Draft Environmental Assessment

for

BALCONES CANYONLANDS NATIONAL WILDLIFE REFUGE
Marble Falls, Texas

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Marble Falls, Texas
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SUMMARY: This environmental assessment describes three alternatives and their impacts to provide a quality hunting experience and a tool for refuge management for Big Game and Migratory Birds (i.e. doves) at Balcones Canyonlands NWR. The Refuge is located in the Edwards Plateau of the central Texas Hill Country in Burnet, Travis, and Williamson Counties, Texas. The preferred alternative in this Environmental Assessment if to have Refuge controlled public hunts. There is also a no hunting alternative and an open hunting alternative. The Refuge opened these activities for hunting between 1997 and 2000. The Fund for Animals/Humane Society lawsuit of 2003 listed Balcones Canyonlands NWR as one of the national wildlife refuges which had not provided a cumulative impact analysis when writing the environmental assessments for its Big Game and Migratory Bird hunting program. This revised environmental assessment provides a cumulative impact analysis for each of the alternatives.

NOTE TO REVIEWERS AND RESPONDENTS

If you wish to comment on the environmental assessment, you may mail comments to the address below. Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their home address from the record, which we will honor to the extent allowable by law. **If you wish us to withhold your name and/or address, you must state this at the beginning of your comment**. We will make all submissions from organizations or businesses and from individuals available for public inspection in their entirety.

Please send comments by _____, 2007.

Address comments to:
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INTRODUCTION

SETTING

The Refuge was established in 1992 under the authority of the Endangered Species Act of 1973, (ESA), as amended, the Fish and Wildlife Act of 1956, as amended, and the Land and Water Conservation Fund Act of 1965, as amended. The Refuge is also part of a larger conservation strategy in the Austin area (City of Austin, 1991a). The focus of this strategy is preservation and restoration of habitat for two endangered migratory songbirds, as well as numerous other species of concern, in the Balcones Canyonlands ecological region on the eastern edge of the Edwards Plateau Ecosystem Unit.

Populations of the federally-listed endangered Black-capped Vireo (*Vireo atricapillus*) and Golden-cheeked Warbler (*Dendroica chrysoparia*) have been declining. A primary reason for these declines is impact on nesting habitat resulting from development and other changes in land use on the Edwards Plateau of Texas (Benson, 1990; Grzybowski, 1985). These two species are neotropical migratory birds, that is, birds that nest and breed in North America, and then migrate to southern Mexico and the Central American tropics during the winter. The Refuge also preserves karst habitat, an underground honeycomb of caves, sinkholes, and streams created by naturally occurring mildly acidic water dissolving the limestone substrate. This habitat typically supports several endangered, endemic species of invertebrates, salamanders, and fish. While karst habitats on the Refuge have not yet been fully surveyed for rare species, eleven cave invertebrates, or troglobites, were identified during preliminary surveys of caves on the Refuge. Nine of these species are considered rare or endemic to the Refuge area (Reddell, 1999). Several other rare cave species have been identified in similar, more thoroughly surveyed, habitat nearby in the Edwards Plateau area (Veni and Associates, 1988). This biological diversity, along the area's rugged natural beauty, led the Nature Conservancy, an international conservation organization, to list the Edwards Plateau area as one of the 200 'last great places' worldwide. Other areas so designated by the Nature Conservancy include the Florida Keys and Oklahoma tallgrass prairie.

The Refuge was originally designated as encompassing 41,000 acres. The Secretary of the Interior approved addition of 5,000 acres in 1996, because the need for protection of additional Golden-cheeked Warbler habitat was identified. In 2000 a Refuge boundary expansion was approved that includes an additional block of 34,000 acres to the west of the previously existing Refuge (USFWS, 2000). The 34,000 acre boundary expansion will allow protection of additional habitat for endangered species and other species, and may facilitate acquisition of several large parcels, reducing the potential for habitat fragmentation. With these additions the Refuge boundary, as currently approved, includes 80,000 acres of land in Travis, Williamson, and Burnet counties. Currently 19,492 acres have been acquired within the Refuge boundary in fee title and 2,453 acres in conservation easements. Additional lands will continue to be acquired as they are available from willing sellers.

As of this writing the Refuge is or will manage approximately 1,482 acres for Black-capped Vireo; 15,088 acres for Golden-cheeked Warblers; 4,223 acres for grassland species; 244 acres in riparian area along Refuge corridors; and 207 acres in other habitats.

The areas currently within the Refuge and the proposed areas for acquisition were/are extensively grazed by cattle, sheep, and goats. The area is predominately Ashe juniper-oak woodlands and most of the Refuge is underlain with karst habitat.

Major roadways that run through or are adjacent to the Refuge include Farm to Market (FM) Roads 243, 1431, 1174, and various county roads like 1869 as well as smaller roads.

Cow Creek, a major stream in the area, is fed by rainfall runoff and spring water. The Refuge has three important watersheds with its proposed boundary, Cow Creek, Big Sandy Creek, and San Gabriel River watersheds. Cow Creek and Big Sandy Creek both flow into the Colorado River. The San Gabriel River flows to the Brazos River. The Colorado River provides potable and recreational water to the Austin.

Habitat management on the Refuge is primarily for the Black-capped Vireo and Golden-cheeked Warbler. Habitat requirements for the Vireo and Warbler differ. Good Black-capped Vireo habitat is characterized by mid-successional shrub oak or other shrub vegetation. Good Golden-cheeked Warbler habitat is characterized by extensive stands of mature trees (oaks, Ashe juniper, escarpment cherry, elms, etc.) found in and around steep canyons and hillsides.

The Refuge also manages for wildlife diversity by managing and providing a variety of vegetation and habitat types for many species of wildlife that breed or overwinter on the Refuge.

SUMMARY OF HUNTING

Deer

Average between 40-60 deer harvested annually.

Turkey

Over the past 10 years (1996 - 2006) only 5 turkeys have been harvested during the Fall season.

Dove Hunting

Year	Total # of Hunter Visits	Doves Harvested
2001	105 hunter visits	77 doves
2002	85 hunter visits	85 doves
2003*	few hunters	19 doves
2005		1 dove

***A significant drought hit the region in 2003.**

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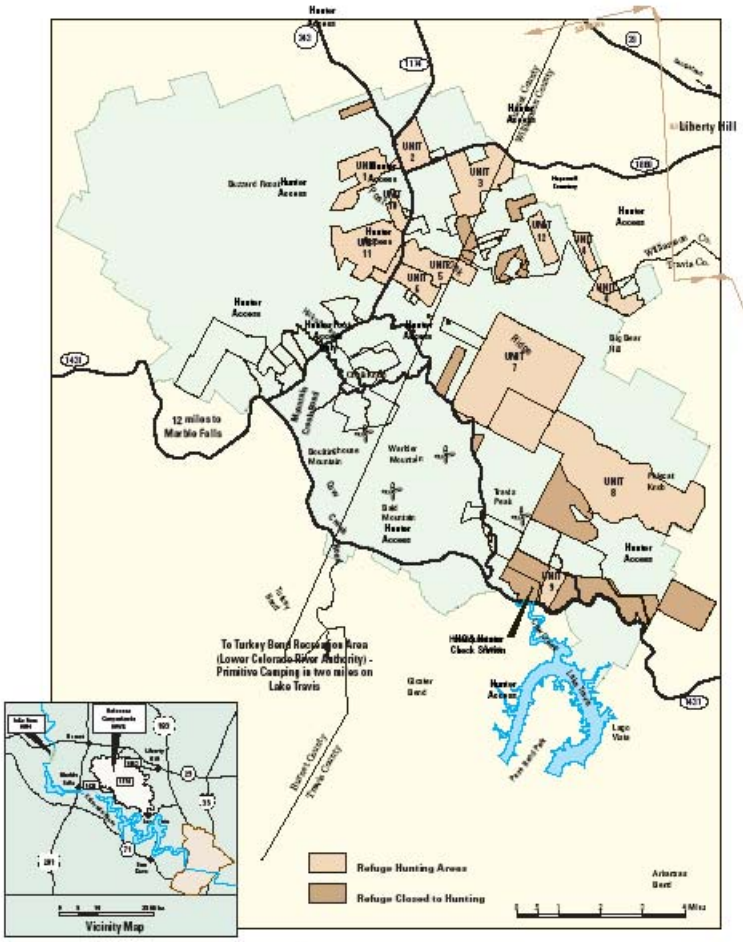
Balcones Canyonlands National Wildlife Refuge

Burnet, Travis and Williamson Counties, Texas



Hunters should look for white letters on brown signs to find their assigned Hunt Unit entrance(s).

