Blackbird-Millington Corridor Conservation Area Plan

Introduction

Conservation Study Area Description

The Blackbird-Millington Corridor study area is approximately 52,000 acres located on the Atlantic Coastal Plain. It includes part of two Ecoregions (large areas of land or water defined by their climate, geology and species): the Chesapeake Bay Lowlands Ecoregion and the North Atlantic Coast Ecoregion (Map A). The Nature Conservancy establishes portfolios of conservation areas across ecoregions to represent the distribution and diversity of native species, natural communities and ecosystems.[1] Through this process of ecoregional planning, the Blackbird-Millington Corridor study area was identified as a conservation priority -- largely based on its tidal wetlands and forests as important features representing unique and high quality areas of natural diversity. It lies within The Nature Conservancy's Delaware Bayshores program and is one of the priority focal areas for that Program. (Map B)

The Delaware Bayshores program focuses on the 4,000-square-mile area along the Delaware Bay in New Jersey and Delaware. This area is home to some 125 rare plant and animal species that rely on the bay's waters, shoals, reefs, beaches, dunes and salt marshes, and on the abutting upland forests, fields and the freshwater streams that meander through them. More than 100 species of birds migrate through or nest along the Bayshores. The protection of these fragile habitats in the Delaware portion of the Delaware Bayshores is led by Maria Trabka, Director of the Delaware Bayshores program for The Nature Conservancy in Delaware.

The Blackbird-Millington Corridor "study area" shown in Map C (with digital aerial photography) was established largely based on a combination of watersheds and connected (or nearly connected) forest blocks and then expanded a bit in all directions in order not to miss any important features on or near the edges. Because the study area was continually fine-tuned over the course of the planning process, there may be minor discrepancies between certain maps and calculations presented herein due to their production at different stages in the process.

The study area's 52,000 acres stretch from the Delaware Bay, across the State of Delaware and into the State of Maryland, stopping just east of the town of Millington. The vast majority of the study area -- over 35,000 acres -- is within the political boundaries of New Castle County, Delaware. However, portions are within the political boundaries of Kent County, Maryland (12,200 acres) and Kent County, Delaware (4,400 acres). A portion of one town, Townsend, is within the study area, with four other incorporated towns lying within six miles. To the north are Middletown and Odessa, to the south is Smyrna, and to the west is Millington. (Map D)

The study area includes over 200 miles of streams and shoreline and the headwaters of two river drainages: The Blackbird Creek, which drains eastward into the Delaware River, and the Cypress Branch, which drains westward into the Chester River and the Chesapeake Bay. Tidal wetlands dominate the far eastern portion of the Corridor and a high density of small, isolated wetlands occurs

[1] *How We Work: Conservation By Design* - Setting Priorities. (n.d.) Retrieved 12/14/04 from http://nature.org/aboutus/howwework/cbd/science/art14308.html.

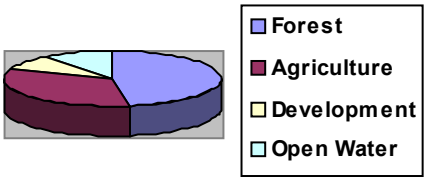
throughout the rest of the Corridor study area. (Map E) The unconfined and confined aquifers that lay under the study area are part of a regional aquifer system that is important for providing drinking water and irrigation, so keeping these aquifers contaminant-free is an obvious concern.[2] Map E shows hydrography and New Castle County water recharge areas.

As is characteristic in the Atlantic Coastal Plain, the topography is gently-sloping, ranging from sea level to 40 meters (130 feet), and underlain by thick layers of unconsolidated sediments or semi-consolidated sedimentary rocks.[3] (Map F.) The study area is part of the Delmarva Penninsula, which experiences severe sea-level changes causing tidal wetlands to creep up into upland areas over time,[4] with an ongoing relative sea level change estimated to be as much as 60 cm over 100 years.[5]

There are more than fifty different soil types in the study area, with the predominant types including soils of the Elkton, Fallsington, Matapeake, Woodstown, Bibb and Sassafras Series' and Tidal Marsh soils.[6] (Map G) Those of the Elkton and Fallsington Series' are deep, poorly drained soils most often used for woodlands or, where adequately drained, for growing crops like corn, soybeans, and small grains. Those of the Matapeake, Woodstown, and Sassafras Series' are deep and well-drained, and tend to be more widely used for agriculture and other purposes.[7] Bibb Series soils are very deep, poorly drained, and found on the floodplains of streams, especially Cypress Branch. Tidal Marsh soils found at the mouth of the Blackbird Creek are frequently inundated.

