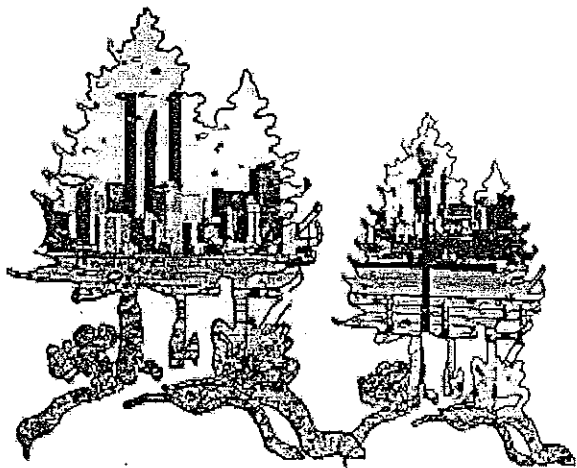


Liberty State Park



General Management Plan for The Parks Interior Section

August 2001



New Jersey Department of Environmental Protection - Division of Parks and Forestry





State of New Jersey

Department of Environmental Protection

DONALD T. DiFRANCESCO
Acting Governor

Robert C. Shinn, Jr.
Commissioner

Office of the Commissioner
P.O. Box 402
Trenton, New Jersey 08625
Tel: (609) 292-2885
Fax: (609) 292-7695

September 28, 2001

Interdisciplinary Planning Committee Member
Liberty State Park
Jersey City, NJ 07305

Dear Committee Member:

Thank you for your submission of a recommended General Management Plan ("GMP") for the 250-acre interior area of Liberty State Park. I recognize that this GMP is the product of an eighteen-month planning process by the diverse group of stakeholders that comprised the Interdisciplinary Planning Committee. I want to personally thank you for the time, effort and commitment that you put into building consensus amongst the stakeholders through this planning process. In view of the very different visions and passion that each of the stakeholders had for this park, I know this was not an easy task.

Liberty State Park sparks the passion of people because it is truly a special place. In view of the Statute of Liberty and Ellis Island, it is a place where visitors reflect on the freedoms provided to us in our great country. Here visitors come to better understand the challenges faced by our ancestors when they arrived to begin their new lives in America. Indeed as many of our ancestors chose their destinations at the Central Railroad of New Jersey Terminal building and boarded their train to their destination in America, it is at Liberty State Park where they really began their new lives. The GMP stresses the importance of not allowing uses of the park to overwhelm the park's historical significance.

The park's history and much of the surrounding communities' cultural significance is a product of its environment. The park's unique location in an estuarine environment, yet located on one of the world's busiest harbors, presents exciting interpretive and education opportunities. The GMP developed by the Interdisciplinary Committee sets forth a vision that will allow visitors to explore our country's history, embrace our cultural diversity, study estuarine wildlife, as well as to recreate and reflect; all within an urban setting. The GMP strikes the appropriate balance of serving a diversity of needs without overwhelming the surrounding environs as a more active recreational approach may have. Moreover, with the participation of the US Army Corps of Engineers in the restoration

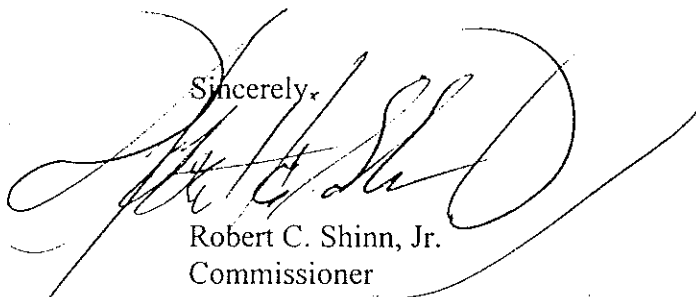
elements of the GMP, the GMP will serve as a national, if not international, case study for urban restoration ecology.

The GMP also strikes an appropriate low-key note that is fitting in light of the events of September 11, 2001. As Carl Sagan noted in the "Pale Blue Dot," "Our planet [a pale blue dot that is our home, that's us] is a lonely speck in the great enveloping cosmic dark. In our obscurity—in all this vastness—there is no hint that help will come from elsewhere to save us from ourselves. It is up to us. ... It underscores our responsibility to deal more kindly and compassionately with one another and to preserve and cherish that pale blue dot...." The horrific attacks of September 11th have caused Americans to unite and take a stand to defend, preserve and cherish this country and our way of life. The passive and mostly natural plans proposed by the GMP honor these sentiments.

Based on the above reasons, I accept the GMP you have recommended and look forward to its implementation in the future.

Once again, thank you for all of your time and dedication to Liberty State Park and in the development of the GMP.

Sincerely,

A large, stylized handwritten signature in dark ink, likely belonging to Robert C. Shinn, Jr. The signature is fluid and cursive, with a large loop at the end.

Robert C. Shinn, Jr.
Commissioner



The Future of Liberty State Park

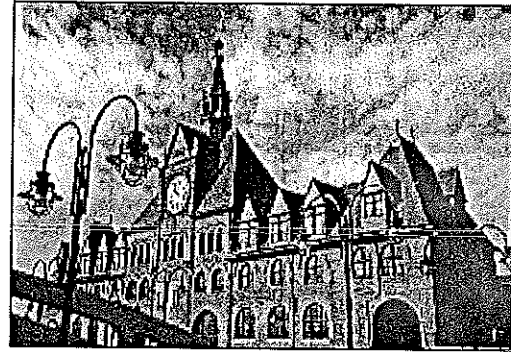
Summary of the Park and Plans for the Future



Background

Liberty State Park is an extraordinary and unique historic and natural resource. With the Manhattan skyline, the Statue of Liberty and Ellis Island as a spectacular backdrop, it is also one of New Jersey's most dramatic parks.

The historic Central Railroad of New Jersey Terminal (CRRNJ) is the cornerstone of the park and was the setting for much of New Jersey's transportation history. A two-mile promenade, Liberty Walk links the picnic area, Interpretive Center and the CRRNJ Terminal while presenting visitors with a sweeping view of the Hudson River. Located in the park's western section is Liberty Science Center, a popular attraction for students and families.



Central Railroad of New Jersey Terminal

In addition, Liberty Science Center is an innovative learning resource for lifelong exploration of nature, humanity and technology; supporting the growth of our diverse region; and promoting informed stewardship of the world.

Activities in the park include boating, canoeing, picnicking, fishing, hiking, biking, and numerous special events. The park also features the Liberty Landing Marina and ferry service to the Statue of Liberty and Ellis Island. Currently 4.3 million annual visitors are accommodated within the 598 upland acres, 523 tidal acres, 25 structures and 5.3 miles of roads.

Liberty State Park was once an urban industrial railroad yard. As a result of its historical land use, the Division of Parks and Forestry has spent the past 25 years since its acquisition planning and building a park infrastructure that is suitable for public recreation, interpretation and education. With more than four million visitors annually, the park's development continues to be an extraordinary success.



As part of the Division's Waterfront Improvement Plan for Liberty State Park, development of an 88-acre Green Park was completed in 1999. Bordered on the west by Freedom Way and on the east by Liberty Walk, the Green Park is comprised of magnificent crescent lawns, trails and landscaping improvements, including newly planted trees, shrubs and wildflower meadows. Approximately four miles of paved walkways have been added, as well as seven plaza areas located along Liberty Walk, which provides views of Ellis Island and the Statue of Liberty.

The Green Park is just one example of the development potential of Liberty State Park as a premiere recreational site and urban green space. The next stage of the park development will focus on providing public access to the 251-acre interior section and enhancing the park's historic resources.

The true local and regional tourism and economic impact of Liberty State Park will only be realized upon the complete restoration of the CRRNJ Terminal and the expansion of Liberty Science Center. The Division, through its partnership with the Save Ellis Island! Foundation and the National Park Service will also play a critical role in the continued restoration of Ellis Island and in providing increased access to this landmark. Improved interpretive facilities, including exhibits and programming, will help attract both a regional and national audience, presenting a broader picture of the area's pivotal role in America's immigrant and industrial history.

While the National Monuments reveal the story of the people of the United States of America and the Liberty Science Center looks into the possibilities of the future; the *mission of Liberty State Park is to provide the public with access to the harbor's resources, a sense of its history and the charge of responsibility for its continued improvement.* These various interests must produce cooperative efforts that enrich the lives of the people in the surrounding community and the experience of all visitors to Liberty State Park.

Critical Future Issues - The Division of Parks and Forestry looks forward to working with the many partners of the park to accomplish the following tasks:

- Provide a fully accessible park that will accommodate over 6 million visitors annually by mass transit, passenger vehicle traffic and pedestrian walkways.
- Present additional improvements to enhance non-commercial, open space for recreational use.
- Complete the interior portion of the park through enhancement of wetlands and forests and the development of interpretive space and public access.
- Remediate the remainder of the contaminated soils.
- Restore the CRRNJ Terminal to accommodate public use and special events, including the improvement of the train shed areas to provide programs, exhibits, special events and interpretive uses.
- Redevelop the southern portion of the park to complete Liberty Walk.
- Restore Caven Point Pier, and the other piers located along the southern boundary of the park.

Capital Improvement Project Needs – In order to accomplish the tasks as outlined, the following capital improvement projects will have to be undertaken. The cost for these projects is speculative at this time; however, preliminary estimates call for between \$68 and \$150 million. The following list of projects is not in any order of priority:

- Terminal Interior, 1st and 2nd Floors
- Train Sheds Stabilization/Adaptive Reuse
- Administration Building
- Liberty Walk Access Improvements
- Site work/Remediation
- Recreational Improvements
- Southern Waterfront Improvements
- Interior Park Plan Implementation
- Southern Jetty Restoration
- Access Improvements
- Interpretive Center Expansion
- Restoration of Caven Point Pier



The Surrounding Community

Jersey City, the state's oldest metropolitan area, is enjoying a renaissance of construction. A gateway to more than 10 million immigrants who landed on nearby Ellis Island in the great migrations of the 1800s and early 1900s, Jersey City is still the golden door to opportunity on the west bank of the Hudson River. It is becoming Wall Street west and Silicon Valley east, as 80 percent of NASDAQ trading now takes place in Jersey City. Plans for redevelopment of the waterfront include 27 million square feet of office space and nearly 15,000 residential units. Since 2000, 15 million square feet of office space, seven thousand residential units and four hotels were built or are under construction.

The land adjoining Liberty State Park has been an integral part of this revitalization. Along the park's southern boarder Port Liberte', a 1,290 condominium unit and future golf course, now houses a permanent residential population and is entering into a new phase of expanded development. A proposed sports complex along the park's western boundary will bring activity to the area of the park that currently hosts the Liberty Science Center. The northern boundary, along the Morris Canal has experienced increased residential development and will be further impacted by the construction of the Jersey City Medical Center. Finally, the National Park Service and the Save Ellis Island! Foundation, have entered into a partnership to appropriately reuse the remaining 29 buildings on Ellis Island. The agreement recognizes the Save Ellis Island! Foundation as the primary fund raising entity for the estimated \$300 million project.

Recently the completion of the New Jersey Light Rail Park and Ride, with 1,290 parking spaces, and the addition of ferry service to the Liberty Landing Marina are beginning to address the problems of access to the park. The intra-park shuttle has begun to focus on circulation within the park. Connecting to mass transit and the ability to enhance pedestrian flow into and around the park are critical to the future success of Liberty State Park.



Basic Charge of the Interdisciplinary Planning Committee

In the center of the park there remains approximately 251 acres of a former railroad yard, which is undeveloped. Much of the area has been re-colonized by various plant communities. These communities represent unique associations of both endemic and non-native species that can be considered the by-product of the cultural events that have taken place during the past several centuries. A broad-based, goal-driven approach is being used to develop the General Management Plan (GMP) for the site. The planning process stresses the fundamental relationship between resource significance and visitor experience. The planning process encourages feedback at the local, regional and statewide levels. Most importantly, the planning process results in documentation of planning efforts that build a consensus among participants, assure logic and consistency in the proposals, and provide a valid rationale in decision-making. The members of the Interdisciplinary Planning Committee, who represent various public and non-profit interest groups, have agreed to participate in the development of this GMP.

Premise I) Inherent Ecological Value

Various plant and animal communities have re-colonized much of the site. Like the surrounding community of people, these assemblages are diverse and have origins throughout the world. This diversity is further enhanced by the rapid rate of natural succession (change inherent within any ecosystem). The park is a major resting area for species using the Atlantic Flyway during the migration seasons. Hence, there is ecological and aesthetic value in some of the existing natural associations.

Premise II) Soils Condition

The soils of the area consist of fill brought in by the railroad companies between 1860 and 1919 to stabilize the surface. Much of it is non-consolidated material resulting from construction projects in Manhattan, or refuse from throughout New York City and the surrounding area. It is classified as historic fill and has some limitations. Allowing public access via the creation of a trail system will have to creatively combine soils mitigation, boardwalk construction, plantings and some fencing to ensure the safety of visitors.

Agreement I, Planning Objectives:

1. Provide public access for interpretive programs, allowing visitors to come into contact with the natural world.
2. Maintain as much of the site as possible, especially wetlands and special plant communities, under a conservation mandate while providing public access.
3. The landscape of the interior should reflect the history of the area now known as Liberty State Park as well as the connection to the harbor/estuary.
4. Provide public access to the perimeter of the site for open space, non-commercial recreational uses.
5. Improve topography, enhance wetlands, provide open water, and enhance aesthetic values and sight lines where possible. In those areas that are to be improved, new

elevations will be established that enhance the existing wetlands, possibly creating open water habitat and taking advantage of the spectacular views of the harbor and the New York City skyline.

6. This planning initiative will be conscious of other neighboring redevelopment efforts, and other tourism issues in the immediate vicinity.