Note: Streams may be too swift to cross by foot, ATV, or vehicle safely. Carefully inspect the crossing.
Note: the distance between Unit 4 and the southeast entrance to Unit 3 is 2.8 miles.

Chapter 1 Purpose and Need for Action

The proposed action is needed to implement the previously approved Hunting Plans for Balcones Canyonlands NWR which provides the public with a high quality recreational experience and the refuge management with a wildlife and habitat management tool to promote the biological integrity of the refuge. Damage by feral hogs has been documented on all units and tracts of Balcones Canyonlands NWWR. Feral hogs are an exotic species that competes directly with native species for food and other habitat needs. In addition, feral hogs prey on numerous non-game species (reptiles, amphibians, etc.) as well as ground nesting birds. The Refuge conducts annual spot-light counts for deer and requires that hunters check-in all game so the harvest can be monitored and the hunt evaluated. Hunting in the context of this environmental assessment (EA) is defined as **Big Game (deer, feral hogs, turkey) and Migratory Bird (dove) Hunting**.

Biological Soundness

Deer

Deer hunts have proven to be not only compatible with refuge objectives but also beneficial in meeting them. Deer harvest is essential to maintain the herd at or below habitat carrying capacity. When deer are overpopulated, they overbrowse their habitat, which can completely change the plant composition of a forest. The refuge has experienced overbrowing on almost all mid-story hardwood species. Young tree seedlings (1-9 years old) can be killed by overbrowsing. Failure to maintain a hardwood component in the juniper-oak woodlands will have negative impacts on future Golden-cheeked Warbler nesting habitat as well as other resident and non-resident wildlife populations. Overpopulation can also lead to outbreaks of devastating diseases such as EHD and bluetongue which have been found locally in overpopulated herds. Overpopulation also leads to starvation, increased car-deer collisions, and poor overall herd health.

The Texas Parks and Wildlife Department (TPWD) recorded deer harvest rates on lands within the Edwards Plateau 2005-2006. TPWD estimated 2,353 deer were harvested in the Edwards Plateau Eco-Region. The Refuge has consulted with TPWD Biologist, Trey Carpenter during planning for the initial deer hunts. At that time it was believed that the amount of land open to hunting, number of hunters, and the length of the season would not negatively impact the deer population of the area. Hunters on the Refuge are generally not as successful in harvesting deer as baiting is not allowed. Deer hunting probably needs to be increased from its present level to reduce the amount of overbrowsing on Refuge hardwoods. Harvest and survey data from TPWD confirm that many years of deer hunting for 90 days using bait on surrounding private lands have not had a cumulative adverse effect on the deer population. The expansion of hunting on 4,762 acres of refuge lands for a very limited deer gun hunt (7-9 days without bait) should not negatively impact the deer herd.

The Refuge conducts annual deer spot-light counts in the late summer and early fall. In 2004 and 2005, the Refuge estimated 1 deer per 9-10 acres. Ideally, the Refuge would prefer 1 deer per 25-35 acres. Annually the Refuge harvests between 40-60 deer per year, which is not enough to reduce the overall herd size to the desired level. It is hoped that increased hunting on neighboring lands will eventually reduce the number as deer freely move on and off the Refuge.

Feral Hogs

Feral hogs are an extremely invasive introduced non-native species. They can harbor several infectious diseases, some of which can be fatal to wildlife. By rooting and wallowing, feral hogs destroy wildlife habitat. Damage includes erosion along waterways and wetlands and the loss of native plants. Additionally, feral hogs compete directly for food with deer, bears, turkeys, squirrels and many other birds and mammals. They are predators of native reptiles and amphibians as well as small mammals and deer fawns and ground-nesting birds such as turkeys. Hunting of feral hogs provides the refuge with another management tool in reducing this detrimental species, and at the same time, is widely enjoyed by local hunters. The Refuge also employs a limited hog trapping program in areas where hog damage is significantly damaging refuge resources.

Wild Turkey

Fall turkey hunting on the refuge is concurrent with the Refuge's White-tailed deer hunt and is currently limited to 8 days during the fall. Over the past 10 years of allowing fall turkey hunting (limit 1 bearded turkey), only 5 turkeys were harvested. The Refuge does not conduct turkey surveys, but turkeys are frequently seen in flocks from 5-45 along Cow Creek Road.

Migratory Birds

The current migratory bird hunts are limited to dove (mourning, white-winged, rock, and Eurasian doves) Hunting is limited to the Johnson Tract (274 acres) for the first 4 days of the state season. Very little dove habitat exists on the refuge to concentrate doves resulting in few dove hunters on the refuge. The Refuge does enhance the area for dove hunting by planting native food plots (dove weed, sunflowers). Dove hunters are required to use non-toxic shot when hunting dove on the Refuge. The refuge adopts the season set by the state of Texas within the Service's Migratory Bird Hunting Frameworks.

The U.S. Fish and Wildlife Service annually prescribe frameworks, or outer limits, for dates and times when hunting may occur and the number of birds that may be taken and possessed. These frameworks are necessary to allow State selections of season and limits for recreation and sustenance; aid Federal, State, and tribal governments in the management of migratory game birds; and permit harvests at levels compatible with population status and habitat conditions. Because the Migratory Bird Treaty Act stipulates that all hunting seasons for migratory game birds are closed unless specifically opened by the Secretary of the Interior, the Service annually promulgates regulations (50 CFR Part 20) establishing the frameworks from which States may select season dates,

bag limits, shooting hours, and other options for the each migratory bird hunting season. The frameworks are essentially permissive in that hunting of migratory birds would not be permitted without them. Thus, in effect, Federal annual regulations both allow and limit the hunting of migratory birds.

Migratory game birds are those bird species so designated in conventions between the United States and several foreign nations for the protection and management of these birds. Under the Migratory Bird Treaty Act (16 U.S.C. 703-712), the Secretary of the Interior is authorized to determine when "hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any ... bird, or any part, nest, or egg" of migratory game birds can take place, and to adopt regulations for this purpose. These regulations are written after giving due regard to "the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, and are updated annually (16 U.S.C. 704(a)). This responsibility has been delegated to the U.S. Fish and Wildlife Service as the lead federal agency for managing and conserving migratory birds in the United States. Acknowledging regional differences in hunting conditions, the Service has administratively divided the nation into four Flyways for the primary purpose of managing migratory game birds. Each Flyway (Atlantic, Mississippi, Central, and Pacific) has a Flyway Council, a formal organization generally composed of one member from each State and Province in that Flyway.

The process for adopting migratory game bird hunting regulations, located in 50 CFR part 20, is constrained by three primary factors. Legal and administrative considerations dictate how long the rule making process will last. Most importantly, however, the biological cycle of migratory game birds controls the timing of data-gathering activities and thus the dates on which these results are available for consideration and deliberation. The process of adopting migratory game bird hunting regulations includes two separate regulations-development schedules, based on "early" and "late" hunting season regulations. Early hunting seasons pertain to all migratory game bird species in Alaska, Hawaii, Puerto Rico, and the Virgin Islands; migratory game birds other than waterfowl (e.g. dove, woodcock, etc.); and special early waterfowl seasons, such as teal or resident Canada geese. Early hunting seasons generally begin prior to October 1. Late hunting seasons generally start on or after October 1 and include most waterfowl season not already established. There are basically no differences in the processes for establishing either early or late hunting seasons. For each cycle, Service biologists and others gather, analyze, and interpret biological survey data and provide this information to all those involved in the process through a series of published status reports and presentations to Flyway Councils and other interested parties. [As an example of how migratory bird data are collected and summarized to inform the regulations setting process, reference the documents attached below: "Waterfowl Status 2006.pdf"; Central Flyway Mid-Winter Survey, 2006 (CFMWS2006.pdf)"; the "Pacific Flyway Databook 2006 (MWS06Draft.pdf) and the "1966-2005 Analyses of Selected Waterfowl Survey data for the Pacific Flyway Portion of Region 2 (pdfreport.pdf). The first attachment summarizes the National status of various species' populations and the other attachments summarize populations by State in each of the relevant Flyways for the U.S. Fish and Wildlife Service's Southwest Region. Though not as detailed as that for waterfowl, relevant data are collected and summarized for migratory bird species such as dove, woodcock, etc.