Land Use Profile of the Corridor

Corridor Study Area Land Use



Of the 52,000 acres included in the Corridor study area, about 27,000 acres is forested. Of the remaining acreage, most is agricultural in use or character (18,700 acres). Residential and commercial development (5,000 acres) occurs largely along roadways.[8] Map H shows the Corridor study area's land use and land coverage. Over 200 miles of streams and shoreline make up the Blackbird Creek and Cypress Branch stream systems in the study area, and approximately 6,000 acres of the Corridor study area is open water and wetlands, mostly in the eastern portion.

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[2] Delaware Department of Natural Resources and Environmental Control, Delaware National Estuarine Research Reserve (DNERR). 1999. *Delaware National Estuarine Research Reserve Estuarine Profiles*. Delaware Department of Natural Resources, Delaware National Estuarine Research Reserve, 818 Kitts Hummock Rd., Dover, DE: 7

[3] DNERR 1999: 7

[4] DNERR 1999: 7

[5] Estimate by The Nature Conservancy based on the methodology of: Titus, James G. and Vijay K. Narayanan. 1995. The Probability of Sea Level Rise. US Environmental Protection Agency, Rockville, Maryland, Retrieved 12/17/04 from http://www.gcrio.org/EPA/sealevel/text.html.

[6] Soil surveys provided digitally (in GIS format) by the Delaware Department of Agriculture (for Delaware) and by the US Department of Agriculture Soil Data Mart (for Kent County, Maryland), 2004.

[7] Official Soil Series Descriptions. (n.d.) Retrieved December 10, 2004 from http://soils.usda.gov/technical/classification/osd/index.htm.

[8] In reality, forest cover and land uses are not mutually exclusive; the pie chart shown here is based on approximations.

The Corridor study area includes several significant public land holdings, including the State of Delaware's Blackbird State Forest (4,800 acres) and "The Rocks" (900 acres) -- Delaware Division of Fish and Wildlife Management Area -- the State of Maryland's Millington Wildlife Management Area (3,800 acres), and the Delaware National Estuarine Research Reserve (150 acres.) The vast majority of the Corridor study area (75%) is owned privately. However, over 7,000 acres of private land is protected via conservation organization ownership (3,338 acres owned by Delaware Wildlands) or agricultural easements held by the Delaware or Maryland Agricultural Land Preservation Foundations with various landowners (3,836 acres). Map I shows all of the protected areas of the Corridor study area. [9]

There are over 3,500 different tax parcels that comprise the Corridor study area, and less than 5% of them are greater than 100 acres in size. Map J shows all tax parcels in the Delaware portion of the study area, and those over 100 acres and in private ownership in the Maryland portion of the study area.[10] The Corridor study area is split between the jurisdictions of three different counties; thus land use planning for the Corridor as a whole is regulated by three different local governing entities: the New Castle County Department of Land Use, the Kent County Delaware Office of Planning and Zoning, and the Kent County Maryland Office of Planning and Zoning. Map K shows zoning for the Corridor. The majority of the Corridor study area has a base zoning of one dwelling per 5 acres, "Suburban Reserve" under New Castle County zoning, with a smaller portion of New Castle County allowing one dwelling per acre ("Suburban"). Most of the Kent County Delaware portion of the Corridor study area, while designated "Agricultural Conservation" or "Agricultural Residential" allows one unit per acre density with on-site septic and water[11] with a smaller area permitting up to 10 units per acre density ("Multi-Family Residential")[12] Most of the Kent County Maryland portion of the Corridor study area is in an agricultural preservation district with a base of one dwelling per 30 acres, with some areas around Massey and Millington designated for "village" or "rural residential" uses (which allow greater densities).

