

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

2002 Progress Report to Fire Island National Seashore
And
The New York State Department of Environmental Conservation

Submitted by
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I. INTRODUCTION

The first 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) began the second phase (1998-2002) of the project, in cooperation with FIIS, the National Park Service (NPS), and the Biological Resources Division of the U. S. Geological Survey/ Patuxent Wildlife Research Center at the State University of New York (BRD/SUNY), in autumn 1998. The principal goal of this phase of the project is to determine whether the PZP vaccine can be useful at Fire Island as a deer management tool within the communities. Specific objectives include 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 is closely linked to FIIS's goal of curtailing the feeding of deer and reducing the overall impacts of deer in the communities.

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 199 does successfully treated in 2002, 191 were unidentified and 8 were identified by monitors.

Of the 199 PZP treatments on FIIS during 2002, 187 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=182) or a Pneu-Dart® .22 cartridge-powered capture rifle (n=5). The remaining 12 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=3) or a Pneu-Dart® .22 cartridge-powered capture rifle (n=9). 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 2002 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 six contiguous community region, which includes Corneille Estates, Ocean Beach, Seaview, Ocean Bay Park, Point O' Woods, and Oakleyville (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, seven on FIIS/NPS lands and three on community-owned lands. At six of the FIIS/NPS bait station sites automatic feeders designed to dispense bait at preset times were used to attract deer for darting. Baiting started on August 15, approximately three-weeks prior to the start of the darting period and continued at most stations through September 18.

III. RESULTS

Logistics and Cost. Between 5 September and 18 September 2002, nine darters working intermittently spent a total of 14 days in the field successfully inoculating a total of 199 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 17 bait stations, including 10 FIIS/HSUS-run bait stations and seven monitor/resident-run bait stations, in 10 communities and on NPS lands between the FIIS lighthouse and Fire Island Pines. Approximately 329 person hours were spent delivering the 199 treatments, averaging 23.5 person hours/day, 14.2 deer treatments/day, and 1.65 person-hours/treatment. Deer were also darted along community streets and on NPS lands as they were encountered. Approximately \$9774 was spent on vaccine (\$4900), bait (\$1377), a rental vehicle (\$1059), darting supplies (\$1768), and miscellaneous expenses (\$670), at a cost of approximately \$49 per deer treatment (not including personnel costs).

In addition to manpower, FIIS provided a four-wheel drive vehicle and The HSUS provided three 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. - SUNY provided one

Safety and Darting Efficiency. None of the 199 deer darted was injured during the darting period and all but six darts striking deer were recovered and tested for complete injection. Two

other vaccination/marketing darts stuck in deer's hips (one at Station D and one at Station 10) and were not recovered after the deer disappeared into heavy cover. Both deer were observed a few minutes after the incidents occurred and neither showed any signs of injury and both had lost their darts. In addition, five vaccination/marketing darts were lost in dense cover after missing their intended targets (at Station 5, Station 8, Station 6, along Ocean View walk in Ocean Beach, and a remote section of the Sunken Forest). There were a total of 10 complete misses with vaccination/marketing darts and one complete miss with a 1cc dart. Two vaccines were known to be lost due to defective vaccination/marketing darts and two vaccines were discarded after being mixed and carried in darts for periods of two days or longer. In addition, six vaccines were lost during mixing and loading darts. In summary, a total of 243 vaccines were dispensed during fall 2002.

Treatment Locations. Of the 199 deer successfully darted on Fire Island in 2002, 52% were darted at bait stations and the remaining 48% 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 Ocean Beach (no bait stations), Seaview (two very confined bait stations), and Ocean Bay Park (no bait stations) 64.8% of the deer were darted along community streets compared to 49.3% darted while roaming streets in the remaining 14 communities (Table 1). While many 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. Between the shyness of some deer to enter and then linger at bait stations and the relatively small size and confinement of a few bait stations, it was often easier to roam streets around the bait stations and dart deer as they were encountered in more open areas.

In addition to the number of deer treated at bait stations and along community streets there was a sharp increase in the number of deer darted in the area between the Lighthouse and Kismet and at bait stations set up on NPS/FIIS land on the western end of the island. In 2001, less than 6% of the deer darted was on NPS land on the western end. In 2002, over 17% of the deer darted were darted on NPS land on the western end (Table 2).

Marking dyes. In 2002, approximately 20% 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 95 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 2001-2002, but estimates during 1999-2000 surveys indicated that fawns comprised approximately 13-14% 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 1998 significant progress has been made toward achieving project objectives and National Park Service objectives on the Fire Island deer immunocontraception project. Deer population densities throughout most areas have declined, the amount of bait used to attract and dart deer has been significantly reduced, the baiting season has been shortened, the use of residential monitors has been mostly abandoned, and the use of backyard feeding stations is diminishing. — baiting season has been shortened

In 2002 bait usage was again decreased significantly (10,450 pounds vs. 12,000 pounds in 2001 vs. 14,000 pounds in 2000 and 21,450 pounds used in 1999). This was accomplished by limiting automatic feeders to drop bait just once each day instead of twice and by a significant reduction in the amount of bait placed out by hand at several stations. Bait use was also considerably less at monitor/resident run bait stations in 2002 primarily due to a decrease in the number of deer using a few of the stations. Baiting began on August 15 again this year and in most cases was discontinued in a community block once darting was completed there.

