City of Garden Ridge

"A way of life, not just a place to live"

AGENDA
WILDLIFE MANAGEMENT ADVISORY COMMISSION
REGULAR MEETING
MONDAY, OCTOBER 16, 2017 -- 6:00 P.M.

The Wildlife Management Advisory Commission will meet in a regular meeting at 6:00 p.m., Monday, October 16, 2017 in the City Council Chambers, 9400 Municipal Parkway, Garden Ridge, Texas. This is an open meeting, open to the public, subject to the Open Meetings Law of the State of Texas, and as required by law, notice is hereby posted on October 13, 2017 before 5:00 p.m., providing time, place, date and agenda thereof. The meeting facility is wheelchair accessible and accessible parking spaces are provided. Requests for accommodations or interpretive services must be made 48 hours prior to this meeting.

1. Call to Order

2. Roll Call

3. Citizen Comments – limited to 30 minutes

Rules for Citizen's Participation:

The Wildlife Management Advisory Commission welcomes citizen participation and comments at all of their Commission Meetings. The Commission offers citizens the opportunity to address them by signing up to speak prior to the meeting. As a courtesy to your fellow citizens and out of respect for our appointed officials, we request that if you speak, you follow these guidelines:

a) Respect and courtesy:
   i. Direct your comments to the entire Commission, not to an individual member, nor to the audience.
   ii. Show the Commission the same respect that you would like to be shown.
   iii. Show the Commission courtesy by ending your speaking at the time allotted below.

b) Speaking:
   i. First citizen comment period
      a. You are required to sign up to speak.
      b. You are limited to three (3) minutes per citizen.
   ii. Business item period
      a. You are required to sign up to speak.
      b. You are limited to three (3) minutes per citizen.
   iii. Second citizen comment period
      a. You are not required to sign up.
      b. You are limited to two (2) minutes per citizen.
   iv. State your name and address before your comments begin.
   v. Citizens are only allowed to speak once, unless also speaking during a posted Public Hearing.

NOTE: The Texas Open Meetings Act permits a member of the public or a member of the governmental body to raise a subject that has not been included in the notice for the meeting. However, any discussion of the subject ***must be limited*** *to a proposal to place the subject on the agenda for a future meeting and any response to a question posed to the Commission is limited to either a statement of specific factual information or a recitation of existing policy.* TEX. GOV'T CODE § 551.042.

4. Business Items-
The Committee may discuss, consider and/or take possible action on the following items:

a) Minutes- September 18, 2017 Wildlife Management Advisory Commission Regular Meeting.

b) Review and discuss wildlife and wildlife incidents within the City of Garden Ridge.
   i. Police
   ii. Animal Control

c) Deer counts results for 2017
   i. Review and discuss

d) Wildlife survey and TTT research
   i. Discuss 2017 Wildlife Survey and possibly make a recommendation to the City Council.
   ii. Discuss the TTT research provided by Commissioner Sullivan.

e) Upcoming Wildlife Management Advisory Commission Public Education Session set for October 23, 2017.
   i. Discuss and provide directions to staff for advertising efforts.

f) Education article for November Grapevine.
   i. Discuss and provide directions to staff.

g) Report on City Council items discussed at the October 4, 2017 Regular Meeting regarding Wildlife Management Advisory Commission.

h) Set date, time and location for next meeting (October 23, 2017 at 7 p.m. or immediately following the Steering Committee if later and November 20, 2017 at 6 p.m.).

i) Future Agenda Items.

5. Citizen's Participation: - limited to 20 minutes.
See "Rules for Citizen's Participation" under Item 3.

6. Adjournment

AGENDA NOTICES:

Decorum Required:

Any disruptive behavior, including shouting or derogatory statements or comments may be ruled out of order by the Presiding Officer. Continuation of this type of behavior could result in a request by the Presiding Officer that the individual leave the meeting, and if refused, an order of removal.

Action by Council Authorized:

The Commission may vote or act upon any item within this Agenda. The Commission reserves the right to adjourn into closed section at any time during the course of this meeting to discuss any of the matter listed below, as authorized by Title 5, Chapter 55, of the Texas Government Code.

Executive Sessions Authorized:

This agenda has been reviewed and approved by the City's legal counsel and the presence of any subject in any Executive Session portion of the agenda constitutes a written interpretation of Texas Government Code Chapter 551 by legal counsel for the governmental body and constitutes an opinion by the attorney that the items discussed therein may be legally discussed in the closed portion of the meeting considering available opinions of a court of record and opinions of the Texas Attorney General known to the attorney. This provision has been added to this agenda with the intent to meet all elements necessary to satisfy Texas Government Code Chapter 551.144(c) and the meeting is conducted by all participants in reliance on this opinion.

Attendance By Other Elected or Appointed Officials:

It is anticipated that members of the City Council, other city board, commissions and/or committees may attend the meeting in numbers that may constitute a quorum of the other city boards, commissions and/or committees. Notice is hereby given that the meeting, to the extent required by law, is also noticed as a meeting of the City Council, other boards, commissions and/or committees of the City, whose members may be in attendance. The members of the boards, commissions and/or committees may participate in discussions on the same items listed on the agenda, which occur at the meeting, but no action will be taken by such in attendance unless such item and action is specifically provided for on an agenda for that board, commission or committee subject to the Texas Open Meetings Act.

Shelley Goodwin, TRMC
City Secretary

This is to certify that I, Shelley Goodwin, posted this Agenda at 11:50 a.m. October 13, 2017 on the bulletin board located at the entrance to the Garden Ridge City Hall, 9400 Municipal Parkway, Garden Ridge, Texas.