Natural Resource Values, Past & Present

Like much of the Delmarva Peninsula, the Blackbird Millington Corridor study area's history is tied inextricably linked with the area's natural resources, beginning with pre-history. Archaeological investigations indicate prehistoric habitation of the area from 3000 B.C. to 1000 A.D. and have unearthed a number of prehistoric sites along the Blackbird Creek.[13] Lenape and Nanticoke are thought to have co-existed in the area, although it is not thought to be a stronghold for either tribe.[14]

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[9] Acreages here and/or areas shown on Map I may not include most recent acquisitions.
[10] Kent County, MD tax parcel data is available only as TIFF images, not in GIS format; parcels over 100 acres were digitized by the TNC GIS intern.
[11] Additional density permitted with sewer service.
[12] Also, Kent County, DE recently (2004) passed a Transfer of Development Rights ordinance, under which the study area is mostly designated a "Secondary" receiving area (1 Dwelling Unit Per Acre TDR value), with a portion designated a "Primary" receiving area (1.5 Dwelling Unit Per Acre TDR value)
[13] DNERR: 20
[14] Crista Ryan. 2003. Blackbird Historical Research. Historical research completed in fulfillment of an internship with The Nature Conservancy. The Nature Conservancy, Wilmington, DE.

In historic times, farming was the most important local industry, relying not only on the land but also on the creeks and waterways, to get goods to market. The Huguenot House, in the eastern part of the Corridor study area, dates to the early 1700's.[15] Peach farming was once the most popular source of income in the area. Local peach farmer Samuel Townsend went on to become a well-known Democratic state senator and namesake for the town of Townsend.[16]

The local creeks were important to others besides farmers and Native Americans. There are tales of pirates overrunning farms, towns and villages along the Delaware Bay, using the creeks to go inland. According to W. Powell in *The History of Delaware* the Linton Farm in Blackbird Hundred was burned to the ground by a Spanish Privateer in 1747.[17] In her efforts to bring slaves to freedom, Harriet Tubman stopped at Clearfield Farm in Blackbird Hundred, owned by well-known abolitionist and Quaker John Corbit.[18]

Natural resource use has continued to play an important but changing role in the area over time. In more recent history, from 1937 to 1997, increases in development (12.5%) impacted both agriculture and natural resources in the Corridor. Cultivated land in the Blackbird Creek watershed decreased by 16% during this time period and estuarine water and tidal mud-flats in the eastern part of the Corridor study area increased (most likely the result of the construction of a stream crossing at Blackbird Landing Road that constricts the channel.) Once extensively cleared for agriculture, deciduous forests in the Blackbird Creek watershed held saw a modest 5% increase[19] (probably due to the abandonment of soils unsuitable for agriculture due to the high water table in the area.) The decline of agriculture on the Delmarva Peninsula, and its likely replacement with development, is a major concern expressed by Corridor area residents and conservationists alike during the planning process. It is also a concern recognized by the Delaware Department of Agriculture which, through the Delaware Agricultural Land Preservation Foundation has one of the most active land conservation efforts in the area, using purchase of development rights and the designation of agricultural security districts.

There are numerous studies that are useful for getting an idea of the economic importance of natural resource use in the Corridor today. The following highlight the importance of the economic contribution of natural resource uses like those in the Corridor study area.

- According to the American Farmland Trust, within the Delmarva Peninsula the total economic contribution of farming has been estimated at $1.6 billion.[20] At about $840 million, Delaware matches the country wide average of 3% in terms for Gross State Product in Agriculture. Furthermore, the net farm income in Delaware was $77 million in 2002.[21] There are over 18,000 acres of farmland in the Corridor study area, with extensive areas of farmland just outside the Corridor study area, especially to the west. Almost 4,000 acres are protected by agricultural easements to the Delaware or Maryland Agricultural Lands Preservation Foundations.

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[15] DNERR: 20
[16] Ryan 2003
[17] Powell, Walter. 1928. *The History of Delaware*. The Christopher Publishing House, Boston, MA: 571
[18] Pipin, Kathryn. 1995. *Families in Transition: A Smyrna History*. Prison Industries, Smyrna, DE: 45
[19] McCorkle, Richard C.A. 2000. Land Use / Land Cover Changes and Ecological Health Indicators in the Blackbird Creek Watershed. A thesis submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Master of Science in Marine Studies, Newark, DE: 22
[20] American Farmland Trust. 2003. Agricultural Situation and Trends of the Delmarva Peninsula.
[21] *Delaware Agricultural 2002 Highlights.* (n.d.). Retrieved October 2004, from http:/www.nass.usda.gov/de/agstat.html.

