

## Metadata for dataset entitled

### “GPS Locations of Ocelots on Laguna Atascosa National Wildlife Refuge: USFWS-TXDOT Collaborative Dataset”

#### Dataset Citation

Swarts, H., M. Sternberg, J. Young (2025). GPS Locations of Ocelots on Laguna Atascosa National Wildlife Refuge: USFWS-TXDOT Collaborative Dataset. Version 1.00. United States Fish and Wildlife Service; Texas Department of Transportation. Sampling event dataset. <https://doi.org/10.7944/xyrh-we06>.

**Please use the Citation and DOI above when citing the associated dataset.**

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Metadata following style needed for uploading data to the Global Biodiversity Information Facility

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ServCat – <https://iris.fws.gov/APPS/ServCat/Reference/175729>

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Publishing Organization = United States Fish and Wildlife Service

Type = Sampling event

Subtype = Observation

Data Language = English

Data License = Creative Commons Attribution (CC-BY 4.0)

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#### Description

The U.S. Fish and Wildlife Service (USFWS) has collected and curated Global Positioning System (GPS) locations from GPS-enabled Tellus Ultralight neck-collars placed on federally endangered ocelots (*Leopardus pardalis*) in Texas in collaboration with the Texas Department of Transportation. This dataset includes 7,321 GPS locations from 5 adult male ocelots being monitored from 2013 to 2020. Ocelots were captured in box-traps, sedated, anesthetized, fit with a GPS collar, and released on USFWS lands following protocols in Sternberg and Swarts (2021; <https://doi.org/10.7944/pbwy-se62> and <https://doi.org/10.7944/wx3d-jd10>). These locations are stored using latitude and longitude with a WGS84 reference system.

Locations in this dataset only occur on the Laguna Atascosa National Wildlife Refuge. One of several complementary datasets with locations of ocelots from GPS collars on the Refuge is located in ServCat (<https://iris.fws.gov/APPS/ServCat/Reference/Profile/175725>).

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Update Frequency = Not planned

Maintenance Description = No additional data are planned to be added to this dataset. Locations may supplement this dataset in the future if any of the current private lands on which animals were located become managed as part of the National Wildlife Refuge System.

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#### GEOGRAPHIC COVERAGE

West -97.712 East -97.24

South 26.121 North 26.647

#### TAXONOMIC COVERAGE

Ocelot (*Leopardus pardalis*)

Kingdom Animalia

Phylum Chordata

Class Mammalia

Order Carnivora

Family Felidae

#### TEMPORAL COVERAGE

Temporal Coverage

Start Date 4/18/2013

End Date 5/4/2020

#### ADDITIONAL DESCRIPTION

##### Purpose

The capture and tracking of ocelots around Laguna Atascosa National Wildlife Refuge were part of the deliberate and planned population monitoring activities for the recovery of ocelots in Texas as conducted by the U.S. Fish and Wildlife Service from 1991 to 2021. These current location data can be helpful for assessing use of different habitats; territories and ranging characteristics; reproductive activity; movements and risks associated with dispersal, crossing of roadways, and use of wildlife underpasses under roadways; interactions with other species including bobcats that were also being GPS-monitored.

##### Introduction

The ocelot (*Leopardus pardalis*) occurs from North to South America, including south Texas and Arizona, in the USA, and south to Argentina. Although its status in Texas was initially more at risk due to over-hunting and habitat destruction, more recently, its presence in the Texas has declined due to a lack of restored habitat and due to collisions with vehicles near key areas. Today, only two known breeding populations of ocelots remain in the United States, both of which occur in south Texas. One of the Texas ocelot populations is found primarily on private ranch land in Willacy and Kenedy counties, while the other population is centered on the Laguna Atascosa National Wildlife Refuge in Cameron County. These populations rely mostly on a habitat of dense Tamaulipan thornscrub, the majority of which has been removed due to agriculture and urbanization before the 1980s, resulting in the isolation of these two populations.

Recovery of the ocelot in the USA relies on increased population connectivity through habitat restoration and preservation of ocelot populations. Although decades of research in Texas have been conducted tracking the movements of ocelots, the majority of those years utilized VHF technology, and GPS technology offers considerably better and more information to inform the scientific community on the ecology and recovery of ocelot.

USFWS staff deployed large, single-door, traps with attached bait cages containing live pigeons to trap and collar ocelots. Trapping and handling protocols followed those of Sternberg & Swarts (2021; <https://doi.org/10.7944/pbwy-se62> and <https://doi.org/10.7944/wx3d-jd10>).

