

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

**2005 Progress Report to Fire Island National Seashore
And
The New York State Department of Environmental Conservation**

**Submitted by
The Humane Society of the United States
700 Professional Drive
Gaithersburg, MD 20879**

DRAFT

**Prepared by Rick Naugle
Research Associate
Wildlife and Habitat Protection
The Humane Society of the United States,**

**Allen Rutberg, Ph.D.
Tufts University School of Veterinary Medicine**

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I. INTRODUCTION

The first five year phase (1993-1997) of the Fire Island deer immunocontraception project, conducted by the Humane Society of the United States (HSUS), was intended to test whether porcine zona pellucida (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 phase also examined the practicality of using local residents (deer monitors) to identify individual deer before delivering PZP treatments.

The five year 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. The study also confirmed that vaccine efficacy increased with successive annual booster treatments and that after five successive years of treatments fawning rates decreased nearly 90%. The study also showed that using deer monitors to identify individual deer for treatment was very effective, but extremely labor intensive (Kirkpatrick et al. 1997; Naugle et al. 2002).

The second five year phase (1998-2002) of the Fire Island deer project conducted by the HSUS, Fire Island National Seashore (FIIS), National Park Service (NPS), and the United States Geological Survey (USGS) was intended to determine whether the PZP vaccine could be a useful deer management tool in a populated area. 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; using a marking system to identify treated deer; 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 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 study showed that comprehensive annual treatments of deer continued to significantly reduce fawning rates and that in a few areas, where deer had been treated for 10 years, that such localized deer populations had decreased significantly. The study also showed that deer could easily be darted with marker darts, marks remained visible long enough to complete treatments in each area, considerably less time was needed to dart individual deer, and that manipulating the time, duration, and location of bait stations could reduce bait usage while still allowing the majority of the deer to be darted annually.

In 2003, The HSUS, FIIS, NPS, and the USGS began the third phase of the Fire Island deer project. The goals are to discover how deep a deer population reduction can be achieved on Fire Island using only immunocontraception, to continually monitor deer population trends across the island, to develop new vaccine delivery strategies to more effectively control deer populations in communities that have not yet shown clear reductions, and to hand over much of the responsibilities for the project to FIIS.

II. METHODS

During the 2005 darting period female deer were treated by personnel from The HSUS and FIIS/NPS with the volunteered assistance of several Fire Island deer monitors and residents 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 Oakleyville 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).

Deer were darted at 13 bait stations as follows: 6 located in resident yards, 6 on FIIS/NPS lands, and 1 on community owned land. Automatic feeders designed to dispense bait at preset times were used at the all stations on FIIS/NPS lands, the 1 station on community owned land, and 1 residential station. Bait was placed out manually at the remaining 5 residential stations. Baiting began on August 15, approximately three-weeks prior to the darting period (September 7-30) and continued at most stations through September 30.

Female deer were darted with combination 1cc/3cc vaccination/marketing darts with barbless 2.5 cm, 14 gauge needles (Pneu-Dart®, Williamsport, PA) or in a few instances with 1cc barbless Pneu-Dart darts with 2.5 cm needles. Darts were loaded with 100 µg PZP emulsified in 0.5 ml of Montanide® ISA 50 adjuvant (Seppic, Inc.) and fired from Dan-Inject® CO₂ injection pistols at ranges of 5-15 meters. The vaccine was stored frozen, thawed in the field, mixed with adjuvant, and loaded into darts as needed. All darts/vaccines were delivered intramuscularly in the hip and all deer darted/treated were presumably female (e.g. antlerless), at least one year old, and/or had been treated in previous years with either PZP and Freund's Complete Adjuvant (FCA), Freund's Incomplete Adjuvant (FIA), or ISA 50. The marking substance used was non-toxic Sharpmark® red liquid livestock marker concentrate (Nasco, Fort Atkinson, WI).

III. RESULTS

During September 7-30, 2005, 6 darters working intermittently spent a total of 20 days in the field successfully inoculating a total of 149 female white-tailed deer in 16 Fire Island communities and on FIIS/NPS land. Approximately 159 person hours were spent delivering the 149 treatments, averaging 7.9 person hours/day, 7.5 deer treatments/day, and 1.1 person-hours/treatment. Deer were also darted along community streets and on FIIS/NPS lands as they were encountered.

