# Noninvasive Monitoring for Ocelots in the Tamaulipan Biotic Province

Contract Number: 201043 - Noninvasive Survey and Monitoring for Ocelots in the Gulf Coast Prairies and South Texas Plains - Formation of the Private Lands Coalition for Ocelot Management - *Final Report: March 2009-February 2011*

Principle Investigator: Michael Tewes

SUMMARY

This survey produced 1,145 photos of about 53 different ocelots on private ranches in Texas and northeastern Mexico. We obtained access to several ranches that required confidentiality and that normally did not allow this type of monitoring. Most of these ocelots had not been previously identified, and this information provided a major improvement in our efforts to monitor population status and abundance. In addition, we created an Ocelot-Ranch Coalition of 19 strategically located properties that received information about our ocelot monitoring and management. A subset of this coalition allowed active monitoring for ocelots and these results were collectively called the "Willacy Ocelot Population Pool". This Willacy Ocelot Population Pool included the different ocelots identified on ranches requiring anonymity, and did not include the 8 ocelots identified on the Yturria Ranch. In addition, this monitoring found few sensitive carnivores in Texas. However, a greater number were found in Mexico with 225 photos of white-nosed coati; 48 photos of hog-nose skunk; 1 photo of long-tailed weasel; 177 photos of mountain lion; 1 photo of badger; 10 photos of eastern spotted skunk; and 128 photos of jaguarundi. This monitoring will continue past the ending dates of the contract period and this report period.

INTRODUCTION

The ocelot in Texas is listed as endangered at the federal and state levels. The special monitoring and information needs for the ocelot, as described on page 899 of the Texas Wildlife Action Plan (TWAP) were addressed. In addition, several monitoring and research needs identified in the developing revision of the USFWS Ocelot Recovery Plan (1990) were covered by this project.

The need for monitoring is clearly stated in the current Ocelot Recovery Plan:

1. Maintain existing ocelot populations in Texas while continuing status surveys.

11. Actively survey known populations - continue surveillance of known populations in south Texas through trapping and photo-documentation.

And monitoring is retained in the upcoming revised Ocelot Recovery Plan:

1.1.3. Document the status of ocelots in known and potential habitat in Texas.

The "Status Needs" and "Monitoring Needs" listed for the ocelot in the TWAP (p. 899) are:

Status Needs:

1. Provide support for continued research to determine extent of present populations, particularly outside of Cameron County.

2. Continue to evaluate population status and current threats in Mexico. Priority of recovery efforts may hinge on current information available in Mexico.

3. Camera evaluation of other parts of the state where ocelots may occur.

4. Centralized collection point for road mortalities.

Monitoring Needs:

1. Continue radio collaring, camera trapping and more extensive survey of state (TWAP, p. 900).

This project provided valuable information on ocelots regarding these status needs, monitoring needs, and management needs on several private ranches in the study area. Although the location of two resident ocelot populations has been identified, there has not been a rigorous estimate of population size. Such an estimate would require intense monitoring over a considerable area, particularly to capture variation over time. Population size and variation is important to understanding the effects of critical population threats (e.g., drought, roads), catastrophic events, and responses to conservation practices (e.g., translocation, prey management).

Distribution of peripheral ocelots has received little attention, yet this is critical to understanding metapopulation dynamics and location of habitats which need to be conserved. For example, road-killed ocelots in northern Kenedy and Jim Wells counties, as well as numerous reliable reports of observations of ocelots occur through much of South Texas. Lack of resources has prevented the verification of most reports, particularly for a secretive cat species that requires special survey methods. Also, a new development is the U.S. Fish and Wildlife Service has relaxed the requirements (Sept. 2007) on our federal scientific permit that enables us to maintain confidentiality with private landowners regarding the exact location of newly discovered ocelots (Jody Mays, USFWS, pers. comm.).