Bird monitoring data, including harvest information, are available through the Service's Division of Migratory Bird Management Website (http://mbdcapps.fws.gov)

Because the Service is required to take abundance of migratory birds and other factors in to consideration, the Service undertakes a number of surveys throughout the year in conjunction with the Canadian Wildlife Service, State and Provincial wildlife-management agencies, and others. To determine the appropriate frameworks for each species, we consider factors such as population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering habitat, the number of hunters, and the anticipate harvest. After frameworks are established for season lengths, bag limits, and areas for migratory game bird hunting, migratory game bird management becomes a cooperative effort of State and Federal Governments. After Service establishment of final frameworks for hunting seasons, the States may select season dates, bag limits, and other regulatory options for the hunting seasons. States may always be more conservative in their selections than the Federal frameworks but never more liberal. Season dates and bag limits for National Wildlife Refuges open to hunting are never longer or larger than the State regulations. In fact, based upon the findings of an environmental assessment developed when a National Wildlife Refuge opens a new hunting activity, season dates and bag limits may be more restrictive than the State allows.

NEPA considerations by the Service for hunted migratory game bird species are addressed by the programmatic document, ‘‘Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds (FSES 88– 14),’’ filed with the Environmental Protection Agency on June 9, 1988. We published Notice of Availability in the Federal Register on June 16, 1988 (53 FR 22582), and our Record of Decision on August 18, 1988 (53 FR 31341). Annual NEPA considerations for waterfowl hunting frameworks are covered under a separate Environmental Assessment, “Duck Hunting Regulations for 2006-07,” and an August 24, 2006, Finding of No Significant Impact. Further, in a notice published in the September 8, 2005, Federal Register (70 FR 53376), the Service announced its intent to develop a new Supplemental Environmental Impact Statement for the migratory bird hunting program. Public scoping meetings were held in the spring of 2006, as announced in a March 9, 2006, Federal Register notice (71 FR 12216). More information may be obtained from: Chief, Division of Migratory Bird Management, U.S. Fish and Wildlife Service, Department of the Interior, MS MBSP-4107-ARLSQ, 1849 C Street, NWR., Washington, DC 20240.

The first year of dove hunting, 2001 was open for 3 weekends, a total of 105 hunter visits harvested 77 dove. The following year, 2002, 85 hunter visits harvested 85 birds. In 2003 there was a significant drought and only a few hunters harvested 19 Mourning Doves and in 2005 only 1 dove was bagged.

There are an estimated 20 million active hunters in the United States, according to industry groups. More than one million Texans alone apply for hunting licenses each year, according to figures from Texas Parks and Wildlife. (from In Texas, hunting has become a pastime for the well-to-do - Private outings rise as public lands shrink. By Bryan Bender, Boston Globe Staff. February 16, 2006)

According to the Sunset Commission report, in 2000, approximately 23 million acres of the state's approximate 176 million acres (including 4 million acres of submerged coastal lands) was owned or managed by a public entity leaving 87 percent of Texas' land in private hands. Most state agencies have not accepted this percentage due to the inclusion of submerged coastal lands in the Sunset Commission's calculation. State agencies contend that 94.3 percent of land in Texas is privately held.

Lands owned by the Federal government in Texas encompass 2.6 percent of the state's total outdoor recreation/conservation lands. These lands are managed by the U.S. Fish and Wildlife Service, U.S. Forest Service, the National Park Service, and the U.S. Army Corps of Engineers. (Texas Environmental Profiles)

The lack of public lands available for hunting, the hunting tradition found in Texas, and the high cost of leasing lands for hunt clubs makes the public owned land and recreational opportunity at Balcones Canyonlands National Wildlife Refuge important for wildlife dependant recreation in Texas. This paired with the need to control habitat degradation has led the U.S. Fish and Wildlife Service to propose the three alternatives for providing hunting at Balcones Canyonlands NWR.

Chapter 2 Alternatives Including the Proposed Action

This action is in response to the Fund for Animals/Humane Society lawsuit of 2003. Different segments of the hunt program for Balcones Canyonlands National Wildlife Refuge were opened between the 1997/1998 and the 2001/20023 hunt seasons. Environmental Assessments, Hunt plans, FONSIs, Section 7 consultations and Compatibility Determinations were completed for all types of hunting opened (big game, and migratory birds). Since the Refuge opened two different types of hunting during the period encompassed by the lawsuit and subsequent to the lawsuit, the Environmental Assessment to look at the entire hunt program at Balcones Canyonlands National Wildlife Refuge is being rewritten to incorporate a cumulative impact analysis for the preferred alternative.

This chapter discusses the alternatives considered for hunting on Balcones Canyonlands NWR. These alternatives are: 1) No Hunting Alternative 1 which discontinues hunting; 2) Alternative 2 which continues with the limited hunt program; and 3) Alternative 3 which opens the entire refuge to state sanctioned hunting opportunities.

2.1 Alternative 1: No Hunting

Under this alternative, the refuge would return to the pre 2002/2003 hunting conditions by discontinuing the hunting program which has been in place since 1997/1998.

2.2 Alternative 2: Limited Hunting (Preferred Alternative)

Under this alternative, hunting would be limited to selected refuge tracts for the following species: deer, feral hogs, turkey (fall only), and doves. Approximately, 12,900 acres are open to big game hunting (figure 1 on page 3) and dove hunting is limited to 274 acres. The refuge currently encompasses over 21,000 acres with a total anticipated acquisition of 46,000+ acres. In the future, additional tracts may be opened to Big Game or Migratory Bird hunting if it is determined that there is legal and safe access, adequate funding, sufficient refuge staff, and populations deemed adequate for hunting. When the acquisition program for the refuge is complete, it is anticipated that there will be more acres opened for hunting. Hunting plans and the environmental assessment will be reviewed annually to ensure that they are up-to-date.

2.3 Alternative 3: Open Hunting

Under this alternative, all refuge lands (except areas deemed unsafe due to the proximity of homes, facilities, and other issues) would be open for hunting of all State game animals during State designated seasons. This would mean year-round hunting as the State of Texas allows this for feral hogs. The seasons for deer and doves would be significantly lengthened depending on the seasons dictated by Texas Parks and Wildlife Department.

Chapter 3 Affected Environment

The Balcones Canyonlands NWR is located on the eastern part of the Edwards Plateau region northwest of Austin, Texas. This area is an ecotone, or mixed community formed by overlap of adjacent ecological communities. Plant and wildlife species typical of eastern deciduous forest, southwestern desert, Texas coastal plains, and interior Great Plains area all represented on the Refuge. Additionally, the region supports numerous endemic species. It is an important area for neotropical migratory birds. Beneath the plateau and the Refuge, underground streams of naturally occurring, mildly acidic water have dissolved the limestone substrate to form karst habitats. Karst habitats support several endangered endemic species of invertebrates, salamanders, and fish, and possibly more organisms not yet discovered.

The Refuge is divided into several large management units; Post Oak Ridge Division, Canyonlands Division, and the San Gabriel Watershed Division. The conservation approaches include woodland and shrubland protection, wetland protection, and prairie restoration.

3.1 Physical Environment

SOILS AND PYSIOGRAPHY

The Refuge is located on the southeastern part of the Edwards Plateau, at the southern end of the Great Plains. The elevation drops about 300 feet at the Balcones escarpment near Austin. Terrain on the Refuge ranges from rough along the escarpment, with canyons and steep slopes, to gently rolling on Post Oak Ridge and in the bottoms. The area is underlain by limestone and contains numerous springs and seeps.

Soils are diverse because of the variety in sites, including ridge tops, slopes, outcrops, and bottoms. Soils area mostly clays and loams and are sometimes very shallow with significant amounts of stones or cobbles. Historically, much of the top soil was washed away from ridgetops and hillsides, leaving rocky outcrops and exposed subsoils.

WATER RESOSURCES

Two aquifers, sub-formations of the Edwards Aquifer, underlie the Post Oak Ridge area, the Glen Rose formation and the Houston member of the Travis Peak formation (Klernt, 1975). Cow Creek, a major stream in the areas, is fed by rainfall runoff and spring water. Most of the Cow Creek Watershed lies within the identified boundary of the Refuge. The Refuge has all or part of four important watersheds within its boundary: the Cow Creek, Big Sandy Creek, Hamilton Creek, and San Gabriel River watersheds. The Cow Creek, Hamilton Creek, and Big Sandy Creek Watersheds all flow to the Colorado River. The San Gabriel River flows northeast to the Brazos River. The Colorado River provides drinking water and recreational water to the city of Austin and many other cities both upstream and downstream.

Three smaller watershed, those of Hickory Creek, Sycamore Creek, and Camp Creek, lie within the western portion of the Refuge. These creeks drain into Lake Travis on the Colorado. The southeast portion of the Refuge is drained by intermittent and perennial streams that also drain in Lake Travis. Springs and seeps provide flow on the few perennial streams and provide intermittent flow in some of the other dry stream terraces.

At least one cave system in the northern part of the Refuge, the Simons Water Cave, is know to have a fairly extensive underground stream; its full extent is not known.

