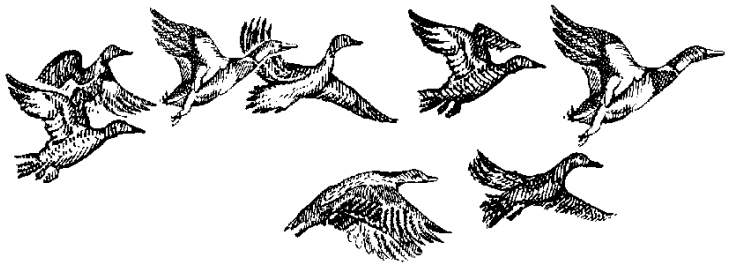
Wildlife and Recreation Management

Study Guide

PROMOTING WILDLIFE EDUCATION FOR FFA AND 4-H



A Guide for Texas Agricultural Science Teachers
and
County AgriLife Extension Agents

Developed by the
Wildlife Alliance for Youth

Members
Association of Texas Soil and Water Conservation Districts
Texas Education Agency
Texas FFA Association
Texas Parks and Wildlife
Texas Soil and Water Conservation Board
USDA-Natural Resources Conservation Service
Welder Wildlife Foundation
Wetland Habitat Alliance of Texas

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Introduction

Millions of people travel throughout Texas each year to enjoy the beauty and splendor of this unique state. The state and federal agencies and the private industries and individuals involved in this career development event (CDE) in Texas hope that students and teachers will develop an awareness and better understanding of the biology and management needed to sustain the wildlife resources available to the people.

This CDE is an excellent opportunity for students to gain considerable insight into wildlife biology and management opportunities. Today, many aspects of our progressive lifestyle threaten wildlife habitat. A conscientious effort must be made to protect this valuable resource. Students participating in this career development event will become more informed regarding the use and management of natural resources.

Objectives of the Wildlife and Recreation Management Career Development Event

1) To familiarize students with the efforts of the Natural Resources Conservation Service the Texas Parks and Wildlife, Soil & Water Conservation Districts, and other conservation partners in stressing proper management of our wildlife resources.

2) To establish the importance of habitat requirements for selected wildlife species in Texas.

3) To reinforce knowledge of the Texas fish and game laws.

4) To create an awareness and understanding of the importance of safety while enjoying the outdoors.

This competition addresses the Texas Essential Knowledge and Skills (§130.5) required for mastery in Wildlife, Fisheries, & Ecology Management as required by the Texas Education Agency and outlined in PEIMS Code 13001500.

General Wildlife Management Principles

Wildlife habitat is another word for home. Like humans, wildlife have basic biological needs. Habitat for wildlife includes food, cover, and water. All changes in vegetation, either natural or artificial, have an effect on wildlife habitat. Furthermore, all changes in vegetation will either increase or decrease wildlife habitat value of an area for all wildlife species utilizing the area.

One example involves prescribed burning of brush. Where quail and deer may benefit, birds needing heavy brush may lose valuable habitat. Wildlife biologists understand this principle and often utilize it when manipulating vegetation to increase habitat needs of "target wildlife species."

Most people relate to wildlife in terms of individual animals. This is often evidenced by the thrill of seeing a rare animal such as a whooping crane or the remorse felt at seeing a fawn killed by a vehicle. However, the professional wildlife scientist sees the population as the unit of management, not the individual.

Wildlife and Recreation Management Rules
(Three or Four Member Teams)

I. Purpose

The purpose for the Wildlife and Recreation Management Career Development Event is to support instructional objectives related to management and conservation of natural resources for wildlife habitat, knowledge of and respect for laws related to hunting and other outdoor recreational activities, and safety. The event is directly correlated to the Wildlife, Fisheries, & Ecology Management curriculum, and is also supported by curriculum related to Range Ecology and Management.

II. Format and Scoring

The following contest format will be used in each of the five regional contests as well as the state contest. A statewide list of 121 plants is available. Each region competition may draw plants from this list that best represent their region. The state competition will select those plants that best represent the regions. Plants will be listed in the *Wildlife and Recreation Management Study Guide* for each CDE. The game animals found in each region will vary. Information regarding each animal and their preferred plants will remain constant in all CDEs. All CDEs will consist of eight question areas listed below. The eight question areas are discussed in detail in the *Wildlife and Recreation Study Guide*. Additional references will be used in the competition and are listed in each section. Point value for each question area along with an explanation of the assignment of points is provided below. The scoring for each question area will remain constant from region to region and state competitions. Total points (score) of some questions may fluctuate due to variables within the question. This is not a typical 100-point contest. Point values listed below may reflect the absolute minimum/varies/absolute maximum scores for each question where 3 values are given.

Typically the range for the complete CDE should be 115 to 150 points for individuals and 345 to 450 for teams. Scan sheets will be used in all WRM CDEs. If conditions do not permit use of the scan sheet, contest officials will hand score all entries and scoring will conform to guidelines in this set of regulations. Teams are responsible for providing their own scan sheets. Coaches or CDE officials may provide a photocopy of a scan sheet for preliminary scoring. If this is done, contestants will be given ample time at the conclusion of the last rotation, not to exceed 10 minutes, to transfer their data to the official scan sheet.

The rules for this competition shall follow those established by the State CDE Committee for all Texas FFA Career Development Events with the following exceptions or modifications.

	Individual	Team
QUESTION 1: WILDLIFE PLANT IDENTIFICATION	30	90

Many trees, shrubs, vines, legumes, grasses, aquatic plants and forbs are found throughout Texas and the ability to identify them is important in wildlife management. For this question, 15 species of plants will be tagged with a letter from "A" through "O". Plants may be imported from all parts of the region or state for this section. Every effort should be taken by contest officials to provide plants that are fresh and clearly represent the correct genus and species as listed in the *Wildlife and Recreation Study Guide* for each CDE. Each plant will have a value of 2 points. Contestants will identify each by entering the correct number from the Question Sheet on to the scan sheet. Providors should NOT put two of the same plant on a contest; if this happens, both plants will be thrown out from scoring.

	Individual	Team
QUESTION 2: WILDLIFE PLANT PREFERENCE	15/Varies/45	45/Varies/135

The same plants used in Question 1: Wildlife Plant Identification will also be used for this question. Three species will be listed to match with their plant preferences in this question. Contestants will select the plants that are considered preferred for a selected wildlife group (i.e. deer & waterfowl) and bubble in the “Y” on the scan sheet under that species if the plant is preferred by that species. More than one animal species may prefer the same plant. There will be one point awarded per animal correctly matched to its plant preference. If the plant is not preferred by any of the three species listed for competition purposes, the contestant should bubble in the “N” under ‘Not preferred by these species.’ However, if the plant is not correctly identified in question 1, no credit will be given for the plant preference in this question. If the student gets the plant wrong, they get no points for Preferences in all species. If the student marks the preference correctly, they get 1 point for that species. If the student marks the preference incorrectly, they lose 1 point for that species. If the student doesn’t mark the preference and it is supposed to be marked, they don’t gain or lose a point for that species. A negative score may not be given in this section.

	Individual	Team
QUESTION 3: WILDLIFE BIOLOGICAL FACTS	20	60

In Texas, game biologists and landowners manage a variety of game animals. Question 3 tests the student's knowledge of each of these species. The students will be asked to correctly answer twenty questions related to the species found in the *Wildlife and Recreation Management Study Guide* for their respective region or state competition. One point is awarded per question.

	Individual	Team
QUESTION 4: WILDLIFE HABITAT EVALUATION	9	27

Habitat management is a major factor in managing wildlife in Texas. The habitat needs for each species is different and the land manager must know the requirements of that animal. Contestants will evaluate three animal species on their need for (1) food, (2) cover, and (3) water as discussed in the *Wildlife and Recreation Management Study Guide* for the CDE in which the contestant is participating. Contestants will be given information on the evaluation site. Three target species from those in the biological facts section of the study guide for the CDE will be identified for the contestants. Aerial or other maps may be provided. The management goals of the property manager will be provided for use by the contestants.

The contestant will be asked to rate the food, cover, and water of the site and determine if each is adequate (A) or deficient (D). *Adequate* is defined as the habitat element being sufficient to maintain or increase the numbers for the species. *Deficient* is defined as lacking or insufficient to the degree that the habitat cannot support or perpetuate the particular species. Each of these three components will be evaluated at the marked site. The quadrant method shall be used for determining if the marked habitat evaluation area is adequate or deficient for food. The four corners of the area should be marked and easily identifiable using flagging tape, painted wooden stakes or otherwise marked so as to be readily seen. The center of the evaluation area should be identified with ribbon of different color than used on the corners. Participants should walk through the marked evaluation area and identify food plants seen in each of the four quadrants. A blank piece of paper should be provided to the contestant by the WAY person in charge of this section to be used to record the plants by quadrant. Only plants from the appropriate region or state plant list should be counted. The plant preferences for each of the three wildlife species should be determined and marked in each quadrant for each particular plant. After each of the four quadrants has been evaluated add up the plant preferences by wildlife species per quadrant. If a minimum of four foods from the plant preferences are found in at least three of the four plots then food is adequate for that species. Food is deficient for each species with less than four foods in at least three quadrants. Contestants will bubble in the “A” on the scan sheet if the element is adequate for the given species. If the element is deficient for the given species, the contestant will bubble in the “D” on the scan sheet. Refer to the sample pages following Wildlife Habitat Evaluation – Question 4 in this study guide (Pages 112, 113) and the CDE Setup Guide for details and examples of the quadrant method of determining food.

	Individual	Team
QUESTION 5: WILDLIFE AND HABITAT MANAGEMENT PRACTICES	Varies	Varies

When managing for wildlife in Texas, some areas may need habitat improvement. Various management practices are available to improve habitat for the listed wildlife species. The number of habitat management practices in this question area will vary within each region and the state competition. The *Wildlife and Recreation Management Study Guide* for region and state competitions will list and discuss those practices considered for each CDE. Officials setting up the CDE will follow recommendations for use of management practices as outlined in the respective study guides for region and state events. Contestants will be given information on the management site. Three target species from those in the biological facts section of the study guide for the CDE will be identified for the contestants. Aerial or other maps may be provided. The management goals of the property manager will be provided. The number of management practices needed will vary based on conditions of the site, landowner goals, and the target species being managed. Contestants will be provided with a list of management practices that should be considered for the CDE. One point will be awarded for each correctly identified management practice matched to the target species. A student should correctly identify only those practices needed for that target species. Each incorrectly identified practice will deduct one point from the total score. For example, if a contestant correctly identifies 6 management practices and incorrectly identifies 2 additional practices, the contestant will score 4 points instead of 6 points. The contestant will bubble in the "Y" under the target species for each correct management practice. If a management practice is not used by any of the three target species, the contestant should mark the "N" under the column 'Not used for these three species.' A negative score may not be given in this section.

	Individual	Team
QUESTION 6: GAME LAWS	15	45

Knowledge of state and federal game laws is important in wildlife management. Students will be tested on their knowledge of current Texas fish and game laws. Contestants will be given a fifteen question True/False, Multiple Choice exam. Contestants will answer the questions by bubbling in the correct response on the scan sheets. Each question will be valued at one point per question.

	Individual	Team
QUESTION 7: SAFETY	5 to 15	15 to 45

This question will test the students' knowledge of safety as it applies to the outdoors. A safe outing is a good outing. This question may be administered simply as a Multiple Choice – Safe/Unsafe exam where questions relate directly to hunting, fishing, boating, or camping safety. This question may be administered as a skit, scene, or enactment. Contestants will be given a question sheet that directs them to consider various safety situations. A situation can be used if it is illegal but only if it is unsafe as well. If a situation is only illegal, it should not be part of this question. For example, no registration numbers on a boat is illegal but it is not unsafe. It should not be used in this question. Contest officials can use from five to 15 safety questions/situations to complete this question area. Each safety question/situation has a value of one point. Students will correctly answer each question on the scan sheet by bubbling in the correct response, Safe/Unsafe or the correct multiple-choice response. The Texas Parks & Wildlife's Hunter Education Manual, Angler Education Manual, and Boater

Safety Manual will serve as references for this question. Providors should not use a live skit that needs to be repeated for every rotation. Scenarios or staged scenes may be used in this section. Only safety issues will be included in this section of the contest. This question is valued at no less than 5 points or more than 15 points per contestant.

	Individual	Team
QUESTION 8: TECHNIQUES	20	60

To manage wildlife, biologists use basic skills and techniques. For example, to manage a deer herd for quality hunting, the age of the deer is an important factor. Contestants will be asked to demonstrate their skills on twenty techniques related to wildlife management. Each technique will be valued at one point. Examples of techniques are: (1) aging a deer from jawbones, (2) identify wildlife species by wings, tracks, pelts, mounts, skulls, or scat, (3) perform a variety of measurements on deer antlers. Techniques may repeat. For example, there may be two or more wings, pelts, or skulls of different species to identify or two or more deer jawbones to age. Contestants will be given a question sheet that asks a question or gives directions for answering or identifying that technique. Each question/instruction will require either a Multiple Choice or True/False response. They are to bubble in the correct response for each technique on the scan sheet.

III. Tiebreakers

A team shall consist of no less than three or more than four members. If a four-member team competes, the lowest scoring team member's score will be dropped and the three higher scores will be added together for the team score. A three-member team score added together stands as is. Participation of incomplete teams (one or two members) is at the discretion of the CDE officials but members of any incomplete team are not eligible for any individual or team awards or prizes.

In the event that the score of two or more teams results in a tie, the following procedure will be used to break the tie. The team with the highest total score of three team members on Question 1 will be the higher placing team. If the teams are still tied, the team with the highest total score of three team members on Question 8 will be the higher placing team. If the teams are still tied, the coaches of the team will meet with contest officials who will conduct a coin toss to determine the higher placing team.

Individuals with scores resulting in a tie will follow the following tiebreaker policy. The contestant with the highest score on Question 1 will be the higher placing individual. If the individuals are still tied, the contestant with the highest score on Question 8 will be the highest placing individual. If the contestants are still tied, they will be accompanied by their coach and will meet with contest officials who will conduct a coin toss to determine the higher placing individual.

IV. Entries and Fees

The advisor of the FFA team or the county extension agent of the 4-H team competing will complete the appropriate entry form for the Wildlife and Recreation Management CDE. The entry fee for each regional contest shall be equal to the entry fees for all Career Development Events, currently set at $50 per team. Although endorsement by the local SWCD is required for some regional competition, sponsorship (payment of entry fee) by the local SWCD is at

their discretion. Registration and fee payment is required through judgingcard.com. Entry fees must be paid as soon as online registration has been made. Any team that has registered is liable for payment of the entry fee even if that team does not compete in the WRM CDE. Only the WAY committee person receiving registration information can cancel a team. Regions requiring waivers will be identified in the event information. The waiver form is attached (see General Release Appendix). Entry should be made as early as possible. Teams that do not have all materials mailed in and received by the deadline identified on the event information will not be allowed to compete. In the event a team member cannot attend, substitutions will be allowed at the competition site. The appropriate forms will be required in order for the substitute to compete.

A summary of registration activities is as follows. Step 1, register and pay fees online at judgingcard.com. Step 2, secure the endorsement of your local SWCD (if necessary). Step 3, if required by your region, have every person that will be present on the competition site complete a waiver. Step 4, mail the SWCD form and waivers to the designated WAY committee person before the deadline.

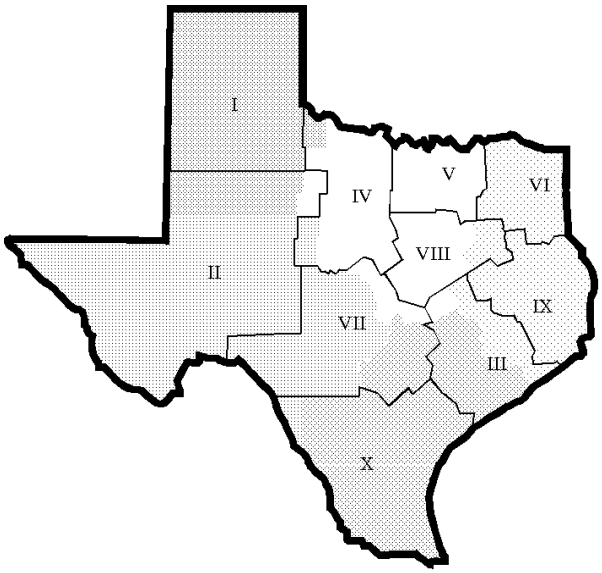
State entry fee will be consistent with entry fees paid for all Career Development Events. Qualifying teams are responsible for their own state entry fees but sponsorship by SWCDs may be provided. Endorsement by SWCDs is not required for state since it has already been obtained for regional competition.

V. Event Operations

Participation at a regional competition may require an endorsement from the local Soil and Water Conservation District in which the competing team is located. Local contests may be conducted in collaboration with the local FFA Chapters and 4-H Clubs and one or more local Soil and Water Conservation Districts (SWCD). The number of teams allowed to enter local competition will be determined by the local SWCD. Only one team from an FFA chapter will be able to advance to regional competition.

For the purpose of conducting this CDE, Texas has been divided into five regions. FFA Areas are assigned to the region, which represents the majority of the habitat for that area. 4-H Clubs will compete based on which FFA area they are located. Area assignments for regional competition are as follows.

Region	Area(s)
I	I
II	II & VII
III	III & X
IV	VI & IX
V	IV, V, & VIII



Awards will be presented at two levels. At the first level, each region will present regional plaques to the first, second, third, fourth, and fifth place FFA teams. The regional FFA high point individual will receive a medallion. Also,

each region will present award plaques to the
first and second place 4-H teams. The regional
4-H high point individual will receive a medallion.
At the second level, each FFA area will present award plaques or banners and high point pins consistent with other career development events in that area.

Advancement to the state competition will follow the Texas FFA Guidelines for CDE advancement. Each area will be limited to the top five teams or 15 percent of the teams competing from each FFA area, whichever is greater. Note: Advancement to state competition for FFA teams is strictly by area. Team placing in the overall regional competition, although a factor for regional awards and recognition, is not a consideration for advancement to state competition. The top two teams from the 4-H within each region will advance to the state competition. Each regional committee will forward regional results to the state committee. The state committee will forward state results to the state director of Agricultural Education, Texas Education Agency.

A Regional Wildlife Alliance for Youth (WAY) Committee will be set up within each region. It will be the responsibility of the regional committee to organize and conduct the regional competition. A State Wildlife and Recreation CDE Committee will be set up from members selected from each regional committee. The state CDE committee will organize and conduct the state competition. Participation on the regional committee is a prerequisite for serving on the state committee. The exception is the state treasurer who shall serve as an ex officio member of each region.

The state committee will meet immediately after the state CDE and elect a chair, co-chair, and secretary from the next year's host region. The host committee will be responsible for scheduling the annual All Region WAY Planning Meeting to be held the summer after the state CDE.

The committees at each level should include but not limited to individuals from the following organizations, agencies, or industry.

- One Texas State Soil and Water Conservation Board Representative
- One Soil and Water Conservation District Director
- One Natural Resources Conservation Service Representative
- Agricultural Science Teacher (One teacher representative from each area in their respective region, and one teacher from each region to serve on the state committee.)
- One Texas Parks and Wildlife Representative
- One County Extension Agent
- Two University/College Representatives
- One Industry Representative

Membership on the committee shall be in staggered three-year terms. Teachers or County Extension Agents serving on the committee may have teams in the contest but will not take part in the actual setup of the contest.

VI. Appeals and Grievances

Any concerns, grievances, or policy recommendations affecting the regional or state Wildlife Alliance for Youth or the Wildlife and Recreation Management Career Development Event should be addressed as follows.

The coach of an FFA team with a concern, grievance, or policy recommendation affecting the region in which they compete should take the issue to the teacher representative from their respective area. The agricultural science teacher representative will then present it to the regional chair that will share the concern with all regional members. If it is a pressing issue, the regional chair should work to resolve the situation immediately. If the issue does not require immediate attention, the issue should be discussed at the next regularly scheduled regional meeting. If it is an issue that could affect other regions, the regional chair should present the issue to the state chair for addressing at the state level.

The coach of a 4-H team will follow the same protocol with the exception that they will contact their extension agent representative to the regional committee. In the absence of a regional representative from the extension service, the 4-H coach will take the issue directly to the regional chair.

The Wildlife and Recreation Management competition is a Texas FFA Career Development Event. As such, the rules governing all FFA CDEs will supercede regional or state policy or rules when a conflict may arise. Issues that may arise may be submitted to the State FFA

Executive Director for resolution in accordance to policies and procedures established by the Texas FFA Association Board of Directors.

Any action that will directly affect the way a regional or state CDE functions must be approved by a majority vote in favor of that action before action is taken. The chair of the committee should call the vote. A phone call or email vote may be taken following written notice at least two weeks in advance. If two weeks' notice is not enough time to notify members, a two-thirds vote may be obtained by personal contact, by phone, or by email.

No region may alter or amend the rules of procedure for the CDE. The WRM CDE will follow the same 5-year rotation for major event changes. In case of an emergency change, the state chair will request permission to address the State FFA CDE Committee for immediate consideration. The State FFA CDE Chair will make the decision or will take it to the state committee if such action is needed.

VII. Equipment

Each contestant will be allowed to bring only the following items to the contest area:

- Transparent clipboard
- Photocopy of the front and back side of the Official Scan Sheet – No writing is allowed on this copy prior to entering the competition area. Contestants are subject to having all items inspected prior to competition. Contestants found with any unauthorized material will be disqualified from the competition. If the WAY committee provides a blank copy, no other copy will be allowed.
- A copy of contest plant list will be provided at the site - No writing is allowed on this copy.
- A blank sheet of white paper to draw the quadrant for food determination for Question 4. The WAY committee may provide the quadrant sheet at some contests.
- Official Scan Sheet. This may only contain the team number, contestant name, and contestant club or chapter prior to competition.
- Plastic bag for storing scan sheet
- Clean, unwritten, manilla folder for storing scan sheet
- #2 pencils

Contestants will NOT be allowed to bring any of the following items to the contest area. Any contestant bringing any of these items into the contest area will be immediately disqualified from competition. Possession alone is enough to disqualify a contestant. It is not necessary for the contestant to be seen using any of the devices.

- Cell phone
- Pager
- Any type of communication device
- Any type of calculator
- Papers or materials of any kind containing printed or written contest information

VIII. Event Sites

Pursuant to Texas FFA State CDE Policies, on-site presence of any competing team, coach, or individuals not directly related to hosting the competition is strictly forbidden at least two weeks prior to competition. Individuals, coaches, or teams found on the competition site

premises prior to competition may be banned from competing and may face possible disqualification from future competitions. It is not the responsibility of the WAY Committee to post or mark the competition area. The governing WAY Committee will make the final determination if a violation has occurred and what action should be taken. Coaches know that the entire premises of an area are considered part of the competition site and should be avoided. For example, if a state or region CDE was held at the Welder Wildlife Refuge in Sinton, Texas, then all of the Welder Wildlife Refuge is considered the competition site.

IX. Fiduciary Management

Any monetary donations for contest operation or scholarships made to any region or the state WAY committee should be solicited as check or money order and forwarded to the state WAY treasurer. All bills, entry fees, and donations for regional or state competitions should be forwarded to the state WAY treasurer for payment as soon as the contest ends. Any local competitions or invitational competitions may use the 501(C)(3) umbrella of WAY provided that personnel hosting such competition are members of WAY and serving on a region or state committee. Bills and invoices should be immediately forwarded to the state treasurer along with an explanation of why the purchase was made. If a WAY committee member makes a purchase and reimbursement is needed, that person shall submit a receipt for the expenses to the state treasurer for reimbursement. All entry fees should be forwarded to the state treasurer. No regional committee should maintain any type of checking or banking account. All scholarships awarded in the name of Wildlife Alliance for Youth or as a reward for participating in a sanctioned Wildlife and Recreation Management CDE should be channeled through the state treasurer.

Donations of food, equipment, or anything of a non-monetary nature that is used for contest operation or presented as awards to contestants or teams or coaches may be accepted by regional or state WAY members for distribution as to the donor's specifications. If such donations require use of WAY's 501(c)(3) status, the state treasurer should be notified of the contribution and its value and provide the donor with necessary documentation.

Question banks will not be used in administering this contest. This does not prevent regions or state committee members from distributing copies of exams or contest questions to team coaches.

X. Competition Dress

Both 4-H and FFA contestants must conform to dress regulations as specified in Section 25.5 General CDE Rules of the Texas FFA General Career Development Event Rules and Regulations. Uniform clothing is permissible as long as the apparel complies with dress requirements.

STUDENTS SHOULD DRESS FOR FIELD CONDITIONS

Section 25.5 – "Dress code for CDE participation is official FFA dress (for events requiring official dress) *OR* closed-toed shoes, pants or slacks, collared shirts with sleeves. The only logos permissible on shirts are brand, school or organizational logos. Shirt collars must be full, folded collars. Capri-type pants shall be deemed to be shorts, not pants or slacks. Contestants not in dress code compliance shall be given an opportunity to remedy the non-compliant apparel, but shall not be allowed to compete until he or she is in compliance.

Contestants found in the contest in violation of the dress code shall be disqualified. Coaches will acknowledge compliance with this rule when registering their team on judgingcard.com by checking the appropriate box.

Vocabulary

The following are basic principles or terms used by wildlife biologists when managing a wildlife population.

Carrying Capacity

Carrying capacity is the number of animals an area of land can support over a substantial length of time which includes periods of stress (i.e. drought) without damage to the habitat or population. Limitations might be food, water, cover, terrain, or even soil. A wildlife manager may identify habitat limitation(s), and then, based on goals and objectives manipulate the habitat to increase, decrease, or maintain the present population.

Diversity

Diversity, in this context, is a habitat term used to describe the variety of plant species and plant structure. For example, a 1,000-acre tract with 300 acres in mature hardwoods, 200 acres of native pasture, 200 acres of a number of young brush species and 300 acres of a number of older brush species would have reasonably high diversity.

Interspersion

Interspersion refers to the arrangement of various habitat types within an area. In the example used in defining “diversity,” if the four vegetative types are each contiguous 200- or 300-acre blocks, then the interspersion is low. However, if the four different vegetative types are broken into 10 to 20-acre blocks of various sizes, the interspersion is very high. High interspersion is not always desirable. The red-tailed hawk, for example, requires approximately 212 acres of contiguous bottomland hardwoods per nesting pair.

Population

Population is the number of organisms found on an area at any given time. Thus, population varies from one month to the next, depending on births, deaths, immigration, and emigration.

Saturation Point

Wildlife managers can increase carrying capacity by increasing the basic habitat requirements of food, cover, water, and space. This allows more animals to survive the crunch period. However, due to social factors (i.e., an animal's tolerance to crowding) there is usually a "social" limit to a species' carrying capacity regardless of food, cover, and water.

Surplus Population

For most wildlife species, there is a "crunch period" where food, cover, or water is the most limiting and the standing crop is at its lowest. During these periods, typically in late winter throughout Texas, mortality must remove the surplus population. Therefore, surplus population refers to the animal numbers above carrying capacity. Unfortunately, the population of grazing species' such as deer, rabbit, elk, and bison, can reach surplus numbers during a period of limited food. When this occurs, habitat damage due to overgrazing is usually the result. Wildlife biologists manage populations through hunting to remove surplus

animals prior to the crunch period. This management activity protects the habitat and ensures herd health.

Turnover

Turnover of a population represents the replacement of old individuals by new ones. It is expressed as the rate or the time that it takes for all individuals in a population to be replaced. A population may be relatively constant in total numbers but may have a very high mortality rate. Turnover rates of 70 percent or higher are not uncommon for small birds and mammals.

In summary, it is essential to understand how populations function in order to achieve a management goal. It is easiest to increase wildlife populations by increasing carrying capacity. To increase carrying capacity, the limiting factor must be determined, then lifted. Populations that are at carrying capacity cannot be increased by protection.

Plant List, Wildlife Species, and Habitat Management Practices
Region I

Plant Identification:

101. Agarito
103. Annual broomweed
104. Annual sunflower
107. Barnyardgrass
113. Blue grama
115. Broomsedge bluestem
116. Buffalo-bur
117. Bullnettle
119. Bumelia (Chittimwood)
120. Bundleflower
122. Catclaw sensitive briar
123. Cattail
124. Cottonwood
125. Croton
126. Dayflower
131. Elbowbush
132. Elm
133. Engelmann daisy
134. Ephedra
135. Four-wing saltbush
136. Globe mallow
138. Grapes
142. Hackberry
145. Honey mesquite
148. Johnsongrass
149. Juniper
151. Lambs-quarters
153. Little bluestem
156. Lotebush
158. Maximilian sunflower
159. Mentzelia
161. Mountain mahogany
164. Old-man's beard
165. Partridge Pea
168. Plains bristlegrass
169. Plum
172. Prickly pear
177. Rescuegrass
180. Ryegrass
181. Sand dropseed
182. Sand sage
183. Sand shinoak (Shinnery)
186. Sida
187. Sideoats grama
188. Smartweed
189. Snow-on-the-mountain (Snow-on-the-prairie)
192. Sumac - Littleleaf
193. Sumac - Skunkbush
194. Switchgrass
195. Tallow weed (Plantain)
196. Tasajillo
198. Texas wintergrass
200. Vetch
201. Vine mesquite
203. Western ragweed
204. Western soapberry
206. Wildrye
207. Wolfberry

Region I Species - The following game species are those that pertain to Region I. All species in this study guide are on the state species list.

A. White-tailed and Mule Deer
B. Pronghorn Antelope
C. Wild Turkey
D. Ring-necked Pheasant
E. Bobwhite and Scaled Quail
F. Mourning Dove
G. Waterfowl
H. White-winged Dove

Region I Habitat Management – Only the following management practices are to be used in Region I for the specified game animals during competition.

Animal Damage
Population Management
Brush Management
Cropland Management
Food Plots
Grazing Management
Prescribed Burning
Provide and Manage Water
Range Planting
Disking
Playa Lake Management
Cover and Windbreak
Residue Management

Plant List, Wildlife Species, and Habitat Management Practices
Region II

Plant Identification:

101. Agarito
103. Annual broomweed
104. Annual sunflower
112. Blackjack oak
115. Broomsedge bluestem
116. Buffalo-bur
117. Bullnettle
119. Bumelia (Chittimwood)
120. Bundleflower
121. Bush sunflower
122. Catclaw sensitive briar
123. Cattail
124. Cottonwood
125. Croton
126. Dayflower
127. Dewberry/Blackberry
131. Elbowbush
132. Elm
133. Engelmann daisy
134. Ephedra
135. Four-wing saltbush
136. Globe mallow
138. Grapes
139. Greenbriar
142. Hackberry
145. Honey mesquite
146. Honeysuckle
148. Johnsongrass
149. Juniper
150. Kleingrass
153. Little bluestem
154 Live Oak
156. Lotebush
158. Maximilian sunflower
160. Mistletoe
163. Nuttall peavine
164. Old-man's beard
166. Pecan
167. Persimmon
168. Plains bristlegrass
169. Plum
170. Post oak
171. Prickly ash (Hercules club)
172. Prickly pear
174. Redbud
175. Red oak
177. Rescuegrass
183. Sand shinoak (Shinnery)
186. Sida
187. Sideoats grama
189. Snow-on-the-mountain (Snow-on-the-prairie)
191. Sumac - Flameleaf
192. Sumac - Littleleaf
193. Sumac – Skunkbush
194. Switchgrass
195. Tallow weed (Plantain)
196. Tasajillo
198. Texas wintergrass
200. Vetch
201. Vine mesquite
203. Western Ragweed
204. Western soapberry
206. Wildrye
207. Wolfberry

Region II Species - The following game species are those that pertain to Region II. All of the species in this study guide are on the state species list.

A. White-tailed and Mule Deer
B. Pronghorn Antelope
C. Bobwhite and Scaled Quail
D. Wild Turkey
E. Mourning Dove
F. White-winged Dove

Region II Habitat Management – Only the following management practices are to be used in Region II for the specified game animals during competition.

Animal Damage	Cropland Management	Prescribed Burning
Population Management	Food Plots	Provide and Manage Water
Brush Management	Grazing Management	Range Planting

Plant List, Wildlife Species, and Habitat Management Practices
Region III

Plant Identification:

101. Agarito
102. American beautyberry
103. Annual broomweed
104. Annual sunflower
109. Blackbrush
112. Blackjack oak
115. Broomsedge bluestem
116. Buffalo-bur
117. Bullnettle
118. Bulrush
119. Bumelia (Chittimwood)
120. Bundleflower
121. Bush sunflower
122. Catclaw sensitive briar
123. Cattail
125. Croton
126. Dayflower
127. Dewberry/Blackberry
129. Duck potato
130. Duckweed
132. Elm
133. Engelmann daisy
134. Ephedra
136. Globe mallow
137. Granjeno
138. Grapes
139. Greenbriar
140. Guajillo
141. Guayacan
142. Hackberry
145. Honey mesquite
146. Honeysuckle
148. Johnsongrass
149. Juniper
150. Kleingrass
153. Little bluestem
154. Live oak
156. Lotebush
158. Maximilian sunflower
160. Mistletoe
164. Old-man's beard
165. Partridge Pea
166. Pecan
167. Persimmon
168. Plains bristlegrass
169. Plum
170. Post oak
171. Prickly ash (Hercules club)
172. Prickly pear
174. Redbud
177. Rescuegrass
180. Ryegrass
185. Sedges
186. Sida
187. Sideoats grama
188. Smartweed
189. Snow-on-the-mountain (Snow-on-the-prairie)
194. Switchgrass
195. Tallow weed (Plantain)
196. Tasajillo
197. Texas kidneywood
198. Texas wintergrass
200. Vetch
201. Vine mesquite
202. Water oak
203. Western ragweed
205. White oak
206. Wildrye
207. Wolfberry
208. Yaupon

Region III Species - The following game species are those that pertain to Region III. All of the species in this study guide are on the state species list.

A. White-tailed Deer
B. Bobwhite and Scaled Quail
C. Javelina
D. Wild Turkey
E. Mourning Dove
F. Waterfowl
G. White-winged Dove

Region III Habitat Management – Only the following management practices are to be used in Region III for the specified game animals during competition.

Animal Damage
Population Management
Brush Management
Cropland Management
Food Plots
Grazing Management
Prescribed Burning
Provide and Manage Water
Range Planting
Disking
Overseeding Legumes

Plant List, Wildlife Species, and Habitat Management Practices
Region IV

Plant Identification:

102. American beautyberry
104. Annual sunflower
105. Ash
106. Bahiagrass
108. Beech
110. Blackcherry
111. Black-gum
112. Blackjack oak
114. Blueberry (Sparkleberry)
115. Broomsedge bluestem
117. Bullnettle
119. Bumelia (Chittimwood)
120. Bundleflower
122. Catclaw sensitive briar
123. Cattail
124. Cottonwood
125. Croton
126. Dayflower
127. Dewberry (Blackberry)
128. Dogwood
130. Duckweed
132. Elm
138. Grapes
139. Greenbriar
142. Hackberry
143. Hickory
144. Holly
146. Honeysuckle
147. Jessamine
148. Johnsongrass
149. Juniper
152. Lespedeza
153. Little bluestem
154. Live oak
155. Longleaf uniola
157. Magnolia
176. Maple
160. Mistletoe
162. Mulberry
165. Partridge pea
166. Pecan
167. Persimmon
169. Plum
170. Post oak
171. Prickly ash (Hercules club)
172. Prickly pear
173. Rattan (Alabama supplejack)
174. Redbud
175. Red oak
177. Rescuegrass
179. Rusty blackhaw
180. Ryegrass
184. Sassafras
188. Smartweed
191. Sumac – Flameleaf
194. Switchgrass
195. Tallow weed (Plantain)
199. Vaseygrass
200. Vetch
202. Water oak
203. Western ragweed
205. White oak
206. Wildrye
208. Yaupon

Region IV Species - The following game species are those that pertain to Region IV. All of the species in this study guide are on the state species list.

A. White-tailed Deer
B. Fox and Gray Squirrel
C. Bobwhite Quail
D. Wild Turkey
E. Mourning Dove
F. Waterfowl
G. White-winged Dove

Region IV Habitat Management – Only the following management practices are to be used in Region IV for the specified game animals during competition.

Animal Damage
Population Management
Cropland Management
Food Plots
Grazing Management
Prescribed Burning
Provide and Manage Water
Disking
Overseeding Legumes
Thin Timber
Retain Large Hardwoods
Streamside Management Zones
Clearcut Patches in Timber
Deaden Hardwoods
Leave Unmowed Strips
Construct firebreak/access road

Plant List, Wildlife Species, and Habitat Management Practices
Region V

Plant Identification

101. Agarito
103. Annual broomweed
104. Annual sunflower
112. Blackjack oak
115. Broomsedge bluestem
116. Buffalo-bur
117. Bullnettle
119. Bumelia (Chittimwood)
120. Bundleflower
121. Bush sunflower
122. Catclaw sensitive briar
124. Cottonwood
125. Croton
126. Dayflower
127. Dewberry (Blackberry)
128. Dogwood
130. Duckweed
131. Elbowbush
132. Elm
133. Engelmann daisy
134. Ephedra
135. Four-winged saltbush
136. Globe mallow
138. Grapes
139. Greenbriar
142. Hackberry
145. Honey mesquite
146. Honeysuckle
148. Johnsongrass
149. Juniper
150. Kleingrass
151. Lambs-quarters
153. Little bluestem
154. Live oak
156. Lotebush
158. Maximilian sunflower
160. Mistletoe
163. Nuttall peavine
164. Old-man's beard
165. Partridge pea
166. Pecan
168. Plains bristlegrass
169. Plum
170. Post oak
171. Prickly ash (Hercules club)
172. Prickly pear
174. Redbud
175. Red Oak
177. Rescuegrass
178. Rushes
180. Ryegrass
181. Sand dropseed
185. Sedges
186. Sida
187. Sideoats grama
189. Snow-on-the-mountain (Snow-on-the-prairie)
191. Sumac - Flameleaf
192. Sumac – Littleleaf
193. Sumac – Skunkbush
194. Switchgrass
195. Tallow weed (Plantain)
196. Tasajillo
198. Texas wintergrass
200. Vetch
201. Vine mesquite
203. Western ragweed
204. Western soapberry
206. Wildrye
207. Wolfberry

Region V Species - The following game species are those that pertain to Region V. All of the species in this study guide are on the state species list.

A. White-tailed Deer
B. Fox and Gray Squirrel
C. Bobwhite Quail
D. Wild Turkey
E. Mourning Dove
F. Waterfowl
G. White-winged Dove

Region V Habitat Management – Only the following management practices are to be used in Region V for the specified game animals during competition.

Animal Damage
Population Management
Brush Management
Cropland Management
Food Plots
Grazing Management
Prescribed Burning
Provide and Manage Water
Range Planting
Disking

Plant List, Wildlife Species, and Habitat Management Practices
State

Plant Identification:

101. Agarito
102. American beautyberry
103. Annual broomweed
104. Annual sunflower
112. Blackjack oak
115. Broomsedge bluestem
116. Buffalo-bur
117. Bullnettle
119. Bumelia (Chittimwood)
120. Bundleflower
121. Bush sunflower
122. Catclaw sensitive briar
123. Cattail
124. Cottonwood
125. Croton
126. Dayflower
127. Dewberry/Blackberry
128. Dogwood
130. Duckweed
131. Elbowbush
132. Elm
133. Engelmann daisy
134. Ephedra
135. Four-wing saltbush
136. Globe mallow
138. Grapes
139. Greenbriar
142. Hackberry
143. Hickory
145. Honey mesquite
146. Honeysuckle
148. Johnsongrass
149. Juniper
150. Kleingrass
153. Little bluestem
154. Live oak
156. Lotebush
176. Maple
158. Maximilian sunflower
160. Mistletoe
162. Mulberry
163. Nuttall peavine
164. Old-man's beard
165. Partridge pea
166. Pecan
167. Persimmon
168. Plains bristlegrass
169. Plum
170. Post oak
171. Prickly ash (Hercules club)
172. Prickly pear
174. Redbud
175. Red oak
177. Rescuegrass
180. Ryegrass
186. Sida
187. Sideoats grama
188. Smartweed
189. Snow-on-the-mountain (Snow-on-the-prairie)
191. Sumac - Flameleaf
192. Sumac - Littleleaf
193. Sumac - Skunkbush
194. Switchgrass
195. Tallow weed (Plantain)
196. Tasajillo
198. Texas wintergrass
200. Vetch
201. Vine mesquite
202. Water oak
203. Western ragweed
205. White oak
206. Wildrye
207. Wolfberry
208. Yaupon

State Species - The following game species are those that pertain to State. All of the species in this study guide are on the state species list.

