PENNSYLVANIA
WILDLIFE ACTION PLAN

2015–2025

Species of Greatest Conservation Need Species Accounts

Appendix 1.4A-Birds

- *Bird Species of Greatest Conservation Need*
- *Maps: Physiographic Provinces and HUC Watersheds*
- *Species Accounts (Click species name below or bookmark to navigate to species account)*

BIRDS

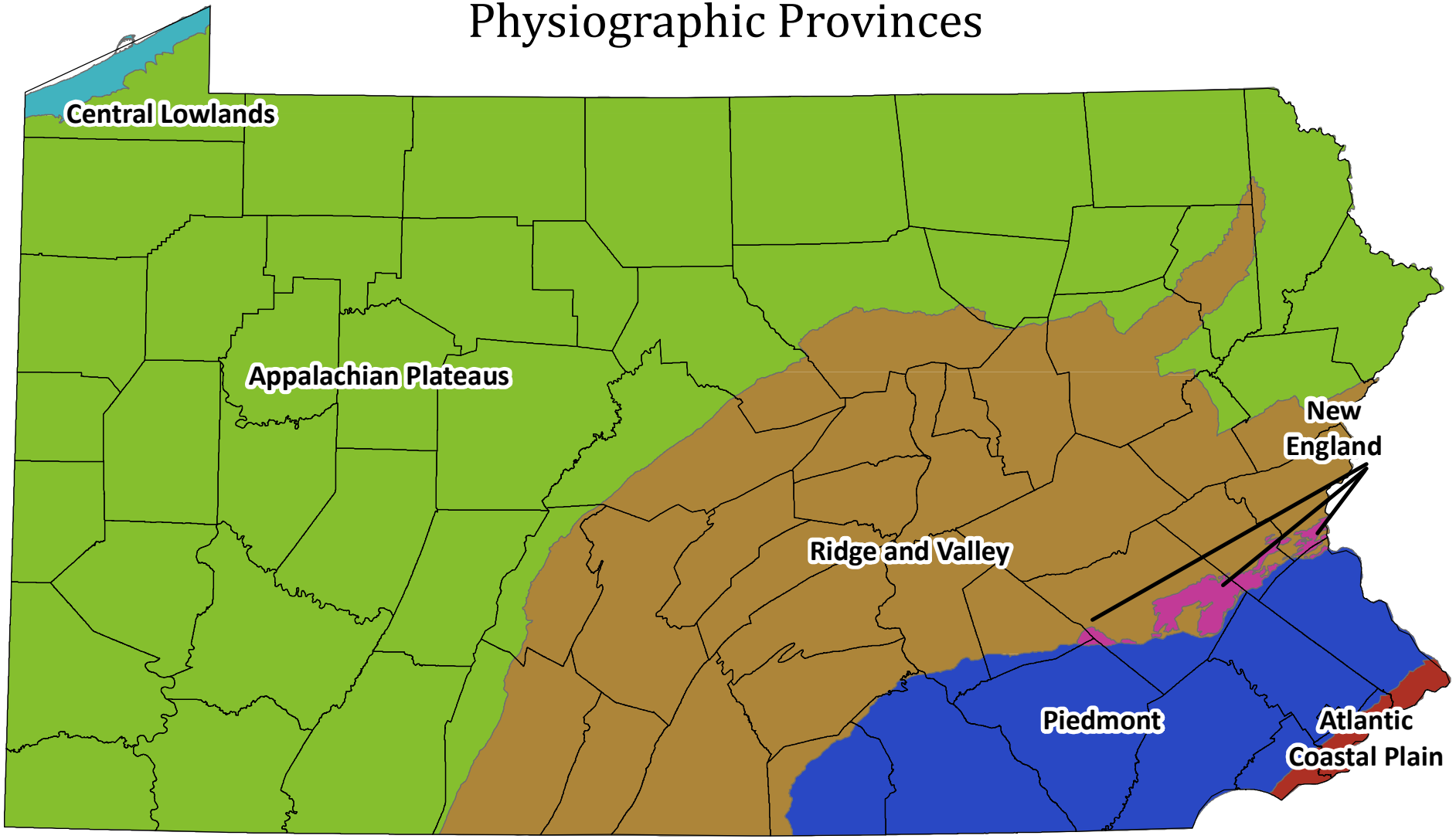
Tundra Swan
American Black Duck
Blue-winged Teal
Green-winged Teal
Lesser Scaup
Long-tailed Duck
Ruffed Grouse
Pied-billed Grebe
Horned Grebe
Red-necked Grebe
American Bittern
Least Bittern
Great Egret
Black-crowned Night Heron
Yellow-crowned Night Heron
Osprey
Bald Eagle
Northern Harrier
Sharp-shinned Hawk
Northern Goshawk
Broad-winged Hawk
Golden Eagle
King Rail
Virginia Rail
Sora
Common Gallinule
American Coot
Piping Plover
Spotted Sandpiper
Upland Sandpiper
Red Knot
Wilson's Snipe
American Woodcock
Black Tern
Common Tern
Barn Owl
Long-eared Owl
Short-eared Owl
Northern Saw-whet Owl
Common Nighthawk
Eastern Whip-poor-will
Chimney Swift
Red-headed Woodpecker
American Kestrel
Peregrine Falcon
Olive-sided Flycatcher
Yellow-bellied Flycatcher
Willow Flycatcher
Loggerhead Shrike
Purple Martin
Bank Swallow
Brown Creeper
Winter Wren
Sedge Wren
Marsh Wren
Swainson's Thrush
Wood Thrush

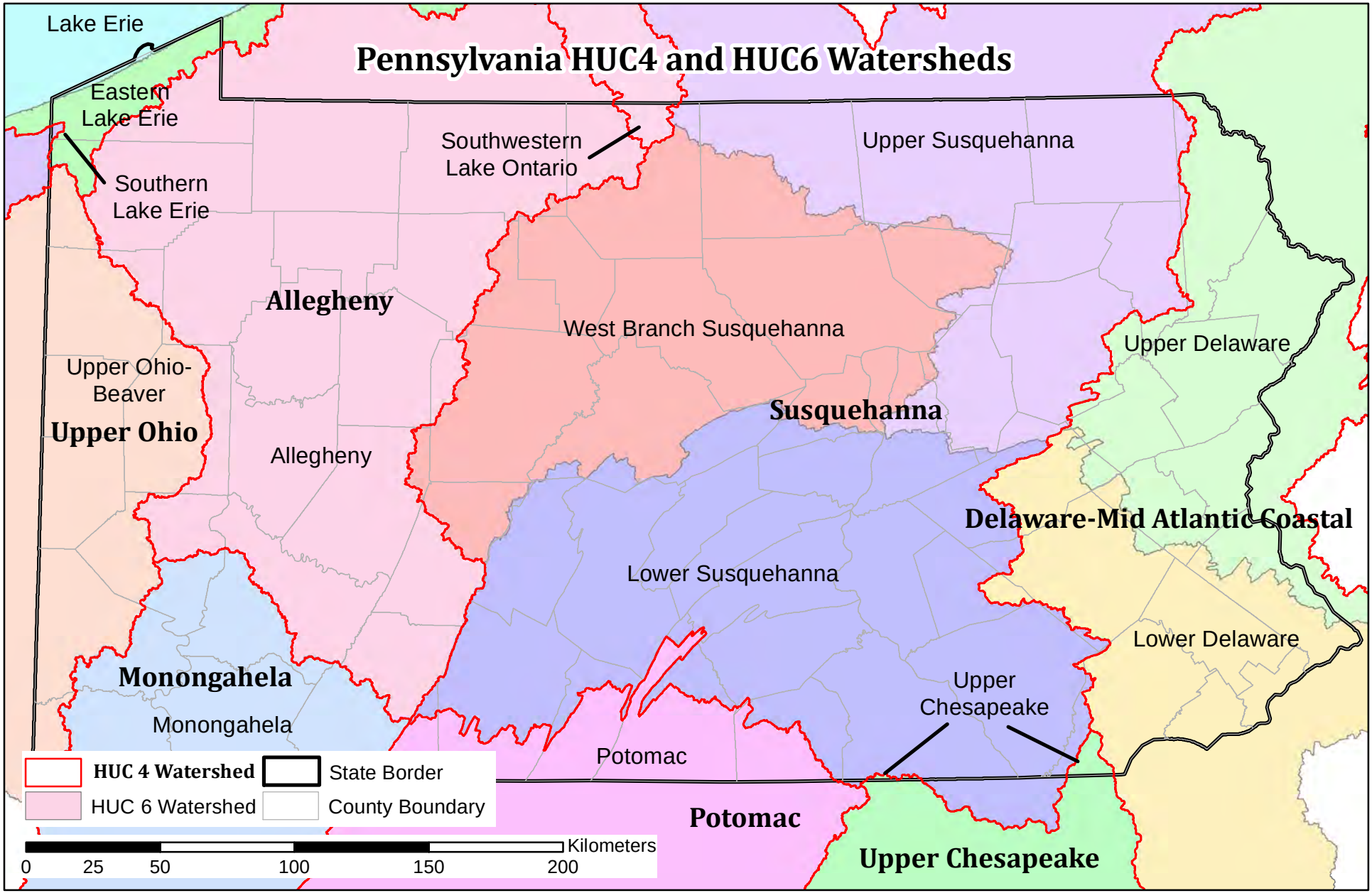
BIRDS, CONTINUED

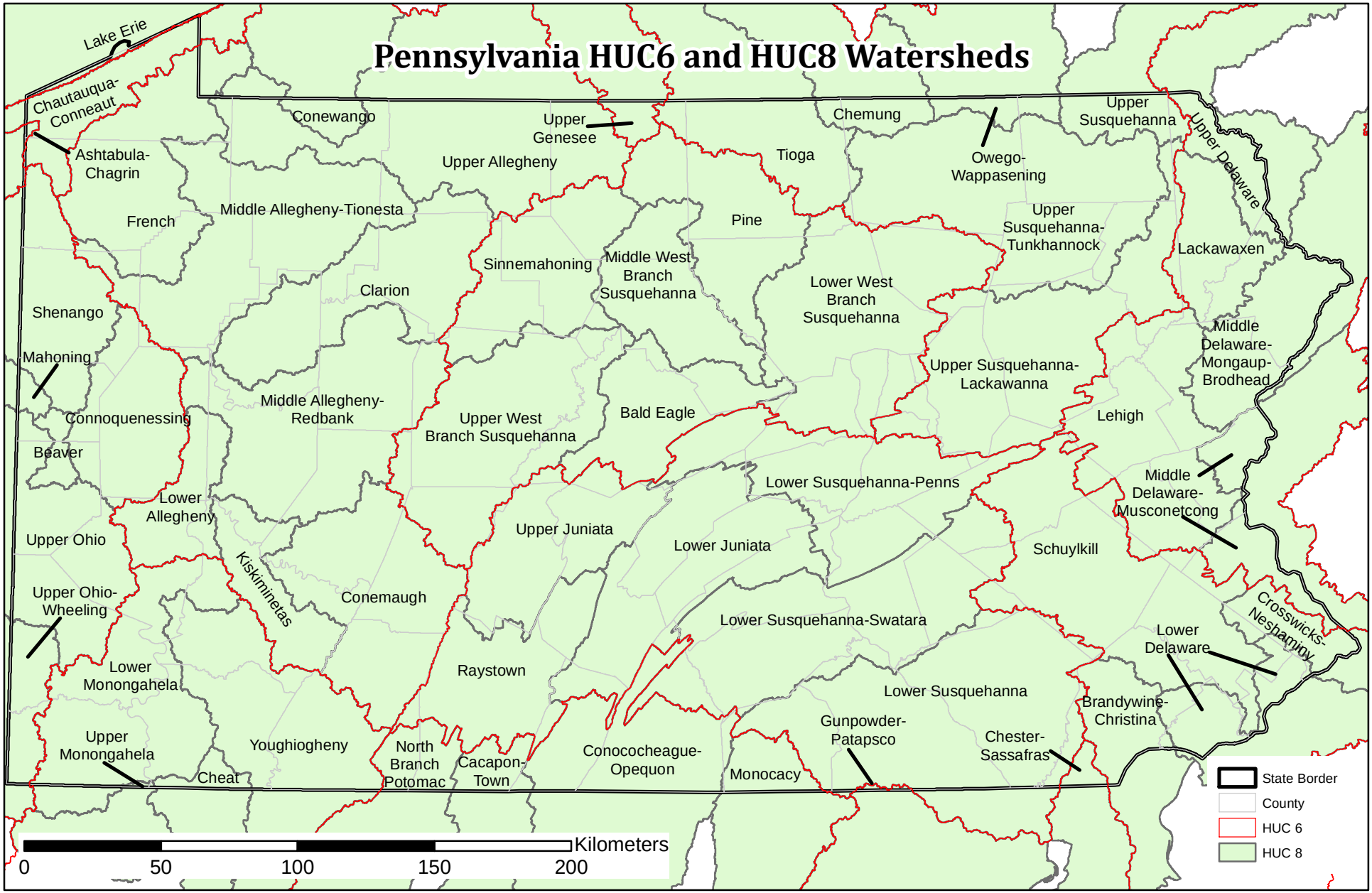
Gray Catbird
Louisiana Waterthrush
Northern Waterthrush
Golden-winged Warbler
Blue-winged Warbler
Black-and-white Warbler
Prothonotary Warbler
Nashville Warbler
Kentucky Warbler
Hooded Warbler
Cerulean Warbler
Blackburnian Warbler
Blackpoll Warbler
Black-throated Blue Warbler
Prairie Warbler
Black-throated Green Warbler
Canada Warbler
Yellow-breasted Chat
Eastern Towhee
Field Sparrow
Vesper Sparrow
Savannah Sparrow
Grasshopper Sparrow
Henslow's Sparrow
White-throated Sparrow
Summer Tanager
Scarlet Tanager
Dickcissel
Bobolink
Eastern Meadowlark
Rusty Blackbird
Red Crossbill
Pine Siskin

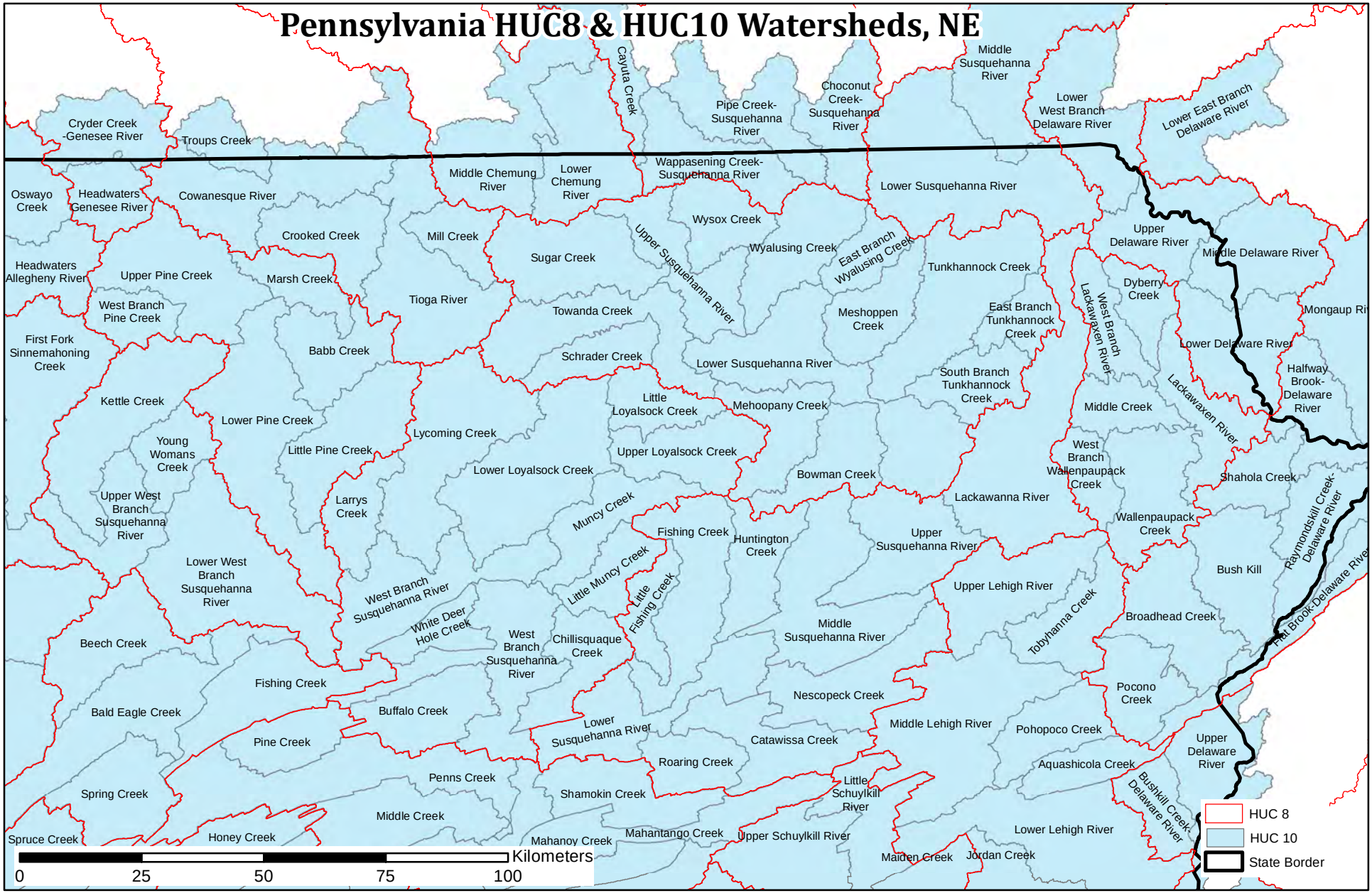
The following Physiographic Province and HUC Watershed maps are presented here for reference with conservation actions identified in the species accounts. Species account authors identified appropriate Physiographic Provinces or HUC Watershed (Level 4, 6, 8, 10, or statewide) for specific conservation actions to address identified threats. HUC watersheds used in this document were developed from the Watershed Boundary Dataset, a joint project of the U.S. Dept. of Agriculture-Natural Resources Conservation Service, the U.S. Geological Survey, and the Environmental Protection Agency.