Shelley Goodwin, TRMC
City Secretary

MINUTES OF WILDLIFE MANAGEMENT ADVISORY COMMISSION
REGULAR MEETING
MONDAY, SEPTEMBER 18, 2017 AT 6:32 P.M.

Commissioners present:
Chairman David Krawczynski
Vice Chairman Cynthia Shanahan-Segovia
Commissioner Troy Bippert
Commissioner Desiree Garner
Commissioner Rick Hannasch
Commissioner Ken Kneupper
Commissioner Paul Sullivan
Councilmember Robb Erickson (ex-offico)

Commissioners Absent:
None

Also Present:
Nancy Cain, City Administrator
Shelley Goodwin, City Secretary

1. Call to Order
With a quorum of the Wildlife Management Advisory Commission Members present, the Regular Meeting of the Garden Ridge Wildlife Management Advisory Commission was called to order by Chair Krawczynski at 6:32 p.m. on Monday, September 18, 2017, in the City Council Chambers of the Garden Ridge City Hall, 9400 Municipal Parkway, Garden Ridge, Texas 78266.

2. Citizen's Participation
Shelby Trial, 21657 Forest Waters, encouraged the Commission to hold a future discussion addressing the wild hog issues within the City of Garden Ridge

3. Business Items-
The Committee may discuss, consider and/or take possible action on the following items:

a) Minutes- August 21, 2017 Wildlife Management Advisory Commission Regular Meeting.
Motion: Upon a motion made by Commissioner Hannasch, and seconded by Commissioner Kneupper, to approve the Wildlife Management Advisory Commission Regular Meeting Minutes from August 21, 2017. The Wildlife Management Advisory Commission voted seven (7) for, none (0) opposed. The motion carried unanimously.

b) Review and discuss wildlife and wildlife incidents within the City of Garden Ridge.

i. Police

The Wildlife Management Advisory Commission reviewed the Police report.

ii. Animal Control

The Wildlife Management Advisory Commission reviewed the Animal Control report.

The Wildlife Management Advisory Commission discussed the rentals of live traps and what happened to the wildlife that are caught in the traps.

c) City of Hollywood Park Deer Management Program

i. Presentation (limit of 15 minutes)

Randy Thomasine, Deer Manager for the City of Hollywood Park, provided details of how Hollywood Park began its Deer Management Program and how the program works today. He stated that he works with the Deer Committee and originally the City used TTP to get the herd numbers down and then switched to TTT. He stated now, after the deer are darted, they are loaded and transported to a ranch in West Texas. He stated he called around to different ranches to find out if they were interested in taking the deer and after they found a ranch who was willing to take the deer, he helped the owner become a State approved site for accepting the deer. He stated the key to a successful program is education and communication concerning their deer management program.

ii. Discussion

The Wildlife Management Advisory Commission discussed the deer per acre ratio for Hollywood Park, cost of darting and transporting to the site and survival rate. They also discussed the darting, ear tagging and tattoo process. The Commission also discussed the communications the City of Hollywood Park provides.

d) Review Ordinance 186 prohibiting the feeding of deer within the City limits of Garden Ridge

i. Review and discuss

The Wildlife Management Advisory Commission discussed the enforcement of Ordinance 186 and the priority to enforcement. They also discussed the need for educating the residents on why they should not feed the wildlife.

Nancy Cain, City Administrator, encouraged residents to help enforce the Ordinance 186 by calling dispatch when they see someone feeding the deer. She stated she will also ask the Police Department to keep an eye out for feeding within the City limits.

e) Deer counts for both 2016 and 2017

i. Review and discuss

The Wildlife Management Advisory Commission reviewed the deer counts and the TTP for 2015 and 2016. They also discussed the differences with the counts and the effect the weather had on the counts.

The Wildlife Management Advisory Commission agreed by consensus to forward the counts to Texas Parks and Wildlife for their review and to summarize the results.

f) Wildlife survey

i. Discuss 2015 Deer Survey

The Wildlife Management Advisory Commission discussed the results of the 2015 Survey and the number of surveys returned.

ii. Discuss the creation of Wildlife Survey

The Wildlife Management Advisory Commission discussed the creation of a Wildlife Survey and the involvement of Texas Parks and Wildlife in the final survey. They also discussed providing education to the residents before sending out the survey, which will help residents understand the different programs and cost.

The Wildlife Management Advisory Commission agreed by consensus to hold an educational training session before mailing out the surveys. They also agreed by consensus to send questions they feel should be on the survey to the City Secretary so she can gather them for Vice Chair Segovia to send to Texas Parks and Wildlife for assistance and recommendations.

g) Wildlife Management Advisory Commission Webpage

i. Review and provide directions to Staff

The Wildlife Management Advisory Commission reviewed the Wildlife Management Advisory Commission Webpage and suggested adding a link to the Agendas and Minutes.

h) Next step to creating a Wildlife Management Program for the City of Garden Ridge.

i. Training/Education

The Wildlife Management Advisory Commission discussed Texas Parks and Wildlife holding training to help educate the residents.

Vice Chair Segovia volunteered to contact Texas Parks and Wildlife to hold a training session.

i) Report on City Council items discussed at the September 6, 2017 Regular Meeting regarding Wildlife Management Advisory Commission.

Councilmember Erickson stated he reported to City Council at the September 6, 2017 Regular Meeting that deer counts were occurring, then the counts would be compiled, and then the Commission would be making a recommendation. The process could be delayed due to the weather. He also stated that City Council thanked them for their hard work.

j) Set date, time and location for next meeting (October 16, 2017 at 6:00 p.m.).

Motion: Upon a motion made by Chairman Krawczynski and a second by Commissioner Sullivan to set the date, time and location for the next meeting to be Octover 16, 2017 at 6 p.m. in the Council Chambers. The Wildlife Management Advisory Commission voted seven (7) for and none (0) opposed. The motion passed unanimously.

k) Future Agenda Items.