Agreement II, Proposed Protection Strategies:

Key to accomplishing the committee's stated objectives will be the integrated use of the protection of critical areas; the conservation of woodland and field areas; the restoration of wetland habitats and provisions for visitor services according to the following:

1. The existing wetland areas, which are protected under the Freshwater Wetland Act, will be enhanced where possible.
2. There is a unique plant community atypical to this area that has been identified as the "moss mat community." Due to its unique association of species, which is characteristic of communities at northern latitudes, this critical area will also be protected.
3. Most of the area will be maintained under a conservation mandate, which allows for the management of invasive species and enhancement with species that would increase biological diversity.
4. Saltwater wetland and estuarine restoration may also be possible.

Agreement III, Methodologies:

In order to accomplish both the protection and enhancement of the park's interior section, the committee further agreed to the following implementation methods (see attached conceptual map):

1. Freshwater Wetlands - The protection of the wet-thicket and sedge ponds, which currently occupy approximately 3 acres, is critical. A buffer of 100 feet must also be included, and the area could be expanded to approximately 10 acres. In addition, the half-acre "moss mat community" is found in association with 2 acres of "common reed," a half-acre of sumac and 1.3 acres of sedge ponds, which act as a buffer. This complex should remain intact and allow the "moss mat community" to expand.
2. Forest Enhancement - The pioneer forest comprises a significant section of the interior. Management strategies in these areas will consist of removing invasive species and a limited amount of wildlife enhancement plantings. In addition, those field areas existing between the wooded areas should be allowed to succeed, creating a more contiguous forest. Field areas include herbs and grasses that inhabit the dry, gravel soils of the old railroad beds. Many grass fields are gradually giving way to early succession woody species. While this transition will be encouraged in those areas between the forested stands, thereby creating a more contiguous forest, some grasses will be maintained. The primary management practice will be to mow the area on an annual/biannual basis or more frequently depending upon the desired use.

3. Field/Forest Succession - Grasses and species of trees typical of early succession currently dominate the dredge spoil site. It may be possible within these areas to create a cross section of the vegetative communities, which existed prior to the development of the area. The creation of an area representative of the transition from salt marsh to upland forest would provide for an exceptional study of habitat restoration in the urban environment while enriching the visitor experience.

The "common reed" (*Phragmites communis*) dominates the marsh meadow. The "common reed" grows as nearly impenetrable stands of 10-12 feet in height. While some of these stands will be involved in the restoration efforts, which may include the reintroduction of freshwater habitat into the park, several acres should be left for its inherent wildlife values.

The restoration of both freshwater and saltwater wetlands could re-introduce aquatic habitats to the center of the park and create a network of interconnected wetlands/waterways.

4. Interpretive Enhancements - Interpretive trails will be developed in areas already used as former roads to minimize disturbance. However, several connecting trails will have to be developed. These should follow the vegetative communities to allow for viewing wildlife while minimizing disturbance.
5. Interpretive and Recreational Enhancements - Several trails and perimeter green spaces will be established in order to provide open space, non-commercial recreational enhancements, connections between existing facilities and access for interpretation. While the perimeter must serve as a buffer to the more ecologically sensitive areas, its width can vary to create interesting areas capable of supporting trails that explore interpretive themes, picnic areas or other forms of open space, non-commercial recreation. The amount of acreage dedicated to the various types of activities would be determined during the future design phase, but should generally follow the wood lot edge.

The 18-acre soil stockpile area, recently used for the storage of soil used for landscaping purposes throughout the park, will provide for a range of open space, non-commercial recreational activities. Its location in the extreme southwest corner of the site, next to the industrial complex and across from the proposed sports complex may lend itself to such use and is critical as a buffer to the more ecologically sensitive areas within the site.

Visual and noise barriers can be created, by using soil to increase the elevation of certain areas within the perimeter. They can be applied to obscure the view of the industrial area or decrease the noise from traffic along Phillips Drive. They can also be used to create interesting lines of sight between the Liberty Science Center and the Interpretive Center or to direct storm water into the wetland areas.

Agreement IV, Feasibility:

This conceptual plan has been developed with the intention of providing the best land use given existing conditions. At this point, engineering studies that focus on mitigation of historic fill, the enhancement of freshwater wetlands and reintroduction of salt marsh habitat must be undertaken. It has been determined that the area is of such significance to the eventual success of other park amenities, and also to the quality of life for surrounding residents and visitors, that a professional international competition for the actual design should be conducted. Such competitions tend to increase the visibility of the project and attract more creative designers.



Conclusion

Liberty State Park, the cornerstone of the Gold Coast, is already a successful rehabilitation story. In addition, with the completion of the interior section of the park, it has the potential to be an international showcase for the restoration of a former industrial landscape. However, the tremendous interest in the remaining undeveloped section of the park is symbolic of a broader struggle that often occurs within New Jersey and throughout much of the nation. That is, to balance the protection of natural resources with the need for continued economic development and recreational opportunities. The General Management Plan (GMP) that this document summarizes strives to complete the park in a manner that honors its history while at the same time provides for the open space needs of residents of the surrounding community and state, as well as national and international visitors. In addition, the GMP must be consistent with the Division's ethic statement that affirms: "activities must be within the physical and biological capabilities of the natural/historic resources."

Audrey Zapp Drive

Open Space Non-Commercial
Recreational Enhancements

Restoration / Conservation

Moss Mat Community

Restoration / Conservation

Open Space Non-Commercial
Recreational Enhancements

Freshwater Wetlands

Interpretive
Center

Area



Looking into the Future at Liberty State Park

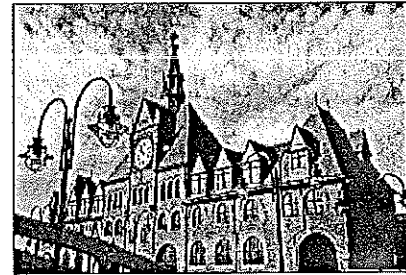


Introduction

Liberty State Park is an extraordinary and unique historic and natural resource. With the Manhattan skyline, the Statue of Liberty and Ellis Island as a spectacular backdrop, it is also one of New Jersey's most dramatic parks.

The historic Central Railroad of New Jersey Terminal (CRRNJ) is the cornerstone of the park and was the setting for much of New Jersey's transportation history. A two-mile promenade, Liberty Walk links the picnic area, Interpretive Center and the CRRNJ Terminal while presenting visitors with a sweeping view of the Hudson River. Located in the park's western section is Liberty Science Center, which is a popular attraction for students and families.

Liberty State Park was once an urban industrial railroad yard. As a result of its historical land use, the Division of Parks and Forestry has spent the past 25 years since its acquisition planning and building a park infrastructure that is suitable for public recreation, interpretation and education. With more than four million visitors annually, the park's development continues to be an extraordinary success.



Central Railroad of New Jersey Terminal

As part of the Division's Waterfront Improvement Plan for Liberty State Park, development of an 88-acre Green Park was completed in 1999. Bordered on the west by Freedom Way and on the east by Liberty Walk, the Green Park is comprised of magnificent crescent lawns, trails and landscaping improvements, including newly planted trees, shrubs and wildflower meadows. Approximately four miles of paved walkways have been added, as well as seven plaza areas located along Liberty Walk, which provides views of Ellis Island and the Statue of Liberty.

The Green Park is just one example of the development potential of Liberty State Park as a premiere recreational site and urban green space. The next stage of the park development will focus on providing public access to the 251-acre interior section and enhancing the park's historic resources.

In addition, Liberty Science Center is an innovative learning resource for lifelong exploration of nature, humanity and technology; supporting the growth of our diverse region and promoting informed stewardship of the world.

Activities in the park include boating, canoeing, picnicking, fishing, hiking, biking, and numerous special events. The park features the historic Central Railroad of New Jersey Terminal building, an Interpretive Center, Liberty Landing Marina, the Liberty Science Center and ferry service to the Statue of Liberty and Ellis Island. Currently 4.3 million annual visitors are accommodated within the 598 upland acres, 523 tidal acres, 25 structures and 5.3 miles of roads.



The true local and regional tourism and economic impact of Liberty State Park will only be realized upon the complete restoration of the CRRNJ Terminal and the expansion of Liberty Science Center. The division, through its partnership with the Save Ellis Island! and the National Park Service will also play a critical role in the continued restoration of Ellis Island and in providing increased access to this landmark. Improved interpretive facilities, including exhibits and programming will help attract both a regional and national audience, presenting a broader picture of the area's pivotal role in America's immigrant and industrial history.

The Interpretive Center



Mission Statement

While the National Monuments reveal the story of the people of the United States of America and the Liberty Science Center looks into the possibilities of the future; the *mission of Liberty State Park is to provide the public with access to the harbor's resources, a sense of its history and the charge of responsibility for its continued improvement.* These various interests must produce cooperative efforts that enrich the lives of the people in the surrounding community and the experience of all that visit Liberty State Park.



Statement of Park Significance

Liberty State Park is comprised of 1212 acres of land within the densely populated New York metropolitan area. Approximately half of that land is uplands while the other half consist of intertidal or freshwater wetlands. It is one of the few places where people have free access to the waterfront of the New York Harbor and over 300 acres of open space for unstructured recreational pursuits. The following statements reflect the significance of both the natural and historic resources of the site:

1. The CRRNJ Terminal is much more than the signature building for New Jersey's premier urban state park. This historic building, listed on both the National and State Registers of Historic Places, represents an integral component of a historic trilogy that includes the Statue of Liberty and Ellis Island National Monuments.
2. The Interpretive Center provides interpretive and educational programs to schools and the general public.
3. Almost two miles of the Hudson River Waterfront Walkway are located in Liberty State Park. The walkway provides an unequalled view of the harbor and many recreational opportunities.

4. Liberty Park Natural Area offers more than 30 acres of some of the last remaining Spartina salt marshes in the Upper New York Bay. The area includes a nature path through the associated uplands.
5. The Caven Point Peninsula, a typical barrier beach and remnant Spartina salt marsh, provides an opportunity to examine the biological richness of the harbor.
6. Liberty Science Center is a family science museum with three floors of interactive exhibits focusing on invention, health and the environment. The center also features the world's largest IMAX dome. The center has many possibilities for the future.
7. The uplands portion of the Liberty State Park Natural Area and the interior 251 acres consist of a variety of habitats that support resident wildlife and migratory songbird populations.
8. Only a few short stretches of the Morris Canal, which once ran from Phillipsburg to Jersey City, remain today. Both of the canal's Jersey City shipping basins are located in Liberty State Park.
9. Located between the Morris Canal Little Basin (built 1836) and the Morris Canal Big Basin (built 1859), this small piece of land offers spectacular views of Manhattan and provides open space for recreation and relaxation.



Visitor Experience Objectives

Often referred to as desired futures, visitor service objectives are conceptual descriptions of what the site could be like based upon resource conditions and visitor experiences. They outline actions, which should occur in order to fulfill the mission of the site. Objectives begin to answer the question, "How are we going to fulfill the mission?" They should be based upon the most recent assessment available.

1. Visitors shall be appropriately oriented to the park and the options available for recreation and interpretation, and the means to access park resources with minimum impact on protection of the resources and the visitor.
2. Visitors will have the opportunity to observe, study, understand and appreciate the ecosystems, their related plant and animal communities, and the natural and human forces that shaped them in a context of contemporary human/environmental relationships.
3. The visitor will have opportunities to relax and enjoy the scenery, wildlife and aesthetic character through outdoor recreational pursuits such as hiking and canoeing that result in minimum impact on the park's natural and cultural resources.
4. Visitors will have the opportunity to understand transportation history as related to the river, canal and railroads.
5. Visitors will have the opportunity to understand the architectural significance of the CRRNJ Terminal, a historic site on the State and National Register of Historic Places.

6. Visitors will have the opportunity to understand the significance of the CRRNJ Terminal, which together with Ellis Island and the Statue of Liberty played a significant role in immigration history.
7. Visitors will have the opportunity to walk, jog, cycle, jog, fish and enjoy other recreational activities.
8. Visitors will have the opportunity to understand the significance of water quality of the Upper New York Bay and how it impacts the quality of their lives.
9. Visitors will have the opportunity to understand how the existence of the harbor influenced settlement/development patterns.
10. Visitors will have opportunity to develop an understanding of the significance of the remaining open space in an urban setting.
11. Visitors will have opportunity to enhance their knowledge of the significance of the remaining wetlands.



Existing Facilities

Liberty State Park opened in 1976 with one functional facility, the Administration Center/Welcome Center, located on a piece of land formerly known as Black Tom. By the late nineteen seventies, the Central Railroad of New Jersey Terminal had been partially restored and was hosting special events. While restoration work continues today, the building is currently the host of special events, exhibits, offices and is also the point of origin for visitors to the Statue of Liberty and Ellis Island. In 1984, the Interpretive Center began to be used for programs for both the general public and school groups. By 1986, the Liberty Walkway had opened allowing free public access to the waterfront for over one-mile. The Liberty Science Center, a world class museum and education center, opened in 1993. By 1996, the Liberty Landing Marina began operation providing another means of access to harbor. The "Green Park," a stretch of landscaped and wildflower meadows that adjoins the walkway, was completed in 1999. Millennium Park, 10 acres of green space and paths located at the corner of Audrey Zapp Drive and Freedom Way opened during the summer of 2000.



Critical Future Issues

The Division of Parks and Forestry looks forward to working with the many partners of the park to accomplish the following tasks:

1. Providing for a fully accessible park that will accommodate over 6 million visitors annually by mass transit, passenger vehicle traffic and pedestrian walkways.
2. Additional improvements to enhance open space, noncommercial recreational use.

