

**OVERVIEW:**

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**HABITAT CONSERVATION**





## Chapter 1:

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# Ecosystems for Pennsylvania Birds

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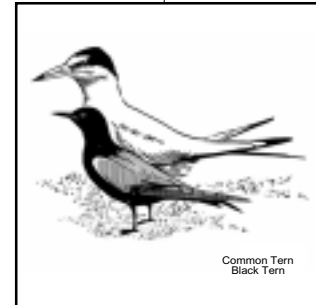
**T**HE word Pennsylvania literally means “Penn’s woods.” More than two centuries after it was named, the Commonwealth retains its sylvan character, especially in its mountainous and rural counties. Forests are the dominant habitat in the state, covering almost 17 million acres, or about 60 percent of the land area. These forests are the state’s major contribution to North American bird populations. The state’s other natural communities add complexity to its mosaic of bird habitats. Wetlands, rivers, thickets and barrens provide a wide diversity of habitats for nesting birds. All of these habitats are important migratory stopover places too. The variety and richness of the state’s bird populations reflect the relative health and diversity of its ecosystems.

## Geographic Review

Several Important Bird Areas (IBAs) are situated in large, contiguous forests. Large-scale forested landscapes support large and productive

forest bird populations. Hickory Run State Park is one of the largest contiguous forest stands in the northeastern counties. At the edge of the Poconos, it contains a mix of forest types, ranging from oak-hickory in the drier and more exposed sites to hemlock and spruce woods in shadier and more protected locations.

The large extent of forest at Hickory Run supports many Neotropical forest interior birds in large numbers. Hickory Run has large numbers of Ovenbird and Wood Thrush. On the Allegheny Plateau, Ricketts Glen State Park, Wyoming State Forest and Pine Creek Gorge are all substantial blocks of forest. The most extensive forest tract in Pennsylvania is the Allegheny National Forest. Two sections of that forest are listed as IBAs: Tionesta National Scenic and Research Area (NSRA) and the Hickory Creek Wilderness, including Heart's Content. Although the forests are mixed, the Allegheny Plateau is mostly northern hardwood forest with hemlocks and pines.



The southern half of the state is more dissected by roads, cities and agriculture. Its forests are islands of bird habitat, sometimes surrounded by a human landscape. In the southwest, the Youghiogheny River drainage, including Ohiopyle State Park, supports large songbird populations only a few miles from Pittsburgh. Occasionally, one of the state's rarest breeding birds, the Swainson's Warbler, has been found spending the summer in the dense thickets of the Youghiogheny Valley near Ohiopyle. The southeast and south-central sections have few large-scale forests, so Gamelands 211 (St. Anthony's Wilderness) and South Mountain are key areas for forest birds in those parts of the state.

The long ridge lines of the Appalachian Mountains are a striking geographical feature of the Keystone State. On a Pennsylvania map, these mountains are long green brushstrokes of forest habitat, sweeping across from the Delaware Water Gap down to the Maryland and West Virginia borders. The mountainside forests along these ridges are home to woodland birds that have declined in more heavily developed areas of metropolitan northeastern and Mid-Atlantic states. Red-eyed Vireos, Wood Thrushes, Ovenbirds and Scarlet Tanagers are among the most common nesting species of these deciduous and mixed forests.

## Diversity Threatened by Fragmentation

The Keystone State is especially important to a legion of eastern deciduous forest species. Pennsylvania is home to approximately 17 percent of the nesting population of Scarlet Tanager and 8.5 percent of Wood Thrush (Rosenberg and Wells). High densities of all these species have been documented in Pennsylvania, even where Gypsy Moth caterpillar defoliation has affected the appearance and profile of the forest. These densities compare favorably with bird study plots positioned elsewhere in the Northeast.

Some species are present on the hillside forests, but in smaller numbers.

The oak-hickory hillsides of the Susquehanna Riverlands and Hawk Mountain support Worm-eating Warblers, but not in high densities. Their large territories encompass several territories of the similarly-sized Red-eyed Vireo or Ovenbird in the same plot. The Worm-eating Warbler is one of the species most frequently cited as an area-sensitive forest bird.

Area-sensitive forest species need larger forest tracts to maintain viable populations. Most forest-interior species tend also to be sensitive to habitat size and shape. Species that are more likely to have higher densities in large tracts of forest tend to be single-brooded, open-nesting Neotropical migrants. This “life-style choice” makes this group vulnerable to nest failure from predation or disturbance. Blue-gray Gnatcatcher, Northern Parula, Cerulean Warbler and Louisiana Waterthrush have less than a 40 percent chance of occurring in forests greater than 3,000 hectares (ha.), even when well inside their breeding range. Wood Thrushes and Ovenbirds have greater breeding success where forests are in larger fragments. Presence or relative density of Wood Thrush, Ovenbird and other forest birds may not indicate nesting success in smaller wooded habitat fragments, which may act as “sinks” where birds are found, but do not successfully reproduce.

