PERFORMANCE REPORT

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TEXAS
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ENDANGERED AND THREATENED SPECIES CONSERVATION

Project No. 33

Assessment of Ocelot Habitat in South Texas

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ABSTRACT

Aerial photography and satellite imagery was used to locate potential habitat patches and these patches were subsequently surveyed on land or by direct aerial observation to verify the occurrence of appropriate ocelot habitat. Habitat assessment and mapping has been completed for all of Region A (Lower Rio Grande Valley area) and B (Lake Corpus Christi area). Habitat was identified as either optimum (>95% brush cover) or suboptimum (75 to 95% brush cover). Areas $\leq$ 50 acres were not recorded unless they were within 1 mile of other areas of habitat $\geq$ 50 acres in size. Significant areas of potential ocelot habitat have been identified in south-central Texas and previously unknown habitat tracts have been located in the Rio Grande Valley. Approximately 9,220 acres of optimum and 4,427 acres of suboptimum habitat were located in the Lower Rio Grande Valley. In the Lake Corpus Christi area, 6,810 acres of optimum and 10,784 acres of suboptimum thornscrub were located. Although this mapping effort will be extremely valuable to biologists and managers, it should not be used as the final assessment of habitat for the endangered felines. Review of projects on a case by case basis remains a necessary procedure to insure habitat protection.

PERFORMANCE REPORT

STATE: Texas **PROJECT NO.:** E-1-5

PROJECT TITLE: Endangered and Threatened Species Conservation.

PERIOD COVERED: September 1992 to August 1993

JOB NUMBER: 33

JOB TITLE: Assessment of ocelot habitat in south Texas.

JOB OBJECTIVE: Assess the distribution and quantity of ocelot habitat in South Texas. When feasible, determine the ownership and threat of key tracts of habitat to assist formulation of conservation strategies.

SEGMENT OBJECTIVES:

1. To complete development of diagnostic characteristics of ocelot habitat from information derived from previous field research.

2. To map the presence of ocelot habitat in South Texas and provide estimates of the quantity of that habitat.

ACCOMPLISHMENTS

Habitat assessment and mapping has been completed on the two regions of concern--the Rio Grande Valley (Region A) and the south-central Texas site near Lake Corpus Christi (LCC) (Region B). Accomplishments for both regions include interpretation of the remote sensing information, identification and classification of tracts, subsequent "ground/aerial truthing" or verification of habitat quality, and mapping of areas identified as appropriate habitat. Acreage determinations have been completed for both regions. Background material and overall results are presented in Attachment 1. Results presented in Attachments 2 and 3 represent sensitive information that should not be distributed. Distribution of the locational information in these reports may pose a serious threat to the continued survival of endangered felines in Texas. Locality information may be used to target areas where ocelots may be found and exploited. **Do not distribute or copy maps** provided in this report.

Recommendations

This survey should be used as a tool for developing better management and conservation plans for the ocelot in South Texas. It should not be used as a final determination of all appropriate habitat available in the areas studied. Evaluation of project

impacts, for instance, will still need to be considered on a case by case basis. Additional refinement of this survey will be required as new information is developed or alterations to existing tracts occur. Application of a geographic information system (GIS) will benefit the utilization of this information as well as facilitating updates. Finally, this cover assessment will enable researchers to develop better trap surveys for identifying new populations of ocelots.

Acknowledgements

Donald "Chip" Ruthven and John Young performed most of the remote sensing analysis and field confirmation. Don Blanton and Mary Hutchinson collected information on imagery and photography available in Jim Wells, Live Oak, and McMullen Counties. They also assisted in photo interpretation of Region 2 and map development. Use of SPOT imagery was provided on a collaborative basis by Dr. Gerry Anderson of the USDA Remote Sensing Unit in Weslaco, Texas. Gerry provided assistance with training personnel in the use of GIS systems and provided maps of suspected habitat areas in Hidalgo, Willacy, and Cameron Counties. We greatly appreciated the assistance provided by Jim Everitt and Jerry Richardson of the USDA Remote Sensing Unit. We also extend our gratitude for the help provided by our Pilot, Mr. Anse Windham of Kingsville, Texas.

SIGNIFICANT DEVIATIONS

None.

