

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

**2008 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 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 (Naugle et al. 2002; Underwood 2005; Rutberg & Naugle 2008).

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 January-February, 2008, female deer were treated on Fire Island in the communities of Corneille Estates, Ocean Beach, Seaview, Ocean Bay Park, and Point O' Woods (hereby referred to as Mid-Island Communities).

During September, 2008 female deer were treated in the communities of Kismet, Seabay Beach, Saltaire, Fair Harbor, Dunewood, Lonelyville, Atlantique, Atlantique Beach (hereby referred to as the West End Communities), Robbins Rest, Corneille Estates, Ocean Beach, Seaview, Ocean Bay Park, Cherry Grove, and Fire Island Pines (hereby referred to as the East End Communities). Deer were also treated in area of the Fire Island Lighthouse, tracts of FIIS land in between communities, and the Sunken Forest.

Deer were darted at bait stations strategically placed within the treatments areas or as they were encountered on community streets and walkways. Bait stations each had one automatic cattle feeder designed to dispense whole corn at preset times. Feeders were setup 1 week prior to darting and shut down and removed at the conclusion of darting in each area. Three (3) automatic feeders were used during the winter darting period and 4 were used during the September period. Each automatic feeder was set to dispense corn for approximately 1 minute in the morning and 1 minute in late afternoon. A 1-minute dispense time allowed for approximately 10 pounds of corn to be placed out each time. At the Corneille Estates, Seaview, Cherry Grove and Fire Island Pines locations bait was placed out by hand into large cattle feed bowls.

Only female deer were darted. Darting usually took place from sunrise to approximately 9:00 a.m. and from 3:00 p.m. until sunset. Darting took place Monday through Friday.

Female deer were darted with combination 1cc/3cc vaccination/markings Pneu-Dart darts with barbless 2.5 cm, 14 gauge needles. Darts were fired from either Dan-Inject® CO₂ injection pistols at ranges of 5-15 meters or a Dan-Inject CO₂ long range rifle at longer ranges (15-25 meters). Darts were loaded with 100 µg PZP emulsified in 0.5 ml of modified Freund's Incomplete Adjuvant (mFIA). 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 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 Montanide® ISA 50 adjuvant (Seppic, Inc.). The marking substance used was non-toxic Sharpmark® red liquid livestock marker concentrate (Nasco, Fort Atkinson, WI).

III. RESULTS

During January 14-February 7, 2008, 4 persons spent 16 days darting 69 female white-tailed deer with PZP in the Mid-Island communities. Approximately 55.5 person hours were spent delivering the 69 PZP treatments, averaging 3.5 person hours/day, 4.3 treatments/day, and 0.8 person-hours/treatment. Eight (8) darts missed deer for a total of 77 doses of PZP used.

During September 3-30, 2008, 9 persons spent 21 days darting 141 female deer with PZP in the West End communities, Mid Island communities, and East End communities, Fire Island Lighthouse, tracts of FIIS land in between communities, and the Sunken Forest. Approximately 318 person hours were spent delivering the 141 PZP treatments averaging 15.1 person hours/day, 6.7 treatments/day, and 2.3 person hours/treatment. Ten (10) darts missed deer and 22 vaccine doses were lost or disposed of for a total of 173 doses of PZP used.

In total, 210 deer were treated with PZP on Fire Island during 2008. During the two darting periods 4-9 people spent 37 days and 373 person hours at 10.1 person hours/day, 5.7 treatments/day and 1.8 person hours/treatment. Eighteen (18) deer were missed and the vaccine lost. An additional 22 doses of vaccine were lost or disposed of for a total of 250 PZP vaccines used on Fire Island in 2008.

In the Mid Island communities, where deer had been darted during the winter the past three years, deer were darted in the winter of 2008 and again in September 2008. During September darters spent approximately 100 person hours concentrating on the communities of Corneille Estates, Ocean Beach, and Seaview to insure as many deer as possible got darted there. Counts during the period revealed that only 2-3 older deer (i.e. most likely treated > 5 years) observed in the area did not receive treatments. Studies from other sites and Fire Island have shown that deer treated >5 years usually do not produce fawns for 2-3 years after treatments stop.

The amount of bait used in 2008 was approximately 695 pounds or 3.3 pounds/deer darted.

During 2008, approximately \$5600 was spent on vaccine and adjuvant, \$1500 on darts and supplies, \$165 on corn, and \$500 on travel related expenses, for a total of \$7765, exclusive of personnel costs. This translates to approximately \$37 per deer treatment.

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. Since 2001, surveys conducted by USGS and FIIS personnel confirm that the number of deer inhabiting most communities has steadily decreased since 1998 (Table 1). Decreases can be most attributed to natural die off and a significant reduction in fawning rates in most areas. Details on these reductions will be presented in a separate report from the USGS.

Since 1998 darters estimate they have annually observed 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 a few deer do not carry sufficient PZP titer levels through the entire breeding season (November-February). Observations also indicate that in areas where bait station use is not allowed 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 not as effective as it is when a community has bait stations.

Beginning in 2004 we began a test of whether we could obtain comparable contraceptive effectiveness by darting deer in the winter, when very few people were on the island and deer were more abundant in the communities. We darted deer in the Mid Island communities during January-March over a three year period; although more deer were encountered and darted in the winter, there was an increase in the number of fawns being born. Basically, deer were being darted just after the fall breeding season (November-December) ended, 10-11 months prior to the next breeding season. No blood samples were taken from these deer, but it was apparent from the slight increase in fawning rates over the three year period that deer, especially young deer were not carrying sufficient PZP antibody titers into rut. Based on these findings deer in the Mid Island communities and all other areas were darted during September this year and will continue to be darted in September in the future.

In addition to a decrease in the number of deer observed and darted on Fire Island each year, significant progress has been made over the past few years toward achieving National Park Service objectives. The amount of bait used to attract deer for darting 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.

Since 2003, bait usage has been decreased significantly (Table 2). This reduction is due primarily to using automatic feeders in most areas and 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. However, we have also seen that some deer become bait shy. As a result, more and more deer need to be darted as they are encountered within and out of the communities.

LITERATURE CITED

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Table 1. Number of deer darted on FIIS (2001-2008)

Year	West End	Mid-Island	East End	Total
2001	70	81	30	181
2002	48	74	27	149
2003	40	59	30	129
2004	46	55	30	131
2005	33	62	24	119
2006	45	74	20	139
2007	28	71	19	118
2008	37	65*	39	141

*only includes deer darted in September 2008

Table 2. Bait station usage on FIIS (2001-2008)

Year	Bait usage (lbs.)	Number of Deer Darted	Lbs. of Bait/Deer
2001	12,000	181	66.3
2002	10,450	149	70.1
2003	11,000	129	85.3
2004	8450	131	64.5
2005	5050	119	42.4
2006	3250	139	23.4
2007	3050	118	25.8
2008	695	210	3.3