The Commission provided the following as future agenda items:

- Deer count summary.
- Recommendation of survey to City Council.
- TPW Permit Application process and timeline for submission of a possible permit.
- Budget for feral hogs.

- Education opportunities with TPW.
- Education/Communication article in Grapevine.

4. Citizen Participation – 2 minute limit per citizen
Randy Thomasine, Deer Manager for the City of Hollywood Park, recommended the Commission work with Liz Bates at TPW and let her determine the deer population and recommend the number of deer needing to be culled.

5. Adjournment
Motion: Upon a motion made by Commissioner Kneupper and a second by Commissioner Hannasch, the meeting was adjourned at 7:48 p.m.

_____
David Krawczynski, Chair

ATTEST:

_____
Shelley Goodwin, TRMC
City Secretary

GARDEN RIDGE POLICE DEPARTMENT

MEMORANDUM

To: Wildlife Management Commission
City of Garden Ridge

From: Ron Eberhardt
Chief of Police
CIty of Garden Ridge

Date: 13 October 2017

Copies:

Reference: Monthly Wildlife Statistics

Members of the Commission,

Here is the data collected in the last 30 days regarding the Police Departments involvement with animal related calls. These numbers do not include any cases related to domestic dogs or cats. We have been informed by two residents that their dogs have been injured by porcupines, but no official police reports were filed.

15 September 2017 - 13 October 2017

1- Injured deer / dispatched by Officer
1- Injured deer but ran off when Officer approached
1- Deceased deer hit by car
1- Deceased racoon hit by a car
1- Dog at large / ACO picked up
1- Unregistered animal - cat

City of Garden Ridge Animal Control

2017 Wildlife Report

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug. 21-Sept. 14	Sep.15 Oct. 12	Oct.	Nov	Dec.	Total
Deer	9	11	9	14	18	14	14	4	13				106
Raccoons	2	3	6	4	4	14	10	8	9				60
Opossums	5	5	9	10	3	3	1	8	11				55
Skunks	12	2	0	0	3	7	12	17	7				60
Wild hogs	0	0	0	0	12	1	5	0	0				18
Turtles	0	0	3	0	0	0	0	0	0				3
Squirrels	0	0	0	0	0	0	1	7	0				8
Foxes	1	0	1	0	0	0	1	0	0				3
Armadillos	0	0	0	3	5	4	4	0	3				19
Hawks	0	0	0	0	0	0	0	0	0				0
Bats	0	0	0	0	0	0	0	0	0				0
Coyotes	1	0	0	0	0	0	0	0	0				1
Buzzards	2	0	0	0	0	0	1	0	0				3
Ringtails	0	0	0	0	3	0	1	0	0				4
Snakes	0	0	2	2	1	0	1	0	1				7
Total	32	21	30	33	49	43	51	44	44	0	0	0	
												YTD Total	347

9400 Municipal Parkway * Garden Ridge, Texas 78266-2600
Phone (210) 651-6632 * Fax (210) 651-9638 * www.ci.garden-ridge.tx.us

City of Garden Ridge Animal Control
Yearly Wildlife Report

	2014	2015	2016	2017									Total
Deer	**312**	**181**	**179**	**74**									746
Raccoons	**81**	**52**	**43**	**28**									204
Opossums	**40**	**37**	**49**	**43**									169
Skunks	**21**	**21**	**24**	**24**									90
Wild hogs	**22**	**6**	**5**	**18**									51
Turtles	**9**	**16**	**5**	**3**									33
Squirrels	**29**	**12**	**3**	**0**									44
Foxes	**7**	**0**	**7**	**2**									16
Armadillos	**26**	**15**	**23**	**11**									75
Hawks	**3**	**0**	**1**	**0**									4
Bats	**1**	**0**	**0**	**0**									1
Coyotes	**1**	**1**	**0**	**1**									3
Buzzards	**3**	**0**	**0**	**2**									5
Ringtails	**0**	**2**	**0**	**3**									5
Snakes	**9**	**0**	**3**	**7**									19
Total	564	343	342	216	0	0	0	0	0	0	0	0	
												YTD Total	1465

9400 Municipal Parkway * Garden Ridge, Texas 78266-2600
Phone (210) 651-6632 * Fax (210) 651-9638 * www.ci.garden-ridge.tx.us

Wildlife Management Survey

1. What neighborhood do you live in?
   include map or list of neighborhoods

2. How long have you lived in the City of Garden Ridge?
   a. Less than 5 years
   b. 5 to 10 years
   c. Longer than 10 years

3. Do you believe there are too many deer in Garden Ridge?
   a. Yes
   b. No
   c. Undecided

4. Please indicate any of the following activities that apply to you:
   a. Feed the deer in my community
   b. Found a fawn in my yard.
   c. Rescued a sick or injured deer in my community
   d. Used repellents, fencing and/or vegetation protectors to deter deer
   e. Planted deer resistant plants in my yard

5. Have you or a family member been involved in a deer-vehicle collision in Garden Ridge?
   a. Yes
   b. No

6. Do you support the current ordinance which prohibits feeding deer in Garden Ridge?
   a. Yes
   b. No
   c. Undecided
   d. Do not know about the ordinance

7. Would you support efforts to reduce the size of the deer population in our community?
   a. Yes
   b. No
   c. Undecided

8. Please rank in order up to as many as three (3) urban deer management options for Garden Ridge to pursue:
   a. Do nothing
   b. Develop a public education program
   c. Trap, transport and process, donating to approved Texas charity
   d. Trap, transport and translocate to approved site
   e. Organize archery hunts
   f. Sharpshooters

g. Fertility Control
   Option 1: _____
   Option 2:_____
   Option 3:_____

9. Have you seen feral hog activity in your neighborhood?
   a. Yes
   b. No

Do you have any additional comments about Wildlife in Garden Ridge, Texas?