3. Completion of the interior portion of park by enhancing wetlands, forests and providing for interpretive space and public access.
4. Remediation of the remainder of the contaminated soils.
5. Restoration of CRRNJ Terminal to accommodate public use and special events, including the improvement of the train shed areas to provide programs, exhibits, special events and interpretive uses.
6. Redevelopment of the southern portion of park to complete Liberty Walk.
7. Restoration of Caven Point Pier and the other piers located along the southern boundary of the park.



Capital Improvement Project Needs

In order to accomplish the tasks as outlined, the following capital improvement projects will have to be undertaken. The cost for these projects is speculative at this time; however, preliminary estimates call for between \$68 and \$150 million. The following list of projects is not in any order of priority:

- | | |
|--|--------------------------------------|
| 1. Terminal Interior, 1 st and 2 nd Floors | 7. Southern Waterfront Improvements |
| 2. Train Sheds Stabilization/Adaptive Reuse | 8. Interior Park Plan Implementation |
| 3. Administration Building | 9. Southern Jetty Restoration |
| 4. Liberty Walk Access Improvements | 10. Access Improvements |
| 5. Site Work/Remediation | 11. Interpretive Center Expansion |
| 6. Recreational Improvements | 12. Restoration of Caven Point Pier |



Demographic Assessment

The population increase from 1990 to 2000 was caused by increased immigration, higher birth rates among recent immigrants (who are generally younger) and a baby boom "echo". As a result the population grew by 32.7 million people. That's 10 million more than in the '80s, more than in any decade, and more than the total national population before the Civil War.

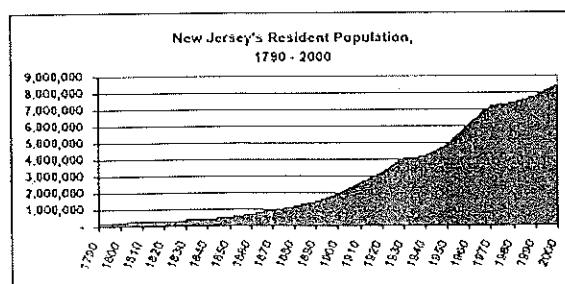
The portrait of America emerging from the 2000 census is that of a more ethnically and racially diverse country, with suburbs filling with new immigrants and a continuing migration from the Frost Belt to the Sun Belt. The census figures, used in the redrawing of Congressional districts, show that the Hispanic population grew 58 percent to 35.3 million people since 1990, pulling into rough parity with blacks as the nation's largest minority. In Florida, Hispanics now outnumber blacks, and in California, a state without a majority, they outnumber blacks and make up one-third of the population. New Jersey and specifically the northeastern area of the state is reflective of these national trends.

In search of bigger yards and a shorter commute to suburban office parks, New Jersey's residents continued to move south and west during the past decade. More than 40% of the state's population growth occurred in the six counties "Wealth Belt" by Rutgers demographer Jim Hughes. The chain of Hunterdon, Middlesex, Somerset, Mercer, Monmouth, and Morris Counties, home to many office parks, corporate headquarters and new housing developments, run across the center of the State. All but Mercer County grew faster than the state average of 8.9%. Somerset County led the pack with population growth of 23.8%. But the state's densely settled northern counties and even often-troubled cities like Jersey City showed surprising growth. While the state's population growth lagged, New Jersey continues to be the densest state in the country: 1,134 people per square mile, up from 1,044 in 1990.¹

Growth

Growth in the state was fueled by immigration. About 55% of the state's increase in population was Hispanic, and the number of Hispanic residents (who may be of any race) jumped by more than half to 1.12 million. As a result, Hispanics now outnumber the state's 1.1 million non-Hispanic blacks. The Asian population grew by 77%, the highest rate of growth. All the growth in the state came from people of color. While the state's population increased by 684,162 people, the number of white residents (including those who identified themselves as Hispanic) fell 25,760, or 0.4%.

New Jersey Population History & Predictions (numbers in thousands):



¹ US Census 2000

Year	Population
1995	7,945
2000	8,178
2005	8,392
2015	8,924

Distribution

The trend of growing suburbs continued through the 1980s into the '90s making New Jersey the most suburban state in the nation. The obvious result of this decentralization has been a large demand for private individual housing. A secondary result of this trend has been a proportional decline in urban density. The six most densely populated cities (Newark, Jersey City, Paterson, Elizabeth, Trenton and Camden) sheltered approximately 29.3% of the state's populace in 1950. By 1990, only 12% of the state's populous resided in these cities. As mentioned above the nineties saw the continuation of suburban sprawl and the establishment of the wealth belt.

New Jersey Current Age Distribution

Despite modest growth during the past two decades, the state's population structure has changed considerably. The most dominant feature of this change has been the maturing "baby-boom" generation. Thus, we can expect that economic activities linked to middle-aged markets to dominate through the remainder of this century and well into the 21st century.

Year	2000	2005	2010	2020	2030	2040	2050
Median age.....	36.2	36.6	37.2	37.6	38.5	38.6	38.1
Mean age.....	37.0	37.2	37.8	39	39.9	40.3	40.3

Household Structure:

While the number of households has significantly increased during the past several decades, the number of people per household has actually decreased. In 1950, the average number of occupants per household was 3.44. 1990 had reduced this figure reduced to 2.7 and by 1999 it had decreased to 2.65. There are primarily two explanations for the shrinking household. First, New Jersey like most other states, has seen a decrease in the number of children per household. The second more interesting trend, however, is the segmentation and diversification of the household. Single-parent families and singles, once considered atypical, now represent a sizeable portion of the household.

Racial and Ethnic Diversity:

Due to its role in providing employment opportunities to immigrants during the "Great wave" immigration, New Jersey has a long history of ethnic pluralism. However, the recent Immigration Law (1965) reduced the number of immigrants from Europe and increased the number arriving from nations that were previously more restricted. Some of the resulting characteristics are as follows:

- the number of non-Hispanic whites actually declined from 1980 - 1990.
- In contrast, the number of blacks grew by 12.1 percent during this same time.

- the number of Hispanic (white or black) grew by 50.4 percent.
- The Asian and Pacific islanders population grew by a dramatic 162.4 percent.

During the nineties these trends continued. As mentioned above, about 55% of the state's increase in population was Hispanic, and the number of Hispanic residents (who may be of any race) jumped by more than half to 1.12 million. As a result, Hispanics now outnumber the state's 1.1 million non-Hispanic blacks. The Asian population grew by 77%, the highest rate of growth. While the state's population increased by 684,162 people, the number of white residents fell 25,760, or 0.4%.

Immigration²

As of 1997, more than 15 percent of New Jersey's residents were foreign immigrants, according to recently released estimates based on the US Census Bureau's March 1997 *Current Population Survey* (CPS). The number of foreign-born increased by 25 percent from 1990 to 1997 to reach 1,208,000 in the state. Only four other states California, New York, Florida and Texas had more foreign-born than New Jersey in 1997. Together with Illinois, these six major states accounted for approximately 72 percent of the nation's foreign-born population.

Economic Projections

Increases in income and declines in poverty were widespread in 1998. For the fourth consecutive year, households in the United States experienced an annual increase in their real median income. Between 1997 and 1998, median household income adjusted for inflation increased 3.5 percent, to \$38,900 (that means that half of households had incomes above \$38,900 and half below). In addition, the poverty rate fell from 13.3 percent in 1997 to 12.7 percent in 1998. The number of poor dropped significantly also -- from 35.6 million poor in 1997 to 34.5 million poor in 1998. Median household income has now surpassed its previous peak in 1989 by 2.6 percent or \$1,000 after adjusting for inflation, although the poverty rate remains statistically the same as its 1989 level of 13.1 percent. Finally, household income inequality did not change from 1997 to 1998; nor is it different from its 1993 level.

Education³

Increases in educational attainment reflect the growing emphasis American society places on graduating from high school and college in order to secure better job opportunities and higher earnings. Between 1971 and 1997, the educational attainment of 25- to 29-year-olds increased. The percentage of students completing high school rose from 78 to 87 percent; the percentage of students completing high school with some college rose from 44 to 65 percent; and the percentage of students completing high school with four or more years of college rose from 22 to 32 percent.

² Sen-Yuan Wu, Division of Labor Market and Demographic Research

³ Census Bureau P20-513 Issued October

Hudson County

Liberty State Park is located in Hudson County, which has exhibited a relatively stable population over the past several decades. The following chart⁴ depicts trends in the population density of cities within Hudson County:

City	1980	1990	1992	Growth % Change
Total	556,972	553,099	554,950	-3.6%
East Newark	1,923	2,157	2,072	+7.75%
Guttenberg	7,340	8,268	8,509	+15.93%
Harrison	12,242	13,425	13,298	+8.63%
Hoboken	42,460	33,397	33,723	-20.38%
Jersey City	223,532	228,537	228,575	+2.26%
Kearny	35,735	34,874	35,265	-1.32%
North Bergen	47,019	48,414	49,757	+5.82%
Secaucus	13,719	14,061	14,804	+7.91%
Union	55,593	58,012	57,256	+2.99%
Weehawken	13,168	12,385	12,405	-5.79%
West New York	39,194	38,125	37,483	-4.37%

The projected population for the year 2020 is 614,155, which interestingly would equal densities the county exhibited during the 1960's.⁵

The Surrounding Community

Jersey City, the state's oldest metropolitan area, is enjoying a renaissance of construction. A gateway to more than 10 million immigrants who landed on nearby Ellis Island during the great migrations of the 1800s and early 1900s, Jersey City is still the golden door to opportunity on the west bank of the Hudson River. It is becoming Wall Street west and Silicon Valley east, as eighty percent of NASDAQ trading now takes place in Jersey City. Plans for redevelopment of the waterfront include 27 million square feet of office space and nearly 15,000 residential units. Since 2000, 15 million square feet of office space, seven thousand residential units and four hotels were built or are under construction.

The land adjoining Liberty State Park has been an integral part of this revitalization. Along the park's southern border Port Liberte', a 1,290 condominium unit and future golf course, now houses a permanent residential population and is entering into a new phase of expanded development. A proposed sports complex along the

⁴ Prepared by: NJ Department of Labor, Division of Labor Market & Demographic Research, 11/99

⁵ Source, United States Census

park's western boundary will bring activity to the area of the park that currently hosts the Liberty Science Center. The northern boundary, along the Morris Canal has experienced increased residential development and will be further impacted by the construction of the Jersey City Medical Center. Finally, the National Park Service and the Save Ellis Island!, have entered into a partnership to appropriately reuse the remaining 29 buildings on Ellis Island. The agreement recognizes the Save Ellis Island! as the primary fund raising entity for the estimated \$300 million project.

Recently, the completion of the New Jersey Light Rail Park and Ride, with associated parking, and the addition of ferry service to the Liberty Landing Marina are beginning to address the problems of access to the park. The intra-park shuttle has begun to address circulation within the park. Connecting to mass transit and the ability to enhance pedestrian flow into and around the park are critical to the future success of Liberty State Park.

Jersey City's population in 1990 was 228,517 and in 1996 was estimated to be 229,039. Meanwhile, Newark lost 6,711 residents from its 1990 census figure of 275,221 to 268,510 in 1996.



Visitation to Liberty State Park

Over the past two decades, the opening of Ellis Island, Liberty Science Center, the waterfront walkway and the marina has resulted in visitation increases that do not correlate with local demographics. The growth rate in visitation far exceeds the growth rate in the local population. Visitors consist of New Jersey and local Hudson County residents as well as foreign and out-of-state visitors. Currently visitation is almost divided between the National Monuments, the Science Center and the other amenities within the park with the National Monuments receiving slightly more visitation. Visitation to Liberty State Park over the past two decades was as follows:

Fiscal Year	Visitation	Fiscal Year	Visitation
1980	859,899	1991	1,972,568
1981	918,315	1992	1,844,933
1982	938,478	1993	2,500,069
1983	988,060	1994	2,831,900
1984	1,032,345	1995	3,543,072
1985	804,558	1996	3,557,294
1986	882,672	1997	3,706,938
1987	1,412,346	1998	3,520,398
1988	1,280,789	1999	4,273,957
1989	1,359,636	2000	4,417,684
1990	1,602,675	2001	4,665,474



Interpretation and Education

The outstanding discovery of the twentieth century is not television or radio, but rather the complexity of the land organism. - Aldo Leopold

This basic truth so succinctly expressed by Leopold over half a century ago accurately characterizes the fundamental questions that the Division of Parks and Forestry must strive to answer. For although New Jersey ranks 46th among the states in size, we are 8th in state park acreage. With over 358,000 acres in the system, New Jersey has preserved and assumed the stewardship role for many of the state's natural and historic resources. With this responsibility, the Division of Parks and Forestry must make ethical land use decisions that will benefit citizens of the state, region and nation.

From the rugged peaks of High Point State Park to the coastal wetlands of Cape May, the state parks and forests system represents the long-term commitment to preserve public open spaces and historic areas. Nowhere else in the nation does such a geographically small state exhibit such natural and cultural diversity. Understanding the true value of these diverse resources is critical to the health of the state.

The State's parks, forests, recreation areas and historic sites have the potential to enrich the lives of every New Jersey resident. There is a site managed by the Division of Parks and Forestry within a short drive of everyone, even those in the most urban and rural communities. There are endless opportunities to provide visitors with positive experiences that will encourage them to become more aware of New Jersey's natural and cultural history.

Therefore, the overall goal of the division's Interpretive Program is to enhance public appreciation of both natural and historic resources through the implementation of educational and interpretive facilities, programming and exhibits. In addition, the program strives to develop a greater public understanding of and positive actions toward these resources and increased public support for the division's efforts.