## Getting Started

The dataset contains 7,321 locations of 5 adult male ocelots on Laguna Atascosa National Wildlife Refuge. Some ocelots received multiple collars, and these different deployments are noted by serial numbers in the dataset. Data are provided in Microsoft Excel format. These data contain locations of these uniquely identified ocelots as well as sex, life stage, remarks on collar deployment, time it took the GPS system to acquire each location, the number of satellites used to acquire each location, a rough estimate of altitude and movement and animal temperature, among other characteristics. These locations have been scrutinized for accuracy, and all collar-testing data as well as data when the collar had been dropped from the ocelot using a remote command to remove it and during retrieval of the collar, have been removed so that only data on the movements of wild ocelots on the Refuge remain.

## KEYWORDS

Keywords – capture, Felidae, GPS, *Leopardus pardalis*, mammal, observation, ocelot, occurrence, Refuge, Texas, USA

## PROJECT DATA

### Title

GPS locations of Ocelots on Laguna Atascosa National Wildlife Refuge: USFWS-TXDOT Collaborative Dataset.

### Description

The U.S. Fish and Wildlife Service (USFWS) has collected and curated Global Positioning System (GPS) locations from GPS-enabled Tellus Ultralight neck-collars placed on federally endangered ocelots (*Leopardus pardalis*) in Texas. This dataset includes 7,321 GPS locations from 5 adult male ocelots, acquired from 2013 to 2020.

### Funding

Major funding was provided by the U.S. Fish and Wildlife Service, and the Friends of Laguna Atascosa National Wildlife Refuge.

### Study Area Description

The data occurs on Laguna Atascosa National Wildlife Refuge, located in Cameron County, Texas, USA.

### Design Description

Ocelots were being monitored as part of the long-term management and recovery of ocelots on and around Laguna Atascosa National Wildlife Refuge, managed by the USFWS until 2021. Ocelots were captured in box-traps, sedated, anesthetized, fit with a GPS collar, and released on USFWS lands from 2012 to 2021 following protocols in Sternberg and Swarts (2021 - <https://iris.fws.gov/APPS/ServCat/Reference/Profile/1111109>).

### Sampling Methods

Locations of ocelots were collected from GPS collars of ocelots on Laguna Atascosa National Wildlife Refuge, located in Cameron County, Texas, USA. Some ocelots received multiple collars over the 2013-2020 study period.

### Sampling Description

GPS locations of ocelots were acquired on a variable schedule depending on the needs to monitor each specific ocelot as determined by USFWS staff. GPS locations ranged from every 30 minutes to as few as two locations in a 24-hour period.

There are separate datasets containing GPS locations of ocelots on and around Laguna Atascosa National Wildlife from this timeframe (e.g., the current dataset in collaboration between USFWS and the Texas Department of Transportation, and another dataset solely collected by USFWS containing locations of ocelots on the Refuge). All locations represent locations of ocelots freely moving about in the wild. Skips in sequential numbers in the “occurrenceID” column represent data found elsewhere in the other datasets. Nevertheless, all data provided are accurate and unaltered locations of wild ocelots, including shortly after recovery from anesthesia and the ocelot having been released back into the wild, and until the collar was retrieved from the ocelot or stopped functioning.

### Quality Control

The dataset has gone through a cleaning and georeferencing process to ensure GPS points and location information is accurate. All data associated with testing each collar were removed. If a collar malfunctioned, its battery died, the collar was removed or replaced with a new collar on the ocelot a note was made in the “eventRemarks” column.

Locations in this dataset only occur on Laguna Atascosa National Wildlife Refuge. These data were acquired using the Select by Location tool in ArcGIS Pro, version 3.1.7, and using USFWS boundaries provided by the USFWS, Division of Realty, Region 2, Albuquerque, New Mexico, to select only the GPS locations of ocelots within Refuge boundaries. Refuge boundaries were accurate as of December 4, 2024.

Coordinates for locations are provided in decimal degrees and should be considered accurate to within 10 m given our testing with these GPS collars. As with similar GPS collars, altitude is not a very reliable metric in this dataset, neither in precision nor accuracy in our experience, but it is provided as you may find some use in these estimated values. Likewise, we would not recommend using altitude to estimate accuracy of the GPS locations.

The time of each location as in the “eventTime” column was calculated from Greenwich Mean Time as it was originally recorded with each location. Time (“eventTime”) was adjusted to Central Standard Time for the USA with seasonal adjustments for Daylight Savings Time.

Details on terms are described in the Additional Metadata section of this file.

### Step Description

1. Trap an ocelot.
2. Sedate, and anesthetize the ocelot.

3. Attach a GPS-enabled and pre-programmed collar on the ocelot.
4. Acquire locations from:
  - a. email delivery from the collar on a predetermined schedule using the local cellular network, or
  - b. manual download data in the field by contacting the collar remotely and copying data to a laptop computer using a UHF antenna and download cable, or
  - c. download the data by direct download through the micro-USB port on the collar onto a laptop once the collar is retrieved.
5. Assess accuracy of each location based on location of initial trapping, frequent tracking of the collar using VHF (during 2-hour beacon periods only on certain days to conserve battery life of the collar), and overlaying locations with known local boundaries and habitats using the ArcGIS software platform.

