

Luna, M. 2019. “Joint Base McGuire-Dix-Lakehurst deer management for aviation safety”: Managing white-tailed deer populations on military installations to minimize the risk of deer strikes. Proceedings of the North American Bird Strike Conference 17:139-156. Halifax, Nova Scotia.

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## **“Joint Base McGuire-Dix-Lakehurst deer management for aviation safety”: Managing white-tailed deer populations on military installations to minimize the risk of deer strikes**

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**Abstract.** White-tailed deer are ranked the #1 most hazardous species to aircraft in the United States. Military Joint-bases are multiple-use facilities composed of many different stakeholders that often face the task of managing on-base deer populations in completely fenced in locations. Although large mammal exclusion is the most important and effective step in minimizing the risk of deer strikes, proactive management and maintenance of healthy deer populations surrounding the airfield perimeter fence is necessary. Joint Base McGuire-Dix-Lakehurst (JB MDL) is located in the State of New Jersey where the deer population is extremely high and considered overabundant. Hunting programs at JB MDL are limited in their ability to effectively maintain deer populations. Factors such as an inability to hunt in heavily populated residential areas, a limited number of hunters allowed on base, and seasonal hunting restrictions have limited the number of deer that hunters have been able to harvest. Standardized population density surveys were conducted to ascertain the on-base deer population. The initial series of population density surveys resulted in 99 deer per square mile, which is well above the recommended 20 deer per square mile carrying capacity. NJ is one of the most restrictive states regarding legal firearm usages and wildlife removal methods. USDA Wildlife Services (WS) worked closely with the 305th Flight Safety office, and the 87th CE Natural Resources office to obtain a Community-Based Deer Management Permit from the New Jersey Division of Fish and Wildlife allowing for the use of more effective management techniques. WS and the 305th Flight Safety office at JB MDL also planned and coordinated deer removal operations in specific locations where deer were documented breaching the airfield perimeter fence. After two years of removal operations, the deer population has been reduced from 99 deer per square mile in February 2017 to ~25 deer per square mile in February 2019. The combination of the deer removal operations and the exclusion efforts by the Air Force (i.e., new fencing and enforcement of closed airfield gates) has led to the decrease in deer breaching the airfield fence from 21 confirmed in CY 2016 to 4 confirmed in CY 2018.

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Good morning. My name is Michael Luna, USDA wildlife biologist for Wildlife Services. Today are we going to be talking about managing whitetail deer on a military installation and more specifically a deer management project I have been working on at McGuire Air Force Base (AFB) in New Jersey (Slide 1). The combination of a joint use military base with a restrictive state such as New Jersey provides some unique challenges and so today we are going to talk a little bit about those challenges and how

we overcame them. A quick overview of the base. It is located in southern New Jersey on the east coast of the United States (Slide 2). It is a joint use facility so there is the Air Force base which is the McGuire section and that is mainly where we will be focusing on today. There is also an Army base which is the Fort Dix section and a Navy base which is the Lakehurst section. There are two airfields on the base. There is one on McGuire and one on Lakehurst and the base is relatively large. It is about 42,000 acres

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and the McGuire section itself is about 3,500 acres. The airfield fencing at McGuire AFB is in relatively poor condition. It is under a fencing project and half of the fence is being replaced but the other half of the fence currently is unfunded. The unfunded section of the airfield fence has manual vehicle gates and manual personnel gates that are in relatively bad condition and also some other weaknesses in the fence as well. The vegetation on McGuire AFB up until recently was maintained as long grass management so throughout the growing season in New Jersey the grass was not cut on the airfield but now as of recently it is maintained 7-14 inches per Air Force standards.

A quick background on our project (Slide 3). In 2014 Wildlife Services conducted a wildlife hazard assessment at McGuire and that did outline the deer issue on base. The BASH program at joint base was poorly documented when it comes to deer strikes. But there are three rumoured deer strikes since 1990 with C-17s. There are pictures of the rumoured deer strikes but they do not show up in the official strike record in Access. The deer management is limited to a hunting program. The base does try to manage the deer population through the hunting program, but unfortunately they are confined to the less active areas on base mainly due to safety concerns.

