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Wildlife Services Protects through Scientific Research

Notable Examples of Significant Research

The National Wildlife Research Center (NWRC) is a world leader in providing science-based solutions to complex issues of wildlife damage management. As the research arm of the Wildlife Services (WS) program, NWRC works with WS operations staff to provide Federal leadership and expertise to resolve wildlife conflicts related to agriculture, livestock, human health and safety (including wildlife diseases), invasive species, and threatened and endangered species.

Wildlife Services (WS) is a science-based program that relies on research and other independent reviews to assess the need for wildlife damage management, the potential impacts of field work, and the costs and benefits associated with program work. Below are several notable studies compiled by WS and independent organizations that highlight the importance and need for WS' assistance in resolving conflicts involving wildlife.

1. Relatedness of swift fox

Kitchen, A.M.; Gese, E.M.; Waits, L.P.; Karki, S.M.; Schauster, E.R. 2005. Genetic and spatial structure within a swift fox population. Journal of Animal Ecology 74:1173-1181.

Kitchen et al. (2005) recorded the space use patterns of 188 radio-collared swift foxes in southeastern Colorado from January 1997 to December 2000. One hundred and sixty-seven foxes were also genotyped and the degree of relatedness between individuals was estimated. The data suggested that swift fox populations are genetically structured at a fine-scale with kin clustering evident. Neighbors were related more closely than expected from the average population relatedness. The authors proposed that the clustering among kin in the swift fox populations has led to an increased level of tolerance among neighbors, thereby reducing the costs inherent in home-range defense and increasing the likelihood that empty ranges were inherited by related foxes.

2. A review of tools for conserving carnivores.

Shivik, J.A. 2006. Tools for the edge: what's new for conserving carnivores. BioScience 56:253-259

Shivik (2006) provided a review of various management tools used to mitigate conflicts between humans and predators, such as wolves, coyotes, and bears. Both disruptive-stimulus (e.g., fladry, Electronic Guards, radio-activated guards) and aversive-stimulus (e.g., electronic training collars, less-than-lethal ammunition) were reviewed. Shivik discussed not only the biological and economic efficiency of these methods, but also noted that social and psychological effects must be considered when selecting a tool. He also notes that efficient protection of American agriculture is also essential for conservation of carnivores.

3. New tools for aging birds.

Fallon, J.A.; Cochrane, R.L.; Dorr, B.S.; Klandorf, H. 2006. Interspecies comparison of pentosidine accumulation and its correlation with age in birds. Auk 123: 870-876.

Many avian and mammal species are difficult to age accurately based on physical characteristics and their population demographics can only be understood from long-term banding and marking programs and captive animals. Pentosidine (Ps) is a stable, fluorescent biomarker that has been found to accumulate with age in the skin collagen of a variety of birds and mammals. In this study, Fallon et al. collected and analyzed skin samples from the breasts of 52 ruffed grouse (Bonasa umbellus) and 19 double-crested cormorants (Phalacrocorax auritus) to investigate the potential use of Ps as a biomarker to estimate the chronological age of these two species. Results showed a significant relationship between age and Ps accumulation in grouse and cormorants. This aging technique can provide for relatively rapid collection of age information and associated population demographics that could aid species management, conservation, and restoration programs.

4. Food detection in birds.

Schaefer, H.M.; Levey, D.J.; Schaefer, V., Avery, M.L. 2006. The role of chromatic and achromatic signals for fruit detection by birds. Behavioral Ecology 17:784-789.

In this study, Schaefer et al. assessed how wavelength- (chromatic) and intensity-related (achromatic) contrasts between fruit and background colors (i.e., sand versus foilage) determine the detectability of fruit by birds. Two experiments using free-flying crows *(Corvus ossifragus)* revealed that crows detected both artificial black and red fruits equally, suggesting that they used chromatic contrasts to detect UV-reflecting berries and achromatic contrasts to detect black berries. The birds prioritized chromatic contrasts when searching for artificial red fruits in foliage, but not when searching for blueberries on sand. The authors concluded that visual signals are more complex than commonly assumed and that the relative importance of chromatic and achromatic contrasts is contingent on the background. Therefore, they suggest that models of signal perception can be improved by incorporating background-specific effects. This, in turn, could result in improved bait delivery systems for exposing birds to chemosterilants or lead to better methods for making crops less detectable to depredating birds.

5. Impacts of predation management on sea turtle conservation.

Engeman, R.M.; Martin, R.E.; Smith, H.T.; Woolard, J.; Crady, C.K.; Constantin, B.; Stahl, M.; Groninger, N.P. 2006. Impact on predation of sea turtle nests when predator control was removed midway through the nesting season. Wildlife Research 33:187-192.

