

APPENDICES

**STANDARD WILDLIFE HABITAT AND POPULATION MANAGEMENT
RECOMMENDATIONS
FOR THE**

**EDWARDS PLATEAU
and
CROSS TIMBERS & PRAIRIES ECOLOGICAL REGIONS**

Appendix A

1-d-1w Wildlife Use Appraisal Check List

1-d-1w Wildlife Use Appraisal Check List

[] Existing 1-d-1 open spaces appraisal? **If NO** → **Not Eligible**
If YES

[] Sustaining breeding, migrating, wintering population of indigenous (native) animals? **If NO** → **Not Eligible**
If YES

Target Species: _____

[] Primary use is wildlife? **If NO** → **Not Eligible**

a. Active, meaningful, written wildlife management plan listing activities and appropriate seasons and/or sequence of events? []

b. Will the management practices place sustaining the population over other uses of the land? []

c. Are practices planned sufficient to maintain the target population? []

d. Are secondary uses compatible with the management of target population? []

If YES

[] Animals produced for human use? **If NO** → **Not Eligible**

a. food and medicine; or

b. hunting; or

c. bird watching/hiking/photography; or

d. passive enjoyment of owners

If YES

[] At least 3 eligible management practices planned for tax year? **If NO** → **Not Eligible**

a. habitat control _____

b. erosion control _____

c. predator control _____

d. supplemental water _____

e. supplemental food _____

f. shelters _____

g. census _____

If YES

[] Does property meet degree of intensity test? **If NO** → **Not Eligible**

a. Is property sufficiently sized to sustain the target population? []

b. Are the planned management practices appropriate to the target population? []

c. Do the planned practices meet typical intensity as per Texas Parks and Wildlife Department Regional Management Plan? []

Appendix B

Wildlife Management Plan Overview

Intensity Levels for Practices over 5 Years

| TREATMENTS | Practice | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|--|----------|--------|--------|--------|--------|--------|
| Habitat Control: | | | | | | |
| HC: Wildlife & Habitat Management Plan | 1yr | | | | | |
| HC: Grazing Management | 1yr | | | | | |
| HC: Prescribed Burning | 15% | | | | | |
| HC: Range Enhancement (re-seeding) | 10% | | | | | |
| HC: Brush Management | 10% | | | | | |
| HC: Vegetation Surveys | 1yr | | | | | |
| HC: Fence Modification | 5yr | | | | | |
| HC: Riparian Management and Enhancement | 5yr | | | | | |
| HC: Wetland Enhancement | 5yr | | | | | |
| HC: Habitat Protection/Species of Concern | 5yr | | | | | |
| HC: Prescribed Control of Species | 10% | | | | | |
| HC: Wildlife Restoration | 1yr | | | | | |
| Erosion Control: | | | | | | |
| EC: Pond Construction | 5yr | | | | | |
| EC: Gully Shaping | 5yr | | | | | |
| EC: Streamside, Pond, Wetland Revegetation | 3yr | | | | | |
| EC: Native Plant Establishment on Erodible Areas | 150# | | | | | |
| EC: Dike/Levee Construction/Management | 5yr | | | | | |
| EC: Establish Water Diversion | 5yr | | | | | |
| Predator Control: | | | | | | |
| PC: Predator Management | 1yr | | | | | |
| PC: Control of Brown-headed Cowbirds | 100# | | | | | |
| PC: Grackle/Starling Control | 100# | | | | | |
| Supplemental Water: | | | | | | |
| SW: Marsh/Wetland Restoration or Development | 5yr | | | | | |
| SW: Well/Trough/Windmill Overflow | 5yr | | | | | |
| SW: Spring Development and/or Enhancement | 5yr | | | | | |
| Supplemental Food: | | | | | | |
| SF: Grazing Management | 1yr | | | | | |
| SF: Prescribed Burning | 15% | | | | | |
| SF: Range Enhancement (Re-seeding) | 10% | | | | | |
| SF: Fence Modification | 5yr | | | | | |
| SF: Food Plots | 1yr | | | | | |
| SF: Feeders and Mineral Supplementation | 1/320ac | | | | | |
| SF: Managing Tame Pasture, Old Fields, Croplands | 5% | | | | | |
| Providing Shelters: | | | | | | |
| PS: Nest Boxes, Bat Boxes | 1yr | | | | | |
| PS: Brush Piles and Slash Retention | 3% | | | | | |
| PS: Fence Line Management | 300ft | | | | | |
| PS: Cropland Management | 1yr | | | | | |
| PS: Half-Cutting Trees or Shrubs | 10% | | | | | |
| PS: Woody Plant/Shrub Establishment | 500# | | | | | |
| PS: Natural Cavity/Snag Development | 5/ac | | | | | |
| Census: | | | | | | |
| C: Spotlight Counts | 3/yr | | | | | |
| C: Aerial Counts | 1yr | | | | | |
| C: Daylight Wildlife Counts | 3@5mi | | | | | |
| C: Harvest Data Collection & Record Keeping | 1yr | | | | | |
| C: Browse Utilization Surveys | 1yr | | | | | |
| C: Endangered, Threatened or Protected Species | 1yr | | | | | |
| C: Nongame Wildlife Species | 1yr | | | | | |
| C: Time/area Counts | 1yr | | | | | |
| C: Roost Counts | 1yr | | | | | |
| C: Song Bird Transects and Counts | 1yr | | | | | |
| C: Quail Call and Covey Counts | 1yr | | | | | |
| C: Point Counts | 1yr | | | | | |

