Toward a professional position on the translocation of problem wildlife

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Translocation of nuisance urban wildlife was identified as a "problem area" at one of the first meetings of The Wildlife Society's (TWS) Wildlife Damage Management Working Group (WDMWG). Several volunteers stepped forward to collect information and opinions on the pros and cons of translocation as a nuisance wildlife management tool. The WDMWG concluded that a report or position paper would be useful to resource management agencies, local government units, and the growing wildlife control industry. The results of this WDMWG initiative were reported at the 1995 TWS annual conference (S. Craven, unpubl. data) and informally at other forums. The interest in the topic, measured by attendance at discussions, comments, and recent surveys (Lavine et al. 1996) suggested that a broader forum was highly desirable. We hope the following discussion will stimulate constructive comments from any concerned stakeholders. The result will be a stronger document, useful in the establishment of state or local policy on the translocation of nuisance wildlife. This is not intended to be a discussion of the merits and techniques of euthanasia. Euthanasia represents only 1 of several options following a decision not to relocate a captured animal.

Introduction

Interactions between people and wildlife in the urban, suburban, and rural environment continue to increase. Many of these encounters are positive and eagerly sought by people and thus provide a key base of support for the wildlife resource. However, many are also considered a nuisance or damage problem, especially in the urban environment. Increased urbanization, increased populations of "urban" wildlife, and decreased funding for agency animal damage programs have all contributed to increased demand for wildlife damage management (Barnes 1994). This has been evident in the rapid growth of USDA/APHIS-Wildlife Services programs and successful private enterprises such as the "Critter Control" network. More professional attention has been directed towards urban wildlife control in conferences, such as the Vertebrate Pest Conference and the Eastern and Great Plains Wildlife Damage Management Conferences.

Most people appreciate and enjoy the animals that make up the urban wildlife community, but are more likely to become personally involved in the well-being of individual animals than in the viability of populations (Runde and Milsap 1994). Thus, public opinion is often against having problem animals killed or harmed (Braband and Clark 1992). Live-capture and removal of nuisance animals is a widely used and popular technique, even in cases where exclusion and habitat modification offer better long-term solutions (Barnes 1994, 1995; Curtis et al. 1993). The public perception that an animal moved from one place to another will "live happily ever after" is widespread.

We define "translocation" as the transport and release of wild animals from one location to another (see Nielsen and Brown 1988) with emphasis on a nuisance and damage context. Translocation of animals has been essential to many wildlife management programs such as the stocking of game species and furbearers, the reintroduction of extirpated species, and the management of endangered and threatened species. We will not discuss these programs except where relevant to understanding the behavior and survival of translocated animals. Nor will we discuss the body of literature on translocation of large carni-

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vores (primarily bears [*Ursus* spp.]) and ungulates. An excellent survey of translocation as a wildlife management tool was conducted by biologists at the University of Idaho (Griffith et al. 1989).

As wildlife translocation has increased, so has the concern among wildlife biologists, resource managers, and the wildlife control industry about its appropriate use. Fundamental concerns include spread of disease, humane aspects of translocation (e.g., stress and mortality of animals), impacts on resident species at or near release sites, and movement of problem animals to areas where they may continue to be a problem (Barnes 1994). These issues have prompted agencies and municipalities to reconsider translocation as a management technique for problem wildlife.

Status of translocation

Translocation is a popular management technique. For example, in 1994 in Illinois, Nuisance Wildlife Control permittees (R. Bluett, Ill. Dep. of Conserv., pers. commun.) relocated 18,879 animals (>13,000 were raccoons [*Procyon lotor*], squirrels [*Sciurus* spp.], and bats) and euthanized or destroyed by other means another 26,000. Barnes (1994) reviewed the use of translocation and euthanasia among Kentucky Nuisance Wildlife Control Operators (NWCO) and found that live capture and translocation was the method of choice in most nuisance wildlife situations. The number of common species, such as raccoons, moved around the landscape by NWCO and the public is probably in the hundreds of thousands nationwide (Barnes 1995; Assoc. Market Res., Pest Control Operators Nuisance Anim. Business Surv. Rep., Middleburg Heights, Oh., 1991; Braband and Clark 1992, Curtis et al. 1993).

