

Accumulation of Selenium by the Aquatic Biota of a Watershed Treated with Seleniferous Fertilizer

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Selenium (Se) is an essential trace element. Selenium deficiency and resultant pathologies are a problem in many domestic animal populations. It has been hypothesized that declines in wild animal populations, specifically in several deer herds in California, are attributable to selenium deficiency (Oliver et al. 1991). This study evaluated the bioaccumulation of selenium in aquatic systems in a deer forage range treated with a seleniferous fertilizer. The selenium supplementation program in the Little Antelope Valley was designed to test the general hypothesis that selenium deficiency may be contributing to the decline in deer populations in several areas of California. A pilot study was designed that would evaluate the accumulation and transfer of selenium in a terrestrial food web. The basic hypothesis was that selenium from an aerially applied seleniferous fertilizer would be accumulated by the native vegetation utilized by the deer for browse, and result in elevated deer blood selenium concentrations and increased fawn survival.

The potential exists in such a program for increased selenium exposure to nontarget systems, food webs and organisms. Selenium is a priority pollutant that has degraded freshwater aquatic systems throughout the United States. Aquatic ecosystems have been observed to be very sensitive to elevated concentrations of selenium. The observed impacts on the upper trophic levels of aquatic systems exposed to selenium is the result of selenium transfer through aquatic food webs. The demonstrated ecotoxic problems, chemistry, cycling, transformation, bioaccumulation, toxicity, background concentrations, and environmental risk assessment of selenium in freshwater systems have been reviewed by Maier and Knight (1994), and Lemly (1993).

This investigation was conducted to identify realized or potential aquatic ecotoxicological problems which could be attributed to the application of a seleniferous fertilizer to the winter range of deer. To address this objective four specific questions were formulated. 1) Are the background selenium concentrations in aquatic systems in the Little Antelope Valley low compared with national averages? 2) Is selenium accumulated in the aquatic systems of the Little Antelope Valley the result of seleniferous

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