- According to the Delaware Forest Service, the forest products industry contributes over $20 million annually to Delaware's economy and the forest and forest products industries provide over 3,700 jobs in Delaware.[22] In Maryland, the total economic impact of the forestry industry has been estimated at $450 million in gross sales and 4,847 jobs statewide. [23] Regionally, forest and forest products provided over a quarter of a million jobs and generated $4.5 billion in wages annually between 1975 and 1995.[24] The Corridor has one of Delmarva's largest forested areas, including the Blackbird State Forest's mostly forested 4,800 acres where forest are preserved not just as important habitats, but also to demonstrate forestry practices and -- through Forest Service staff -- provide forest management assistance to local landowners.

- The U.S. Fish and Wildlife Service conducted a nationwide survey in 2001 estimating the economic benefit of hunting. Combing the costs of travel, equipment and various other items, the survey totals the financial benefit at $ 14,662,000 in Delaware.[25] Blackbird State Forest, Millington Wildlife Management Area, and many of the surrounding private lands are popular hunting areas for deer, waterfowl, and small game. Similarly, "The Rocks", owned and managed by the DNREC Division of Fish and Wildlife in the eastern portion of the Corridor study area, allows hunting of waterfowl. Much of the privately owned surrounding lands are privately hunted for waterfowl and for deer and small game -- landowners in the Corridor study area report that private hunting leases are an important source of income to them.

- The U.S. Fish and Wildlife Service also released data on the economic impact of fishing (Salt and Fresh Water) for the country.[26] Delaware recorded an impact of $77.7 million and $31.1 million for salt and freshwater fishing respectively. Maryland recorded an impact of $641 million and $406 million for salt and freshwater. Much of the fishing opportunities in the Blackbird-Millington Corridor study area occur along the Delaware Bay coastline, but freshwater fishing in the Corridor study area's streams also takes place.

- Like hunting and fishing, wildlife watching has a profound impact on the economy at the local level as a flux of watchers provides a boost to local businesses. The Delaware Horseshoe Crab and Shorebird survey has estimated the total impact of bird watching to the economy to be around $15 - $25 million on the Delaware Bay in New Jersey - an impressive example of the potential impact of wildlife watching on the economy.[27] Although the study area is north of these horseshoe crab concentrations, significant numbers of shorebirds (spring and summer) and waterfowl (fall and

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[22] *Delaware's Forests: A Vision for the Future.* (n.d.) Delaware Department of Agriculture, Forest Service, Doc. Control #65-01-04/98/06/05: 1,6.
[23] The Economic Importance of Maryland Forestry Industry. 1999. Maryland Department of Business & Economic Development. Retrieved January 6, 2005 from http://www.magicalliance.org/Forests/economic_importance_of_MD_Forests.htm: 4.
[24] Assessing the Impacts of Forests on Human Welfare: Preliminary Results from the Mid-Atlantic Integrated Assessment. 2000. Kluwer Academic Publishers. *Environmental Monitoring and Assessment* 63: 43-63.
[25] U.S. Department of the Interior, Fish and Wildlife Service (USFWS) and U.S. Department of Commerce, U.S. Census Bureau. 2001. *2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, Delaware*.
[26] USFWS 2001
[27] Wildlife-Associated Recreation on the New Jersey Delaware Bayshore: The Economic Impact of Tourism Based on the Horseshoe Crab - Shorebird Migration in New Jersey, Executive Summary. 2000 Fermata Inc. Retrieved December 13, 2004 from http://www.fermatainc.com/basic/eco-crab.html.

winter) utilize the area's eastern wetlands, mudflats, and open waters. The area is also an important stopover spot for migratory songbirds and is home to some of the most watch-able large birds, like hawks, herons, osprey, and bald eagles, and undoubtedly contributes to wildlife watching opportunities in the region.

With so many potential variables involved, it would be unrealistic to estimate a specific dollar amount to represent the economic value of natural resource use in the Corridor study area without the kind of Corridor-specific first-hand research and analysis that is beyond the scope of this plan. However, the studies cited above do least indicate that such values can be measured, and that they could be substantial for an area such as the Corridor.

But the value of Corridor natural resources is not limited to their use. There are also real economic values associated with the non-use benefits they provide – such as the contribution of forests to maintaining and enhancing air and water quality. These benefits extend beyond the Corridor study area to the Delaware Bay and Atlantic coast and ocean.