The active areas on base such as the residential areas and golf course do have a high population of deer and they are not managed through the hunting program. Also, those residential areas and the golf course that do have a high population of deer happen to butt up against the unfunded section of airfield fence.

Since Wildlife Services took over the project in 2015 we have been conducting active

deer management on both airfields. We've removed 21 deer off the airfield in 2015 and an additional 14 in 2016 -- those are deer that already breached the airfield fence that had free access to the runways and flight line. Also in 2016 we did have a deer strike in joint base. In Slide 3 we did have the deer wrapped up in the 17 landing gear and the picture on the right is the aftermath on the runway. Now this for obvious reasons made a lot of attention from wing leadership. Actually the vice wing commander at the time was on the aircraft that struck the deer. It gained a lot of attention from the pilots and from the flight safety office. Ultimately wing leadership came to us, came to Wildlife Services and asked us to manage the deer population outside of the airfield fence. That is how our deer management project got started. When moving into the project we wanted to make sure we had some clear cut objectives (Slide 4). We wanted to accurately assess the deer population through standardized surveys. We didn't just want to go out there and start removing deer. We wanted to get a good population census first in order to measure how we were doing in the project. Also we wanted to maintain active communication involving all parties in the joint use military base operation. Logistically this was going to be one of the hardest parts of the project. Joint base has a lot of shareholders, there is a lot of moving parts which makes it difficult. Also we wanted to obtain necessary permits from fish and wildlife management in New Jersey so even though we are on federal lands and we are a federal agency, the base still likes to have a good working cooperative agreement with the state and so does New Jersey Wildlife Services. For those of you who do not know, New Jersey is one of the most restrictive states when it comes to firearm use or any type of wildlife themed management. That was just another hurdle to add on top of the

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Joint Base. Also we wanted to work closely with the natural resources personnel to enhance the hunting program. At first glance you can see that the hunting program had a lot of room for improvement, and we knew in the future the hunting program would be a good tool in order to maintain that healthy deer population. And last but not least we wanted to provide a management plan that is data driven and can be repeated so for whatever reason if Wildlife Services isn't on the airfield or isn't on the base in the future we give the base good population density and a plan for years to come.

The first thing from a scientific management perspective we want to get some surveys done. We want to choose a method that could accurately assess the deer population (Slide 5). There have been no type of deer population censuses done in McGuire what so ever – anything we could find in any record. We also wanted to choose a method that provides usable data and can be easily repeated. We went back and forth between spotlight surveys and FLIR surveys. We do have a FLIR, we do to use it for night surveys on the airfields, but we ultimately ended up going with spotlight surveys. There is a lot of literature out there on spotlight surveys already when it comes to whitetail deer surveys. We really didn't think we needed to reinvent the wheel on that. And also the aspect of repeatability. Spotlights are cheap, again in the future if we are not there it just is an easy thing for the base to copy.

Next we needed to pick our survey route. It was relatively easy for us to pick our survey route (Slide 6). We wanted to encompass the golf course -- the front nine and back nine of the golf course -- where we observed a lot of deer. Also there is a creek bed that runs through the golf course and we observed deer using it to move around base. This is

the main ramp of the airfield here and this is our unfunded section of airfield fence where we have the manual vehicle gates and personnel gates and we have trail cameras on all those vehicle gates. We have multiple pictures of deer breaching the airfield fence through those gates if they were left open, or if they don't close all the way because they are not functioning correctly.

The next thing we need to do is get our visible acres or our survey area (Slide 7). So basically, and again this is all previous literature, we drove our route and we stopped every one tenth of a mile recorded how far we can see on each side of the truck with a rangefinder and basically we did that for our entire route. It was only 4.2 miles. If we add that to our equation we end up with our 316.25 visible acres for our survey area. Then we actually just had to conduct our surveys (Slide 8). Basic Spotlight survey. We drove our route 5-8 miles an hour, 1-2 hours after dusk, identify deer along the way. Ideally this would be a three-person operation, but we only had two people at the time. So what we did with two people we would have one driver that is also a recorder and one person in the passenger seat using the spotlight to identify deer like in the picture on the slide. We would drive the route twice in opposite directions only recording one side of the truck per pass. So obviously there is some room for human error, but it is fairly easy for us to mitigate because it was the same two of us doing the survey every time. If we see a group of three deer on one side of the road and as we are coming back the opposite direction we identify the same group of deer on the other side of the road we just didn't count them. It was fairly easy for us to mitigate.

