

# Social media as a digital data source for wildlife ecology studies

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New Haven, CT

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UNIVERSITY OF  
**GEORGIA**





Making data and images of millions of biological specimens available on the web

119,163,881

Specimen Records

30,380,997

Media Records

1,614

Recordsets

[Search the Portal](#)



**Why digitization matters**

More about what we do and why



### Digitization

Learn, share and develop best practices



### Sharing Collections

Documentation on data ingestion



### Working Groups

Join in, contribute, be part of the community



### Proposals

New tool and workshop ideas



### Citizen Scientists

How can you help biological collections?

### Researchers

Learn about research directions



### Collections Staff

Learn how your collection can benefit from our work

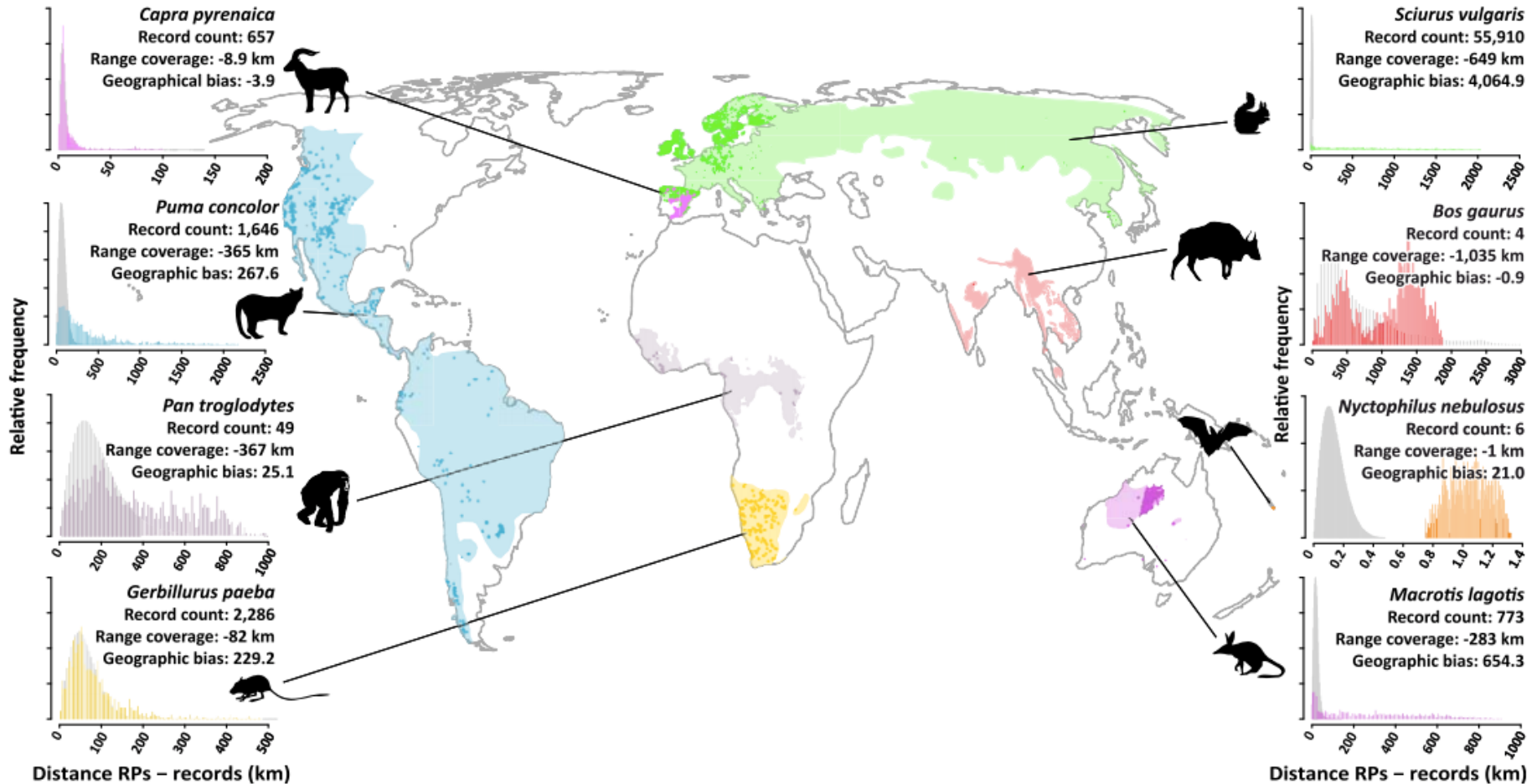


### Teachers & Students

Download lesson plans about using digitized specimens



# Bias in species records



# The new era of social media

JAN  
2019

## DIGITAL AROUND THE WORLD IN 2019

THE ESSENTIAL HEADLINE DATA YOU NEED TO UNDERSTAND GLOBAL MOBILE, INTERNET, AND SOCIAL MEDIA USE

TOTAL  
POPULATION



**7.676**  
BILLION

URBANISATION:

**56%**

UNIQUE  
MOBILE USERS



**5.112**  
BILLION

PENETRATION:

**67%**

INTERNET  
USERS



**4.388**  
BILLION

PENETRATION:

**57%**

ACTIVE SOCIAL  
MEDIA USERS

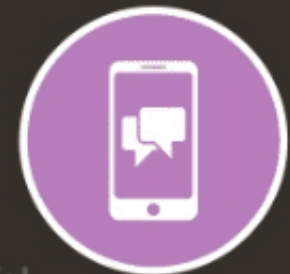


**3.484**  
BILLION

PENETRATION:

**45%**

MOBILE SOCIAL  
MEDIA USERS



**3.256**  
BILLION

PENETRATION:

**42%**






we  
are  
social



we  
are  
social



# Top Social Media Sites

	Monthly Users	Data Type	API	Scale
	> 2 billion	Video, Photos Audio Text	✓	350 million photos uploaded per day
	1.9 billion	Video, Photos Audio Text	✓	> 100 billion videos
	1 billion	Photos Video, Audio Text	✓	> 50 billion photos

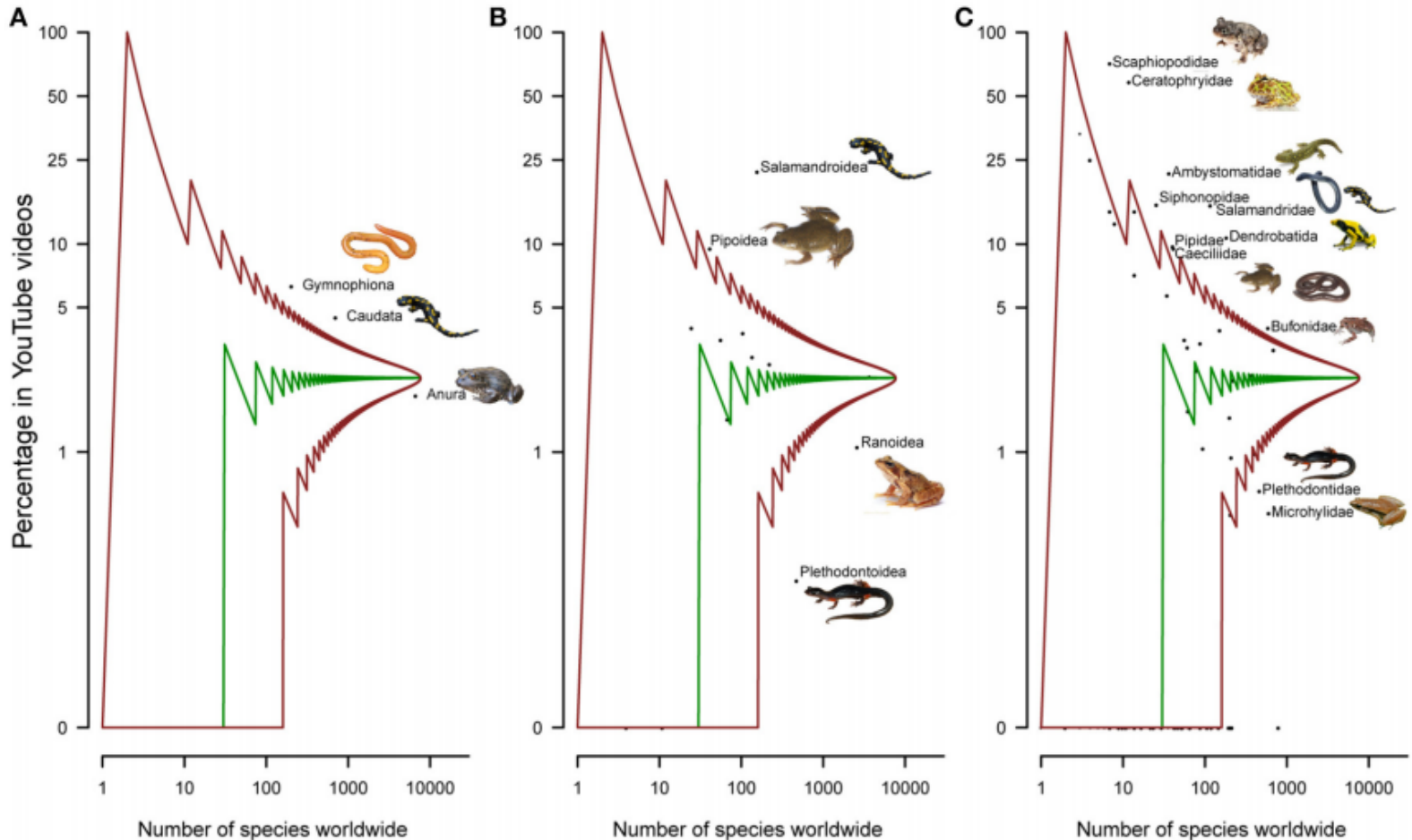
# Discussion Objectives:

- Horizon scan of social media in wildlife ecology studies
- Discuss opportunities and obstacles of social media data
- Brainstorm possible avenues for data curation into established pipelines of natural history data



# Biodiversity patterns in pet amphibians

Measey et al. 2019, *Frontiers in Ecology and Evolution*



**FIGURE 1 |** Taxonomic patterns in amphibian **(A)** orders, **(B)** superfamilies, and **(C)** families present in the species identified in captive YouTube amphibian videos. The median (green line) and 95% confidence intervals (brown lines above and below), adjusted for multiple comparisons, were estimated from the hypergeometric distribution. The points that fall between the 95% confidence intervals are not significantly over or under-represented, relative to the number of amphibian species worldwide. Those labeled orders, superfamilies or families that fall above the 95% confidence intervals are over-represented and those below are under-represented in our sample of YouTube videos.

# Coyote-domestic dog behaviors

**Table 2.** Numbers (and percentages) of coyote–dog (*Canis latrans*, *C. lupus familiaris*) dyadic interactions per ethogram category (see Table 1) for a total of 49 coyote–dog dyads involving 39 coyotes and 45 dogs (30 large, 7 medium, 8 small). Dyadic interactions were observed in 35 video clips containing 1–3 dyads per video. Number of videos here sums to 36, because 1 video contained a predatory and an agonistic dyad.

Ethogram category	# Dyads (%)	# Coyotes	# Dogs			# Videos
			Large	Medium	Small	
Predatory	5 (10.20)	5	0	1	3	4
Agonistic	13 (26.53)	10	11	1	0	9
Social play	13 (26.53)	9	9	3	1	11
Other/undetermined	18 (36.73)	15	10	2	4	12



