S.U.M. Iron

3. AFFECTED ENVIRONMENT

Introduction

This chapter describes the existing conditions at Paterson Great Falls NHP that could be affected by future park management actions proposed in the three GMP alternatives. The information provides the baseline for the evaluation of impacts of the alternatives in "Chapter 4: Environmental Consequences" of this Draft GMP/EA.

The GMP project area is the area that will be directly influenced by proposed park management actions. It generally includes the area within the park boundary. For some topics, the study area also includes areas outside the park boundary that could be indirectly influenced by the proposed actions. The NPS has used the best available information to describe existing conditions within the study area.

Impact Topics

The description of existing conditions is organized by "impact topic" which are the resources and park values that could be affected by implementing any of the proposed management alternatives. Impact topics analyzed in detail were identified based on the context of the park's environment, applicable laws, and public comment received during the GMP planning process public and agency scoping. A number of other impact topics were initially considered but then dismissed from detailed analysis. Those topics are listed below with the reason(s) for dismissal.

Impact Topics Analyzed

Cultural Landscapes

All of Paterson Great Falls NHP forms a man-made cultural landscape that could be affected by management alternatives for the park. Improvements to park grounds and trails, restoration of the raceway system, and stabilization of the ATP site would all affect significant cultural landscape features and characteristics (natural systems and features, spatial organization, circulation, vegetation, buildings and structures, small-scale features, constructed water features, views and vistas, and archeological sites).

Historic Structures

A large collection of historic structures occurs within Paterson Great Falls NHP, many of which could be affected by management alternatives for the park. Many of these structures are listed on or determined eligible listing on the National Register of Historic Places.

Upper Raceway Park

Archeological Resources

Within Paterson Great Falls NHP there are a number of archeological resources and areas of archaeological potential related to specific industrial activities (NPS 2012a). Management actions in the park involving ground disturbance, such as treatments of historic structures or development of visitor use facilities, would have the potential to disturb these resources.

Water Resources (includes Surface Water and Water Quality)

Restoration and/or repairs of the raceway system, dams, and river wall would require construction activities within and along the banks of the Passaic River. These actions would have the potential to impact surface water and water quality.

Floodplains

Paterson Great Falls NHP encompasses areas within both the 100-year and 500-year floodplains including some locations around the falls and portions of the raceway system. Impacts on floodplains and their functionality could occur from some of the proposed management actions. Repairs and rehabilitation of some structures within the floodplains, such as the dams, raceways, and pedestrian bridges, could displace floodwaters or otherwise alter existing floodplains.

Visitor Use and Experience

Visitor use and experience could be affected by one or more of the actions in the alternatives, such as the provision of new recreational opportunities, the development of new visitor facilities and amenities, and the establishment of new partnerships. New facilities such as trails and interpretive media would change the way visitors use and experience the park. All the alternatives could have an impact on overall visitor understanding, including interpretive and educational opportunities.

Socioeconomics

NPS Management Policies (NPS 2006b) states under section 1.6, "Cooperative Conservation beyond Park Boundaries," "Cooperative conservation beyond park boundaries is necessary as the National Park Service strives to fulfill its mandate to preserve the natural and cultural resources of parks unimpaired for future generations." Included under this policy guidance is the recognition that "NPS activities may have impacts outside park boundaries. Recognizing that parks are integral parts of larger regional environments, and to support its primary concern of protecting park resources and values, the NPS will work cooperatively with others to:

- anticipate, avoid, and resolve potential conflicts
- protect park resources and values
- provide for visitor enjoyment
- address mutual interests in the quality of life of community residents, including matters such as compatible economic development and resource and environmental protection"

An increase in tourism and park visitation is likely to occur as a result of implementing any of the alternatives. This visitation could result in increased spending in the local area. Although the economy of the city is diversified and may not be substantially affected by the park, some businesses and individuals in the local area could be beneficially impacted by increased spending.

Park Operations

As a new park, Paterson Great Falls NHP currently has limited staff and operational capacity. One purpose of this plan is to determine appropriate levels and types of staff needed to effectively manage the park. Proposed improvements and additions to visitor facilities, amenities, and infrastructure would strain existing staff and budgets as visitation increases. Additionally, as the NPS moves forward with plans to acquire property within the boundary of the park, additional staffing will be needed to facilitate maintenance of those properties.

Impacts Topics Dismissed from Detailed Analysis

Ethnographic Resources

Ethnographic resources are defined as any "site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it" (NPS 1998b). As part of the actions common to all alternatives in this GMP, the park intends to complete an ethnographic overview and assessment to determine whether or not ethnographic resources are associated with the park. At this time, however, there are no known ethnographic resources associated with the park; therefore, the impact topic of ethnographic resources was dismissed from detailed analysis.

Museum Collections

NPS Management Policies 2006, Director's Order 24: NPS Museum Collections Management, the NPS Museum Handbook, and cultural resources laws identify the need to evaluate effects on museum collections, if applicable. The park does not currently own any objects, artifacts, or archival collections and will not directly acquire or store collection items under any of the proposed alternatives. Since the park does not plan to acquire museum collections in the future

The Falls in Spring

under these alternatives, the impact topic of museum collections was dismissed.

Geologic Resources

According to NPS management policies, the NPS will: assess the impacts of natural processes and human-related events on geologic resources; maintain and restore the integrity of existing geologic resources; integrate geologic resource management into NPS operations and planning; and interpret geologic resources for park visitors.

Geologic resources within Paterson Great Falls NHP include the cliffs and chasm of the Great Falls of the Passaic which are listed as fundamental resources for the park. The park's fundamental resources would receive primary management consideration because they are essential in achieving the park's purpose and maintaining its significance. Under all alternatives, the park's geologic features would be preserved and protected as integral components of the park's natural systems. Proposed management actions related to the park's geologic resources would not differ among the alternatives and actions are not expected to impact geologic resources.

Soils

According to its management policies, the NPS actively seeks to understand and preserve the soil resources of parks, and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources.

Paterson Great Falls NHP comprises lands that are classified by the Natural Resource Conservation Service as urban lands. Urban land is nonagricultural land comprising soil material that was disturbed and manipulated by human activities in an urban environment. Urban soils are extensively disturbed, displaced, and compacted, which creates a soil material unlike its natural counterpart. This can be due to (1) the mixing of soil material when soil is scraped away, stockpiled, and re-spread, or transported to another location and spread; (2) the dumping and spreading of soil material from diverse sources over existing surfaces; and (3) the contamination resulting from deposition, mixing, and filling of materials not found in the natural soil, or found at concentrations greater than those usually found in natural soils. Such disturbance and manipulation results in changes to the physical, chemical, and

biological properties of these soils; these changes make them generally less favorable as a rooting medium than soils in a natural landscape.

The manipulation of earth that was necessary to construct the river wall along the south bank of the Passaic River, the raceway system through the park, and the hydropower plant and ATP sites, permanently altered the topography of the land and natural soil regimes which once existed. Possible construction associated with implementation of management actions would primarily involve rehabilitation or stabilization of those structures or sites. Because the soils in those areas were so extensively disturbed in the past, any short- or long-term adverse impacts on soils associated with excavation, grading, and resurfacing would be negligible. Existing topography and elevations would not be altered and erosion and sedimentation control measures would minimize soil exposure, control soil losses, trap sediment, and prevent sediment transport into adjoining waterways during construction.

Other ground-disturbing actions proposed under the alternatives for areas on the north side of the Passaic River would include trail restoration and/or construction. As with other construction activities, erosion and sedimentation control measures would be employed to reduce sediment from entering the river. Any potential adverse impacts would be primary due to soil compaction, however, this action is similar across all action alternatives and the total footprint of trails would be relatively small.

Because the topography and natural soil regimes were permanently altered by previous construction, as well as by decades of industrialization and urbanization, any new construction associated with implementation of the alternatives would only be expected to contribute negligible impacts on soils. Therefore, the topic of soils was dismissed from further analysis.

Prime and Unique Farmlands

The Farmland Protection Policy Act (7 USC § 4201 et seq.) was passed to address the effects of federal programs on the conversion of farmland to nonagricultural uses. In support of this legislation, the Department of the Interior issued several memoranda to guide its agencies in addressing prime and unique farmlands in the NEPA process. Prime farmlands are those lands that have the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fertilizer, pesticides, and labor, and without intolerant soil erosion. Unique farmlands are those that are used for the production of specific high-value food and fiber crops.

There are no prime or unique farmlands located within the park.

Federally Listed Threatened or Endangered Species

Section 7 of the Endangered Species Act of 1973, as amended, directs all federal agencies to use their existing authorities to conserve federally listed threatened and endangered species and to ensure that actions they fund, authorize, permit, or otherwise carry out will not jeopardize the continued existence of any listed species, or result in the destruction or adverse modification of designated critical habitats. Throughout the planning process, informal consultation with the New Jersey Field Office of the U.S. Fish and Wildlife Service (USFWS) has been conducted to identify any potential species thought to be present within the area of Paterson Great Falls NHP. USFWS identified four bat species thought to occur in the area: Indiana bat (Myotis sodalis), an endangered species; northern long-eared bat (Myotis septentrionalis), a threatened species; little brown bat (Myotis lucifugus); and the tri-colored bat (Pipistrellus subflavus). The little brown bat and tri-colored bat are both currently under review for listing as threatened or endangered.

The primary threat to all four bat species is white-nosed syndrome, but other man-made threats also play a role in bat population loss including disturbance, loss of forested summer habitats, and environmental contaminants. In general, bats hibernate from late October to April in caves and abandoned mine shafts, then emerge in spring to roost in wooded areas near streams and rivers as well as in man-made structures such as buildings or ruins. According to USFWS, actions which may affect these species of bats include clearing trees over 3 inches in diameter at breast height (dbh) between April 1 and September 30; clearing greater than 0.5 acre of trees at any time of year; and removal, modification, or disturbance of known roost trees.

Actions proposed as part of the alternatives included in this plan which could impact bat species include rehabilitation, preservation, and stabilization of select historic structures and ruins, and tree removal to maintain viewsheds and improve trails. To reduce the likelihood of impacting these bat species, the NPS would employ mitigation measures such as conducting field surveys for the presence of bats and restricting tree clearing from April 1 to September 30. The NPS would also encourage other landowners within the boundary of the park to consider the impacts their actions could have on bat species and employ similar mitigation measures.

As a result of mitigation measures and continued consultation with USFWS and the state, no adverse impacts to Indiana bat (Myotis sodalis), northern long-eared bat (Myotis septentrionalis), little brown bat (Myotis lucifugus), or tri-colored bat (Pipistrellus subflavus) are expected as a result of the proposed alternatives in this plan. As part of the Section 7 consultation process, a letter was submitted to the USFWS for review and concurrence with the NPS determination of "may affect, not likely to adversely affect." (See chapter 5 for additional Section 7 consultation information)

Air Quality

Section 118 of the 1963 Clean Air Act (42 USC 7401 et seq.) requires park units to meet all federal, state, and local air pollution standards. Further, the Clean Air Act provides that the federal land manager has an affirmative responsibility to protect air quality related values (including visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse pollution impacts. NPS Management Policies 2006 also requires parks to perpetuate the best possible air quality in parks.

Passaic County is located in a densely populated area of New Jersey within the metropolitan areas surrounding Newark, NJ and New York, NY. The whole of the region contributes to Passaic County's non-attainment status for ozone which the state addresses in the 2007 state implementation plan for attainment. Paterson Great Falls NHP is not a federal Class I area afforded additional protection for air quality related values such as visibility. Instead, the park is a Class II area, which allows for a less stringent level of air quality protection than Class I areas. In addition, Passaic County is designated as non-attainment for the 1997 eight-hour National Ambient Air Quality Standards for ozone. Proposed management actions would have some negligible, short-term impacts on air quality during construction activities including the operation of equipment and construction vehicles. Under all alternatives, the park would pursue opportunities to use and promote "green" technologies which would serve to reduce greenhouse gases where possible. Any potential increases in vehicle emissions, fugitive dust, or airborne particulates created during construction, however, would be temporary in nature and would rapidly dissipate. On a regional level, the amount of criteria pollutants emitted would not be substantial. Overall, there would be negligible impacts on local air quality; however, such impacts would be short-term, lasting only as long as construction. Therefore, the topic of air quality was dismissed from further analysis.

Tribal Resources (including Sacred Sites and Indian Trust Resources)

According to Executive Order 13007, "Indian Sacred Sites," the NPS will accommodate, to the extent practicable, access to and ceremonial use of Indian sacred sites by religious practitioners from recognized American Indian and Alaska Native tribes and would avoid adversely affecting the integrity of such sacred sites. Paterson Great Falls NHP is associated with three federally-recognized tribes: Delaware Nation, the Delaware Tribe of Indians, and the Stockbridge-Munsee Community. The park consulted with those tribes early in the planning process and no sacred sites were identified within the park's boundary. Copies of this GMP/EA will be forwarded to each affiliated tribe. If the tribes subsequently identify the presence of sacred sites within park boundaries, further planning would be undertaken in consultation with the tribes and appropriate mitigation measures developed as necessary. The location of any sacred sites would not be made public. Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by Department of the Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable

Native American Program

fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. There are no Indian trust resources in Paterson Great Falls NHP or its general vicinity. The lands composing the park are not held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians.

Energy Resources and Conservation Potential

Alternatives in the general management plan could result in new facilities with inherent energy needs. In the proposed alternatives, new facilities would be designed with long- term sustainability in mind. The NPS has adopted the concept of sustainable design as a guiding principle of facility planning and development. The objectives of sustainability are to design facilities to minimize adverse effects on natural and cultural values, to reflect their environmental setting, and to require the least amount of nonrenewable fuels/energy.

Management actions could result in an increased energy need, but this need is expected to be negligible when seen in a regional context. Paterson Great Falls NHP would also operate under the wise energy–use guidelines and requirements stated in NPS Management Policies 2006; Executive Order 13123, "Greening the Government through Effective Energy Management"; Executive Order 13031, "Federal Alternative Fueled Vehicle Leadership"; Executive Order 13149, "Greening the Government through Federal Fleet and Transportation Efficiency;" and the 1993 NPS Guiding Principles of Sustainable Design. Therefore, this resource topic is eliminated from further analysis.

Public Health and Safety

During scoping, the public expressed concerns over safety within the boundaries of the national historical park. The general agreement signed between the NPS and the city of Paterson states that the city will "retain jurisdiction for its police department and emergency services to respond to emergencies, conduct law enforcement investigations and enforce the law as permitted by federal and state law." Additionally, actions and developments proposed in the alternatives would not result in any identifiable adverse impacts to human health or safety.

Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires federal agencies to make achieving environmental justice part of their mission. Specifically, each agency must identify and address "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."

The potentially affected community does contain minority and low- income populations; however, environmental justice is dismissed as an impact topic for the following reasons:

- NPS staff and the planning team actively solicited public participation as part of the planning process and gave equal consideration to all input from persons regardless of age, race, income status, or other socioeconomic or demographic factors.
- Implementation of the proposed alternative would not result in any identifiable adverse human health effects. Therefore, there would be no direct or indirect adverse effects on any minority or low-income population.
- The impacts associated with the preferred alternative would not result in any identified effects that would be specific to any minority or low income population community.