Craven and Nosek (1992) conducted a national survey to examine nuisance wildlife translocations. They found that 47 states allowed captured animals to be translocated from the site of capture. California, Massachusetts, and Alaska did not allow captured animals to be translocated (with some exceptions through permit conditions). Some states had species-specific restrictions on translocation. Connecticut did not allow translocation of skunks, foxes, or raccoons. Connecticut mandated euthanasia or release on site of any captured, unprotected animal that was a potential rabies-vector species. Colorado, Florida, Idaho, and Minnesota required a permit for wildlife translocations.

Fifty states allowed captured animals to be euthanized, though many species-specific restrictions applied. Species protected as migratory birds and threatened or endangered species may not be killed and must be released unharmed, although there are some exceptions for nuisance waterfowl. Many states required the release of game animals and furbearers. Most states reported that euthanasia was the preferred alternative for dealing with urban nuisance animals, although 41 states reported that euthanasia was not mandatory for any species. Where it was mandatory, the reason cited was consideration of disease transmission.

Twenty-eight states required a state-issued permit, license, or permission from the appropriate wildlife agency to translocate wildlife. These requirements applied to state-licensed trappers, rehabilitators, animal damage control operators, or property owners with permit authority to capture nuisance or depredating wild animals. Fourteen states allowed anyone with a nuisance wildlife problem to capture and remove nuisance wildlife. The remaining states had a variety of restrictions on eligibility for performing translocations; these ranged from restrictions on land or home owners on a case-specific basis to situations where only state agency personnel were authorized (Craven and Nozek 1992).

More recently, La Vine et al. (1996) found that fish and wildlife agencies of 33 states allow property owners to relocate animals causing property damage or other conflicts with humans, 8 states allow any species to be relocated, and 13 states have regulations against relocation of threatened and endangered or other protected species. The prevalence of disease in wildlife populations determines the legality of translocating species in 12 states. Property owners may designate a private agent (not a public employee) to relocate animals in 32 of the 33 states.

Fish and wildlife agencies of 45 states allow property owners to euthanize animals responsible for property damage or other conflicts (La Vine et al. 1996). In 39 of these states, property owners may designate a private agent to euthanize the animals. Only 5 states do not have restrictions on species of animals that may be euthanized. Forty-two states restrict the species that may be captured or handled by nonagency (private) personnel, and 39 states regulate the handling of animals or the techniques used for control, including types of traps used and trap-check intervals (La Vine et al. 1996). At least 10 states do not regulate the disposition, including relocation, euthanasia, and carcass disposal, of animals removed for nuisance or damage control.

State regulations change rapidly. For example, Ohio recently enacted stringent guidelines governing translocation, and Vermont, because of disease considerations, no longer allows translocation. However, these

summaries demonstrate how much variation there is, nationwide, in the regulation of translocation and the probable difficulty in achieving national consensus.

Impacts of translocation

The first priority in the translocation of a nuisance animal is to solve or reduce a problem. Secondly, consideration may be given to the welfare of the individual animal. In most cases, little consideration is given to either the impact of an animal release on conspecific or other animal populations at the release site, or to ecological relationships in general.

Although several post-release field studies have been undertaken to determine the survival of translocated animals, little research attention has focused on the impacts of translocated animals at the point of release. Survival of released animals has been compared to survival of established, wild populations. In such comparisons, the released animals usually suffered higher mortality rates. Rosatte and MacInnes (1989) studied the survival and movements of translocated, urban raccoons, the species most frequently noted in urban complaints (Braband and Clark 1992, Craven and Nosek 1992). They documented a 50% mortality rate within 3 months of release. In addition, other animals in their study could not be located or were found to be losing weight at a time when they should have been storing fat prior to winter denning. The authors concluded that the mortality rate might have approached 75% during the first year. Other studies also have documented high mortality rates for translocated raccoons (Frampton and Webb 1974, Wright 1978).