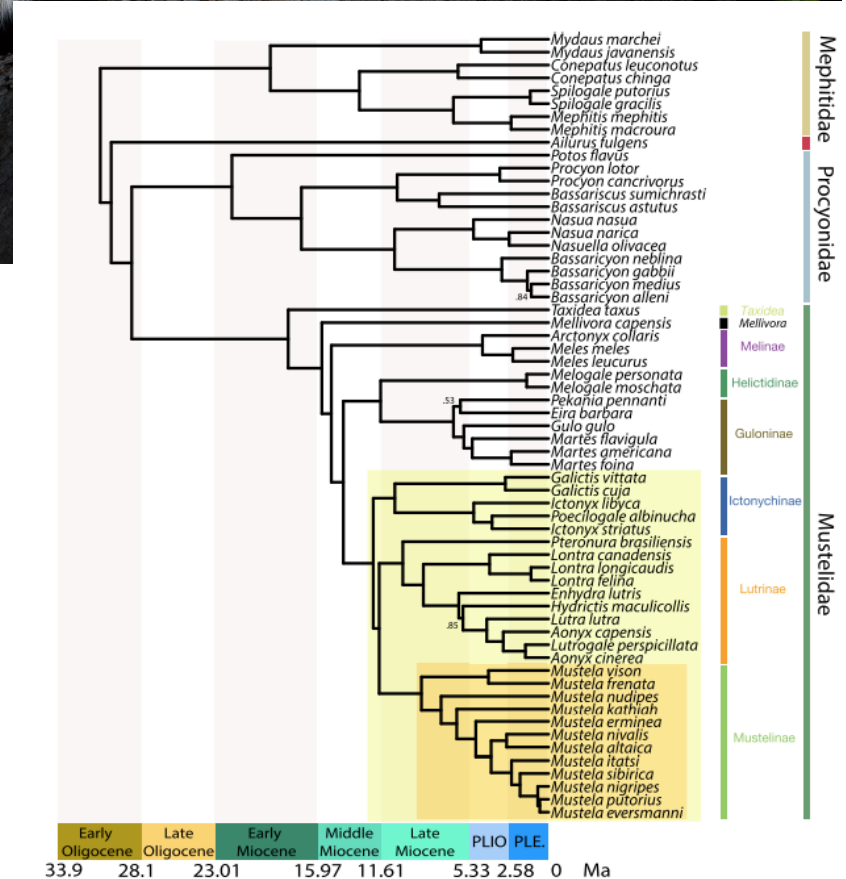
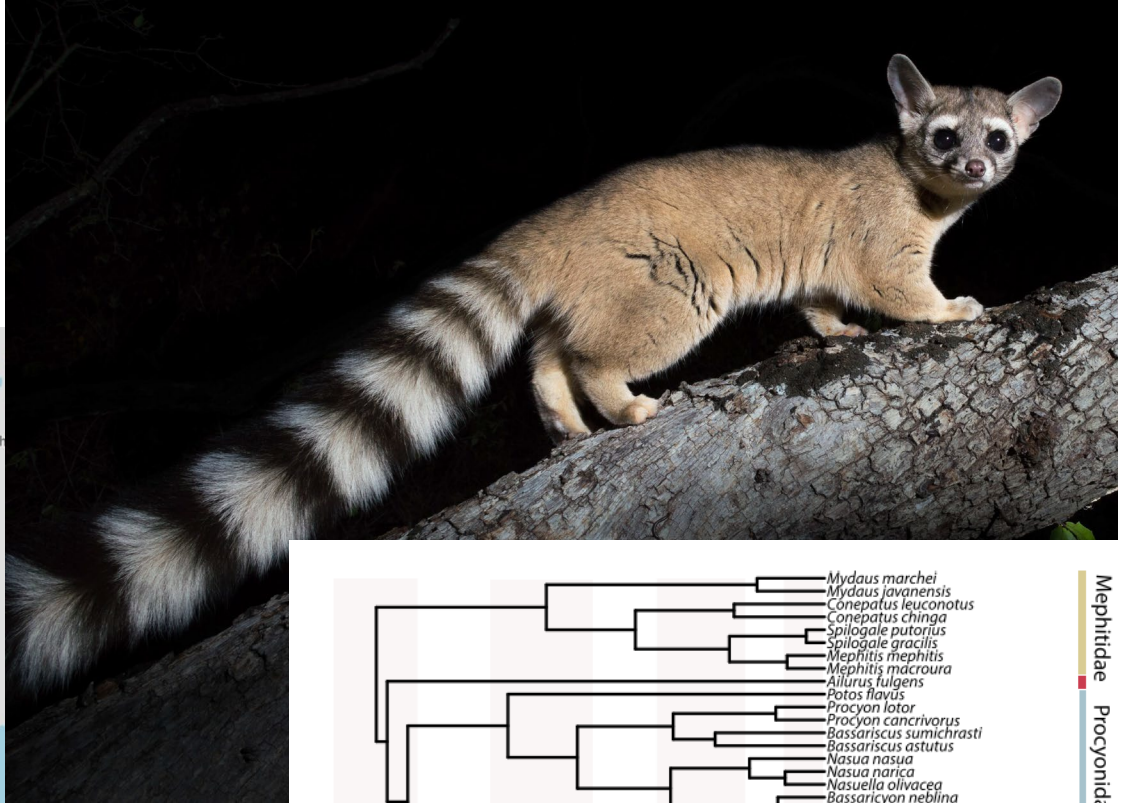
# Human-wildlife sentiments

- These pics were taken outside the Trafalgar Sports Bar this Thursday at 4 pm. They were mingling with tourists and passersby, eyeing everyone for possible goodies (even one on lookout duties up the lamppost!). (Anon, January 2014)



- Mount Alvernia is under siege by monkeys, but you probably already know that. (Anon, March 2014)
- Despicable vandals! (Anon, January 2014)