Many studies have been conducted on the impact of forested land on the surrounding water quality, most of which focus on forested riparian buffers as a means of water pollution control. Through such efforts, the Chesapeake Bay Program has concluded that forested tracts of land can be a great financial benefit to society by reducing the total cost of water treatment. One study conducted in the Chesapeake Watershed suggests that an acre of forest can uptake 21 pounds of nitrogen and 4l pounds of phosphorus yearly at a cost of $0.30 and $1.60 per pound respectively, based on the costs of establishing and maintaining forested riparian buffers. Another study of the Rhode River in Maryland concluded that forests can uptake from 26 to 44 pounds of nitrogen per hectare annually.[28]

While upgrading wastewater treatment plants may be the surest way to decrease nitrogen in the Chesapeake Bay, the cost of removing nitrogen and phosphorous at the maximum feasible level of implementation has been estimated at $8.56 per pound and $74.00 per pound, respectively, by the Chesapeake Bay Commission.[29] With nearly 30,000 acres of forested land, almost 8,000 of which is within 200 meters (or 650 feet) of streams and wetlands, the Blackbird Millington Corridor represents a tremendous water pollution control opportunity. Even with these forested stream buffers, water quality in the Blackbird Creek and Cypress Branch suffers -- neither stream fully supports aquatic life uses, according to the Delaware Department of Natural Resources and Environmental Control (DNREC) and the Maryland Department of Natural Resources.[30]

Studies have also shown that trees can remove some of our most plaguing pollutants from the air, such as CO2 and O3. According to the Delta Land Trust, reforested land can annually sequester 1,500 pounds of carbon per acre.[31] The Corridor study area's location within a non-attainment zone for the standards established by the Clean Air Act for ozone (03) and particulate matter[32], and its relative

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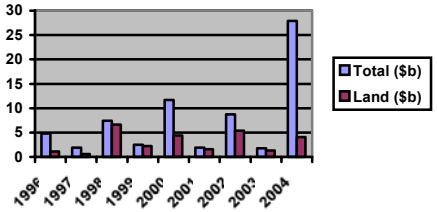
[28] Lowrance and others. 1995. Water Quality Functions of Riparian Forest Buffers in Chesapeake Water Sheds. *Environmental Management*, Vol. 21, No. 5: 690 (reprinted in 1998 by the Chesapeake Bay Program, EPZ 903-R-95-004.)
[29] Chesapeake Bay Commission. 2004. Cost-Effective Strategies for the Bay: Identifying Smart Investments for Nutrient Reduction, October 25, 2004 DRAFT: 9.
[30] See Conservation Targets: Riparian Buffers on page 51 herein.
[31] *Carbon Sequestration*. (n.d.) Retrieved December 13, 2004 from http:/www.deltalandtrust.org/carbon_sequestration.html
[32] Air Quality Management Section, Division of Air and Water Quality, Delaware Department of Natural Resources and Environmental Control. 2003. *Delaware Annual Air Quality Report 2003*: 7

proximity to Delaware City, where a great deal of industrial air pollutants and associated violations emanate, makes the preservation and enhancement of its forests a particularly attractive air pollution control opportunity from a public policy perspective.

Confirming the need for a public investment in open space are "willingness-to-pay" studies that reveal taxpayer recognition of the value of these and other non-use services provided by open space. According to a recent survey of 199 Delawareans by researchers at the University of Delaware, taxpayers are willing to pay quite a bit for open space that provides environmental and non-market agricultural services. The results showed that the net benefits provided by preserved parcels with agricultural and environmental attributes, as measured by taxpayer willingness to pay, may exceed $1,000,000 for a 1,000-acre parcel. The survey also revealed that preserved forestland provides just as significant of benefits per acre as cropland, although forestland is often less expensive to preserve.[33] These results provide the most Corridor-specific indication of how the public values natural resources, based on willingness to pay.

