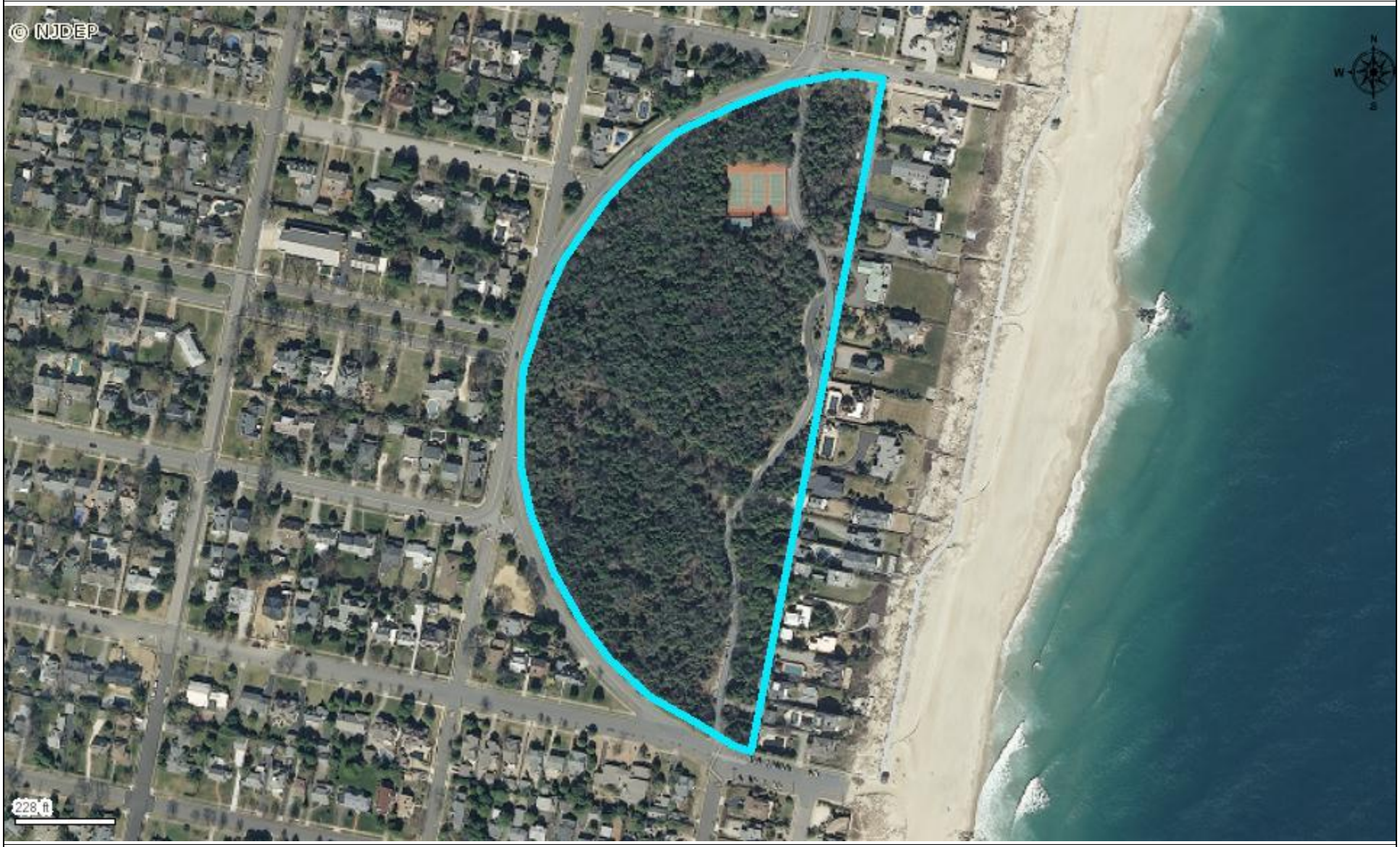
Stand Map
all one stand

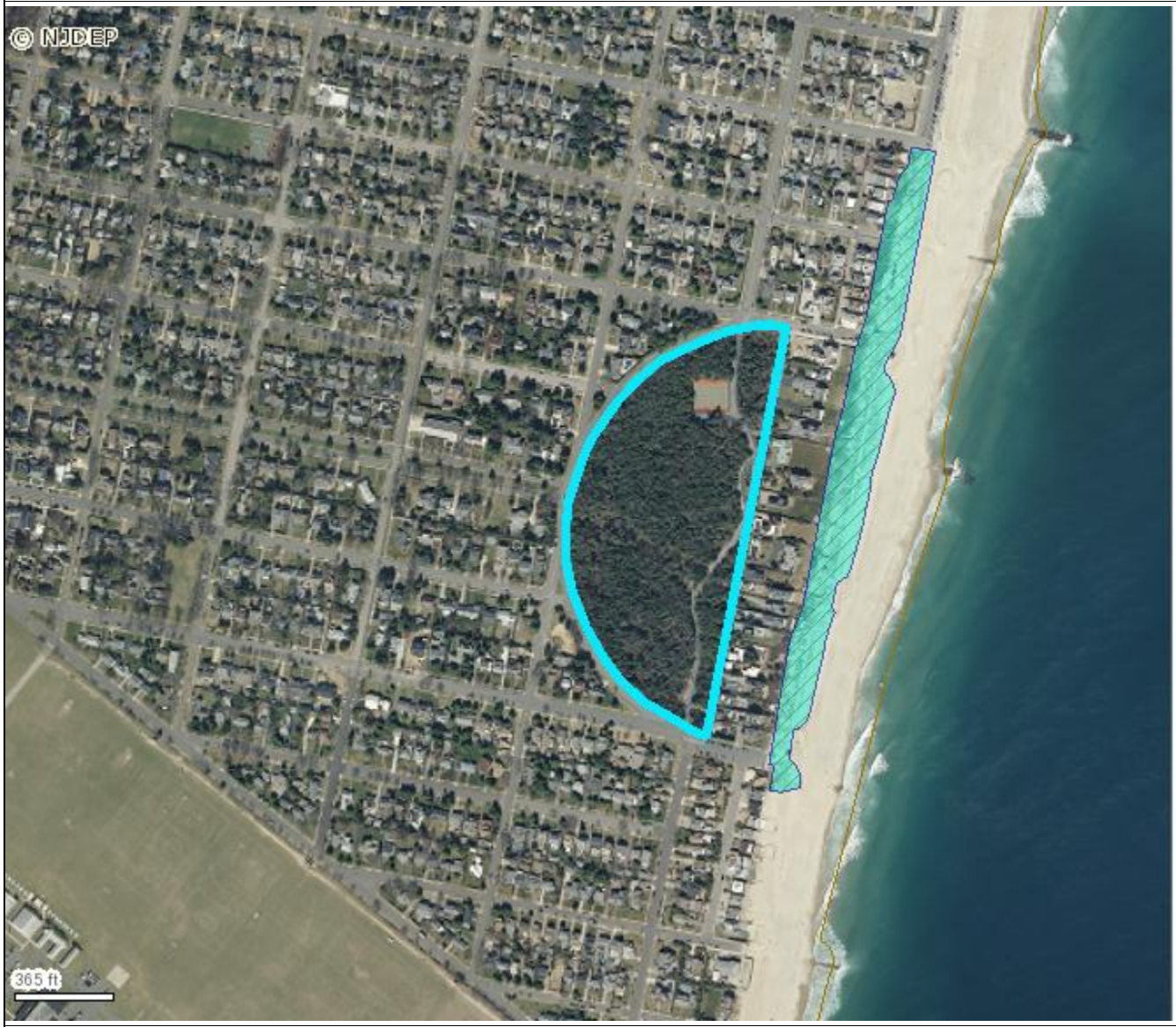


Map Printed On {2015-10-02 12:00}

2012 Infrared

Map Printed On {2015-10-02 11:58}

Wetlands & Water Resources

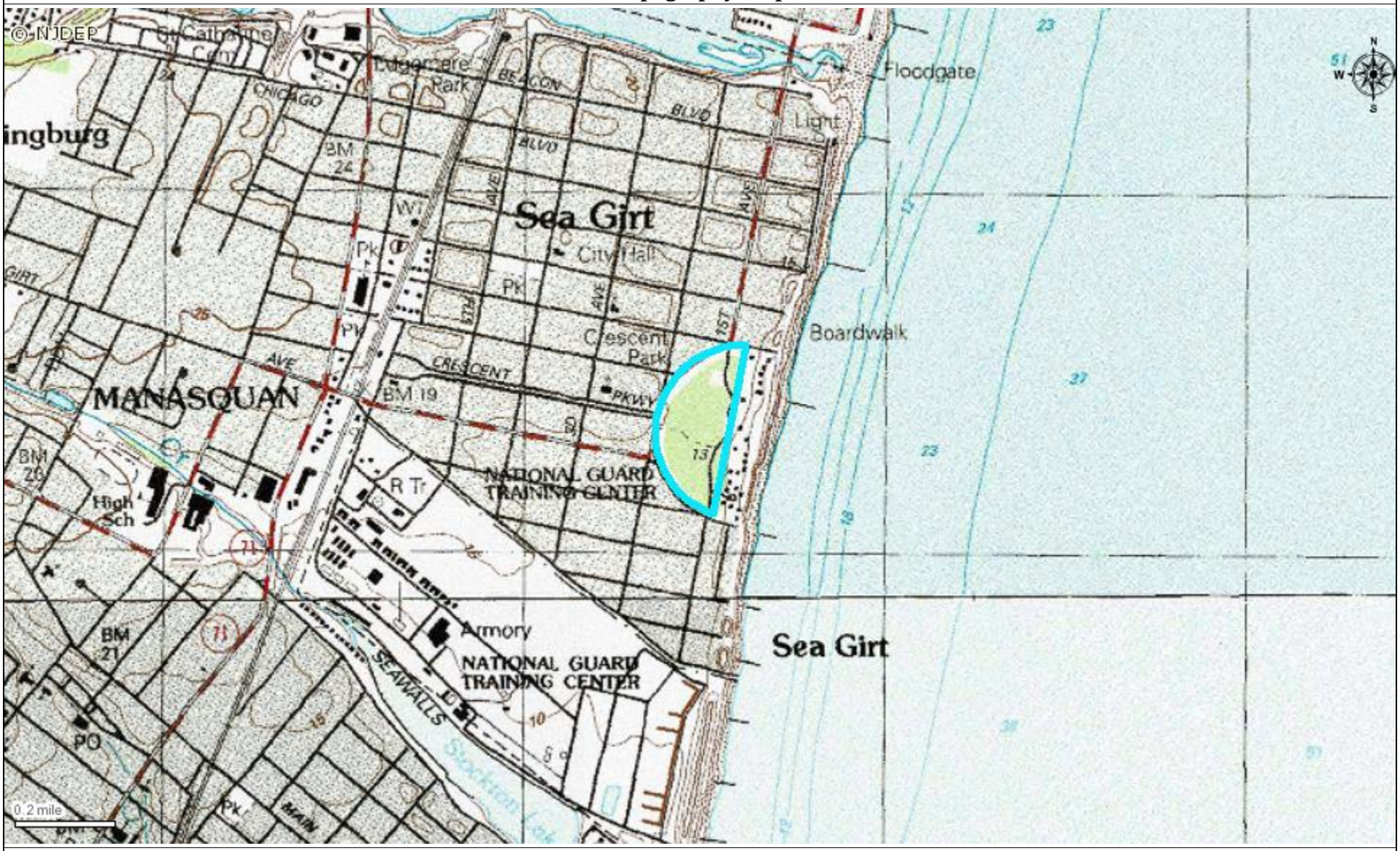


Legend

GeoWeb
Landscape Project - Vernal Habitat
TYPE
Potential vernal habitat area
Vernal habitat area
Streams
Coastline
Stream/River
Artificial Path
Connector
Canal/Ditch
Pipeline
Category One Waters
Wetlands (2012)