A. White-tailed and Mule Deer
B. Pronghorn Antelope
C. Javelina
D. Fox and Gray Squirrel
E. Bobwhite and Scaled Quail
F. Ring-necked Pheasant
G. Wild Turkey
H. Mourning Dove
I. Waterfowl
J. White-winged Dove

State Habitat Management – Only the following management practices are to be used in State for the specified game animals during competition.

Animal Damage
Population Management
Brush Management
Cropland Management
Food Plots
Grazing Management
Prescribed Burning
Provide and Manage Water
Range Planting
Disking
Overseeding Legumes
Thin Timber
Retain Large Hardwoods
Streamside Management Zones

Plant Identification- Question 1

This question involves correctly identifying 15 plants from a region or state list. These plants are placed into two groups: Group I - Trees, Shrubs, and Vines; Group II - Grasses and Forbs. Each plant is identified as to its region(s). Plants in bold lettering are on the state list. The number listed in front of the plant corresponds to the number to be used in identifying the plant on the scan sheet.

Group I - Trees, Shrubs, and Vines of Texas

Note: Plants in bold are on the state list.	**Description**
Plant	
101 Agarito *Mohonia trifoliolata* Regions I, II, III, V	This evergreen shrub grows up to 10 feet tall with spiny, stiff, holly-like leaves. It occurs on dry, stony hillsides in most of South and West Texas. The fruit is a small red berry that ripens in April and May. Agarito berries are readily eaten by a variety of birds, including quail and turkey. The berries are also an important food for coyotes. Deer eat the tender, reddish tips of new growth.
102 American beautyberry *Callicarpa americana* Regions III, IV	This shrub grows to about eight feet in height. It has purple to blue berry-like fruit that grows in clusters at the leaf axils. It grows in rich woods and thickets in the pinelands of East Texas and the coastal plain. It is a favorite browse by white-tailed deer. The fruit is eaten by at least 10 species of birds including quail, robins, and mockingbirds. Deer readily eat the fruit in September and October.
105 Ash *Fraxinus spp.* Region IV	The Eastern Texas Ash, the Green Ash, and the White Ash are the three principal ash trees for consideration in East Texas. Green Ash is more abundant in bottomlands, while White Ash occupies well-drained, moist uplands. Green Ash and White Ash trees are spreading, round-topped trees that reach and can exceed 70-feet. Deer and rabbits browse the foliage. A variety of land animals as well as birds eat the seed.
108 Beech *Fagus grandifolia* Region IV	Beech grows on fertile bottomlands and uplands that are sandy and moist. These trees grow to heights in excess of 80 feet tall. Beechnuts are eaten by many kinds of birds and mammals including quail, raccoon, gray fox and red fox. They are a favorite food for squirrels, which also eat catkins. The nuts and buds are a choice for turkeys.

109 Blackbrush *Acacia rigidula* Region III	This is a stiff thorny shrub of the South Texas brush country. It attains a height of 15 feet with many stems from the base and often forms dense thickets. The seed is a bean-type legume and its thorns are in pairs at the nodes. Quail and other seed-eating birds eat the seeds. This plant provides cover for quail, deer, and javelina. This low quality forage grows on sandy or limestone soils.
110 Black Cherry *Prunus serotina* Region IV	The Blackcherry is a medium-sized tree averaging 50- to 60- feet tall. It grows on all soils except swampy or very dry. The leaves and twigs contain cyanic acid and wilted foliage is poisonous to livestock. Apparently, deer can eat unwilted foliage without harm. Many birds and mammals relish the fruit.
111 Black-gum *Nyssa sylvatica* Region IV	The black-gum tree is also called the Black Tupelo and one variety is called the Swamp Tupelo. Black Tupelo does not dominate any major forest type, but is a component of many hardwood and pine sites. Swamp Tupelo is of major importance on moist sites of the Lower Coastal Plain. The fruits are eaten by a variety of birds, including turkey, as well as mammals such as deer and squirrel. Deer relish the young plants but the older plants have intermediate palatability.
112 Blackjack Oak *Quercus marilandica* Regions II, III, IV, V	Blackjack Oak can attain a height of 60 feet, but is usually smaller. It grows on dry, sandy, sterile soils. The fruit is an acorn reportedly used by quail, turkey and white-tailed deer. Acorns may be toxic to livestock. It has good browse value.
114 Blueberry (Sparkleberry) *Vaccinium arboreum* Region IV	Blueberries are of the genus *Vaccinium*. Many hybrids occur among species that have overlapping geographic ranges. Tree sparkleberry is found in sandy or rocky woods, thickets, and clearings. It is one of the few blueberries that grow in neutral or slightly alkaline soils. Many species of wildlife relish the juicy fruits of blueberries. In some areas, blueberry foliage is unpalatable. In other areas, the foliage is a choice food of deer.
119 Bumelia *Sideroxylon lanuginosum* Regions ALL	Bumelia is shrub or tree with stiff, thorny branches that produces a berry in the fall. Its leaves are often clustered on short spurs. Other common names are gum elastic and chittimwood. Birds including quail, mourning dove and white-winged dove will often eat the fruit as soon as it becomes ripe. Deer will browse the leaves.

124 Cottonwood

Populus spp.

Regions I, II, IV, V

This large tree grows up to 100 feet tall and eight feet in diameter it grows along streams and draws where deeper soils and moisture exist. Deer and livestock may browse young plants. The trees major value is nesting for birds and as roost for turkey. Hollow trees are used as den sites for mammals.

127 Dewberry (Blackberry)

Rubus spp.

Regions ll, III, IV, V

Dewberry grows as a trailing, crawling vine. Blackberry stands erect. The plants have thorny, semi-woody stems and fleshy fruit with seeds on the surface. Flowers are white with touches of pink. Ripe fruit is shiny with a jet-black color. Many species use the fruit and the stem and deer browse the leaves.

128 Dogwood

Cornus spp.

Region IV,V

Dogwood is an understory species that is very tolerant to shade. It grows well on most sites that have good internal drainage. Virtually all game species use the fruit. It is one of the more important deer food plants. Foliage and twigs are often heavily browsed except in the Gulf Coast areas where use is light to moderate.

131 Elbowbush

Forestiera pubescens

Regions I, II, V

This straggling, irregularly shaped shrub often grows along streams in moist soil situations. Its secondary branches often are at almost right angles to the main branch. It will often grow under live oak trees. Its wildlife value is chiefly as a cover plant. The foliage will be browsed by deer. The fruit are eaten by game and song birds.

132 Elm

Ulmus spp.

Regions ALL

Several species of elm occur across Texas. Cedar Elm is most common. This tree reaches a height of about 90 feet. Twigs and branches often have corky wings. The leaves are simple and alternate and are most often found in limestone soils. Squirrels and birds including turkeys eat the seeds and buds of elm. Deer browse the twigs and foliage.

134 Ephedra

Ephedra spp.

Regions I, II, III, V

Ephedra is an erect, vine-like shrub with small, scale-like leaves. It rarely exceeds three feet in height. Quail eat the seeds. Deer and pronghorn antelope browse the plant. It is found on dry soils in Central and West Texas. This evergreen shrub provides green browse during the winter.

135 Four-wing saltbush

Atriplex canescens

Regions I, II, V

This evergreen, grayish shrub grows up to eight feet tall with many branches. Deer and pronghorn antelope browse the plant. Quail and small mammals eat the fruit. Local names are shadscale and sagebrush. It is a good cover plant for quail and widely adapted to the West Texas grassy uplands to sandy deserts. It will grow on salt and alkali flats.

137 Granjeno

Celtis pallida

Region III

Granjeno is a densely branched evergreen shrub in south and southwest Texas. It grows to a height ranging from 15 to 18 feet. The bark is gray to brown with long stout spines. The granjeno bark is smooth and its fruit is a yellow or orange drupe. The fruit is eaten by a variety of birds including Gambel's and scaled quail. Raccoons, deer, and rabbits eat the fruit. The plant, also called spiny hackberry, may also provide limited browse.

138 Grapes

Vitis spp.

Regions ALL

These vines include a number of different varieties, all of which climb on trees or other structures and produce berry-like fruits in clusters. The berry usually has a tough skin enclosing a pulp interior with one to three seeds. Songbirds, gamebirds, squirrels, and fur-bearers eat these fruits. Yields vary annually. In addition to the valuable fruit, the grapevines offer escape and nesting cover for a variety of birds. Deer eat the foliage and fruits.

139 Greenbriar

Smilax spp.

Regions II, III, IV, V

Several species of greenbriar occur in South and Southwest Texas. The vines are stout and climb by tendrils attached to trees and shrubs. Most species have spines and grow in woodlands, thickets, and fencerows. Greenbriar is a favorite browse of deer. Songbirds, raccoon, and small mammals eat the seeds.

140 Guajillo

Acacia berlandieri

Region III

Guajillo is a shrub legume that is three to nine feet tall and is branched at the base. It has recurved prickles about one-eighth inch long. Grows in sandy or limestone soils south and west of the Nueces River. Deer browse guajillo. The legume bean-like fruit has seeds that are eaten by birds and small mammals. This plant can be toxic to sheep and goats due to hydrocyanic acid poisoning. It is an important source of nectar for honey production.

141 Guayacan

Guaiacum angustifolium

Region III

This species is a small shrub or tree often growing in clumps, evergreen, with thick, stubby branches. It grows throughout the South Texas brush county. The fruit is a heart-shaped capsule containing two bean-like shiny, red to yellow seeds. It is commonly call soap bush. Deer and livestock browse this plant.

142 Hackberry
(Sugarberry)

Celtis spp.

Regions ALL

The hackberry tree has corky warts and ridges and can grow up to 120 feet tall. Squirrels, small mammals, and 25 species of birds eat the fruit. Mule and white-tailed deer browse the plants. Hackberry is a reliable supplier of berries during most of the winter, providing food for seed-eating birds. Hackberry seedlings are often heavily browsed by deer and livestock.

143 Hickory

Carya spp.

Region IV

The hickory group has the genus *Cary sp.* It is comprised of the pecan and several "hickories." Hickories are tall trees that grow to 180 feet in height. Squirrel, wild turkey, crow, and blue jay feed on the nuts. Deer do not normally browse the twigs and stems.

144 Holly

Ilex opaca

Regions IV

American Holly has a spiny, waxy leaf. The tree usually reaches a height of 40 to 50-feet. The berries are used for food by songbirds, turkey, and deer. Deer browse on the leaves and twigs when all other foods are scarce.

145 Honey mesquite

Prosopis glandulosa

Regions I, II, III, V

Mesquite is a shrub to small tree reaching a height up to 25 feet. It has compound leaves and a bean type legume seed. It has spines up to two inches long. Mesquite grows on the plains and prairies. It invades overgrazed rangeland. The beans are high in protein and readily eaten by a variety of wildlife species as well as domestic livestock.

146 Honeysuckle

Lonicera spp.

Region II, III, IV, V

There are two species of honeysuckle in Texas, Japanese and White or bush honeysuckle. Japanese honeysuckle was originally introduced from Asia and is common throughout the Southern United States. Vines grow in dense mats when supported. Birds and deer relish the black, pulpy berries. The vines and leaves are a favorite of deer.

147 Jessamine

Gelsemium sempervirens

Region IV

Carolina jessamine, also called yellow jessamine, is a beautiful, slender, climbing, evergreen vine. It grows best in wooded stream bottoms. All parts of the plant contain alkaloids related to strychnine. The plant is considered poisonous to humans, honeybees, and livestock. Deer are apparently unaffected by the plant's toxins.

149 Juniper

Juniperus spp.

Regions ALL

Juniper is commonly referred to as cedar. It is a small tree or shrub from three to 20 feet tall. It is evergreen with scale-like leaves. It generally grows in rocky soils. It invades rangeland in the absence of fire. The primary value is as a cover species for deer and other animals. Birds and small mammals use the fruits as food. It is a poor browse species. Mature stands may be used as nesting habitat for the endangered golden-cheeked warbler if associated with oak. The most common is ashe juniper.

154 Live oak

Quercus virginiana

Regions II, III, IV, V

This oak species is an evergreen tree with alternate, simple leaves, deeply furrowed, dark brown bark which often reaches a height of 60 feet. Quail, squirrels, deer, turkey, and javelina eat the acorns. Live oak is an important browse plant, especially in the Edwards Plateau. It is usually found on sandy-loam soils but also occurs on heavy clays.

156 Lotebush

Zizyphus obtusifolia

Regions I, II, III, V

This shrub is a stiff, spiny, multi-branched shrub with gray-green grooved twigs. It usually is less than eight feet tall. The fruit is eaten by birds, foxes, raccoons, and other species. It is a very important cover and food plant for quail in the Rolling Plains and High Plains Resource Areas. Deer will browse lotebush.

157 Magnolia
Magnolia spp.

Region IV

Southern Magnolia is a large evergreen tree in southern coastal states. The tree grows in low, moist sites on upland areas. The leaves are shiny, bright green on the upper surfaces. The fruit is an aggregate made up of numerous pod-like structures that contain 2 to 3 crimson seed. Squirrels, songbirds, and turkey eat the fruit.

176 Maple

Acer spp.

Region IV

The maple tree grows to a height of 100 feet and has a narrow, rounded crown. The seed ripen in Spring and early Summer.The seed provide a primary food source for squirrels. Deer browse the foliage, especially the young sprouts.

160 Mistletoe

Pharadendron spp.

Regions ll, lll, IV, V

Mistletoe is parasitic on broad-leaved trees and resembles a small shrub with yellowish green branches and leaves. The plant produces a berry that matures in the fall and is readily eaten by birds. Deer will browse mistletoe when it grows within their reach. With high deer density it will be found only above 6 feet from the ground.

161 Mountain mahogany

Cercocarpus montanus

Region I

This shrub is four to 15 feet tall and grows on rocky hillsides and canyons at higher elevations. It is deciduous with small leaves. Wildlife value consists primarily in use as browse by deer and pronghorn antelope.

162 Mulberry

Morus spp.

Regions IV

Red mulberry usually occurs on moist sites. The short-trunk tree may reach 50 to 70-feet in height. The fruit ripens from May through June and resembles blackberry. Squirrel, opossum, raccoon, and many birds use the fruit. Deer browse the foliage mostly during spring and summer.

166 Pecan

Carya illinioensis

Regions II, III, IV, V

The pecan is a large tree associated with streams and rivers. It may reach heights of 150 feet. It produces a nut with a thin husk that splits when the fruit reaches maturity. Turkey, squirrels, deer, javelina as well as crows and raccoons eat the nuts.

167 Persimmon

Diospyros spp.

Regions II, III, IV

There are two species of persimmon, Common (Diospyros virginiana) and Texas or Mexican (Diospyros texana).The common persimmon is a tree usually less than 40 feet tall. The bark is brown to black with deep fissures with ridges that are broken into rectangular, checkered sections. Fruit of the persimmon plant is yellow to orange or dark red when ripe.

169 Plum

Prunus spp.

Regions ALL

Several species of plums occur throughout Texas. They are shrubs or small trees that often form thickets. The fruit furnishes some food for squirrel, quail, deer, turkey, foxes, and raccoons. The plant provides cover for quail when it occurs in thickets.

170 Post oak

Quercus stellata

Regions II, III, IV, V

This oak tree normally grows from 30 to 50 feet, sometimes higher. It is the dominant tree growing on sandy soils in the Post Oak Savanna and Cross-Timbers vegetative areas. Acorns occur in clusters of two to four and the cup covers about one- third of the nut. The bark is gray with rough scaly ridges. Alternate and simple leaves do not have the small bristle at the ends of the leaf vein that are found on blackjack oak. Quail, squirrel, deer, and turkey eat the acorns. The young plants maybe browsed by deer but are not a preferred plant. It may cause tannic acid poisoning in cattle.

171 Prickly ash
(Hercules club)

Zanthoxylum spp

Regions
II, III, IV, V

Prickly ash is a thorny shrub from three to 15 feet in height with stout spines up to one-half inch long. Its leaves are aromatic when crushed. Prickly ash generally grows on rocky upland soils. It is also called pepperwood, toothache bush and wait-a-bit. Many species of birds, including quail, turkey, and dove eat the fruit.

172 Prickly pear

Opuntia spp.

Regions ALL

A thorny cactus with flat fleshy pads, prickly pear forms mats or clumps. Fruits are fleshy and purple when ripe. It is an important food plant for wildlife. The fruits, seeds, and stems are eaten by at least 44 species of animals including dove, quail, deer, pronghorn antelope, javelina, songbirds, and many small mammals. Prickly pear is used as an emergency food for livestock during droughts. It tends to invade and spread on overgrazed rangeland.

173 Rattan
(Alabama supplejack)

Berchemia scandens

Region IV

This vine plant grows in rich, moist soils. The stems may girdle and kill large trees. Small mammals and many varieties of birds including ducks eat the fruits of the Rattan. Deer feed on both the fruits and foliage. The heaviest use for browse occurs in Spring and Summer.

174 Redbud

Cercis canadensis

Regions II, III, IV, V

Redbud is a shrub or small tree that grows up to 40 feet tall. It has a straight trunk usually branching five to nine feet from the ground. It is easily seen in the spring with its showy, small clustered, rose-colored flowers that cover the branches before the leaves come out. Several varieties occur in Texas east of the Pecos River. Quail and other birds eat the seeds. Deer will browse the plant.

175 Red oak

Quercus buckleyi

Quercus falcata

Quercus pagoda

Quercus shumardii

Regions ll, IV, V

Several species of oak are included under Red oak. They grow on rocky and shallow hillsides as well as in deep soils along bottomland areas. The fruit is a small acorn about one-half inch long. Acorns are readily eaten by deer, quail, turkey, squirrel, and other species. The plant is a highly palatable browse for white-tailed deer and livestock.

179 Rusty blackhaw

Viburnum rufidulum

Region IV

The rusty blackhaw is a shrub that can grow up to 40 feet in height. It is usually found as a smaller shrub. Leaves are semi-evergreen in the South. The bark is corky and appears to be dead. Blackhaw is an understory species. The shrub is valuable to wildlife chiefly for the fruit it produces. Birds, mammals, squirrels, and deer use the fruit for food. Deer and beaver eat the twigs, bark, and leaves.

182 Sand sage

Artemisia filifolius

Region I

Sand sage is an aromatic, rounded, shrub less than four feet tall that grows on sandy soils in the Panhandle of Texas. The plant is browsed by deer and pronghorn antelope, but not preferred. Quail and turkeys will utilize it for nesting cover. Livestock on rangeland in poor condition with few grasses present may graze it.

183 Sand shinoak

Quercus havardii

Regions I, II

This low shrub is usually less than three feet tall and forms dense thickets in deep sands. The acorns produced provide food for quail, turkey, deer, and prairie chickens. The plant can be toxic to livestock during certain times of the year. The thickets formed by shinoak provide cover for quail, turkey, songbirds, and small mammals.

184 Sassafras

Sassafras albidum

Region IV

The Sassafras tree grows best in open woods and along fence rows on moist, well-drained, sandy soils. Songbirds, turkey, bobwhite quail, raccoon, squirrel, and other mammals eat the fruit of the Sassafras. The leaves and twigs are browsed all year by deer.

191 Sumac – Flameleaf

Rhus compallinum

Regions II, IV, V

This tree or shrub is a perennial that can grow up to 32 feet tall. It prefers rocky hills and bottomlands. The leaves turn to a bright red in the fall, hence its name. Birds eat the seeds and deer will browse the plant.

192 Sumac – Littleleaf

Rhus microphylla

Regions I, II, V

This plant is clump forming many-branched shrub that may grow to a height of 15 feet. Its branches are crooked. It grows on dry rocky hillsides. Ground squirrels, game birds and a few other small mammals eat the fruit. Pronghorn, mule and white-tailed deer browse the plants

193 Sumac – Skunkbush

Rhus aromatica

Regions I, II, V

This is an aromatic shrub with slender crooked branches usually less than 10 feet tall. It is drought resistant and forms thickets that provide cover for quail. Many species of birds, including quail, prairie chicken, and pheasant are known to eat the fruit. Deer browse the plant. It occurs on a variety of soil types from limestone outcrops to sand dunes.

196 Tasajillo

Cylindropuntia leptocaulis

Regions I, II, III, V

A bush or small cactus-like plant, tasajillo is usually less than four feet tall. It belongs to the same family as prickly pear. The joints are round rather than flat as in prickly pear. The fruit is red or dark red. Tasajillo grows on heavy soils. It can be commonly found under mesquite. Small mammals and birds eat the fruit. One common name is turkey-pear since turkeys readily eat the fruit.

197 Texas kidneywood

Eysenhardti a texana

Region III

This small, irregular shaped shrub is less than eight feet tall. It grows on calcareous soils in the dry hills and canyons of southwestern and central Texas. The plant is a legume with a small pod. Leaves of this plant are unpleasantly scented when crushed. The plant is a preferred browse for deer and livestock. It has been almost completely grazed out on many hill county ranches that were heavily stocked with sheep and goats.

202 Water oak

Quercus nigra

Regions III, IV

This tree attains a height of 80 feet and has a grayish-black bark. It grows in bottomlands and along streams from the Colorado River eastward in Texas. Leaves are simple, alternate, and persistent and varied in shape. The acorns are produced very close to the twigs and are small (one-third to two-thirds inch in diameter). Acorns are used by deer and a wide variety of birds that include ducks, quail, and turkey.

204 Western soapberry

Sapindus saponaria

Regions I, II, V

Usually found in moist soils along streams, this tree grows to a height of 50 feet. Deer eat the foliage of young trees and consume the fruits that fall on the ground in the winter. Turkey eat the fruit.

205 White oak

Quercus alba

Regions III, IV

The White Oak tree prefers deep, well-drained, loamy soils. White oak acorns are the preference of most wildlife because of their sweet taste. Trees tend to have either very good or very poor acorn crops. Acorns are eaten by waterfowl, squirrels, turkey, and deer.

207 Wolfberry

Lycium spp.

Regions I, II, III, V

Wolfberry is a spiny shrub up to seven feet tall found up to 3,000 feet in altitude. The plant produces a red berry sometimes used by quail, turkey, and other birds. Deer utilize the foliage. Wolfberry has a moisture conserving mechanism in which the leaves will defoliate during a dry summer only to re-leaf in the fall following adequate moisture. The bare silvery stems may appear dead when leafless but are still alive.

208 Yaupon

Ilex vomitoria

Regions III, IV

This plant is commonly called “yaupon holly” because of the holly-like appearance of evergreen leaves and bright red berries. It is an evergreen shrub, three to 25 feet tall that is multi- branched from the base. It forms dense thickets and reproduces from sprouts as well as seeds. It occurs in eastern Texas in sandy woodlands. The fruit is eaten by at least seven species of birds including quail. It is browsed by deer and is important as an emergency food source during late winter periods.

Group II – Grasses and Forbs of Texas

Plant	Description
103 Annual broomweed *Amphiachyris dracunculoides* Regions I, II, III, V	This bushy, loosely-branched, yellow, fall flowering forb grows six to 18 inches tall with narrow leaves and small composite flowers about one-fourth inches across. It is a common fall plant throughout Texas. Density is dependent upon winter rainfall amounts. The plant provides overhead cover for quail. The seed is readily eaten by quail.
104 Annual sunflower *Helianthus annuus* Regions ALL	Sunflowers are stout, rough-stemmed, erect, fibrous plants two to 10-feet tall having large yellow flowers two to five inches across. Sunflowers are widespread, often covering fields. They grow on almost any site with soil disturbance. The nutritious seeds are a food source for game birds, songbirds, and rodents. The sunflower is a favorite food of dove. Deer and pronghorn antelope will eat young plants and immature flower
106 Bahiagrass *Paspalum notatum* Region IV	Bahiagrass includes many varieties, only one of which in native to East Texas. It is a common sight in pastures and hay lands throughout East Texas. It is very aggressive and will crowd-out other grasses. The familiar "V" shape florescence seed head is bitter to the taste. It has little value to wildlife except for the cover it provides and the insects it attracts. Bahiagrass is an excellent grass for grazing and provides high quality hay. Livestock favor Bahiagrass hay over Bermudagrass.
107 Barnyardgrass *Echinocholoa crus-galli* Region I	This annual, warm-seasoned, introduced grass grows on disturbed sites, roadsides, ditches and wet areas. It varies in size from 12 to 24 inches in height. It is erect with a smooth stem and swollen nodes. Inflorescence is a panicle and seeds are covered with stiff hairs. Barnyardgrass has smooth, moderately large seeds. Barnyardgrass and other wild millets (Echinochloa sp.) are important foods for ducks and are used by other birds. Wild millet is often seeded over mud flats as a waterfowl management practice.
113 Blue grama *Bouteloua gracilis* Regions I	Blue grama is a native, perennial, warm-season grass that grows in the plains and western Texas. The seed head is composed of one to three comb-like branches. It is a short grass (eight to 20 inches) with a bunch type growth form. It is a dominant grass on the Great Plains. It grows well on sandy loam and loam soils. Reproduction is by seeds and tillers. Songbirds eat the seeds. Mule deer, whitetailed deer, and pronghorn antelope graze blue grama.

115 Broomsedge bluestem

Andropogon virginicus

Regions
ALL

Broomsedge bluestem is a perennial, native, warm-season grass that grows primarily in the eastern half of the state. It is a bunchgrass with basal as well as stem leaves. Leaves are flat or folded and the stems are flattened at the base. The overall appearance of the plant resembles a broom from which it gets its name. It has value to wildlife primarily for nesting, escape, and loafing cover.

116 Buffalo-bur

Solanum rostratum

Regions
I, II, III, V

An annual, native, warm-season forb, buffalo-bur occurs on disturbed sites and over-grazed rangelands. This 2-foot plant is covered in stickers and has yellow flowers. Doves, quail, and other birds eat the seeds.

117 Bullnettle

Cnidoscolus texanus

Regions
ALL

Bullnettle is an upright or spreading perennial that grows up to 40 inches tall on dry, sandy soil. The entire plant is covered with stiff, stinging hairs. Flowers on this plant are white, fragrant, and tubular. The plant has large, edible seeds that are mostly brown. When the seeds detach from the plant, they will camouflage to match their surroundings, as will most crotons.Dove, quail, turkey, and many seed-eating mammals eat seeds.

118 Bulrush

Scirpus spp.

Region III

Rushes are a varied group of essentially leafless, sedge family plants varying in size from two inches to two feet. They are aquatic plants that grow in the margins of aquatic sites and in saturated soil conditions. The stems vary from cylindrical to triangular and are capped with a single compact spike. The cluster of seeds in the spike is the principal part of these plants used by wildlife. Ducks commonly eat the underground tubers as well as the seeds.

120 Bundleflower

Desmanthus spp.

Regions
ALL

The name of this forb comes from its unusual arrangement of seedpods originating from a bundle, either flat or twisted. A two- to four-foot tall plant, bundleflower is a perennial and grows from a woody crown. It is a member of the legume family and produces two to six seeds in a flat, twisted pod. It grows on clay soils in North Texas, East Texas, and Central Texas. Deer and pronghorn eat the plant. Quail and other birds eat the seed. There are three common varieties of bundleflower: velvet, Illinois, and prostrate.

121 Bush sunflower

Simsia calva

Regions
II, III, V

This plant is a perennial, native, warm-season forb with a large taproot. Stems may be semi-woody, with triangular-shaped, coarse leaves. Showy, bright, yellow to orange-yellow flowers are present most of the growing season. It is an important forage plant for deer, pronghorn antelope, and is eaten by livestock. Seeds are eaten by dove and quail.

122 Catclaw sensitive briar

Schrankia nuttallii

Regions
ALL

This species is a spiny, sprawling, perennial forb. It has many prostrate stems three to four feet long that rise from a woody rootstock. Its flowers are rose pink and spherical. Deer and pronghorn browse the stems and leaves, and quail, dove, and turkey eat the seeds.

123 Cattail

Typha spp.

Regions
I, II, III, IV

Cattail is a tall, strap-leaf plant with a sausage-like head that grows in and around water. The seeds of the plant are very small and hairy. Geese and muskrats eat the rootstocks. Red-winged Blackbirds and other species use the plant for nesting and cover.

125 Croton

Croton spp.

Regions
ALL

Several species of annual and perennial croton occur throughout Texas. They are commonly called doveweed or goatweed. Annual croton occurs in overgrazed fields and after soil disturbance. Crotons have one to three large oily seeds that are valuable for many game and non-game birds. They are a major component in the diets of dove and quail. Deer and pronghorn antelope browse some species of croton.

126 Dayflower

Commelina erecta

Regions ALL

This perennial plant has ascending or spreading branches and parallel-veined leaves. Flowers are two-pedaled, lavender-blue and about one to one and a half inches across. It grows in sandy soils and prefers some shade. Seeds are food to dove, quail, turkey, and songbirds. Deer, pronghorn antelope, and livestock browse the plant.

129 Duck potato

(Arrowhead)

Sagittaria spp.

Region
III

This is a rhizomatous perennial, native, warm-season wetland forb. Its leaves vary from arrowhead-shaped to long-wide blades, according to the species. This also gives it the common name of arrowhead. Waterfowl eat the seed. Corms produced in the fall are the primary importance of duck potato. Corms are the fleshy, bulb-like base of the stem, usually underground. It is a fair cover plant for waterfowl.

130 Duckweed

Lemna spp.

Regions
III, IV, V

This free-floating, aquatic plant is pale green in color. They are the simplest and the smallest of flowering plants. This plant can commonly form stands that completely cover bodies of water. Duckweed prefers water with high organic content. It is used as food by certain waterfowl. Minute animals associated with the duckweed contribute greatly to the value.

133 Engelmann daisy

Engelmannia peristenia

Regions I, II, III, V

This forb is a stout-stemmed, coarse-haired, leafy perennial with yellow, composite flowers one to two inches across. Leaves are simple and deeply lobed along the margins. Leaves are three to six inches long with rough and hairy indents. It usually grows in patches. The plants grow to about three feet in height. During the winter, plants will form a rosette of attractive green foliage. Deer, pronghorn and livestock feed on the plant. Seeds are important to birds.

136 Globe mallow

Sphaeralcea spp.

Regions I, II, III, V

An upright or occasionally sprawling perennial forb, globe mallow is about two to three feet tall. It has a woody base with leaves up to two inches long, wide with shallow lobes. Deer and pronghorn antelope eat the plant while quail and turkey eat the seeds.

148 Johnsongrass

Sorghum halepense

Regions ALL

Johnsongrass is an introduced species. This weak perennial, warm-season grass is considered a weed in cultivated fields. Its height can range from two to six feet and it has a large, open seed head. Its leaves are wide with a light colored mid-rib which often has splotches of purple that results from a fungus. It has scaly rhizomes. When subjected to stressed growing conditions, Johnsongrass can produce prussic acid, a poison that is deadly to cattle. Deer browse on young plants. The seeds are a food source to game birds and songbirds.

150 Kleingrass

Panicum coloratum

Regions II, III, V

This is an introduced, perennial, warm-season grass having a knotty base with dark-in-color stem nodes. The leaves and sheaths have hair. The seed are hard and persistent. This grass adapts to most soils but has poor cold tolerance in the northern quarter of the state. It is often introduced on croplands that have been converted to pasture. Kleingrass seeds are the typical panic type and used by quail and other ground-feeding birds. Kleingrass is used as nesting cover for quail and turkey.

151 Lambs-quarters

Chenopodium spp.

Regions I, V

This common plant grows six inches to three feet high with pale, mealy blossoms. This annual grows in waste places and is often covered with a white flowery coating. The seeds are small and numerous. Seed is a food source to dove, quail, pheasant, waterfowl, and numerous songbirds, as well as small mammals. The seeds are persistent into the late winter increasing their value to wildlife.

152 Lespedeza

Lespedeza spp.

Region IV

Lespedeza is commonly found on low fertility, acid soils of East Texas. Common lespedeza grows on clayey soils. Deer feed on the entire plant's vegetation. Birds including turkey and quail utilize the leaves. Improved varieties are grown for grazing and hay production. The Kobe variety is a common variety planted to build soils after World War II. Other plants usually overtake the common variety when fields are fertilized and limestone applied.

153 Little Bluestem

Schizachyrium scoparium

Regions ALL

This plant is a native, important perennial tall grass of the true prairies. It is blue-green in color turning to reddish-brown at maturity. It is usually about three to four feet tall, but can grow to six feet. Erect stems arise from a densely leafed base. Seeds are not as hairy as broomsedge bluestem and the plant is not as robust as big bluestem. Seeds grow one on top of another and spread apart at the jointed end at maturity. The plants greatest value for wildlife is its nesting cover for birds and fawning cover for deer.

155 Longleaf uniola

Chasmanthium laxum

Region IV

Longleaf uniola is a common woods grass of East Texas. It grows well under shaded forests. The plant has little use directly by wildlife other than rabbits and other rodents that feed on the green basal shoots in late winter. Livestock will graze longleaf uniola, especially in the Spring.

158 Maximilian sunflower

Helianthus maximiliani

Regions I, II, III, V

This tall leafy plant has large, yellow composite flowers with 2½ inch wide blossoms on the upper one-half to one-third of the upper stems. It blooms in late summer and fall. This variety of sunflower prefers areas that receive extra water. It is a perennial that grows up to eight feet tall. As a prolific seed producer it is a valuable food source for quail and other birds. Deer, pronghorn and livestock browse the plant.

159 Mentzelia

Mentzelia spp.

Region I

Mentzelia is a stiffly, upright, rough-hairy, herbaceous perennial that grows up to three feet tall. The stem is solitary, rigid, ashy white. Leaves are covered with stiff hooked hairs that easily become attached to clothing and give the name stickleaf to the family of plants. It grows on sandy, dry, gravelly, calcareous soils. The seed are food to quail, dove, and songbirds. The seed is a good emergency food.

163 Nuttall Peavine

Astragalus nuttallianus

Region ll, V

This plant is an annual forb that resembles vetch but does not have tendrils. Quail and turkey eat the nuttall peavine seed. Deer, pronghorn and turkey browse the entire plant.

164 Old-man's beard

Clematis drummondii

Regions ll, III, V

This is a perennial, climbing, delicately branched vine. Older stems are woody at the base. It has a very noticeable plume-like bloom. It grows on dry, well-drained soils along roadsides and along fencerows. Deer, pronghorn antelope, and livestock browse the plants.

165 Partridge pea

Chamaecrista fasciculata

Regions I, III, IV, V

This upright, smooth, annual legume grows one to four feet tall. The flower is bright yellow with five unequal petals about 1½ inches in diameter. Leaves are alternate and divided into eight to 15 opposite pairs of small leaflets. The seed is flat and brown and held in flat pods. Quail and other ground-feeding birds eat the partridge pea seed. Deer and pronghorn antelope will eat young plants. The plant prefers sandy soils.

168 Plains bristlegrass

Setaria leucopila

Regions I, II, III, V

This native, warm-season, perennial grass grows on sandy to sandy loam soils. It has one bristle below each seed. Leaf blades are often folded and rough and it may grow up to three feet tall. The large seeds of this grass are a valuable wildlife food for upland game and songbirds. Plains bristlegrass is used for nesting cover.

177 Rescuegrass

Bromus catharticus

Regions ALL

Rescuegrass is a cool-season, annual plant that starts to grow in late winter. It reproduces by seed and grows to a height ranging from 16 to 31 inches. Rescuegrass grows throughout all regions of Texas. The grass is food to deer and pronghorn antelope. It is a preferred plant of wild turkey.

178 Rushes

Juncus spp.

Region V

Rushes are a varied group of essential leafless, sedge family plants varying in size from two inches to two feet. They are aquatic plants that grow in the margins of aquatic sites and in saturated soil conditions. The stems vary from cylindrical to triangular and are capped with a single compact spike. These cluster of seeds in the spike is the principal part of these plants used by wildlife. Ducks commonly eat the tubers as well as the seeds.

180 Ryegrass

Lolium perenne

Regions I, III, IV, V

Ryegrass species can be annuals or perennials. The most commonly used varieties by wildlife are annuals. The annual variety reseeds extremely well. Ryegrass is commonly used with oats, wheat, elbon rye, and/or legumes. It grows well on a variety of soils from wet to dry. Wildlife use is limited mostly to grazing of the plant by deer, waterfowl, and turkey. Seed use is not well known. Plantings are used to attract geese and ducks.

181 Sand dropseed

Sporobolus cryptandrus

Regions I, V

This grass is a native, warm-season, perennial grass. It grows up to four feet tall (12 to 24 inches normally) occurring on sandy soils in the central and western two-thirds of Texas. The easiest recognizable feature of this plant is the dense, long hairs at the collar. The seedhead is often enclosed partly by the upper leaf sheath. A distinct “flag-leaf” is usually present at a right angle to the stem just below the seedhead. The seeds of the dropseed grasses are important to ground-feeding birds. The seed is utilized by quail and songbirds.

185 Sedges

Carex spp.

Regions III, V

There are about 500 sedge species occurring in the United States with a large number occurring in Texas. Sedges are herbaceous, grass-like plants with three leaves rising from the nodes rather than two as in grasses. Stems are triangular. The majority of sedges grow in moist soils. The triangular or lens-shaped seeds of sedges are eaten by many species including ducks, and songbirds. Deer browse the plants. Sedges provide cover for nesting ducks and concealment for small animals.

186 Sida

Sida spp.

Regions I, II, III, V

Sida is a reclining or trailing hairy perennial. Flowers of these species vary in color. It is a member of the mallow family. Sida grows in sandy, loamy, or rocky soils. Deer and pronghorn antelope browse sida. It is also known as teaweed or ironweed.

187 Sideoats grama

Bouteloua curtipendula

Regions I, II, III, V

This state grass of Texas is a perennial, warm-season, native that gets its name from the arrangement of the seeds growing off one side of the panicle. The glandular-based hairs on the leaf margins also distinguish the plant. It is best adapted to calcareous and moderately alkaline soils. Ground-feeding birds, including quail and turkey, use the seed.

188 Smartweed

Polygonum spp.

Regions I, III, IV

Smartweed varieties are widely distributed in moist soil along water margins and wet sites. The plant has a conspicuous sheath located at the swollen nodes. The flowers are pinkish-red or white. Stems are erect to sprawling and usually one to three feet in height. The fruit is a small shining black flattened seed. The seeds are an important food source for waterfowl, dove, pheasant, and turkey.

189 Snow-on-the-mountain

Euphorbia marginata

Snow-on-the-prairie *Euphorbia bicolor*

Regions I, II, III, V

This plant is a white-topped spurge, one to three feet tall branching from a single stem. It occurs in open fields, gravel flats, playas, and river bottoms. It has a milky sap. The plant is conspicuous in the late summer and fall because of its showy, white margined foliage on the upper parts of the stem. The seed is large and round. Dove, quail, and songbirds eat the seed.

194 Switchgrass

Panicum virgatum

Regions ALL

A tall plant of two to 10 feet, switchgrass is a robust, native warm-season plant that is native to all parts of Texas. It is an important component of the true tall grass prairie plant complex. It grows on moist to mesic prairie sites and along the edges of streams and rivers. The seedhead is large, pyramid-shaped, and open with seeds borne on the tips of branches. The large flat leaves have a triangular patch of hair near the base. It reproduces by rhizomes as well as seed. The seed of panicums are used by a variety of waterfowl and upland game birds. Duck species, dove, quail, pheasant, and songbirds are typical species using the plant seeds. It is a good nesting cover plant for turkeys and provides cover for young fawns.

195 Tallow weed

(Plantain)

Plantago spp.

Regions ALL

Tallow weed is a member of the annual plantain family. The family is stemless and grows near the ground. It is called tallow weed because livestock fatten on it the early spring. It grows on limestone soils in disturbed and overgrazed sites. It is an important food plant for deer and pronghorn antelope. Seeds are eaten by dove, quail and turkey. Tallow weed is dependent upon spring and winter rain for growth.

198 Texas Wintergrass

Nassella leucotricha

Regions I, II, III, V

This cool-season, perennial, native species occurs on a variety of soils and sites. It is shade tolerant and withstands heavy grazing. The leaves are dark green, very erect, and are covered with short stiff hairs. The sharp-based seed have long, bent and twisted awns giving the plants the local name of "spear grass". It grows through the winter and young shoots provide forage for deer. Songbirds and small rodents eat the seed.

199 Vaseygrass

Paspalum urvillei

Region IV

Vaseygrass is a tall paspalum that grows in fields that are seasonal wet to wet year-around. It commonly invades hay meadows that have poor drainage. The seed provide food for birds. Certain varieties of paspalums, such as brownseed or Florida, are sought after. Vaseygrass, however, is thought of as a noxious invader.

200 Vetch

Vicia spp.

