BAJA CALIFORNIA COACHWHIP

Masticophis fuliginosus (Cope 1895a)

Status Summary

Masticophis fuliginosus is a Priority 3 Species of Special Concern, receiving a Total Score/Total Possible of 45% (50/110). This species has not previously been considered a Species of Special Concern (Jennings and Hayes 1994a).

Identification

Masticophis fuliginosus is a large slender colubrid snake with smooth scales, reaching up to 170 cm in TL (Grismer 2002). Two color phases exist in the species, a light morph and a dark morph. The light morph is yellowish, tan, or gray above with dark zigzagging bands on the body and dark neckbands. The dark morph has a dark gray brown, golden brown, or black dorsal ground color, and sometimes has distinguishable dark neckbands (Wilson 1971, Grismer 2002). Dark morph animals can be uniformly dark above, or the scales on the sides of the body can have pale edges, giving the appearance of narrow lines (Wilson 1971). The venter is light colored with brown spots (Wilson 1971, Grismer 2002).

Masticophis fuliginosus can be distinguished from congeneric southern California snakes by geographic range, as there is little overlap with

Baja California Coachwhip: Risk Factors

Ranking Criteria (Maximum Score)	Score
i. Range size (10)	10
ii. Distribution trend (25)	20
iii. Population concentration/ migration (10)	0
iv. Endemism (10)	0
v. Ecological tolerance (10)	0
vi. Population trend (25)	10
vii. Vulnerability to climate change (10)	3
viii. Projected impacts (10)	7
Total Score	50
Total Possible	110
Total Score/Total Possible	0.45