In conclusion, no disproportionately high or adverse impacts on low income or minority population are expected. Based on the above information and the requirements of Executive Order 12898, environmental justice was ruled out as an impact topic to be further evaluated in this document.

Overview of Resource Information

Climate Change

Climate change refers to any significant changes in average climatic conditions or variability for an extended period. Recent reports by the US Climate Change Science Program, the National Academy of Sciences, and the United Nations Intergovernmental Panel on Climate Change provide evidence that climate change is occurring and will accelerate in the coming decades. While climate change is a global phenomenon, it manifests differently depending on regional and local factors.

Over the last decade, the NPS has consulted with the scientific community, federal agencies, non-profit organizations, and other informed parties to gather data and explore strategies to prepare the national park system for potential future impacts of a changing climate. Sea level rise, extreme precipitation events, heat waves, and increases in severe winds or other phenomena related to climate change will alter how natural and cultural resources are managed, and the types of activities, facilities and infrastructure the NPS can support.

There are a number of executive orders, policies and plans that guide the response to climate change for Paterson Great Falls National Historical Park as a unit of the national park system:

- Executive Order 11988 (1977) requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development.
- Executive Order 13653 (2013) directs federal agencies to prepare for the impacts of climate change by undertaking actions to enhance climate change preparedness and resilience.
- Executive Order 13514 (2009) establishes an integrated strategy for sustainability in the federal

government and makes reduction of greenhouse gas emissions a priority for federal agencies.

- 2013 President's Climate Action Plan (U.S. Executive Office of the President 2013) advises that agencies will be directed to ensure that climate risk management considerations are fully integrated in federal infrastructure and natural resource management planning.
- Secretarial Order 3289, Amendment 1 (2010) directs each office of the Department of the Interior to consider and analyze potential climate change impacts when undertaking long-range planning.
- Department of the Interior Climate Change Adaptation Policy (523 DM1) outlines a set of principles and provides guidance for integrating climate change adaptation strategies into policies, planning, programs, and operations.
- NPS Management Policies 2006 (NPS 2006b) §4.7.2 instructs NPS units to collect and maintain baseline climatological data for reference and encourages reduction of greenhouse gas emissions in park operations.
- NPS Management Policies 2006 (NPS 2006b) §9.1.1 guides sustainable facility planning and development.
- NPS Climate Change Response Strategy (NPS 2010d) outlines a four-pronged approach to addressing climate change: science, adaptation, mitigation, and communication.
- NPS Climate Change Action Plan 2012-2014 (NPS 2012b) details actions and recommendations to implement the climate change response strategy.
- NPS Green Parks Plan (NPS 2012d) defines a collective vision and a long-term strategic plan for sustainable management of NPS operations including reducing greenhouse gas emissions and adapting facilities at risk from climate change.
- NPS Policy Memorandum 12-03: Applying National Park Service Management Policies in the Context of Climate Change (NPS 2012e) addresses emergent questions regarding the influence of climate change on the guiding principles of park natural resource management.
- NPS Policy Memorandum 14-02: Climate Change and Stewardship of Cultural Resources (NPS 2014b) provides guidance and direction regarding stewardship of cultural resources in relation to climate change.
- NPS Policy Memorandum 15-01: Addressing Climate Change and Natural Hazards for Facilities (NPS 2015) provides guidance on the design of facilities to incorporate impacts of climate change adaptation and natural hazards when making decisions in national parks.

New Jersey Climate Change Trends and Projections Summary

Past climate trends verify that the climate in New Jersey is already changing (table 3.1). Records show that spring is arriving earlier, summers are growing hotter, and winters are becoming warmer and less snowy. Research shows that if global warming emissions continue to grow unabated, New Jersey can expect dramatic changes in climate over the course of this century (UCS 2007). If the rate of emissions is lowered, however, projections show that many of the changes will be far less dramatic (UCS 2007). Understanding these trends and how they are predicted to continue to change provides a basis for taking management actions that would address the specific local impacts that climate change poses for the park, such as extreme heat, severe storms, flooding and drought.

Heron

Table 3.1 Northeast U.S. and New Jersey—Historic Trends and Projected Climate Change Impacts

	Climate Change Trend	Projection Summary
Temperature	Temperatures in the Northeast U.S. have increased 1.5 degrees Fahrenheit (°F) on average since 1900. Most of this warming has occurred since 1970. New Jersey has observed an increase in average annual temperatures of 1.2 °F from 1971-2000 and the most recent decade of 2001-2010. Winter temperatures across the Northeast have been rising even faster than annual average temperatures, up 4 °F since 1970. **Heat Waves:** In New Jersey, the total number of days over 90 °F has increased by roughly 36 percent since 1949. On average, based on historical data from 16 weather station locations spread across the state, days over 90 °F have increased from about 17 a year to 23, although there is considerable range between north and south, coastal and inland, and urban and rural parts of New Jersey.	By the 2020s, the mean annual temperature in New Jersey will have increased 1.5 to 3 °F above the state-wide baseline (1971-2000) average of 52.7°F degrees. By the 2050s it will be up 3 to 5 °F, and by the 2080s it will be 4 to 7.5°F warmer than today. **Extreme Heat:** Extreme heat events are expected to increase in intensity and duration. Currently, the area experiences on average two heat waves a year (where temperatures exceed 900F) of about four days in duration. By the 2020s, it is projected to be three to four events of four to five days; by the 2050s, four to six events of about five days; and by the 2080s, summers could have five to eight heat waves of five to seven days each on average. Annual days over 90°F will rise from an average of 14 in 2000 to 23 to 29 by the 2020s, 29 to 45 by the 2050s, and 37 to 64 by the 2080s.
Precipitation	New Jersey has become wetter over the past century. Northern New Jersey's 1971-2000 precipitation average was over 5" (12%) greater than the average from 1895-1970. Autumn (Sept-Nov) has seen the greatest increases, with summer having the least. **Extreme Precipitation:** Extreme precipitation, defined as precipitation above 1, 2 or 4 inches at daily timescales, is highly variable both spatially and temporally. There has been a small, but not statistically significant trend, towards more extreme precipitation events in the region during the last three decades. **Drought:** New Jersey has experienced one severe water-supply drought (2001-2002) and three minor ones (2005, 2006 and 2010) in the last decade. Even so, there is no significant long-term trend visible in the frequency or severity of droughts in New Jersey, going as far back as 1895.	Average annual precipitation is expected to increase in the region by up to 5% by the 2020s and up to 10% by the 2050s. Most of this additional precipitation will come in the winter, where a 20-30% increase in precipitation (mostly rain) is projected by the late century. **Extreme Precipitation:** While models suggest that the percentage increase in annual precipitation across the mid-Atlantic region is expected to be on the order of 10% or less by mid-century, a perhaps more significant concern is that this precipitation is more likely to fall during extreme events causing inland flooding. Analyses performed for New York City indicate a 10 to 25% increase in the frequency of intense precipitation events by the 2080s. These projections would be broadly applicable on average across most of New Jersey. **Drought:** Even though overall precipitation is likely to increase under climate change, most of this increase is expected to occur in the winter months. Summer precipitation is not forecasted to increase much, if at all, and is not likely to be evenly distributed throughout the season. This is likely to lead to more frequent occurrences of short-term soil moisture droughts across the Northeast. However, given the likelihood of heavier cool-season precipitation, current modeling indicates that water-supply droughts will be no more or less frequent or severe than under existing climate conditions. **Ice Storms and Snowfall:** Snowfall events are likely to become less frequent and the snow season will decrease in length. Possible changes in the intensity of snowfall per storm are highly uncertain.

Table 3.1 Northeast U.S. and New Jersey—Historic Trends and Projected Climate Change Impacts *continued*

	Climate Change Trend	Projection Summary
Sea Level Rise	Globally, sea level rose roughly 8 inches over the past 100 years. Along the coast of New Jersey, sea level has risen an additional 4 to 8 inches during the past 100 years due to subsidence in the mid-Atlantic region. Total relative sea level rise (the combination of rising seas and subsidence) in New Jersey over the past 100 years is therefore approximately 12 to 16 inches.	Projections suggest that mean sea level would rise two to five inches by 2020, seven to 12 inches by 2050, and 12 to 23 inches by the end of the century. By incorporating ice sheet melting patterns, sea level is projected to rise from 0.5 to 1.8 meters (20 to 71 inches) by 2100 over 1990 levels. The upper limit for the end of the 20th century is constrained by melting ice to be less than 2m (79 inches). Because we are currently tracking on an 80 cm (31 inch) global rise by 2100 New Jersey should plan for at least 1 m (39 inches) of rise, including the effects of subsidence, by the end of the 21st century.

Source: Sustainable New Jersey and NJ Department of Environmental Protection, *New Jersey Climate Change Trends and Projections Summary, 2011.*

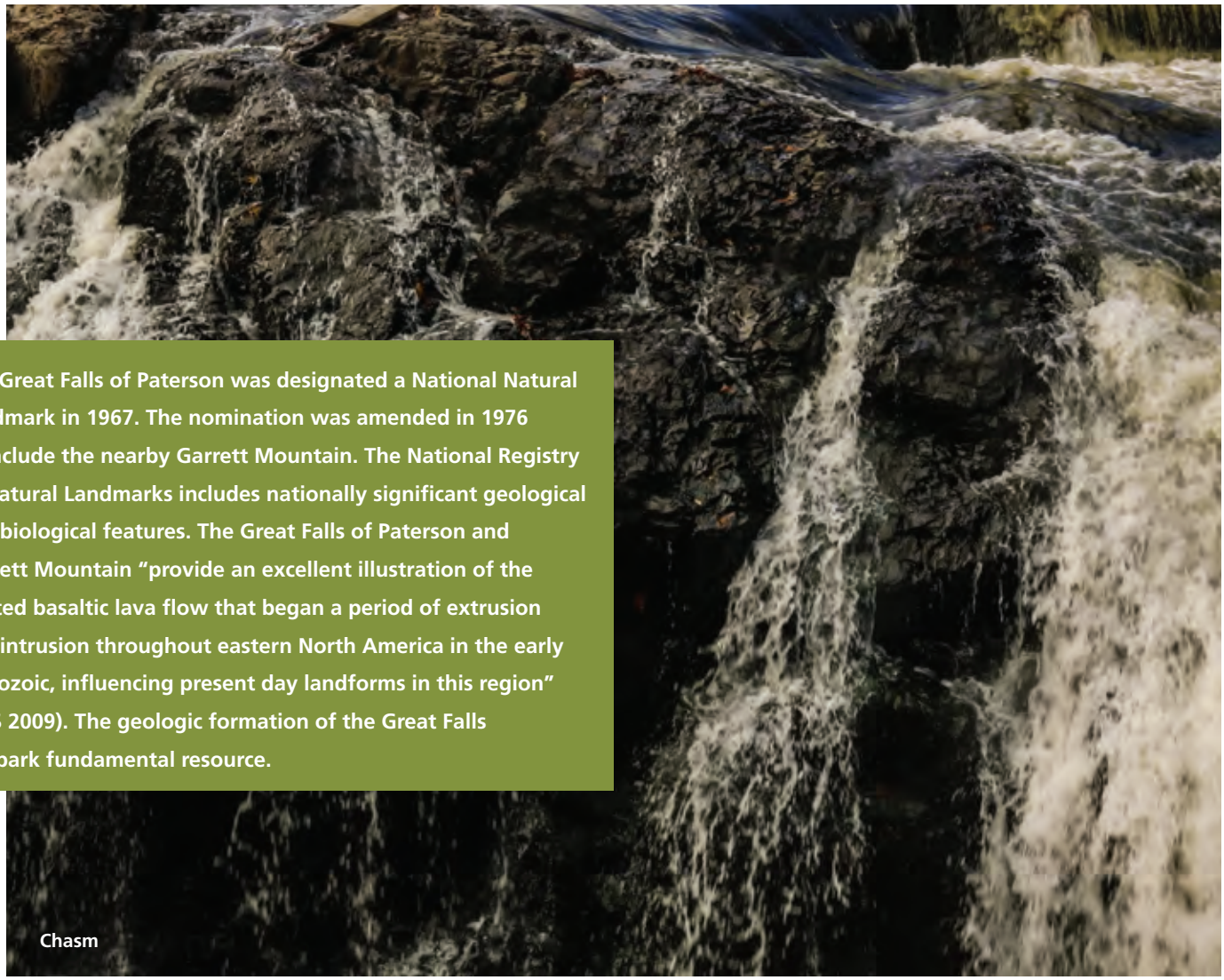
Geologic Resources

The park is located in the Piedmont Physiographic Province. The bedrock geology of the area includes Orange Mountain Basalt and Passaic Formation. Orange Mountain Basalt is composed of dark greenish gray to black, fine-grained, dense, hard basalt associated with three major lava flows. The Passaic Formation is composed of conglomeratic sandstone. It is an interbedded sequence of reddish brown, and less often maroon or purple, fine to coarse grained sandstone and a pebbly sandstone, pebble conglomerate, siltstone, shaly siltstone, silty shale, and shale (USGS 2006).

Garrett Mountain is part of the First Watchung Mountain, one of three generally north-trending ridges in the region named the First, Second, and Third Watchung Mountains (USGS 2006). The ridges are composed of basalt, formed from cooled volcanic lava. The Passaic River crosses the First Watchung Mountain through a water gap over a resistant ridge and into a basalt chasm carved in the lower flow of the Orange Mountain Basalt, forming the Great Falls. The Great Falls chasm is 280 feet wide and has a vertical drop of 77 feet (USGS 2006; USGS 2013a).

The gorge leading to the Great Falls was formed due to collapse and erosion along weak rock zones because of closely spaced joints. The Great Falls formed within the gorge due to undermining of a hard rock layer caused by erosion of an underlying softer rock layer; the underlying soft sandstone was eroded, leaving the overlying hard, basaltic rock of the First Watchung ridge projecting without support. Erosion that continues at the base of the Great Falls now occurs in weakened basalt, instead of sandstone (Harper 1977).

The two bedrock formations (basalt and sandstone) run generally north south and the seam between the two splits the park, generally at the Great Falls, where the basalt formation is visible. Further to the east, the sandstone layer can be seen at the base of the cliff near Ryle Road. Columnar joints are visible in the basalt cliffs, which formed from cooling lava. Tectonic joints are also visible at the Great Falls. They are typically planar, well formed, smooth to slightly irregular, and variably spaced (2 to 10 feet apart). Movement along these joints has created gaps in the basalt, known as faults, which can be seen on the cliff forming the back wall of the S.U.M. Hydroelectric Plant (NJDEP 2008). The basalt is likely to lose small to large sections periodically due to expansion of water in the basalt rock joints and fractures caused by freezing and thawing, particularly during the early winter and spring (NJDEP 2008). The area around the park includes abandoned sandstone and basalt quarries. Quarry activity changed the topography of the area over time due to excavation.