Our survey results (Slide 9). We did our first group of three surveys in mid-winter and ended up with 39, 57 and 51 total deer.

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Basically we just take our total number of visible acres and divide by the total number of deer and that gave us our 1 deer/6.45 acres and that can be easily converted into deer per square mile and we ended up with 99.2 deer per square mile. Our manageable or our target healthy carrying capacity was 20 deer per square mile so we were well over that already to begin with. This map (Slide 10) gives you an idea of our survey results for our survey route in comparison to the airfield itself.

Then we need to develop our management plan (Slide 11). We were already at five times our manageable carrying capacity. Deer removal was pretty much deemed necessary at this time. So now we need to go through the obtaining approval process which is the most difficult part of the project on a joint use facility. We went through multiple meetings that allowed us to educate the base leadership on the options and risks involved – like stand work versus mobile shooting or any other type of management that was on the table at that time. As we were going through the obtaining approval process Joint Base has multiple wing commanders and that communication can be challenging. We work for the 305th flight safety office and they have the 305<sup>th</sup> wing commander. They are the ones that actually came to us to ask to manage the deer population. The problem is that once you step outside of airfield fence, it then becomes the 87th wing commander's responsibility. Getting those two wing commanders together in the same room was challenging in itself -- very busy people, but also we didn't just speak with wing commanders. We met with security forces, natural resources, the environmental lawyers, ground safety obviously was heavily involved. The facilities surrounding the removal sites and of course the restrictive State of New Jersey.

These next couple slides (Slides 12-15) kind of how we went through the obtaining approval process at first is very restrictive just six tree stands they kind of pushed us towards the back of the base, but as we went through some more meetings we added some more tree stands and we added some light mobile shooting areas. Light mobile shooting is kind of a term we coined in New Jersey – we are still following all New Jersey laws. So basically we can't shoot from the top of the truck and we can't use a suppressor so if we see a deer in a spot that we can safely remove it, we have to stop the truck, get out of the truck, load the firearm and then go ahead with removal without a suppressor. Obviously not as effective, not as safe either as you are shooting not from an elevated position.

We had a couple more meetings. We had some more light mobile shooting areas and some more tree stands and ultimately ended up with our 2017 final approved areas Slide 16). So very restrictive. The limited light mobile shooting and tree stand work. Our 2017 deer removal results (Slide 17): we were at 99 deer per square mile again our target is 20 deer per square mile. We did the light mobile shooting like I just explained combined with stand work and we ended up removing 34 deer and donating them to the hunters for the hungry. The deer that we did remove, we field dressed them, we brought them to a local butcher and they work with hunters for the hungry and they were able to donate that meat to local food banks for people in need so it went to a good place.

Fast forward to 2018 (Slide 18). Now we got a full year to work with the base. We got a full year to work with the state. And we had a full year to gather some more data. So instead of just our group of three surveys in the winter, we now did one survey per

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month for the entire year. We were able to average those 12 surveys out and ended up with 66 deer per square mile. We also have got a year to work with the state. We brought our chief of safety and we went to New Jersey council meetings and we were able to get a community-based deer management permit from New Jersey Division of Fish and Wildlife. This allows us for the true mobile shooting that most states are used to -- shooting from the top of the truck with the use of suppressed rifles. This is a pretty big deal for New Jersey. This is the first time New Jersey Wildlife Services has ever gotten this permit from New Jersey. New Jersey doesn't just give them out. I think there is only four that I know of. It was a big deal for the base, it was a big deal for New Jersey and for New Jersey Wildlife Services. Also we had a year to work with the base. Our first removal went smoothly so we are able to expand our mobile shooting areas for 2018 (Slide 19). Now with our new effective methods we can just go out there delete the stand shooting, delete the light mobile shooting and just do the true mobile shooting in our new areas.

