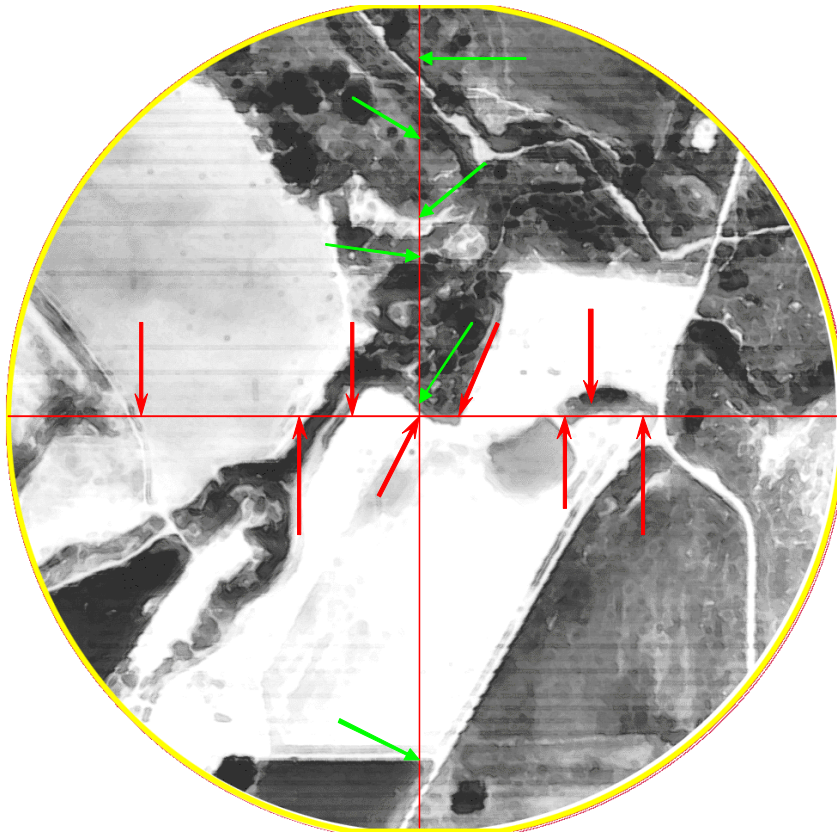
Area 4 was placed last because it contained no stage 5 or 6 woodlands. With none of the necessary habitat being provided, gray squirrels could not do well in this habitat.

Sample Features on Aerial Photos



Interspersion

As discussed in the Concepts section, many wildlife species prefer areas with high interspersion of lands in different successional stages. It is important to consider the amount of interspersion when evaluating habitat through aerial photographs. One way of measuring the amount of interspersion of an area is to apply the “interspersion index” principle. This can be done using aerial photographs by counting the number of times the habitat changes along an imaginary north-south line across the widest part of the area, then along the widest east-west line. Next, add these two numbers together to get an interspersion index value. Compare this value with the other three areas to be judged. The higher the value, the better for quail, rabbits, and other wildlife species that like areas with high interspersion. The interspersion indexes for the photo shown below are: A to B = 6; C to D = 8; $AB + CD = 6 + 8 = 14$. Thus, your interspersion index value for the aerial photo seen here is **14**.



Definitions of Food Groups - Appendix A

Aquatic Plants:

An aquatic plant is a plant that grows partly or wholly in water, whether rooted in the mud, or floating without anchorage. Plants that require constantly moist conditions without standing water can also be included in this group. For the purpose of this contest only examples from the following genera will be considered.

Algae: various genera

American lotus-*Nelumbo lutea*

Arrowhead/duck potato-*Sagittaria spp*

Big duckweed-*Spirodela spp*

Bladderworts-*Utricularia spp*

Bulrushes-*Scirpus spp*

Burreeds-*Sparganium spp*

Cattails-*Typha spp*

Coontail-*Ceratophyllum spp*

Cordgrass-*Spartina spp*

Duckweed-*Lemna spp*

Floating hearts-*Nymphoides spp*

Naiads-*Najas spp*

Pondweed-*Potamogeton spp*

Reshes- *Juncus spp*

Sedges –*Carex spp*

Smaratweed- *Polygonum spp*

Spikerush- *Eleocharis spp*

Waterlily- *Nymphaea spp*

Watermeals- *Wolffia spp*

Watermilfoil- *Myriophyllum spp*

Waterprimrose-*Ludwigia spp*

Waterweed- *Elodea spp*.

Bark: The tough outer covering of the woody stems and roots of trees, shrubs, and other woody plants.

Birds: May be represented by feathers, bones, skulls, feet or any part that distinguishes the class.

Buds: A small protuberance on a stem or branch, sometimes enclosed in protective scales and containing an undeveloped shoot, leaf, or flower. The bud may be represented on the branch or stem, or removed from the branch or stem.