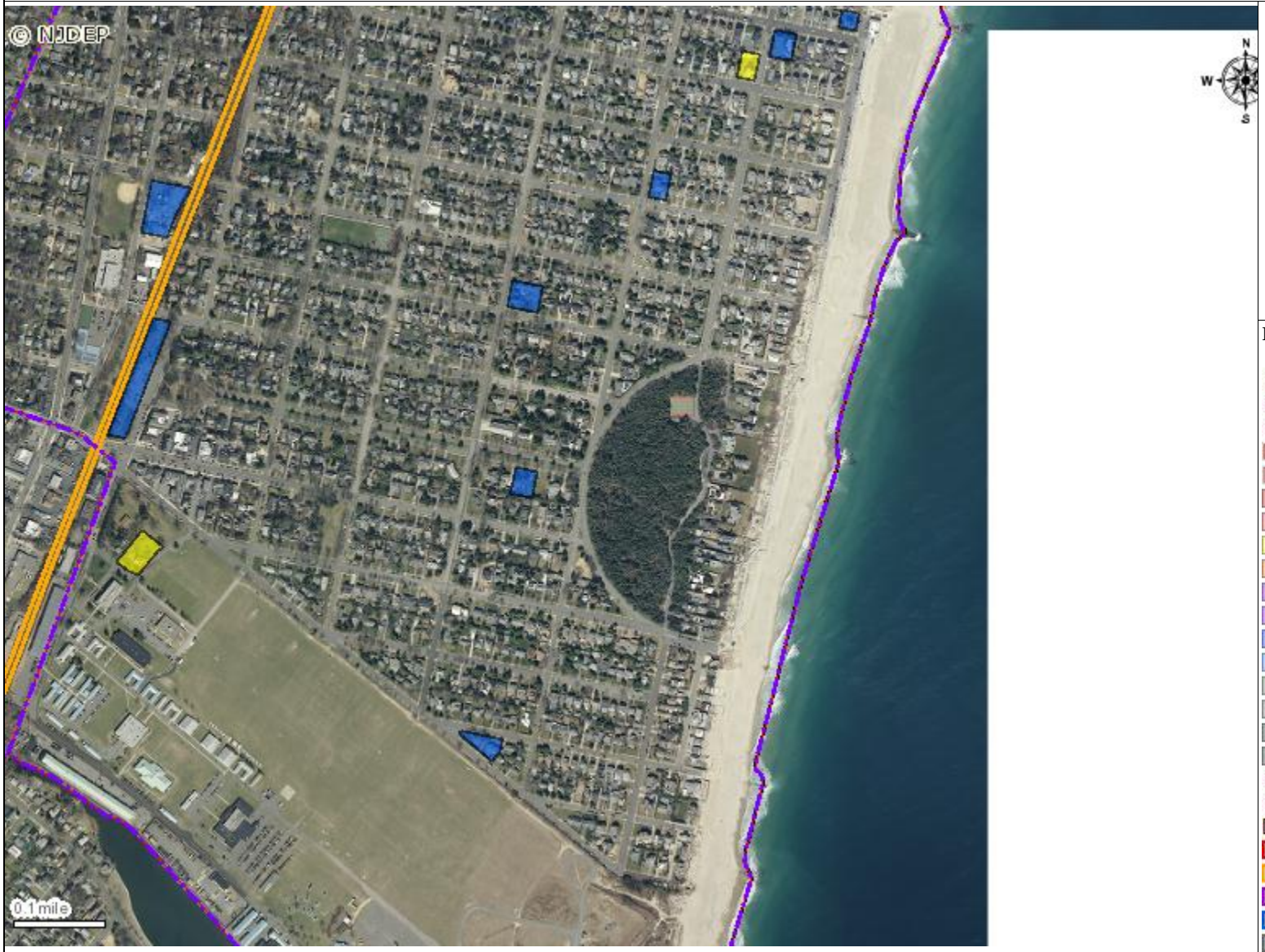
Map Printed On {2015-10-02 12:06}

Topography Map



Map Printed On {2015-10-02 12:08}

Historic Resources



Legend

GeoWeb
Historic Properties
Designation Status
- National Historic Landmark INDV
- National Historic Landmark HD
- Listed INDV
- Listed HD
- Eligible INDV
- Eligible HD
- Local Landmark
- Locally Designated HD
- Identified INDV
- Identified HD
- Not Eligible INDV
- Not Eligible HD
- Delisted INDV
- Delisted HD

Historic Districts
Designation Status
- National Historic Landmark
- Listed
- NR Eligible
- Locally Designated
- Identified
- Not Eligible
- Delisted
- Municipalities
- Counties

Mid-Atlantic States
- New Jersey
- Other Mid-Atlantic States

Map Printed On {2015-10-22 15:35}

1930's Air Photo

Map Printed On {2015-10-02 11:54}

Controlling English Ivy

(*Hedera helix*)

in the Pacific Northwest

Although produced by and the responsibility of The Nature Conservancy, this document grew from a workshop co-sponsored by Metro, The City of Portland Parks, Natural Resources Division, The Society for Ecological Restoration, Northwest Chapter and The Nature Conservancy in February 2002. As well as extensive literature review, the data and field experience of more than 20 individuals and organizations (primarily) from northwestern Oregon went into this document. Funding for the production of this guide and the research that supported it was provided by the Northwest Service Academy of the AmeriCorps and the United States Fish and Wildlife Service. In addition, the Oregon Department of Agriculture and the No Ivy League in Portland, Oregon provided friendly review. Thank you all.

Editors Note: The discussion in this document is specific to *Hedera helix* (English ivy) and not particular named cultivars. Some cultivars apparently behave ecologically like *H. helix* and are likely to respond similarly to the treatments described here, some apparently do not. Because of the risk that other cultivars will prove invasive, the authors urge caution in the use of any ivy cultivars for landscaping. Please seek out and use other landscaping choices.

English Ivy Description

English ivy (*Hedera helix*) is a trailing or climbing vine (**photograph 1 and 2**) belonging to the family Araliaceae (ginseng) and is native to Europe. Brought to North America by colonial settlers, *H. helix* is widely cultivated as ornamental/utilitarian groundcover in the Pacific Northwest (PNW).

Photo 1. Ivy ground cover

Photo 2. Ivy leaves and viney stems

Because of its' wide planting, climbing habit, and because seeds are spread by birds, ivy has become widespread in natural areas and unmanaged green/open spaces, where it buries native groundcover vegetation (**photograph 3**) and climbs and kills or topples matures trees (**photograph 4**). Because of its great potential to fundamentally change Pacific Northwest forested habitats, English ivy can fairly be called the kudzu of the Pacific Northwest (**photograph 5**).

Vines attach to the bark of trees, brickwork, and other surfaces by way of numerous, small root-like structures, which exude a glue-like substance. Older vines are known to reach a foot in diameter. Leaves are typically dark green, alternate (they alternate sides on the stem) and simple (the leaf is not composed of little leaflets). Juvenile leaves are 3-5 lobed (**photographs 1 and 2**), but mature leaves or leaves in full sun are ovate (roundish) to rhombic (angular but not square)(**photograph 6**).

Photo 3. Ivy smothering native fern

Photo 4. Ivy toppling native tree

Mature plants produce umbrella-like clusters of greenish-white flowers in the fall (**photograph 7**). The black, berry-like fruit (**photograph 8**), containing a few hard, stone like seeds typically mature in the spring.

Ecological Threat

English ivy is an aggressive invader that threatens nearly all forested habitat types in the northwestern U.S. up to at least 3000' in elevation (900 meters). English ivy cover is rapidly reaching catastrophic levels, especially in urban and near urban areas of the Pacific Northwest.

Photo 5. Ivy carpet over forest

Photo 6. Mature ivy leaves

Without prompt action, many thousands of trees will be toppled or killed over the next decade in the Portland metro area alone.

Ivy is capable of growing along the ground as well as into the upper forest canopy. The dense growth and abundant leaves, which spring from the stems like small umbrellas, form a thick canopy just above the ground, and prevent sunlight from reaching other plants. Similarly, vines climbing up tree trunks spread out and surround branches and twigs, preventing most of the sunlight from reaching the leaves of the host tree. Loss of host tree vigor, evident within a few years, is followed by death a few years later. Furthermore, the added weight of vines makes infested trees susceptible to blow-over or tip-over, especially during winter storms. English ivy also serves as a reservoir for bacterial leaf scorch (*Xylella fastidiosa*), a plant pathogen that is harmful to native trees such as elms, oaks, and maples.

Photo 7. Flowering mature ivy patch

Once established at a site, English ivy can be expected to move beyond its intended borders into neighboring yards, parks and other lands, either by vegetative means or by seed dispersed by birds.

As habitat for wildlife, a monoculture of ivy is a poor replacement for a diverse native forest understory. Areas dominated by ivy have lower diversity of birds, mammals and amphibians, and appear to be good habitat only for rats. Although some native birds do eat the berries, ivy fruit seems to be preferred mostly by non-native starlings.