Taxpayers' willingness to pay for land conservation is also reflected in successes at local polls around the country. In the 2004 elections, ballot measures were passed to create a total of $3.25 billion in new public funding to protect land for parks and open space thanks to voters in 121 communities and 24 states. Conservation ballot measures have enjoyed tremendous success and a 77% passage rate since 1996. Figure 1 shows ballot measure funding for conservation since 1996. [34]

US Conservation Ballot Measure Funding
Source: Trust for Public Land



Socio-Economic Profile of the Corridor

Census 2000 data downloaded from the U.S. Bureau of Census web site and the ESRI census data web site provides a rough profile of the current population of the Corridor study area.[35] At the block level, census data includes basic information on population, housing, race and age. There are 132 Census blocks included or partially included within the Corridor study area boundary; each block has a Federal Census block number that correlates to the data collected for that block. Combining these blocks results in an area a bit larger than the actual study area (70,000 acres, versus 52,000 acres.) However, because since Census block units are the smallest units for which Census data are available, this is as close to a representation of the Corridor study area as possible.[36]

Census block data shows that, as of 2000:

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[33] Duke, Joshua M. and Thomas W. Ilvento. 2004. A Conjoint Analysis of Public Preferences for Agricultural Land Preservation. *Agricultural and Resource Economics Review*, Forthcoming October 2004: Abstract
[34] *A Clear Victory for Land Conservation*. (n.d.) Retrieved 12/15/04 from the Trust for Public Land wet site: http://www.tpl.org/tier3_cdl.cfm?content_item_id=12010&folder_id=2386
[35] U.S. Bureau of Census web site: www.census.gov; ESRI free tiger file census data download page: http://arcdata.esri.com/data/tiger2000/tiger_download.cfm.
[36] A full summary of Census Block data for the Corridor is provided in Appendix I.

- There are over 7,000 people (2,000 families) living in the 132 census blocks most closely aligned with the Corridor. Ninety percent of those people are white and just over half of them (51%) are men. The median age of Corridor area residents is 42 years old.
- There are over 2,500 households in the Corridor area, and slightly more housing units (2,693). Only 5% of housing units in the Corridor area are vacant and the overwhelming majority (86%) of housing units are owner-occupied.

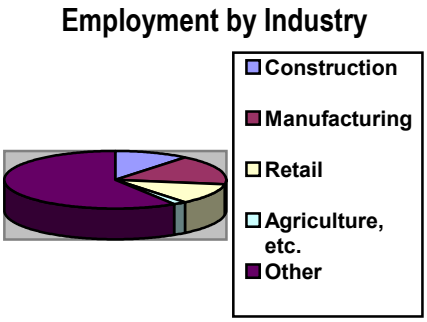
Map L shows Corridor study area Census Blocks and the distribution of Corridor area Population and Housing Units across Census blocks. From this map it is evident that most of the population of the Corridor study area resides in the Delaware portion and that there is a population cluster in the northern center region of the Corridor study area, and another smaller cluster on the south west region – where the towns of Townsend and Millington abut the Corridor study area. What is not evident from this map (because population data are randomly distributed within each Census Block) is that development (according to land use/land cover), and thus population, is largely clustered along roadways.

For more information on the Corridor area's population, Census data at the block group level, which includes data on education, employment, income, housing values and tenure can be used. This information comes from the Census 2000 long form questionnaire, which is only available at the block group level and is only collected from a sample of the population. So while these data give provide a much more intimate look at the Corridor area's population, they are also less accurate as a representation of the Corridor study area.[37] There are 10 Census block groups included or partially included within the Corridor study area, corresponding to an area that is quite a bit larger (approximately 112,000 acres) than the study area. (Map M)

The Census block group data indicates that, as of 2002:

- Close to half (41%) of Corridor-area residents have a high school education and 9% have completed a bachelor's degree. (26% of residents are under 18.)

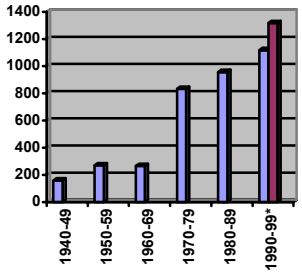
- Construction, manufacturing, and retail trade are the dominant industries of employment for Corridor-area residents, with only 2% of residents employed in agriculture, forestry, fishing and hunting. Residents work primarily (91%) in-state and most (68%) work in-county. Most residents (57%) earn $50,000 or more per year; the median annual salary is about $53,300. The graph to the right shows the proportion of Corridor area employment by industry.



- The overwhelming majority of residents (93%) drive to work, and almost all drive alone (versus carpooling). Only 4% work from home. About 10% of Corridor-area residents drive an hour or more to work, but most drive less than 45 minutes.

[37] A full Summary of Census Block Group data for the Corridor is provided in Appendix II.