#### ADDITIONAL METADATA

A dataset was curated by USFWS staff previously from the Farm-to-Market 106 road expansion project (also known as “Monitoring Ocelot and Bobcat Use of Wildlife Underpasses”). Those data included some of the data in the current dataset, but the current dataset is improved so that users do not need to be intimate with the data procedures to select the most appropriate part of the older dataset to use.

For the current dataset, data were scrutinized a bit more as it was noted that some of the location data acquired from several collars early in their deployment were while the cat was still in a trap recovering from anesthesia about to be released back to the wild, or later in their deployment were from a collar which had fallen off of the cat and was yet to be noted as such, retrieved and data collection to be terminated. We thought it more appropriate to remove those non-data from this more refined dataset for wider public use.

The USFWS uses standard data terms like Darwin Core terms in this dataset whenever possible to describe some of the data fields for each record. Darwin Core is a suite of standards terms, labels, and definitions that assist the scientific community in the sharing of biodiversity information. Terms in the dataset are mostly those in accordance with the Darwin Core Standard (Darwin Core Task Group 2021) (<http://rs.tdwg.org/dwc/terms/index.htm>).

These data used Darwin Core in order to keep USFWS datasets similar to that required by the Global Biodiversity Infrastructure Facility (GBIF). In doing so, the dataset is improved to a higher standard of data organization and similar to other datasets we will, or have already, released.

Terms were also used from the Extended Measurement or Fact extension (eMoF) in Darwin Core. The eMoF extension is a standard for documenting measurements and facts related to both sampling events and species occurrences. It allows researchers to include data like environmental conditions, measurements of organisms, and other relevant information alongside occurrence records.

We also used standard terms from the Movebank Attribute Dictionary (hereafter “Movebank” below) when no similar term was found in either the main terms of Darwin Core or the eMoF extension. Terms used in Movebank describe studies, events (e.g., collar locations), animals,

deployments and tags. The Movebank vocabulary can be cited as follows: Max Planck Institute of Animal Behavior. 2024. Movebank Attribute Dictionary. British Oceanographic Data Centre, Natural Environment Research Council Vocabulary Server. <http://vocab.nerc.ac.uk/collection/MVB> (accessed on 2025 0501). Users of the dataset should refer to those sources if more clarity is needed about a given field, or how it might relate to information from other databases.

## Terms

Some cells may refer to other datasets. Keep in mind there is a complementary dataset on the Service Catalog (<https://iris.fws.gov/APPS/ServCat/Reference/Profile/175725>) and others may be added later.

While some terms are self-explanatory, the following terms are those typical of GBIF.org. Some may seem repetitive, unnecessary, and some may be of little use to USFWS users but they were included as they had been part of the larger dataset during curation and may have some use to our staff: type, eventType, basisOfRecord, occurrenceID (a good row to use to sort data given these unique codes), ownerInstitutionCode, institutionID, samplingProtocol, scientificName, scientificNameID, vernacularName, sex, eventTime, occurrenceStatus, eventRemarks, continent, countryCode, stateProvince, county, altitude, kingdom, phylum, class, order, family, genus. Each term that deserved a more detailed explanation is listed below.

The term “license” which is populated by “CC BY 4.0” signifies the data is being provided under the Creative Commons Attribution 4.0 International license, granting others the freedom to share, adapt, and build upon our work, as long as they properly credit the authors, and the agencies or “institutions” as Darwin Core refers to them. The term “license” is a Darwin Core term.

The term “accessRights” shall remain with this data in any way that you use it. This is a Darwin Core term.

The term “samplingProtocol” is a link to the Digital Object Identifier (and access to the file) for the USFWS Standard Operating Procedures used to collect and process the data. This is a Darwin Core term. This can be placed in your internet search browser and will resolve at a site on the internet where the file can be reviewed or downloaded.

The term “lifeStage” was a rough estimate of age (i.e., juvenile or adult) based in part on the study of ocelots in Texas, wherein the weight of ocelots appeared to be correlated with age in the kitten and juvenile stages of life (see chart below). Ocelots were classified as adults when their age was estimated to be 2 or more years. These estimates were applied to bobcats as well. The term “lifeStage” is a Darwin Core term.

Age estimated based on measured mass/weight

0 - 5 months = 3.4 kg or less

6 - 11 months = 3.4 - 6 kg

12 - 17 months = 5.1 - 6.6 kg

18 - 23 months = 6.2 - 7.2 kg

None of the ocelots in this dataset were considered to be a juvenile. Morphological data for each captured ocelot can be found in the Service Catalog

(<https://iris.fws.gov/APPS/ServCat/Reference/Profile/179881>).