Hobe Sound National Wildlife Refuge (HSNWR) on Jupiter Island along Florida's coast provides undeveloped and protected beach habitat for nesting by loggerhead (Caretta caretta), leatherback (Dermochelys coriacea) and green (Chelonia mydas) turtles, each of which is federally listed as threatened or endangered. Raccoons and armadillos are serious nest predators at HSNWR. Consequently, predator removal was identified as the most important management program at the beach. In this study, Engeman et al. evaluated the impact on nest predation resulting from removal of predator control midway through the nesting season in 2004. Results showed that predation during only three-quarters of the 2004 nesting/hatching season substantially out-paced predation for the entire season in the two preceding years when predation management was in place.

6. Avian influenza in wild birds.

Clark, L.; Hall, J. 2006. Avian influenza in wild birds: status as reservoirs and risks to humans and agriculture. Ornithological Monographs 60:3-29.

Clark and Hall (2006) discussed avian influenza ecology, evolution from low- to high-pathogenic forms, modes of transmission, zoogeography, risks to humans and biosecurity at domestic poultry facilities. The authors noted although there is little anyone can do about the natural reservoir of AI in birds, increased information about how the viruses are maintained, transmitted and moved across the landscape in nature would provide valuable information about agricultural and human-health risk assessment.

7. Role of raccoon in bovine tuberculosis transmission.

VerCauteren, K.; Smith, H.; Stevenson J. 2005. The role of raccoons in the ecology of bovine tuberculosis. Proceedings of the Wildlife Damage Management Conference 11:46-48.

Bovine tuberculosis is a contagious bacterial disease that has had significant socioeconomic impacts on the region of northern lower Michigan. VerCauteren et al. (2005) investigated the role raccoons may play in the ecology and maintenance of the disease on farms. Preliminary results of 61 radio collared raccoons yielded a better understanding of raccoon movement and habitat use within an agricultural complex. Preliminary analysis of raccoons suggested annual home range sizes of 0.824km2 and 0.608km2 for males and females, respectively. Additionally raccoons and cattle were documented at resource interfaces, further illustrating the potential for disease transmission among species. Results highlight the importance for farmers and wildlife managers to address raccoons and other medium-sized mammals when developing on-farm biosecurity strategies.

8. New repellent for reducing deer browsing on plants: hydrolyzed casein.

Kimball, B.A.; Nolte, D.L. 2006. Development of a new deer repellent for the protection of forest resources. Western Journal of Applied Forestry 21:108-111.

In this study, Kimball and Nolte conducted several experiments toward the development of a new repellent to minimize deer browsing to commercial and ornamental plants. Casein (methionine-containing milk protein), hydrolyzed casein (same protein after hydrolysis), albumin (egg protein), soy flour (plant protein) and methionine (essential amino acid) were tested with captive deer. Hydrolyzed casein (HC) was shown to be less palatable to the deer than the other protein sources or free amino acid. Deer preference for conifer seedlings treated with repellent solutions varying in HC concentration demonstrated that a 12% HC repellent solution would effectively reduce deer damage to forest resources. Furthermore, a 12% HC deer repellent would cost 50 to 70% less than commercially available deer repellents.

9. Gaining a better understanding of wildlife rabies control through modelling.

Sterner, R.T.; Smith, G.C. 2006. Modelling wildlife rabies: transmission, economics, and conservation. Biological Conservation 131:163-179.

Rabies is a fatal disease of mammals. Modelling affords scientists an inexpensive way to study key parameters of wildlife rabies transmission, rabies management economics, and threatened mammal (TM) conservation. Sterner and Smith (2006) described key aspects of rabies-transmission models in wildlife; promoted the use of a ‘‘threshold successful contact’’ rate (CT) to predict disease persistence; reviewed selected oral rabies vaccination (ORV) strategies, economic studies, and benefit–cost models associated with the use of ORV as a means of rabies control in non-TM situations; and discussed implications of these models to the conservation of TM. The authors recommended five steps to improve modeling of rabies transmission (wildlife disease in general), rabies-control economics, and TM conservation. The review inferred that early, localized culling, combined with ORV, will aid rabies control efforts with wildlife.

10. Use of the GnRH vaccine in feral swine.

Killian, G.; Miller, L.; Rhyan, J.; Doten, H. 2006. Immunocontraception of Florida feral swine with a single-dose GnRH vaccine. American Journal of Reproductive Immunology 55:378-384.

In this study, Killian et al. evaluated the effectiveness of a single-shot GnRH immunocontraceptive vaccine in both male and female feral swine. After 36 weeks, none of the 2000-ug-treated females were pregnant and only 20% of the 1000-ug-treated females were pregnant. Males were less responsive to the vaccine than females. The authors concluded that the single-shot vaccine was effective in reducing fertility in a mixed population of male and female feral swine and may be useful for contraception and disease control of feral swine populations.

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