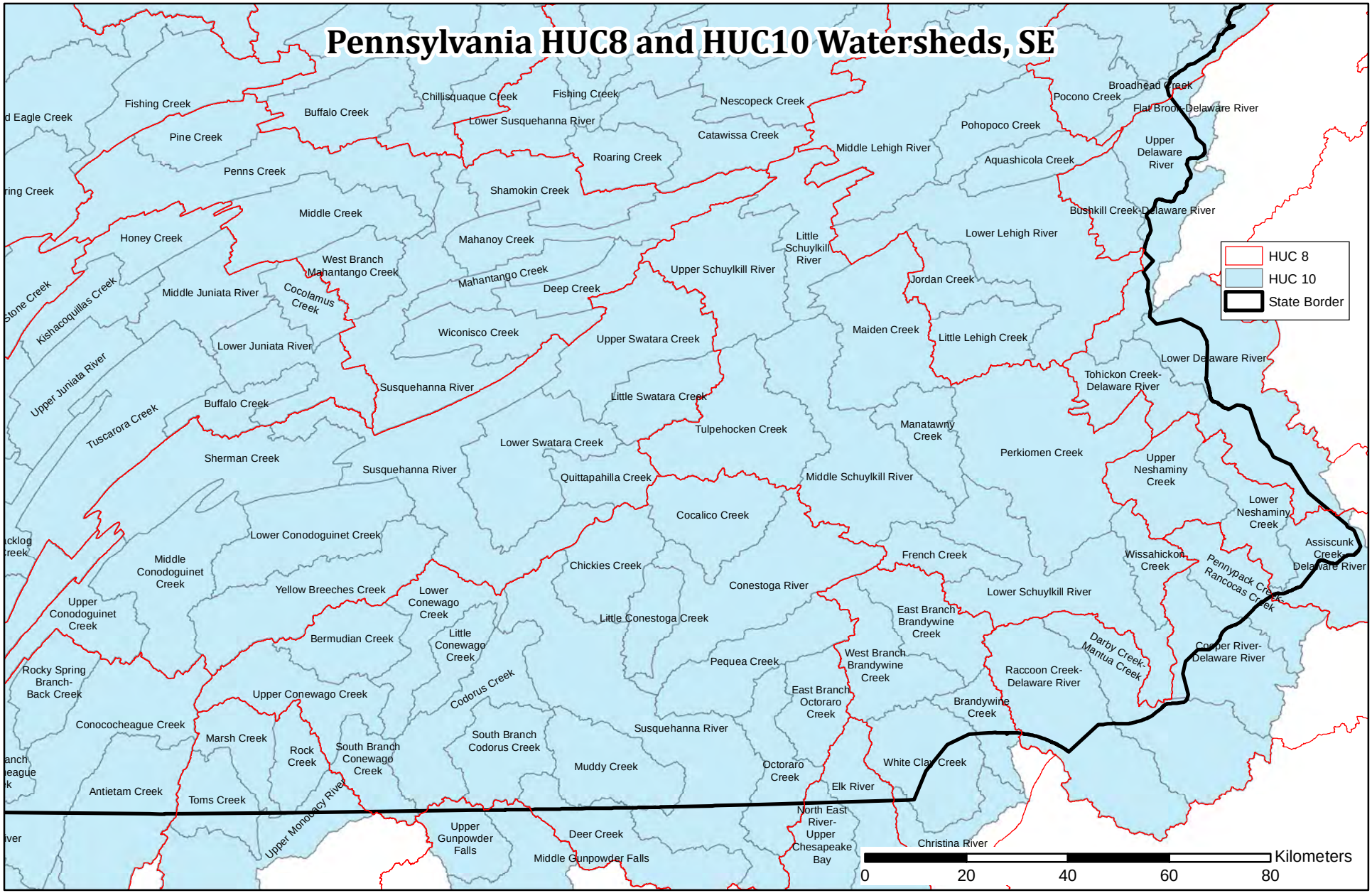
Physiographic Provinces

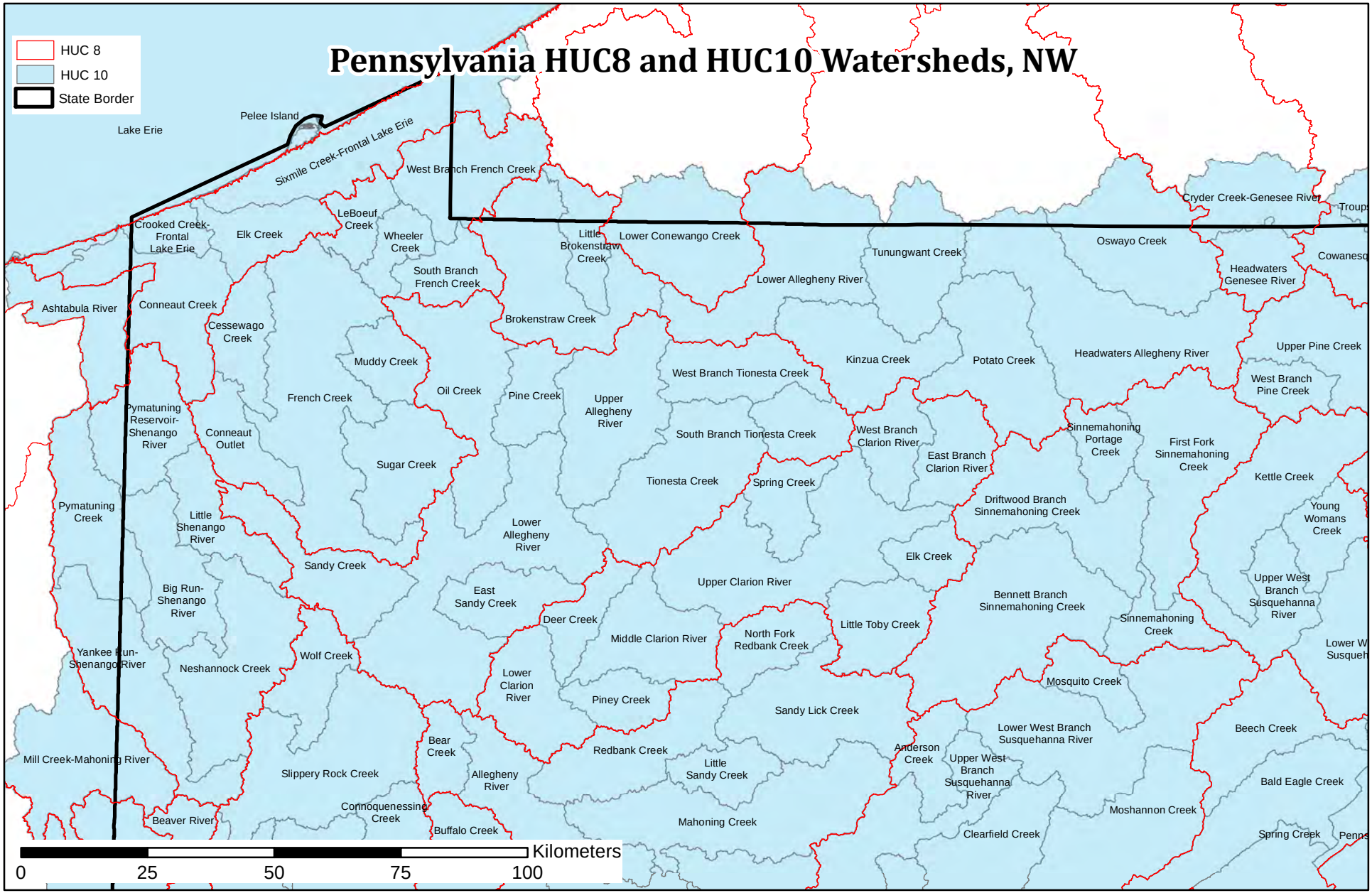



Pennsylvania HUC4 and HUC6 Watersheds
Lake Erie
Eastern Lake Erie
Southern Lake Erie
Southwestern Lake Ontario
Upper Susquehanna
Allegheny
West Branch Susquehanna
Upper Delaware
Upper Ohio-Beaver
Upper Ohio
Allegheny
Susquehanna
Delaware-Mid Atlantic Coastal
Lower Susquehanna
Lower Delaware
Monongahela
Monongahela
Upper Chesapeake
Potomac
Potomac
Upper Chesapeake
HUC 4 Watershed
State Border
HUC 6 Watershed
County Boundary
Kilometers
0 25 50 100 150 200


Pennsylvania HUC6 and HUC8 Watersheds
Lake Erie
Chautauqua-Conneaut
Conewango
Upper Genesee
Chemung
Upper Susquehanna
Upper Delaware
Ashtabula-Chagrin
Upper Allegheny
Tioga
Owego-Wappasening
French
Middle Allegheny-Tionesta
Pine
Upper Susquehanna-Tunkhannock
Lackawaxen
Sinnemahoning
Middle West Branch Susquehanna
Clarion
Lower West Branch Susquehanna
Shenango
Middle Delaware-Mongaup-Brodhead
Mahoning
Upper Susquehanna-Lackawanna
Middle Allegheny-Redbank
Connoquenessing
Upper West Branch Susquehanna
Bald Eagle
Lehigh
Beaver
Lower Susquehanna-Penns
Middle Delaware-Musconetcong
Lower Allegheny
Upper Juniata
Upper Ohio
Lower Juniata
Schuylkill
Kiskiminetas
Upper Ohio-Wheeling
Conemaugh
Crosswicks-Neshaminy
Lower Susquehanna-Swatara
Lower Delaware
Lower Monongahela
Raystown
Lower Susquehanna
Brandywine-Christina
Gunpowder-Patapsco
Upper Monongahela
Youghiogheny
North Branch Potomac
Cacapon-Town
Conococheague-Opequon
Chester-Sassafras
Cheat
Monocacy
State Border
County
HUC 6
HUC 8
Kilometers
0
50
100
150
200


Pennsylvania HUC8 & HUC10 Watersheds, NE
Cryder Creek-Genesee River
Troups Creek
Oswayo Creek
Headwaters Genesee River
Cowanesque River
Middle Chemung River
Lower Chemung River
Cayuta Creek
Wappasening Creek-Susquehanna River
Pipe Creek-Susquehanna River
Choconut Creek-Susquehanna River
Middle Susquehanna River
Lower West Branch Delaware River
Lower East Branch Delaware River
Lower Susquehanna River
Crooked Creek
Mill Creek
Wysox Creek
Upper Susquehanna River
Sugar Creek
Wyalusing Creek
East Branch Wyalusing Creek
Upper Delaware River
Middle Delaware River
Headwaters Allegheny River
Upper Pine Creek
Marsh Creek
Tioga River
Towanda Creek
Meshoppen Creek
Tunkhannock Creek
Dyberry Creek
West Branch Lackawaxen River
Mongaup Ri
West Branch Pine Creek
First Fork Sinnemahoning Creek
Babb Creek
Schrader Creek
Lower Susquehanna River
East Branch Tunkhannock Creek
South Branch Tunkhannock Creek
Lower Delaware River
Halfway Brook-Delaware River
Kettle Creek
Little Loyalsock Creek
Mehoopany Creek
Middle Creek
Lackawaxen River
Lower Pine Creek
Young Womans Creek
Lycoming Creek
Little Pine Creek
Upper Loyalsock Creek
Lower Loyalsock Creek
Bowman Creek
West Branch Wallenpaupack Creek
Shahola Creek
Upper West Branch Susquehanna River
Larrys Creek
Muncy Creek
Lackawanna River
Wallenpaupack Creek
Raymondskill Creek-Delaware River
Fishing Creek
Huntington Creek
Upper Susquehanna River
Lower West Branch Susquehanna River
Little Muncy Creek
Little Fishing Creek
Bush Kill
West Branch Susquehanna River
White Deer Hole Creek
Upper Lehigh River
Tobyhanna Creek
Broadhead Creek
Pal Brook-Delaware River
Beech Creek
West Branch Susquehanna River
Chillisquaque Creek
Middle Susquehanna River
Fishing Creek
Nescopeck Creek
Pocono Creek
Bald Eagle Creek
Buffalo Creek
Lower Susquehanna River
Middle Lehigh River
Pohopoco Creek
Pine Creek
Catawissa Creek
Upper Delaware River
Roaring Creek
Aquashicola Creek
Penns Creek
Little Schuylkill River
Bushkill Creek-Delaware River
Spring Creek
Shamokin Creek
Middle Creek
Lower Lehigh River
Spruce Creek
Honey Creek
Mahanoy Creek
Mahantango Creek
Upper Schuylkill River
Maiden Creek
Jordan Creek
Kilometers
0
25
50
75
100
HUC 8
HUC 10
State Border


Pennsylvania HUC8 and HUC10 Watersheds, SE
HUC 8
HUC 10
State Border
Kilometers
0
20
40
60
80
Fishing Creek
Buffalo Creek
Chillisquaque Creek
Fishing Creek
Lower Susquehanna River
Nescopeck Creek
Catawissa Creek
Roaring Creek
Middle Lehigh River
Pocono Creek
Broadhead Creek
Flat Brook-Delaware River
Pohopoco Creek
Aquashicola Creek
Upper Delaware River
Pine Creek
Penns Creek
Shamokin Creek
Middle Creek
Honey Creek
Mahanoy Creek
Little Schuylkill River
Lower Lehigh River
Bushkill Creek-Delaware River
West Branch Mahantango Creek
Mahantango Creek
Upper Schuylkill River
Deep Creek
Jordan Creek
Middle Juniata River
Cocolamus Creek
Kishacoquillas Creek
Wiconisco Creek
Upper Swatara Creek
Maiden Creek
Little Lehigh Creek
Lower Juniata River
Upper Juniata River
Susquehanna River
Little Swatara Creek
Lower Delaware River
Tohickon Creek-Delaware River
Buffalo Creek
Tuscarora Creek
Tulpehocken Creek
Manatawny Creek
Lower Swatara Creek
Perkiomen Creek
Sherman Creek
Susquehanna River
Quittapahilla Creek
Middle Schuylkill River
Upper Neshaminy Creek
Cocalico Creek
Lower Neshaminy Creek
Lower Conodoguinet Creek
Assiscunk Creek
Delaware River
Middle Conodoguinet Creek
Chickies Creek
French Creek
Wissahickon Creek
Pennypack Creek
Rancocas Creek
Yellow Breeches Creek
Lower Conewago Creek
Conestoga River
Lower Schuylkill River
Upper Conodoguinet Creek
Little Conestoga Creek
East Branch Brandywine Creek
Bermudian Creek
Little Conewago Creek
Darby Creek-Mantua Creek
Cooper River-Delaware River
Pequea Creek
West Branch Brandywine Creek
Rocky Spring Branch-Back Creek
Raccoon Creek-Delaware River
Codorus Creek
East Branch Octoraro Creek
Upper Conewago Creek
Brandywine Creek
Conococheague Creek
Susquehanna River
Marsh Creek
South Branch Codorus Creek
Rock Creek
South Branch Conewago Creek
Muddy Creek
Octoraro Creek
White Clay Creek
Antietam Creek
Toms Creek
Elk River
Upper Monocacy River
North East River-Upper Chesapeake Bay
Upper Gunpowder Falls
Deer Creek
Christina River
Middle Gunpowder Falls


Pennsylvania HUC8 and HUC10 Watersheds, NW
HUC 8
HUC 10
State Border
Lake Erie
Pelee Island
Sixmile Creek-Frontal Lake Erie
West Branch French Creek
Cryder Creek-Genesee River
Crooked Creek-Frontal Lake Erie
Elk Creek
LeBoeuf Creek
Wheeler Creek
Little Brokenstraw Creek
Lower Conewango Creek
Tunungwant Creek
Oswayo Creek
Cowanesq
South Branch French Creek
Lower Allegheny River
Headwaters Genesee River
Ashtabula River
Conneaut Creek
Cessewago Creek
Brokenstraw Creek
Muddy Creek
Kinzua Creek
Potato Creek
Headwaters Allegheny River
Upper Pine Creek
West Branch Tionesta Creek
West Branch Pine Creek
French Creek
Oil Creek
Pine Creek
Upper Allegheny River
Pymatuning Reservoir-Shenango River
Conneaut Outlet
South Branch Tionesta Creek
West Branch Clarion River
Sinnemahoning Portage Creek
First Fork Sinnemahoning Creek
East Branch Clarion River
Sugar Creek
Tionesta Creek
Spring Creek
Kettle Creek
Pymatuning Creek
Little Shenango River
Driftwood Branch Sinnemahoning Creek
Young Womans Creek
Lower Allegheny River
Elk Creek
Sandy Creek
Upper Clarion River
Upper West Branch Susquehanna River
Big Run-Shenango River
East Sandy Creek
Bennett Branch Sinnemahoning Creek
Deer Creek
Little Toby Creek
Sinnemahoning Creek
Middle Clarion River
North Fork Redbank Creek
Yankee Run-Shenango River
Wolf Creek
Neshannock Creek
Lower Clarion River
Mosquito Creek
Piney Creek
Sandy Lick Creek
Lower West Branch Susquehanna River
Beech Creek
Bear Creek
Redbank Creek
Anderson Creek
Upper West Branch Susquehanna River
Mill Creek-Mahoning River
Slippery Rock Creek
Allegheny River
Little Sandy Creek
Bald Eagle Creek
Connoquenessing Creek
Moshannon Creek
Beaver River
Buffalo Creek
Mahoning Creek
Clearfield Creek
Spring Creek
Kilometers
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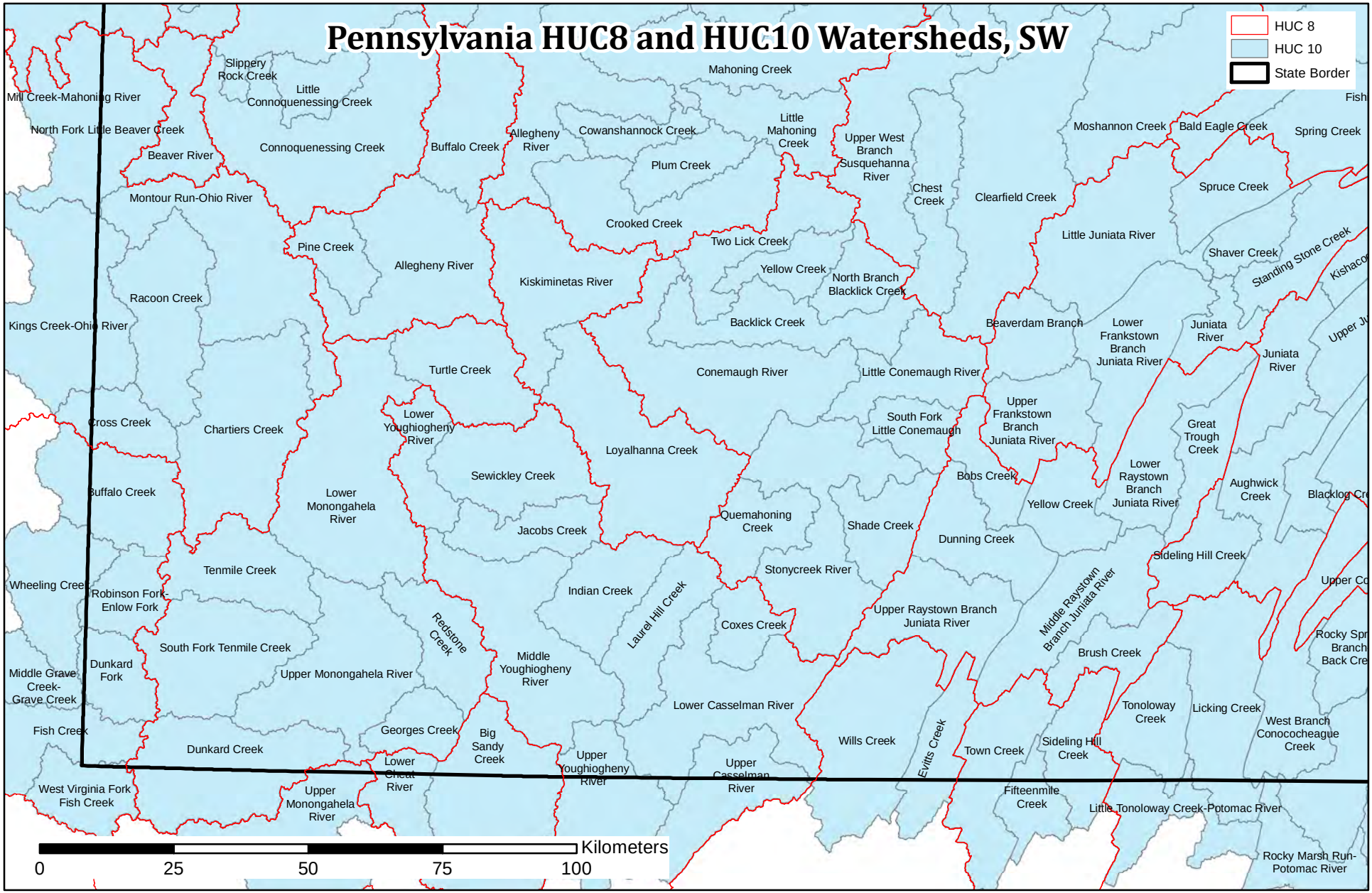
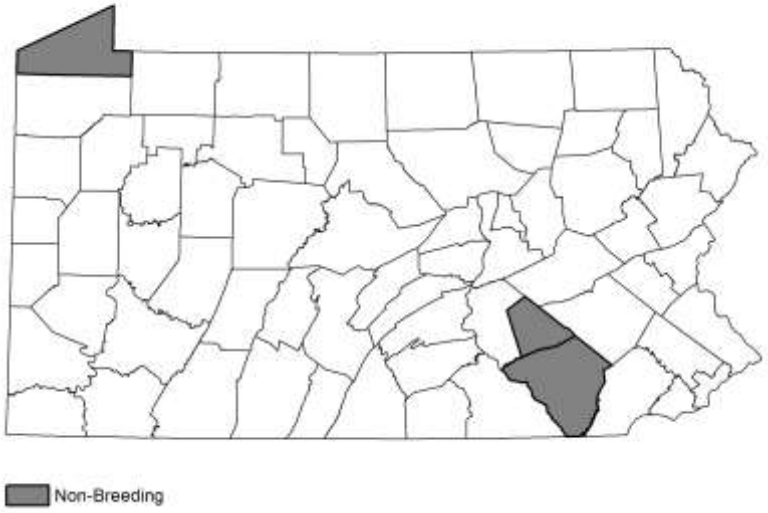

Pennsylvania HUC8 and HUC10 Watersheds, SW
HUC 8
HUC 10
State Border
Slippery Rock Creek
Little Connoquenessing Creek
Mill Creek-Mahoning River
North Fork Little Beaver Creek
Beaver River
Connoquenessing Creek
Buffalo Creek
Allegheny River
Cowanshannock Creek
Mahoning Creek
Little Mahoning Creek
Upper West Branch Susquehanna River
Plum Creek
Chest Creek
Clearfield Creek
Moshannon Creek
Bald Eagle Creek
Spring Creek
Spruce Creek
Montour Run-Ohio River
Crooked Creek
Two Lick Creek
Yellow Creek
North Branch Blacklick Creek
Pine Creek
Allegheny River
Kiskiminetas River
Racoon Creek
Kings Creek-Ohio River
Backlick Creek
Little Juniata River
Shaver Creek
Standing Stone Creek
Beaverdam Branch
Lower Frankstown Branch Juniata River
Juniata River
Turtle Creek
Conemaugh River
Little Conemaugh River
Cross Creek
Chartiers Creek
Lower Youghiogheny River
South Fork Little Conemaugh
Upper Frankstown Branch Juniata River
Great Trough Creek
Loyalhanna Creek
Sewickley Creek
Bobs Creek
Lower Raystown Branch Juniata River
Aughwick Creek
Buffalo Creek
Lower Monongahela River
Quemahoning Creek
Shade Creek
Yellow Creek
Jacobs Creek
Dunning Creek
Sideling Hill Creek
Tenmile Creek
Stonycreek River
Wheeling Creek
Robinson Fork
Enlow Fork
Indian Creek
Laurel Hill Creek
Redstone Creek
Coxes Creek
Upper Raystown Branch Juniata River
Middle Raystown Branch Juniata River
Brush Creek
South Fork Tenmile Creek
Dunkard Fork
Middle Youghiogheny River
Upper Monongahela River
Middle Grave Creek-Grave Creek
Lower Casselman River
Tonoloway Creek
Licking Creek
Fish Creek
Georges Creek
Big Sandy Creek
Wills Creek
Evitts Creek
Sideling Hill Creek
Town Creek
West Branch Conococheague Creek
Dunkard Creek
Lower Cheat River
Upper Youghiogheny River
Upper Casselman River
West Virginia Fork Fish Creek
Upper Monongahela River
Fifteenmile Creek
Little Tonoloway Creek-Potomac River
Rocky Marsh Run-Potomac River
Kilometers
0
25
50
75
100

Tundra Swan

Cygnus columbianus

Ian D. Gregg
Pennsylvania Game Commission

Photo: Hal Korber



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3N (M)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(M) Unknown**

Conservation Goal:

Maintain Tundra Swan peak migration counts in the southern Lebanon / northern Lancaster County area above the Global Important Bird Area threshold at least 7 times in the next 10 years.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(M) Agricultural**	**Lakes**
Habitat	**(M) Agriculture (NLCD 81-82)**	

Specific Habitat Requirements:

Combination of open water areas (lakes and slow-moving portions of large rivers) for secure roosting with substantial amounts of large agricultural fields (especially harvested corn, harvested soybeans, and winter wheat) for feeding within 5-10 miles of roost sites.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Migration

Specific Threat: Loss of agricultural field feeding habitat via conversion to residential and commercial development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection Secure key swan feeding areas through easements (agricultural preservation or conservation). Parcel prioritization map completed by Audubon PA should be consulted to help guide easement locations.	By 2020, increase amount of permanently protected farmland in the Middle Creek Initiative Focus Area from current 1,348 acres to 5,000 acres.	Acreage of protected farmland in the Middle Creek Initiative Focus Area.	Within the Middle Creek Initiative Focus Area, monitor trends in 1) total agricultural land acreage 2) acreage of priority parcels secured with conservation easements and 3) number of swans / swan use days provided. 1) and 2) should be monitored through statistics obtained through county government and should continue until objective is reached. Swan numbers should be tracked annually through existing and / or newly established monitoring programs identified elsewhere in this account.	1

Action Location: Physiographic Province: Piedmont, Ridge and Valley

Associated Species: Canada Goose, Snow Goose, Mallard

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Migration

Specific Threat: Direct mortality/ interference with flight paths and access to feeding or roosting habitat sites due to construction of elevated structures such as utility lines.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Include major tundra swan flight paths and use areas in environmental review process for elevated structures, and take appropriate avoidance / mitigation measures.	By 2020, create a database of important tundra swan roosting and feeding areas and incorporate in environmental review process for construction of elevated structures.	1) Creation of database of important swan roosting and feeding areas; 2) Incorporation of this database into environmental review process; 3) Changes in corridor-related aspects of current swan use sites and number of swans using these sites.	Creation of database and use in environmental review are a yes / no evaluation. Habitat and swan use changes should be tracked annually through existing and / or newly established monitoring programs identified elsewhere in this account.	2

Action Location: Physiographic Province: Piedmont, Ridge and Valley, Central Lowland

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Migration

Specific Threat: Change in agricultural practices making current high-quality feeding habitat unattractive to swans.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Annually monitor percent composition of all crop types within the Middle Creek Initiative Focus Area. If significant changes toward unsuitable crops for swan feeding occur, provide financial incentives to agricultural producers to encourage crop rotations and harvest techniques that provide stable to increased levels of food resources for swans.	By 2017, develop a survey program to annually monitor percent composition of all crop types within the Middle Creek Initiative Focus Area. By 2018, identify a procedure to target financial incentives to agricultural producers to encourage crop rotations and harvest techniques that provide stable to increased levels of food resources for swans if needed.	Creation of habitat survey and financial incentive procedure.	Measure percentage of agricultural fields in southern Lebanon and northern Lancaster Counties that provide suitable feeding habitat (harvested corn, harvested soybeans, winter wheat) for tundra swans. Alternatively, conduct research and monitoring to estimate amount of metabolizable energy provided by agricultural habitats in this region.	3

Action Location: Physiographic Province: Piedmont, Ridge and Valley

Associated Species: Canada Goose, Snow Goose, Mallard

RESEARCH NEEDS

1. Migration- Collect and compare quantitative site- and landscape-level habitat data from swan use and nonuse sites to clarify the most important components of habitat for migrating swans.

