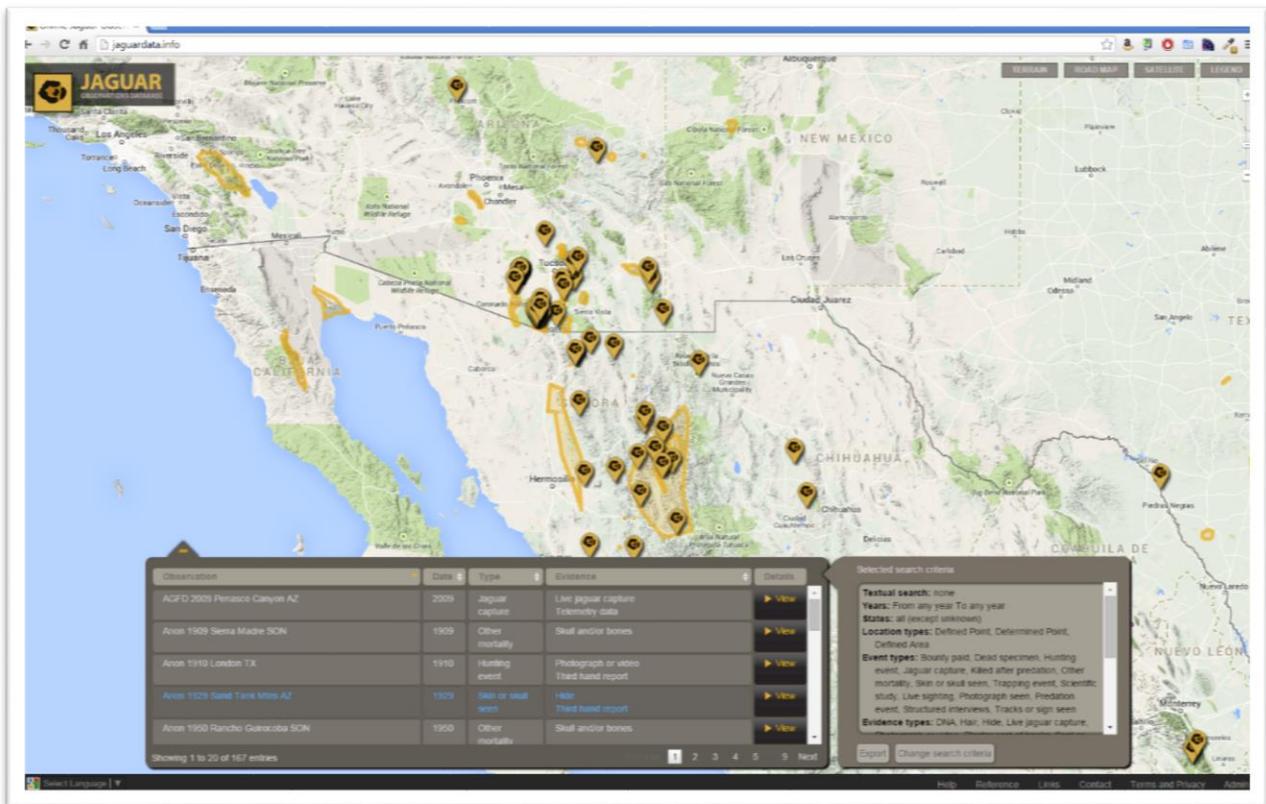


Northern Jaguar Online Database

A Submission to the U.S. Fish and Wildlife Service
in Partial Fulfillment of Contract F12PX00877

23 December 2014



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Overview

The US Fish and Wildlife Service contracted with the Wildlife Conservation Society (WCS) to develop a web-enabled jaguar observation database, as the next generation of the comprehensive observations database (originally in Microsoft Access and ESRI shapefile formats) created by WCS as part of the jaguar habitat modeling exercise begun originally in 2010 in support of the Jaguar Recovery Team. The high-level requirements for the online database application were:

1. an interface for defining criteria used to create a list and map of jaguar observations across its northern range. The interface will be simple and intuitive enough for **stakeholders** and **the general public** to use but detailed enough to allow **scientists** to specify complex search criteria applicable to their field.
2. an interface for administrators to add, edit, and delete all jaguar observations across its northern range, thereby maintaining a central authoritative data source.

Deliverables

Guided by modifications 3 and 4 of contract F12PX00877, the specification developed by Kim Fisher, Marit Alanen, and Chris Miles in June 2013 and reviewed by the Jaguar Recovery Team (see attached 130806_northern_jaguar_onlinedb_spec.pdf) listed the following deliverables for the application:

- Design workshop in Tucson
- Phase 1: Web application specification document
- Phase 2: Site infrastructure and core public interface
 - Hosting setup/domain registration and creation of development environments
 - Installation of web framework and account management system component
 - Database conversion
 - Zotero configuration
 - Development of map to display observations
 - Creation of controls for filtering observations in datagrid and map
 - Frontend layout and styling
- Phase 3: Administrative interface, secondary public interface, test/launch
 - Datagrid add/edit/delete functionality
 - Zotero linking functionality
 - Mini-map allowing graphic geographic placement of the observation
 - User account management (add, edit, delete, change role, email)
 - Bilingual rendering
 - Static footer content

In addition, modification 5 included:

- User help (tutorials/examples/videos)
- Training session in Tucson

Finally, modification 5 also specifies provision beyond contract closing of:

- Ongoing maintenance and project management
- Hosting for five years

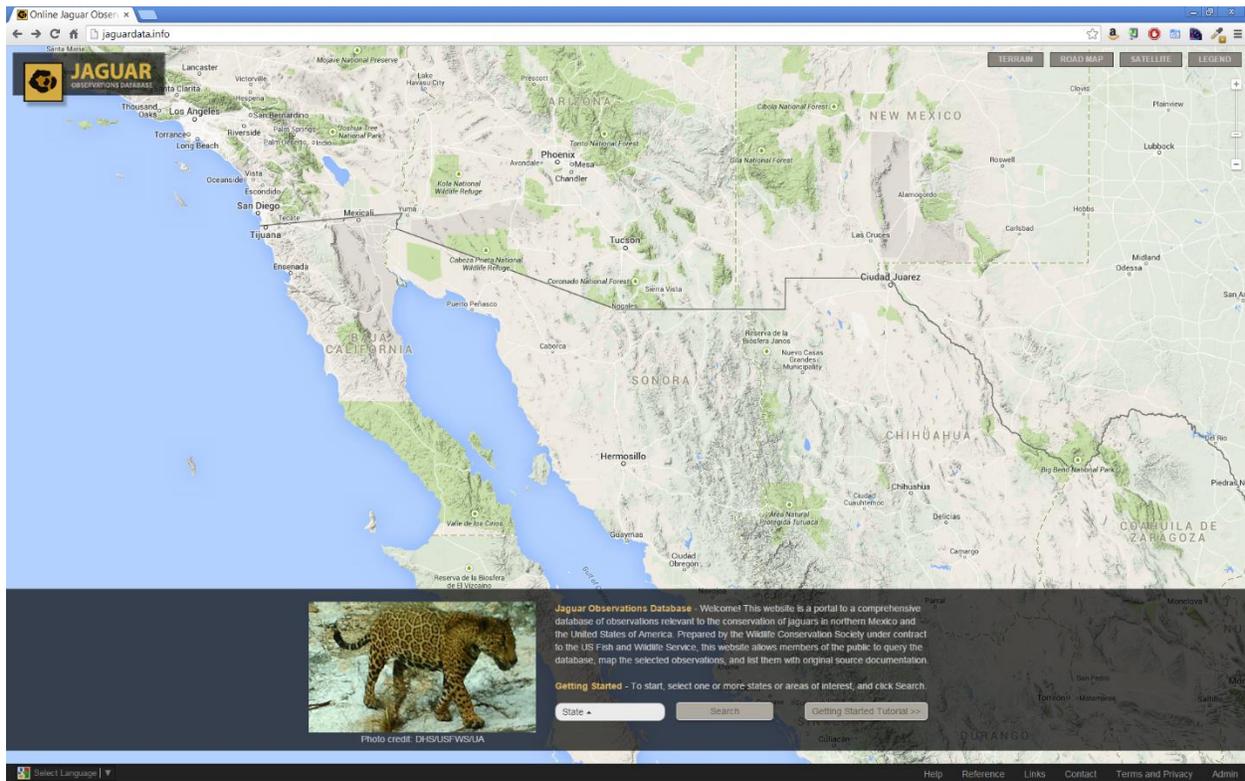
Results

All items listed above were delivered on time and approved by FWS. As with any software, ongoing maintenance will result in improvements over the next five years but the application can be considered complete. The site is not yet public because some data updates from FWS are still pending, but once these updates are complete a simple password removal will make the site public.

The application was built around a PostGIS-enabled PostgreSQL database and a Python-based Django 1.5 framework with a variety of modules, using a Bitnami-created Ubuntu/Apache virtual server from Amazon (AMI). The code and database were committed to a Subversion repository, allowing for local development. Client-side, a number of jQuery and Bootstrap-oriented JavaScript libraries were used. Thus the whole application is built on an open-source stack.

Public website interface

The public interface to the online database is available at <http://jaguardata.info/>. Until the final data edits are complete, the entire site is protected by a username/password combination of northernjag/OJOD4good.



Initial landing splash page

The screenshot shows the Jaguar Observations Database interface. A map of Mexico is displayed with several observation points marked by yellow icons. A search results table is overlaid on the map, showing a list of observations with columns for Observation, Date, Type, Evidence, and Details. A search criteria panel is also visible on the right side of the table.

Observation	Date	Type	Evidence	Details
Frenton 1963 Sierra Frenton SON	1963	Hunting event	Photograph or video Third hand report	View
Funk 1924 Obeque AZ [arizonensis type specimen]	1924	Killed after predation	Hide Skull and/or bones Third hand report	View
Garceton & Lily 1907 Fort Apache AZ	1907	Hunting event	Hide Third hand report	View
Gilbert 1957 White River AZ	1957	Skin or skull seen	Skull and/or bones Third hand report	View
Glenn 1996 Hog Canyon AZ	1996	Live	First hand report	View

Showing 61 to 80 of 167 entries

Selected search criteria:
 Textual search: none
 Years: From any year To any year
 States: all (except unknowns)
 Location types: Defined Point, Determined Point, Defined Area
 Event types: Bounty paid, Dead specimen, Hunting event, Jaguar capture, Killed after predation, Other mortality, Skin or skull seen, Trapping event, Scientific study, Live sighting, Photograph seen, Predation event, Structured interviews, Tracks or sign seen
 Evidence types: DNA, Hair, Hide, Live jaguar capture