Appendix C

Sample Wildlife Management Plan for 1-d-1w

Based on document by PLATEAU Integrated Land & Wildlife Management

Sample of Plan for XXXXX Ranch in Edwards Plateau

Application for 1-d-1 w Wildlife Use Appraisal
_____ County

_____ **RANCH**
Wildlife Management Plan
Date: _____
Summary Page

Property Description:

_____ acres located in eastern _____ County. See attachment 1 for specific meets and bounds.

Ownership:

Current use:

Agricultural production, cattle grazing; valued under 1-d-1 open spaces agricultural use appraisal.

Planned use:

Wildlife management for hunting and passive recreational use; to be valued under 1-d-1 w wildlife management use appraisal.

Target indigenous species:

White-tailed deer
Rio Grande turkey
Mourning dove
Migrating and breeding song birds
Wintering and breeding waterfowl

Planned management practices:

Habitat control

1. Preparing wildlife management plan
2. Prescribed burning

Erosion control

1. Dike/levee construction/management

Providing supplemental supplies of food

1. Food plots

Providing shelters

1. Nest boxes, bat boxes

Making census counts to determine population

1. Harvest data collection and record keeping
2. Spotlight counts
3. Song bird transects and counts

_____ **Ranch Wildlife Management Plan**

Prepared by: _____,
_____, 19__

Property description

_____ Ranch, a _____ acre property in _____ County, is located on the escarpment to the Edwards Plateau. The property includes three (3) hilly native pastures, two (2) spring-fed lakes and one (1) perennial creek. There is one water well providing water to the residence. The property is currently being rested from agricultural production. Livestock was removed from the property in June of 1997. Prior to the recent removal of livestock, the ranch was actively engaged in agriculture for at least the previous 15 years.

The vegetation on _____ Ranch consists of native range grasses, improved pasture grasses, native shrubs and trees. An aggressive cedar (Ashe juniper) clearing program has kept the ranch clear of cedar in the recent past. The native trees and vegetation currently provide excellent habitat and food for a sustaining population of both game and non-game species of native wild animals. The lakes and wet margins provide excellent habitat for wintering and migrating waterfowl.

Ownership goals

The owners of _____ Ranch, XXX and family, wish to manage and maintain a healthy and sustaining population of white-tailed deer, turkeys, mourning dove, song birds, and waterfowl. The XXX are actively managing the property to produce hunt-able populations of white-tailed deer and mourning dove. The property is secondarily used as a weekend retreat for the family.

Planned Wildlife Management Practices

Habitat Control

1. Wildlife Management Plan. Preparation and implementation of this wildlife management plan enumerating the target species, planned practices, and monitoring methods. This plan was prepared by wildlife management consultants and was presented to a biologist for the Texas Parks and Wildlife Department (TPWD) and the Natural Resources Conservation Service (NRCS) for review and comment.
2. Controlled Burn. Preparation and implementation of a prescribed burn plan to maintain the natural diversity and high quality range conditions of XXXXX Ranch providing food and cover for white-tailed deer, Rio Grande turkey, mourning doves and song birds. The plan will be prepared by a professional (_____) trained in Fire Ecology, and will include the preparing of fire lines, training in burning techniques, burn prescriptions, and execution of burns as conditions allow. The burn plan will follow a seven-year rotation,

burning approximately 15% of the property per year. Annual records of progress with burning will be kept on file at the ranch.

Erosion control

1. Dike/levee construction/management. Serious erosion of creek banks caused by the spillway from the lake on the creek will be treated by reshaping the eroded area, construction of a concrete spillway, and reseeding grasses on the creek banks and spillway areas to prevent further erosion and create a filter strip to protect water quality of the creek. This will enhance the water quality of the creek, thereby providing clean water for wildlife on the ranch. See enclosed map and photographs.