Liberty State Park, the most visited site administered by the division, plays a key role in interpretation. The combination of natural resources, historic sites and the development of history afford the division the opportunity to tell a unique story. Three major interpretive and educational themes form the foundation of all division programming: Diversity, Change, Continuity and Constants, and Crossroads. These general themes are reflected at Liberty State Park as follows:

Diversity

Diversity is such a broad and pliable concept that it is readily adaptable to both biology and history. Currently, the concept of biological diversity has received global attention. Many authors (Ryan, Wilson et. al.) have estimated that present extinction rates far exceed those of the past. The tropics, with the loss of the rainforests, are the subject of many debates. Such biological impoverishment is by no means restricted to the tropics. New Jersey, through large-scale alteration of habitat, has witnessed extreme shifts in biological diversity. Deforestation, due to agriculture, the charcoal industry and development, has led to the rapid destruction of natural communities. However, recent improvements in water quality and the restoration of habitats have led to an increase in the number of species observed at Liberty State Park. Mitigation and restoration have made a difference.

Citizens of the U.S. have come to accept that the nation is the product of hundreds of years of cultural diversity. Nowhere is this more evident than here in New Jersey where millions of immigrants who, after processing on Ellis Island, found their way to a new life via the streets and sidewalks of this state. In fact, by 1920 New Jersey had the highest percentage of foreign-born citizens in the nation. The mixing of these cultures produced a community that was truly unique, for rather than blending into one homogeneous assemblage; they strove to maintain some form of ethnic identification. This pride of origin continues and can be evidenced in many of today's pluralistic communities. The following story lines apply:

1. Liberty State Park contains an oasis of natural habitat and open space in an urban environment offering essential nesting, resting and feeding areas for resident and migratory wildlife. The location of this site on the Atlantic Flyway is particularly important for neo-tropical migratory songbirds.
2. The natural assemblages (flora and fauna) present in Liberty State Park represent unique associations reflective of the cultural events that have taken place during the last century.
3. Liberty State Park is located on the Upper New York Bay where the salt water of the Atlantic Ocean meets and mixes with the freshwater of the Hudson River. This estuary provides essential habitats for a great diversity of life and has been a source of sustenance throughout this area's history.
4. Cultural diversity, as the result of migration/immigration is a strong characteristic of the surrounding community.

Change, Continuity and Constants

Change, Continuity and Constants are concepts ubiquitous in human and natural history. They can relay the highlights of events that caused the milestones in the history books as well as the changes in the plant associations growing in fields and forests. The cultural and natural environments also exhibit some constants,

such as the dependence of humanity on the resources of the New York Harbor. The following story lines apply:

1. The area that is now Liberty State Park has undergone immense changes in form and use since the first Europeans settled there in the 1600's. It has evolved from a quiet fishing cove used for thousands of years by the Native Americans; to the greatest concentration of rail facilities in the northeast; to the state's premiere urban park.
2. With its invaluable waterfront access, the area that is now Liberty State Park has long been an important transportation hub, playing host to a variety of transportation modes, the most significant being the concentration of rail facilities that existed there for over a hundred years from the 1860's.
3. The CRRNJ Terminal stands with the Statue of Liberty and Ellis Island as a reminder of this country's Industrial Revolution and the "Great Wave" of immigration.
4. Immigration in the area was not confined to the early part of the 20th century. The community surrounding Liberty State Park is reflective of the north/south migration and the current influx of people from Asia and the former Soviet Union.
5. Located on the Atlantic Flyway, the open space of Liberty State Park provides refuge for countless birds during the spring and fall migration.
6. The land itself has changed from marshes to industrial fill to emergent urban forest.
7. Use of the harbor has changed from subsistence fishing, to industrial transportation and recreational fishing.

Crossroads

The area surrounding Liberty State Park has always been the crossroad or meeting place of the Atlantic Ocean and the Hudson River. A point of egress for both immigrants and goods, the CRRNJ Terminal served as the crossroad for the entire nation. In addition, the changing economic landscape from the industrial to the high tech industries of today is all part of the area's history. The following story lines apply:

1. The estuary is the meeting place of salt water from the ocean and fresh water from the river.
2. Many immigrants began their new lives in this country by walking onto the trains of the CRRNJ.
3. Communipaw is now and has always been a place where cultures meet.
4. Many modes of transportation, from perriauger, to canal boats, to trains and cars have all crossed over the land of Liberty State Park.



The Park's Interior Section

*Natural Resource Assessment*⁶

In the center of the park there remains approximately 251 acres, the former railroad yard, which is undeveloped. Much of the area has been re-colonized by various plant communities. These communities represent unique associations of both endemic and non-native species that can be considered the by-product of the cultural events that have taken place during the past several centuries. Like the surrounding community of people, these assemblages are diverse and have origins throughout the world. This diversity is further enhanced by the rapid rate of natural succession. Hence, the question has become "what is the true value of the interior section of the park and how should it be managed?"

Succession, a natural process that changes the composition of biological communities in a geographic area over time, is occurring in this undeveloped site in many different locations and forms. The complex history of the site has created a number of different soil types and an interesting micro topography, which favors the adaptations of some organisms over others. Some portions of the site closely approximate patterns of succession observed in similar ecosystems within the region, while others have been colonized by rare and unusual species, some of which are unknown in other parts of the state.

Upland communities, consisting of grassy fields, scrubby thickets and scattered stands of trees, now cover large portions of the old gravel rail beds. The water table is relatively high in many locations, although it is locally scarce at the surface of the soil where gravel and sand prevail. The composition of the surface soils on the site has strongly influenced the various rates of succession taking place and in many ways serves as templates for communal development. In areas where depressions have been created by the clearing of old buildings and railways, or drainage obstructed, grassy wet meadows and swampy thickets have emerged.

The soils of the area consist of fill brought in by the railroad companies between 1860 and 1919 to stabilize the surface. Much of it is non-consolidated material resulting from construction projects in Manhattan, or refuse from throughout New York City and the surrounding area. It is classified as historic fill. In 1990, DEP collected 57 soil samples from 28 sampling locations within the site. Some of those samples showed polynuclear aromatic hydrocarbons, pesticides and metals above DEP's soil cleanup criteria.

Before public can access be provided, one foot of clean material must be placed on the surface. One of our challenges is to develop a conceptual land use plan that provides for the needs of the visitor, determines where access is needed and where fill material is acceptable, while considering the history and the protection of the existing unique natural resources of the site.

⁶ the natural resource inventory from the area has been included as appendix B

Historic Resource Assessment

Created by filling the salt marsh during the late nineteenth and early twentieth centuries the undeveloped section of the Park originally served as the railroad yard of the CRRNJ. It functioned primarily as the temporary storage and transfer of goods and services delivered by the railroad. Under the terms of the Wharf Act of 1851, shoreline owners only had to obtain the consent of the County Board of Freeholders for permission to build docks, etc. This act resulted in a complete transformation of the cove. Prior to the extensive filling operations, the cove had been one of the city's remaining areas to retain some of the city's Dutch heritage.

The first alteration was the construction of the Morris Canal Big Basin in 1859. In 1860 an act was passed authorizing the extension of the Central Railroad of New Jersey (CRRNJ) from Elizabeth to Jersey City. The CRRNJ filled in the cove with over 200 million cubic feet of garbage hauled over from New York City. Ballast from ocean-going vessels was also used as fill.

In 1864, the CRRNJ opened its first waterfront terminal, a plain wooden structure. Before building, the underwater area was filled with the cheapest medium of landfill - garbage, much of it from New York City. Ballast from ocean going vessels was also used. In that same year passenger service began. By 1867, the Jersey Central employed its first car float operation, and in the late 1860's the line was the leading cove freight line.

Due to significant increase in usage, the CRRNJ decided to construct a new terminal. The design of the 1889 head house was by the architectural firm Peabody & Stearns, done in an eclectic style. The front elevation presents a 5-part massing plan with a large central pavilion and two lower end pavilions on the flanks. The central pavilion was crowned with a 215' x 125' rectangle. The central waiting room was 64' x 96' and lit by a skylight. A ticket office was contained within the waiting room.

At the turn of the century, the CRRNJ Terminal experienced a great increase in passenger traffic. A new terminal facility was needed and in 1912 - 14 further expansion consisted of enormous sheds to house double-decked ferries, additional track and storage areas and the largest Bush train shed ever built. From 1890 - 1915, between 30,000 and 50,000 commuters per day were transported on 128 ferryboat runs to and from the terminal. Between 200 - 300 trains came into the terminal each day, bringing commuters from all parts of New Jersey. Besides the improvements on the terminal in 1912 - 1914, the train yard was enlarged and new buildings erected, including the express building and the train shed (the number of tracks were increased from 12 to 20).

The CRRNJ also played a significant role in the peopling of the United States. It has been estimated that 37 million persons came to the United States between 1820 and 1930. Between 1892 - 1954 approximately 12 to 17 million persons were processed through Ellis Island (there has never been an approximate figure due to a fire that destroyed all the records on Ellis Island in 1897.) Anywhere from 50 - 70% of those entering the country through this portal went directly to New Jersey, many of them to board trains at the CRRNJ Terminal. New Jersey received the fifth largest number of immigrants of all the states.

The CRRNJ Terminal and linear corridor that included Audrey Zapp Dr. was placed on both the State and National Register of Historic Places on August 27, 1975. Future enhancements within the boundaries of this nomination must receive the approval of the Historic Preservation Office.

For information regarding the terminal, its history and future plans please refer to the CRRNJ Prospectus.



The Interdisciplinary Planning Committee

There is a great deal of interest in the remaining undeveloped land within the park. There are as many proposals for the use of the site as there are interested parties. A broad-based, goal-driven approach has been used to develop this General Management Plan for the site. The process stresses the fundamental relationship between resource significance and visitor experience. Most importantly, the process results in documentation of planning efforts that build a consensus among participants, assure logic and consistency in the proposals, and provide a valid rationale in decision-making.

Public involvement in the planning process is encouraged in order to learn about the concerns, issues, expectations, and values of existing and potential visitors; park neighbors, people with traditional cultural ties to lands within the park, concessionaires, cooperating associations, other partners, scientists and scholars, and other government agencies. Through public involvement, the Division shares information about the planning process, issues, and proposed management actions; learns about the values placed by other people and groups on the same resources and visitor experiences; and builds support among the local public, visitors, legislature, and others for implementing the plan. Leaders from the surrounding communities were invited to participate on the General Management Planning committee. In addition, the alternatives being considered as well as the final plan are presented in public forums.

The planning committee for this project includes: members from the Friends of Liberty State Park; the Liberty State Park Development Corporation; the Liberty State Park Conservancy; the Liberty Science Center; New Jersey Audubon; the Natural Resource Conservation Service; the Hudson/Passaic Soil Conservation District; Jersey City; Congressman Menezes's Office and staff from the Division of Parks and Forestry (see appendix C for a list of committee members).



Planning Objectives

The planning committee has established the following primary objectives:

1. *Provide public access for interpretive programs allowing visitors to touch the natural world.* Experiential interpretive and educational programs foster awareness and understanding of the natural resources needed to achieve environmental literacy. No where is this more important than in the urban environment where access to open space is extremely limited.
2. *Maintain as much of the site as possible, especially wetlands and special plant communities, under a conservation mandate while providing public access.* The natural assemblages (flora and fauna) represent unique associations reflective of the cultural events, which have taken place during the last century. Like the surrounding human community these assemblages are diverse and have origins throughout the world. This diversity is enhanced by the rapid rate of natural succession. We must strive to protect and study this process of succession within the urban environment while providing access to as much of the 251 acres as possible. These 251 acres will become a case study in restoration ecology and adaptive reuse of the land.
3. *The landscape of the interior should reflect the history of the park as well as the connection to the harbor/estuary.* The history of the area now known as Liberty State Park can be viewed as a retrospective of cultural attitudes to the land and more specifically the harbor/estuary ecosystem. Enhanced environmental literacy has resulted in abatement of past degradation and partial rehabilitation of the harbor estuary resources. These stories, including the soil contamination of the site, are important to the planning process.
4. *Provide public access to the perimeter of the site for multiple uses.* The perimeter of the site (along Audrey Zapp Drive and Phillips Drive) may provide an opportunity for visitor services of a more active nature. In this densely populated urban area there is a great need for recreational opportunities. These types of uses should be considered — especially in the soil stockpile areas, which have already been significantly altered. Within this context, connecting Liberty Science Center with the rest of the park is also important.
5. *Improve elevations, enhance wetlands, provide open water, and enhance aesthetic values and sight lines where possible.* In those areas that are to be disturbed, new elevations will be established that enhance the existing wetlands, possibly creating open water habitat and taking advantage of the spectacular views of the harbor and New York City skylines.
6. *The planning effort will be conscious of other neighboring redevelopment efforts.* The area surrounding the park has undergone significant redevelopment during the past two decades. The term "the gold coast" used when describing the waterfront of the lower Hudson River and Upper New York Harbor was indicative of the regentrification typical of the area. Liberty State Park was the catalyst for that change as it was the first place where the public had access to the waterfront in over 100 years. This type of change continues today and will continue to have an impact upon the park.



Proposed Resource Management Strategies

Any project can have a range of options that satisfy one or more of the objectives. In this case there are two extreme possibilities; complete mitigation of the site or complete protection of the site. There also is a range of compromise alternatives that could mitigate for contaminated soils in those areas where there will be public access, while providing for the protection of the unique natural resource features.

Complete mitigation would require that a foot of clean fill be placed over all the land, with the exception of delineated wetlands. Delineated wetlands are protected under the Freshwater Wetland Act. Vegetative communities could then be established according to the desired wildlife and public use needs. While this action would initially be the most destructive, it would provide the greatest control over the eventual outcome. It would also allow for the most active use of the remaining 251 acres within Liberty State Park. However, the complete mitigation of the site would not satisfy several of the established objectives. It obviously does not protect the existing natural communities, nor would the establishment of new plant communities reflect the cultural history of the site. In addition, if the entire site were covered, then the opportunity to study urban succession would be lost.