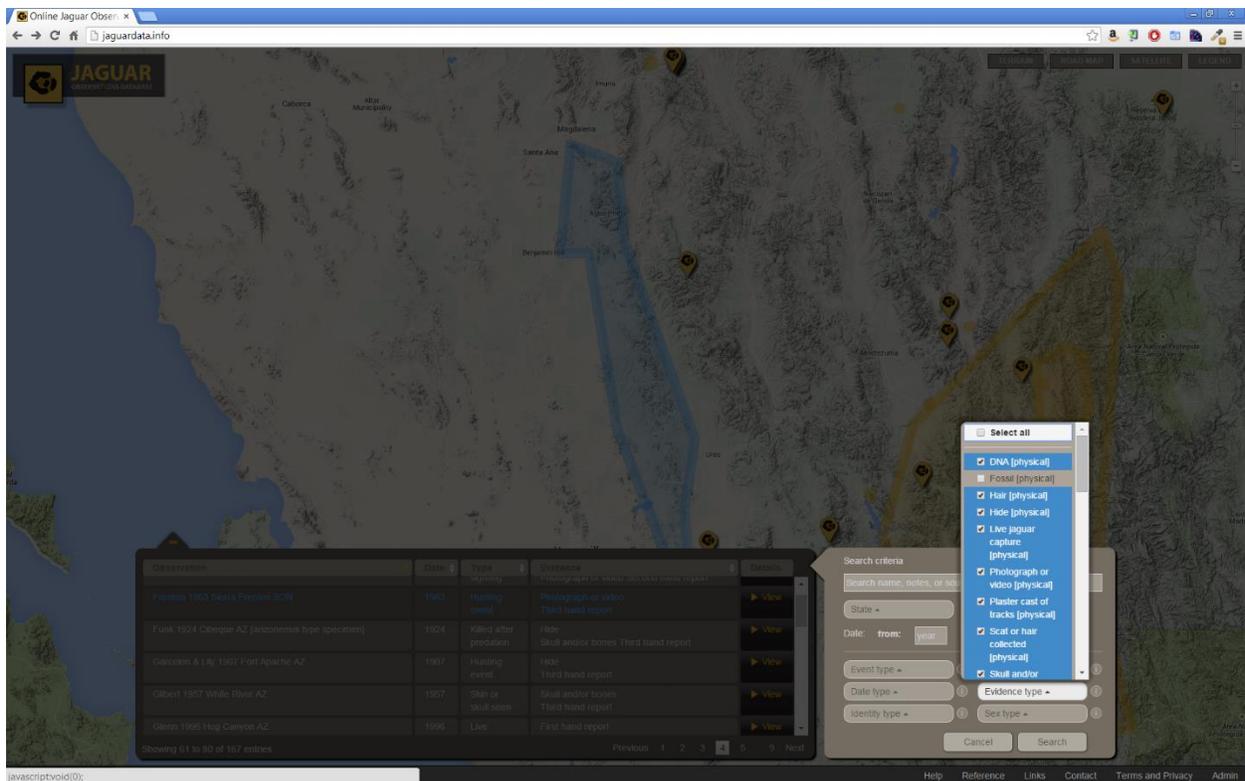
Observation search results on map and in sortable table. Note that point and polygonal observations are both represented. Note also the ability to export results to csv.

The screenshot shows the detailed view of an observation. The observation details are displayed in a panel over the map. The details include the name of the observation, state, locality type, year, date type, event type, evidence types, individuals, event text, location text, and notes. A table of records is also shown, listing the source, date, date type, and date text for each record.

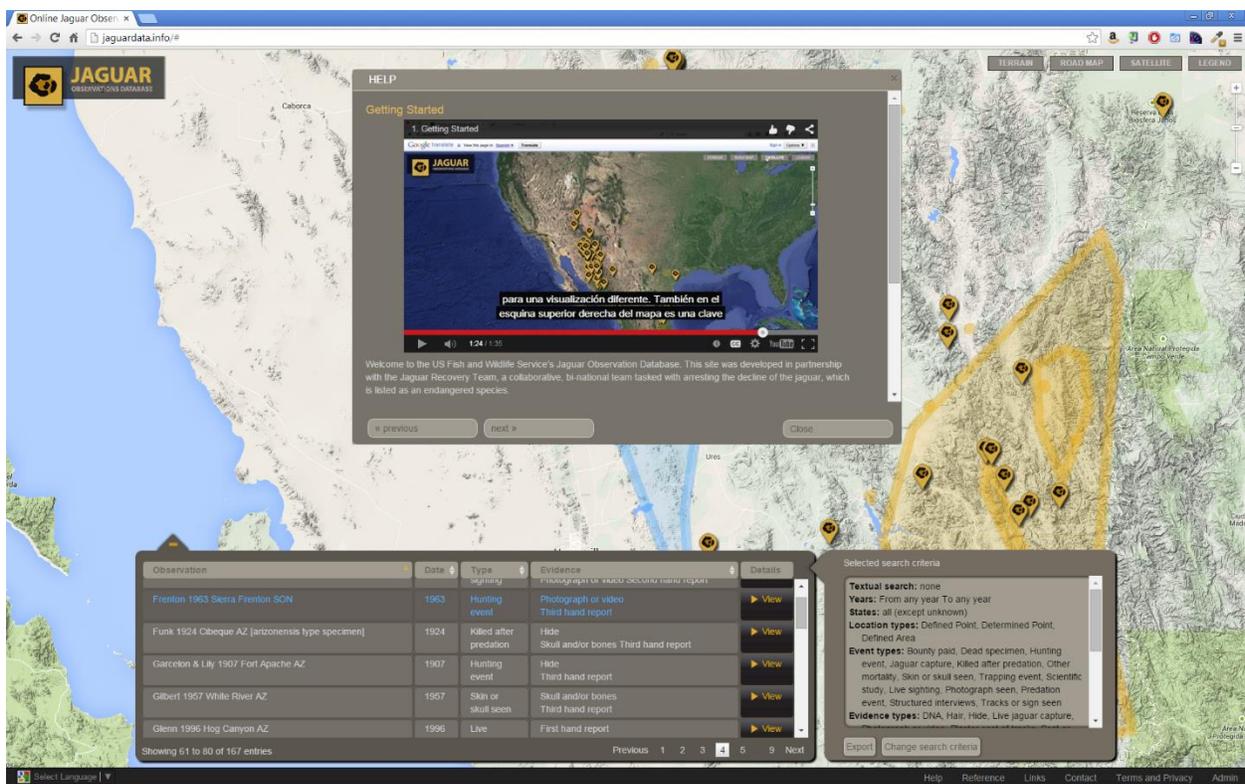
Observation details:
 Name: Frenton 1963 Sierra Frenton SON
 State: Sonora
 Locality type: Defined Area
 Year: 1963
 Date type: Year
 Event type: Hunting event
 Evidence types: Photograph or video, Third hand report
 Individuals: Jaguar (male certain; adult assumed), Jaguar (male - certain), Adult - assumed
 Event text: Figure 51. Male jaguar basin in 1963 by Alfonso Barragan in the Sierra Frenton, Sonora. Photograph courtesy of El Hernandez
 Location text: Sierra Frenton, Sonora
 Evidence types: Photograph or video, Third hand report
 Documentation text: [Photograph]
 Notes:

Source	Date	Date type	Date text
Brown and Lopez-Gonzalez 2001	1963	Year	1963

Observation details, with table slid out of way



Changing observation search criteria. Search criteria are always attached to search results.



Example help content, including narrated video with both English and Spanish subtitles

The screenshot shows the Jaguar Data website interface. A 'REFERENCE' popup window is open, displaying a table of evidence types and their physical existence. Below the popup, an 'Observation' table lists several records. To the right, a 'Selected search criteria' panel shows various filters for text, years, states, location types, event types, and evidence types.

REFERENCE

Evidence type

The evidence type attribute describes the kinds of evidence that support each event. Evidence types range from fossils to cultural myths. A full list of evidence types can be found in the table below.

Evidence type	Description	Physical existence
Photograph or video		Yes
Skull and/or bones		Yes
Hide		Yes
DNA		Yes
Scal or hair collected		Yes
Plaster cast of tracks		Yes
Fossil	Fossilized bone or track found, attributed to jaguar	Yes
Tracks seen and/or measured		Yes
Live jaguar capture		Yes
Subfossil	Incompletely fossilized remains	Yes
Hair		Yes

Observation

Observation	Date	Type	Evidence	Details
Frenton 1963 Sierra Frenton SON	1963	Hunting event	Photograph or video Third hand report	View
Funk 1924 Obeque AZ [arizonensis type specimen]	1924	Killed after predation	Hide Skull and/or bones Third hand report	View
Garcekon & Lily 1907 Fort Apache AZ	1907	Hunting event	Hide Third hand report	View
Gilbert 1957 White River AZ	1957	Skin or skull seen	Skull and/or bones Third hand report	View
Glera 1996 Hog Canyon AZ	1996	Live	First hand report	View

Showing 61 to 80 of 167 entries

Selected search criteria

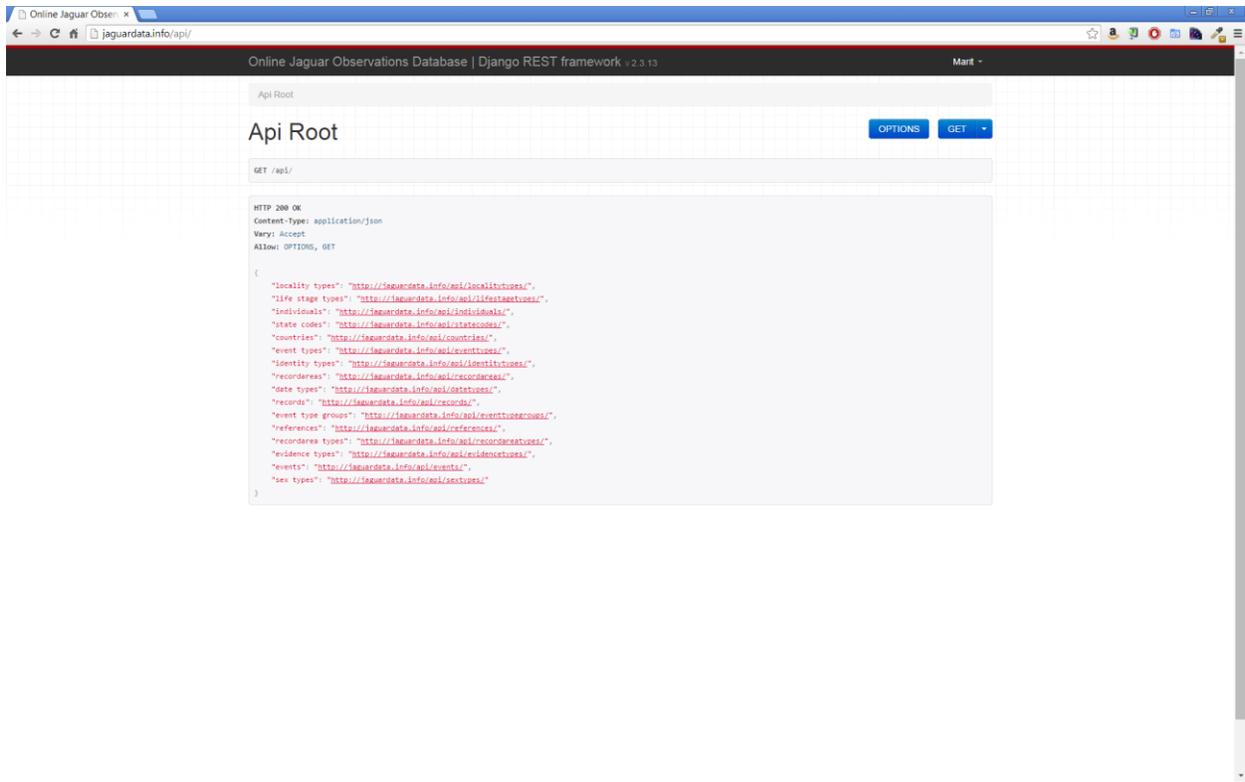
Textual search: none
 Years: From any year To any year
 States: all (except unknowns)
 Location types: Defined Point, Determined Point, Defined Area
 Event types: Bounty paid, Dead specimen, Hunting event, Jaguar capture, Killed after predation, Other mortality, Skin or skull seen, Trapping event, Scientific study, Live sighting, Photograph seen, Predation event, Structured interviews, Tracks or sign seen
 Evidence types: DNA, Hair, Hide, Live jaguar capture,