### Pennsylvania's Forest Interior Species

Whip-poor-will	Yellow-throated Warbler
Yellow-bellied Flycatcher	Cerulean Warbler
Acadian Flycatcher	Black-and-white Warbler
Brown Creeper	American Redstart
Blue-gray Gnatcatcher	Prothonotary Warbler
Veery	Worm-eating Warbler
Swainson's Thrush	Swainson's Warbler
Hermit Thrush	Ovenbird
Wood Thrush	Northern Waterthrush
Yellow-throated Vireo	Louisiana Waterthrush
Red-eyed Vireo	Kentucky Warbler
Northern Parula	Hooded Warbler
Black-throated Blue Warbler	Canada Warbler
Black-throated Green Warbler	Scarlet Tanager
Blackburnian Warbler	

The larger-scale forest fragments of Pennsylvania make it a very important state to the continued success of many eastern deciduous forest birds. In fact, the forests of Pennsylvania may be “rescuing” the highly fragmented forest population by continually providing new birds in the large “source” habitat.

At one time, essentially all of what is now Pennsylvania was covered by a vast forest. Little remains of that original forested landscape;

approximately 4,200 ha., less than 0.1 percent of the state's standing forest, is considered "old growth" or "primary" forest. Pennsylvania's old-growth forests are confined to approximately 51 sites in 36 counties. At least seven IBAs contain stands of old-growth forest. These sites are examples of outstanding old forests that are known to harbor high breeding-bird populations and diversity. All old-growth IBAs are part of extensive forests and have the potential to serve as core reserves and bird population sources.

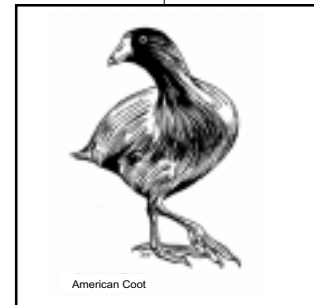
## The Value of Old-Growth Forest

The definition of "old growth" is controversial, but changing as researchers explore the attributes of undisturbed forested ecosystems. The appearance of old-growth relies on topography, soils, local geography and the dominant tree species. Since various forest types may express their age differently, it's difficult to encapsulate all kinds of old-growth forest in a simple definition or description. For many people, old-growth forests are those "that existed since settlement by Europeans and have not been directly disturbed since that time," an idea somewhat synonymous with "virgin," "primary" and "original" forests. Although somewhat vague, the definition of old-growth forests as "relatively old and relatively undisturbed by man" covers the range of forest types. Pennsylvania's old-growth forests have the following traits:

- vertical diversity as a result of diverse tree species and sizes;
- some large trees;
- large, standing dead trees (snags) and large logs (downed boles);
- and, patchiness associated with small scale disturbances and death of individual dominant trees.

Uneven age structure and canopy complexity are key characteristics of the state's remaining old-growth. Some old-growth stands have patches of shrub cover or young trees, especially along streams or in blowdown clearings. These structural features contribute to high breeding population numbers of several bird species found in Pennsylvania's premier old-growth stands.

The two largest Swainson's Thrush populations occur in Allegheny National Forest's old-growth: the Tionesta NSRA and Heart's Content. Once common in portions of northern Pennsylvania, findings of Swainson's Thrush were confined to 43 blocks during the surveying of the state for the Breeding Bird Atlas; this species has not been consistently present at many locations in years since. Swainson's Thrush is more than 40 times more abundant in old-growth stands than in managed, younger forests of the region. A few of the state's old-growth hemlocks are essentially the only locations that regularly support this species. This species of special concern can be one of the most common breeding birds in Pennsylvania's old-growth hemlock forests, suggesting a much higher state population in pre-colonial days.



The nesting densities of some Neotropical migrants can be dramatically high in old-growth. For instance, Blackburnian Warbler averaged 82.8 pairs per 40 ha. in six Pennsylvania old-growth stands, while Magnolia and Black-throated Green warblers averaged 40.2 and 35.33 pairs per 40 ha., respectively. Old-growth hemlocks support large populations of Brown Creeper, a species indicative of older forests. Uncommon breeding birds associated with northern climates are found in some old-growth. The Yellow-bellied Flycatcher used mossy areas in Tionesta. Ricketts Glen State Park and Cook Forest State Park support nesting Golden-crowned Kinglets and Red-breasted Nuthatches. The Winter Wren regularly nests among the large roots of ancient hemlocks and pines in most of the state's old-growth, including Alan Seeger and Detweiler's Run Natural Areas of the Thickhead Natural Area, Cook Forest State Park and Allegheny National Forest sites. The moist character of streamside hemlock old-growth is attractive to species like Acadian Flycatcher and Louisiana Waterthrush, both forest-interior species with a more southerly distribution. Even when natural disaster strikes old-growth, the windthrows create the gaps and uneven ground acceptable to nesting Dark-eyed Junco and Hermit Thrush. Canada Warbler and Black-throated Blue Warbler are common where there is a well-developed shrub layer. Large snags attract Chimney Swifts, suspected to nest in the Tionesta blowdown and other isolated large snags in Pennsylvania's older forests. An Olive-sided Flycatcher displayed territorial behavior in an unmanaged blowdown area next to an old-growth forest where snags persisted. This Neotropical migrant, which spends the winters in South American montane forests, has declined throughout much of its range; it has not been found nesting in the state for more than 60 years.

