

**IMMUNOCONTRACEPTION OF WHITE-TAILED DEER AT
FIRE ISLAND NATIONAL SEASHORE**

**2003 Progress Report to Fire Island National Seashore
And
The New York State Department of Environmental Conservation**

**Submitted by
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January 2, 2004

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NYSDEC License Number LCP03-576
NPS Special Use Permit Number FIIS-2003-SCI-0011

I. INTRODUCTION

The first five year phase (1993-1997) of the Fire Island National Seashore (FIIS) deer immunocontraception project, which began in autumn 1993, was intended to test whether the PZP immunocontraception vaccine could be delivered effectively to deer in the field, and whether vaccine efficacy under field conditions matched that in more controlled situations. This study confirmed that PZP vaccine could be delivered to large numbers of free-ranging, mostly habituated deer, but vaccine efficacy was lower than that seen in more controlled studies, especially the year following initial treatment. However, vaccine efficacy increased with successive annual booster treatments. In addition, the use of monitors to identify and attract individual deer for treatment was extremely labor intensive (Kirkpatrick et al. 1997; Naugle et al. 2002).

The Humane Society of the United States (HSUS) conducted the second five year phase of the project, in cooperation with FIIS, the National Park Service (NPS), and the Biological Resources Division of the U. S. Geological Survey (USGS)/ Patuxent Wildlife Research Center at the State University of New York (BRD/SUNY), from 1998 to 2002. The principal goal of that phase of the project was to determine whether the PZP vaccine could be useful at Fire Island as a deer management tool within the communities and on FIIS lands. Specific objectives included the demonstration of a reduction in the deer population in the communities; the scaling back and eventual elimination of the labor intensive deer monitoring system; the use of distance sampling methods to estimate population density and composition; reduction of the total amount of bait and bait stations used to attract deer for darting; shortening of the time that bait is available; and the relocation of bait stations outside the communities to the extent consistent with effective and efficient vaccine delivery. The immunocontraception project was and still is closely linked to FIIS's goal of curtailing the feeding of deer and reducing the overall impacts of deer in the communities.

In 2003, The HSUS, FIIS, NPS, and the USGS/BRD began the third phase of the immunocontraception project on Fire Island with the goal of continuing to reduce the overall deer population on the western, populated portion of the island. This phase will be run year to year with the intent of treating greater than 90% of the female deer population annually, monitoring that population to estimate annual fawning rates, and to determine the feasibility of the overall project.

II. METHODS

Darting and PZP Treatments. Female white-tailed deer were treated with 65 µg PZP emulsified in 0.5 ml of Montanide® ISA 50 adjuvant (Seppic, Inc.). Vaccine was stored frozen and then thawed and mixed in the field as needed. All deer treated were presumably at least one year old and/or had been treated in previous years with PZP and either Freund's Complete Adjuvant (FCA), Freund's Incomplete Adjuvant (FIA), or ISA 50. Of the 180 does successfully treated in 2003, 168 were unidentified and 12 were identified by monitors.

Of the 180 PZP treatments on FIIS during 2003, 173 were delivered in combination 1cc/3cc vaccination/marketing darts with barbless 2.5 cm needles (Pneu-Dart®, Williamsport, PA) fired from either a Dan-Inject® CO₂ injection pistol (n=170) or a Pneu-Dart® .22 cartridge-powered capture rifle (n=3). The remaining 7 treatments were delivered to some identified does, a few highly recognizable unidentified does, and in a few instances to extremely wary does using 1cc barbless darts fired from a Dan-Inject® CO₂ injection pistol (n=5) or a Pneu-Dart® .22 cartridge-powered capture rifle (n=2). All vaccine was delivered in the hip or gluteal region of the deer. The marking substance used again this year was non-toxic Sharpmark® red liquid livestock marker concentrate (Nasco, Fort Atkinson, WI).