# Ringtails



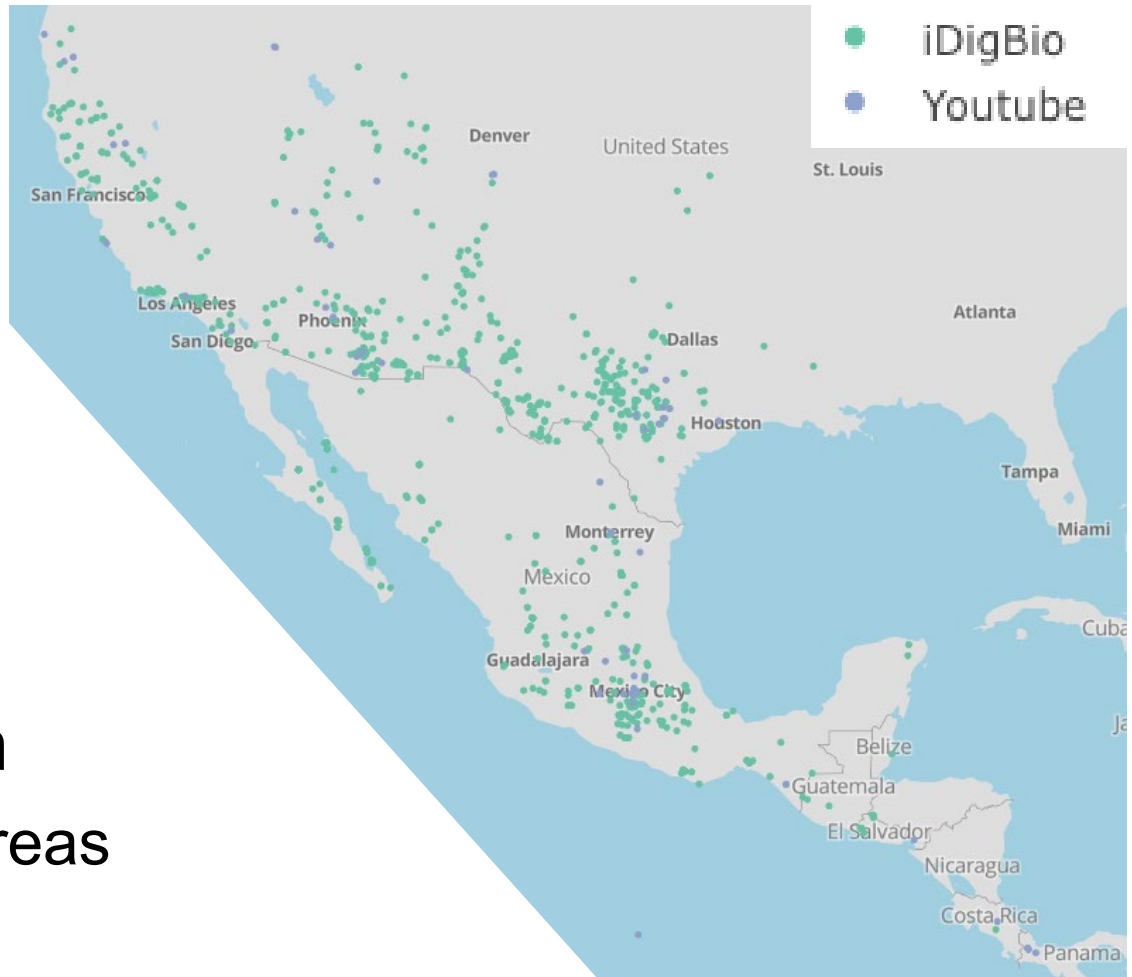


# Human-ringtails interactions



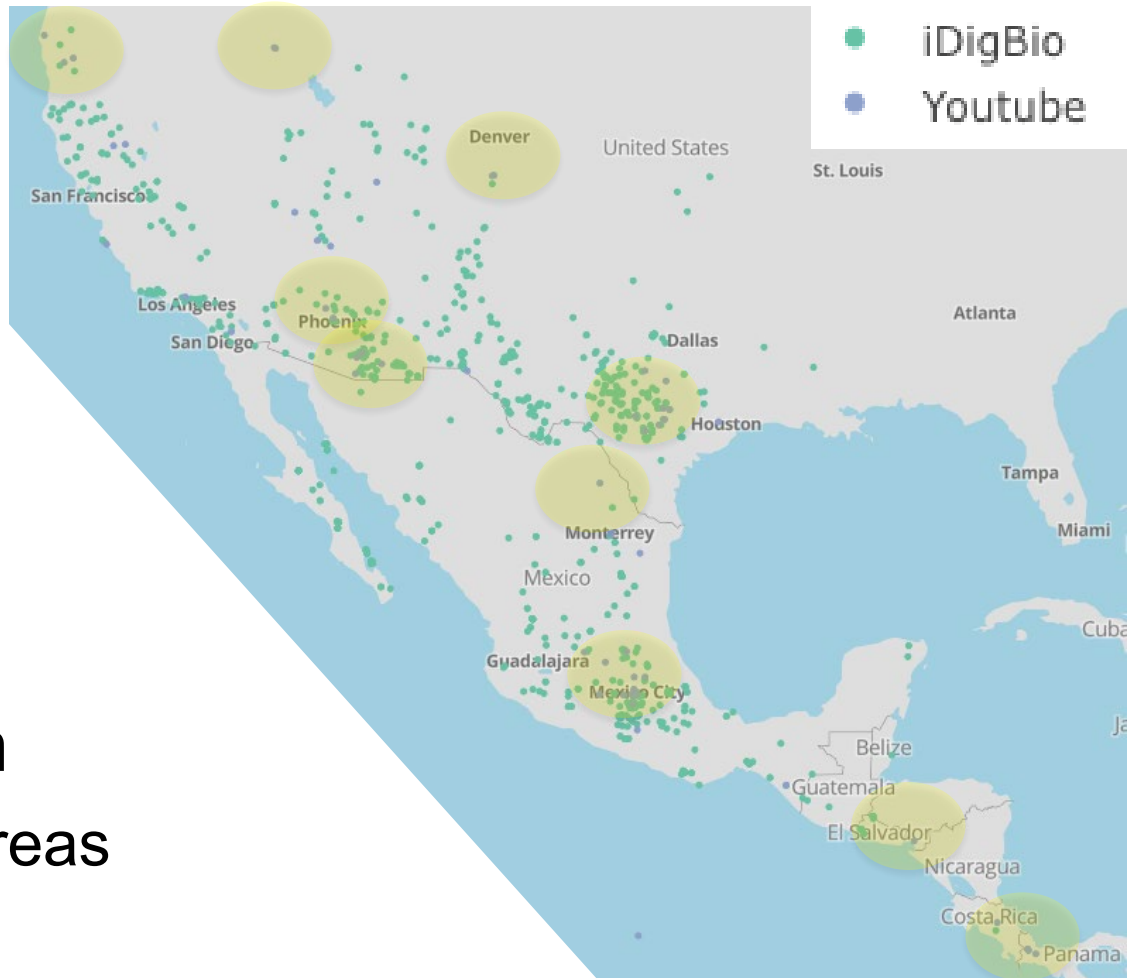
# Expansion of species occurrence data

- 1398 videos
- 207 videos of wild ringtails
- 65 unique GPS locations
- Complements in
  - data deficient areas
  - edges
  - cities



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# Ecological and behavioral insights

- Activity times
- Vocalizations
- Interspecies interactions:
  - prey, predators
- and so much more!





# How to scale with computational methods?

**TABLE 1** Commonly used tools for computer vision application to ecology

Name	Reference	Task	Comments
OpenCV	Bradski (2000)	Description, Counting, Identity	Source library for computer vision algorithms in python/java/C++
ImageJ	Abràmoff et al. (2004)	Description, Counting	Segmentation and thresholding
BISQUE	Kvilekval et al. (2009)	Description, Counting	Also serves as a hosting platform for image analysis tools
Agisoft Photoscan	-	Description	Commercial software for 3D model reconstruction from images
StereoMorph	Olsen and Westneat (2015)	Description	R package for 3d reconstruction and image calibration
NaturePatternMatch	Stoddard et al. (2014)	Description	Comparing features among ecological images
MotionMeerkat	Weinstein (2015)	Counting	Background subtraction for animal detection in videos and images.
Google Cloud API	-	Identity	Classification of image content using Cloud Vision API, deep learning source library using TensorFlow
Merlin	Van Horn et al. (2015)	Identity	Bird identification app for iPhone and Android
Wildbook	Crall et al. (2013)	Identity	Individual identification and data management tools

# Discussion Questions

- How to account for bias in researcher effort and social-media use?
- How to overcome the bottleneck of image processing?
- How to better capture collector and animal behavior?