Photo 8. Ripe ivy fruit cluster (purple) and unripe (green)

Despite its propensity for quickly and completely covering the ground, English ivy actually increases erosion problems, especially on steep slopes, since its shallow, sparse root system doesn't provide the deep soil anchoring of mature trees and shrubs.

Basic Ecology

English ivy grows easily in many types of soil, from full sun to complete shade, and once established, is fairly drought tolerant. In the PNW, ivy grows in elevations up to about 3000 feet. In lower elevations, ivy grows throughout the year, although growth may slow or stop during extended drought or during intense cold periods. Ivy reproduces either vegetatively via stolons (root-like stems) or through seeds (**photograph 9**). Roots form when stem nodes contact moist soil, leading to the formation of a dense mat of vegetation. Ivy roots are vigorous resprouters, meaning that a broken root left in the soil will almost certainly grow a new stem. Ivy fruits can be spread great distances by birds. It is unknown whether the seed requires passage through an animal intestinal tract to germinate.

Photo 9. Ivy seedling

Ivy has two distinct growth phases, the immature, vegetative stage and the mature, fruiting stage. During the vegetative stage, the plant grows rapidly and tends to sprawl across the ground (or climb any available vertical surface - see below). These characteristics are responsible for both the popularity of the plant as an ornamental ground cover, and unfortunately, its threat as an invasive weed. When a vine hits any upright object (trees, shrubs, houses, power or telephone poles, fences, etc...), it climbs, and can even reach the tops of even mature conifers of 300 feet (90 meters), climbing as much as 30 feet (10 meters) per year.

The fruiting stage typically occurs on climbing plants, but may also occur on prostrate patches of sufficient age, especially in full sunlight (**photograph 7**). Because these patches may form thick mats, the ivy essentially climbs on itself to produce upright, fruiting stems. In either case, flowers are produced in the fall and fruits mature in the spring.

Away from established ivy patches, new occurrences result from birds spreading seeds. Regardless of origin, once established in an area ivy cover gradually increases until it eliminates all other ground cover and reduces tree canopy coverage by killing mature trees through a combination of shading and over-weighting. Following the loss of canopy dominant trees, the increase in sun exposure not only increases ivy's ability to produce fruit, but also may allow other less shade tolerant weed species (especially Himalayan blackberry [*Rubus armeniaca* (*R. procerus, R. discolor*)] or traveler's joy - old man's beard [*Clematis vitalba*] in our area) to become established.

In the end, the results of societal passivity regarding ivy will be extensive loss of shade trees, declines in native flora and fauna, water quality and forest productivity; and increases in erosion, slope failures and landscaping / management costs for private citizens, the forest industry and public agencies alike.

Control Summary

Because there are effective manual/mechanical and chemical control methods, current and future ivy problems are really due to a lack of knowledge, will or money (or all three). Manual options include a variety of approaches to hand-pulling, chopping or digging that, while generally environmentally safe and effective, typically cost from $2000 to $8000 per acre even at minimum wage (i.e. 300 to 1300 hours or more of hand removal work per acre). Thus, substantial volunteer work forces are necessary for effective manual control in most situations. There are several effective chemical control options, offering good control 10-20 times less expensive than manual / mechanical methods. Early data suggest that herbicide treatment may slow recovery of native species when compared to manual control, but clearly does not stop it. Currently, there are no effective biological control agents, although goats will defoliate ivy.

Manual Approaches

Manual removal is a safe, effective and generally ecologically friendly but costly method of eradicating local infestations of English ivy. Sampling work conducted by TNC indicates that a carefully executed manual pull can consistently reduce ivy cover from 80% cover or more to 2-6% one year later without follow up treatment, and to 1-2% with a single follow up. Other local groups involved in ivy removal have made similar observations.

Unfortunately, manual control of English ivy is quite expensive (or at least labor intensive). Based on research conducted by The Nature Conservancy (TNC) and The Three Rivers Land Conservancy, as well as more approximate figures reported by other local groups, it typically requires from 300 to well over 1,000 human hours to perform the initial manual clearing on an acre of heavily infested ground. This assumes extensive ivy cover, gently sloped land and moist soil. Lower numbers may result from situations in which there are few or no native plants remaining, or if the ivy cover is not extensive. Higher numbers, sometime substantially higher will result from areas with abundant native vegetation mixed with heavy ivy cover, very steep slopes, dry soil or barriers such as logs and (native or non-native) blackberry. The pulling rate will also be greatly affected by the strength and dedication of the person(s) doing the pulling, root depth and density and soil conditions.

Nearly all sites require at least a second round of clearing to complete the initial restoration, then, annual or bi-annual maintenance to control stubbornly resprouting roots and new seedlings. As mentioned above, the initial pulling usually results in cover values of 2-6% a year after the initial clearing. As a result, depending on your site and the effectiveness of the initial clearing, you should expect the second pulling to still require a substantial commitment of effort or resources. One-percent coverage represents roughly 435 square feet (40 square meters) per acre. Again based on TNC research, follow up treatment will therefore range from 20-60 human hours per acre under typical conditions.

How to pull ivy

General

There are nearly as many strategies for manual removal as there are practitioners, ranging from disorganized grabbing and pulling, to meticulous strand-by-strand removal by well-coordinated teams. Most are variations on the simple concept of pulling up the plant by hand and trying to remove as much of the root as possible while minimizing ground disturbance and harm to remnant native plants. The City of Portland's Ivy Removal Project (No Ivy League) lists more than 20 strategies for groups working together to do manual removal (**www.noivyleague.org**). The approach you choose will depend on a number of factors including the density of the ivy, how much native vegetation is mixed in with the ivy, whether you are on a steep slope or a flat surface, and whether you are working alone or with a group. Within a group, the temperament and experience of the group will affect the strategy you choose to employ.

The essential elements to efficient, effective ivy removal and long-term recovery of native vegetation are:

- removing as much of the root system as possible,
- minimizing trampling and churning of the soil,
- protecting native plants that are present,
- clearing an area thoroughly before moving on.

Because ivy is both an aggressive resprouting species (it re-grows easily from root fragments) and it has long, relatively fragile roots, it is important to pull the vine at the spot where the root comes out of the ground to get effective control. Ivy roots or series of connected nodes may be continuous over several meters just below the soil surface, and are capable of resprouting from almost any broken root end. At the same time, in order to minimize trampling it is important to avoid repeated walking across the same area while uprooting the plants. Protecting surviving native plants also requires more careful pulling. Working efficiently combines many of these concepts.

Case Study Examples

1. *In areas with no remaining native plants:*

In cases with no remnant native plants it may be helpful to use shovels, digging forks or mattocks to loosen the ivy root systems. The No Ivy League recommends a method they term log-rolling, in which the ivy mat is uprooted and rolled up. The "log" of ivy is rolled up ahead until it is too large to move. It is then cut off and disposed of, either as part of a large pile or moved offsite. Alternatively they pull and scatter the fragments on the ground surface.

2. *In areas with significant remaining native plants:*

A basic approach that works well for TNC is having "ivy pullers" work from a kneeling position (wearing rainpants or using a waterproof pad helps keep things comfortable in the winter). Start by grabbing a single vine and uprooting it only as far as you can reach, then set it aside and grab the next one you can reach. Uproot that one as far as you can and set it aside. When you have cleared/uprooted everything you can reach without moving, shift position and start again. Although it may appear slow and methodical, this technique accomplishes several things very well. It minimizes bending over, which conserves energy and helps prevent back pain. It also increases concentration. In addition, kneeling minimizes walking back and forth, which reduces trampling. It also encourages very thorough work and reduces follow up treatment time. Lastly this approach minimizes damage

to remaining native plants, which reduces the need for replanting. When vines do break off, are cut or are fully uprooted, TNC recommends rolling them up into a crude ball because it makes it easier to tell what has been pulled from what hasn't.

To bag or not to bag

Disposing of pulled ivy becomes an important issue when you consider that there can be more than 10 tons per acre. It can be bagged and hauled off, piled on gurneys and hauled off, piled on site, or scattered on site. The No Ivy League recommends scattering the pulled stems, but others report that this makes site assessment difficult and leads to missing some living, rooted ivy. Bagging adds costs and effort, and removes nutrients from the site. Making piles causes dead spots on the ground and can allow some ivy to re-root, if the pile is not turned. For these reasons we recommend removing ivy if the site is easily accessible and making tall narrow piles if it is not. Where ivy cover is not dense, pulled stems and roots can be scattered and left on site without compromising pulling effectiveness.

Risks of Manual Control

Although careful planning and training help to minimize them, manual control has its own unique side effects. There is no available data that precisely documents the effects of hand pulling. However, some degree of trampling, soil churning, and loss of desirable vegetation is inevitable (**photograph 10**). Native vegetation can be uprooted accidentally, and vegetation and duff (organic material, often with ferns) can be stripped off of rocks. The severe soil disturbance can leave a site vulnerable to surface erosion and to invasion by other weed species.

Photograph 10. Large area of ground manually cleared of English ivy

More than one reviewer mentioned the importance of timing manual removal to minimize effects on native vegetation and wildlife (especially breeding birds and amphibians). In order to minimize damage to native plants and disturbance of local wildlife, some programs (including TNC and ODFW) focus manual control efforts during winter months (approximately November to February). Although this apparently reduces impacts to native plants and animals, many PNW amphibians are active during this time and care should be taken to minimize impacts on them.

Chemical Approaches

The literature reports mixed, but usually incomplete control with growing season application of various over the counter herbicides including triclopyr (Garlon 3a and in many "shrub-killers"), glyphosate (Round-up, Rodeo, Aquamaster, Gly Star) and 2-4 D (too many to list). The waxy layer on the leaves appears to limit many herbicides, especially hydrophilic compounds such as glyphosate, from effectively permeating the leaves. Local experiments done by TNC, City of Portland and Metro, however, suggest that under some circumstances herbicides can provide safe and effective control of ivy, even when applied during winter.

Summary of herbicide literature
(*For extensive references on published research on chemical control of ivy, please refer to the websites listed at the end of this document, especially* **tncweeds.ucdavis.edu**)

In container pots, two applications, one month apart, of 2,4-D (Weedar 64) applied at 1.1 kg/ha (1.0 lb/A) provided control of English ivy. Two applications of glyphosate (Roundup) applied at 4.5 kg/ha (4.0 lb/A) effectively inhibited regrowth and provided some control of mature vines. Regrowth with reduced shoot weight was observed with one treatment of 2,4-D and glyphosate at the rates stated above. The same observation was noted for one or two applications of glyphosate applied at a lower rate of 2.2 kg/ha (2.0 lb/A). Regrowth occurred with plants sprayed with one or two applications of Dicamba (Banvel) or triclopyr (Garlon) at the rate of 0.6 kg/ha (0.5 lb/A).