2. Migration- Examine predicted effects of various climate change scenarios on wetland and agricultural habitats in the Lebanon / Lancaster County area to identify potential long-range concerns and appropriate mitigation approaches.

3. Migration- Develop methodology / models to estimate metabolizable energy available to tundra swans in the Lebanon / Lancaster County area and measure effects of changes in land use or agricultural practices on swan food resources and bioenergetics.

SURVEY NEEDS

1. Migration- Development of a statistically designed, consistently conducted monitoring program (aerial and / or ground-based) in the broader area around Middle Creek Wildlife Management Area to track progress toward conservation target and maintain an up-to-date registry of roosting and feeding locations most important to migrating swans.

2. Migration- Development of a procedure to achieve regular and standardized compilation of data collected through non-swan-specific monitoring programs (e.g. eBird) on numbers and locations of migrating swans.

3. Migration- Development of a standardized survey of roosting and feeding habitat quantity and characteristics in the southern Lebanon / northern Lancaster County area.

MONITORING PROGRAMS

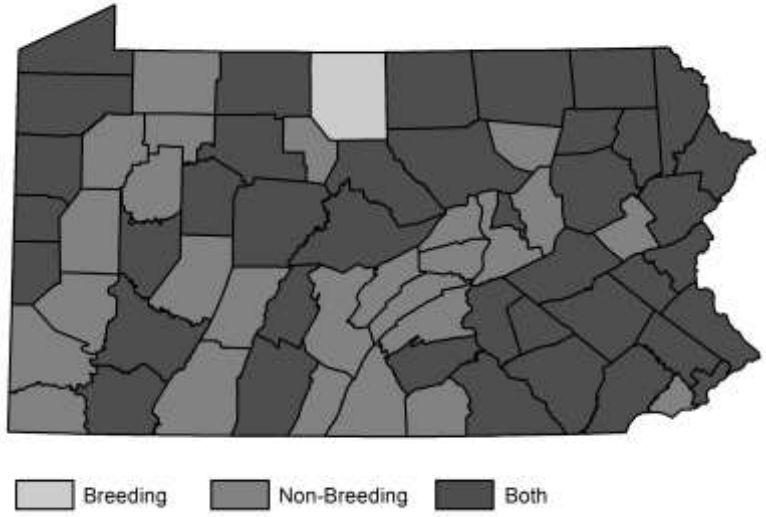
Program Name	Lead Agency	Hyperlink	Description
Atlantic Flyway Midwinter Waterfowl Survey	U.S. Fish & Wildlife Service	https://migbirdapps.fws.gov/mbdc/databases/mwi/mwidb.asp?opt=mwidb	Annual (January) count of all waterfowl species on major wintering areas within the Atlantic Flyway.
Eastern Population Tundra Swan Fall Productivity Survey	U.S. Fish & Wildlife Service	http://www.fws.gov/migratorybirds/Newreportspublications/PopulationStatus.html	Annual (December) survey of percentage of juveniles in the population and the number of juveniles per family group during latter stages of fall migration or early stages of winter residency.
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Middle Creek Wildlife Management Area waterfowl migration updates	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt?open=514&objID=621427&mode=2	Early morning estimate of number of tundra swans roosting on Middle Creek Lake, obtained approximately daily (at minimum 2-3 times per week) from early February through early April.

American Black Duck

Anas rubripes

John Dunn
Pennsylvania Game Commission

Photo: Joe Kosack



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B, S3N (M), S4N (W)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**1600**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown; (M) Unknown; (W) Decline of 11 - 40%**

Conservation Goal:

Due to the lack of identified state-level goals from the management community and the differential seasonal feasibility of maintaining populations, the target for this species should be to maintain current wetland quality and acreage to support Black Ducks and other wetland dependent Species of Greatest Conservation Need.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(B, M, W) Lakes**	**(B, M, W) Lakes**
Habitat	**(B, M) Eutrophic, Medium Alkalinity Lake** **(W) Laurentian-Acadian Freshwater Marsh**	**(B, M, W) Hypereutrophic, High Alkalinity Lake**

Specific Habitat Requirements:

(B) Palustrine shallow wetlands in forested regions, scrub/shrub, forested wetlands, emergent marshes, and beaver flowages.
(M) Palustrine and lacustrine wetlands.
(W) Lacustrine and riverine habitats providing open water.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss of wetland acreage and function to development

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Work with township and municipal planning authorities to identify key wetland habitats used by black ducks and protect them from development and disturbance; Implement buffers around wetlands that limit development. Enforce existing wetland protection laws.	Protect nesting wetland habitats from development. Reduce annual losses to < 100 acres in the Appalachian Plateau.	Number of wetland acres protected	Acres protected from loss or degradation through NWI mapping	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Green-winged Teal, Blue-winged Teal, Common Gallinule, American Coot

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Fragmentation of forested wetland habitats used for breeding.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection Designate priority forested wetland habitats for protection from energy development.	Identify priority forested wetland habitats for breeding.	Number of wetland acres protected	Acres protected from loss or degradation through NWI mapping	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Green-winged Teal, Blue-winged Teal, Common Gallinule, American Coot

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Breeding

Specific Threat: Disturbance to breeding black ducks from human activities

Action	Objective	Measure	Monitoring	Priority
TRACS Action 5.0 Facilities and Areas Create seasonal propagation areas on state lands and through cooperative agreements on private lands to limit disturbance during the breeding season.	Identify priority wetlands through NWI mapping, Breeding Bird Atlas, eBird, etc. and then protect 20% from disturbance during breeding season.	Number of wetland acres protected	Acres protected from loss or degradation through NWI mapping; monitoring of breeding population	2

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Green-winged Teal, Blue-winged Teal, Common Gallinule, American Coot

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Draining, dredging, filling, leveling, and flooding of wetlands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources In wetlands used as breeding habitat, protect sites from draining, dredging and filling due to development. Manage water levels to provide optimal conditions for foraging.	Monitor and manipulate water levels in managed wetlands for optimal breeding conditions, e.g., food resources.	Number of wetland acres protected and under management	Acres protected from draining/filling and managed for maximum production of food resources	2

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Green-winged Teal, Blue-winged Teal, Common Gallinule, American Coot

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Increased drought could cause wetlands to dry out, making them unsuitable for nesting. Alternatively, increases in extreme weather (precipitation) events could cause nest flooding.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Develop a statewide climate change mitigation strategy for freshwater emergent wetlands and wildlife species dependent on these habitats.	Create a plan for assessing predicted and current climate change impacts to major emergent wetlands in Pennsylvania within the next 2 years and begin implementation of this assessment within the next 5 years.	Number of major wetlands assessed via the plan during next 5 years.	1- A. climate change conservation plan has been created for Pennsylvania's major emergent wetlands, B. major wetlands are assessed for vulnerability and impacts, 2 - committee of wetland, taxa, and climate change experts, 3 - plan developed within 2 years, wetlands assessment (including field component) within 5 years	2

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Green-winged Teal, Blue-winged Teal, Common Gallinule, American Coot

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Hybridization and competition with mallards

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Monitor proportion of hybrids and genetic introgression of black ducks and mallards.	Identify proportion of mallard x black duck hybrids in the harvest and of banded samples using morphological and (where practicable) genetic techniques.	Proportion of mallard x black duck hybrids	Proportion of mallard x black duck hybrids	3

Action Location: Physiographic Province: Appalachian Plateaus

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Bioaccumulation of pesticides and contaminants (e.g. mercury and carbamate pesticides).

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Determine the impact of pesticide use and contaminant bioaccumulation in breeding black ducks.	Sample breeding black ducks for pesticide and contaminant levels to better understand the impacts to reproductive success and survivorship.	Number of black ducks sampled	Assess contaminant levels in black ducks.	3

Action Location: Physiographic Province: Appalachian Plateaus

IUCN Threat: 1.0 Residential and Commercial Development

Season: Migration

Specific Threat: Loss of wetland acreage and function to development. Increased disturbance during migration resulting in reduced survival.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Work with township and municipal planning authority to identify key wetland habitats used by black ducks during migration and protect them from development and disturbance. Implement buffers around wetlands that limit development. Enforce existing wetland protection laws.	Potect migration wetland habitats from development. Reduce annual losses to < 100 acres in the Appalachian Plateau	Number of wetland acres protected	Acres protected from loss or degradation through NWI mapping	2

Action Location: Physiographic Province: Statewide

Associated Species: Green-winged Teal, Blue-winged Teal, Common Gallinule, American Coot

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Migration

Specific Threat: Loss of wetland acreage and function to development.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Protect migration wetland habitats from development. Reduce annual losses to < 100 acres per year	Number of wetland acres protected	Acres protected from loss or degradation through NWI mapping	2
Designate priority migration wetland habitats for protection from energy development					

Action Location: Physiographic Province: Statewide

Associated Species: Green-winged Teal, Blue-winged Teal, Common Gallinule, American Coot

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Migration

Specific Threat: Loss of wetland acreage and function to development.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 9.0	Planning	Protect migration wetland habitats from development. Reduce annual losses to < 100 acres per year	Number of wetland acres protected	Acres protected from loss or degradation through NWI mapping	2
Designate priority migration wetland habitats for protection from development					

Action Location: Physiographic Province: Statewide

Associated Species: Green-winged Teal, Blue-winged Teal, Common Gallinule, American Coot

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Migration

Specific Threat: Draining, dredging, filling, leveling, and flooding of wetlands.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Monitor and manipulate water levels in managed wetlands to create food and resting habitat during migration.	Number of wetland acres protected and under management	Acres protected from draining/filling and managed for maximum production of food resources	2

In wetlands used as migration habitat, protect sites from draining, dredging and filling due to development . Manage water levels to provide optimal conditions during migration.

Action Location: Physiographic Province: Statewide

Associated Species: Green-winged Teal, Blue-winged Teal, Common Gallinule, American Coot

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Migration

Specific Threat: Wetland habitat degradation by invasive exotic species (e.g. Phragmites, reed canary grass, purple loosestrife).

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Identify key migration habitat and conduct treatments annually	acres of migration habitat with reduced invasives.	1-presence and abundance of invasive plants, 2-invasive plant surveys/assessment	2

Mechanical, chemical or biological control of invasive plants in wetlands used for migration habitat.

Action Location: Physiographic Province: Statewide

Associated Species: Green-winged Teal, Common Gallinule, American Coot, Virginia Rail, Sora, King Rail

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Migration

Specific Threat: Increased drought could cause wetlands to dry out, reducing food resources for migration.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Develop a statewide climate change mitigation strategy for freshwater emergent wetlands and wildlife species dependent on these habitats.	Create a plan for assessing predicted and current climate change impacts to major emergent wetlands in Pennsylvania within the next 2 years and begin implementation of this assessment within the next 5 years.	Number of major wetlands assessed via the plan during next 5 years.	1- A. climate change conservation plan has been created for Pennsylvania's major emergent wetlands, B. major wetlands are assessed for vulnerability and impacts, 2 - committee of wetland, taxa, and climate change experts, 3 - plan developed within 2 years, wetlands assessment (including field component) within 5 years	2

Action Location: Physiographic Province: Statewide

Associated Species: Green-winged Teal, Blue-winged Teal, Common Gallinule, American Coot

IUCN Threat: 9.0 Pollution

Season: Migration

Specific Threat: Bioaccumulation of pesticides and contaminants (e.g. mercury and carbamate pesticides).

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Determine the impact of pesticide use and contaminant bioaccumulation in migrating black ducks. Action Location: Physiographic Province: Statewide	Sample black ducks during migration for pesticide and contaminant levels to better understand the impacts to reproductive success and survivorship.	Number of black ducks sampled.	Assess contaminant levels in black ducks.	3

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Winter

Specific Threat: Human disturbance resulting in reduced fitness and survivorship.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Protect key wintering habitats through regulation and public education. Action Location: Physiographic Province: Statewide Associated Species: Lesser Scaup, Bald Eagle	Develop regulations limiting human disturbance and develop educational program	Number of acres of wintering habitat protected	Number of black ducks in wintering habitats	2

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Winter

Specific Threat: Hybridization and resource competition with mallards.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Monitor proportion of hybrids and genetic introgression of black ducks and mallards. Action Location: Physiographic Province: Statewide Associated Species: Mallards	Identify proportion of mallard x black duck hybrids in the harvest and of banded samples using morphological and (where practicable) genetic techniques.	Proportion of mallard x black duck hybrids	Proportion of mallard x black duck hybrids	3

RESEARCH NEEDS

1. Breeding- At the flyway and regional scales, support research to develop more accurate population and habitat models for breeding black ducks.

1. Migration- None

1. Wintering- At the flyway and regional scales, support research to determine carrying capacity of habitats used by wintering black ducks.

SURVEY NEEDS

1. Breeding- Conduct comprehensive assessment of wetland habitats and their quality to support black ducks and other wetland WAP species (e.g., Great Lakes Marsh Monitoring Survey, Bird Studies Canada).

1. Migration- Development of a procedure to achieve regular and standardized compilation of data collected through non-species-specific monitoring programs (e.g. eBird) on numbers and locations of migrating black ducks.

1. Wintering- Refine Atlantic Flyway Midwinter Waterfowl Survey to allow for continued monitoring of regional and state trends in wintering black ducks while obtaining data more efficiently and safely for higher-priority species in the survey.

2. Breeding- Development of a procedure to achieve regular and standardized compilation of data collected through non-species-specific monitoring programs (e.g. eBird) on numbers and locations of breeding black ducks.

2. Wintering- Development of a procedure to achieve regular and standardized compilation of data collected through non-species-specific monitoring programs (e.g. eBird) on numbers and locations of wintering black ducks.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
Atlantic Flyway Breeding Waterfowl Survey	U.S. Fish & Wildlife Service	https://migbirdapps.fws.gov/mbdc/databases/afbws/afbws.asp?opt=afbws	This survey has been conducted annually since 1989 in Pennsylvania and other AF states from Virginia to New Hampshire. It provides breeding population estimates for the major breeding waterfowl species. A total of 346 1-km2 plots are surveyed across six physiographic regions of Pennsylvania using a stratified random design.
Atlantic Flyway Midwinter Waterfowl Survey	U.S. Fish & Wildlife Service	https://migbirdapps.fws.gov/mbdc/databases/mwi/mwidb.asp?opt=mwidb	Annual (January) count of all waterfowl species on major wintering areas within the Atlantic Flyway.
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.

MONITORING PROGRAMS

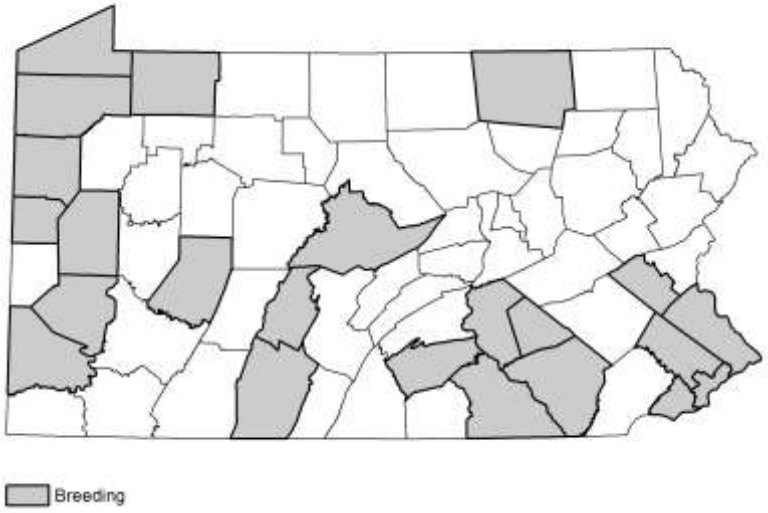
Program Name	Lead Agency	Hyperlink	Description
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals
Post-season black duck banding program	U.S. Fish & Wildlife Service	http://blackduck.cmi.vt.edu/populationMonitor.php?Program=Pilot	Post-season (Jan. - March) and preseason (August-September) banding program in Pennsylvania provides harvest and survival rates for 2 periods.
Pre-season black duck banding program	U.S. Fish & Wildlife Service	http://www.pwrc.usgs.gov/bbl/	Post-season (Jan. - March) and preseason (August-September) banding program in Pennsylvania provides harvest and survival rates for 2 periods.
USFWS Harvest Information Program	U.S. Fish & Wildlife Service	http://www.fws.gov/hip/	Annual survey of migratory game bird license purchasers that provides hunter participation and harvest data for waterfowl and webless migratory game birds.
USFWS Parts Collection Survey	U.S. Fish & Wildlife Service	http://www.fws.gov/birds/surveys-and-data/harvest-surveys/parts-collection-surveys.php	Classification by age and sex of Black Ducks using wings submitted by successful hunters.

Blue-winged Teal

Anas discors

Kevin Jacobs
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S1B**
IUCN Red List	**VU Vulnerable**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Stabilize the historically declining breeding Blue-winged Teal population size and geographic distribution within Pennsylvania as measured by the periodic Pennsylvania Atlas of Breeding Birds.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Lakes**	**Lakes**
Habitat	**Hypereutrophic, Medium Alkalinity Lake**	**Hypereutrophic, High Alkalinity Lake**

Specific Habitat Requirements:

Wetlands, particularly emergent marshes, vernal wetlands, lakes and ponds with emergent aquatic vegetation. Shallow wetlands are preferred, and teal are often associated with wetlands of high quality. Agricultural habitats, especially grasslands, are used for nesting.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss or conversion of wetland and associated upland grassland acreage and function to development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Work with township and municipal planning authority to identify key wetland habitats used and protect them from development and disturbance. Implement buffers around wetlands that limit development. Enforce existing wetland protection laws.	Protect quality wetland and associated upland habitat from development and reduce annual losses.	Number of wetland and grassland acres protected.	Acres protected from loss or degradation through NWI mapping, grassland acreage protected.	1

Action Location: Physiographic Province: Statewide

Associated Species: American Black Duck, Green-winged Teal, Common Gallinule, American Coot

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Breeding

Specific Threat: High frequency hay mowing cycles during breeding period that exacerbates nest losses.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection Incorporate Farm Bill conservation incentives and other programs to encourage delayed mowing of grasslands in agricultural habitats.	Identify priority agricultural wetland and grassland habitats used by breeding and nesting blue-winged teal	Number of wetland and grassland acres protected.	Acres protected from loss or degradation through NWI mapping, grassland acreage protected.	1

Action Location: Physiographic Province: Statewide

Associated Species: American Black Duck, Green-winged Teal, Common Gallinule, American Coot

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Agriculture policies that encourage intensive row-cropping have reduced grasslands required for nesting habitats.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection Incorporate Farm Bill conservation incentives to secure and set aside vernal wetlands and associated grasslands in agricultural habitats.	Identify priority agricultural wetland and grassland habitats used by breeding and nesting blue-winged teal	Number of wetland and grassland acres protected.	Acres protected from loss or degradation through NWI mapping, grassland acreage protected.	1

Action Location: Physiographic Province: Statewide

Associated Species: American Black Duck, Green-winged Teal, Common Gallinule, American Coot

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Loss or conversion of wetland and associated upland grassland acreage and function to development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Mitigate and incorporate conservation incentives for wetlands and grasslands development and development in energy developed habitats.	Identify priority agricultural wetland and grassland habitats used by breeding and nesting blue-winged teal	Number of wetland and grassland acres protected.	Acres protected from loss or degradation through NWI mapping, grassland acreage protected.	2

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: American Black Duck, Green-winged Teal, Common Gallinule, American Coot

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Wetland habitat degradation by invasive exotic species (e.g. Phragmites, reed canary grass, purple loosestrife).

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Mechanical, chemical or biological control of invasive plants in wetlands and associated grasslands used for breeding habitat. Action Location: Physiographic Province: Statewide Associated Species: American Black Duck, Green-winged Teal, Common Gallinule, American Coot	Provide incentives to control invasive species on breeding habitats and conduct treatments annually	Number of wetland and grassland acres protected.	Acres protected from loss or degradation through NWI mapping, grassland acreage protected.	2

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Bioaccumulation of pesticides and contaminants (e.g. mercury and carbamate pesticides).