Conversely, the maximum protection of existing vegetative communities would protect the greatest amount of land, but it would provide the least amount of public access.

The committee agrees that the preferred course of action would be to protect those areas that have ecological or educational values. Especially the plant communities that would not only act as a source of seed material, but would also afford an opportunity to study succession in an urban setting while offering limited public access. In this way, the site can be used to enhance the interpretive and educational messages of Liberty State Park and increase public access and enjoyment.

Trails through the interior section are seen as appropriate and will make use of those areas where soil mitigation is necessary, and where they will not adversely impact the unique vegetative communities of the site. Access to the wetlands will be provided in the form of an appropriate trail system, as trails should be part of the visitor experience. Runoff and erosion from these trails would have to be monitored and mitigated if required.

The committee's decision to focus on the development and enhancement of natural settings and passive trails is reflective of a national movement among landscape architects, city planners, environmentalist and neighborhood associations who advocate for ecologically diverse parks that can function as community gathering places. "It is a reaction against the design equivalent of racial profiling - the assumption, dominate in urban park design from the 1930's until recently, that what poor neighborhoods need most is active recreation dominated by rec centers and asphalt basketball courts."⁷ In developing a variety of vegetative assemblages, aquatic communities,

⁷ A Park Offers Nature, Not Just Hoops, The New York Times, Thursday, December 28, 2000

unstructured fields and passive trails, the interior section of the park becomes a special place where people can reconnect to the land, enhancing their "sense of place". "If you don't know where you are," says Wendell Berry, "you don't know *who* you are." At the same time, the area provides the link that ties the existing elements of the park together.

Key to accomplishing the above stated objectives will be the integrated use of the protection of critical areas; the conservation of woodland and field areas and the restoration of wetland habitats and provisions for visitor services. The existing wetland areas, which are protected under the Freshwater Wetland Act, will be enhanced where possible. These areas will provide the benefits of wildlife habitat, storm-water protection and groundwater recharge. In addition, there is a unique plant community atypical for this area that has been identified as the moss mat community. Due to its unique association of species, which is characteristic of communities at northern latitudes, this critical area will also be protected. Most of the area will be maintained under a conservation mandate, which allows for the management of invasive species and enhancement with species that would increase biologic diversity. Restoration of freshwater wetlands is possible in those areas dominated by the common reed (*Phragmites communis*). Saltwater wetland restoration may also be possible within the site. The acreage given for each management strategy represents preliminary estimates based upon the concepts presented in this plan. They are presented here for the purposes of conceptual planning and will undoubtedly change during the design phase of the project.

Preservation

Wetlands are among the most productive ecosystems in the world, comparable to rain forests and coral reefs. An immense variety of species of microbes, plants, insects, amphibians, reptiles, birds, fish and mammals can be part of a wetland ecosystem. Physical features such as climate landscape shape (topology), geology, and the movement and abundance of water help to determine the plants and animals that inhabit each wetland. Wet-thicket and sedge ponds currently occupy approximately 3 acres. A buffer of 100 feet must also be included, and the area could be expanded to approximately 10 acres.

The "moss mat community" is atypical to the area. "Hair-cap" moss (*Poltrichum commune*), so named for the tiny hairs projecting from the lid of its reproductive capsule (or sporophyte), has grown into an extensive colony. This enriched environment provides an ideal substrate for colonization by other plants, whose offspring may someday "succeed" the mosses. Hairy boneset (*Eupatorium pilosum*), a wild herb which displays a cluster of tiny, white flowers late in the summer, seems to be dependent on the "moss mat community" for its moisture and has not been found growing outside of its protective mass. The running ground "pine" (*Lycopodium complantanum*), a simple, seedless plant that resembles a pine seedling, is usually found in close association with this moss-mat community, probably due to similarities in reproductive requirements, rather than a direct dependence on the moss. The white cushion moss (*Leucobryum glaucum*) is another prominent moss, which grows as small, isolated mounds. Its associated wetlands, consisting of two acres of common reed (*Phragmites communis*) and .5 acres of sumac thickets, create a buffer to the "moss mat community." The half-acre moss mat community is found in association with 2 acres of common reed, a half-acre of sumac and 1.3 acres of

sedge ponds, which act as a buffer. This complex should remain intact and allow the "moss mat community" to expand.

These two associations will remain protected with public access only to the perimeter.

Conservation

A number of trees species have colonized the park's fields, meadows and thickets forming "pioneer forests." Gray birch (*Betula populifolia*), a small to medium-sized tree that can tolerate extremely poor soils, grows well in a variety of locations, from bare gravel to low, wet muck. In one area near the south end of the site, a dense thicket of gray birch provides one of the park's most outstanding sites.

Another important group of pioneer trees are the poplars (*Populus spp.*), which grow in great abundance in the park. They produce large quantities of plumed seeds early in the spring when the ground is flooded, which germinate and quickly shoot up wherever there are open areas of wet mineral soil. Poplars, as well as birches, are often the first to colonize areas of bare mineral ash leftover from wildfires in forests throughout the northeast. The cinders and mineral ash leftover on many surfaces in the park are from the continuous operations of the railroads and the high water table, which have accommodated the needs of these species quite well. Four species of poplars grow in the park; quaking aspen (*Populus tremuloides*), big-tooth aspen (*P. grandidentata*), white poplar (*P. alba*), and Eastern cottonwood (*P. deltoides*).

Gray birches and poplars make up the bulk of the trees on the site, but there are quite a few other species as well. The tree-of-heaven (*Ailanthus altissima*), a much-maligned plant introduced from the Far East, is well represented. This tree is a highly competitive and widely naturalized species in New Jersey, due to its high tolerance for environmental stress. Wild cherry trees (*Prunus spp.*) are scattered throughout the area, owing their presence to the various birds that eat their fruits and distribute the undigested cherry seeds in their droppings. A number of saplings and young trees that are representative of more mature forest ecosystems within the region can occasionally be found in this undeveloped site. Oaks (*Quercus spp.*), maples (*Acer spp.*), and white ash (*Fraxinus americana*) are the most notable. The presence of these species gives a strong indication that a forest comprised of these species will develop on the site, completing a long cycle of succession.

The sumac association is also found in this area. While sumac is only a marginal food source it does provide cover, and appears to be acting as a buffer to the pioneer forest. Therefore, it also should be included as a protected area.

The pioneer forest comprises approximately 103 acres. Management strategies in these areas will consist of removing invasive species and a limited amount of wildlife enhancement plantings. In addition, those field areas existing between the wooded areas should be allowed to succeed, creating a more contiguous forest cover of approximately 113 acres.

The 51 acres of field areas include herbs and grasses that inhabit the dry, gravel soils of the old railroad beds. Mugwort (*Artemisia vulgaris*), an aromatic annual introduced from Europe, dominates vast expanses of these fields. A companion of mugwort, and sometimes dominant across these fields, is switchgrass (*Panicum virgatum*). Switchgrass has a wide range of habitats in the park (from dry fields to wet meadows) and is a common species in abandoned fields and rail yards across New Jersey. Scattered throughout are patches of yarrow (*Achillea millefolium*), a medicinal plant that has been cultivated in the Mediterranean region since antiquity. Reed-steppe grass (*Calamagrostis epigeios*), a native European grass, covers large areas of sandier soils, sometimes mixed with reed grass. It seems likely that this grass hitched a ride on the belongings of European immigrants entering the country through Ellis Island, as it has not been recorded at any other location in the state. Sleepy catchfly (*Silene antirrhina*), a small carnation-like plant (Carophyllaceae) with pink flowers, grows in sandy fields and along roadsides near the eastern side of the site. Another interesting plant is the spike-ball sedge (*Cyperus ovularis*), which unlike many other sedges, has adapted to these drier locations. Camphor weed (*Heterotheca subaxillaris*), a strongly aromatic plant with a yellow daisy-like flower, thrives in almost bare sand. Oxe-eye daisies (*Chrysanthemum leucanthemum*), hawkweed (*Hieracium canadense*), broomsedge (*Andropogon virginianus*), which is actually a grass, and a large number of other plants also contribute to the diversity of this dry, field ecosystem.

As mentioned above, many grass fields are gradually giving way to early succession woody species. While this transition will be encouraged in those areas between the forested stands, thereby creating a more contiguous forest, some grasses should be maintained.

Of the 51 acres of grass, at least 28 will be maintained as such along the perimeter. These areas will serve as habitat for grassland birds and mammals as well as a place for unstructured recreation. In addition, they will provide a buffer and transition to the more critical areas within the site. The primary management practice will be to mow the area on an annual/biannual basis or more frequently depending upon the desired use.

Restoration

Grasses and species of trees typical of early succession currently dominate the 40-acre dredge spoil area within the site. It may be possible within these 40 acres to create a cross section of the vegetative communities, which existed prior to the development of the area. The creation of an area representative of the transition from salt marsh to upland forest would provide for an exceptional study of habitat restoration in the urban environment while enriching the visitor experience. The purpose of this part of the project is to restore tidal flushing to approximately 20 acres of the dredge spoil site, creating the correct elevations for optimal salt marsh development and use. This would be accomplished by establishing elevations and intertidal soil conditions suitable to a diverse salt marsh flora, providing mudflat and channel bank habitats for intertidal invertebrates, providing refuge area for juvenile fish, and increasing suitable habitat for water birds including species of special concern. The remaining 20 acres of the containment site would be planted with those species (bayberry, alder, sassafras and cedar) typical of a maritime forest system.

The common reed (*Phragmites communis*) dominates the 23 acres of marsh meadow. These communities exist in depressions created by the clearing of the old railroad beds, while others are emerging in more recently disturbed areas where drainage has been obstructed by construction and road building. Old dredge materials composed of sand and silt dominate the soils in these areas. Common Reedgrass is well known within the region as colonizer of roadside ditches and the only form of vegetation in vast expanses of the Hackensack Meadowlands. The Reedgrass grows as a nearly impenetrable; dense stands are 10-12 feet in height. While approximately 18 acres will be involved in the restoration efforts which may include the reintroduction of freshwater habitat into the park, several acres (approximately 5) should be left for its inherent wildlife values.

Interpretive and Recreational Enhancements

Several trails and perimeter green spaces will be established in order to provide open space, non-commercial recreational enhancements, connection between existing facilities and access for interpretation. While the perimeter must serve as a buffer to the more ecologically sensitive areas, its width can vary to create interesting areas capable of supporting trails, which explore interpretive themes, picnic areas or other forms of open space, non-commercial recreation. The amount of acreage dedicated to the various types of activities would be determined during the future design phase, but should generally follow the wood lot edge.

The 18-acre soil stockpile area, recently used for the storage of soil for landscaping purposes throughout the park, will provide for a range of open space, non-commercial recreational activities. Its location in the extreme southwest corner of the site, next to the industrial complex and across from the proposed sports complex may lend itself to such use and is critical as a buffer to the more ecologically sensitive areas within the site.

Visual and noise barriers can be created, by using soil to increase the elevation of certain areas within the perimeter. They can be used to obscure the view of the industrial area or decrease the noise from traffic along Phillips Drive. They can also be used to create interesting lines of sight between the Liberty Science Center and the Interpretive Center or to direct storm water into the wetland areas.

Proposed Land Use Summary

The following table outline current and proposed land use within the 251-acre site:

Designation	Current # of Acres	Proposed # of Acres	%
Preservation			4.3
Wet Thickets & Sedge Ponds	3	10	
Moss Matt	.5	1	
Conservation			45.0
Pioneer Forest	103	113	
Restoration			26.8
Dredge Spoils	40	0	
Salt Marsh	0	20	
Maritime Forest	0	20	
Freshwater Wetland	2.5	18	
Marsh Meadow	23	9	
Recreational Enhancement			23.9
Park Enhancement (along Zapp Dr.)	10	14	
Soil Stockpile	18	18	
Grass Fields	51	28	
Totals	251	251	100



Supporting Facilities, Infrastructure and Staffing

Any park enhancement requires additional support in both personnel and infrastructure. While increases in visitation from the above improvements would be expected, it would not be concentrated at one time or place. Existing roads and restrooms will have to be examined in the context of the overall transportation master plan, currently being developed as a cooperative project with the Department of Transportation.

Allowing for more activity along the perimeter would provide additional opportunities for current visitors. It may also entice those visiting the National Monuments, Liberty Science Center and Liberty Landing Marina to further explore the park. In addition, the thematic exploration of trails resulted in increased interpretive and educational activities, a corresponding increase in staff would be required at both the Interpretive Center and the Science Center. Four to five additional park personnel, a ranger, interpreter and several groundskeepers, would be required once the improvements are made to the site.

Access to the park has been a concern for many years and is a topic of discussion with each additional attraction, event or improvement. In order to maintain as much open space as possible the Transportation Master Plan, developed in the 1980's, calls for the construction of a multilevel central parking facility. To date funding for such a project has not been available.

Traffic flow into the park is already a problem during periods of high visitation. Therefore, additional traffic would require that the entrance roads into the park, the connecting roads to the city, the turnpike entrances and the parking facilities be examined and restructured to accommodate the increase in traffic. The current transportation study, being done in cooperation with the Department of Transportation, will consider the implications of the future improvement of the interior section of the park in its final recommendation.