Other Sensitive Carnivores

This project was designed to focus on the monitoring and inventorying of ocelots (TWAP, high priority species, p. 744) on private lands in the Gulf Coast Prairies and Marshes, the South Texas Plains, and private lands in the Tamaulipan Biotic Province of northeastern Mexico. Actual ranches selected were determined by several factors, including the presence of reliable reports and habitats, cooperating landowners, and features supportive of research. Since camera trapping has the ability to confirm other wildlife, we also recorded several sensitive carnivore species. The presence of individuals from the following carnivore community detected by this monitoring project were recorded (TWAP priority ranking and page number in parenthesis): white-nosed coati (high; p. 744), hog-nosed skunk (medium; p. 744), long-tailed weasel (medium; p. 745), mountain lion (medium; p. 745), badger (medium; p. 745), eastern spotted skunk (medium; p. 745), and jaguarundi (low; p. 746).

There is limited information on these sensitive carnivores regarding their status, distribution, and stability in Texas. Baseline understanding of status and distribution is fundamental to suggesting conservation strategies. Monitoring and ecological information generated for this carnivore community will provide valuable ecological information for important habitats (e.g., Lower Rio Grande valley brushland) and important landscape features within the South Texas Plains and Gulf Coast Prairies and Marshes; both listed in the TWAP as Tier I Ecoregions (TWAP p. 22, 23).

Following is a record of some contractual variations and project alterations. During the first contract year, Texas Parks and Wildlife Department communicated during late June 2009 that funding was unavailable due to internal problems and the work could not be supported at

that time, thus truncating the project before the contract year ending in August 31, 2009. Notification was received in late October 2009 that the second year funding was available, and expenditures beginning on September 1, 2009 could be reimbursed. Regardless of these fiscal interruptions and uncertainties, we continued the camera trapping on several ranches during this time period, and the project continued into the second year. Also, after the contract was initiated, the U.S. Fish and Wildlife Service announced that it would serve as the coordination center for roadkill information, thus rendering Objective 6 as unnecessary.

In addition, since important results were being obtained for several ranches, we requested a no-cost time extension for 6 months following the end of the contract year on August 31, 2010, or extension until February 28, 2011. This period also allowed us time to continue the camera monitoring and to analyze additional data sets on some new ranches.

Several biologists expended much effort and time on this project. The following individuals deserve recognition for their involvement and participation with the ocelot monitoring project. We appreciate the assistance, including much volunteer time, that was provided by Chad Stasey, Arturo Caso, Sasha Carvajal, Jennifer Korn, Lon Grassman, Christina Tewes, Joe Holbrook, Taylor Garrison, Paeton Phaup, and Charles Speikerman. In addition, important participation and assistance was given by TPWD biologists Daniel Kunz, Jimmy Rutledge, Alan Cain, Randy Fugate, Eric Garza, and project coordinator, Jesus Franco. We appreciate the permission of several landowners who allowed access, including Frank Yturria, the late Michael Corbett, Kathie Corbett, Barry Putegnat, Juan Garza, Karen and Phil Hunke, and several landowners requiring anonymity. Their participation is greatly appreciated and was largely responsible for the success of this monitoring.

## OBJECTIVES

1. Develop a program titled "Private Lands Coalition for Ocelot Management" that covers one million acres of private lands in South Texas.
2. Develop a survey and monitoring plan for cooperating ranches in the high-priority zones.
3. Monitor ocelots on private lands with existing populations.
4. Survey for the presence/absence of ocelots in habitats with regional proximity to the existing populations using a population-centric approach.
5. Inventory ocelot habitat cover on prime ranches suitable for future surveys, monitoring, and translocation.
6. Formalize a central recording center for ocelot road-kills at Texas A&M University-Kingsville as identified in the TWAP.
7. Survey for sightings and information on the status, distribution, and habitat of 8 carnivores listed in the TWAP occurring in the South Texas Plains and Gulf Coast Prairies and Marshes.

## METHODS

Ranches in the area surrounding the known Willacy Ocelot Population were identified and evaluated for possible inclusion in the Ocelot-Ranch Coalition for information and communication. We conducted site visits with most of these ranches and discussed ocelot issues.