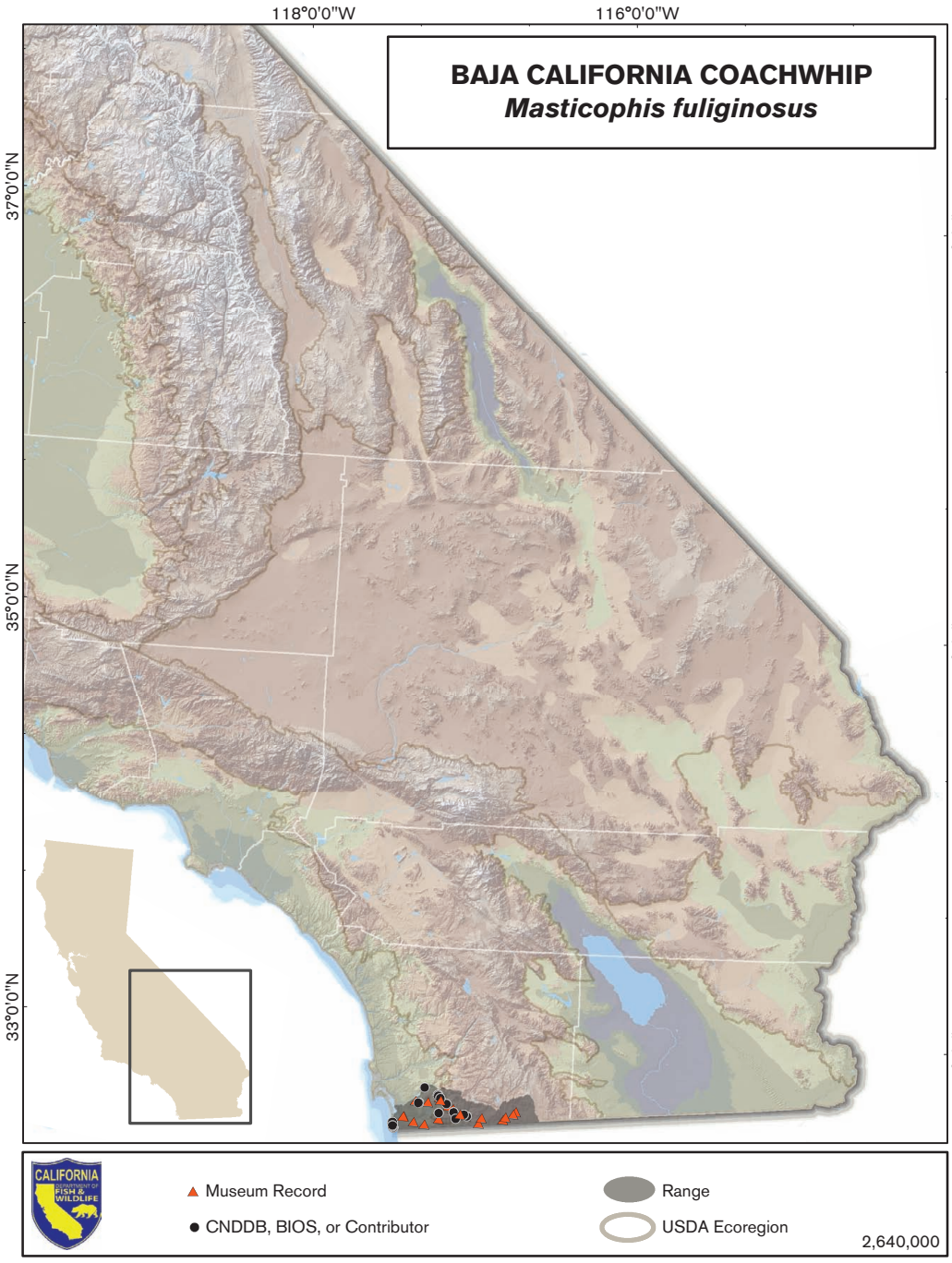

PHOTO ON PREVIOUS PAGE: Baja California coachwhip, Baja California, Mexico. Courtesy of Brad Shaffer.

other species, and by color. *Masticophis flagellum piceus* is reddish to pinkish above, with dark bands at the neck. California whipsnakes (*M. lateralis*) have a conspicuous light stripe on either side. Racers (*Coluber constrictor*) are pale green or dark above (brown, olive, or bluish) but have unmarked white to yellow ventral surfaces (Stebbins 2003).

Taxonomic Relationships

We follow Grismer's (2002) proposal that *Masticophis fuliginosus* is a full species, rather than a subspecies of *M. flagellum*. This arrangement is based on a lack of intergradation with neighboring *M. f. piceus* (Wilson 1971, Grismer 1994). Analysis of a single mitochondrial DNA gene from 229 *M. flagellum* individuals (including 30 *M. fuliginosus*) from 30 localities in southern California supported the genetic distinctiveness of *M. fuliginosus* (Mitrovich 2006). However, 4 out of 30 snakes identified in the field as *M. fuliginosus* had mitochondrial DNA sequences that were most closely related to *M. f. piceus* (Mitrovich 2006). This could be due to hybridization or incorrect identification in the field, as the study was conducted on tissues without voucher specimens. Further resolution of this problem with multiple nuclear DNA markers would likely help to clarify the taxonomic status of this species.

Life History

Very little is known about the life history of *Masticophis fuliginosus* in California. In general, *Masticophis* are extremely active diurnal snakes that prefer warm temperatures (Brattstrom 1965, Hammerson 1977). In southern Baja California, *M. fuliginosus* can be active year-round, but in the northern part of the range, they tend to be inactive in winter and emerge in mid-March (Grismer 2002). Activity in San Diego was observed to be greatest in spring and summer and greatly reduced in the fall (Mitrovich et al. 2009). Mating has been observed in northern Baja California in late April, and hatchlings have been seen in early August (Grismer 2002).