The Great Falls of Paterson was designated a National Natural Landmark in 1967. The nomination was amended in 1976 to include the nearby Garrett Mountain. The National Registry of Natural Landmarks includes nationally significant geological and biological features. The Great Falls of Paterson and Garrett Mountain "provide an excellent illustration of the jointed basaltic lava flow that began a period of extrusion and intrusion throughout eastern North America in the early Mesozoic, influencing present day landforms in this region" (NPS 2009). The geologic formation of the Great Falls is a park fundamental resource.

Chasm

Mount Morris, which at one point stood in the location of today's Overlook Park, was quarried heavily during 19th and 20th centuries as mills in the former ATP site grew. Additional quarrying took place as the S.U.M. began to develop its hydroelectric and steam facilities. Additional sandstone and basalt quarrying occurred in the Valley of the Rocks (Rutsch et al 1973).

Soils

Soils types occurring in the park consist primarily of Holyoke-rock outcrop complex, Rock outcrop-Holyoke complex, and Urban land-Riverhead complex, as well as some Dunellen-Urban land complex (USDA, NRCS 2008).

The Holyoke-rock outcrop complex (HomC) has slopes of 3 to 15 percent. The Rock outcrop-Holyoke complex (RNHE) has slopes of 15 to 45 percent. Both complexes include rock outcrops that consist of exposures of bare, hard bedrock. These outcrops are mainly unweathered volcanic and metamorphic rock, but also include some sedimentary rock such as consolidated limestone and conglomerate (USDA, NCRS 2008). These rock outcrops are located directly around the falls and along the banks of the river near the falls. The Holyoke component is comprised of a thin layer of till derived mainly from basalt and red sandstone, conglomerate, and shale. They are nearly level to very steep soils on bedrock controlled ridges and hills that were modified by glacial action (USDA, NCRS 2013).

The Urban land-Riverhead complex (USRHVB) has slopes of 3 to 8 percent. The urban land complex is mostly covered by streets, parking lots, buildings, and other structures of urban areas and is underlain by disturbed and natural soil material (USDA, NRCS 2008). The Riverhead component consists of very deep well drained soils formed in glacial outwash deposits derived primarily from granitic materials (USDA, NCRS 2013).

The Dunellen-Urban land complex (DuUb) has slopes of 3 to 8 percent. The Urban land, Dunnellen Substratum soils are areas with some type of disturbance, such as from construction, grading, or the addition of fill material. The surface is generally covered by pavement, concrete, buildings, and other structures and is underlain by disturbed and natural soil material consisting of sandy loam and loamy sand (USDA, NRCS 2008). Soils in some areas of the park may contain contamination from the previous industrial uses that encompassed much of the park at various points throughout the site's history. Several contaminated sites within and adjacent to the park have been documented, including the former ATP site, which is classified as a brownfield.

A brownfield is defined as any former or current commercial or industrial site, currently vacant or underutilized and on which there has been, or there is spected to have been, a discharge of a contaminant.

(Source: Brownfield and Contaminated Site Remediation Act, N.J.S.A. 58:10B-1 et seq.)

Cultural Resources

Paterson Great Falls NHP encompasses a wide array of cultural resources, including cultural landscapes, historic structures, archeological resources, and museum objects.

- Cultural landscapes are geographic areas (including both cultural and natural resources and the wildlife and domestic animals therein) associated with a historic event, activity or person or exhibiting other cultural or aesthetic values. There are four types of cultural landscapes, not mutually exclusive: historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes.
- Historic structures are constructed works consciously created to serve human activity. They are usually immovable, although some have been relocated and others are mobile by design. They include buildings and monuments, dams, millraces and canals, nautical vessels, bridges, tunnels and roads, railroad locomotives, rolling and track, stockades and fences, defensive works, temple mounds and kivas, ruins of all structural types, and outdoor sculpture.
- Archeological resources are the physical evidences of past human activity, including evidences of the effect of that activity on the environment. What makes archeological resources significant are their identity, age, location, and context in conjunction with their capacity to reveal information through the investigatory research designs, methods, and techniques used by archeologists.

  Archeological resources represent both prehistoric and historic time periods. They are found above and below ground and under water. Examples of prehistoric archeological resources include clifferent dwellings, Indian mounds, petroglyphs, surface scatters of pottery fragments and chipped stone, campsites, and villages. Examples of historic archeological resources include archeological components of historic structures, battlefields, mining camps, forts, shipwrecks, and similar historic properties. A historic period house, for example, may have a broad variety of material culture associated with it (e.g., in construction trenches and trash pits) that can be effectively examined using archeological techniques. The remains of historic properties or resource types not typically included in the historical record will have archeological value when they can reveal significant information. Examples of submerged archeological resources include dams and raceways, sunken ships (including submarines) and aircraft, and inundated prehistoric campsites and historic forts.

- Museum collections are assemblages of objects, specimens, and archival and manuscript collections that are valuable for the information they provide about processes, events, and interactions among people and the environment. Natural and cultural objects and their associated records provide baseline data, serving as scientific and historical documentation of the park's resources and purpose.

Cultural Landscapes

The cultural landscape of Paterson Great Falls includes the natural and built features that together make up the NHL District which comprises approximately 129 acres including a section of the Passaic River, the Great Falls, Valley of the Rocks, S.U.M. Island, the raceway system, a dam, and a number of historic structures. Together, the Passaic River and the raceway system provided the framework for the development of Paterson, physically linking the city's natural systems to its industrial enterprise.

Wooded areas occur along the southern end of Upper Raceway Park and within the Valley of the Rocks area on the north side of the Passaic River. Upland temperate forest species with an herbaceous understory compose these wooded areas, including a mix of native, non-native and invasive species (NJDEP 2008).

Open areas of lawn with ornamental trees and shrubs are maintained at Overlook Park, Mary Ellen Kramer Park, and the approach to the pedestrian footbridge behind the S.U.M. Hydroelectric Plant. The path edge along the Upper Raceways includes herbaceous species and lawn cover that is mowed. The ATP site includes open areas that have been colonized by a variety of native, non-native and invasive species typically found in abandoned urban settings. A ribbon of riverine forest borders the Passaic River below the Valley of the Rocks.

According to the NHL nomination, the primary historic period for the cultural landscape is 1793 to 1912. The historic significance during this period was its role as the first planned industrial development in the United States and variety of industrial architecture. Additional layers of history and development have accumulated in the landscape over time, however, extending the period of significance beyond its early industrial beginnings.

Industrial Landscape

The Passaic River and Great Falls form the core of the industrial landscape becoming the focus of S.U.M.'s development. The historic raceway system took advantage of the topographic change in the area of the Great Falls and was linked to the Passaic River through intakes and outfalls. The location and alignment of the raceway system was guided by the topography of the land surrounding the river which, in turn, strongly influenced the location of the mill buildings and alignment of Paterson's roadways. The industrial landscape within the park boundary is encased within the larger urban industrial historic district made up of narrow, geometrically organized streets and mid-height predominantly brick industrial, commercial and civic buildings.

The industrial landscape was characterized by the alteration and "hardening" of the natural landscape features. Some river banks were reinforced with walls while others were quarried; permanently altering the topography of the city and stripping the landscape of its hillsides, cliffs, and vegetation.

Industrial complexes concentrated along the south bank of the Passaic River, created a discernable landscape of historic industrial buildings and associated structures including the Colt Gun Mill and the S.U.M. Hydroelectric Plant. Soils in some areas of the park may contain contamination from the previous industrial uses that encompassed much of the park at various points throughout the site's history. Several contaminated sites within and adjacent to the park have been documented, including the former ATP site, which is classified as a brownfield.

Recreational Landscape

The mid-twentieth century saw a gradual transformation of the industrial landscape into a landscape that blended new recreational uses into the industrial environment. This transformation represents a layer of recreational use and design overlaid on the industrial components of Paterson Great Falls NHP's overall cultural landscape.

The area currently known as Overlook Park is the result of years of human manipulation and quarrying of Mount Morris. The area underwent substantial transformation in the 19th century as Mount Morris

was quarried to build new mills which would eventually be constructed within the quarried site. In 1912, the construction of the S.U.M. Hydroelectric Plant again transformed the area and construction of new buildings and retaining walls created the terraced spaces that still remain at the park.

Most of the auxiliary power plant had been removed by this time, and the old building foundations were transformed into small terraces. A statue of Alexander Hamilton was moved to the park from Paterson City Hall, and modest landscape design was undertaken to include a small hedge, trees, and lighting. Visitor parking, a view to the Great Falls, and the Alexander Hamilton statue are still located at Overlook Park. Visitors can access an area with picnic tables below the parking lot and closer to the river via a stairwell at Overlook Park along the S.U.M. Steam Plant foundation. The S.U.M. Hydroelectric Plant is an active power generation plant and in accordance with the NPS's general agreement with the city (appendix B) is open to the public for reserved tours. From Overlook Park, the Plant is a visible part of the viewshed that encompasses the Great Falls. Although the parking lot is in poor condition, it provides a popular view of the Great Falls. Landscape improvements are planned for Overlook Park and the Alexander Hamilton statue was cleaned and waxed in the summer of 2012.

The designed landscape at Mary Ellen Kramer Park does not fall within the period of significance for the historic district, but the area was used historically for recreation. A garden and refreshment pavilion occupied the site during the mid-nineteenth century. The site deteriorated substantially for the next several decades. Mary Ellen Kramer worked tirelessly in the 1970s to preserve and protect the historic district of Paterson, and the former Great Falls Park was renamed in her honor. The park is located on the north side of the Passaic River and connected by a footbridge and south of Hinchliffe Stadium. The green open space of Mary Ellen Kramer Park provides picnic and recreational space and affords views of the top of the waterfall as it descends into the chasm. Landscape improvements and environmental site remediation began at Mary Ellen Kramer Park in November 2013 and were completed in spring 2015. These improvements include provisions to address existing soil contamination; removal of selected trees, paving, fencing; salvage of selected stone paving and curbing; retention of stone walls, structures, selected trees, and stone outcrops; and reconfiguration of the viewing area.

The Landing is the promontory of land south of the Great Falls. It is linked to Mary Ellen Kramer Park by the historic Arch Bridge and a second concrete footbridge built after 1980. The Landing is enclosed with fencing and includes a small parking area for the S.U.M. Hydroelectric Plan and a lawn area with trees.
Upper Raceway Park is located near the center of the historic district between McBride Avenue and the

Upper Raceway and it abuts the Stanley M. Levine Reservoir and Lou Costello Pool. After significant water leaked from the Upper Raceway into adjacent industrial buildings, the raceway was repaired in the early 1980s as part of the Upper Raceway Park rehabilitation. The rehabilitation included setting brownstone at the raceway walls, and installing a new clay floor for the raceway. However, the raceway within the park continues to suffer from a debris collection, excessive volunteer/invasive vegetation, and a lack of water management system maintenance, and was last operated by the city of Paterson in 2009.

The Valley of the Rocks is a basalt entablature and colonnade cliff on the north side of the Passaic Rover across from the ATP site. An informal social trail near Hinchliffe Stadium leads to a rocky "beach" area along the north side of the Passaic River. The informal trail to the rocky area near the Passaic River is an unmarked footpath that has not been formally marked as a visitor access point. There is an asphalt footpath and a wooden staircase that lead to the informal trail, both of which are in need of repairs.

Landscape Views

Views within the park and to surrounding landscapes are identified as park fundamental resources, including both industrial landscape views and natural scenic views. Views are an important element of the visitor experience. The topography within the park provides visitors with panoramic views of the industrial landscape, reflecting settlement and industrial development patterns. The breathtaking views of the Great Falls and

surrounding natural landscape allow a glimpse into the inherent beauty of nature in contrast to the manipulated landscape of the industrial city.

- Overlook Park provides views to the Great Falls, the chasm, the pedestrian bridge, the Arch Bridge, the S.U.M. Hydroelectric Plant, and the Passaic River.
- The area adjacent to the S.U.M. Hydroelectric Plant provides views to the lower Passaic River.
- The pedestrian footbridge provides views to the upper and lower Passaic River, Overlook Park, to the Great Falls from above, and to Garrett Mountain.
- The approach to the pedestrian footbridge behind the S.U.M. Hydroelectric Plant provides views to the upper Passaic River, the top of the Great Falls, the S.U.M. Hydroelectric Plant, and the lower Passaic River.
- The northern entrance to Mary Ellen Kramer Park near Maple Street provides views of the historic dam and the upper Passaic River.
- Mary Ellen Kramer Park provides views to the upper and lower Passaic River, Overlook Park, the S.U.M. Hydroelectric Plant, Hinchliffe Stadium, the Great Falls, the Allied Textile Printing site, and Garrett Mountain.
- Mary Ellen Kramer Park Great Falls Viewing Platform provides views of the Great Falls, the chasm, and the upper Passaic River.
- Newly rehabilitated parkland at the intersection of Wayne Avenue and Maple Street provides views across the upper Passaic River to Mary Ellen Kramer Park.
- Upper Raceway Park provides views to the Great Falls NHL District, the Upper Raceway, and Garrett Mountain.

Historic Structures

The NHL District cultural landscape includes many structures within and outside the park's boundary. The inventory below identifies historic structures within the boundary.

S.U.M. Hydroelectric Plant

The hydroelectric plant was built after a 1912 decision by S.U.M. to switch from water-generated power to a more economical form of power: electricity. The modest plant was designed and built by the Thomas Edison Electric Company and was operable by 1914. Initially intended to provide power to the mills, the plant also supplied a great deal of power to the city's grid and continues to supply power to the city today. Construction of the hydroelectric plant changed milling operations in Paterson as manufacturing facilities began to switch to electricity instead of water-powered wheels. The plant was purchased by the city of Paterson in 1986. The S.U.M. Hydroelectric Plant is an active power generation plant and in accordance with the general agreement between the NPS and city(appendix B) is open to the public by reserved tour only. From Overlook Park, it is a visible part of the viewshed that encompasses the Great Falls.

S.U.M. Steam Plant Foundation

Located in the area which was previously occupied by Mount Morris, the steam plant was built in 1915 to supplement power beyond the output of the hydroelectric plant during times of low water flow in the Passaic River. The plant relied on steam produced from coal-fired ovens and was piped to several mills at the former ATP site for energy (FMG 2010). The steam plant, built in a similar design to the S.U.M. Hydroelectric Plant was supported by a concrete platform with spaces containing equipment below.

The plant was shut down in 1958 and demolished in 1960. The only remnants of the plant today are its concrete foundation, including the exterior terrace, the lower façade, and lower level foundation features. The remaining structure consists of concrete exterior walls that are below grade with the exception of the north facade. The foundation has been filled and capped with a series of flat roofs. The upper level is a small terrace where most visitors go to view the Great Falls. The terrace also includes the Alexander Hamilton statue and other smaller monuments. The lower level of the foundation is currently unused but at one time, contained working public restrooms.

S.U.M. Administration Building

The S.U.M. Administration Building was constructed in 1920. The building is a rectangular two-story brick structure which is in good overall condition and is structurally sound. It contains office and storage space.