Camera surveys were continued and expanded on several private ranches in Texas and northeastern Mexico from February 2009 to February 2011. Monitoring sites were located in

northern Willacy County and northeastern Mexico. Passive infrared-triggered, auto-focus, digital cameras were used for the monitoring, including Cuddeback, Wildview, Moultrie, and Bushnell brands. The units were positioned 15-30 cm above the ground in order to be triggered by the body of a passing cat. Camera stations were placed along unpaved roads, senderos (pasture roads), and major game trails (collectively referred to as travel pathways). Some travel pathways were surveyed consecutively because of the high likelihood of success in obtaining an ocelot photo.

Photographs were analyzed to determine the identity of each cat. Cats were identified using natural markings on the tail, legs, flank, body, and face, and by non-natural markings including scars or tags. Each photograph was classified as an initial capture, recapture, or non-capture. Non-captures were classified if the cat could not be unequivocally identified. Individual cats were classified with a unique alphanumeric identification. We generally used the following guidelines in classification (Heilbrun et al. 2003, 2006).

1. A photograph was considered as an initial capture only if it could not unequivocally be matched with a previously photographed individual.
2. A recapture did not require the photograph of the enitre cat.
3. A poor photograph or one that could not unequivocally be classified as an initial capture or recapture was classified as a “non-capture.”
4. A “feature” used in identification included groupings of or individual tail stripes, body or leg spots, facial markings, scars, or whisker patterns (Sequin 2001).
5. Three natural features or 1 human-made mark (collar, ear tag) were used as the minimum requirement to identify and match another photograph before the cat was classified as a

recapture (Sequin 2001).

6. Identification and comparison of 1 different feature was considered sufficient to determine that 2 photographs depicted different individuals.

We already have determined that this marking and identification technique can provide accurate, nonbiased data for mark-recapture estimators in which individual identification of cats is required (Heilbrun et al. 2003, 2006). The general sampling design and statistical analyses used to estimate ocelot density based on photographic captures followed Karanth and Nichols (1998). Ocelot population density was generated where sufficient data were available (e.g., Mexico) using the software program CAPTURE (Rexstad and Burnham 1991). The CAPTURE program has been used to estimate tiger and leopard densities in other studies using camera trapping (Karanth and Nichols 1998, Kawananishi 2002, Henschel and Ray 2003).

A cover map was developed for each site prior to the survey to assist in distribution of sampling effort. Digital ortho-quadrangles (DOQs) and aerial imagery were used to create this map, along with field verification of the traits.

## RESULTS

We contacted the owners, managers or representatives of several ranches in the area of northern Willacy County and Kenedy County. Although discussions and information exchange varied among the ranchers, it was clear that our interest and work on ocelots was understood by these contact points. This group of individuals has formed the basis of an informal communication and information consortium among 19 ranches located in proximity to the

important Willacy ocelot population. This Ocelot-Ranch Coalition represents a communication network covering 1,035,000 acres of rangelands in Texas, a large area that will be critical to the future recovery of the ocelot. We will continue to work with these ranchers in upcoming monitoring and conservation efforts. This success represents one of the major accomplishments by this project.

The research and monitoring described in a proposal sometimes differ with the actual implementation of field projects based on the vagaries in wildlife, environment, property access and time limitations, equipment ordering, camera problems, and many other factors. One of the more significant factors was the termination of our monitoring of ocelots in Mexico during June 2010 because of the eruption of drug-related violence and risks to biologists, particularly around our study sites.

## Survey of Private Ranches in Texas

Following are the sampling periods and results obtained for individual ranches in southern Texas and northeastern Mexico. The number of camera nights sampled were an approximation because not all cameras functioned properly during all time periods. Also, the number of ocelots conclusively identified may increase as better photographs are obtained allowing biologists to identify ocelots from previous photographs, and to develop a broader photo library.

### San Francisco Ranch (Yturria Ranch)

Between 1 April 2009 and 28 February 2011, 20 to 29 camera trap units were used on the

San Francisco Ranch. A total of 6,605 camera trap-nights were logged, with 752 trap-nights logged from 1 April to 24 May 2009; 520 trap-nights from 25 May to 20 June 2009; 800 trap-nights from 21 June to 29 July 2009; 838 trap-nights from 30 July to 17 September 2009; 540 trap-nights from 5 December to 6 January 2010; 591 trap-nights from 7 January to 24 February 2010; 581 trap-nights from 25 February to 31 March 2010; 463 trap-nights from 1 April to 3 May 2010; and 1,520 trap-nights from 15 December 2010 to 28 February 2011.

