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CHEMICAL IMMOBILIZATION – ONE MORE WILDLIFE MANAGEMENT TOOL

John E. Ostrom
Minneapolis-St. Paul International Airport, 4300 Glumack Dr.,
Suite 3000, 55111 St.Paul, USA
Email: jostrom@mspmac.org

Abstract

Airport Managers' options for lethally removing deer from within the Air Operations Area of an airport are severely limited due to public relations and safety concerns. The Minneapolis-St. Paul International Airport has successfully implemented a depredation program to lethally remove white-tailed deer using chemical immobilization with succinylcholine chloride followed by immediate euthanasia with a stunning device. This chemical immobilization program provides a safe, cost effective and lethal method for humanely removing deer from within the tight constraints of a large hub airport.

Key Words: Airport (Minneapolis-St. Paul International Airport), Chemical, Cost, Depredation, Public relations

Background

The Minneapolis-St. Paul International Airport (MSP) is comprised of 3,300 acres and is located approximately six miles south of the downtown areas of Minneapolis and St. Paul near the confluence of the Mississippi and Minnesota Rivers.

MSP has three runways; 04/22 (11,006 feet long), 12L/30R (8200 feet long) and 12R/30L (10,000 feet long). By the year 2004, a new north/south runway (17/35) will be constructed to the west of the existing runways as well as a 1,000 foot extension of runway 12R/30L.

MSP is the hub for Northwest airlines, Mesaba Airlines and Sun Country. In 1999, MSP had over 510,000 aircraft operations resulting in the transportation of more than 34 million passengers through the airport.

The airport has an elevation of 841 feet Mean Sea Level and is located in the flat uplands approximately 100 feet above the river valleys. These valleys are rimmed with bluffs that steepen as the confluence is reached, but contain several large lakes, marshes and wooded areas. The remainder of the uplands, except portions of the Fort Snelling National Cemetery, surrounding MSP has been highly developed for urban uses, including industrial, commercial and residential. The bluffs leading to the river valleys and the associated river bottoms are unsuitable for industrial or residential construction and are maintained primarily as natural areas, including Fort Snelling State Park and the Minnesota National Wildlife Refuge. Significant natural and manmade features that provide wildlife habitat within one mile of MSP are the Fort Snelling National Cemetery, Fort Snelling State Park, Minnesota Valley National Wildlife Refuge, Fort Snelling Golf Course and adjacent park/polo grounds and the Mississippi and Minnesota Rivers. Both the State Park and cemetery harbor populations of white-tailed deer (Odocoileus virginianus) whose herd sizes are estimated at 850-1000 and 50-100 respectively. Periodically, deer will leave these areas and enter the Air Operations Area (AOA) of the airport by either jumping the eight foot security fence or running through a temporarily opened security gate.

In the early 1990's, the original strategy for dealing with deer that were found on the AOA was a three tiered approach.

1. Attempt to herd the deer off of the AOA through an open gate. If unsuccessful then;
2. Request the assistance of the local Conservation Officer to chemically immobilize the animal and capture it. If unsuccessful then;
3. Herd the deer into an area on the AOA where it could be shot in a safe manner utilizing a 12 gauge shotgun firing slugs or 00-buckshot

This strategy was based on two admirable but conflicting goals; to save the life of the animal if at all possible and to reduce the hazard to aircraft caused by the deer on the airport.

In following this methodology, there were several incidents involving white-tailed deer that forced the airport to rethink its strategy on how to deal with deer that gained access to the Air Operations Area at MSP.

June 21, 1992
A white-tailed deer was reported on the AOA at MSP. Two airport police vehicles along with an Operations vehicle responded to the reported location. Once the animal was located, the vehicle operators attempted to herd it off of the AOA through an opened security gate. The deer ran off with the Operations vehicle in pursuit. While attempting to cross an active runway, (Runway 30L), the deer collided with the driver's side of the Operations vehicle. A NW B727 was on final approach for that runway but changed course to the North parallel runway (Runway 30R). The deer continued on across another runway (Runway 04/22) and into a wooded area on the airport and then jumped over the security fence.

July 21, 1992
The FAA Air Traffic Control Tower (ATCT) reported a white-tailed deer had crossed an active runway (Runway 30L). Airport police and Operations vehicles responded to the report and located the deer on the East Side of the airport. While attempting to herd the deer off of the airport through an open security gate, the deer collided with the rear passenger side door of the Operations vehicle. The deer was chased to a location where it was cornered in an area between the security fence and an aircraft hangar. Vehicles were put into position to block the only exit for the deer. As officers were approaching to shoot the deer, the animal ran along the fence towards the vehicles that were blocking its exit. A college student under employment of the airport attempted to tackle the deer and was knocked against the hangar wall as the animal slid between the vehicles and back into the open. The deer continued running until it eventually collapsed and died from exhaustion and on a taxiway in front of an F28 aircraft fully loaded with passengers.