Providing supplemental supplies of food

1. Food plots. White-tailed deer in this area are subject to stress during the late summer and winter periods. Approximately one percent of the area will be planted between May 1 and June 15 in warm season food plots with a mixture of legumes (black-eyed peas, cow peas, and dry land alfalfa)-2/3, and grain sorghum-1/3, in prepared beds in existing open areas adjacent to pasture roads, fire lanes, an existing pipeline right-of-way, and on 2 three acre fenced patches in lower areas that tend to receive and hold more moisture. These same areas or adjacent areas will be lightly disced and replanted between September 15 and Oct 15 to cool season food plots of native perennial plants of Engelmann daisy, Illinois bundleflower, Maximillian sunflower, and bush sunflower (see NRCS planting schedule).

Providing supplemental shelter

1. Nest boxes, bat boxes. Migrating wood ducks frequent the ponds on XXXXX Ranch. In order to encourage the nesting and breeding of wood ducks on the property, the ranch will enroll in the Wood Duck Nest Box Program sponsored and monitored by TPWD. The program will include the appropriate placement of nest boxes with predator guards, monitoring of nest boxes for predators and successful breeding, and reporting to TPWD. Copies of monitoring information and a map will be provided upon request.

Making census counts to determine population

1. Harvest data collection and record keeping. Records of the harvest of white-tailed deer and turkey will be maintained by XXXXX Ranch. Records of sex, weight, condition, age, antler growth or beard and spur length information, data and location of harvest will be maintained on all game taken on the ranch. Harvest records will be available on request.

2. Spotlight counts. XXXXX Ranch is currently involved in a spotlight count program to monitor population and determine harvest rates of white-tailed deer. The spotlight count program, originally designed by TPWD, will be implemented on an annual basis with at least three counts made per year. Data from the counts will be used to determine changes in population density and reproductive success of white-tailed deer. Records of incidental sightings of other mammals will also be kept. Copies of spotlight count data will continue to be available on request.

3. Song bird transects and counts. An annual breeding song bird survey as per American Birding Association protocol will be conducted on XXXXX Ranch. Information from these surveys will help in monitoring trends in the health and sustainability of breeding song bird populations on the ranch. Copies of survey design and data will be available on request.

Appendix D

Livestock Management Recommendations

Because "weeds" (broadleaved herbaceous plants) compete with grasses for growing space, nutrients, and moisture, their presence in rangeland plant communities is usually considered to be undesirable by most range managers, but they are important for wildlife. A well-planned livestock grazing system allows for a greater plant diversity, including a good component of forbs.

A range that has not been grazed for a long period of time, and is otherwise not periodically disturbed, can almost "stagnate" and become dominated by relatively few species of plants and exhibit limited variety and diversity. Therefore, total long-term deferment from livestock grazing is not normally recommended for optimum range and wildlife habitat management. Several growing seasons of deferment may be needed to allow an abused range to recover, but grazing should again be implemented after sufficient recovery is made.

Livestock should be considered as "tools" that can be used to maintain good wildlife habitat. A well-planned livestock grazing system is one which allows adequate rest periods for plants to recover after grazing. Most domestic livestock are selective grazers and consume the most nutritious and palatable plants first. Whenever a plant is eaten, there is not only a reduction in top growth but also a reduction in root growth. This reduces the plant's ability to rapidly regrow following defoliation. During the growing season, herbaceous plants need at least 30 to 60 days of rest to recover from grazing. Woody plants need as long as 4 to 6 months of rest to allow for regrowth. The recovery periods depend upon the severity of defoliation, moisture conditions, and temperature.

During continuous year-long grazing when livestock are left in a pasture for 365 days of the year, the most palatable plants are repeatedly defoliated. Frequent, repeated use will not allow seed production or plant recovery. Continuous grazing, even at light to moderate stocking rates, will remove the most desirable and palatable plants while the least preferred/least palatable plants that receive less grazing pressure become more dominant because of a reduction in competition. The result is a change in the species composition and an overall reduction in plant species diversity. Continuous grazing should not be used as a grazing method if the land manager's desire is to improve habitat for wildlife.