Cutting (using a nylon cord weed-eater to cut to the stem surface just before treatment) followed by a 25% solution of glyphosate also provided control of English ivy. Excellent control of *H. helix* that had been cut and then sprayed was achieved with a 2% solution of 2,4-D. A lower rate of glyphosate (2% solution) and cutting provided only slight control. Glyphosate only (2% solution) did not control English ivy. The herbicide triclopyr or mowing alone provided no control. Control evaluations were made 1 year post-treatment.

Recent herbicide research done in Portland
Over the past several years, Metro Parks and Greenspaces Program, the City of Portland and The Nature Conservancy have been (independently) testing herbicides for the control of English ivy within the Portland metropolitan region. All have found that glyphosate (in either the Round-up Pro or Rodeo formulation) or triclopyr (Garlon 3a) can be extremely effective against English ivy and reasonably gentle on native species when applied during a sunny period during winter (ideally early-mid January). The herbicide is mixed at 2-5% volume / volume (v/v) with the surfactant Li-700 (for glyphosate or near water) or Hasten (for triclopyr) at 0.5 - 1.0% v/v. Control rates above 95% with a single careful treatment are typical. The fatty acid pelargonic acid (sold under the brand name Scythe) can also be added to the mix at 0.5 - 1% concentration to aid herbicide penetration. Even at

1%, but especially at higher rates, it may increase damage to desirable evergreen plants, because it damages plant tissue by disrupting cell membranes.

Recent discussions with a representative of the herbicide manufacturer Monsanto suggest a 2:1 or greater ratio combination of glyphosate and triclopyr (Garlon 3a, a Dow Agrosciences product), with glyphosate at 2% volume will enhance control of perennial species such as ivy and blackberry compared to glyphosate alone. The same individual points out that Li-700 consistently underperforms other surfactants when used with glyphosate. That said, although several well known and effective surfactants are labeled for aquatic or riparian use, Li-700 is the only surfactant approved by NOAA-Fisheries for use along salmonid bearing waterways, because of its' extremely low toxicity to fish and wildlife. Furthermore, because water may move triclopyr through the soil, it should be used with caution in a broadcast application near surface water when rain is forecast to occur in the near future.

As always, with any herbicide use carefully read and follow application directions and safety information provided on the herbicide label. The label is the law. When in doubt, please contact your local Soil Water and Conservation District or the Department of Agriculture.

How to use herbicides on English ivy

Effectively killing ivy without damaging or destroying resident native vegetation depends on two factors, treatment timing and careful application. This approach will help you maximize delivery of herbicide to ivy roots and minimize delivery to native plant leaves and roots.

Timing - Spray late enough in the late fall / early winter to ensure that most native species are dormant, but soon enough that they are not close to bud break. For most Portland area sites this means December to mid- January, with late January - early February as a fall back. This timing also allows time for ivy leaves to reappear after being temporarily buried by fall leaf drop. At the TNC study site (Camassia Natural Area, West Linn, OR) Indian plum and snowberry are the first to break bud, usually sometime between the last week of January and the first week of February. Because herbicides can be absorbed through the stems or buds it is wise not to push the envelope of activity in the spring.

Spot applications of patches missed during the first winter treatment or applications in areas with no remnant native vegetation can be made during the growing season. It is generally preferable to wait until after the period of maximum vegetative growth (or even post flowering) in order to achieve the most effective translocation (movement) of the herbicide into the roots. Balance this goal with trying to spray before new spring leaves have established a thick waxy coating. These same guidelines may be applied to the initial treatment of areas of ivy infestation in which protecting remnant native plants is not a concern.

Application - Spray during a clear day and ideally before another one. If possible, temperatures should be 65 degrees F or above, but that rarely occurs in winter in this region. Settle for clear and above freezing. These circumstances help ensure that the ivy will be actively growing and will have time to fully absorb the herbicide before rain may wash it off. Spray the herbicide so as to contact the upper surface of as many leaves as possible (and bottom where possible), spraying them to "just wet" or less (i.e. avoid dripping). At the same time, carefully avoid getting herbicide on buds, leaves or young stems of evergreen natives, even if it means allowing some ivy leaves to remain unsprayed (a follow up treatment can target those later).

<u>What to expect</u> - Winter applications may take a long time to show their effect. At The Nature Conservancy's study site, the full impact of treatments done in late January is not apparent until May (**photograph 11**). Licorice ferns and sword ferns are particularly vulnerable to some herbicides and if their protection is important, special care should be taken to avoid exposing them to herbicide.

Photo 11. Photograph taken four months after herbicide treatment with 2% Rodeo and Li-700/Scythe solution. Note the native vegetation and spiderwebs within the plot.

Cost

A careful applicator can treat a typical acre in two to four hours. Depending on ivy density, expect each acre to require 5-25 gallons of herbicide solution as described above. This results in total costs in the range of $100-$500 / acre assuming $25-$100 / hour for operator cost and $50 / gallon for chemicals. Contracting the work out, steep slopes or otherwise difficult terrain or a high density of native vegetation may slow application and increase the costs. Metro Parks and Greenspaces reports contracted ivy removal to cost $229 / acre for manual removal from trees at 4.5 feet above ground and an additional $309 (including chemical cost) for follow-up spraying as described above.

Integrated Approaches

Manual, mechanical, grazing or mowing methods can be effectively combined with herbicide treatment. For example, herbicides can be used to spot spray resprouting ivy vines following an initial hand clearing, presumably targeting the roots that are most resistant to hand removal, and reducing the total volume of herbicide necessary.

Defoliation (mowing or grazing) followed by allowing the plants to resprout new leaves will raise the ratio of young (thin wax layer on the leaf) to old leaves (thick wax layer) and increase the plants' uptake of herbicides and thus presumably increase treatment effectiveness. This approach will, however, also reduce the total leaf area, thereby reducing the amount of herbicide that can potentially be translocated to the plant roots. Depending on the presence and density of native vegetation, follow-up treatment can be done either as soon as 2-3 leaves form on each stem or the following winter as described above.

Alternatively, hand-pulling can follow herbicide application. This can be especially useful in areas around remnant native vegetation that may not have been sprayed effectively in order to protect the natives from herbicide drift.

Best Management Practices

It can not be over-emphasized; there is no single "best" method. Apply the tools that are available based on your specific ecological goals and the resources you have available. Nevertheless, we have broken the ivy control world down to the following general categories and offer the following as recommended "best practices," combining ecological and economic concerns.

Areas of ivy monoculture:
Unless there is a particularly strong non-ecological reason for using manual control (i.e. you have a lot of volunteers or a site in which herbicide use is prohibited), areas devoid or nearly devoid of native ground cover should be treated using herbicides or an integrated herbicide - manual approach rather than strictly manual approaches. In this case it is simply difficult to justify the high cost of manual removal when **a)** there is little chance for non-target impacts of the herbicide and **b)** there are so many acres of ivy infested forest that need attention.

If done carefully, an initial winter treatment using either 2-5% v/v solution of triclopyr or glyphosate (or both) as described above can provide 95% control or better in a single treatment with little impact to scattered remnant perennial vegetation. Follow-up treatment can be either a second herbicide application or spot manual removal done at least 6 months but up to a year after the initial treatment. Because the ivy takes several months to die, planting can begin as soon as the first fall after the first treatment. If performed carefully, follow-up "spot" treatment with herbicide or hand removal can be done with negligible impact to any planted native vegetation.

Planting the site as soon as possible with appropriate native vegetation should be strongly considered. If necessary, initial seeding with native grasses to stabilize the soil surface, then planting in later with shrubs and trees is a good strategy.

Dense ivy with scattered native vegetation:
As in the worst-case scenario example above, in these situations an herbicide-based approach can protect most of the remaining native perennial vegetation and effectively control the ivy, while controlling project costs. Integration with manual control by spraying very carefully around individual native plants or patches of more intact vegetation will improve the survival of remnant native vegetation.

In most cases, at least some replanting of native species should be included in the treatment plan (especially on steep slopes), although you may be surprised at how fast remnant native vegetation can increase in cover once the competing ivy is removed (**photograph 11**).

Dense ivy patches within substantial native vegetation:
If an integrated approach is chosen, the balance should be tipped towards manual approaches, with herbicide use limited to careful spot treatment of locally dense infestations of ivy.

Planting should be necessary only on a spot basis in most cases. A very rapid increase in native vegetation following ivy removal where there is substantial native vegetation in place at the time of treatment is typical.

Light ivy cover within a native matrix:
This is the ideal time to use an all-manual approach. Because remnant native species will quickly occupy growing space, there should be very little need for replanting. Furthermore, volunteers will be extremely gratified to **a)** clear a large area in a few hours and **b)** leave the area looking really good instead of stripped bare. Winter is a good time for this approach because the ivy's green leaves are more conspicuous when other vegetation is underground or dormant.

Additional Resources

www.noivyleague.org
The website of the City of Portland's Ivy Control Project (No Ivy League). Full of information on ivy control with a strong focus on community education, manual control and protection of mature trees.

tncweeds.ucdavis.edu
The home of The Nature Conservancy's Invasive Species Program. Contains an extensive and well-referenced literature review of ivy control methods. Also contains extensive information about herbicides, adjuvants and weed control equipment.

www.nps.gov
Website of the National Park Service, get a national perspective from the federal government.