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Director, Resource Protection Division — **Date**

Assessment of Ocelot Habitat in South Texas

ATTACHMENT 1

QUANTIFICATION OF SHRUB COVER TYPES FOR OCELOTS IN SOUTH TEXAS

July 19, 1993

PURPOSE

The goal of this assessment was to identify the amount and distribution of thornshrub tracts that support cover types often associated with ocelot use in the Rio Grande Valley. By gathering baseline information about the amount and distribution of these cover types, biologists and computer modelers can begin to develop estimates of the population size of ocelots in Texas and evaluate the likelihood of population persistence under varying scenarios. This information is critical to the development of (1) metapopulation dynamic models, (2) population viability analysis, and (3) management strategies for the ocelot.

HOW TO USE THIS INFORMATION

A discussion of the constraints and utility of the data generated from this cover type assessment is required:

For feasibility reasons, the scope and scale of this assessment was defined during the early project phase. Two scales of assessment were sought. We undertook a **detailed assessment** of two primary regions: the Rio Grande Valley and the south-central Texas region. These two regions received disproportionate attention because of previous evidence that suggests they may support ocelot populations or tracts with necessary thornshrub cover types (Tewes and Everett 1986).

Ultimately, an objective of this study was to estimate total acreage of selected thornshrub cover types in south Texas that have possible value to ocelots. Consequently, a more general assessment was conducted over a greater area. This broader scale included the southern 17 counties of Texas.

It should be emphasized that neither the regional or south Texas assessments are substitutes for the detailed analysis often required for impact determinations of development projects or associated permitting requirements. The details of such activities should be evaluated on a project and/or site basis.

This report and associated maps should be viewed not as a static document but one that can be updated as new information becomes available. Past research has revealed ocelot-tract associations for only some of the sites in the Rio Grande Valley, primarily for sites in the eastern Rio Grande Valley. The importance of ocelot-tract relationships for the other sites is only speculative, particularly for the region in south-central Texas. As new information is obtained the conservation value of particular thornshrub tracts may increase or decrease.

No ecological research has been conducted in this south-central Texas region to determine which abiotic and biotic characteristics are selected by ocelots. Consequently, our ability to extrapolate research findings generally becomes weaker the further away from a study site one attempts to apply results. For example, the definition of ocelot habitat in one location may be different in another location.

The presence of a tract identified in this assessment does not mean an ocelot is present. Conversely, absence of a tract does not guarantee the absence of an ocelot. There are several ecological and biogeographical reasons that could explain this presence/absence phenomenon. Some of these reasons include local dispersal patterns, proximity of core and satellite subpopulations, extinction-recolonization processes, interspecific exclusion, anthropogenic disturbances and the relationship between habitat presence, saturation, and regional selectivity by ocelots. Notwithstanding, the results derived from this assessment provide a significant advance by providing information for the development of ocelot conservation strategies.

The information contained in this report/maps can also be misapplied. For example, individuals seeking to illegally trap, poach or otherwise abuse this endangered species could use the detailed maps to locate possible populations. Consequently, a dissemination plan has been developed and each copy of this report/maps is coded and its distribution will be carefully monitored by the Recovery Team for the Endangered Cats of the U.S.

OVERVIEW

The northern limits of the present range of the ocelot (Felis pardalis) extend from Mexico into extreme southern Texas, primarily the Rio Grande Valley. Ocelots prefer to inhabit dense stands of mixed thornshrub (Tewes 1986, Laack 1991). Because the majority of the Rio Grande Valley has been cleared of native thornshrub (Saunders et al. 1968), population estimates for ocelots in south Texas are fewer than 120 individuals (Tewes and Everett 1986). Optimum thornshrub cover for ocelots is considered to be ≥ 95% and sub-optimum habitat at 75-95% brush coverage (Tewes and Everett 1986). Dominant woody vegetation in the Rio Grande Valley belongs to the honey mesquite (Prosopis glandulosa)-colima (Zanthoxylum fagara)/granjeno (Celtis pallida) community of the honey mesquite/granjeno association (McLendon 1991), in which honey mesquite is the dominant woody species and codominants may include granjeno, colima, hogplum (Colubrina texensis), whitebrush (Aloysia spp.), blackbrush (Acacia rigidula), wolfberry (Lycium spp.), brasil (Condalia hookeri), Texas persimmon (Diospyros texana), and Texas ebony (Pithcellobium flexicaule).