Several livestock grazing methods and systems have been developed which provide adequate periods of rest and allow vegetative recovery. There are many variations of these systems and the land manager needs to select the one that fits his particular situation. Some commonly used deferred-rotation grazing systems are: three pasture/one herd rotation, four pasture/one herd rotation, high intensity/low frequency (HILF), short duration, and four pasture/three herd rotation, or rest rotation. Regardless of the type of deferred-rotation grazing system used, the length of time that an individual pasture should be grazed, and the length of time that it would

need to be rested before being grazed again, would be dependent on the size of the pasture, its grazing capacity, the time of year (growing season versus non-growing season), the amount of rainfall received since being grazed, and the class of livestock. Grazing schedules and livestock stocking rates for pastures within a grazing system need to be flexible and continually reevaluated based on rainfall patterns, seasons of the year, and local range conditions. Knowing how long to graze and how long to rest is more an art than a science, dependent more on environmental factors and the on-site conditions than on the calendar.

Below are brief descriptions of the different deferred-rotation grazing systems. There are many variations of each system and the land manager can modify the grazing schedules to fit the local situation.

Three pasture/one herd rotation - The one herd of livestock is rotated through the pastures every 3 months. This allows each pasture to receive 6 months of rest before being grazed again. Over time, the pastures are grazed during different seasons of the year, with a 3 year interval before an individual pasture is grazed during the same time period again. For example, a pasture grazed from April through June during the first cycle, would be grazed from January through March during the second cycle, October through December during the third cycle, and July through September during the fourth cycle, before being grazed again during the April through June period during the fifth cycle. (This system should preferably be a step in moving toward a 1 herd/multiple pasture {4+} grazing system that provides a minimum of 75% of the land being rested at any one time.)

Four pasture/one herd rotation - The one herd of livestock is rotated through the pastures every 2 months. Each pasture also receives 6 months of rest before being grazed again, but the interval before an individual pasture is grazed again during the same time period is reduced to 2 years. For example, a pasture grazed April and May during the first cycle, is grazed December and January during the second cycle, and August and September during the third cycle, before being grazed again April and May during the fourth cycle.

High intensity/low frequency (HILF) - The number of pastures in this system is variable, but typically requires a minimum of 6 to 8 pastures. The livestock are kept in one herd, and each pasture is grazed intensely by the entire herd for approximately 1 to 1 1/2 months (high intensity), followed by a long period of rest (low frequency). The following are the calculations for determining how long each pasture should be grazed under a HILF system, using a system with 7 pastures as an example:

- 1.) add 1 to the number of pastures in the system ($1+7=8$)
 - 2.) divide the number of days in a year by the answer from step 1 to determine how many days each pasture should be grazed ($365 \text{ days} \div 8 = 46 \text{ days of grazing per pasture}$).
- It would take 322 days ($7 \text{ pastures} \times 46 \text{ days each} = 322 \text{ days}$) to complete the grazing cycle, and each pasture would receive 276 days of rest between grazing periods.

Short duration system - This system requires that a ranch be divided into numerous pastures, typically a minimum of 12 to 20. The livestock are kept in one herd and the herd is rotated rapidly through the pastures. Each pasture is grazed intensely for a short period of time (a few days), followed by several months of rest. The length of the grazing cycle needs to be based on

the season of the year and the amount of rainfall received during the cycle. For example, a 90 day cycle could be used during the growing season when plants recover more rapidly after being grazed. Each pasture in a short duration system that has 15 pastures, for example, would be grazed for approximately 6 days each (90 days divided by 15 pastures = 6 days per pasture) during the spring and summer growing season. The grazing cycle would be completed in 90 days. Each pasture would receive 84 days of rest between grazing periods, which would hopefully be enough for sufficient plant recovery if adequate rain was received during the cycle. The cycle could be lengthened during the non-growing system when dormant warm-season plants can withstand heavier grazing pressure without damage. Each pasture in the 15 pasture system would be grazed for 10 days at a time under a 150 day cycle used during the winter, with 140 days of rest between grazing periods.

Four pasture/three herd rotation - The livestock are divided into 3 herds and stocked within 3 of the 4 pastures. One herd is moved to a vacant pasture every 4 months. This allows for an individual pasture to be grazed for 1 year and rested for 4 months. The four pasture/three herd system is the least preferred because of the long period of time that livestock remain in each pasture.

Rest-Rotation Grazing – One pasture in a multiple pasture system receives a year of rest on a rotational basis at least every third or fourth growing season. The system allows for year-long escape cover, nesting and foraging habitat, as well as seed-set.

