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Publication Brief for Resource Managers

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Movement Patterns of Snakes in Fragmented Landscapes

Habitat fragmentation is a significant threat to biodiversity worldwide. Habitat loss and the isolation of habitat fragments disrupt biological communities, accelerate the extinction of populations, and often lead to the alteration of behavioral patterns typical of individuals in large, contiguous natural areas. The coachwhip *(Masticophis flagellum)* is a larger-bodied, wide-ranging, North American snake species threatened by habitat fragmentation. USGS scientists Milan Mitrovich, Jay Diffendorfer, and Robert Fisher used radio-telemetry to study the space-use behavior of the coachwhip in fragmented and contiguous areas of coastal southern California. Their study has been published in *Journal of Herpetology.*

The researchers tracked 24 snakes at three sites over two years and reported results related to common space-use parameters including home-range size, movement patterns within individual home ranges, and the extent of home-range overlap among individuals. The study revealed evidence of great plasticity in the space-use behavior of coachwhips in fragmented habitats. As area available to the snakes was reduced, individuals faced increased crowding, had smaller home-range sizes, tolerated greater home-range overlap, and showed more concentrated movement activity and convoluted movement pathways.

Snakes at isolated sites, one-tenth and one-thirtieth the size of the total area utilized by tracked snakes in continuous habitats (~1,500 ha), maintained home ranges that were, on average, one-quarter and one-twelfth, respectively, the average size of home-ranges of snakes from continuous habitats (~135 ha).

Management Implications:

- Regional decline of coachwhip populations is not explained solely by patch size and represents an exception to the hypothesis that negative responses to habitat fragmentation are driven largely by habitat loss.
- The behavioral plasticity of coachwhips allows high densities of snakes to persist on habitat patches that are smaller than even a typical home range in continuous habitat.
- If exposure to urban edges is a major cause of decline for wide-ranging species, and space-use requirements are flexible, then appropriately buffering isolated populations through the use of physical barriers such as walls or fences to reduce emigration and exposure to edges may increase the long-term viability of fragmentation-sensitive species in urban landscapes.

The behavioral response shown by coachwhips suggests, on a regional level, area-effects alone cannot explain observed extinctions on habitat fragments but, instead, suggests changes in habitat configuration are more likely to explain the decline of this species. Ultimately, if ‘‘edge-exposure’’ is a common cause of decline, then isolated fragments, appropriately buffered to reduce emigration and edge effects, may support viable populations of fragmentation-sensitive species.

Mitrovich, M.J., J.E. Diffendorfer, and R.N. Fisher. 2009. Behavioral response of the coachwhip (Masticophis flagellum) *to habitat fragment size and isolation in an urban landscape. Journal of Herpetology 43: 646–656.*