Written by Jonathan Soll
The Nature Conservancy
Last edited 01/14/05

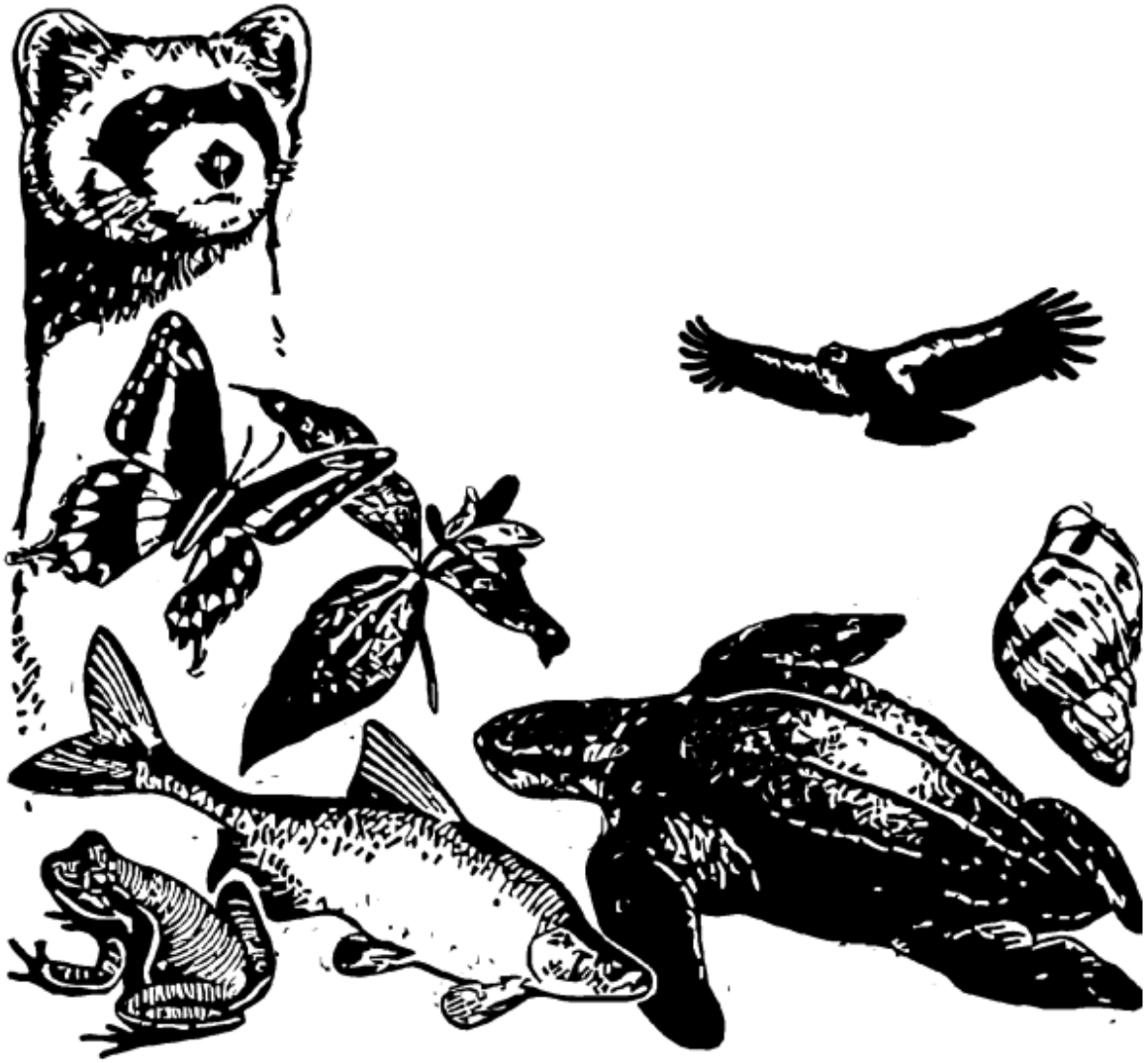
U.S. Fish & Wildlife Service

Crescent Park

IPaC Trust Resource Report

Generated October 23, 2015 07:51 AM MDT

This report is for informational purposes only and should not be used for planning or analyzing project-level impacts. For projects that require FWS review, please return to this project on the IPaC website and request an official species list from the Regulatory Documents page.



US Fish & Wildlife Service

IPaC Trust Resource Report

Project Description

NAME

Crescent Park

PROJECT CODE

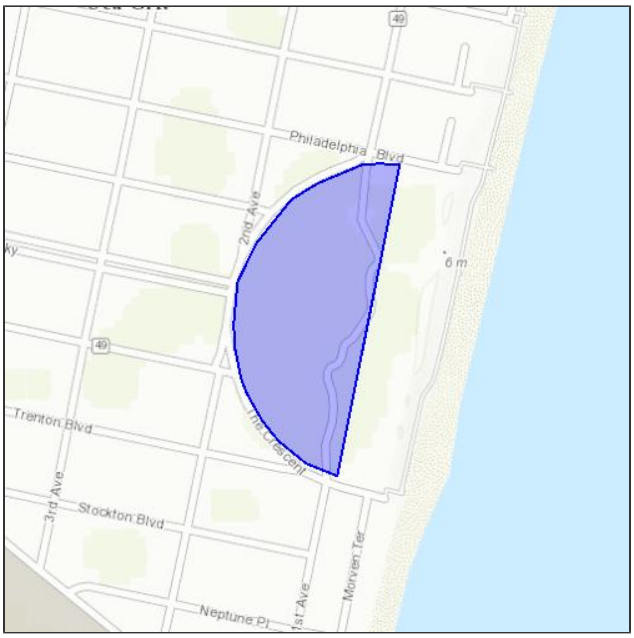
M7ZXJ-6FJY5-GJ7IA-CLTNM-GMY7LY

LOCATION

Monmouth County, New Jersey

DESCRIPTION

No description provided



U.S. Fish & Wildlife Contact Information

Species in this report are managed by:

New Jersey Ecological Services Field Office
927 North Main Street, Building D
Pleasantville, NJ 08232-1454
(609) 646-9310

Endangered Species

Proposed, candidate, threatened, and endangered species that are managed by the Endangered Species Program and should be considered as part of an effect analysis for this project.

This unofficial species list is for informational purposes only and does not fulfill the requirements under Section 7 of the Endangered Species Act, which states that Federal agencies are required to "request of the Secretary of Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action." This requirement applies to projects which are conducted, permitted or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can be obtained by returning to this project on the IPaC website and requesting an official species list on the Regulatory Documents page.

Birds

Piping Plover Charadrius melodus **Threatened**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B079

Flowering Plants

Seabeach Amaranth Amaranthus pumilus **Threatened**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=Q2MZ

Critical Habitats

Potential effects to critical habitat(s) within the project area must be analyzed along with the endangered species themselves.

There is no critical habitat within this project area

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity which results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service (1). There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

You are responsible for complying with the appropriate regulations for the protection of birds as part of this project. This involves analyzing potential impacts and implementing appropriate conservation measures for all project activities.

American Oystercatcher Haematopus palliatus — **Bird of conservation concern**
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0G8

American Bittern Botaurus lentiginosus — **Bird of conservation concern**
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0F3

Black Skimmer Rynchops niger — **Bird of conservation concern**
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0EO

Black-billed Cuckoo Coccyzus erythropthalmus — **Bird of conservation concern**
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HI

Blue-winged Warbler Vermivora pinus — **Bird of conservation concern**
Season: Breeding

Fox Sparrow Passerella iliaca — **Bird of conservation concern**
Season: Wintering

Great Shearwater Puffinus gravis — **Bird of conservation concern**
Season: Migrating

Gull-billed Tern Gelochelidon nilotica — **Bird of conservation concern**
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0JV

Horned Grebe Podiceps auritus — **Bird of conservation concern**
Season: Wintering

Hudsonian Godwit Limosa haemastica — **Bird of conservation concern**
Season: Migrating

Least Bittern Ixobrychus exilis — **Bird of conservation concern**
Season: Breeding

Least Tern Sterna antillarum — **Bird of conservation concern**
Season: Breeding

Peregrine Falcon Falco peregrinus — **Bird of conservation concern**
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0FU

Pied-billed Grebe Podilymbus podiceps **Bird of conservation concern**
Year-round

Prairie Warbler Dendroica discolor **Bird of conservation concern**
Season: Breeding

Purple Sandpiper Calidris maritima **Bird of conservation concern**
Season: Wintering

Red Knot Calidris canutus rufa **Bird of conservation concern**
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0DM

Rusty Blackbird Euphagus carolinus **Bird of conservation concern**
Season: Wintering

Saltmarsh Sparrow Ammodramus caudacutus **Bird of conservation concern**
Season: Breeding

Seaside Sparrow Ammodramus maritimus **Bird of conservation concern**
Year-round

Short-eared Owl Asio flammeus **Bird of conservation concern**
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HD

Snowy Egret Egretta thula **Bird of conservation concern**
Season: Breeding

Upland Sandpiper Bartramia longicauda **Bird of conservation concern**
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HC

Wood Thrush Hylocichla mustelina **Bird of conservation concern**
Season: Breeding

Worm Eating Warbler Helmitheros vermivorum **Bird of conservation concern**
Season: Breeding

Refuges

Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. If your project overlaps or otherwise impacts a Refuge, please contact that Refuge to discuss the authorization process.

There are no refuges within this project area

Wetlands

Impacts to NWI wetlands and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes.

Project proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate U.S. Army Corps of Engineers District.

DATA LIMITATIONS

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

DATA EXCLUSIONS

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

DATA PRECAUTIONS

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

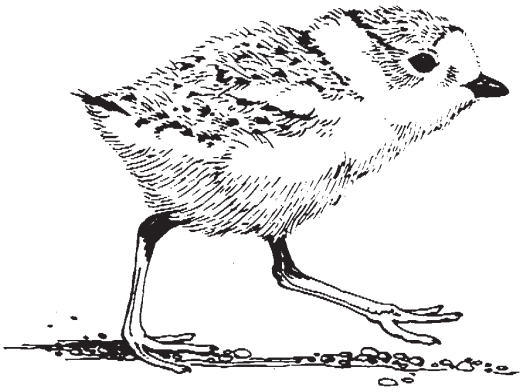
There are no wetlands identified in this project area

The Atlantic coast piping plover

Small, stocky, sandy-colored birds, piping plovers resemble sandpipers. Adult plovers have yellow-orange legs, a black band across the forehead from eye to eye, and a black ring around the base of the neck. Plover chicks have been likened to tiny wind-up toys or cotton balls with legs. Like their parents, they run in short starts and stops. When still, adults and chicks blend into the pale background of open, sandy habitat on outer beaches where they feed and nest. The bird's name derives from its call – plaintive bell-like whistles often heard before the birds are seen.

Plovers in trouble

Piping plovers were common along the Atlantic coast during much of the 19th century, but commercial hunting for feathers to decorate hats nearly wiped them out. Following passage of the Migratory Bird Treaty Act in 1918, plovers recovered to a 20th century peak in the 1940s. Increased development and beach recreation after World War II caused the population decline that led to Endangered Species Act protection in 1986. Intensive protection has helped the population more than double in the last 20 years, but the most recent surveys place the Atlantic population at fewer than 2,000 pairs.



Plover life

Atlantic coast piping plovers breed on coastal beaches from Newfoundland and southeastern Quebec to North Carolina. After they establish nesting territories and conduct courtship rituals beginning in late March or early April, pairs form shallow depressions - nests - in the sand on the high beach close to the dunes. They sometimes line nests with small stones or fragments of shell. Plovers typically lay four eggs that hatch in about 25 days. The downy chicks are soon able to follow their parents in foraging for the marine worms, crustaceans and insects that they pluck from the sand and eat.