It is possible that a small population of ocelots may still exist in the vicinity of Lake Corpus Christi (LCC) located at the junction of Live Oak, Jim Wells, San Patricio, and Nueces Counties and other restricted locations throughout south Texas. Several landowners still report observing ocelots, primarily south and west of LCC and throughout south Texas (M. Tewes pers.

commun. 1992). The objective of this project was to map thornshrub cover types in the Rio Grande Valley (Cameron, Hidalgo, and Willacy Counties), around LCC and the surrounding area (northern Jim Wells, Live Oak, McMullen, and northwest Patricio and Nueces Counties), and the remainder of southern Texas (southern Jim Wells, Kleberg, Kenedy, Brooks, Jim Hogg, Webb, Zapata, and Starr Counties) using the criteria established by Tewes and Everett (1986).

STUDY AREAS

The Rio Grande Valley (RGV) study area contains approximately 2,164,281 acres. The study area around LCC encompasses approximately 398,670 acres and is bordered on the west by U.S. Hwy. 281 from the junction of U.S. Hwy. 281 and U.S. Hwy. 59 in George West, Live Oak County, Texas to the junction of U.S. Hwy. 281 and F.M. 2044 in Jim Wells County, Texas. The southern boundary is along a line running due east from the junction of U.S. 281 and F.M. 2044 in Jim Wells County to the intersection of that line with F.M. 666 in Nueces County. The eastern boundary then follows F.M. 666 north to San Patricio, San Patricio County, Texas, then due north along a straight line to its intersection with the San Patricio-Bee County border, then west to the intersection of the San Patricio, Bee, and Live Oak County border, then north along the Live Oak-Bee County border to its intersection with U.S. Hwy 59. The northern boundary of the LCC study area traverses from the intersection of the Live Oak-

Bee County border and U.S. Hwy. 59, west to the junction of U.S. Hwy. 59 and U.S. Hwy. 281 in George West.

An extended area surveyed around LCC, includes the remainder of Live Oak, McMullen, and northwest Jim Wells Counties in which the southern boundary lies along a line west from the junction of U.S. Hwy. 281 and F.M. 2044 to the Jim Wells-Duval County border. This area contains approximately 1,388,498 acres. The remainder of the south Texas study area contains approximately 7,873,587 acres.

METHODS

Areas of brush were first located using infra-red and black-and-white aerial photographs (U.S. Geological Survey, EROS Data Center, Sioux Falls, SD), 7.5 minute series topographic maps (U.S. Department of the Interior Geological Survey, Denver, CO), or SPOT satellite imagery (Remote Sensing Research Unit, U.S.D.A., Weslaco, TX). Target areas located on aerial photos, maps, or SPOT satellite imagery were surveyed from the ground when public roads were available to confirm estimated thornshrub coverage. Private roads or private land access were not used unless permission was sought and granted. All areas located from aerial photos, maps, or SPOT satellite imagery were also surveyed from fixed-wing aircraft from an altitude of 270-360 feet to verify estimated thornshrub canopy coverage. Thornshrub areas were then delineated onto existing aerial photos or maps. Because of limitations and the unavailability of satellite or

aerial photos/images, Kleberg, Kenedy, Brooks, Jim Hogg, and Zapata Counties were surveyed from aircraft only and approximate locations of habitat were marked on State Highway Maps (State Department of Highways and Public Transportation, Austin, TX). Acreage of the thornshrub tracts with optimum and suboptimum cover were measured to the nearest acre from aerial photographs at local ASCS offices or from SCS Soil Survey Maps, in which map scale ranged from 1:79 (cm:m) to 1:360, using a Keuffel & Esser Co. model 620005 compensating polar planimeter (Keuffel & Esser Co. Rockaway, NJ).

For project feasibility reasons, areas of cover tracts ≤ 50 acres were not recorded unless they were within 1 mile of other areas of habitat ≥ 50 acres in size. Woodlands which had an overstory canopy (i.e., tree layer) of ≥ 75% but little or no woody understory (i.e., shrub layer) were also not recorded.

Riparian strips (e.g., creeks, drainages) were also not recorded because they generally are very narrow (<150 feet wide) and their widths frequently vary over short distances, thus making acreage quantification over vast areas extremely difficult and subjective. Also, the dense tree layer that often dominates drainage or riparian corridors usually obscures the shrub layer from aerial view or photographic interpretation. Finally, most of the riparian (creek, drainage) strips were inaccessible by occurring private land.