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Sample breeding blue-winged teal for pesticide and contaminant levels to better understand the impacts to reproductive success and duckling survivorship. Action Location: Physiographic Province: Statewide	Determine the impact of pesticide use and contaminant bioaccumulation upon aquatic invertebrates.	Number of ducks sampled; number testing positive/negative.	Assess contaminant levels in blue-winged teal.	3

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Increased drought frequency could cause wetlands to dry out, making them unsuitable for nesting. Alternatively, increases in extreme weather (precipitation) events could cause nest flooding.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Develop a statewide climate change mitigation strategy for wetland dependent wildlife.	Create a plan for assessing predicted and current climate change impacts to major emergent wetlands in Pennsylvania within the next 2 years and begin implementation of this assessment within the next 5 years.	Number of major wetlands assessed via the plan during next 5 years.	1- A. climate change conservation plan has been created for Pennsylvania's major emergent wetlands, B. major wetlands are assessed for vulnerability and impacts, 2 - committee of wetland, taxa, and climate change experts, 3 - plan developed within 2 years, wetlands assessment (including field component) within 5 years	3

Action Location: Physiographic Province: Statewide

Associated Species: American Black Duck, Green-winged Teal, Common Gallinule, American Coot, American Bittern, Least Bittern

RESEARCH NEEDS

1. Breeding- Determine landscape-level impacts of Farm Bill conservation policy on habitat quality for blue-winged teal and other species reliant upon a mix of wetland and grassland habitats.

2. Breeding- Develop best management practices for nesting blue-winged teal and grassland birds in agricultural landscapes.

SURVEY NEEDS

1. Breeding- Conduct comprehensive assessment of wetland and grassland habitats and their quality to support blue-winged teal and other wetland and grassland dependent WAP species (e.g., Great Lakes Marsh Monitoring Survey, Bird Studies Canada).

MONITORING PROGRAMS

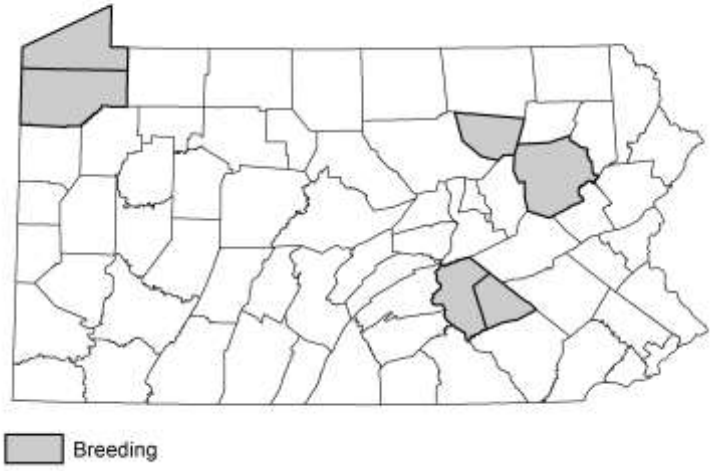
Program Name	Lead Agency	Hyperlink	Description
Atlantic Flyway Breeding Waterfowl Survey	U.S. Fish & Wildlife Service	https://migbirdapps.fws.gov/mbdc/databases/afbws/afbws.asp?opt=afbws	This survey has been conducted annually since 1989 in Pennsylvania and other AF states from Virginia to New Hampshire. It provides breeding population estimates for the major breeding waterfowl species. A total of 346 1-km2 plots are surveyed across six physiographic regions of Pennsylvania using a stratified random design.
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals
Preseason duck banding	U.S. Fish & Wildlife Service	http://www.pwrc.usgs.gov/bbl/	Banding occurs between August-September, prior to the onset of the hunting season. Banding of birds at this time provides estimates of harvest and survival rates of waterfowl populations.
USFWS Harvest Information Program	U.S. Fish & Wildlife Service	http://www.fws.gov/hip/	Annual survey of migratory game bird license purchasers that provides hunter participation and harvest data for waterfowl and webless migratory game birds.

Green-winged Teal

Anas crecca

Molly Giles
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S1B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Maintain presence as a breeding species by maintaining the current quality and acreage of the wetlands, especially in the northwestern part of the state, on which this and other Species of Greatest Conservation Need rely.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Emergent Marsh**	**Lakes**
Habitat	**Laurentian-Acadian Freshwater Marsh**	**Mesotrophic, Medium Alkalinity Lake**

Specific Habitat Requirements:

Wetlands, particularly dense emergent marshes and shrubby swamps; lakes and ponds with emergent aquatic vegetation. Shallow wetlands are preferred, and teal are often associated with wetlands of high quality.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss of wetland acreage and/or loss of function of wetland complexes.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Identify and protect from development emergent wetland habitats used by Green-winged Teal; enforce existing wetland protection laws.	Protect quality wetland habitat from development and reduce annual wetland losses.	Number of wetland acres protected.	Acres protected from loss or degradation through NWI mapping.	1

Action Location: Physiographic Province: Appalachian Plateaus, Central Lowland

Associated Species: American Black Duck, Blue-winged Teal, Common Gallinule, American Coot

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Loss of wetlands; fragmentation of forested wetland habitats used for breeding.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection Identify forested wetland habitats used by Green-winged Teal that are in areas targeted for energy development, and protect or acquire those areas before loss or degradation occurs.	Identify and protect priority forested wetland habitats used by breeding and nesting Green-winged Teal	Number of wetland acres protected.	Acres protected from loss or degradation through NWI mapping.	1

Action Location: Physiographic Province: Statewide

Associated Species: American Black Duck, Blue-winged Teal, Common Gallinule, American Coot

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Breeding

Specific Threat: Human disturbance during breeding, nesting, and brood rearing.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 5.0 Facilities and Areas Create waterfowl propagation areas on state/federal lands, particularly in Crawford and Erie Counties; seek cooperative agreements with private landowners to create disturbance-free breeding sites.	Identify priority wetlands through NWI mapping, then place all or a certain percentage of each wetland under protection as a propagation area.	Number of wetland acres protected.	Acres protected from loss or degradation through NWI mapping.	2

Action Location: Physiographic Province: Appalachian Plateaus, Central Lowland

Associated Species: American Black Duck, Blue-winged Teal, Common Gallinule, American Coot

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Destruction of wetland systems through draining, dredging, or filling of wetlands, and disruption of flooding regimes.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources In wetlands used as breeding habitat, protect sites from draining, dredging and filling. Manage water levels to provide optimal conditions for nesting, foraging, and brood-rearing.	Monitor water levels in managed wetlands for optimal conditions.	Number of wetland acres protected and under management.	Acres protected from draining, dredging, or filling and managed for maximum production of foraging and nesting habitat.	2

Action Location: Physiographic Province: Appalachian Plateaus, Central Lowland

Associated Species: American Black Duck, Blue-winged Teal, Common Gallinule, American Coot

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Extreme weather events as a result of climate change could reduce availability or suitability of breeding and nesting sites.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Develop a statewide climate change mitigation strategy for freshwater emergent wetlands and wildlife species dependent on these habitats.	Create a plan for assessing predicted and current climate change impacts to major emergent wetlands in Pennsylvania within the next 2 years and begin implementation of this assessment within the next 5 years.	Number of major wetlands assessed via the plan during next 5 years.	1- A. climate change conservation plan has been created for Pennsylvania's major emergent wetlands, B. major wetlands are assessed for vulnerability and impacts, 2 - committee of wetland, taxi, and climate change experts, 3 - plan developed within 2 years, wetlands assessment (including field component) within 5 years	2

Action Location: Physiographic Province: Statewide

Associated Species: American Black Duck, Blue-winged Teal, Common Gallinule, American Coot, American Bittern, Least Bittern

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Bioaccumulation of pesticides, contaminants, and heavy metals.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Determine the impact of pesticide use and contaminant bioaccumulation in breeding Green-winged Teal.	Sample breeding Green-winged Teal for pesticide and contaminant levels to better understand the impacts to reproductive success and survivorship.	Number of ducks sampled; number testing positive/negative.	Assess contaminant levels in American green-winged teal.	3

Action Location: Physiographic Province: Statewide

RESEARCH NEEDS

1. Breeding- None

SURVEY NEEDS

1. Breeding- Development of a procedure to achieve regular and standardized compilation of data collected through non-species-specific monitoring programs (e.g. eBird) on numbers and locations of breeding green-winged teal.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
Atlantic Flyway Breeding Waterfowl Survey	U.S. Fish & Wildlife Service	https://migbirdapps.fws.gov/mbdc/databases/afbws/afbws.asp?opt=afbws	This survey has been conducted annually since 1989 in Pennsylvania and other AF states from Virginia to New Hampshire. It provides breeding population estimates for the major breeding waterfowl species. A total of 346 1-km2 plots are surveyed across six physiographic regions of Pennsylvania using a stratified random design.
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals
Preseason duck banding	U.S. Fish & Wildlife Service	http://www.pwrc.usgs.gov/bbl/	Banding occurs between August-September, prior to the onset of the hunting season. Banding of birds at this time provides estimates of harvest and survival rates of waterfowl populations.

MONITORING PROGRAMS

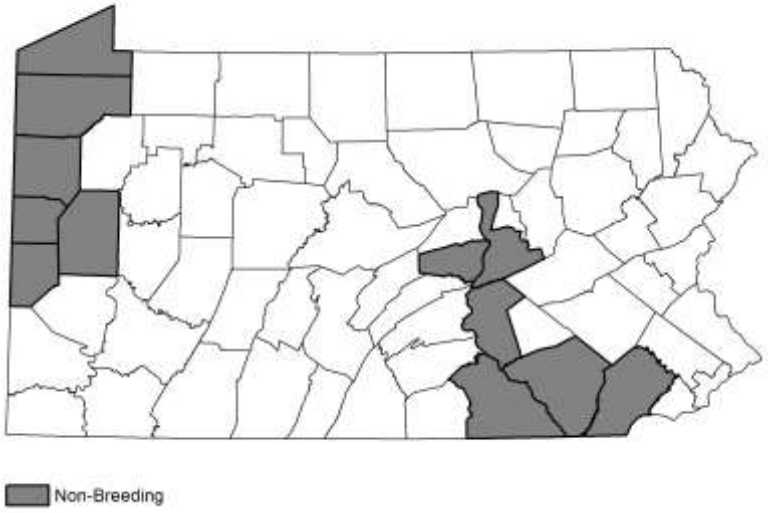
Program Name	Lead Agency	Hyperlink	Description
USFWS Harvest Information Program	U.S. Fish & Wildlife Service	http://www.fws.gov/hip/	Annual survey of migratory game bird license purchasers that provides hunter participation and harvest data for waterfowl and webless migratory game birds.

Lesser Scaup

Aythya affinis

Kevin Jacobs
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S5N (M)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(M) Unknown**

Conservation Goal:

Maintain historical distribution and abundance of migrating Lesser Scaup in Pennsylvania and particularly on Lake Erie and Presque Isle Bay as measured by migration surveys conducted at Presque Isle.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(M) Lakes**	**(M) Lakes**
Habitat	**(M) Lake Erie**	**(M) Eutrophic, Medium Alkalinity Lake**

Specific Habitat Requirements:

Large, deep waterbodies providing diverse submerged aquatic vegetation and abundant aquatic invertebrate prey. Lake Erie is believed to be the only portion of Pennsylvania providing adequate habitat to support a significant proportion of the species' population, although scaup also occasionally occur at other locations (on lakes and large rivers) throughout the state.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Migration

Specific Threat: Fragmentation of migratory paths and lake habitats used for feeding and resting.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	By 2020, complete habitat model for Pennsylvania portion of Lake Erie	Creation of risk model for migrating scaup	Yes/no evaluation of whether risk model is completed	1

Work cooperatively with partners to develop models of high- and low-risk areas for wind turbine placement based on species distribution data during migration. This will provide a needed baseline to pursue additional future actions that will avoid and mitigate impacts.

Action Location: Physiographic Province: Central Lowland

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Migration

Specific Threat: Wetland habitat degradation by invasive exotic species (e.g. Phragmites, reed canary grass, purple loosestrife); replacement of high-quality invertebrate food sources by lower-quality invasive species.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 101.0	Species Management	By 2020, complete habitat model for Pennsylvania portion of Lake Erie.	Food availability for migrating scaup	Yes / no evaluation of whether risk model is completed.	2

Monitor aquatic invasive species, use by scaup and functional ecological relationships that impact scaup.

Action Location: Physiographic Province: Central Lowland

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Migration

Specific Threat: Bioaccumulation of pesticides and contaminants.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Work with partners to understand bioaccumulation of pollutants in the aquatic food chain and impacts upon scaup reproduction.	Sample migrating lesser scaup for pesticide and contaminant levels to better understand the impacts to post-breeding survival and future reproductive success.	Number of ducks sampled; number testing positive/negative.	Assessment of contaminant levels.	3

Action Location: Physiographic Province: Central Lowland

RESEARCH NEEDS

1. Migration- Examine existing data sources (Lake Erie migration surveys, Christmas Bird Count, eBird) to determine if they provide adequate data quantity / quality to monitor trends in the number of scaup migrating through Pennsylvania.

2. Migration- Monitor wind-energy development planning and implementation in relation to established scaup habitats on Lake Erie.

3. Migration- Evaluate invasive aquatic species composition in Lake Erie (vegetation, invertebrates, and fish) and potential impacts upon migration food availability for lesser scaup.

SURVEY NEEDS

1. Migration- Compile historical fall scaup migration abundance records from Gerald MacWilliams to determine abundance patterns and if future coordination of efforts are warranted or possible.

2. Migration- Participate with coordinated Great Lakes waterbird surveys (e.g., Great Lakes Marsh Monitoring Survey, Bird Studies Canada).

MONITORING PROGRAMS

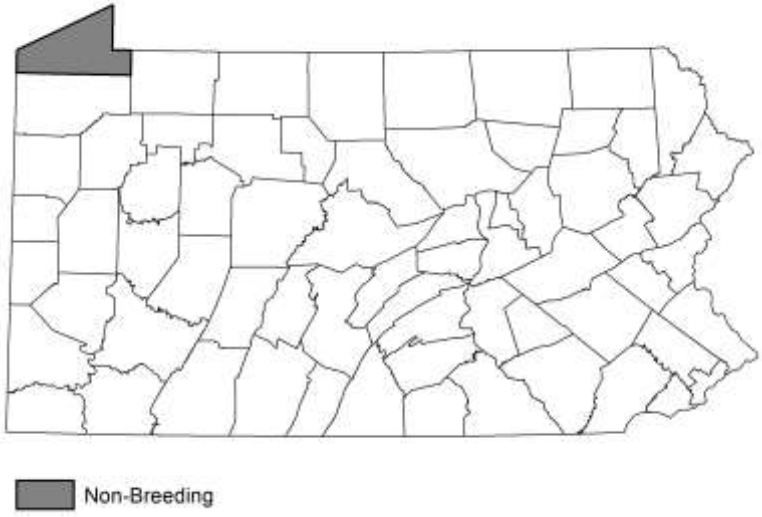
Program Name	Lead Agency	Hyperlink	Description
Atlantic Flyway Midwinter Waterfowl Survey	U.S. Fish & Wildlife Service	https://migbirdapps.fws.gov/mbdc/databases/mwi/mwidb.asp?opt=mwidb	Annual (January) count of all waterfowl species on major wintering areas within the Atlantic Flyway.
Gerald MacWilliams Lake Erie fall migration survey	Gerald MacWilliams		Daily bird count at Presque Isle from Mid-September through December.
National Audubon Society Christmas Bird Counts	National Audubon Society	http://birds.audubon.org/christmas-bird-count	Since 1900, this is an annual winter survey of more than 2,300 count circles worldwide. The longest running Citizen Science survey in the world, Christmas Bird Count provides critical data on population trends.
USFWS Harvest Information Program	U.S. Fish & Wildlife Service	http://www.fws.gov/hip/	Annual survey of migratory game bird license purchasers that provides hunter participation and harvest data for waterfowl and webless migratory game birds.
USFWS Parts Collection Survey	U.S. Fish & Wildlife Service	http://www.fws.gov/birds/surveys-and-data/harvest-surveys/parts-collection-surveys.php	Classification by age and sex of Lesser Scaup using wings submitted by successful hunters.

Long-tailed Duck

Clangula hyemalis

Ian D. Gregg
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4N (M), S4N (W)**
IUCN Red List	**VU Vulnerable**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(M) Unknown; (W) Increase of 11 - 25%**

Conservation Goal:

Identify or develop statistically reliable metric(s) to monitor population trends of migrating and wintering Long-Tailed Ducks in Pennsylvania (especially Lake Erie), and maintain stable or increasing trend in the metric(s).

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(M, W) Lakes**	
Habitat	**(M, W) Lake Erie**	

Specific Habitat Requirements:

Large, deep waterbodies (both freshwater and marine) providing diverse and abundant invertebrate prey. Lake Erie is believed to be the only portion of Pennsylvania providing adequate habitat to support a significant proportion of the species' population, although migrating and wintering Long-Tailed Ducks also occasionally occur at other locations (on lakes and large rivers) throughout the state.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Migration

Specific Threat: Current levels of sport harvest may be too high.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Complete calculations of harvest potential of long-tailed ducks and adjust harvest regulations as necessary to maintain realized harvest at or below the harvest potential.	1) By 2016, complete analyses of Long-Tailed Duck harvest potential. 2) By 2017-2018 harvest regulations cycle, implement harvest restrictions (if necessary) to maintain Long-Tailed Duck realized harvest at our below calculated harvest potential.	1) Calculation of harvest potential; 2) Harvest levels.	1) Yes / no evaluation of whether harvest potential analysis is completed. 2) Harvest levels to be monitored through U.S. Fish and Wildlife Service's Harvest Information Program and Parts Collection Survey.	1

Action Location: Physiographic Province: Statewide

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Migration

Specific Threat: Direct mortality from disease, especially Type E avian botulism.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Prompt removal of fish and bird carcasses during botulism outbreaks.	During the 2015-2025 period, reduce the frequency, length, and extent of botulism outbreaks in the Lower Great Lakes from the 2005-2014 averages.	Number, temporal extent, and total mortalities recorded for avian botulism outbreaks.	In cooperation with partner agencies, annually enumerate number of botulism outbreaks, temporal length of all outbreaks, and total individuals affected (Long-Tailed Ducks and other species).	1

Action Location: Physiographic Province: Central Lowland

Associated Species: Common Loon, Red-breasted Merganser, Lesser Scaup, lake sturgeon

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Migration

Specific Threat: Construction of offshore wind turbines in Lake Erie may reduce foraging habitat availability, create barriers to movement, and cause direct mortality.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 3.0 Data Collection and Analysis Work cooperatively with partners to develop models of high- and low-risk areas for wind turbine placement based on species distribution data during migration. This will provide a needed baseline to pursue additional future actions that will avoid and mitigate impacts. Action Location: Physiographic Province: Central Lowland	By 2020, complete habitat model for Pennsylvania portion of Lake Erie.	Creation of risk model for migrating Long-Tailed Ducks.	Yes / no evaluation of whether risk model is completed.	2

IUCN Threat: 9.0 Pollution

Season: Migration

Specific Threat: Direct mortality from oil spills.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 3.0 Data Collection and Analysis Work cooperatively with partners to develop models of high- and low-risk areas for oil spills based on species distribution data during migration and locations of infrastructure (e.g. refineries, pipelines) and major shipping channels. This will provide a needed baseline to pursue additional future actions that will avoid and mitigate impacts. Action Location: Physiographic Province: Central Lowland	By 2020, complete habitat model for Pennsylvania portion of Lake Erie.	Creation of risk model for migrating Long-Tailed Ducks.	Yes / no evaluation of whether risk model is completed.	2

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Winter

Specific Threat: Construction of offshore wind turbines in Lake Erie may reduce foraging habitat availability, create barriers to movement, and cause direct mortality.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 3.0 Data Collection and Analysis Work cooperatively with partners to develop models of high- and low-risk areas for wind turbine placement based on species distribution data during winter. This will provide a needed baseline to pursue additional future actions that will avoid and mitigate impacts. Action Location: Physiographic Province: Central Lowland	By 2020, complete habitat model for Pennsylvania portion of Lake Erie.	Creation of risk model for wintering Long-Tailed Ducks.	Yes / no evaluation of whether risk model is completed.	2

IUCN Threat: 9.0 Pollution

Season: Winter

Specific Threat: Direct mortality from oil spills.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 3.0 Data Collection and Analysis Work cooperatively with partners to develop models of high- and low-risk areas for oil spills based on species distribution data during winter and locations of infrastructure (e.g. refineries, pipelines) and major shipping channels. This will provide a needed baseline to pursue additional future actions that will avoid and mitigate impacts. Action Location: Physiographic Province: Central Lowland	By 2020, complete habitat model for Pennsylvania portion of Lake Erie.	Creation of risk model for wintering Long-Tailed Ducks.	Yes / no evaluation of whether risk model is completed.	2

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Winter

Specific Threat: Starvation mortality in severe winters when extensive ice cover on the Great Lakes reduces or eliminates access to feeding areas.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Maintain open water areas on smaller waterbodies close to the Great Lakes to provide accessible alternative habitat to Long-Tailed Ducks during severe winters.	Direct Management of Natural Resources	During the 2015-2014 period, maintain 1,000 ha of open water in Erie and Crawford Counties during winter months.	Acreage of open water maintained.	Bi-weekly during the months of December through March, use remote sensing to assess the amount of open water available in Erie and Crawford Counties.	3

Action Location: Physiographic Province: Appalachian Plateaus, Central Lowland

Associated Species: All waterfowl, Bald Eagle

RESEARCH NEEDS

1. Migration- Examine existing data sources (e.g. eBird) to determine if they provide adequate data quantity / quality to monitor trends in the number of Long-Tailed Ducks migrating through Pennsylvania.

1. Wintering- Examine existing data sources (e.g. Christmas Bird Count, eBird) to determine if they provide adequate data quantity / quality to monitor trends in the number of Long-Tailed Ducks wintering in Pennsylvania.

2. Migration- Examine habitat use and selection of Long-Tailed Ducks migrating through Pennsylvania.

2. Wintering- Examine habitat use and selection of Long-Tailed Ducks wintering in Pennsylvania.

3. Migration- Determine breeding ground affiliations of Long-Tailed Ducks migrating through Pennsylvania.

3. Wintering- Determine breeding ground affiliations of Long-Tailed Ducks wintering in Pennsylvania.

SURVEY NEEDS

1. Migration- Development of a procedure to achieve regular and standardized compilation of data collected through non-species-specific monitoring programs (e.g. eBird) on numbers and locations of migrating long-tailed ducks.

