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FIRE ISLAND NATIONAL SEASHORE
DEER AND VEGETATION MANAGEMENT PLAN
AND ENVIRONMENTAL ASSESSMENT

U.S. Department of the Interior
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FIRE ISLAND NATIONAL SEASHORE

DEER AND VEGETATION

MANAGEMENT PLAN

January 1991

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I. INTRODUCTION

Fire Island National Seashore is approximately a 20 mile mid-island section of Fire Island (32 miles long). The Island contains two non-federal parks, 17 private (primarily seasonal) communities within the boundary of the National Seashore, and approximately 19,600 acres of federal park land within the National Seashore boundary. Barrier island deer and related barrier island vegetation can be found throughout the Island. The white-tail deer (Odocoileus virginianus) population on Fire Island has been documented as rising within the past ten years, and a vegetation browse line has been noted as the deer population increased. In addition, during this ten year period, an increase in deer/human interactions has been noted, and Lyme disease has increased throughout the northeastern United States. This plan provides for continuing the natural operations associated with barrier island deer. In addition, the Plan also stresses protecting island residents, visitors, and other natural and cultural resources of the Island. Other thrusts of the plan provide for continuing research toward a clearer understanding of: Lyme disease, barrier island deer and their relationship to other natural resources. This Deer and Vegetation Management Plan is an addendum to the park's Resource Management Plan.

This plan will present the legislation which governs the park, the resulting management objectives, and will detail the research and management program to be initiated to address the Fire Island deer and vegetation issues.

A. Purpose and Need

During the early 1980's park staff noted an increase in deer sightings/interactions, and an increase in areas of noticeable deer browse lines. At this time also, Lyme disease became an issue in the northeastern United States. Each of these issues caused alarm in a number of the communities within the boundary of the National Seashore. This plan was developed in response to these concerns.

The purpose of this Deer and Vegetation Management Plan is to provide guidance in the management of the deer and vegetation resources of Fire Island National Seashore. This Plan addresses human/deer/vegetation interaction issues including deer impacts on vegetation, health risks associated with Lyme disease, safety concerns associated with deer-human interactions, and the effects of recreational feeding of deer.

B. Authority

Because Fire Island National Seashore is a unit of the National Park Service (NPS), resource management decisions must be made within the framework of NPS legislation and policies. The following sections present a brief summary of the key legislation and policies most pertinent to the management of deer and vegetation at Fire Island National Seashore.

Legislation

1. NPS Organic Act: 1916 (16 USC 1)

The National Park service was established to:

"promote and regulate the use of Federal areas known as national parks, monuments, and reservations... [whose] purpose is to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

2. Enabling Legislation: Fire Island National Seashore

On September 11, 1964, Congress passed Public Law 88-587 establishing Fire Island National Seashore "for the purpose of conserving and preserving for the use of future generations certain relatively unspoiled and undeveloped beaches, dunes, and other natural features within Suffolk County, New York, which possess high values to the Nation as examples of unspoiled areas of great natural beauty in close proximity to a large concentration of urban population."

Section 5 of this legislation addresses the issue of hunting and fishing at the park. This section states that the Secretary shall permit hunting, fishing, and shell-fishing on lands and waters under his/her administrative jurisdiction within Fire Island National Seashore, in accordance with the laws of New York and the United States, except that the secretary may designate areas where, and establish periods when, no hunting shall be permitted for reasons of public safety, administration, or public use and enjoyment.

Section 7 of the legislation (Public Law 88-587) states,

the Sunken Forest "shall be preserved from bay to ocean in as nearly its present state as possible, without developing roads therein, but continuing the present access by those trails already existing and limiting new access to similar trails, limited in number to those necessary to allow visitors to explore and appreciate this section of the seashore". This section also states that the Secretary shall utilize any other authority available for the conservation and development of natural resources.

Other relevant legislation includes the Wilderness Act (Public Law 88--577) and the Endangered Species Act (16 USC 1531 et seq.)

NPS Management Policies: (December, 1988)

1. Basic Management Concepts, Natural Areas: (Chapter 4:1-2)

This section states that "the primary objective in natural areas will be the protection of natural resources...Natural resources will be managed with concern for fundamental ecological processes... Managers will....try to maintain all the components and processes of naturally evolving park ecosystems....Just as all components of a natural system will be recognized as important, so will change be recognized as an integral part of the functioning of natural systems... Interference with natural processes in park natural areas will be allowed only (1) when directed to by Congress, (2) in some emergencies when human life and property are at stake, or (3) to restore native ecosystem functioning that has been disrupted by past or ongoing human activities."

2. Population Management: (Chapter 4:6)

This section states, "Natural processes will be relied on to control populations of native species to the greatest extent possible. Unnatural concentrations of native species caused by human activities may be controlled, if the activities causing the concentrations cannot be controlled".

3. Management of Harvested Species: (Chapter 4:7)

This section states, 'Hunting and trapping wildlife will be allowed only in parks where use is specifically authorized. In areas set aside with legal authorization for hunting, trapping, fishing, subsistence use, or other harvest of native wildlife, the National Park Service will still seek to perpetuate native animal life and to protect the integrity of natural ecosystems'.

C. Park Management Goals

The following management goals shall guide deer and vegetation management at Fire Island National Seashore.

- Maintain the assemblages of plants and animals characteristic of the natural vegetation communities of Fire Island National Seashore.
- Protect threatened and endangered species.
- Provide for natural processes that regulate and change the natural resources.
- Maintain all the components and processes of the natural areas, including the abundance and diversity of the plants and animals and to recognize change as an integral part of the natural systems.
- Identify potential human influences on park resources while providing for visitor experiences that are compatible with the above goals.

