

U.S. Wildlife Management Plan: Recovery of the Endangered Ocelot (*Leopardus pardalis*) in Arizona, New Mexico, and Texas

Daniel Zerinskas* and Carol A. Pollio

American Public University, West Virginia, USA

Abstract

The ocelot (*Leopardus pardalis*) once inhabited the entire southwest region of the United States, but native populations are in severe decline as a result of habitat loss, isolation, and excessive hunting prior to the protection of the Endangered Species Act. Currently, two ocelot populations are known to exist in southern Texas, and there is evidence of individual ocelots occupying southeastern Arizona. Although protected from hunting and direct human impact, the U.S. ocelot populations remain in decline. Ocelots are a solitary species requiring a significant amount of habitat to establish a home range and a defensible territory during breeding season. The loss of habitats and migration routes results in limited reproductive success as well as decreased genetic variability, causing a decline in population growth. Contributing to the negative population trend is the impacts of human development and traffic causing early mortality in otherwise healthy individuals. The conservation and preservation of key habitat and high quality corridors is essential to re-establishing ocelot populations in much of its prior range. Additionally, translocation and reintroduction programs should be introduced and maintained in collaboration with habitat conservation to increase the probability of viable populations.

Keywords: Ocelot (*Leopardus pardalis*); Recovery; Endangered; Translocation; Habitat

Introduction

The ocelot (*Leopardus pardalis*) is an endangered species anywhere found in the United States, and was included to the U.S. Federal Endangered Species Act (ESA) in 1982 [1]. Due to the diversification, stability and protection for ocelot subspecies distributed across South America, the IUCN Red List [2] has listed the ocelot as a species of least concern despite having decreasing population. However, hunting and trapping as well as habitat degradation and fragmentation has severely impacted ocelot subpopulations occupying the U.S. [3]. Northern ocelots (*L. p. albescens*) occur as two small isolated populations in Texas with less than 25 individuals each, and another large population inhabits Tamaulipas, Mexico [4]. In Arizona and Sonora, Mexico, populations of ocelots (*L. p. sonoriensis*) are evident with Mexico having a well established population while ocelot distribution in Arizona is sporadic and dwindling [4]. Connectivity with established populations in northern Mexico is essential for the successful recovery and re-establishment of ocelot populations in much of their former range in the southwest region of the U.S.

Depending on the geographic region, ocelots inhabit many ecosystems including tropical forests, vegetated deserts, and savannah grasslands [1]. Jackson et al. [5] discovered that key habitat for ocelots occupying Texas consisted mainly of medium to large sized patches with dense thorn scrub vegetation, heavy canopy cover, small water bodies, and quality corridors. As a result of human transformation of key habitat to agricultural landscape, ocelot populations have become isolated and are in danger of going extinct [5]. The conversion of closed canopy vegetation to the open canopy of agricultural fields and the loss of connectivity through manmade structures and roads has limited resource availability, reduced breeding success and genetic variability, and negatively affects adult and juvenile survivorship [5]. As a predatory species, ocelots require thick vegetation and canopy cover for nutritional requirements including small mammals, lizards, and birds [1]. Thick vegetative coverage is also essential to the establishment of breeding territory, den placement, and the natural defense of ocelots through the use of camouflage [6].

Ocelots are a solitary species that primarily interact with other individuals during breeding, which occurs throughout the year with no exact breeding season being evident [7]. Female ocelots will yield one or two offspring per litter, and each successful litter is followed by a one year inter-birth period [7]. However, Laack et al. [7] found that female ocelots are capable of multiple litters in a single year, and inter-parturition periods will be considerably reduced if early mortality in offspring occurs. Ocelot offspring will continue to depend on the mother's parental care until the age of three months, afterwards leaving the safety of the den to begin hunting with the mother [7]. Two to four den sites in an established territory will be used by an adult female during the first three months of rearing a successful litter, and the female ocelot will travel up to 900 meters to relocate kittens to new dens [7]. Dense vegetation, especially species of thorn brush, is crucial to the placement of dens, and the removal of vegetation by humans results in the early relocation of mother and her young as well as fewer available sites suitable for den establishment [7]. As a result of prey remains and scat being absent at occupied den locations, Laack et al. [7] theorized the relocation of offspring is a result of environmental disturbance and maturing offspring out growing initial placement. The accumulation of odors and the wearing of trails reduce concealment of offspring, increasing the possibility of predation by coyotes, raptors, bobcats, or other adult ocelots [7].