Both the eggs and piping plover chicks blend into the beach so thoroughly that they are almost impossible to see. When predators or intruders come close, the chicks squat motionless on the sand while the parents attempt to attract the attention of the intruders, often by feigning a broken wing. Surviving chicks are able to fly in about 30 days.

Storm tides, predators or intruding humans sometimes disrupt nests before the eggs hatch. When this happens, the plovers often lay another clutch of eggs. Chicks hatched from these late-nesting efforts may not fly until late August.

Piping plovers often gather in groups on undisturbed beaches before their southward migration. By mid-September, both adult and young plovers have departed for their wintering areas. These birds winter on the Atlantic coast from North Carolina south to Florida, along the Gulf coast, and in the Bahamas and West Indies.

Challenges

- Development – Commercial, residential and recreational development has decreased suitable coastal habitat for piping plovers to nest and feed.
- Disturbance – Human disturbance often curtails plover breeding success. Foot and vehicle traffic may crush nests or chicks. Excessive disturbance may cause plover parents to desert the nest, exposing eggs or chicks to the summer sun and predators. Interrupted feedings may stress juvenile birds during critical periods in their development.
- Predators – Pets, especially dogs and cats, may harass or kill the birds (see http://www.fws.gov/northeast/pdf/catseat.pdf). Animals such as raccoons, skunks and foxes, attracted by food left on the beach, also kill the birds.
- Weather – Storm tides may destroy nests.

Protecting the plover

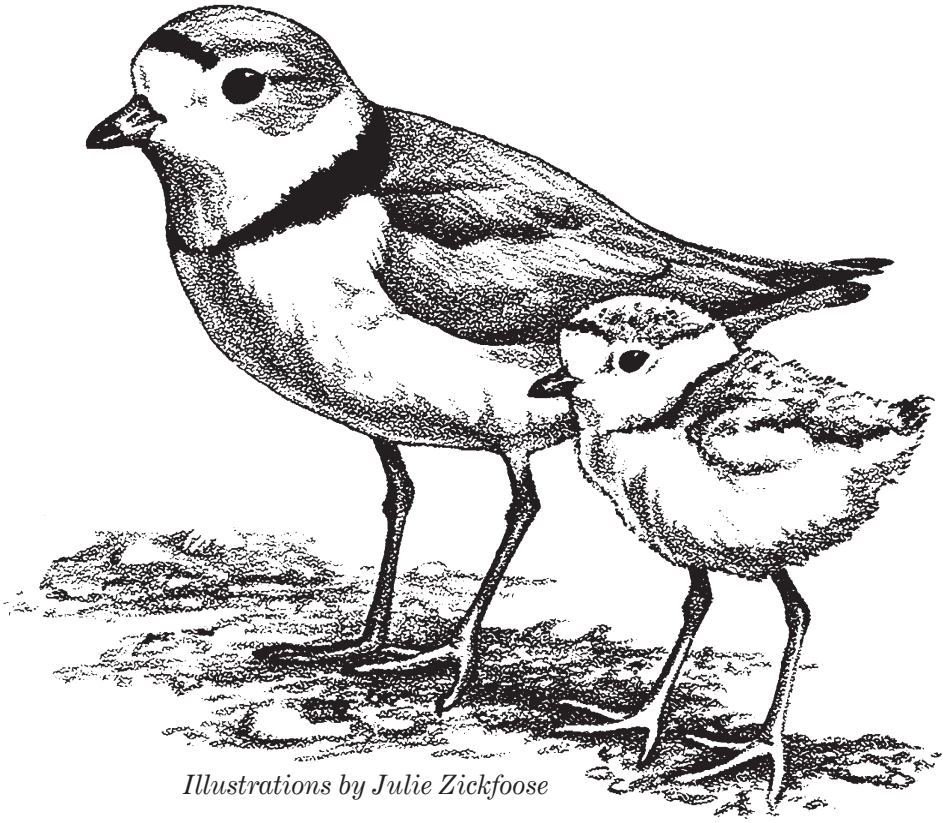
The piping plover is designated as threatened along the Atlantic coast, which means that the population would become endangered and face possible extinction without Endangered Species Act protection. Recovery efforts include conserving breeding and wintering habitat; and protecting breeding birds, eggs, and chicks from predators and from disturbance and death caused by human activities.

Other rare species that inhabit the beach ecosystem, including the endangered roseate tern, the threatened northeastern beach tiger beetle, the threatened seabeach amaranth, least terns, common terns, black skimmers and Wilson's plovers, benefit from piping plover protection.

You can help protect piping plovers
The Endangered Species Act provides penalties for killing, harassing or harming piping plovers.

- Respect all areas fenced or posted for protection of wildlife.
- Do not approach or linger near piping plovers or their nests
- If pets are permitted on beaches used by plovers, keep your pets leashed.
- Do not leave or bury trash or scraps of food on beaches – food attracts plover predators.

For more information about Atlantic coast piping plovers, see http://www.fws.gov/northeast/pipingplover.



Illustrations by Julie Zickfoose

For further information contact:
Office of Endangered Species
U.S. Fish and Wildlife Service
300 Westgate Center Drive
Hadley, MA 01035-9587
413/253 8200

Federal Relay Service
for the deaf and hard-of-hearing
1 800/877 8339

U.S. Fish & Wildlife Service
1 800/344 WILD
http://www.fws.gov

August 2007

US Fish and Wildlife Service
Raleigh Ecological Services Field Office

Seabeach Amaranth (*Amaranthus pumilus*)

Seabeach amaranth. Credit: Gene Nieminen.

Family: Amaranth (*Amaranthaceae*)

Federal Status: Threatened, listed April 7, 1993

Best Search Time: July through October (or before first tropical storm that causes overwash

Description: Seabeach amaranth is an annual plant found on the dunes of Atlantic Ocean beaches. The stems are fleshy and pinkish-red or red, with small rounded leaves that are 0.5 – 1 inch (in) (1.3 - 2.5 centimeters; cm) in diameter. The leaves, with indented veins, are clustered toward the tip of the stem and have a small notch at the rounded tip. Flowers and fruits are relatively inconspicuous, borne in clusters along the stems. Germination occurs over a relatively long period of time, generally from April to July. Upon germination, the species forms a small unbranched sprig, but soon begins to branch profusely into a clump. This clump often reaches 30 cm in diameter and consists of five to 20 branches. Occasionally, a clump may get as large as a meter or more across, with 100 or more branches.

Flowering begins as soon as plants have reached sufficient size, sometimes as early as June, but more typically commencing in July and continuing until the death of the plant in late fall. Seed production begins in July or August and peaks in September during most years, but continues until the death of the plant. Weather events, including rainfall, hurricanes, and temperature extremes, and predation by webworms have strong effects on the length of Seabeach amaranth's reproductive season. As a result of one or more of these influences, the flowering and fruiting period can be terminated as early as June or July. Under favorable circumstances, however, the reproductive season may extend into late fall. The species is an effective sand binder, building small dunes where it grows.

Habitat: Seabeach amaranth occurs on barrier island beaches, where its primary habitat consists of overwash flats at accreting ends of islands and lower foredunes and

upper strands of non-eroding beaches. It occasionally establishes small temporary populations in other habitats, including sound-side beaches, blowouts in foredunes, and sand and shell material placed as beach replenishment or dredge spoil. Seabeach amaranth appears to be intolerant of competition and does not occur on well-vegetated sites. The species appears to need extensive areas of barrier island beaches and inlets, functioning in a relatively natural and dynamic manner. These characteristics allow it to move around in the landscape as a fugitive species, occupying suitable habitat as it becomes available.

Distribution: Historically, Seabeach amaranth occurred in nine states from Massachusetts to South Carolina. The species is currently found in New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, and South Carolina.

Threats: The most serious threats to the continued existence of Seabeach amaranth include the construction of beach stabilization structures, beach erosion and tidal inundation, beach grooming, pedestrian traffic, herbivory by insects and feral animals and, in certian circumstances, by off-road vehicles.

References:

Buchanan, M.F. and J.T. Finnegan. 2010. Natural Heritage Program List of the Rare Plant Species of North Carolina. NC Natural Heritage Program, Raleigh, NC.

U.S. Fish and Wildlife Service. 1996. Recovery Plan for Seabeach Amaranth (*Amaranthus pumilus*). Rafinesque. Atlanta, GA 59 pp.

State of New Jersey

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
State Forestry Services
Mail Code 501-04
ONLM -Natural Heritage Program
P.O. Box 420
Trenton, NJ 08625-0420
Tel. #609-984-1339
Fax. #609-984-1427

BOB MARTIN
Commissioner

August 21, 2015

Don Donnelly
New Jersey Audubon Society
1024 Anderson Road
Port Murray, NJ 07865

Re: Crescent Park
Block(s) - 9, Lot(s) - 22
Sea Girt Borough, Monmouth County

Dear Mr. Donnelly:

Thank you for your data request regarding rare species information for the above referenced project site in Sea Girt Borough, Monmouth County.

Searches of the Natural Heritage Database and the Landscape Project (Version 3.1) are based on a representation of the boundaries of your project site in our Geographic Information System (GIS). We make every effort to accurately transfer your project bounds from the topographic map(s) submitted with the Request for Data into our Geographic Information System. We do not typically verify that your project bounds are accurate, or check them against other sources.

We have checked the Landscape Project habitat mapping and the Biotics Database for occurrences of any rare wildlife species or wildlife habitat on the referenced site. The Natural Heritage Database was searched for occurrences of rare plant species or ecological communities that may be on the project site. Please refer to Table 1 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented on site. A detailed report is provided for each category coded as 'Yes' in Table 1.

We have also checked the Landscape Project habitat mapping and Biotics Database for occurrences of rare wildlife species or wildlife habitat in the immediate vicinity (within ¼ mile) of the referenced site. Additionally, the Natural Heritage Database was checked for occurrences of rare plant species or ecological communities within ¼ mile of the site. Please refer to Table 2 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented within the immediate vicinity of the site. Detailed reports are provided for all categories coded as 'Yes' in Table 2. These reports may include species that have also been documented on the project site.

The Natural Heritage Program reviews its data periodically to identify priority sites for natural diversity in the State. Included as priority sites are some of the State's best habitats for rare and endangered species and ecological communities. Please refer to Tables 1 and 2 (attached) to determine if any priority sites are located on or in the vicinity of the site.