A ranch must be divided into at least two pastures before even the least complex two pasture/one herd deferred-rotation grazing system can be implemented. If not cross-fenced, the land manager would need to have access to other areas where livestock could be moved to during the prescribed rest periods. Electric fencing is a lower cost/less labor intensive alternative to barbed wire for dividing a ranch into multiple pastures. For a deferred-rotation grazing system to be most effective, all the pastures in the system should be more or less equal in size and/or have similar grazing capacities (e.g., pastures on the most productive, deep soils of a ranch would have higher livestock grazing capacities and should therefore be smaller than pastures on shallower, less productive soils).

Individually fenced improved grass pastures on a ranch should be incorporated into a deferred-rotation grazing system. Rotating livestock through the tame grass pastures would help provide longer/more frequent periods of deferment for the native pastures since most species of non-native forages can generally withstand more intensive grazing pressure than native plants can. Note: most species of "improved" livestock forages (such as coastal bermuda, Klein grass, Old World bluestem, etc.) do not have much value to wildlife, except possibly as cover for some species, especially if grown in dense monocultures with very little diversity of native plants.

Since livestock are confined to individual pastures in a deferred-rotation grazing system, each pasture needs to have at least one source of water available when livestock are in that pasture. Creeks may provide adequate water during most of the year, but water from seasonal streams may become limited or inaccessible during extended dry periods. Also, concentrated livestock activity around creek waterholes can cause excessive damage to the plants and soils in the area. Earthen stock tanks and/or water piped to troughs from a well may provide better, more reliable,

sources of water. One water source can serve several pastures if properly located. For example, one water trough could serve two pastures if straddled by a cross-fence, or a trough in a separately fenced "waterlot" constructed at the juncture of several cross-fences could serve numerous pastures.

A deferred-rotation grazing system will fail to produce the desired results of maintaining a healthy and diverse plant community if the range is overstocked with animals, both domestic and wild. The appropriate livestock stocking rate for a specific ranch is dependent on that ranch's herbaceous plant productivity and past grazing history. The stocking rate can vary from year to year, and seasonally within a year, depending on environmental factors. Stocking rates should be calculated on grazeable land, excluding dense woods or brush, or water. The impact of grazing animals should be closely monitored and the number of livestock on a ranch may need to be frequently adjusted to account for the variations in a ranch's grazing capacity.

A rule-of-thumb livestock stocking rate for native rangelands in the eastern portions of the Cross Timbers and Edwards Plateau regions of northcentral and central Texas is 1 animal unit (a.u.) per 15-20 acres. Recommended stocking rates decrease in a westward progression across the regions in association with decreases in the average annual rainfall. A rule-of-thumb rate in central portions of the regions is 1 animal unit per 25-35 acres, while it is 1 animal unit per 40-50 acres in the most arid far west portion of the Edwards Plateau.

The combined total of all animals on the range, including all classes of livestock as well as deer and exotics, must be considered when determining stocking rates. The following equivalent values of animal unit standards can be used for planning the management of rangelands:

Cattle

| | |
|--|-----------------|
| weaned calves to yearlings | 0.6 animal unit |
| steers and heifers (1 to 2 years) | 1.0 animal unit |
| mature cows, with or without unweaned calves at side | 1.0 animal unit |
| bulls (2 years and over) | 1.3 animal unit |

Sheep

| | |
|---|-----------------|
| 5 weaned lambs to yearlings | 0.6 animal unit |
| 5 mutton or ewes (1 to 2 years) | 1.0 animal unit |
| 5 mature ewes, with or without unweaned lambs at side | 1.0 animal unit |
| 5 rams | 1.3 animal unit |

Goats

| | |
|---|-----------------|
| 6 weaned kids to yearlings | 0.6 animal unit |
| 6 muttons or does (1 to 2 years) | 1.0 animal unit |
| 6 does, with or without unweaned kids at side | 1.0 animal unit |
| 6 bucks or muttons over 2 years | 1.3 animal unit |

Horses 1-1.5 animal unit

Deer
6 deer 1.0 animal unit

Exotics (depends on the species; use animal unit standard set for similar size domestic animal)

A well-planned cattle grazing system is compatible with wildlife habitat management. Since cattle primarily consume grass, they do not normally compete with most wildlife for the same food sources, unless forced to due to excessive stocking rates and/or continuous grazing pressure. However, goats and sheep more directly compete with wildlife. Goats prefer browse (the foliage of woody plants); sheep prefer forbs. The foliage and seeds of forbs and woody plants are important food sources for many species of wildlife. Excessive goat browsing also reduces the amount of low-growing woody brush needed for cover for many wildlife species and can limit the reproduction of woody plants. It is recommended that sheep or goats not be stocked on a ranch if maintaining and improving the habitat for wildlife is an objective, unless 4-6 months rest can be periodically provided in pastures to allow for the adequate recovery of woody plants.