_____

_____

_____

_____

Survival and Movements of Translocated White-tailed Deer in South Texas

Aaron M. Foley, *Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville, 700 University Blvd., MSC 218, Kingsville, TX 78363*

Brent Pierce, *Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville, 700 University Blvd., MSC 218, Kingsville, TX 78363*

David G. Hewitt, *Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville, 700 University Blvd., MSC 218, Kingsville, TX 78363*

Randy W. DeYoung, *Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville, 700 University Blvd., MSC 218, Kingsville, TX 78363*

Tyler A. Campbell, *USDA-APHIS-Wildlife Services National Wildlife Research Center, Kingsville, TX 78363*

Mickey W. Hellickson, *King Ranch, P.O. Box 1090, Kingsville, TX 78363*

Justin Feild, *King Ranch, P.O. Box 1090, Kingsville, TX 78363*

Scott Mitchell, *Texas Parks and Wildlife Department, 2805 N. Navarro, Suite 600-A, Victoria, TX 77901*

Mitch A. Lockwood, *Texas Parks and Wildlife Department, 309 Sidney Baker South, Kerrville, TX 78028*

Karl V. Miller, *Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA 30602*

Abstract: In south Texas, white-tailed deer (*Odocoileus virginianus*) translocations have become a common technique for non-lethal means of deer removal with the implementation of a Trap, Transport, and Transplant (TTT) permit program. However, the effectiveness of TTT as a management tool has not been evaluated. We monitored survival, movements, and body condition of 51 adult white-tailed deer from two translocations to two 2,000-ha south Texas properties, one of which was partially enclosed by a 2.5-m net-wire fence. Annual survival of all translocated deer was lower in the partially fenced property (64%) compared to the unfenced property (80%), but overall survival was similar to survival rates of adult native south Texas deer reported in previous studies (68%–74%). As expected, more deer left the unfenced property (52%) than the partially enclosed property (14%). Cumulatively, 40% of deer survived and remained on the release area after one year. Young (1.5–3.5 years old) translocated males had below average antler gain, body condition scores, and rump fat measurements 6–8 months post-release compared to resident males. Results of this study indicate reasonable survival rates can be achieved, but released deer may not remain in the vicinity of the release site and tend to have below-average body condition 6–8 months after release compared to native deer.

Key words: Odocoileus virginianus, survival, Texas, translocation, white-tailed deer

Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies 62:25–30

Translocations have played a role in white-tailed deer (*Odocoileus virginianus*) management since the 1870s (Mackie 2000). Early translocations focused on restoration of extirpated populations (Williamson 1987). Currently, deer are translocated for a variety of reasons, including augmenting low-density populations (O'Bryan and McCullough 1985), removal of deer from areas of high density (Jones and Witham 1990, Cromwell et al. 1999), or to improve perceived deficiencies (e.g., antler size) in intensively-managed populations.

In general, public support for deer translocations is high because translocations represent an alternative to lethal methods of population control (Ishmael et al. 1995); the public's implicit assumption being that re-located deer experience high survival. Translocations performed for population control or intensive management also assume that deer remain in the vicinity of the release site; this criterion is often defined loosely relative to the size of the managed area.

Several researchers have evaluated post-translocation survival and movements of white-tailed deer (Hawkins and Montgomery 1969, Jones et al. 1997). These studies, as well as retrospective assessments of translocations using genetic markers (Ellsworth et al. 1994, Leberg and Ellsworth 1999, DeYoung et al. 2003) indi-

cate that not all translocations are successful due to emigration or death. Reasons for success or failure of specific translocations are uncertain, but may involve some combination of conditions during capture, similarity of capture and release sites, source stocks used, animal condition, and possibly others. For example, some deer translocation studies used capture methods such as rocket-nets (Jones and Witham 1990, Cromwell et al. 1999), Stephenson box traps (Jones et al. 1997), and chemical immobilization (Hawkins and Montgomery 1969) that may have high rates of capture-related mortality or negative effects on near-term survival and performance of translocated deer (Webb et al. 2008). Furthermore, in south Texas, drought conditions can cause fluctuations in the amount and quality of food available, a potentially serious challenge for translocated animals.

Interest in survival and performance of translocated deer in Texas has increased during the past decade with implementation of a Trap, Transport, and Transplant (TTT) permit program administered by the Texas Parks and Wildlife Department (TPWD). Landowners who are granted a TTT permit may capture and translocate wild white-tailed deer if capture and release sites are biologically suitable. Number of permits issued annually increased from 40 to 77 during 2004–2007 and the number of deer trapped and relocated increased from about 1,700 to >4,500 (R. McGillicuddy, TPWD, personal communication). Number of deer trapped and relocated in the 1990s may have been higher prior to additional restrictions aimed at ensuring capture sites were free of chronic wasting disease. Helicopter net gunning (Barrett et al. 1982) is used ~72% of the time as the trapping method (R. McGillicuddy, TPWD, personal communication). Helicopter net gunning results in lower capture mortality than alternative methods of capture involving prolonged restraint or chemical immobilization (Webb et al. 2008), which may equate to better post-translocation survival or performance.

Although the number of deer relocated under the Texas TTT program continues to rise, no formal post-translocation evaluations have been performed. Our objectives were to conduct a preliminary assessment of deer movements, survival, and body condition from two separate translocations in south Texas performed to augment low-density populations (e.g., below carrying capacity). The stock sources originated in different ecoregions of the state and the release areas represent different intensities of management (e.g., partially enclosed vs. free-ranging).

