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The Impacts of Off-Road Vehicle Noise on Wildlife

The noise of off-road vehicles is among their least-endearing qualities to hikers, mountain bikers, and other non-motorized recreationists. The noise of ORVs can do more than simply annoy humans, however. ORV noise can cause significant adverse impacts to wildlife in at least two ways. First, exposure to ORV noise can result in hearing impairment or even loss, with severe consequences for animals dependent on their sense of hearing for finding prey, avoiding predators, and interacting with other individuals of the same species. Second, wildlife exposed to ORV noise often experience stress and other disturbance effects.

Over time, such impacts can lead to altered movement patterns, behavioral changes, and long-term stress impacts, all with potentially significant adverse results.

Hearing Impairment

Animals exposed to ORV noise often suffer from impaired hearing. Studies have documented hearing loss caused by the noise of dune buggies, dirt bikes, and other ORVs that is inflicted on a wide range of species, including Mojave fringe-toed lizard (Bondello et al. 1979, Brattstrom and Bondello 1983), kangaroo rat (Luckenbach and Bury 1983), and birds (Marler et al. 1973). Several studies have reported bleeding ears and nasal passages after exposure to ORV activity (e.g., Gibson et al. 1975 reporting on small mammals).

Hearing impairment and loss, unsurprisingly, is a very serious concern for most wildlife species. Loss of hearing sensitivity can lead to increased exposure to predation, increased difficulty killing prey, and otherwise significant disruptions in predator-prey relationships (Bondello and Brattstrom 1979, Memphis State University 1971). The impairment of intraspecific communication is another serious concern (Luz and Smith 1976, Luckenbach 1975, Luckenbach 1978, Weinstein 1978). Specific problems can include the inability to recognize mating signals, warning calls, and calls by juveniles (Memphis State University 1971). Gibson et al. (1975), for instance, reported that small mammals became unusually aggressive and disorientated after being exposed to the Barstow to Las Vegas motorcycle race.

Disturbance and Stress

The results of disturbance and stress-related impacts can take longer to materialize but are no less significant. Wildlife disturbance by ORVs is a serious problem for many species, and ORV noise is clearly a major component of these disturbance impacts. Put simply, noise can stress (and thus adversely impact) wildlife (Aune 1981, Baldwin 1970, Burger 1981, Bury 1980, Jeske 1985, Vos et al. 1985, Ward et al. 1973). Wildlife exposed to noise can suffer high levels of physiological stress even if they appear to fully adapt to the noise (Aune 1981, EPA 1971). One potential outcome of disturbance effects is displacement. When a species is dependent on a narrow range of habitat characteristics, displacement into marginal or even unsuitable habitat has lasting effects on survival and productivity. This is true, for instance, for the kangaroo rat (Dipodomys sp.) (Brattstrom and Bondello 1983).

Some research has parceled out the effects of noise, however, and drawn attention to specific ways in which exposure to ORV noise adversely affects wildlife. An Environmental Protection Agency (1971) report argues that noise acts as a physiological stressor producing changes similar to exposure to extreme heat, cold, pain, and other high-stress environmental conditions. One consequence is the alteration of wildlife behavior. For instance, Dufour (1971) concluded that chronic exposure to ORV noise might result in physiological and behavioral changes, warning that these effects are probably cumulative. Manci, et al. (1988) reports that at noise levels above 90 decibels mammals may retreat, freeze or become startled. Brattstrom and Bondello (1983) reported that amphibians, reptiles, and mammals suffered deleterious effects from moderate exposure to ORV noise. These effects included physiological and behavioral hearing loss and the misinterpretation of important environmental acoustical signals.

For some species, the noise of ORVs can directly interfere with critical life history behaviors. For instance, early summer thunderstorms provide an essential environmental cue for the Couchís spadefoot toad (Scaphiopus couchi). The toads, inhabitants of the arid southwestern U.S., emerge from their burrows to mate and lay eggs, and the larvae are born and undergo metamorphosis. All this occurs when the presence of thunderstorms indicates that the appropriate temperature conditions exist (to ensure both suitable conditions for toad survival and adequate availability of prey) and that moisture, another critical ingredient, is sufficient (McClanahan 1967). The toad can mistake the thundering of ORVs across the desert floor for the sound of early summer thunderstorms, however, and emerge during the wrong season and in the absence of water (Brattstrom and Bondello 1983), with significant adverse impacts to the population (McClanahan 1967, Brattstrom and Bondello 1983). Although the mechanisms may vary, a wide range of species may suffer from such impacts. Rennison and Wallace (1976) report the disruption of courtship and breeding by desert birds as a result of ORV noise exposure.

The timing of the ORV use can play an important role as well. Eisenberg and Isaac (1963) reported that infant survival of kangaroo rats is jeopardized by ORV use because adults locate their offspring by responding to repeated scratch-whines. ORV use during the late winter and spring, before the offspring have dispersed, poses the greatest threat. Similarly, when the peak of ORV activity occurs during the peak of lizard reproductive activities, reproductive success can be reduced (Mayhew 1966a, 1966b).

Long-term exposure to the stress of ORV activity (of which ORV noise is typically a major component), is linked to numerous health problems. Baldwin and Stoddard (1973) note that noise exposure is linked to stress, ulcers, tension, and coronary disease in humans, suggesting that similar effects might manifest in wildlife species as well. Rats exposed to high noise levels suffered impacts which included reduced body weight, increased heart rate, and the shrinking of ovaries and kidneys (Geber and Anderson 1967).

Conclusion

When evaluating the potential impacts of ORV use on wildlife, the effects of noise must be considered. Although most of the research into the mechanisms of noise impacts have been conducted on desert wildlife, the considerable literature on disturbance effects across ecosystem types strongly suggests that similar impacts occur in widespread fashion. The specific impact concerns discussed above are exacerbated by four additional characteristics of ORV noise.

For one thing, ORV noise is loud and, under many conditions, can travel long distances (e.g., Rennison and Wallace 1976). For another, a great deal of existing ORV use occurs in fragile habitats, such as desert and wetland ecosystems, which often are home to wildlife species that are especially sensitive to noise and other human disturbance. Many species live in and are relatively adapted to quiet environments, and ORV noise often greatly exceeds ambient decibel levels. Third, although the displacement effects of noise disturbance can be severe, many wildlife species are limited in their ability to relocate to avoid ORV impacts. Finally, rapidly advancing ORV technology allows for ever-greater penetration into wild and sensitive habitats ó the blanket of ORV noise grows ever-larger.

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