

Bounty

—Sustaining wildlife habitat and populations maintains natural system services

The climate and geology of the eastern United States created the eastern deciduous forest which has evolved for over 14,000 years—since the last Ice Age. These are some of the most biologically diverse forests in the nation. More than 99% of the pre-settlement, old growth forests are gone. The natural integrity of the native forest remained intact until the 1850's when much of the pre-settlement forests were clear cut.¹ What exists today, are second growth forests. Today, only 40% of the forests are capable of producing enough habitat to support healthy populations of many migrating forest dwelling birds. Over 40% of the birds migrating in the Atlantic Flyway are in conservation need, meaning they need more habitat to sustain their populations.² Future forests will not likely have the same species mix as Penn's Woods. Oak trees are the most voluminous and ecologically important trees in today's forests, but in many places, the numbers of oak seedlings and saplings are insufficient to replace existing forests.³



A habitat provides the food, water, shelter and nesting sites that animals need to live and reproduce. Animals live at all levels of a forest, so habitat has multiple levels of canopy and understory trees, shrubs, grasses, ferns and wildflowers. The diversity of species in native forests is high. This mix of species of all types is called biological diversity.

Insects, invertebrates, birds, butterflies and animals don't eat non-native plants unless they have nothing else to eat. The chemicals, fats and nutrients don't taste good to them and don't

¹ Conservation Fund, 2006. The State of Chesapeake Forests. U.S Forest Service.

² National Audubon Society, Annual Report 2012.

³ Conservation Fund, 2006. The State of Chesapeake Forests. U.S Forest Service.

provide the levels of fats and proteins they need to sustain themselves. According to Doug Tallamy in his book *Bringing Nature Home*, native plants have 29 times the biodiversity of non-native plants. Without our native insects, invertebrates, birds, plants and animals, our natural systems don't function properly. As a result, municipalities are forced to raise taxes to replace these services. Before we know it, we will have lost the trees and the natural communities that brought us here in the first place.

The biggest threats to biodiversity in Pennsylvania are the destruction and fragmentation of wildlife habitats through development and the introduction of invasive, non-native species. An out-of-balance white-tailed deer herd is the third major threat in some areas. Invasive pests and plants have permanently altered the native biological diversity of our landscapes and the habitats they provide. The continued introduction of non-native species is a serious concern that could have significant consequences.

A major cause of fragmentation and introduction of invasive plants is development. In 2009, the fastest growing crop in the Chesapeake Bay Watershed was not soybean or corn, it was turf grass.⁴ While sprawl has slowed down, due mostly to the economy and changing demographics, one of the major contributors to stormwater and flooding problems is growing faster than main street's knowledge about stewardship. Lawn does almost nothing to support wildlife, and chemical use on lawns has seriously hurt wildlife populations. Even suburban areas can contribute to habitat restoration if grass is replaced with native trees, shrubs and wildflowers. A program which allows for conservation zoning and backyard habitat design can go a long way to replace habitat and enhance natural system services.⁵

The majority of remaining forests are small patches, less than 1,000 acres, an indicator of the low amount of interior forest and the problems that this creates. Nearly all land animals and plant species evolved in forests with interior conditions, protected from the effects of extreme weather and predation where forests are exposed along the edges—like farmland or development. Some species have adapted to the loss of interior forests, but many have not and are threatened by its continuous loss, due to fragmentation.⁶

As forest patch sizes decrease due to development, patches become more isolated and forest dependent animals, especially rare species, may decline below the threshold needed to avoid inbreeding, and maintain breeding dispersal and migration. In addition, maintaining forests as an economic resource becomes more difficult as forest patches get smaller.

⁴ Chesapeake Bay Stormwater Network, 2009, The grass crop of the Chesapeake Bay Watershed, Bulletin no. 8.

⁵ John Rogers, 2015. Nature is Serious Business, *Designing With Natives*. DWTN.net

⁶ Conservation Fund, 2006. The State of Chesapeake Forests. U.S Forest Service.

The ability of individual plants and animals to move through a landscape helps maintain regional populations of insects, animals and birds in the short term, and shifts their geographic range in response to climate change.⁷ This process is called “habitat conductivity.” Sustaining species populations over time helps maintain natural system services and the economic benefits they provide. It also makes these systems more resilient to climate change.⁸ Without connected habitats and corridors, the full value of open space may not be realized and these precious benefits may be significantly diminished or lost forever.