Study Areas

Translocation 1

Webb County (capture site) was in the Rio Grande Floodplain ecoregion, and was characterized by brushy species such as mesquite (*Prosopis glandulosa*) and blackbrush (*Acacia rigidula*) (EPA 2008). Annual precipitation averaged 565 mm (NOAA 2008). Calhoun County (release site) was in the Northern Humid Gulf Coastal Plains ecoregion characterized by grasslands and scattered oak (*Quercus* spp.) savannahs (EPA 2008). Annual precipitation averaged 1124 mm (NOAA 2008). The release site had few resident deer due to historically high harvest rates and low recruitment rates (S. Mitchell, TPWD, personal communication) on adjacent properties. Helicopter counts revealed a deer density of 165 ha/deer in 2002 and 140 ha/deer in 2003 during the two years prior to translocation. In 2004, the release site was enclosed by a 2.5 m net-wire fence on two sides and water of the upper Laguna Madre and associated bays on the other sides.

Translocation 2

The capture and release areas were located in Kleberg County, part of the Southern Subhumid Gulf Coastal Prairie ecoregion (EPA 2008). Typical brushy plants include huisache (*Acacia farnesiana*) and mesquite. Average annual precipitation was 718 mm, but highly variable among years (NOAA 2008). Trends in relative density estimated from aerial surveys suggested that the release area (17.2 ha/deer) contained a lower deer density than the capture area (8.4 ha/deer), probably due to differences in recruitment and harvest during previous years. The capture and release sites contained only standard livestock fencing <1.25 m in height.

Methods

Both translocations were approved with Texas Parks and Wildlife Scientific permits SPR-0496-773 and SPR-0907-1424.

Translocation 1

We captured 15 female and 7 male adult white-tailed deer in Webb County via helicopter net gunning (Barrett et al. 1982) during March 2005. Most TTT translocations occur in March because females are pregnant and post-rut males are replenishing energy reserves expended during rut and may be more likely to remain in the vicinity of the release area. March is also when males begin to cast their antlers, affording translocated males an opportunity to integrate into the social structure of the population prior to having hardened antlers the following fall. We estimated age based on tooth replacement and wear (Severinghaus 1949) and recorded gross Boone and Crocket antler scores (Nesbitt and Wright 1981). We removed antlers with a hand-held saw about 2.5 cm above the burr to prevent injuries during transport. We marked each animal with color-coded, numbered plastic livestock ear tags and attached VHF radio-collars (Advanced Telemetry Systems, Inc., Isanti, Minnesota) equipped with a mortality sensor. We placed

deer in a covered trailer and relocated them about 240 aerial km northeast (approximately three hrs drive) to a private ranch in Calhoun County. Ambient temperatures reached 32 C during transport. All deer were released inside one ~2,000 ha pasture. We monitored radio-collared deer once per month for 12 months to monitor movements and survival. We obtained confidence intervals on survival rates by using a normal approximation for a binomial distribution (Fleiss 1981). We recaptured three males in December 2005, nine months after translocation to adjust radio collars. We recorded antler measurements for their first set of antlers produced in their new environment. Two of the 2.5-year-old recaptured males had broken main beams so we used measurements from the unbroken antler to estimate missing values for the broken antler.

Translocation 2

In March 2007, we captured 29 male deer in Kleberg County via helicopter net gunning. We recorded age and antler size, removed antlers, and attached ear tags and VHF radio-collars on 25 males using the same procedures as described above. We affixed radio-ear tags (Advanced Telemetry Systems, Inc.) on the remaining two males. Two males were not found due to either extreme dispersal or radio-collar failure. Those two males were omitted from analysis. Ages of two males were not recorded. We placed deer in a covered trailer and relocated 30–50 aerial km east (approximately 45 minutes drive) on an unenclosed private ranch. Ambient temperatures reached 25 C at midday during transport. All deer were released in one 2,000-ha pasture.

We monitored deer monthly for 12 months. We used raw data of deer that survived and died to calculate survival rates. A normal approximation for a binomial distribution was used to obtain confidence intervals (Fleiss 1981). We recaptured four males during October of the same year (seven months post-translocation) and recorded antler measurements. We also estimated body condition using three methods. First, we visually assigned each deer a subjective body condition score (BCS) based on the amount of tissue along the spine, ribs, and hip areas, after the methods of Cook et al. (2007). Scores ranged from 1 to 5, with 1 being the poorest and 5 being excellent. We measured rump fat using a portable ultrasound (E.I. Medical Imaging, Fort Collins, Colorado, Cook et al. 2007). Rump fat measurements using portable ultrasound are a good index of total body fat in cervids because the relationship between rump and total body fat remains linear over a wide range of body conditions, unlike kidney or marrow fat indices (Stephenson et al. 2002). The BCS also served as a basis for interpreting the ultrasonogram (e.g., discerning fat from skin and muscle tissue), because deer in poor condition will have little or no rump fat. All BCS and ultrasound were performed by the same observer. Body condition scores and rump fat were only recorded for males captured in Kleberg County. To determine whether rump fat measurements from translocated deer differed from resident deer, measurements were compared with resident males (n = 15) captured on the release site in October 2007. We used a Mann-Whitney test (Mann and Whitney 1947) for differences in body condition scores between 3.5-year-old resident and translocated males.