Of the 149 deer successfully darted, 54.4% were darted at bait stations and the remaining 45.6% were darted along community streets (Table 1). The amount of bait used in 2005 was 5050

pounds or 33.9 pounds/deer darted (Table 2). The Sharpmark red marking dye used in 2005 remained highly 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/or whether they were in summer coat, winter coat, or in transition. Darting was concluded in an area when the majority of the female deer encountered showed signs of the red dye on their coats.

Of the 149 deer darted in 2005, 143 were darted with combination marking/injection darts and 6 were darted with 1 cc darts. No deer were injured, but 13 vaccination/marketing darts missed their targets and 3 of the darts were not recovered. The darts were lost in the following areas: 1 at bait station C (Hamburg Residence), 1 at bait station #5 (FIIS/NPS Atlantique), and 1 in the Sunken Forest. There was an additional 30 vaccines and darts disposed of and 4 vaccines were lost during mixing. In summary, a total of 200 vaccines were used during fall 2005.

During 2005, approximately \$7815 was spent by the HSUS on vaccine (\$4200), bait (\$665), rental vehicles (\$1300), darting supplies (\$900), and travel related expenses (\$750), at a cost of approximately \$52 per deer treatment (not including personnel costs).

IV. DISCUSSION AND CONCLUSIONS

Since 1998, when deer in all areas between the Lighthouse and Fire Island Pines began receiving PZP treatments, the number of deer darted annually has decreased (Table 3). Informal surveys by deer monitors and darters and more formal surveys by USGS and FIIS personnel confirm that the number of deer inhabiting most communities has steadily decreased since 1998. Decreases can be most attributed to a significant reduction in fawning rates in most areas.

Since 1998 darters estimate they have annually observed approximately 90-95% of the deer inhabiting each community during the darting period. During those periods observations have indicated that although fawns are still being born each year many of them-given their size when observed-are being born later than normal (i.e. after July 1). This suggests that the majority of the female deer in most areas are getting darted each fall, but some deer simply do not carry sufficient PZP titer levels through the entire breeding season (November-February). Observations also indicate that in areas without bait stations fawning rates are considerably higher and more fawns are being born at the normal time (June). This suggests that the method of roaming streets searching for deer to dart is effective, but not as effective as it is when a community has bait stations (Table 1).

In addition to a decrease in the number of deer observed and darted on Fire Island annually significant progress has been made over the past few 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 2005, bait usage was considerably less than the average amount used over the previous 4 years (Table 3). This reduction is due primarily to using automatic feeders at 8 of the 13 bait stations

set up in 2005 and the curtailing of the amount of bait residents receive and place out daily. Automatic feeder stations have clearly shown that a large number of deer can be attracted and darted using relatively small amounts of bait. As a result, in 2006, even more stations will be converted to automatic feeders only.

Finally, a study is being designed to determine if deer can be darted/treated with PZP over the winter and to determine if such winter treatments will be as effective at blocking pregnancy as fall treatments are. This study will take place beginning in February 2006 and continue through at least 2008. During February 2006 FIIS personnel female will dart deer in the contiguous stretch from Corneille Estates to the western boundary of Cherry Grove (Sunken Forest/Sailors Haven area).

LITERATURE CITED

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Table 1. Number of deer darted in Fire Island communities (2001-2005)

	West End		Mid-Island		East End			
Year	Bait	Street	Bait	Street	Bait	Street	Total	Total
2001	57	13	26	55	6	24	89	92
2002	29	19	26	48	9	18	64	85
2003	16	24	26	33	14	16	56	73
2004	35	11	31	24	19	11	85	46
2005	18	15	25	37	8	16	51	68

Table 2. Bait station usage on FIIS (2001-2005)

Year	Bait usage (lbs.)	Number of Deer Darted	Lbs. of Bait/Deer
2001	12,000	208	57.7
2002	10,450	199	52.5
2003	11,000	180	61.1
2004	8450	154	54.9
2005	5050	149	33.9

Table 3. Overall number of deer darted on FIIS (1998-2005)

	1998	1999	2000	2001	2002	2003	2004	2005
West End Communities	113	114	89	70	48	40	46	33
Mid-Island Communities	90	72	75	81	74	59	55	62
East End Communities	37	39	33	30	27	30	30	24
West End NPS	-	-	15	12	34	31	11	19
Mid-Island NPS	6	6	2	2	5	0	0	10
East End NPS	-	-	11	13	11	20	12	1
Total	246	231	225	208	199	180	154	149