Regions ALL

Vetches are vine-like legumes. Most vetch species bloom in mid-spring and produce seed by June. The seeds are fairly large and range in size that compares to a No. 4 shotgun shot size up to the size of a BB. The leaves and stem of vetch are very high in protein and are used by deer, turkey, quail, and livestock. Vetch seed is used throughout the year by turkey, quail, dove, and songbirds.

201 Vine mesquite

Panicum obtusum

Regions I, II, III, V

This perennial, warm-season, native plant grows to a height of two feet. It occurs in western two-thirds of Texas on gravel or clay soils that receive extra moisture. Depressional areas in prairies are common sites for the plant. The plant may have stolons several feet long that have swollen nodes. The brownish round seeds lie close to the main stem forming a narrow seedhead. It withstands heavy grazing. The hard persistent seeds are valuable for quail and other ground feeding birds.

203 Western ragweed

Ambrosia psilostachya

Regions ALL

Western ragweed is a perennial plant that grows two to three feet high. It has rigid fibrous stems and multi-divided leaves.

Regarded as a weed, western ragweed is valuable to wildlife. The plant produces a large amount of seed that is high in oil content. It is one of the most valuable winter foods for all ground feeding birds. Western ragweed is important for quail and dove.

206 Wildrye

Elymus spp.

Regions ALL

Wildrye resembles wheat with awns. It is a perennial, cool-season grass. It provides good cool-season forage for livestock. Young plants provide valuable forage for deer. It provides nesting cover for birds and fawning cover for deer. Seeds are eaten by doves, quail, and turkey.

WRM CDE Plant Preferences – Question 2

anol -> indicates that this animal is not on the region list
pnol -> indicates that this plant is not on the region or state list

Waterfowl

			Regions					
	Common Names	**Scientific Names**	**I**	**II**	**III**	**IV**	**V**	**State**
107	Barnyardgrass	*Echinocholoa crus-galli*	**Yes**	anol	pnol	pnol	pnol	pnol
118	Bullrush	*Scirpus spp.*	pnol	anol	**Yes**	pnol	pnol	pnol
123	Cattail	*Typha spp.*	**Yes**	anol	**Yes**	**Yes**	pnol	**Yes**
129	Duck potato	*Sagittaria latifolia*	pnol	anol	**Yes**	pnol	pnol	pnol
130	Duckweed	*Lemna spp.*	pnol	anol	**Yes**	**Yes**	**Yes**	**Yes**
148	Johnsongrass	*Sorghum halepense*	**Yes**	anol	**Yes**	**Yes**	**Yes**	**Yes**
155	Lambs-quarters	*Chenopodium spp.*	**Yes**	anol	pnol	pnol	**Yes**	pnol
170	Post oak	*Quercus stellate*	pnol	anol	**Yes**	**Yes**	**Yes**	**Yes**
173	Rattan	*Berchemia scandens*	pnol	anol	pnol	**Yes**	pnol	pnol
175	Red Oak	*See plant description*	pnol	anol	pnol	**Yes**	**Yes**	**Yes**
178	Rushes	*Juncus spp.*	pnol	anol	pnol	pnol	**Yes**	pnol
180	Ryegrass	*Lolium spp.*	**Yes**	anol	**Yes**	**Yes**	**Yes**	**Yes**
185	Sedges	*Carex spp.*	pnol	anol	**Yes**	pnol	**Yes**	pnol
188	Smartweed	*Polygonum spp.*	**Yes**	anol	**Yes**	**Yes**	pnol	**Yes**
194	Switchgrass	*Panicum virgatum*	**Yes**	anol	**Yes**	**Yes**	**Yes**	**Yes**
202	Water oak	*Quercus nigra*	pnol	anol	**Yes**	**Yes**	pnol	**Yes**
205	White oak	*Quercus alba*	pnol	anol	**Yes**	**Yes**	pnol	**Yes**

Javelina

			Regions					
	Common Names	**Scientific Names**	**I**	**II**	**III**	**IV**	**V**	**State**
101	Agarito	*Mahonia trifoliolata*	anol	anol	**Yes**	anol	anol	**Yes**
104	Annual sunflower	*Helianthus annuus*	anol	anol	**Yes**	anol	anol	Yes
109	Blackbrush	*Acacia rigidula*	anol	anol	**Yes**	anol	anol	Yes
127	Dewberry (Blackberry)	*Rubus spp.*	anol	anol	**Yes**	anol	anol	**Yes**
138	Grapes	*Vitis spp.*	anol	anol	**Yes**	anol	anol	**Yes**
145	Honey mesquite	*Prosopis glandulosa*	anol	anol	**Yes**	anol	anol	**Yes**
154	Live oak	*Quercus virginiana*	anol	anol	**Yes**	anol	anol	**Yes**
166	Pecan	*Carya illinoensis*	anol	anol	**Yes**	anol	anol	**Yes**

167	Persimmon	*Diospyros spp.*	anol	anol	**Yes**	anol	anol	**Yes**
172	Prickly pear	*Opuntia spp.*	anol	anol	**Yes**	anol	anol	**Yes**
198	Texas wintergrass	*Nassellia leucotricha*	anol	anol	**Yes**	anol	anol	**Yes**
203	Western ragweed	*Ambrosia psilostachya*	anol	anol	**Yes**	anol	anol	**Yes**

Mourning and White-winged Dove

			Regions					
	Common Names	**Scientific Names**	**I**	**II**	**III**	**IV**	**V**	**State**
104	Annual sunflower	*Helianthus annuus*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
116	Buffalo-bur	*Solanum rostratum*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
117	Bullnettle	*Cnidoscolus texanus*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
119	Bumelia	*Sideroxylon lanuginosum*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
120	Bundleflower	*Desmanthus illinoensis*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
121	Bush sunflower	*Simsia calva*	pnol	**Yes**	**Yes**	pnol	**Yes**	**Yes**
122	Catclaw sensitive briar	*Schrankia nuttallii*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
125	Croton	*Croton spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
126	Dayflower	*Commelina erecta*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
127	Dewberry (Blackberry)	*Rubus spp.*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
133	Englemann daisy	*Engelmannia peristenia*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
142	Hackberry	*Celtis spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
148	Johnsongrass	*Sorghum halepense*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
150	Kleingrass	*Panicum coloratum*	pnol	**Yes**	**Yes**	pnol	**Yes**	**Yes**
151	Lambs-quarters	*Chenopodium spp.*	**Yes**	pnol	pnol	pnol	**Yes**	pnol
152	Lespedeza	*Lespedeza spp.*	pnol	pnol	pnol	**Yes**	pnol	pnol
158	Maximilian sunflower	*Helianthus maximiliani*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
159	Mentzelia	*Mentzelia spp.*	**Yes**	pnol	pnol	pnol	pnol	pnol
165	Partridge pea	*Chamaecrista fasciculata*	**Yes**	pnol	**Yes**	**Yes**	**Yes**	**Yes**
168	Plains bristlegrass	*Setaria leucopila*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
171	Prickly ash (Hercules Club)	*Zanthoxylum spp.*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
172	Prickly pear	*Optunia spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
180	Ryegrass	*Lolium spp.*	**Yes**	pnol	**Yes**	**Yes**	**Yes**	**Yes**
186	Sida	*Sida spp.*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
188	Smartweed	*Polygonum spp.*	**Yes**	pnol	**Yes**	**Yes**	pnol	**Yes**
189	Snow-on-the-Mountain (Snow-on-the-Prairie)	*Euphorbia marginata (Euphorbia bicolor)*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**

191	Sumac-Flameleaf	*Rhus compallinum*	pnol	**Yes**	pnol	**Yes**	**Yes**	**Yes**
192	Sumac –Littleleaf	*Rhus microphylla*	**Yes**	**Yes**	pnol	pnol	**Yes**	**Yes**
193	Sumac –Skunkbush	*Rhus aromatica*	**Yes**	**Yes**	pnol	pnol	**Yes**	**Yes**
194	Switchgrass	*Panicum virgatum*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
195	Tallow weed	*Plantago spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
200	Vetch	*Vicia spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
201	Vine mesquite	*Panicum obtusum*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
203	Western ragweed	*Ambrosia psilostachya*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Pronghorn Antelope

Regions

	Common Names	**Scientific Names**	**I**	**II**	**III**	**IV**	**V**	**State**
104	Annual sunflower	*Helianthus annuus*	**Yes**	**Yes**	anol	anol	anol	**Yes**
113	Blue grama	*Bouteloua gracilis*	**Yes**	pnol	anol	anol	anol	pnol
120	Bundleflower	*Desmanthus spp.*	**Yes**	**Yes**	anol	anol	anol	**Yes**
122	Catclaw sensitive briar	*Schrankia nuttallii*	**Yes**	**Yes**	anol	anol	anol	**Yes**
121	Bush sunflower	*Simsia calva*	pnol	**Yes**	anol	anol	anol	**Yes**
125	Croton	*Croton spp.*	**Yes**	**Yes**	anol	anol	anol	**Yes**
126	Dayflower	*Commelina erecta*	**Yes**	**Yes**	anol	anol	anol	**Yes**
133	Englemann daisy	*Engelmannia pinnatifida*	**Yes**	**Yes**	anol	anol	anol	**Yes**
134	Ephedra	*Ephedra spp.*	**Yes**	**Yes**	anol	anol	anol	**Yes**
135	Four-wing saltbush	*Atriplex canescens*	**Yes**	**Yes**	anol	anol	anol	**Yes**
136	Globe mallow	*Sphaeralcea spp.*	**Yes**	**Yes**	anol	anol	anol	**Yes**
145	Honey mesquite	*Prosopis glandulosa*	**Yes**	**Yes**	anol	anol	anol	**Yes**
158	Maximilian sunflower	*Helianthus maximiliani*	**Yes**	**Yes**	anol	anol	anol	**Yes**
161	Mountain mahogany	*Cercocarpus montanus*	**Yes**	pnol	anol	anol	anol	pnol
163	Nuttall peavine	*Astragalus nuttallianus*	pnol	**Yes**	anol	anol	anol	**Yes**
164	Old-man's beard	*Clematis drummondii*	**Yes**	**Yes**	anol	anol	anol	**Yes**
165	Partridge pea	*Chamaecrista fasciculata*	**Yes**	pnol	anol	anol	anol	**Yes**
168	Plains bristlegrass	*Setaria leucopila*	**Yes**	**Yes**	anol	anol	anol	**Yes**
177	Rescuegrass	*Bromus catharticus*	**Yes**	**Yes**	anol	anol	anol	**Yes**
182	Sand sage	*Artemisia filifolia*	**Yes**	pnol	anol	anol	anol	pnol
186	Sida	*Sida spp.*	**Yes**	**Yes**	anol	anol	anol	**Yes**
187	Sideoats grama	*Bouteloua curtipendula*	**Yes**	**Yes**	anol	anol	anol	**Yes**

191	Sumac –Flameleaf	*Rhus lanceloate*	pnol	**Yes**	anol	anol	anol	**Yes**
192	Sumac – Littleleaf	*Rhus microphylla*	**Yes**	**Yes**	anol	anol	anol	**Yes**
193	Sumac –Skunkbush	*Rhus aromatic*	**Yes**	**Yes**	anol	anol	anol	**Yes**
195	Tallow weed (Plantain)	*Plantago spp.*	**Yes**	**Yes**	anol	anol	anol	**Yes**
196	Tasajillo	*Cylindropunita leptocaulis*	**Yes**	**Yes**	anol	anol	anol	**Yes**
200	Vetch	*Vica spp.*	**Yes**	**Yes**	anol	anol	anol	**Yes**

Ring-necked Pheasant

Regions

	Common Names	**Scientific Names**	**I**	**II**	**III**	**IV**	**V**	**State**
104	Annual sunflower	*Helianthus annuus*	**Yes**	anol	anol	anol	anol	**Yes**
116	Buffalo-bur	*Solanum rostratum*	**Yes**	anol	anol	anol	anol	**Yes**
120	Bundleflower	*Desmanthus spp.*	**Yes**	anol	anol	anol	anol	**Yes**
125	Croton	*Croton spp.*	**Yes**	anol	anol	anol	anol	**Yes**
148	Johnsongrass	*Sorghum halepense*	**Yes**	anol	anol	anol	anol	**Yes**
151	Lambs-quarters	*Chenopodium spp.*	**Yes**	anol	anol	anol	anol	pnol
165	Partridge pea	*Chamaecrista fasciculata*	**Yes**	anol	anol	anol	anol	**Yes**
188	Smartweed	*Polygonum spp.*	**Yes**	anol	anol	anol	anol	**Yes**
194	Switchgrass	*Panicum virgatum*	**Yes**	anol	anol	anol	anol	**Yes**
203	Western ragweed	*Ambrosia psilostachya*	**Yes**	anol	anol	anol	anol	**Yes**

Fox and Gray Squirrels

			Regions					
	Common Names	**Scientific Names**	**I**	**II**	**III**	**IV**	**V**	**State**
108	Beech	*Fagus grandifolia*	anol	anol	anol	**Yes**	pnol	pnol
110	Blackcherry	*Prunus serotina*	anol	anol	anol	**Yes**	pnol	pnol
111	Black-gum	*Nyssa sylvatica*	anol	anol	anol	**Yes**	pnol	pnol
112	Blackjack oak	*Quercus marilandica*	anol	anol	anol	**Yes**	**Yes**	**Yes**
114	Blueberry (Sparkleberry)	*Vaccinium arboreum*	anol	anol	anol	**Yes**	pnol	pnol
127	Dewberry (Blackberry)	*Rubus spp.*	anol	anol	anol	**Yes**	**Yes**	**Yes**
128	Dogwood	*Cornus spp.*	anol	anol	anol	**Yes**	**Yes**	**Yes**
132	Elm	*Ulmus spp.*	anol	anol	anol	**Yes**	**Yes**	**Yes**
138	Grapes	*Vitis spp.*	anol	anol	anol	**Yes**	**Yes**	**Yes**
142	Hackberry	*Celtis spp.*	anol	anol	anol	**Yes**	**Yes**	**Yes**
143	Hickory	*Carya spp.*	anol	anol	anol	**Yes**	pnol	**Yes**
145	Honey mesquite	*Prosopis glandulosa*	anol	anol	anol	pnol	**Yes**	**Yes**
154	Live oak	*Quercus virginiana*	anol	anol	anol	**Yes**	**Yes**	**Yes**
157	Magnolia	*Magnolia spp.*	anol	anol	anol	**Yes**	pnol	pnol
176	Maple	*Acer spp.*	anol	anol	anol	**Yes**	pnol	**Yes**
162	Mulberry	*Morus spp.*	anol	anol	anol	**Yes**	pnol	**Yes**
166	Pecan	*Carya illinoensis*	anol	anol	anol	**Yes**	**Yes**	**Yes**
169	Plum	*Prunus spp.*	anol	anol	anol	**Yes**	**Yes**	**Yes**
170	Post oak	*Quercus stellata*	anol	anol	anol	**Yes**	**Yes**	**Yes**
175	Red oak	See plant description	anol	anol	anol	Yes	Yes	Yes
179	Rusty blackhaw	*Viburnum rufidulum*	anol	anol	anol	**Yes**	pnol	pnol
184	Sassafras	*Sassafras albidum*	anol	anol	anol	**Yes**	pnol	pnol
202	Water oak	*Quercus nigra*	anol	anol	anol	**Yes**	pnol	**Yes**
205	White oak	*Quercus alba*	anol	anol	anol	**Yes**	pnol	**Yes**
208	Yaupon	*Ilex vomitoria*	anol	anol	anol	**Yes**	pnol	**Yes**

Bobwhite & Scaled Quail

			Regions					
	Common Names	**Scientific Names**	**I**	**II**	**III**	**IV**	**V**	**State**
101	Agarito	*Mahonia trifoliolata*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
102	American beautyberry	*Callicarpa americana*	pnol	pnol	**Yes**	**Yes**	pnol	**Yes**
103	Annual broomweed	*Amphiachyris dracunculoides*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
104	Annual sunflower	*Helianthus annuus*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
108	Beech	*Fagus grandifolia*	pnol	pnol	pnol	**Yes**	pnol	pnol
109	Blackbrush	*Acacia rigidula*	pnol	pnol	**Yes**	pnol	pnol	pnol
112	Blackjack oak	*Quercus marilandica*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
116	Buffalo-bur	*Solanum rostratum*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
117	Bullnettle	*Cnidoscolus texanus*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
119	Bumelia (Chittimwood)	*Sideroxylon lanuginosum*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
120	Bundleflower	*Desmanthus spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
121	Bush sunflower	*Simsia calva*	pnol	**Yes**	**Yes**	pnol	**Yes**	**Yes**
122	Catclaw sensitive briar	*Schrankia nuttallii*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
125	Croton	*Croton spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
126	Dayflower	*Commelina erecta*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
127	Dewberry (Blackberry)	*Rubus spp.*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
128	Dogwood	*Cornus spp.*	pnol	pnol	pnol	**Yes**	**Yes**	**Yes**
133	Englemann daisy	*Engelmannia peristenia*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
136	Globe mallow	*Sphaeralcea spp.*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
137	Granjeno	*Celtis pallida*	pnol	pnol	**Yes**	pnol	pnol	pnol
138	Grapes	*Vitis spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
142	Hackberry	*Celtis spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
146	Honeysuckle	*Lonicera spp.*	pnol	**Yes**	pnol	**Yes**	**Yes**	**Yes**
145	Honey mesquite	*Prosopis glandulosa*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
148	Johnsongrass	*Sorghum halepense*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
150	Kleingrass	*Panicum coloratum*	pnol	**Yes**	**Yes**	pnol	**Yes**	**Yes**
151	Lambs-quarters	*Chenopodium spp.*	**Yes**	pnol	pnol	pnol	**Yes**	pnol
152	Lespedeza	*Lespedeza spp.*	pnol	pnol	pnol	**Yes**	pnol	pnol
154	Live oak	*Quercus virginiana*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
156	Lotebush	*Ziziphus obtusifolia*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
158	Maximilian sunflower	*Helianthus maximiliani*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
159	Mentzelia	*Mentzelia spp.*	**Yes**	pnol	pnol	pnol	pnol	pnol

163	Nuttall peavine	*Astragalus nuttallianus*	**pnol**	Yes	pnol	pnol	**Yes**	**Yes**
165	Partridge pea	*Chamaecrista fasciculata*	**Yes**	pnol	**Yes**	**Yes**	**Yes**	**Yes**
167	Persimmon	*Diospyros spp.*	pnol	**Yes**	**Yes**	**Yes**	pnol	**Yes**
168	Plains bristlegrass	*Setaria leucopila*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
169	Plum	*Prunus spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
170	Post oak	*Quercus stellata*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
171	Prickly ash (Hercules Club)	*Zanthoxylum spp.*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
172	Prickly pear	*Opuntia spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
174	Redbud	*Cercis Canadensis*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
175	Red oak	*See plant description*	pnol	**Yes**	pnol	**Yes**	**Yes**	**Yes**
180	Ryegrass	*Lolium spp.*	**Yes**	pnol	**Yes**	**Yes**	**Yes**	**Yes**
181	Sand dropseed	*Sporobolus cryptandrus*	**Yes**	pnol	pnol	pnol	**Yes**	pnol
183	Sand shinoak (Shinnery)	*Quercus havardii*	**Yes**	**Yes**	pnol	pnol	pnol	pnol
184	Sassafras	*Sassafras albidum*	pnol	pnol	pnol	**Yes**	pnol	pnol
186	Sida	*Sida spp.*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
189	Snow-on-the-mountain (Snow-on-the-prairie)	*Euphorbia marginata (Euphorbia bicolor)*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
191	Sumac –Flameleaf	*Rhus lanceolata*	pnol	**Yes**	pnol	**Yes**	**Yes**	**Yes**
192	Sumac –Littleleaf	*Rhus microphylla*	**Yes**	**Yes**	pnol	pnol	**Yes**	**Yes**
193	Sumac –Skunkbush	*Rhus aromatica*	**Yes**	**Yes**	pnol	pnol	**Yes**	**Yes**
194	Switchgrass	*Panicum virgatum*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
195	Tallow weed, Plantain	*Plantago spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
196	Tasajillo	*Cylindropunita leptocaulis*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
200	Vetch	*Vicia spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
201	Vine mesquite	*Panicum obtusum*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
202	Water oak	*Quercus nigra*	pnol	pnol	**Yes**	**Yes**	pnol	**Yes**
203	Western ragweed	*Ambrosia psilostachya*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
205	White oak	*Quercus alba*	pnol	pnol	**Yes**	**Yes**	pnol	**Yes**
206	Wildrye	*Elymus spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
207	Wolfberry	*Lycium spp.*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
208	Yaupon	*Ilex vomitoria.*	pnol	pnol	**Yes**	**Yes**	pnol	**Yes**

White-tailed and Mule Deer

			Regions					
	Common Names	**Scientific Names**	**I**	**II**	**III**	**IV**	**V**	**State**
101	Agarito	*Mahonia trifoliolata*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
102	American beautyberry	*Callicarpa americana*	pnol	pnol	**Yes**	**Yes**	pnol	**Yes**
104	Annual sunflower	*Helianthus annuus*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
105	Ash	*Fraxinus spp.*	pnol	pnol	pnol	**Yes**	pnol	pnol
109	Blackbrush	*Acacia rigidula*	pnol	pnol	**Yes**	pnol	pnol	pnol
110	Black cherry	*Prunus serotina*	pnol	pnol	pnol	**Yes**	pnol	pnol
111	Black-gum	*Nuyssa sylvatica*	pnol	pnol	pnol	**Yes**	pnol	pnol
112	Blackjack oak	*Quercus marilandica*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
113	Blue grama	*Bouteloua gracilis*	**Yes**	pnol	pnol	pnol	pnol	pnol
114	Blueberry (Sparkleberry)	*Vaccinium arboreum*	pnol	pnol	pnol	**Yes**	pnol	pnol
119	Bumelia (Chittimwood)	*Sideroxylon lanuginosum*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
120	Bundleflower	*Desmanthus spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
121	Bush sunflower	*Simsia calva*	pnol	**Yes**	**Yes**	pnol	**Yes**	**Yes**
122	Catclaw sensitive briar	*Schrankia nuttallii*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
124	Cottonwood	*Populus spp.*	**Yes**	**Yes**	pnol	**Yes**	**Yes**	**Yes**
125	Croton	*Croton spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
126	Dayflower	*Commelina erecta*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
127	Dewberry/Blackberry	*Rubus spp.*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
128	Dogwood	*Cornus spp.*	pnol	pnol	pnol	**Yes**	**Yes**	**Yes**
131	Elbowbush	*Forestiera pubescens*	**Yes**	**Yes**	pnol	pnol	**Yes**	**Yes**
132	Elm	*Ulmus spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
133	Englemann daisy	*Engelmannia peristenia*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
134	Ephedra	*Ephedra spp.*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
135	Four-wing saltbush	*Atriplex canescens*	**Yes**	**Yes**	pnol	pnol	**Yes**	**Yes**
136	Globe mallow	*Sphaeralcea spp.*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
137	Granjeno	*Celtis pallida*	pnol	pnol	**Yes**	pnol	pnol	pnol
138	Grapes	*Vitis spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
139	Greenbriar	*Smilax spp.*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
140	Guajillo	*Acacia berlandieri*	pnol	pnol	**Yes**	pnol	pnol	pnol
141	Guayacan	*Guaiacum angustifolium*	pnol	pnol	**Yes**	pnol	pnol	pnol

White-tailed and Mule Deer – Continued

			Regions					
	Common Names	**Scientific Names**	**I**	**II**	**III**	**IV**	**V**	**State**
142	Hackberry	*Celtis spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
144	Holly	*Ilex spp.*	pnol	pnol	pnol	**Yes**	pnol	pnol
145	Honey mesquite	*Prosopis glandulosa*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
146	Honeysuckle	*Lonicera spp.*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
147	Jessamine	*Gelsemium sempervirens*	pnol	pnol	pnol	**Yes**	pnol	pnol
148	Johnsongrass	*Sorghum halepense*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
149	Juniper	*Juniperus spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
152	Lespedeza	*Lespedeza spp.*	pnol	pnol	pnol	**Yes**	pnol	pnol
154	Live oak	*Quercus virginiana*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
156	Lotebush	*Ziziphus obtusifolia*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
176	Maple	*Acer spp.*	pnol	pnol	pnol	**Yes**	pnol	**Yes**
158	Maximilian sunflower	*Helianthus maximiliani*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
160	Mistletoe	*Phoradendron spp.*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
161	Mountain mahogany	*Cercocarpus montanus*	**Yes**	pnol	pnol	pnol	pnol	pnol
162	Mulberry	*Morus spp.*	pnol	pnol	pnol	**Yes**	pnol	**Yes**
163	Nuttall peavine	*Astragalus nuttallianus*	pnol	Yes	pnol	pnol	**Yes**	**Yes**
164	Old-man's beard	*Clematis drummondii*	pnol	**Yes**	**Yes**	pnol	**Yes**	**Yes**
165	Partridge pea	*Chamaecrista fasciculata*	**Yes**	pnol	**Yes**	**Yes**	**Yes**	**Yes**
166	Pecan	*Carya illinioensis*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
167	Persimmon	*Diospyros spp.*	pnol	**Yes**	**Yes**	**Yes**	pnol	**Yes**
169	Plum	*Prunus spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
170	Post oak	*Quercus stellate*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
172	Prickly pear	*Opuntia spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
173	Rattan (Alabama supplejack)	*Berchemia scandens*	pnol	pnol	pnol	**Yes**	pnol	pnol
174	Redbud	*Cercis canadensis*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
175	Red oak	*See plant description*	pnol	**Yes**	pnol	**Yes**	**Yes**	**Yes**
177	Rescuegrass	*Bromus catharticus*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
179	Rusty blackhaw	*Viburnum ruflldulum*	pnol	pnol	pnol	**Yes**	pnol	pnol
180	Ryegrass	*Lolium perenne*	**Yes**	pnol	**Yes**	**Yes**	**Yes**	**Yes**
182	Sand sage	*Artemisia filifolia*	**Yes**	pnol	pnol	pnol	pnol	pnol
183	Sand shinoak (Shinnery)	*Quercus havardii*	**Yes**	**Yes**	pnol	Pnol	pnol	pnol

White-tailed and Mule Deer – Continued

			Regions					
184	Sassafras	*Sassafras albidum*	pnol	pnol	pnol	**Yes**	pnol	pnol
185	Sedges	*Carex spp*	pnol	pnol	**Yes**	pnol	**Yes**	pnol
186	Sida	*Sida spp.*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
191	Sumac- Flameleaf	*Rhus compancaolata*	pnol	**Yes**	pnol	**Yes**	**Yes**	**Yes**
192	Sumac –Littleleaf	*Rhus microphylla*	**Yes**	**Yes**	pnol	pnol	**Yes**	**Yes**
193	Sumac –Skunkbush	*Rhus aromatica*	**Yes**	**Yes**	pnol	pnol	**Yes**	**Yes**
195	Tallow weed (Plantain)	*Plantago spp.*	**Yes**	**Yes**	**Yes**	Yes	**Yes**	**Yes**
197	Texas kidneywood	*Eysenhardtia texana*	pnol	pnol	**Yes**	pnol	pnol	pnol
198	Texas wintergrass	*Nassellia leucotricha*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
200	Vetch	*Vicia spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
202	Water oak	*Quercus nigra*	pnol	**Yes**	**Yes**	**Yes**	pn**ol**	**Yes**
203	Western ragweed	*Ambrosia psilostachya*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
204	Western soapberry	*Sapindus saponaria*	**Yes**	**Yes**	pnol	pnol	**Yes**	pnol
205	White oak	*Quercus alba*	pnol	pnol	**Yes**	**Yes**	pno**l**	**Yes**
206	Wildrye	*Elymus spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
207	Wolfberry	*Lycium spp.*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
208	Yaupon	*Ilex vomitoria*	pnol	pnol	**Yes**	**Yes**	pnol	**Yes**

Wild Turkey

			Regions					
	Common Names	**Scientific Names**	**I**	**II**	**III**	**IV**	**V**	**State**
101	Agarito	*Mahonia trifoliolata*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
102	American beautyberry	*Callicarpa americana*	pnol	pnol	**Yes**	**Yes**	pnol	**Yes**
104	Annual sunflower	*Helianthus annuus*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
106	Bahiagrass	*Paspalum notatum*	pnol	pnol	pnol	**Yes**	pnol	pnol
108	Beech	*Fagus grandifolia*	pnol	pnol	pnol	**Yes**	pnol	pnol
109	Blackbrush	*Acacia rigidula*	pnol	pnol	**Yes**	pnol	pnol	pnol
110	Black cherry	*Prunus serotina*	pnol	pnol	pnol	**Yes**	pnol	pnol

111	Black-gum	*Nyssa sylvatica*	pnol	pnol	pnol	**Yes**	pnol	pnol
112	Blackjack oak	*Quercus marilandica*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
114	Blueberry (Sparkleberry)	*Vaccinium arboreum*	pnol	pnol	pnol	**Yes**	pnol	pnol
117	Bullnettle	*Cnidoscolus texanus*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
119	Bumelia (Chittimwood)	*Sideroxylon lanuginosum*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
120	Bundleflower	*Desmanthus spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
122	Catclaw sensitive briar	*Schrankia nuttallii*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
125	Croton	*Croton spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
126	Dayflower	*Commelina erecta*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
127	Dewberry/Blackberry	*Rubus spp.*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
128	Dogwood	*Cornus spp.*	pnol	pnol	pnol	**Yes**	**Yes**	**Yes**
132	Elm	*Ulmus spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
133	Englemann daisy	*Engelmannia peristenia*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
136	Globe mallow	*Sphaeralcea spp.*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
137	Granjeno	*Celtis pallida*	pnol	pnol	**Yes**	pnol	pnol	pnol
138	Grapes	*Vitis spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
140	Guajillo	*Acacia berlandieri*	pnol	pnol	**Yes**	pnol	pnol	pnol
142	Hackberry	*Celtis spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
143	Hickory	*Carya spp.*	pnol	pnol	pnol	**Yes**	pnol	**Yes**
144	Holly	*Ilex spp.*	pnol	pnol	pnol	**Yes**	pnol	pnol
145	Honey mesquite	*Prosopis glandulosa*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
146	Honeysuckle	*Lonicera spp.*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
148	Johnsongrass	*Sorghum halepense*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
152	Lespedeza	*Lespedeza spp.*	pnol	pnol	pnol	**Yes**	pnol	pnol
154	Live oak	*Quercus virginiana*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
156	Lotebush	*Ziziphus abtusifolia*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
157	Magnolia	*Magnolia spp.*	pnol	pnol	pnol	**Yes**	pnol	pnol
158	Maximilian sunflower	*Helianthus maximiliani*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
163	Nutall peavine	*Astragalus nuttallianus*	pnol	Yes	pnol	pnol	**Yes**	**Yes**
165	Partridge pea	*Chamaecrista fasciculata*	**Yes**	pnol	**Yes**	**Yes**	**Yes**	**Yes**
166	Pecan	*Cary illinioensis*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
167	Persimmon	*Diospyros spp.*	pnol	**Yes**	**Yes**	**Yes**	pnol	**Yes**
168	Plains bristlegrass	*Setaria leucopila*	**Yes**	**Yes**	**Yes**	pnol	Yes	**Yes**
169	Plum	*Prunus spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
170	Post oak	*Quercus stellata*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

171	Prickly ash (Hercules Club)	*Zanthoxylum spp.*	pnol	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
172	Prickly pear	*Opuntia spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
175	Red oak	*See plant description*	pnol	**Yes**	pnol	**Yes**	**Yes**	**Yes**
177	Rescuegrass	*Bromus catharticus*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
180	Ryegrass	*Lolium spp.*	**Yes**	pnol	**Yes**	**Yes**	**Yes**	**Yes**
183	Sand shinoak (Shinnery)	*Quercus havardii*	**Yes**	**Yes**	pnol	pnol	pnol	pnol
184	Sassafras	*Sassafras albidum*	pnol	pnol	pnol	**Yes**	pnol	pnol
187	Sideoats grama	*Bouteloua curtipendula*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
188	Smartweed	*Polygonum spp.*	**Yes**	pnol	**Yes**	**Yes**	pnol	**Yes**
191	Sumac - Flameleaf	*Rhus lancaolata*	pnol	**Yes**	pnol	**Yes**	**Yes**	**Yes**
192	Sumac - Littleleaf	*Rhus microphylla*	**Yes**	**Yes**	pnol	pnol	**Yes**	**Yes**
193	Sumac - Skunkbush	*Rhus aromatica*	**Yes**	**Yes**	pnol	pnol	**Yes**	**Yes**
195	Tallow weed (Plantain)	*Plantago spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
196	Tasajillo	*Opuntia leptocaulis*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
200	Vetch	*Vicia spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
201	Vine mesquite	*Panicum obtusum*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**
202	Water oak	*Quercus nigra*	pnol	pnol	**Yes**	**Yes**	pnol	**Yes**
203	Western ragweed	*Ambrosia psilostachya*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
205	White oak	*Quercus alba*	**pnol**	**pnol**	**Yes**	**Yes**	**pnol**	**Yes**
206	Wildrye	*Elymus spp.*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
207	Wolfberry	*Lycium spp.*	**Yes**	**Yes**	**Yes**	pnol	**Yes**	**Yes**

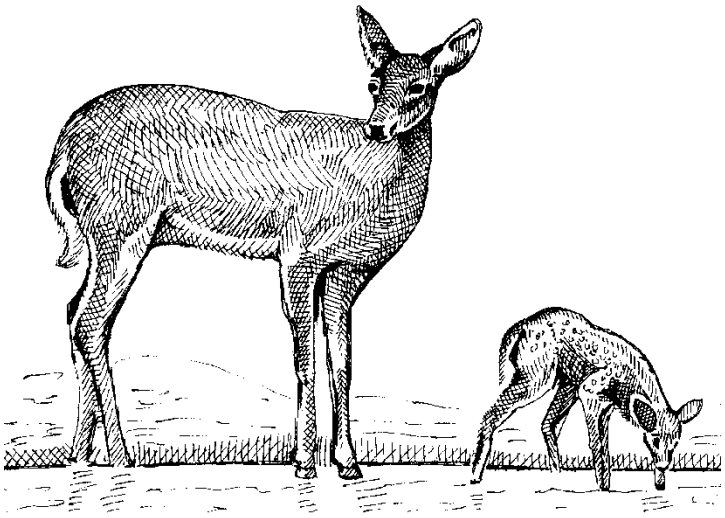
Wildlife Biological Facts - Question 3

This section contains:

1. Biological information on:
   - White-tailed deer
   - Mule deer
   - Pronghorn antelope
   - Javelina
   - Fox squirrel
   - Gray squirrel
   - Bobwhite quail
   - Scaled quail
   - Ring-necked pheasant
   - Wild turkey
   - Mourning dove
   - White-winged dove
   - Waterfowl
2. Examples of Wildlife Biological Facts Questions.

White-tailed Deer

Odocoileus virginianus



Biological Facts

White-tailed deer are the most abundant big game animal in the state and are found in most counties. Texas has the largest state deer population that is estimated to be four million, with an annual harvest of about 600,000.

White-tailed deer vary from one ecological area of the state to another in weight, antler size, food habits, and color. Deer, like cattle, are ruminants. This allows them to feed quickly by partially chewing food, and to complete chewing of their food "cud" when in safe cover. They have a very keen sense of smell and good hearing. Deer sight is very sharp and they are quick to notice the slightest movement. Snorting, stomping their feet, smell, raising the tail "flag," and voice calls are some means of communicating. Top speed is between 30 to 35 miles per hour.

Antler composition (unlike horns that are modified hair) is actually bone material that grows from bases, called pedicels. Antler development begins in April and is nourished by a network of blood vessels called "velvet." Velvet is shed in September and the hard antlers are retained until about February when they are shed. Non-typical antlers result primarily from heredity, although injury can cause oddities. Prime antler development occurs when a buck is five to six years old because body growth has ceased. Older bucks normally regress in antler size. It is very unusual for a buck to reach five to six years old in a heavily hunted population.

Yearling deer are approximately one and one-half years old. A fawn is less than one year old. Large numbers of spiked bucks may occur when there is high competition for food from other deer and/or livestock. Spikes can be attributed to genetics, nutrition, or age. It is common in deer herds that exceed carrying capacity for yearling bucks to be spikes. Obviously, a male fawn born in early May has a greater likelihood to be a six or eight-point during his second winter than a male fawn born in late July, regardless of nutrition or genetics.

Both bucks and does normally become sexually mature during their second fall/winter (15 to 20 months old). Body growth is rapid during the first two years. The normal breeding period occurs between October and January with the peak breeding (rut) varying greatly, even within a county. Normally, a doe can have three estrus cycles a year. The doe is receptive to a buck for about 28 hours. If not bred, she will come back in heat about 28 days later. The gestation period averages about 200 days. A doe's first pregnancy usually produces a single fawn; thereafter, under good habitat conditions, she can have twins, with occasional triplets. Good habitat produces an average of one and one-half fawns per breeding doe per year. The state average for weaned fawns produced for two and one-half year old and older does is from 0.2 to 0.3 fawns per doe.

Nutrients in excess of those needed for body growth and maintenance is used for reproduction, lactation, or antler development. Fawns are weaned at about four months old and females typically remain with their mother until she fawns again the next spring. Predation by coyotes in some areas of the state may take from 20 to 60 percent of the annual fawn crop. Bobcats are also predators on fawns but they will take fewer fawns than coyotes.

The home range of a deer is an area where an individual animal spends most of its time. It contains all the food, water, cover, and other needs of the individual. Home range size varies according to the availability of food, water, and cover in an area. A buck’s home range is typically two to four times greater than a doe’s. Deer may move their “core” (where they spend the majority of their time) home range according to the season of the year. This is a result of available food supplies, fawning areas, and distance to water. A buck in rut may leave his home range but will return when it is complete.

Age of a deer can be estimated by examining the tooth replacement or wear on the premolars and molars of the lower jaw. In nature, few deer live beyond 10 years of age. Deer in an intensively hunted herd will have a younger age structure. This can explain why trophy deer would be fairly uncommon in this type of hunting situation.

Habitat Needs

Food

Plants eaten by deer can be divided into three general categories: (1) browse or woody plants, (2) forbs or weeds (herbaceous broadleaf plants), and (3) grasses. The percentage these three types of food in the deer diet varies with seasons, vegetative areas, soils, individuals, and competition. Deer are very selective if they have a choice of foods and select foods because of their palatability, succulence, availability, and nutritive value. A good deer diet consists of three to seven pounds of dry matter per day and contains from 14 to 18 percent protein. The leaves, twigs, and fruit of woody brush species, along with weeds and forbs, make up the bulk of the diet. Increased use of grass may indicate over population, poor conditions, or too much competition. In addition to native plants, deer also like many agricultural crops such as peanuts, corn, peas, clover, oats, ryegrass, wheat, and others. In some areas, deer will eat the tender parts of cotton plants. Salt is used when it is available, but it is not essential.

Cover

White-tailed deer require some type of woody cover. Cover may take many forms such as trees and brush in draws and along slopes, rough topography, or large, solid tracts of timber and brush. It may be motts or thickets in open areas, or along streams in prairie areas. Cover must be adequate to provide shelter from weather, predators, and man.

A mixed cover type with a diverse plant community is much more desirable than one with only one specie. The ideal percentages of cover would vary from 20 to 70 percent of an area, and would depend on the brush species, deer densities, and hunting pressures. Fawns are frequently hidden in areas of tall grass.

Water

Deer need available water for drinking and water needs are greatest during hot weather. Deer consume one-half to one gallon of water daily. Water sources should be distributed over the managed area. In dry portions of the state, water may limit deer densities and distribution. General recommendations indicate deer should have water within one to three miles.

Space

The area needed to maintain a deer herd will be tied to the arrangement of food, cover, and water. Normally at least several hundred acres of good quality habitat containing food, cover, and water are required. Deer densities as high as one deer to three acres have been reported, but are very unusual and typically seasonal. Carrying capacity of the land for deer varies depending on the potential of the site (i.e., soil, vegetation, and current rainfall).

Management

Habitat

Management of deer habitat primarily involves retaining, creating, or improving the relationship between food, cover, and water. Deer need a diverse forage supply.

Food

Where good forage conditions exist, appropriate management would be to continue the existing system. This would be to retain the existing trees, brush, vines, grasses, and forbs. Sound range management is essential to maintaining a stable deer population. Prescribed burning or mechanical treatments may enhance the quality and quantity of woody plants available to deer.

Forage quality is the most common limiting factor for white-tailed deer in Texas. The most severe nutritional stress period in Texas is mid to late summer (quality) and late winter (quality and quantity).