S.U.M. Gatehouse (for Upper Raceway)

The S.U.M. Gatehouse was built in c. 1846 and was designed to regulate the amount of water flowing through the raceway system from the Passaic River. It is a narrow rectangular gable roofed building located at the top of the Upper Raceway near the McBride Avenue Bridge, and is underpinned by a brown sandstone wall and a concrete pier. Approximately fifteen feet below the gatehouse is a poured concrete dam. The gatehouse is in poor condition.

S.U.M. Dam

The S.U.M. Dam is over 200 feet long and between eight and thirteen feet high. Constructed of reinforced masonry in 1838-1840, the dam replaced an earlier wooden structure and was intended to raise the level of the river at the Upper Raceway (NPS 1970). The dam enabled the S.U.M. to store water in order to moderate the flow through the raceway system during months of low water levels in the river. Enlarged in 1864, the dam provided an ample pond of water that was released through the raceway system every morning in time for the mills to start operations.

Ryle Dam

Ryle Dam was built around 1860 by John Ryle to impound water for Paterson's first water system (Fries 2008). The breached dam is just above the chasm of the falls under the upper Passaic River.

Arch Bridge

The Arch Bridge carries a water pipe over the falls, while framing views of the falls from below. The Arch Bridge, constructed circa 1888 as a "deck truss" type footbridge, is in good condition. The bridge connects Mary Ellen Kramer Park to the south side of the Passaic River above the S.U.M. Hydroelectric Plant.

Great Falls Development Corp Building

The Great Falls Development Corp Building is a rectangular brick single story structure, located in Mary Ellen Kramer Park, likely constructed before 1900. Although currently not used, it originally served as a pump room and then provided office and storage space. It is in poor condition, with a failing roof.

Current Park Headquarters

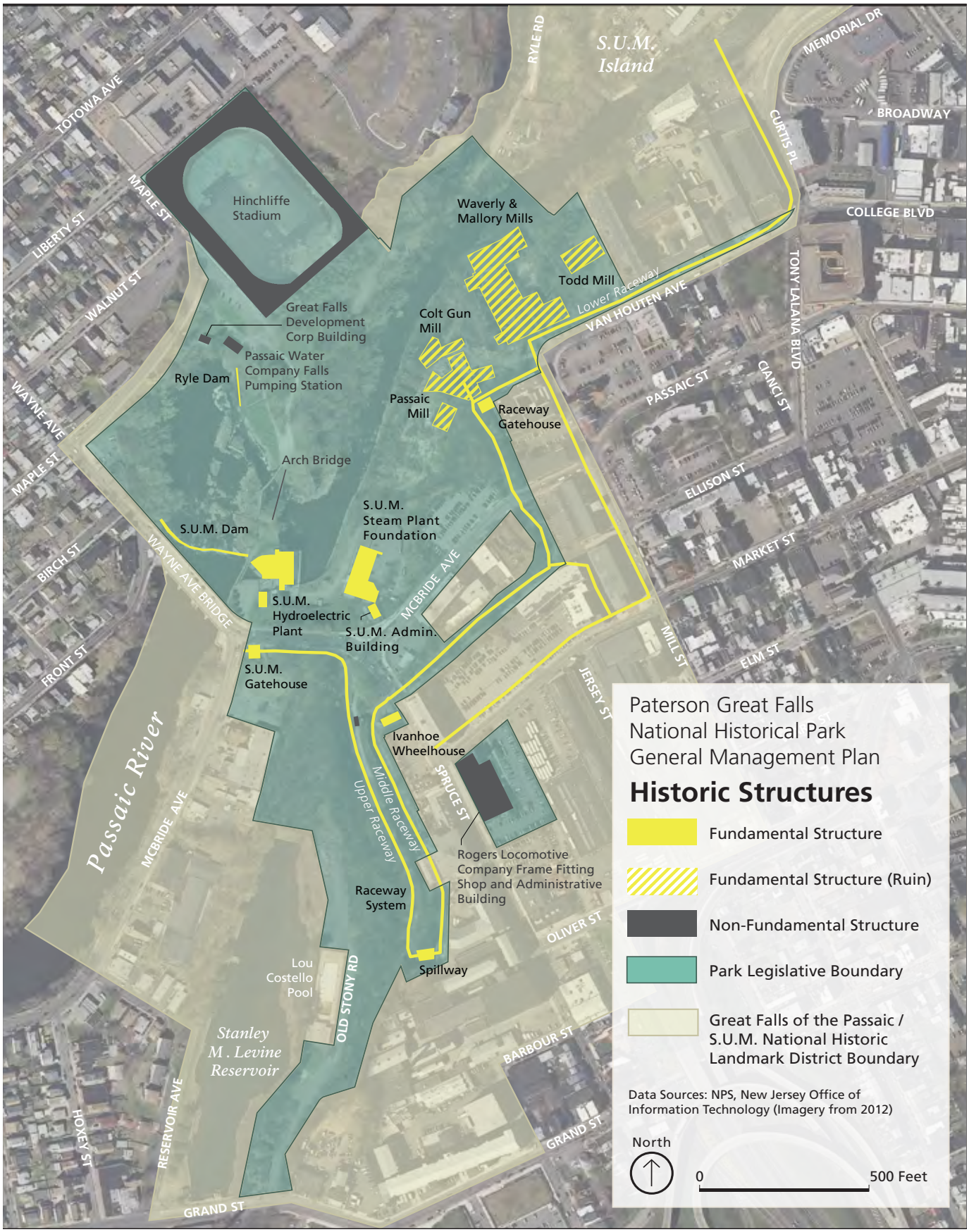
Passaic Water Company Falls Pumping Station

The Passaic Water Company began pumping water directly into the city mains in the mid-1800s. Around 1857, the company built a pumping station below the falls, which included multiple pump houses, a machine shop, and a boiler house. These were located near the present-day Mary Ellen Kramer Park. Remaining structures include the foundation of a pump house, a screen house, a chimney, and a machine shop. The Passaic Valley Water Commission currently operates a pump house on the property.

Ivanhoe Wheelhouse

The Ivanhoe Manufacturing Company was established by Henry Butler after several years working in paper manufacturing at the Passaic Mill. The Ivanhoe Paper Mill was built in 1850, and its wheelhouse (1865) is the last remaining structure of the ten building complex. The mill produced tissue and writing paper for publishing companies and the government, and was famous for its writing paper. The wheelhouse is located below the Upper Raceway and historically housed a large water turbine that powered the mill. The wheelhouse was restored in 1981, but without the water wheel and turbine. It now serves as a museum that exhibits work from regional artists.

FIGURE 3.1 Historic Structures



Ivanhoe Spillway

Rogers Locomotive Company Frame Fitting Shop and Administration Building

The Rogers Locomotive Company Frame Fitting Shop and Administration Building (Rogers Locomotive Building) is the former erecting shop of the Rogers Locomotive and Machine Works manufacturing firm. Thomas Rogers started a firm—then known as Rogers, Ketchum & Grosvenor—that designed and built machinery for Paterson's textile industry in 1832. They diversified to include the production of railroad locomotives and associated small parts for the railway industry. The most famous of the locomotives to be designed and built by Rogers Locomotive and Machine Works (renamed in 1856) was The General, created in 1855. The former erecting shop is the oldest of the remaining buildings from the complex owned and operated by the Rogers Locomotive and Machine Works. The building was constructed in the 1830s after the development of the Upper Raceway. A multi-story building, the exterior architecture of the Erecting Shop is intact although the upper-story machinery was removed. The double bay doors at the lower level of the building served as the portal for newly built locomotives. Today, the building is owned by the city of Paterson and houses the Paterson Museum and city-leased office space.

Raceway System

Primarily constructed of stone masonry, the raceways have been repaired with newer materials, such as concrete, over time. They incorporate sections of earthen embankment and rock outcropping. The raceways stretch approximately one mile through the Great Falls NHL District, dropping about 22 feet in elevation for each level and incorporating three small waterfalls. The raceway system incorporates dams, spillways, mechanisms for raising and lowering the level of the spillway, gate structures, headraces, tailraces, bypasses, among other structural components.

The raceway system was actively used to power Paterson's mills until the S.U.M. decided to move to electric power in the early 1900s. Since then, much of the raceway has no longer been used. Leaks throughout the raceway system, along with the potential of flooding from the raceways into nearby streets, have caused concerned and prevented re-watering of the raceway system. The city of Paterson last operated the raceway in 2009.

Upper Raceway. The Upper Raceway is defined as the portion of the raceway system leading from the Passaic

River to the southern weir and spillway near the Dolphin Mill complex; the upper tailrace extends from the southern spillway to the Ivanhoe Basin (NPS 2013b). The raceway was laid out in order to supply water to new mill lots developed by S.U.M. along Spruce Street. Construction of the Upper Raceway required additional elevation modifications for the entire raceway system in order to gain greater water pressure for the new mills. Construction efforts for the Upper Raceway included excavation into a nearby hillside, and the development of an embankment between the Upper Raceway and tailrace (NPS 2013b). In 1830, the addition of lock gates made the Upper Raceway navigable from the river. However, by 1846, a new channel was cut from the river to the Upper Raceway, bypassing the reservoir, which was eventually filled in, and making the Upper Raceway un-navigable. Today a pedestrian path runs along the Upper Raceway in an area known as Upper Raceway Park. This portion of the raceway was rehabilitated between 1977 and 1982 and again in 2004.

Some components of the Upper Raceway include: gatehouses (such as the 1846 Gatehouse) raceway-gate dam, sluice, Ivanhoe check dam, head race, tail race, other water control structures and flumes, catch basin, Ivanhoe flume, and the Ivanhoe pedestrian bridge. The materials that make up the raceway include a bridge of concrete and brick vaults with brown sandstone abutments; brown sandstone walls; brown sandstone walls with bluestone caps; concrete piers, poured concrete walls; natural stone walls; poured concrete dam with control gates; and a bottom of mud, clay, or concrete. Elements of the raceway system such as the sluice and spillway at the Ivanhoe basin have been extensively rehabilitated with the replacement of wooden flashboards, and regrading of the bottom to direct flow into the sluice. Other major changes include the addition of a geosynthetic clay liner with bentonite at the seams between the liner and walls; the filling in of concrete and log flumes near the Wheelhouse; and the addition of concrete baffles to slow water in the spillway near the southern weir.

The upper tailrace runs parallel to the Upper Raceway, with a steep embankment between the two structures. The tailrace is constructed of sandstone and concrete with a bottom of concrete, geosynthetic clay liner, and natural materials. Some of the walls for the tailrace were likely the foundations of mill buildings. Repair along the tailrace has included stone wall replacement with concrete walls; wall seam patching; the replacement of the natural bottom with concrete or geosynthetic clay liner; and the addition of a new check dam near the Ivanhoe basic. Leaking occurs along the tailrace in the elevator shafts of adjacent buildings; flow over the southern spillway may also contribute to flooding.

Middle Raceway. The construction for the middle raceway began in 1793 and extended S.U.M.'s mill operations to the northern edge of the ATP site c. 1800. The middle raceway extended from the Ivanhoe Basin to the Essex Spillway and then to the lower raceway near the north end of Mill Street; the middle tailrace ran underground along Market Street and then along Mill Street (NPS 2013). The middle raceway ended at the north gates waste way, which was in service until c. 1916-1917. The middle tailrace connected the mills along the middle raceway to the river and carried away their waste water. Flumes, such as the Rosen Mill flume, provided an outlet for the tailrace system. The flume and gatehouse at the north gates waste way historically released excess water from the raceway into the river, as the S.U.M. had a contractual obligation to maintain a sounding depth of three feet for the water supply for power (FMG 2010). A section of the raceway between Spruce Street and the Hamilton Mill may date to the original construction of the entire system (NPS 2013b).

The materials that make up the middle raceway include sandstone, natural embankment, and concrete; originally, the bottom was made up of soil and mud over a sand base. Covered sections of the tailrace include brown sandstone or brick walls with vaulted ceilings. Sand lined the bottoms of the tailrace historically. Some elements of the middle raceway system include the Essex Spillway; concrete sluices and flashboards; control gates to regulate the flow at the diverters for different mills; and gatehouses.

The spillway from the Ivanhoe basin was rehabilitated and repaired between 1978 and 2006, with replacements of the brown sandstone walls, mortar, and bluestone caps. Contaminated soil was found in the basin near the Ivanhoe Wheelhouse in 2005; the soil was partially

Raceway

removed and the area was sealed and bermed to prevent water from crossing the contaminated material. Some of the middle raceways walls have been created from the foundation walls for adjacent buildings and other retaining walls not intended for use as raceway embankments. The south wall of the raceway is lined with sandstone, concrete, and natural embankment and is in poor condition. Sluices with steel gates and flashboards that were part of the head races at the Hamil and Cooke Mill now divert water to holding tanks, where it is later released to the tailrace. Loose riprap lines the embankment and bed of the raceway beneath the McBride Avenue Extension Bridge, which was replaced in 1999; this area of the raceway leaks water into adjacent buildings.

Sections of the middle raceway are in poor condition and in some cases the raceway walls are bulging, collapsed, or deteriorating (FMG 2010). The SUM spillway and raceway features are in poor condition, and are in danger of further deterioration.

Lower Raceway. The lower raceway was built several years after the middle raceway, beginning around 1807. It runs parallel to Van Houten Street near the former ATP site. The lower raceway was fed from the tail races on the mills located along the middle raceway and from a 22-feet high spillway near the Essex Mill. It extends from the Essex Spillway, along Van Houten Street and then along Curtis Place to the river (NPS 2013b). The lower raceway coincided with the development of mills along Boudinot Street (NPS 2013b).

The materials that make up the lower raceway are similar to what has been found in other sections of the raceway system: brown sandstone walls; concrete wall caps; concrete and masonry walls; riprap embankments; concrete diverter with steel gates; and soil and mud bottoms. The walls lining the raceway were occasionally created from the foundation walls of adjacent mills, such as the Phoenix Mill and the Congdon Mill. A portion of the lower raceway has been filled in. Sections of the lower raceway are in poor condition (FMG 2010).