Most discussions of Pennsylvania old-growth center on northern hardwood, hemlocks and Eastern White Pines, because very little oak or hickory old-growth remains. What still exists is in small fragments. The huge trees that characterize old-growth are extremely productive of mast. Hundreds of pounds of acorns, hickory nuts and beechnuts are produced by old-growth stands. At one time this also included American Chestnuts, probably the most important winter food for most Pennsylvania wildlife in pre-colonial Pennsylvania.

This large mast production benefited many bird species, including the Passenger Pigeon. The devastation of the nation's old-growth forest and the consequential disruption of mast production alone may have led to the extinction of what was most likely the most abundant bird on the continent. Some of the last large "encampments" of nests and flocks of Passenger Pigeon were observed only a few miles from two IBA sites: Hickory Creek/Heart's Content and Tionesta NSRA.

Predatory birds are also part of old-growth bird communities and large-scale forests. Northern Goshawk (Candidate - Rare) and Barred

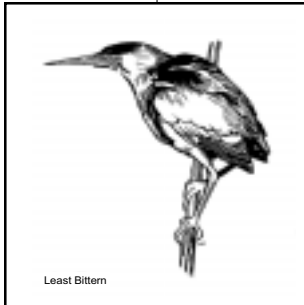
Owl both nest in some of Pennsylvania's old-growth. Both species require large forested areas and declined earlier this century due to deforestation and, in the case of the Goshawk, persecution. The Red-shouldered Hawk is also found in mature forests, from high elevation old-growth to riverside forests of the southern counties.

## Riparian Forests Diminished by Development

Riparian forests are not well represented on Pennsylvania's public lands. Few state gamelands, state parks, or state forests contain sizable stream-side forest. Some IBAs were selected, at least in part, because they contain this important ecosystem. One of the most outstanding examples of riparian forest is Enlow Fork of Wheeling Creek on the border between Washington and Green counties. In a well-developed section of the state, it's a relatively remote site, difficult to access. Its rich understory of wildflowers attracts naturalists and birds alike.

The Commonwealth contains significant portions of three river systems: the Allegheny/Monongahela/Ohio, the Susquehanna, and the Delaware. Although these rivers potentially demark large riparian forest, the landscape around rivers is greatly impacted by development, including road-building and damming of waters over flood plains. European settlers followed rivers deeper into the interior of the colonies and found the flood plains suitable for habitation. They cut huge trees and plowed the deep, rich soil. Paths and canals, and then railroads and paved roads, rapidly spread civilization along each waterway. This led to prosperity, industrialization and development along the Keystone State's rivers, but ecosystem destruction was the inevitable result. As a consequence, most forests along the state's larger rivers are greatly disturbed and highly fragmented.

The Susquehanna Riverlands has almost a mile of riparian forest on both sides of the river, including an island with large trees. Yellow-throated Vireo and Warbling Vireo are two of its most common breeding birds, inhabiting the tops of the large sycamores and Silver Maples along its shore. The abrupt 'pit-suh' of the Acadian Flycatcher and ascending buzzy trill of the Northern Parula are common sounds in riparian forests. The Louisiana Waterthrush also needs riparian forest with high canopy. The rich undergrowth that characterizes the deep soil of riparian forests lends diversity to the forest and supports many ground-foraging birds. Deer over-browsing of understory plants and tree seedlings however, can diminish the diversity of vegetation and forest structure that support many songbird populations. Seasonally flooded riparian forests, such as Cussawago Creek Bottoms, are extremely rare in our highly-developed state. Wood Ducks thrive in such places. So do many songbirds that have declined near lowland metropolitan areas where this habitat has been swallowed up.



In the southern counties, riparian forests have a rich diversity of birds. One of their summer residents, the Cerulean Warbler, is one of the most severely declining Neotropical migrants. Its numbers have not been declining dramatically in Pennsylvania, but the state holds some responsibility for keeping the range of the species intact. In Pennsylvania, the Cerulean Warbler is most commonly found in the western counties and especially on wooded hillsides near and along streams. Ceruleans are especially sensitive to forest fragmentation. Yellow-throated Warbler is also associated with riparian forests, especially in the southern and southwestern counties. It has been found primarily in tall American Sycamores or White Pines along streams. Kentucky Warblers reside in forest bottomlands where Spicebush and many wildflowers grow in profusion. The future of these warblers and other riparian forest birds may rely on conservation efforts on behalf of this ecosystem in the face of developmental pressure.

## Boreal and Conifer Habitats Contribute to Diversity

Bogs and conifer swamps are gems of biodiversity. History has left us few boreal bogs and swamps in the state. The few that are left often support a large diversity of birds. A few Important Bird Areas have been selected because they represent this greatly diminished bird habitat. The combination of forest, shrubland, dense fern growth and patchiness creates great micro-habitat diversity, which, in turn, attracts a wide variety of species. Boreal and northern conifer swamps are especially attractive to Pennsylvania's rare nesting species. This is the home to one of the state's rarest breeders, the Yellow-bellied Flycatcher. This Pennsylvania-threatened species nests in dense mats of sphagnum moss, often under the thick cover of shrubs and ferns. Its cohorts are the Northern Waterthrush, Canada Warbler and White-throated Sparrow, all low-nesting species more common north of the state. Conifer swamps, including hemlock-dominated headwater wetlands, contribute to the regional biodiversity of mostly deciduous forests that cover the northern counties. Pockets of conifers add Red-breasted Nuthatch, Golden-crowned Kinglet, Magnolia Warbler and Blackburnian Warbler to the bird lists of several state forests and gamelands.