Feasibility

What is presented in this GMP is a conceptual framework for the future restoration and development of the site. In order to move from concept to reality, an enormous amount of planning and engineering work must be accomplished. The committee has recommended that two separate but integrated efforts be undertaken. The first is to conduct a feasibility study to determine if the concepts presented are possible. The participation of the Army Corps of Engineers (Corps) is key to the successful inclusion of water features and wetland restoration within the site. The Corps has initiated feasibility studies on thirteen sites within the New York/New Jersey Harbor Estuary. These sites are being evaluated for their potential of large-scale habitat restoration projects. The committee feels that Liberty State Park, with its significant natural and historic resources, waterfront walkway and Liberty Science Center is by far the most important site within the study area. With the federal support that would result from the Corps' cooperation, the interior section of the park could become recognized internationally as a prototype for restoration ecology in urban environments.

In addition, it is the majority opinion of the committee, that landscape design should not be undertaken until a feasibility study has defined those areas suitable for habitat enhancement or wetland restoration. At that point the committee is recommending that an international design competition be undertaken to develop the landscape plan. Such a competition has many advantages. Most importantly it would bring some of the most creative minds, those on the cutting edge of landscape design and restoration ecology into the process. It would also give the project the visibility necessary for a public undertaking of this magnitude.



Conclusion

Liberty State Park, the cornerstone of the Gold Coast, is one of the most successful rehabilitation stories every witnessed. The tremendous interest in the remaining undeveloped section of the park is symbolic of a broader struggle which often occurs within New Jersey, and throughout much of the nation, to balance the protection of natural resources with the need for continued economic development and recreational opportunities. The proposal outlined above strives to complete the park in a manner, which honors its history while at the same time provides for the residents of the surrounding community. It is constant with the Division's principle that "activities must be within the physical and biological capabilities of the natural/historic resource."

It is also the opinion of the committee that the area is of such significance to the eventual success of other park amenities, and also to the quality of life for surrounding residents, that an international competition for the actual design should be conducted. Such competitions tend to increase the visibility of the project and attract more creative designers, giving the project the attention it deserves.

Appendix A: The Alternatives

Currently sites within the Division of Parks and Forestry have several types of master and management plans. Many of these address the conservation or preservation of resources, however they do not necessarily articulate the mission of the site or indicate the relationship of the site to the surrounding community. While the overall goal of the Statewide Interpretive Plan is to provide guidance for the enhanced appreciation of both natural and historic resources, we also view it as an opportunity to begin to develop a more holistic vision for each site/area in the form of a GMP.

The cornerstone of the planning process is the development of alternatives, which explore the interrelationships between resource management, desired visitor experience and administrative needs. Goal-driven alternatives allow decisions to be made based on an assessment of the implications and tradeoffs inherent within any proposed land or historical resource use. After review of the alternatives the preferred alternative can be decided upon.

During this planning process the committee considered, and presented to the public, three alternatives. After review of the alternatives, the preferred GMP was decided upon.

In this case the primary difference between the alternatives focused on the use of the perimeter of the site. The perimeter of the site has loosely been defined as that area from the corner of Audrey Zapp Drive and Freedom Way, west to Audrey Zapp Drive and Phillips Drive, then south to the current soil stockpile area. While the perimeter must serve as a buffer to the more ecologically sensitive areas, the committee agrees that more active uses are appropriate. However, defining "more active" was difficult. Hence, the following alternatives focus on different uses for the perimeter of the site. In each alternative it is the width of the perimeter and the proposed use that changed.

Alternative 1: *Making Connections*

This alternative assumes that the highest priority is that of protecting the natural resources of the site and restricting land use at the boundary to a passive trail system. Physical development for the trails would consist of a perimeter trail (perhaps 10ft wide, matching the existing Green Park trails) in a 25 ft, green buffer. The perimeter trail would be constructed of a hard surface, asphalt or similar material that meets ADA requirements. Interior trails would be limited to narrow (perhaps 5ft. wide) footpaths. These will be constructed of a permeable material so that the hydrology of the site is not altered by the construction of the paths. While ADA access to typical habitats will be provided with an alternative substrate (i.e. crushed shells or similar), or a boardwalk where appropriate, much of the interior trail will simply be wood chips or similar substrate to provide for minimum intrusion.

The 18-acre stockpile area would be graded to enhance the hydrology of the wetlands. Planting a border of trees could create a visual and noise buffer between the park, the industrial complex and the proposed sports complex. The remainder could be kept as open fields.

Recreational opportunities in this alternative would include hiking, biking and nature observation, etc. along the trails. Formal ball fields (i.e. lined fields, backstops or bleachers) are not permissible as per division policy. The fields, which currently surround the perimeter, could be cut once or twice a season to inhibit woody plant growth.

Alternative 2 – An Expanded Perimeter

This alternative proposes that the perimeter be more than passive trails. The area could be developed to promote certain park themes (i.e., harbor ecology, cultural history or transportation). Fields along the perimeter could be maintained for unstructured recreational activities, however facilities for structured sports would not be provided. The perimeter could in some areas be 300-400 ft. wide.

Between the Science Center and the soil stockpile area, on the east side of Phillips Drive, a large open field would be maintained as space for public access and unstructured recreational activities. These fields could be used to complement the proposed sports complex.

This alternative also views the soil stockpile area as part of the perimeter as well as a buffer, which enhances the hydrology of the existing and proposed wetlands, and creates a vegetative sound barrier along Phillips Drive. Fields for unstructured recreation or a picnic grove also could be incorporated into this area.

Alternative 3: A High Activity Feature

This alternative includes both the trail system, and a more active perimeter as in alternative's 1&2, and adds a high activity feature within the soil stockpile area. Examples of such a feature could include an aquatic center, ice skating rink, horse riding facilities, or skateboard facility. Since the Division of Parks and Forestry does not normally supply such facilities, it may be appropriate to develop a lease or other such contract with a private partner for its construction and operation through a public/private partnership. Such arrangements have the potential to provide a variety of services for park visitors. In general, the return from the concession would include franchise fees or land use fees. This revenue could be used to offset operational expenses.

In addition, a few members of the Interdisciplinary Planning Committee have made a specific proposal for the inclusion of an aquatic center for the soil stockpile area. It is envisioned that such a center would include water games, rides, sand play and other recreational activities associated with shallow water impoundments. The operating season for such a center would be approximately three months during the summer. The development of such a facility would require between 10 and 14 acres. Projected costs and attendance for such a facility are very speculative. However, for preliminary planning purposes the required attendance is estimated at between

3,500 and 3,700 people per day during the summer season. The projected entry fee could be between 8 and 16 dollars.

Supporting Facilities Infrastructure and Staffing

The three alternatives would require very different levels of support. Each alternative brings with it the reality of more visitors, which increase the need for maintenance and security personnel. However, it is the number of visitors and personnel needs that vary greatly. The following discussion is intended to broadly convey the types of support necessary for each alternative.

Alternative 1: *Making Connections*, would require little additional support and no significant change to the supporting infrastructure. While increases in visitation would be expected, they would not be concentrated at one time or place. Existing roads and restrooms would probably be sufficient. However more trails and park areas would require some additional maintenance, ranger and interpretive staff. An additional three to four staff members would be required.

Alternative 2 – *An Expanded Perimeter*, would have a similar but slightly higher, impact on both the infrastructure and staffing. Allowing for more activity along the perimeter would provide additional opportunities for current visitors. It may entice those visiting the National Monuments, Liberty Science Center and Liberty Landing Marina to further explore the park. It would not, however, be perceived as a separate destination attracting a concentrated number of new visitors at one time. In addition to the staffing requirements mentioned above, more groundskeepers would be required. If the thematic exploration of trails resulted in increased interpretive and educational activities, a corresponding increase in staff would be required at both the Interpretive Center and the Science Center. An additional four to five park personnel would be required with this alternative.

Alternative 3: *High Activity Feature* - envisioned as a public/private partnership in which the capital and operational costs of the facility would be the responsibility of the private partner. If such a venture were profitable it would be able to offset operational costs. However, as with the other public/private entities within the park, security and safety issues would still be the responsibility of the Division of Parks and Forestry. Therefore, increases in ranger and administrative staffing would correlate to the size of the proposed facility and the number of visitors. Using the current ratio of visitors to staff, an increase in visitation of between 3,500 and 3,700 visitors per day would require two to three rangers and one additional administrative employee. This would be in addition to the staff mentioned for alternatives 1 and 2. Since a public/private facility would be responsible for maintenance of the area, park maintenance personnel would be minimal, possibly one additional maintenance worker.

The following chart represents a summary of the additional personnel requirements:

Personnel	Alternative 1	Alternative 1&2	Alternative 1,2&3
Ranger	1	1	2-3
Maintenance	1-2	1-2	2
Interpretive	1	2	2
Administrative			1
Totals	3-4	4-5	7-8

Considering current compensation rates for the employees mentioned above, the increase in operational expenses for salaries ranges from approximately \$100,000 to \$250,000 per year. Additional costs for equipment and supplies would also increase proportionately.

The Division of Parks and Forestry's visitor use survey indicated that the average number of people per vehicle visiting state parks was between three and four. Hence, an additional 3,500 visitors would translate into an average of 1,160 cars per day. Considering visitor turnover at such facilities and the impact of mass transportation, the designed parking facility would have to accommodate between 600 and 750 vehicles. For comparison, the parking facility for the Science Center has space for 1,107 cars and 25 buses, and the parking lot for Statue of Liberty and the Ellis Island ferry has space for 1,000 cars and 50 buses.

Appendix B Natural Resource Inventory

THE ECOLOGY OF LIBERTY STATE PARK: A HISTORICAL PERSPECTIVE

by David W. MacFarlane

INTRODUCTION

Liberty State Park is located on the waterfront, in Jersey City, New Jersey, in an area that has undergone massive change over the last three hundred and fifty years. This waterfront property was once an extensive, tidal wetland community, consisting of salty mud-flats and brackish marshes. These wetlands, originally used as summer hunting and fishing grounds by Native Americans, were completely transformed by European settlement. After centuries of intensive use, abandonment, and acquisition by the State of New Jersey, a new community has emerged on the site. This new community is unique and complex - like its long and complicated history. Many of its members are pioneers, colonizing a harsh new land. Some are exotic species, intentionally or accidentally introduced from their homelands, while others are native American species, expanding into new niches, and taking back old ones. This new community also contains a great number of people, whose needs will largely determine its future.

The contents of this document are presented in three main sections: Part I. is an interpretation of the role of human activity in shaping the park's current landscape, and Part II. is a qualitative analysis of the biological communities that have evolved as a result. The information in Part II. focuses on communities which occupy the undeveloped portions of the park, although these areas are under the constant influence of surrounding development. The final section includes the collecting/sighting data used to compile the report.

HISTORY

Early in the 17th century, Dutch explorers charted the river we now know as the "Hudson", and soon after settlers began to colonize the lands that surround it. In 1626, Dutch settlers founded New Amsterdam on Manhattan Island. In 1633, they founded Pavonia, now known as Jersey City. The tidal wetlands of Pavonia, where Liberty State Park is now located, consisted of salt marshes, cedar swamps and mud flats. These wetlands, known as Communipaw to the indigenous Lenape people, served as a feeding and breeding grounds for many species of fish, crustaceans, shellfish, birds, and mammals. The Lenape (Delawares) spent their summers along the coast and used Communipaw's vast natural resources to fulfill a wide variety of their survival needs. The colonists began to harvest this vast wealth of marine resources as well particularly oysters and renamed the area Oyster Bay. Liberty Island was called The Great Oyster Island. News of these lands and their great natural wealth reached England, who sent her armies and seized Dutch possessions in the region. New Amsterdam became New York, and Oyster Bay became a tiny part of a growing British colonial empire.

The New York Harbor became the center of colonial expansion bringing many new settlers, and new threats, to the native ecosystem. Swamps and tidal marshes were cleared and drained, to make way for farms and towns. Surrounding forests were cleared for timber and fuel. Domesticated animals, such as sheep, cattle, pigs, cats, horses, fowl and goats were brought over in large numbers, while many wild animals were displaced or hunted to near extinction. Many species of exotic plants, birds, insects and pathogens were introduced accidentally, some of which remain today. Mountains became mines, forests became towns, and marshes became fertile fields. The native Lenape were driven off the land and devastated by newly introduced diseases, to which they had no immunity. The marshes and reefs of Oyster Bay, however, continued to be harvested for fish and shellfish throughout much of this initial colonial expansion, and remained largely intact until the beginning of the nineteenth century.

The American Revolution brought new changes to the region, and to Oyster Bay. New York City markets, now free of British control, boomed with business. Ships from many nations sailed to the United States, to load up with valuable American cargoes. There was little demand for imports and many of the ships arriving in the New York Harbor had nothing but ballast (to keep the empty ships from capsizing at sea), consisting of soil and stones, as cargo. Ballast had to be shoveled out before the ship could be loaded, and coastal marshes were a convenient place to dump it. Large portions of the tidal marshes of Oyster Bay became ballast dumps, rich in seeds, spores, and microorganisms from all over the world, some of which were able to survive and spread across the emerging landscape. The vegetation of this new area was so unusual that it became a favorite specimen collection site for famous nineteenth century botanists, such as Nathaniel Lord Britton and Addison Brown.

Industrial growth and development of the region, fueled by the discovery of anthracite coal in Pennsylvania, accelerated the transformation of the land and shrinking of the marshes. The Morris Canal, which connected Phillipsburg, Pennsylvania to Newark, was a major supply route for the coal needed in the growing New York metropolis. In 1836, the canal was extended to Jersey City and out into the New York harbor. Rubble and dredge from the construction of the canal were piled on top of ballast dumps and remaining marshes. Fish and wildlife, dependent on the marshes, were disappearing, and all but the deepest oyster beds had been depleted by dredging and mass harvesting.