May 18, 1994
The FAA Air Traffic Control Tower (ATCT) reported a white-tailed deer on an aircraft apron. Two Operations vehicles responded and found the deer on an active runway (Runway 12R) which was immediately closed. The ATCT also saw the deer on the runway and issued "Go Around" instructions to a NW DC10 on final approach to the runway. The deer ran off of the runway and across another runway (Runway 04) which was immediately closed. The first runway (Runway 12R) was reopened when

the deer was clear of it and no longer a hazard to aircraft. During the attempt to herd the deer off of the AOA through an open gate, the animal turned around 180 degrees and started running for the runway that had been opened 10 minutes earlier. The runway was immediately closed and a second NW DC10 on final approach to that runway (Runway 12R) performed a missed approach. The deer never entered that runway environment but continued running into a wooded area and jumped over the security fence.

A review of the original strategy along with the incidents listed above found that there were problems with the following methods of approach of dealing with deer on the airport:

Method: Attempt to herd the deer off of the AOA through an open gate.

Problems:

1. It was impossible to expeditiously herd a wild and stressed white-tailed deer to a specific location.
2. Many times, the attempt to herd a deer resulted in animals with injuries ranging from lacerations to broken bones and even death.
3. Herding the deer off of the AOA just shifted the problem of the deer from the airport to the public roadway system.

Method: Request the assistance of the local Conservation Office to chemically immobilize the animal and capture it.

Problems:

1. The majority of the time, the local Conservation Officer was unable or unavailable to respond to the airport.
2. Many times, when the chemical immobilization technique was used on deer, the result was that the deer died.

Method: Herd the deer into an area on the AOA where it could be shot in a safe manner utilizing a 12 gauge shotgun firing slugs or 00-buckshot.

Problems:

1. It was impossible to expeditiously herd a wild and stressed white-tailed deer to a specific location.
2. There were very few safe places on the airport where a 12 gauge shotgun slug or 00-buckshot could be fired due to buildings, people or vehicles in the vicinity.

After review of the incidents and careful scrutiny of the existing strategy and problems resulting from it, it was agreed that the airport needed to devise a new plan for how to deal with deer on the airport. After collaboration with a variety of departments and agencies, a new policy was developed. This policy consisted of three principles:

1. Safety of the public, both on and off of the airport is the first and highest priority, and;
2. Immediate removal of the animal with minimal impact to airport operations is essential, and;
3. Safety of the operator is paramount.

This new policy prompted the airport to search for new and alternative methods for removing deer on the airport. After researching the options, it was decided to consider the following methods:

- Physical capture
- Firearms
  - High powered rifle (sharpshooter)
  - 12 gauge shotgun (slugs, 00-buckshot)
  - Custom made 12 gauge ammunition
- Bow hunting
- Crossbow
- Chemical Immobilization

As part of the evaluation process, the following set of criteria were developed:

- It must be safe for the surrounding area and,
- It must be safe for the person using it and,
- It must minimize the amount of time that the animal is on the AOA and,
- It must be as simple as possible.

It was also recognized that the following issues would need to be addressed with any method that was selected:

- What are the political forces involved?
- What are the economic considerations?
- Are there any regulatory concerns?
- Are there any social problems – real or perceived?

After thoroughly researching and carefully reviewing each method, it was decided that chemical immobilization provided the most promising method for dealing with deer on the AOA. Chemical Immobilization offered the following benefits:

1. It was safe for the surrounding area.

The chemical immobilization delivery systems on the market provided for a limited range of less than 100 yards. This meant that there was minimal concern for darts that missed the target flying considerable distances downrange and causing damage to persons or property. The force needed to propel the darts was minimal and was such that if the dart did impact a person there would be considerably less damage than if struck by any other firearms projectile.

2. **It must be safe for the person using it.**
   The delivery systems are similar to other firearms and are as safe as the existing lethal firearm methods that were in use. Depending on the immobilizing agent used, there were no major health concerns for the operator.

3. **It must minimize the amount of time that the animal is on the AOA.**
   Depending on the immobilizing agent used, the amount of time the animal poses a hazard to aircraft can be as little as 1_ minutes after being administered the drug.

4. **It must be as simple as possible.**
   Chemical immobilization is a more complex process than the existing method of removing deer with firearms, yet with adequate training, the process can be made simple for the operator.