Observation search criteria reference content

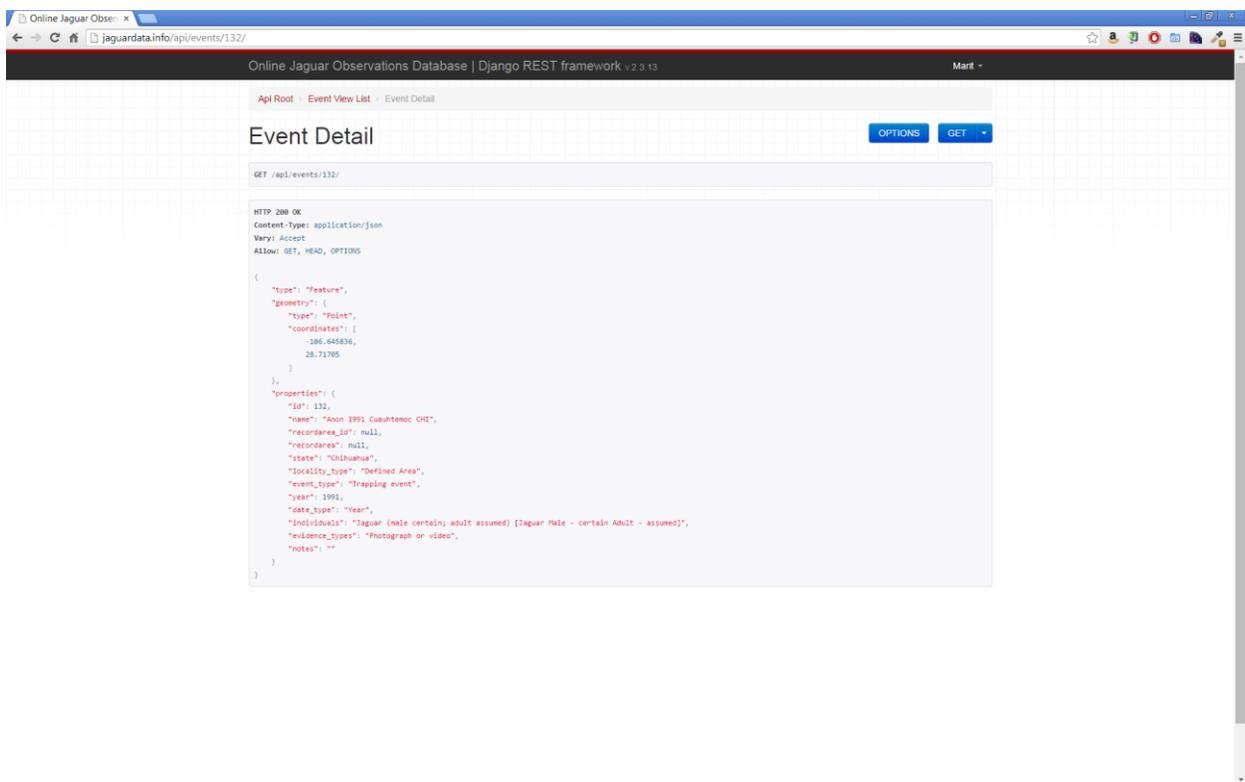
API

The public application was developed around a series of REST endpoints acting as a logical layer between the raw database and the application logic and defining an open architecture that could potentially support other applications. The REST API endpoints are accessible here:

<http://jaguardata.info/api/>



REST API root



Sample API data, for Event

Administrative interface

The administrative interface to the online database is accessible at <http://jaguardata.info/admin/> and includes the Django account management framework so that different groups and users can be defined with permissions to add, edit, or delete different tables in the database. The administrative form for Events was highly customized to act as the primary data entry interface for observations.