D. Background Information

1. Management History

The General Management Plan prepared for Fire Island National Seashore in 1978, identifies four management areas (zones) in the park. These areas include the Natural, Historic, General Outdoor Recreation, and Special Use Areas. For the purpose of discussing the deer and vegetation management issues, we are combining the four areas into two. One area will be the Natural Area (including all the larger Natural Areas and the Lighthouse area located in the Historic Area). The second area will be the Development Area (including the General

Outdoor Recreation sections of the park, the smaller green [tract] areas between island communities, and Special Use Areas; see map of Management Areas on page 8). The two areas have different management objectives. And each has a distinct deer population (O'Connell and Sayre, 1989).

The west end of Fire Island contains Robert Moses State Park, managed by the New York State Department of Parks, while Smith Point County Park on the eastern end of the island is managed by the Suffolk County Parks Department.

Natural Area

According to NPS policy, the Natural Area includes lands and waters that will be managed to conserve natural resources and ecological processes and to provide for their use and enjoyment by the public in ways that do not adversely affect these resources and processes (NPS Management Policies, Chapter 2:7).

Therefore, in the natural area, the national seashore has managed for natural processes. To better understand the natural processes of the ecosystem, the National Park Service has conducted research. Only when research demonstrates that a natural process is being altered by human interference will the NPS intervene to mitigate those human impacts. When intervention methods have achieved their goal they may be eliminated or modified.

Developed Area

The green tracts and primary visitor use areas such as Watch Hill and Sailors Haven have been managed to provide recreational facilities and opportunities that are generally unavailable elsewhere in the region. However, the serenity and beauty of the barrier island have also been preserved.

The National Seashore has established direct federal involvement with local governmental jurisdictions in a cooperative effort to provide appropriate land uses within the exempted communities of the national seashore. The primary federal authority in the 17 communities found within the boundaries of the park has been in the establishment and enforcement of zoning guidelines. Residents of the Fire Island communities are private property owners under the jurisdiction of one of the year

round communities on Long Island. The park administration has worked closely with the elected officials in these communities to ensure continued good relations.

2. Park and Ecosystem Description

Fire Island is 32 miles (55 kilometers) long. It is located approximately three miles off the southern shore of Long Island. Fire Island National Seashore, created on September 11, 1964, is situated on a 20 mile mid-island section between Robert Moses State Park and Smith Point County Park. The National Seashore is near the most populated area in the United States. The National Seashore was created "for the purpose of conserving and preserving for the use of future generations certain relatively unspoiled and undeveloped beaches, dunes and other natural features within Suffolk County, New York, which possess high values to the Nation as examples of unspoiled areas of great natural beauty in close proximity to large concentrations of urban population, the Secretary of the Interior (was)... authorized to establish an area to be known as the 'Fire Island National Seashore'" (Public Law 88-587).

The Natural Area at Fire Island National Seashore is the largest area in the park. It encompasses the Wilderness Area (1381 acres), the Sunken Forest (250 acres), the Fire Island Light House Area (200 acres) and all remaining natural areas in the park (from General Management Plan of 1979 - tracts five and six, plus Talisman and Watch Hill natural areas; approximately 280 acres).

Six vegetation communities make up the natural area of Fire Island National Seashore. They include the dune, swale shrubland, pitch pine woodland, maritime forest, fresh water bog/marsh and salt marsh areas. These communities are generally situated in a south to north order on the island (see cross-section diagram; pg. 10). However, each of the six vegetation communities is not always found in all north/south island cross sections. The Wilderness Area, a primitive natural area, contains vegetation representative of all six of these Communities. The maritime forest and Wilderness Areas, which are areas of special concern at the park, are discussed in greater detail below.

The Development Area encompasses the General Outdoor

Recreation and Special Use Areas designated in the park's 1979 General Management Plan. This area contains facilities which serve visitors and provide for park administration.

This area includes the 17 communities on Fire Island (approximately 930 acres) located within the boundaries of Fire Island National Seashore. This area also consists of park visitor centers, administration facilities, park concessions (approximately 150 acres), and other municipal lands and facilities (approximately 2500 acres) which are located inside, the boundaries of Fire Island National Seashore. Robert Moses State Park and a section of Smith Point County Park are outside the boundaries of the National Seashore.

Fire Island National Seashore contains areas off of Fire Island proper. Deer have been noted during surveys on East and West Fire Island, islands off the northwest coast of Fire Island. Deer have been noted on these islands during surveys. Deer have also been observed swimming in the Great South Bay. These deer may frequent Fire Island, but are not considered an issue in this management plan. In addition, the William Floyd Estate, located in the town of Shirley, on Long Island, contains 613 acres. This site has from 15 to 25 deer. These deer are, at present, not considered an issue in the Fire Island deer and vegetation management question.

The areas adjoining Fire Island National Seashore, including Robert Moses State Park and Smith Point County Park, have visitor beach areas and large tracts of natural land areas. Communication and cooperation with these neighbors, as with the communities within the Seashore, will be an important part of the planning process and implementation of this plan.

Fire Island National Seashore Location Map

3. Resource Description

The Maritime Forest (Sunken Forest)

The maritime forests on Fire Island include holly forests and pitch pine communities. The Sunken Forest on Fire Island, considered a rare plant community type, is an outstanding example of a maritime forest. The most common trees here are American Holly (Ilex opaca), Sassafras (Sassafras albidum), and Shadbush (Amelanchier canadensis). Common shrubs of the maritime forest are inkberry (Ilex glabra) and highbush blueberry (Vaccinium corymbosum). On the forest floor, wild lily of the valley (Maianthemum canadense), wild sarsaparilla (Aralia nudicaulis), false Solomon's seal (Amilacina stellata) and many other herbaceous plants are found.

The Wilderness Area

The Wilderness Area in Fire Island National Seashore (established in 1980) is a unique and valuable area. It is the only Federal wilderness area in New York State and is an area in which "natural processes will be relied on to control populations of native species to the greatest extent possible." (NPS Management Policies, Chapter VI, Natural Resource Management, page 7). The area contains sand dunes, primary dune communities, small stands of pitch pines (Pinus rigida) and other barrier island trees as well as a northern border of salt marshes. This area is also habitat for many species of native birds and migratory waterfowl.

