



STATUS REPORT ON THE HASTINGS-ON-HUDSON DEER IMMUNOCONTRACEPTION STUDY 2017

Summary

This document describes the results of the Hastings-on-Hudson Deer Immunocontraception Study as of 2017, the fourth year of a five-year viability study. For full background to the project refer to the [2016](#) village report, In addition to this report to the village, there is a detailed annual [report](#) to the NY State DEC also available on the village website and which can be used for more in-depth review of the project³. Below is the list of accomplishments since the 2016 report.

- On 11 field days from March 10-29, 2017, two to three HSUS teams captured 25 deer and immunized 21 does, bringing the total of immunized does to 69. Two captured deer were bucks and two were previously captured does whose tags had been lost.
- A full population census has not been completed but observations of tagged and un-tagged does suggest that approximately 75% of does are immunized.
- 191 properties were flagged after homeowners gave permission for darting to occur on their property
- From September 27-29, 2017, seven does received one of the two vaccine re-treatments via dart injection without being immobilized with anesthesia.
- Pregnancy and/or birthing of fawns from 2014-2016 by does prior to immunization was between 77-90%, while after immunization fawning by does that were sighted was between 10-20% from 2015-2017.
- Four immunized does died of various causes in 2017 and a total of 9 immunized does have died since the study began in 2014.
- Sightings of tagged does indicates that most remain in the same social groups and in the same territories, with limited migration.
- Hosta survival after three months increased from 12% in 2015 to 24% in 2017.
- Deer-Vehicle Collisions (DVCs) have declined over the five years of the study.
- There will be no more does added to the study, and only re-immunizations will be carried out in 2018 and 2019.
- Pending results from the fifth year of the study, a plan for sustaining and expanding the effort will be needed.
- The net project cost to the village to date has been \$74,112.
- EPA approval of the PZP-22 use in the field, and DEC approval of its use for deer population management will be needed in order to move from the research phase to the management phase.

Bottom line: study data thus far indicate that the vaccine is effective at reducing fawning rates. Pending completion of a population count, the population effect will not be known for certain. Field observations during the summer and fall of 2018 will improve the reliability of estimates of the project's outcomes. In the next year a sustainable management plan will need to be developed.



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Background

Yearly Capture and Immunization Steps

During the first four years of the study each annual iteration of the study was comprised of three phases:

1. **Pre-capture Phase:** The Deer Team came for a few days in mid-February to set up feeding stations around the village. The stations were intended to draw deer predictably to locations where they could be located and darted more easily. Residents were also solicited for permission to dart does located on their property.
2. **Capture and Treatment Phase:** After feeder placement the Deer Team returned after 10-14 days, and prior to the initiation of darting spent a few days becoming acquainted with the location and behavior of the deer. They then began darting and treating deer at the feeding stations and then elsewhere in the community as opportunities arose.
3. **Re-treatment Phase:** PZP immunization is expected to produce infertility for 2-3 years post injection, thus does must be re-immunized every other year throughout their reproductive lives. Re-treating does not require capture and is done with auto-injecting darts in the fall of the year before the mating season.

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A complete description of the three annual phases can be found in the [2016 report](#) to the village. In the fifth year of the study, only phase 3, Retreatment, will take place. Does that were immunized two years prior will be reimmunized in order to sustain their infertility. Re-treating began in September of 2016. Does being re-treated do not need to be captured. A self-injecting dart fired from an air rifle delivers the booster, subsequently falling to the ground for recovery. This significantly reduces the effort and time required, but it does necessitate locating all of the tagged does of the annual cohort.

Results after four full years of research

The year by year gathered data are critical and their usefulness and meaning is increasing with each new year of the study. The study design does not assume that preliminary findings are sufficient to draw useful conclusions, although they establish important baselines for comparison. Enough data for conclusive analysis will not be available until the fifth and sixth years of the study and beyond, when it will be possible to reliably document reduction in fawning rates and consequent changes in population density and impact. Initially the primary data available to use were the number of does immunized (8, 20, 20 and 21 in each of the first four years, respectively), the survival duration of backyard hostas, and numbers of car-deer collision. In year four we have begun to estimate fawning rates of does immunized in the first three years of the study, and to estimate the total number and density of deer. Although it cannot be systematically observed, reports of deer migrating outside their presumed Hastings home range is incidental data that is not systematically acquired, though it is still of value. Appendix A lists all deer captured.