The screenshot displays the Django administration interface for 'Northernjag'. On the left, a sidebar lists various application tables with 'Add' and 'Change' links. The main content area shows a database diagram with the following tables and their fields:

- recordareas**: id (PK), name (varchar(100)), description (text(200)), polygon (geometry('POLYGON')), recordareatype_id (FK).
- recordareatype**: id (PK), name (varchar(50)).
- statescode**: id (PK), name (varchar(50)), country_id (FK), description (text(200)).
- country**: id (PK), name (varchar(50)).
- localitytype**: id (PK), name (varchar(50)), description (text(200)), example (text(200)), sequence (int).
- eventtype**: id (PK), name (varchar(50)), event_type_group_id (FK), sites (int), accessed (int), point (geometry('POINT')).
- eventtypegroup**: id (PK), name (varchar(50)).
- statiotype**: id (PK), name (varchar(50)), description (text(200)), example (text(200)), sequence (int).
- event**: id (PK), name (varchar(200)), accessed (int), event_type_group_id (FK), event_type_id (FK), event_date (date), event_time (time), event_location (text), event_area_id (FK), event_area_name (text), event_area_type_id (FK), event_area_type_name (text), event_area_type_description (text), event_area_type_sequence (int), event_area_type_order (int), event_area_type_accessed (int), event_area_type_point (geometry('POINT')).
- record**: id (PK), name (varchar(200)), accessed (int), record_type_id (FK), record_date (date), record_time (time), record_location (text), record_area_id (FK), record_area_name (text), record_area_type_id (FK), record_area_type_name (text), record_area_type_description (text), record_area_type_sequence (int), record_area_type_order (int), record_area_type_accessed (int), record_area_type_point (geometry('POINT')).
- record_individuals**: id (PK), record_id (FK), individual_id (FK), name (varchar(50)), description (text(200)), date_taken (date), sex (int), record_type_id (FK), record_date (date), record_time (time), record_location (text), record_area_id (FK), record_area_name (text), record_area_type_id (FK), record_area_type_name (text), record_area_type_description (text), record_area_type_sequence (int), record_area_type_order (int), record_area_type_accessed (int), record_area_type_point (geometry('POINT')).
- identifiertype**: id (PK), name (varchar(50)), description (text(200)).
- sextype**: id (PK), name (varchar(50)).
- identifiertype**: id (PK), name (varchar(50)), description (text(200)), example (text(200)).
- record_evidence_types**: id (PK), record_id (FK), evidence_type_id (FK), evidence_date (date), evidence_time (time), evidence_location (text), evidence_area_id (FK), evidence_area_name (text), evidence_area_type_id (FK), evidence_area_type_name (text), evidence_area_type_description (text), evidence_area_type_sequence (int), evidence_area_type_order (int), evidence_area_type_accessed (int), evidence_area_type_point (geometry('POINT')).
- evidencetype**: id (PK), name (varchar(50)), description (text(200)), physical (int).
- record_cross_references**: id (PK), record_id (FK), reference_id (FK), name (varchar(200)), name_date (varchar(50)), year (int), accessed (int), accessed_date (date).
- reference**: id (PK), name (varchar(200)), name_date (varchar(50)), year (int), accessed (int), accessed_date (date).

Administrative interface, with access to all application tables and a database diagram.