Fire Island Vegetation Community Diagram

4. Public Use

Few casual visitors have reported deer interaction incidents. Park reports of deer/human interactions are primarily received from residents of the communities, regarding deer in the community. There is an impression in the communities that deer on private property are the responsibility of the national seashore. The New York State Environmental Conservation Law (ECL, Section 11-0105) states "The State of New York owns all fish, game, wildlife, shellfish, crustacea and protected insects in the state,..." To engender good public relations, park rangers often assist in mitigating concerns over deer incidents in the communities. Through an agreement with the New York State Department of Environmental Conservation reports of all such incidents are sent to their office.

II. DEER AND VEGETATION MANAGEMENT ISSUES

During the early 1980's chance deer sightings on Fire Island were increasing. Both NPS officials and the public expressed concerns about the apparent increase and the potential impact on the natural vegetation and their interaction with the human population on the island. Also during this period, deer were becoming increasingly common in developed environments, including the Fire Island Communities. To collect objective data on the deer population, helicopter surveys were begun. Using the aerial survey method, approximately 250 deer were estimated in 1983 as compared to approximately 600 in 1988. Research has continued on several aspects of the Fire Island deer population and the condition of Island vegetation (primarily in the Sunken Forest Area). These programs of research and monitoring are considered critical and serve as the cornerstone for making decisions about managing the resources of the park.

A. Impacts of Deer on Vegetation

In 1966, vegetation studies were conducted in the Sunken Forest of Fire Island to examine how maritime forests develop and are maintained over time. Plant communities, like the Sunken Forest, act as anchors for wind-blown sand, and are essential to the stability of barrier island systems.

In the mid-1980's the Seashore staff noted that understory vegetation within the Sunken Forest was changing. It was speculated that high numbers of deer were impacting the Forest's vegetation, and potentially inhibiting regeneration of this unique vegetation type. Out of this concern grew interest in deer impacts on vegetation observed throughout the island. It was speculated that the deer might be responsible for the low numbers of certain native vegetation species on the Seashore.

The Seashore staff initiated research to re-evaluate the island's vegetation to determine whether it was being altered by deer browsing, and if so, whether these changes would be detrimental to long term growth and development of plant communities including the Sunken Forest. In 1986, permanent vegetation monitoring plots established in 1985 were reexamined. Deer exclosures and control plots were established in three locations on the island: two each in the lighthouse and Wilderness Areas, and three in the Sunken

Forest. The results of these surveys to date indicate that while it is probable that the current high deer population levels are impacting the vegetation within the Sunken Forest, the extent to which these impacts are detrimental to native plant communities on the island remains unclear.

Deer are having little impact on the well established mature trees within the Sunken Forest. Permanent plots have demonstrated net positive growth in the overstory tree layer since 1986. Similarly, there is little evidence of major reductions in woody seedling density in unfenced plots. Therefore, regeneration of the tree species forming the canopy of the Forest does not appear to be problematic at this time. However, deer appear to be playing a major role in the general decline in the dominance of perennial plants in the herb layer on the forest floor. Once common herbaceous species like Starry false Solomon's Seal (Smilacina stellata), Wild Sarsaparilla (Aralia nudicaulis), and Canada Mayflower (Epigara repens) have become very rare in the unfenced plots. However, by 1986, herb cover inside the deer exclosures increased by about 50%. It is probable that the decline of shrub species such as Huckleberry (Gaylussacia baccata) and Inkberry (Ilex glabra) in unfenced plots are also a result of deer browsing. Since 1985, density of dominant shrubs has increased dramatically inside fenced plots.

Other wildlife species including the Eastern Cottontail Rabbit (Sylvilagus floridanus) and Eastern Gray Squirrel (Sciurus carolinensis) may also impact the island's vegetation. Rabbits have long been present on Fire Island, and grey squirrels have inhabited the island since the late 1960's. Other factors which influence plant communities over time include successional patterns, changes in forest canopy structure, and climatic factors including the frequency and severity of natural disasters (i.e. - hurricanes, droughts) as well as other disturbances such as forest or human impacts. The degree to which each of these contributes to the overall change in the island's vegetation complex remains uncertain at this time.

Although the vegetation data from the surveys conducted in the deer exclosures and adjacent control plots show shifts in vegetation composition and density, it is still too early to determine with any statistical certainty whether these shifts are detrimental to vegetation communities of the Sunken Forest or elsewhere on Fire Island. A longer data record of deer-vegetation interactions is required before this determination can be made with confidence.

The barrier deer populations have grown dramatically on the Seashore since 1983. Concomitant with that increase has been a perceived decline in physical stature of some animals (deer, rabbit, fox), visual impacts on island vegetation, especially the Sunken Forest, and a perceived increase in the frequency of human and deer interactions. Intensive research has shown that deer occupy relatively constant home ranges throughout the year on Fire Island. Deer include a variety of plants in their diets, including ornamental vegetation where it is available. Impacts of deer on vegetation are variable, but are most dramatic in the Sunken Forest. Most significant are the effects of browsing on the herb layer in the Forest, the larger trees being least affected. It is unclear as yet whether these changes in the vegetation affect the perpetuation of this maritime forest.

B. Health Risks Associated with Lyme Disease

The relationship between population levels of white-tailed deer and densities of Northern deer ticks remains unclear even after studies in New Jersey, Massachusetts, and on Fire Island. These reports suggest that deer play a role in the population biology of deer ticks (primarily as hosts for the adult ticks), but that in the endemic area studied, they did not regulate tick populations. If these results are generally applicable, moderate lowering of deer population densities probably would not have much effect on tick populations. However, complete (or near complete) elimination of deer may lower tick numbers considerably. There are, however, differences of opinion on this question in the scientific community.