3.2 Vegetation

The plant community of the Refuge represents an ecotone, that is, the mixing of species where different ecological communities overlap. Vegetation on the Refuge includes species typical of the prairies of the Great Plains, the forests of the southeastern United States, the desserts of the Southwest and the tropics of the south. Some species are unique to the Texas Hill Country (as the Edwards Plateau Area is called). Plant communities on the Refuge range from open grassland to dense woodlands and forests. The majority of the Refuge is dominated by a variety of juniper-oak - woodlands, with Ashe juniper (*Juniperus ashei*) a strong component. Oak species vary by site, including the abundant Spanish oak (*Quercus buckelyi*), plateau live oak (*Q. fusiformis*), post oak (*Q. stellata*), and shin oak (Q. *sinuata* var. *breviloba*). Other species include cedar elm (*Ulmus crassifolia*), hackberry (*Celtis laevigata*), escarpment black cherry (*Prunus serotina* var. *eximia*), Texas ash (*Fraxinus texensis*), Arizona walnut, (*Juglans major*), and gum bumelia (*Bumelia lanuginose*). Grasslands and savannahs include a mixture of native and non-native grasses and forbs. Little bluestem (*Schizachrium scoparium*), silver bluestem (*Bothriochloa laguroides* var. *torreyana*), sideoats grama (*Bouteloua curtipendula*), buffalo grass (*Buchloe dactyloides*), and Texas wintergrass (*Stipa leucotricha*) area the most common native grasses. Riparian woodland corridor species include American elm (*Ulmus Americana*), cedar elm, sycamore (*Platanus occidentalis*), and hackberry, along with live oaks and junipers.

Although most of the Refuge is a limestone-dominated terrain, the diversity of plant communities results from variation in soils, topography, fire history, and history of human disturbance (including farming, woodcutting, and grazing by goats, sheep, and/or cattle).

3.3 Wildlife Resources

The Refuge supports a variety of wildlife species due to its ecotonal location at the junction of the Great Plains and the Gulf Coastal Plains. Thirty-two of the fifty-five species of mammals known to occur in the Balcones Canyonlands have been confirmed as occurring on the Refuge. Several bat species occupy the areas. Over 215 species of birds have been identified on the Refuge, many of which are known to nest in the region. Nearly half of these use the Refuge during migration and breeding, spending the remainder of the year in Mexico, Central America, or South America. Two of these, the Black-capped Vireo and the Golden-cheeked Warbler are federally listed as endangered.

Eight amphibian species and thirty-two reptile species have been found on the Refuge to date; and numerous species of cave fauna occupy the karst habitat beneath the surface of the Refuge.

3.4 Threatened and Endangered Species

3.4.1 Bald Eagle

A few bald eagles have been seen flying over the Refuge, most of them during winter months. There is no active nest located on or adjacent to refuge property.

3.4.2 Golden-cheeked Warbler

Listed as endangered, the Warbler nests only in Central Texas and has specific nesting requirements. Most existing and future Warbler habitat on the Refuge is within the Canyonlands Division, with lesser amount in the Post Oak Ridge division. Because it is principally a climax type habitat, the mature juniper-oak woodlands occupied by the Warbler requires little attention or manipulation, other than protection from natural or human-caused disturbance. Protection and enhancement of Warblers and their habitat will principally involve deer herd management to insure continued replacement trees are protected from over-browsing, fire protection, and detection, monitoring and possibly control of oak wilt (a disease of live oak and Spanish oak trees on the Refuge).

3.4.3 Black-capped Vireo

Most of the Vireo habitat is located in the Post Oak Ridge Division, with the largest blocks in the north and central units. Low deciduous cover is the key element in Vireo habitat. They nest "door knob" handle high in shrub lands that range from 3 to 6 meters in height. They also prefer a certain amount of openness with total woody cover between 35-55 percent. Many of the management strategies described for the Warbler apply to the Vireo as well. Control of deer density will reduce browsing pressure in Vireo nesting colonies. Control of nest parasites, Brown-headed Cowbirds, also greatly benefits reproduction for the Vireos. Hogs root and overturn rocks in Vireo nesting habitat and potentially can destroy vegetation. Because Vireos construct their nests about door knob handle high, hog could destroy nests or Vireos.

3.4.4 Cave Invertebrates

The Refuge is within the range of several species of cave invertebrates, but few studies have been initiated to document where they occur. In addition, it is possible that the newly described and endangered Jollyville salamander occurs on within one of the Refuge springs.

3.4.4 Other Endangered Species

The only other federally-listed species know to occur on the Refuge is the Peregrine Falcon which occurs as an uncommon spring and fall migrant. These Falcons are transients over the Refuge.

3.5 Fishery Resources

The Texas Parks and Wildlife Department is currently engaged in active conservation of the Guadalupe bass (*Micropterus treculi*). This species is endemic to the Edwards Plateau. Several streams on the refuge could be suitable for Guadalupe bass introduction.

3.6 Cultural Resources

A "cultural overview and assessment" of the Refuge was completed in 1998 (Tomka & Leffler, 1998). The area of ecological concern is situated with the central Texas archeological region. The cultural history of the region includes four general chronological stages of possible occupation of the region over thousands f years. The three prehistoric stages have been defined on the basis of ecological adaptation and recovered archeological materials. Each stage reflects a change in subsistence as exhibited by material remains and settlement patterns. The historic period reflects the effects of European immigration and the settlement of the region by native populations. The historic stage includes ranching and farming activities and their influence on the present day land use patterns in the region. May documents sites occur with the Refuge boundary and in the general vicinity, but no know site specific studies have been conducted on the Refuge. Most sites are commonly called "kitchen middens or burnt rock middens) and almost all have been opened by previous land owners.

The body of federal historic preservation laws has grown dramatically since the enactment of the Antiquities Act of 1906. Several themes recur in these laws, their promulgating regulations, and more recent Executive Orders. They include: 1) each agency is to systematically inventory the historic properties on their holdings and to scientifically assess each property's eligibility for the National Register of Historic Places; 2) federal agencies are to consider the impacts to cultural resources during the agencies management activities and seek to avoid or mitigate adverse impacts; 3) the protection of cultural resources from looting and vandalism are to be accomplished through a mix of informed management, law enforcement efforts, and public education; and 4) the increasing role of consultation with groups, such as Native American tribes, in addressing how a project or management activity may impact specific archaeological sites and landscapes deemed important to those groups. The U.S. Fish and Wildlife Service, like other federal agencies, are legally mandated to inventory, assess, and protect cultural resources located on those lands that the agency owns, manages, or controls. The Service's cultural resource policy is delineated in 614 FW 1-5 and 126 FW 1-3. In the FWS's Southest Region, the cultural resource review and compliance process is initiated by contacting the Regional Historic Preservation Officer/Regional Archaeologist (RHPO/RA). The RHPO/RA will determine whether the proposed undertaking has the potential to impact cultural resources, identify the "area of potential effect," determine the appropriate level of scientific investigation necessary to ensure legal compliance, and

initiates consultation with the pertinent State Historic Preservation Office (SHPO) and federally recognized Tribes.

3.7 Socioeconomic

Balcones Canyonlands National Wildlife Refuge is located in portions of three counties: Burnet, Travis, and Williamson. The economy of each of these counties is distinctly different, with Burnet county being primarily rural, Williamson county containing both rural areas and areas influenced by the Greater Metropolitan Area of Austin with its population in excess of one million people, and Travis County influenced predominantly by Austin. Travis County has also seen the development of some recreation–oriented communities, such as Lago Vista and Jonestown and several communities south of the Refuge. Over the past 20 years, subdivision of large ranch holdings and development occurring in Williamson County has been shifting its economy from a rural, agricultural area to one characterized by bedroom communities for the Austin area, such as Cedar Park, Leander, Round Rock , and Georgetown. Located the farthest from Austin, the Burnet County economy remains a smattering of production of other livestock such as sheep and goats. Some high tech industry is beginning to move into the area. There are two retirement communities, Marble Falls and Granite Shoals, along the Highlands Lakes.

Much of the growth and change of Williamson County is the result of the rapid growth, and change in the Austin Area resulting from numerous industries relocating to Texas in response to an available employment pool and an oversupply in the real estate market from the decline in the oil industry in the early 1980's. Throughout the 1991's this growth continued in the Austin Metropolitan Statistical Area (MSA), consisting of Travis, Williamson, and Hays Counties, largely due to the growth of the high tech industry in Austin. During this decade the Austin MSA added more than 130,000 units of new housing. The MSA's population grew at an annual rate of more than 4%.

