Habitat Fragmentation Impacts Ocelot Mating System

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Most of the 30 different species of small cats in the world, including ocelot and bobcat in Texas, share a similar mating system. Typically, a male ocelot will travel over a large territory that is two or three miles across and overlaps the territories of two or three female ocelots. The male patrols this large area to secure access to mates. It also frequently travels over this area to monitor when a female becomes estrus and is in suitable breeding condition. This condition will only last a few days, so the male must move frequently to monitor the females for signs of estrus.

The male will typically deposit feces and urine along trails within its territory. Besides searching for suitable mates, these patrols are designed to encounter prey and to inform the territorial male about the presence of rival males. Occasionally, male-male encounters occur, and territorial combat has been documented in Texas ocelots more than once. In contrast, the female ocelot has a different mating strategy. The female searches for a smaller territory, compared to the male, which has plenty of dependable food sources and dense cover to protect the den sites and young kittens.

The final component of this mating system occurs when the young mature to dispersal age, usually in one or two years. Typically, the young female moves to an adjoining or nearby territory, and the mother may even allow partial tolerance or overlap of its female offspring. This use of nearby areas conveys an advantage to the new female territory because of its familiarity. The young female ocelot knows where the prey are abundant, location of dense escape cover and areas to avoid that may pose increased risk such as roads or high pockets of coyotes. In contrast, the young male usually disperses from its natal area and may travel 10 or more miles to establish its own territory. The exact mechanism initiating this dispersal is not always known, but some levels of aggression or mother intolerance of her male offspring has been documented.

Overall, this pattern of male dispersal and female philopatry are common in mammals and serve to maintain genetic diversity and avoid inbreeding. Unfortunately, ocelots are habitat specialists and strongly prefer dense thornshrub. Ocelots rarely move through habitats lacking dense brush, which prevents dispersal. Thus, populations can become effectively isolated by open landscapes.

The entire population of ocelots in the United States exists in a small group of habitat patches in extreme South Texas. There are fewer than 80 individuals in two isolated sites, with about a dozen ocelots identified in Cameron County and another 35 in Willacy County.

Texas ocelots have lost genetic diversity over time as the populations have become more genetically isolated due to lack of exchange.

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For example, there was a 10 percent decrease in genetic diversity in the Cameron population from samples taken in 1999-2005 compared to 2006-2013. Small, isolated populations lose diversity through a process known as genetic drift, where random differences in mating and survival among individuals often results in the under- or over-representation of different genetic lineages. If an individual in an isolated population leaves few or no offspring, its genetic material is lost forever.

The potential for inbreeding is another risk for small populations, but has seldom been documented in free-ranging populations. Inbreeding includes mating between closely related individuals, such as parent-offspring, between siblings or other close relatives. One of the primary concerns about inbreeding is the accumulation of recessive alleles, or alternate forms of genes. In animals, each individual has two copies of most genes, one from each parent. Recessive alleles are present in many populations at low frequency and seldom cause problems because they are paired with a normal form of the gene. However, if an individual inherits a recessive gene copy from each parent, the combination could have debilitating or lethal effects.

Long-term capture and monitoring programs for ocelots at the Caesar Kleberg Institute have collected blood and tissue samples from Texas ocelots over three decades. Doctoral student Jennifer Korn recently used genetic analyses to study parent-offspring relationships of ocelots in the Texas populations. Jennifer's research resulted in a partial pedigree analysis and the first documented cases of inbreeding in wild ocelots.

Results for the Willacy population found seven females produced one young, four females produced two young and one female (Y1) produced three young or 17 percent of the identified offspring. In the Cameron population, a female ocelot (F88) and a male ocelot (M132) produced 17 percent and 25 percent of the offspring assigned to that population.

Although the Willacy population has historically retained greater genetic diversity, it has not been resistant to inbreeding events. Eight cases of inbreeding were identified in the Willacy population, and six inbreeding events in the Cameron population.

Both populations contained mother-son pairings (Cameron-three events, Willacy-two events), matings usually avoided in carnivores by the dispersal of male offspring from the natal range. Matings between father-daughter combinations were identified in the Cameron population (one event) and the Willacy population (two events).

Most offspring were produced by a few individuals, a classic case of genetic drift. In addition, the documented inbreeding events provide another strong piece of evidence that the ocelot populations are isolated, with limited pathways for dispersal to nearby available habitat.

Two different offspring following ocelot Y1 a little after midnight on the San Francisco Ranch owned by Mr. Frank Yturria in extreme South Texas.
Photo by Michael Tewes, Caesar Kleberg Wildlife Institute

The normal mating system of wild small cats tends to avoid inbreeding and genetic erosion. This expected pattern or mating system is not happening within the confined ocelot populations in South Texas. Because of the lack of suitable habitat for males to disperse into, they tend to stay in or near the maternal territory. We believe this explains, at least in part, why genetic erosion has been occurring in the Texas ocelot and the numerous inbreeding events that have been identified.

These results are the first to use genetic analyses to identify the mating system and parental relatedness of an ocelot population anywhere within its range in the Western Hemisphere.

The acquisition of large samples of ocelots over three decades required hard work by several biologists and represents a major team effort. In addition, long-term support by Tim and Karen Hixon and Frank Yturria were critical to this success. Additional grants by SeaWorld-Busch Gardens of San Antonio helped us gather this information. Finally, the recent initiation of a major ocelot project by the East Wildlife Foundation has provided important new insights into the ocelot populations of South Texas.

The multiple inbreeding events and genetic erosion documented over the past 30 years have critical implications in guiding the recovery of this endangered cat in the United States. Translocation is an important strategy that can provide temporary assistance. Moving ocelots moved from the genetically rich pool in northeast Mexico is the preferred option; however, translocations between the two ocelot populations in Texas can also provide some benefits. For example, ocelots sampled on the East El Sauz Ranch had over 25 percent greater genetic diversity than the Cameron population and could assist in genetic augmentation of this depleted population.

However, translocation will only provide temporary relief because the continuing lack of prime habitat and isolation of the existing populations will continue to impact the mating system. Most wildlife managers agree that the ultimate solution requires the restoration of several large tracts of extremely dense thornshrub communities. Furthermore, increased connectivity of habitat on the landscape will result in increased population survival. These tracts will be expensive to restore and should be created where they will be used by ocelots or within dispersal distance (10 miles) of the two remaining ocelot populations.

The conservation challenges are significant for the last ocelot population in the United States. However, we believe there is hope particularly with support expressed by key private landowners. We can only remain optimistic.