Davis (1995) identified 6 factors that may contribute to elevated mortality among translocated animals. These included: (1) stress associated with capture, handling, transportation, and weather; (2) territorial behavior which may result in aggression among conspecifics at release sites; (3) disorientation at the release site, which puts the released animal at a competitive disadvantage in locating food and shelter; (4) unsuitable habitat when the animal is released at a site that does not meet its normal requirements; (5) nonestablishment, which refers to the frequently observed wandering behavior and long-distance movements of released animals resulting in exposure to highway and other hazards; and (6) disease transmission from the released animal to resident animals or vice versa. Any combination of such factors might lead to poor survival rates. These factors should be minimized as much as possible by proper handling, site selection, and disease evaluation prior to a translocation and release.

Griffith et al. (1989) conducted 3 surveys to determine what factors led to successful wildlife translocations (reintroductions in this case). They concluded that herbivores were more likely to be translocated (reintroduced) successfully then carnivores or omnivores. Habitat selection was an important factor. Annual survival rates of 84% averaged from various studies for animals released in "excellent" habitat were much higher than the 69% for "good" habitat and 38% for poor habitat (Griffith et al. 1989). Translocations made by well-meaning, but poorly informed and untrained private citizens, are unlikely to give adequate consideration to habitat and other factors. Thus, the survival rates of translocated animals are likely to decline. It is important to recognize that although elevated mortality may be unacceptable to wildlife biologists, some citizens prefer low survival rates over euthanasia.

In addition to high mortality rates of translocated animals, several studies (Frampton and Webb 1974, Wright 1978, Rosatte and MacInnes 1989) have documented exceptional movements and increased risk of disease transmission by translocated raccoons. Threats to the safety and health of pets and humans represent a serious problem (Flyger et al. 1983, Jenkins and Winkler 1983); also, transmission of infectious disease to resident wildlife is a concern (Rosatte and MacInnes 1989). A major epizootic of raccoon rabies in the mid-Atlantic states was attributed to a translocation of raccoons from Florida to Virginia (Nettles et al. 1979, Jenkins and Winkler 1987). Rosatte and MacInnes (1989) reported an outbreak of skunk (*Mephitis mephitis*) rabies in Ontario spread by animals translocated from Mississippi. A problem associated with translocating wild animals is that an animal may be incubating an infectious disease without exhibiting the clinical symptoms (MacInnes 1987) which would preclude the translocation.

Recognizing the relationship between wildlife translocation and disease transmission, several organizations have adopted position statements or resolutions. In 1994 the Council of State and Territorial Epidemiologists recommended that the U.S. Fish and Wildlife Service and the appropriate state agencies adopt regulations "prohibiting the importation and interstate movement of certain wildlife (for use as companion animals or for hunting purposes). These include, but are not limited to, wild canids and carnivorous animals, wild rodents, and feral swine." In 1990 the International Association of Fish and Wildlife Agencies adopted a resolution at the organization's 80th Annual Convention that "urges the adoption of state-by-state regulations prohibiting the importation or interstate movement of foxes and

coyotes [*Canis latrans*] for the purpose of stocking coursing pens or for release and pursuit by hounds outside of coursing pens." While neither resolution specifically addresses nuisance-animal management, both support a cautious approach to translocation.

Conspecifics or other species at the site of release may impact translocated animals through competition or direct predation. The potential disruption of existing, intact, gene complexes by the introduction of new individuals into a population is an additional concern (Runde and Milsap 1994). For example, in the United States, stocking northern bobwhite (*Colinus virginianus)* and wild turkeys (*Meleagris* spp.) in attempts to restore depleted populations may have weakened the native genetic stock, resulting in poorly adapted local populations (Runde and Milsap **1994).** Cade **(1983)** reviewed several cases in which translocations, introductions, and natural range extensions of birds have resulted in hybridization detrimental to native populations.

Surviving translocated animals may undertake large-scale movements which compromise efforts to locate suitable release sites. Also, nuisance animals accustomed to a particular food source, type of shelter, or human activity may seek out familiar situations. The net result is the transfer of a problem from one location to another.

Conclusions

The prevalence of translocation as a management technique in the United States, valid concerns over detrimental impacts, and consideration of contemporary societal attitudes towards animals, suggest a series of general conclusions.