The Austin MSA is predominantly young adult, comparatively well educated, and with a median household income of just more than $42,000. The majority of the population is white (some 72%), with persons of Hispanic or Latino origin constituting about 20%, Black or African American persons about 9%, and smaller number of Asian Americans, and Native Americans. Unemployment in the MSA is considerably lower than, and been consistently lower than, that elsewhere in the State of Texas.

Burnet County, outside of the Austin MSA has also experienced rapid growth over the last census period, experiencing a population change of over 50% between 1991 and 2000. The county population remains relatively small, 34.3 persons per square mile, at less than one half of Texas' statewide population density of 79.6 persons per square mile, reflecting Burnet Counties rural nature.

Refuge Recreation Facilities

Balcones Canyonlands NWR provides wildlife dependent recreation at several sites. Hunting, fishing, wildlife observation, wildlife photography, interpretation, and environmental education are six priority uses that national wildlife refuges should provide if they are appropriate and compatible with the purpose of the refuge. Places where the Refuge provides these types of activities are:

Warbler Vista with parking lot, signs, and bulletin board, electronic gate

Cactus Rocks Trail: 0.6 miles with parking lot
Vista Knoll Trail, 1.2 miles of trail
Ridge Line Trail, 0.75 miles of trail
Sunset Deck and associated parking lot

Doeskin Public Use Area with parking lot and gates

Pond and Prairie Trail: 0.4 miles partially paved for accessibility
Creek Trail, 0.6 miles of trail
Rim Rock Trail, 2.2 miles of trail
Shin Oak Trail, 0.5 miles of trail
Indian Grass Trail, 1.5 miles of trail
Kiosk, bulletin board, amphitheater, portable bathroom, trail signs, corn crib, benches, wooden foot bridges, and interpretive signs and exhibits,

Shin Oak Observation Deck with parking lot and gates
interpretive exhibits and signs

Post Oak Creek Trail--under construction

Hunting blinds, 3 each, on the Mullin Tract, hunt unit #2

Numerous roads, improved and unimproved.

Chapter 4 Environmental Consequences

This chapter describes the foreseeable environmental consequences of implementing the three management alternatives in Chapter 2. When detailed information is available, a scientific and analytic comparison between alternatives and their anticipated consequences is presented, which is described as "impacts" or "effects." When detailed information is not available, those comparisons are based on the professional judgment and experience of refuge staff and U.S. Fish and Wildlife Service and State biologists.

4.1 Summary of Effects

4.1.1 Public Health and Safety

Health and safety issue may occur when there are too many visitors trying to use the same lands for the same activity or when there are visitors trying to use the same resource for different purposes.

Alternative 1: No Hunting

Under this alternative there is only a very slight chance of a firearms accident. This would most likely be from a hunter hunting on adjacent private property.

Alternative 2: Limited Hunting

Under this alternative there is a chance of a firearms accident from a hunter with a loaded weapon to someone from the general public (or themselves). All hunters born after Sept. 2, 1971 must have completed a hunter safety course. Exceptions for the safety course include hunters under the age of 16, but they must be accompanied by an adult. All tracts open to hunting are posted as "closed" during our mini-seasons unless you have a refuge permit, thus the general public should not be on those tracts. Hunter numbers and season lengths are very restrictive relative to State seasons under this alternative.

Alternative 3: Open Hunting

Under this alternative there would be a slightly higher chance of a firearms accident relative to Alternative 1 or 2. Essentially all refuge tracts would be open with a greater number of hunters hunting over a longer time period.

4.1.2 Cultural Resources

Alternative 1: No Hunting

Under this alternative, lack of hunting will not pose any threat to historic properties on and/or near the refuge.

Alternative 2: Limited Hunting

Under this alternative, hunting does not pose very limited threats to historic properties on and/or near the refuge. It is readily apparent that most middens have already been opened and searched. Hunters are told during check-in that they may not disturb any refuge artifacts. This information is also in the hunting brochure they receive.

Alternative 3: Open Hunting

Under this alternative, hunting does not pose any *direct* threat to historic properties on and/or near the refuge. It is doubtful that the Refuge would be able to check-in all hunters if state-wide seasons were observed.

4.1.3 Facilities

Areas with significant facilities (government quarters, headquarters, maintenance facilities, etc.) are closed to hunting. Numerous types of roads traverse the Refuge including graveled, caliches, and old ranch roads.

Alternative 1: No Hunting

Under this alternative, existing facilities would still require some maintenance throughout the year for other recreational users. Roads would not be impacted and fewer signs would be required.

Alternative 2: Limited Hunting

Under this alternative, maintenance of existing facilities on the Refuge tracts (i.e. parking areas, roads, trails, buildings, and portable bathrooms) will need attention during high use times by hunters. These areas are also maintained for use by other recreational users throughout the year.

Alternative 3: Open Hunting

Under this alternative, road maintenance would increase significantly and low water crossings would have to be improved. Additional parking facilities would have to be constructed in addition to regular maintenance of existing facilities. Many refuge tracts have no or very limited parking. Although they are currently open to other recreational users, use is very limited due to access problems.

4.1.4 Wildlife Oriented Recreational Programs

Balcones Canyonlands has several public use facilities. Doeskin Ranch Public Use Area with several trails, environmental education facilities (kiosks and amphitheater); Shin Oak Observation Deck and interpretive signs and kiosk; Warbler Vista with trails and interpretive signs; Sunset Deck with a trail and signage; and the Post Oak Creek trail and signs at the Refuge Office. Several special events are held on the Refuge. SparrowFest is held during February and focuses on sparrow identification. The Balcones Songbird Festival is held in April and celebrates Neotropical Migrants. Several schools take part in

Refuge lead environmental education programs, Bridges to Birding Balcones and Going Buggy. Generally at least one wildlife photography workshop is conducted during the year. Numerous tours to observe the Golden-cheeked Warbler and Black-capped Vireo are conducted by local Audubon groups and the Friends of Balcones. Occasionally fishing derbies for children are held on selected refuge ponds.

Alternative 1: No Hunting

Under this alternative there would be a direct impact to programs as described under the Congressionally mandated Improvement Act of 1997. Section 5(a)(3) of the Act states:

"(B) Compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System, directly related to the mission of the System and the purposes of many refuges and which generally fosters refuge management and through which the American public can develop an appreciation for fish and wildlife;
(C) compatible wildlife-dependent recreational uses are the priority general public uses of the System and shall receive priority consideration in refuge planning and management; and
(D) when the Secretary determines that a proposed wildlife-dependent recreational use is compatible within a refuge, that activity should be facilitated, subject to such restrictions or regulations as may be necessary, reasonable and appropriate."

There would be no effect on the current wildlife oriented recreational activities permitted because there would be limited conflict between user groups.

Alternative 2: Limited Hunting

Under this alternative, the Congressionally mandated Improvement Act of 1997 is fully met (see Alternative 1 above).

Certain public use areas are closed during the 4 weekends the refuge is open to hunting for safety reasons. The Johnson Unit, which is open to dove hunting the first 4 days of dove season in September, is closed to other forms of public use except for 4 weekends of Big Game hunting.

Alternative 3: Open Hunting

Under this alternative, the Congressionally mandated Improvement Act of 1997 is *partially* met. Due to the State allowing year-round hunting (for feral hogs and rabbits), all tracts would have to be closed to other uses for safety reasons. This alternative would not allow for other compatible uses on the refuge.

4.1.5 Refuge Physical Environment

Alternative 1: No Hunting

Under this alternative, impacts on the refuge physical environment would have minimal

to negligible effects as these areas will be open to other recreational users. Some disturbance to surface soils, topography, and vegetation would occur in areas currently open to walking; however effects would be minimal. Lack of hunting could cause animals to over populate having detrimental effects to vegetation.

Alternative 2: Limited Hunting

Under this alternative, impacts on the refuge physical environment would have minimal to negligible effects. Some disturbance to surface soils, topography, and vegetation would occur in areas currently open to hunting; however effects would be minimal. Hunting would benefit vegetation as it is used to keep many resident wildlife populations in balance with the habitat's carrying capacity. The refuge would also control access to minimize habitat degradation.

Air-borne pollution is always a concern as the refuge is located within 60 miles of one of the most industrialized areas in the US. Numerous refineries, chemical plants, power plants, ports, and vehicular traffic contribute to particulate matter that affects the region in various ways depending on wind direction. The addition of vehicle use in parking areas would be negligible. All hunts are walk-in only except for limited use of all terrain vehicles for hunters with disabilities.

Impacts associated with solitude are expected to be minimal given time and zone management techniques, such as seasonal access and area closures, used to avoid conflicts among user groups.

Alternative 3: Open Hunting

Under this alternative, impacts on the refuge physical environment would be similar to Alternative 2 except access and other recreational user conflicts would be harder to control as some 40 tracts could be opened to hunting compared to the 5 that are currently maintained and controlled.

