

CHAPTER 1: AGRICULTURAL LAND BASE OF SUSSEX COUNTY



The agricultural land base of Sussex County comprises a significant portion of New Jersey's farmland. Sussex County supported 1,029 individual farms in 2002 (second in the State) on 75,496 acres (fifth in the State). Hay – the County's principal crop – was planted on 21,195 of these acres (second in the State). Sussex County also supports New Jersey's most notable concentration of dairy and livestock operations with 89 beef cow farms (third in the State) and 30 dairy farms (second in the State) that range over 15,974 acres (second in the State). (*2002 Census of Agriculture*)¹

Quantitative figures alone do not capture the full importance of Sussex County's farmland. Sussex County's agricultural lands bestow the County with a rich rural setting found nowhere else in New Jersey. Steep ridgelines abut fertile valleys offering spectacular agricultural viewsheds. Many farms in Sussex are also located near valuable natural resource and park lands. This combination creates an undeveloped, natural landscape that spans large swaths of the County. This landscape has been the living and working environment for generations of Sussex County residents, and to many, it means home.

Agricultural Landscape

Sussex County rests in two of New Jersey's four physiographic provinces – the Appalachian Ridge and Valley province and the Highlands province. The Ridge and Valley province in Sussex County is part of a large geologic formation that extends 1,200 miles between Alabama and the St. Lawrence Valley in eastern Canada. It encompasses all of the County's area north and west of the Sparta-Waywayanda-Pochuck (Highlands) Ridge, which ranges between Byram and Vernon Townships.

The Ridge and Valley Province in Sussex County is divided into two valleys by the Kittatinny Ridge, which ranges between Walpack and Montague Townships in the northern part of the County. The Kittatinny Ridge was formed when tectonic forces compressed and elevated sections of the Earth's crust and created the Appalachian Mountains. Glaciation, wind, and water have since eroded the quartzite and sandstone bedrock of the Kittatinny Ridge into its current shape and size. (*1975 Sussex County Soil Survey*)² Due to the intensity of these weathering forces and the exposed bedrock they left behind, much of the Kittatinny Ridge is unsuitable for agricultural production.

The Kittatinny Valley encompasses the broad swath of land between the Kittatinny and Highlands Ridgelines. This valley supports the County's principal concentration of agricultural operations. In the northeast, the rolling hills in Wantage, Frankford, and Lafayette Townships provide excellent areas for hay and livestock farms. In the southwestern Townships of Hampton, Stillwater, Fredon, and Green, the Valley becomes flatter and more suitable for farms that plant row crops such as vegetables and Christmas trees. The Kittatinny Valley is also home to the County seat – Newton – as well as the Boroughs of Sussex and Branchville where limited concentrations of agricultural businesses and support services are located.

Outside the Kittatinny Valley, farmland in Sussex County is sparse. Some pockets of agricultural land exist in two other areas of County – the Upper Delaware/Minisink Valley and the Highlands Ridgeline. Encompassing parts of Montague and Sandyston Townships, the Upper Delaware Valley rests between the Kittatinny Ridge to the east and the Delaware River to the west. The Upper Delaware Valley is primarily occupied by public open space lands, but it supports some orchards and equine operations as well. The Upper Delaware Valley is more rural than the Kittatinny Valley, and offers scenic views of almost entirely undeveloped, agricultural landscapes from the ridgelines that surround it.

The Highlands Physiographic Province is characterized by Precambrian mountains of granite and gneiss bedrock with adjoining limestone valleys. In Sussex County, the Highlands Province is comprised of a long ridgeline that includes Sparta Mountain, Wawayanda Mountain, Hamburg Mountain, and Pochuck Mountain, and runs between the eastern Townships of Byram and Vernon. Small pockets of agricultural land within the Highlands Ridge contain noteworthy agricultural operations including orchards, vegetable farms, and livestock farms. However, most areas in the Sussex County Highlands are thickly forested, developed, or covered by steeply sloping terrain.