Conifer swamps and bogs are greatly diminished since the great timbering of the late 19th and early 20th centuries. Early in this century, Yellow-bellied Flycatchers were breeders in Poconos mountain bogs and swamps, but have not been confirmed nesting in that region for more than 60 years. Destruction of these swamps has diminished the range of this flycatcher and many other northern species in Pennsylvania. The Olive-sided Flycatcher was once widespread in forests, near ponds and in burned-over areas across the northern half of the state, but has not been confirmed nesting for more than 60 years.

## Forest Recovery Forecast

There is hope for northern forest recovery in Pennsylvania. Many of the most important wetlands are owned by state agencies and are protected. Some rare species have staged recoveries or have been discovered in various remote locations. Yellow-bellied Flycatchers have produced young in five locations across the northern tier in the last ten years. In two boreal conifer swamps, Blackpoll Warblers have been observed breeding in the 1990s for the first time in history. Red Crossbills have nested or attempted to nest in some conifer stands. In the Poconos, lands such as the Long Pond macrosite, Pocono Lake Preserve and the Promised Land State Park/Bruce Lake area provide the basis for long-term northern bird population recovery.

## Barrens Are Barren in Name Only

Special ecosystems called barrens, which have attributes of forest shrubland and grasslands, usually occur as a result of poor soil conditions caused by thin soil, rocky deposition, or high concentrations of metals. Since fire regenerates barrens, this ecosystem is threatened by fire repression. The barrens are also threatened by the spread of exotic plants like Ailanthus, Multiflora Rose and Japanese Honeysuckle, which aggressively replace native vegetation.

Barrens can contain grassy areas that support typical grassland birds. The Greater Prairie-chicken once nested in the barrens of the Poconos and York County, but became extinct due to overhunting. Its existence in pre-colonial Pennsylvania provides evidence that barrens are an important native bird habitat as well as a vital habitat for rare plants and insects. They are, in effect, early successional forests held back from normal plant succession by poor soil and fires.

The “barrens” found on serpentine shales or terminal moraines might have looked barren to those that settled them, but not to botanists and ornithologists. The patchy and grassy barrens are host to many early successional or shrub birds declining in other parts of the state. The Prairie Warbler got its name from the prairies of the pioneers, and is still locally common in such habitat. The Golden-winged Warbler is also commonly found in pine-oak barrens, even at fairly high elevations in the Poconos. Its close relative, the Blue-winged Warbler, is more commonly found in barrens and early successional forests. Black-and-white Warblers climb the limbs of the small trees that dot the barrens landscape and nest on the ground under the many shrubs. The sweet chipping heard in Pitch-Pine barrens may be a singing Pine Warbler, not a Chipping Sparrow.

Heath, whether found on mountains or in bogs, is a valuable bird habitat. In structure, it bears some resemblance to barrens habitats and shares some of the same birds. The dense, low vegetation is a luxurious home for many birds that have declined in the state as a

whole. Common Yellowthroats and Rufous-sided Towhees abound in the brush. Although towhees have declined in the northeastern states, they're abundant in Pennsylvania's heaths and barrens. Any walker in the barrens is followed by the "che-wink" of the friendly towhees, which have disappeared from areas where heath, thickets and shrubland have been replaced by shopping malls and subdivisions. At night, the che-wink of the towhee is replaced by the echoing whistles of Whip-poor-wills, a locally abundant bird of barrens, heaths and forest openings. The Whip-poor-will may have abandoned some of the farm country of old, but is still common in extensive tracts of young forest, recovering clearcuts, and heath.

In moist heathlands Canada Warbler can be locally abundant, although it's considered a rare breeding bird in the state. It is found in laurel thickets along streams even at lower elevation sites, like the Hook Natural Area and Detweiler's Run. White-throated Sparrows are frequent companions of Canada Warblers in higher elevation heaths and bogs. They remind Pennsylvania of lands up north with their singing refrain: "Oh, Canada!"

Thickets of blackberry (*rubus* spp.) and other shrubs are beneficial to many bird species. Entering such habitats is such a thorny issue that many birders do not give them the attention they deserve. The related Gray Catbird and Brown Thrasher are just two of the species found in thickets that have declined in Pennsylvania in recent years. Large shrublands and thickets are the setting for the spectacular displays of the Yellow-breasted Chat, the largest and oddest American warbler. The Yellow-Breasted chat has declined in Pennsylvania and northern West Virginia, perhaps parallel with the availability of its unappreciated habitat.

## Grassland Species in Trouble

Grasslands support an array of birds with distributions not centered in Pennsylvania. As a whole, grassland birds are declining more than any other group of Pennsylvania birds. Even relatively common and widespread grassland and early succession habitat species such as Field Sparrow have been declining in recent years. Native grasslands, ephemeral habitats in Pennsylvania, were probably maintained in part by fire regimes imposed by native Americans. Most grassland birds are opportunistic colonizers of newly created habitat. Although Pennsylvania was primarily forested in pre-colonial times, apparently grassland birds were fairly common in settled sections of the state in the times of Wilson and Audubon. This includes Dickcissel, a bird more commonly associated with the tallgrass prairies of the midwest, capable of colonizing old fields and reclaimed strip mines of the Eastern Seaboard and Mid-Atlantic states.