RESULTS AND DISCUSSION

Approximately 9,220 acres of optimum and 4,427 acres of suboptimum habitat was located in the LRGV study area (Table 1). All of this habitat was within the honey mesquite - colima/granjeno community of the honey mesquite/granjeno association. Large thornshrub tracts were located on three private ranches in Willacy County, the Santa Ana National Wildlife Refuge in Hidalgo County, the Resaca de las Palmas State Park in Cameron County, numerous lomas (i.e., hills) in southeast Cameron County, and Laguna Atascosa National Wildlife Refuge in eastern Cameron County.

Within the LCC study area approximately 6,810 acres of optimum thornshrub and 10,784 acres of suboptimum thornshrub were located (Table 1). Although not quantified, numerous drainages contained suitable thornshrub. These tracts were generally of the honey mesquite/granjeno association in the western areas of the study area but also included the hackberry (Celtis laevigata)/huisache (Acacia smallii) association and the live oak (Quercus virginiana)/honey mesquite-seacoast bluestem (Schizachyrium scoparium) community of the live oak-post oak (Quercus stellata) association in the southeastern portion of the study area. These drainages could possibly serve as travel corridors for ocelots.

Several areas of suitable thornshrub occurred within the watersheds of Agua Dulce and Sandy Hollow Creeks in northeastern Jim Wells and northwestern Nueces Counties. Areas of suitable

Table 1. Areas (acres) of optimum (≥ 95% horizontal coverage) and suboptimum (75-95% horizontal coverage) thornshrub tracts by study region and county in the Rio Grande Valley (RGV), Lake Corpus Christi (LCC) area and vicinity, and south Texas during 1992.

	≥ 95% cover	75-95% cover
RGV study area		
Cameron County	5,009	413
Hidalgo County	682	1,439
Willacy County	3,529	2,575
LCC study area		
Jim Wells County	2,909	3,106
Live Oak County	3,448	6,902
Nueces County	277	638
San Patricio County	176	138
Extended study area around LCC		
Jim Wells County	163	781
Live Oak County	509	2,878
McMullen County	454	1,121
Southern Texas study area		
Brooks County	183	808
Duval County	252	1,756
Jim Hogg County	0	99
Jim Wells County	40	894

Table 1. (Cont.)

	≥ 95% cover	75-95% cover
Kenedy County	247	1,729
Kleberg County	242	173
Starr County	0	477
Webb	558	459
Zapata	0	49
TOTAL	18,678	26,434

thornshrub located south, southwest, southeast, and north of LCC generally belong to the honey mesquite/granjeno association in which the dominant vegetation included an overstory of honey mesquite and an understory of granjeno, brasil, colima, and blackbrush. A few areas west of LCC and a large area northeast of LCC just east of IH 37 belong to the guajillo (Acacia berlandieri)/cenizo (Leucophyllum frutescens) association in which the dominants are guajillo, blackbrush, and cenizo.

The extended study area around LCC contained approximately 1,126 acres of optimum and 4,780 acres of suboptimum thornshrub. The majority of this thornshrub in Live Oak County lies within the guajillo/cenizo association, whereas suitable thornshrub in McMullen County belong to the whitebrush-honey mesquite/granjeno community within the honey mesquite/granjeno association. Whitebrush seemed to increase in the woody plant community from east to west across the study area, as did the guajillo/cenizo and the blackbrush/twisted acacia (Acacia tortuosa) associations.

The southern Texas study area contained approximately 1,522 acres of optimum and 6,444 acres of suboptimum thornshrub (Table 1). The majority of this habitat in Webb and Duval Counties belongs to the guajillo/cenizo and blackbrush/twisted acacia associations. Thornshrub communities in southeast Kenedy County lies within the live oak/mesquite-seacoast bluestem community of the live oak-post oak association. The remainder of the thornshrub tracts within this study area primarily lies in the honey mesquite/granjeno association. Large areas of thornshrub

were located in southeastern Duval County, eastern Webb County, and southeastern Kenedy County. Extensive areas of thornshrub occurred throughout all of the study areas that supported 50-75% brush cover with small areas ≥ 75% woody cover and that were not large enough to meet the size criteria established for this assessment.