It is recommended that when leasing grazing rights, there be a written livestock grazing lease agreement that as a minimum specifies a maximum stocking rate and that a rotational grazing system will be used. Grazing schedules (how long each pasture will be grazed and how long each will be rested) and stocking intensities need to be flexible and continually reevaluated based on rainfall patterns, seasons of the year, and local range conditions. The landowner needs to retain the rights to require the lessee to reduce, and in some instances increase, the number of livestock depending on range conditions, and to require that range plants receive appropriate periods of rest. As a suggestion, it may be to the landowner's benefit to receive grazing lease "payment" in the form of facilities/habitat improvements (fence repair, additional cross-fence construction, cedar control, prescribed burning, discing to encourage forb growth, etc.) in lieu of monetary reimbursement. A good, trustworthy lessee can be an asset to a landowner, helping to maintain and improve the quality of the habitat as well as serving as the landowner's "eyes and ears" in his absence. Conversely, a lessee who is more concerned with maximum, short-term economic gains rather than the long-term sustained health of the land can be a liability.

Appendix E

Vegetation Management Recommendations

Managing native vegetation (browse, weeds, grasses) to prevent continuous overuse by livestock and wildlife should be of primary concern. Over 50 percent use of most species on a continuous basis will stress vegetation, causing less production or killing of the plant. Good livestock management, utilizing a deferred-rotation grazing system at proper stocking rates, can prevent overutilization of vegetation by livestock. Sound deer and feral hog (and other large exotics, such as axis, sika, etc.) harvest strategies are also needed to prevent overuse of food and cover by wildlife. Native white-tailed deer and feral hogs (and large exotics if present) are the only wildlife species present in the Edwards Plateau/Cross Timbers that can degrade or virtually destroy the habitat for not only themselves, but for the many smaller mammal and bird species that rely on the same vegetation for food and/or cover.

Managing or planning for the long term, considering wet years as well as drought years, and not carrying more livestock or deer than the land will support during poor as well as good years should be the overall goal.

Wildlife have a certain requirement for cover. Cover provides a sense of security from disturbance and protection from inclement weather and predators. The amount and kind of cover vary with the species. A stand of herbaceous plants may provide adequate cover for some bird species and small mammals, while other species require woody cover (trees and shrubs) in lieu of or in addition to herbaceous cover. The best cover for a large species such as white-tailed deer in the Edwards Plateau/Cross Timbers is a pattern or mosaic of woody brush and trees interspersed within open areas at an approximate 2/1 ratio of open area to woody cover. Clumps or strips of brush should be wide enough so that an observer cannot see through them from one side to the other during the winter months when deciduous species are bare of leaves. Cover strips should be as continuous as possible to provide travel lanes. Deer and other wildlife can be displaced by disturbance from an area without adequate escape cover. A habitat that provides several different types and arrays of cover benefits more species of wildlife than a habitat that has limited types, amounts, and distribution of cover.

Management of vegetation, whether it be deciduous post oak woodlands, ashe juniper woodlands, mesquite woods, or open grasslands, requires long-term planning. Any vegetation manipulation practice will have an impact on resident wildlife species, either good or bad, depending on the type of treatment used, the degree of use, and location. Before implementing vegetation control techniques, determine what the long-term effects will be for each wildlife species that occurs in the area and minimize the negative impacts. Consider the location and size of sensitive wildlife habitats that provide important nesting or roosting sites, feeding areas, desirable wildlife food producing plants, cover, water, and space needs. Wildlife can be displaced by disturbance from an area without adequate escape or security cover. The amount and distribution of cover on adjacent lands need to be taken into consideration when assessing the cover needs of wide-ranging wildlife species such as deer and turkey. A small ranch would

need a larger amount of security cover on a percentage basis than would a larger ranch where the vastness of the area provides security.

The control of plant species such as ashe juniper, eastern red cedar, mesquite, prickly pear, and oak species that invade a variety of rangeland sites is often warranted. When these species dominate an area, they diminish plant diversity and the quality of habitat for most wildlife species. Vegetation manipulation may be in the form of prescribed burning, mechanical, biological, or herbicide control of trees, brush, or weeds, and is important to create and maintain open rangelands for grassland dependent wildlife. Most of these practices will require the use of specialized equipment or machinery for plowing, discing, bulldozing, spraying, or other vegetation or soil manipulation procedures. The cost effectiveness of the different control measures must be considered prior to initiation of control measures.