Carrion: This is defined as stinking, rotting flesh. To be considered in this group the item must have a definite odor of decomposition, be presented in a plastic bag, or have the words this stinks on the display. A dry bone, a dry skin, or other body part does not represent carrion, but will represent other food groups. Maggots are a natural

sequella to decomposition and may be present on the carrion. They should not be considered in grouping the specimen as carrion.

Centipedes & Millipedes: elongated arthropods having many body segments Millipedes have pairs of legs.

Crayfish: small freshwater decapod crustacean that resembles a lobster. Regionally they have many names including crawdads, and crawdaddys.

Earthworms: terrestrial worm that burrows into and helps aerate soil; often surfaces when the ground is cool or wet; used as bait by anglers

Eggs: Only the eggs of vertebrate species (mammals, birds, reptiles, amphibians, fish) are considered in this category. Invertebrate eggs (insect and spider) will represent the group of the adult invertebrate.

Ferns: Fern are flowerless, seedless vascular plants having roots, stems, and fronds and reproducing by spores. Ferns may be represented by a picture, the whole plant or a part of the plant that defines it.

Fish: A fish is a poikilothermic (cold-blooded) water-dwelling vertebrate with gills.

Forbs: A more common term for them is "weed". A forb is a non-wooded, broad leaved plant other than grass, especially one growing in a field, prairie, or meadow. A scientific definition would be "herbaceous plant other than those in the Gramineae (true grasses), Cyperaceae (sedges), and Juncaceae (rushes) families, ie., any nongrass-like plant having little or no woody material. They may be represented on the contest by a single leaf or by the entire plant including the flower.

Frogs & Salamanders: This food group may be represented by the organism in any life stage except the egg.

Fruit & Berries: The display must include the soft, fleshy, pulp-covered seed.

Fungi: A kingdom of plantlike spore-forming organisms that grow in irregular masses without roots, stems, leaves, and that lack chlorophyll.

Grains: Are to be the cereal grains and include only wheat, oats, rye, barley, rice and corn. These may be represented on the test by only the seed,

the seed head, or by the entire plant including the seed head.

Grass: The leaves of the grasses are usually tall and thin with a mid rib and parallel veins. In most species the leaf forms a collar around the stem, although in some species this is modified. The grasses may be represented by the entire plant including the seed head, or by a single leaf or group of leaves.

Hard Mast: This food group includes the nuts from walnut, hickory, oak, beech, pecan, almond and the common hazel. They may be shown with the husk or without.

Insects: small invertebrate (*without a backbone*) animals, except for spiders, centipedes and millipedes, that are more or less obviously segmented

Leaves & Twigs: For the purpose of this contest this food group will always be represented by a leaf and associated woody material (twig). This is to avoid confusion with the food group forbs.

Lichens: A fungus, usually of the class Ascomycetes, that grows symbiotically with algae, resulting in a composite organism that characteristically forms a crust-like or branching growth on rocks or tree trunks. Lichens may be shown with a rock or branch or without.

Lizards: Lizards are reptiles of the order Squamata, which they share with the snakes (Ophidians). They are usually four-legged, with external ear openings and movable eyelids

Mammals: Any mammal regardless of size fits in this category. This group may be represented by a photograph, a live animal, a museum mount specimen or by any part of the mammal that is representative of the class mammals: such as teeth, hair.

Mussels: These are the freshwater mollusks found throughout the U.S. in streams with good water quality. The group may be represented by the whole organism, or by just a single shell or group of shells.

Nectar from Flowers: This food group will be represented by the flower with no other plant parts present.

Scorpions: arachnid of warm dry regions having a long segmented tail ending in a venomous sting

Seeds: A fertilized ovule containing an embryo which forms a new plant upon germination.

Snails: Snail applies to most members of the molluscan class Gastropoda that have coiled shells.

Snakes: Snakes are cold blooded legless reptiles closely related to lizards, which share the order Squamata.

Spiders: arachnid that usually has silk-spinning organs at the back end of the body; they spin silk to make cocoons for eggs or traps for prey

Tubers: Will be represented by either the nutlet of the yellow nut sedges (chufa) or by potato.

Turtle and Tortoise: Turtles are reptiles of the order Testudinata, most of whose body is shielded by a special bony shell developed from their ribs. The term turtle is usually used for the aquatic species, aquatic fresh-water turtles also being referred to as terrapins. The term is also used (esp. North America) to refer to all members of the order, including tortoises, which are predominantly land based.