The major reservoirs of Lyme disease for Fire Island appear to be white-footed mice (Peromyscus leucopus), and a number of other birds and mammals, not deer. Deer apparently play little or no role in the transmission cycle of Lyme disease because they are not competent reservoirs. In other words, if an uninfected tick feeds on an infected deer, the tick generally does not pick up the disease organism. However, the deer may still be an important link in the pathway of transmission of Lyme disease to humans.

Research on ticks and Lyme disease on Fire Island has dealt with the distribution of infected ticks (with an eye toward improving precautions to avoid tick bites), and with techniques to manage tick populations and Lyme disease (specifically, field trials of the efficacy and potential

environmental impact of permethrin-treated cotton balls) in development areas.

From further research northern deer tick adults (active in spring and fall) were most common in high shrub thickets and in the woods on Fire Island, primarily along trails. About half the adults were infected with Lyme disease. Immature ticks were most common in leaf litter and ground-level vegetation in the woods. In the area of immature ticks, about one fifth to one third of the nymphs (active late spring through midsummer) were infected. Larvae (midsummer into the fall) are rarely infected.

While recent experiments in the development areas with permethrin treated cotton balls look promising for the control of deer ticks on small mammals, and ultimately the management of Lyme disease in selected areas, the park continues to suggest that the public continue to take precautions against tick bites by wearing appropriate clothing and checking frequently for ticks.

In addition, Lyme disease falls directly under the objective recognizing safety and health concerns of visitors. A detailed analysis of the life history of ticks inhabiting Fire Island and their habitat requirements has given the park an initial first step toward the management of Lyme Disease at the seashore. While scientific opinions vary, there is little evidence to support the notion that by eradicating deer, Lyme Disease will be eliminated. To the contrary, evidence suggests that Lyme Disease on Fire Island may be best controlled by managing ticks (through the sensitive use of insecticides) and the activities of people, rather than managing deer.

Deer apparently do not readily transmit the spirochete that causes Lyme disease to other organisms. However, that does not mean deer are unimportant in the pathway of transmission of the disease to humans because deer are important hosts to adult ticks. Experiments with cotton balls treated with insecticide show promising results for the potential management of Lyme disease in more sensitive areas of the Seashore.

C. Deer-Human Interaction

Fire Island National Seashore is unique in the National Park System. It not only contains within its boundaries abundant and varied natural resources, but also a rich cultural

tradition of human habitation. Recently, the interface between humans and the island's natural resources has become the focus of much attention. The white-tailed deer, long-time residents of Fire Island, have for a variety of reasons grown in number far beyond recent experience. This has been the cause of both consternation and delight for many Fire Island residents.

While there has not been any formal research on human and deer interactions on Fire Island, there has been significant concern expressed regarding several issues. Those of specific interest include the health and safety of humans in the presence of large concentrations of deer (especially in the community areas), potential influences of humans on deer behavior and numbers, and depredation by deer on ornamental vegetation and private property.

Because the presence of deer in such close proximity to human habitation means many things to many people, it is important to examine the various values people ascribe to deer. These values form the departure of opinions regarding resource management decisions, and are often the root of heated controversy. By understanding those values, managers will be better equipped to deal effectively and fairly with all concerned.

D. Recreational Feeding of Deer

Of particular concern to the National Park Service is the feeding of wildlife, especially deer at Fire Island, and the planting of exotic and ornamental vegetation in otherwise natural areas.

The feeding of deer has had a long history in the United States. At one time, deer feeding was sanctioned by state and national agencies as a means of promoting larger populations. Research on the behavior of deer at feeding stations has clearly demonstrated that the very animals such programs were established to protect, mostly the young and weak, rarely if ever benefit from them.

From a practical viewpoint, concentrating deer in localized situations, like those around feeding stations, invites personal property damage. Because deer are attracted to a feeding station does not mean that they will not eat natural and ornamental vegetation. In fact, captive deer that are fed often supplement their diet up to 40-60% with natural

vegetation. Needless-to-say, deer can, and do, cause many thousands of dollars of damage to crops, orchards, and ornamental vegetation annually. This kind of damage can be alleviated or even eliminated by avoiding activities that promote the concentration of deer into small areas such as feeding deer. Ornamental vegetation may be protected from deer browse by creative use of fencing.

In addition, recreational feeding of deer in the Fire Island communities has direct relevance to the national seashore objective of minimizing human activities which may alter population size, distribution, and behavior of native species.

Deer on Fire Island, while occasionally docile, are still wild animals and should be treated as such. Some animals are relatively unafraid of humans due to the lack of significant predators and harassment. This in turn has led many residents to attracting deer to feeding stations. Recreational feeding has the potential to affect both the behavior and population dynamics of deer inhabiting Fire Island. Attracting deer to a localized food source also invites potential property damage to ornamental vegetation. If visitors and residents are to play an active role in the deer and vegetation management on Fire Island, the consequences of recreational deer feeding must be known, understood, and accepted by a large majority of those making use of Fire Island.

In summary, human habitation in natural settings often present managers with challenging issues. This is especially true of deer populations, which can exhibit wide tolerance of human presence. Where harassment is not excessive, and predators absent, deer can become unusually docile. Habituation of deer to human presence has been largely ignored as a research topic. By understanding the degree to which human activities can affect the behavior of wild animals, we can work toward minimizing our impacts on these populations while maximizing the benefits that can be gained in so doing.

III. DEER AND VEGETATION MANAGEMENT GOALS AND OBJECTIVES

A primary goal of the NPS is to preserve the resources of parks and to provide for visitor use by current and future generations. In order to accomplish this two-sided goal, a park manager designates various areas of the park as "management areas" based upon the type of resources, public use, and the particular park objectives.

