

## Factors influencing population-level effectiveness of PZP immunocontraception in two western wild horse populations

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Although effectiveness of immunocontraceptives on individual female wild horses is well described, published data on population effects are restricted to east coast barrier islands, notably Assateague Island National Seashore, MD. If immunocontraceptives are to be used effectively as a management tool on western wild horse populations, factors influencing population dynamics in contracepted populations must be understood. Here we present results on population dynamics in herds treated with PZP preparations at two locations, Cedar Mountains Herd Management Area (CM), UT, and Sand Wash Basin HMA (SWB), CO. At both sites we monitored foaling, population size, mortality, immigration, and emigration. At SWB, 79% of known wild horse mares >2 years old received initial hand-treatments of PZP-22 (PZP emulsion plus controlled-release pellets) during a gather in October 2008. Approximately 65% of SWB mares >2 years old were boosted by dart in autumn 2010 with either PZP-22 or ZonaStat-H (the native PZP emulsion). At CM, approximately 52% of known wild horse mares >2 years old were gathered and received initial treatments of PZP-22 in December 2008. CM horses were gathered again in February 2012, and approximately 73% of known mares were treated with PZP; untreated CM mares received initial treatments of PZP-22, and previously treated mares received boosters of either PZP-22 or ZonaStat-H. At both SWB and CM, foal and adult mortality were low, and some horses moved across HMA boundaries. Efficacy of initial PZP-22 treatments was comparatively low, but single boosters of either PZP-22 or ZonaStat-H extended contraceptive effectiveness for at least three years at both sites. Foaling rates among all SWB mares >2 years old averaged 45% post-treatment (2010-2013) versus 78% pre-treatment (2009), and population growth averaged 18% per year (2009-2013). At CM, foaling rates among all mares >2 years old averaged 47% post-treatment (2010-2015) versus 62% pre-treatment (2009). Following the 2008 treatments, the CM population grew an average of 23% per year (2009-2012). Because a high proportion of CM mares was treated in 2012 and the boosters were effective and long-lasting, population growth averaged only 13% per year from 2012-2015, with a low of 4.5% in 2013. Our experience suggests that applying current contraceptive tools to large HMA's can achieve dramatic reductions in population growth if >70% of mares present in the population can be maintained under contraceptive treatment. Given that PZP boosters were effective and long-lasting, planning for multiple treatments will be crucial.