Soils

More than one hundred individual soil types are found throughout Sussex County. Soil types are determined by the parent bedrock material from which they were formed, the drainage characteristics they have, and the steepness of the slopes on which they are found. Soil types are also grouped into larger categories called soil series based on their parent material, chemical composition, and profile, as well as soil associations that combine similar soil series. There are more than thirty soil series that comprise eleven soil associations in Sussex County. A complete listing of the County's soils can be found at the end of this chapter. (*2005 Sussex County Soil Survey*)³

The soils of Sussex County are direct reflections of the region's topography and the geological processes responsible for it. Areas that are most susceptible to the weathering influence of glacial, wind, and soil erosion – such as the County's steeply sloping ridgelines and mountainsides – have had most of their topsoil eroded to lower elevations. The County's valleys serve as repositories for much of this eroded soil and generally have deeper and higher quality soils. Even here, soils are generally located on gently to moderately sloping, rocky terrain. Up to 25% of the County's cultivated areas are affected

by soil erosion due to topography. Sussex County's rolling landscape also serves to concentrate surface water flows into many rivers, lakes, wetlands, and their surrounding farmlands. Up to 15% of the County's tillable areas have been historically impacted by flooding. (2005 Sussex County Soil Survey)

Despite the many soil limitations in Sussex County, local soils are adequate to sustain a viable agricultural industry. Farmers have successfully adapted traditional practices to fit the rolling and rocky terrain in the County. They also rely heavily on products that grow well in these soils including hay, corn, and livestock. In addition, more than 14% of the County (48,399 acres) is covered by Prime, Statewide or Unique agricultural soils (see *Agricultural Soils Chart* below). (Natural Resource Conservation Service, Soil Survey website)⁴ Many of these acres fall within public parklands (see *Soils Map*), but many are actively farmed (see *Candidate Qfarms Map*).

<i>Abbr</i>	<i>Soil Description</i>	<i>Quality</i>	<i>Erodability</i>	<i>Acres</i>
DefAr	Delaware fine sandy loam, 0 to 3 % slopes, rarely flooded	Prime	Potentially	401
DefBr	Delaware fine sandy loam, 3 to 8 % slopes, rarely flooded	Prime	Potentially	616
HdxAb	Hazen-Hoosic complex, 0 to 3 % slopes, very stony	Prime	Not high	8,150
HdxBb	Hazen-Hoosic complex, 3 to 8 % slopes, very stony	Prime	Potentially	22,394
LorB	Lordstown-Wallpack complex, 0 to 8 % slopes, forest & recreation	Prime	Potentially	55
PohA	Pompton sandy loam, 0 to 3 % slopes	Prime	Not high	555
RkrB	Riverhead sandy loam, 3 to 8 % slopes	Prime	Potentially	774
ScoA	Scio silt loam, 0 to 3 % slopes	Prime	Not high	154
UnfA	Unadilla silt loam, 0 to 3 % slopes	Prime	Potentially	73
WabBb	Wallpack fine sandy loam, aeolian mantle, 0 to 8 % slopes, very stony	Prime	Potentially	63
WacB	Wallpack silt loam, 3 to 8 % slopes	Prime	Potentially	97
CorA	Colonie loamy fine sand, 0 to 3 % slopes	Statewide	Potentially	42
CorB	Colonie loamy fine sand, 3 to 8 % slopes	Statewide	Potentially	742
HonCb	Hoosic-Hazen complex, 8 to 15 % slopes, very stony	Statewide	Potentially	1,575
LorC	Lordstown-Wallpack complex, 8 to 15 % slopes	Statewide	High	1,052
UnfB	Unadilla silt loam, 3 to 8 % slopes	Statewide	Potentially	365
WabCb	Wallpack fine sandy loam, aeolian mantle, 8 to 15% slopes, very stony	Statewide	High	776
WacC	Wallpack silt loam, 8 to 15 % slopes	Statewide	High	1,331
CatbA	Catden mucky peat, 0 to 2 % slopes	Unique	Not high	9,226
	TOTAL			48,399
	<i>Source: Natural Resource Conservation Service, Soil Survey website</i>			

Over 32,000 acres are covered by prime and statewide important soils of the Hazen-Hoosic Complex (2005 Sussex County Soil Survey). These soils originated from glacial outwash of slate, shale, and sandstone materials, and are generally very deep and stony. They are found primarily on mounds and slopes within the County's valleys. They exhibit moderate permeability and fertility with soils of the Hoosic series containing relatively low water capacity. Consequently, dry seasons significantly impact crop yields from these soils and many crops, especially vegetables and flowers, require extensive irrigation. Although these soils can support most crops, they are best suited for small grains, with slopes steeper than 8% appropriate only for pastures and woodlands.