A list of rare plant species and ecological communities that have been documented from the project site, referenced above, can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/countylist.html. If suitable habitat is present at the project site, the species in that list have potential to be present.

Status and rank codes used in the tables and lists are defined in EXPLANATION OF CODES USED IN NATURAL HERITAGE REPORTS, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/nhpcodes_2010.pdf.

If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend that you visit the interactive NJ-GeoWeb website at the following URL, http://www.state.nj.us/dep/gis/geowebsplash.htm or contact the Division of Fish and Wildlife, Endangered and Nongame Species Program at (609) 292-9400.

PLEASE SEE 'CAUTIONS AND RESTRICTIONS ON NHP DATA', which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/newcaution2008.pdf.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Robert J. Cartica
Administrator

c: NHP File No. 15-4007421-8180

Mail Code 501-04
Department of Environmental Protection
State Forestry Services
Office of Natural Lands Management
P.O. Box 420 Trenton, New Jersey 08625-0420
(609) 984-1339 Fax: (609) 984-1427

Invoice

Date	Invoice #
8/21/2015	8180

Bill to:
New Jersey Audubon Society
1024 Anderson Road
Port Murray, NJ 07865

Make check payable to:
Office of Natural Lands Management
And forward with a copy of this statement to:
Mail Code 501-04
Office of Natural Lands Management
P.O. Box 420 Trenton, New Jersey 08625-0420

Quantity (hrs.)	Description	Rate (per hr.)	Amount
1	Charge for Natural Heritage Database search for rare species and ecological communities locational information. Project: 15-4007421-8180	$ 70.00	$ 70.00
Don Donnelly Project Name: Crescent Park		**Total**	$ 70.00

NHP File No. 15-4007421-8180

Table 1: On Site Data Request Search Results (7 Possible Reports)

Report Name	Included	Number of Pages
1. Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	No	0 pages included
2. On or In the Immediate Vicinity of the Project Site Based on Search of the Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	No	0 pages included
3. Natural Heritage Priority Sites On Site	No	0 pages included
4. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches	No	0 pages included
5. Vernal Pool Habitat on the Project Site Based on Search of Landscape Project 3.1	No	0 pages included
6. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File	No	0 pages included
7. Other Animal Species On the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	No	0 pages included

Table 2: Vicinity Data Request Search Results (6 possible reports)

Report Name	Included	Number of Pages
1. Immediate Vicinity of the Project Site Based on Search of Natural Heritage Database Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	Yes	1 page(s) included
2. Natural Heritage Priority Sites within the Vicinity	No	0 pages included
3. Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches	Yes	1 page(s) included
4. Vernal Pool Habitat In the Immediate Vicinity of Project Site Based on Search of Landscape Project 3.1	No	0 pages included
5. Rare Wildlife Species or Wildlife Habitat In the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File	No	0 pages included
6. Other Animal Species In the Immediate Vicinity of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	Yes	1 page(s) included

Immediate Vicinity of the Project Site
Based on Search of Natural Heritage Database
Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database

Scientific Name	Common Name	Federal Protection Status	State Protection Status	Regional Status	Grank	Srank	Identified	Last Observed	Location
Vascular Plants									
Amaranthus pumilus	Seabeach Amaranth	LT	E	LP, HL	G2	S1	Y - Yes	2009-08-07	2001-2011: Wreck Pond at southern border of Spring Lake, south 2.8 km to Main St. in Manasquan.

Total number of records: 1

Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
Aves								
	Least Tern	Sternula antillarum	Foraging	4	NA	State Endangered	G4	S1B,S1N
	Least Tern	Sternula antillarum	Nesting Colony	4	NA	State Endangered	G4	S1B,S1N
	Osprey	Pandion haliaetus	Foraging	3	NA	State Threatened	G5	S2B
	Piping Plover	Charadrius melodus	Nesting Area	5	Federally Listed Threatened	State Endangered	G3	S1B,S1N
Mammalia								
	Fin Whale	Balaenoptera physalus	Live Individual Sighting	5	Federally Listed Endangered	State Endangered	G3G4	S1
	Humpback Whale	Megaptera novaeangliae	Live Individual Sighting	5	Federally Listed Endangered	State Endangered	G4	S1
	North Atlantic Right Whale	Eubalaena glacialis	Live Individual Sighting	5	Federally Listed Endangered	State Endangered	G1	S1
Reptilia								
	Atlantic Leatherback	Dermochelys coriacea	Occupied Habitat	5	Federally Listed Endangered	State Endangered	G2	S1

Other Animal Species
In the Immediate Vicinity of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program

Scientific Name	Common Name	Federal Protection Status	State Protection Status	Grank	Srank
Invertebrate Animals					
Metarranthis pilosaria	Coastal Bog Metarranthis			G3G4	S3S4

Total number of records: 1

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Monmouth County, New Jersey

August 18, 2015

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Monmouth County, New Jersey
Survey Area Data: Version 8, Sep 24, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 8, 2014—Sep 2, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Monmouth County, New Jersey (NJ025)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
DouB	Downer-Urban land complex, 0 to 5 percent slopes	17.4	99.9%
UdauB	Udorthents-Urban land complex, 0 to 8 percent slopes	0.0	0.1%
Totals for Area of Interest		**17.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If

intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Monmouth County, New Jersey

DouB—Downer-Urban land complex, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 4j72
Elevation: 0 to 170 feet
Mean annual precipitation: 28 to 59 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 161 to 231 days
Farmland classification: Not prime farmland

Map Unit Composition

Downer and similar soils: 60 percent
Urban land: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Downer

Setting

Landform: Low hills, knolls
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits and/or gravelly fluviomarine deposits

Typical profile

Ap - 0 to 10 inches: sandy loam
Bt1 - 10 to 16 inches: sandy loam
Bt2 - 16 to 36 inches: sandy loam
C1 - 36 to 48 inches: loamy sand
C2 - 48 to 80 inches: stratified sand to sandy loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A

Description of Urban Land

Setting

Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s

Minor Components

Woodstown

Percent of map unit: 5 percent
Landform: Flats, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear, concave

Sassafras

Percent of map unit: 5 percent
Landform: Low hills, knolls
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear

UdauB—Udorthents-Urban land complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 1j1jl
Elevation: 400 to 1,500 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 60 percent
Urban land: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting

Landform: Low hills
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Fill and/or disturbed original soil material

Typical profile

A - 0 to 12 inches: loam
C - 12 to 72 inches: loamy sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D

Description of Urban Land

Setting

Landform: Low hills
Landform position (three-dimensional): Lower third of mountainflank
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Buildings, pavement, and other impervious surfaces over fill and/or disturbed original soil material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Land Classifications

This folder contains a collection of tabular reports that present a variety of soil groupings. The reports (tables) include all selected map units and components for each map unit. Land classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Land Capability Classification

The land capability classification of map units in the survey area is shown in this table. This classification shows, in a general way, the suitability of soils for most kinds of field crops (United States Department of Agriculture, Soil Conservation Service, 1961). Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

- Class 1 soils have slight limitations that restrict their use.
- Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.
- Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.
- Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.
- Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.
- Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.
- Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.
- Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class 5 are subject to little or no erosion.

Report—Land Capability Classification

Land Capability Classification–Monmouth County, New Jersey				
Map unit symbol and name	Pct. of map unit	Component name	Land Capability Subclass	
			Nonirrigated	Irrigated
DouB—Downer-Urban land complex, 0 to 5 percent slopes				
	60	Downer	2e	—
	30	Urban land	8s	—

Land Capability Classification–Monmouth County, New Jersey				
Map unit symbol and name	Pct. of map unit	Component name	Land Capability Subclass	
			Nonirrigated	Irrigated
UdauB—Udorthents-Urban land complex, 0 to 8 percent slopes				
	60	Udorthents	3w	—
	40	Urban land	8s	—

Land Management

This folder contains a collection of tabular reports that present soil interpretations related to land management. The reports (tables) include all selected map units and components for each map unit, limiting features and interpretive ratings. Land management interpretations are tools designed to guide the user in evaluating existing conditions in planning and predicting the soil response to various land management practices, for a variety of land uses, including cropland, forestland, hayland, pastureland, horticulture, and rangeland. Example interpretations include suitability for a variety of irrigation practices, log landings, haul roads and major skid trails, equipment operability, site preparation, suitability for hand and mechanical planting, potential erosion hazard associated with various practices, and ratings for fencing and waterline installation.

Damage by Fire and Seedling Mortality on Forestland

This table can help forestland owners or managers plan the use of soils for wood crops. Interpretive ratings are given for the soils according to the limitations that affect the potential for fire damage and for seedling mortality. The ratings are both verbal and numerical.

Rating class terms indicate the potential for fire damage and for seedling mortality. *Low* indicates that the soil has features that reduce its potential for fire damage or seedling mortality. Good performance can be expected, and little or no maintenance is needed. *Moderate* indicates that the soil has features that result in a moderate potential for fire damage or seedling mortality. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. *High* indicates that the soil has one or more properties that result in a high potential for fire damage or seedling mortality. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration.

Numerical ratings in the table indicate gradations between the point at which the potential for fire damage or seedling mortality is highest (1.00) and the point at which the potential is lowest (0.00).

The paragraphs that follow indicate the soil properties considered in rating the soils. More detailed information about the criteria used in the ratings is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

Ratings in the column *potential for damage to soil by fire* are based on texture of the surface layer, content of rock fragments and organic matter in the surface layer, thickness of the surface layer, and slope. The soils are described as having a low, moderate, or high potential for this kind of damage. The ratings indicate an evaluation of the potential impact of prescribed fires or wildfires that are intense enough to remove the duff layer and consume organic matter in the surface layer.

Ratings in the column *potential for seedling mortality* are based on flooding, ponding, depth to a water table, content of lime, reaction, salinity, available water capacity, soil moisture regime, soil temperature regime, aspect, and slope. The soils are described as having a low, moderate, or high potential for seedling mortality.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service, National forestry manual.

Report—Damage by Fire and Seedling Mortality on Forestland

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Damage by Fire and Seedling Mortality on Forestland–Monmouth County, New Jersey					
Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
DouB—Downer-Urban land complex, 0 to 5 percent slopes					
Downer	60	Low		Low	
Urban land	30	Not rated		Not rated	
UdauB—Udorthents-Urban land complex, 0 to 8 percent slopes					
Udorthents	60	Low		Low	
Urban land	40	Not rated		Not rated	

Forestland Planting and Harvesting

This table can help forestland owners or managers plan the use of soils for wood crops. Interpretive ratings are given for the soils according to the limitations that affect planting and harvesting on forestland. The ratings are both verbal and numerical.