Expected Annual Difference (EAD) in Antler Score for Both Translocations

On both study sites, we measured antler scores of a subset of translocated deer that were harvested or re-captured to determine the difference between pre-translocation and post-translocation antler growth. Antler development is sensitive to male nutritional condition, especially during late spring and early summer (French et al. 1956). Below-average antler growth can indicate poor nutritional condition. Deer were translocated before antler casting and new growth. Thus, any stress or other effects of the new habitats could be apparent in antler development after release. However, antler development is also influenced by age, particularly in physically immature males (< 5.5 years of age). Therefore, we derived an expected annual difference (EAD) in antler scores for all male age classes (e.g., the expected increase in antler size from 1.5 to 2.5 years; 2.5 to 3.5 years, etc) based on antler measurements of resident deer (n = 2,639) captured on five south Texas ranches during 2002–2007 (D. Hewitt, unpublished data). We compared the antler size for translocated individuals during October following release to the EAD for the appropriate age class.

Results

Annual survival rate (excluding the two harvested males from Translocation 1) was 72% (95% CI = 58%–84%) for both translocations. Furthermore, 40% (95% CI = 27%–56%) of the deer survived and remained on the release area after one year for both translocations (excluding the two harvested males from Translocation 1).

Translocation 1

Fourteen of 22 (64%) deer survived 12 months after release during Translocation 1 (Table 1). Male survival rate was 43% (95% CI = 12%–78%) and female survival rate was 73% (95% CI = 45%–91%). No 2.5-year-old females died, but 4 of 11 ≥3.5-year-old females died (Table 1). Two of 7 males left the release area, while no females permanently left. One female left the release area but returned after 13 days and subsequently died. Overall, 50% (95% CI

Table 1. Status of white-tailed deer by age classes 12 months after translocation in Calhoun and Kleberg Counties, Texas, 2006–2008.

Translocation	Sex	*n*	Age class	Left property	Alive on property	Survived	Died
1 (Calhoun)	Male	3	1.5	1	0	1	2
		3	2.5	1	0	1	2
		1	3.5+	0	1	1	0
	Female	4	2.5	0	4	4	0
		11	3.5+	1	6	7	4
2 (Kleberg)	Male	1	1.5	0	0	0	1
		9	2.5	3	6	9	0
		15	3.5+	9	2	9	4[a]
		2	N/A	2	0	2	0
Translocations 1 and 2		49		17	19	34	13[a]

a. Does not include two harvested males from Kleberg County.

= 29%–71%) of the translocated deer survived and remained on the release area after one year. We continued to monitor deer for a total of 24 months. Only one death occurred >12 months, which was a female that died 15 months post-release.

Translocation 2

Eighty percent (95% CI = 59%–92%) of deer released during Translocation two survived (Table 1) for 12 months, excluding the two harvested males. Five of the seven deaths were natural mortalities, while two were legally harvested during the following hunting season. All natural mortalities occurred within one month of release; exact causes of mortalities were unknown due to scant evidence left by scavengers.

Twelve of 20 surviving males left the release area, including one male that returned to the original capture area approximately one week later and the two males that were subsequently harvested. Average aerial distance for those males that left the property was 10.4 ± 6.9 km (range = 0.8–22.5 km) from the center of the release area. Most ($^{9}/_{12}$) of the dispersers moved >9.3 km from the center of the release area and $^{3}/_{12}$ remained within <1 km of the boundary of the release area. Whether those deer established a permanent home range is unknown. Males that left the property tended to be older than those that remained on the property (Table 1, $z = 1.84$). Furthermore, 4 of 12 (33%) deer that remained on the property died, compared to 3 of 15 (20%) dispersers.

Antler growth of the two translocated yearling males was below EAD; one male gained 22 inches (about half of the EAD for age 1.5–2.5 years) and the other male was 16 inches smaller at 2.5 years old than his previous antler size (Figure 1). Antler growth of males 2.5 years and older was variable (Figure 1).

Average rump fat thickness was 16.8 mm (SE = 3.8) and 24.8 mm (SE = 1.5) for 3.5-year-old translocated and resident males, respectively (Figure 2). Median body condition scores of translocated males tended to be less than resident males ($z = 1.77$, $P = 0.08$) in the 3.5-year-old age class.

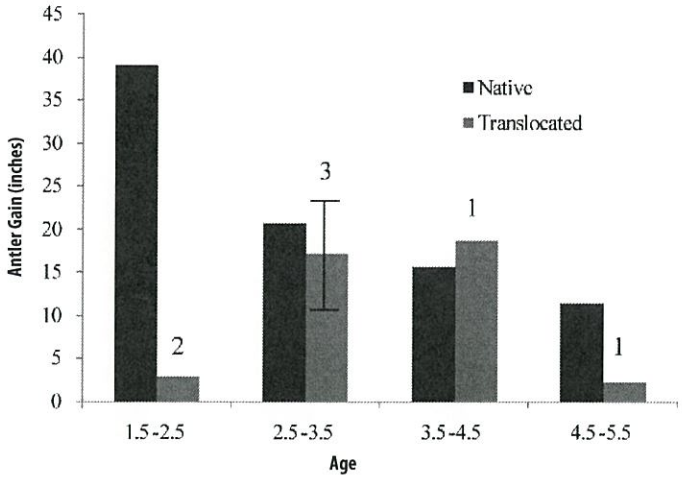

Figure 1. Mean (+/- S. E.) Expected Annual Difference (EAD) for four age classes of native white-tailed deer from five ranches in southern Texas and of translocated white-tailed deer in Calhoun and Kleberg counties, Texas. Sample sizes are shown for translocated deer.