Under “organismName”, "OF" signifies ocelot female, and "OM" signifies ocelot male. The three-digit code following the alpha-code was a unique number assigned to each individual ocelot and bobcat uniquely identified as part of the cat monitoring program at the Refuge; a system that was accurate and consistent since approximately 2007. This is a Darwin Core term.

The term “collarSerial” provides the serial number for a particular collar that was deployed on an ocelot. Some ocelots may have had multiple collars deployed on them if caught across various seasons. Some collars had a slightly different data acquisition schedule. Also, some collars may have performed better than others. Users may find use in comparing across collar deployments. The term is part of the Measurement Or Fact extension.

The term “eventTime” in this dataset is the time in Central Standard Time accounting for Daylight Savings Time. In some complementary datasets eventTime was written to ISO 8600 format where the -0500 or -0600 is appended after the time and is provided to recognize the offset from Greenwich Mean Time (accounting for Daylight Savings Time) as a standard under DarwinCore.

The term “geodeticDatum” was used to inform users that the datum for the calculation of the decimal degree coordinates was based on the WGS84 reference system. Original locations were in Universal Transverse Mercator and converted to decimal degrees in latitude and longitude using ArcGIS Pro 3.7.1. Due to our expertise using these collars we were confident in estimating the term “coordinateUncertaintyInMeters” to be 10 m of accuracy. Each of those are Darwin Core terms.

The terms “hasGeospatialIssues” and “issues” were kept in this data set to make it easier for users to maintain complementary datasets with other similar datasets being released from GPS collar projects in South Texas, although neither had any entries in the current dataset.

Under the term “eventRemarks” there is occasional information about deployment or issues with the collar such as “Collar was dropped using the remote command as the battery was getting low”.

In some complementary datasets the term “organismRemarks” may have been used and can be considered synonymous with “eventRemarks”. As the information describes the event as opposed to some character of the organism, this term has been changed to “eventRemarks” in more recent datasets.

The term “GPS time to fix” is the amount of time (in seconds) it took the Tellus collar system to acquire a GPS location. When collars were programmed USFWS had the opportunity to require the collar to get a location within a certain timeframe or to wait until the next scheduled time if a location cannot be obtained in the allotted time; this was to conserve battery in cases where the collar was working too long to get a position. If for example the Time to Fix was set to a maximum of

90 sec the X value will never be over 90. USFWS staff do not recall a time limit being programmed. Values in the dataset range from 30-119 seconds. This is a Movebank term.

The term “altitude” (in meters) was estimated for the GPS collar location by the Tellus collar system. These data were not considered accurate or precise by USFWS but a general reference. This is a Darwin Core term.

The term “GPS HDOP” stands for Horizontal Dilution of Precision of the GPS collar. It is a measure calculated from the geometry of the GPS satellites used to determine the GPS collar location. This is a fraction as in “1.8”. It is unitless. This is a Movebank term.

The term “GPS satellite count” as per a note from the collar manufacturer: Number of satellites that were used to fix the position, usually a value between 3 and 12. This is a Movebank term.

The term “activity x” is an estimate of the lateral movement/activity of the GPS collar at the time of the location. Note from manufacturer: Movement corresponding to the animal leaning the head up and down (nodding). This figure can be a value between 0-180. This is a Movebank term.

The term “activity y” is an estimate of the vertical movement/activity of the GPS collar at the time of the location. Note from manufacturer: Movement corresponding to the animal shaking its head. This figure can be a value between 0-180. This is a Movebank term.

The term “temperature”, as per the manufacturer, is a measure of temperature inside the GPS collar in degrees Celsius. This value is affected by both the ambient and the body temperature. Note that if the collar is exposed to direct sunlight, this temperature may be higher than the surrounding air temperature, as the sunlight increases the temperature in the unit. Also, because the temperature sensor is built inside the main housing, a sudden rise or fall in air temperature will be recorded with some delay (as it takes some time before the temperature inside the unit reaches the surrounding air temperature). This is a Movebank term.

is measured in Celsius and is an estimate of the collared animal’s temperature based on sensors in the Tellus Ultralight GPS collar. This is a Movebank term.

The term “recordedBy” are the names of the individuals that were responsible for handling the animal, placing a collar on it, and/or curating the dataset. This is a Darwin Core term.

The term “recordedByID” is the Open Researcher and Collaborator Identification (ORCID) codes unique to those individuals named in the “recordedBy” cell. This is a Darwin Core term.

For any data that were not recorded, the value entered was “NR”.

#### USE CONSTRAINTS

Although these data have been subjected to rigorous review and are substantially complete, the USFWS reserves the right to revise the data pursuant to further analysis and review. These data are released on condition that neither the USFWS nor the U.S. Government shall be held liable for any damages resulting from its authorized or unauthorized use.

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