4.1.6 Natural Environment Impacts

Alternative 1: No Hunting

Under this alternative, there would be impacts to the refuge's natural environment without hunting. When deer are overpopulated, they over-browse their habitat, which can change the structure and plant composition of a forest. Feral hogs are considered a threat to the biological integrity of the refuge because they are an extremely invasive, non-native species with few natural predators. By rooting and wallowing, feral hogs destroy wildlife habitat. Damage includes erosion along waterways, levees, and wetlands and the loss of native plants which directly affect numerous other species such as ground nesting birds, reptiles and amphibians.

Some adjacent landowners have complained about feral hog populations that come from refuge lands into their yards or hay fields rooting up the area. There would be limited control under Alternative 1.

Other recreational users would still be able to walk throughout these areas causing similar negligible foot traffic damage as would hunters.

Alternative 2: Limited Hunting

Under this alternative, many impacts to natural environment using limited hunting would be beneficial. Using hunting as a management tool to reduce herd size of deer and feral hog would benefit numerous other species such as ground nesting birds, reptiles and amphibians.

Some adverse impacts will occur during hunting activities to flora and fauna under this alternative. Ways to minimize adverse effects such as noise, trampling, and visual disturbances are included under refuge Specific Regulations such as: 1) limiting the number of hunters; 2) limiting the length of the hunt season; 3) limiting the tracts where hunting could potentially occur, especially on roads/tracts that are constantly flooded during hunt season; 4) strictly limiting the use of all terrain vehicles; 5) hunting during daylight hours only; and 6) hunter education through a permit or brochure process. Additionally, increased presence by refuge staff and law enforcement personnel on fewer tracts could help in the educational process.

Other recreational users would still be able to walk throughout these areas causing similar negligible foot traffic damage as would hunters.

Alternative 3: Open Hunting

Under this alternative, many impacts to natural environment using state limited hunting might be beneficial. Using hunting as a management tool to reduce herd size of deer and feral hog would benefit numerous other species such as ground nesting birds, reptiles and amphibians. Using state seasons on all tracts might diminish the quality of the hunt along with more habitat degradation.

Most of the methods used to minimize adverse effects to flora and fauna listed under Alternative 2 would not be used under this alternative. For instance: 1) hunter numbers would dramatically increase; 2) length of season tied to state seasons, not the mini-seasons currently employed by the refuge; 3) most tracts (~ 40) would be open instead of the current 5; 4) all terrain vehicles would still be restricted; 5) night hunting would be included for feral hogs (currently closed); and 6) hunters would still be required to get a permit. Additionally, increased presence by **limited** refuge staff and law enforcement personnel would not be sufficient to help in the educational process.

Other recreational users would still be able to walk throughout these areas causing similar negligible foot traffic damage as would hunters.

4.1.7 Impacts to Hunted Wildlife

Alternative 1: No Hunting

Under this alternative, no species would be harvested. Some disturbances by other recreational users as described under Alternative 2 would still occur and would be permitted. Numbers of other recreational users are currently not regulated and the refuge has seen a steady increase of visitors to the area.

Alternative 2: Limited Hunting

Under this alternative, harvesting species of animals depends on factors such as: population number of animals, condition of habitat, number and experience level of hunters, type of weapon allowed, length of season, and weather conditions. The refuge can control number of hunters, type of weapon allowed, and length of season. This alternative should generally keep harvest figures in line with current averages. Harvest figures could fluctuate if non-controlled factors varied widely such as a large influx of waterfowl concentrating due to water/weather conditions giving hunters a better opportunity to hunt.

Some disturbances by other recreational users could still occur; however. Other public uses that cause disturbance, such as wildlife observation and photography, fishing, environmental education, etc., would still be permitted during periods of no hunting.

Alternative 3: Open Hunting

Under this alternative harvesting of species would be similar to Alternative 2 except for the following:

1) The number of hunters would dramatically increase over the Refuge.

2) The length of hunting seasons would tied to state seasons, not the mini-seasons currently employed by the refuge, thus potentially significantly many more animals could be harvested.

4.1.8 Impacts to Endangered and Threatened Species

Alternative 1: No Hunting

Under this alternative, current public use levels on the refuge would be lowered, albeit slightly, consequently would be no increased chance of adversely affecting threatened and endangered species. Numbers of other recreational users are currently not regulated and the refuge has seen a steady increase of visitors to the area.

Alternative 2: Limited Hunting

Under this alternative, current public use levels on the refuge would remain essentially the same, consequently would be no increased chance of adversely affecting threatened and endangered species. The tract where the bald eagle nest is located is closed to hunting.

See Section 3.4 for further discussion of endangered species.

Alternative 3: Open Hunting

Under this alternative, current public use levels on the refuge would increase slightly, consequently there could be a minor increased chance of adversely affecting threatened and endangered species. The tract where the current bald eagle nest is located may be open to hunting with a buffer zone around nest site. Enforcement could be difficult. This site was open to hunting before the Service purchased this tract.

4.1.9 Impacts to Wildlife Dependant Recreation

Alternative 1: No Hunting

The public would not have the opportunity to harvest a renewable resource, participate in wildlife-oriented recreation that is compatible with the purposes for which the refuge was established or have an increased awareness of Balcones Canyonlands NWR and the National Wildlife Refuge System. The Service would not meet public use demand. Public relations would not be enhanced with the local community, let alone the State of Texas.

Alternative 2: Limited Hunting

Under this alternative, the public would be allowed to harvest a renewable resource, and the refuge would be promoting a wildlife-oriented recreational opportunity that is compatible with the purpose for which the refuge was established. The public would have an increased awareness of Balcones Canyonlands NWR and the National Wildlife Refuge System and public demand for more hunting would be met. The public would also have the opportunity to harvest a renewable resource in a traditional manner, which is culturally important to the local community. This would also allow the public to enjoy hunting at little cost in a region where private land is leased for hunting, often costing $500-$2000/year/person for membership. Balcones Canyonlands offers a youth hunt during the first weekend of its hunt season. This hunt is free to youth 12-17 years of age. Additionally, this hunt allows youth the opportunity to 1) experience a wildlife-dependant recreation; 2) gain an appreciation for and understanding of wildlife, the natural world and the environment; and 3) promote a land ethic and environmental awareness.

As public use levels expand across time, unanticipated conflicts between user groups may occur. Experience has proven that time and space zoning (e.g., establishment of separate use areas, use periods, and restrictions on the number of users) is an effective tool in eliminating conflicts between user groups. This alternative allows for many user groups to use many tracts throughout the year

Alternative 3: Open Hunting

This alternative would be similar to Alternative 2 with one major exception. Hunting would dominate all other wildlife dependent recreational activities. It would be very difficult to zone other activities if hunting occurred on most tracts through entire state

sanctioned seasons. Communication to other users would be very difficult and pose danger to non-hunting user groups.

4.2 Cumulative Impacts Analysis

4.2.1 Anticipated Direct and Indirect Impacts of Preferred Action on Wildlife Species.

4.2.1.1 Migratory Game Birds

Under the preferred Alternative 2, Balcones Canyonlands NWR estimates a maximum additional 50 doves being harvested each year on the Johnson tract. No additional dove fields would be permitted. This harvest impact is insignificant to the total number of doves harvested in Texas and is well within the Federal framework for dove harvest. Dove hunting occurs on less than 274 acres of the Refuge.

The first year of dove hunting, 2001 was open for 3 weekends, a total of 105 hunter visits harvested 77 dove. The following year, 2002, 85 hunter visits harvested 85 birds. In 2003 there was a significant drought and only a few hunters harvested 19 Mourning Doves and in 2005 only 1 dove was bagged.

The U.S. Fish and Wildlife Service annually prescribe frameworks, or outer limits, for dates and times when hunting may occur and the number of birds that may be taken and possessed. These frameworks are necessary to allow State selections of season and limits for recreation and sustenance; aid Federal, State, and tribal governments in the management of migratory game birds; and permit harvests at levels compatible with population status and habitat conditions. Because the Migratory Bird Treaty Act stipulates that all hunting seasons for migratory game birds are closed unless specifically opened by the Secretary of the Interior, the Service annually promulgates regulations (50 CFR Part 20) establishing the frameworks from which States may select season dates, bag limits, shooting hours, and other options for the each migratory bird hunting season. The frameworks are essentially permissive in that hunting of migratory birds would not be permitted without them. Thus, in effect, Federal annual regulations both allow and limit the hunting of migratory birds.

