

First records and possible range extension of the American Hog-nosed Skunk into Grand Canyon National Park, U.S.A.

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Abstract

Current knowledge of the geographic distribution of the American or White-backed Hog-nosed Skunk *Conepatus leuconotus* suggests contractions in the northernmost reaches of its range. Recently, American Hog-nosed Skunk was documented along the Colorado River through the Grand Canyon National Park (GCNP) for the first time, extending the north-western geographic range of this species. We employed a camera-trap study to determine the extent to which American Hog-nosed Skunks may be distributed along the Colorado River through GCNP and found American Hog-nosed Skunks distributed across a 55-river mile reach along the canyon bottom, including both sides of the river. This constitutes the first time this species has been documented west and north of the Colorado River. Progressive increases in shoreline vegetation since the completion of the Glen Canyon Dam in 1963 has potentially amplified terrestrial invertebrate biomass and prey availability and encouraged American Hog-nosed Skunks to establish along the Colorado River through the Grand Canyon.

Keywords: *Conepatus leuconotus*, Hog-nosed Skunk, Grand Canyon, Colorado River

Introduction

The geographic distribution of the American or White-backed Hog-nosed Skunk *Conepatus leuconotus leuconotus* (Lichtenstein, 1832) at the northern end of its range in the U.S.A. is defined primarily by data from historical museum specimens and sporadic sightings, and recent reports suggest that the species may be undergoing population declines across much its range within the U.S.A. The species has likely disappeared from Colorado and northern New Mexico and has dramatically declined in Texas (Cuaron *et al.* 2008), presumably due to habitat loss and fragmentation (Dragoo & Honeycutt 1999, Helgen 2016). In Arizona, records of American Hog-nosed Skunks are concentrated in the south-eastern region of the state (Fig. 1). Although Hoffmeister (1986) suggested that American Hog-nosed Skunks in Arizona may have been expanding their range in the north-western part of the state, he did not report any records of this species in his 1971 account, *Mammals of Grand Canyon*. In 1956, an immature male Hog-nosed Skunk (catalogue no. 160255, Museum of Southwestern Biology, University of New Mexico, accessed at <https://arctos.database.museum/guid/MSB:Mamm:160255> on 22 January 2020) was trapped in the Hualapai Mountains in western Arizona (Musgrove & Hoffmeister 1957), extending the previously known range of this species nearly 160 km to the north-west. This specimen was captured 100 km south-south-west of the nearest point to the Colorado River in Grand Canyon. A few years later, Huey

(1961) reported an American Hog-nosed Skunk in 1960 along U.S. Route 93 in Arizona and about 66 km to the west of the Grand Canyon.