Number of does immunized and re-immunized

By the close of 2017, up to 60 tagged and PZP-treated adult female deer survived on site out of 69 immunized, although not all of them have been observed in the past year, and some may have



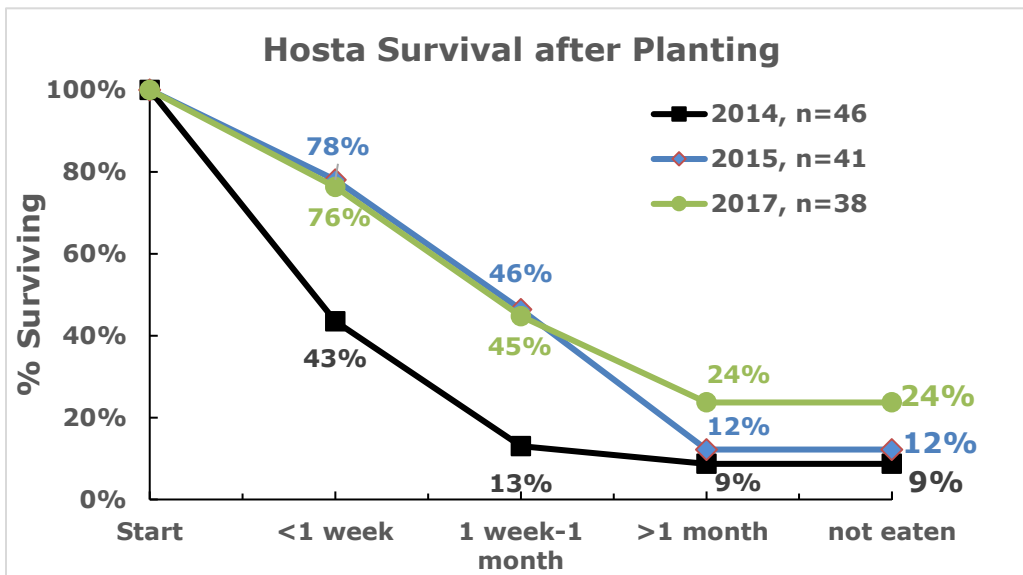
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migrated elsewhere. Over four years the death of nine immunized does has been documented. We estimate that this number of immunized does represents approximately 75% of the adult female deer whose home ranges lie principally in the Village of Hastings-on-Hudson.

Of does first immunized in 2014 and 2015, twelve have received one of the two vaccine re-treatments via dart injection without being immobilized with anesthesia.

Hosta survival duration

Each of the four previous study years residents volunteered to place a hosta plant outside their house and then to report each subsequent week whether the plants still survived uneaten. The resulting data on hosta survival duration from 2014-2017 are shown below. Data collection in 2016 was incomplete and therefore is not shown. There are hopeful trends in the data collected since 2014, however, it is still too early to be certain the apparent increase in survival rate will continue. Factors other than deer density no doubt contribute to the results, particularly the availability of sufficient amounts of other desirable foods.



Deer-Vehicle Collisions (DVCs)

Year	2013	2014	2015	2016	2017
DVCs reported	12	>7	8	8	5

The number of deer-vehicle collisions in 2017 was the lowest of the past five years and appears to be steadily declining. The number of DVCs is small, and subject to random fluctuation as well as causal variables unrelated to this project, so DVCs are not the strongest metric of success for the project.

Estimated fawning rates

The data gathered through autumn 2016 suggests that the PZP vaccine treatments are highly effective in inducing infertility. Now that PZP treatments have been administered to 60 still-living females from 2014-2017, there should be a measurable decline in number of fawns present in the population in summer 2018. Whether the decline in fawn numbers translates into an effect on population density and deer impacts in 2018 and beyond remains to be seen.



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Estimated population size

Infrared-triggered camera trapping surveys are considered to be the most reliable method of estimating deer population size. For four years camera data have been collected and partially analyzed. The estimated deer density, based on the 2014 data, of $\sim 17/\text{km}^2$ is similar to that reported by other suburban communities that are experiencing conflicts with deer. If the estimated number of resident females (~ 90) is accurate and has been relatively stable since 2014, we have tagged and treated approximately $\frac{3}{4}$ of the adult female deer resident in Hastings-on-Hudson as of winter 2017.

The high pregnancy rates of untreated does combined with the low fawn:doe ratio observed in camera trapping studies suggest that either low litter size or relatively high early fawn mortality or both are limiting population recruitment.