Housing Units Constructed



- Nearly all (98%) of the residents sampled for the Corridor-area are native to the U.S., and most (62%) are native to their state of residence. 84% have resided in the same county since 1995. The population is almost evenly split between residents who have been in their homes 10 years or less, and those who have been in their homes for more than 10 years. The graph to the left shows the number of housing units constructed over time in the Corridor and surrounding area.[38]

Overview of Planning Methods

The planning methodology employed for the Corridor study area is a modified version of The Nature Conservancy's 5-S planning process. The 5-S process is one that has been used extensively throughout the U.S. and internationally to conserve functional landscapes for natural biodiversity. At the core of this process is an iterative, adaptive approach that begins with identifying conservation targets (ecological systems & species), and continues with assessing target viability based on key ecological attributes, assessing stresses and sources of stress to targets to determine critical threats, and developing conservation strategies to address target needs and stresses. Built into the process is the identification of indicators that can be measured and used to monitor progress into the future. The Nature Conservancy has developed a host of tools to assist with the 5-S planning process, including an Excel workbook that is particularly helpful for documenting and assessing target viability and for assessing threats. Portions of that workbook (in table format) are presented in this report.

The 5-S process is inherently community-based, in that it relies on the participation of key conservation partners outside of The Nature Conservancy (TNC). However, in order to incorporate input from the community as a whole (landowners and residents) the 5-S process was modified to include a concurrent process of community education

Science, Conservation, and Planning Experts from:

- Delaware DNREC, Divisions of Fish & Wildlife, Water Resources, Soil & Water Conservation
- Delaware Department of Agriculture, Forest Service
- Delaware Agricultural Lands Preservation Foundation
- Delaware National Estuarine Research Reserve
- US Fish & Wildlife Service
- US Geological Survey
- University of Delaware
- Maryland DNR, Wildlife & Heritage Service
- The Nature Conservancy
- Eastern Shore Land Conservancy
- Delaware Nature Society
- Delaware Greenways
- Chester River Association
- Ducks Unlimited
- The Conservation Fund
- Delaware Wildlands
- St. Andrew's School
- Chesapeake Fields
- Kent County (DE) Division of Planning
- Kent County (MD) Planning & Zoning
- New Castle County Dept. of Land Use
- Wilmapco
- Delaware Department of Transportation
- Delaware Economic Development Office
- Delaware Governor's Office
- Delaware Office of State Planning Coordination
- Rep. Bethany Hall-Long
- Congressman Wayne Gilchrest's Office

[38] Census data does not provide housing units built 1990-99; instead, shown are units built 1990-98 (first bar) and those built 1999-Mar2000 (second bar).

and feedback, and to fit the timeline for the Blackbird-Millington Corridor Conservation Area Plan. Figure 2 is a flowchart that summarizes the planning process: on the left-hand side, are the conservation science and planning activities involved in planning and on the right are the community involvement activities, with arrows indicating the flow of information/input from one activity to the next. In the center is a timeline that provides temporal reference. The overall planning process was led and facilitated by part-time TNC project manager, Jennifer Adkins, with part-time TNC project outreach coordinator (and local resident) Judy Hopkins serving as a liaison and organizer for local resident participation.

One goal of planning efforts was to insure that each step of the process included and informed scientists, experts, organizations and community members outside of The Nature Conservancy in order to engage the best of the scientific community for identifying and defining conservation targets, threats and the necessary protections; engage the local community for refining and testing the science for real-world practicability and for adding the human component; and engage partners and planners to determine the best possible application of the problem-solving tactic, tools, and resources available. A key aspect of the planning process was the organization and participation of "teams" of experts. With over 30 different agencies/divisions, organizations, or individuals involved (or potentially involved) in conservation efforts for the Corridor, the organization of these folks into teams with specific expertise and purpose was essential. Following are the teams that were employed, with a list of the agencies/organizations represented in the above right sidebar.[39]

Project Advisory Team ("Advisory Team"). The role of the Advisory Team was to provide input and guidance on the conservation planning process itself. Advisory Team members were selected for their broad-based knowledge and understanding of the Corridor study area (scientific, political, and cultural) and to keep the team small but representative. The Advisory Team met occasionally (3 times) to provide input on the process and course of the project.