Select event to change

ID	Name	Point	Record area	Locality type	State	Event type	Individuals	Evidence types	Year	Date type	Accessid
1	Delete selected events Export to CSV Huasabas on Rio Savajpo SON	(None)	Huasabas (county)	Defined Area	Sonora	Attack on person	Jaguar (adult assumed) [Jaguar Unknown or unattributed Adult - assumed]	Third hand report	1992	Few Years	494
2	Adams 1855 Near Tejon Pass CA	POINT (-118.877070000000033 34.803619999999999)	(None)	Determined Point	California	Live sighting	Jaguar (uncertain) [Other Unknown or unattributed Unknown or unattributed]	Third hand report	1855	Season within a Year	409
3	AGFD 2008 Penasco Canyon AZ	POINT (-111.179259999999999 31.408429000000017)	(None)	Defined Area	Arizona	Jaguar capture	Macho B [Jaguar Male - certain Adult - certain]	Live Jaguar capture Telemetry data	2009	Exact Date	503
4	Alvarez 1970 Mexico City Zoo (bone specimen)	(None)	(None)	Undetermined Area	Mexico	Dead specimen	Jaguar (juvenile certain) [Jaguar Unknown or unattributed Immature - certain]	Skull and/or bones	1970	Year	963
80	American Hunters 1935 Soyopa SON	(None)	Soyopa (area)	Defined Area	Sonora	Hunting event	Jaguar (sex unknown; age unknown) [Jaguar Unknown or unattributed Unknown or unattributed]	Third hand report	1935	Few Years	126
5	Anon 1250 Mimbrres Homeland MHAZ	(None)	Mimbrres (homeland)	Wide Area	Mimbrres Homeland	Cultural image seen	Jaguar / cat image [Cat Unknown or unattributed Unknown or unattributed]	Cultural representation of Jaguar	1250	More than a Century but less than a Millennium	493
6	Anon 1400 Cave of the Masks TX	POINT (-106.042407999999994 31.917235999999999)	(None)	Determined Point	Texas	Cultural image seen	Jaguar / cat image [Cat Unknown or unattributed Unknown or unattributed]	Cultural representation of Jaguar	1400	More than a Century but less than a Millennium	386
7	Anon 1400 Jaguar Cave TX	POINT (-106.833240000000035 31.402107000000009)	(None)	Determined Point	Texas	Cultural image seen	Jaguar / cat image [Cat Unknown or unattributed Unknown or unattributed]	Cultural representation of Jaguar	1400	More than a Century but less than a Millennium	385
8	Anon 1400 Shrine of the Stone Luna NM	POINT (-106.299582000000009 35.772270000000009)	(None)	Determined Point	New Mexico	Cultural image seen	Jaguar / cat image [Cat Unknown or unattributed Unknown or unattributed]	Cultural representation of Jaguar	1400	Nearest Century	489
9	Anon 1430 Jeddido Sites AZ	POINT (-110.279494000000003 35.718611000000028)	(None)	Determined Point	Arizona	Cultural image seen	Jaguar / cat image [Cat Unknown or unattributed Unknown or unattributed]	Cultural representation of Jaguar	1430	Half a Century	388
10	Anon 1475 Pottery Hound NH	POINT (-108.333379999999999 34.748215999999999)	(None)	Determined Point	New Mexico	Cultural image seen	Jaguar / cat image [Cat Unknown or unattributed Unknown or unattributed]	Cultural representation of Jaguar	1475	More than a Century but less than a Millennium	383
11	Anon 1550 Pajarito Plateau NM	(None)	Pajarito Plateau (mountain range)	Defined Area	New Mexico	Cultural image seen	Jaguar / cat image [Cat Unknown or unattributed Unknown or unattributed]	Cultural representation of Jaguar	1550	More than a Century but less than a Millennium	384
12	Anon 1700 Benton County MO	(None)	Benton (county)	Wide Area	Missouri	Cultural account	Jaguar / cat image [Cat Unknown or unattributed Unknown or unattributed]	Cultural representation of Jaguar	1700	More than a Century but less than a Millennium	378
13	Anon 1700 Moundville AL	POINT (-87.344489999999975 32.998078999999997)	(None)	Determined Point	Alabama	Cultural image seen	Jaguar / cat image [Cat Unknown or unattributed Unknown or unattributed]	Cultural representation of Jaguar	1700	More than a Century but less than a Millennium	377
16	Anon 1825 Santa Fe [Argentina]	POINT (-60.723089999999972 -31.641344000000001)	(None)	Determined Point	Argentina	Attack on person	Jaguar (adult assumed) [Jaguar Unknown or unattributed Adult - assumed]	Third hand report	1825	Exact Date	265
17	Anon 1848 Cochise County AZ	(None)	Cochise (county)	Wide Area	Arizona	Live sighting	Jaguar (sex unknown; age unknown) [Jaguar Unknown or unattributed Unknown or unattributed]	Third hand report	1848	Year	167
26	Anon 1860 San Jacinto and Santa Rosa Mountains, CA	(None)	San Jacinto and Santa Rosa Mountains CA (mountain range)	Defined Area	California	Cultural account	Jaguar (sex unknown; age unknown) [Jaguar Unknown or unattributed Unknown or unattributed]	Third hand report	1860	Prior to a given year	362
28	Anon 1889 Near Mouth of the Pecos River TX	(None)	Near the mouth of the Pecos River TX (neighborhood)	Defined Area	Texas	Hunting event	Jaguar (sex unknown; age unknown) [Jaguar Unknown or unattributed Unknown or unattributed]	Third hand report	1889	Few Years	333
29	Anon 1890 Grand Canyon AZ	(None)	Grand Canyon (mountain range)	Defined Area	Arizona	Hunting event	Jaguar (cub certain) [Jaguar Unknown or unattributed Cub - certain] Jaguar (female certain; adult assumed) [Jaguar Female - certain Adult - assumed]	Third hand report	1890	Decade	169
30	Anon 1896 Sen Homeland SON	(None)	Sen (homeland)	Wide Area	Sen Homeland	Cultural account heard	Jaguar (sex unknown; age unknown) [Jaguar Unknown or unattributed Unknown or unattributed]	Third hand report	1896	Prior to a given year	481
35	Anon 1901 Cacalotan SIN	(None)	Cacalotan (county)	Defined Area	Sinaloa	Other locality	Jaguar (sex unknown; age unknown) [Jaguar Unknown or unattributed Unknown or unattributed]	Third hand report	1901	Prior to a given year	304

Administrative list of Events (observations) showing ability to delete or export multiple events.

Change event | Django administration

Name: Anon 1918 Grand Canyon AZ Accessid: 32

Notes:

Locality type: Determined Point State: Arizona Event type: Hunting event Year: 1918 Date type: Decade

Individuals: Jaguar (sex unknown; age unknown) [Jaguar Unknown or unattributed Unknown or unattributed] Evidence types: Third hand report