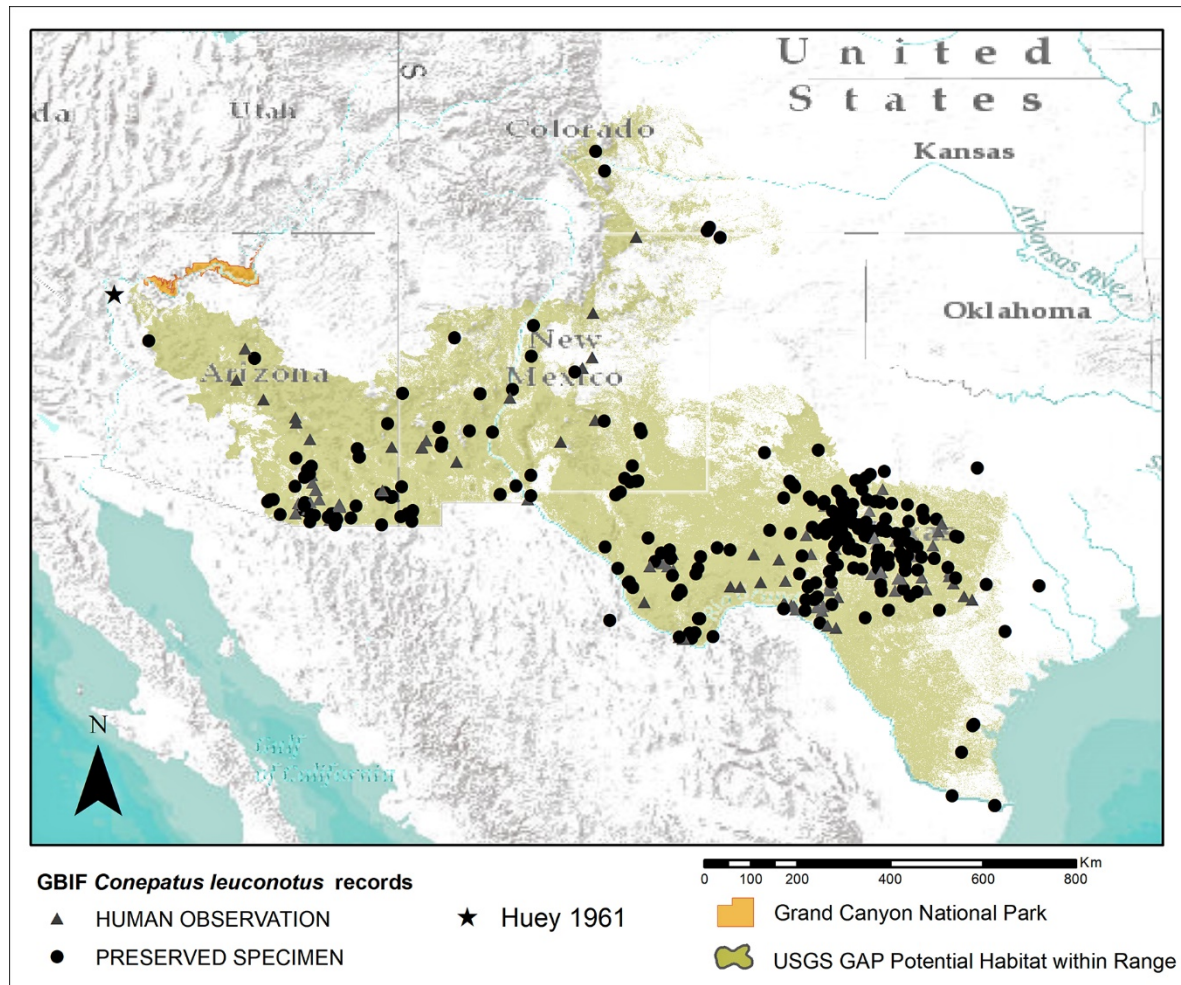


Fig. 1. Museum (preserved specimen) and verified sightings (human observation) of American Hog-nosed Skunks *Conepatus leuconotus* in the south-western U.S.A. relative to the position of Grand Canyon National Park (U.S. Geological Survey 2017, GBIF.org 2019).

Recent evidence of Hog-nosed Skunk in Grand Canyon

The first reports of American Hog-nosed Skunks in Grand Canyon National Park (GCNP) occurred along the Colorado River in 2012 (35°48.86'N, 113°19.84'W). In August of that year, a recreational rafter photographed a solitary American Hog-nosed Skunk on the north side of the Colorado River in the Grand Canyon (Fig. 2a). A year later, in August 2013, another recreational rafter photographed a juvenile American Hog-nosed Skunk on the south side of the Colorado River, seven miles upriver from the original observation (Fig. 2b). Probable signs of American Hog-nosed Skunk (tracks, burrowing and scat) were further documented in 2014 in locations where these initial observations were made. To further verify the presence of American Hog-nosed Skunks in the park and determine the extent of

their presence, in June 2015, we deployed 21 Bushnell HD Trophy Cams along 60 river miles in the western reaches of the Grand Canyon from June 2015 to September 2016. We detected American Hog-nosed Skunks at 17 of the 21 (81%) camera traps across a 55-mile stretch between river miles 181 and 236. Given the distances between cameras relative to home range sizes reported for American Hog-nosed Skunks elsewhere (Brashear *et al.* 2015), we suspect that most skunks captured at different cameras represented different individuals. Thus, we recorded a minimum of 26 individuals, including one mother–offspring pair (Fig. 2c). Rather than suggesting dispersing individuals, observations of multiple American Hog-nosed Skunk individuals, including kits and juveniles, across 55 river miles indicates that a breeding population has been established along the Colorado River in Grand Canyon.