Many of the County's other prime and statewide important soils, including soils of the Colonie, Delaware, Riverhead, and Unadilla Series, are found within the Kittatinny Valley and the Delaware Water Gap National Recreation Area. These soils tend to be deep with good drainage and water capacity, making them excellent for a variety of crops. Soils that are commonly found near the County's waterways, such as those of the Colonie and Unadilla Series, are typically fine-grained and contain higher levels of organic matter than other soils. These fine-grained soils are suitable for a wide range of agricultural products, including vegetables and nursery crops. Coarse-grained soils, such as those of the Delaware Series, tend to be located further away from water bodies, and are more commonly planted with corn and small grains. (*Natural Resource Conservation Service, Soil Survey website*)

The remainder of Sussex County's agricultural soils are located in areas that are not currently utilized for agriculture. Soils of the Pompton Series are found in flat plains near the Highlands Ridge that are primarily forest-covered, while soils of the Lordstown-Wallpack complex are most commonly found within the Delaware Water Gap National Recreation Area. These tend to exhibit a coarse-grained, rocky substrate with variable drainage qualities. Catden soils are associated with important natural areas within or adjacent to submerged lands. Consequently, they are poorly drained and deep with high levels of organic matter. Catden soils are primarily occupied by undeveloped wildlife conservation areas. (*Natural Resource Conservation Service, Soil Survey website*)

Irrigated Land & Water Sources

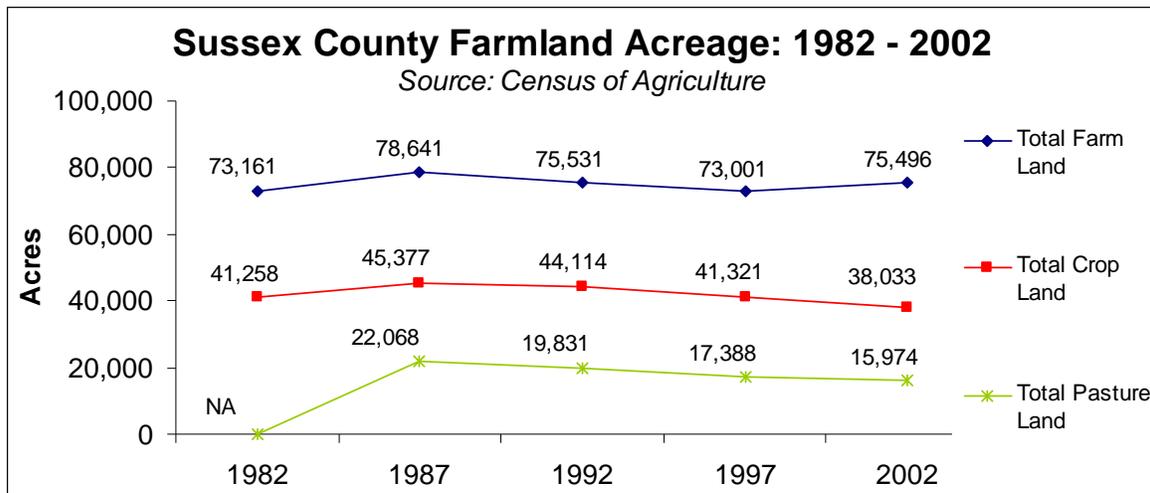
The amount of irrigated farmland in Sussex County is very small. Only 93 farms irrigated 642 acres during 2002, representing less than 10% of the County's farms and less than 1% of its farmland. (*2002 Census of Agriculture*) However, the irrigated acreage in Sussex County has nearly doubled since 1982 with more than three times as many farms utilizing irrigation. This trend is partly attributable to the increasing number of water-intensive agricultural operations, such as nurseries and vegetable farms, taking root in the County in areas where local soils require irrigation to support these products. Additionally, the 2002 Census year was abnormally dry, which may account for some of the irrigation increases that were observed.

Limited groundwater supplies are the only available sources of water for the limited amount of irrigation that occurs in Sussex County (642 acres). Towns in the Kittatinny Valley where most of the County's irrigated acres are found – Wantage, Lafayette, and Hampton Townships – contain aquifers of general poor productivity. (*2003 Sussex County Open Space Plan*)⁵ Competition for these limited groundwater resources between agriculture and other local land uses, including new residential and commercial developments, has been continually intensifying in these areas. There is a general concern that further development will limit the availability of water for agriculture in much of Sussex County.