Darting Locations. During the 2003 darting period does were treated at bait stations and along community streets in the areas of: (1) a seven contiguous community region which includes Kismet, Seabay Beach, Saltaire, Fair Harbor, Dunewood, Lonelyville, and Atlantique Beach, (hereafter collectively referred to as the West End Communities); (2) Robbins Rest and Atlantique, and a four contiguous community region, which includes Corneille Estates, Ocean Beach, Seaview, and Ocean Bay Park, (hereafter collectively referred to as the Mid-Island Communities); (3) Cherry Grove and Fire Island Pines (hereafter collectively referred to as the East End Communities); (4) NPS lands between the Fire Island Lighthouse and Kismet (hereafter collectively referred to as West End NPS land); (5) NPS lands between Atlantique Beach and Corneille Estates (hereafter collectively referred to as Mid-Island NPS land); and (6) between Point O' Woods and Cherry Grove, between Cherry Grove and Fire Island Pines and the Talisman Heliport area (hereafter collectively referred to as East End NPS land) (Table 1).

Bait Stations. Deer were darted at seven bait stations located in monitors/residents yards, six on FIIS/NPS lands and one on community-owned lands. At the FIIS/NPS bait station sites automatic feeders designed to dispense bait at preset times were used to attract deer for darting. At monitor/resident stations bait was placed out by hand. Baiting started on August 15, approximately three-weeks prior to the start of the darting period and continued at most stations through September 16.

III. RESULTS

Logistics and Cost. Between 4 September and 16 September 2003, seven darters working intermittently spent a total of 13 days in the field successfully inoculating a total of 180 female white-tailed deer. Deer were treated by personnel from The HSUS and FIIS/NPS with the volunteered assistance of several Fire Island deer monitors and residents. Deer were darted at 14 bait stations, including 8 FIIS/HSUS-run bait stations and 7 monitor/resident-run bait stations, in 11 communities and on NPS lands between the FIIS lighthouse and Fire Island Pines. Approximately 224 person hours were spent delivering the 180 treatments, averaging 17.2 person hours/day, 13.8 deer treatments/day, and 1.24 person-hours/treatment. Deer were also darted along community streets and on NPS lands as they were encountered. Approximately \$8280 was spent on vaccine (\$4000), bait (\$1450), a rental vehicle (\$946), darting supplies (\$1140), and miscellaneous expenses (\$744), at a cost of approximately \$46 per deer treatment (not including personnel costs).

In addition to manpower, FIIS provided a four-wheel drive vehicle, an all terrain vehicle (ATV), and two bicycles. Corn for the bait stations was paid for by The HSUS and distributed to bait stations primarily by FIIS. Several of the Fire Island community residents again provided us with areas for bait stations and storage in addition to ones provided by FIIS. The community of Saltaire and a Fire Island Pines resident provided housing for The HSUS personnel during the period.

Safety and Darting Efficiency. None of the 180 deer darted was injured during the darting period and all but four darts striking deer were recovered and tested for complete injection. One vaccination/markings dart stuck in a deer's hips at Station C and was not recovered after the deer disappeared into heavy cover. The deer was observed a few minutes after the incident occurred and showed no signs of injury and had lost the dart. In addition, two vaccination/markings darts were lost in dense cover after missing their intended targets (one at Station A and one at Station 6) and one dart was lost at Station D after striking a deer. There were a total of 10 complete misses with vaccination/markings darts. Six vaccines were known to be lost due to defective vaccination/markings darts and two vaccines were discarded after being mixed and carried in darts for periods of two days or longer. In addition, two vaccines were lost during mixing and loading darts. In summary, a total of 201 vaccines were dispensed during fall 2003.

Treatment Locations. Of the 180 deer successfully darted on Fire Island in 2003, 53% were darted at bait stations and the remaining 47% were darted along community streets or in a few instances in semi-remote areas such as the Sunken Forest and Sailors Haven (Table 1). However, in communities without bait stations 100% of the deer found were darted along the streets (Table 1). While some of the deer darted along community streets might have eventually been darted at bait stations there were several deer darted along community streets that were often observed at bait stations, but failed to get darted there because of their wariness. Due to the shyness of some deer at bait stations it was often easier to roam streets around the bait stations and dart many of them as they were encountered.