1. Wintering- Support the implementation of an operational Atlantic Flyway Sea Duck Survey, building on the experimental U.S. Fish and Wildlife Service surveys conducted from 2008-2011.

MONITORING PROGRAMS

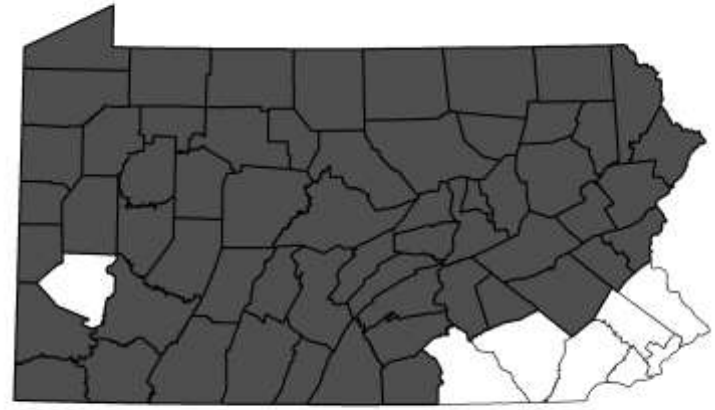
Program Name	Lead Agency	Hyperlink	Description
Atlantic Flyway Midwinter Waterfowl Survey	U.S. Fish & Wildlife Service	https://migbirdapps.fws.gov/mbdc/databases/mwi/mwidb.asp?opt=mwidb	Annual (January) count of all waterfowl species on major wintering areas within the Atlantic Flyway.
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Great Lakes Pelagic Bird Surveys	Great Lakes Commission	http://glc.org/	Aerial transect surveys completed during fall and spring migration periods, and mid-winter as practicable.
USFWS Harvest Information Program	U.S. Fish & Wildlife Service	http://www.fws.gov/hip/	Annual survey of migratory game bird license purchasers that provides hunter participation and harvest data for waterfowl and webless migratory game birds.
USFWS Parts Collection Survey	U.S. Fish & Wildlife Service	http://www.fws.gov/birds/surveys-and-data/harvest-surveys/parts-collection-surveys.php	Classification by age and sex of Long-tailed Ducks using wings submitted by successful hunters.

Ruffed Grouse

Bonasa umbellus

Lisa M. Williams
Pennsylvania Game Commission

Photo: Jacob Dingel



Breeding & Non-Breeding

CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B, S3N (W)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B, W) Relatively Stable (<=10% change)**

Conservation Goal:

Increase populations to 1980 levels as stated in the Pennsylvania Ruffed Grouse Management Plan (Williams et al. 2011) to reverse long-term declines in this species (see Wilson et al. 2012).

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(B) Northern Hardwood & Conifer** **(W) Central Oak-Pine**	
Habitat	**(B) Appalachian (Hemlock)-Northern Hardwood Forest** **(W) Northeastern Interior Dry-Mesic Oak Forest**	

Specific Habitat Requirements:

(B, W) Mosaic of age classes within a forested landscape, with early succession forest as 12-15% of total.
(B) Peak use by drummers occurs at years 6-18 of regrowth. Low moist bottomlands with herbaceous cover, as well as coarse woody debris, important as brood habitat.
(W) High quality, native food and cover species within close proximity to one another. Conifers may provide important thermal cover from winter rain and ice. Diverse and complex native forest structure is preferred over heavily managed or thinned parcels.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Young forest acreage is below the 12-15% of forested acreage needed to maintain grouse populations, and does not occur in the distribution across the landscape needed to support grouse dispersal and colonization. Where private landowners are undertaking active forest management, it is often not appropriate for long term habitat quality.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Provide technical assistance, and (where necessary) funding to implement non-commercial treatments to increase proportion of young forest on the landscape.	By 2025, reverse trend of % young forest on the landscape from declining to increasing.	% young forest (seedling / sapling) forest cover as measured by USFS, DCNR, and PGC forest inventory programs	Monitor trends in proportion of young forest as measured by forest inventory programs conducted by U.S. Forest Service, PA Department of Conservation and Natural Resources, and Pennsylvania Game Commission.	1

Action Location: Physiographic Province: Statewide

Associated Species: Blue-winged Warbler, Golden-winged Warbler, Prarie Warbler, Eastern Whip-poor-will, Appalachian cottontail, eastern box turtle, eastern fence lizard, wood turtle

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: West Nile virus may have affected and continue to suppress population recovery; invasive plants impact habitat quality.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Assess vulnerability of Ruffed Grouse to West Nile Virus; focus control of invasive plants on woody and herbaceous species that provide no value to grouse.	Conduct Challenge Trial of Ruffed Grouse to WNV. Collect hunter-harvested samples to assess statewide impact. Review current seasons and bag limits based on this new information. Continue to prioritize invasive species control efforts for highly-negative species (buckthorn, stilt grass, tree of heaven, etc.).	lab study completed; # hunter harvested samples; # invasive control projects	Identify how new disease information has informed season structure and development of a harvest framework. Monitor hunter flush rates in good habitat and correlate with WNV Infectivity Index for PA.	1

Action Location: Physiographic Province: Statewide

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Feral and domestic pets in habitats surrounding human development likely have a negative impact on this ground nesting species.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach Education regarding the impacts of "hands-off" forestry for young forest community. Increased outreach regarding the impact of dogs and cats to ground nesting birds and the need to keep pets on leash or indoors during breeding season. Landowner outreach re: invasive species.	Develop and disseminate education programs.	# programs developed; # public education events provided; # people reached	Pre- and post-testing of public event audiences. Human dimensions surveys on public's awareness of dog/cat impacts on ground nesting wildlife and attitudes toward active forestry.	2

Action Location: Physiographic Province: Statewide

Associated Species: Blue-winged Warbler, Golden-winged Warbler, Prarie Warbler, Eastern Whip-poor-will, Appalachian cottontail, eastern box turtle, eastern fence lizard, wood turtle

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Energy development sites fragment forest habitat and introduce invasive species.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Cluster sites on the landscape to limit the footprint of forest fragmentation. Create young forest between sites that connects multiple, dispersed well pads into a larger area of young forest to convert the otherwise-fragmenting footprint created by well pads into a useful habitat matrix.	Incorporate forest fragmentation concerns into energy development planning.	# plans developed; # operators contacted; # cooperative agreements	Project mapping that reflects habitat fragmentation mitigation concerns.	2

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Blue-winged Warbler, Golden-winged Warbler, Prarie Warbler, Eastern Whip-poor-will, Appalachian cottontail, eastern box turtle, eastern fence lizard, wood turtle

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Access roads for energy development fragment forest habitat.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Incorporate forest fragmentation concerns into energy development planning.	# plans developed; # operators contacted; # cooperative agreements	Project mapping that reflects habitat fragmentation mitigation concerns.	2

Cluster transportation corridors on the landscape to limit the footprint of forest fragmentation. Create wide borders of young forest parallel to the edges of transportation corridors (or interspersed perpendicular to the transport corridor like branches off the main line) to convert the fragmentation created by energy corridors into a useful habitat matrix. Replace hard edges with wide borders of high quality young forest.

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Blue-winged Warbler, Golden-winged Warbler, Prarie Warbler, Eastern Whip-poor-will, Appalachian cottontail, eastern box turtle, eastern fence lizard, wood turtle

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Acid deposition leads to reduced calcium availability in diet.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Identify management areas with higher calcium levels and high soil buffering capacity when establishing grouse management activities.	# sites identified; # established sites with Calcium analysis conducted	Project planning that reflects Calcium profile, soil buffering capacity and mitigation concerns.	3

Focus habitat restoration in sites with adequate calcium and/or buffering capacity; seek acid deposition reduction at policy/government levels; explore feasibility of soil liming where grouse are a featured management species.

Action Location: Physiographic Province: Statewide

Associated Species: Forest-dwelling songbirds, regenerating tree and shrub species, fish

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Winter

Specific Threat: Young forest acreage is below the 12-15% of forested acreage needed to maintain grouse populations, and does not occur in the distribution across the landscape needed to support grouse dispersal and colonization. Where private landowners are undertaking active forest management, it is often not appropriate for long term habitat quality.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Education programs and technical assistance must continue to be prioritized in an attempt to reach both public and private land managers regarding: 1) population declines of young forest obligate species; 2) proper and sustainable forest management best practices; 3) benefit of overstory removal to young forest wildlife species.	Develop and disseminate education programs to public and private land managers	Number of programs developed; number of public education events provided; number of people reached	Human dimensions surveys on public awareness and attitudes toward active forestry.	1

Action Location: Physiographic Province: Statewide

Associated Species: Blue-winged Warbler, Golden-winged Warbler, Prarie Warbler, Eastern Whip-poor-will, Appalachian cottontail, eastern box turtle, eastern fence lizard, wood turtle

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Winter

Specific Threat: Reduced habitat suitability from inferior food and cover provided by invasive vegetation.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Actively manage invasive plants that threaten young forest regeneration and those that limit timber harvest opportunities for landowners. Elimination of invasives is not likely, but a focus on prevention of new invasives such as European buckthorn may slow ingress into PA.	Investigate and implement best management practices to maintain high-quality young forest.	Number of acres restored; Number of suitable acres maintained	Monitor condition of young forests on public lands; Monitor populations of grouse in good habitat	1

Action Location: Physiographic Province: Statewide

Associated Species: Blue-winged Warbler, Golden-winged Warbler, Prarie Warbler, Eastern Whip-poor-will, Appalachian cottontail, eastern box turtle, eastern fence lizard, wood turtle

THREATS AND ACTIONS

IUCN Threat: 2.0 Agriculture and Aquaculture

Season: Winter

Specific Threat: Non-native quick-growing species planted for biomass or pulp production may serve as ecological traps.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Involve wildlife biologists in the planning and implementation of biomass programs.	Number of projects reviewed	Integration of wildlife biologists and natural vegetative community experts in biomass planning processes in public and private ventures.	3

Extreme caution should be used in evaluating any potential species for biomass production, since dense quick-growing species can often become invasive. Actively manage invasive plants that threaten young forests and those that limit timber harvest opportunities for landowners.

Action Location: Physiographic Province: Statewide

Associated Species: Blue-winged Warbler, Golden-winged Warbler, Prarie Warbler, Eastern Whip-poor-will, Appalachian cottontail, eastern box turtle, eastern fence lizard, wood turtle

RESEARCH NEEDS

1. Breeding- Determine vulnerability and mortality rates of ruffed grouse exposed to West Nile Virus.

1. Wintering- Comparative study of sex and age ratios in fall population, from 1970-80s (Mgmt. Plan's population baseline years) to present via a Parts Collection Survey.

2. Breeding- Analyze expected range contraction of grouse in Pennsylvania and other Northeastern / Appalachian states following methodology used in New York by Porter and Jarzyna (2013) to inform priority areas for intensive habitat management.

2. Wintering- Extent of West Nile Virus exposure in PA ruffed grouse, as indexed by antibodies in hunter harvested samples.

3. Breeding- Determine impact of changing spring weather conditions on juvenile production, obtain current survival rate estimates of juvenile grouse, and determine relative contributions of various mortality factors (disease, weather, predation) to juvenile mortality.

3. Wintering- Suitability of grouse season structure and current harvest levels on PA ruffed grouse, with particular emphasis on north/south population dynamics.

SURVEY NEEDS

1. Breeding- Refine PGC Grouse Summer Sighting Survey to provide more reliable data on annual recruitment.

1. Wintering- Develop a targeted hunter survey of grouse habitat with detailed characterization of vegetation and cover types, and repeat visits to determine species presence as a way to identify factors involved in habitat occupancy.

2. Breeding- Expand spring and fall flush counts at priority sites in order to detect a population response where specific management actions have targeted grouse.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Grouse Hunter Cooperator Survey	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt?open=514&objID=601998&mode=2	Cooperating hunters keep field diaries of hunting trips (county, # flushes, # bagged) annually as a way to monitor population trends in appropriate habitat.
Grouse Parts Collection Survey, 2014-2017	Pennsylvania Game Commission		Classification by age and sex of grouse wings and tails submitted by cooperating hunters.
Grouse Summer Sighting Survey	Pennsylvania Game Commission		PGC employees tally grouse broods and adults seen during normal work hours. Conducted annually as a way to monitor trends in juvenile production.
National Audubon Society Christmas Bird Counts	National Audubon Society	http://birds.audubon.org/christmas-bird-count	Since 1900, this is an annual winter survey of more than 2,300 count circles worldwide. The longest running Citizen Science survey in the world, Christmas Bird Count provides critical data on population trends.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

MONITORING PROGRAMS

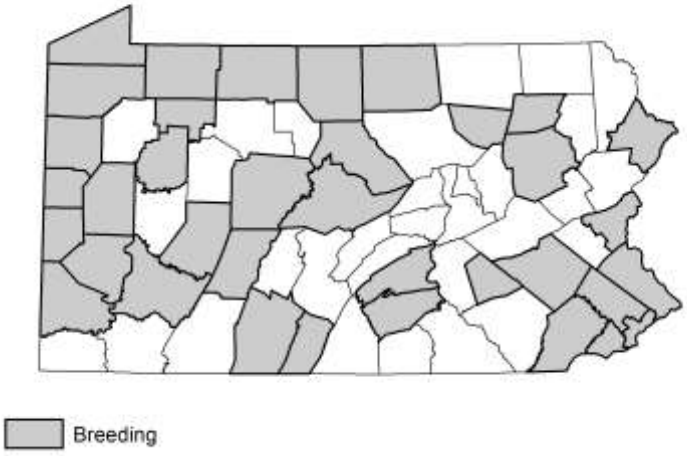
Program Name	Lead Agency	Hyperlink	Description
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals
PGC Game Take Survey	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt/document/1460119/11101-13z_pdf	Annual survey of license buyers that reveals WMU of hunt, effort, and harvest figures for a random sample of grouse hunters.
PGC Grouse Drumming Survey	Pennsylvania Game Commission		Spring drumming surveys conducted at PGC locations that have received active grouse management. Used to detect presence and population response pre- and post-management.

Pied-billed Grebe

Podilymbus podiceps

David Yeany II
Western PA Conservancy

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S2B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Maintain at least 10-15 breeding pairs annually in Pennsylvania through 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Lakes**	**Wet Meadow / Shrub Marsh**
Habitat	**Mesotrophic, Low Alkalinity Lake**	**Laurentian-Acadian Wet Meadow-Shrub Swamp**

Specific Habitat Requirements:

Emergent wetlands with abundant vegetation (70% cover, 69-133cm in height) and shallow water (24-56cm depth).

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Draining, dredging, filling, leveling, and flooding of wetlands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources In wetlands used as breeding habitat, protect sites from draining, dredging and filling due to development and maintain water depths of 24-56cm for open water areas.	Implement active water level monitoring and management at 26 BBA confirmed breeding locations during the next 10 years.	Number of breeding locations attaining necessary water depth.	1-wetland water levels, 2-surface water level measurements (e.g. staff gauges), 3-10 years	2

Action Location: Physiographic Province: Statewide

Associated Species: American Black Duck, Green-winged Teal, Common Gallinule, American Coot

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Wetland habitat degradation by invasive exotic species (e.g. Phragmites, reed canary grass, purple loosestrife).

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Survey breeding locations for impacted sites and remove/burn and/or chemically spot-treat invasive plants in wetlands where they are dominating native vegetation and degrading habitat.	Determine high priority breeding locations where invasives are an issue and implement treatment annually.	Number of breeding locations with reduced invasive vegetation cover.	1-presence and abundance of invasive plants, 2-invasive plant surveys/assessment, 3-annually for 10 years	2

Action Location: Physiographic Province: Statewide

Associated Species: American Black Duck, Green-winged Teal, Common Gallinule, American Coot, Virginia Rail, Sora, King Rail

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Increased drought could cause wetlands to dry out, making them unsuitable for nesting. Alternatively, increases in extreme weather (precipitation) events could cause nest flooding.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Develop a statewide climate change mitigation strategy for freshwater emergent wetlands and wildlife species dependent on these habitats.	Create a plan for assessing predicted and current climate change impacts to major emergent wetlands in Pennsylvania within the next 2 years and begin implementation of this assessment within the next 5 years.	Number of major wetlands assessed via the plan during next 5 years.	1- A. climate change conservation plan has been created for Pennsylvania's major emergent wetlands, B. major wetlands are assessed for vulnerability and impacts, 2 - committee of wetland, taxa, and climate change experts, 3 - plan developed within 2 years, wetlands assessment (including field component) within 5 years	2

Action Location: Physiographic Province: Appalachian Plateaus, Central Lowland

Associated Species: American Black Duck, Green-winged Teal, Common Gallinule, American Coot, Virginia Rail, Sora, King Rail

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Bioaccumulation of pesticides and contaminants (e.g. mercury and carbamate pesticides).

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Determine the impact of pesticide use and contaminant bioaccumulation in Pennsylvania breeding pied-billed grebes.	Test pied-billed grebes from several breeding locations for levels of mercury and pesticides to better understand the impacts to reproductive success and survivorship.	Number of pied-billed grebe samples tested for pollutants.	1-pied-billed grebe contaminant levels, 2-appropriate tissue sample methods and testing, 3-intial assessment over 2 breeding seasons	3

Action Location: Physiographic Province: Statewide

RESEARCH NEEDS

1. Breeding- Habitat requirements: nest site selection, minimum wetland size, factors affecting nesting success and density, and importance of water quality and disturbance.

2. Breeding- Quantify effects of biocide bioaccumulations.

3. Breeding- Evaluate effects of waterfowl/waterbird management on nesting Pied-billed grebes.

SURVEY NEEDS

1. Breeding- Continue statewide surveys of wetlands utilizing the Pennsylvania Game Commission Marsh Bird Survey protocol adapted from North American Marsh Bird Monitoring Protocols and the 2nd PA BBA.

2. Breeding- Implement annual, standardized surveys of Crawford, Mercer, Lawrence, and Butler Counties, the historic stronghold for breeding pied-billed grebes (e.g., Great Lakes Marsh Monitoring Survey, Bird Studies Canada).

3. Breeding- Select 5 breeding locations as long-term (>3 years) monitoring sites to understand population stability across varying habitats.

MONITORING PROGRAMS

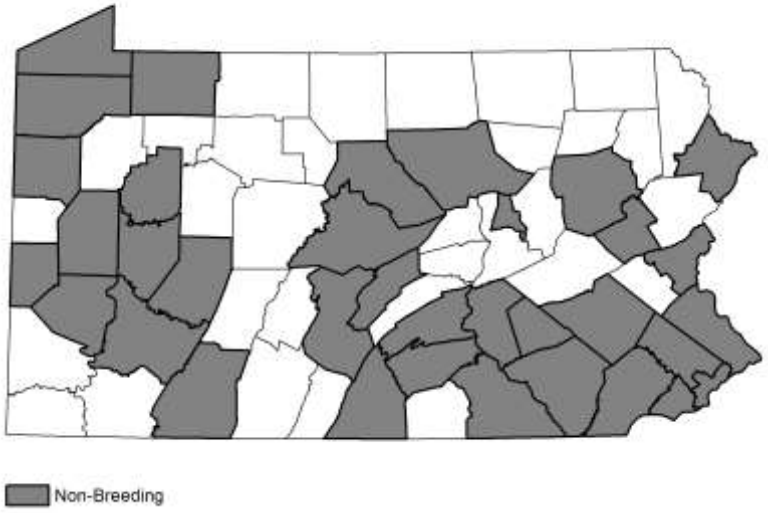
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Pennsylvania Game Commission Marsh Bird Surveys	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt/community/birding_and_bird_conservation/21066/marsh_bird_survey?qid=81806114&rank=4	During breeding seasons, PGC staff, partners, and volunteers conduct standardized audio playback surveys for secretive marsh birds across the state including: pied-billed grebe, American bittern, least bittern, black rail, king rail, Virginia rail, sora, common moorhen, and American coot. Protocol adapted from North American Marsh Bird Monitoring Protocols (Conway 2011) and is very similar to that used in the 2nd Pennsylvania Breeding Bird Atlas. Survey results inform management of these wetlands.

Horned Grebe

Podiceps auritus

David Yeany II
Western PA Conservancy

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3N (W)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(W) Decline of 61 - 90%**

Conservation Goal:

Continue to provide ponds, lakes, and rivers with good water quality as wintering habitat across wintering range in Pennsylvania.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Lakes**	**Lakes**
Habitat	**Oligotrophic, High Alkalinity Lake**	**Mesotrophic, Medium Alkalinity Lake**

Specific Habitat Requirements:

More common in coastal salt water; in Pennsylvania, medium to large-sized fresh water bodies, including rivers, inland lakes and large ponds.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Winter

Specific Threat: Disturbance from boating (i.e. wakes) and other human activities can disrupt normal foraging activity.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Educate recreational boaters about disturbance impacts to water birds.	Conduct regional outreach about recreational disturbance to wildlife in Western, Central, and Eastern Pennsylvania.	Number of attendees at each of the regional outreach events.	1-public knowledge of wildlife disturbance, 2-before and after surveys of attendees, 3-within next 5 years	3

Action Location: Physiographic Province: Statewide

Associated Species: Red-necked Grebe, Pied-billed Grebe, Great Blue Heron, Bald Eagle

RESEARCH NEEDS

1. Wintering- Investigation of winter behavior and descriptions of wintering habitat locations.

SURVEY NEEDS

1. Wintering- Use eBird and Christmas Bird Count data to determine estimates of winter population sizes, trends, and significant concentration areas.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.