The greatest area of Class A or optimal thornshrub cover types occurs in the eastern Rio Grande Valley (i.e., Cameron and Willacy Counties) and portions of two counties in south-central Texas (i.e., Live Oak and Jim Wells Counties) (Table 2). However, we found throughout the south Texas region less than 1% of the total area within each county supported Class A or optimal cover types. Even more noteworthy, only 18,678 acres or 0.15% of the 16-county study area in south Texas supported thornshrub cover types evaluated as Class A (Table 2).

Similarly, most of the counties surveyed during this study supported considerably less than 1% of their area as Class B or suboptimal cover types. Only 26,434 acres or 0.21% of this south Texas region supported Class B thornshrub cover types (Table 2).

Live Oak County supported the greatest area (i.e., 10,350 acres) of combined optimal and suboptimal thornshrub communities (Table 3). Another south-central Texas county that supported extensive coverage (i.e., Jim Wells County; 6,015 acres) of combined Class A and B thornshrub cover types is located adjacent

to Live Oak County. Consequently, this study confirmed our belief that significant acreages of thornshrub cover types occurred outside of the Rio Grande Valley.

Significant acreages of combined Class A and B thornshrub cover types were found in the Rio Grande Valley, particularly Willacy County (6,104 acres), Cameron County (5,422 acres), and Hidalgo County (2,121 acres) (Table 3).

In summary, the location and acreage of significant tracts of dense thornshrub communities were identified in many areas of south Texas. A cluster of thornshrub tracts were found in the Rio Grande Valley and another in south-central Texas. However, the total area of south Texas covered by these cover types is minimal and at least partially explains the rarity of the ocelot.

This information will be extremely valuable to wildlife biologists and managers by enabling them to develop more accurate estimates of population size and persistence under varying conditions. The local and landscape conservation value of particular thornshrub tracts can be better assessed by applying this information in conservation models.

Table 2. Descending rank of Class A (≥ 95% horizontal coverage) and Class B (75-95% horizontal coverage) thornshrub area (acres) in south Texas during 1992. Percent of county area covered by Class A and B cover types are provided in parenthesis.

	≥ 95% cover	75-95% cover
Cameron County	5,009 (0.87%)	413 (0.07%)
Willacy County	3,529 (0.93%)	2,575 (0.68%)
Live Oak County	3,448 (0.51%)	6,902 (1.02%)
Jim Wells County	2,909 (0.54%)	3,106 (0.57%)
Hidalgo County	682 (0.07%)	1,439 (0.15%)
Webb County	558 (0.03%)	459 (0.02%)
McMullen County	454 (0.06%)	1,121 (0.15%)
Nueces County	277 (0.08%)	638 (0.19%)
Duval County	252 (0.02%)	1,756 (0.15%)
Kenedy County	247 (0.03%)	1,729 (0.19%)
Kleberg County	242 (0.04%)	173 (0.03%)
Brooks County	183 (0.03%)	808 (0.14%)
San Patricio County	176 (0.04%)	138 (0.04%)
Jim Hogg County	0	99 (0.01%)
Starr County	0	477 (0.05%)
Zapata County	0	49 (0.01%)
TOTAL	18,678 (0.15%)	26,434 (0.21%)

Table 3. Descending rank of counties with greatest combined area (acres) of Class A and B thornshrub cover types (i.e., 75-100% horizontal coverage) in south Texas during 1992. Percent of county covered by Class A and B thornshrub is in parenthesis.

	75-100% cover (combined acres for categories A and B)	
Live Oak County	10,350	(1.53%)
Willacy County	6,104	(1.61%)
Jim Wells County	6,015	(1.11%)
Cameron County	5,422	(0.94%)
Hidalgo County	2,121	(0.22%)
Duval County	2,008	(0.17%)
Kenedy County	1,976	(0.22%)
McMullen County	1,575	(0.21%)
Webb County	1,107	(0.05%)
Brooks County	991	(0.17%)
Nueces County	915	(0.27%)
Starr County	477	(0.05%)
Kleberg County	415	(0.07%)
San Patricio County	314	(0.08%)
Jim Hogg County	99	(0.01%)
Zapata County	49	(0.01%)
TOTAL	45,112	(0.36%)

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