Marking dyes. In 2003, approximately 40% of the does encountered were still in their summer coats or in transition from summer to winter. As a result, the Sharpmark red marking dye again remained visible on deer coats for times ranging from less than one day to over 14 days, depending on whether deer licked the site of injection and whether they were in summer coat, winter coat, or in transition. However, during the process of baiting and darting deer each day, close observations made by darters revealed that once a deer had been marked, regardless of whether it licked the injection site or not, it usually retained some trace of the red dye for at least several days. Darting was usually concluded in an area when the majority of the female deer encountered showed signs, however faint, of the red dye on their coats. Between the daily observations made by the darters and observations made by several deer monitors in several communities, we estimate that we darted over 90 percent of the observable female deer in nearly every community we worked in. However, because of the limited effectiveness of the Sharpmark marking dye during the past three years The HSUS continues to search for a non-toxic marking dye that will reliably persist on a deer's coats for longer periods of time.

Population Monitoring. Estimates of deer density within the Fire Island communities has been estimated since 1995 on Fire Island using distance sampling techniques devised by Dr. Brian Underwood. Deer surveys using these techniques have proven accurate and between 1995 and 1998 indicated that deer numbers in the West End communities, where initial studies were focused, increased by approximately 11% per year. Since 1998 female deer in these and all communities between the lighthouse and Fire Island pines have been rigorously treated with PZP in marker darts. As a result, between 1999 and 2001 (prior to the fawning season) distance sampling surveys in the West End communities indicate a 35% reduction in the number of deer and an overall reduction of approximately 9% in all communities between the lighthouse and Fire Island Pines. Fawning rate estimates are still pending for 2003, but estimates since 1999 indicates that fawns annually comprise approximately 12-15% of the total deer population in the communities. Prior to the start of PZP treatments it was estimated that over 90% of the female deer population within Fire Island communities produced fawns annually.

IV. DISCUSSION AND CONCLUSIONS

Since 2000, when deer in all areas between the Lighthouse and Fire Island Pines began receiving treatments, the number of deer darted has decreased each year (Table 2). Surveys in communities and at bait stations during the darting periods indicate that fewer deer are visiting them each year. While some deer simply will not visit a bait station when darters are present, monitors have documented significant decreases in the number of deer they see daily. Interestingly, the biggest decline has been the buck population. Also, since 1998 the number of females producing fawns annually has decreased nearly 80%. Although a few does (10-15%) still produce fawns annually we have noticed that the majority of these fawns are being born late (i.e. after July 1). This indicates that the majority of the adult female deer population is getting darted each fall, but a few does simply do not carry sufficient PZP titer levels to get them through the entire breeding season. Regardless, the steady decline of the buck population, the decline in number of does being darted each year, and a significant decrease in the number of fawns being born indicates that the overall deer population between the Lighthouse and Fire Island Pines is steadily going down. Preliminary deer counts in 2003 by the USGS/NPS indicate that in some areas deer numbers have decreased 50% or more from what they were in 1998.

In addition to a decrease in the number of deer on Fire Island significant progress has been made over the past six years toward achieving National Park Service objectives. The amount of bait used to attract and dart deer annually has been significantly reduced, time spent baiting and darting deer has decreased significantly, the use of residential monitors to identify individual deer is no longer necessary, and backyard feeding has decreased significantly.

In 2003, bait use was comparable to the amount used in 2002 and remained considerably less than that used in prior years. These reductions can be mostly attributed to using automatic feeders at all FIIS run bait stations and limiting the amount of bait residents/monitors receive. Automatic feeder stations have clearly shown that a large number of deer can be attracted to bait stations and then darted using relatively small amounts of bait. As a result, in 2004 we will convert some of the more productive monitor/resident run bait stations to automatic feeder

stations. This will allow The HSUS and FIIS to even more closely regulate bait consumption and reduce the amount of bait used each year even more.