Former Allied Textile Printing (ATP) Site Structures and Ruins

Historically, the former ATP site included a complex of over 30 buildings and structures with significant landscape features such as the quarry and raceways. Today, many of those buildings are ruined or missing entirely. Invasive and volunteer vegetation has overwhelmed much of the site. The ATP ruins—comprised of remnants of the former industrial mills housed on the site, its industrial landscape, and industrial artifacts—are

ATP Ruins

Photo Courtesy of Mark Hillringhouse

currently gated off, closed to the public, and the site is classified as a brownfield. Various contaminants at the ATP site include metals and volatile organic compounds which are located along the former industrial sewers, underground storage tanks, coal burning areas, and other locations. The remaining buildings and structures lack roofs and are heavily damaged. The site lacks direct utility supply, but city utilities run through the property. A cultural resource investigation for the former ATP site was completed in 2010 which included an assessment of the condition of the structures and ruins as well as treatment options for the site. Table 3-2 documents structures and ruins, their historical uses, and their condition as determined by the cultural resource investigation. The following terms, defined by the report, were used in describing the condition of the resources:

- **Fair:** Element overall performs its intended function, with minor areas of failure. Material exhibits deterioration in limited areas. Material requires moderate level repairs, aggressive cleaning, patching and finishing to obtain serviceable condition. Represents average material condition.
- **Poor**: Element marginally performs its intended function, with large areas of failure or loss. Material exhibits significant deteriorated areas and may require re-anchoring or re-attachment to substrate. Material requires significant repairs, reinforcement, extensive patching, cleaning and finishing to obtain serviceable condition. Represents below average material condition.
- **Very Poor:** Element does not perform its intended function. Material has significant deterioration or loss, and/or separation from substrate materials over substantial area. Material may be salvageable with widespread patching or reinforcement, but may require partial replacement. Material requires removal and replacement, significant repairs and/or patching, and extensive cleaning to return to serviceable condition. Finish cannot be returned to use, and must be stripped and re-applied. Represents marginal material condition.
- **Total Loss:** Element does not perform its intended function. Damage to material and/ or finish is extensive and widespread, and cannot be reversed. Material or finish is not salvageable for repair and must be removed and replaced. Represents a state of advanced loss and failure.
- **Missing:** Material and/or element is missing, no longer extant (FMG 2010).

Table 3.2 Structures and Ruins of the Former ATP Site

General Location	Historic Name	Historic Building Use	Assessed Condition
Passaic Mill Lot	Passaic Mill (Front)	dyeing	poor
Passaic Mill Lot	Regal Boiler House	boiler house	poor
Passaic Mill Lot	Passaic Mill (Rear)	dye house	total loss (no visible remains)
Passaic Mill Lot	Dry Box House	folding	total loss (structural failure)
Passaic Mill Lot	Washing/Bleaching; Printing	washing bleaching (1st floor) printing (2nd floor)	very poor
Todd Mill Lot	Copper Storage	copper storage	missing (no visible remains)
Todd Mill Lot	Office/Lab	office, labs	missing (no visible remains)
Todd Mill Lot	N/A	cloth washing	missing (no visible remains)
Todd Mill Lot	Todd Mill	storage	very poor
Waverly & Mallory Mill Lot	Drying/Makeup Building	drying, make-up (rear section)	very poor
Passaic Mill Lot	Drying/Makeup Building	drying, make-up (sump house)	very poor
Waverly & Mallory Mill Lot	Drying/Makeup Building	drying, make-up (front section)	very poor
Waverly & Mallory Mill Lot	Waverly Mill (Rear)	storage	total loss
Waverly & Mallory Mill Lot	Storage Building	storage	total loss
Waverly & Mallory Mill Lot	Mallory Mill East	color room, dying, finishing	total loss
Waverly & Mallory Mill Lot	Mallory Mill West	printing, drying, finishing	total loss
Waverly & Mallory Mill Lot	Waverly Mill	curing and tubing, frames and drying	very poor
Colt Gun Mill Lot	John Ryle Dye House East	drying and finishing	very poor
Mount Morris Quarry	Wash Room	wash room	very poor
Mount Morris Quarry	Standard Silk Dyeing Co. Boiler House	boiler house	fair
Mount Morris Quarry	John Ryle Dye House West	drying and finishing	total loss
Colt Gun Mill Lot	Filter Room		poor
Mount Morris Quarry	Knipscher & Maas Dye House	dyeing and finishing	poor
Mount Morris Quarry	Office and Silk Storage		total loss
Mount Morris Quarry	Finishing and Shipping	finishing and shipping (standard)	total loss (no walls remain)
Mount Morris Quarry	Washing Room (standard)	jig dyeing room	fair

General Location	Historic Name	Historic Building Use	Assessed Condition
Mount Morris Quarry	Dye House	dye house (standard)	very poor
Colt Gun Mill Lot	Colt Gun Mill	colt gun mill	fair
Mount Morris Quarry	Washing Room	washing (standard)	total loss
Mount Morris Quarry	Storage Room	storage (standard)	total loss
Mount Morris Quarry	Finishing Room	finishing building,	total loss (no walls remain)
Colt Gun Mill Lot	Machine Shop	machine shop drying (standard)	missing(no visible remains)
Todd Mill Lot	Storage Building	make up	total loss(no visible remains)
Todd Mill Lot	N/A	bleaching washing	total loss (no visible remains)
Waverly & Mallory Mill Lot	Storage Building		total loss
Mount Morris Quarry	South Outbuilding		very poor
Mount Morris Quarry	North Outbuilding		poor
Waverly & Mallory Mill Lot	Gate House	gatehouse	missing (no visible remains)
throughout site	Middle raceway Spillway, Lower Raceway, North Gates Wasteway	S.U.M. Raceway System	poor

Colt Gun Mill

The Colt Gun Mill was constructed by the Patent Arms Manufacturing Company on the former location of John Colt's nail factory near the Passaic River. Led by Samuel Colt, the Colt Gun Mill was under construction in 1836 and commenced manufacturing in 1837. The factory was a large, five-story stone building with a bell tower and measured approximately 135 feet long by 44 feet wide. Initially, the factory is thought to have produced cutlery as well as the first Colt revolvers. The building's size ensured it dominated the skyline of Paterson and was an icon for the city (FMG 2010). Due to poor sales and financial stability, the Patent Arms Manufacturing Company sold the factory in 1840. At the time of its sale, it housed a variety of machinery and tools: drilling machines, lathes, cutting engines, polishers, punches, filers, forges, and others.

After the failure of the gun manufacturing, the mill served as a silk manufactory with the addition of new spindles for the generation of silk thread, becoming the "true birth place of Paterson's silk industry" under the leadership of John Ryle (FMG 2010). Ryle expanded the mill complex with auxiliary buildings beginning in 1850.

The mill continued in use for textile production through the management of the Standard Dyeing and Finishing Company in the 1980s. The building burned in 1983 but was later stabilized in the 2002. Sections of the former Colt Gun Mill are in very poor condition, with some areas of the mill a total loss (FMG 2010). The remaining (extant) walls have been partially stabilized and preserved and remain reasonably intact. Stabilization measures included the disassembly of the surviving, unstable portions of the mill's second floor, stockpiling the salvaged masonry, installation of steel framing to stabilize the east and west walls, and adding concrete caps to further stabilize and preserve the walls. There is significant remaining fabric which offers opportunity for additional stabilization, preservation, and interpretation. The site is sensitive for archeological resources because intact features and deposits were found in similar contexts in close proximity to the Gun Mill, and because resources associated with the Gun

Mill may document changes in the way in which power was supplied to the mills through time.

Waverly & Mallory Mills

Built c. 1865, the Waverly Mill was reconfigured for silk production in the 1890s, run by Gallant Brothers Silk Manufacturers. A large brick building, the Waverly Mill originally housed cotton fabric dyeing, finishing, and storage facilities. Some of sections of the Waverly Mill are in very poor condition, with other areas of the mill complex a total loss (FMG 2010). While material loss is significant, portions remain that could be stabilized and preserved (FMG 2010).

The Mallory or "Mallary" Mill began as a cotton processing enterprise, but was transformed into a silk spinning factory around the Colt Gun Mill complex as a response to the increasingly important silk industry in Paterson. Probably constructed around 1870 or a little later, the Mallory Mill was reconfigured for silk processing around 1890. The Mallory Mill was a rectangular brick building that originally housed engraving and calico-printing facilities. It was expanded to include a waterwheel house by 1900. Sections of the Mallory Mill are in very poor condition, with some areas of the mill a total loss (FMG 2010). The Mallory Mill ruins include foundations and wall remnants that define the mill's footprint. There is little remaining building fabric in debris piles. Material loss is extensive and there is no potential for preservation. The site is archeologically sensitive due to the possibility of waterpower remnants.

Todd Mill

The Todd Mill had been fully constructed by 1875 and was located north east of the Colt Gun, Mallory, and Waverly Mills. It was an L-shaped brick building that contained an engine building, a carpenter's shop, and tuning and fitting facilities, run by the Todd and Rafferty Machine Works. The Todd Mill was responsible for the fabrication of the mechanical systems and engine construction for an early submarine designed by John Holland, and for steam engines. By 1900, the mill had adapted to the silk industry and housed a machine shop and broad silk and silk ribbon manufacturing facilities. Archaeological investigations have identified two head races and tail races, with wheel pits in between. Sections of the former mill has been assessed as completely missing with no visible remains, but one standing portion of the former mill remains and is considered to be in very poor condition. These portions are considered unstable and in need of intervention to slow deterioration.

Passaic Mill

The Passaic Mill was constructed around 1813-1814 in an L-shaped plan and was used initially for the production of wire. The building had a masonry bearing wall structure with a saw tooth roof. In 1817, manufacturing at the brick mill was updated to include the production of duck cloth. The transformation of the duck cloth from flax to cotton transformed the industry, and owner John Colt sold his cotton duck to the U.S. government for sailcloth. Throughout the 1850s and 1860s, production at the Passaic Mill diversified to include printing calicoes and manufacturing silk thread and ribbons. Between the years 1899 and 1915, The Standard Silk Dyeing Company majorly expanded the Passaic Mill to the north. The fires of 1983 destroyed the mill. Sections of the former mill are in very poor condition, with some areas of the mill a total loss (FMG2010). The boiler house, with its prominent smoke stack is in fair/poor condition. A second portion of the Passaic Mill is one of the most intact of the ruined dye houses remaining on the former ATP site. The sidewalls and roof framing still express the sawtooth design. While in overall poor condition, these portions of the mill have the potential to be preserved as a ruin. The foundation, walls, and steel framing appear to be stable. The timber sawtooth roof requires immediate attention if it is to be saved. The archeological sensitivity of this area is largely unknown.

Hinchliffe Stadium

Hinchliffe Stadium is a national historic landmark that is nationally significant for its role in the history of Negro professional baseball in twentieth-century segregated America. Built in 1931-32 by the city of Paterson, the stadium was envisioned as a means of providing its citizens—struggling from years of economic depression—with an affordable venue for sports and entertainment events. The notable landscape architecture firm, Olmsted Brothers, designed the overall plan for the stadium, which commands a sweeping view of the historic industrial mill buildings in the adjoining Paterson Great Falls NHL District. John Shaw, principal architect of the

Hinchliffe Stadium Volunteer Cleanup

Paterson architectural firm Fanning & Shaw, designed the blended Spanish Colonial Revival and Art Deco/ Moderne styled stadium. Constructed into a hillside, the open-air stadium presents three exterior walls that accommodate interior stepped bleacher seating decks, forming a bowl open at the lower (southeast) end in a U shape. The entire building is fabricated of reinforced poured concrete with an applied skim coat. Major character-defining alterations to the stadium came early, in the 1930s, and predominantly in 1934 with the addition of a restroom building, a concession stand, seating along the southeast wall, and widening of the track. The changes reflect the use of the stadium as an entertainment venue that was subject to the needs of shifting business models.

Today, although the stadium is in deteriorated condition and is closed, it still clearly portrays the description of its as-build condition as written and photographed in 1932 (NPS 2104a). The stadium's design, materials and workmanship survive intact and clearly impart the original and historic appearance and construction of the building (NPS 2014a). Although years of vacancy and vandalism have damaged the building, it remains as one of the most intact, if not the most intact of the few remaining stadiums that retain important historical integrity, associated with Negro baseball. Hinchliffe is distinctive, not only because of its unique design, but because it retains its entire physical plant, rather than just a field or lot where games were played (NPS 2014a). The stadium's period of significance is 1932 to 1944, covering the years when it served as a venue for segregated Negro professional baseball (NPS 2014a). Built as the Great Depression deepened and used during the era of "Jim Crow" segregation, Hinchliffe Stadium is an outstanding example of an athletic facility that served as a Negro professional baseball venue and home field for an extended period of time (NPS 2014a). Additionally, Hinchliffe Stadium hosted numerous Negro National League (NNL) games, considered by baseball scholars to be the premier Negro major league from the second half of the 1930s through the 1940s, including NNL season opening games in 1936 and 1937 (NPS 2014a). It is through the strong association of Hinchliffe Stadium with Negro professional baseball as it operated within the context of institutionalized segregation of African-Americans in the United States by which the stadium gains national significance (NPS 2014a).

Archeological Resources

Known archeological resources within Paterson Great Falls NHP include a variety of features and deposits related to historic features of the Paterson industrial era.

Pre-contact and Post-contact Native American Occupation

Three major cultural periods are evident in the Paterson area and have been documented through archaeological investigations: Paleoindian, Archaic, and Woodland traditions. The Paleoindian period is characterized by the presence of fluted projectile points and other related tools; and site types that include quarries, base camps (often located near waterways), maintenance stations, and hunting sites. The Archaic period emerged during the warming Holocene climate and resulted in a more diverse array of site types and the presence of new tool such as stone axes, chisels, and gouges, stone vessels, and the small stemmed point tradition. Settlement was largely focused on waterways. The Woodland period is characterized by the presence of ceramics, increasing sedentism, and extensive agriculture (NPS 2012a).

Several nearby sites are known, these include at least 20 pre-contact fords and weirs between Passaic Park and Two Bridges, a rock shelter and a stone blade cache. No known Native American period occupation sites or artifacts are present within the current park boundaries.

Historic Period

Numerous studies focused on the industrial development of Paterson have been conducted in the city's industrial core. These have investigated the location of dozens of features associated with the initial industrial development of the city, including the S.U.M. raceways and various associated structures, Stoney Road, and the Spillway at L'Enfant's Gap. Many of these features have been abandoned or lost to development. More than 20 archeological projects have been undertaken in or near the NHL District and Paterson Great Falls NHP. During the 1970s, the Paterson Archaeology Project studied the Upper Raceway, the Rogers Locomotive Works, and other sections of Paterson. More recently, testing and excavation done as part of National Historic Preservation Act Section 106 compliance has identified other resources related to Paterson's early industrial periods. Recent investigations done for a general cultural resources assessment of the ATP site has provided more detailed archeological data related to the development of the mills that were once present within the park boundaries.

Some of the many archeological resources identified during these extensive investigations include:

- additional sections of the raceway system
- waste weirs, sluices, and flume locations
- abandoned S.U.M. reservoir and intake gatehouse
- Ivanhoe Paper Mill rag and waste storage building
- Rogers Locomotive and Machine Works oil and paint storage building
- Rogers blacksmith shop
- two intact brick locomotive erecting bays

These archeological studies share several general outcomes. Most have resulted in the identification of intact features and deposits that can yield new information important in documenting the industrial development of Paterson. Many have also revealed the presence of large amounts of demolition debris and fill soils, pointing to some of the challenges urban archeologists will face in conducting additional research in the Paterson Great Falls NHP. Finally, earlier work has indicated that most of the intact features and deposits in the park are related to the period of industrial development, While it is possible that earlier resources are present, it is not likely they will be extensive.