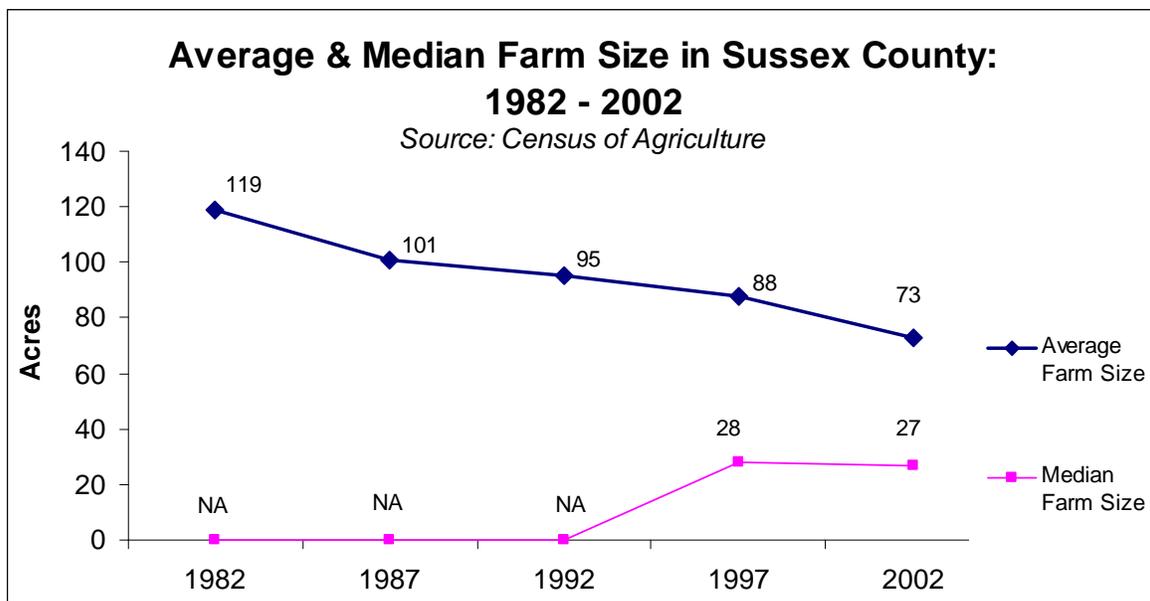
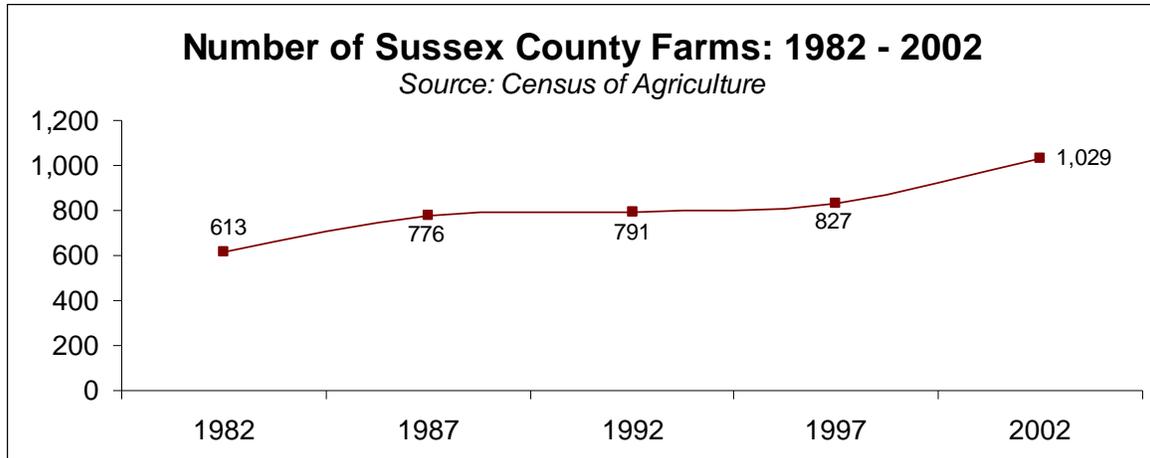
There are only a handful of farms in the County that are located within the Highlands Preservation Area and the farms utilizing limited irrigation are not located in the Highlands. Three farms in Sussex County are enrolled in the Soil and Water Conservation (8-Year Farmland Preservation) program in the Sussex County and none of these farms are located in the Highlands. As mentioned, Sussex County is 525 square miles in size and, of this, only 642 acres is utilized for agricultural irrigation. The nature of Sussex County farming is predominantly livestock and hay, both of which do not require irrigation. Very few Sussex County farmers raise vegetables, which have higher water needs, as their primary product. It is highly unlikely that there will be a significant change in agricultural practices in Sussex County to warrant groundwater consumption concerns.