Adult survivorship is estimated to be 87% of resident ocelots and 57% of transient ocelots, and juvenile survivorship is estimated to be at a 68% probability of reaching an age of one year [6]. Haines et al. [6] established criteria for differentiating resident ocelots from transient

*Corresponding author: Daniel Zerinskas, American Public University, N George St, Charles Town, West Virginia, USA, E-mail: skas422@gmail.com

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ocelots, with resident ocelots being individuals with an established home range of at least three months and transient ocelots being individuals that migrated from natal range to establish a new home range and territory. The reduced adult survivorship in transient ocelots compared to resident ocelots was a result of unfamiliarity to foreign range, intra-specific competition, and inter-specific interaction [6]. The leading cause of mortality to entire ocelot population was unnatural events, as collisions with cars, illegal use of poisons, and predation by domestic animals was the major contributor to total mortality [6]. Naturally caused mortality was a significant influence in adult survivorship, and natural mortality was more evident in transient ocelots than resident [6]. Transient ocelots and increased mortality was more evident in males than females due to fewer females migrating from natal range, and males dispersing to compete with other males for the establishment of breeding territories [6].

Isolation of current ocelot populations in the U.S. inhibits population growth and recovery of the endangered species. Subpopulations in Texas and Arizona are isolated from each other by human population and expansion including open areas, fences, roads, and other manmade barriers [4]. Small isolated ocelot populations are subject to further decline from inbreeding and reduced genetic diversity, which increases risks to disease and low reproductive success [4]. Contributing to the negative impacts of isolated populations, issues with geographic and governmental boundaries between the U.S. and Mexico further complicate the successful recovery of ocelot subpopulations occupying the U.S. The translocation of northern ocelots from Tamaulipas and Sonora, Mexico to Texas and Arizona will aid in the short-term recovery of ocelot populations by physically increasing individual numbers, thus increasing genetic variability through greater diversity [4]. If translocation efforts are successful, ocelot reintroduction programs can be established in previously recorded range including Arizona, New Mexico, and Texas. The Translocation Team [4] suggests that the translocation of four individual ocelots every year over a twenty year period is required for successful implementation of the relocation program, with careful monitoring of reproductive success and adult survivorship to ensure population stability. However, to successfully recover the endangered ocelot, habitat preservation and restoration as well as conservation of quality corridors is necessary for the long-term viability of introduced and current ocelot populations [4].

Prime habitat essential to the recovery of the ocelot may be located in the Madrean Archipelago, also known as the Sky Island region [8]. The Sky Island region is a large area expanding from southwestern United States into Northwestern Mexico where differing geographic climate and habitat being to overlap [8]. The Chihuahuan and Sonoran

deserts outline the East-West borders of the Sky Island region, while the Sierra Madre Occidental and the Mogollon Rim create the southern and northern borders [8]. The convergence of subtropical, temperate, and desert regions creates a territory rich in biodiversity [8]. The Sky Island region consists of more mammals than any other region in the United States, and there is evidence that ocelots have begun to inhabit the region after years of no sightings [8]. The subtropical forests, savannah grasslands, and dense thorn brush of the deserts create a multitude of differing habitats in which ocelot populations could occupy. However, the quick population growth in Arizona during the past five years has threatened the Sky Island region with human expansion and development such as agriculture, residential housing, new construction of highways and roads, and increased traffic [8]. Therefore, the most influential factor to the decline of ocelot populations and interfering with successful recovery programs is the continued loss of habitat and corridors.

Ocelot populations are dwindling in the United States, and the most influential factor limiting growth and recovery is loss of habitat and corridors. It is due to decreasing habitat, resources, and corridors that increases mortality of ocelots such as car collisions, domestic pets, or retaliatory events. Contributing to the decline of ocelot populations is the lack of genetic diversity as a result of current populations being small and isolated. Translocation of individual members from regions in Mexico will be essential to the recovery and management of ocelots in the U.S. In addition, the identification and preservation of critical habitat and corridors will be necessary for the long-term viability of ocelot populations.

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