There were 146 ocelot photos representing a minimum of 8 individuals documented during this survey. Of the other sensitive carnivores, only one badger was recorded during February 2011. Approximately 400 acres of dense thornshrub represented prime habitat in the two conservation easements.

El Tecolote Ranch (Hunke Ranch)

From 30 July 2010 to 17 January 2011, 4 to 10 camera trap units were used on the El Tecolote Ranch. A total of 1,376 camera trap-nights were logged, with 470 trap-nights logged from 30 July to 15 September 2010; 342 trap-nights from 16 September to 23 October 2010; 352 trap-nights from 24 October to 6 December 2010; and 212 trap-nights from 7 December to 17 January 2011. No ocelots or other sensitive carnivores were documented, and there was no significant ocelot habitat observed on this ranch.

Corbett Ranch

From 24 April 2009 to 10 February 2011, 9 to 10 camera trap units placed at 29 stations were used on the Corbett Ranch. A total of 3,666 camera trap-nights were logged, with 324 trap-

nights logged from 24 April to 21 May 2009; 570 trap-nights from 21 May to 30 July 2009; 300 trap-nights from 30 July to 13 November 2009; 303 trap-nights from 14 November to 3 May 2010; 272 trap-nights from 4 May to 24 June 2010; 167 trap-nights from 25 June to 15 August 2010; 398 trap-nights from 15 August to 29 September 2010; 484 trap-nights from 30 September to 16 November 2010; 435 trap-nights from 17 November to 6 January 2011; and 413 trap-nights from 6 January to 10 February 2011. No ocelots or other sensitive carnivores were detected during this survey, with the exception of 2 badgers.

Willacy Ocelot Population Pool

There were a collection of ranches which allowed access and monitoring only under the agreement of anonymity. The results are collectively identified as the "Willacy Ocelot Population Pool". Different ranches were surveyed at different intensities and with varying camera trap nights. Generally, considerable effort was expended on these areas, and the cumulative results yielded 13,015 camera trap-nights.

The ability to accurately and conclusively determine an exact number of different ocelots from spots in photographs can be challenging and is subject to some error. Our preliminary assessment identified a minimum of 12 different ocelots, and another 4 possible ocelots in the Willacy Ocelot Population Pool. These were individuals beyond the estimate of 8 ocelots for the Yturria Ranch. Because of the difficulty of matching spotting patterns, often with poor quality photos, the number may vary slightly as we obtain additional information about individuals. Nonetheless, this represents an important discovery by this project. No significant tracts of additional prime ocelot habitat (dense thornshrub with at least 95% horizontal cover) were found.

Survey of Private Ranches in Mexico

Rancho Caracol, Rancho Camotal, East Caracol

The following summary of trapping intensity applies to the combined area of the three adjacent ranches located in the northern end of the Sierra Tamaulipas of Mexico - Rancho Caracol, Rancho Camotal, and East Caracol.

A total of 15,874 camera trap-nights were logged, with 2,140 trap-nights (Grid 1 - 63.7 $km^2$ effective area) of 20 camera stations from 7 February 2009 to 25 May 2009; 2,304 trap-nights (Grid 2 - 57.3 $km^2$ effective area) of 24 camera stations from 25 May 2009 to 28 August 2009; 5,940 trap-nights (Grid 3 - 134 $km^2$ effective area) of 54 camera stations from 29 August 2009 to 17 December 2009; and 5,490 trap-nights (Grid 4 - 108 $km^2$ effective area) of 30 camera stations from 18 December 2009 to 19 June 2010.

This effort yielded 866 ocelot photos of at least 33 different individuals. Program MARK estimated about 1 ocelot for 5.2 $km^2$ for Grid 3 and about 1 ocelot for 6.3 $km^2$ for Grid 4.