1. Live capture and translocation is widely used as a nuisance-wildlife-control technique by wildlife managers, the wildlife control industry, and the general public. Its inherent popularity with clients strongly suggests it will continue in spite of biological and ecological concerns. The wildlife management profession should minimize or eliminate translocation where possible (for certain species and situations as noted), and attempt to improve the success of those translocations that do occur through education and training.
2. The movement of wild animals by professional wildlife managers to reintroduce or augment populations is a proven and valid technique for wildlife management. Translocations of this kind should not be confused with translocation of nuisance species by the general public with little or no consideration of the habitat requirements or adequate care of the target animals.
3. Decisions on translocations should be species-specific. The population status of animals to be translocated should be considered. Species can justifiably be characterized on the basis of population data or professional judgement. Terms such as rare, common, abundant, or overabundant are relative, vary from region to region, and imply value judgements, but they may be useful in translocation decisions. "Overabundant" implies a value judgement and should be justified with supporting information on habitat carrying capacity, habitat degradation, historical population trends, and reported levels of damage. Population status should be of concern to the professional, although the public may be more concerned with the well-being of an individual animal, regardless of its abundance. Both biological and social carrying capacity are relevant to decisions on translocation.
4. The use of translocation might be reduced if certain species groups, such as exotic species, were identified for differential treatment. However, distinctions between exotic and native species in translocation decisions are not always clear. Although a number of common pest species are exotics, mandatory euthanasia for captured exotics is not possible for several reasons. First, some exotic species (e.g., escaped or released primates or psittacines in Florida) may not fall under agency regulations. Such animals may have considerable monetary value and generate public empathy. If captured, they should preferably be placed in captivity or returned to their native range. Second, the defmition of an exotic becomes blurred in instances such as the introduced (but "naturalized") ringnecked pheasant ***(Phasianus colchicus)***, the house finch ***(Carpodacus mexicanus),*** feral house cats, and resident urban Canada ***geese*** (*Branta canadensis*). Exotic species generally recognized as pests, including commensal rodents and birds (rock dove ***[Columba livia],*** house sparrow ***[Passer domesticus],*** European starling [*Sturnus vulgaris*]), which pose significant economic and health threats and compete with native species, should not be translocated.
5. When euthanasia is mandated, recommended, or chosen over translocation, the chosen method should conform to the 1993 Report of

the American Veterinary Medical Association (AVMA; Andrews 1993). Some available techniques, including shooting, carbon monoxide, captive bolt, clubbing, lethal injection, and others, are impractical or inhumane. Drowning (not to be confused with drown-set traps) and vehicle exhaust are not recommended by either the Humane Society of the United States or the AVMA. These methods cause severe stress, pain, and suffering to the animal. The AVMA report categorizes methods of euthanasia as acceptable, conditionally acceptable, and unacceptable. Species suitability, mode of action, and comments are provided for each method. Unfortunately, few "acceptable" euthanasia techniques are practical and available for field technicians, and fewer still are available to the public, It is not reasonable to expect a homeowner to incur the cost of a veterinarian for euthanasia in addition to the often appreciable costs and frustration caused by nuisance wildlife. The development of injectable, cost-efficient, and humane euthanasia agents would be a substantial benefit for nuisance-wildlife control and might reduce the incidence of translocation. The Humane Society of the United States is developing a manual on euthanasia which promises to be a valuable resource.

6. Despite the public perception that live capture and translocation of animals is humane, inadvertent cruelty to captured animals may result from long periods of restraint, exposure to harsh weather conditions, lack of food or water, physical injury (e.g., skinned noses or scalps, broken teeth, etc. in attempts to escape), or stress. Most animal-damage-control techniques may result in inhumane treatment of target and nontarget animals if misapplied. Even exclusion can be inhumane to animals if they are trapped inside a confined area rather than excluded from it. Proper training and education for all wildlife-control practitioners, including the public, is essential.
7. Translocation of common species is not likely to have significant conservation benefits. Because some translocated individuals that would have died do survive and reproduce, translocation does benefit individual animals. However, such translocations carry the threat of transmitting diseases, parasites, and maladaptive genetic and behavioral complexes into recipient populations. Translocated individuals also may cause damage and become a nuisance at the recipient site. Translocations of most species to publicly-owned properties managed for maintenance of natural communities of plants and animals is inadvisable. When translocations to natural areas are permitted, they should be considered experimental and be accompanied by pre- and post-release monitoring of recipient populations. The same principle holds true for private lands, but resource agencies have less control over the actions of private landowners.
8. Any translocations of nuisance raccoons, foxes, or skunks are inadvisable; they pose the threat of disease and parasite transmission, and frequently result in nuisance problems.
9. Despite real or perceived negative impacts, translocations of some animals are likely to continue. Guidelines should be developed to improve the success of translocations and survival of individual animals and to minimize related problems. Such guidelines would be useful to control practitioners and to the general public. Guidelines should include: (a) proper selection of a release site, including permission from the landowner or manager, selection of suitable habitat, and status of resident animals; (b) techniques of release, including season and weather conditions, time of day, recommended minimum distances from capture site, and handling of females with young; and (c) possible recommendations on health certification and quarantine requirements where necessary.