Glossary

aerate: to supply or expose water with air to increase dissolved oxygen and release harmful gases.

annual: when referring to plants, those that complete their life cycle from seed to mature seed-bearing plant in one growing season.

arid: dry, receives little precipitation.

broadleaf: a plant with wide blade leaves, such as an oak or cottonwood. Seeds are born from flowering parts in contrast to conifers which bear seeds in cones.

browse: to eat

butte: a hill that rises abruptly from the surroundings. The sides are steeply sloped or with cliffs, and the top is nearly flat.

cacti: plants adapted to dry conditions. Often store water in leaves and other parts of the plant. Usually have small leaves and thorns.

canopy cover: the amount of ground covered by the branches, leaves, and stems of plants. Can specify as herbaceous, shrub, tree, or all canopy cover. Expressed as a percentage.

coastal plain: large, nearly level areas of land near ocean shores.

conifer: usually refers to needleleaf trees that bear their seeds in cones. Spruces, pines, and firs are examples.

cover: vegetation and other land features that provide areas for wildlife to hide, sleep, feed, and reproduce.

decadent: declining in health and/or productivity.

deciduous: plants that annually shed their leaves. Usually trees and shrubs.

decomposition: the natural break-down and decay of dead plant and animal material

defecating: elimination of solid body waste by animals

detrimental: having harmful effects.

dominant: the plant or animal species that is the most noticeable and common in an area. Often are a controlling force in the community where they occur.

drought: the lack of normal precipitation for an extended period of time. A long period with little or no rain.

endangered species: a species that is in danger of becoming extinct.

environment: the surroundings that affect the growth and development of an organism. The surroundings of an organism, including other plants and animals, climate, and location.

ecosystem: the plant community along with the animal community together with soil, air, water, and sunlight

evergreen: plants that do not lose all their leaves at

one time. Usually conifer trees, but also some broadleaf trees such as live oak.

excavate: to make a cavity or hole. To hollow out.

exclusion: keeping something out of an area.

fertile: rich in material needed to support plant growth.

fingerling: a small fish, especially up to one year of age

fluctuate: to vary, or rise and fall irregularly.

forage: n. refers to the vegetation eaten by animals; v. to search for food

forb: low growing herbaceous plants, both annuals and perennials. Can be shown with a flower as part of a plant. Sometimes referred to as weeds.

glean: to gather food in a systematic manner with a minimum of waste and unnecessary effort.

ground litter: layer of the forest floor consisting of decaying organic matter such as leaves, branches, and dead plants.

hardwood: deciduous or broadleaf trees.

herbaceous: all grasses and forbs having soft rather than woody stems, including flowers, plants called weeds, and the nonwoody parts of trees (e.g., leaves)

herbicide: chemicals used to control the growth of or kill undesired plants.

insecticide: chemicals used to control insects.

invertebrate: animals lacking a backbone. Some examples are insects, spiders, mollusks, and crustaceans.

irrigate: to supply cropland, parks, yards, etc., with water through the use of diversions, ditches, and pipes.

legume: plants that bear seeds in a pod. Typically have characteristics that allow them to improve the fertility of the soil. Some examples are alfalfa, clover, soybeans, and peas.

native: plant and animal species that have not been brought in from other countries; living or growing naturally in a particular region

nutrients: chemicals required for plants and animals to grow and exist.

omnivore - feeding on both animal and plant substance

perennial: a plant that lives for several years. Having a life span of more than two years.

phytoplankton: microscopic floating and suspended aquatic plants. Are the first step of the food chain in many aquatic systems.

plateau: an elevated, relatively level expanse of land. Sometimes called tableland.

regenerate: to replace lost or damaged parts with new tissue.

rejuvenate: to stimulate and return to youthful health and vigor.

riparian: on or near the bank of water areas. The land area that is influenced by the adjacent water.

savannah – grassland with scattered trees maintained by both fire and grazing

scarifies: when fire causes the hard, protective coating on some seed varieties to split open, allow the seed to begin growing (e.g. table mountain pine requires hot fire to open its pine cones)

secluded: removed or screened from view of other areas and disturbances.

sedge: grass-like plant with long narrow leaves, stems are round. Many species like wet areas.

seed bank: a reserve of seeds waiting to be released.

senescent: the growth stage in a plant or plant part (like a leaf) from full maturity to death; old age

slash: the residue left on the ground after trees are harvested.

softwood: usually refers to coniferous trees. Some deciduous trees such as aspen also have relatively soft wood.

stagnant: sluggish, not producing to potential.

stocking rate - amount of land allotted to each animal for the entire grazeable portion of the year

subclimax: a stage in succession that is short of the climax stage, but further development is inhibited by some factor(s) other than climate.

succulent: having thick fleshy leaves that conserve moisture.

terrain: the character or topography of the land.

thatch build-up: the accumulation of dead plant material, such as leaves, twigs, bark, and grass on the ground

transitional: the process of changing from one form to another.

woody: plants that have hard, bark-like material present; trees and shrubs; of or containing wood or wood fibers

zooplankton: microscopic animals that float/swim in water. Consume phytoplankton and are an important part of the aquatic food chain.