Natural Resources

The park's natural resources generally described in the following section include the following:

- ***Water resources*** are the hydrological systems and features of the park, including streamflow characteristics, water quality, and floodplains.
- ***Floodplains*** are areas of land that are subject to natural flooding from an adjoining waterway.

Water resources and floodplains are analyzed further in "Chapter 4: Environmental Consequences."

Water Resources

The Passaic River flows from its headwaters in Morris County to Newark Bay. In the city of Paterson, the river flows northeast forming the northern and eastern boundaries of Paterson. The river is the principal hydrologic feature in the park and is a park fundamental resource.

Streamflow Characteristics

The Passaic River feeds a raceway system above the Great Falls. The city of Paterson holds a NJDEP water allocation permit to divert water into the raceway system. During the summer months, the amount of water flowing over the falls, and subsequently into the raceway system, is controlled by a flow regulation agreement for between North Jersey Water Supply and the city of Paterson. The agreement states that there should be a "passing flow" at all times and no pumping upriver from the falls. Passing flow requirements set a rate of water flow which either must be maintained downstream or must be allowed to pass a specified point in a stream. This agreement does not address water flow during the remainder of the year or "winter drought" issues.

Water is also diverted into the S.U.M. Hydroelectric Plant above the falls. The plant's license from the Federal Energy Regulatory Commission and the lease with the PMUA requires that the plant operator, currently Eagle Creek Renewable Energy, provide "continuous flows to the existing power canal network." The PMUA holds a Bureau of Water allocation permit from the Division of Water Supply and Geosciences and NJDEP, and must meet passing flow requirements over the Great Falls. The permit requirements state that diversions from the PMUA intake shall not cause the Passaic River flow over the Great Falls to be less than 200 cubic feet per second (NJDEP 2013a).

Water Quality

Water Quality Management in the Passaic River Basin. The water quality in the Passaic River and its tributaries is affected by the activities that take place in the watershed. Water pollution is generated from stormwater runoff and point source pollutants such as wastewater treatment discharges, industrial discharges and combined sewer overflows. Under the Clean Water Act of 1977, the EPA is responsible for developing water quality standards that define goals for U.S. waterbodies by designating uses, setting criteria to protect those uses, and establishing provisions to protect water quality from pollution. To assess water quality conditions, the EPA monitors criteria related to aquatic life, biological condition, nutrients, human health, microbiology (pathogens), and recreation (US EPA 2013).

The park is located within Watershed Management Area 4, Lower Passaic River and Saddle River (WMA 4) in the Passaic River Lower (Saddle to Pompton) watershed, sub-watershed Passaic River Lower (Goffle Bk to Pompton River). WMA 4 includes many older cities and industrial centers such as Paterson, Newark, Clifton, and East Orange and its water quality is affected by its industrial past as well as current point sources of pollution and stormwater runoff. There are several ongoing restoration initiatives in WMA 4 that are focused on the 17-mile tidal stretch of the lower Passaic River south of the park, from the Dundee Dam to Newark Bay. The portion of the lower Passaic River south of the park is included in the Urban Waters Federal Partnership. The partnership is a collaborative effort to restore waterways and their environments. It is composed of 13 federal agencies, including the U.S. Environmental Protection Agency (USEPA) and the U.S. Army Corps of Engineers, along with supporting agencies including the NPS.

Passaic River Designated Uses. The Passaic River segment that flows through the park and the sub-watershed surrounding the park supports its designated uses for agricultural water supply and industrial water supply, but does not support its designated uses for aquatic life, fish consumption, primary contact recreation, or public water supply (NJDEP 2012a). Within the park, the river does not meet primary recreational standards due to elevated levels of E. coli (NJDEP 2012a).

According to the 2008 *Draft Passaic River Canoe Kayak Trail Plan* (LPSRA 2008), it is safe to paddle on the Passaic River as long as paddlers take the proper precautions associated with paddling on a "post-industrial, urban river with combined sewer overflow outlets,

especially after a large rainfall in the watershed when pathogen counts increase". Activities such as boating are considered secondary contact recreation.

Passaic River Impaired Waters. The portion of the Passaic River that flows through the park is listed on New Jersey's Section 303(d) list of impaired waters. The Section 303(d) list is one of two basic approaches the Clean Water Act uses to protect and restore waterbodies. Under Section 303(d), the Clean Water Act requires states to identify waters that do not or are not expected to meet applicable water quality standards and report their findings to the EPA every two years.

Primary contact recreation refers to water- related recreational activities that involve significant ingestion risks, including but not limited to, wading, swimming, diving, surfing, and water skiing.

Secondary contact recreation refers to water-related recreational activities with minimal probability of water ingestion, including but not limited to, boating and fishing (NJDEP 2012b).

Once a waterbody has been identified on the Section 303(d) list, a total maximum daily load (TMDL) must be developed for each pollutant that is impairing the waterbody. The TMDL is a written plan and analysis that calculates the maximum amount of a pollutant allowed to enter a waterbody to ensure the waterbody will meet and continue to meet the water quality standards for each pollutant (USEPA 2012). The Clean Water Act requires states to rank and prioritize the development of TMDL to focus available resources on developing TMDLs in an effective and efficient manner, while taking into account environmental, social, and political factors. NJDEP has a set of criteria that are used to prioritize TMDL development. Those TMDLs ranked low priority are not expected to be complete in the immediate or near future. Table 3.3 summarizes the water quality attainment, causes of non-attainment, and the TMDL status for each pollutant for the Passaic River that flows through the park.

Combined Sewer Overflows. Rainfall at the park that is not absorbed by the ground runs off the site as stormwater. While some stormwater runs directly into the Passaic River, much of it collected in storm drains and enters Paterson's combined sewer system. Under regular conditions, all flows within Paterson's sewer system are conveyed to the Passaic Valley Sewerage Commission's wastewater treatment plant downstream in Newark, where wastewater is treated and discharged into the Passaic River. During extreme stormwater events such as heavy rainfall or snowmelt, combined sewer overflows (CSOs) can exceed capacities of the

Winter in the Park

lines to convey flows and/or the capacity of the downstream plant for treatment; at such times the combined stormwater and sanitary sewer flows may be released directly into the Passaic River, impacting water quality. These CSOs contain pollutants that affect the health of the river and its uses.

There is one CSO outlet located within the park on the north side of the Passaic River, just below the southeastern corner of Hinchliffe Stadium. There are several other CSO outlets located downstream of the park, near S.U.M Island (NJDEP 2013a). According to New Jersey Pollutant Discharge Elimination System, the permits for these CSO locations expired in 2009 and are not believed to be actively used (NJDEP 2011).

Debris and Litter

Debris and litter are another source of water pollution. Commission's River Restoration Program was created to

Table 3.3 Water Quality Attainment and TMDL Status

Use	Attainment	Cause	TMDL Development
Agricultural water supply	Fully supporting	N/A	N/A
Aquatic life	Not supporting	Cyanide	Low priority
	Oxygen, dissolved	Completed	
	Phosphorus (total)	Completed	
Fish consumption	Not supporting	Pesticides: chlordane in fish tissue, DDD, DDE, DDT	Low priority
	Mercury in fish tissue	Low priority	
	PCB in fish tissue	Low priority	
Industrial water supply	Fully supporting	N/A	N/A
Primary contact recreation	Not supporting	Escherichia coli (E. coli)	Completed
Public water supply	Not supporting	Arsenic	Low priority

address this issue along the Passaic River and within Newark Bay. The program removes litter and debris from the Passaic River, including within the park boundaries. The program is composed of three elements: volunteer shoreline clean-ups, skimmer vessel floatables removal, and community or municipality requested clean-ups (PVSC 2013).

Floodplains

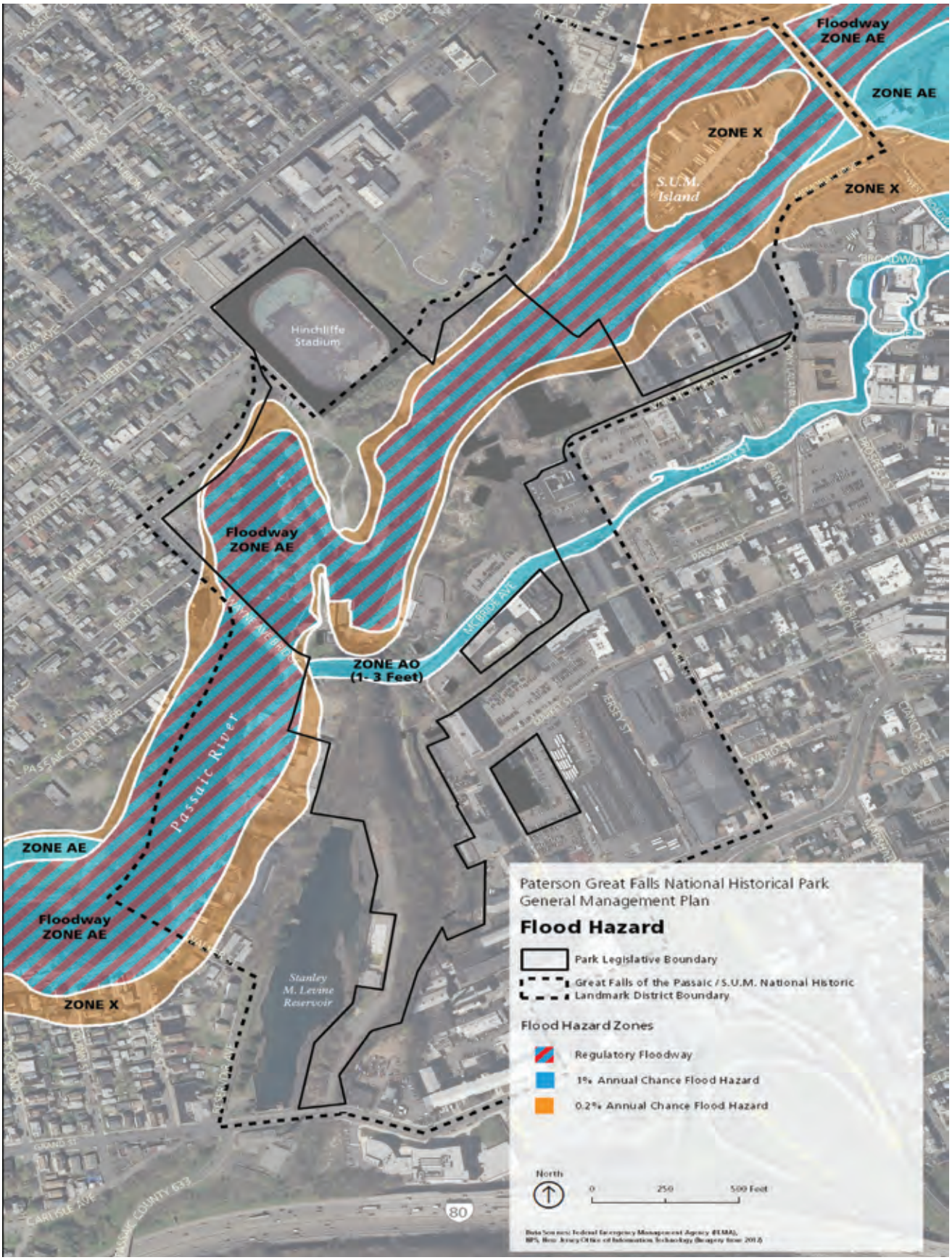
Flooding is a recurring problem in the city of Paterson. The most severe flood, the "flood of record ", occurred in 1903, and more recent floods in 1968, 1971, 1972, 1973, two in 1975, 1984, 1992, 1999, 2005, 2007, 2010, 2011 (Hurricane Irene) and 2012 (Hurricane Sandy) were sufficiently devastating to warrant federal disaster declarations (USACE 2013). Hurricane Irene in August 2011 was the most destructive flood that the Passaic River Basin has experienced with an estimated $1 billion in damages (USACE 2013).

Within Paterson Great Falls NHP, construction of river walls, raceway systems and dams has altered the natural flow of river, changing the location and size of the adjacent floodplain and creating floodplains along the upper, middle and lower raceways. Today, the regulatory floodway along the river in the park varies from 200 to 500 feet in width. The regulatory floodway is defined as follows:

- A "regulatory floodway" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. Communities must regulate development in these floodways to ensure that there are no increases in upstream flood elevations.

Adjoining the regulatory floodway is a narrow 500-year floodplain. Other areas of 100-year floodplains in the park include and adjoin the upper, middle and lower raceways (Zone AO), where average flooding depths are between one and three feet.

FIGURE 3.2 Floodprone Areas



Visitor Use and Experience

Visitor Experience

Visitors to Paterson Great Falls NHP come to the park for many reasons— to explore its historic sites and hear its stories through the interpretive media and programs, to enjoy the park's outdoor spaces engaged in a variety of recreation activities, and to pursue research into America's industrial heritage. Some visitors actually never visit the park – rather they are virtual visitors who explore the park remotely, via the internet or utilizing new technologies.

The park is open to the public during daylight hours and does not charge an entrance fee. Current visitor experiences center around the Great Falls and Paterson's industrial history. Visitor activities include both passive and active recreational activities, such as: visiting the Welcome Center and the Paterson Museum, touring the park and the adjoining historic district, viewing the Great Falls, and exploring trails along the raceway system.

History of the Great Falls

Visitors observe and appreciate the natural geologic formations, read about their formation, and learn about the raceway systems and the historic mill structures they powered. These experiences all tie into understanding the history of the Great Falls and Paterson as one of the nation's earliest industrial centers, a project of Alexander Hamilton and the S.U.M., and the development of water power systems for industrial use. The experiences also connect to the related stories of immigrants who worked in the mills, factory owners and operators, and laborers who worked for better working conditions and pay.

Discovering Historic Resources

Learning about the area's history is an important part of the Paterson Great Falls NHP visitor experience tied to the park's scenic and preserved historic settings. Cultural resource-based recreation opportunities include self-guided exploration and discovery of historic mill buildings and the raceway system along pedestrian paths and sidewalks, as well as guided tours and programming. There are multiple opportunities for visitors to explore the historic sites and structures associated with the park and the city of Paterson, including the historic raceway landscape and mill buildings. The wayside at Overlook Park and the partner-led tours facilitate visitors' exploration of historic sites.

Upper Raceway Park, including the Ivanhoe Wheelhouse and the S.U.M. Gatehouse, provide access to the raceway system. The exterior of the Ivanhoe Wheelhouse provides an example of a wheelhouse. While walking through Upper Raceway Park, visitors see the beginning of the raceway systems and some of the many mills that utilized the raceways to generate power. The middle and lower raceways run through the city and portions of the park, including through the former ATP site. The portions of the raceways located adjacent to the former ATP site are not accessible to the public. The middle and lower raceways lack adjacent formalized pedestrian paths.

The former ATP site is currently closed to the public. The ATP ruins are composed of remnants of the former industrial mills housed on the site, such as the Colt Mill ruins, Mallory Mill ruins, Waverly Mill ruins, and Todd Mill ruins. Visitors can see the ruins from Mary Ellen Kramer Park.