MONITORING PROGRAMS

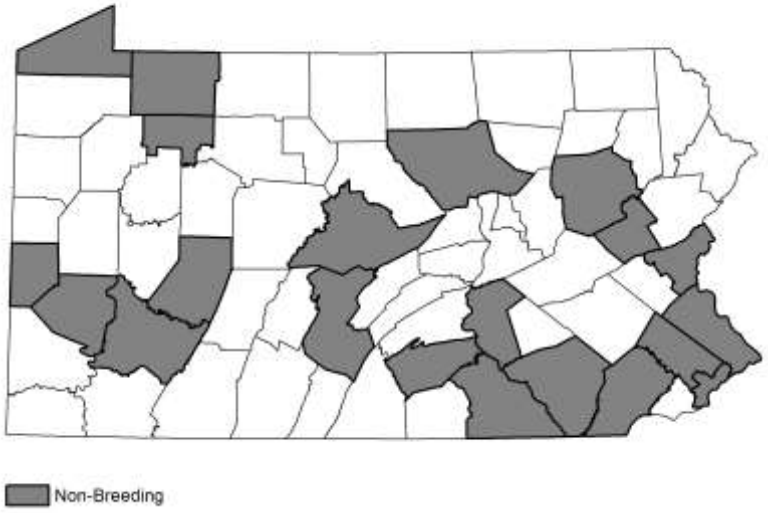
Program Name	Lead Agency	Hyperlink	Description
National Audubon Society Christmas Bird Counts	National Audubon Society	http://birds.audubon.org/christmas-bird-count	Since 1900, this is an annual winter survey of more than 2,300 count circles worldwide. The longest running Citizen Science survey in the world, Christmas Bird Count provides critical data on population trends.

Red-necked Grebe

Podiceps grisegena

David Yeany II
Western PA Conservancy

Photo: Donna Dewhurst



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3N (W)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(W) Unknown**

Conservation Goal:

Continue to provide ponds, lakes, and rivers with good water quality as wintering habitat across wintering range in Pennsylvania.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**#N/A**	**#N/A**
Habitat	**Lotic**	

Specific Habitat Requirements:

In Pennsylvania, medium to large-sized fresh water bodies, including rivers, inland lakes and large ponds, as well as inlets and bays of Lake Erie.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Winter

Specific Threat: Disturbance from boating (i.e. wakes) and other human activities can disrupt normal foraging activity.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Educate recreational boaters about disturbance impacts to water birds.	Conduct regional outreach about recreational disturbance to wildlife in Western, Central, and Eastern Pennsylvania.	Number of attendees at each of the regional outreach events.	1-public knowledge of wildlife disturbance, 2-before and after surveys of attendees, 3-within next 5 years	3

Action Location: Physiographic Province: Statewide

Associated Species: Horned Grebe, Pied-billed Grebe, Great Blue Heron, Bald Eagle

RESEARCH NEEDS

1. Wintering- Investigation of winter behavior and descriptions of wintering habitat locations.

SURVEY NEEDS

1. Wintering- Use eBird and Christmas Bird Count data to determine estimates of winter population sizes, trends, and significant concentration areas.

MONITORING PROGRAMS

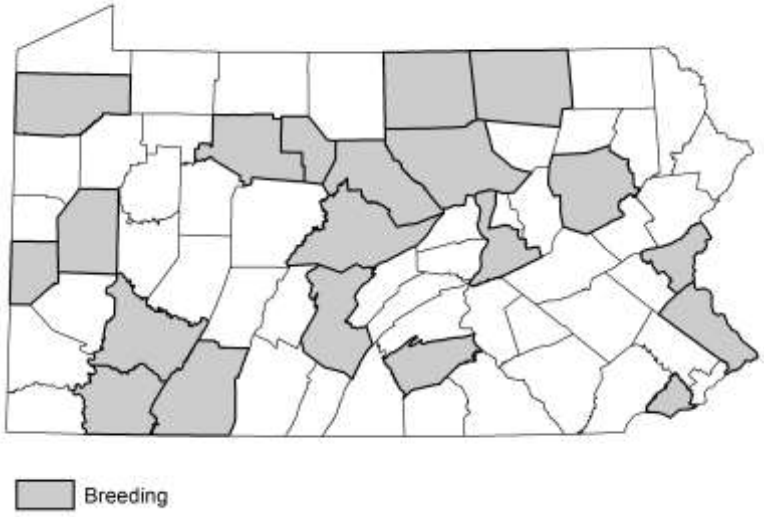
Program Name	Lead Agency	Hyperlink	Description
National Audubon Society Christmas Bird Counts	National Audubon Society	http://birds.audubon.org/christmas-bird-count	Since 1900, this is an annual winter survey of more than 2,300 count circles worldwide. The longest running Citizen Science survey in the world, Christmas Bird Count provides critical data on population trends.

American Bittern

Botaurus lentiginosus

Robert Ross
U.S. Geological Survey, Retired

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G4**	State Rank	**S2B**
IUCN Red List	**VU Vulnerable**	PA Legal Status	**Endangered**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Minimize loss and degradation of currently available emergent wetland habitat and increase amount available through habitat restoration where possible. Maintain breeding population at 5 sites identified in the Second Pennsylvania Atlas of Breeding Birds (Wilson et al. 2012).

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Emergent Marsh**	**Wet Meadow / Shrub Marsh**
Habitat	**Laurentian-Acadian Freshwater Marsh**	**Laurentian-Acadian Wet Meadow-Shrub Swamp**

Specific Habitat Requirements:

Extensive freshwater wetlands w/dense stands of cattails, spatterdock, bulrushes, sedges interspersed with open water.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Wetland filling/encroachment

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance	No net loss of wetland habitat	DEP monitoring of wetland changes	Annual surveys of obligate wetland species' populations	1
Avoid, minimize, or mitigate wetland losses, even those < 5 acres.				
Action Location: Physiographic Province: Statewide				
Associated Species: All rails, most ardeids and ducks, shorebirds, facultative wetland songbirds				

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Array of wetland plants including phragmites, purple loosestrife, and narrow-stemmed cattail

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources	Remove dense invasive growth in large wetlands	Resurvey following and subsequent summers	Annual surveys of obligate wetland species' populations.	1
Largely physical removal with motorized and/or hand tools; long-term and less reliable biological control with insect predator from native continent may be available.				
Action Location: Physiographic Province: Statewide				
Associated Species: All rails, most ardeids and ducks				

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Bioaccumulation of toxins from agricultural runoff, industrial and municipal waste.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Enforcement of local, state, and regional wastewater treatment regulations. Strengthening of nonpoint source pollution regulations and technical assistance in areas draining into high priority sites.	Sustain wetland quality through wastewater treatment operations in municipalities where water feeds into high priority breeding sites. Strengthen nonpoint source pollution regulations and technical assistance.	# facilities meeting standards; # nonpoint source improvements	Monitor pollutant levels with known toxic effects on waterfowl at priority sites. Monitor annually.	3

Action Location: Physiographic Province: Statewide

Associated Species: Other ardeids

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Greater frequency/severity of drought in summers

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Develop a statewide climate change mitigation strategy for freshwater emergent wetlands and wildlife species dependent on these habitats.	Create a plan for assessing predicted and current climate change impacts to major emergent wetlands in Pennsylvania within the next 2 years and begin implementation of this assessment within the next 5 years.	Number of major wetlands assessed via the plan during next 5 years.	1- A. climate change conservation plan has been created for Pennsylvania's major emergent wetlands, B. major wetlands are assessed for vulnerability and impacts, 2 - committee of wetland, taxa, and climate change experts, 3 - plan developed within 2 years, wetlands assessment (including field component) within 5 years	3

Action Location: Physiographic Province: Statewide

Associated Species: American Black Duck, Blue-winged Teal, Common Gallinule, American Coot, rails

RESEARCH NEEDS

1. Breeding- Identification habitat suitability of existing sites including better understanding what management techniques enhance manipulated wetlands or restore degraded habitats.

2. Breeding- Factors affecting nesting success and mortality in adults, juveniles, nestlings, and eggs in PA priority wetlands (mostly IBAs), including contaminants levels in bitterns and their eggs.

3. Breeding- Basic biology of species is poorly known (BNA account), so research on basic biology, mating system, sources and rates of mortality including contaminents, philopatry of individuals, migration routes and stopovers needed even if part of a larger-scale project.

SURVEY NEEDS

1. Breeding- Regular surveys in large wetlands where this species and its cohorts have history of breeding (e.g., Great Lakes Marsh Monitoring Survey, Bird Studies Canada).

2. Breeding- Total territories and nesting success in wetlands across state; extend wetland surveys to smaller wetlands especially with history of bitterns or newly created wetlands, continuing to pursue unknown populations.

3. Breeding- Persistence and nesting success at key nesting areas in state (mostly PA IBAs).

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
Audubon PA Important Bird Area Surveys	Audubon Pennsylvania		Marsh bird surveys at Important Bird Areas designated due to their importance to wetland birds. Standardized marshbird protocols as described in PGC Marsh Bird Surveys and volunteer surveys.
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.

MONITORING PROGRAMS

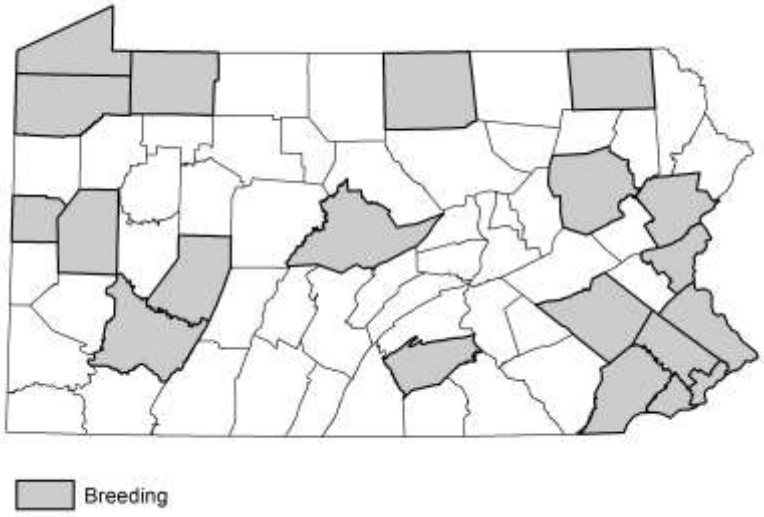
Program Name	Lead Agency	Hyperlink	Description
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals
Pennsylvania Game Commission Marsh Bird Surveys	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt/community/birding_and_bird_conservation/21066/marsh_bird_survey?qid=81806114&rank=4	During breeding seasons, PGC staff, partners, and volunteers conduct standardized audio playback surveys for secretive marsh birds across the state including: pied-billed grebe, American bittern, least bittern, black rail, king rail, Virginia rail, sora, common moorhen, and American coot. Protocol adapted from North American Marsh Bird Monitoring Protocols (Conway 2011) and is very similar to that used in the 2nd Pennsylvania Breeding Bird Atlas. Survey results inform management of these wetlands.

Least Bittern

Ixobrychus exilis

Robert Ross
U.S. Geological Survey, Retired

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S2B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Endangered**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Minimize loss and degradation of currently available emergent wetland habitat (particularly marshes >5ha) and increase amount available through habitat restoration where possible; identify where least bitterns are successfully breeding in the state; develop site-specific conservation plans for sites where least bitterns are currently breeding (Brittingham 2005, Brauning 2005).

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Lakes**	**Emergent Marsh**
Habitat	**Eutrophic, High Alkalinity Lake**	**Laurentian-Acadian Freshwater Marsh**

Specific Habitat Requirements:

Palustrine emergent wetlands, dominated by tall emergents such as cattails interspersed with shrubs and open water.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Wetland filling/encroachment

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance	No net loss of wetland habitat	DEP monitoring of wetland changes	Annual surveys of obligate wetland species' populations	2
Avoid, minimize, or mitigate wetland losses, even those < 5 acres.				
Action Location: Physiographic Province: Statewide				
Associated Species: All rails, most ardeids and ducks, shorebirds, facultative wetland songbirds				

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Array of wetland plants including phragmites, purple loosestrife, and narrow-stemmed cattail

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources	Remove dense invasive growth in large wetlands	Resurvey following and subsequent summers	Annual surveys of obligate wetland species' populations	2
Largely physical removal with motorized and/or hand tools; long-term and less reliable biological control with insect predator from native continent may be available.				
Action Location: Physiographic Province: Statewide				
Associated Species: All rails, most ardeids and ducks				

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Methyl-mercury bioaccumulation in top predators such as ardeids causes mortality and sublethal effects impacting populations

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Enforcement of local, state, and regional wastewater treatment regulations. Strengthening of nonpoint source pollution regulations and technical assistance in areas draining into high priority sites.	Sustain wetland quality through wastewater treatment operations in municipalities where water feeds into high priority breeding sites. Strengthen nonpoint source pollution regulations and technical assistance.	# facilities meeting standards; # nonpoint source improvements	Monitor pollutant levels with known toxic effects on waterfowl at priority sites. Monitor annually.	3

Action Location: Physiographic Province: Statewide

Associated Species: Other ardeids

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Greater frequency/severity of drought in summers

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Develop a statewide climate change mitigation strategy for freshwater emergent wetlands and wildlife species dependent on these habitats.	Create a plan for assessing predicted and current climate change impacts to major emergent wetlands in Pennsylvania within the next 2 years and begin implementation of this assessment within the next 5 years.	Number of major wetlands assessed via the plan during next 5 years.	1- A. climate change conservation plan has been created for Pennsylvania's major emergent wetlands, B. major wetlands are assessed for vulnerability and impacts, 2 - committee of wetland, taxa, and climate change experts, 3 - plan developed within 2 years, wetlands assessment (including field component) within 5 years	3

Action Location: Physiographic Province: Statewide

Associated Species: American Black Duck, Blue-winged Teal, Common Gallinule, American Coot, rails

RESEARCH NEEDS

1. Breeding- Continued research into Best Management Practices for maintaining mosaic of emergent vegetation and open water in light of declines, including response to wetland management.

2. Breeding- Factors affecting nesting success and mortality in adults, juveniles, nestlings, and eggs.

3. Breeding- Effects of industrial and agricultural landscapes on contaminant levels in bitterns and their eggs.

SURVEY NEEDS

1. Breeding- Regular surveys in large wetlands where this species and its cohorts have history of breeding (e.g., Great Lakes Marsh Monitoring Survey, Bird Studies Canada).

2. Breeding- Total territories and nesting success in wetlands across state; extend wetland surveys to smaller wetlands especially with history of bitterns or newly created wetlands.

3. Breeding- Persistence and nesting success at key nesting areas in state (mostly PA IBAs).

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
Audubon PA Important Bird Area Surveys	Audubon Pennsylvania		Marsh bird surveys at Important Bird Areas designated due to their importance to wetland birds. Standardized marshbird protocols as described in PGC Marsh Bird Surveys and volunteer surveys.
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals

MONITORING PROGRAMS

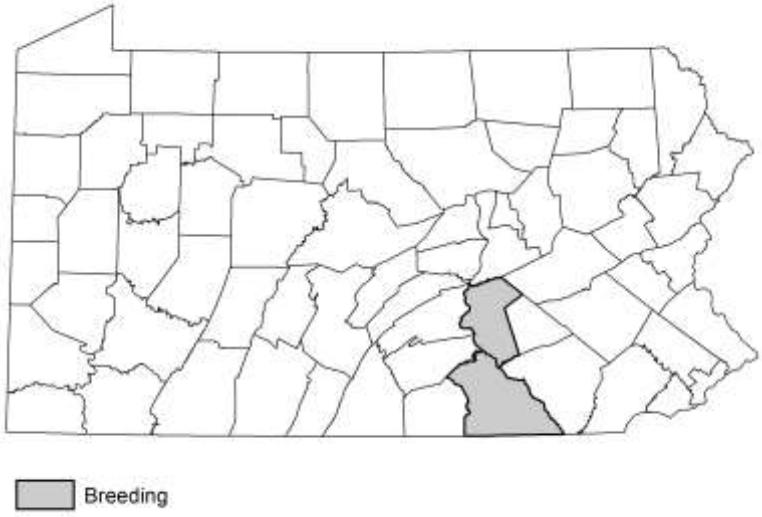
Program Name	Lead Agency	Hyperlink	Description
Pennsylvania Game Commission Marsh Bird Surveys	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt/community/birding_and_bird_conservation/21066/marsh_bird_survey?qid=81806114&rank=4	During breeding seasons, PGC staff, partners, and volunteers conduct standardized audio playback surveys for secretive marsh birds across the state including: pied-billed grebe, American bittern, least bittern, black rail, king rail, Virginia rail, sora, common moorhen, and American coot. Protocol adapted from North American Marsh Bird Monitoring Protocols (Conway 2011) and is very similar to that used in the 2nd Pennsylvania Breeding Bird Atlas. Survey results inform management of these wetlands.

Great Egret

Ardea alba

Terry L. Master
East Stroudsburg University of Pennsylvania

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S2B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Endangered**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**~300 individuals**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Stable**

Conservation Goal:

Maintain nesting colony at Wade Island at mean historical levels (145 nests, range = 103-197) based on the annual Pennsylvania Game Commission Wade Island Survey estimates from 1992-2014, and 3-8 nests at the Kiwanis Park in York, PA (Master 2012).

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Lakes**	**Large Rivers**
Habitat	**Hypereutrophic, High Alkalinity Lake**	**Warm Large River**

Specific Habitat Requirements:

Wade Island - nests built at or near the top of river birch, silver maple, green ash, American sycamore, black willow.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Breeding

Specific Threat: Unauthorized intrusions into the colony would pose a serious problem, especially during courtship, nest repair and incubation periods.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection Add, as well as repair/maintain no trespassing signs at Wade Island if any are still in existence. Signs should provide a reason, e.g., "disturbance could cause nesting failure" to make clear reasons for denial of access to the island. One hundred meters is a suggested buffer distance from human activity (Erwin 1989, Rogers and Smith 1995). Greater protection required for Kiwanis Lake nests. Action Location: Physiographic Province: Ridge and Valley HUC10 Watershed: Susquehanna River Associated Species: Black-crowned Night-Heron	Provide protection of Wade Island from intrusion and disturbance during the nesting season, especially when pairs are courting, repairing/building nests and incubating.	No trespassing occurring on Wade Island, stable nesting population.	Signs at Wade Island should be permanent and maintained.	1

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Japanese Knotweed may prevent tree regeneration; Double-crested Cormorants threaten other colony inhabitants by usurping nest sites and decreasing soil pH threatening nesting tree survival.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Knotweed removal and continue to retain U.S. Department of Agriculture-Animal and Plant Health Inspection Service (APHIS) for culling Double-crested Cormorants.	Prevent competition for nest sites and death of the relatively few nesting trees on Wade Island.	At a minimum, no increase in nesting Double-crested Cormorant population above that of 2013-14 and hopefully a decrease.	Removal of Japanese Knotweed would have to be done initially and then periodically into the foreseeable future. Double-crested Cormorant numbers can be controlled if culling becomes the most powerful density dependent mechanism influencing the population (Frederikson et al. 2001). Extinction will result if culls exceed the compensatory capacity of the population to repopulate (Middleton et al. 1993) over a number of years. Thus, culling should be effective if the compensatory capacity of the population is known.	2

Action Location: Physiographic Province: Ridge and Valley
HUC10 Watershed: Susquehanna River

Associated Species: Black-crowned Night-Heron

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: indirect threat of pollution on prey populations.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Monitor water quality, collect chick/adult carcasses/egg shells/feathers for analysis of toxic/bioaccumulating substances (Ross 2010).	Adhere to the 2-year milestones of the EPA's Watershed Implementation Plan for decreasing the total maximum daily load of sediment entering Chesapeake Bay via the Susquehanna River and other tributaries.	Decreasing sediment load in water, no detrimental loads of toxic/bioaccumulating substances in carcasses.	Carcasses of adults and especially juveniles are easily acquired on Wade Island, thus material for determining toxic/bioaccumulating substance loads is readily available.	2

Action Location: Physiographic Province: Ridge and Valley
HUC10 Watershed: Susquehanna River

Associated Species: Black-crowned Night Heron, Green Heron, Belted Kingfisher, Bald Eagle, Osprey and any other fish-eating species frequenting the Susquehanna River

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Extreme flooding/drought events with respect to the breeding cycle/prey demand are all potential vulnerabilities.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Monitor water temperature, fish populations, especially smaller species (comprising 48% of diet) that Great Egrets prefer (Romano 2008).	Provide critical information on fish populations for timely implementation of conservation measures, if required.	Stable nesting population on the island.	Pervasiveness of the problem and the large scale, global response required makes effectiveness of local actions difficult to determine.	2

Action Location: HUC10 Watershed: Susquehanna River

Associated Species: Black-crowned Night Heron, Green Heron, Belted Kingfisher, Bald Eagle, Osprey and any other fish-eating species frequenting the Susquehanna River

RESEARCH NEEDS

1. Breeding- Although difficult to determine because of nest height, nesting success (productivity) would be a top research priority (Master 2010).

2. Breeding- Analysis of carcasses/egg shells/feathers from Wade Island for toxic/bioaccumulating substances (Master 2010).

3. Breeding- Post breeding dispersal patterns would be a secondary research priority. The location of foraging individuals both up and down river of Wade Island was determined during an airplane flight in 2006. This was not a research priority at the time. Use of satellite transmitters would provide much more detailed information over time of foraging, post-breeding dispersal and wintering movements of Wade Island individuals.

SURVEY NEEDS

1. Breeding- Annual nest/pair counts are conducted by the Pennsylvania Game Commission in late April/early May at Wade Island. It would be interesting to compare those estimates with surveys conducted in early/mid June as a later estimate might be more accurate with regard to determining the number of nesting pairs. arlier counts could continue for comparative purposes with past surveys (Master 2010).

2. Breeding- Coordinate timing of Wade Island Survey and Kiwanis Lake Survey to provide a more accurate snapshot of nest numbers at the same time.

3. Breeding- Search for additional colonies should be done regularly.

MONITORING PROGRAMS

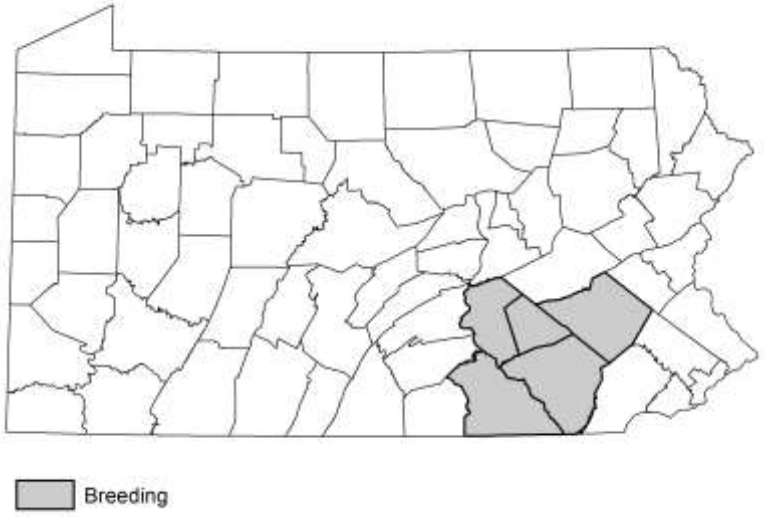
Program Name	Lead Agency	Hyperlink	Description
Annual nest/pair count conducted by the Pennsylvania Game Commission in late April/early May, depending upon weather/river conditions, at Wade Island	Pennsylvania Game Commission		A single day count of pairs/nests at Wade island coordinated by the Pennsylvania Game Commission with volunteers from the PGC, DCNR and other organizations/NGOs depending upon the year.