More specifically Park Deer and Vegetation Management Goals are to:

- * Maintain the natural processes which allow the sustenance of the Island deer population.
- * Provide opportunities for national seashore visitors to enjoy, appreciate, explore, and learn about this barrier island resource.
- * Encourage and support scientific studies of deer biology, ecology, and history. These studies will provide information for deer and vegetation management, and will be compatible with the park's protection objective.
- * Inventory and monitor the natural resources utilized by the deer to increase our knowledge and understanding of our deer and vegetation resources.
- * Provide for public health and safety while recognizing that no barrier beach environment outing can ever be completely safe, and that risk-taking is part of the outdoor experience.
- * Establish regulations, guidelines and policies that provide for a balance between deer and vegetation management goals, recreational and educational opportunities, scientific research, and human safety.

Area Specific Objectives

A. Natural Area

1. Establish an information base from which informed deer and vegetation management decisions can be made.
2. Determine the "ecological carrying capacity" of deer under existing and predicted conditions by December 1994.

Prepare a report that suggests alternative actions, probable impacts, and make a management decision to take action, even if that is no action. Economic carrying capacity will not be addressed since the policy of the NPS is to support natural processes in natural areas.

3. Develop educational and interpretive materials, including brochures, signs, maps, exhibits, and audio-visual materials, explaining the national seashore philosophy, and direction for deer and vegetation management.

B. Development Area

1. Retain environmentally compatible traditional uses, such as visiting the island for beach combing, swimming, and boating, while also preserving the nationally significant natural resources.

2. Recognize and mitigate reasonable safety and health concerns related to park management of community residents and park visitors.

3. Minimize human activities which alter population size, distribution and behavior of deer.

4. Encourage communities on Fire Island to preserve natural vegetation wherever it occurs.

IV. ENVIRONMENTAL ASSESSMENT

Purpose and Need

Fire Island National Seashore is a barrier island situated with an east/west bearing approximately three miles off the south coast of Long Island. It contains "relatively unspoiled and undeveloped beaches, dunes, and other natural features...in close proximity to large concentrations of urban population" (Public Law 88-587). Some areas contain uncommon resources such as barrier island deer and some of the vegetation upon which they feed. These resources are uncommon, and thus little research is available on barrier island deer and some of the vegetation upon which they feed. In addition, there are seventeen communities on the island within the boundaries of Fire Island National Seashore, they, and the national seashore promote island visitation.

The purpose of this environmental assessment is to determine whether the proposed actions specified in the park's deer and vegetation plan best meet resource preservation and visitor use needs.

Alternative Actions and Impact Analysis

Alternative One - No Action

This action makes no attempt to obtain additional information on the trends associated with the Fire Island deer populations and related vegetation.

Impacts - not very likely to be an effective method area-wide or long-term; may be suitable on a short-term basis and/or within certain sections of the natural or developed areas. The monetary cost is minimal. Environmental cost is unknown.

Alternative Two (Preferred) - Continue Research

The first study of the insular deer of Fire Island was completed in 1989. That research suggested much additional information would be necessary and helpful to park managers. This action involves further study into the "ecological carrying capacity" of Fire Island in relation to deer. Research would continue on the tick that carries Lyme disease, exclosure suitability, and

Community values in relation to deer and vegetation. Data from much of this research would alert park managers prior to the natural area deer population reaching a level that no longer allows for the natural processes of the deer population or the related vegetation. Much of the information from this research may also be applicable to the developed area.

Impacts - Allows for development of a sound plan to mitigate environmental hazards to those natural processes sustaining Fire Island (barrier island) deer. The monetary cost is moderate/high. As long as all resource management decisions are based on sound research there should be no net loss to the environment.

Alternative Three (Preferred) - Develop an Active Deer and Vegetation Management Information (Interpretation) Program

The park will assist the island communities and visitors through educational activities in understanding this barrier island deer population. Information on topics such as: fencing to protect landscape, deer ecology, Lyme disease, and the problems, both legal and environmental with recreational feeding of Fire Island deer would be available.

Impacts - This action will increase public understanding of deer and related vegetation ecology on Fire Island. As the park's deer research uncovers new information in areas such as Lyme disease, feeding habits, or fertility controls, this information will be added to the program. The monetary cost is moderate. Environmental protection would be improved.

Alternative Four - Artificial Feeding

This action involves the use of food supplements or planting food crops on public lands.

Impacts - This action may increase the biological carrying capacity, but does not encourage an environmentally controlled population. It may be temporarily effective in limited situations to affect deer movement and distribution. The monetary cost is

high. This action would alter the environment of the area in which it is used. It is not supported by federal regulations or NPS policy.

Alternative Five - Population Control

This action involves the use of such activities as: fertility control, professional hunters, recreational hunting, reintroduction of predators, and trap and removal.

Impacts - Except for reintroduction of predators, none of these options support the natural processes of Fire Island. Several of these choices would be unusable in the community areas where the deer are a primary concern (recreational hunting and reintroduction of predators). At present there is no cost effective method of delivering the fertility control drugs on free ranging deer populations. The monetary cost would be high for all but professional hunters. The environmental cost of each of these control actions, except the reintroduction of predators, would require a moderate to high cost to the environment. Reintroduction of predators would require a separate Environmental Assessment.

Alternative Six - Deer Exclosures

This action involves setting up areas in the Park that are fenced off to exclude deer.

Impacts - This alternative would allow for the protection of certain areas from deer browsing. It would protect vegetation judged to be at risk in the area, on the State or Federal list of Threatened/Endangered Species, or whatever criteria would be used for this form of vegetation protection. This may be detrimental to certain natural processes and perpetuate non-targeted species. The monetary cost of set up and maintenance would be moderate. The cost to the environment would be determined when the objectives of each proposed exclosure are decided.