Migration and neighboring deer herds

We have observed additional female deer that graze in Hastings-on-Hudson part of the time, especially entering Hillside Woods from the north from Dobbs Ferry, and from the Andrus School which occupies a parcel comprising both Hastings-on-Hudson and the City of Yonkers to the south. However, we know of only one instance in which a large distance was traveled by a tagged female deer. This was doe #10 who was taken by a hunter in July 2016 near Teatown Reservation, Ossining, a distance of approximately 19 miles from Hastings. Doe #1 was reported to the DEC as killed by a hunter just north of Dobbs Ferry in the summer of 2014, a little over a mile from where it was originally tagged. Suburban female deer, as opposed to males, are thought to have relatively small and stable home ranges, and our field observations support that general conclusion.

Public engagement

This project has had broad public participation over its four years. Forty-one residents participated in the Host a Hosta study in 2017, and 38 of those provided complete reporting over the time frame for observations. Dr. Irene Jong has coordinated this aspect of the research for all four years and will continue to do so in the fifth year of the study. In addition, The Hastings High School Environmental Science students, under the direction of Science Head and Environmental Science Teacher, Melissa Shandroff, once again canvassed neighborhoods and planted survey flags indicating that the properties were available for deer darting. This was a vital component of the program and enabled the HSUS darting team to function effectively. DPW superintendent, Mike Gunther, oversaw placement of feeding stations and kept them stocked, also securing the feed corn they dispensed.



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Costs to date

This effort, as mentioned, is a cooperative project with the Humane Society of the United States and Tufts University. Those entities cover personnel and some expenses, and we cover the rest. (The particulars have been spelled out in a partnership agreement signed by the Humane Society and the Village.) The Village has spent a net of \$74,112 so far over the four years of the project. As a point of comparison, Cayuga Heights, NY, spent \$150,000 in the first year of its deer surgical sterilization program. It is too early to know which approach is more effective, but our investment in deer immuno-contraception is relatively lower than other available methods.

Year	Net Cost
2014	\$13,831
2015	\$4,197
2016	\$36,570
2017	\$19,514
Total	\$74,112

What happens in 2018

No further does will be immunized and only re-immunizations will be done in 2018 and 2019. We will continue to study hosta consumption rates, DVC counts and do field observations of fawning. Camera capture will continue, but data analysis methods will need to be made more effective if the data are to be fully analyzed.

There will be another re-treating week in September for does immunized in 2016 and those immunized in 2014 and 2015 that have not already been re-immunized.

Project challenges in the year ahead

The largest challenge now is re-locating immunized dose so they can be re-immunized. It is also important now to convincingly establish the population census and the fawning rates of immunized vs. non-immunized does. Photo capture is an effective means of counting deer, but data analysis has been too time-intensive to be completed and better analysis methods are needed. Having a high percentage of does tagged will make this much more accurate and less time intensive than it has been up to now.

Project Risks

It is important to continue to emphasize that this project is a scientific study that seeks to determine the efficacy of this particular method of deer population control. Based on the results of the study, we will then determine if it would make sense for us to continue on an ongoing basis. There is no guarantee of success. If we are successful the Village can be rightfully proud of having provided a significant tool to hundreds of communities like ours that suffer this problem.

Any well-run project should be clear-eyed about the immediate and long-term risks to its successful implementation. We believe the following are the most significant risks to the project.

Immigration/Emigration:

This is one of the primary risks of the project, and one this experiment seeks to assess. Can population numbers of deer be more rapidly suppressed through immunocontraception than they are increased by immigration from neighboring communities? Deer are thought to be relatively stable in their ranges, and to expand into new areas at a slow pace. Sightings indicate that the does in Hastings do not migrate to a very high degree.



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Vaccine Effectiveness and Persistence of Infertility:

Initial field observations indicate that pregnancy and/or birthing of fawns from 2014-2016 by does prior to immunization was between 77-90%, while after immunization fawning by does that were sighted was between 10-20% from 2015-2017. This is a marked decrease in fertility caused by the PZP-22 immunization. An open question is whether does that are re-immunized two or more years after their initial immunization will remain infertile for an extended period of time, as other species such as horses do. If they do, then the initial effort to immunize them will be warranted. However, if infertility does not persist, the necessary effort to continue to re-immunize may overwhelm our ability to find and dart all of the does.