Livestock grazing and the resulting competition for food should be minimized. This can be done by deferring areas important to deer during critical periods, properly stocking a unit, and implementing a grazing system.

Cover

If cover is adequate, it should be protected from overgrazing and wildfire. Where cover is lacking, native woody re-growth should be protected or modified. Tall growing herbaceous plants can be used to connect brushy areas or function as temporary cover.

Water

Reliable available water from ponds, wells, springs, or creeks should be well distributed over an area. Ideally, water would be near cover and a water source should be located within one to three miles from the next available source.

Population

Quality and quantity of available food determines the carrying capacity, or the number of deer an area can support. Carrying capacity is affected directly by the amount and time of rainfall. Deer numbers must be kept within the carrying capacity of a unit or deterioration of the habitat will occur and lower the carrying capacity. A herd that exceeds the carrying capacity will have reduced body weights, decreased antler development, and lower fawn survival. When livestock numbers are excessive, the carrying capacity for deer is reduced. In overpopulated areas, mortality is higher, especially among fawns and older deer.

High incidence of spikes indicate a management problem such as poor nutrition due to excessive deer numbers or poor habitat, competition with livestock, drought, out-of-balance buck:doe ratio, or a combination of these conditions.

A healthy deer herd can withstand a harvest of up to 30 percent of the population. Deer populations can increase rapidly with increased fawn survival. Harvesting does is necessary to maintain the population at carrying capacity.

Ideally, the population should contain about an equal number of bucks and does or a 1:1 ratio that is slightly below carrying capacity. This situation will produce the greatest number of bucks and increase the availability of quality bucks. Adjoining hunting leases should make group decisions on harvest and management to improve the white-tailed herd. Opportunities exist for small landowners to form a wildlife management association to plan management goals and activities.

Non-biological Conservation Practices

Grazing land offers the opportunity for numerous livestock practices to also improve deer habitat. Proper livestock grazing is necessary to maintain the carrying capacity for deer. Proper stocking rates and grazing systems prevent overgrazing and reduction of preferred plants. This is especially important during fawning and antler development. Ponds constructed primarily for livestock provide deer water as do properly constructed troughs. Deer also use salt, minerals, and protein supplements that are placed out for livestock.

In range planting, species that have value for deer can be included. Established monocultures of introduced grass pastures can be overseeded with legumes (clovers, peas, and vetch) or cool season annual grasses (rye, wheat, oats, and ryegrass). Existing woody cover areas can be retained and fenced to provide deer first choice of browse species.

Wildlife Biological Facts - Question 3

Examples: Questions during the actual competition may include, but are not limited to the following examples.

Directions: Place an **X** beside the correct answer.

1. The annual harvest rate of white-tail in Texas is?

   (A) 600,000 (B) 6,000,000 (C) 60,000 (D) 6,000

2. A white-tailed deer's top speed is?

   (A) 10 to 15 mph (B) 20 to 25 mph (C) 30 to 35 mph (D) 40 to 45 mph

3. True or False: Antlers composition is modified hair..

4. A doe can have ____ estrus cycles a year.

   (A) 3 (B) 4 (C) 5 (D) 6

5. The gestation for a white-tail is ____ days.

   (A) 210 (B) 235 (C) 245 (D) 200

6. Fawns are weaned at how many months?

   (A) 2 (B) 3 (C) 4 (D) 5

7. A good deer diet consists of____ to ___pounds of dry matter per day.

   (A) 3 to 7 (B) 5 to 8 (C) 10 to 12 (D) 14 to 18

8. Deer consume ___ to___ gallons of water daily.

   (A) 1/2 to 1 (B) 1 to 2 1/2 (C) 2 1/2 to 3 (D) 3 to 4 1/2

9. Water should be located within ___to ___ miles from the next available water source.

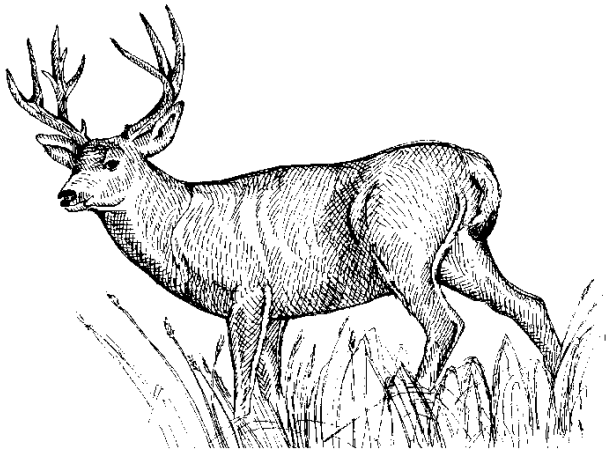
   (A) 1/2 to 1 (B) 1 to 2 (C) 1 to 3 (D) 1 to 4

10. A healthy deer herd can withstand a harvest of up to ___ percent of the population.

    (A) 15 (B) 20 (C) 25 (D) 30

Mule Deer

Odocoileus hemionus



Biological Facts

Nationally, mature mule deer weigh between 125 and 400 pounds, and between 125 to 300 in Texas. The record antler spread for mule deer is 47.5 inches. This deer has large ears and a tail that usually has a black tip with a white base with white on the inside of the tail. Mule deer antlers are referred to as bifurcated. That is, antlers usually form a back fork.

The mule deer breeding season extends from mid-November through mid-February with the peak occurring in late December. Its gestation period is approximately seven months (210 days). Most fawns are born in June and July. Does wean the fawns in 60 to 75 days if adequate green forage is available. If not, fawns may nurse longer and place severe stress on the doe in the winter. Mule deer seldom breed as fawns. Young bucks generally do not participate in the rut until they are three or four years old. The amount and quality of forage prior to rut has a direct relationship on the number of young does that conceive. The incidence of multiple births is greater for does feeding on good range. Mule deer fawn crops average 45% in the Trans-Pecos and 35% in the Panhandle. Fawn survival is influenced by weather, predation, and habitat quality. Increases in populations are generally associated with fawn crops in excess of 50% and fawn crops of 25% or less usually result in a decline.

The home range of mule deer is approximately two to four square miles, but it can be as large as 26 square miles in the Panhandle. Bucks tend to have slightly larger home ranges than does and during rut they may leave their home range in search of does. Following rut, they return to their normal home range.

Antlers are shed after the breeding season in mid-January to mid-April. Mature bucks generally lose their antlers before immature bucks. New antlers fully develop in 150 days. Older bucks generally have larger antlers, but antlers are not a reliable method for determining age. Age, genetics, and amount of quality forage available determine antler size. Aging is determined by tooth replacement until the deer is two years old. After two years, the age is determined by tooth wear.

Habitat Requirements

Food

Browse is the main item in the diet of the mule deer, representing approximately 70%. Succulents such as cactus, lechuguilla, and cholla can be considered in the browse category. Forbs are preferred, but their availability is highly variable. Forbs average 25% of the diet. Grasses make up no more than 5% of the diet and usually include tender grass shoots important on a seasonal basis.

Cover

Mule deer require shrubs, trees, and tall grasses for shelter and cover. The amount of woody cover necessary to sustain deer varies with the kind and quality of the cover, topography, soils, and grazing pressure by domestic animals.

Water

Water should be no greater than 2.5-3 miles apart for optimum distribution of mule deer. It is desirable to have adequate cover adjacent to the water supply. Poorly spaced water supplies may concentrate the deer herd around available water and cause overuse of forage species.

Space

In the natural range of mule deer, space is seldom a limiting factor. Quality of habitat is a factor that limits mule deer populations. The population estimate for mule deer in the Trans-Pecos is approximately one per 100 acres. In the Panhandle, the mule deer density may range from one deer per 30 acres to one deer per 1,000 acres, depending on the habitat type.

Management

1. On western ranges, a well-balanced livestock management system will benefit mule deer populations. Livestock should be managed by implementing proper stocking rates and a grazing system to protect and promote better forage species. The management system should provide rest during the critical growth period for the preferred forage species.

Even on well managed grasslands, which support a wide variety of forage plants, there is competition between deer and domestic livestock for certain plant species. As the degree of forage utilization increases, competition becomes more keen as each class of grazing animal is forced to consume plant species that are less preferred. In conditions of severe overstocking, competition between grazing animals for the same forage plants becomes more direct.

Although deer feed on a large number of plant species, relatively few species make up most of the diet. If these key species are not available or reduced below the needs of the deer, the animals will not thrive, even though other species of plants are still available. Goats and sheep, in contrast, are much more adaptable to changes in forage. Goats and sheep prefer a diet containing browse and forbs, but do quite well on grass. Inability to adapt to major changes in forage supplies can be a limiting factor in the production of mule deer.

2. Avoid indiscriminate brush control and protect important forage species. Brush should be managed in strips or blocks, alternating with untreated areas. Special consideration should be given to leaving brush in drainageways and steep slopes. Try to create variety in the habitat because deer require quality forage and cover in all seasons of the year.

3. Harvest of bucks should be no more than 10% to allow the bucks to reach a mature age class. Doe harvest is carefully regulated. A buck-doe ratio of 1:3 is desirable if the population is stable and within carrying capacity. Fawn production and survival is low in a desert environment and more does may be necessary to maintain the population.

4. Determine key browse species in each pasture and maintain proper use. Proper use may be less than 50 percent.

5. Provide adequate water supplies about 2.5 to 3 miles apart. Maintain cover around water supplies.

6. Small grain or legume plots can be planted for mule deer for winter grazing. In more arid regions, these plots will require supplemental irrigation.

Wildlife Biological Facts - Question 3

Examples: Questions during the actual competition may include, but are not limited to the following examples.

Directions: Place an **X** beside the correct answer.

1. True or False: A mature mule deer can weigh up to 300 pounds in Texas.

2. What is the back fork on mule deer antlers referred to as?

   (A) horns (B) bifurcated (C) pedicle (D) tine

3. The gestation period for mule deer is_months.

   (A) 3 (B) 5 (C) 6 (D) 7

4. A peak breeding season occurs in what month?

   (A) November (B) December (C) January (D) February

5. Do does or bucks have a larger home range?

   (A) Does (B) bucks (C) they are the about same

6. Antlers are shed after the breeding season in mid-January to mid-_____.

   (A) February (B) March (C) April (D) May

7. What is the main item in the diet of a mule deer?

   (A) Browse (B) forbs (C) grasses (D) small grains

8. Water should be within__to____miles apart for optimum distribution.

   (A) 1.5 to 3 (B) 2 to 4 (C) 2 to 3 (D) 2.5 to 3

9. A harvest of bucks should be no more than ____ percent.

   (A) 10 (B) 20 (C) 30 (D) 40

10. A buck-doe ratio of__to____is desirable if the population is stable.

    (A) 1 to 1 (B) 1 to 2 (C) 1 to 3 (D) 1 to 4

Pronghorn Antelope

Antilocapra americana

Biological Facts

The pronghorn is often called antelope or pronghorn antelope. The pronghorn antelope only occurs in North America. The pronghorn is a medium sized deer-like animal. Males weigh from 90 to 125 pounds; females are smaller, averaging 90 pounds. Their coloring consists of white patches along the sides, neck, rump, side of the jaw, crown, and a throat band. This is against a tan to light brown overall color. Males have darker markings on the chin, neck, and on the face. Both sexes generally will have horns but some females will not. The horn cover of epithelial cells is shed annually. The horn cover is shed beginning in the middle of October and ending in early November. New horn growth starts immediately. The prong is usually not evident until the first week of December.

Pronghorns are very fleet, able to attain speeds of 45 mph for short distances. They will not jump fences but will go under fences that have 14 to 16 inches of clearance between the bottom wire and the ground.

The historic range of the pronghorn was from the arid plains of northern Mexico, northward into the north-central plains of Canada. Their present range in Texas is the Trans-Pecos region and on the grasslands of the Panhandle.

Mature males will collect a harem of 2 to 14 females during the breeding season. The rut in Texas extends from August to mid-October. The gestation period is approximately 235 days. Fawns are born from mid-March into early June. The first pregnancy generally produces a single fawn, with twins in subsequent pregnancies.

On good ranges, the fawns per doe ratio is an average of 1.8 fawns per doe. The fawns are hidden for the first 7 to 10 days. After a week or so they will run at the side of the doe and in a month are grazing on green vegetation. Nursing continues for approximately four months.

Habitat Requirements

Food

The diet of the pronghorn consists primarily of forbs, browse, and a few grasses, varying with the seasons and the habitat types. Generally, their diet will be 65 percent forbs, 30 percent browse, and less than 5 percent grasses.

Pronghorns are unique in that they can utilize several forbs that are poisonous to domestic livestock. On poor condition and overgrazed ranges, and during periodic droughts, pronghorns have suffered losses from browsing woolly locoweed, creosotebush, and tarbush.

When available and accessible, small grains such as wheat, barley, and oats may make up as high as 70 percent of the winter diet of pronghorns.

Cover

The pronghorn is a plains animal that prefers open, rolling landscapes where their defense mechanisms of excellent eyesight and speed can be used as protection against predators. It requires no protective vegetative cover, but it will utilize draws and headers for protection from the elements during the winter months.

Water

Daily water consumption ranges from 0.09 gallons/day to 1.19 gallons/day. The pronghorn's system apparently can conserve water. If forced, they can go without water for some time. Livestock watering facilities should be kept available at all times when pronghorns are known to be in a pasture. Most antelope herds are found within a 4-6 mile radius of a water source.

Space

A free-ranging herd of pronghorns will cover great distances, depending on the forage available. On fenced rangelands, three or four section pastures are considered a minimum size for a small herd of 8 to 12 pronghorns. Males with harems defend their territory during the breeding season and the larger the pastures, the less conflict between breeding males defending their harems against bachelor males.

Management

Vegetation

The greatest single management factor that will benefit the pronghorn is proper grazing use of rangelands. Grazing systems that provide periods of rest during the periods of forb production will be especially beneficial to pronghorns.

Reduction of competition from domestic livestock on rangelands is beneficial to pronghorns. Cattle are the least competitive (approximately 20 to 25 percent), while goats and sheep (approximately 40 percent) are stronger competitors since both are heavy users of forbs.

Wildlife Biological Facts - Question 3

Examples: Questions during the actual competition may include, but are not limited to the following examples.

Directions: Place an **X** beside the correct answer.

1. Females weigh on average__pounds.

   (A) 75 (B) 90 (C) 100 (D) 125

2. The horn cover is shed from mid-____and ending in early_____.

   (A) August, September (B) September, October (C) October, November (D) November, December

3. A pronghorn antelope's top speed is?

   (A) 30 (B) 35 (C) 40 (D) 45

4. Males will collect a harem of___to___females during the breeding season.

   (A) 2 to 14 (B) 4 to 16 (C) 5 to 10 (D) 2 to 5

5. The gestation period is approximately ___ days.

   (A) 200 (B) 210 (C) 235 (D) 255

6. True or False: Fawns are hidden the first 7 to 10 days.

7. Fawns will nurse for approximately ____ months.

   (A) 2 (B) 3 (C) 4 (D) 5

8. True or false: Pronghorn can utilize several forbs that are poisonous to domestic livestock.

9. What type of landscape do pronghorn prefer?

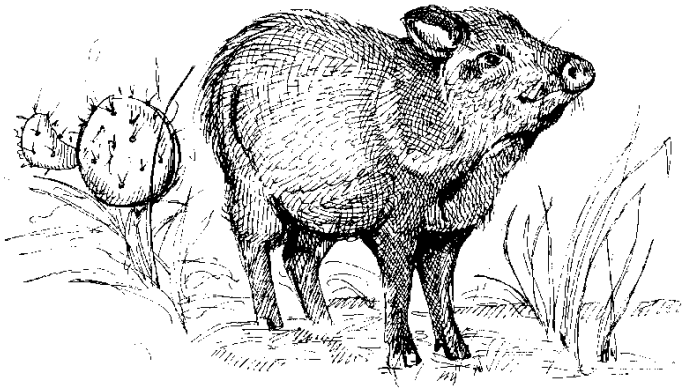
   (A) mountains (B) forest (C) desert (D) open plains

10. Water should be within a___to__mile radius.

    (A) 2 to 4 (B) 4 to 6 (C) 5 to 6.5 (D) .5 to 2

Javelina

Pecari tajacu



Biological Facts

The proper common name for javelina is collared peccary. Adults are about 18 inches in height, with a body length of 30 to 40 inches and weigh 30 to 50 pounds. They have a pig-like snout and the canines form dagger-like tusks. The coloring is a dark, grizzled gray, brown, and black with a band of whitish hairs around the neck, hence, the collar. The hairs are very coarse and almost bristly on the shoulders and back. They have a musk gland on the rump which produces a strong odor. Javelinas have poor vision and rely on their sense of smell to keep the herd together. In Texas, the javelina ranges from the Edwards Plateau, south through the Rio Grande Plains, north into the Rolling Plains, and west through the Trans-Pecos region. Its range extends through Mexico and the southwestern United States and as far south as South America.

The javelina is a promiscuous species and breeding takes place through most of the year. The gestation period is 142 to 148 days. The size of the litter ranges from one to four, usually two. Some females have two litters per year. The young weigh about one pound at birth and are reddish or yellowish in color with a darker dorsal stripe. They are born in a thicket or animal burrow and can run in a few hours after birth. They follow their mother in a day or two when she rejoins the herd. The young nurse for six to eight weeks and will remain with the mother for two to three months. Mortality of javelina during the first two weeks is high, especially during periods of drought.

Habitat Needs

Food

Javelina are chiefly herbivores and feed on various cacti, especially prickly pear, mesquite beans, sotol, lechuguilla, and other succulent vegetation. Food studies indicate prickly pear makes up 80 to 95 percent of the daily diet when prickly pear is abundant. Forbs and grass are important if prickly pear is not available. They also root for tubers, rhizomes, and bulbs. Most food studies found that javelina also eat certain animals, such as rats, snakes, grubs, and various carrion. Seasonal mast such as acorns, grapes, hackberries, persimmons, and agarito berries are taken when available.

Cover

Javelina prefer the semi-desert conditions of the southwestern United States. The most preferred habitat is typified by dense thicket of brush, prickly pear, or scrub oak. They also take advantage of rough canyons and gullies for travelways and protection during inclement weather. They are most active during the cooler hours of the day and at night. Resting-places are usually the denser thickets, under rock ledges or shaded and cooler areas.

Water

In the southwestern United States, their succulent diet makes the javelina less dependent on free water. On ranges where prickly pear and lechuguilla do not make up a major part of the flora, javelinas will seek out water in intermittent streams, livestock ponds, and troughs. If succulents such as prickly pear and lechuguilla have been reduced through brush control, water placement becomes an important factor to consider.

Space

Javelina usually travel in herds of 5 to 15 animals that have no particular leadership or hierarchy. The home range of a herd is directly related to the density of brush on that range. In South Texas, herd home ranges vary from 180 to 975 acres. Dense brushy cover and the abundance of prickly pear are the key criteria that determine the home range size. Herd boundaries often overlap about 200 yards and when herds meet on this common ground a fight ensues with much chasing and loud popping of the tusks.

Management

Vegetation

The javelina requires both prickly pear and dense brush as critical food and cover elements. Both are highly undesirable from the viewpoint of the domestic use. Therefore, a rancher wanting to improve forage for domestic livestock and also retain habitat for the javelina must make a compromise in his brush management/range rehabilitation programs. Research has shown that retaining 30 to 50 percent of rangelands in brush patterns, such as strips, motts, and draws, will not be detrimental to javelina habitat. Feeding, loafing, and bedding areas should be joined by brush strips or brushy creeks and draws. Dense brushy and prickly pear areas should be preserved for the javelina.

Competition

The increase in feral hog numbers around the state has led to concern about competition between javelina and feral hogs. Competition for food and habitat are the main concerns and this varies from area to area around the state. Competition will be highest when poor range conditions exist due to overgrazing, drought, or extreme vegetation modification such as clearing brush from large blocks of land.

Population Dynamics

Drought years and resulting poor range conditions appear to be the two factors that curtail reproduction potential of the javelina. Predation by bobcats and coyotes on young pigs is also a factor, especially during the first two weeks of birth. Herds are usually a 1:1 ratio of males to females. When subjected to moderate hunting pressure, javelinas will even maintain their numbers through years of average range conditions. During periods of drought when herd numbers decline and reproduction is low, hunting pressure should be reduced. Habitat quality, especially food and cover, are primary factors that determine the recovery rate of a herd following a decline in numbers during periods of stress.

Useful Conservation Practices

Animal damage control, deer population control, and grazing management are three conservation practices that are beneficial on ranges used by javelina. Brush management and prescribed burning must be applied in carefully planned patterns that preserve the most dense brush cover and most abundant prickly pear for the javelina. Obviously, on prime javelina habitat, no brush management may be the most desirable alternative.

Wildlife Biological Facts - Question 3

Examples: Questions during the actual competition may include, but are not limited to the following examples.

Directions: Place an **X** beside the correct answer.

1. What is the scientific name for Javelina?

   (A) Tayassu tajacu (B) *Meleagris gallopavo* (C) *collared peccary* (D) *Odocileus hemionus*

2. Javelina are about ____ inches in height.

   (A) 10 (B) 12 (C) 16 (D) 18

3. Javelina have a musk gland (on their)___.

   (A) Neck (B) between the shoulders (C) rump (D) chest

4. The gestation period for Javelina is__to ____days.

   (A) 120, 140 (B) 142, 148 (C) 140, 142 (D) 130, 138

5. True or False: Javelina breed year round.

6. Javelina young weigh____pound(s) at birth?

   (A) 2 (B) 4 (C) 1 (D) 3

7. Javelina young nurse for ___ to ____weeks.

   (A) 6, 8 (B) 4, 5 (C) 3, 4 (D) 2, 3

8. Javelina usually travel in herds of ___to ___ animals.

   (A) 6,12 (B) 5,15 (C) 4,10 (D) 12,18

9. In South Texas, herd home ranges vary from ____ to ____acres.

   (A) 100,900 (B) 215,860 (C) 180,975 (D) 190,965

10. Herds usually have a ___:___ ratio of males to females.

    (A) 2:1 (B) 1:1 (C) 1:2 (D) 2:3

Fox Squirrel

Sciurus niger

Eastern Gray Squirrel (Cat Squirrel)

Sciurus carolinensis carolinensis

Biological Facts

The fox squirrel is larger than the gray squirrel with the weight of adult fox squirrels ranging from 1.3 to 2.8 pounds. The adult has rusty or reddish underparts and brownish or grayish upperparts. The tail is usually less than half of the total length and is cinnamon mixed with black in color. The feet are cinnamon.

Gray squirrels weigh from 0.7 to 1.3 pounds. The adults' upperparts are dark yellowish rusty, especially on the head and back legs. The arms, sides of the neck, and sides of the rump have gray-tipped or white-tipped hairs. This gives a gray tone to these parts. The hairs of the tail are dull yellow at the base, then blackish and tipped with white. The ears have a conspicuous white spot at the base in winter.

They breed throughout the year with peaks in July to September, and December to February. Mating is by chance with several males attempting to mate with a single female. The gestation period is 42 to 45 days. Usually 2 to 4 squirrels are born. When born, squirrels are naked, blind, and helpless. Their eyes open at 5 weeks. Offspring start climbing at 7 to 8 weeks, venture to the ground at 10 weeks, and are weaned by 12 weeks. Maturity is reached at about 10 to 11 months.

Feeding usually occurs early in the morning and late in the afternoon. A variety of oak species is the best insurance to insure acorn production. Much of an acorn crop is lost to worms and other forms of animals. Mass migrations may occur when the food supply is depleted.

Young squirrels will make up about 60 percent of a given yearly population. A population of one squirrel per acre is considered good. For short periods under ideal food conditions, an acre may support as many as 10 squirrels. Mites, chiggers and fleas are serious external parasites and in some cases have rendered squirrels unable to breed.

Habitat Needs

The daily food requirement is 0.2 pounds. Acorns are the main stay food, making up about 60 percent by weight of the total amount of food consumed. Acorns are utilized to some extent 12 months out of the year. Most hardwood trees must be at least 25 years old before acorn production begins. Calcium is supplied by eating antlers, bones, seeds, and fruit. Pecans and other nuts are taken in considerable quantities in spring, summer, and fall. Pecans are preferred over all other foods. Squirrels begin to feed on pecans when blooms occur. Feeding continues through the nut stage.

Typical seasonal foods of squirrels include the following.

August – October	November - January	February – April	May – July
Acorns	Acorns	Acorns	Berries
Beech	Beech	Sedges	Buds and Flowers
Black Cherry	Blackgum	Beech	Corn
Blackgum	Hickory	Eggs	Fungi
Chinquapin	Osage-orange (bois d'arc)	Elm	Insects
Dogwood	Sedges	Fungi	
Fungi	Walnut	Grasses	
Hawthorn		Hickory	
Hickory		Insects	
Hornbeam		Magnolia	
Insects		Maple Buds	
Pecan		Maple Flowers	
Pine Seeds		Oak	
Sugar Maple Seeds		Young Birds	
Walnut			

Cover

Fox squirrels are adapted to a wide variety of forest habitats, but in most areas open upland forest of mixed trees support the heaviest population. The best habitat is mature oak-hickory woodland broken into small, irregularly shaped tracts of 5 to 20 acres and connected by strips of woodland, which serve as squirrel highways. A mixture of pine, elm, beech, pecan, maple, and other food-producing trees enhances the habitat. Along the western parts of their range, they are restricted more or less to river valleys that support pecans, walnuts, oak, osage-orange, and other required trees.

Gray squirrels prefer cover found along streams. They prefer dense hammocks of live oak, willow oak, water oak, white oak, cypress, blackgum, and magnolia. Highest populations are usually found in hammocks of white oak and water oak mixed with magnolia, sweetgum, and holly. High populations of gray squirrels are also found in high-quality bottomland tracts with a predominance of oaks and pecan. Swamps and uplands are less productive.

Hollow trees are preferred as places for offspring to be born and for nurseries. Leaf nests are also used, especially in spring and summer. Leaf nests also serve as refuge, resting, and feeding stations and occasionally as nurseries. Production is two and one-half times more successful in tree cavities than leaf nests. On an average, hardwood trees must be 40 years old to provide den cavities. An area must contain 5 to 10 percent mature hardwood trees to maintain good habitat. Gray squirrel den trees must have vines and heavy cover around the tree.

Water

Water is a must for good squirrel habitat, although water is not required daily. Squirrels can go for several weeks without water. Water is obtained from succulent foods when surface water is not available. Sources of water may be ponds, creeks, or even hollows in trees filled with water. Squirrels will leave an area if water is not available for extended periods.

Space

Fox squirrel may range up to 40 acres over a period of a year. The average range is about 10 acres with the minimum range being about two acres. The gray squirrel may range up to 20 acres over a period of a year. The average range is about eight acres with the minimum range being about two acres.

Management

Vegetation

The best management technique for gray squirrel is to leave an area undisturbed. In most cases, this is not economically feasible. Where vines are absent, it is possible to restore the gray squirrel habitat by planting vines such as grape and rattan. Where hollow den trees are absent or in short supply, nest boxes can be used.

Prescribed burning of hardwoods will increase heart rot and, in time, will increase cavity trees. However, this practice should only be performed if timber value is not an objective. Burning hardwoods will significantly reduce timber value.

Useful Non-biology Conservation Practices

Proper grazing use of the woods will minimize competition. Livestock grazing may be eliminated by removal of all animals. Give consideration to removing livestock from woods in early spring to reduce competition. The fencing out of wooded areas will eliminate competition with livestock for acorns, fruits, and buds.

Clearing should be done in such a way as to leave streamside management zones. When leaving trees during clearing, leave trees in motts and/or strips. No underbrushing should be done in gray squirrel habitat.

The use of nest boxes can enhance the habitat when the stand of trees is not old enough to contain den trees. Plant corn, peanuts, and grain sorghum next to wooded areas for food. Plant rattan, grape, and honeysuckle in gray squirrel habitat where vines are absent.

When deadening hardwoods in pine forests, leave at least 10 to 15 percent of the area in preferred hardwoods if squirrels are a target species. Optimum fox squirrel habitat on an upland site would be 10 to 15 percent in pine and the remainder in quality mast producing hardwoods. During site preparation, leave areas undisturbed 100 to 150 feet each side of drains and areas on steep slopes.

Wildlife Biological Facts - Question 3

Examples: Questions during the actual competition may include, but are not limited to the following examples.

Directions: Place an **X** beside the correct answer.

1. The fox squirrels are____ gray squirrels.

   (A) larger than (B) smaller than (C) the same size as

2. An adult fox squirrel ranges from ____ to ____ pounds.

   (A) 1.5, 2.2 (B) 1.5, 2.8 (C) 1.3, 2.8 (D) 1.8, 3.1

3. Gray squirrels weigh from ____ to _____ pounds.

   (A) 0.6, 2.5 (B) 0.7, 1.3 (C) 0.9, 2.6 (D) 1.2, 3.6

4. The gestation period is approximately ____ to ____ days.

   (A) 33, 45 (B) 48, 52 (C) 41, 52 (D) 42, 45

5. Young squirrels make up about ___ percent of a given yearly population.

   (A) 10 (B) 20 (C) 40 (D) 60

6. An acre can support as many as ___ squirrels.

   (A) 5 (B) 10 (C) 15 (D) 20

7. _____ are the main stay food, making up to 60 percent by weight of the total amount of food consumed.

   (A) pecans (B) beech (C) acorns (D) insects

8. The daily food requirement is ____ pounds.

   (A) 0.2 (B) 0.3 (C) 0.4 (D) 0.6

9. True or False. Water is required daily.

Bobwhite Quail

Colinus virginianus

Biological Facts

The adult bobwhite male measures 10 to 11 inches in length, has a wingspan of 14 to 15 inches, and weighs from five to six ounces. The male's most conspicuous marking is the white throat patch and the broad white stripe above the eye extending from the bill to the nape of the neck. Both the patch and the stripe have a black or dark brown border that accentuates their whiteness.

The female bobwhite quail is similar in appearance to the male except that her throat patch and eye stripe are buff colored instead of white, and the border to these areas is dark brown instead of black. The female is also slightly smaller in size and weight.

The bobwhite's breast, belly, rump, wings, and tail are reddish brown with black markings. The belly and flanks are basically white, but the dark brown edging of the belly feathers give the belly a scaled appearance. The bobwhite quail's bill, eyes, legs, and feet are black.

Quail usually form a weak pairing bond. Hens are not always faithful to their roosters and vice versa. Either the hen or rooster can incubate the eggs. Incubation is not shared. Hens or the roosters may abandon their nest leaving their mate to incubate. The “freed” parent will seek new mates and attempt to nest again. Some hens may nest as many as three times, leaving her new mate to incubate the eggs. Biologists recommend management strategies that provide maximum breeding opportunities, such as leaving residual nesting cover in the fall to enhance the quality of early nesting cover. Nesting usually begins a couple of weeks after pairing and may extend through August. The peak of nesting occurs during May and early June, with 12 to 15 eggs to a clutch. Incubation period is 23 days.

The young can leave the nest as soon as their down dries and are capable of short flights at two weeks of age. Quail reach mature size from 14 to 16 weeks of age and remain in coveys until they break up in April when the members pair off for breeding. Bobwhite quail have a high annual mortality rate. A 70 to 80 percent population turnover annually is common. Food shortage, cold, adverse weather (drought or excessive rain), predators, and disease cause this high mortality. Potential life span is four to five years. Average life expectancy is less than one year.

Habitat Requirements

Food

The quail's food consists of about 15 percent animal matter and 85 percent plant matter. The animal food is predominantly insects such as beetles, weevils, caterpillars, and crickets. Young birds feed almost exclusively on insects. The plant matter is composed mainly of seeds and fruits, although some green vegetation is consumed. Plants that produce a smooth, hard seed such as ragweed, croton, and partridge pea are important food plants. Quail use agricultural crops including corn, grain sorghum, legumes, soybeans, and other small grains.

Cover

Quail are edge animals and prefer early successional stage vegetation. They inhabit idle fields, open woodland, crop fields with weedy edges, and pastures. Nesting, loafing, escape, and protective cover near dusting and feeding areas are necessary. Loafing or resting cover is used during the middle of the day between feeding periods. Low growing woody plants provides loafing cover and should not be over 200 to 300 feet apart. Last year's growth of herbaceous cover provides ideal nesting sites. Location of the nest is often near the edge of rough grass. This permits the chicks, when they hatch, to be led to thinner cover for feeding. As a result, the edge of roads, fence rows, or firelanes are favorite spots selected for nesting.

Canopy cover of brush at 5 – 20 percent is considered desirable for bobwhites. Cover needs for quail are quite complicated with low, woody cover needed for loafing cover. However, too much canopy (above 20 percent) is not desirable for habitat. A low, woody cover about the size of the hood of a pickup (lotebush, sumacs) is needed scattered around so that a softball can be thrown from one cover to the next. Nesting cover is critical with 250 – 300 basketball sized clumps of grass (little bluestem, or hulahoop size clump of prickly pear) needed per acre. This works out to one clump about every 12 – 13 feet over an acre. Then escape cover is needed consisting of scattered shrubs and dense forbs where quail can hide after being forced to fly by a predator.

Shrub thickets, each up to ¼ acre, provide escape cover and are needed on about every 15 acres. Roosting cover must provide warmth at the ground level and not restrict flight in any direction. Quail roost in a circle, heads looking outward with their tails toward the center.

Water

Water requirements are generally met from the food consumed, dew, or surface water.

Space

The annual home range of a covey varies from 10-80 acres. Bobwhites spend 75% of their time in a core area of 22 acres. Generally, the closer together the necessary types of cover and food are, the smaller the annual range. Research (F. Guthery) has demonstrated that given intensive management and favorable weather conditions, maximum carrying capacity for quail can exceed three birds per acre.

Management

Vegetation

Quail habitat needs may be met with range management practices. Grazing management is needed to maintain ground cover or increase bare ground depending on range condition. Quail are not adapted to dense stands of brush; therefore, brush management can be used to maintain some low shrubs and trees needed for cover. Prescribed fire can also be used to suppress woody plant growth and improve pastures. Disking and other methods of soil disturbance encourage growth of sunflower, croton, partridge pea, and other forbs. Disking also thins ground vegetation allowing for optimum feeding and traveling conditions. No more than 5-15% of an area should be disked.

Population

Hunted and unhunted areas exhibit the same annual rate of turnover that is usually 70 to 80%. Quail numbers have a tendency to fluctuate widely according to weather conditions. The reason for bag limits on quail is to spread out the harvest of quail among more hunters. Seasons allow young birds to mature and let hunters harvest surplus birds that would be lost during the critical winter months.

Non-biological Conservation Practices

Crop residues left on the soil surface (rather than fall disking) will leave waste grain from seed-producing crops on the surface of the soil during fall and winter months for food sources for quail and other seed-eating birds. Mowing around the edges of pastures should be delayed until mid summer to minimize nest disturbances.

Woody fence rows and other odd areas should be maintained to provide additional edge and interspersion of different habitat types. As a general rule, approximately 10 to 25% of the area should be left in woody plants if optimum quail habitat is the goal. Grazed pastures with close growing clovers such as white clover are excellent bugging areas. These areas must be grazed enough to allow for young birds to travel with minimal effort.

Fencing to provide for the establishment of food plantings can be a beneficial practice to quail. Maintaining woody fence rows where needed will provide escape cover for

quail along field edges. Range, pasture, and hayland planting of plant species with food value for quail can increase the food sources available for seed-eating birds. Construction of ponds, tanks, or watering systems may benefit some wildlife species but water supplementation is a questionable management practice. Water held in plants often exceeds bobwhite requirements by a factor of 10,000.

Prescribed burning is a beneficial practice for wildlife management in Texas. It eliminates the ground litter and reduces the wildfire hazard. In addition, many of the more desirable annual grasses and forbs will germinate as well as increase the variety of understory species. Also, disking of firelanes when controlled burning is practiced will provide for germination of seed-producing plants for quail and allows for optimum foraging conditions. A key habitat requirement for bobwhite is for vegetation to be sparse enough to facilitate easy travel, feeding, and escape opportunities for all age birds.

Wildlife Biological Facts - Question 3

Examples: Questions during the actual competition may include, but are not limited to the following examples.

Directions: Place an **X** beside the correct answer.

1. Male bobwhite has a wingspan of ___ to ___inches.

   (A) 10, 11 (B) 14, 15 (C) 12, 14 (D) 15, 16

2. The bobwhite quail's bill, eyes, legs, and feet are ___.

   (A) brown (B) buff (C) black (D) grey

3. Some hens may nest as many as ___ times.

   (A) 2 (B) 3 (C) 4 (D) 5

4. Peak nesting occurs during_____to early_____.

   (A) July, August (B) September, October (C) March, April (D) May, June

5. Incubation for Bobwhite is ___ days.

   (A) 23 (B) 15 (C) 21 (D) 12

6. A____to_____percent population turnover annually is common.

   (A) 5, 20 (B) 40, 60 (C) 70, 80 (D) 75, 90

7. Quail diet consists of about ____% animal matter.

   (A) 10 (B) 15 (C) 20 (D)25

8. Young birds feed almost exclusively on____.

   (A) animal matter (B) plant matter (C) seeds (D) insects

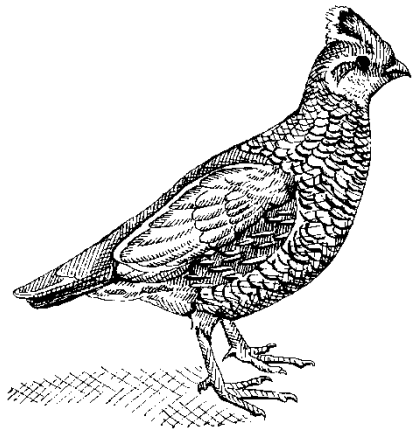
9. Canopy cover brush at ___ to ___ percent is desirable for bobwhites.

   (A) 5, 15 (B) 5, 20 (C) 10, 15 (D) 10, 20

10. True or False: Water requirements are generally met from the food consumed, dew, or surface water.

Scaled Quail

Callipepla squamata



Biological Facts

Other common names of the scaled quail are blue quail and cotton-top. Two subspecies of scaled quail occur in Texas; the Arizona form, *Callipepla squamata pallida*; and, the Chestnut-bellied, *C. s. castanogastris*. *Callipepla squamata pallida* inhabit the Trans-Pecos, West Central, and Panhandle areas. The Chestnut-bellied, *C. s. Castanogastris*, inhabits South Texas. The coloration and markings of the two birds are similar but the Chestnut-bellied is darker with a chestnut colored belly patch from which the bird gets its name. Scaled quail are only slightly larger than bobwhite quail.

The name comes from the dark edging on the blue-gray feathers of the front and upper back which gives the bird its scaly appearance. The hen has a crest tipped with white. Scaled quail generally occur along and west of the 100^{o} longitude line in Texas. Their range overlaps that of the bobwhite in the Rolling Plains and South Texas Plains. Scaled quail normally form large coveys of 25 or more birds except during the breeding season.

Habitat Requirements

Scaled quail generally inhabit dry, brushy rangelands where they can run rapidly. They only resort to flight when crowded or pressed. They inhabit semi-arid rangelands with sparse grasses and moderate to dense brush interspersion. If brushy cover is lacking, scaled quail will use corrals, feedlots, and abandoned building for shade and cover.

Nests are grass-lined hollows and are generally hidden beneath a bush or clump of grass. Clutch size is usually about 12. Eggs are white but may have brown spots. Incubation time is about 21 days. Incubation and nesting success fluctuates greatly primarily due to the unreliable nature of rainfall in West and South Texas.

The diet of scaled quail is primarily seeds with a smaller proportion of the diet composed of insects and green vegetation. Insects are more abundant in summer months and form a larger part of the diet during that season. Seeds from crotons, *Euphorbia* (spurges), mesquite, amaranth, paspalum, *Setaria* (bristlegrass, millet), and similar seeds that are hard and durable are major components in the diet of scaled quail. Scaled quail readily eat grasshoppers, snout beetles, and similar sized insects. As with bobwhite quail, the diet will vary greatly depending upon the availability of food types and amounts.

Scaled quail do not require surface water to exist, but the need for water is high. Almost all surface water sources such as windmills with troughs and surface tanks will have a covey of birds in the immediate area if other habitat elements are present. Available water is a limiting factor for these birds.

Management

Scaled quail occur in the more arid parts of Texas on rangeland that has lower livestock carrying capacity when compared to the central and eastern portion of the state. Management practices are generally limited to grazing management and to a lesser extent brush management. Prescribed burning may be applied to rangeland to achieve desired plant changes such as reduction of juniper.

Scaled quail do not generally lend themselves to the more intensive management practices that may be applied to bobwhites. Disking, food plots, and cover plantings are generally not practiced for scaled quail due to more extensive size of ranches and limited and unreliable rainfall patterns.