Just a comparison of the removals from 2017-2018 (Slide 20). Again we are at 99 deer per square mile before our first removal, 66 before our second removal. We deleted the limited light mobile shooting. We deleted the stand work. And now it is obviously much more effective. Our first removal we worked nine total nights for 63 hours and removed 34 deer. Our second removal we only worked three total nights with our new effective methods and ended up removing 35 deer. So obviously much more effective. Another big thing in 2018, we worked with the base to expand the hunting areas and extend the hunting season. Now we added some shotgun areas. We added some more archery areas. And we extended hunting season for a full 2 weeks.

Just a good example of the base working together. I am still following all New Jersey laws and everyone working towards a safe deer management goal.

Just a quick graph of our deer management over the years 2015 to 2016 (Slide 21). We were not removing any deer outside the airfield fence. We are having a lot of deer breach the airfield fence. In 2017- 2018 we started removing deer outside the airfield and we drastically reduce the number of deer breaching the airfield fence. Obviously there are some other things to consider when looking at this graph. We had the the fence project going on at the time so half the fence is being replaced. Also there is just a huge culture change on base. Since our strike in 2016 there has been all new signage up on our manual gates. They are all now being policed by airfield management and security forces so they are all being kept closed and we can see that to be true with our trail cameras on the gates that they are being left open much less often. Just something to consider when looking at that graph. Our current 2019 status (Slide 22) -- we are now fluctuating between 15 and 25 deer per square mile. We vastly expanded the hunting areas and extended the hunting season. One thing I haven't touched on yet as you probably caught on from some of the visuals that the front nine of the golf course -- it was part of our survey area but there was no hunting in those areas and did not do removals in those areas due to safety concerns. We work with natural resources and security forces that are able to shut down the front of the golf course for a week and they had an organised archery hunt with the Rod and Gun Club on base. Again just another example of everyone on base on that joint use facility working towards the same management goal. The number of deer breaching the airfield fence was drastically reduced like I showed on the graph before

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from 26 in 2015 to 4 in 2018. I think we have had 2 so far in 2019. Also one thing I did not touch on is that we did not do any removals to interfere with the hunting season. We waited until the end of the hunting season, let the hunters go in there and do their thing and then we would do the removals after they were done.

In conclusion it is the first time an active deer population census was conducted at McGuire (Slide 23). We used our standardized route and procedure that can be repeated for years to come. We had a management goal that was [inaudible] the base and now joint base has a long-term deer management plan which ultimately results in why we are all here today – a safer airfield environment.

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# Managing White-tail Deer on a Military Installation

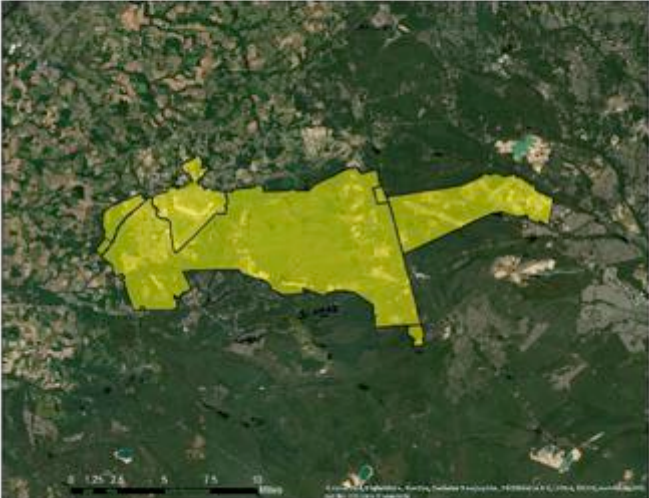


Michael Luna, USDA WS

Slide 1

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## Joint Base McGuire-Dix-Lakehurst



- Located in Southern NJ on the East coast of the US
- Air Force, Army, and Navy base combined into one
- 2 airfields
- Base total acreage = 42,000Acres. McGuire = 3,500
- Airfield fencing is in poor condition
- Vegetation was maintained as long grass management