Across Pennsylvania, the survival of game birds and mammals, supports a \$5.8 billion annual recreation industry—but this depends on the continued well-being of some of our most obscure, least understood species. Wildlife and bird watching are the fastest-growing outdoor activities and in Pennsylvania, people annually spend more on wildlife watching than on either fishing or hunting. In 2011, Pennsylvanians spent \$1.9 billion on wildlife watching alone. Many more people enjoy the outdoors while walking, biking, kayaking, watching butterflies and gardening in their own backyards. Although Pennsylvania still enjoys a rich diversity of fish and wildlife, many species have already been lost and many more are in jeopardy.

Today, landowners and communities have a responsibility to repair degraded and damaged habitats through restoration, enhancement and protection. This includes creating natural corridors, replacing invasive plant species with native ones and implementing best management stewardship practices. Restoration can be done at a watershed or backyard scale. It is very cost effective to invest in habitat and green infrastructure. Natural system restoration has shown investment returns in Pennsylvania of \$7 and \$13 for every one dollar spent.^{9 10}

More work needs to be done to make environmental stewardship part of local community culture. Only then can residents and policy makers ensure a foundation for a vibrant, balanced economy, high quality of life, low cost of living and good health and well-being for future generations. *Our responsibility today is not just to preserve existing habitat, we need to manage it so it can regenerate and expand the natural system services provided by nature.*

⁷ Heller & Zavaleta 2009. Review Biodiversity management in the face of climate change: A review of 22 years of recommendations. Science Direct.

⁸ U.S. Environmental Protection Agency. 2012. The Economic Benefits of Protecting Healthy Watersheds. EPA 841-N-12-004.

⁹ Department of Recreation, Park and Tourism Management, The Pennsylvania State University Keystone Fund Report; www.tpl.org/Pennsylvania; (2012). *The Economic Significance and Impact of Pennsylvania State Parks: An Updated Assessment of 2010 Park Visitor Spending on the State and Local Economy, 2012*;

¹⁰ Trust for Public Land, (2013). Pennsylvania’s Return on Investment in the Keystone Recreation, Park, and Conservation Fund, DCNR

The Role of Suburban Habitat

Can trees in a suburban area help maintain bird populations? The answer is yes. Large, protected and connected natural habitats (nodes) are often the foundation for any regional green habitat network. This is sometimes called “green infrastructure.” Parks, trails, greenways and other open spaces can link natural communities to each other and to the regional landscape matrix.¹¹ When it comes to protecting sustainable populations of wildlife, size does matter and bigger is better. Shape counts too.¹² Suburban neighborhoods can provide the added forest, field habitat and buffers to help sustain both edge and interior bird populations.

As mature forests become fragmented from roads, transmission lines and pipelines, less habitat is available for breeding birds. A variety of factors, such as increased brood parasitism and nest predation result in lower reproductive success in the habitat that remains.¹³ Thus, forest fragmentation not only causes a net loss of habitat, it can also reduce the suitability of remaining habitat in a region.

Characteristics of a forest that can determine its quality as bird habitat include the size and shape of a forest patch, how isolated the patch is from other forests, how much forest remains in the surrounding landscape, the land-use matrix and how much edge habitat exists nearby. Most of these characteristics are interrelated, so it’s difficult to change one without affecting another.

Not all species are sensitive to the size of an area. Some, like cardinals, live along edges. Some birds like pheasants, live in shrubby areas. Bob whites and Indigo buntings live in grasslands. The greatest diversity can occur when there are enough large, native habitat areas (7,500 acres) with edges for all species to breed successfully. Forest patches that are too small may not offer enough interior habitat to sustain breeding individuals. Similarly, a forest in the shape of a long corridor or peninsula does not offer as much interior habitat as a circular or square forest. When large areas exist, smaller, nearby forested habitat areas (125-500 acres) become important to bird breeding success.¹⁴ When larger habitats exist, species like Scarlet Tanager can nest successfully in smaller forested areas nearby. We see this in the highly-developed Pennypack Watershed where Scarlet Tanagers are still seen.

¹¹ Denworth, J. J. Keene, B. Kaufman and J. Rogers. 1991, Guiding Growth, Building Better Communities and Protecting our Countryside, Pennsylvania Environmental Council.

¹² Jones, C., J. McCann, and S. McConville. 2000. A guide to the conservation of forest interior dwelling birds in the Chesapeake Bay Critical Area. Chesapeake Bay Critical Area Commission, Annapolis, MD. 63 pp.