Scaled quail are adapted to rangelands in lower successional stages. Rangelands that support low to mid-successional grasses such as panicums, paspalums, and bristlegrasses provide more large seeds for food than do rangelands in higher successional stages, which supports more small seeded grasses such as bluestems. Lower successional rangeland also provides more annual forbs than do higher successional stages.

Grazing management practices that result in creating higher successional vegetation may result in a decrease in scaled quail populations. If the areas have both species, the number of bobwhites may increase with the additional cover provided.

Brush management practices have the potential for significantly affecting scaled quail habitat. Mesquite is a major source of food and cover for them as are many other woody species. Practices that significantly reduce the amount of woody plants may cause a similar reduction in scaled quail numbers.

When brush management practices are planned and quail management is a desired objective, individual areas should be left untreated to provide food and needed cover. The total amount of untreated acreage to be retained in a pasture will depend upon the relative importance assigned to quail production and livestock production desired by the landowner.

Areas of brush to be retained should be selected according to species used most extensively by quail. Generally, areas of deeper soils along draws and creeks will support a greater variety of plants. In pastures with little or no variation in topography, strip patterns are frequently used. Clumps or motts of trees and brush can be left at various locations. Areas retained in brush must be large enough to support a covey of birds to be effective. A minimum of 50 acres per covey is generally required.

Wildlife Biological Facts - Question 3

Examples: Questions during the actual competition may include, but are not limited to the following examples.

Directions: Place an **X** beside the correct answer.

1. The scientific name for scaled quail is?

   (A) *Colinus virginianus* (B) *Meleagris gallopavo* (C) *Zenaida macroura* (D) *Callipepla squamata*

2. Scaled quail are slightly _____ than bobwhite.

   (A) smaller (B) larger (C) faster (D) slower

3. Scaled quail generally occur along and ____ of the 100 degree longitude in Texas.

   (A) North (B) South (C) East (D) West

4. Scaled quail usually form large coveys of___or more birds except during breeding season.

   (A) 15 (B) 20 (C) 25 (D) 30

5. Scaled quail will____when they are crowded or pressed.

   (A) fly (B) hide (C) run (D) squat

6. Nests are grass-lined hollows and are generally hidden beneath a __or clump of___.

   (A) tree, soil (B) bush, tree limbs (C) bush, grass (D) tree, grass

7. Clutch size for scaled quail is?

   (A) 10 (B) 12 (C) 14 (D) 16

8. Incubation time is about ____ days.

   (A) 21 (B) 23 (C) 25 (D) 26

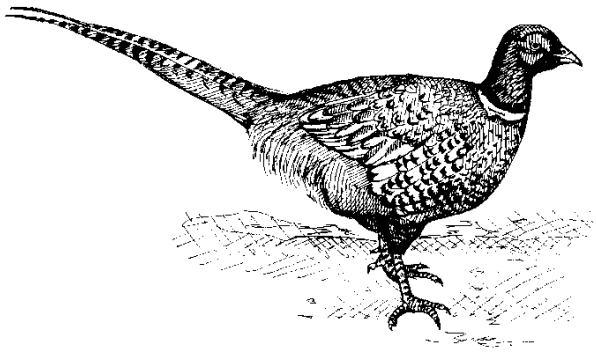
9. The diet of a scaled quail is primarily?

   (A) insects (B) green vegetation (C) seeds (D) animal matter

10. True or False: Scaled Quail do not require surface water to exist, but the need for water is high.

Ring-necked Pheasant

Phasianus colchicus



Biological Facts

The Ring-necked pheasant is a chicken-like bird weighing from two and a fourth to three pounds. The male's plumage is a very bright array of browns, golds, buffs, blues, and blacks with a greenish-purple iridescence around the head and neck and bright red wattles and eye patch. The tail is long, sweeping, and pointed. The hens are somewhat smaller, a mottled brown with a shorter tail. The male has a distinctive white ring that separates his neck and shoulder feathers. This is the origin of the name ring-necked.

The ancestry of the ring-necks in the United States is a mixture of Chinese, Korean, and Manchurian birds. Pheasant, an exotic, was first introduced into the United States as early as 1790. The early introductions were unsuccessful. Establishment of the pheasant first succeeded in 1881 in Oregon. Additional establishment took place in 1891 in South Dakota, 1895 in Utah, 1907 in Idaho, 1939 in the Texas Panhandle, and on the Texas Gulf Coast during the 1970s.

Pheasants have established in croplands where grain crops such as corn, grain sorghum, and small grains make up a large part of the cropping systems. This fowl also has shown an affinity to irrigated croplands in contrast to dryland cropland with identical cropping systems.

The breeding season in Texas begins in April and the peak-hatching season is generally in mid-June. The clutch size varies between 12 to 15 eggs and the incubation time is approximately 23 days. A hen will produce only one brood per year. Hens may re-nest if eggs are destroyed early in incubation. Pheasant do not form a pair bond, but the male establishes a territory that he will defend against intruding males during the breeding season. In a given year, 65 to 75 percent of the fall population will not live until the hunting season the following year.

Playas and small grains are critical for nesting hens. Alfalfa is favored by nesting hens, but available acreage is limited. Wheat has a major drawback as nesting cover because peak harvest of the crop coincides with peak hatch. Nesting areas can be created or restored by grazing playas lightly, or not at all. Planting alfalfa-grass mixtures in 10-acre plots within 200 yards of a playa can also provide nesting areas.

Habitat Requirements

Food

Pheasant are seedeaters. Domestic grains (i.e., corn, grain sorghum, wheat, barley, and soybeans) provide the bulk of the pheasant's diet. In the spring and summer, insects provide a significant amount of the animal matter in the diet. Pheasant chicks subsist entirely on insects for the first five weeks of their life. Seeds such as ragweed, careless weed, smartweed, and crotons make up a significant amount of the winter diet. Gravel and calcium in the form of snail shells is an important item in their diets, especially during the breeding and egg laying period.

Cover

Pheasants need several cover types; loafing cover, travel lanes, roosting cover, nesting cover, and winter cover. Of these, nesting cover and winter cover are the most critical. Winter cover such as weedy, fencerows and windbreaks provide protection from the elements.

Water

Water does not appear to be a critical habitat element. The pheasant's close association with irrigated croplands and insects in its diet seems to fulfill the need.

Space

Pheasants will roam widely to fulfill its life needs; however, if adequate food and cover are available throughout the year, it will spend most of its time on a square mile or less.

Management

Vegetation

The quality of the pheasant habitat is directly related to the cropland management practices that affect the pheasant's food supply and cover. Following harvest of grain crops such as grain sorghum, corn, soybeans, and sunflowers, there is enough waste grain on the land to sustain a pheasant population through a winter. However, this is only true if waste grains are left on or near the soil surface and accessible to the birds. Corn and grain sorghum residues provide excellent winter cover.

Population

During a favorable year, a hen pheasant will raise approximately 8 to 10 chicks. Up to 75 percent of the fall population will not survive a full year. Mortality factors such as starvation, predation, accidents, and winter kill account for the annual turnover. Research has shown that hunting makes no significant difference in the annual turnover or survival rate.

Wildlife Biological Facts - Question 3

Examples: Questions during the actual competition may include, but are not limited to the following examples.

Directions: Place an **X** beside the correct answer.

1. Ring-necked Pheasant is a chicken-like bird weighing?

   (A) 2 to 4 pounds (B) 3 ½ to 5 pounds (C) 2 ¼ to 3 pounds (D) 1 ¾ to 3 pounds

2. When was the Ring-necked Pheasant first introduced to the United States?

   (A) 1895 (B) 1790 (C) 1881 (D) 1907

3. The breeding season begins in what month?

   (A) April (B) May (C) June (D) July

4. The clutch size varies between ____ to ____ eggs.

   (A) 10, 12 (B) 11, 14 (C) 12, 14 (D) 12, 15

5. The incubation time is approximately ____ days.

   (A) 21 (B) 22 (C) 23 (D) 24

6. _____ is favored by nesting hens, but available acreage is limited.

   (A) Alfalfa (B) wheat (C) barley (D) smartweed

7. Of the seven types of cover needed for pheasant, ____ cover and ____cover are the most critical.

   (A) loafing, roosting (B) travel lanes, roosting (C) loafing, nesting (D) nesting, winter

8. During a favorable year a hen will raise approximately _____ to _____ chicks.

   (A) 5, 10 (B) 8, 10 (C) 6, 12 (D) 8, 12

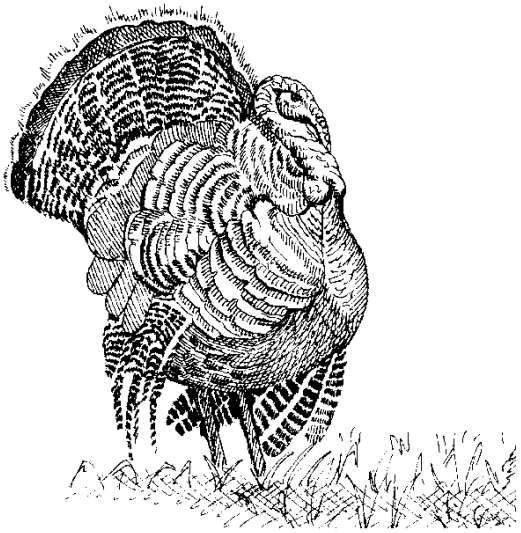
9. Up to____% of the fall population will not survive a full year.

   (A) 50 (B) 65 (C) 75 (D) 80

10. True or False: Research has shown that hunting makes no significant difference in the annual turnover or survival rate.

Wild Turkey

Meleagris gallopavo



Biological Facts

Three subspecies of wild turkey occur in Texas:

M.G. silvestris Vieillot	Eastern turkey
M.G. intermedia Sennett	Rio Grande turkey
M.G. merriami Nelson	Merriam's turkey

The wild turkey is a large game bird native to the forested regions of America. Wild turkeys are agile and adept at running or flying. Of the five subspecies, three occur in Texas. The Rio Grande turkey is the most abundant and widely distributed, occurring in about a 400 mile east to west band in the central portion of the state. The Merriam's turkey is of limited distribution and occurs in the mountainous regions of the Trans-Pecos in ponderosa pine habitat. The eastern wild turkey occupies the humid forest of eastern Texas. Each subspecies is genetically different and is adapted to the climatic and habitat conditions in which they live.

Before settlement by European immigrants, wild turkeys were very abundant. But extensive land clearing and relentless hunting for market virtually eliminated the bird from eastern forests by 1900. A restoration program has occurred to restock the eastern wild turkey in East Texas. Other depleted areas in Texas have been restocked with the Rio Grande turkey.

Wild turkey are a very large, long-legged gallinaceous bird, but trimmer than the domestic turkey. Adult males (gobblers) weigh from 12 to 20 pounds, have spurs on their legs, a beard projecting from the breast, and have dark iridescent breast plumage. Hens weighing from 8 to 12 pounds are less iridescent. Their beard is thinner and shorter, or lacking.

The wild turkey prefers walking or running to flying and has been clocked at 15 miles per hour when running to escape danger. If forced to fly, the bird is strong and swift and can attain speeds up to 40 mph for short distances.

Gobbler tracks are larger than hens and gobblers have larger, elongated droppings. Hen droppings are spiraled normally and resemble a piece of popcorn in shape.

The species is promiscuous. In the spring when mating begins, the gobbler does not establish a strict territory. Instead, he attempts to drive away other toms from the area. The gobbler's courtship display, or strutting, is a means of announcing his local superiority and simultaneously attracting his harem (from 3 to 10 hens per gobbler). Individuals pair only briefly. Each female breeds only once each spring. Females then isolate themselves to tend the clutch.

Nests are built on the ground in tall grasses or other vegetation and are composed of leaves, straw, and grass. Eggs range in number from 8 to 26, averaging 12. It takes 28 days of incubation for the eggs to hatch. Turkeys will usually attempt to re-nest if the nest fails. Nest success is lower for re-nesting attempts. Once all the poults hatch, the hen leads them away from the nest and they begin their active life. Poults begin to roost in trees at about two weeks of age, but can fly at about 10 days. Predation is heavy during this early developmental stage.

The wild turkey is susceptible to diseases such as blackhead, fowl cholera, and pox, which can be transmitted to and from domestic fowl.

Habitat Needs

Wild turkeys require appropriate habitat for protection and food to meet their year-round needs.

Food

The turkey is opportunistic and utilizes a wide range of food. During the spring and summer, food items are green grasses and forbs, buds, flowers, seed, and insects. Poults' diet during their first two weeks of life is 90 percent insects found primarily in openings and on the edge of pastures. Fall and winter foods include seed, green grass and forb shoots, acorns, and agriculture crops such as corn, grain sorghum, and wheat.

Cover

Mature timber provides good roosting sites and shelter from the weather. Large brush or timbered stands, dense grassy fields, and thickets offer good escape cover.

The best habitat is a diversity of land use types with at least half in mature brush or timber and interspersed with openings. Interspersion of trees or brush and openings is the key. Good habitat includes a variety of mast-producing hardwood trees, moderate to open understory cover with a variety of mast-producing plants such as sand shinoak,

and abundant ground cover that provides green forage and seeds. Openings include areas such as grasslands, fallow fields, roadways, power lines, and pipelines.

Water

Turkeys require water daily and can obtain water from foods or free water. A water source should be located within one mile from the next available source. Ideally, water would be near roosting and nesting sites.

Space

Annual range of a turkey is frequently 8 to 10 miles from winter roost sites to summer nesting sites (encompassing about 20,000 acres). The birds are very sensitive to human disturbance, so they should not be hunted or bothered within a quarter mile of their roost or nest.

Habitat Management

Habitat can be managed to provide for turkeys by maintaining good habitat and improving marginal habitat requirements. Range characteristics such as size, shape, plant species composition, and density affect turkey habitat.

Maintenance of openings can enhance wild turkey habitat. A managed area should contain 10 to 50 percent openings scattered throughout. Openings less than 20 acres are better and should be shaped for maximum edge effect to limit long movements of hens with broods.

Supplemental food planting and watering sites can enhance turkey habitat, especially in marginal habitat. Plantings can supplement natural foods and concentrate turkey movements within an area. Legume planting is a source of food for turkeys during winter and spring. Small grain crops will also be used when they ripen in summer until gone.

Proper grazing use assures production of forbs and grasses that are utilized by wild turkey for food and cover. Brush control can be planned to create clearings in appropriate locations. These locations will produce forage, fruits, and insects, as well as nesting opportunities. Prescribed burning will open the understory, which will facilitate natural turkey movement and encourage growth of succulent vegetation. Never burn during the nesting season. Firebreaks can be used for travel by turkeys and hunters. Desired trees and food-producing shrubs should also be protected.

Wildlife Biological Facts - Question 3

Examples: Questions during the actual competition may include, but are not limited to the following examples.

Directions: Place an **X** beside the correct answer.

1. What is the scientific name of the Rio Grande turkey?
   (A) *Meleagris gallopavo* (B) *M.G. silvestris viellot* (C) *M.G. intermedia Sennett*
   (D) *M.G. merriami Nelson*

2. The_____turkey is the most abundant and widely distributed.

   (A) Eastern (B) Rio Grande (C) Merriam's

3. Adult male (gobblers) weigh from ____ to ____ pounds.

   (A) 8, 12 (B) 10, 15 (C) 12, 15 (D) 12, 20

4. What is a wild turkeys top running speed?

   (A) 10 (B) 15 (C) 20 (D) 30

5. What is the top speed a wild turkey can fly?

   (A) 15 (B) 20 (C) 30 (D) 40

6. Incubation of the eggs is____days.

   (A) 28 (B) 21 (C) 20 (D) 18

7. Eggs range in numbers from ____ to ___.

   (A) 8, 12 (B) 10, 20 (C) 18, 26 (D) 8, 26

8. Turkey poults can fly at about _____ days.

   (A) 5 (B) 8 (C) 10 (D) 12

9. Pouts' diet the first two weeks of life is 90%___.

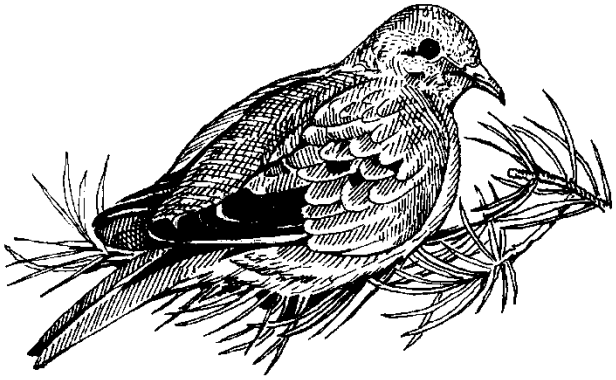
   (A) insects (B) seeds (C) forbs (D) green grasses

10. Water should be within ____ miles.

    (A) ½ (B) 1 (C) 2 (D) 3

Mourning Dove

Zenaida macroura



Biological Facts

This pigeon-like bird is a member of the order *Columbiformes*. It is very streamlined and sleek, varying from 11 to 13 inches in length and weighing three and a half to five ounces. The wings are bordered with large white spots and are five and a half to seven inches long. The neck is long, and the head is small.

Males are more brightly colored than the female but it is difficult to distinguish the difference. The lower sides of the neck are iridescent. The bare skin around the eyes is bluish, while the iris is dark brown. The bill is slender, small, and black. The legs and feet are red. Female and juvenile birds are slightly smaller than the male, have duller color, and shorter tail.

The mourning dove is a native of North America. Fossil evidence has been found from LaBrea Tar Pits in California and from Pleistocene deposits in Arizona.

The mourning dove is the most numerous and widely-distributed game bird in North America. They breed from Canada to the Bahamas. It winters from California to Georgia, south to Panama, and may be found in Alaska and Greenland in the summer. The eastern race generally ranges east of the Great Plains area and the western race is found to the west.

Mourning doves start to migrate south in September as soon as nesting is completed. The migration is a leisurely process. Most of the actual flying is in the morning and late afternoon. They roost at night and rest during the middle of the day. They average 15 miles a day. Migration is normally completed by December.

They do not have an actual territory except during the nesting period. Available food and roosting cover determines their range. Dove move about constantly in search of food but tend to stay secluded during bad weather.

Doves pair off to nest, but gather in flocks of both adults and juveniles after nesting. Groups of 20 or more may fly together during migration, but this number may change as flight continues. Several groups often collect on wires or feeding grounds, making it impossible to distinguish between the adults and juveniles. There appears to be no strong social ties.

Mourning doves are monogamous and both sexes incubate the eggs. Mating may start as early as January or February in the south, and as late as March or April in the north. The male selects a nesting territory and defends it against other males by cooing, flying at, and pecking intruders. He often has to reduce the size of his area as pressure is brought from other males.

A female is attracted by the cooing of the male that he does from selected perches. Cooing is the main courtship activity and is most intense early in the morning, beginning before dawn. The female may coo also, but these calls are very weak and scarcely audible. Cooing is accomplished by bobbing the tail, holding the body rigid and the neck arched, with the throat puffed out. The male performs a nuptial flight when a female accepts and a nesting site has been selected.

The male selects a nest building site before attracting the female, then brings sticks to her which she forms into a loose nest which takes several days. The first egg is laid, followed by the second egg two days later. The eggs are elliptical-oval, pure white, and average 28 millimeters by 21 millimeters. There are usually two to five periods of nesting for each pair, depending on climate, individuals, losses, etc. If a nest is destroyed, the pair makes another nest or lays another clutch in the same nest.

Most nests are made in trees, but the trees will not be used until fully leafed out. Crowding or a lack of trees forces ground nesting. Most tree nests are placed 5 to 25 feet above the ground. The same sites are used year after year, and often the same location in the tree is used. Doves may use nests of other birds such as the robin, blue jay, and English sparrow.

Incubation requires 14 to 15 days and both the male and female participate. Usually, the male sits during the daylight and the female at night. The dove is altricial (young are helpless at hatching and require complete parental care for some time). A glandular secretion, "pigeon milk" from both parents' crop, is the only food the young receive until they leave the nest.

Raising a brood requires about a month and within a week after the young leave the nest, the parents either lay another clutch or leave for migration. The juveniles will grow and complete their feathering for a couple of weeks after leaving the nest. They then gather in small flocks and begin migrating before the older birds. The young do not breed the first year.

It is generally agreed that hunting is the largest mortality factor acting on dove. It may take 30 to 35 percent of the fall population. Along with hunting, there is predation, accidents, starvation, disease, and parasites that contribute to the loss of dove. All factors included result in a loss of 50 to 70 percent of adult and juvenile birds in most years. Most predation losses occur to nests. Starvation takes a small percentage of doves and only the most severe weather causes this. The average life span of a mourning dove is 1 - 1.5 years.

Habitat Needs

Food

Most of the diet consists of seeds from native grasses, cultivated grains, and forbs such as croton and sunflower. Insects are a minor item in the diet. Gravel or grit is needed to digest seed. Doves may fly up to 15 miles to feed in grain fields.

Cover

The mourning dove is one of the most adaptable of all species as indicated by its wide range. However, they do not inhabit forests, plains, vast open fields, marshes, or prairies. The broken topography of trees and openings brought about by agriculture seem to be more desirable. Trees, hedgerows, shrubs, and wires between utility poles furnish the dove nesting and roosting sites. Doves prefer to feed on the ground where the vegetation is sparse rather than in dense perennial grasses.

Water

The need for water is high, especially during the nesting season. Water is very seldom a limiting factor due to the bird's mobility. However, water should be within 12 to 18 miles.

Space

Space is not a limiting factor except during the nesting season.

Management

Vegetation

Mourning doves appear to be holding their own and this is mainly due to their adaptation to changing land use. Increased weed production through disking areas of perennial grasses provides additional food. Sound management of crop residues by leaving waste grain, weed, seeds, and stubble on top of the ground supplies the dove with their favorite foods. Leaving trees to serve as roosting and nesting sites and developing ponds for watering livestock have made many areas of once open grassland a much more favorable dove habitat. Developing feeding areas by disking, grazing, or burning will increase dove use of an area. Dove will not feed in dense grass, weeds, or brush.

Population

Most hunting is done around water holes, weedy (sunflower and croton) fields, or grain fields. The regulation of hunting and bag limits is the major management practice in dove management. Limits and hunting seasons vary from state to state, as does hunter success. If mortality is 50 percent or less, the next year's breeding population will increase; but if it is 70 percent or more, it will decrease. Some of the states harvesting the most doves are California, Texas, Oklahoma, Tennessee, Kentucky, Georgia, and Alabama.

Non-biological Conservation Practices

Mourning doves are unsuitable for game farming or transplanting. Charging dove hunters a fee has become a source of income for many farmers and they leave grain in the fields to attract the birds to their land. Leaving crop residue and waste grain on the soil surface following harvesting operations provides an excellent food source. Construction of farm ponds provides both feeding and watering areas.

Wildlife Biological Facts - Question 3

Examples: Questions during the actual competition may include, but are not limited to the following examples.

Directions: Place an **X** beside the correct answer.

1. How much does a mourning dove weigh?

   (A) 1 ½ to 4oz (B) 2 to 5oz (C) 3 ½ to 5oz (D) 5 to 7oz

2. What color are the legs and feet of a mourning dove?

   (A) black (B) red (C) yellow (D) grey

3. The mourning dove is a native of_____.

   (A) North America (B) Mexico (C) China (D) India

4. Mourning dove start to migrate starting in_____.

   (A) October (B) November (C) August (D) September

5. Migration is a_____process.

   (A) rapid (B) long (C) leisurely (D) fast

6. During migration doves average ____ miles a day.

   (A) 12 (B) 13 (C) 14 (D) 15

7. Groups of__or more doves may fly together during migration.

   (A) 18 (B) 20 (C) 22 (D) 25

8. A female is attracted by the _____ of the male dove.

   (A) cooing (B) chirping (C) brightly colored feathers (D) nesting site

White-winged Dove
Zenaida asiatica

Biological Facts

This pigeon-like bird is a member of the order Columbiformes. It is a medium-sized, rather heavy-bodied and square-tailed dove, averaging 11 to 12 inches in length and weighing around 5 ounces. Adult coloration is mainly grayish-brown, with a prominent white wing patch across its outer wing coverts, contrasting with blackish upper surface of flight feathers and visible when the wing is folded or spread. It has a black streak along its lower ear coverts that forms a cheek patch. The neck is long and the head is small.

The bare skin around the eyes is grayish to bright blue in adults, with the iris orange to orange-red. Feet are bright pinkish-red, becoming more brilliant during breeding season. Juveniles are similar to adults but lack a black cheek patch, feet are a dull reddish brown, head is smaller and iris is brown to light orange

The white-winged dove breeds from the southwestern United States south into Central America. The species is currently expanding with populations spreading along the coast of the Gulf of Mexico in the southeastern U.S. and north to southern Oklahoma. The white-winged dove in Texas was historically limited to the agricultural areas in the Rio Grande Valley but its range has expanded greatly in the last 30 years. White-winged doves have adapted well and are expanding rapidly in urban and suburban areas of Texas. Texas breeding populations have been documented as far north as Amarillo and east to Beaumont. Since 1990 there has been a larger population of white-winged doves in central and upper south Texas than in their historical range. The largest single population of white-winged doves in the U.S. occurs in San Antonio, TX.

Portions of white-winged dove populations in the U.S. and northern Mexico migrate short distances southward in winter, while others are either resident or migrate northward to inland locations or eastward or westward to coastal locations. Those birds that migrate south begin in early September and continue through October with the peak in Mid-September. Adult generally migrate earlier than juveniles and white-winged doves usually migrate in groups of less than 50 birds. Migration is influenced by food availability and weather.

Nest density and nesting success historically was highest in climax brush communities of south Texas and northern Mexico, with additional utilization in areas near resacas and creeks. White-winged doves are monogamous through a breeding season and both sexes take turns incubating the eggs. Nest building begins for migratory populations soon after arriving in breeding areas in April-May, while resident urban populations begin building nests in early to mid-March. Male white-winged doves select and defend their territory and general nesting site, while females select a specific nest location within the territory. White-winged doves can nest in colonies with as little as 10 inches separating nests. Nest sites are usually shaded, in dense canopy coverage and with sparse ground cover. They are usually located on a sturdy foundation, such as a horizontal branch or the crotch of a tree and are constructed of small twigs.

Eggs are usually laid 24 hours apart, and after a 14-15 day incubation hatch 24 hours apart. The young fledge at 13-18 days. White-winged doves often produce multiple broods per breeding season, either immediately re-nesting following nest predation or 4-15 days following fledging of previous brood. Both parents feed young a milky secretion formed in crop glands ("crop milk") as in other columbids.

Average life span for white-winged doves ranges from 1.7 to 2.9 years with some individuals in the wild documented over 20 years. Band recovery data provides evidence of a disproportionally high mortality among young birds. The population continues to grow, with the largest gains occurring outside the Lower Rio Grande Valley.

Habitat needs

Food

Most of the diet consists of the seeds and fruit from native and cultivated vegetation. Native grass seeds utilized include panic grass and bristlegrass, while native forbs seeds from sunflower, croton and spurge are commonly consumed. Seeds and fruit from woody brush species such as brasil, granjeno and coma are often in their diet. The largest component of the white-winged doves diet relates to their congregation near agricultural areas. Commercial sunflower, corn, sorghum, milo and wheat seeds all make up large parts of the white-winged dove diets where available. They occasionally ingest grit to aid in digestion.

Cover

Prefers heavier cover interspersed with agricultural fields. In their historic range they prefer dense mixed woodlands of brush species, but will utilize heavy vegetation along waterways, as well as oaks and citrus groves. In urban areas they have adapted to large residential shade trees. White-winged doves feed on the ground, but unlike mourning dove can feed on food sources elevated above the ground, such as seed heads of corn, grain sorghum or sunflower.

Water

Needs water daily, but often can satisfy some or all of its water requirements by eating moist fruit. Prefers to drink in open areas, such as bare ditch or stream banks, sand or gravel bars, stock ponds or troughs. Peak drinking times are morning or afternoon.

Space

Space is not a limiting factor except during nesting season.

Management

Vegetation

The statewide white-winged dove population continues to grow, with the largest gains occurring outside the Lower Rio Grande Valley. It is common for large populations of white-winged doves to roost in town and fly out to nearby agricultural fields to feed. Brush and trees provide roosting and nesting sites. Agricultural fields and forb (weed) dominated pastures provide feeding sites. Conservation-minded farming practices provide waste grains for consumption. Brush and trees provide roosting and nesting sites.

Population

The regulation of hunting seasons and bag limits is the major factor in the management of the population. Being a migratory gamebird white-winged doves are regulated at the state level under a federal framework set by the U.S. Fish and Wildlife Service. Approximately 80% of the white-winged dove harvest nationally occurs in Texas. Based on banding date it is estimated Texas hunters harvest only 3-4% of the state's population, well below any threshold that would limit the expansion of the population.

Wildlife Biological Facts – Question *3*

Examples: Questions during the actual competition may include, but are not limited to the following examples.

Directions: Place an X beside the correct answer

1. The white wing patch on a white-winged dove is visible when the bird is sitting or flying.

   T/F

2. A white-winged dove's feet are a bright pinkish-red during the breeding season.

   T/F

3. All white-winged dove populations migrate.

   T/F

4. At what time interval do white-winged dove eggs hatch?

   (A) 24 hours (B) 1 hour (C) 12 hours

5. White-winged doves can feed on elevated food sources, such as a sunflower seed head.

   T/F

6. What percentage of the Texas white-winged dove population is harvested by hunters?

   (A) 1% (B) 3% (C) 10% (D) 50%

7. Are white-winged doves monogamous for a breeding season?

   T/F

8. Prior to 1950 most white-winged doves were found in the Lower Rio Grande Valley.

   T/F

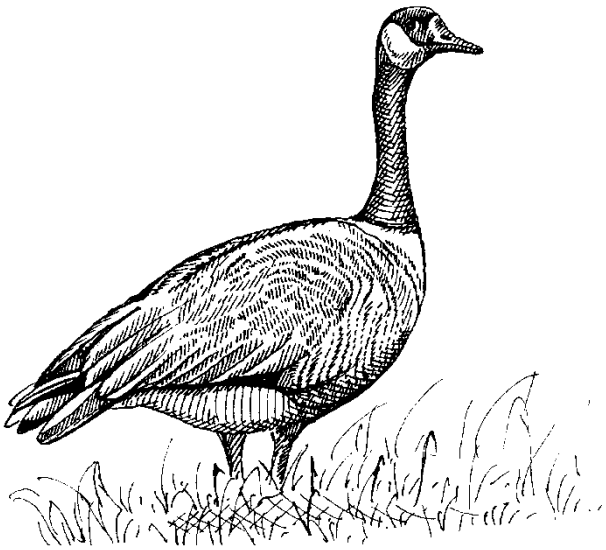
9. White-winged doves only produce one brood per breeding season.

   T/F

10. What Texas city has the largest population of white-winged doves?

    (A) Houston (B) Dallas (C) San Antonio

Waterfowl



Biological Facts

Texas is the wintering site for millions of waterfowl. Some species breed and raise their young in Texas, others are migrants traveling between breeding and wintering grounds, and others are wintering residents.

"Puddle ducks" are typically ducks of shallow marshes and rivers rather than of large lakes and bays. They are good divers, but usually feed by dabbling or tipping rather than submerging. Most of this group are sure-footed and can walk and run well on land. Puddle ducks can fly off any surface without running or pedaling. Common puddle ducks include the mallard, gadwall, pintail, blue-winged teal, green-winged teal, American widgeon, shoveler, wood duck, and mottled duck.

"Diving ducks" or "divers" prefer deeper marshes, bays, and lakes. Their feet set far back on the body and have a lobe of skin on their hind toes. Divers must run or pedal to get into flight. Common divers are redhead, canvasback, ring-necked duck, bufflehead, goldeneye, merganser, lesser scaup, and ruddy duck.

One waterfowl group that appears to be increasing in numbers in East Texas is the fulvous whistling duck and the black-bellied whistling duck. Whistling ducks are the least known ducks of North America.

There are four common geese that winter in Texas: Canada, lesser snow, Ross', and white-fronted.

To most North Americans the word "goose" conjures up the Canada goose. There are 11 recognized races of Canada geese ranging from the huge "giant" race reaching 12.5 pounds to the cackling race weighing only 3.4 pounds.

The lesser snow goose has two color phases: a dark plumage (the so-called blue goose) and a white phase (the snow goose). Until 1961, the blue and lesser snow geese were thought to be two separate races. Snow geese fly in a peculiar undulating fashion. Individual members of a flock fly at staggered heights, rising and descending slightly. Snow geese fly more rapidly with a faster wing beat, than do the Canada geese. In flight, snow geese form U's, oblique lines, check mark symbols, and irregular masses, seldom flying in well-formed V's of Canada geese.

The Ross' goose is a small white goose with black wing tips in adults. This goose can be confused with the snow goose. These geese have a smaller body size, shorter neck, more rapid wing beat, and more highly pitched call than the snow geese. Within the last 25 years, there has been a great upsurge in numbers of Ross' geese.

Whited-fronted geese (specklebellys) are brownish gray in appearance and, at a distance, show no distinguishing plumage characteristics. They tend to fly in large flocks and in V's like Canada geese. Far away in flight, their most distinguishing characteristic is their high-pitched laughing call. They are among the most vocal of geese.

Habitat Needs

A "wetland" is described as "land where water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface." Water is basic in the development or improvement of waterfowl habitat in Texas. Wetlands furnish four major requirements for waterfowl: food, water, resting/roosting cover, and nesting places. Wetlands are the most productive wildlife lands in the country, providing habitat for thousands of ducks and geese each year, as well as other resident and migrating water-loving birds and wildlife.

Importantance of Wetlands

Wetlands provide important functions for people and the environment. Wetlands provide the following benefits: flood protection, erosion control, wildlife food and habitat, commericial fisheries, water quality, and recreation.

Assessment of Loss

In 1763 George Washington was among those assigned to survey the Dismal Swamp area of Virginia and North Carolina for purposes of reclamation. Estimates of irreversibly altered or destroyed wetlands in the 48 continental states have already reached 40 percent. Hundreds of thousands of acres of former inland wetlands are now among our most highly productive croplands and timberlands. More than one-half of the U.S. population lives in counties bordering the oceans, Gulf of Mexico, and Great Lakes. Millions more vacation by the oceans and lakes.

Texas wetlands can be broadly grouped into the following six categories:

1. Gulf Coast Wetlands
2. Bottomland Hardwood Forests
3. Playa Lakes
4. Freshwater Springs and Headwater Streams
5. West Texas Riparian Areas
6. Coastal Pothole Wetlands

Between the 2004 and 2009 the Gulf Coast Wetlands experienced a net wetland loss of 257,150 acres. Much of the remaining acreage has been degraded by saltwater intrusion due to canals, channels, drainage ditches, land subsidence and groundwater depletion.

Bottomland hardwood habitat has been reduced by approximately 63 percent, from an initial estimate of 16 million acres to 5.9 million acres. The 10-million acre loss of bottomland hardwood is a result of agricultural conversion, reservoirs, and commercial/residential development.

It has become increasingly important for private landowners to recognize the importance of wetlands on private lands and to implement management programs to enhance the remaining wetlands for wildlife uses. Both public and private sectors have recently become active in providing incentives to the private landowner to manage wetlands. Both technical and financial assistance is available to the private landowner in Texas to enhance their wetlands. The Natural Resources Conservation Service can assist a landowner with various sources of assistance.

Management

There are many types of wetlands and many ways to improve waterfowl habitat, but there are several practices useful in managing any wetland. Shallow water depths from 6 to 18 inches are most desirable for puddle ducks. These ducks tip over to feed on seeds, acorns, and roots on the ground under the water. Diving ducks, such as canvasback, redhead, scaup, ring-necked duck, and merganser, prefer deep water.

Maintaining water on waterfowl management areas during the fall, winter, and early spring are desirable for waterfowl. Draining or allowing the water to dry up during the summer allows emergent vegetation to grow. Waterfowl relish seeds produced by smartweed, barnyard grass, and many other "weeds." If good waterfowl food plants are not present, crops such as red rice, Japanese millet, and/or browntop millet may be planted. When areas are planted for waterfowl and are to be hunted, follow state and federal laws pertaining to "baiting."

Managing River Bottom Hardwoods for Waterfowl

The keys to providing quality river bottom habitat for waterfowl include:

1) Properly manage desirable hardwood species that produce mast. Consider waterfowl needs when harvesting trees. Mark the trees to remove according to a recommended method depending on the kinds and age of trees present.

2) Control undesirable species by harvesting or with chemical treatment.

3) Manipulation of water during the fall, winter, and spring should be considered. If the area does not naturally flood at a frequency and duration that has been satisfactory for providing quality waterfowl habitat, a greentree reservoir may be an alternative if proper age and species of hardwoods are present.

Sometimes it is desirable to fence wetland areas. This will protect the areas from livestock grazing.

For greentree reservoirs, construct an earthen embankment with a water control structure to seasonally flood hardwood bottoms. Flood the reservoir with 6 to 18 inches of water over 80 percent of the area from October 15 through March 15. Drain the reservoir from March 15 through October 15 to prevent damage to the trees and allow regeneration of perennial vegetation. A reliable water source is needed to reap full benefits from a greentree reservoir. Manage desirable trees such as willow oak, water oak, nuttall oak, green ash, bald cypress, and tupelo gum. If desirable trees are not present, plant the area to adapted desirable species. If the entire flooded area has a dense tree canopy, a small opening from one-half acre up to several acres should be made to improve accessibility to ducks. These areas will also help to provide a variety of vegetation.

Mow, disk, or graze these areas when needed during the summer to improve plant species composition. Consider fencing the reservoir to prevent overgrazing or continuous use by livestock. Install wood duck boxes with predator guards if there is adequate water pools standing during periods of draw down. Recent research has documented slight reductions in hardwood (quality and quantity) grown in greentree reservoirs.

Many of the previous practices may be applied in any river-bottom hardwood situation, even if a greentree reservoir is not constructed. Consult your USDA, Natural Resources Conservation Service representative prior to beginning these projects. Several state and federal laws govern activities in wetlands.

Managing Upland Depressions

Upland depressions are areas that occur in flatwoods or native/improved pastures. They may be improved by the construction of embankments and/or water control structures to enhance or create a wetland and to allow for water level management. Close the embankments to create a shallow flood during the fall, winter, and spring. Drain and allow perennial vegetation to re-seed during the summer months. Plant the draw down area in duck food crops if adequate natural duck foods are not present. If part of the upland depression has permanent water, install wood duck boxes with predator guards. To improve nesting habitat around permanent water, plant the perimeter to water tolerant trees, shrubs, or tall grasses, such as switchgrass. Fencing to exclude livestock may be desired.

Managing Cropland

Install water control structures in fields, if feasible, to allow for water manipulation and/or for erosion control. After harvesting rice, soybeans, or grain sorghum (or in years when the field is idle) roll or lightly disk several one to three-acre portions of the field. This creates "holes" for ducks and geese to get started. In late August or September, close levees and catch rainwater and/or pump water to a shallow depth of 12 inches or less. Ideally, progressively flood a portion of the field at two to four week intervals. Leave the field flooded until the end of March, or as long as possible, until spring land preparation is necessary.

Some areas on the farm that will not be flooded could be planted to ryegrass or winter wheat in the fall for geese. If you are located where mottled ducks nest and have idle fields that tend to hold water, delay disking these areas and leave a 100 foot perimeter not disked or disturbed until July 1.

Ducks will benefit a rice farmer by eating weed seed as well as red rice that can significantly reduce red rice problems.

Managing Coastal Marshlands

If needed, install water control structures to manipulate water or to control intrusion of saltwater. Where necessary, construct small embankments to hold shallow water on natural marshes. Consult your Natural Resource Conservation Service representative prior to beginning construction. Several state and federal laws may apply. When summers are sufficiently dry to allow seedbed preparation, plant some areas to winter wheat or ryegrass in the fall for geese. Poor waterfowl food plants such as giant cut grass, maidencane, or cattails can be plowed or disked out if the marsh dries naturally. These areas can then be planted to choice duck foods if they do not return naturally. Cattle grazing can be used to control unwanted plants such as cutgrass and maidencane. Carefully monitor grazing to encourage the growth of quality waterfowl food plants. Burning or mowing dense native vegetation in the fall can increase open water areas in those years when dry conditions permit. Be sure to follow the Texas Commission on Environmental Quality rules regarding burning and US Fish and Wildlife Service regarding illegal baiting activities.