The rise of the railroad system in the second half of the nineteenth century caused the filling in of the remaining fragments of salt marsh. The fill consisted of a variety of materials, including harbor dredgings, excavated materials from construction of the New York City subway system, rock from the Palisades, as well as slag, and waste from other industrial activities. In 1864, the Central Railroad of New Jersey built its first terminal on the site to fulfill the growing need for faster modes of transportation. In 1889, a new terminal was constructed, which still stands in the park today, to accommodate the hordes of commuters, and the millions of "huddled masses" pouring into the U.S. through Ellis Island. Railroad operations reached their height in the early twentieth century and were gradually replaced by cars, trucks and buses and the Central Railroad was finally closed in 1967.

The decline of the railroad and transportation related industries in the region caused many of the rail yards and piers to become abandoned. These abandoned areas were quickly colonized by wild plants and animals, some of which are still evident in the park today. Hoary Vervain (*Verbena stricta*), for example, an attractive, violet-colored wildflower, native to the Western U.S., now grows in the park and may have come here by train; its presence in New Jersey has been documented on only a few other occasions.

The State of New Jersey began purchasing portions of this abandoned land between 1970 and 1975, enacting the first Green Acres legislation. The state cleared large portions of the rail yard, removing old tracks, abandoned buildings, and much of the standing vegetation. The remaining landscape was barren, except for a few pockets of wild vegetation. The soil consisted of piles of unevenly distributed fill, rock fragments, black sand, slag, cinder ash, small amounts of organic matter, old roots, and various solid wastes. Once again new plants colonized the site and another community began to emerge. The state contracted Texas Instruments Inc., to study the ecology of the site, and a report was completed in 1976.

The park was officially dedicated in 1976, as part of America's bicentennial celebration. Roads and parking lots were built to give the public access to this developing resource. A visitor's center and park office were established at the head of an old pier at the southeast corner of the park, complete with a picnic area and a front row view of "Lady Liberty," whose restoration was completed in 1986. On the northeast corner of the park, the old CRRNJ terminal was partially restored and converted into a museum and a headquarters for the park's development corporation. In the northernmost part of the park, on the old Morris Canal, a ferry terminal was established to provide access to Ellis Island and the Statue of Liberty, two of the park's most featured attractions and important historical resources.

Along the southeastern edge of the park, the state set aside approximately thirty-six acres of aquatic and wetland habitat as a State Natural Area. This habitat includes what is part of the only remaining fragments of the original saltmarsh communities, which once dominated the Hudson River Estuary. An Interpretive Center was established on the western edge of this preserve to provide an educational resource for the interpretation of the human-environmental interface. A coastal, upland community was planted to foster an increase the diversity of wildlife communities utilizing the park's natural resources. These plantings included many typical, salt-tolerant coastal species, including; Japanese Black Pine (*Pinus thunbergii*), Beach Plum (*Prunus Maritima*), and Salt-spray Rose (*Rosa rugosa*). Other species were planted for their value as a shelter or food source for wild birds, including Thorn-apple (*Cratageus* spp.) and Russian Olive-tree (*Eleagnus angustifolia*); some of which have spread outside of the area into other portions of the park.

ECOLOGY

The interior 251 acres of Liberty State Park are a strange and interesting urban wilderness. Succession, a natural process which changes the composition of biological communities in a geographic area over time, is occurring in this undeveloped site in many different locations and forms. The complex history of the site has created a

number of different soil types and an interesting micro-topography, which favors the adaptations of some organisms over others. Some portions of the site closely approximate patterns of succession observed in similar ecosystems within the region, while others have been colonized by rare and unusual species, some of which are unknown in other parts of the state. The water table is relatively high in many locations, although it is locally scarce at the surface of the soil where gravel and sand prevail. The composition of the surface soils on the site has strongly influenced the various rates of succession taking place and in many ways serve as templates for communal development.

There are two principal types of surface soils: 1) the gravel and mineral ash of the old rail-beds and 2) the marine sediments and dredge spoils which lay in between. Beneath the surface soils is a heterogeneous mix of construction rubble and sediments dredged from the bottom of the estuary. The bottom, and deepest layer of the soil, is the original organic mud from the salt marsh.

Large portions of the old gravel rail-beds are now covered by upland communities, consisting of grassy fields, shrubby thickets, and scattered stands of trees. In areas where the clearing of old buildings and railways has created depressions, or drainage has been obstructed, communities, comprised of grassy, wet meadows and swampy thickets, have emerged. The majority of these wetlands are Common Common Reed (*Phragmites australis*) meadows, although a number of other types are found.

Pioneer Communities

Certain portions of the undeveloped site have remained as bare gravel and mineral ash. These materials are remnants of old railroad beds and are occupied by the simplest of communities in the area. The most barren of these sites lack even a simple crust of lichen due to the harsh nature of the soil conditions. The dark, bare surface of these areas suffer from great extremes of temperature; heating to high temperatures during the middle of the day and rapidly cooling after dark. The coarse-grained texture of the surface soil elements combined with a profound lack of organic matter, creates a poverty of moisture and essential nutrients at the surface.

Despite these severe conditions a number of pioneering species have managed to colonize these areas: The British Soldier Lichen (*Cladonia cristatella*) is a pioneer of bare sand and gravel, and old railroad ties which are slowly decomposing throughout the site. Lichens are symbiotic associations between algae and fungi, and their activities are important in the initial phase of soil development. Orange "Grass" (*Hypericum gentianoides*), a small, somewhat succulent member of the St. John's Wort family, is able to grow in extensive colonies on these otherwise bare sites. This plant exhibits a simple, leafless growth form, which reduces its surface area and defends the plant from evaporative water loss. Blue Curl (*Trichostemma dichotomum*), a rather fragrant member of the Mint family, is another colonizer of these bare sites, and is often found intermingled with the Orange Grass. Hairgrass (*Bulbostylis capillaris*) often grows as a colony of small tufts, particularly in more compacted soils. Common Mullein (*Verbascum thapsus*), Hyssop-leaved Boneset (*Eupatorium hyssopifolium*), and Queen Anne's Lace (*Daucus carota*), with its long taproot, are also tolerant of these drier locations, although they are common on a variety of other sites.

Moss-mats

In places where soil moisture is not as scarce, colonies of mosses have found a niche among the chips of gravel and sand, sometimes forming extensive mats. "Hair-cap" moss (*Polytrichum commune*), so named for the tiny hairs projecting from the lid of its reproductive capsule, or sporophyte, has grown into extensive colonies on some of these old railbeds. Its bright green foliage sticks up like the canopy of a tiny pine forest from the orange brown litter of its older, denser body mass. In this decaying mass, precious moisture and nutrients are trapped, providing for the next generation of mosses.

This enriched environment provides an ideal substrate for colonization by other plants, whose offspring may someday "succeed" the mosses. Hairy Boneset (*Eupatorium pilosum*), a wild herb which displays a cluster of tiny, white flowers late in the summer, seems to be dependent on the moss-mat community for its moisture, and has not been found growing outside of its protective mass. The Running Ground "Pine" (*Lycopodium complanatum*), a simple, seedless plant that resembles a pine seedling, is usually found in close association with this moss-mat community, probably due to similarities in reproductive requirements, rather than a direct dependence on the moss. The White Cushion Moss (*Leucobryum glaucum*) is another prominent moss, which grows as small, isolated mounds, and can be recognized by its spongy, dirty-white foliage, which turns blue-green when wet.

Sedges & Rushes

In open areas where soils are saturated, or in some cases inundated with water, a number of sedges and rushes have found a niche. Sedges and rushes are some of the first plants to colonize bare, wet soils. Ditches, depressions, temporary pools and even tire ruts serve as excellent habitats for them. Woolgrass (*Scirpus cyperinus*), a tall sedge, whose mature seeds look like a small clump of wool stuck on the top of a stalk of grass, is the most common of these plants, often growing intermingled with patches of Common Reed. Other sedges, including Straw-colored Cyperus (*Cyperus strigosus*), and Three-square (*Scirpus americana*), named for the three square surfaces of its leaf stalk, occupy these sites as well. Sharp-fruited Rush (*Juncus acuminatus*), Common Rush (*J. effusus*), and surprisingly, Torrey's Rush (*Juncus torreyi*), which is rare in New Jersey, are the most common of the rushes growing on these soggy soils. In one interesting location two species of Spike Rush (*Eleocharis* spp.) dominate a small pool, which occupies a depression formed between old railroad beds. The two plants are distributed across the area according to their size and the water's depth. Along the shallow edges Dwarf spike rush (*E. parvula*) grows, while the deeper portions are occupied by Blunt spike rush (*E. obtusa*), which is much taller.

Marsh-meadows

A number of wet, grassy meadows can be found throughout the site. Some of these communities exist in depressions created by the clearing of the old railroads, while others are emerging in more recently disturbed

areas where drainage has been obstructed by construction and road building. Old dredge materials composed of sand and silt dominate the soils in these areas.

The dominant species in all of these meadows is Common Common Reed, whose presence is well known within the region as colonizer of roadside ditches, and the only form of vegetation in vast expanses of the Hackensack Meadowlands. The Common Reed grows as a nearly impenetrable, dense stand 10-12 feet in height. Its generic, scientific name, *Phragmites*, comes from the ancient word "Phragmos", meaning "fence." These Common Reed marshes, despite their reputation as a pest species, are an important habitat for some of the park's wildlife. Marsh Wrens (*Cistothorus palustris*) live year round in these marshy meadows, and those who listen closely can hear their bubbling musical chatter. Rodents, like the Meadow Vole (*Microtus pennsylvanicus*), forage amongst the reedmat nibbling on fallen seeds, and gnawing on tender shoots. Northern Harriers (*Circus cyaneus*) can be seen daily flying over the Common Reed searching for voles to make a meal out of. Northern Harriers are listed as endangered species in New Jersey, but are locally abundant here. Another bird, the Ring-necked Pheasant (*Phasianus colchicus*), is common in thickets on the edges of these marsh-meadows, and uses the Common Reed and surrounding fields for cover, nesting and food resources. This attractive pheasant was originally introduced into the New York City area from the Orient, as a game bird.

In areas where the Common Reed is more sparse, or its populations are fragmented, other species of plants are able to gain a foothold. Marsh Mallows (*Hibiscus palustris*) grow along the edges of more saturated marsh-meadows. This plant, with its extravagant pink flowers, is amongst the most beautiful in the park. Another wildflower, Purple Loosestrife (*Lythrum salicaria*), often grows intermingled in open patches of Common Reed. This wildflower puts on a brilliant display of color throughout the summer and early fall, and its copious flowers provide nectar for crowds of hungry butterflies. Sedge meadows, as mentioned earlier, are sometimes intermingled with these Common Reed meadows, as well as patches of Marsh Fern (*Thelypteris palustris*), Sensitive Fern (*Onoclea sensibilis*) and Horsetails (*Equisetum arvense*). Nodding Ladies Tresses (*Spiranthes cernua*), attractive wild orchids, are locally abundant on the edges of some of the marsh-meadows. Fox-tail clubmoss (*Lycopodium alopecuroides*), a creeping Lycopyte, which looks a lot like a small green rope woven into the soil, is found growing in association with the orchids.

Fields-Herbs

Large areas of the park are covered with fields of herbs and grasses, particularly the dry, gravel soils of the old railroad beds. Mugwort (*Artemisia vulgaris*), an aromatic annual introduced from Europe, dominates vast expanses of these fields. A companion of Mugwort, and sometimes dominant across these fields, is Switchgrass (*Panicum virgatum*). Switchgrass has a wide range of habitats in the park, from dry fields to wet meadows, and is a common species in abandoned fields and railyards across New Jersey. Scattered throughout are patches of Yarrow (*Achillea millefolium*), a medicinal plant which has been cultivated in the Mediterranean region since antiquity. In Homer's epic poem "Iliad", Achilles used the leaves of Yarrow to heal his bleeding troops at the battle of Troy, and modern scientists have confirmed the hemostatic properties of this herb. Reed-Steppe Grass (*Calamagrostis epigeios*), a native European grass, covers large areas of sandier soils, sometimes mixed with

Reed Grass. It seems likely that this grass hitched a ride on the belongings of European immigrants entering the country through Ellis Island, as it has been recorded at no other location in the state. Sleepy Catchfly (*Silene antirrhina*), a small Carnation-like plant (Carophyllaceae) with pink flowers, grows in sandy fields and along roadsides near the eastern side of the site. This tiny plant secretes a sticky paste-like substance on its stem beneath its flower which catches small insects as they contact it. Another interesting plant is the Spike-ball Sedge (*Cyperus ovularis*), which unlike many other sedges, is adapted to these drier locations. Camphor Weed (*Heterotheca subaxillaris*), a strongly aromatic plant with a yellow daisy-like flower, thrives in almost bare sand. Oxe-eye Daisies (*Chrysanthemum luecanthemum*), Hawkweed (*Hieracium canadense*), Broomsedge (*Andropogon virginianus*), which is actually a grass, and a large number of other plants also contribute to the diversity of this dry, field ecosystem. This diverse ecosystem contributes its biomass to a growing food-web, which attracts a variety of hungry consumers.

Fields - Insects

A diversity of wildflowers bloom throughout the growing season across these fields and offer sweet nectar to a variety of butterflies. The Black Swallowtail (*Papilio polynexes*) is often seen feeding on nectar from Spotted Knapweed (*Centaurea maculosa*), while its young feed on various plants in the Parsley family, such as Queen Anne's Lace and Wild Parsnip (*Pastinaca sativa*).

Monarch Butterflies (*Danaus plexippus*), use different flowers within the park at different times during their yearly migration from Mexico to Canada, and back. During the early summer, some stop to feed on the nectar of the park's thistles and daisies, and lay eggs on Common Milkweed (*Asclepias syrica*) plants. Later the Monarch's larvae hatch and feed on the milkweed. The milkweed is poisonous to most organisms, but the larvae are immune and actually incorporate the poison into their tissues, which makes them unpalatable to many predators. They retain these poisons throughout their adult lives. In the fall, we see Monarchs again as they migrate south to escape the encroaching cold. On their way, some stop to fuel up on late blooming flowers such as various Goldenrods (*Solidago* spp.), Asters (*Aster* spp.), and Bonesets (*Eupatorium* spp.), which are major constituents of these fields.