PZP-22 Approval by the EPA and DEC

PZP-22 must be approved for field use by the EPA if it is to become a long-term fertility management tool. Beyond that the NY State DEC must approve its use as a management tool and not just allowable for research studies. Furthermore, the DEC will need to consider allowing immunizing deer by darting without requiring an ear tag. They do so now because any substance injected into deer could be consumed if the deer is hunted for meat. Although PZP is just a pig protein and is not harmful if ingested, its injection into a deer still requires visible identification of the injected deer. Darts that inject and mark the deer with dye are in development, and hopefully will be approved, but approval is uncertain at the moment. Injection by darting entails much less effort and risk, and a dye mark would potentially persist for the 60 days required for marking an injected doe.

Sustainability

The study is being carried out over a five-year period and staffed by external darting teams. Beyond five years, if it is to become an ongoing method of deer population control, the effort will likely need to be sustained locally. It is not clear that the effort to directly dart deer with PZP can be sustained by trained residents of the village. Will we be able to identify enough capable volunteers or will we have to rely on paid professionals? While this risk is at least a year away, it is probably the most serious risk to sustaining the effort longer-term.

References

1. The Hunt For Balance: Management Techniques and Policy Recommendations for Dealing with Overabundant Deer in the Hudson Valley of New York State, Brent Miller, Discussion Brief #15, Fall 2016, The Benjamin Center for Public Policy Initiatives, State University of New York at New Paltz, www.newpaltz.edu/benjamincenter.
2. History of Deer Populations in New York State, Rob Christie, presentation at Strategies for Deer Management in Westchester Suburban Communities: Understanding opportunities and challenges for your municipality, April 30, 2015, a symposium sponsored by Westchester County Parks, Westchester County Center, White Plains, NY.
3. 2017 Report to the New York State Department of Environmental Conservation, Allen T. Rutberg and Kali Pereira, Center for Animals and Public Policy, Cummings School of Veterinary Medicine at Tufts University and The Humane Society of the United State



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Appendix: Captured Deer

Animal ID	Date of Capture	Age @ Capture	STATUS 9/2017: (Last sighted)	Initial (PZP-22) By hand	Booster Remote
1	3/9/2014	Ad > 2	DECEASED 11/25/14	3/9/2014	-
2	3/23/2014	Ad > 2	Dispersed - 2015	3/23/2014	Due: 9/2016
3	3/25/2014	Ad > 2	Unknown - 2014	3/25/2014	Due: 9/2016
4	3/25/2014	Ad > 2	Alive	3/25/2014	9/26/16 Em
5	3/26/2014	Ad > 2	Alive	3/26/2014	9/26/16 Em
6	3/27/2014	Ad > 2	Alive	3/27/2014	9/26/16 Em + Pel
7 aka 30	3/27/2014	Ad >7	Alive	3/27/2014	9/26/16 Em + Pel
8	3/28/2014	Ad > 2	Alive	3/28/2014	9/27/16 Em
9	2/7/2015	Ad	Alive	2/7/2015	9/29/17 Em + Pel
10	2/8/2015	Ad	DECEASED 10/29/16	2/8/2015	-
11	2/12/2015	Ad	Alive	2/12/2015	9/27/17 Em
12	2/12/2015	Ad	Alive	2/12/2015	9/27/17 Em
13	2/18/2015	Ad	Alive	BUCK	-
14	3/6/2015	Ad	Unknown - 2015	3/6/2015	Due: 9/2017
15	3/7/2015	2.5	Alive	3/7/2015	9/27/17 Em + Pel
16	3/6/2015	3	Unknown - 2015	3/6/2015	Due: 9/2017
17	3/8/2015	5	Unknown -2015	3/8/2015	Due: 9/2017
18	3/10/2015	2.5	Alive	3/10/2015	Due: 9/2017
19	3/10/2015	4.5	DECEASED 2016	3/10/2015	
20	3/11/2015	6	Unknown - 2015	3/11/2015	Due: 9/2017
21 aka 75	3/9/2015	2	Alive	3/9/2015	Due: 9/2017
22	3/23/2015	5	Unknown - 2015	3/23/2015	Due: 9/2017
23	3/23/2015	2.5	Unknown - 2016	3/23/2015	Due: 9/2017
24	3/27/2015	Ad	Alive	3/27/2015	9/27/17 Em + Pel
25	3/30/2015	2	DECEASED 11/16	3/30/2015	
26	3/31/2015	Ad	Alive	3/31/2015	Due: 9/2017
27	3/11/2015	2.5	Alive	3/11/2015	9/27/17 Em + Pel
28	3/19/2015	3.5	DECEASED 16-Oct	3/19/2015	
29	3/20/2015	5.5	Alive	3/20/2015	9/28/17 Em
30 aka 7	4/3/2015	Ad	Alive	3/27/2014	
31	2/25/2016	2	Alive	2/25/2016	Due: 9/2018
32	2/29/2016	2	Unknown - 2016	2/29/2016	Due: 9/2018
33	3/1/2016	Adult	Unknown - 2016	3/1/2016	Due: 9/2018
34 aka 72	3/4/2016	3-4 y	Alive	3/4/2016	Due: 9/2018
35	3/6/2016	Adult	Alive	3/6/2016	Due: 9/2018
36	2/26/2016	Adult	Alive	2/26/2016	Due: 9/2018
37	2/27/2016	2-3 yr	Alive	2/27/2016	Due: 9/2018
38	3/1/2016	3 y	Unknown - 2016	3/1/2016	Due: 9/2018