Managing Farm Ponds

Select areas with existing shallow flats or construct shallow areas around existing ponds. Install a water control structure to allow for water manipulation. Trap rainwater in the fall, winter, and early spring. Drain the shallow water during early spring. Water deeper than six feet can be left for recreation, fish production, or livestock water. When the shallow areas dry, they may need disking to encourage the growth of quality waterfowl plants. Leave a 50-foot wide strip of natural or planted tall grasses around the perimeter to provide nesting habitat for mottled ducks. Wood duck nest boxes can be erected.

These recommendations are made to cover a variety of common situations found in Texas. Consult your Natural Resources Conservation Service representative to get specific advice on your individual situation.

Waterfowl Identification

Waterfowl identification is not easy. It requires effort. The more often a species is identified, the more readily its characteristic flight and plumage can be recognized in the future. To be an effective waterfowl hunter, the correct identification of species is a must.

Wildlife Biological Facts - Question 3

Examples: Questions during the actual competition may include, but are not limited to the following examples.

Directions: Place an **X** beside the correct answer.

1. The lesser snow goose has two color phases: the blue goose and the snow goose.

   (A) Yes (B) No

2. "Puddle Ducks" prefer what depth of water?

   (A) 6”-18" .(B) 18”-24" (C) 24”-36"

3. Wetlands furnish four of the major requirements for waterfowl: food, water, resting and _____ places.

   (A) Roosting (B) rafting (C) nesting

4. Estimates of irreversibly altered or destroyed wetlands in the 48 continental states have already reached _____percent.

   (A) 10 (B) 20 (C) 30 (D) 40 (E) 70

5. What percent of the U.S. population lives in the counties bordering the oceans, the Gulf of Mexico, and the Great Lakes?

   (A) <30 (B) >50 (C) >70

6. "Puddle Ducks" do not have which of the following characteristics?

   (A) legs near center of body (B) hind toe lobed (C) spring into the air on take off

7. Female (hen) ducks have brighter body colors than males (drakes).

   (A) True (B) False

8. A drake mallard duck’s voice has a low raspy rink sound, while the hen mallard has a loud resonant quack or quacks.

   (A) True (B) False

9. What percent of the nation's bottomland hardwoods have been lost?

   (A) < 25 (B) < 40 (C) > 50 (D) > 60

10. Blackbellied whistling ducks are diving ducks.

    (A) True (B) False

Wildlife Habitat Evaluation - Question 4

When identifying plants to determine if food is adequate or deficient, consider plants of all sizes that are rooted in the same flagged plot.

(Habitat Requirements)

Wildlife	Element	Needs
White-tailed Deer Mule Deer	Food	An abundance and diversity of forage plants within reach.
	Cover	Presence of escape cover and protection from the elements.
	Water	A reliable year-round water source.
Pronghorn Antelope	Food	Abundance of forbs and browse.
	Cover	Small brush species are used for fawning cover and protection in the winter from wind and snow.
	Water	Will use livestock watering facilities.
Javelina	Food	Abundance of prickly pear and other cacti.
	Cover	Large amount of dense brush and cacti.
	Water	Not a factor if prickly pear is abundant.
Squirrel	Food	Abundance and diversity of hard mast producing trees. Presence of soft mast producing trees and shrubs.
	Cover	Trees
	Water	Seldom a limiting factor.
Bobwhite Quail	Food	Abundance and diversity of grass and weed seed. Well distributed bugging areas.
	Cover	Bunch grasses, bare ground, some woody cover.
	Water	Can be a limiting factor.

Wildlife	Element	Needs
Scaled Quail	Food	Abundance and diversity of grass and weed seed. Well distributed bugging areas.
	Cover	Sparse vegetation and abundance of bare ground. Low growing woody brush and cactus.
	Water	Available water is a limiting factor.
Ring-necked Pheasant	Food	Croplands where grain crops are grown. Corn, wheat, grain sorghum.
	Cover	Adequate cover is needed for brood rearing, winter protection, and protection from predators when feeding.
	Water	Usually not a problem but can be a limiting factor associated with irrigated croplands and playas.
Wild Turkey	Food	A variety of hard and soft mast producing trees and shrubs. Diversity of forbs and grasses. Well distributed bugging areas.
	Cover	Mix of grassy openings. Mature stands of trees for roosting with good visibility in understory. Some brush for escape cover.
	Water	A reliable year-round water source.
Mourning Dove	Food	Presence of seed producing plants. Agriculture crops, especially cereal grains, are utilized.
	Cover	Trees and brush. Can be scattered to dense. Feeds in areas with bare ground.
	Water	Seldom a limiting factor because of mobility.

Wildlife	Element	Needs
Waterfowl	Food	Abundance of choice foods available during season of use.
	Cover	Enough cover to meet the needs of the target management species.
	Water	Enough to meet the needs of the target management species during the season of use.
White-winged Dove	Food	Presence of grass and forb seed-producing plants. Agriculture crops, especially cereal grains, are important.
	Cover	Trees and brush. Has adapted to residential shade trees. Feeds in areas with bare ground.
	Water	Seldom a limiting factor because of mobility.

Forb, Woody and Grass Species used As Food Found in Evaluation Area

North — East

Elm	D		T
Bumelia (Chittumwood)	D	Q	T
Sida	D		
Greenbriar	D		
Honey Mesquite	D	Q	T
Texas Wintergrass	D		
Western Ragweed	D	Q	T
	7	3	4

Elm	D		T
Bumelia (Chittumwood)	D	Q	T
Sida	D		
Greenbriar	D		
Honey Mesquite	D	Q	T
Texas Wintergrass	D		
Western Ragweed	D	Q	T
Prickly Pear	D	Q	T
	8	4	5

Elm	D		T
Sida	D		
Greenbriar	D		
Texas Wintergrass	D		
Western Ragweed	D	Q	T
Prickly Pear	D	Q	T
Live Oak	D	Q	T
Post Oak	D	Q	T
	8	4	5

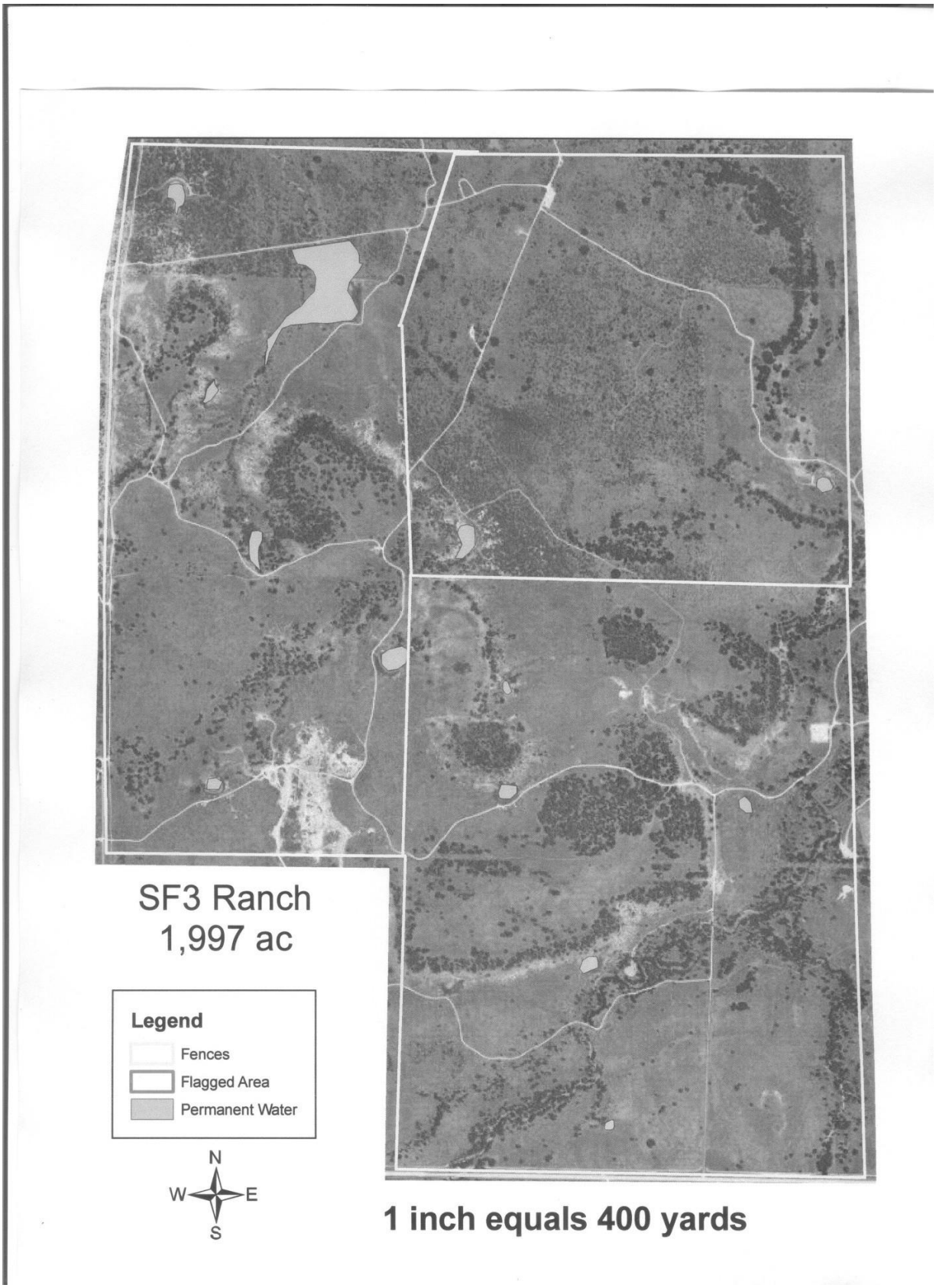
Elm	D		T
Sida	D		
Greenbriar	D		
Honey Mesquite	D	Q	T
Texas Wintergrass	D		
Western Ragweed	D	Q	T
Live Oak	D	Q	T
Post Oak	D	Q	T
	8	4	5

West — South

D = Deer
Q = Quail
T = Turkey

Food Evaluation - Divide plot into four parts. List food plants by species in each quarter plot. If four preferred plants are found in at least three of the four plots then food is adequate for that species.

Food Evaluation Plot Results
Deer = Food is Adequate
Quail = Food is Adequate
Turkey = Food is Adequate


SF3 Ranch
1,997 ac
Legend
Fences
Flagged Area
Permanent Water
N
W
E
S
1 inch equals 400 yards

Wildlife and Habitat Management - Question 5

The following management practices and their effects are used throughout the state. Complete discussion of each practice in presented in this section. Management practices are identified to the region in which they are used. If a practice is in **bold** print, it is on the state list.

Management Practice **Effects**

1. **Animal Damage** - Control of pests that are causing extensive damage to target species. All regions

2. **Population Management** - Determines population characteristics and sets harvest conditions and rates. All regions

3. **Brush Management** - Maintenance and creation of diverse habitat types. All regions

4. **Cropland Management** - Manages cropland to provide food and/or shelter. Regions I, II, III, and V

5. **Food Plots** - Supplements nutritional needs. Provides food source during stress periods. All regions

6. **Grazing Management** - Provides for adequate food, cover, and water for wildlife and livestock. All regions

7. **Prescribed Burning** - Controls underbrush. Makes browse more accessible. Encourages growth of annuals, grasses and vines. Increases palatability and quality of forages. All regions

8. **Provide and Manage Water** - Provides drinking water and/or habitat water for target species. All regions

9. **Range Planting** - Provides diversity of plants. Replaces plants that have been removed. Regions I, II, III, and V

10. **Disking** - Encourages growth of annuals, particularly forbs. Exposes bare ground for feeding and movement. Regions I, III, IV, and V

11. **Overseeding Legumes** - Provides additional seed, forage, and/or bugging area. Regions III and IV

12. **Thin Timber** - Encourages growth of young browse plants, annuals and grasses. Encourages development of mast producing plants and vines. Creates openings. Region IV

13. **Retain Large Hardwoods** - Retains mast producing trees. Retains potential den trees. Region IV

14. **Streamside Management Zones** - Provides areas for cover and escape. Maintains large mast producing den trees. Protects water resources. Region IV

15. **Playa Lake Management** - Provides cover, water, and food. Region I

16. **Cover and Windbreaks** - Provides cover, food, and shelter. Region I

17. **Residue Management** - Leave waste grains on soil surface. Provides protection from predators and weather. Region I

18. **Clearcut Patches in Timber** - Creates openings. Encourages growth of young browse plants, annuals and grasses. Encourages development of mast producing shrubs and vines. Region IV

19. **Deaden Hardwoods** - Encourages growth of young browse plants, annuals and grasses. Encourages development of mast producing plants and vines. Creates openings. Region IV

20. **Leave Unmowed Strips** - Provides sources of seed producing plants. Provides escape cover. Region IV

21. **Construct Firebreaks/Access Roads** - Provides access where needed. Improves fire protection. Creates openings.

Wildlife Management Practices (Topic No. 8986-C), available from AgriLife Learn, is a reference that can aid in the training of team members in this question area.

ANIMAL DAMAGE

This wildlife management application applies to all regions and state.

Definition: The control, not elimination, of pests that are causing extensive damage to target species.

Wildlife management is often thought of as protecting and providing habitat for wildlife populations. Predator or exotic wildlife species at one time or another may require control actions to reduce their predation or competition with target species or their habitat. Wildlife damage control is an increasingly important part of the wildlife management profession because of expanding human population and intensified land-use practices. Wildlife damage control activities must be based on sound economic, ecological, and sociological principles and carried out as positive necessary components of overall wildlife management programs.

Research indicates “prey” species are controlled by “predator” species in some situations. In other situations, predators do not control the prey. Many factors may impact predator-prey relationships. Wildlife population numbers are constantly changing based on weather, habitat, land use, or hunting. As an example, coyotes may provide natural control in an unhunted deer herd. In this situation the coyote/deer predator-prey relationship may reduce extreme fluctuations in deer populations. If predators are removed or controlled in an ecological system, then other control programs are required to maintain animal populations within carry capacity.

Management Benefits of Wildlife Damage Control

A management plan may focus on one or more species. An example would be deer and quail. In this example, the wildlife manager works to maintain deer and quail numbers at a “Maximum Sustained Yield.” This means the manager wants to keep the two species at the maximum population numbers possible with regard to animal health (antler production for deer and bird numbers for quail).

A variety of birds, mammals, and domestic species cause problems for wildlife managers. Many times a pest problem is created by human non-native land use activities such as livestock, introduced plants, introduced “exotic” animals, and cropland practices.

Wildlife Damage Control as a Management Tool

Wildlife damage control programs can be thought of as having four parts

- Problem definition
- Ecology of the problem species
- Control methods application
- Evaluation of control

Problem definition refers to determining the species and numbers of animals causing the problem, the amount of loss or nature of the conflict, and other biological and social factors related to the problem.

Ecology of the problem species refers to understanding the life history of the species, especially in relation to the conflict.

Control methods application refers to taking the information gained from parts one and two to develop an appropriate management program to alleviate or reduce the conflict. Control of these species, except domestic dogs, is commonly done with traps, M-44 ejector devices, snares, and hunting. The control of these predators can increase revenue to the wildlife manager. The sale of pelts and hunting rights can increase the economic gain to a landowner from pest species.

Evaluation of control allows an assessment of the reduction in damage in relation to costs and impact of the control on target and non-targeted populations and the environment.

Common Pest to the Wildlife Manager

Blackbirds and Starlings

The term blackbird loosely refers to a group of about 10 species of North American birds. Together, blackbird depredations on crops planted for target game species can be enormous. Quail and waterfowl food plots are often severely damaged by these pests.

Propane cannons are the most common method of controlling blackbirds and starlings. The noise from the cannon frightens the birds.

Hawks, Owls, and Eagles

Animal damage control programs remove animals that are impacting wildlife populations or land use activities such as livestock and cropland practices. Hawks, owls, and eagles are protected by state and federal laws and may not be killed. Each can cause loss of wildlife species, but they also benefit the natural ecosystem through rodent control. Hawks and owls will prey on quail, turkey, and pheasant. Eagles will kill young fawns. If cover is a limiting factor, a manager can reduce loss of game animals by maintaining adequate grass and brush cover through management practices such as grazing, brush control, range planting, and prescribed burning.

Coyote, Fox, Bobcat, Domestic and Feral Dogs, Mountain Lion, and Feral Swine

These predators prey on animals ranging from big game and livestock to rodents, wild birds, and poultry.

The coyote is considered the most common and most serious predator of livestock and wildlife in Texas. Coyote numbers have been increasing in Texas. Around many domestic sheep and goat growing areas, coyotes are strictly controlled, but with great effort.

Coyote hunting using mouth calls, recordings, and howlers is a sport enjoyed by many sportpersons.

The red and gray fox are common in Texas. Their presence can go unnoticed unless you are a game bird manager with a high number of fox. The reduction of coyotes usually results in higher fox numbers. Fox may prey on waterfowl, turkey, and quail, as well as eating eggs.

Bobcats are opportunistic predators. They will prey on species ranging from mice to deer. Predation by bobcats is usually not a serious problem.

Domestic dog predation is common in many areas. Unknowing owners may leave for work in the morning and return at late evening to find their dogs, just as they left them, in the yard. These dogs may have been running game throughout the day. Loose dogs and cats are known to chase and catch game animals.

Feral dogs should be placed in the same category as coyotes. They are efficient predators and will readily cross with coyotes.

The mountain lion is a symbol of wilderness to many people. Lion numbers are on the increase in Texas. This large predator will prey largely on deer. However, cattle, horses, sheep, goats, and hogs are also part of the mountain lion's diet.

Feral swine, also known as feral hogs, wild hogs, or Eurasian boar are an invasive species and are not native to North America. They are increasing in numbers and they are the focus of increased control efforts. However, hog hunting is also a popular sport in some areas and they provide a lean meat that is popular.

Feral Swine feed primarily on grasses, forbs, roots, fruits, and invertebrates with use varying depending on the time of the year. Feral swine rooting and wallowing can impact native vegetation and wetlands in localized areas. Some areas with high feral hog numbers may see extensive damage and habitat destruction. They can compete with javelina for food and space. They can destroy nests and eat the eggs of turkey and quail. Feral swine may also take some white-tailed deer fawns.

Skunk and Raccoon

Skunks are members of the weasel family. Skunks are disliked mainly because of their egg eating habits. Raccoons are omnivorous, eating both plant and animal foods. Raccoons are not particular about what they eat. Wildlife managers get to

know the raccoon at an early age. Nothing is protected from raccoon predation. They feed on food plots, wildlife feeds and baits, eggs, young birds, and ducklings.

Population Management

This wildlife habitat application applies to all regions and state.

Definition: The monitoring of birth rates, death rates, and sex ratios through surveys and applying harvest recommendations based on the population characteristics.

Wildlife management can be divided into two major components: habitat management and population management. Quality habitat is the key to maintaining healthy wildlife populations. Good quality habitat will provide the wildlife manager with more options than an area with poor habitat. Population management determines the population characteristics of a group of animals, the interactions between animals and their environment, and sets guidelines or limits on numbers available for harvest. Population characteristics include density, birth rate, death rate, age structure, and sex ratio. Density is the number of animals per unit area usually expressed as 1 deer per 20 acres or 3 quail per acre. Changes in density, age structure, and sex ratios are related to natural mortality and hunting pressure. A manager uses this information to set population goals and harvest recommendations for a population of animals. Population management may require an increase or decrease in the number, sex, or age of animals harvested or a halt to hunting.

Good habitat and population management should have stated goals and lead to improved production, increased survival, balanced age classes, increased body size, and for deer an increase in antler measurements. Collecting data on the animal or population of interest should be a priority. An incomplete understanding may occur if you are expecting a few observations to provide an unreasonable amount of information about a population. Good population management decisions are based on the quality and quantity of data.

White-tailed Deer

Population density data may be collected by performing helicopter surveys or spotlight surveys, with additional daylight herd composition count used to determine sex ratios and fawn survival. Helicopter surveys do not work well in areas with a canopy of large trees or dense stands of timber and brush. They do provide good buck:doe ratio and fawn survival data. The expense of a helicopter survey may be higher than using a spotlight survey. Spotlight surveys are easy and provide good deer density data, but do not work as well for buck:doe ratios and fawn survival. Consistent year to year data collection provides the manager with changes in herd composition between years. Harvest recommendations are adjusted each hunting season based on density and composition counts. For quality management harvest rates should maintain a sex ratio of 1 buck for each 1 to 2 does or less. Proper herd management may allow harvest of between 10 - 25 % of bucks and does. Harvest rates should consider deer density, fawn survival, and sex ratio and how they correlate to increasing, decreasing, or maintaining the population.

Collection of harvest data provides information on the age, size, and condition of individual animals and the population overall. The manger can determine if the goals and objectives of the management plan are being met and if adjustments need to be made. Harvest data should include date, location, sex, age, weight, condition, number of points, basal circumference, inside spread, and length of beam. The Boone and Crocket scoring system may be used for additional antler measurements.

Quail

Estimating quail numbers can be inaccurate, expensive, and time-consuming. The line transect method is the best current method. Recommendations include 4 permanent 1- mile-long transects for each 640 acres and each line should be walked at least 3 times prior to calculating an estimate. Drive counts and whistle counts are also used to estimate numbers. Each of these surveys should be used to provide trends in the quail population from year-to-year. Harvest records should include the sex, number of quail taken, and the number of adult and juveniles in the bag. Research suggests the annual bobwhite harvest should be no more than 25-45% of the fall population. During drought years the harvest should be reduced to 10-20% of the fall population.

Turkey

Line transects and winter roost counts are used to estimate turkey numbers. Large numbers of birds congregate on winter roosts and turkeys can be counted as the birds leave the roost or when they return to the roost in the evening. Long term population trends, production, and sex ratios should be used to set yearly harvest quotas.

Production and sex ratio information can be obtained from observations (referred to as hen/poult counts) in July and August. The annual quota should be flexible enough to adapt to changing environmental conditions such as drought or abundant rainfall. A ratio of 3 poults per hen is considered good production and less than 2 is considered poor. An optimum sex ratio is 2 to 3 hens per gobbler. Harvesting 10% to 20% of the gobblers annually is a conservative approach. This recommendation may increase or decrease based on long-term population trends and production.

Pronghorn Antelope

Population estimates are obtained during aerial surveys conducted in June and July by Texas Parks & Wildlife Department. Information is recorded by herd units on the total population, buck:doe ratios, and fawns per doe. Harvest recommendations are made to the landowners based on these surveys.

Mule Deer

Mule deer density may be determined using aerial surveys from a fixed-wing aircraft, helicopter, spotlight counts, and supplemented with daylight herd composition counts. A buck-doe ratio of 1:3 is desirable if the population is stable and within carrying capacity. Fawn production and survival is low in desert environments and more does may be necessary to maintain the population.

BRUSH MANAGEMENT

This wildlife habitat application applies to Regions I, II, III, V, & state.

Definition: Removal, reduction, or manipulation of woody plants.

Brush management may be applied to

- Restore natural plant community balance
- Create a desired plant community
- Reduce competition for space, moisture, sunlight, and nutrients between desirable and undesirable plants
- Manage invasive woody plants
- Restore desired vegetative cover to protect soils, control erosion, reduce sediment, improve water quality, and enhance stream flow
- Maintain or enhance wildlife habitat
- Improve forage accessibility, quality, and quantity for livestock and wildlife
- Protect life and property from wildfire hazards
- Improve visibility and access for handling livestock

Brush management is applied on rangeland, native pastureland, and pasture and hayland where removal or reduction of excessive woody plants is desired. These practices can be expensive.

Methods of Brush Management

Methods of brush management include mechanical treatments, herbicide applications, and biological control. Often a combination of treatment methods is necessary to achieve the desired objectives.

Mechanical treatments normally require the use of a crawler type tractor with implements to doze, grub, chain, root plow, rake, or roller chop. The specific treatment used is dictated by landowner objectives, target species, brush density, brush growth characteristics, soils, topography, associated plant species, and management capabilities.

Herbicide treatments are applied as aerial foliar sprays or granules by airplane or helicopter, as foliar sprays by ground applicators, individual plant treatment as either foliar spray, stem treatments, or spot on soil treatments. Herbicides for brush management are constantly changing as new chemicals or mixtures are brought to market. Check current recommendations from the Natural Resources Conservation Service, Texas Parks & Wildlife Department, or the chemical companies.

Each herbicide or herbicide mixture has a manufacturers label approved by the Environmental Protection Agency (EPA) that specifies the plant species that the herbicide is effective on, the application rate, the time or season of application, mixing and application instructions, and any safety or environmental hazard precautions. Herbicide labels should be strictly followed.

Biological Treatment

Biological treatment of brush involves the use of goats to defoliate the woody species by concentrated grazing. The treatment area is stocked with enough goats to defoliate at least 85 percent of the woody vegetation. Goat herd treatment normally requires grazing the treatment area for 30 days, removal for 30 days, and resumed grazing for 30 days. This sequence of browsing and rest is maintained throughout the growing season and applied for three consecutive years in most cases. Goating is almost always a companion or follow-up practice to one of the above mentioned brush management practices. Goats are not selective browsers or grazers. From a wildlife management perspective, goating may be a least desired alternative. The degree of use needed to control brush species will usually cause overuse of browse, forbs, and grass important to wildlife species. White-tailed deer, turkey, quail, and javelina habitat may be severely degraded by goating.

Benefits to Wildlife from Brush Management

For the most part, wildlife populations benefit when a diversity of habitat types are present in their home range. Woody plants provide food and cover for deer, quail, turkey, dove, and javelina. However, these species also benefit from and require herbaceous habitat types for fawning and nesting, brood rearing, and the production of food in the form of forbs, hard seeded grasses, cacti, and insects. Carefully planned and executed brush management allows for the creation and maintenance of diverse habitat types.

Some specific benefits include.

- The ability to manipulate woody species to meet the needs of the desired wildlife species
- The ability to create a diversity of habitat types
- The ability to remove specific woody plant species
- The ability to create a desired landscape for management, aesthetics, hunting, etc
- The ability to improve the types, quality, and productivity of food producing plants

Some negative aspects of brush management are:

- Goating, prescribed burning, and broadcast foliar applied herbicides are nonselective and should only be applied after careful planning.
- Mechanical treatment generally produces major ground disturbances which retards succession and subjects soils to short term risk of erosion.
- Brush management can change the woody plant composition from one undesirable species to a completely new undesirable species or from one growth form (single stem) to a more undesirable growth form (multiple stems).
- Some brush management treatments such as root plowing will decrease plant diversity.
- Brush management often benefits some wildlife species at the expense of other species.

Other Associated Practices

As mentioned before, brush management is often a combination of treatments such as mechanical followed by goating or herbicides followed by prescribed burning. In addition, other practices may be needed to maintain habitats once a treatment has been applied. Range seeding with native species may be used following some forms of mechanical brush management such as tree dozing or root plowing. Prescribed grazing in the form of deferment, proper use, and planned grazing systems must be applied when livestock are present to prevent overuse of herbaceous plant communities and degradation of remaining woody habitats. Cross fencing and water development may be necessary to facilitate prescribed grazing. Population control of both native and exotic ungulates may also be necessary to prevent degradation of habitats.

Brush management is an important tool in the manipulation of wildlife habitat. Like any land management tool, it can be applied and have positive or negative effects. Any brush management done should be based on clearly defined objectives based on the desires of the land manager and the needs of the land and the wildlife populations that inhabit the area.

CROPLAND MANAGEMENT

This wildlife habitat application applies to all regions and state.

Definition: The utilization of agricultural and other practices to provide food, cover, and/or shelter.

Most wildlife species depend primarily on native lands such as forestland, rangeland, or wetland for their food and cover requirements. However, cropland can also be a very important source of food for certain kinds of wildlife when properly managed. Cropland fields that are interspersed with other kinds of land provide better habitat than vast expanses of pure cropland.

There are five basic ways in which cropland can be managed to favor wildlife.

- The choices of crops grown
- The harvesting of crops
- The plowing of crop stubble
- The intensity of weed control
- The growth of weeds and brush along field edges

Choices of Crops Grown

Crops can provide two basic categories of food for wildlife: green leafy forage and seed. The following chart indicates the major crops that are utilized by certain game species.

	Wheat	Oats	Sorghum	Corn	Rice	Peanuts	Soybeans	Sunflower
Deer	x	x	x	x		x	x	
Pronghorn	x	x						
Javelina				x		x		
Squirrel				x		x		x
Quail	x	x	x	x	x		x	x
Pheasant	x		x	x	x	x	x	x
Turkey	x	x	x	x		x	x	x
Dove	x	x	x	x	x		x	x
Waterfowl	x	x	x	x	x	x	x	

Harvesting of Crops

For wildlife that consume seeds, the harvesting of seed crops removes most of the potential food source. Farmers who allow several rows of seed crops to remain unharvested can greatly increase the amount of food for game birds. The unharvested rows can be left around the perimeter of the field, next to cover to favor quail, turkey, or pheasants. They can also be scattered throughout the field to provide food for dove and waterfowl. **Caution, this practice could be considered baiting. It is an approved practice, but only when hunting over the area is prohibited.**

Plowing of Crop Stubble

When a crop is harvested, a certain portion of the seed is accidentally scattered on the ground. This is called waste grain, and it is beneficial to birds. Many farmers have traditionally plowed the stubble of crops as soon as the crop is harvested. If crop stubble is plowed with a disk or moldboard, most of the waste grain is buried and not available to birds. By delaying the plowing of crop stubble, farmers can increase the length of time that birds have access to waste grain. By plowing with a chisel plow instead of a disk or moldboard, more waste grain will be left on the soil surface. In addition to waste grain, crop stubble left standing also provides needed cover for birds such as quail, pheasant, and turkey.

Brush and Weeds Along Field Edges

Many farmers prefer to keep their fields neat and clean and do not allow weeds and brush to grow along the edges of fields. Wildlife will benefit if a band of brush or weeds is allowed to grow around the perimeter of a field. This narrow band can provide nesting cover for quail, dove, turkey, and pheasant. It can also provide escape cover and a stable food supply for birds.

Weed Control

In order to make good crops, farmers cannot allow weeds to dominate their fields. However, many cropland weeds are good food sources for wildlife, especially birds. Farmers who will tolerate some weeds to grow in their crops will provide better wildlife habitat. Some cropland weeds are beneficial to wildlife (i.e., pigweed, buffalobur, ragweed, sunflower, lambsquarters, doveweed, spurge, smartweed, pricklypoppy, partridge pea, Johnsongrass, foxtail, barnyardgrass, and annual panicum).

FOOD PLOTS

This wildlife habitat application applies to all regions and state.

Definition: To provide quality supplemental food supplies to ensure an adequate diet and to decrease nutritional deficiencies during stress periods for wildlife.

Generally, whenever food plots are mentioned in Texas, most think of scattering oats or wheat around a deer hunting stand and top dressing with a sack of fertilizer & disking them into the ground. In most cases this is "baiting" not supplemental feeding. Baiting is used to draw game to an area where adequate numbers of animals can be harvested to maintain the health of the herd or flock. Many think that these so called "food plots" and "corn feeders" add substantially to wildlife nutrition. Usually this type of supplemental feeding provides only a fraction of dietary needs. Before beginning any food plot program, the numbers of a wildlife species must be within the average carrying capacity of the ecosystem that is occupied. If wildlife numbers already exceed the food supply available, a food plot program will only amplify the problem. Food plots can be expensive and well-managed native range can provide the necessary nutrition. Planting food plots is not a replacement for poor habitat management.

Benefits to Wildlife from Food Plots

Deer

Deer in Texas may have one major stress period from late summer/early fall and a minor stress period from later winter/early spring. Habitat management is the most important factor in the management of deer. Whether the vegetation is maintained or abused will determine the nutritional impacts on deer. Nutritional requirements of deer vary with age and time of year. The protein requirement of a weaned deer fawn is believed to be about 13 to 20 percent. Adult deer can be maintained with a diet as low as 4 percent Crude Protein and can meet growth requirements with as little as 10 percent C.P. Deer can "get by" with very little protein in the winter. Pregnancy does not increase the need for protein. Antler production requires protein in that the velvet antler before it mineralizes is made almost entirely of a protein called collagen. The hardened deer antler is about 22 percent calcium, 11 percent phosphorus, and about 45 percent protein.

Lactation places the greatest demand on a deer for protein. Average doe milk is 8.2 percent protein - about twice that of cow milk. Does lacking in protein will probably not give lower quality milk, but they produce less milk. Research has proven that body growth takes precedence over antler growth, so if protein is in short supply, the deer will have smaller antlers. Deer require a 13 to 16 percent protein diet for optimum antler development. (Robert D. Brown, 1996, Texas A&M)

Quail

Food plots may: 1) improve inferior habitat, 2) carry birds through weather emergencies, 3) supply essential nutrients at specific times, and 4) concentrate birds for hunting. However, food plots are not dependable in areas with less than 25 inches of rainfall and there are no studies to indicate the use of food plots increase quail populations.

The following should be considered if food plots are included in a management plan. Food plots should: 1) be adjacent to woody escape cover, 2) be long and narrow to create edge and maximize interspersion of habitat types, 3) provide one acre of food plot for each 20 to 40 acres of rangeland, and 4) be planted with adapted plant species. Quail will eat the seeds produced by food plots, the green leaves, and of tremendous importance, the insects that are present. Seeds that have hard seed coats are of most importance. Some legume seed have seed coats that will last for months and even years without deteriorating or sprouting. Vetch is an example.

Pheasant

Food plots for pheasant can be as simple as leaving unharvested areas in crop fields. These “leave” areas should be close to connecting cover. Food plots can be planted in a variety of crops such as corn, wheat, and alfalfa.

Turkeys

Turkeys are similar to quail in food plot needs. Turkeys do not require the overhead cover but it may be present. Green leaves, seed, and insects are all used. Again, hard seed crops are important. Turkeys will utilize more dense stands of vegetation than quail.

Dove

Mourning doves are a here-today-gone-tomorrow species. Any change in weather in the fall may send them south, leaving behind abundant food supplies. Doves prefer areas with sparse ground cover with or without overhead cover. Most food plots for dove are mowed (shredded) or lightly disked after they mature to invite the birds. Food plots are important in late winter when seed that have not deteriorated may be hard to find. Again, "hard seeded" crops are preferred.

Waterfowl

Ducks and geese are attracted to a crop field of grain and wheat. Unharvested areas can be left and food plots can be planted. Playa Lakes can be managed for waterfowl foods by developing irrigation systems that make use of existing adjoining cropland systems.

Planning Food Plots

Location, Shape, and Size

The location of food plots will determine the success of the manager's efforts. For deer, quail, turkey, and pheasant the site selected must have easy access from a travel corridor. The amount of use is determined by the ease that these species can enter the plot. Areas should have soils that are suitable for tillage and flat slopes to prevent erosion. Planting with no-till drills seeding into the existing sod allows seeding locations that are steep and/or have erosive soils.

The production of plots can be limited by existing trees/shrubs surrounding the site, averting much needed moisture and nutrients from the plantings. Trees provide unwanted shade and their roots extend out into plots. The surrounding trees can limit good growth from plantings for 30 to 50 feet from the edge. If you are clearing areas for plots, be sure to turn the plots east and west to allow for maximum exposure to sunlight. Plots can be irregularly shaped on land contours or rectangular.

Plots should be a minimum of one-half acre and up to three to five acres in size. Quail, deer, and turkey need a minimum of one to three percent of the habitat acres in food plots to be effective. Some deer managers strive for as high as eight percent.

Soils

The classification of the soil on a food plot will decide what plants will grow best. The soil texture and the wet/dry nature of the soil are extremely important in plant selection. An example is dry, sandy soils. These soils will grow hairy vetch but most clovers will do poorly. The Natural Resources Conservation Service (NRCS) offices are a good place to get soil, seeding rate, and depth of planting information.

Soil Testing and Fertilizer

A soil test is necessary if you are planning to plant more than one small food plot. You can guess at the lime and fertilizer rate but the cost of a soil test is about equal to a bag of fertilizer. The soil sample should be sent to the lab with an explanation of what crops are to be grown. Different crops require totally different fertilizer and lime rates. An example is for legumes such as sweet clover. Clovers require high amounts of phosphorous and potash but too much nitrogen is actually harmful for optimum performance. Soil test bags and "how to" information can be obtained from the NRCS or Extension Service.

Fertilizer is usually applied at planting and is disked into the soil. It may be applied as a top dressing to provide additional fertility to the soil as the crop grows.

Legumes

Some of the more common legumes are clovers, vetches, and peas. Legumes are very high in protein. Legumes are a wonder of nature. They have the ability to extract nitrogen from the air and store it in the roots, stems, and leaves. The root systems of legumes have a relationship with a unique type of bacteria. These specific bacteria grow on the roots of legumes and produce nitrogen. The bacteria form nodules (knots) on the legume roots. A specific bacterium is used to inoculate each legume prior to planting. A commercial sticker will cause the bacteria to adhere to the seed.

Seedbed Preparation

The tillage of the soil prior to planting is necessary for many crops. Disking should be done several weeks prior to planting if there is a large amount of vegetation to be turned under. This will allow time for the material to rot or melt down before planting. If soil moisture is of importance (dry times), disking and getting a rain before planting is best. A lot of moisture is lost when soil is tilled. Dragging a harrow, pipe, or log behind the disk will help smooth the field. Disking should be a depth of six inches or more. It is important to attempt to kill or set back weed competition.

Planting Method

Each seed size has a different planting depth. Small seeds are usually placed close to the soil surface and are covered around one-fourth inch deep. Larger seed such as peas or corn can be buried over one inch deep.

It may be necessary to plant large seeded crops first and then plant small seeded crops on the soil surface. Larger seeds can be lightly disked into the proper depth. Next, the small seed such as clovers can be broadcasted on the soil surface and dragged or rolled to cover.

Commercial drills are an excellent method of planting. Drills can be set to plant seed at the proper depth. Drills with a small seed attachment can be used to drill in large seeds while planting small seeds near the surface. No-till drills can plant directly into sod.

Most seed can be broadcast planted. The disadvantages of broadcast seedings are (1) not as uniform as drilled seeding, (2) small seed/large seed mixtures cannot be used, and (3) the possibility exists of damaging the seed coat on softer seed. The advantage of broadcast is the fact that seed can be mixed with fertilizer and both done in one trip. Legume seed can be mixed with fertilizer if a commercial sticker is used and the seeds are planted in the time interval stated on the sticker package. Fertilizer will kill unprotected inoculants.

Food Plot Management

A crop with a long maturity, such as corn, may need additional fertilizer applied. There are times that insects can attack crops and they must be sprayed for control. Most food plot plantings require little care after planting.

If clovers and vetches have produced good seed crops the previous growing season, a light disking and fertilization may be all that is required for the next year crop.

Fall deer food plots sometime grow tall and rank before being used by deer. It may be necessary to shred off the excess growth so tender shoots will emerge.

Selection of Crops to Manage

Bobwhite Quail - Mourning Dove - Turkey - Pheasant

One must remember that the more successful food plots are those that are managed for native plants. Common Sunflower is an example of a native plant that can be introduced if not on a specific site. Food plots can be constructed by simply disking and/or prescribed burning sites. Disking at different times of the year results in the growth of different native plants. The goal is to have a dependable year round supply of foods.

Native plants	Introduced plants
Annual sunflower	Alfalfa
Broomweed	Clovers
Croton	Corn
Dayflower	Johnsongrass and sorghum alum
Hackberry	Sesame
Illinois bundleflower	Sorghums (hard seeded)
Ragweed	Sunflowers (small seeded)
	Vetches (hairy, bigflower)

Waterfowl

Again, native plants are an excellent option for waterfowl. Waterfowl diets vary between species. Some waterfowl prefer deepwater habitats that have plants such as watermilfoil and coontail. Shallow water habitats can consist of plants grown in a permanent water or native plants and crops flooded after they have matured. "Moist Soil" management is another excellent way of growing native food plants. Moist Soil areas are usually kept in a moist but non-flooded condition to encourage specific plants to grow and then flooded during fall and winter. Still another food plot method is growing crops like corn or ryegrass and never flooding. Methods for managing waterfowl food plots are many and should be tailored to the species that is to be attracted.

Common Native plant	Introduced Crops
Smartweed	Corn
	Japanese millets
	Oats
	Sorghums
	Wheat

Deer

Deer will benefit from native plants that have been cultivated by disking and/or prescribed burning fields. Many of the forbs (weed-like plants) used by quail, dove, and turkey will be grazed or browsed by deer. It is common to see deer in hay fields and pastures feeding. The deer are mainly feeding on the multitude of little forbs (i.e., ragweed, henbit) and not the grasses. Again, burning and disking at different times and seasons of the year cause different forbs to grow.

Common Crops for Deer

Warm Season	Cool Season
Alfalfa	Clovers
Corn	Elbon rye
Grain sorghums	Oats
Millets	Wheat
Peanuts	
Sunflowers	

GRAZING MANAGEMENT

This wildlife habitat application applies to all regions and state.