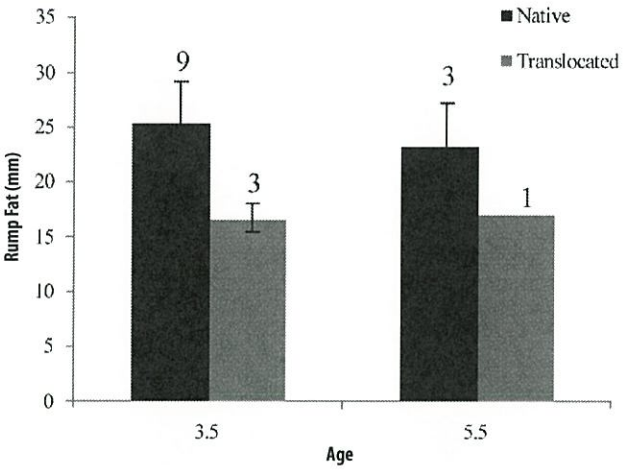

Figure 2. Mean (+/–SE) rump fat measurements for two age classes of native and translocated male white-tailed deer in Kleberg County, Texas. Numbers above bars indicate the sample size.

Discussion

Survival rates of translocated deer in our study (72% combined) compare well with annual survival rates of adult resident male deer in south Texas (72%, Webb et al. 2007; 71%, DeYoung 1989) and adult resident female deer in south Texas (68%–74%, Kie and White 1985). In other regions of the United States, reported survival rates for white-tailed deer post-translocation have been variable (32%, Hawkins and Montgomery 1969; 15%, O'Bryan and McCullough 1985; 75%, Pais 1987). The reasons for the range of survival rates likely involve differences in capture methods, post-

capture handling, habitat types, and animal condition. Therefore, the two translocations we monitored could be considered successful in terms of survival to one-year post-release.

In this study, nearly all natural mortalities occurred within one month of release and likely reflect capture and transport conditions. We did observe some qualitative differences in survival and performance among age classes. For example, deer in Translocation 2 appeared to have a higher survival rate to one-year post-release. The reasons for the difference in survival between the two translocations are not clear, but may be related to differences in habitat type or the travel time among capture and release sites. Deer exposed to different habitat types may need some time to adjust to different forage available and different sources of drinking water. An increase in travel time may hinder survival rates. Beringer et al. (2002) mentioned long processing times may have hindered survival of translocated deer in Missouri.

The 14% (including the female deer that briefly left the release area) and 52% of surviving translocated deer that left the release areas after Translocations 1 and 2, respectively, were not within percentages reported in other studies (32% partially fenced, Jones and Witham 1990; 26% free-ranging, Hawkins and Montgomery 1969; and 50% free-ranging, Cromwell et al. 1999). Variation in proportion of deer that left the release areas could be explained in part by differences in the size of the areas and the type of properties (e.g., enclosed vs. free-ranging). Our release areas were ca. 2,000 ha, considerably larger than the study area of Cromwell et al. (1999) and considerably smaller than the study area of Hawkins and Montgomery (1969). A property size of 158,000 ha would be needed to keep all of surviving deer on property in Translocation 2. However, 10 of 12 dispersed deer moved less than the mean distance of 10.4 km; therefore, 33,900 ha would be needed to maintain 90% ($^{18}/_{20}$) of the surviving deer. Much of the northern and western section surrounding the release area consisted of unsuitable deer habitat (e.g., extensive fields of cotton and grain sorghum). The property size needed to maintain a high percentage of translocated deer would likely decrease with continuous deer habitat. Future studies should examine if dispersal occurs with translocated females on low fenced properties which could negatively influence population growth.

Age may have influenced emigration even though Hawkins and Montgomery (1969) did not find a relationship among movements of translocated deer by sex or age. The median age of males that remained on the release area in Translocation 2 was lower (2.5) than the median age of males that left the release area (4.0; Table 1). This includes two males that left the property and were harvested. Movements away from the release area may be attributed to social stress (see Beringer et al. 2002), carrying capacity (Ideal Free Distribution, Fretwell and Lucas 1972), homing (Campbell 1999), or simply be an artifact of arbitrary property boundaries which animals can not recognize.

Young males (≤3.5 years) tended to have lower body condition and antler growth approximately 6–8 months post-translocation when compared to resident deer. Capture and translocation are stressful events but young deer may show a greater response than older deer because young deer are still undergoing skeletal growth and often do not have fat reserves that would buffer stressful conditions (Harder and Kirkpatrick 1996). Our results, though preliminary, suggest that the stress of translocation may reduce body and antler development of the young age classes for one year or more.

Our study indicates that reasonable, based on typical survival rates of resident deer, white-tailed deer survival rates can be achieved through common TTT practices in south Texas. However, the size of the managed area should be considered, as a large proportion of deer left the unfenced release site. Depending on the goals of the translocation, larger release sites, or game-fenced areas, may be necessary to ensure that all individuals remain on the release area. We did not recapture enough deer to quantify trends in condition and performance by sex and age class. Additional research is necessary to further refine effects of translocation on performance and survival among sex and age classes. One approach could be to replicate this experiment using different variables such as distance between capture and release areas, temperature during relocation, age structure, and sex ratios on the release area. Further study on the response of females to translocations is warranted.

Acknowledgments

We thank personnel and volunteers from King Ranch Inc., Falcon Point Ranch, and CKWRI, especially F. Bryant for his support and advice. R. McGillicuddy of TPWD provided TTT permit data and patiently answered questions about the TTT program. This project was funded by King Ranch, Inc., University of Georgia, Falcon Point Ranch, and CKWRI. This is publication number 08-122 of the CKWRI.

Literature Cited

Barrett, M. W., J. W. Nolan, and L. D. Roy. 1982. Evaluation of a hand-held net-gun to capture large mammals. Wildlife Society Bulletin 10:108–114.

Beringer, J., L. P. Hansen, J. A. Demand, J. Sartwell, M. Wallendorf, and R. Mange. 2002. Efficacy of translocation to control urban deer in Missouri: costs, efficiency, and outcome. Wildlife Society Bulletin 30:767–774.