Rating class terms indicate the degree to which the soils are suited to a specified aspect of forestland management. *Well suited* indicates that the soil has features that are favorable for the specified management aspect and has no limitations. Good performance can be expected, and little or no maintenance is needed. *Moderately suited* indicates that the soil has features that are moderately favorable for the specified management aspect. One or more soil properties are less than desirable,

and fair performance can be expected. Some maintenance is needed. *Poorly suited* indicates that the soil has one or more properties that are unfavorable for the specified management aspect. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration. *Unsuited* indicates that the expected performance of the soil is unacceptable for the specified management aspect or that extreme measures are needed to overcome the undesirable soil properties.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The paragraphs that follow indicate the soil properties considered in rating the soils. More detailed information about the criteria used in the ratings is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

Ratings in the columns *suitability for hand planting* and *suitability for mechanical planting* are based on slope, depth to a restrictive layer, content of sand, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, moderately suited, poorly suited, or unsuited to these methods of planting. It is assumed that necessary site preparation is completed before seedlings are planted.

Ratings in the column *suitability for use of harvesting equipment* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, and ponding. The soils are described as well suited, moderately suited, or poorly suited to this use.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service, National forestry manual.

Report—Forestland Planting and Harvesting

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Forestland Planting and Harvesting–Monmouth County, New Jersey							
Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
DouB—Downer-Urban land complex, 0 to 5 percent slopes							
Downer	60	Well suited		Well suited		Well suited	
						Dusty	0.01

Forestland Planting and Harvesting–Monmouth County, New Jersey							
Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
UdauB—Udorthents-Urban land complex, 0 to 8 percent slopes							
Udorthents	60	Well suited		Well suited		Moderately suited	
						Low strength	0.50
						Dusty	0.01
Urban land	40	Not rated		Not rated		Not rated	
DouB—Downer-Urban land complex, 0 to 5 percent slopes							
Urban land	30	Not rated		Not rated		Not rated	

Hazard of Erosion and Suitability for Roads on Forestland

This table can help forestland owners or managers plan the use of soils for wood crops. Interpretive ratings are given for the soils according to the limitations that affect various aspects of forestland management. The ratings are both verbal and numerical.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The paragraphs that follow indicate the soil properties considered in rating the soils. More detailed information about the criteria used in the ratings is available in the **National Forestry Manual**, which is available in local offices of the Natural Resources Conservation Service or on the Internet.

Ratings in the column **hazard of off-road or off-trail erosion** are based on slope and on soil erosion factor K. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 75 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance. The hazard is described as slight, moderate, severe, or very severe. A rating of *slight* indicates that erosion is unlikely under ordinary climatic conditions; *moderate* indicates that some erosion is likely and that erosion-control measures may be needed; *severe* indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and *very severe* indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

Ratings in the column **hazard of erosion on roads and trails** are based on the soil erosion factor K, slope, and content of rock fragments. The ratings apply to unsurfaced roads and trails. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that little or no erosion is likely; *moderate* indicates that some erosion

is likely, that the roads or trails may require occasional maintenance; and that simple erosion-control measures are needed; and *severe* indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Ratings in the column **suitability for roads (natural surface)** are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, ponding, flooding, and the hazard of soil slippage. The ratings indicate the suitability for using the natural surface of the soil for roads. The soils are described as well suited, moderately suited, or poorly suited to this use. *Well suited* indicates that the soil has features that are favorable for the specified kind of roads and has no limitations. Good performance can be expected, and little or no maintenance is needed. *Moderately suited* indicates that the soil has features that are moderately favorable for the specified kind of roads. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. *Poorly suited* indicates that the soil has one or more properties that are unfavorable for the specified kind of roads. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service, National forestry manual.

Report—Hazard of Erosion and Suitability for Roads on Forestland

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Hazard of Erosion and Suitability for Roads on Forestland–Monmouth County, New Jersey							
Map symbol and soil name	Pct. of map unit	Hazard of off-road or off-trail erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
DouB—Downer-Urban land complex, 0 to 5 percent slopes							
Downer	60	Slight		Slight		Well suited	
						Dusty	0.01
Urban land	30	Not rated		Not rated		Not rated	
UdauB—Udorthents-Urban land complex, 0 to 8 percent slopes							
Udorthents	60	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Low strength	0.50
						Dusty	0.01
Urban land	40	Not rated		Not rated		Not rated	

Haul Roads, Log Landings, and Soil Rutting on Forestland

This table can help forestland owners or managers plan the use of soils for wood crops. Interpretive ratings are given for the soils according to the limitations that affect various aspects of forestland management. The ratings are both verbal and numerical.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The paragraphs that follow indicate the soil properties considered in rating the soils. More detailed information about the criteria used in the ratings is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

For *limitations affecting construction of haul roads and log landings,* the ratings are based on slope, flooding, permafrost, plasticity index, the hazard of soil slippage, content of sand, the Unified classification, rock fragments on or below the surface, depth to a restrictive layer that is indurated, depth to a water table, and ponding. The limitations are described as slight, moderate, or severe. A rating of *slight* indicates that no significant limitations affect construction activities, *moderate* indicates that one or more limitations can cause some difficulty in construction, and *severe* indicates that one or more limitations can make construction very difficult or very costly.

The ratings of *suitability for log landings* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, ponding, flooding, and the hazard of soil slippage. The soils are described as well suited, moderately suited, or poorly suited to use as log landings. *Well suited* indicates that the soil has features that are favorable for log landings and has no limitations. Good performance can be expected, and little or no maintenance is needed. *Moderately suited* indicates that the soil has features that are moderately favorable for log landings. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. *Poorly suited* indicates that the soil has one or more properties that are unfavorable for log landings. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration.

Ratings in the column *soil rutting hazard* are based on depth to a water table, rock fragments on or below the surface, the Unified classification, depth to a restrictive layer, and slope. Ruts form as a result of the operation of forestland equipment. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that the soil is subject to little or no rutting, *moderate* indicates that rutting is likely, and *severe* indicates that ruts form readily.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service, National forestry manual.

Report—Haul Roads, Log Landings, and Soil Rutting on Forestland

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Haul Roads, Log Landings, and Soil Rutting on Forestland–Monmouth County, New Jersey							
Map symbol and soil name	Pct. of map unit	Limitations affecting construction of haul roads and log landings		Suitability for log landings		Soil rutting hazard	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
DouB—Downer-Urban land complex, 0 to 5 percent slopes							
Downer	60	Slight		Well suited		Moderate	
		Dusty	0.01	Dusty	0.01	Low strength	0.50
Urban land	30	Not rated		Not rated		Not rated	
UdauB—Udorthents-Urban land complex, 0 to 8 percent slopes							
Udorthents	60	Moderate		Moderately suited		Severe	
		Low strength	0.50	Low strength	0.50	Low strength	1.00
		Dusty	0.01	Dusty	0.01		
Urban land	40	Not rated		Not rated		Not rated	

Soil Chemical Properties

This folder contains a collection of tabular reports that present soil chemical properties. The reports (tables) include all selected map units and components for each map unit. Soil chemical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil chemical properties include pH, cation exchange capacity, calcium carbonate, gypsum, and electrical conductivity.

Chemical Soil Properties

This table shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable cations plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. It is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced saturated hydraulic conductivity and aeration, and a general degradation of soil structure.

Chemical Soil Properties–Monmouth County, New Jersey								
Map symbol and soil name	**Depth**	**Cation-exchange capacity**	**Effective cation-exchange capacity**	**Soil reaction**	**Calcium carbonate**	**Gypsum**	**Salinity**	**Sodium adsorption ratio**
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
DouB—Downer-Urban land complex, 0 to 5 percent slopes								
Downer	0-10	1.1-5.5	0.8-4.1	4.3-6.5	0	0	0	0
	10-16	2.1-5.3	1.6-4.0	3.6-6.5	0	0	0	0
	16-36	2.1-5.3	1.6-4.0	3.6-6.0	0	0	0	0
	36-48	0.8-4.7	0.6-3.5	3.6-5.5	0	0	0	0
	48-80	0.5-4.7	0.4-3.5	3.6-5.5	0	0	0	0
Urban land	—	—	—	—	—	—	—	—
UdauB—Udorthents-Urban land complex, 0 to 8 percent slopes								
Udorthents	0-12	5.9-20	3.1-8.4	5.0-6.0	0	0	0	0
	12-72	0.6-3.6	0.0-3.2	5.1-5.5	0	0	0	0
Urban land	—	—	—	—	—	—	—	—

Vegetative Productivity

This folder contains a collection of tabular reports that present vegetative productivity data. The reports (tables) include all selected map units and components for each map unit. Vegetative productivity includes estimates of potential vegetative production for a variety of land uses, including cropland, forestland, hayland, pastureland, horticulture and rangeland. In the underlying database, some states maintain crop yield data by individual map unit component. Other states maintain the data at the map unit level. Attributes are included for both, although only one or the other is likely to contain data for any given geographic area. For other land uses, productivity data is shown only at the map unit component level. Examples include potential crop yields under irrigated and nonirrigated conditions, forest productivity, forest site index, and total rangeland production under of normal, favorable and unfavorable conditions.

Forestland Productivity

This table can help forestland owners or managers plan the use of soils for wood crops. It shows the potential productivity of the soils for wood crops.

Potential productivity of merchantable or *common trees* on a soil is expressed as a site index and as a volume number. The *site index* is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that forestland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. More detailed information regarding site index is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

The *volume of wood fiber*, a number, is the yield likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Trees to manage are those that are preferred for planting, seeding, or natural regeneration and those that remain in the stand after thinning or partial harvest.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service, National Forestry Manual.

Report—Forestland Productivity

Forestland Productivity–Monmouth County, New Jersey				
Map unit symbol and soil name	**Potential productivity**			**Trees to manage**
	Common trees	**Site Index**	**Volume of wood fiber**	
			Cu ft/ac	
DouB—Downer-Urban land complex, 0 to 5 percent slopes				
Downer	Black oak	70	52.00	Eastern white pine, Flowering crabapple, Flowering dogwood, Pin oak, Scarlet oak, Shortleaf pine, Sugar maple, Yellow-poplar
	Pitch pine	—	—	
	Scarlet oak	70	52.00	
	White oak	70	52.00	
Urban land	—	—	—	—
UdauB—Udorthents-Urban land complex, 0 to 8 percent slopes				
Udorthents	—	—	—	—
Urban land	—	—	—	—