The IBA project has included a few grassland sites, featuring the rarest breeding birds in the state. Short-eared Owl and Upland Sandpiper

are found in only a few locations, including Piney Tract (Mount Zion) of Clarion County. Piney Tract also supports at least 100 pairs of Henslow's Sparrow. Henslow's Sparrow is declining throughout the United States, where it's considered a migratory non-game bird of management concern. Pennsylvania's Henslow's Sparrow population may be vital for the continued existence of this species in this part of the country. Popular grassland birds such as Bobolink and Eastern Meadowlark are found in larger tracts of grassy habitat, often where mowing is delayed in the season or deferred for another year. Rank growth and some woody vegetation grows in open fields that support a diversity of grassland birds, including the rarer and declining species, such as Henslow's Sparrow.

The Loggerhead Shrike (PA-Endangered) is almost extirpated from the state. Shrikes are unusual songbirds in their predatory habits. They once existed in some western tier counties, but are now confined to a few locations in Adams and Franklin counties. The savanna-like parkland and farmland that support Loggerheads are facing development pressure in the state's southern counties. Road fatalities have been an important negative factor for the shrikes, especially in winter. So, natural habitat features may not be the only factors limiting the shrike populations.

The so-called grassland habitats that exist in the state today are generally poor imitations of the real thing. Most larger grassland sites are reclaimed strip mines or agricultural areas. Reclaimed strip mines have significant pollution problems with negative impacts on stream and groundwater health in the area. The excavation of strip mines invariably destroyed native habitat. Reclaimed strip mines rarely approximate the original natural state. Agricultural areas often imitate the characteristics of native grasslands, but mowing cycles and constant disturbance of hayfields and row crops creates population sinks for grassland birds. Birds are attracted to the areas, but have their nesting cycle disrupted and often have their nests or young destroyed. Hence, Upland Sandpipers, Bobolinks, Eastern Meadowlarks, and Grasshopper and Henslow's sparrows are drawn into the mower blades. The majority of grassland birds are attracted to and are more successful in older hayfields and meadows where forbs and some woody vegetation have been allowed to grow. Field age is one of the best predictors for grassland bird diversity and appearance of those species that have been most often cited as declining.

Although not often thought of as a grassland bird, the Northern Bobwhite is another victim of the decline in grassland habitat size and quality. A few Bobwhite still breed in the stateline barrens of Chester County and perhaps a few other locations in southern counties. This familiar bird has almost disappeared as a naturally occurring breeding species in the state. Habitat improvements made on private lands for popular grassland gamebirds, Northern Bobwhite and the exotic Ring-necked Pheasant, might indirectly boost the success of several grassland



songbird species.

Restoration and responsible, long-term management of grasslands should be a high priority for bird conservation in Pennsylvania. The warm-season grass programs have the potential for improving grassy habitat for birds. For this program to bear the most fruit, diversity of grasses and creative management techniques will be necessary. Native grassland birds thrive in a wide diversity of micro-habitats within grasslands, including large stands of tallgrass and greatly disturbed grass with large barren spots. These extremes exist on native grasslands. Large grasslands might be necessary to attract and maintain many uncommon grassland species. There are few grassland IBAs in Pennsylvania because large-scale, long-term grassland bird management has been lacking in this state. The success of many locations may be short-lived.

## Wetland Birds in a Quagmire

The majority of Pennsylvania's breeding birds of special concern are wetland birds. In the past century, Pennsylvania's wetlands have declined by more than 50 percent. Many of the birds listed in Pennsylvania are also probably area-sensitive, requiring fairly large wetlands in order to maintain breeding populations. The destruction and deterioration of the state's wetlands might be the most serious negative effect on the state's biodiversity.

Many of Pennsylvania's most imperiled breeding species require a mosaic of wetland types together. The state-endangered King Rail is practically gone from Pennsylvania as a breeding species. Black Tern is slipping from the region as a breeding species. American Bittern, Least Bittern, King Rail, Black Tern and Pied-billed Grebe may also be considered area-sensitive species in the same way that forest birds are considered sensitive to the size of woodlots. Small, isolated wetlands rarely support these species. Even Bald Eagle and Osprey are essentially creatures of large wetland and river systems.

Migratory waterfowl depend on Pennsylvania's large rivers and impoundments for resting and feeding places. The spectacle of Tundra Swan and Snow Goose migration is enjoyed by thousands of wildlife-watchers at Middle Creek Wildlife Management Area (Lancaster County). Indiana County's Yellow Creek State Park is not as well known, but also a crucial waterfowl stopover. It hosts thousands of American Coots and more glamorous waterfowl each year. These reservoirs are key stopover locations for each flyway represented in the state. A variety of water depths is needed to support the several waterfowl species that migrate through Pennsylvania. The puddle ducks, such as Black Ducks and teals, feed in shallow waters, while diving ducks, like scaups and mergansers, often use deeper waters. Healthy waterways full of fishes and aquatic insects are needed to maintain these aquatic ecosystems as functional bird habitat.