¹³ Rosenberg, K. V., R. W. Rohrbaugh, Jr., S. E. Baker, J. D. Lowe, R. S. Hames, and A. A. Dhondt. 1999. A land manager’s guide to improving habitat for Scarlet Tanagers and other forest-interior birds. Cornell Lab of Ornithology, Ithaca, NY. 23 pp. PA. James Hallet. 2001. First genetic evidence that animals use corridors (adopted from Society for Conservation Biology, 2001).

¹⁴ Same as 3 above.

Studies have shown that animals use habitat corridors and that species diversity is greater in areas connected by corridors than in those which are not.¹⁵ Berry-eating birds have been found to transfer more plant seeds between habitats that are connected than those that are not.¹⁶ Other studies have shown that corridors are used by rodents, butterflies and birds.¹⁷ Forest corridors provide crucial migratory routes for songbirds, some of which are now threatened, due to loss of habitat.¹⁸ Also, many ecologically-important species use riparian corridors.¹⁹

Riparian forests offer a tremendous diversity of habitat. The layers of habitat provided by trees, shrubs and grasses and the transition of habitats from aquatic to upland make these areas critical to the life stages of more than one-half of all native species. Protecting stream corridors is very important in maintaining habitat.²⁰

Streams that travel through woodlands provide spawning habitat for fish. Trees and woody debris provide valuable cover for small fish and other aquatic organisms along the water's edge. Degradation of any portion of a stream can have profound effects on living resources downstream. While the overall impact of these riparian forest corridors is greatest in headwaters and smaller order streams, there is a clear link all the way downstream.

While neighborhoods will not be able to become surrogates for natural forest habitat and support all the species that live there, they do provide several key features.

- Increase habitat and provide successful breeding opportunities for a wide variety of birds.
- Provide food sources for many migrating birds.
- Supplement the size of existing protected natural areas and parks increasing their overall size.
- Provide an additional buffer for interior dwelling species in existing protected natural areas and parks.

¹⁵ E. Damschen, John Orrock. 2008. How wildlife corridors work over time. National Academy of Science (on-line Dec 1).

¹⁶ Boker B. J. Tewskbury, S. Sargent and N. Haddad. 2005. Landscape Corridors Provide for Seed Dispersal: Birds help habitats maintain diversity; *Science Daily*, July 7, 2005.

¹⁷ E. Damschen, John Orrock. 2007. Do wildlife corridors work? Studying butterflies and fragments of open space. Ecological Society of America. *Science Daily*, December 4, 2008.

¹⁸ B. McRea, P. Beier 2007. Innovative Model Connects Circuit Theory to Wildlife Corridors. Northern Arizona University. M. Holland 2008. Designing wildlife corridors: Wildlife need more complex travel plans; *Nature*, Oct .

¹⁹ Lowrance, R., L.S. Altier, J.D. Newbold, R.R. Schnabel, P.M. Groffman, J.M. Denver, D.L. Correll, J.W. Gilliam, J.L. Robinson, R.B. Brinsfield, K.W. Staver, W. Lucas, and A.H. Todd. 1995. Water Quality Functions of Riparian Forest Buffer Systems in the Chesapeake Bay Watershed. U.S. EPA Chesapeake Bay Program. EPA 903-R-95-004 CBP/TRS 134/95. 67 pages. Environmental Management. Vol. 21: 687- 712.

²⁰ Lynch, L. Economics of Riparian Buffers - Talk given September 1998. Maryland Cooperative Extension. College Park, MD. 9 pages. See related publications: When a Landowner Adopts a Riparian Buffer - Benefits and Costs. <http://www.riparianbuffers.umd.edu/PDFs/FS774.pdf> and Riparian Buffer Financial Assistance Opportunities. <http://www.riparianbuffers.umd.edu/fact/FS769.html>.

- Ensure the continuation of natural services that help clean the air and water.
- Maintain the biological capacity and natural life support systems.
- Provide close access to nature for many adults and children.
- Reduce the need for expensive stormwater management, potable water treatment, flood control and restoration projects by protecting water resources including streams, wetlands and riparian corridors.
- Maintain community character and ecological address (sense of place).
- Provide a green regional image and beautiful vistas.

For more information see: Beautiful habitat while you decrease the size of your lawn (DWTN.net)

The following indicators can be used to track and design great habitat.

- The percentage of canopy covering the site. 60% or better is the goal.
- Vegetation layers that are present on the site, i.e., canopy, understory, shrubs, grasses and wildflowers. Having all four levels present is the goal.
- The percentage of native species covering the property. 60% is the goal.
- The number of different native plant species present on the property. Having more than 25 species is the goal.