Definition: The manipulation of grazing and browsing animals to accomplish a desired result on rangeland, pastureland, grazed forest land, native pasture, hayland, and grazed cropland.

Grazing livestock can be either good or bad for wildlife depending on how the grazing is managed. Some kinds of grazing may be good for certain kinds of wildlife and bad for others. If a livestock producer is interested in wildlife, there are grazing methods that can be used to favor the preferred wildlife.

The grazing management decisions that affect wildlife are:

- stocking rate
- kinds of livestock
- pasture rest

Stocking Rates

The stocking rate of livestock in a pasture is extremely important to the quality of wildlife habitat. The stocking rate is the number of livestock grazed on a unit of land for a specified period of time. Stocking rate is usually expressed as the number of acres for one animal unit for one year. An animal unit is the equivalent grazing of one 1,000-pound cow and her calf. Two 500-pound steers would equal one animal unit. Five sheep or six goats would equal one animal unit. The amount of forage it takes to support one animal unit for one year is about 9,500 pounds dry weight. The correct stocking rate will keep the pasture healthy and the plants strong. It will prevent or minimize erosion and provide needed wildlife habitat.

A proper stocking rate will leave enough vegetation ungrazed to provide cover and food for wildlife. The heavier the stocking rate, the less vegetation will be left over for food and cover for wildlife. The lighter the stocking rate, the more vegetation is left over at the end of the year. However, too much ungrazed vegetation can be detrimental to good wildlife habitat.

Land is overgrazed when stocking rates are too heavy. Overgrazed pastures often lack enough grass for nesting cover for quail and turkey. Overgrazed pastures may also lack enough grass for deer to conceal their fawns. When a pasture is too heavily stocked, there may also be a lack of food for certain kinds of wildlife.

When pastures are ungrazed or stocking rates are too light, the land can become overgrown with too much vegetation. Too much grass can inhibit small birds such as quail from traveling and finding seed. Too much grass can also decrease the amount of forb growth.

Kinds of Livestock

The kinds of livestock grazed will make a difference in the quality of habitat provided. Cattle are primarily grass eaters and normally eat only minor amounts of forbs and browse. Goats prefer to eat browse plants. Sheep prefer forbs, but they will also eat lots of grass. If a rancher is interested in providing the maximum amount of deer food, grazing with goats or sheep is not recommended. Deer eat the same kinds of food as goats and sheep. The more goats or sheep that are in a pasture, the less food is available for deer. Deer numbers and deer quality will often decline in pastures grazed with sheep or goats due to competition for food. A rancher would want to graze the proper number of cattle, since cattle only eat minor amounts of browse and forbs. Furthermore, a rancher interested in providing the best quail habitat possible may not want to graze with sheep. Quail rely heavily on the seeds of forbs for their food supply. Allowing sheep to graze results in fewer forbs left to produce seed.

Pasture Rest

Pastures need to be rested periodically from grazing to allow the best plants a chance to gain vigor and spread. Pastures grazed continuously year after year do not provide the best quality habitat. Grazing animals are selective in the plants they choose to graze. They will graze their favorite plants again and again if given a chance. If this continues, those favorite plants will become overgrazed and will eventually die. To give these favorite plants a chance to grow and thrive, livestock must be periodically removed from pastures. Ranchers can provide these needed rest periods by fencing property into smaller pastures and rotating one herd of livestock among two or more pastures. For example, a three-pasture - one-herd grazing rotation would group all livestock into one herd and move the herd among three pastures. This would allow two pastures to be rested at any one time while one was being grazed. Pastures might be grazed for two to three months and then rested for four to six months before being grazed again. Grazing rotations such as this will usually result in better wildlife habitat than continuously grazed pastures. Fencing and rotational grazing also allow ranchers to rest special areas such as turkey roosts and bottomlands during critical periods.

Another way to provide needed rest periods is to graze only during a portion of the year and then sell livestock or move them to another location. Resting pastures during the primary growing season usually favors wildlife the most.

Some pastures heavily grazed for long periods will benefit from prolonged rest periods of two to four years. This will allow stunted plants to regain vigor and allow new seedlings of desirable plants to re-establish.

Livestock Exclusion

Purpose

Livestock exclusion is designed to:

- protect, maintain, or improve the quantity and quality of the plant and animal resources;
- maintain enough cover to protect the soil;
- maintain moisture resources;
- increase natural beauty; and
- protect areas of endangered or protected plants and animals.

Where Applicable

Livestock exclusion is applicable only if the landowner or operator physically constructs or maintains a barrier necessary to exclude livestock. It is not applicable to areas where livestock is not normally present. This practice is not to be confused with Deferred Grazing (temporary removal of livestock).

Fenced food plots are an example of excluding livestock. Food plots are usually constructed to keep livestock out all of the time.

Some plants and animals do not coexist with livestock very well. The protection of the habitat needed for these species is afforded by livestock exclusion.

Livestock exclusion can be used when establishing various trees, shrubs, forbs, or grasses. Protection may be given for a growing season or for several years.

Livestock exclusion may be used to protect ponds, streams, and springs. Protection is provided to prevent soil compaction, stream bank erosion, loss of vegetation, and improve water quality.

PRESCRIBED BURNING

This wildlife habitat application applies to all regions and state.

Definition: Fire applied to a specific area, for a specific purpose, under exacting weather conditions to achieve specific management objectives.

Fire, both natural and planned, is a part of the ecological process under which many of the ecosystems of the state developed. Fire, used as a tool, can help to maintain or improve wildlife habitat. Other uses of prescribed burning include improving plant diversity, control of some undesirable woody plants, removal of grass "rough," improving browse production and others. Prescribed burning is an effective tool for removing dense growth and suppressing woody plant invasion from areas that were originally grasslands or savannas. Although any of these objectives could be accomplished by other means, it would be at greater expense than with controlled fire. Prescribed burning provides the manager with an effective and economical means of managing wildlife habitat.

Effects on Wildlife from Prescribed Burning

Burning in the grasslands of the state is generally credited with improving the habitat for wildlife. It is highly recommended in areas where juniper is or may become a problem and where prickly pear has invaded. The major wildlife species benefiting from the use of fire for habitat improvement are deer, turkey, quail, dove, and a variety of songbirds, including the endangered species, such as the black-capped vireo.

Some specific benefits include

- Creating openings or "edge" for feeding, travel and dusting
- Improving plant diversity for food and cover
- Improving the palatability and nutrient content of browse and forbs
- Keeping juniper stands open by setting back seedling establishment
- Improving other food sources such as insects
- Maintaining varying heights and densities of woody plants
- Maintaining suitable nesting habitat

Some negative aspects of burning involving improperly planned, timed and/or executed burns can have negative effects that may include

- Injury to important mast producing trees, such as oaks
- Conversion of browse species to grass
- Possible elimination of highly preferred species
- Destruction of nesting habitat for some species
- Temporary reduction of cover

Prescribed burning for managing deer habitat

Prescribed fire typically causes several changes in the habitat

- a temporary increase in nutrients such as protein and phosphorus
- an increase in palatability of forage during the first growing season following the fire or longer
- an increase in available browse production
- an increase (following an initial reduction) in fruit yields in most plants in the next three-five years

Prescribed burning at 3 to 5 year intervals during the summer or winter will bring about a higher level of nutrition resulting in improved antler development in bucks, and survival and development of fawns. Since burning can be damaging to certain species such as oaks; and can lead to an initial, short-lived, reduction in mast production, some areas within the management area should be left unburned.

Prescribed burning for managing bobwhite quail habitat

Adequate grass cover for nesting, low shrubs for escape cover, and the necessary forbs, grasses, and shrubs to provide seeds and fruits.

Fire can be an important tool in preventing grasslands and savannas from becoming too heavily wooded. Prescribed burning keeps grasslands in a stage of succession that is necessary for good quail habitat. Periodic fire promotes grass growth, stimulates increased seed production of some plants and may increase the populations of desirable insects such as grasshoppers. An important consideration is to leave enough patches of woody vegetation and grass to provide adequate cover.

Prescribed burning for managing mourning dove habitat

Since the diet of doves consists primarily of grass and forb seeds, control of competing and shading brush invasion is crucial. Doves are frequently found foraging on fresh burns. Bare areas are particularly important for feeding. In addition, since doves do not normally scratch in litter for seeds, nor feed in dense vegetation, periodic burning can be beneficial by reducing the amount of litter and plant material from the soil surface.

Prescribed burning for managing Rio Grande turkey habitat

Because ideal habitat for turkey is a diversity of land uses that range from mature bottomland forests to grassy openings to cropland, burning can be an important tool to manipulate habitat. Burning can be used to keep dense woody stands open and keep openings from becoming too heavily infested with brush. Careful planning can accommodate special situations such as the need for dense, herbaceous cover with some shrubby, overhead cover for nesting.

Burns should be made on a 3 to 5 year cycle during the summer or winter months. Burning before or after the nesting season is recommended, with small, scattered

areas burned throughout the summer or winter for regular production of new green growth.

Conducting Prescribed Burns

There are several conditions that must be met or considered in order to accomplish a successful prescribed burn. These include:

Season of year

Burning may be accomplished from first killing frost until about March 15th. Burning later than this may impact nesting habitat. Summer burns should be considered carefully because they are more difficult to control and may impact vegetation differently. Summer burns should be conducted after July to avoid impacts to fawns and nesting birds. Management goals will determine what time of the year to burn.

Fuel Conditions

Grassland fires depend upon grass as the fine fuel to carry the fire and develop the intensity or heat to accomplish the desired objective. Generally the grass should be dormant or at least dry and continuous enough that the fire will carry throughout the area to be burned. A minimum of 2,000 pounds of fine fuel or consistent pine needle coverage per acre is necessary to conduct a reasonably good fire.

When burning, the soil surface should be moist or dry but there should be good moisture in the sub-soil. This will insure a relatively quick cover being established on the burned area following the fire.

Weather

Several weather factors are involved in determining the success of a prescribed burn. These factors are as follows.

- The number of days since the last rain. Generally a burn can be made one to five days after a rain of one-half to one inch.
- Relative humidity should be in the 20 to 50 percent range. Never burn when relative humidity is less than 20 percent.
- Air temperature should be in the 55^{o}F to 75^{o}F range for winter burns. Temperatures for summer burns will be in the 90^{o} range.
- Wind velocity should be a steady 5 to 15 miles per hour and from one direction. Fires should not be set when there is no wind, when winds are light and variable or when the National Weather Service predicts wind shifts. Burning should also never be done when winds are in excess of 20 miles per hour.
- A weather forecast should always be obtained from the Weather Service the day of the burn.

Other Associated Practices

Prescribed burning for wildlife habitat improvement is usually conducted in association with other management practices. Controlling livestock grazing prior to and after the fire is absolutely essential if management goals are to be met. Grazing must be controlled prior to the fire to ensure adequate fuel loads and to improve vigor of the grass. After the fire, grazing must be excluded to allow plants to grow back before they are grazed. Other practices might include brush control prior to the fire or after the fire, fireguards and firebreaks, and others.

Conclusion

Prescribed burning is one of the most under-utilized yet valuable tools available to wildlife managers. Goal-setting and clearly defined objectives are needed when using fire as a tool. Precautions and safety must be carefully planned. Ecological sites and wildlife species react differently and are affected differently by fire. Fire should be used as a tool for manipulation of habitat only after the ecological site and species in question and goals to be accomplished are carefully studied and understood.

Key Points:

- burning does not kill most plants
- burning seldom kills wildlife
- burning attracts many species

PROVIDE AND MANAGE WATER

This wildlife habitat application applies to all regions and state.

Definition: Provide water for both drinking and habitat as needed by target species.

Design and Development

From an engineering standpoint, it first must be determined if the site is suitable for development. For permanent water impoundments there must be suitable clay content in the soil materials. This minimizes water loss from seepage and provides for a more stable embankment. For seasonally flooded areas clay content is not as critical since year-round water retention is not a concern. In the event of poor clay content, an embankment will usually be designed with a wider top and flatter slopes to provide a more stable structure. Emergency spillways will be constructed to prevent water from topping any fill material and to minimize erosion on site and downstream. Designs vary according to the type of facility. For most water impoundment reservoirs, an emergency spillway will consist of an excavated flat vegetated bottom gently sloping to the drainage area.

Spillways are usually designed to allow a minimum flow of one foot deep during a critical storm event. In most cases, a water control structure (called a principal spillway) such as a drawdown pipe, flash board riser, or trickle tube will be included and placed at a lower elevation than the emergency spillway. Factors considered in spillway design include soils in the watershed, slope of the watershed, vegetative cover of the watershed, and acres of runoff in the watershed. Storm frequencies used in spillway design will vary with the size and type of impoundment.

Constructed Permanent Impoundments

Constructed permanent impoundments for drinking water can vary from small pit-type ponds to earthen dams. Minimal depths should be great enough to allow for normal evaporation loss and seepage and still provide permanent water. Constructed shallow areas and islands greatly enhance the value of these structures for wildlife from a standpoint of food supply and habitat. Location of the impoundment is critical to facilitate wildlife utilization. Positioning the watering facilities no more than one-half mile apart or one per 100 acres facilitates both large and small animals. Topographic maps are excellent tools to assist in locating potential sites.

Other examples of wildlife water facilities include seasonal shallow water impoundments. These types of structures can be built to provide small areas of permanent water as well as larger areas of seasonal shallow water to benefit waterfowl and other "water loving" species. Shallow water impoundments are usually constructed in fairly level or flat areas having poorly drained soils. Sites that are subject to shallow flooding during the winter are usually best suited. Areas prone to deep seasonal flooding are difficult to manage and expensive to maintain and construct. Sites that are

accessible by farm equipment for possible food planting and maintenance of structures are ideal. Waterfowl prefer sites located away from actively traveled roads.

Most open water impoundments require water control structures to facilitate flooding and draining of the site in a timely manner. Flooding usually begins in October and ends in mid-March. Pipes and drains should be large enough to drain the impoundments fairly rapid and discontinue watering during the growing season. This allows for emergence of native grasses and forbs for food production as well as to prevent damage to timber. Optimal depth in this type of reservoir ranges from 6 to 18 inches of water. Water control structures can be set at elevations to allow permanent water in borrow areas used to construct the levee and completely drain the shallow areas.

Wells and Pumps

Windmills and solar pumps may be used to supply water in patures where impoundments are not possible. These water sources can also be used to help distribute grazing pressure around a pasture. Over flow from windmills and solar pumps can be directed into small pit-type ponds to provide an easily accessible water source for wildlife.

Natural Occurring Water Supplies

Natural occurring water supplies such as springs, perennial streams, and potholes are important to all wildlife as sources of drinking water and habitat. Resource management decisions adjacent to and in these areas should be carefully considered. Considerations for livestock exclusion, streamside management zones, and pest management can have a positive effect on sediment load, water quality, improved nesting habitat, food supplies, and wildlife travel corridors.

Conclusion

Wildlife requires several types of habitats and foods to meet their behavioral and nutritional needs during the year. Watering facilities, with consideration given to resource management in adjacent areas, can be the most beneficial habitat complexes that can be provided.

RANGE PLANTING

This wildlife habitat application applies only to Regions I, II, III, & V and state.

Definition: Provides diversity of plants and replaces plants that have been removed.

Most wildlife lives on lands where the existing natural vegetation meets all of their habitat requirements. In these healthy habitats, hundreds of native plants consisting of grasses, forbs, vines, shrubs and trees provide all of the food and cover required by the wildlife. However in some cases, land has been altered so severely that the native vegetation is gone or consists only of low quality plant species. These alterations could be caused by conversion to cropland, improved patures, or by severe overgrazing, which cause the loss of wildlife habitat. Nature has the incredible ability to heal itself after such severe alterations. Native plants will return to these areas little by little once the farming or overgrazing has ceased. However, this process of healing is very slow, and managers can speed up the process by planting preferred species of vegetation. This is called range planting or range seeding. Although it can speed up the recovery of habitat, it is a very expensive project, and carries with it the risk of failure. Most range planting failures are caused by poor rainfall in the year following seeding or by poor grazing management.

Important factors to consider when developing range-planting project are

- select adapted plant species
- select plant species with high value to wildlife
- implementation costs
- proper planting technique
- proper management of area

Select Adapted Species

One must be careful to use only those species known to grow well in a selected area. Species must withstand the climatic extremes of drought, cold, and heat that are normal for the area. For example, species growing naturally in East Texas usually do not adapt to South or West Texas. The best range plantings will include many different kinds of plants (grasses and forbs) rather than only a few. Plantings should ideally include some of the same plant species that grew on the area before the alterations took place. Plants that grow very well on a sandy soil will not grow on a clay soil or a shallow, rocky soil. One of the biggest problems in range plantings is that there is not a wide variety of seed available for sale of most native plants for a reasonable cost.

Select Plants with High Value to Wildlife

Planning a range-planting project to enhance wildlife should include a seed mix of those plants with known value to wildlife. If enhancement of quail habitat were important, plants providing seed eaten by quail would be needed. Examples would be Illinois bundleflower, western ragweed, or plains bristlegrass. A plan could include shrubs that provide escape cover for quail, such a four-wing saltbush. The seed of these plants can be used in West and South Texas. If enhancement of the deer food supply were needed, forbs such as Engelmann daisy, Maxmilian sunflower, bundleflower, or vetch might be considered if they were adapted to the region and the soil.

Proper Planting Technique

Proper technique of planting includes proper seeding rate, proper seedbed preparation, proper timing of planting and proper method of planting. The proper seeding rate for the mixture of plants selected will help insure that enough seed are planted to get an adequate density of plants. Normally about 20 seed are planted per square foot. If even one or two of those seed survive the critical seedling stage and make mature plants, then the seeding will be successful. Every plant has a different seeding rate depending on the size of the seed. The larger the seed, the more pounds of seed must be planted. Seeding rates for range planting will vary from 1 to 15 pounds per acre. A lab test can examine the seed to test the germination and the purity of the seed.

A good seedbed is needed to increase the chances of a successful planting project. A good seedbed means a soil free from weeds and other vegetation that compete with new seedlings. A good seedbed is usually plowed so that it is fairly smooth and firm without large clods. Planting expensive seed on a poor seedbed is a waste of money.

The timing of planting is also important. Planting should usually be done prior to spring rains, although in some cases fall planting is recommended. If planting is too late, such as summer, heat and dry soil will often cause failure. Planting in mid-winter is often recommended so that seed will be ready to germinate as soon as the soil warms up and spring rains come.

The method of planting seed will also help determine success. Broadcasting the seed on top of a good seedbed often works well, especially if a light drag is pulled to cover the seed slightly. Most seed used in range plantings should only be covered with about one-half inch of soil. Seed buried too deeply will never germinate. A better method of seeding is to use a special piece of equipment called a drill. A drill pulled behind a tractor will create a shallow trench in the soil, drop the seed in the trench, and then cover the trench all in one operation. One must be very careful not to bury seed too deeply. Once seed has been planted, timely rainfall is essential for success.

Proper Management

After planting is complete, management of the area will also determine success of the project. Livestock must be excluded from all seeded areas for at least the first year to allow young plants to grow deep healthy root systems. Where deer numbers are high, reduction of the deer herd may be needed to allow forbs to establish. In some cases where the soil lacks nutrients, fertilizer should be applied to enhance plant growth. This is especially true on old cropland and on sandy soils in high rainfall areas. If weeds begin to overtake the planting, weed control should be considered. Since weeds usually grow taller and faster, mowing can be used to cut off the weeds above the height of the planted species. Herbicides cannot be used if forbs are a part of the planting. After plants are well established, which may take one to three years, the manager must be careful not to allow the seeded area to be overgrazed. Livestock can be allowed to graze about half of the volume of plant growth. Then they must be moved to another pasture until the plants have re-grown to their normal height.

DISKING

This wildlife habitat application applies only to Regions I, III, IV, & V and state.

Definition: Disturbing the soil surface with disk, plow, or harrow to expose mineral soil.

Benefits of Disking to Wildlife

Disking is an inexpensive, easy method of increasing native plants and food for many wildlife species. Soil disturbance is most commonly used for quail but can be used for dove, waterfowl, deer, turkey and non-game birds. Disking works well for increasing stands of croton, partridge pea, ragweed, crabgrass, and other annuals.

Many “weed seeds” lie dormant for many years. These hard seeds may remain dormant because of shading by other vegetation. Almost any field will grow a crop of beneficial weeds after disking. Wetlands that have grown up in undesirable plants can often be rejuvenated by disking and water level control.

Disking as a Management Tool

Disking in the winter produces heavy-seeded foods such as ragweed and partridge pea while the peak production of important grass seed results from April plowing. Disking in June favors green leafy type plants that attract insects, plus a number of major seed plants birds feed on in the fall. Re-disking every few years is necessary to keep the food plants from becoming crowded out by less desirable vegetation. Experimental trials are needed to learn the results on various soil types. Erosive soils and areas of steep slopes should be avoided to prevent erosion. Disking across the slope instead of up and down hill will further prevent erosion. Most disking should be shallow and not exceed four inches in depth.

Disking patterns should be in long strips rather than in square blocks. Additional strips can be added each year. Old areas will continue to produce quality plants for two to three years.

Fertilization should be kept to a minimum. Tall bunch grasses are beneficial for nesting and cover if they are lacking in the area. A balance of feeding, cover, and nesting areas is essential.

Other Associated Practices

Disk patterns can be incorporated with food plots and prescribed burned plots. When selecting various management practices to apply, remember that diversity is the key.

OVERSEED LEGUMES

This wildlife habitat application applies only to Regions III, IV and state.

Definition: Interseeding existing vegetation with a legume(s) by means of seed distribution with a cyclone type seeder or drill.

Benefits to Wildlife

Overseeding pastures and rangeland with legumes will benefit many species of wildlife. Legumes are extremely high in protein quantity and quality. Legumes are important for their green vegetation as well as the hard seed produced. Hard seed are beneficial because of their resistance to weather and break-down. Many pastures are established to a grass monoculture. Examples are Bermudagrasses, Kleingrass, buffelgrass, and Bahiagrass. Many of these grasses provide little if any food for wildlife. By overseeding a field with a legume, a high-quality forage and hard seed are provided for wildlife. Legume pastures provide excellent conditions for insects. Insects are important to quail, turkeys, and many non-game birds.

Overseeding as a Management Tool

Some of the needs of various wildlife species can be met with a legume/pasture program.

These pastures can provide part of the years' diet for some animals. One of the shortcomings is the summer legume program in Texas. There are just a few legumes for the warm-season that are compatible with livestock grazing and they are being used sparingly. They are jointvetch, Alyceclover, and lespedezas. These legumes do well with a planned grazing system.

Large seeded legumes such as vetches, singletary peas, and partridge peas produce seeds that have tough, hard, seed coats. These seeds will lie for months without deterioration. They are excellent choices for quail, turkey, dove, and non-game birds.

Overseeding Application

Legume selection must be planned for the type of soil (sand, clay, wet, dry) to be planted. A legume can be selected to fit most soil types. Hairy vetch is an example of a plant that will grow well on deep, droughty sands. Crimson clover will not grow well on such soil.

All legumes must be inoculated before planting. This is easily done using a commercial inoculate and sticker combination. The roots of the legume plant are "attacked" by bacteria call rhizobia. These bacteria take nitrogen from the air in the soil and produce nodes or knots on the legume roots. The plant uses some of the nitrogen. This is part of the reason that legumes are so high in protein. The remainder of the nitrogen is time released into the soil thus improving fertility.

Most of the Texas adapted legumes grow best in a neutral to high pH range. Commercial limestone is commonly added before or during planting according to a soil test. The same soil test used to find the soil pH is used to obtain the fertilizer needs for the legumes being grown. Legumes usually need low levels of nitrogen (20-40-60), medium levels of phosphorus (20-40-60), and high levels of potash(20-40-60) to grow.

Legumes need to be seeded into pastures that have been grazed down or clipped to prevent shading. Inoculated seed can be broadcast or drilled.
Broadcast seed should be lightly disked and dragged with a section harrow or roller. Fields that have been heavily disked can simply be dragged.

Warm-seasoned Legumes	Cool-seasoned Legumes
American jointvetch	Alsike clover
Annual lespedezas	Arrowleaf clover
Alyceclover	Berseem clover
Cowpeas	Crimson clover
Partridge pea	La. S-1 clover
Soybean	Rose clover
	Singletary peas
	Sweetclover
	Vetches

THIN TIMBER

This wildlife habitat application applies only to Region IV and state.

Definition: Selectively removing trees from the forest canopy for the purpose of: allowing more sunlight to reach the forest floor; creating openings; improving the vigor of the remaining trees; and improving the fruit and mast production of desirable trees.

Generally whenever timber thinning is mentioned in East Texas, it is usually associated with pine stands and with the spacing of trees. However, controlling the density of the forest canopy is also an effective tool for wildlife managers. The same idea of removing some trees from the canopy to allow the remaining trees to receive more sunlight, moisture, and nutrients applies to desirable understory plants such as grasses, forbs, vines, and shrubs. In addition, providing room for crown growth and development for mast-producing trees such as oaks, can result in higher yields from these trees.

Benefits to Wildlife from Thinning Timber

For most wildlife species, the early stages of succession, such as the first five to seven years after tree planting or the cessation of farming activities, are ideal for many of their habitat needs. Grasses, vines, forbs, and low growing shrubs dominate the site. After a time, however, as trees invade and start to dominate, the canopy becomes so dense that little sunlight reaches the forest floor. The desirable, low growing plants start to decrease and are often replaced by more shade tolerant species. Generally these shade tolerant plants have little value to wildlife. If the more desirable plants are maintained, efforts must be made to provide the needed sunlight.

Thinning as a Tool for Managing Deer Habitat

Browse (i.e., leaves, twigs, and buds of woody plants) is the mainstay of a deer's diet. Forbs, legumes, and to a lesser extent grasses also contribute to their diet. These plants decline as a forest canopy closes. However, unless the habitat is practically devoid of these plants, they respond quickly to thinning. Annual forbs become abundant the first growing season after a thinning, while grasses and perennial forbs peak in two to three years and then gradually decline. Browse also responds to timber thinning, but usually at a slower rate. Its yield peaks at about five to eight years.

When available, acorns produce a high-energy food for deer. Acorn, as well as other mast such as fruits, yields can be increased with thinning. Providing increased space into which the crowns of desirable mast-producing trees can spread will improve their light gathering capabilities and, in turn, increase production. This response may not be immediate and depends on how crowded the trees were before the thinning.

Thinning as a Tool for Managing Squirrel Habitat

As mentioned earlier, thinning will increase crown development. This can improve the yields of acorns and other mast. Thinning in pine/hardwood stands should retain 10 to 20 percent of the trees in desirable hardwoods. These hardwoods should have crowns sufficiently developed to effectively respond to the new space. Stunted, one-sided, and poorly formed crowns are generally poor candidates for future big mast producers.

Hardwoods should be managed for a long rotation because mast production may not start until the trees are 25 years old. In addition, management should be for a variety of mast producing trees because many species produce crops on cycles that may be as long as 5 to 10 years.

Thinning as a Tool for Managing Bobwhite, Dove, and Turkey Habitat

Because grasses, forbs, soft mast, and insects associated with grassy land covers are critical to these birds' diet, thinning is crucial in managing their habitat. These plants respond well to the additional sunlight reaching the forest floor. But without other management tools such as prescribed burning, this vegetation may become too dense for use. Therefore thinning must always be in association with other practices.

Just as with deer and squirrel, acorns are an important part of a turkey's diet. As with deer and squirrel, thinning can improve the yields of important mast producing trees. Waterfowl using flooded timber can benefit from thinning from increased mast and seed produced under the forest canopy.

Conduct Timber Thinning

The first step in thinning is to determine the need. The need will depend on the species for which the area is being managed. However, some guidelines may include:

- Absence of grasses and forbs because of dense shading.
- Increased space for crowns of important mast producing trees. These trees should not be suppressed or have a poor crown development.
- Shade-tolerant shrubs and trees (i.e., maple, hophornbeam, holly, and elm) dominate the understory.

The method and intensity of the thinning is dependent on the manager's objective. Thinning pine stands at or a little above the intensity needed to maintain the trees' growth and vigor will usually also provide the needed light to stimulate grass, forb, and browse production.

Thinning hardwood stands should include the following steps. First, the manager should favor trees of desired species that have good form and potential. Poorly shaped, stunted trees are poor candidates for potential crop trees. Next, remove the midstory and understory trees that interfere with the crop tree's crown expansion. Lastly, make the thinning light enough so that the crop trees will not receive so much light that they develop new branching on their trunks.

Pine/hardwood mixes should be thinned in such a way as to combine the methods used for pine and hardwood systems as explained above. Retaining hardwoods will mean some loss in pine production and so some compromise between pine production and wildlife habitat improvement must be achieved. Generally retaining 10 to 20 percent of the stand in hardwoods will accomplish both objectives.

Other Associated Practices

Thinning can result in such an increase of sunlight reaching the forest floor, the site can be invaded with brush within a short time. Prescribed burning may be needed to control this process. Other practices may include: clearcutting patches, maintaining Streamside Management Zones, deadening hardwoods, retaining large hardwoods, and constructing firebreaks and access roads.

Conclusions

Thinning, as with many other habitat management tools, should be a component of a process. It is not a one-time fix. Because the trees will respond to the thinning and fill the gaps created in the canopy, thinning will need to be repeated on a cycle in order to maintain the desired level of grass, forb, and browse production.

RETAIN LARGE HARDWOODS

This wildlife habitat application applies only to Region IV and state.

Definition: Keeping large mast producing, den, or potential trees for the improvement of wildlife habitat.

Many times during forestry operations, particularly in pine management systems, large hardwoods are either harvested or deadened to make room for desirable younger trees. In addition, oaks, being more valuable than many other species, are the choice trees for harvesting. Retaining large, wildlife important, hardwoods means making compromises with maximum timber production. If properly planned and done, however, this trade-off need not be too significant.

Benefits to Wildlife from Retaining Large Hardwoods

Many hardwoods are important sources of food to wildlife. They provide acorns, nuts, fruits, and buds to many species. However just as not all green vegetation is used as browse, not all hardwoods meet all wildlife dietary needs. Important hardwoods include oaks, beech, hackberry, and hickory. Lesser important varieties are cherry, elm, ash, and sassafras. The better-formed trees of important species should be left to help meet wildlife needs.

Retaining Large Hardwoods as a Tool for Managing Deer Habitat

The importance of large hardwoods to deer is in the mast, particularly the acorns they produce. Since many mast-producing species do not produce high yields every year, it is important to leave a variety. These trees should either have, or be capable of producing large spreading crowns to increase their production of mast. Poorly formed, suppressed trees are usually poor candidates to be retained.

Retaining Large Hardwoods as a Tool for Managing Squirrel Habitat

Large food-producing trees are probably more important to squirrels than any other wildlife species. Acorns are used to some extent throughout the year but make up most of the diet during the fall and winter. Thinning in pine/hardwood stands should retain 10 to 20 percent of the trees in desirable hardwoods. Most oaks do not produce high yields of acorns until they are at least 25 years old. Therefore, it is important to include retaining a variety of large, well-formed hardwoods in a management plan.

In addition to food, large hardwoods provide cover for squirrels. Although leaf nests are frequently used, tree cavities are essential for good squirrel habitat. These den trees are not usually found in any number until trees reach about 40 years of age. Although squirrels can actually help the decaying process by gnawing at the bark around small decayed openings such as limb scars or knots on older trees. These potential den trees will have characteristics that would degrade them for timber production. These characteristics would include swellings, limb scars and large broken branches. Retaining two or more den, or potential den, trees per five acres will generally meet the need for cover.

Retaining Large Hardwoods as a Tool for Managing Turkey Habitat

Larger, older hardwoods produce the higher yields of masts that are very important to turkey. Whenever possible, entire stands or blocks of timber should be retained in mature hardwoods. In addition, large hardwoods provide roosting sites for turkeys. The birds frequently roost in trees, preferring the larger ones along streams and other wet areas.

Conducting Large Hardwood Retention

Generally the concepts of retaining large hardwoods is the same despite the species of wildlife for which the habitat is being managed. The trees left should best meet the needs of the animal or bird. More important than the numbers of trees retained is their species and condition. Sometimes, retaining scattered individual trees is the only choice. Whenever possible, hardwoods should be left grouped or as corridors.

Other Associated Practices

This practice is closely associated with thinning timber and deadening hardwoods, and it should be planned as part of these practices.

Conclusions

Except for quail and dove, large hardwoods are critical to wildlife. They provide food and with turkey and squirrels, their need for cover. Meeting this need does not necessarily mean a severe reduction in other land uses such as timber management. A long standing rule of thumb has been to retain as little as 10 percent and as much as 20 percent of the timber tract in hardwoods.

STREAMSIDE MANAGEMENT ZONES

This wildlife habitat application applies only to Region IV and state.

Definition: A forest area immediately adjacent to a stream, creek, and river channels, managed for forest resources with specific attention given to measures that can be taken to protect both instream and downstream water quality as well as other beneficial uses.

Streamside management zones (SMZ) are strips of various widths of timber left alongside stream channels. SMZs are normally a minimum of 50 feet in width on each side of the channel, but can be wider if topography or other site conditions deem it necessary. The primary purpose of an SMZ is to provide protection to the edges of the channel bank and prevent sediment from a disturbed area from reaching the channel. These strips are areas of relatively undisturbed zones of timber and native vegetation. They provide excellent habitat areas for all types of wildlife.

Managing Wildlife Habitat

Hardwood species grow in areas adjacent to creeks and streams. Leaving all of the trees provides both habitat and food for deer, squirrel, turkey, and quail. These game animals utilize masts and other forages produced in these zones. The more mature trees in SMZs provide roosting areas for turkeys and doves, along with squirrel nest and den sites. The criteria for leaving an SMZ in an undisturbed condition allows the shrubs and forbs to remain providing browse, grazing, and feeding opportunities for deer, turkey, quail, and other wildlife species.

The SMZ is normally associated and adjacent to areas of recently harvested timber. This creates an edge along the SMZ that is beneficial. SMZs provide travel corridors used by many animal species. This “screen effect” is extremely valuable after clear-cutting operations.

PLAYA LAKE MANAGEMENT

This wildlife habitat application applies only to Region I.

Definition: Wetlands of the High Plains.

Playas are the major wildlife habitat providers of the High Plains and in many other areas. More than 100 bird species, which include up to 20 species of waterfowl, and several mammal species regularly utilize playa habitat. The playas are important wintering areas for waterfowl. They serve as staging areas for migrating shorebirds and waterfowl.

Waterfowl Management

Moist soil management is adding or removing water from or to a playa to promote vegetation communities best suited to provide native waterfowl food. The best time to create moist soil conditions may change from year to year. The recommended schedule should be followed as close as possible. To attract waterfowl during the winter the playa must be ponded. Pumping may be needed to provide ponding conditions.

The following schedule is recommended.

DATE	MANAGEMENT
Early April	Drawdown or add water to create conditions for desired plant community.
Mid-Late June	Drawdown or add water to reestablish plants lost to spring flooding.
August	Drawdown or add water to maximize seed production for food.
November - January	Add water to maintain one-foot depth for ducks to rest and feed.

Only enough water should be added to wet soil for good seed germination. All steps will not be needed every year.

Upland Species Management

Protection of the native plant community during the entire year is very important to a variety of species. Many playas provide critical nesting sites and winter cover. The playa should be protected from fire and cultivation. The native plant community will provide the best habitat when allowed to mature naturally.

Many playas are grazed and this can greatly affect the plant community. Heavy grazing should be discouraged. Light to moderate grazing provides the best habitat for a wider range of wildlife species. The best habitat for waterfowl and pheasant occurs when there is good standing residue from winter through late spring. Generally, grazing should leave residues at least 12 inches in height over most of the playa.

Conclusion

A management plan is needed to develop proper playa habitat. The plan should be designed to benefit the widest range of wildlife species. The plan should cover needed habitat elements, timing of application of management elements, and any follow up necessary to ensure success of the plan.

COVER AND WINDBREAKS

This wildlife habitat application applies only to Region I.

Definition: Establishment and management of woody and herbaceous plants to provide cover, food, and shelter.

Windbreaks support wildlife in many different ways. They can provide food, escape cover, winter protection, and nesting sites. During harsh winter months, shelters reduce the wind and help relieve the severe stress accompanying exposure to cold. In order for windbreaks to furnish high-quality wildlife habitat on the High Plains of Texas, plantings must include the correct plants. Windbreaks improve habitat for game species such as pheasant, quail, dove, turkey, and deer. Many non-game bird species such as robins, American kestrels, mockingbirds, and cardinals benefit from these plantings. Mammals such as cottontail rabbits, skunks, and raccoons are benefited plus many rodent species. The three most important factors in determining the value of windbreaks to wildlife are adequate size, proper location, and the variety of vegetation within the windbreak.

Food Production

Foods that windbreaks provide include fruits, nuts, acorns, seeds, foliage, and insects or other invertebrates. Different wildlife species will utilize the different types of food. Availability of these foods varies seasonally and depends largely on what species are planted. The best species to use on the High Plains to provide food are hackberry, skunkbush sumac, nanking cherry, western sand cherry, bur oak, pecan, mulberry, honeysuckle, native plum, and four-wing saltbush.

Cover Production

Windbreaks provide woody escape and loafing cover for many wildlife species. Escape and loafing cover must provide good, thick cover to the ground while providing some areas to be open at ground level. Shrubs and moderately sized trees are good choices. Winter thermal cover is critical for wildlife survival. Animals maintain warmth by avoiding exposure to the wind. Windbreaks provide this cover when species such as eastern red cedar, rocky mountain juniper, and arborvitae are planted. Travel lanes are needed to allow wildlife to move about from food supplies and other resources. A windbreak's long, linear design provides needed travel lanes. For example, they can provide a travel lane between the nesting cover of a playa and a cropland field that provides a food supply.

Designing for Wildlife

- Choose trees and shrubs that have wildlife benefits, but are adapted to the local climate. Native species are the best because they are adapted and known to the wildlife.

- Include a variety of trees and shrubs in the windbreak. This improves the wildlife value through diversity and increases the types of wildlife that will utilize the windbreak.

- When possible, tie different habitats together. This could be connecting a block of rangeland to a riparian area or a playa to a cropland field.

- At least three rows should be planted. One row should be evergreen trees, one row should be deciduous trees, and one row should be a shrub row.

Conclusion

With a little extra planning, a windbreak can function as a haven for wildlife. The windbreak must be properly located. This may include adding length or width over the original design. It may also mean adding additional rows. It must include species that provide food and cover needed for target wildlife species.

RESIDUE MANAGEMENT

This wildlife habitat application applies only to Region I.

Definition: Managing the amount, orientation (standing or laying), and distribution of crop and other plant residue on the soil surface year round, while growing crops where the entire field surface is tilled prior to planting.

Purposes: This practice may be applied as part of a conservation cropping system to support one or more of the following:

- reduce sheet and rill erosion;
- reduce wind erosion;
- maintain or improve soil organic matter content and tilth;
- conserve soil moisture;
- provide food and cover for wildlife; and
- tillage implements are equipped to operate through plant residues without clogging.

Benefits to Wildlife

Conventional tillage programs used by many farmers are to plow under crop residues soon after harvest. This leaves the soil bare, subject to erosion from wind and water, accelerates the breakdown of stalks and leaves, and covers up most of the waste seed that could be used by wildlife. These bare fields offer little protection for wildlife.

Minimum tillage farming is a fairly new concept that was created to reduce erosion, conserve moisture, and require less energy to produce a crop. An extra benefit to this type of no-till farming is the gaining of wildlife habitat. Minimum tillage and residue management is part of a Cropland Management System.

Game birds such as quail and pheasant as well as non-game birds and mammals need protection from predators and severe weather when feeding. Birds of prey and other predators find easy targets in plowed or shredded fields.

Conclusion

Residue management allows for waste grain utilization by wildlife while providing many other benefits in soil and water conservation.

CLEARCUT PATCHES IN TIMBER

This wildlife habitat application applies only to Region IV.

Definition: Creating openings in the forest canopy for the purpose of encouraging herbaceous vegetation, vines, or low shrubs within the forest stand.

Creating openings can enhance wildlife habitat in woodlands with standing timber more than 5 years old. Normally, forest canopies prevent enough sunlight from reaching the forest floor to produce vegetation that can be used by wildlife for food and cover. Openings provide the sunlight needed to grow this desired vegetation. Forest openings, therefore, can enhance habitat diversity, create seasonal habitat, and increase the quality and quantity of vegetative growth and fruiting.