Impact Matrix

ALTERNATIVE	IMPACT			
	Nat. Res. Impact	Monetary Impact	Visitor Safety	Visual Impact
1. No Action	Negative	Minimal	Negative	Negative
2. Continue Research	Positive	Mod/High	Positive	Positive
3. Deer Info. Program	Positive	Moderate	High	Positive
4. Artificial Feeding	Negative	Very High	Moderate	Negative
5. Population Controls	Negative	Mod/High	Moderate	Negative
6. Exclosures	Moderate	Moderate	High	Moderate

Summary of Preferred Alternatives

Alternatives - 2 and 3

Alternative 2 - Continue Research Necessitated by Recent Studies

In this alternative our present studies of Lyme disease and the Sunken Forest vegetation will continue. We will be starting a study of the Fire Island ecological carrying capacity in 1991/1992. The park will continue the two annual deer surveys and the spring deer mortality counts in the Wilderness Area. This alternative allows Park Management to build upon the limited existing data in the field of barrier island deer. Should data indicate a need to regulate the deer population, these studies could be used to develop the required Environmental Impact Statement. This information will also be useful to other barrier island areas that are experiencing similar deer and vegetation issues.

This alternative encompasses research on the seven deer exclosures set up in 1985. These exclosures will remain in place. If study of these exclosures suggests additional exclosures should be put in place (i.e. to protect threatened/endangered plant species), alternative six may also be adopted.

Another benefit of alternative 2 is the connection with alternative 3; to enable the Park to pass the most up-to-date information on the deer and vegetation issue to the public, especially on Fire Island.

Also, as our initial study was completed and this plan has been developed, a number of natural resource areas in the eastern U.S. have begun watching our progress and requesting the research information as it becomes available.

Alternative 3 - Develop an Active Deer and Vegetation Management Information (Interpretation) Program.

The park's present Interpretation Program is set up to disseminate Park information in all visitor contact areas of the park (Visitor Centers, trail heads, guided walks, etc.). The park Interpretive Program has a number of contacts in the communities where park information is expected to be available and is used each day (bulletin boards, school groups, hotels, etc.). This alternative will begin with dissemination of

brochures on deer ecology, maps and guidelines on avoiding the areas most likely to contain the Northern Deer Tick (the major host of the spirochete that carries Lyme disease). From these outreach areas forms will be available to report deer activity, or deer/human interactions which will enable researchers to more easily obtain the baseline data often needed to uncover trends in deer behavior.

From these visitor contact areas Island residents will be able to obtain information helpful in protecting them and their property as much as is possible from the risks associated with living with barrier island natural resources.

V. SCHEDULED ACTIONS FOR PLAN IMPLEMENTATION

With the objectives and issues of deer and vegetation outlined, the park will complete the following actions to meet the park objectives. This section is to define the proposed actions to be taken through this plan.

A. Natural Area

Objective 1. Establish an information base from which informed deer and vegetation management decisions can be made.

ACTIONS

a. The North Atlantic Region will continue research into predators to Ixodes dammini, the deer tick or, Borrelia burgdorferi, the spirochete. Natural predators are the preferred method of control in the park (initial park research for predators was begun in 1990).

b. Continue vegetation research in the Sunken Forest to determine the impact of deer on the area. This research may also determine the impact of natural disasters such as hurricanes, on the deer and related vegetation.

c. The Park will continue bi-annual deer surveys and an annual spring deer mortality count in the Wilderness Area (through 1996).

d. Research the need for, and feasibility of, exclosures used to protect area plant community integrity. Exclosures are presently used for research in the Sunken Forest, the Wilderness Area and the Lighthouse Area. Would expanding this program, during times of plant community stress due to human activities, assure biological diversity? If data suggests this action, the park will request additional base funding to develop and maintain all needed exclosures.

e. Organize a reference library in the Resource Management Office in Patchogue. References will be available to: park staff for Interpretation Programs and researchers working on Fire Island deer and vegetation management (off-site researchers may use the facility and copy information to transfer to their research area). Requests for use by off-site researchers should be made to the Superintendent, Fire Island National Seashore; and

be sent on letterhead from the Institution under which the researcher is studying.

Objective 2. Determine the "ecological carrying capacity" of deer under existing and predicted conditions by December 1994. Prepare a report that suggests alternative actions, probable impacts, and make a management decision to take action, even if that is no action. Economic carrying capacity will not be addressed since the policy of the NPS is to support natural processes in natural areas.

ACTIONS

a. Obtain funding for research into the "ecological carrying capacity" of Fire Island deer. These funds will be sought from NPS Regional or Washington accounts, Special Initiative Funds, or Natural Resource Protection Program Funding. Environmental compliance procedures must be completed prior to taking significant actions suggested by this research.

Objective 3. Develop educational and interpretive materials, including brochures, signs, maps, exhibits, and audio-visual materials, explaining the national seashore philosophy, and direction for deer and vegetation management.

ACTIONS

a. Signs will be posted at trail heads that address the inherent dangers of close contact with wild animals and deer in particular (i.e. male deer tendencies during the rutting season). Information on deer ticks and human/deer interaction reports will be included on such a sign.

b. An interpretive brochure will be developed which explains the dangers of close contact with deer, the legal and environmental consequences of recreational deer feeding, and a summary of deer ecology (i.e. natural feeding habits, life cycle).

c. A slide program suitable for visitor center or off-

site program use will be prepared. This program will be 15 to 20 minutes in length. It will have a script on tape or booklet form depending on audio-visual equipment available. There will be an allowance for a question and answer period after the program. There will be an evaluation form to be completed and returned to the Interpretive Specialist and Natural Resources Management Specialist. It will elicit information not only on the A-V program, but information useful for deer/human interaction records (i.e. how many people in the audience have participated in recreational deer feeding while on Fire Island).