Slide 2




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## Background

- WHA at McGuire
- The BASH program at JB MDL was poorly documented but has 3 rumored deer strikes since 1990 (C-17)
- Deer Management limited to a hunting program (confined to less active areas of the base)
- Active Deer Management on both Airfields (21 deer removed in 2015 and 14 in 2016)
- Deer strike at JB MDL



Slide 3

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## Objectives

- Accurately assess the deer population through standardized surveys
- Maintain active communication involving all parties in a joint use military base operation
- Obtain the necessary permits for efficient wildlife management in NJ
- Work closely with the Natural Resources personnel to enhance the hunting program
- Provide a management plan that is data driven and can be repeated

Slide 4




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## Surveys

1. Choose a method that accurately assesses deer population
2. Choose a method that provides usable data that can be easily repeated




Slide 5

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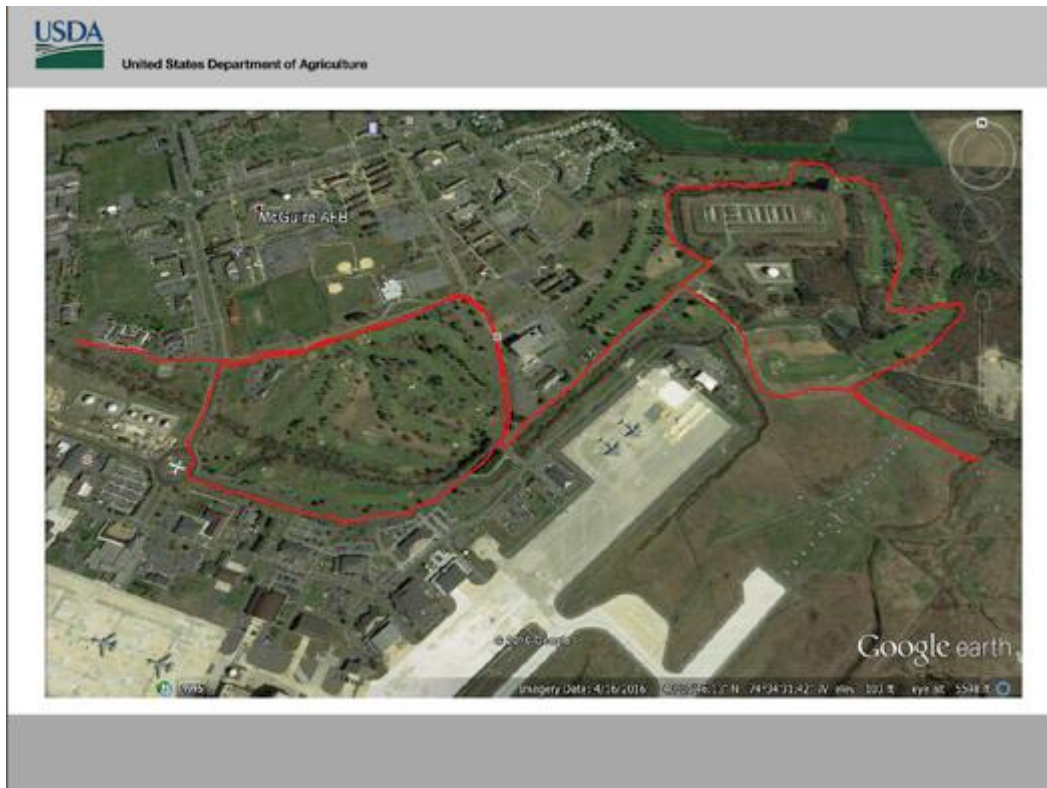
## Surveys

1. Choose a method that accurately assesses deer population
2. Choose a method that provides usable data that can be easily repeated



Slide 6

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Slide 7

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## Visible Acres


- **Equation-** Total yards of visibility / number of 1/10mile stops + 1 the start point X Number of miles X 1,760 / 4,840 = Visible Acres
- **Figures:**
- **Total Yards of Visibility** = 4495+4409= 8904
- **Number of 1/10 mile stops** = 42
- **Number of miles** = 4.2
  