Campbell, B. H. 1999. Homing of Translocated Brown Bears (*Ursus arctos*) in Coastal South-Central Alaska. Northwestern Naturalist 80:22–25.

Cook, R. C., T. R. Stephenson, W. L. Myers, J. G. Cook, and L. A. Shipley. 2007. Validating predictive models of nutritional condition for mule deer. Journal of Wildlife Management 71:1934–1943.

Cromwell, J. A., R. J. Warren, and D. W. Henderson. 1999. Live-capture and small-scale relocation of urban deer on Hilton Head Island, South Carolina. Wildlife Society Bulletin 27:1025–1031.

DeYoung, C. A. 1989. Mortality of adult male white-tailed deer in south Texas. Journal of Wildlife Management 53:513–518.

DeYoung, R. W., S. Demarais, R. L. Honeycutt, A. P. Rooney R. A. Gonzales, and K. L. Gee. Genetic consequences of white-tailed deer (*Odocoileus virginianus*) restoration in Mississippi. Molecular Ecology 12:3237–3252.

Ellsworth, D. L., R. L. Honeycutt, N. J. Silvy, M. H. Smith, J. W. Bickham, and W. D. Klimstra. White-tailed deer restoration to the southeastern united states: evaluating genetic genetic variation. Journal of Wildlife Management 58:686–697.

Environmental Protection Agency (EPA). 2008. Descriptions of the level IV ecoregions of Texas. EPA. ftp://ftp.epa.gov/wed/ecoregions/tx/tx_back.pdf Fleiss, J. L. 1981. Statistical methods for rates and proportions, second edition. John Wiley and Sons. New York, New York.

French, C. E., L. C. McEwen, N. D. Magruder, R. H. Ingram, and R. W. Swift. 1956. Nutrient requirements for growth and antler development in white-tailed deer. Journal of Wildlife Management 20:221–232.

Fretwell, S. D. and H. L. Lucas. 1972. On territorial behavior and other factors influencing habitat distribution in birds. Acta Bioethica 19:16–36.

Harder, J. D. and R. L. Kirkpatrick. 1996. Physiological methods in wildlife research. Pages 275–306 *in* T. A. Bookhout, editor. Research and management techniques for wildlife and habitats. Allen Press, Inc., Lawrence, Kansas.

Hawkins, R. E. and G. G. Montgomery. 1969. Movements of translocated deer as determined by telemetry. Journal of Wildlife Management 33:196–203.

Ishmael, W. E., D. E. Katsma, T. A. Isaac, and B. K. Bryant. 1995. Live-capture and translocation of suburban white-tailed deer in River Hills, Wisconsin. Pages 87–96 *in* J. B. McAninch, editior. Urban deer : A manageable resource? Proceedings, 1993 Symposium, North Central Section, The Wildlife Society, St. Louis, Missouri.

Jones, J. M. and J. H. Witham. 1990. Post-translocation survival and movements of metropolitan white-tailed deer. Wildlife Society Bulletin 18:434–441.

Jones, M. L., N. E. Mathews, and W. F. Porter. 1997. Influence of social organization on dispersal and survival of translocated female white-tailed deer. Wildlife Society Bulletin 25:272–278.

Kie, J. G. and M. White. 1985. Population dynamics of white-tailed deer (*Odocoileus virginianus*) on the Welder Wildlife Refuge, Texas. The Southwestern Naturalist 30:105–118.

Leberg, P. L. and D. L. Ellsworth. 1999. Further evaluation of the genetic consequences of translocations on southeastern white-tailed deer populations. Journal of Wildlife Management 63:327–334.

Mackie, R. J. 2000. History of management of large mammals in North America. Pages 292–320 *in* S. Demarais and P. R. Krausman, editors. Ecology and management of large mammals in North America. Prentice Hall, Upper Saddle River, New Jersey.

Mann, H. B. and D. R. Whitney. 1947. On a test of whether one of two random variables is stochastically larger than the other. Annals of Mathematical Statistics 18:50–60.

National Oceanic and Atmospheric Administration (NOAA). 2008. National Weather Service Forecast Office. NOAA. http://www.srh.noaa.gov/crp/climate/default.html

Nesbitt, W. H. and P. L. Wright. 1981. Records of North American big game. The Boone and Crockett Club, Alexandria, Virginia.

O'Bryan, M. K. and D. R. McCullough. 1985. Survival of black-tailed deer following relocation in California. Journal of Wildlife Management 49:115–119.

Pais, R. C. 1987. Mortality, dispersal and habitat use of resident and translocated white-tailed deer does on the Cumberland Plateau of eastern Kentucky. M.S. Thesis. University of Kentucky, Lexington.

Severinghaus, C. W. 1949. Tooth development and wear as criteria of age in white-tailed deer. Journal of Wildlife Management 13:195–216.

Stephenson, T. R., V. C. Bleich, B. M. Pierce, G. P. Mulcahy. 2002. Validation of mule Deer body composition using in vivo and post-mortem indices of nutritional condition. Wildlife Society Bulletin 30:557–564.

Webb, S. L., D. G. Hewitt, and M. W. Hellickson. 2007. Survival and cause-specific mortality of mature white-tailed deer. Journal of Wildlife Management 71:555–558.

———, J. S. Lewis, D. G. Hewitt, M. W. Hellickson, and F. C. Bryant. 2008. Assessing the helicopter and net-gun as a capture technique for white-tailed deer. Journal of Wildlife Management 72:310–314.

Williamson, L. L. 1987. Evolution of a landmark law. Pages 1–17 *in* H. Kallman, editor. Restoring America's Wildlife. U.S. Department of Interior, Fish and Wildlife Service, Washington, D.C.