Migratory game birds are those bird species so designated in conventions between the United States and several foreign nations for the protection and management of these birds. Under the Migratory Bird Treaty Act (16 U.S.C. 703-712), the Secretary of the Interior is authorized to determine when "hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any ... bird, or any part, nest, or egg" of migratory game birds can take place, and to adopt regulations for this purpose. These regulations are written after giving due regard to "the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, and are updated annually (16 U.S.C. 704(a)). This responsibility has been delegated to the U.S. Fish and Wildlife Service as the lead federal agency for managing and conserving migratory birds in the United States. Acknowledging regional differences in hunting conditions, the Service has administratively divided the nation into four Flyways for the primary purpose of managing migratory game birds. Each Flyway (Atlantic, Mississippi, Central, and Pacific) has a Flyway Council, a formal organization generally composed of one member

from each State and Province in that Flyway. Balcones Canyonlands NWR is within the Central Flyway.

The process for adopting migratory game bird hunting regulations, located in 50 CFR part 20, is constrained by various factors. Legal and administrative considerations dictate how long the rule making process will last. Most importantly, however, the biological cycle of migratory game birds controls the timing of data-gathering activities and thus the dates on which these results are available for consideration and deliberation. Bird monitoring data, including harvest information, are available through the Service's Division of Migratory Bird Management Website (http://mbdcapps.fws.gov).

Because the Service is required to take abundance of migratory birds and other factors in to consideration, the Service undertakes a number of surveys throughout the year in conjunction with the Canadian Wildlife Service, State and Provincial wildlife-management agencies, and others. To determine the appropriate frameworks for each species, the Service considers factors such as population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering habitat, the number of hunters, and the anticipated harvest. After frameworks are established for season lengths, bag limits, and areas for migratory game bird hunting, migratory game bird management becomes a cooperative effort of State and Federal Governments. After Service establishment of final frameworks for hunting seasons, the States may select season dates, bag limits, and other regulatory options for the hunting seasons. States may always be more conservative in their selections than the Federal frameworks but never more liberal. Season dates and bag limits for National Wildlife Refuges open to hunting are never longer or larger than the State regulations. In fact, based upon the findings of an environmental assessment developed when a National Wildlife Refuge opens a new hunting activity, season dates and bag limits may be more restrictive than the State allows. ***At Balcones Canyonlands NWR, season length is much more restrictive for dove hunting than the State allows. Currently, only the first 4 days are open during the length of the state season.***

NEPA considerations by the Service for hunted migratory game bird species are addressed by the programmatic document, ‘‘Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds (FSES 88– 14),’’ filed with the Environmental Protection Agency on June 9, 1988. A Notice of Availability was published in the Federal Register on June 16, 1988 (53 FR 22582), and our Record of Decision on August 18, 1988 (53 FR 31341).

4.2.1.2 Resident Big Game

4.2.1.2.1 Deer

Deer nearly disappeared from the Texas Landscape over 100 years ago. White-tailed deer have been restored to most areas they previously occupied and may have even expanded their range into historically unoccupied areas of Texas. Overabundant deer herds can result in concerns for the deer, for native plant communities, for urban landscapes and the health, safety and economic wellbeing of local communities. Neighborhoods across Texas are beginning to confront these issues. As overabundant

white-tailed deer reduce the health of native plant communities, other wildlife species can become less common. Overabundant herds have deer health problems such as starvation, increased numbers of parasites and more disease. (Texas Parks and Wildlife, "Living with Overabundant White-tailed Deer in Texas).

Visual observations by refuge and State biologists in 1996/1997 noted significant deer browse lines on various tracts of the refuge. Under this alternative overbrowsing by deer would eliminate or reduce hardwood seedlings and prevent Golden-cheeked Warbler habitat restoration and replacement of habitat in case of disease (oak wilt) or wildfire. Black-capped Vireo habitat would be very susceptible to overbrowsing and reduction of optimal nesting sites. The amount of mast available to several wildlife species (quail, turkey, jays, foxes, raccoons, etc.) would be reduced. White-tailed deer hunting does not have regional population impacts due to restricted home ranges. The average home range of a male deer in Mississippi is 1,511 ± 571 S.D hectares. (Mott *et al*. 1985). Therefore, only local impacts occur.

Adding four weekend hunts with a limited number of hunters culminated in between 36 and 60 deer with an average of 43 deer harvested per year over the past ten years. Additionally, the refuge's mini-seasons were much more restrictive than the state allowed.

White-tailed deer populations in the Texas Hill Country are among the densest in the country. Although there have been local, severe die-offs, populations remain very high. Anecdotal harvest and survey data confirm that decades of deer hunting on surrounding private lands (private lands use bait and a longer season) have not had a local cumulative adverse effect on the deer population. Texas Parks and Wildlife Department (TPWD) estimated 177,692 deer were harvested in the Edwards Plateau region of the State in 2005 and 2006 seasons (Liu 2006). The Refuge does not allow baiting of deer on the refuge, so it is probable that the harvest would go up significantly.

4.2.1.2.2 Feral Hogs

Executive Order 13112, Invasive species, issued in February, 1999 instructs Federal Agencies to:

(a) Each Federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law,
(1) identify such actions:
(2) subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them.

Feral hogs are an extremely invasive, non-native species and not considered a game species by the State of Texas. There is an estimated population in excess of 1.5 million feral hogs in Texas. This is due in part to intentional releases, improved habitat, increased wildlife management, disease eradication, limited natural predators, and high reproductive potential. There seem to be very few inhibiting factors to curtail this population growth. (Rick Taylor, Wildlife Biologist, Texas Parks and Wildlife) No bag limits or set seasons are established for feral hogs. Hunting of feral hogs provides the refuge with another management tool in reducing this detrimental species, and at the same time, is widely enjoyed by local hunters. Cumulative effects to an exotic, invasive species should not be of concern because the refuge would like to extirpate this species on refuge lands. Hunting of hogs is not considered detrimental to the biological integrity of the refuge, is not likely to create conflict with other public uses and is within the wildlife dependant public uses to be given priority consideration. Since hogs are exotic, they are a priority species for refuge management only in terms of their negative impacts on refuge biota and need for eradication. They are a popular game species though, and the public interest would best be served by allowing this activity on the refuge. However, even with hunting, feral hogs are likely to always be present because they are prolific breeders. The refuge has averaged harvesting fewer than 3 hogs per year over the past ten years. This low harvest necessitates that the Refuge continue its trapping program. The State of Texas allows for year-round hunting of feral hogs.

4.2.1.2.3 Turkey

Fall turkey hunting on the refuge is concurrent with the Refuge's White-tailed deer hunt and is currently limited to 8 days during the fall. Over the past 10 years of allowing fall turkey hunting (limit 1 bearded turkey), only 5 turkeys were harvested. The Refuge does not conduct turkey surveys, but turkeys are frequently seen in flocks from 5-45 along Cow Creek Road. The number of turkey harvested is insignificant to the local population of turkeys and has no impact on the total population.

4.2.1.3 Non-hunted Wildlife

Non-hunted wildlife would include all other species found on the refuge. Hunter use days account for only 22 of the total visitor use days on the refuge. All tracts open to hunting are also open to wildlife observation, fishing, photography, and environmental education. Even if hunting were discontinued on the refuge, the continued steady growth of other wildlife dependent recreation would soon exceed the 965 hunter use days reached in 2006/07. Ironically, since hunting takes place in winter months, most peak populations of migratory wildlife such as birds (except ducks) or bats are not found on the refuge. Many other species are inactive or burrowed up like amphibians or reptiles. It is more likely that other recreational users traversing the refuge in spring, summer, or fall would disturb wildlife to a greater degree.

4.2.1.4 Endangered Species

As discussed above under 4.2.1.4 and 3.4, activities by hunters will have negligible effects on endangered and threatened species that utilize the refuge. A Section 7

Evaluation was conducted in association with the initial assessment for opening hunting on Balcones Canyonlands NWR. It was determined that Alternative 2 (limited hunting) would not likely adversely affect these endangered species.

4.2.2 Anticipated Direct and Indirect Impacts of Preferred Action on Refuge Programs, Facilities, and Cultural Resources.

4.2.2.1 Wildlife-Dependant Recreation

As public use levels expand across time, unanticipated conflicts between user groups may occur. The refuge's visitor use programs would be adjusted as needed to eliminate or minimize problems and provide quality wildlife-dependent recreational opportunities. Experience has proven that time and space zoning (e.g., establishment of separate use areas, use periods, and restrictions on the number of users) is an effective tool in eliminating conflicts between user groups. This would continue under Alternative 2.

The refuge would control access under the preferred Alternative 2 to minimize wildlife disturbance and habitat degradation, while allowing compatible wildlife-dependent recreation. Some areas, such as waterfowl sanctuaries or rookeries, would be closed seasonally to minimize disturbances by hunters or other recreational users.