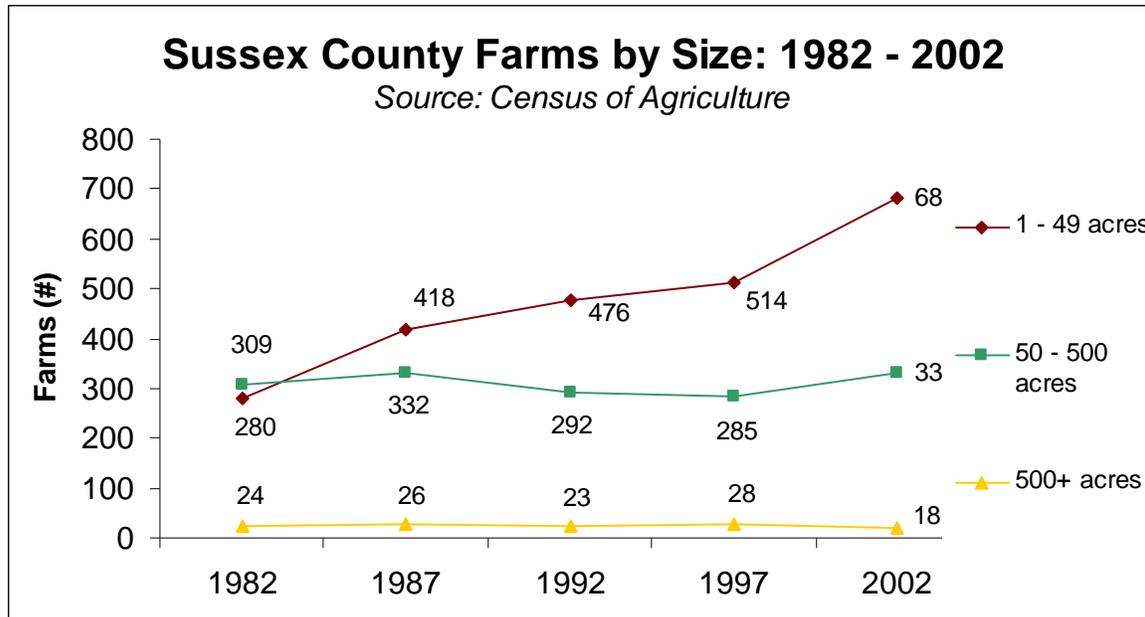
Farmland Trends & Statistics

The size of the agricultural land base in Sussex County has remained relatively constant in recent years. The total amount of land in agricultural production (75,496 acres in 2002) has not significantly changed since 1982 (see *Farmland Acreage* chart below). However, the total acreage of both crop and pastureland has been steadily declining during the last twenty years. During this time, cropland has decreased by 16% while pasture land has decreased by 28%. (All statistical data was derived from the *2002 Census of Agriculture*)



There are a number of reasons that the overall agricultural land area has remained constant while the amounts of crop and pasturelands have decreased. Many of the farmland losses associated with development of farmland are offset when natural land in other parts of the County is cleared and tilled for agricultural use. Additionally, large residential properties often become eligible for farmland assessment status when landowners produce sufficient amounts of agricultural products. This trend has increased the number of individual farms in Sussex County (see *Farms* chart below), and resulted in a corresponding decrease in the average farm size (see *Average and Median Farms* chart below). Consequently, changes to the overall area of farmland in Sussex County have been small in recent years.