Black-crowned Night-Heron

Nycticorax nycticorax

Terry L. Master
East Stroudsburg University of Pennsylvania

Photo: Joe Kosack



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S2B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Endangered**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**~240 nests**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

300-400 nests distributed among 3-4 well protected main colony sites.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Large Rivers**	**Lakes**
Habitat	**Warm Large Rivers**	**Hypereutrophic, High Alkalinity Lake**

Specific Habitat Requirements:

Shallow aquatic/terrestrial margins of fresh, brackish and salty aquatic environments -in both remote wetlands and city parks.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Breeding

Specific Threat: Threats at various colony sites include high predation rates, property owner attitudes and general lack of colony protection, especially early in the breeding season through the incubation phase of nesting.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection Add, as well as repair/maintain no trespassing signs at Wade Island if any are still in existence. Signs should provide a reason, e.g., "disturbance could cause nesting failure" to make clear reasons for denial of access to the island. One hundred meters is a suggested buffer distance from human activity (Erwin 1989, Rogers and Smith 1995). Various problems are occurring at all other colony sites, thus, all require greater protection. Action Location: HUC10 Watershed: Susquehanna River Associated Species: Great Egret	Provide protection for the Wade Island colony. Develop/enhance dialog with property owners hosting other colonies to encourage protective actions, especially when pairs are courting, repairing/building nests and incubating.	No trespassing occurring on Wade Island, stable nesting population.	Signs at Wade Island should be a permanent fixture. Protections implemented at other colonies need to be monitored, in large part by maintaining friendly/cooperative relationships with private property owners hosting colonies.	1

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Japanese Knotweed may prevent tree regeneration; Double-crested Cormorants threaten other colony inhabitants by usurping nest sites and decreasing soil pH threatening nesting tree survival.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Knotweed removal and continue to retain U.S. Department of Agriculture-Animal and Plant Health Inspection Service (APHIS) for culling Double-crested Cormorants.	Prevent competition for nest sites and death of the relatively few nesting trees on Wade Island.	At a minimum, no increase in nesting Double-crested Cormorant population above that of 2013-14 and hopefully a decrease.	Removal of Japanese Knotweed would have to be done initially and then periodically into the foreseeable future. Double-crested Cormorant numbers can be controlled if culling becomes the most powerful density dependent mechanism influencing the population (Frederikson et al. 2001). Extinction will result if culls exceed the compensatory capacity of the population to repopulate (Middleton et al. 1993) over a number of years. Thus, culling should be effective if the compensatory capacity of the population is known.	2

Action Location: HUC10 Watershed: Susquehanna River

Associated Species: Great Egret

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Indirect threat of pollution on prey populations.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Monitor water quality, collect chick/adult carcasses and analyze for toxic/bioaccumulating substances.	Adhere to the 2-year milestones of the EPA's Watershed Implementation Plan for decreasing the total maximum daily load of sediment entering Chesapeake Bay.	Decreasing sediment load in water, no detrimental loads of toxic/bioaccumulating substances in carcasses.	Carcasses of adults and especially juveniles are easily acquired on Wade Island, thus material for determining toxic/bioaccumulating substance loads is readily available.	2

Action Location: HUC10 Watershed: Susquehanna River

Associated Species: Black-crowned Night Heron, Green Heron, Belted Kingfisher, Bald Eagle, Osprey and any other fish-eating species frequenting the Susquehanna River

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Extreme flooding/drought events with respect to the breeding cycle/prey demand are all potential vulnerabilities.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Monitor water temperature, fish populations, especially smaller species (composing 40% of diet) that Black-crowned Night Heron prefer (Romano 2008).	Provide critical information on fish populations for timely implementation of mitigating measures.	Stable nesting population on the island with sufficient prey base.	Pervasiveness of the problem and the large scale, global response required makes effectiveness of local actions difficult to determine.	2

Action Location: HUC10 Watershed: Susquehanna River

Associated Species: Black-crowned Night Heron, Green Heron, Belted Kingfisher, Bald Eagle, Osprey and any other fish-eating species frequenting the Susquehanna River

RESEARCH NEEDS

1. Breeding- Observation and quantification of diet composition, foraging behavior, distances traveled to foraging sites, productivity levels, and adult survival at colony sites other than Wade Island where these characteristics have been investigated (Master 2010).

2. Breeding- Continue to study effectiveness of Cormorant removal efforts on Night Heron colonies.

3. Breeding- Identification and protection of any migratory stopover sites regularly used in Pennsylvania (Master 2010).

SURVEY NEEDS

1. Breeding- Regular surveys of all known colonies in state.

2. Breeding- Annual nest/pair counts are conducted by the Pennsylvania Game Commission in late April/early May at Wade Island. Conduct additional surveys in early/mid June as a later estimate to compare regular surveys.

3. Breeding- Search for additional colonies not regularly monitored and learn more about foraging range of nesting birds using satellite telemetry.

MONITORING PROGRAMS

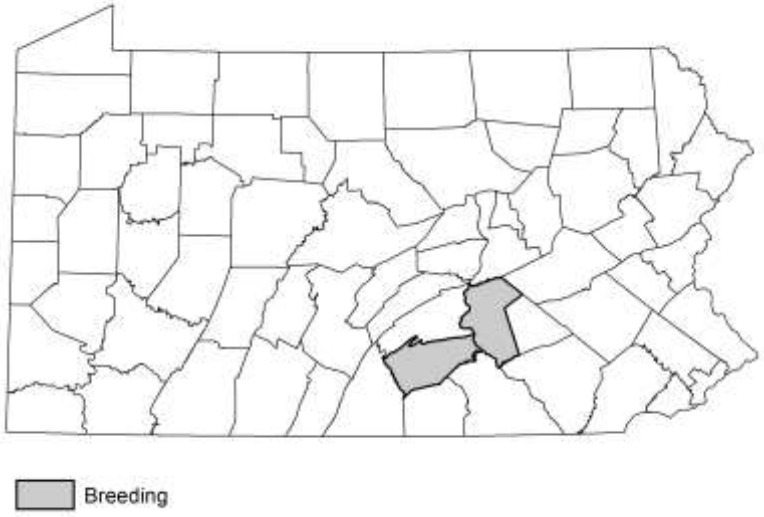
Program Name	Lead Agency	Hyperlink	Description
Annual nest/pair count conducted by the Pennsylvania Game Commission in late April/early May, depending upon weather/river conditions, at Wade Island	Pennsylvania Game Commission		A single day count of pairs/nests at Wade island coordinated by the Pennsylvania Game Commission with volunteers from the PGC, DCNR and other organizations/NGOs depending upon the year.

Yellow-crowned Night-Heron

Nyctanassa violacea

Terry L. Master
East Stroudsburg University of Pennsylvania

Photo: Joe Kosack



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S1B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Endangered**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**14**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

10-20 active nests located at one or more protected colony site.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Large Rivers**	**Urban/Suburban Built**
Habitat	**Warm Medium Rivers, Low Gradient Small Rivers**	**Developed (NLCD 21-24 & 31)**

Specific Habitat Requirements:

Riparian forest and urban settings. Nests located 30-80 feet on a horizontal branch in tall shade trees, such as American sycamore, with open understory.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Breeding

Specific Threat: Vulnerable to human disturbance during nesting season

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach Most feasible measures have already been implemented including Pennsylvania Game Commission (PGC) educational efforts and engagement with property owners as well as annual monitoring of the primary colony site.	Continue educational efforts and enhance dialog with property owners/ neighborhoods hosting colonies to encourage protective actions and "ownership" of the colony, especially when pairs are courting, repairing/building nests and incubating.	Colony protection and reproductive success over the long term.	Maintain friendly/cooperative relationships with property owners hosting colony sites.	1

Action Location: HUC10 Watershed: Susquehanna River

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Likely vulnerable to medium sized wild and feral mammalian predators and Great-horned Owls.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Monitor nest predation.	Prevent predators from access to nests.	Reduction of nest failure as a result of predation.	Determine if observed nest failure is due to predation based on observational evidence at the nest and below nesting trees.	1

Action Location: HUC10 Watershed: Susquehanna River

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Indirect threat of pollution on crustacean populations.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Monitor water quality, collect chick/adult carcasses and analyze for toxic/bioaccumulating substances.	Direct Management of Natural Resources	Adhere to the 2-year milestones of the EPA's Watershed Implementation Plan for decreasing the total maximum daily load of sediment entering Chesapeake Bay via the Susquehanna River and other tributaries.	Decreasing sediment load in water, no detrimental loads of toxic/bioaccumulating substances in carcasses.	Although carcasses of Yellow-crowned Night-Herons would be nearly impossible to acquire, those of Great Egrets and Black-crowned Night-Herons on Wade Island could be used as surrogates to determine in general toxic/bioaccumulating substance loads resulting from feeding on prey from the river although effects might be somewhat different when feeding on fish vs. crustaceans. Crustaceans could also be tested for these substances.	2

Action Location: HUC10 Watershed: Susquehanna River

Associated Species: Black-crowned Night Heron, Green Heron, Belted Kingfisher, Bald Eagle, Osprey and any other species using aquatic food resources frequenting the Susquehanna River

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: May be vulnerable to extreme weather, particularly floods which could limit access to prey.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Monitor water temperature and crayfish/invertebrate populations.	Provide critical information on crustacean populations for timely implementation of conservation measures, if necessary.	Stable nesting population on the island with sufficient prey base.	Pervasiveness of the problem and the large scale, global response required makes effectiveness of local actions difficult to determine.	2

Action Location: HUC10 Watershed: Susquehanna River

Associated Species: Black-crowned Night Heron, Green Heron, Belted Kingfisher, Bald Eagle, Osprey and any other species requiring aquatic resources frequenting the Susquehanna River

RESEARCH NEEDS

1. Breeding- Studies of productivity/nesting success, reasons for nest failure and reduced reproductive success, if that occurs, should be determined.

2. Breeding- Studies of prey choice/diet composition are needed generally to quantify the reliance of this species on the Rusty Crayfish population.

3. Breeding- Study ability of this species to coexist with humans and seek opportunities for improving Yellow-crowned Night-Heron nesting success and colonization of the state's southern riparian areas.

SURVEY NEEDS

1. Breeding- Continue to survey known nesting colonies.

2. Breeding- Search for additional colonies not regularly monitored.

3. Breeding- Learn more about foraging range of nesting birds.

MONITORING PROGRAMS

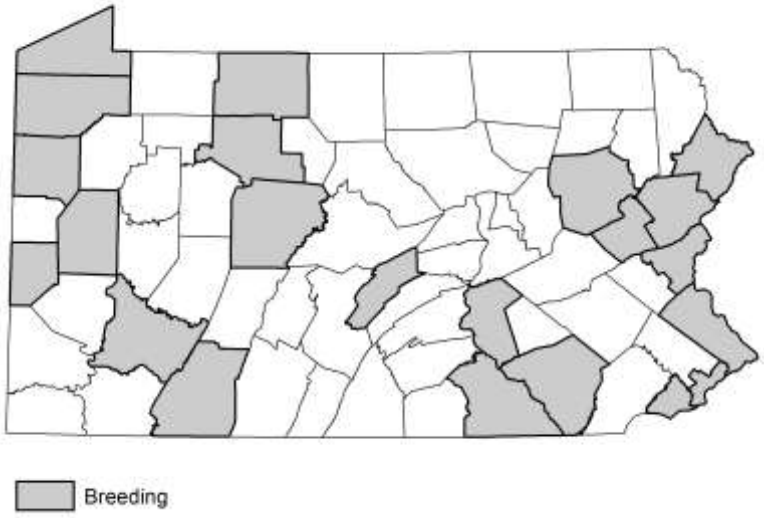
Program Name	Lead Agency	Hyperlink	Description
Annual count of nesting pairs in primary nesting colony.	Pennsylvania Game Commission		Periodic inspection of nesting colony.

Osprey

Pandion haliaetus

Patricia M. Barber
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Threatened**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**600**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Five breeding clusters of at least 9 pairs each and a total population of at least 50 nesting pairs annually.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Lakes**	**Lakes**
Habitat	**Eutrophic, Medium Alkalinity Lake**	**Mesotrophic, Medium Alkalinity Lake**

Specific Habitat Requirements:

Shallow water areas with good fish populations and artificial or natural nesting structures nearby.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss of sites with low nest disturbance

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Best management practices Action Location: Physiographic Province: Statewide	Minimize human conflicts	Increasing number of successful nests in industrial and developed areas	Regular periodic monitoring of nesting osprey to determine nesting success	1

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Breeding

Specific Threat: Increased nest disturbance

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Best management practices Action Location: Physiographic Province: Statewide	Minimize human disturbance	High nesting success of osprey on human structures	Regular periodic monitoring of nesting osprey to determine nesting success	1

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Human activity eliminating or changing water levels, reducing nesting attempts, nesting success or productivity

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Best management practices Action Location: Physiographic Province: Statewide	Maintain current acreage of high quality habitat	Acres of clean, slow moving, shallow water	Regular periodic monitoring of nesting osprey to determine nesting success	1

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Industrial waste that include nutrients, toxic chemicals and/or sediments; recreational lead added to environment especially as fishing sinkers

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Monitor for contaminants	Sample sufficient numbers of eggs, nestling or older osprey to detect questionable levels of toxins	Number of individuals sampled	Regular periodic sampling of nesting osprey to determine nesting success, testing unhatched eggs or necropsies on fresh carcasses	1

Action Location: Physiographic Province: Statewide

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Breeding distribution and productivity could be impacted by severe weather events and changing foraging opportunities (water levels).

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach Develop and provide digital information on how extreme weather events and changing water levels will affect nest site security and foraging success	Developers and community planners making decisions to accommodate osprey needs	Number of individuals looking at material on web site	Compare successful nest locations as water levels change and among year with different weather condition	1

Action Location: Physiographic Province: Statewide

RESEARCH NEEDS

1. Breeding- Develop population measures to define recovered population and develop monitoring framework to evaluate population, maximizing confidence while minimizing effort.

2. Breeding- Develop best management practices for nesting osprey to avoid specific human-osprey conflicts.

3. Breeding- Develop education material to help further osprey conservations and facilitate successful human-osprey coexistence.

SURVEY NEEDS

1. Breeding- regular periodic nest monitoring to track population trajectory, ensuring management plan goals are being met.

2. Breeding- Summarize e-bird entries to ensure that all reported nests are identified and protected.

3. Breeding- Contaminant analysis to monitor toxins moving up the food chain and potentially negatively affecting osprey stability.

MONITORING PROGRAMS

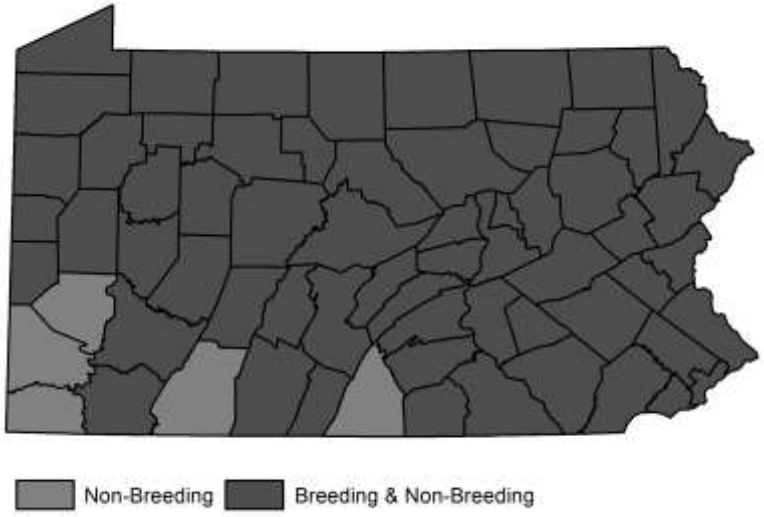
Program Name	Lead Agency	Hyperlink	Description
Contaminant Exposure Food Web Transfer and Effects on Ospreys in Chesapeake Bay Regions of Concern	Patuxent Wildlife Research Center		Ecotoxicological investigation - osprey eggs and nestling's blood are sampled for contaminants.
Osprey nest monitoring	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt?open=514&objID=721226&mode=2	During the breeding season volunteers and staff monitor nests for activity and productivity. Moving forward these survey are likely to focus on sub-sampling to concentrate effort.

Bald Eagle

Haliaeetus leucocephalus

Kathy Korber
Pennsylvania Game Commission

Photo: Hal Korber



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B, S5N (W)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**600**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B,W) Increase of >25%**

Conservation Goal:

Maintain a minimum of 150 nesting pairs which includes successful nesting pairs in at least 40 counties, with 60% of known nests successful and a productivity rate of at least 1.2 eaglets fledged per successful nest, based on a five year running period (Gross and Brauning 2011).

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(B)Northern Hardwood & Conifer** **(W) Agricultural**	**(B) Northern Swamp** **(W) Urban/Suburban Built**
Habitat	**(B) Appalachian (Hemlock)-Northern Hardwood Forest** **(W) Agriculture (NLCD 81-82)**	**(B) North-Central Appalachian Acidic Swamp** **(W) Developed (NLCD 21-24 & 31)**

Specific Habitat Requirements:

(B) Shallow flat-water with abundant fish, roost trees and large trees within a mile of water for nesting.
(W) Protected perch and roost site trees near open water for foraging.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: A decline in water quality due to acid mine drainage, gas drilling or wastewater disposal could negatively impact fisheries that support Bald Eagles.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Continue to monitor breeding and wintering bald eagle populations.	Early detection of regressing populations.	Annual surveys	Annual surveys of breeding and wintering eagles for 10 years. Subsampling nests for success / productivity to detect issues with nest disturbance, water pollution, etc.	1

Action Location: Physiographic Province: Statewide

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Breeding

Specific Threat: Persecution as perceived threat to farm animals and fish and game species.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 7.0 Law enforcement Investigate and prosecute all illegal killings and instances of harassment (Gross and Brauning 2011). Monitor eagle nest productivity as written in Bald Eagle Management plan as strategies.	Deter eagle shootings, killings and harassment.	Prosecute violators and publicize the prosecutions via news releases (Gross and Brauning 2011)	Investigate and prosecute suspected and known killings and harassments of bald eagles and eagle nests; 10 years	1

Action Location: Physiographic Province: Statewide

Associated Species: All birds of prey

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Disease or heavy metal contamination due to feeding on contaminated carcasses or prey.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Investigate and attempt to resolve any eagle mortality issues involving AMV or other diseases, lead-poisoning, and pollution, determining the source of mortality and limiting that source to eagles. This may include public education about these threats to limit mortality to eagles and other wildlife and coordination with other agencies.	Decrease preventable mortality to eagles.	Reports of eagle mortality due to these sources.	Track eagle mortality from these sources.	1

Action Location: Physiographic Province: Statewide

Associated Species: Many waterbirds, raptors, and scavengers that are vulnerable to diseases and accidental poisoning.

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Lead Poisoning from consuming game animal carcasses that are contaminated by lead ammunition pellets or fragments and other sources that may enter the food chain.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Test injured, sick and deceased bald eagles for lead poisoning and determine source of exposure when possible.	Monitor to determine the extent and sources of lead exposure.	Test all sick, injured and dead eagles that are found.	sample the lead levels in blood or tissue from available specimens; 10 years	1

Action Location: Physiographic Province: Statewide

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Loss of suitable waterfront and riparian forest habitat to development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Continue to monitor breeding and wintering bald eagle populations. Action Location: Physiographic Province: Statewide	Discover the extent of the limiting factor.	Annual surveys.	Annual surveys of breeding and wintering eagles for 10 years.	2

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Breeding

Specific Threat: Human recreational activities can lead to nest site, roost site, and foraging area disturbance.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Continue to promote information on Bald Eagles, laws protecting eagles, eagle etiquette and eagle viewing opportunities through the PGC website. Action Location: Physiographic Province: Statewide	Educate PA citizens about bald eagles and promote conservation stewardship for the species.	An increase in the number of viewers visiting the PGC's Bald Eagle webpages.	A tally of Bald Eagle webpage users can be monitored annually to determine if educational outreach is effective.	2

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Bald Eagle nests and nest trees are susceptible to severe weather events, particularly heavy winds and excessive frozen precipitation.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Continue to monitor individual nests and nest success. Action Location: Physiographic Province: Statewide	Monitor weather-related nest failure and eagle adoption of new nests in territories.	Observe known nests and territories.	Monitor nests throughout nesting period, particularly during and following severe weather events.	2

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Winter

Specific Threat: Human disturbance from recreation flushes eagles from roost and foraging sites, leading to energy expenditure and reduced fishing success.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Continue to monitor wintering bald eagles through the national mid-winter bald eagle survey; identify and protect roost sites; and increase public awareness through volunteer participation and the PGC bald eagle webpages.	Monitor wintering eagles and increase public awareness and stewardship of wintering eagles.	Annual surveys	Monitor roosting and foraging sites during winter and increase public awareness of this critical part of the eagle's life cycle, particularly the need for eagle etiquette.	2

Action Location: Physiographic Province: Statewide

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Winter

Specific Threat: Invasive plants and animals threaten forest and stream health.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection Protection of riparian forest areas will allow the eagles to find alternative nesting and foraging areas lost from storm damage.	Protection of riparian areas that are beneficial to stream water quality and wildlife that the habitat supports.	Bald Eagle nest site / territory persistence and success	Continued monitoring of eagle nesting territories and other bird populations in riparian forest habitats.	3

Action Location: Physiographic Province: Statewide

Associated Species: Riparian forest birds including Common Merganser, Wood Duck, and others.

RESEARCH NEEDS

1. Breeding- From Bald Eagle Management Plan: Starting in 2011, annually determine principal causes and rates of nest failures.

1. Wintering- Identify all communal roost site locations and collect data on size, habitat, and extent of use.

2. Breeding- Annually track nest failures to determine if human interference is affecting nest success and productivity in regions or state-wide. Develop and implement guidelines to reduce impacts on eagle nest success and productivity.