Recreational Uses

Paterson Great Falls NHP is a popular destination for neighborhood residents who come to walk, run, and relax overlooking the Passaic River and Great Falls. Other passive recreational uses include special events and picnicking.

Access to the river for water-based recreational activities is limited to fishing, both within the park and upstream and downstream of the park. Near Hinchliffe Stadium, an informal footpath leads to a rocky beach on the north shore of the Passaic River. River access is available upstream at Pennington Park and at West Side Park, both via stairs down a concrete bulkhead that lead to a natural shoreline; however, given the location upriver, access to the park on the river is not possible without a portage around the Great Falls. There is currently no formalized portage access around Great Falls and any informal access is dependent on water levels that allow for bridge clearances.

Special Events and Related Regional Attractions

The park's location within the city of Paterson provides opportunities for visitors to incorporate visits to nearby cultural and historic venues, activities, and events into visits to the park, and for the community to incorporate local events and activities into the park. Some examples of these connected activities and experiences include:

- Resources within the Great Falls NHL District—located outside of the park's legislative boundary—provide additional opportunities to explore and experience the collection of predominately 19th century mills and other structures that contribute to the NHL District. A walk through the NHL District provides an opportunity to observe the buildings' architecture and consider their previous uses as active industrial mills.
- The Great Falls Summer Jazz Series held in Overlook Park and sponsored by the city is a five-concert series that occurs every Saturday in August, with two bands playing each Saturday evening. Each free concert also features food and beverage vendors.
- The Great Falls Festival takes place on Labor Day weekend. It honors Paterson's industrial heritage and its role in labor and manufacturing. The festival features vendors, activities, booths for civic and charitable organizations and music. It is part of Labor Day celebrations that also include a parade that starts in Haledon and finishes at the Great Falls NHL District.
- The Paterson Falls Film Festival takes place in the Paterson Museum and the Ivanhoe Building.
- The Annual Art Walk is a walk through the historic district and the Great Falls National Historical Park that includes both music and art.
- Lambert Castle, located on Garret Mountain, was constructed in 1892-39 as the private residence of an English immigrant who made his fortune in the silk industry and today is operated by the Passaic County historical Society as a museum and library.
- The American Labor Museum is a restored 1908 home of immigrants that was a meeting place for silk mill workers during the 1913 Paterson Silk Strike. The museum includes restored period rooms, a permanent exhibit on the 1913 Paterson Silk Strike, changing exhibits, a store, gardens, a library, and educational programs and special events.
- The Ivanhoe Artists Mosaic is located within walking distance of the park and hosts events in the Ivanhoe Wheelhouse, including art classes, an open mike night, and other lectures and events.

Current Visitation

The park currently attracts many visitors who are local residents, using the park as their neighborhood outdoor and recreational space, focused on the Great Falls area. The park also attracts out-of-town visitors seeking a heritage tourism experience, who are interested in the Great Falls and the events that occurred in Paterson that the park interprets.

Because the park is new to the national park system, data traditionally collected, such as the number of yearly visitors, is limited. Currently, NPS and partners count visitors as participants in tours, school groups, specials events and people who visit the Paterson Museum and Welcome Center. In addition, NPS and partners have estimated through observation and informal counting that approximately 50,625 visitors enjoyed activities in Mary Ellen Kramer Park, Overlook Park and Upper Raceway Park and participated in partner-sponsored events in adjacent areas in 2014. The total number of actual and estimated visitors in the national historical park during 2013/2014 is 104,500.

Pre-Arrival Information and Orientation

The NPS park website provides a variety of information for visitors to use for planning a trip to the park. The "plan your visit" pull-down menu offers information on how to get to the park, operating hours and seasons, things to do, fees and reservations, things to know before visiting, accessibility, and park closures (if any). Links are provided to the Paterson Museum website for additional information on things to do in the park. The Paterson Museum website provides information on how to get to the museum, operating hours, fees, and guided tours, images of the exhibit floor, and articles providing an overview of the Great Falls' history and some of the industries that grew up around the falls.

Table 3.4 Current Visitation Estimates

Year		2013/2014
Paterson Museum	(3,526 school children)	26,452
Welcome Center (previously the Great Falls Historic District Cultural Center)		3,106
Ivanhoe Artists Mosaic, Inc.		4,754
NPS programming		9,564
Actual number of visitors participating in tours, programs and museum visits		53,876

Visitor Facilities and Amenities

Visitor Contact Stations and Visitor Services

The Welcome Center, formerly known as the Great Falls Historic District Cultural Center, provides orientation for visitors once they arrive in the park. The center includes exhibits for visitor to learn about the park, a gift shop operated by Eastern National (the park's cooperating association), a community conferencing area, restrooms, staff offices, and free parking. NPS and the Paterson Museum staff the facility, which is generally open 4 to 5 days per week from late fall through winter and 6 to 7 days per week during spring and summer months.

Partner organizations, such as the Paterson Museum, provide independent interpretive activities, information, and other visitor services such as restrooms. The Paterson Museum, operated by the city of Paterson, includes exhibits on Paterson history, local archeology, and mineralogy. The museum is open Tuesday through Sunday and charges a $2 admission fee for adults.

Trails

The park's trails, open spaces, and pedestrian connections to the park encourage self-guided exploration, provide opportunities for relaxing away from the more congested urban environs surrounding the park, and provide space for recreational activities and picnicking. The park currently contains a number of pedestrian paths which provide visitors with a pedestrian network to explore the park and its resources:

- A pedestrian path runs along Upper Raceway Park providing visitors opportunities to view the raceway system, experience solitude within a more naturalized setting, and sit and enjoy the park on park benches.
- Stoney Road, extends from the ridge top above the Upper Raceway and ends at the Stanley M. Levine Reservoir.
- The pedestrian footbridge that spans the river near the falls provides access between Overlook Park and Mary Ellen Kramer Park and connects the two sides of the river.
- An informal social trail near Hinchliffe Stadium leads to a rocky "beach" area along the north side of the Passaic River. This social trail near the Passaic River is an unmarked footpath that has not been formalized as a visitor access point.
- There is an asphalt footpath and a wooden staircase that lead to the informal trail, both of which are in need of repairs.
- There are also trails running through Mary Ellen Kramer Park and into the adjacent parkland at the intersection of Wayne Avenue and Maple Street.

Education, Interpretation and Understanding

The park offers visitors varied experiences through interpretation, education, and stewardship programs. Educational and interpretive programs are developed to encourage more enjoyment of park resources and facilitate a greater appreciation of the cultural and historical significance of the park as well as the historic structures located within the adjoining Great Falls NHL District. Programs offered by the park, its partners, and

neighbors include self-guided walking tours, guided walking tours, educational programming, concert series, and art and film festivals.

Interpretative and Educational Programming

Park Guided Tours. During the summer and fall, guided tours of the park are given twice a day on weekdays. During the winter and spring seasons, reservations are required to schedule a guided tour. These one-mile walking tours are led by a member of the Great Falls Youth Corps, an NPS Ranger, or a park volunteer. The tour covers the story of Paterson and the Great Falls, and helps visitors discover the natural and cultural diversity of the area the nation's first industrial city. The tour route travels through parts of the NHL District, and includes stops at partner visitor facilities such as the Paterson Museum.

Educational Programs with Schools. The park provides educational programs to school groups, including an introduction to the park during field trips given by a park ranger and visits to local schools by a park ranger. There are several teaching aids and curriculum guides available on the park's website that help teachers link subjects such as history, social studies, and geography to the natural and cultural stories of Paterson and the Great Falls. In addition to the ranger-led introductions to the park for field trips, the park provides classroom programs to local schools in the Paterson area.

Paterson Public School #7 Partnership. In 2012, the park "adopted" Paterson Public School #7's 5th grade elementary school class. The educational partnership works to achieve shared goals of educators and the park and revolves around a 40-year spiraling curriculum taking advantage of all park resources and themes. The partnership will culminate during NPS's Centennial celebration in 2016 when that year's graduating class, then in the 8th grade, will unveil their capstone service project to enhance the visitor experience at the park.

Junior Ranger Program. The park has a Junior Park Ranger and a Web Ranger program. The Junior Ranger Program allows participants to learn more about their national parks and earn official badges and certificates upon completion. The Web Ranger Program provides participants with an opportunity to learn about our national parks through the internet.

Volunteers

Volunteer Stewardship

Volunteer programs offer opportunities for visitors to become involved in stewardship of the park. Volunteer programs typically involve cleanups, defined landscaping projects, or providing tours of the park. Annual volunteer clean-up days occur in April and in August. The event in April is an Earth Day clean-up sponsored by the Passaic Valley Sewerage Commission, NPS, and the Paterson Department of Public Works. The Earth Day clean-up targets the banks of the Passaic River and the Great Falls Reservoir. The August clean-up is sponsored by the Great Falls Youth Corps, NPS, NJCDC, and city. The Earth Day clean ups attract hundreds of volunteers. In spring 2014, more than 450 volunteers registered to clean up and paint the interior of Hinchliffe Stadium on the day it was officially designated as a national historic landmark.

Partner Involvement, Special Events, and Adjacent Activities

Partners play a role in promoting understanding, education, and interpretation. Currently the park has working relationships with various groups and organizations, and will continue to build on these partnerships. The park is committed to strengthening relationships with universities, schools, institutes, and organizations as well as local, state, and federal agencies to accomplish a variety of operational needs.


Water Testing

Hamilton Partnership for Paterson Sponsored Programs. The Hamilton Partnership for Paterson is the park's official Friends Group. It helps promote the park and secure funding to help maintain historic structures, fund programs, and develop new initiatives. This non-profit partner is working to enhance the benefits of the national park for the city, state and nation, helped initiate development of the Mill Mile, a self-guided walking tour, accessed on-line or via brochure, of key locations within the park.

Great Falls Youth Corps. In partnership with NPS, the NJCDC organizes the Great Falls Youth Corps, a summer program for local high school students which works on projects at the park. The Corps' strategy seeks to improve the properties around the park, and develop momentum for additional projects. The Great Falls Youth Corps provides walking tours within the park.
Paterson Education Fund Programs and Outreach.
A cooperative agreement between the park and the Paterson Education Fund (PEF) is introducing new youth programs and education outreach. For example, with PEF, the YMCA and the STEM Academy in Paterson, the park brought the non-profit "Rocking the Boat" to the city in the summer of 2012 to get school kids out onto the Passaic River and developed a workshop for teachers to show them how to use the park as a classroom. The park is also working closely with the city of Paterson to create future youth programming.

William Paterson University Oral History Program. In 2013, the NPS signed a general agreement with William Paterson University. The agreement is designed to generate greater use of the park's historical, cultural, and natural resources for educational purposes.
The university provided the park its first interns and developed its oral history program.

Other Partner Sponsored Programs and Events. New cooperative agreements completed in 2014 include those with Montclair State University (Eco-Explorer Program through the Passaic River Institute, MSU), Passaic County Community College (Exploring Paterson Great Falls NHP through the visual and literary arts), and the Student Conservation Association (hired a trained crew leader to oversee the Great Falls Youth Corps landscape team).

The park held its third Annual Asphalt Art competition in summer 2014. The art event, conducted in partnership with a local artist and sponsors, attracted more than 500 people, including 75 amateur and profession artists who interpreted the park's themes through chalk on asphalt canvasses laid out within the park.

Health and Safety

Paterson Great Falls NHP experiences safety issues similar to those found in any unit of the national park system, as well as additional visitor safety challenges due to its urban location. Issues focus on visitor personal safety, visitor conflicts, and vandalism. Conflicts between users can sometimes pose safety problems, such as those between vehicles and pedestrians and between vehicles and bicyclists. Areas of the park with narrow sidewalks or high vehicular traffic can be particular areas where conflicts may occur. Closed or unmaintained cultural resources and facilities pose risks to visitors who explore them. Many of the former ATP site structures are in very poor and unsafe condition. They present climbing hazards with unstable surfaces and sharp objects. Although the former ATP site is not open to public access, it is inadequately fenced, or the fence has been breached, in some locations. Additional surveillance and lighting is needed to address these issues. Law enforcement throughout the park is currently

handled by the city of Paterson police department. In addition to law enforcement, this park is dependent on the city for dispatch and emergency medical services. Without dedicated park rangers to make routine park visitor contacts, ensuring that park regulations are understood and being met is difficult, as is checking for safety and resource violations, and responding to or directing visitor inquiries to appropriate park staff.

Transportation and Access

Visitors access Paterson Great Fall NHP using all modes of transportation. Area residents walk and bike to the park, while visitors from other parts of the city, the region and beyond rely primarily on private vehicles to get to the park. Some visitors access the park on private bus tours or on public transportation.

Vehicular Access

Interstate 80 (I-80), running east-west from Teaneck, New Jersey to San Francisco, California, is adjacent to the southern boundary of the park. This freeway serves as a primary means of access for visitors arriving to the park from places beyond the city of Paterson. Ramps from the Market Street Exit ramp provide direct access to Oliver Street, just one block from the park.

Two other roadways— State Route 4 and State Route 19—provide regional vehicular connections to the park. Both are typically congested due to proximity to interstate highway access ramps and other regional roadways.

Streets adjacent to and running through the park include McBride Avenue, Wayne Avenue, Spruce Street, Mill Street, Van Houten Street and Maple Street. Informal traffic volume information indicates that Ward, Market, Spruce, Wayne, Main, Broadway, and Totowa Streets carry the most traffic in the park vicinity and that there are generally three peak periods for vehicular traffic: the morning and evening rush hours and after school (City of Paterson 2008). Traffic congestion and associated threats to pedestrian safety are common complaints of Greater Spruce Street residents (City of Paterson 2008).

Parking

Several surface parking facilities within the park offer free parking for visitors. These include lots at Overlook Park, the Welcome Center, the Paterson Museum, and the Lou Costello Pool (off Old Story Road).

The Paterson Parking Authority owns and operates a 212-space surface lot on Lower Market Street, across from the Paterson Museum and adjacent to the Middle Raceway. This lot is currently utilized by private permit holders. The parking authority has developed a conceptual plan for a parking garage on the site with up to 1,000 spaces.

On-street parking within the park is generally prohibited, with the exception of several metered spaces on the south side of Van Houten Street and some free on-street spaces along the southern portion of Spruce Street near the Paterson Museum.

The Paterson Parking Authority operates additional surface lots and parking structures in the vicinity of the park and in downtown Paterson. These facilities charge an hourly usage rate of $3 to $4 for the first hour, $2 for the second hour and $1 for each additional hour. The closest parking authority facilities to the park that offer hourly parking are at 80 Prospect Street (172 surface parking spaces) and 65 Ellison and Prospect Streets (parking garage with 836 spaces).

Public Transportation

The park is accessible by several modes of public transportation including New Jersey Transit rail and bus lines, city-run trolley service, and charter bus lines.

Rail Service

The New Jersey Transit (NJT) Main Line provides commuter rail service to Paterson. It runs from Port Jervis to Hoboken, with connections available to New York City and other NJT lines by transferring at the Secaucus Junction Station. The closest station to the park is located in downtown Paterson, approximately one mile (a 20-minute walk) away.