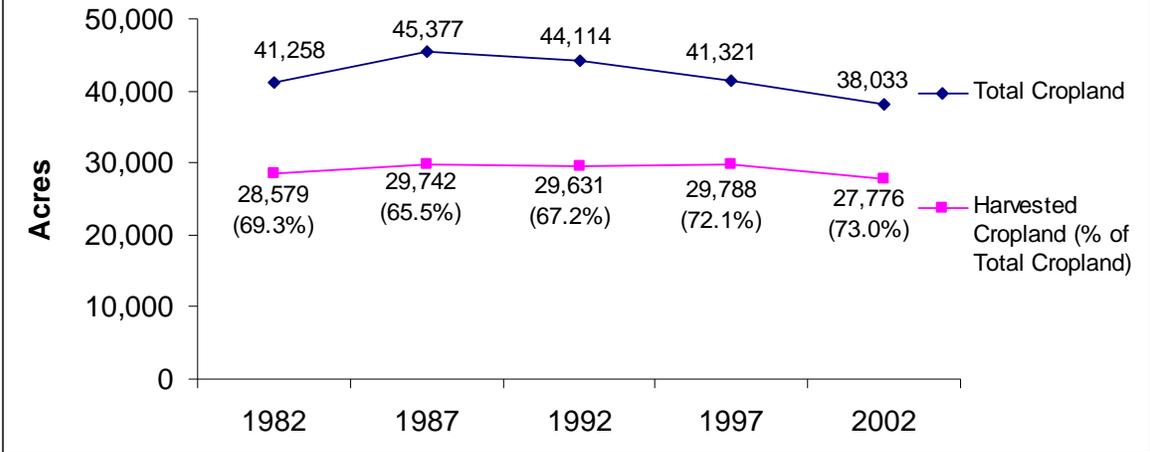


Simultaneously, former crop and livestock acreage is being transferred to “other” agricultural uses. Nurseries, floriculture operations, and equestrian facilities have become more lucrative and popular in the region and are replacing many crop and livestock farms. The overall amount of agricultural land does not change when this occurs, but the amount of crop and pasturelands declines. Increases in acreage devoted to these “other” agricultural uses are helping to compensate for losses in crop and livestock lands keeping the overall agricultural acreage constant.

There is a general concern among farmers that an increasing amount of formerly productive farmland is being abandoned. This land remains part of the County’s total agricultural land, but it is not used for pasture or crop land. Land left fallow and unmanaged promotes the spread of invasive plant species and often serves as habitat for wildlife that damages crops in nearby fields. More abandoned land also means that Sussex County farmers must increase the percentage of still active farmland that they harvest each year in order to maintain current levels of productivity. Sussex County farmers harvested crops on 27,776 in 2002. This represents a slight decrease in the total harvested acreage from previous years, but an increase in the percentage of still active cropland that was harvested (see *Cropland Harvested* chart below).

Sussex County Cropland Harvested: 1982 - 2002

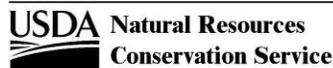
Source: Census of Agriculture



Acreage and Proportionate Extent of the Soils

Sussex County, New Jersey

Map symbol	Map unit name	Acres	Percent
AhbBc	Alden silt loam, 0 to 8 percent slopes, extremely stony	2,156	0.6
AhcBc	Alden mucky silt loam, gneiss till substratum, 0 to 8 percent slopes, extremely stony	3,336	1.0
AruCh	Arnot-Lordstown complex, 0 to 15 percent slopes, very rocky	3,490	1.0
ArvD	Arnot-Lordstown-Rock outcrop complex, 15 to 35 percent slopes	7,447	2.2
ArvE	Arnot-Lordstown-Rock outcrop complex, 35 to 60 percent slopes	4,560	1.3
AtcA	Atherton mucky silt loam, 0 to 3 percent slopes	41	*
CatbA	Catden mucky peat, 0 to 2 percent slopes	9,226	2.7
ChkC	Chatfield-Hollis-Rock outcrop complex, 0 to 15 percent slopes	9,351	2.7
ChkE	Chatfield-Hollis-Rock outcrop complex, 35 to 60 percent slopes	13,963	4.1
ChwBc	Chippewa silt loam, 0 to 8 percent slopes, extremely stony	565	0.2
CorA	Colonie loamy fine sand, 0 to 3 percent slopes	42	*
CorB	Colonie loamy fine sand, 3 to 8 percent slopes	742	0.2
DefAr	Delaware fine sandy loam, 0 to 3 percent slopes, rarely flooded	401	0.1
DefBr	Delaware fine sandy loam, 3 to 8 percent slopes, rarely flooded	616	0.2
FaxC	Farmington-Rock outcrop complex, 0 to 15 percent slopes	3,918	1.1
FdwB	Farmington-Wassaic-Rock outcrop complex, 0 to 8 percent slopes	2,450	0.7
FmhAs	Fluvaquents, loamy, 0 to 3 percent slopes, occasionally flooded	1,256	0.4
FrdAb	Fredon-Halsey complex, 0 to 3 percent slopes, very stony	10,545	3.1
GawEh	Galway loam, 35 to 60 percent slopes, very rocky	538	0.2
HdxAb	Hazen-Hoosic complex, 0 to 3 percent slopes, very stony	8,150	2.4
HdxBb	Hazen-Hoosic complex, 3 to 8 percent slopes, very stony	22,394	6.5
HhmBc	Hibernia loam, 0 to 8 percent slopes, extremely stony	3,135	0.9
HkrgBb	Hinckley loamy coarse sand, 0 to 8 percent slopes, very stony	180	*
HkrgCb	Hinckley loamy coarse sand, 8 to 15 percent slopes, very stony	625	0.2
HncD	Hollis-Rock outcrop-Chatfield complex, 15 to 35 percent slopes	16,442	4.8
HonCb	Hoosic-Hazen complex, 8 to 15 percent slopes, very stony	1,575	0.5
HopEb	Hoosic-Otisville complex, 25 to 60 percent slopes, very stony	14,985	4.4
LacBc	Lackawanna cobbly fine sandy loam, 0 to 8 percent slopes, extremely stony	34	*
LacCc	Lackawanna cobbly fine sandy loam, 8 to 15 percent slopes, extremely stony	447	0.1
LacDc	Lackawanna cobbly fine sandy loam, 15 to 35 percent slopes, extremely stony	371	0.1
LorB	Lordstown-Wallpack complex, 0 to 8 percent slopes	55	*
LorC	Lordstown-Wallpack complex, 8 to 15 percent slopes	1,052	0.3
LorCh	Lordstown-Wallpack complex, 8 to 15 percent slopes, very rocky	1,599	0.5
LorD	Lordstown-Wallpack complex, 15 to 25 percent slopes	953	0.3
LorDh	Lordstown-Wallpack complex, 15 to 35 percent slopes, very rocky	2,123	0.6
MabEh	Manlius-Nassau complex, 35 to 60 percent slopes, very rocky	797	0.2
NauBh	Nassau-Manlius complex, 0 to 8 percent slopes, very rocky	5,922	1.7
NauCh	Nassau-Manlius complex, 8 to 15 percent slopes, very rocky	19,398	5.6
NauDh	Nassau-Manlius complex, 15 to 35 percent slopes, very rocky	19,108	5.6
NavE	Nassau-Rock outcrop complex, 35 to 60 percent slopes	6,175	1.8
OpnCh	Oquaga-Lackawanna complex, 8 to 15 percent slopes, very rocky	119	*
OpnDh	Oquaga-Lackawanna complex, 15 to 35 percent slopes, very rocky	1,952	0.6
OprC	Oquaga-Rock outcrop complex, 0 to 15 percent slopes	493	0.1



