



Effects of Capture, Shearing, and Release on the Ecology and Behavior of Wild Vicuñas

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ABSTRACT The goals of sustainable use of wildlife include minimizing long term deleterious impacts of management. We evaluated the ethoecological and demographic responses of wild vicuñas (*Vicugna vicugna*) to capture, shearing, and release in northern Argentina, as well as effects on behavior, by comparing captured and shorn versus non-captured animals for 2 yr after capture events. We observed subtle and short-term changes in the movement behavior of individuals, likely due to thermal and behavioral stress following capture. We did not observe changes in survival and birth rates, social organization, or distribution of animals following capture. Therefore, we concluded that the capture techniques used resulted in low impacts on the wild vicuña population. © 2011 The Wildlife Society.

KEY WORDS Andean communities, behavioral impacts, capture and shearing, sustainable use, *Vicugna vicugna*, wild vicuñas.

The wild vicuña is intimately connected with Andean culture; as a result, conservation and management of vicuñas are both complex and risky (Vilá 2006). Vicuñas are adapted to the high Andean environment (Koford 1957), with more than a quarter of a million individuals occupying 5 countries. The fiber from shorn vicuñas is also among the finest (12.5 microns) and highest priced in the world (\$300–\$770/kg); over 43 tons have been sold in the last 10 yr (Bonacic et al. 2006). The harvest of fiber from vicuñas is an example of the sustainable use of wildlife (Gordon 2009), because these animals can be managed via capture, handling, shearing, and immediate release back into the wild (Lichteinstein and Vilá 2003). Sahley et al. (2007) presented preliminary evidence on the sustainability of live shearing of vicuñas from 2 wild Peruvian populations. They found that the population growth in a wild population that was periodically captured for shearing was similar to that for a non-shorn population. Additionally, birth rates were equivalent.

Nevertheless, capture of wild animals can potentially cause injuries and changes in their normal behavior and physiology (Beringer et al. 1996, Morgan and Tromborg 2007, Swaisgood 2007, Cattet et al. 2008). Previous research on vicuñas demonstrated that captures affected, in the short-term (at time of capture), the physiological, physical, and behavioral parameters relative to baseline values (Bonacic and Macdonald 2003, Bonacic et al. 2006, Arzamendia et al. 2010). To date, we still know little about the ecological and behavioral responses of vicuñas to capture and shearing management in the long-term (months and years after), and problems not detected in the short term can negatively affect

the management system and its sustainability (Williams et al. 2006).

The effect of management on natural behavior can be informative (Sutherland 1998, Gimpel and Bonacic 2006). Any deviation from behavioral homeostasis signals the possibility that the animal perceives a threat and can also be an indicator of a stress response (Swaisgood 2007). Noticeable signs of stress include: alarm or defense responses, avoidance, suppression of feeding and sexual behavior, aggression, stereotypic behavior, apathy, decreased complexity of behavior, and high latency required to resume normal activity after the stressor (Swaisgood 2007).

In a highly social species such as the vicuña, functional family groups are key to reproductive success and population health (Koford 1957, Franklin 1974, Vilá 1992). The family group protects neonates against predators, allows females to graze without disturbance, and provides males the opportunity to mate with females of the group (Vilá and Cassini 1994). Such groups have a mean composition of 1 male, 3 females, and 2 calves and are generally stable (Vilá and Cassini 1994).

We evaluated the behavioral and demographic response of wild vicuñas to capture and shearing by quantifying the responses of vicuñas that had been shorn, and of control animals that had not been captured. Our objective was to investigate and document changes, including individual-levels and population-level changes of wild vicuñas after capture. We hypothesized that capture and shearing could cause changes in behavior, population parameters, and habitat use; these changes could potentially vary from subtle, short-term changes to persistent changes resulting from chronic stress. Some possible effects that might result from captures include changes in: 1) demographic parameters, such as increase in mortality (due to injuries that may

Received: 17 June 2010; Accepted: 7 April 2011;
Published: 23 September 2011

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