B. Development Area

Objective 1. Retain environmentally compatible traditional uses, such as visiting the island for beach combing, swimming, and boating, while also preserving the nationally significant natural resources (i.e. barrier island geography that protects Long Island).

ACTIONS

a. Install interpretive devices and dune crossovers directing visitors to activities that cause minimal damage to environment (natural processes) and sustain the area wildlife.

b. At the next printing of the Park general brochure a section on the visitors part in maintaining the natural processes required to sustain the Parks insular wildlife, with special emphasis on the deer populations will be included.

Objective 2. Recognize and mitigate safety and health concerns of community residents and park visitors.

ACTIONS

a. The Park will develop an Integrated Pest Management Program which incorporates our knowledge of the "questing" habits of deer ticks to lower the number of tick/human contacts. From our latest studies, responsible application of pesticides in the developed

areas is possible. The park will make use of the technology such as the use of permethrin treated cotton balls, to attain a level of safety from Lyme Disease not obtainable in the Natural Area. A program of public education about ticks and their habitat affinities will be initiated, as well as a continuation of ongoing tick research. All programs will be implemented and evaluated by the park's Natural Resource Management Specialist.

b. The park will develop programs similar to those outlined under Natural Area Objective number three. This includes signs, brochures, and audio-visual programs directed toward the particular deer and vegetation concerns of community residents and park visitors (observing deer). This will include information such as, suggestions on stalking wildlife for picture taking purposes.

c. The Interpretive Division will order several books for the cooperating association sales area in the visitor centers. The books should help visitors photograph wildlife (deer in particular) more effectively.

d. The park, with the help of the Regional Social Science Staff, will develop the deer/human interaction report. This information will be used by the park to map trends in deer activity in the seashore. The communities may use such a report to develop programs to minimize negative impacts from deer/human interactions. This report may take the form of research to discover the public attitude toward wildlife in relation to their abundance and effect on the island's natural and social systems (a community outreach program). This information will be used to direct the interpretive efforts of our park brochures and the interpretive programs given by our staff.

e. The park will work cooperatively with the communities to develop a communications plan procedure for recording deer-human interaction reports in the park and the 17 communities located within the park boundaries. This data will be monitored for trends in deer-human contacts to limit unsafe interactions.

Objective 3. Minimize human activities which alter population size, distribution and behavior of native

species including deer.

ACTIONS

a. A concerted effort will be taken to inform the public of the biological and legal consequences of feeding deer. There is a need for a local informed public on this issue. Park marinas and island communities are the major visitor entry points for this activity. The park may develop special programs to discourage visitors and residents from giving or leaving food for deer and other wildlife.

b. The concessioner will be asked to produce signs and add information to concession handouts which explain the legal and environmental dangers of recreational deer feeding.

Objective 4. Encourage communities on Fire Island to preserve native vegetation wherever it occurs.

ACTIONS

a. The maintenance staff, with the help of resource management and interpreters will develop fencing demonstration areas to help residents prevent unwanted deer browsing on landscape vegetation. This will be used on interpretive talks.

a. The park will work cooperatively with the communities to develop a communications plan procedure for disseminating information on barrier island landscaping. An avenue of communication and funding similar to a "Cooperative" will be developed for this purpose. Points from other NPS cooperatives, task forces, etc. will be used to form this effort in the Developed Area. Fire Island National Seashore will initiate the actions in the public use areas of the park, while the cooperative will suggest avenues of action and funding in the communities. The NPS will lend their expertise and facilities for this group where beneficial to the overall resource management of the island. This cooperative program with island communities will share information.

b. Develop a cooperative program with park communities:

Membership

- one member from each community, with an alternate available,
- the New York State Department of Environmental Conservation, Robert Moses State Park, and Smith Point County Park Officials will be asked to become members,
- Superintendent, Chief Ranger, and Natural Resource Management Specialist will be permanent members,

Technical Advise from NPS

- park and North Atlantic Region participation (i.e. research staff will attend as reference personnel; Superintendent, Chief Ranger, and Resource Management Specialist membership to discuss park and community concerns),

Funding

- cooperative may develop programs to acquire private funding for park research that benefits both park and community,

Education

- cooperative will be an avenue for interpretive programs on deer and vegetation management,

Community Advisory Group

- cooperative may act in a community based advisory capacity to the park on issues of concern,

C. Plan Implementation and Revision Timeline

	1991	1992	1993	1994	1995	1996
Natural Area Actions						
1a. Reference Library		XXX				
1b. Vegetation Research (5 yrs.)	XXX					
1c. Deer Pop. Surveys (5 yrs.)	XXX					
1d. Deer Tick Research (5 yrs.)	XXX					
2a. Ecological Carrying Cap. (3 yrs.)	XXX					
3a. Trail Head Signs		XXX				
3b. Deer Contact Brochure	XXX					
3c. Deer A-V Program		XXX				

Developed Area Actions

	1991	1992	1993	1994	1995	1996
1a. Dune X-over Signs		XXX				
1b. FIIS Brochure Deer Section					XXX	
2a. Tick IPM Program		XXX				
2b. Deer/Human Safety Prog.	XXX					
2c. Wildlife Contact Books	XXX					
2d. Protective Fence Display		NLT				
2e. Deer/Human Interact. Rept.	XXX					
3a. Rec. Deer Feed Warnings		XXX				
3b. Concession Program		NLT				
4a. Cooperative Organization		NLT				

NLT=Not Later Than;

D. Revising the Plan

Deer and vegetation management is an ongoing process that requires periodic evaluation of management effectiveness. This process will be facilitated through implementation of a monitoring program and through periodic input from a deer and vegetation observation group composed of National Seashore and Regional staff involved or interested in deer and vegetation management on Fire Island. This group will meet at the Superintendents discretion.

Major changes in this plan will be recommended by the Superintendent and approved by the Regional Director. Minor changes and updates require approval only from the Superintendent. Minor changes include: grammatical corrections, page numbering corrections, deletion, correction, or addition of appendices, and correction of the table of contents. Changes requiring the Regional Director's approval will be submitted with a new Plan signature page.