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Animal ID	Date of Capture	Age @ Capture	STATUS 9/2017: (Last sighted)	Initial (PZP-22) By hand	Booster Remote
39	3/1/2016	3 y	Alive	3/1/2016	Due: 9/2018
40	3/8/2016	Adult>3	Alive	3/8/2016	Due: 9/2018
41	3/12/2016	2-3 yr	Unknown (2016)	3/12/2016	Due: 9/2018
42	3/13/2016	3-4 yr	Alive	3/13/2016	Due: 9/2018
43	3/15/2016	4-5 yr	Alive	3/15/2016	Due: 9/2018
44	3/15/2016	Adult	Alive	3/15/2016	Due: 9/2018
45	3/20/2016	3 yr	Unknown - 2016	3/20/2016	Due: 9/2018
46	3/22/2016	1.5-2.5yr	Unknown - 2016	3/22/2016	Due: 9/2018
47	3/29/2016	1.5-2.5yr	Alive	3/29/2016	Due: 9/2018
49	3/20/2016	3-4 yr	Alive	3/20/2016	Due: 9/2018
50	3/22/2016	3-4 yr	DECEASED 6/17/17	3/22/2016	
51	3/22/2016	3 yr	Alive	3/22/2016	Due: 9/2018
48	3/10/2017	Adult	DECEASED 3/30/17	3/10/2017	
52	3/12/2017	Adult	Alive	3/12/2017	Due: 9/2019
53	3/15/2017	1.5	Alive	3/15/2017	Due: 9/2019
54	3/11/2017	Adult	DECEASED 3/12/17	3/11/2017	
55	3/10/2017	3+	Alive	3/10/2017	Due: 9/2019
56	3/10/2017	Adult	Alive	3/10/2017	Due: 9/2019
57	3/11/2017	Adult	Alive	3/11/2017	Due: 9/2019
58	3/12/2017	Adult	Alive (obs. Yonkers 9/17)	3/12/2017	Due: 9/2019
59	3/11/2017	Adult	Alive	3/11/2017	Due: 9/2019
60	3/12/2017	Not recorded	Aive	3/12/2017	Due: 9/2019
61	3/16/2017	Adult	Alive	Buck	-
62	3/15/2017	Not recorded	Alive	3/15/2017	Due: 9/2019
63	3/13/2017	2+	Alive	3/13/2017	Due: 9/2019
64	3/15/2017	2	Alive	3/15/2017	Due: 9/2019
65	3/15/2017	Adult	Alive	3/15/2017	Due: 9/2019
66	3/16/2017	Young Adult	Alive	3/16/2017	Due: 9/2019
67	3/19/2017	3	Alive	3/19/2017	Due: 9/2019
68	3/15/2017	Adult	Alive	3/15/2017	Due: 9/2019
69	3/18/2017	Adult	Alive	Buck	-
70	3/22/2017	1.5	DECEASED 7/9/17	3/22/2017	
71	3/20/2017	2.5	Alive	3/20/2017	Due: 9/2019
72 aka 34	3/20/2017	3+	Alive		
73	3/21/2017	2+	Alive	3/21/2017	Due: 9/2019
74	3/21/2017	2.5	Alive	3/21/2017	Due: 9/2019
75 aka 21	3/21/2017	3+	Alive		

Yellow	Retag/Duplicate	Grey	Deceased	Salmon	Tagged Male
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