Benefits to Wildlife from Clear-cutting Patches in Timber

Many wildlife species depend on the early stages of succession for all or part of their food and cover needs. Presence of grasses, forbs, vines, and some shrubs characterized these early stages. Typically, these plants require full sunlight for optimum growth and development, and for fruiting. But as the forest trees grow their canopies block this sunlight. As a result, either the vegetation under a full forest canopy is sparse or it switches to more shade tolerant species. Generally most shade tolerant species have low value for wildlife (see Tolerance to Shade in the information charts in Question 1 - Wildlife Plant Identification for the preferred species listed in Question 2 - Wildlife Plant Preference). Clear-cutting patches in forest stands sacrifices a small amount of production from the timber (in acreage) in favor of creating early successional areas within the forest.

Managing Deer Habitat

Although grasses, forbs and legumes are not the mainstay of a deer's diet, they are important nonetheless. Good habitat contains a variety of forbs and legumes in addition to browse and fruits. The best growth of forbs, grasses, and legumes is found in openings. Openings can also benefit browse production. Depending on the method used in creating and maintaining the openings, re-sprouting of browse species can also occur. This re-sprouting will make plants more accessible for browsing than they might have been in the forest.

In addition, openings can provide vegetation not found in mature forests. This vegetation may be native plants requiring full sunlight for their development or introduced plants such as ryegrass and clovers in food plots.

Managing Quail, Dove and Turkey Habitat

The invasion of openings by grasses, forbs, legumes and vines, as well as woodies, provide a variety of benefits for these birds. The seed and fruits of these plants are crucial to their diets. In addition, the insects associated with grassy cover are important food to quail and turkey. Many times these plants are either absent or inadequate in the forest.

Vegetation common to openings can also meet nesting and cover needs for these birds. "Rough vegetation" such as last year's herbaceous growth will provide good nesting sites for turkey and quail. Low growing brush will also provide needed cover.

Managing Waterfowl Habitat

Creating openings in forested bottomlands and upland depressions allow for the development of annuals, grasses, sedges, and forbs that are important food plants for the waterfowl that frequent these sites. Openings can also be managed for non-native planted species such as annual ryegrass.

Applying Patch Clear-cutting

Location is the first important step in applying this practice. If possible, openings should be located in association with two or more habitat edges, such as different timber ages or types, or in natural transition zones. Examples of transition zones are where forest stands join wetland areas or other land uses such as crop or pastureland. Use of existing openings in the forest such as log landings, roads, trails, and poorly stocked woods should also be considered whenever possible. Often times these areas can be enhanced or enlarged to meet the desired objectives.

Avoid creating openings on steep slopes where excessive erosion is possible or on shallow soils. In addition, avoid locating openings near public roads because it will encourage poaching.

Forest openings should be 1 to 5 acres in size, but may, in some instances, be as small as one-half acre. To create more "edge," they should be irregular in shape, and to ensure adequate sunlight penetration, the minimum width should be at least one and one-half times the height of the surrounding trees. At least one opening per 50 to 100 acres of forest is generally adequate for improving wildlife habitat when incorporated with other management practices such as thinning.

Although clear-cutting or harvesting is the primary method of creating openings in the forest, supporting practices may include any of the following. The manager must consider the most economical, as well as desirable, practice or combination of practices.

Prescribed burning is effective in controlling small brush or in "cleaning up" after a harvest. It is ineffective, however, in stands with dense undergrowth.

Mechanical methods include felling, roller chopping, shredding, and dozing the residual trees. Selection of one of these practices will depend on the management objectives for the opening. For example, if the opening is to be managed for annual plantings, more intensive methods such as dozing may be necessary.

Chemical methods include broadcast or directed spray application of approved herbicides or single-stem treatments. Single stem control can be accomplished with injection, hack-n-squirt, and basal spray application methods.

The level of maintenance of forest openings depends on the objectives of the manager. If the management goals are to keep the opening in early successional stages, mowing, disking or prescribed burning will be necessary. However, yearly application of these practices is unnecessary and not as beneficial as allowing several years of growth to occur between applications. Selective use of herbicides can also be used to control succession or in areas where smoke management may be a problem.

Other Associated Practices

Practices used within or in association with clear-cutting patches in timber include prescribed burning, disking, controlling livestock grazing, and establishing food plots. Constructing firebreaks and creating access roads in association with prescribed burns provides access where needed, improves fire protection, and creates openings.

Conclusion

Clear-cutting openings in forest stands is an effective means of introducing earlier successional stages within the forest without sacrificing too much timber production or other wildlife benefits from the forest.

DEADEN HARDWOODS

This wildlife habitat application applies only to Region IV.

Definition: Selective removal of undesirable hardwoods by chemical or mechanical means for the purpose of encouraging the growth and development of more desirable browse and mast producing trees and vegetation.

The control of unwanted hardwoods can be an important tool in improving wildlife habitat because everything green in the woods is not necessarily food. The presence of hardwood trees in a stand can be detrimental to wildlife if they are of low value as a food source and if they actually hinder the growth of more important plants through shading and competition. The wildlife importance of the available plants, along with their vigor and food production potential, must be considered. Controlling some plants to favor others is the purpose of this practice. Applying this practice can result in providing sunlight and growing space for important food producing trees, as well as low growing grasses, forbs, and brush.

Total hardwood elimination from a stand of mixed pine and hardwoods is undesirable, not only for the wildlife benefits these trees can provide but also for their economic value. Hardwood trees are an important source of fiber for the paper and lumber industries. Therefore, deadening hardwoods must be done in a thoughtful, careful manner in order to accomplish the goals of the landowner. However, when control of cull hardwoods is necessary to enhance the development and growth of plants important to wildlife, deadening is an effective habitat management tool.

Benefits to Wildlife from Deadening Hardwoods

Deadening unwanted hardwoods, either in the overstory (the upper levels of the tree canopy) or the mid-story (the canopy layer below the crowns of the dominant trees) will result in more sunlight penetrating the forest stand. This increased sunlight will stimulate the development and growth of low growing plants (e.g., grasses, forbs, vines, and brush). Often times the shade tolerant plants growing under a dense forest canopy are of little benefit to wildlife. Therefore, if the more desirable plants are to be maintained, or even encouraged, efforts must be made to provide the needed sunlight.

In addition, the space provided by controlling some of the trees can soon be occupied by more desirable species. In southern forestry, these desirable species have normally been pine, but the same principle holds for important wildlife food species such as mast producing trees like oaks.

Hardwood deadening can also be a tool to create small openings in a forest stand. These openings will respond to the additional sunlight in a similar way as in the forest, but in an accelerated rate. In effect, succession will be pushed back to the early stages of grasses, forbs and vines. For most wildlife species, these early stages are ideal for many of their habitat needs.

Hardwood Deadening as a Tool for Managing Deer Habitat

Browse makes up the mainstay of a deer's diet. However, not all browse is used. In fact, less than one-third of all the plant material in the woods can be classified as good deer food. Therefore, management should be directed toward those vines, shrubs, and trees that are preferred. These are listed in Question 2 - *Wildlife Plant Preference*. Management must also include a variety of mast-producing hardwoods to offset the deficiencies browse plants have at certain times of the year such as winter. Important small tree and shrub mast producing species include dogwood, plum, mulberry, persimmon, American beautyberry, grape, and blackberry.

These browse and mast-producing plants as well as forbs and legumes require sunlight to produce an adequate food source. Dense forest canopies prevent this needed sunlight from penetrating to the forest floor. Deadening undesirable hardwoods can help change this condition.

Acorns are another important part of the deer's diet. Therefore hardwood deadening should not result in the improvement of browse at the expense of destroying mast production from trees such as the oaks. Normally the hardwood species that provide no food value are the targets for deadening. Even mast-producing trees that are of poor form, suppressed, or diseased may be deadened. In other words, an oak may also be deadened if it is at risk of dying, or does not have enough crown to produce good acorn crops.

Hardwood Deadening as a Tool for Managing Squirrel Habitat

Since acorns are the mainstay of the squirrels' diet, thinning, rather than hardwood deadening, is probably the more important practice for habitat management. Hardwood deadening may be used to the same effect as thinning - increasing the crown development of oaks- if the trees being controlled are of such low quality or value that they cannot be sold. Deadening can have a beneficial effect by improving the production of soft mast such as grapes and berries, but the benefits probably do not justify the expense. If hardwood deadening is used in managing the habitat for other wildlife species, care must be taken to maintain an adequate supply of large, well-formed oaks and other nut producing trees.

Hardwood Deadening as a Tool for Managing Bobwhite, Dove, and Turkey Habitat

Grasses, forbs, soft mast, and insects associated with grassy land cover are critical to the diet of these birds. Grasses and low growing brush are also important for nesting and cover. These plants respond well to the additional sunlight that can be provided by deadening unwanted hardwoods. It is important to include other practices such as prescribed burning to keep the growth of these plants in check. Otherwise this vegetation may become too dense for use.

Just as with deer and squirrel, acorns are an important part of the turkey's diet. Selectively controlling cull hardwood to provide room into which mast-producing trees can spread their crowns can improve their nut/acorn yields.

Hardwood Deadening as a Tool for Managing Waterfowl Habitat

Deadening hardwoods is an important tool in improving habitat for waterfowl, such as mallards and wood ducks, which frequent flooded forest sites. Just as with squirrel, deer and turkey, deadening can improve the yields from mast-producing trees. It can also be used to manipulate cover. Dense, low growing vegetation interspersed in a more open forest stand is important to these ducks, particularly the wood duck. A carefully done deadening operation can be used to achieve this effect. In addition, deadening can be used to create open areas that can be used to manage either native or planted grasses and forbs.

Applying Hardwood Deadening

Since the effects of hardwood deadening are similar to those achieved by thinning, it may be confused with thinning. The primary difference between these two practices is tied to markets. Deadening is necessary when either markets are not available for the trees that must be controlled or when these trees are not suitable for sale. This may be due to their small size (less than 6 inches measured at DBH height), being of unsuitable species (such as hornbeam or hophornbeam), or they are of such poor form as to have no marketable use.

Deadening hardwoods in forest stands has no set rule of thumb on how many or which species to deaden. Each individual stand must be evaluated to determine which improvements in wildlife habitat are needed. Since animal needs vary, careful thought must be given before implementing a change.

Selective control of hardwoods by deadening can be accomplished by several methods. Specific use of chemicals, applied according to label instructions, can control hardwoods with less labor or cost than using hand tools or machinery. Methods of chemical application include basal spraying, injecting, soil spot treatment, hack-and-squirt, aerial spraying, and broadcasting pellets. Although aerial spraying requires less labor, it is less selective than the other methods. The results from applying herbicides depends on several factors such as rainfall, resistance of a given species to the chemical used, the vigor of the individual trees being controlled, and the care used in the application.

Mechanical methods include girdling or frilling, which cuts the bark and cambium in a strip around the tree's trunk. These basically prevent the storage of food in roots by cutting off the transport system from the leaves to the roots. Depending on the size and condition of the tree, this method can result in resprouting below the girdle. Depending on the species and its importance to wildlife, this resprouting may or may not be beneficial.

Other Associated Practices

Because deadening of hardwoods can result in an increased amount of sunlight reaching the forest floor, the site can quickly become invaded with brush. Prescribed burning may be needed to control this process. Other practices used in association with hardwood deadening are thinning timber; retaining large hardwoods; controlling livestock grazing; leaving streamside management zones; clearcutting patches in timber; and establishing food plots.

Conclusion

Creating openings in the over- or mid-stories to allow more sunlight penetration into the stand or to provide room where more desirable trees can spread their crowns, can be an important management tool when the trees being controlled have no real value for wildlife or economically. It is a means of converting a site's production from unwanted plants or species toward those that are desirable for wildlife.

LEAVE UNMOWED STRIPS

This wildlife habitat application applies only to Region IV.

Definition: Retaining unmowed areas in beneficial locations to improve and enhance wildlife habitat.

A shredder type mower is an underutilized tool for game management. However, like any tool for management, practice location and timely application can make or break habitat benefits for any species. Combining practices with tools such as a mower and a disk, as well as a prescribed fire and set-aside areas, can greatly enhance habitat management.

Benefits to Wildlife from Leaving Unmowed Strips

Prime turkey and quail habitat should have a mixture of grasses, forbs (weeds) such as croton, ragweed, partridge pea, and blackberry/dewberry. The condition as well as the location of these plants in the habitat is critical. Field borders are very important areas to be managed for these species of plants. They can be very beneficial as both wildlife travel corridors and feeding areas. Idle areas, old homesteads, and fence rows can be managed similarly to greatly enhance and increase available habitat. Deer will utilize these areas for browse, escape cover, and bedding. Unmowed strips are used by many species of wildlife for travel corridors.

Location of Unmowed Strips

Strips should be located roughly within 200 feet of tree or brush cover for protection and escape routes. In the absence of woody cover, brush piles can be constructed to provide cover and escape around the habitat strips. In areas of wooded cover, mowing of thick sprouts combined with a prescribed fire will encourage growth and spread of some of the more desirable plant species.

Establishment and Management of Unmowed Strips

When considering leaving unmowed strips, it can be advantageous to start the practice by first disking. Disking should be carried out between January 1 and March 1. Disking encourages growth and production of seed producing forbs and annual grasses. This practice will also thin existing grass stands. Strips can very greatly in size from 10 to 50 feet in width. Strips as wide as 150 feet are not uncommon. Fence rows can be managed 10 to 12 feet on each side. The sides of the fence rows and field borders are good areas for planted feeds to enhance food production in conjunction with the more natural improvements. Fertilizer can be applied to areas adjacent to fields with regular pasture management to encourage weed seed production.

Once the areas to be managed have been located and established, it may take two to three years to fully realize the benefits. Species such as plum, bush lespedeza, and other fruit-producing trees are a welcomed addition in unmowed strips. Unmowed strips that are narrow and linear (straight) pose a threat from predators. Predators such as raccoon, coyotes, skunks, and hawks find strips easy to hunt. Two things can be used to deter predators. Wider strips are more difficult for a predator to search. Strips need to have breaks at least every 150 to 200 feet that are shredded or disked. These "breaks" will trigger a pursued prey, such as a quail being chased by a fox, to flush rather than keep running down a strip. The break should be 10 to 15 feet in width.

Other Associated Practices

Unmowed strips are closely associated with prescribed fire and disking. These conservation practices go together hand-in-hand.

Conclusion

Good habitat is a combination of factors present that influence wildlife quality and quantity. For any suitable habitat, there must be adequate space, cover, food, and water. Unmowed strips will have a positive effect on quality and quantity of habitat for target species. Factors such as food production, cover, and edge effect should be monitored and evaluated for wildlife activity and utilization. Alternative sites should be considered for future development as the need arises.

CONSTRUCT FIREBREAK/ACCESS ROAD

This wildlife habitat application applies only to Region IV.

Definition 1: Firebreak - A natural or man-made barrier usually created by the removal of vegetation (trees, brush, grasses, etc.) for preventing or controlling the spread of fire.

Definition 2: Access Road - A constructed travel lane for vehicles.

Generally, these two practices have different purposes. Roads are to provide access into and through the property while firebreaks are used to keep fire out. However, their purposes can be interchangeable. For example, roads can be used as effective fire guards while firebreaks can sometimes be used to provide vehicular access to a tract.

Although they may have different purposes, they do have some common characteristics. One is that they both provide long, narrow openings in the woods allowing sunlight to reach the forest floor. These openings can be managed to supply important wildlife food plants - either native or introduced. Also, depending on how they are constructed and maintained, they can expose the bare soil that provides feeding and “dusting” sites for birds.

Benefits to Wildlife from Constructing Firebreaks/Access Roads

Installing a system of firebreaks and roads can be an important tool for improving wildlife habitat. Roads provide designated routes for vehicle movement through the property, and firebreaks can protect the forest or grasslands from unwanted, destructive wildfires. They also serve as important means of controlling prescribed burning of the grass or forest resource. Both firebreaks and roads can furnish bare ground or early succession plants such as grasses and forbs. They give the manager the opportunity to choose the vegetation to be managed by providing sites for planting introduced vegetation such as legumes.

Constructing Firebreaks and Roads as a Tool for Managing Deer Habitat

In East Texas, it is common to see forest roads and firebreaks used as food plots for deer. These plantings not only supply an important, although not mainstay, part of the deer’s diet but also provides cover for the prevention of erosion on these sites. On roads and firebreaks that are not planted to introduced plants, the exposure of mineral soil can stimulate the production of native forbs and grasses. These too are important parts of a deer’s diet. Firebreaks and roads also serve as travel ways for deer.

Constructing Firebreaks and Roads as a Tool for Managing Dove Habitat

The seeds of grasses, forbs, and cultivated grains are the mainstay of the dove's diet. Farm and ranch roads and firebreaks can help meet this need when they are either planted with desirable food plants or they are disturbed by practices such as disking. Disturbing the site is also very beneficial to dove because it provides bare ground that is important to their feeding.

Constructing Firebreaks and Roads as a Tool for Managing Quail Habitat

As is true with dove, roads and firebreaks can help supply the quail's need for food from native and introduced plants. In addition, the insects found in grassy areas are important to its diet. If firebreaks are disked and road right-of-ways are maintained, the vegetation on these sites is usually thinner than outside the road and firebreak. Therefore, the edges of roads and firebreaks can be favorite nesting sites.

Constructing Firebreaks and Roads as a Tool for Managing Turkey Habitat

As with dove and quail, the plants found in firebreaks and road right-of-ways, either native or planted, along with commonly found insects, are important to a turkey's diet. In addition, like deer firebreaks and roads also create travel ways.

Applying the Practices of Constructing Firebreaks/Access Roads

Although these practices can benefit wildlife, it must be remembered that their primary purposes are to protect the tract from wildfire and to provide access to and through the property. Therefore some features may, by necessity, be less than optimum from a wildlife perspective. For example, firebreaks are typically installed along boundaries in order to protect the entire tract from fire. The following are considerations in planning and installing firebreaks/roads.

Location

The location of firebreaks should be planned to protect different land uses, different timber stand ages, property boundaries, areas along public roads, and especially railroads. Roads should be planned to achieve the most economical way to either travel through the tract or to get wood products out of the woods. Road planning should consider factors such as taking advantage of the available topography and soils while avoiding potential problem areas such as highly erodible soils and excessively steep slopes.

Construction Methods

Traditionally firebreaks have been plowed, but disking is becoming more common as the concern for erosion and water quality grows. Normally, a width of at least 6 feet is sufficient to contain most creeping or slowly moving ground fires. Access roads can range from forest trails where little more is done than clearing the timber in the road right-of-way, to bladed and ditched all-weather roads. The level of construction should match the intended use of the road, whether it is a limited access trail for hunting or a haul road for a logging operation.

Erosion Control

The first step in erosion control is in the planning process. Whenever possible, avoid excessively steep and highly erodible soils. When this is not possible, steps must be taken during construction and maintenance to control potential erosion problems. Water control devises such as water bars and wing ditches are applicable for both firebreaks and roads, and should be considered. Re-vegetating areas that are a potential problem is another consideration. The use of cool-season plants that are important to wildlife should be used if they will also meet the need for controlling erosion.

Maintenance

Firebreaks should be inspected annually just before the fall or spring fire-danger season. When necessary, they should be re-applied, particularly if bare soil is the means of fire control. If the firebreaks are planted to cool-season plants to serve as "green firebreaks," the vegetation may be controlled after the spring "green-up" to promote the growth of forbs. Common pasture practices such as fertilizing and mowing may also be applied to green firebreaks.

Roads should be frequently inspected to check the adequacy of the installed erosion control measures. Whenever possible, mowing should be chosen over grading for the control of vegetation on the roads and in the ditches. The need for replanting of erosion control or wildlife food plantings should also be evaluated.

Conclusion

Firebreaks and access roads are integral practices for any land use. Proper planning and installation are important in order to achieve their purposes, protect the environment and to benefit wildlife. They can be used to provide "edge" between different land uses, to protect resources within land uses, or to provide access through land uses.

Fish and Game Laws - Question 6

Fishing and hunting laws are necessary for many reasons. Some laws protect wildlife. Other laws provide equal opportunities for everyone to fish, hunt, photograph, or just observe wildlife. The laws of nature and the laws of man did not always work to help wildlife.

A safe knowledgeable hunter or angler must be responsible. A responsible sportsperson will obey written laws and regulations. All anglers and hunters have responsibilities to wildlife, others who fish or hunt, landowners, themselves, other users, their equipment, and their hunting dogs.

Major federal wildlife legislation became law in the early 1900's. The following legislation has had a major impact on wildlife management and preservation:

- The Migratory Bird Hunting Stamp Act (1934);
- The Federal Aid in Wildlife Conservation (1937) (Pittman Robertson Act); and
- Endangered Species Act (1973).

State and federal laws regulated the harvest of game and non-game birds. As of 1992, the only bird species unprotected by state and federal law are English sparrows, feral rock doves, and the European starling. These three birds may be killed at any time and their eggs and nests may be destroyed. Grackles, yellow-headed blackbirds, red-winged blackbirds, cowbirds, and crows may be controlled without a federal or state depredation permit. This may occur when they are harming or about to harm ornamental or shade trees, agricultural crops, aquaculture crops, terrestrial crops, livestock, wildlife, or when they are concentrated in such numbers and manner as to constitute a health hazard or other nuisance.

This CDE will cover questions in the following four areas of the Texas Parks and Wildlife Laws book:

- Licenses, permits, and stamps;
- Classification of offenses and punishments;
- Hunting and fishing provision; and
- Water safety.

Consult the Wildlife, Fisheries, and Ecology Management curriculum, Hunter Safety Handbook, and Texas Parks and Wildlife Outdoor Annual for details on fish and game laws.

Sample questions are included for practice. The State WAY committee will draw its own questions for the CDE.

Safety - Question 7

Safety is the primary goal of each hunter. Each year there are countless accidents that suggest the hunter had little or no regard for safety. The objective of this section is to save lives by making sure students understand the importance of safety. Questions/activities will cover firearm safety, boating safety, angling safety, hunting safety, and campsite safety

This section will train and later determine what the students have retained from their training at home and in the classroom. References for this question will include: Hunter Safety Handbook and/or Outdoor Life - Hunter Education Training Course; Boat Texas - A Course on Responsible Boating and/or Texas Boating Basics - A Course in Better Boating; and Sport Fishing and Aquatic Resources Handbook.

The safety question area may be administered as a written exam, a staged scene, or an enactment (role playing). If a written exam is administered, it may be in the TRUE/FALSE or SAFE/UNSAFE question/statement form. If administered as a staged scene, the contestant will have to identify safety violations at the scene. If administered as an enactment, an individual from the WAY committee will role play an individual in a hunting, camping, or fishing scenario. CDE contestants will have to identify safety violations or unsafe practices committed by the individual. Each local committee will determine the question for the written portion of this section. A practical example is a makeshift campsite with unsafe conditions such as a loaded gun leaning against a tree, a boat with no flotation devices, and shells near the fire. The local committee will determine the unsafe items.

Safety - Question 7

Examples: Questions during the actual competition may include, but are not limited to the following examples.

Directions: Read each question carefully and write in the correct answers.

1. Identify the four parts of a rifle cartridge.

   _____, _____,
   _____, and _____

2. Name the five types of rifle action.

   _____, _____,
   _____, _____, and
   _____.

3. What are the three major causes of hunting accidents?
   _____, _____, and
   _____.

Directions: Place an **X** beside the correct answer.

4. Never carry an unmarked deer over your shoulder.
   (a) True_____ (b) False _____

5. Firearms should be unloaded before crossing a fence.
   (a) True_____ (b) False _____

6. Never carry a closed action firearm in a vehicle.
   (a) True_____ (b) False _____

7. Drowning and hypothermia are the two major threats around water.
   (a) True_____ (b) False _____

8. Each person should have a PFD while in a boat.
   (a) True_____ (b) False _____

9. Alcohol and drugs should never be used while hunting.
   (a) True_____ (b) False _____

10. When crossing a fence, care should be taken to lean the firearm against a secure object.
    (a) True_____ (b) False _____

Techniques - Question 8

Wildlife identification is very important. Sportsmen and wildlife biologists must know the animal they are hunting, observing or managing. This question will help the students learn how to identify animals in this region of Texas. The students will be asked to identify animals from tracks, feathers, wings, skins, horns, scat and illustrations. Each student will be asked to utilize wildlife techniques to determine management information such as species and age. The Hunter Safety Handbook will be one source of reference for this question. Students may be asked to measure deer antlers to measure the inside spread, length of main beam, beam circumference (H1), or the number of points of a set of antlers. Any measurements will follow Boone and Crockett guidelines.

Suggested Reference List:

Age of a Deer. Texas Agricultural Extension Service: Bulletin No. B145333.

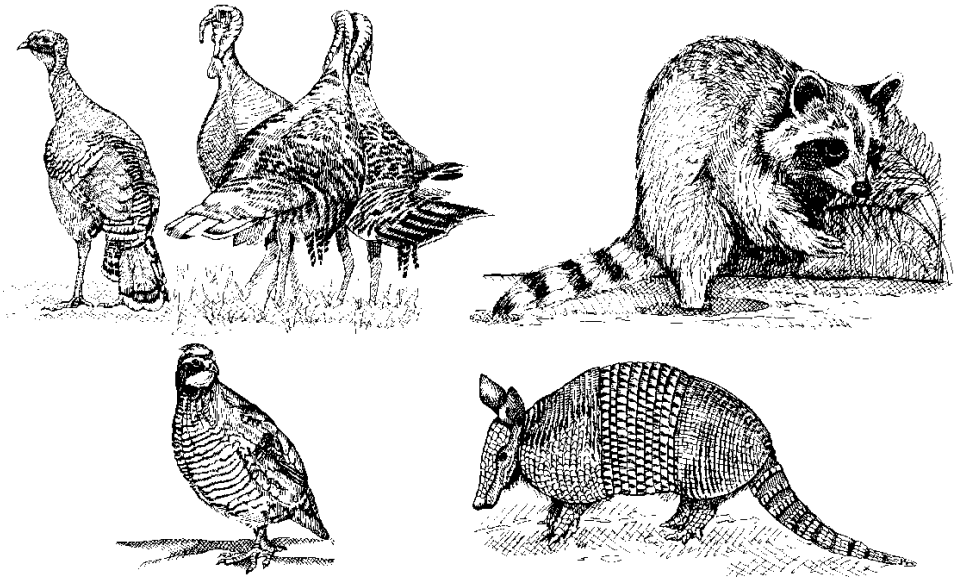
Wildlife, Fisheries, and Ecology Management. Instructional Materials Service, Texas A&M University. Catalog No. 13015.

Ducks, Geese & Swans. Federal Cartridge Company.

Hines, Bob. 1978. Ducks at a Distance: A waterfowl identification guide. Department of the Interior, U.S. Fish and Wildlife Service. Washington, DC. Available as an online PDF at https://www.fws.gov/uploadedfiles/ducks%20at%20a%20distance-ocr.pdf

Wildlife Habitat Evaluation Handbook. National 4-H Council.

Wildlife Management Techniques. 1971. The Wildlife Society, Washington DC



Instructional Aids

It may take several years to collect all items needed to train a group of students for the CDE. Much can be learned in the collection of props by students. Props can be collected by legally harvesting game, processing plants, wildlife groups such as Ducks Unlimited, contest within a club or chapter, and working with departments such as Texas Parks & Wildlife, US Fish & Wildlife, Texas Agricultural Extension Service, and the Natural Resources Conservation Service.

The following is a list of some of the needed props.

1. Waterfowl wings and feet.
2. Books with good ID pictures of waterfowl.
3. Books on the animals and plants of Texas.
4. All sets of Wildlife slides from Instructional Materials Service, Texas A&M.
5. Deer jawbones of various ages.
6. Antlers and horns (pronghorn) for measurements
7. Squirrel tails (adult and juvenile).
8. Breast feather, beards, and legs from turkeys (tom and hen - adult and juvenile).
9. Legs and feathers from pheasant (adult and juvenile).
10. Skulls of furbearers, games animals, unprotected non-game animals.
11. Skins of furbearers, games animals, unprotected non-game animals.
12. Dove and quail wings (adult and juvenile).
13. Plaster cast of tracks of furbearers, games animals, and unprotected non-game animals.
14. One-fourth inch wide measuring tapes.
15. Clear (transparent) molds of real animal scat - deer, pronghorn, turkey tom & hen. Others would be excellent.
16. Items needed to teach the Texas Parks & Wildlife Department's Hunter Education Course, Angler Education Course, and Boater Safety Course.

Note to Contest Committee Persons: Since it is illegal to own or have in possession mounts or parts of any protected, threatened, endangered, or extant species use of mounts or parts from these species should not be used for this CDE.

Note to Agricultural Science Teachers and 4-H Leaders: It may be an advantage to have a Scientific Collecting Permit. Permits are issued for education and research purposes only. Contact the Texas Parks and Wildlife Department in Austin, Texas (1-800-792-1112) for details.

Appendix

Figures 1-6 are from Wildlife Management Techniques, The Wildlife Society, Washington DC; 1971. The original authors can be found in the Literature Cited Section of the Wildlife Techniques book.

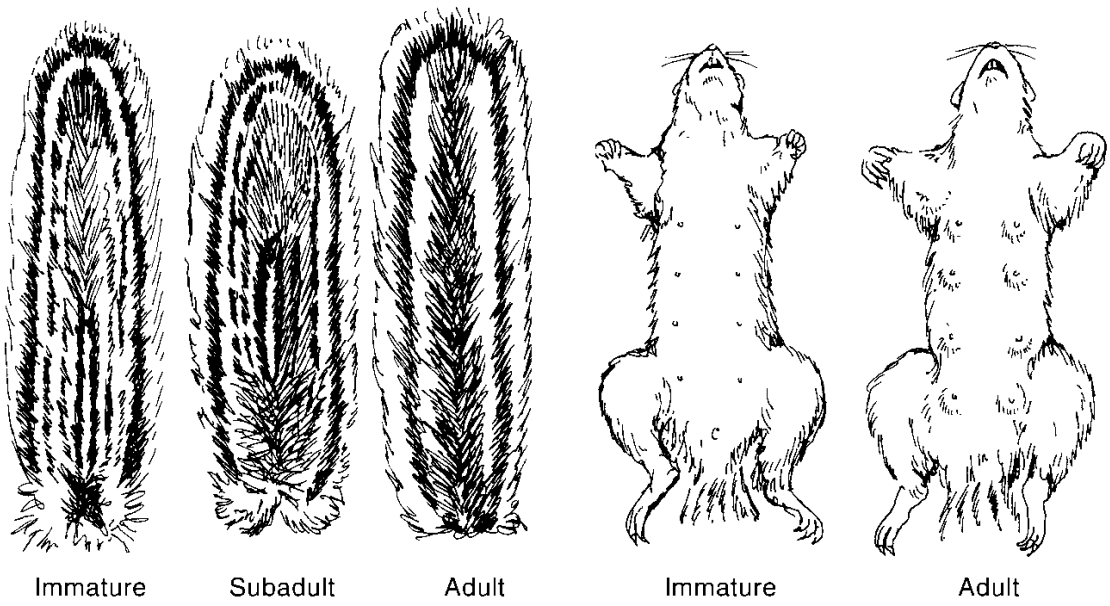


Fig. 1. Age criteria for squirrels. Age may be determined by examination the ventral surface of the tail. LEFT: Juvenile, the shorter secondary hairs are absent on the lower side of the tail bone. Right: The appressed hairs obscure the outline of the tail bone in the adult (Sharp 1958). RIGHT: Mastology of the female squirrel. Left: Juvenile, with nipples minute and barely discernable. Right: Lactating adult, nipples black pigmented with most of hair worn off. (Allen 1943; Godin 1960).

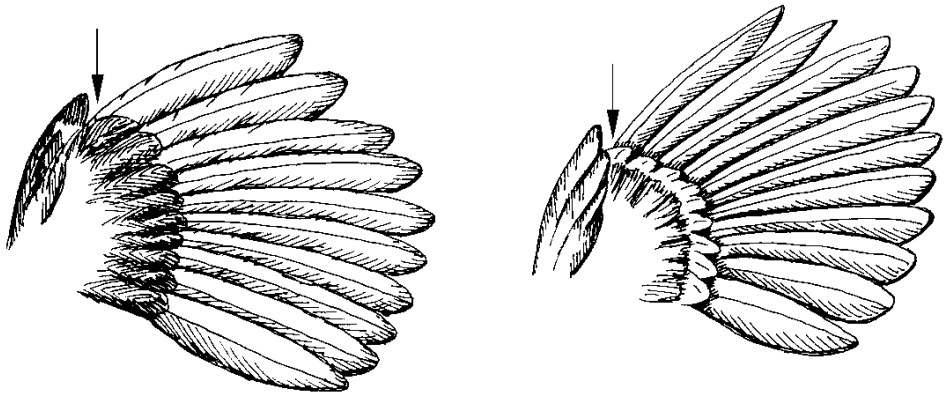


Fig. 2. Age criteria, based on wing characters, of all bobwhite quail. LEFT: Primary coverts in adult are of uniform color. RIGHT: Primary coverts in immature individuals have tips of light color (Godin 1960).

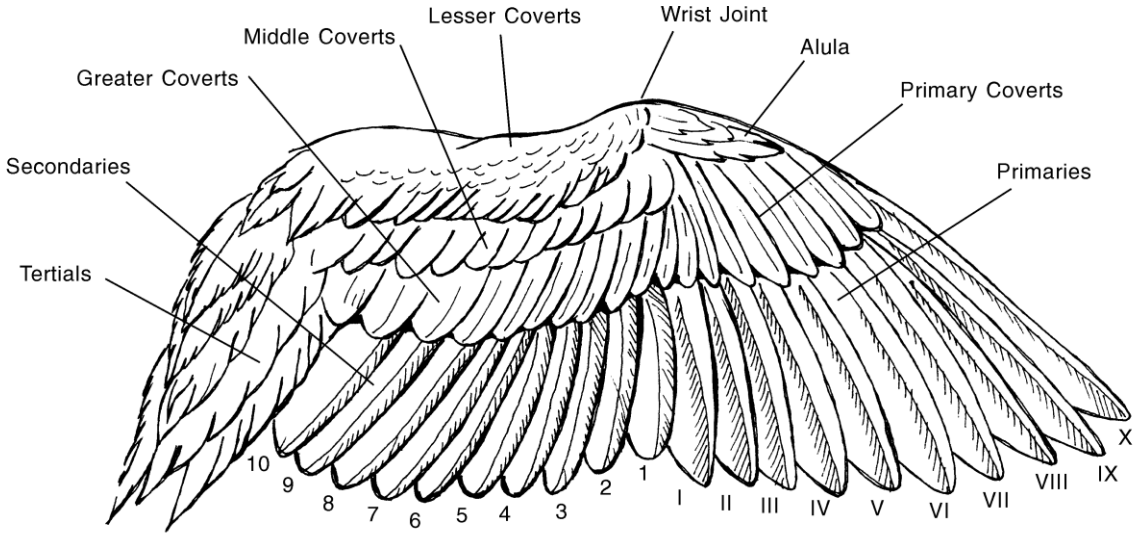


Fig. 3. Nomenclature and position of numbered feathers of a typical wing (Godin 1960).

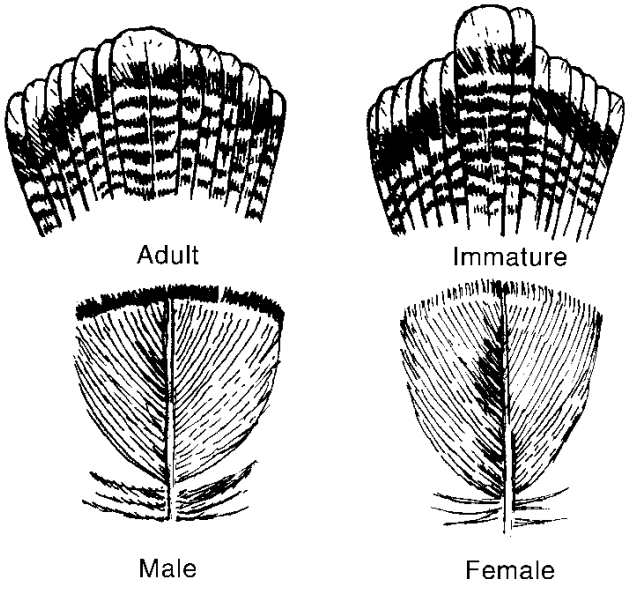


Fig. 4. Sex and age characters in the eastern wild turkey. TOP: The adult shows an even contour of the spread tail (left) whereas the immature (right) has an irregular contour. BOTTOM: Breast feather of male (left) is flattened and black-tipped, whereas that of the female (right) is rounded and buff-tipped.

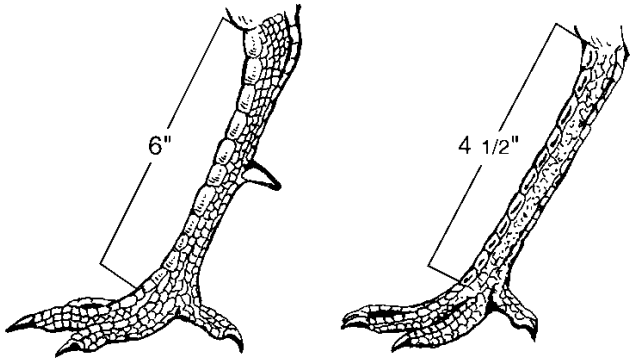


Fig. 5. Sex and age characters in the eastern wild turkey. TOP: The adult shows an even contour of the spread tail (left) whereas the immature (right) has an irregular contour. MIDDLE: Breast feather of male (left) is flattened and black-tipped, whereas that of the female (right) is rounded and buff-tipped. BOTTOM: Foot of male is about 15.2 cm and bears a spur while that of the female is only 11.4 cm (from Godin 1960).

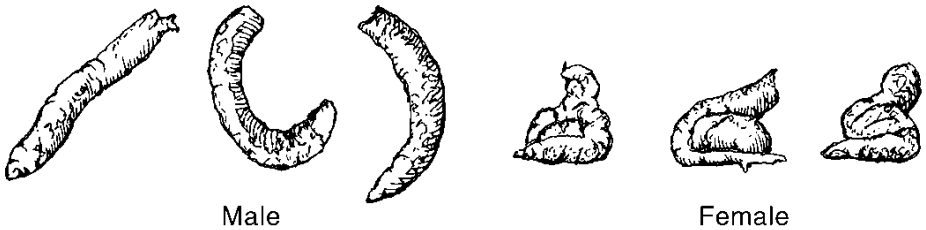


Fig. 6. Dropping configurations as indicators as sex for the eastern wild turkey. LEFT: Typical gobbler configurations. RIGHT: Typical configurations of the hen (Bailey 1956, Godin 1960).

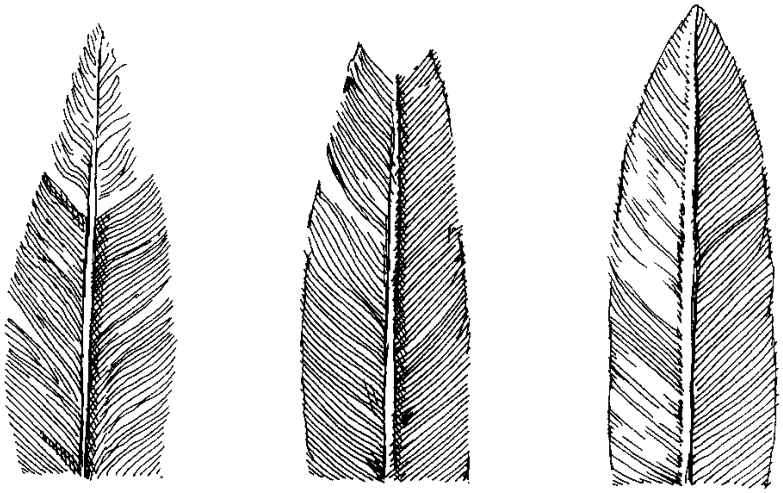


Fig. 7. Tail feather as age criteria in waterfowl. LEFT: Juvenile tail with down attached at the tip of shaft. CENTER: Juvenile tail with characteristic "V" notch. RIGHT: Adult tail with pointed tip (from Godin 1960).

Virtual Contest

1. Qualifying virtual contests should be taken under the supervision of a school designated proctor that signs the ethics form prepared by Texas FFA.

2. Question 1: Wildlife Plant Identification: There must be multiple identifying characteristics of plants represented in quality photos of plants. Regional and State providers will supply the photos for qualifying events.

3. Question 4: Wildlife Habitat Evaluation: An aerial map and scenario OR video and scenario of habitat should be used to complete this section of a virtual contest.

   A quadrant sheet with plants listed in each quadrant should be given to determine adequate or deficient food.

   A student should be able to determine Adequate or Deficient on water by reading the scenario

   Note - biologist hosting contests should be announced and accessible since they all view management in different ways for their part of the state.