Fig. 2. (a) First photographic documentation of an American Hog-nosed Skunk *Conepatus leuconotus* in Grand Canyon National Park, an adult along the north side of the Colorado River at 220 Mile Canyon in August 2012. (Photo: Jen Hiebert.) (b) Second documentation of the species in the park, a juvenile along the south side of the Colorado River, at Pumpkin Springs, in August 2013. (Photo: Ariel Leonard.) (c) Female and kit camera-trapped along the north side of the Colorado River in Grand Canyon National Park, in June 2016 (Photo: Grand Canyon Wildlife Program).

Discussion

Overall, this study verified the occurrence of American Hog-nosed Skunks in the Grand Canyon and documented a population widespread along the river corridor in western Grand Canyon, both north and west of the Colorado River. Prior to this study, the nearest record of American Hog-nosed Skunk was a road-killed individual along U.S. Route 93 north of Kingman, AZ, and over 60 km to the west–south-west of Grand Canyon. Either American Hog-nosed Skunks have been present – but undetected – in the Colorado River corridor in GCNP or they have more recently extended their range into these areas. The remoteness of the Grand Canyon, the relatively infrequent human visitations and the cryptic behaviour of American Hog-nosed Skunks may have allowed them to go undetected, but other small carnivores along the river corridor (e.g. Spotted Skunks *Spilogale gracilis* and Ringtails *Bassariscus astutus*) have been recorded numerous times over several decades in the same riverside habitats where American Hog-nosed Skunks were detected. Climatological and anthropogenic changes to vegetation and the invertebrate prey associated with that vegetation may have allowed a sparse Hog-nosed Skunk population to increase in the Colorado River corridor in GCNP or, if they were not already there, encouraged American Hog-nosed Skunks to expand into the area. Prospects for long-term occupancy of Hog-nosed Skunks in the Grand Canyon appear robust given the widespread distribution reported here, coupled with recent climate modelling that indicates suitable habitat in the Grand Canyon region (Hass & Dragoo 2017), including north of the Colorado River, where records of Hog-nosed Skunks had never been reported previous to our study.



Fig. 3. Putative American Hog-nosed Skunk *Conepatus leuconotus* digging activity in a tamarisk *Tamarix* spp. thicket along the Colorado River in Grand Canyon National Park.

The Colorado River is dammed above GCNP by Glen Canyon Dam, and human regulation of river flow has resulted in a progressive increase in riparian vegetation over the last five decades since the dam's completion (Sankey *et al.* 2015). In the absence of scouring floods, non-native tamarisk (*Tamarix* spp.) has become ubiquitous throughout the Colorado River drainage through the Grand Canyon, replacing native trees such as willows and establishing permanent stands of streamside vegetation. American Hog-nosed Skunks are primarily insectivorous (Hall & Dalquest 1963); more so than other skunks (Bailey 1905, Seton 1926), although their diet also includes small vertebrates (Dragoo & Honeycutt 1999). American Hog-nosed Skunks are especially adapted for digging for prey, with long claws and large shoulders and often roots in soil using its pig-like snout. Therefore, an increase in terrestrial invertebrate biomass associated with more shoreline woody vegetation could potentially have served as the ecological driver for growth in the population of Hog-nosed Skunks already present or range expansion of skunks into GCNP. We found a strong anecdotal association with tamarisk thickets in our study and often noted extensive areas of digging by skunks associated with the understorey of these introduced trees (Fig. 3). We therefore hypothesise that the ecological changes caused by the Glen Canyon Dam, upriver from GCNP, encouraged the recent occupancy and establishment of American Hog-nosed Skunk population along the Colorado River through the Grand Canyon. Given the current concern over the potential decline in populations and range of American Hog-nosed Skunks in other parts of the U.S.A., our findings represent hope that the species may be doing better than suspected in this largely protected area.

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