4.2.2.2 Refuge Facilities

As previous described, hunters comprise about 20 visitor use days. No additional facilities would be needed under the preferred alternative. Maintenance or improvement of existing facilities (i.e. parking areas, roads, trails, and check station) will cause minimal short term impacts to localized soils and waters and may cause some wildlife disturbances and damage to vegetation. The facility maintenance and improvement activities described are periodically conducted to accommodate daily refuge management operations and other recreational users. These activities will be conducted at times (seasonal and/or daily) that cause the least amount of disturbance to wildlife. During times when roads are impassible due to flood events or other natural causes those roads, and trails impacted by the event will be closed to vehicular use.

4.2.2.3 Cultural Resources

The preferred alternative does not pose any threat to historic properties on and/or near the refuge.

4.2.2.4 Anticipated Impacts of Hunt on Refuge Environment and Community.

Under the preferred alternative, it is expected there will only be negligible impacts on the refuge environment which consists of soils, vegetation, air quality, water quality, and solitude. Some disturbance to surface soils and vegetation would occur in areas selected for hunting; however impacts would be minimal. The refuge would also control access to minimize habitat degradation. In fact, the habitat degradation experienced by refuge hunting would mitigate the habitat degradation experience by uncontrollable numbers of

white-tailed deer and feral hogs.

Impacts associated with solitude are expected to be minimal given time and space zone management techniques, such as seasonal access and area closures, used to avoid conflict among user groups.

The refuge would work closely with State, Federal, and private partners to minimize impacts to adjacent lands and its associated natural resources; however, no indirect or direct impacts are anticipated. The refuge expects some increased visitation and tourism to bring additional revenues to local communities.

4.2.2.5 Other Past, Present, Proposed, and Reasonably Foreseeable Hunts and Anticipated Impacts

Cumulative effects on the environment result from incremental effects of a preferred action when these are added to other past, present, and reasonably foreseeable future actions. While cumulative effects may result from individually minor actions, they may, viewed as a whole, become substantial over time. The proposed hunt plan has been designed so as to be sustainable through time given relatively stable conditions. Changes in refuge conditions, such as sizeable increases in refuge acreage or public use, are likely to change the anticipated impacts of the current plan and would trigger a new hunt planning and assessment process. In addition, the Comprehensive Conservation Plan will be revised every 15 years with the next revision in 2016.

The implementation of the preferred alternative described in this assessment includes actions relating to the previously approved refuge hunt program for dove and big game. This action would have both direct and indirect effects; however, the cumulative effects of these actions are not expected to be substantial.

The refuge has changed the hunt program during the past 10 years and expects additional changes in the foreseeable future to the hunt program. Additional changes would not significantly increase the number of hunters or number of days the Refuge is open to hunting unless significant acreage would be acquired. Rather, smaller changes to increase the quality of hunting experience and fewer disturbances to adjacent hunters are anticipated. Based on figures noted in this assessment, impacts would still be negligible when limitations are imposed on the hunters. It is expected there will be a far larger increase in numbers and percentages in ***wildlife dependent recreational users*** not related to hunting activities from wildlife observation, interpretation (hiking trails), and more special events and environmental education programs.

Chapter 5 Consultation and Coordination with Others

The TPWD concurs and fully supports the regulated consumptive public use of the natural resources associated with the Balcones Canyonlands NWR (Refer to Letters of Concurrence in original proposals). The Fish and Wildlife Service also provided an in depth review by the Regional Office personnel and staff biologists. Numerous contacts were made throughout the area of the refuge soliciting comments, views, and ideas into the development of the accompanying hunting plan.

Chapter 6 Regulatory Compliance

In order to meet specific refuge and other broader U. S. Fish and Wildlife Service (Service) directives, the following purposes were established for Balcones Canyonlands NWR:

Executive Order 13112, Invasive species, issued in February, 1999 instructs Federal Agencies to:

(a) Each Federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law,
   (1) identify such actions:
   (2) subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them.

Administrative Procedure Act (5 U.S.C. 551-559, 701-706, and 801-808) as amended: Contains procedures that Federal agencies must follow, including public information, open meetings, and privacy of information requirements, and provision for hearings, adjudications, rule making and judicial and congressional review of agency actions.

Antiquities Act of 1906 (16 U.S.C 431-433): It is illegal for a person to appropriate, excavate, injure or destroy an historic or prehistoric run or monument, or an object of antiquity, situated on lands owned or controlled by the U.S., without permission of the Secretary of the department with jurisdiction over the Land.

Bald Eagle Protection Act (16 U.S.C. 668-668d) as amended: Prohibits the taking (includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb) or possession of and commerce in bald and golden eagles, with limited exceptions.

Clean Air Act (42 U.S.C. 7401-7671q) as amended: Establishes Federal standards for air pollutants from stationary and mobile sources and to work to regulate polluting emissions. The Act was designed to improve air quality.

Emergency Wetlands Act of 1986: Provides for the conservation of wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions.

Endangered Species Act of 1973 (16 U.S.C. 1531-1544) as amended: Provides broad protection for species of fish, wildlife, and plants that are listed as threatened or endangered in the U.S. or elsewhere.

Federal Lands Recreation Enhancement Act (REA), 16 U.S.C. 6803(c), Consolidated Appropriations Act (PL 108-447): This law grants the Secretary authority to collect recreation fee revenues for public recreation and rescinds the collection authorities in the Emergency Wetland Resources Act and those provided by the Land and Water Conservation Fund Act. REA replaces the Recreation Fee Demonstration Program (Fee Demo) and authorizes the Recreation Fee Program for 10 years (through 2014).

Fish and Wildlife Act of 1956 (16 U.S.C. 742a -754j-2) as amended: Directs the Secretary of the Interior to develop the policies and procedures necessary for carrying out fish and wildlife laws and to research and report on fish and wildlife matters. The Act establishes the Fish and Wildlife Service within the Department of the Interior.

Fish and Wildlife Conservation Act (16 U.S.C. 2901-2911) as amended: Encourages states to develop conservation plans for nongame fish and wildlife of ecological, educational, aesthetic, cultural, recreational, economic, or scientific value. Also directs the Secretary to undertake certain activities to research and conserve migratory nongame birds.

Fish and Wildlife Improvement Act of 1978 (16 U.S.C. 742l): Authorizes the Secretary of the Interior to assist in training of state fish and wildlife enforcement personnel to cooperate with other federal or state agencies for enforcement of fish and wildlife laws and to use appropriations to pay for rewards and undercover operations. Also allows for disposal of property abandoned or forfeited under federal fish, wildlife or plant laws administered by the Secretary in a manner deemed appropriate by the Secretary.

Migratory Bird Treaty Act (16 U.S.C. 703-712) as amended: Implements various treaties and conventions between the U.S. and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Under this Act, taking, killing, or possessing migratory birds is unlawful. The Secretary of the Interior may adopt regulations determining the extent to which, if at all, hunting, taking, capturing, killing possessing, selling purchasing, shipping, transporting, or exporting of any migratory bird, part, nest or egg will be allowed.

Migratory Bird Conservation Act (16 U.S.C. 715d): Establishes refuges as an inviolate sanctuary, or for any other management purposes, for migratory birds.

National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee) as amended: Provides for the administration and management of the national

wildlife refuge system including wildlife refuges, areas for the protection and conservation of fish and wildlife threatened with extinction, wildlife ranges, game ranges, wildlife management areas, and waterfowl production areas. This Act also authorizes 6 priority public uses when deemed compatible and appropriate with the mission of the site. Hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation are these priority uses.

Recreational Hunting Safety and Preservation Act of 1994 (16 U.S.C 5201-5207): Provides for civil penalties to be assessed against a person who intentionally and significantly hinders a lawful hunt.

Refuge Recreation Act (16 U.S.C. 460K-460k-4) as amended: Authorizes the Secretary of the Interior to allow public recreation in federal conservation areas when compatible with the purposes of these areas.

Sikes Act (16 U.S.C. 670a-670o) as amended: Authorizes the Secretary to develop cooperative plans for conservation and rehabilitation programs. The Secretary, in cooperation with state agencies and in accordance with comprehensive plans, is to plan, develop, maintain, and coordinate programs for conservation and rehabilitation of wildlife, fish and game under his jurisdiction.

Soil and Water Resources Conservation Act of 1977 (16 U.S.C. 2001-2009) as amended: Provides for a continuing appraisal of U.S. soil, water and related resources, including fish and wildlife habitats, and a soil and water conservation program to assist landowners and land users in furthering soil and water conservation.

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