   Much of the information needed to develop such guidelines is inadequate or widely dispersed, and the need for species-specific data makes developing sound guidelines a daunting task for an individual. Many outstanding wildlife-control specialists in the public and private sector have the knowledge and experience to contribute to such a project, and it seems clear that a team approach to guideline development would be productive. Such an effort could be coordinated by the National Animal Damage Control Association, The Wildlife Society Wildlife Damage Management Working Group, The Berryman Institute at Utah State University, or other organizations.

Recommendations

These conclusions have led us to a series of 10 recommendations.

1. Encourage solutions to wildlife-damage problems based on habitat modification, exclusion, tolerance, repellents, or other techniques to minimize the need for translocation, but with sensitivity to clients' underlying concern for a viable solution to problems.
2. Evaluate each wildlife damage control situation for the viability of translocation as a solution relative to other options. Where other options exist, translocation should be discouraged.
3. Support retention of live-capture as a key tool for wildlife damage management. However, euthanasia, rather than translocation, should be favored in cases with a significant risk of disease or parasite transmission (e.g., raccoons, skunks, foxes, and perhaps other species).
4. Encourage development of guidelines for translocation by a team of experienced wildlife damage control professionals.
5. Support additional research on the fate of translocated animals and the impact on resident animals at release sites, including cost-benefit analyses.
6. Support the continued translocation of wildlife by professional wildlife managers for conservation purposes (e.g., stocking, reintroduction, endangered species conservation).
7. Promote continued education of the general public on the best methods for dealing with nuisance wildlife and the risks associated with translocation. A concise publication or handout on translocation and the risks involved (as called for by Davis **1995)** would be a useful tool for damage-control practitioners to improve public awareness of this issue with clients and the public.
8. Encourage the development of new technologies, including practical methods of euthanasia (such as an injectable euthanasia agent or a live trap-kill chamber combination), which would be readily available to field personnel.
9. Support continuing education opportunities on euthanasia techniques for wildlife managers and animal-damage-control practitioners.
10. Encourage the International Association of Fish and Wildlife Agencies, with help from the WDMWG and the National Animal Damage Control Association (NADCA), to facilitate development of translocation guidelines for review and potential adoption by state wildlife agencies.

Even with a consensus on these recommendations among professional wildlife managers and resource agencies, questions are likely to remain. For example, will the public comply with translocation ordinances? Are there "right answers" in these discussions, given the many interrelated aspects of animal welfare, human emotion, and professional ethics involved? Can realistic guidelines for translocation of wildlife really be developed and followed? Comments should be directed to the senior author.

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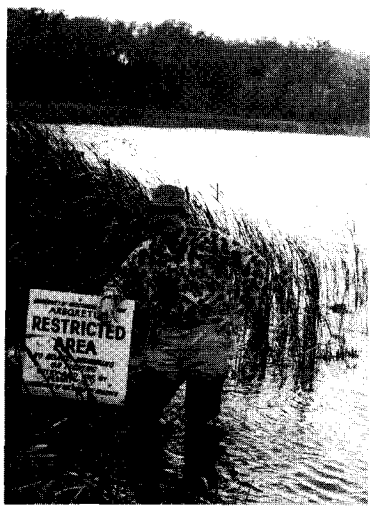

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