Chemical immobilization provided some additional challenges with the issues listed above. All of the immobilizing agents that could be used were drugs that were regulated by the federal government. To use any of these drugs would require special authorization and/or supervision by a licensed veterinarian who would sponsor the program. The cost of using chemical immobilization was higher than using standard firearms. The increased costs were attributed to the sponsor fees, delivery system, drugs, darts, training and administration of the program. Selecting chemical immobilization as a deer removal method prompted questions from both the wildlife and animal rights communities. Questions of philosophy and intent, operator qualifications, commitment to the program and animal care were all raised. Within the wildlife community, the purpose of using chemical immobilization for the capture of free-ranging animals is to physically take into possession or secure such animals alive and unharmed. The principle objective of chemical immobilization is to capture the animal while inflicting the least amount of fear, pain, injury, and stress. While we agreed with these principles, our primary goals were to provide the highest safety to the public and immediately remove the animal with as little impact to airport operations as possible. We viewed chemical immobilization as a quick and effective tool that would allow us to lethally remove deer while at the same providing the highest level of safety to the public. Our goal was not to

capture the animal alive, but to lethally remove the animal from the airport as quickly as possible.

Chemical immobilization also required some additional choices over standard firearm use that had to be made before the program could be implemented. Those choices included:

- Selection of sponsor
- Choice of immobilizing agent – drug
- Choice of delivery system
- Choice of dart system
- Choice of euthanasia method
- Type and amount of training

Selection of sponsor

During the course of our research into alternative methods for removing deer, we met with a wildlife veterinarian who provided us with the necessary information and knowledge of what was required of a chemical immobilization program. Once we had decided that chemical immobilization was our method of choice, it was only logical that we would ask this veterinarian if they would sponsor our program as our consultant. Thus initiating and ending our search for a sponsor.

Choice of immobilizing agent

With all of the drugs available for use in chemical immobilization, our drug of choice was succinylcholine based on the following criteria:

- The drug must be relatively safe for humans
  Succinylcholine is a muscle relaxant drug and when used on deer in the correct quantities is relatively harmless to humans. It is non-poisonous when taken by mouth or when applied to the body surface.

- The drug must act rapidly (<10 minutes)
  The drug when administered intramuscularly produces complete muscular paralysis within 5 minutes.

- The effective amount of the drug must be minimal
  The normal dose of succinylcholine required to immobilize an adult white-tailed deer (175 lbs.) is from 7-10 mg. The amount decided upon for a lethal dosage for our use was 20 mg. We decided to use a concentration of solution of 20mg of succinylcholine per ml.

- The drug must allow for the beneficial use of the carcass after capture and euthanasia
  The meat of animals killed while under succinylcholine influence is fit for consumption as the drug is destroyed by cooking and digestion. All deer removed with succinylcholine were to be fed to captive wolves at a wildlife science center.

Choice of delivery system
Our selection criteria for the delivery system considered the following:

- Maximum effective range
- Availability of propellant
- Temperature sensitivity
- Impact injury
- Maintenance
- Performance reliability
- Ease of use

After reviewing all of the products on the market and their ability to meet our selection criteria, we chose the Pneu-Dart Model 171, which we have since replaced with the Model 193. This rifle is a .22 caliber powered dart gun. The rifle has a unique slide lever action and will accept darts from _ cc to 6 cc. Darts can be removed from the chamber without the use of tools. By adjusting the power control valve, close shots can be taken without injury to the animal.

Choice of dart system
Our selection criteria for the dart system considered:

- Injection speed
- Weight
- Volume
- Reliability
- Pressurized vs. unpressurized

The 1 cc “C” disposable Pneu-Dart was the dart system of choice. These darts contain a small explosive charge which detonate on impact and quickly injects the drug. The darts do not allow for the pressurization the drug within it, thus not allowing for the possibility of a rapid depressurization of the contents of the dart on the operator.

Choice of euthanasia method
The criteria for the method of euthanasia was simple:

- Effective and humane

- Safe for the operator and public
- Easy to use and maintain

A thorough review of the equipment in use within the industry revealed that a penetrating bolt gun was the best choice.

Type and amount of training

Working with the sponsor we identified the following subjects that would be covered during an 8 hour classroom training session:

- Definitions
- Deer anatomy – injection sites
- Physiology – intramuscular injection, pharmacokinetics, stress
- Immobilization drugs – general classifications, pharmacology
- Drug dose determination – weights and measures
- Accidental human exposure
- Equipment – guns, darts, syringes, captive bolt
- Pre-immobilization considerations
- Immobilization event
- Euthanasia
- Record keeping
- Carcass disposal

In conjunction with the classroom training, each person was required to attend training in basic first aid and CPR.

In addition to the classroom, first aid and CPR training, field training was offered to each individual four times a year. The field training consisted of four hours of hands on experience in the following areas:

- Weapon qualification – accuracy, familiarity and safety
- Weapon trajectory, ballistics and range
- Field dispensing of drugs
- Delivery techniques
- Recovery of darts
- Euthanasia

Although participation in the field training was only required once a year, all individuals chose to participate in more than one of the four annual training events.

In conclusion, the chemical immobilization of white-tailed deer at the Minneapolis-St. Paul International Airport has proven to be a safe, cost effective and lethal method for humanely removing deer from within the tight constraints of a large hub airport.