During the 2003 darting period 3-4 people darted deer primarily at bait stations during the early morning hours and then combined sitting at bait stations and roaming community streets searching for deer to dart during the late afternoon and evening hours. This technique enables darters to dart the majority of the deer in each community in a relatively short period of time. As a result, during the 2003 darting period five days was spent in the West End Communities, four days was spent in the Mid-Island Communities, and four days was spent in the East End communities and on FIIS lands. Such a comprehensive approach allowed darters to dart the majority of the deer before marks faded and insured that as few deer as possible got darted more than once.

While working in each block of community's HSUS personnel conducted surveys to determine the percentage of deer darted. These surveys revealed that over 90% of the deer encountered between the Lighthouse and Fire Island Pines, with the exception of Point O' Woods, carried marks indicating they received PZP treatments in 2003.

Finally, it should be noted that the total number of PZP treatments delivered in 2003 decreased significantly from 2002. This is due in part to a noticeable decrease in the number of deer and the fact that no deer were darted within the confines of Point O' Woods (13 deer were darted there in 2002). Point O' Woods officials refused to comply with the baiting and darting schedule agreed upon by all parties (The HSUS, NPS/FIIS, USGS, and 15 Fire Island communities). On September 2, when baiting was scheduled to begin in Point O' Woods, officials there refused to allow anyone in the community until September 15. In addition, they also refused to allow deer to be darted along their roads and boardwalks at any time. Darting ended in the Mid-Island communities on September 12 and island-wide September 16. To have waited until September 15 to begin baiting deer there would have meant they could not be darted until after October 1 or after our permits for darting expired. As a result, we were unable to bait or dart deer in Point O' Woods in 2003. Unfortunately, this means that Point O' Woods and the surrounding communities will undoubtedly see an increase in the number of fawns born next year.

LITERATURE CITED

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Table 1. PZP treatment locations and number of deer darted on FIIS during fall 2003

	West End Community	Mid- Island Community	East End Community	West End NPS Land	Mid- Island NPS Land	East End NPS Land	Total
FIIS/ Community Bait Stations	4 (10%)	0	n/a	26 (83.9%)	0	13 (65%)	43 (23.9%)
Monitor/ Resident Bait Stations	12 (30%)	26 (44.1%)	14 (46.7%)	n/a	n/a	n/a	52 (28.9%)
Roaming Streets	24 (60%)	33 (55.9%)	16 (53.3%)	5 (16.1%)	0	7 (35%)	85 (47.2%)
Total	40	59	30	31	0	20	180

Table 2. PZP treatment locations and number of deer darted on FIIS (1998-2003)

	1998	1999	2000	2001	2002	2003
West End Communities	113	114	89	70	48	40
Mid-Island Communities	90	72	75	81	74	59
East End Communities	37	39	33	30	27	30
West End NPS	-	-	15	12	34	31
Mid-Island NPS	6	6	2	2	5	0
East End NPS	-	-	11	13	11	20
Total	246	231	225	208	199	180

Table 3. PZP treatment locations and number of deer treated by individual community during fall 2003

Station #	Location	Number Darted	Community/ Streets	Number Darted
1	Lighthouse tract	5	Lighthouse	5
2	Kismet Firehouse	13	Kismet	2
3	FIIS/Buteau	4	Seabay	1
4	Saltaire Dump	3	Saltaire	4
5	Dolphin Walk Dunewood	0	Fair Harbor	7
6	FIIS/Atlantique	5	Dunewood	4
7	FIIS/Robbins Rest	0	Lonelyville	4
8	Point O' Woods Ball field	0	Atlantique	2
9	Sunken Forest West	9	Robbins Rest	0
10	Sunken Forest East	4	Corneille Estates	0
A	Seabay Pool house	7	Ocean Beach	16
B	Harry Baker/Saltaire	5	Seaview	14
C	Judy Hamburg/Corneille Estates	13	Ocean Bay Park	3
D	Bruce Mayer/Seaview	12	Point O' Woods	0
E	Norman Steele/Seaview	1	Sunken Forest	7
F	Bud Verspoor/Cherry Grove	5	Cherry Grove	0
G	Lee Frey/Fire Island Pines	9	Fire Island Pines	16
Totals		95		85