Colonial waterbirds are particularly vulnerable because their nests are clustered in a few locations near good feeding grounds. They need both the nesting structures (usually trees) protected from predators and flooding as well as reliable foraging areas during the crucial stages of nesting. Many wading birds nest on the Sheets Island Archipelago of the lower Susquehanna River and other large islands along the state's rivers. The populations of Black-crowned Night-Heron and Great Egret depend on these islands for their survival. Islands give herons some sanctuary from predators, but rarely are given sanctuary status in the legal sense. Great Blue Heron colonies are quite vulnerable to logging and development, so the Brucher Sanctuary Heronry serves as an especially appropriate monument to bird conservation.

An overlap exists between the lists of wetland and grassland species. For instance, Northern Harrier and Short-eared Owl use both habitats and have suffered from the elimination and fragmentation of each. Northern Harrier populations have been drastically fragmented, but isolated pairs are sighted in scattered locations across the state. Sedge Wren habitat defies easy classification; it's found in sedge-dominated emergent wetlands and wet meadows, pond edges, pastures and hayfields. It may not occupy all available habitat in the state, but its presence is easily overlooked and it has invasive and opportunistic patterns of occupancy. All three grassy wetland species are declining throughout the northeastern United States.

Some wetlands are special because there are few, if any, like them in the state. The lower Susquehanna River's Conejohela Flats are among the few large mud flats that still exist in the state. These mud flats are vital stopover places for migrant shorebirds and other water birds. Flooding or dredging such sites has had devastating effects on Pennsylvania shorebirds. River islands also provide important nesting and stopover habitat for many birds, ranging from small wrens to large herons. Management for mud flats and associated islands should be a high priority for sites that can provide the important bird habitat that has almost been eliminated.

## Wetland Preservation: A Partner-builder

Wetland preservation and restoration has brought together many organizations as partners to conserve wildlife habitat. Many large wetlands in Pennsylvania are owned by the Pennsylvania Game Commission. The large Conneaut Marsh/Geneva Marsh wetlands complex supports many wetland birds rare elsewhere in the state. Tucked away in corners of the state, little-known places like Shohola Gamelands 180 support many nesting waterfowl. These large marshes and swamps are needed to maintain the state's wetland bird populations. The wetlands of Erie National Wildlife Refuge are another example of larger habitat blocks needed to maintain the vanishing marsh birds of Pennsylvania.



Locations as divergent as “The Muck” of Tioga County and John Heinz National Wildlife Refuge at Tinicum support the rare Marsh Wren and American Bittern. Preservation and renewal of the state’s wetlands needs to be a high priority for the state’s bird conservation. Renewal efforts are taking place in Pennsylvania with more than 50 private conservancy organizations and several state and federal agencies working to improve the state’s wetlands. Considering the many adverse factors, their efforts must be considerable to affect recovery for the many wetland birds and other organisms decimated by wetland losses.

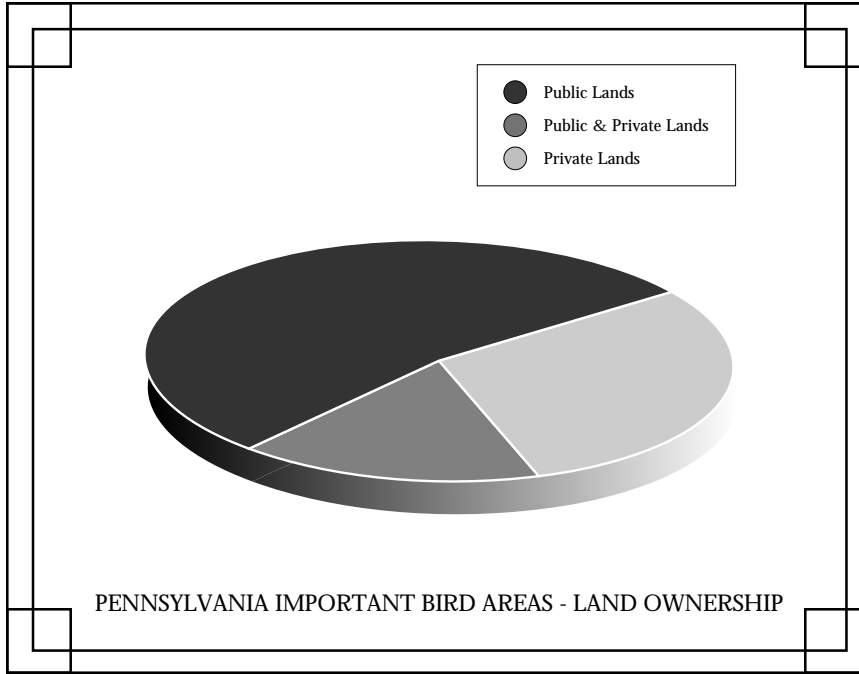
## IBA Uses Gap Analysis

The IBA Program is a blueprint for a mixed conservation strategy in Pennsylvania. It emphasizes both locations vital to common birds as well as rare species vulnerable to anthropogenic effects. A mixed strategy of protecting areas that support species richness (including many common birds) and rarity hotspots is a useful strategy for prioritizing areas for conservation management. The IBA list has addressed these issues by taking a “gap analysis” approach to listing Important Bird Areas, including good bird habitat in virtually all regions and habitats. The criteria qualifying locations as IBAs forces a rich mix of habitats and a wide geographic dispersion. A “gap analysis” approach attempts to include all provinces and bioregions as part of the state’s biodiversity. It’s important to monitor the bird populations, including those species, habitats and geographic areas that are not currently well covered by ongoing programs.