Prescribed burning is an effective, low-cost habitat management tool that can be used to enhance plant diversity by stimulating the production of a variety of forb and grass species and to maintain woody plants at the low heights most beneficial to wildlife. Livestock as well as wildlife can benefit from a properly planned and conducted prescribed burn. However, there are legal constraints and liabilities in the use of fire. The land manager should be well-trained and knowledgeable on the proper use of fire before attempting a prescribed burn. Refer to Texas Agricultural Extension Service bulletin "Prescribed Range Burning in Texas" for details on the use of fire as a range management tool.

It is often necessary for a pasture to receive a period of deferment from livestock grazing to allow for a build-up of enough fuel (herbaceous plant litter) to carry a fire.

The use of mechanical equipment to control woody plants will typically result in an initial growth of forbs and annual grasses and the resprouting of many woody species. Soil disturbance associated with mechanical controls releases the natural seed bank found in the soil, increasing the quantity, quality, and distribution of plants beneficial to wildlife. However, without periodic follow-up treatments of fire, herbicides, or additional mechanical manipulations, and/or without proper livestock grazing management, these sites will eventually again become dense stands of regrowth brush and trees. Mowing (shredding) areas of herbaceous plants and/or low density woody plants is another form of mechanical treatment. Mowing should be postponed until after the peak of the nesting/young-rearing period of local ground-nesting birds and mammals. One-third of open areas can be mowed per year, preferably in strips or mosaic types of patterns, to create "edge" and structural diversity.

Biological control is the use of heavy grazing pressure by livestock such as goats to control or suppress woody plants and sheep to control herbaceous weeds. Under certain management goals, biological control of woody plants and forbs can be a legitimate practice if done correctly. However, it is not normally a recommended wildlife habitat management practice. Long-term heavy grazing pressure by goats, which prefer woody browse but will also consume forbs, will eliminate all leaves from woody plants up to a height of four feet. The creation of this "browse line" and the resulting park-like appearance of the woody plant community will have negative effects on the wildlife species that also depend on the low-growing foliage of woody plants for both forage and cover. Heavy grazing pressure by sheep, which prefer forbs, will reduce or eliminate forbs that are also beneficial to wildlife.

There are many specifically formulated herbicides on the market today that can selectively control unwanted vegetation to enhance wildlife habitat. Determining the proper product and application technique requires consultation with TAEX, NRCS, or TPWD personnel. Always advise that wildlife is a goal for your projects of this type. If herbicides are improperly use, they can have a significant negative impact on many plant communities and may suppress or eliminate plants other than the target species. Selective application methods, rather than broad-scale applications, are recommended to avoid the elimination of plants that are important to wildlife.

Ashe Juniper (Cedar) Control

Cedar has invaded large areas of the Cross Timbers and Edwards Plateau regions of central Texas and it dominates many rangesites with shallow limestone soils. The suppression of fire and long-term overgrazing by livestock has contributed to the spread and invasion of this evergreen woody species. If not controlled or managed, cedar will eventually form a closed canopy that prevents sunlight from reaching the ground, limiting the growth of grasses, forbs, and other woody plants. The massive shallow root system of cedar allows it to successfully compete with more desirable plants for available soil moisture. The foliage of cedar intercepts rainfall and prevents moisture from reaching the ground. Soil erosion is enhanced under cedar stands due to the limited amounts of herbaceous plants.

Cedar has minimal food value to both livestock and wildlife. Its foliage is not preferred by browsing species. Deer only utilize it to a small extent, typically during the late winter when the availability of other foods is low. The fruit (berries) that it sporadically produces are eaten by some bird species and occasionally by deer, but they are not normally important components of wildlife diets. Cedar is an important component of Golden-cheeked warbler (GCW) habitat, and any control should follow management guidelines in **Appendix K**. Regrowth cedar is almost never a component of GCW habitat.

The most common species of cedar in central Texas, ashe juniper or blueberry cedar, does not resprout from roots, as do most other woody species, if all above-ground green material is removed or killed. Redberry juniper does occur in some areas, especially the more western portions of the region. Redberry juniper has the ability to resprout from roots and is therefore more difficult to control. A landowner should learn how to identify the species occurring on his land so the most appropriate control methods can be used.

Ashe juniper can be controlled with a variety of control methods including mechanical (dozing, chaining, grubbing), fire, herbicides, biological, and hand cutting. Selective, single-stem removal of cedar where it is growing in stands mixed with other desirable woody plants is preferred over broad-scale removal to prevent damage to the desirable species. When it is removed from these areas, care must be taken to avoid reducing the amount of cover in the stands below minimum levels needed for wildlife. Because of its evergreen growth form, cedar can add structural density to stands of deciduous woody plants during the winter months. Control efforts should be targeted toward “regrowth” cedar invading range sites.