- **McGuire data-** 8904 / (42+1) X 4.2 X 1760 / 4840 = **316.25 Visible Acres**

Slide 8

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## Conducting Surveys



- 5-8 MPH
- 1-2 hours after dusk
- 3 person operation

Slide 9

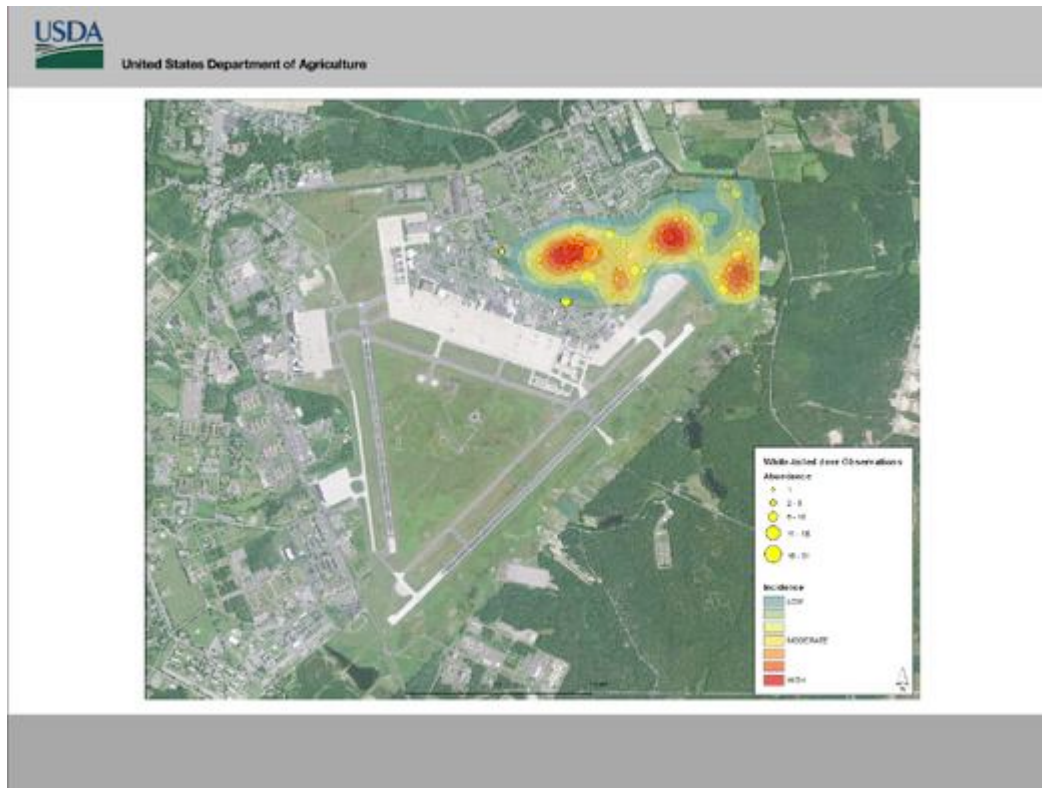
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## Survey Results

- **Survey 1** – 39 total deer
- **Survey 2** – 57 total deer
- **Survey 3** – 51 total deer
  
- **Total number of visible Acres / total number of deer**
- **McGuire Data-**  $(316.25 \times 3) / (39+57+51) = 948.75/147 = \underline{\text{One deer per 6.45 Acres}}$
- 1 square mile = 640 acres
- $640 \text{ acres} / 6.45 = \underline{\text{99.2 deer per square mile}}$
- Manageable Carrying Capacity of deer = 20 deer per square mile

Slide 10

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Slide 11

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## Develop Management Plan

- Deer removal was deemed necessary
- Obtain Approval
- Educate Base Leadership of the options and risks involved (numerous meetings)
- Stand work vs. Mobile shooting

Slide 12



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## Obtaining Approval

- Joint Base MDL has multiple Wing Commanders / communication was challenging
- Meetings, Meetings, Meetings
  - Security Forces
  - Natural Resources
  - Environmental Lawyers
  - Ground Safety
  - Multiple Facilities Surrounding Removal Sites
  - The State of New Jersey



Slide 13

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## Obtaining Approval



Slide 14


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Slide 15




Slide 16



## 2017 Deer Removal Results

- 99 deer per square mile determined by standardized surveys (20 deer per square mile is suggested healthy carrying capacity)
- “Light mobile shooting” combined with stand work
- 34 deer removed and donated to Hunters for the Hungry