Disturbance, fragmentation and development are constantly destroying and degrading bird habitats. Development is the most pernicious of these factors because of its relative permanence. Conservation efforts should be directed toward those species that are most affected. There is an urgent need to protect what few original ecosystems exist in the Commonwealth. They might serve not only as population centers for many species, but also as field laboratories necessary to study the possibilities that exist for Pennsylvania’s birds.

Large-scale areas are needed for preserving bird populations based on the minimum viable populations necessary to maintain a species. We need to “think big” and be bold in our approach to bird habitat conservation. Fragmentation is arguably the greatest cause for extirpation. The large forest tracts of Pennsylvania, exemplified by areas designated by the IBA Program, are the state’s biggest contribution to bird conservation for this reason. Enlargement and consolidation of the state’s fragmented bird habitats is necessary to preserve bird populations in all ecoregions. The state’s bird diversity would be best preserved by a regional landscape approach with good bird habitat protected in each of the various ecoregions of the state. With such an approach, regional extirpations can be avoided. By recognizing the importance of the state’s ecosystems, even the common ones, and

forming partnerships between agencies and interested parties, we can keep our common birds common and avoid crisis bird management. The regional coverage by IBA is a great start in this direction.



## Keeping Watch: Monitoring Important Bird Areas

How do we know that an Important Bird Area remains a high quality bird habitat? One of the best ways is to take a personal interest in the site and keep an eye on the bird populations by establishing a bird inventory or monitoring program. Audubon chapters, bird clubs, families, or individuals engage in many projects because of their concern about local bird populations. There are many tried and true methods for monitoring bird populations. There is precious little site-specific information about bird populations on Pennsylvania's public lands. We need more, for purposes of public education and as a testament to the importance of Pennsylvania's habitats to birds and other wildlife. American ornithology has a long and proud tradition of amateur involvement in bird population studies. By keeping a vigilant watch over birds in our favorite places, we also send a message to the world that we care about habitats and we are constantly learning and contributing more information to help conserve the birds we enjoy. Here is just a brief outline of successful programs for keeping watch over bird populations:

The Pennsylvania Society for Ornithology Special Areas Project (SAP) is a simple and straightforward inventory of birds at specific locations. Clubs “adopt” a local park, natural area, gameland, reserve, or forest as a “special area” to monitor in all seasons of the year. Under the leadership of a Local Coordinator, the club conducts several field trips each year, sometimes as a group, but also as individual efforts. Volunteer birders record all the birds they hear and see in a given field trip and keep tabs of their time in the field, habitat types, and weather conditions. Observations of breeding behavior are also collected in order to ascertain the breeding status of each species. These observations are kept as standardized “breeding codes” used by breeding bird atlas projects. The resulting data are organized on Seasonal Survey Forms to be sent in to the SAP State Coordinator on a quarterly basis. The data are open for use in a variety of ways. The local club can use the information for its own educational and conservation purposes. The data can be published in a variety of forums, including the club newsletter, the PSO Newsletter, or submission to *Pennsylvania Birds*, the magazine of the PSO, as part of County Seasonal Reports, site guides, or annotated checklists. SAP also serves as a commonly held file of bird data on locations of concern to local birders and conservationists. One of the goals of SAP is to contribute more site-specific check-lists for the state’s public lands and bird preserves. These check-lists serve as educational tools and a public declaration about the bird community of a specific location. SAP is an easy way for a local club to keep in touch with its Important Bird Area or its local birding hot-spot. Many Audubon chapters and bird clubs have been contributing data for several years. For more information, contact Douglas Gross, SAP Coordinator, Ecology III, R.R. 1, Box 1795, Berwick, PA 18603.

The Cornell Laboratory of Ornithology has developed many citizen-science projects for the study of birds. Several of these projects are very appropriate to combine with the Important Bird Areas project. Cornell’s Bird in Forested Landscapes program grew out of its successful Project Tanager. The Landscapes project studies the relationship between birds and the forested habitats they occupy. It focuses on seven species of forest thrushes and two accipitrine hawks, the Sharpshinned and Cooper’s hawks. Project Tanager collects data on our tanager species, which in the case of Pennsylvania includes the widespread Scarlet Tanager and the rare and localized Summer Tanager. Cerulean Warbler is one of the ultimate Neotropical migrant forest species that deserves more attention. Pennsylvania has scattered and localized populations of this forest-interior species in decline. The Cerulean Warbler Atlas Project is mapping these populations. For more information about these citizen-science bird projects, please contact the Cornell Laboratory of Ornithology, Bird Populations Studies, 159 Sapsucker Woods Road, Ithaca, New York, 14850-1999.