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* See footnote at end of table.

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Acreage and Proportionate Extent of the Soils

Sussex County, New Jersey

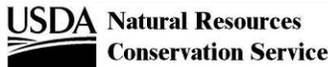
Map symbol	Map unit name	Acres	Percent
OprE	Oquaga-Rock outcrop complex, 35 to 60 percent slopes	567	0.2
PHG	Pits, sand and gravel	788	0.2
PohA	Pompton sandy loam, 0 to 3 percent slopes	555	0.2
QY	Quarry	719	0.2
RkrB	Riverhead sandy loam, 3 to 8 percent slopes	774	0.2
RnaF	Rock outcrop-Arnot-Rubble land complex, 60 to 80 percent slopes	324	*
RnfC	Rock outcrop-Farmington-Galway complex, 8 to 15 percent slopes	8,412	2.4
RnfD	Rock outcrop-Farmington-Galway complex, 15 to 35 percent slopes	17,142	5.0
RoefBc	Rockaway loam, thin fragipan, 0 to 8 percent slopes, extremely stony	463	0.1
RoefCc	Rockaway loam, thin fragipan, 8 to 15 percent slopes, extremely stony	3,884	1.1
RoefDc	Rockaway loam, thin fragipan, 15 to 35 percent slopes, extremely stony	4,285	1.2
RokB	Rockaway-Chatfield-Rock outcrop complex, 0 to 8 percent slopes	1,320	0.4
RokC	Rockaway-Chatfield-Rock outcrop complex, 8 to 15 percent slopes	3,185	0.9
RokD	Rockaway-Chatfield-Rock outcrop complex, 15 to 35 percent slopes	18,803	5.5
RooB	Rockaway-Urban land complex, thin fragipans, 0 to 8 percent slopes	481	0.1
RooC	Rockaway-Urban land complex, thin fragipans, 0 to 15 percent slopes	2,011	0.6
RooD	Rockaway-Urban land complex, thin fragipans, 0 to 25 percent slopes	1,355	0.4
ScoA	Scio silt loam, 0 to 3 percent slopes	154	*
SwfBc	Swartswood loam, 0 to 8 percent slopes, extremely stony	3,598	1.0
SwfCc	Swartswood loam, 8 to 15 percent slopes, extremely stony	9,290	2.7
SwfDc	Swartswood loam, 15 to 35 percent slopes, extremely stony	10,110	2.9
UccAs	Udifluvents, 0 to 3 percent slopes, occasionally flooded	617	0.2
UdaB	Udorthents, 0 to 8 percent slopes, smoothed	1,663	0.5
UdauB	Udorthents-Urban land complex, 0 to 8 percent slopes	1,724	0.5
UnfA	Unadilla silt loam, 0 to 3 percent slopes	73	*
UnfB	Unadilla silt loam, 3 to 8 percent slopes	365	0.1
USCHRB	Urban land-Chatfield-Rock Outcrop complex, 0 to 8 percent slopes	101	*
USCHRC	Urban land-Chatfield-Rock Outcrop complex, 0 to 15 percent slopes	911	0.3
USCHRD	Urban land-Chatfield-Rock Outcrop complex, 0 to 35 percent slopes	1,918	0.6
USFARC	Urban land-Farmington-Rock outcrop complex, 0 to 15 percent slopes	1,096	0.3
USFARD	Urban land-Farmington-Rock outcrop complex, 0 to 35 percent slopes	238	*
USFAWB	Urban land-Farmington-Wassaic complex, 0 to 8 percent slopes	146	*
USHAZA	Urban land-Hazen-Hoosic complex, 0 to 3 percent slopes	65	*
USHAZB	Urban land-Hazen-Hoosic complex, 0 to 8 percent slopes	520	0.2
USNAMB	Urban land-Nassau-Manlius complex, 0 to 8 percent slopes	261	*
USNAMC	Urban land-Nassau-Manlius complex, 0 to 15 percent slopes	519	0.2
USNAMD	Urban land-Nassau-Manlius complex, 0 to 25 percent slopes	213	*
USWUSB	Urban land-Wurtsboro-Swartswood complex, 0 to 8 percent slopes	61	*
VepBc	Venango silt loam, 0 to 8 percent slopes, extremely stony	2,284	0.7
VepCc	Venango silt loam, 8 to 15 percent slopes, extremely stony	2,068	0.6
WaahAt	Wallkill silt loam, 0 to 3 percent slopes, frequently flooded	1,160	0.3
WabBb	Wallpack fine sandy loam, aeolian mantle, 0 to 8 percent slopes, very stony	63	*
WabCb	Wallpack fine sandy loam, aeolian mantle, 8 to 15 percent slopes, very stony	776	0.2