Slide 17



## 2018 McGuire Removal

- Continued standardized surveys
- Still above carrying capacity at 66 deer per square mile
- Procured Community Based Deer Management Permit from NJDFW (allowed for shooting from the top of the truck and use of suppressed rifles)
- Expanded mobile shooting areas

Slide 18



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Slide 19

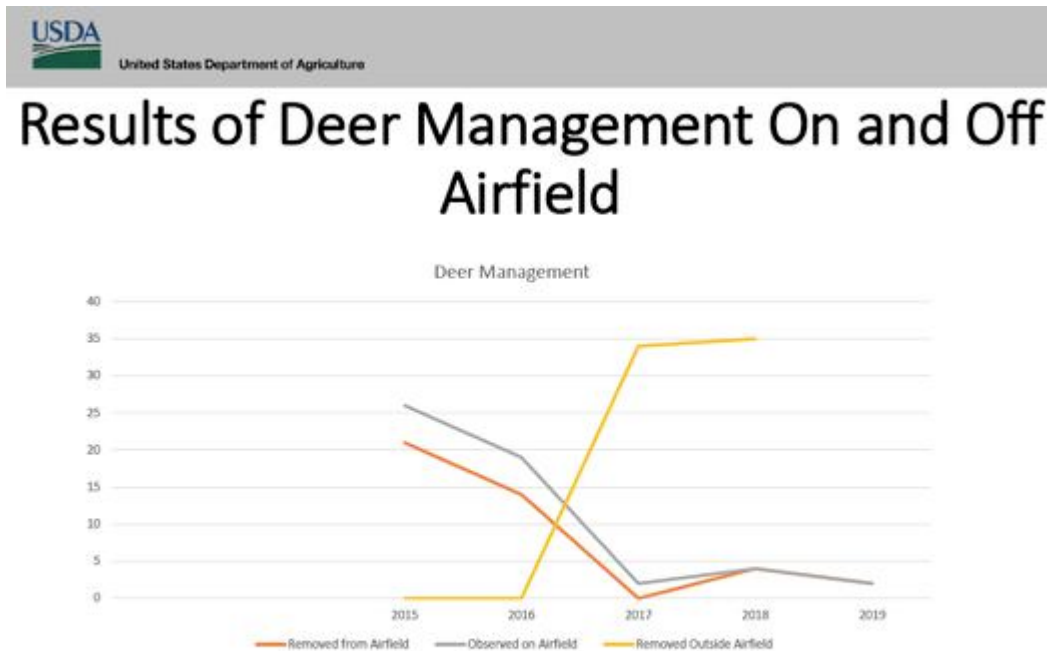
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## Deer Removals

First Deer Removal 2017	Second Deer Removal 2018
<ul style="list-style-type: none"><li>• Surveys resulted in 99 deer per square mile (20 per square mile suggested density)</li><li>• Limited "light mobile shooting"</li><li>• Stand work</li><li>• 9 total nights (63hrs) of deer removals conducted</li><li>• 34 deer removed and donated</li></ul>	<ul style="list-style-type: none"><li>• Surveys resulted in 66 deer PSM</li><li>• New Community Based Deer Management Permit (CBDMP)</li><li>• Worked with base to expand deer hunting areas and extend hunting season</li><li>• Deleted stand work</li><li>• 3 total nights (21hrs) of deer removals conducted</li><li>• 35 deer removed and donated</li></ul>

Slide 20

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Slide 21


## 2019 Status

- Fluctuating between 15-25 deer per square mile
- Vastly expanded hunting areas and extended hunting season
- Controlled archery hunts are organized by the Natural Resource department
- Number of deer breaching the airfield fence has been drastically reduced (from 26 in 2015 to 4 in 2018)

Slide 22

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## Conclusion

- The first time an accurate deer population census was conducted at McGuire
- We used a standardized survey route and procedure that can be repeated for years to come
- We had a management goal that was data based
- JB MDL now has a long term deer management plan, which results in a safer airfield environment

Slide 23