A major review and update of this deer and vegetation management plan will be completed no later than December, 1996.

VI. STAFF RESPONSIBILITIES

SUPERINTENDENT

Is directly responsible to the Regional Director for all deer and vegetation management activities.

Approves deer and vegetation management research projects conducted within the boundaries of Fire Island National Seashore.

Approves any new deer and vegetation management actions designed to control deer or related vegetation populations (this includes boundary fencing, exclosures, or other deer barriers).

Approves cooperative agreements, memoranda of understanding, special use permits, collecting permits, and research proposals.

Works with concessionaires and other non-federal entities to encourage activities that foster good deer and vegetation management.

Maintains permanent membership in the "Fire Island Cooperative".

CHIEF RANGER

Enforces laws and regulations prohibiting recreational deer feeding and any wildlife disturbances.

Coordinates with Natural Resources Management Specialist for deer search and rescue (immobilization) efforts. Coordinates yearly deer immobilization training sessions, involving protection staff, interested staff from other divisions, and outside expertise.

Maintains Island resident or visitor/deer interaction reports; passes data on to Natural Resources Management Specialist for monitoring trends of interactions.

Increases deer and vegetation protection patrols when possible as requested by Natural Resources Management Specialist.

Staff assists with the annual spring deer mortality count in the Wilderness Area.

Maintains permanent membership in the "Fire Island Cooperative".

NATURAL RESOURCE MANAGEMENT SPECIALIST

Coordinates all deer and vegetation management actions with the Chief Ranger

Prepares, updates, and revises the Deer and Vegetation Management Plan.

Reviews and recommends action on collection permits, special use permits, memoranda of understanding, cooperative agreements, and research proposals, and seeks outside reviews as needed.

Reviews and judges written requests for deer and vegetation information and releases information as warranted.

Identifies necessary deer and vegetation research. Coordinates and assists with deer and vegetation research projects.

Prepares budget requests for deer and vegetation management projects.

Monitors the condition of the deer and related vegetation resources.

Supervises inventory and monitoring of all known deer populations, and keeps deer and vegetation files up-to-date with all pertinent information.

Schedules and supervises deer and vegetation restoration projects.

Installs Island resident or visitor/deer interaction monitoring devices (including case incident reports, visitor center logs, and records of telephone calls).

Attends professional meetings on deer and vegetation management.

Facilitates meetings of deer and vegetation management program

groups.

Provides expertise and assistance for interpretive programs, and trains National Seashore Staff in the implementation requirements of the Plan.

Cooperates with Chief Ranger on developing standard operating procedures and training in deer rescue (immobilization) methods.

Maintains permanent membership in the "Fire Island Cooperative".

INTERPRETIVE SPECIALIST

Enhances Fire Island resident and visitor knowledge and respect for deer and vegetation resources through interpretive media.

Develops educational and interpretive materials, including brochures, signs, maps, exhibits, and audio-visual materials, explaining the national seashore philosophy, and direction for deer and vegetation management.

Conducts deer and vegetation related Island resident and visitor programs, evening programs, and tours. Sponsors special programs for Island residents and visitors.

Trains visitor center staff in conducting of tours, talks, and programs, and in sensitive responses to Island resident and visitor requests for deer and vegetation management information.

Cooperates with Chief Ranger and Resource Management Specialist on deer and vegetation management, deer mortality counts, and deer rescue (immobilization) activities.

CHIEF MAINTENANCE

Maintains deer control devices including exclosures, signs, boundary fencing, and other deer barrier equipment.

Trains subordinates in the philosophy, direction, and purposes of this Plan.

Assists with the annual spring deer mortality counts in the Wilderness Area.

VII. INVITATION TO COMMENT

The National Park Service (NPS) proposes to implement a Deer and Vegetation Management Plan on Fire Island National Seashore that requests additional research to determine "ecological carrying capacity" for barrier island deer, sets up an information (Interpretation) program to educate the public on barrier island deer management and exchange information with Fire Island residents to mitigate deer/human and deer/property interactions. In addition the Plan delineates management objectives and outlines deer and vegetation management responsibilities.

If you would like to volunteer information pertinent to deer and vegetation management at Fire Island, be placed on our mailing list, or would like to comment on the issue, you are invited to do so and send our comments to:

Superintendent
Fire Island National Seashore
120 Laurel Street
Patchogue, New York 11772

prior to May 3, 1991. All information supplied to the National Park Service will be come part of the public record for this management plan process.

VIII. BIBLIOGRAPHY

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These references and others are available from your local library, library loan system, or at the Fire Island National Seashore Library (hours; 9 - 4, Mon - Fri, by appointment, 515-289-4810).

APPENDIX A

1989 FIRE ISLAND DEER AND VEGETATION STUDY OBJECTIVES

A study of the deer and vegetation on Fire Island initiated at that time (completed in 1989) which was to:

- determine deer population size and trends,
- map deer movement patterns,
- identify deer nutritional needs,
- ascertain effects of deer upon the vegetation (and determine Fire Island deer dietary preferences),
- identify the deer interaction with Lyme disease, and
- offer management recommendations.

APPENDIX B

DEER AND VEGETATION MANAGEMENT TASK FORCE OBJECTIVES

At the completion of the first Fire Island National Seashore study of the insular deer population (1989), a task force was initiated and the following plan objectives were established.

- Identify Management Goals and Objectives,
- Define the Criteria for Action,
- Develop Options for Management,
- Select the Appropriate Option, and
- Implement the Deer and Vegetation Management Plan.

APPENDIX C

PLANNING TEAM AND CONSULTANTS

The Fire Island National Seashore Deer and Vegetation Management Plan is being developed by the following Planning Team and Consultants.

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