Acreage and Proportionate Extent of the Soils

Sussex County, New Jersey

Map symbol	Map unit name	Acres	Percent
WabDb	Wallpack fine sandy loam, aeolian mantle, 15 to 35 percent slopes, very stony	1,033	0.3
WacB	Wallpack silt loam, 3 to 8 percent slopes	97	*
WacBc	Wallpack silt loam, 3 to 8 percent slopes, extremely stony	350	0.1
WacC	Wallpack silt loam, 8 to 15 percent slopes	1,331	0.4
WacCc	Wallpack silt loam, 8 to 15 percent slopes, extremely stony	677	0.2
WacD	Wallpack silt loam, 15 to 25 percent slopes	685	0.2
WacDc	Wallpack silt loam, 15 to 35 percent slopes, extremely stony	811	0.2
WATER	Water	10,427	3.0
WecBc	Wellsboro silt loam, 0 to 8 percent slopes, extremely stony	69	*
WecCc	Wellsboro silt loam, 8 to 15 percent slopes, extremely stony	242	*
WumBc	Wurtsboro loam, 0 to 8 percent slopes, extremely stony	682	0.2
WusBc	Wurtsboro-Swartswood complex, 0 to 8 percent slopes, extremely stony	7,850	2.3
WusCc	Wurtsboro-Swartswood complex, 8 to 15 percent slopes, extremely stony	8,079	2.4
WusDc	Wurtsboro-Swartswood complex, 15 to 35 percent slopes, extremely stony	3,572	1.0
Total		343,694	100.0

* Less than 0.1 percent.



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¹ United States Department of Agriculture: National Agricultural Statistic Service, 2002 Census of Agriculture.

http://www.nass.usda.gov/Census_of_Agriculture/index.asp. Accessed June 2007.

² United States Department of Agriculture Soil Conservation Service in Cooperation with New Jersey Agricultural Experiment Station and Cook College, Rutgers University. *Soil Survey of Sussex County, New Jersey*. Washington, DC, 1975.

³ Natural Resource Conservation Service (NRCS). 2005 Sussex County Soil Survey. Online at: <http://soildatamart.nrcs.usda.gov/Survey.aspx?County=NJ037>. Accessed September 2007.

⁴ Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. *Official Soil Series Descriptions*. <http://soils.usda.gov/technical/classification/osd/index.html>. Accessed June 2007.

⁵ Morris Land Conservancy in Cooperation with the Sussex County Agriculture Development Board. *A Comprehensive Farmland Preservation Plan for the County of Sussex*. Boonton, NJ, September 2003.