Radiotelemetry of 24 snakes in two reserves in San Diego County found large variation in home range size, from roughly 11 to 130 ha (Mitrovich et al. 2009). Variation in home range size was largely due to habitat availability, with smaller home ranges in smaller habitat fragments. No differences in potential prey were detected among sites where snakes had different home range sizes. The diet of *M. fuliginosus*, like its close relative *M. flagellum*, is broad and includes a variety of vertebrate prey such as lizards, snakes, birds, and mammals (Cliff 1954, Grismer 2002).

Habitat Requirements

Masticophis fuliginosus is a habitat generalist throughout Baja California, Mexico, and is common in marshlands, coastal sand dunes, rocky arroyos and hillsides, thorn forests, sandy flats, and scrub vegetation (Linsdale 1932, Cliff 1954, Leviton and Banta 1964, Bostic 1971, Welsh 1988, Grismer 2002). In California, *M. fuliginosus* occurs mainly in coastal sand dunes, shrubland, and grassland, and is most commonly observed foraging in bushes and shrubs (Linsdale 1932, Bostic 1971, Welsh 1988, Grismer 2002). Hollow stumps of plants such as agave and yucca are used as retreats (Bostic 1971, Grismer 2002).

Distribution (Past and Present)

Masticophis fuliginosus has a very small geographic range in California, occurring in a small area of San Diego County near the United States–Mexico border (Wilson 1973). The range of the species extends over most of the Baja California peninsula, including some small offshore islands (Wilson 1973, Grismer 2002).

A resurvey of Klauber's (1939) sites in southern California found that *M. fuliginosus* was absent from some previously occupied sites (Fisher and Case 2000, Case and Fisher 2001; R. Fisher, pers. comm.), suggesting that the species has declined in the last seven decades. However, the full extent of local extirpations is unknown.

Trends in Abundance

While data on abundance across the range are not available, some reductions in abundance are likely to have occurred due to development, road mortality, and fragmentation. This species may be particularly prone to death from automobiles given its large home range size and high level of diurnal activity (Mitrovich et al. 2009).

Nature and Degree of Threat

Masticophis fuliginosus in California are mainly threatened by habitat loss, fragmentation, and road mortality due to development, as well as the inherent demographic threats associated with a very small geographic range. Climate change may affect *M. fuliginosus* through changes in fire regime and vegetation shifts. However, both increases and decreases in fire have been predicted, and there is little consensus because of the difficulty in modeling Santa Ana weather events in southern California (Westerling et al. 2004, Westerling and Bryant 2008). How *M. fuliginosus* may respond to changes in fire regime is unknown. Climate change is predicted to decrease the availability of chaparral and shrubland by up to 44%, while grassland is predicted to increase by up to 390% in southern California (Lenihan et al. 2008, PRBO 2011). Though *M. fuliginous* also uses grassland habitat, large losses in shrub habitat may negatively affect this species. Finally, development along the border may effectively isolate the population that occurs in California, making it more susceptible to decline than it otherwise would be.

Status Determination

Masticophis fuliginosus has an extremely small range in California that occurs entirely in an area with substantial urban, military, and agricultural development. However, the extent of extirpation and population decline is poorly documented, resulting in a Priority 3 Species of Special Concern designation.

Management Recommendations

Protection of remaining habitat in San Diego County is necessary to prevent further declines or extirpations. Minimizing urban edge effects by creating habitat buffers may benefit populations, particularly those living in small habitat fragments (Mitrovich et al. 2009). Given the very small range of the species, it may be possible to reduce road mortality with wildlife tunnels and associated drift fences installed beneath high-traffic roads in key areas important for population connectivity.

Monitoring, Research, and Survey Needs

Drift fence arrays with funnel traps have been successfully used to document the presence/absence of *Masticophis fuliginosus* in California (Fisher and Case 2000), and mark–recapture data to establish population sizes are essential for future management. Additional genetic data would complement existing mitochondrial DNA data and radiotelemetry research, respectively. Specifically, such data are needed to further resolve the taxonomic status of this snake and to provide information on landscape-level population structure. The efficacy of road-crossing structures should be investigated for this species.