Core Science Team ("Core Team"). The role of the Core Team was to provide information and consultation on the development of an initial set of targets and ways to measure their viability, and the ongoing refinement and compilation/assimilation of input into the plan. Core Team members were selected for their working familiarity with the various elements of the natural communities/species in the Corridor study area. Core Team members met at each step in the process (4 times) in an informal setting to develop and refine plan components using input provided by technical teams and community workshops.

Community Outreach Team / Focus Group ("Outreach Team"). The role of the Outreach Team was to provide input and guidance on project outreach to the community, and a community perspective on strategies. Members were selected for their perspective, leadership, connections, and ability to disseminate information and positively promote the project in the community. Members were consulted regularly in the early stages of the project to stimulate community participation, and focus groups met twice to provide landowner and resident input on strategy development.

Technical Teams. The role of the Technical Teams was to bring the best expertise and interdisciplinary peer review to the planning process. Technical team members are selected for their expertise in specific

[39] A full list of team members is provided in Appendix III.

areas critical to the Corridor study area and included a broad range of scientists, conservation practitioners, planners, and policy-makers. Two technical teams -- the Science Technical Team and the Planning Technical Team -- were formed early in the process and later merged into one team. Teams were convened three times, twice to develop and fine-tune an effective set of strategies for the Corridor.

Community Workshop Participants. The last, but perhaps most important group of people engaged in the planning process was local residents. Community workshops (7 total) and field trips (3) were utilized to promote community knowledge, understanding and support for the project, and to gain community input to insure its effectiveness, acceptance, and feasibility. Workshops were open to the public, and were advertised through mailings to landowners, announcements in local newspapers and newsletters, postings at local businesses and bulletin boards, and through the efforts of the TNC Outreach Coordinator and the Outreach Team.

The work of these teams constitutes the core of the results presented here. The TNC project manager prepared, convened, and presented or facilitated each meeting and workshop, and collected, documented and incorporated the results while the TNC outreach coordinator provided continuous outreach and connection within the community as needed to complement and insure the success of community workshops. The Nature Conservancy's protection and conservation staff participated in the planning process as team members. Core and Advisory Team members were also invited to participate in technical team workshops and meetings. Various team members were also consulted individually -- by phone, email, or in person -- to provide more detailed input or assistance in specific areas of expertise.

In addition to these team efforts, the services of a Geographic Information Systems (GIS) intern/contractor and a Socio-Economic Analysis (SEA) intern were required to complete the analysis and mapping needed to support the work and recommendations of the teams.

GIS analysis and mapping played an integral part of the planning process. Many of the indicators used to measure conservation target viability were selected in part because of the availability of GIS data for them and the capacity of one or more of the participating agencies to track and measure these indicators over time using GIS analysis. GIS mapping and analysis were used at every step -- from identifying the study area and its land uses/features, to designating priority areas for conservation. For the first half of the project, GIS support was provided by TNC GIS intern Emily McKenzie; for the second half of the project, GIS support was provided by contractor Lori Schnick, a University of Delaware graduate student and part-time employee of the Water Resources Agency. Core science team member Rick McCorkle of the U.S. Fish & Wildlife Service Delaware Estuary Program also provided invaluable GIS analysis for forest habitat quality indicators. Managing and updating data sets was a challenge (see sidebar.)

The Information Challenge: A Moving Target

Data analysis and collection was ongoing throughout the planning period and even as this report was being written -- as were attempts to constantly improve the analysis as better data became available. The study area boundary was similarly improved along the way, as more was learned about the area. Since it was not always feasible to go back and re-run all analysis every time better data became available, these slight differences between data are reflected in some maps and calculations. For example, a slightly better version of forest cover data was used in later analysis (like patch isolation) than was used originally (like forested buffer.) Minor differences on maps and in calculations are, to the best of our knowledge, attributable to this.

SEA analysis (and related mapping) also played an important, albeit less integrated, role in the project. Developing a profile of the community, it's socio-economic status, and the values of Corridor study area resources use was a critical part of the project. A set of community values was identified by participants in spring community meetings and developed into a community target with measures using Census data research/analysis. The results were related to land uses and natural resources to develop a set of key attributes for what the community values. This analysis was completed by socio-economic intern Anthony Hanna -- a graduate student at the University of Delaware's Geography Department who worked under the guidance of the TNC project manager Jennifer Adkins and UD professor John Mackenzie. This analysis was crucial to providing a clearer picture of the local population and it's values, and integrating them in the plan with other conservation targets.