During 2002, 4-5 people darting deer at several bait stations in the mornings and then 3-4 people roaming streets during the late afternoon and evenings were very effective for darting the majority of deer in each area. This strategy also allowed darters to locate and dart several deer that do not enter bait stations when darters are present. Although darting deer this way has proven to be very effective and efficient there has been some recent concern that it is dangerous to residents. As a result, in 2002 street roaming was, for the most part, confined to weekdays when the majority of the residents were off the island. However, every deer darted in Ocean Beach and Ocean Bay Park was darted along community streets and as a result coverage in these communities was not as comprehensive as in other communities. It is estimated from darters observations that approximately 85-90% of the does in these communities received treatments compared to >95% in all other areas.

It should also be noted that the total number of PZP vaccine treatments delivered in 2002 again decreased slightly from previous years. However, daily surveys conducted by darters and deer monitors again indicated that well over 95% of the observable does in nearly all areas between

the lighthouse and Fire Island Pines received treatments. Also, during 2002 some bait stations showed a sharp increase in the number of deer darted while some stations showed a marked decrease in the number darted.

mornings too
At the Lighthouse bait station (station 1), set up primarily for NPS/FIIS interpretive purposes, the number of deer darted doubled from 2001. Presumably, this is in part a result of the lighthouse station being baited in the evenings and the Kismet Firehouse station, approximately ½ mile away, being baited in the mornings. However, reports from FIIS personnel indicate that the after three years of operation the lighthouse station is now attracting deer from Robert Moses State Park. Also, the number of deer darted at the Point O' Woods ball field bait station (station 8) was also double that of 2001 and all bait stations on NPS/FIIS lands showed noticeable increases over 2001 figures.

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Conversely, the Corneille Estates (Station C) and the two bait stations in Seaview (stations D and E) showed a considerable decline in the number of deer darted in 2002 primarily due to their confinement and the increased wariness of several older deer. These findings, combined with the number of deer darted while roaming around these communities streets, suggests that these stations may need to be altered or moved to locations more suitable for attracting and holding deer.

The decrease in the number of deer being darted at some bait stations is similar to findings at other immunocontraception sites. Researchers at other HSUS immunocontraception projects have documented that after a few years of treatments deer become more difficult to dart (i.e. longer shots must be taken). In addition, many deer at these sites become very apprehensive about entering bait stations when darters are present. On Fire Island observations also indicate that deer receiving multiple treatments over the years have become very reluctant to feed at a bait station when darters are standing or moving about only a few yards away. However, once the darter leaves the wary deer readily come in.

As a result of these findings, an experiment was conducted in Fire Island Pines during the 2002 darting period. A 4' x 8' wooden lattice sheet with two-inch squares was tacked onto a ground level deck overlooking the Lee Frey residence bait station. The latticework was placed away from where deer normally enter and at approximately twice the distance (12-15 yards) from where deer were normally darted at. This setup allowed the darter to sit quietly behind the panel with the barrel of the dart gun through one of the openings and go relatively unnoticed by most of the deer entering the site. As a result, the darter was able to dart several deer that normally do not enter the site when a darter is visible.

Although this experiment was successful at a relatively large bait station, the decrease in deer utilizing smaller stations and concerns over darting deer along community streets means that as deer become more and more wary darting techniques will need to be modified and that some bait stations may need to be altered or relocated in the near future.

LITERATURE CITED

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Table 1. PZP treatment locations and number of deer darted on FIIS during fall 2002

	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	14 (29.1%)	13 (17.6%)	n/a	27 (79.4%)	4 (80%)	9 (81.8%)	67 (33.7%)
Monitor/ Resident Bait Stations	15 (31.3%)	13 (17.6%)	9 (33.3%)	n/a	n/a	n/a	37 (18.6%)
Roaming Streets	19 (39.6%)	48 (64.8%)	18 (66.7%)	7 (20.6%)	1 (20%)	2 (18.2%)	95 (47.7%)
Total	48	74	27	34	5	11	199

Table 2. PZP treatment locations and number of deer darted on FIIS (1998-2002)

	1998	1999	2000	2001	2002
West End Communities	113	114	89	70	48
Mid-Island Communities	90	72	75	81	74
East End Communities	37	39	33	30	27
West End NPS	-	-	15	12	34
Mid-Island NPS	6	6	2	2	5
East End NPS	-	-	11	13	11
Total	246	232	225	208	199

- person hrs. spent darting deer in bait stations vs. roaming streets.