Bus Service

NJT provides bus service within the city of Paterson. Fourteen bus lines run within one-half mile of the park. Service is provided to Newark, Paramus Park, Wayne, Hackensack, and East Rutherford in New Jersey and the George Washington Bridge and Port Authority Bus Terminals in New York. NJT also provides bus service

FIGURE 3.3 Transportation System

in surrounding counties including Passaic, Bergen, Essex, and Hudson Counties.

NJT operates the Broadway Bus Depot on Broadway Street, just east of Curtis Place, approximately one block from the Lower Raceway. The depot, renovated in 2010, serves as the termination point for bus lines 72, 74, 161, 171, 190, 703, 746, 748, and 770.

NJT also operates the Market Street Garage, a bus maintenance facility and office space, adjacent to the Paterson Museum, on Market Street. NJT has a $17 million capital project scheduled to rehabilitate the facility, including renovation of interior offices, a new customer lobby and ticket office, and other mechanical and structural improvements. This location is convenient to the ramps on and off of I-80 and the Garden State Parkway.

Private bus carriers also provide service in the park vicinity, mostly for commuting, between Paterson and regional destinations. The largest of these, Spanish Transportation Company, operates as Express Service and provides frequent and competitively priced service with passenger pick-ups along Main Street and Market Street.

Other Public Transportation

The Paterson Parking Authority runs the free Paterson Trolley Monday through Friday from 7:00 AM to 6:00 PM. The trolley line serves Paterson City Hall, Passaic County offices and courts, the Federal Plaza, Passaic County Community College, downtown merchant and center city areas, and the farmers market.

Pedestrian and Bicycle Circulation

Pedestrian circulation within the park includes sidewalks along streets and a network of paths/trails. Sidewalks are available on the streets surrounding the park; however, there is a break in the sidewalk in front of the ATP site on Van Houten Street and curb cuts interrupt the sidewalk in various places surrounding the park. The sidewalks on McBride Avenue are separated from the roadway by a metal barrier between Spruce Street and Wayne Avenue. The sidewalks on the Wayne Avenue Bridge are narrow and do not provide a lot of space for pedestrians.

Pathways are located along the Upper Raceway and in Mary Ellen Kramer Park. From the southern end of the Upper Raceway Trail, a trail leads up the hill towards the Lou Costello Pool parking area, off of Old Stony Road.

McBride Avenue and the pedestrian footbridge over the Passaic River in the vicinity of the Great Falls provide pedestrian connections for park visitors and local residents between the two sides of the park. The footbridge is accessed from McBride Avenue near its intersection with Wayne Avenue on the south side of the river and from Maple Street through Mary Ellen Kramer Park on the north side of the river.

There are limited bicycle paths around and within the park. There are currently no designated bicycle lanes in the city of Paterson. There is one signed bicycle route on the west side of the Passaic River between Great Falls and Overlook Park. Dedicated bike lanes are proposed along McBride Avenue, Ellison Street, Spruce Street and Market Street. In addition, shared bikes lanes are proposed for Van Houten Avenue adjacent to the park.

Socioeconomics

Park and open space areas in and around an urban area are key contributors to the quality of life in the community. This becomes even more significant in very large metropolitan areas, where population densities and travel distances to open public lands are greater. Paterson Great Falls NHP is located within the largest metropolitan area in the United States, where along with other parks and open space, it plays an important role in sustaining and enhancing the quality of life for the residents of the city of Paterson and Passaic County.

Population and Community Trends

Historically, the city of Paterson has held the majority of Passaic County's population; however, Paterson's share of the county's population has been in decline, and went from a peak of over 40% to currently under 30% of the county's total population (City of Paterson 2014). Since 2000, the city's population has declined. After peaking in 2000, with 149,222 people, it declined by 2.7% to 145,2109 in 2012 (USDOC 2012).

Passaic County experienced an increase of 2.8% in population between 2000 and 2012, from 489,049 to 502,885. In all areas of Passaic County, population grew much more slowly than the rest of New Jersey, which increased in population by 5.4 percent between 2000 and 2012 (City of Paterson 2014).

In 2012 the population of the city of Paterson represented 2% of the population of the total population for the New York-Newark-NY-NJ-CT-PA Combined Metropolitan Statistical Area (estimated at 23,362,099) (USDOC 2012).

People and Households

Median Age and Household Size

In 2012, the median age for the city of Paterson was 32.2 and the average household size was 3.29 (USDOC 2012). The average Paterson resident is getting older, with an increase in the median age of approximately one year over each of the past three decennial censuses (City of Paterson 2014). While people are living longer and the median age continues to rise, the population of the city overall is relatively young and proportionally distributed across age groups (City of Paterson 2014).

Population growth projections for 2020 indicate that the population aged 65 and older will increase the most in Passaic County (NJDLWD 2013a). Over the same period, the 0 to 14 age group is projected to have the greatest decline in the county, with smaller declines in the 15 to 24 and 24 to 44 age groups (NJDLWD 2013a). This is consistent with the projected increase in median age for the city of Paterson.

Race and Ethnicity

From a park management standpoint, understanding the racial makeup of the community can help understand ways to make the park more inviting, develop better outreach with the community, and improve park program relevance.

The demographics of the city of Paterson reflect its history as a city where immigrants settled. Though the industrial job base which originally propelled the city to become a significant portal for immigrants is significantly eroded, the city continues to be home to large number of immigrants and their children. The percent of foreign born population in the city is 29.7%, significantly higher than the percentages for New Jersey (20.8%) and United States (12.9%) (USDOC 2012). Passaic County has a similarly high 27.5% foreign born population. Within the city, 62.5% of the population age 5 years or older speaks a language other than English at home, compared to 46.9% in Passaic County, 29.6% in New Jersey and 20.5% nationwide.

As a "minority majority" city, 28.6% of the city of Paterson is African American (compared to 12.8% statewide), and 56.7% is Hispanic or Latino (compared to 17.7% statewide) (USDOC 2012).

Table 3.5 Race and Ethnicity as a Percentage of the Population

Hispanic or Latino and Race*	City of Paterson	Passaic County	New Jersey
Hispanic or Latino (of any race)	56.7%	37.1%	17.7%
White alone	10.0%	45.2%	59.2%
Black or African American alone	28.6%	11.2%	12.8%
American Indian and Alaska Native alone	0.0%	0.1%	0.1%
Asian alone	3.5%	5.1%	8.3%
Native Hawaiian and Other Pacific Islander alone	0.0%	0.0%	0.0%
Some other race alone	0.3%	0.5%	0.4%
Two or more races	0.8%	0.8%	1.4%

Note: The methods that the 2008 to 2012 American Community Survey (USDOC 2012) used for identifying race/ethnicity allows for a dual reporting of ethnicity. As such, the total percentages can be greater than 100 percent. Source: USDOC 2012

The white (not Hispanic or Latino) population is 10%, compared to 59.2% statewide (USDOC 2012).

Income, Poverty, and Education

Other factors that play a role in park management and visitation trends are the income levels and poverty levels of residents who live near the park. In 2012 the city of Paterson per capita income was $15,529, compared with $27,122 in Passaic County and $35,928 statewide (USDOC 2012). The median household income in the city of Paterson was $33,585, compared with $37,540 in Passaic County and $71,637statewide (USDOC 2012). 27.6% of persons in the city of Paterson live below the poverty level, compared with15.8% in Passaic County and 9.9% statewide (USDOC 2012).

Educational attainment typically correlates with income and poverty characteristics. In 2012, the city of Paterson had the lowest percentage of population with high school degrees or higher (71.3%) or college degrees or higher (10.3%) than either Passaic County (81.6% and 25.8%, respectively) or New Jersey (87.9% and 35.4%, respectively) (USDOC 2012).

Employment Trends

Employment opportunities typically correlate to educational background and impact household income. In the city of Paterson, the largest industry employer is production, transportation, and material moving occupations. In contrast, in Passaic County the largest industry employer is management, business, science, and arts occupations.

Table 3.6 Educational Attainment by Population Percentage

Educational Attainment	City of Paterson	Passaic County	New Jersey
Less than 9th grade	15.7%	10.1%	5.5%
9th to 12th grade, no diploma	13.0%	8.3%	6.6%
High school graduate (includes equivalency)	41.4%	34.6%	29.2%
Some college, no degree	14.7%	15.7%	17.1%
Associate's degree	4.9%	5.5%	6.2%
Bachelor's degree	7.5%	17.4%	22.0%
Graduate or professional degree	2.7%	8.4%	13.4%
Percent high school graduate or higher	71.3%	81.6%	87.9%
Percent bachelor's degree or higher	10.3%	25.8%	35.4%

Source: USDOC 2012

Table 3.7 Employment by Occupation

Occupation (civilian employed population 16 years and over)	City of Paterson	Passaic County	New Jersey
Management, business, science, and arts occupations	17.0%	31.6%	40.1%
Service occupations	23.8%	17.4%	16.4%
sales and office occupations	22.5%	25.7%	25.7%
Natural resources, construction, and maintenance occupations	8.7%	7.8%	7.5%
Production, transportation, and material moving occupations	28.0%	17.5%	10.4%

Source: USDOC 2012

Table 3.8 Housing Characteristics

Housing Characteristics	City of Paterson	Passaic County	New Jersey
Median home value	$302,400	$361,000	$337,900
Median rent	$1,085	$1,136	$1,154
Owner-occupied units	22.5%	55.0%	66.2%
Renter-occupied units	71.3%	45.0%	33.8%
Single-family detached units	28.0%	17.5%	10.4%
Multi-family and attached units	84.0%	57.65%	45.1%

Source: USDOC 2012

Housing and Urban Development

Housing values and rents do not differ greatly among the city of Paterson, Passaic County and the state. Housing costs are high when compared to median incomes. When more than 30% of household income is spent on housing expenses, those households are considered to be facing a cost burden. In 2012, households spending more than 30% of their income on housing costs in Passaic County included approximately 48.8% of homeowners and 62.4% of renters (USDOC 2012). Median incomes in the city were lower than in the county and the state, and many Paterson residents spent more than 30% of household income on housing. In the city of Paterson, approximately 66% of homeowners and 66% of renters spent more than 30% of their income on housing costs (USDOC 2012).

In 2012, the city of Paterson had a higher percentage of rental units than either Passaic County or New Jersey, and in fact the majority of Paterson residents (71%) reside in rental properties (USDOC 2012).
The city of Paterson also has one of the highest densities of any city in the nation. With a land area of 8.43 square miles, population per square mile in 2012 was 17,226 (USDOC 2012). While the city is dense and composed of a number of attached and/or multi-family units (2 or more units), the city's housing stock is made up mostly of many small units rather than larger scale housing developments. Over 50% of the city's housing stock is composed of either single- or two-unit structures. Given the population density in the city of Paterson, the open space and supporting recreation areas is an important value provided by Paterson Great Falls NHP.

Park Visitors

Economic Effects of the Park on the Community

Just as population growth and community demographics have effects on the management and use of Paterson Great Falls NHP, the park also has effects on the economy of the community around it. Units of the national park system have many direct and indirect positive effects on their regional economy. This impact can be traced to several sources and attributes, such as money spent by visitors at local businesses, jobs created at these local businesses due to visitor demand, NPS jobs created at the park, NPS contracts with local businesses, and other area tourism generated by the park.

Economic Contributions of the Park to the Local Economy

In 2013, approximately 60,125 people visited Paterson Great Falls NHP. The majority of these visitors are presumably from the local area and are primarily day visitors. In the future, the recent designation of the park as a unit of the national park system is likely to attract more visitors and different types of visitors from farther away in the region and beyond the region. As new visitors travel to the area, they provide an economic stimulus through their local spending at local stores and restaurants. This economic contribution centers primarily on the city of Paterson. Money spent by visitors in the local area can also have other indirect, or secondary, effects. For example, money spent that supports local businesses and jobs recirculates into the local economy and beyond. This recirculation happens when the local businesses buy products or services from other sources (e.g., from wholesale suppliers), or when employees at local businesses spend their income at other businesses in communities surrounding the park to sustain their lifestyle (e.g., grocery shopping, entertainment). This secondary effect is often referred to as an economic "multiplier," because one dollar injected into the local economy often has more than one dollar's effect on the local economy.

The employment offered by the NPS and park partners, while currently a small number, also contributes to the local economy. The social and economic benefits of this job base are twofold. First, the jobs made available by the park and its partners provide employees with a steady income that helps sustain their lives and those

Great Falls Great Food Program

of their families. Secondly, similar to the economic effects of revenue generated by park visitation, the income earned by park and partner employees also has direct and secondary effects on the local economy. These employees contribute to the local economy by spending the money they earn on goods and services in the community. This spending directly supports local businesses and their growth. Local communities also benefit directly via the sales tax generated. In addition, secondary economic benefits (i.e., the multiplier effect) are realized when this money eventually circulates further beyond the local economy. Data to measure these to measure these direct and indirect contributions from NPS and park partner employment on local economies is not currently available for Paterson Great Falls NHP.

While the effects of visitor spending and employment are well understood, specific data regarding the magnitude of these beneficial direct and indirect contributions from visitors and employment to the city of Paterson's local economy are not currently available.

Business and Industry Trends

Most private employment in the city of Paterson occurs in a few key industries. Healthcare is the largest private employment industry, followed by manufacturing, retail, and administrative support and waste

View from Stoney Ridge Trail

management. Approximately 30% of all employment in the city comes from the public sector, of which the education services and public administration industries make up the largest two industries (City of Paterson 2014).

Employment sectors for the city of Paterson and Passaic County are somewhat similar. In Passaic County, trade transportation and utilities was the largest private employment industry in 2012, followed by education and health services and professional/business services (NJDLWD 2013b).

Park Operations

Staffing

The park is administered by a Superintendent, and headquarters are currently located in the S.U.M Administration Building adjacent to the Great Falls. The Superintendent's office currently includes a Superintendent, and a supervisory park ranger and a park ranger. The park is also supported administratively by a management assistant from a nearby unit of the national park system. Park staffing in 2015 is three full-time-equivalent (FTE) employees. The FTE number indicates NPS staff only, not volunteer and seasonal positions or positions funded by partners.

NPS staff currently co-operate the Welcome Center, located across the street from the Overlook Park, with Paterson Museum staff and volunteers. Currently the Paterson Museum and Ivanhoe Wheelhouse are operated by city staff, partners and volunteers.

Public Safety

Law enforcement throughout the park is currently handled by the city of Paterson police department. In addition to law enforcement, this park is dependent on the city for dispatch and emergency medical services. City agency staff respond to emergencies and currently the park is without law enforcement assistance to make routine park visitor contacts, ensuring that park regulations are understood and being met, as is checking for safety and resource violations, and responding to or directing visitor inquiries.

Maintenance

Currently, the city of Paterson and the PVWC provide maintenance of the landscape and structures in park areas. Local agencies, such as Passaic Valley Sewage Commission, and interested groups lead clean-up events in the park with volunteers.