Properly applied fire (prescribed burning) can be used to economically kill small blueberry cedars up to about 3 feet tall. Other control methods are necessary to initially remove larger cedars that are not effected by fire. Prescribed burns at 8 to 10 year intervals can be used to maintain control of cedar seedlings that are continuously being established throughout central Texas from undigested seeds that are widely dispersed by birds and other animals, but a 5 year burning rotation seems the optimum form of control to reduce hand cutting.

The biological control of cedar with goats is not recommended because excessive browsing on other more preferred species of woody plants will precede utilization of the cedar, resulting in the degradation of wildlife habitat. Control of cedar with certain specific herbicides can be effective on low densities of cedars less than three feet tall.

Cedar does have some value as wildlife escape and thermal cover, especially in areas where other forms of woody cover are lacking or in short supply. The amount of cover on open "prairie" habitats of central Texas may be less than needed to provide a minimum amount of security for wildlife. Although some species of wildlife may prefer and utilize open habitats, others are hesitant to venture very far from escape cover. While it may not be the most desirable, cedar is one of an apparently limited number of woody species that can grow on certain soil types of central Texas. It is recommended that small stands and strips of cedar be retained and encouraged at 200-300 intervals in habitats lacking sufficient woody cover. These blocks and strips of cedar can provide structural diversity, travel lanes and security cover that is beneficial to many species. The distribution and density of cedar can be controlled over time to prevent it from forming dense stands.

Mesquite Control

Mesquite, another woody invader infesting many range sites in central Texas may be necessary on some sites. Its growth form varies from a multi-stemmed shrub to an upright tree. Adaptable to a variety of soil types, mesquite can colonize and dominate open rangelands, old fields, and other areas where ground cover has been reduced and fire eliminated from the environment. Mesquite sprouts from buds along a compressed, buried section of the stem called the "crown". Control by grubbing, bulldozing, root plowing, and chaining of mature-size trees has proven successful under proper soil moisture conditions. Several approved herbicides are also available for control. Shredding, on the other hand, or other practices that only remove top growth but do not involve removal of the crown is not recommended and may result in further sprouting. Any control planning should proceed with good common sense and a sense of aesthetics.

Mesquite seed pods are readily eaten by wildlife and livestock, resulting in the dispersal of undigested seeds across the landscape. Seeds may remain dormant for extended periods of time and germinate when the right conditions or soil disturbances occur. Young mesquites can quickly become established and grow rapidly, particularly when competition from other plants is reduced by heavy grazing pressure.

Like red cedar or ashe juniper, mesquite does have some redeeming qualities. It provides seed pods that are a beneficial although sporadic food source, microclimates for cool season grasses

and forbs that may be important to plant diversity, nitrogen fixing roots, and cover, that is beneficial to many wildlife species.

Range enhancement involves range reseeding and native grass restoration. Establishing native herbaceous plants (grasses and forbs) that provide food and cover, benefits wildlife and provides erosion control benefits. Plant species selected and methods for establishment should be applicable to the county. Non-native species are generally not recommended, but if required for a specific purpose, non-native species should not exceed 25 percent of the seeding mix. Seeding mixtures providing maximum native plant diversity are recommended. Many herbaceous broadleaf plants (known as forbs - weeds and wildflowers) are beneficial to wildlife for forage and/or seed production. Encourage "weed and wildflower" species by selective application of chemical, biological (eg., grazing management) and/or mechanical means on native rangelands, Conservation Reserve Program lands, and tame grass pastures (eg., coastal bermuda). Natural Resource Conservation Service personnel in the area can provide detailed recommendations on range and native grass reseeding, designed to meet individual goals. Refer to Appendix K for native grass restoration guidelines.

Farming Practices: Delaying of shredding or mowing of hay or native grass pastures until after July 15 will usually avoid killing of young fawns or ground nesting birds by accident.

Use Integrated Pest Management to minimize pesticide applications (consult the Texas Department of Agriculture, Austin). If necessary, spot spraying is much preferred over broadcast spraying especially for broad-spectrum herbicides. Spray early in the spring while plants are still small, requiring less spray. Many "weeds" are important to wildlife.

To provide weed seeds (ragweed, croton, sunflower, partridge pea, trailing wild bean, etc.) that are the basis of quail, dove, and other seed-eating bird's fall and winter diets, shallow disk 10 - 20 foot wide strips in sandy soil around the edge of brush and woods after the first freeze. This practice will promote growth of these important forbs the following spring and summer.