Point: POINT (-112.154920000000047 36.095545000000013) Record area: None

Records	Location	Event	Identity and Evidence	Date	Documentation	Notes
AGFD 2011 [access id: 1228] <input type="checkbox"/> Delete?	4UM Grand Canyon (mountain range) <input type="checkbox"/> Use? Arizona <input type="checkbox"/> Use? Determined Point <input type="checkbox"/> Use? AZ: Grand Canyon Village <input type="checkbox"/> Use?	Hunting event <input type="checkbox"/> Use? Unknown <input type="checkbox"/> Use?	<input type="checkbox"/> Use? Jaguar (male certain) [Jaguar Male - certain Unknown or unattributed] Jaguar (male certain; adult assumed) [Jaguar Male - certain Adult - assumed] Jaguar (male certain; cub certain) [Jaguar Male - certain Cub - certain] Jaguar (male uncertain; adult assumed) [Jaguar Male - uncertain Adult - assumed] Jaguar (myth) [Other not applicable for applicable Jaguar-related phenomena] [Other not applicable] Jaguar (sex unknown; age unknown) [Jaguar Unknown or unattributed Unknown or unattributed] <input type="checkbox"/> Use? Hunting club record [not physical] Linguistic evidence [not physical] Other documentary evidence [not physical] Other physical evidence [not physical] Pray animal killed jaguar skin [not physical] Second hand report [not physical] Telemetry data [not physical] Third hand report [not physical]	Decade <input type="checkbox"/> Use? 1909 to 1918 <input type="checkbox"/> Use?	AGFD 2011 <input type="checkbox"/> supporting notes... Social 1727 Brown 1963 Brown 1969 Brown 1991 Brown and Gonzalez 2000 Brown and Lopez-Gonzalez 2001	
Bordenes Working Group Database 2007 [access id: 186] <input type="checkbox"/> Delete?	4UM Grand Canyon (mountain range) <input type="checkbox"/> Use? Arizona <input type="checkbox"/> Use? Wide Area <input type="checkbox"/> Use? COCHISE COUNTY, ARIZONA: 280.88 KM NORTHEAST OF SAN LUIS RIO COLORADO, SONORA (State, Bordenes Working Group Database 2007 maps this point in Yagup, not Cochise County and service position to Record ID 187)	Hunting event <input type="checkbox"/> Use? MORTALTY <input type="checkbox"/> Use?	<input type="checkbox"/> Use? Jaguar (male certain) [Jaguar Male - certain Unknown or unattributed] Jaguar (male certain; adult assumed) [Jaguar Male - certain Adult - assumed] Jaguar (male certain; cub certain) [Jaguar Male - certain Cub - certain] Jaguar (male uncertain; adult assumed) [Jaguar Male - uncertain Adult - assumed] Jaguar (myth) [Other not applicable for applicable Jaguar-related phenomena] [Other not applicable] Jaguar (sex unknown; age unknown) [Jaguar Unknown or unattributed Unknown or unattributed] <input type="checkbox"/> Use? Hunting club record [not physical] Linguistic evidence [not physical] Other documentary evidence [not physical] Other physical evidence [not physical] Pray animal killed jaguar skin [not physical] Second hand report [not physical] Telemetry data [not physical] Third hand report [not physical]	Decade <input type="checkbox"/> Use? 1909-1918 <input type="checkbox"/> Use?	Bordenes Working Group Database 2007 <input type="checkbox"/> supporting notes... CLASS ID: G28H200K1, 1994	
Brown and Lopez-Gonzalez 2001 [access id: 32] <input type="checkbox"/> Delete?	4UM Grand Canyon (mountain range) <input type="checkbox"/> Use? Arizona <input type="checkbox"/> Use? Wide Area <input type="checkbox"/> Use? Grand Canyon AZ <input type="checkbox"/> Use?	Hunting event <input type="checkbox"/> Use? Circumstances unknown, Number/ Sex? Collector Unknown <input type="checkbox"/> Use?	<input type="checkbox"/> Use? Jaguar (male certain) [Jaguar Male - certain Unknown or unattributed] Jaguar (male certain; adult assumed) [Jaguar Male - certain Adult - assumed] Jaguar (male certain; juvenile certain) [Jaguar Male - certain Juvenile - certain] Jaguar (male uncertain; adult assumed) [Jaguar Male - uncertain Adult - assumed] Jaguar (myth) [Other not applicable for applicable Jaguar-related phenomena] [Other not applicable] Jaguar (sex unknown; age unknown) [Jaguar Unknown or unattributed Unknown or unattributed] <input type="checkbox"/> Use? Hunting club record [not physical] Linguistic evidence [not physical] Other documentary evidence [not physical] Other physical evidence [not physical] Pray animal killed jaguar skin [not physical] Second hand report [not physical] Telemetry data [not physical] Third hand report [not physical]	Decade <input type="checkbox"/> Use? 1909-1918 <input type="checkbox"/> Use?	Brown and Lopez-Gonzalez 2001 <input type="checkbox"/> supporting notes... Table 1 [Second Hand Report], verified by E.W. Nelson, reported LANGE 1960	
			<input type="checkbox"/> Use? Hunting club record [not physical] Linguistic evidence [not physical] Other documentary evidence [not physical] Other physical evidence [not physical] Pray animal killed jaguar skin [not physical] Second hand report [not physical] Telemetry data [not physical] Third hand report [not physical]		Silva 1963 Jern. comm. Knobel 1948 Knobel 1972 Kurten and Anderson 1980 Kurten 1993 Lacey 2011 Lamy et al. pers. comm. Lange 1960	

Editing an event with multiple records. Note the UTM link providing the ability to enter coordinates in a variety of UTM projections.

Select user to change: x

jaguardata.info/admin/auth/user/

Django administration

Welcome, Marit. Documentation / Change password / Log out

Home > Auth > Users

Select user to change

0 of 8 selected

Username	Email address	First name	Last name	Staff status
admin	kfisher@wca.org	Kim	Fisher	Yes
Carlos	carlsdmev@gmail.com	Carlos	Lopez-Gonzalez	Yes
Eric	esanderson@wca.org	Eric	Sanderson	Yes
Erin	erin_fernandez@fws.gov	Erin	Fernandez	Yes
Mario	mpampieri@wca.org	Mario	Gampieri	Yes
Marit	marit_alanen@fws.gov	Marit	Alanen	Yes
Test_Contributor	Marit_Alanen@fws.gov	Test	Contributor	Yes
TimSnow	tsnow@zagfd.gov	Tim	Snow	Yes

8 users

Filter

- By staff status
 - All
 - Yes
 - No
- By superuser status
 - All
 - Yes
 - No
- By active
 - All
 - Yes
 - No
- By groups
 - All
 - Northern jaguar administrators
 - Northern jaguar editors
 - Northern jaguar contributors

Administrative user account management