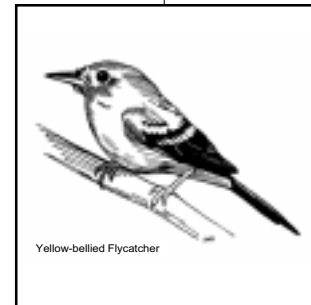
Perhaps the most intensive and most informative bird-monitoring program is the Monitoring Avian Productivity and Survivorship (MAPS)

program. This program uses a standardized mistnetting scheme for tracking changes and patterns in the number of young produced and the survivorship of adult and young birds. One of the greatest gaps in our knowledge of Pennsylvania birds is the basic demographic data that shows the reproductive success at a given location. In general, bird-banding is another way to keep close tabs on the birds that migrate through or breed at any given location. For more information about the MAPS project, contact Kenneth Burton, The Institute for Bird Populations, P.O. Box 1346, Point Reyes Station, CA 94956. For more information about the Eastern Bird Banding Association, contact Donald and Elaine Mease, 3266 Springtown Hill, Hellertown, PA 18055.

For those with the skills and time, Breeding Bird Censuses (BBC) and Winter Bird Population Studies are well-established protocols for carefully monitoring bird populations. The BBC determines the number of breeding pairs on a census plot. It works on the principal that birds hold territory throughout the nesting season, many by singing regularly in their territory. By mapping the singing males and any interactions between birds, the BBC determines with precision how many territories are occupied each year. Winter Bird Population Studies are conducted much like the BBCs, but in the winter months. This program collects bird population data during the time of year that can be most stressful for many bird species. For more information about these bird programs, contact James D. Lowe, Cornell Laboratory of Ornithology, 159 Sapsucker Woods, Ithaca, NY 14850.

Very few IBA sites were designated because of their importance as migratory stopovers for plovers and sandpipers. The number of high quality shore bird stopovers in the Keystone State is very low. So, it is particularly important that we monitor what few shore bird stopovers we have, to ensure their preservation. The International Shore Bird Survey is a program that monitors the number and variety of shore bird species during migration. It also helps determine the timing of migration and the importance of the various stop-over and staging areas. For more information about this program, contact the Manomet Center for Conservation Science, P.O. Box 1770, Manomet, MA 12345.

Pennsylvania can be considered the home of hawk-watching. Hawk Mountain has inspired thousands of people to watch, monitor, and conserve raptors and their habitats. It is the first and best known refuge for birds of prey. The ridges and plateaus of Pennsylvania are justifiably among the most famous diurnal raptor corridors in the world. However, many of the most interesting hawk-watch sites deserve more observer time and some migration corridors are not as well-monitored as others. For more information about hawk monitoring, please contact the Hawk Mountain Sanctuary, 1700 Hawk Mountain Road, Kempton, PA 19529-9449, or the Secretary of the Hawk Migration Association of North America, P.O. Box 3482, Lynchburg, VA, 24503.



Fall raptor migration results are published in *Pennsylvania Birds* each year. The hawk-watch report editor is Frank Hohenleitner, 910 Larchmont Ave., Havertown, PA 19083.

The Commonwealth of Pennsylvania has a Species of Special Concern list that is maintained by the Pennsylvania Biological Survey (PABS). The bird committee of the PABS is known as the Ornithological Technical Committee. Several sites were selected as IBAs because of their value for maintaining populations of birds on this list. Data on breeding evidence, distribution, and population of any of these species are always appreciated. For more information about the Pennsylvania Birds of Special Concern, please contact the OTC Chairman, Douglas Gross, R.R. 1, Box 175, Berwick, PA 18603, or Daniel Brauning, Pennsylvania Game Commission, R.R. 2, Box 484, Montgomery, PA 17754.

There are many side benefits to keeping watch over local Important Bird Areas. These programs “force” birders into a regular routine of conducting field trips and keeping good notes. The lessons learned by regularly doing field work are surprising and delightful. Birders sharpen their skills by regular birding activity and transfer their knowledge to others. We all can learn by engaging ourselves in regular field data collection. Even bird behavior-watching and data collection can provide valuable information about the interactions between birds and their environment. All of these projects are excellent opportunities for mentoring within Audubon chapters and bird clubs. There is much to learn by doing, and much to learn by doing things with each other.

For more information about collecting bird data, including other interesting and enjoyable programs, please consult the following sources:

The American Birding Association Volunteer Opportunities for Birders Directory. American Birding Association, P.O. Box 6599, Colorado Springs, CO 80934-6599.

Bring Back the Birds, What You Can Do to Save Threatened Species. Russell Greenberg and Jamie Reaser. Stackpole Books, 1995.

Bird Source Website ([birdsource.cornell.edu/](http://birdsource.cornell.edu/)).

National Audubon Society Website ([www.audubon.org](http://www.audubon.org)).

The National Biological Services Website ([www.im.nbs.gov/birds/](http://www.im.nbs.gov/birds/)).

Pennsylvania Birds, Journal of the Pennsylvania Society for Ornithology. Franklin C. Haas and Barbara M. Haas (Editors-in-Chief), 2469 Hammertown Road, Narvon, PA 17555-9726.

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