Pearly Everlasting (*Anaphalis margaritcea*), an attractive wildflower with woolly leaves, grows in dense patches on dry fields opposite the Liberty Science Center, and is the primary host for the American Painted Lady (*Vanessa virginiensis*). White and Yellow Sweet Clover (*Melilotus officianale* and *alba*) serve as hosts to Orange and Clouded Sulfur butterflies (*Colias eurythreme* and *philodice*). These clovers are also important for the development of the soil through symbiotic associations they form with nitrogen fixing bacteria (*Rhizobium* spp.). Butterflyweed (*Asclepias tuberosa*), provides a brilliant display of orange in the summer, a rare color in the flowers of most plants.

A variety of insects are abundant in these fields in addition to butterflies. Indian Hemp (*Apocyanum cannabinum*), a common annual whose tough, fibrous stems were woven by native Lenape, serves as a host to the colorful Dogbane Beetle (*Chrysochus auratus*), which sport iridescent, protective, wing-shells known as

elytra. Soapwort (*Saponaria officinalis*), known for its pretty, pink flowers, which form a soapy froth in water, is one of a number of nectar sources for HoneyBees (*Apis mellifera*). The Soapwort produces nectar deep inside of its tube-like flowers. Foraging bees, digging deep in the flowers to get at this sugary treat, become coated with pollen, and deliver it to the next Soapwort. Clever ants (*Formicidae*), however, have learned to chew through the outside wall of the flower to steal pollen and nectar directly from its source; look for these tiny holes at the base of a flower on Soapworts growing in the park. The Red-legged Grasshopper (*Melanoplus femurrubrum*), and the common Carolina Grasshopper (*Dissosteira carolina*), are present in vast numbers throughout the park, especially in the late summer when the grasses are in full bloom. Another interesting insect is the Spittlebug (*Philaneus spumarius*), who coats itself in a bubbly froth on the stems of a wide variety of plants. The froth serves as a source of protection against predation and moisture loss for the tiny growing nymph inside. The Locust Borer (*Megacyllene robiniae*), a type of beetle whose form closely mimics a Yellow-jacket wasp (*Vespiniae*), feeds as an adult on nectar from various Goldenrods and its larvae are laid under the bark of Black Locust (*Robinia pseudoacacia*) trees. Many species of flies, mosquitoes, spiders and a host of other insects can also be found in these old fields, and many more remain undocumented.

Fields - Toads, Snakes and Mammals

The abundance of seeds and insects within the area, serve as food for larger animals. The only known amphibian on the site is the Fowler's Toad (*Bufo woodhousei fowleri*). It feeds mostly on beetles and ants, and prefers sandier soils near temporary pools, which it uses for breeding. Reptiles, such as Garter Snakes (*Thamnophis sirtalis*), eat these toads, as well as mice and other small mammals. The House Mouse (*Mus musculus*) benefits from the shelter of large warehouses and decaying old buildings in the industrial complex located directly adjacent to the site. Its diet consists mainly of food and organic debris from nearby human dwellings, but most likely it supplements its diet with wild foods from the park, such as seeds and insect larvae. A number of other mammals make occasional forays into the park from surrounding areas, including Raccoons (*Procyon lotor*), Opossums (*Didelphis virginiana*), Bats (*Pteropodidae*), feral dogs (*Canis domesticus*), house cats (*Felis domesticus*), and Eastern Gray Squirrels (*Sciurus carolinensis*), although most do not live here.

Thickets - Trees, Birds

Large areas of the park are now covered with thickets of shrubs and trees, which have replaced some of the herbaceous plants of the older fields. The decomposing litter of annual and perennial herbs in the fields has accumulated over the decades and contributed to the formation of a surface horizon of more mature soil, capable of supporting these larger, woody plants. Most of these shrubs and trees are specially adapted to tolerate the poor soil conditions and can capitalize on the abundant light available in open fields and meadows. This taller, more permanent type of vegetation adds new dimensions to the ecosystem, increasing the shade and cover from the elements; factors which mitigate changes in temperature and moisture. The niches created by this new mix of vegetation favor a rise in the population of birds, who benefit from increased shelter for nesting, and nearby fields and marshes for feeding.

The Sumacs (*Rhus* spp.) are a group of shrubs particularly well adapted to colonize poor, dry soils and are amongst the dominant woody species. Winged Sumacs (*Rhus copallina*), named for the wing-like projections on the petioles of its compound leaves, are widely scattered throughout, sometimes growing as continuous, dense thickets. Smooth Sumac (*Rhus glabra*), whose twigs are thick and smooth, grows in low, dense colonies but is far less common than the winged variety. "Staghorn" Sumac (*Rhus typhina*), named for the velvet-like hairs on its stout twigs, is found scattered throughout the park. Birds and other animals rarely eat the bright red berries of Sumacs, which remain on the plant throughout the winter, until the late winter when other food is scarce.

Northern Bayberry (*Myrica pensylvanica*), a shrub which is indigenous to coastal New Jersey, grows well in sandy soils, and over the last few decades some specimens have grown to be quite large. Bayberry is specially adapted to nitrogen poor soils, with its tough, leathery leaves, and its symbiotic association with nitrogen-fixing microorganisms in the soil, known as actinomycetes (*Frankia* spp.). Bayberry is an important food source for migrating birds, like Yellow-rumped Warblers (*Dendroica coronata*), searching for a meal late in the fall, on their way south. Waxy bayberries were also a source of fragrant candle wax for early European settlers, who had to boil many bushels of them to make a few small candles.

Another dominant plant, which isn't technically a shrub, is Japanese Knotweed (*Polygonum cuspidatum*). This hardy, herbaceous plant, introduced from Asia as an ornamental, grows in a dense shrubby mass of bamboo-like shoots, and is opportunistic throughout; growing in, up, and around other plants wherever it can. Cut-leaved Blackberry (*Rubus laciniata*), a thorny, creeping, vine-like shrub, grows well in the compact, gravelly sites of the old railbeds, but is not limited to them. In open areas and along roadsides it is found entangled with taller herbs and grasses forming low, dense clumps. Eastern Cottontail rabbits (*Sylvilagus floridanus*) make use of these blackberry-briar hedges for shelter during the breeding season.

In wet areas, where meadows are giving way to shrubs, Pussy Willows (*Salix discolor*) are common, often growing as multi-stemmed clumps. The flowers of the Pussy Willow bloom early, which makes them important sources of nectar and pollen for Bumble bees (*Bombus* spp.) rearing their spring broods. Elderberry (*Sambucus canadensis*), a plant renowned in folk remedies and recipes, also grows in these wet soils, providing dark, purple berries during the summer. Steeplebush (*Spirea tomentosa*), a slender shrub, crowned with a "steeple" of bright pink flowers, grows to form knee-high thickets, usually in wet meadows covered by a dense moss mat. In one interesting location, on the north eastern side of the site, a sphagnum moss mat (*Sphagnum* spp.) has developed in the shade of the Steeplebush. Saplings of Red Maple (*Acer rubrum*) and a few Black Willows have invaded some of these wet-meadows as well. These native trees are indicative of poorly drained soils throughout New Jersey, and foreshadow the possible emergence of a hardwood swamp on this site.

A number of trees have colonized the park's fields, meadows, and shrub-thickets forming "pioneer forests." Gray birch (*Betula populifolia*), a small to medium sized tree which can tolerate extremely poor soils, grows well in a variety of locations, from bare gravel to low, wet muck. In one area near the south end of the site, a dense thicket of gray birch provides one of the parks most outstanding sites. In winter, one can see Tree

Sparrows (*Spizella arborea*) sheltering themselves from cold winds amidst the branches of these small trees, and scratching around in the ground at their bases for whatever seeds they can find.

Another important group of pioneer trees are the poplars (*Populus* spp.), which grow in great abundance in the park. They produce large, quantities of plumed seeds early in the spring when the ground is flooded, which germinate and quickly shoot up wherever there are open areas of wet, mineral soil. Poplars, as well as birches, are often the first to colonize areas of bare mineral ash leftover from wildfires in forests throughout the northeast. The cinders and mineral ash leftover on many surfaces in the park from the continuous operations of the railroads, and the high water table, has accommodated the needs of these species quite well. Four species of poplars grow in the park; Quaking Aspen (*Populus tremuloides*), Big-tooth Aspen (*P. grandidentata*), White Poplar (*P. alba*), and Eastern Cottonwood (*P. deltoides*). The fast-growing Cottonwoods are the largest trees in the park, making them excellent perches for large predatory birds like Red-tailed Hawks (*Buteo jamaicensis*), who hunt for mice and rabbits in the fields and meadows. Cottonwoods also have the distinction of being one of the few trees successful in colonizing dense Common Reed meadows.

Gray birches and poplars make up the bulk of the trees on the site, but there are quite a few other species as well. The Tree-of Heaven (*Ailanthus altissima*), a much maligned plant introduced from the Far East, is well represented. This tree is a highly competitive and widely naturalized species in New Jersey, due to its high tolerance for environmental stress. Wild Cherry trees (*Prunus* spp.), are scattered throughout the area, owing their presence to the various birds that eat their fruits and distribute the undigested cherry seeds in their droppings. A number of saplings and young trees which are representative of more mature forest ecosystems within the region, can be found occasionally in this undeveloped site. Oaks (*Quercus* spp.), Maples (*Acer* spp.), and White Ash (*Fraxinus americana*) are the most notable. The presence of these species gives a strong indication that a forest comprised of these species will develop on the site, completing a long cycle of succession.

Four species of woody vines, Frost Grape (*Vitis vulpina*), Virginia Creeper (*Parthenocissus quinquefolia*), Porcelainberry (*Ampelopsis brevipedunculata*), Poison Ivy (*Toxicodendron radicans*), have colonized the park's interior, particularly in locations where trees are dead or dying. These species have been introduced into the park by birds (see Black Cherry above) who eat their berries. These vines use the tall, sturdy trunks of trees to anchor themselves to while they grow skyward towards the sun.

A number of birds nest in the park throughout the summer months utilizing the food and protection provided by the diverse vegetation. American Goldfinches (*Carduelis tristis*) nesting during the summer are dependent on the downy seeds of Canada Thistle (*Cirsium arvense*), which serve as a soft, insulating bedding for their broods, and a primary food source for both young and adults. Rufous-sided Towhees (*Pipilo erythrophthalmus*) spend hot, summer days foraging for worms and insects within the cover of these thickets. Song sparrows (*Melospiza melodia*) nest on the ground in the shade of birch and poplar trees, feasting on insects and seeds from nearby fields. Gray catbirds (*Dumetella carolinensis*), sing their chaotic songs in briar hedges eating juicy blackberries (*Rubus* spp.).

Liberty State Park's bird list, including both resident and migrant species now numbers 210. At any time of the year, one can come to the park and observe an interesting avian visitor making use of Liberty's bounty of natural resources. Tree Swallows (*Iridoprocne bicolor*) arrive in spring just in time to gobble up the swarms of newly emerged mosquitoes, rising up from the marshes. Savannah Sparrows (*Passerculus sandwichensis*), a bird which has become increasingly rare in New Jersey, stop at the park during their yearly migrations to forage in the shrubby fields. Green Parakeets (*Aratinga holochlora*) fly up to New Jersey from Florida during the dog-days of summer. Visitors to the park, many of whom are unaware of wild parakeet populations, are amazed when they observe these colorful, tropical birds gorging themselves on the fruits of wild Mulberry trees (*Morus* spp.). Red-winged Blackbirds (*Agelaius phoeniceus*) nest in the wet thickets of the reed-marshes, feeding their young chicks with regurgitated insect parts. In the fall, small bands of Kestrels (*Falco sparverius*), which are north America's smallest falcons, can be seen dive-bombing insects from trees and telephone wires. In the depths of winter, Snowy Owls (*Nyctea scandiaca*), come south to the park to escape the frozen tundra of northern Canada and feast upon the rodent populations.

Conclusion

The land now known as Liberty State Park has undergone massive change over the last three hundred and fifty years. The original tidal-wetland community is gone, and a new and different community exists in its place. The people of New Jersey are the dominant members of this new community and our diverse wants and needs will largely decide its future. The other members of this community, only a fraction of whom have been described by this document, are little known us, but their contributions to it should not be underestimated. The roles that these other organisms play in the park's environment are not as clear as our own, but it is certainly in our best interest to understand them; they are indicators of its status and health. The community of organisms that has emerged on this site is amazing, considering the conditions that these pioneering creatures have faced. In twenty-five years they have transformed an abandoned railyard into a living oasis in the midst of concrete and steel. The presence of this community is a strong indication of a land that is healing, and a tribute to the tenacity of life on this planet.

Appendix C: The Planning Committee

Steve Ellis/Diane Hewlett-Lowrie, Liberty State Park
Elizabeth Jeffrey, Jersey City
Richard Kane/Bill Neil, NJ Audubon Society
Emlyn Koster/Connie Clayman, Liberty Science Center
Kay LiCausi, Congressman Menendez
Ethel Pesin, Liberty State Park Advisory Commission
Sam Pesin, Friends of Liberty State Park
Janice Reid/Jocelyn Bamba, Natural Resources Conservation Service
Greg Remaud/Michael Stringer, Liberty State Park Conservancy
Glen Van Olden, Soil Conservation District
Andrew Wilner, American Littoral Society
Dorsey Winant, Paulis Hook Community Association
Peter Ylvisaker, Liberty State Park Development Corp.