These ocelots occupied low tropical forest according to the CONABIO vegetation map. If the densities of 1 ocelot for 5.2 $km^2$ or 6.3 $km^2$ were extrapolated over the entire 1,864 $km^2$ of this cover type covering the Sierra Tamaulipas, then a range of 300 to 350 ocelots could occupy this population. This population size is well above the target of 175 ocelots identified as a source population for possible translocation. In addition, there were other cover types that likely supported ocelots in this mountain range and adjacent areas which were not assessed.

These three ranches also supported many of the sensitive carnivores listed in our search. This record included the following: 225 photos of white-nosed coati; 48 photos of hog-nose

skunk; 1 photo of long-tailed weasel; 177 photos of mountain lion; 1 photo of badger; 10 photos of eastern spotted skunk; and 128 photos of jaguarundi. We could not estimate population size or the number of individuals for these species because they lacked individual markers (i.e., unique spot patterns).

Rancho San Jose de las Canadas

In addition, we set 20 camera trap units placed at 20 stations on Rancho San Jose de las Canadas, located in the southern Sierra Tamaulipas. These cameras were set for a 30-day period and produced an additional 600 camera trap-nights. No ocelots were documented and only one mountain lion was photographed. The early suspension of this monitoring was caused by the arrival of illegal drug gangs that stole our cameras.

REFERENCES

Haines, A.M., J.E. Janecka, M.E. Tewes, L.I. Grassman, and P. Morton. 2006. The importance of private lands for ocelot *Leopardus pardalis* conservation in the United States. Oryx 40:90-94.

Heilbrun, R.D., N.J. Silvy, M.E. Tewes, and M.J. Peterson. 2003. Using automatically triggered cameras to individually identify bobcats. Wildlife Society Bulletin 31:748-755.

Heilbrun, R.D., N.J. Silvy, M.J. Peterson, M.E. Tewes. 2006. Estimating bobcat abundance using automatically triggered cameras. Wildlife Society Bulletin 34:69-73.

Henschel, P. And J. Ray. 2003. Leopards in African rainforests: survey and monitoring techniques. WCS Global Carnivore Program, Bronx, New York.

Jacobson, H.A., J.C. Kroll, R.W. Browning, B.H. Koerth, and M.H. Conway. 1997. Infrared-

triggered cameras for censusing white-tailed deer. Wildlife Society Bulletin 25:547-556.

Karanth, U. And J.D. Nichols. 1998. Estimation of tiger densities in India using photographic captures and recaptures. Ecology 79:2852-2862.

Kawanishi, K. 2002. Population status of tigers (Panthera tigris) in a primary rainforest of Peninsular Malaysia. Ph.D. disseratation, University of Florida, Gainesville, Florida.

Laack, L.L. 1991. Ecology of the ocelot (Felis pardalis) in south Texas. Thesis, Texas A&I University, Kingsville, TX, USA.

Rexstad, E. And K.P. Burnham. 1991. User's guide for interactive program CAPTURE. Abundance estimation for closed animal populations. Colorado State University, Fort Collins, Colorada, USA.

Sequin, E.S. 2001. Influence of social status on coyote vulnerability to photo-capture. Thesis, University of Nevada-Reno, Reno, Nevada, USA.

Shindle, D.B., and M.E. Tewes. 1998. Woody species composition of habitats used by ocelots (*Leopardus pardalis*) in the Tamaulipan Biotic Province. The Southwestern Naturalist 43:273-279.

Tewes, M.E., and D.D. Everett. 1986. Status and distribution of the endangered ocelot and jaguarundi in Texas. Pages 147-158 *in* S.D. Miller and D.D. Everett, editors. Cats of the world: biology, conservation, management. National Wildlife Federation, Washington, D.C., USA.

White, G.C., and T.M. Shenk. 2001. Population estimation with radio-marked animals. Pages 329-350 *in* J.J. Millspaugh and J.M. Marzluff, editors. Design and analysis of wildlife radiotelemetry studies. Academic Press, San Diego, California, USA.