3. Breeding- Monitor Bald Eagle nests for productivity using a matrix of randomly selected nests to determine if there are significant environmental factors limiting eagle productivity that can be addressed.

SURVEY NEEDS

1. Breeding- Continued monitoring of the bald eagle nesting population including known breeding areas as well as potential areas.

1. Wintering- Continuation of annual mid-winter bald eagle survey.

2. Breeding- Annually assess and address factors potentially affecting nesting Bald Eagle productivity and populations (nest failures, human interference factor, other factors determined).

2. Wintering- Communal roost site monitoring.

3. Breeding- Increase public participation in all Bald Eagle nest surveys to allow continuation of monitoring without burdening staff.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
Bald Eagle Breeding Survey	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt/document/1066011/bald_eagle_management_plan_pdf	Each breeding season the Bureau of Wildlife Management's Wildlife Diversity Division coordinates monitoring efforts through regional office wildlife supervisors. PGC staff and many volunteers collect breeding and nest productivity data throughout breeding and nesting periods from known nests and identify and document new nests or breeding pairs.

MONITORING PROGRAMS

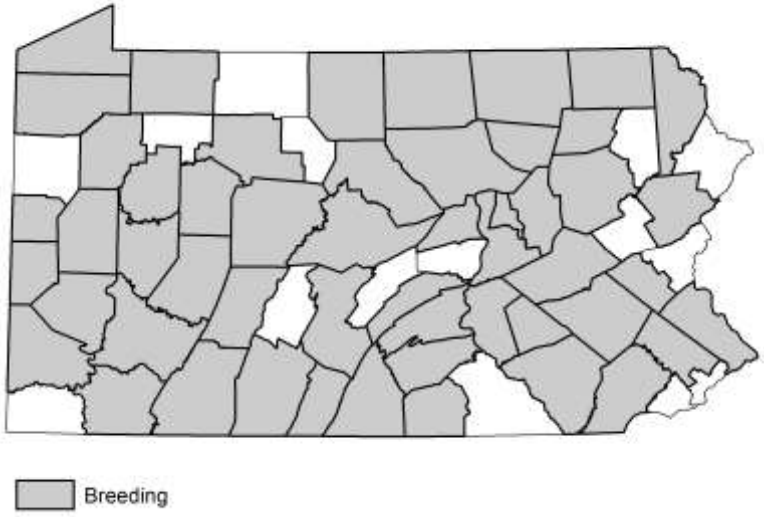
Program Name	Lead Agency	Hyperlink	Description
Bald Eagle Mid-winter Survey	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt?open=514&objID=1667261&mode=2	This annual survey is conducted during a selected period in early January along standard survey routes.

Northern Harrier

Circus cyaneus

Kim Van Fleet
Dickinson College

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S2B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Threatened**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**600**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Reverse declines in number of breeding Northern Harriers and maintain nesting pairs in at least 100 Breeding Bird Atlas blocks by 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Agricultural**	
Habitat	**Agriculture (NLCD 81-82)**	

Specific Habitat Requirements:

Large open grasslands (reclaimed strip mines); marshy meadows, wet lightly grazed pastures, open bogs, freshwater and brackish marshes, and riparian woodland.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Fragmentation, degradation and loss of breeding and foraging habitat, direct human disturbance of breeding birds, collisions with motor vehicles

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Examine zoning or comprehensive plans especially in areas where known breeding pairs regularly occur. Provide input when variances are requested, acquire potential undeveloped lands in vicinity of known occupancy during breeding season	Reduce loss, degradation and fragmentation of breeding and foraging habitats. Acquire additional lands in core and buffer areas.	Prevent further development in good to high quality habitat areas. Continued use of areas by breeding birds	Annual grassland raptor surveys	1

Action Location: Physiographic Province: Statewide

Associated Species: Wetland & upland grassland birds including Upland Sandpipers and Short-eared Owls

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Disturbance/displacement of breeding or potentially breeding birds, disturbance of foraging birds, air pollution, surface water pollution. Planting trees on reclaimed mines

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Create new laws where necessary and increase ability to enforce existing laws and standards.	Create laws that mandate complete avoidance of sensitive habitat areas by gas drillers. Continued mine reclamation projects by coal industry focused on creating higher quality grassland habitat and maintaining it as such through periodic manipulations. Mitigating existing AMD in areas where needed.	No additional wellheads in sensitive habitat areas frequented by Northern harriers. Measurable increase of good to high quality grassland habitats in former strip mine areas.	Annual grassland raptor surveys	1

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Wetland & upland grassland birds including Upland Sandpipers and Short-eared Owls

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Habitat encroachment, loss of native plant species that provide cover and or nesting sites, nest predation

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Employ IPM strategies and actions to remove invasives and revegetate with appropriate native plants in both upland (dry grasslands) and lowland (wet meadows) sites.	Removal of 90-95% of all invasive plant species.	Measurable amounts of available resources (nest sites, food, water, cover) capable of supporting several pairs of Northern Harriers locally and a larger breeding population regionally throughout breeding season.	Annual grassland raptor surveys	1

Action Location: Physiographic Province: Appalachian Plateaus, New England, Piedmont, Ridge and Valley

Associated Species: Wetland & upland grassland birds including Upland Sandpipers and Short-eared Owls

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Accumulation of Methylmercury (neurotoxin) in body tissues as a result of agricultural runoff (pesticides and sediments)

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Monitor and assess all coal and oil fired power plants to ensure compliance with EPA's 2011 Mercury and Air Toxics Standards(MATS). Monitor and assess mercury emissions from concrete production facilities. Identify local and regional sources of non-point pollution including sedimentation of waterways and wetlands from agricultural, suburban and urban areas where stormwater runoff has become an increasing issue.	Reduction of multiple pollutants and sediment from point and non-point sources known to impact aquatic systems.	Measureable reduction of specific pollutants [e.g. methyl mercury, lead, fertilizers (nitrogen, phosphorus), residual pesticides, sediment loads, . Reduced eutrophication and clearer water column), increased nesting success	Annual grassland raptor surveys	1

Action Location: Physiographic Province: Appalachian Plateaus, New England, Piedmont, Ridge and Valley

Associated Species: Wetland & upland grassland birds including Upland Sandpipers and Short-eared Owls

THREATS AND ACTIONS

IUCN Threat: 2.0 Agriculture and Aquaculture

Season: Breeding

Specific Threat: Loss of nesting habitat, cover, and prey species from agricultural practices including mowing and pesticide application.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Promote and engage landowners in CREP and WHP programs. Educate landowners about the importance and function of hedgerows and encourage employment of IPM strategies in controlling pest species.	Create additional habitats areas for breeding populations and reducing use of synthetically produced pesticides and fertilizers.	Number of landowners enrolled in CREP and WHP programs	Annual grassland raptor surveys	2

Action Location: Physiographic Province: Statewide

Associated Species: Wetland & upland grassland birds including Upland Sandpipers and Short-eared Owls

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Natural succession, reforestation practices, agricultural practices

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources habitat restoration projects	Reclaim and improve upland and wetland habitats to accommodate ecological needs of Northern Harrier during breeding and young rearing seasons.	Gradual increase in numbers of Northern Harrier and measurable nesting success	Annual grassland raptor surveys	2

Action Location: Physiographic Province: Appalachian Plateaus, New England, Piedmont, Ridge and Valley

Associated Species: Wetland & upland grassland birds including Upland Sandpipers and Short-eared Owls

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Nest site flooding from excessive rainfall; vulnerability of nest sites to predation as a result of drought.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase opportunities for nesting success during periods of excessive rainfall events.	Nesting success and overall higher fecundity per breeding pair.	Annual grassland raptor surveys	2

A combination of upland and wetland mitigation projects that would facilitate buffering the impacts of extreme weather events. (e.g. creation of additional wetlands and uplands in appropriate areas surrounding core habitat; install mechanisms that facilitate raising and lowering water levels during excessive precipitation events or periods of drought)

Action Location: Physiographic Province: Appalachian Plateaus, New England, Piedmont, Ridge and Valley

Associated Species: Wetland bird species including rails, herons, egrets

RESEARCH NEEDS

1. Breeding- Determine current status and distribution of breeding population of Northern Harrier in PA using best available information (2nd PABBA, eBird reports, pers. comm.). Conduct additional surveys in suitable habitat areas to include areas of historic nesting to determine extent of actual number of breeding males and females.

2. Breeding- Assess quality and quantity of core and supporting habitats relative to vegetative structure and resource needs of Northern Harrier in areas where successful breeding continues to occur and compare to areas where regional populations and local breeding pairs no longer occur.

3. Breeding- Examine other factors besides habitat loss that potentially contribute, directly or indirectly, to the decline of breeding northern harrier population in PA and surrounding states (e.g. rodenticides, water pollution (chemical and sediment) originating from agriculture, industry or private lands, methyl mercury levels, lead contamination, nest predation and or failure, agricultural practices, etc.).

SURVEY NEEDS

1. Breeding- Breeding season surveys in core and supporting areas where harriers have been confirmed or probable during the breeding season over the last five years (2nd BBA, eBird reports, personal comm.). etermine reproductive status and success, nest survivorship and fledgling success.

2. Breeding- Conduct habitat surveys to examine and compare habitat quality (vegetative composition, resources availability, water level, live trapping small mammals etc.) and quantity (# acres/hectares) in core and surrounding areas where Northern Harriers continue to successfully breed to sites where numbers have declined or where birds historically occurred to determine what, if possible, could be done to reverse declines and abandonment previously inhabited sites.

3. Breeding- Conduct small mammal surveys to determine local and regional abundance of prey species necessary for long term reproductive success of Northern Harrier.

MONITORING PROGRAMS

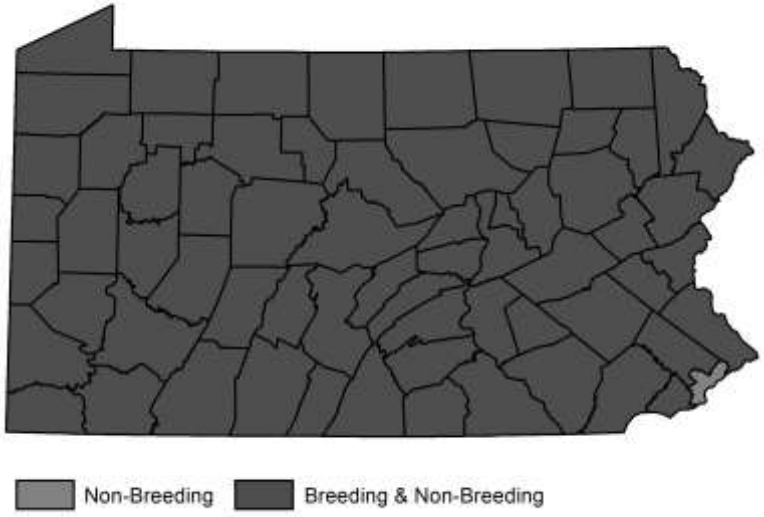
Program Name	Lead Agency	Hyperlink	Description
Habitat reclamation projects: present and future Surface Mine Reclamation Act (SMRA)	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt/community/abandoned_mine_reclamation/13961	surface mine reclamation in areas near known nesting areas that result in beneficial habitat supporting foraging and or nesting Northern Harriers during breeding season.
Surveys during breeding and overwintering seasons	Pennsylvania Game Commission		Conduct statewide surveys focused specifically on breeding Northern Harrier populations to determine if changes have occurred since the completion of the 2nd Breeding Bird Atlas. Assess changes in breeding population of Northern Harrier in Pennsylvania.

Sharp-shinned Hawk

Accipiter striatus

Laurie J. Goodrich
Hawk Mountain Sanctuary Association

Photo: David Brandes



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B, S5N (M)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**11000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown; (M) Increase of >25%**

Conservation Goal:

Maintain or increase species breeding population or habitat in Pennsylvania to include nesting territories in at least 950 atlas blocks by 2025, as referenced by the Second Atlas of Breeding Birds (Wilson et al. 2012). Maintain species migratory population at current or higher levels, as measured by Pennsylvania's raptor counts, through 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(B,M) Northern Hardwood & Conifer**	
Habitat	**(B, M) Appalachian (Hemlock)-Northern Hardwood Forest**	

Specific Habitat Requirements:

(B,M) Large, contiguous coniferous or mixed conifer/deciduous forests, away from suburban areas or areas of human consistent human activity.
(B) Dense forest stands of either conifers or younger forest used for nesting. Nesting birds use forest openings, dirt roads or right of ways for foraging.
(M) Migrants select large or contiguous forests greater than 200 hectares (Goodrich 2010) often near streams or rivers or wet thickets.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Reduction in younger deciduous or conifer forest habitat and fragmentation or disturbance of large blocks of forest. Lack of conifer patches in large forest blocks.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	In next five years, create handouts on importance of conifer patches within deciduous forest matrix and implement promotion of this through forestry organizations	Acres of conifer cover and ratio of conifer to deciduous forest	Monitor number of foresters participating in program and over ten year period establishment of new conifer patches or stands	1
Promote establishment of native conifer patches within deciduous forest blocks through outreach to foresters regarding benefits to wildlife; work with Forest Stewardship foresters and PGC foresters					
Action Location:	Physiographic Province: Statewide				
Associated Species:	Black-throated Green Warbler, Northern Goshawk, Broad-winged Hawk, Blue-headed Vireo				

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Reduction in dense forest structure due to overbrowsing by white-tailed deer; Loss of conifers in Pennsylvania forests, especially hemlock to adelgid infestations.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Continue studies of forest health or support continued work at university level	Regeneration of native forest	Monitor forest regeneration rates in test plots around the state; monitor number of deer per state management area	1
Continue to monitor impacts of white-tailed deer on forest health and provide information to state biologists setting harvest recommendations					
Action Location:	Physiographic Province: Statewide				
Associated Species:	Wood Thrush, Ruffed Grouse, etc.				

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Forest fragmentation reduces suitable nesting habitat, prey availability, and may increase interspecific conflict.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Provide incentives such as tax relief or planning assistance to owners of large forests to conserve forest blocks, particularly in Poconos, Appalachians, and Northern Hardwoods. Work with conservancies to conserve forest blocks owned by smaller landowners particularly mixed deciduous-conifer areas, through easements and other resources. Work with industrial forest land owners to conserve conifer stands and provide patches of younger age forest stand habitat.	In next 10 years, implement state wide private forest land habitat management incentives to conserve forested blocks and protect or reestablish native conifer patches within large deciduous forest areas; In next 10 years, provide educational information and incentives to public land managers to conserve native conifer stands within large forest blocks and provide patches of young forest stands within forest matrix.	Number of landowners conserving forest blocks; percent conifer cover and/or proportion of young forest stands in larger forest blocks.	Monitor coniferous forest cover by region using GIS; Monitor landowner participation in forest conservation incentives; monitor number of nesting pairs in managed areas or in response to forest stand management and incentives with pre and post project playback surveys.	2

Action Location: Physiographic Province: Statewide

Associated Species: Ruffed Grouse, Rose-breasted Grosbeak, Blackburnian Warbler, Black-throated Green Warbler, Blue-headed Vireo

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Forest fragmentation reduces suitable nesting habitat, prey availability, and may increase interspecific conflict.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Encourage energy extraction companies to minimize forest habitat disturbance by using existing right of ways and clustering wells; designate large forest blocks as higher priority areas for forest wildlife conservation and create zones where industrial activities limited and reforestation required post disturbance.	In next 5 years, create education outreach on importance of contiguous forest habitat and provide to companies and municipalities. Use Atlas data to identify key forest blocks for nesting birds including this species and restrict as possible extensive drilling and fragmentation in these areas. Require reforestation post-drilling. Work with industrial forest owners to maintain contiguous forest blocks and conifer stands in areas away from drilling activities.	Acres of unfragmented forest and proportion of conifer or mixed conifer-deciduous forest; number of shale drilling companies and other large scale forest owners adopting forest conservation measures.	Conduct baseline and tri-annual surveys for this species and other large forest-dependent species in Marcellus Shale impacted forests. Monitor forest fragmentation in northern counties monitor the trend in Sharp-shinned Hawks and other species associated with large forests and conifer stands.	2

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Northern Goshawk, Broad-winged Hawk

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Fragmentation of nesting forests and disturbance of nesting areas from noise and traffic.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Encourage energy extraction companies to minimize forest habitat disturbance by using existing right of ways and roadways for new pipelines; designate large forest blocks as higher priority areas for forest wildlife conservation and create zones where industrial activities limited and reforestation required post disturbance.	In next 5 years, create education outreach on importance of contiguous forest habitat and provide to companies and municipalities. Use Atlas data to identify key forest blocks for nesting birds including this species and restrict as possible extensive drilling and fragmentation in these areas. Require reforestation post-drilling. Work with industrial forest owners to maintain contiguous forest blocks and conifer stands in areas away from drilling activities.	Acres of unfragmented forest and proportion of conifer or mixed conifer-deciduous forest; number of shale drilling companies and other large scale forest owners adopting forest conservation measures.	Conduct baseline and tri-annual surveys for this species and other forest-dependent species in Marcellus Shale impacted forests. Monitor forest fragmentation in northern counties monitor the trend in Sharp-shinned Hawks and other species associated with large forests and conifer stands.	2

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Northern Goshawk, Broad-winged Hawk

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Climate change may change forest structure and composition; possible loss of conifer component would be detrimental.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Promote establishment of native conifer patches within deciduous forest blocks through outreach to foresters regarding benefits to wildlife; work with Forest Stewardship foresters and PGC foresters	In next five years, create handouts on importance of conifer patches within deciduous forest matrix and implement promotion of this through forestry organizations	Acres of conifer cover and ratio of conifer to deciduous forest	Monitor forest inventory plots, identify composition changes as they occur; promote additional conifer stands to maintain or improve component at 2014 levels	2

Action Location: Physiographic Province: Statewide

Associated Species: Black-throated Green Warbler, Northern Goshawk, Broad-winged Hawk, Blue-headed Vireo

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Migration

Specific Threat: Reduced roosting and foraging habitat in industrial forest stands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Provide guidance to foresters in migration corridors to maintain some mature forest blocks along Blue Mountain and other key migration corridors (see Wurzbacher 2013).	Implement education outreach to agencies managing land on migration corridors such as Blue Mountain.	Acres of contiguous forest.	Monitor acres by forest age in managed forests along migration corridors.	1

Action Location: Physiographic Province: Ridge and Valley

Associated Species: Neotropical songbirds, Broad-winged Hawk, Cerulean Warbler

IUCN Threat: 1.0 Residential and Commercial Development

Season: Migration

Specific Threat: Development along migratory corridors can reduce stopover habitat for migrating Sharp-shinned Hawks.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Provide incentives such as tax relief or planning assistance to owners of large forests to conserve forest blocks, particularly in Poconos, Appalachians, and Northern Hardwoods. Work with conservancies to conserve forest blocks owned by smaller landowners particularly mixed deciduous-conifer areas, through easements and other resources. Work with industrial forest land owners to conserve conifer stands and provide patches of younger age forest stand habitat.	In next 10 years, implement state wide private forest land habitat management incentives to conserve forested blocks and protect or reestablish native conifer patches within large deciduous forest areas; In next 10 years, provide educational information	Number of landowners conserving forest blocks; percent conifer cover and/or proportion of young forest stands in larger forest blocks.	Monitor coniferous forest cover by region using GIS; Monitor landowner participation in forest conservation incentives; monitor number of nesting pairs in managed areas or in response to forest stand management and incentives with pre and post project playback surveys.	2

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Ruffed Grouse, Northern Goshawk, Broad-winged Hawk, Scarlet Tanager

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Migration

Specific Threat: Reduction and fragmentation of large forested areas along Lake Erie shoreline and on and near Appalachian ridges.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Provide incentives such as tax relief or planning assistance to owners of large forests to conserve forest blocks, particularly in Appalachians, especially Kittatinny Ridge, and along Lake Erie shoreline.	In next 10 years, implement state wide private forest land habitat management incentives to conserve forested blocks and protect or reestablish native conifer patches within large deciduous forest areas; In next 10 years, provide educational information and incentives to public land managers to conserve native conifer stands within large forest blocks and provide patches of young forest stands within forest matrix.	Number of landowners conserving forest blocks; acres of conserved forest along migration corridors.	Monitor forest cover by region using GIS; Monitor landowner participation in forest conservation incentives within 1-3 miles of migration corridor.	2

Action Location: Physiographic Province: Ridge and Valley

Associated Species: Neotropical songbirds, Broad-winged Hawk, Cerulean Warbler

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Migration

Specific Threat: Reduced habitat availability and foraging opportunities during migration from human recreational disturbance.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Promote zoning within municipalities along migration corridors that allows for low density, low impact uses in and near migration corridors	Implement outreach to municipal leaders	Zoning for low impact uses in migration corridors	Monitor land use and zoning over time	2

Action Location: Physiographic Province: Ridge and Valley

Associated Species: Neotropical songbirds, Broad-winged Hawk, Cerulean Warbler

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Migration

Specific Threat: Fragmentation of forest patches along migratory corridors and increase in vehicle strikes.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Provide incentives and education to municipalities particularly in Appalachians, especially Kittatinny Ridge, and along Lake Erie shoreline to minimize high volume roads along Blue Mountain, Tussey Mountain, Lake Erie Shoreline.	Implement education to municipalities on importance of state flyways and reduced vehicular traffic where possible.	Volume of roadways in key flyways	Monitor road volume and traffic by region using GIS;	3

Action Location: Physiographic Province: Ridge and Valley

Associated Species: Neotropical songbirds, Broad-winged Hawk, Cerulean Warbler

RESEARCH NEEDS

1. Breeding- Determine population densities by region or forest type and develop a long-term monitoring system, possibly a volunteer-based call playback survey for breeding forest raptors in Pennsylvania.

1. Migration- Use banding data to define nesting and wintering range of Pennsylvania migrants, i.e. define source populations and connectivity. Similarly, use banding data to map wintering and migration areas for Pennsylvania nesting birds. Migration count data suggest there may be two key source regions for Pennsylvania migrants in eastern and western Appalachian ridges, defining these source populations through band recovery mapping or stable isotope work may improve population trend assessment using counts.

2. Breeding- Assess habitat use patterns of nesting Sharp-shinned Hawks in north central counties and their sensitivity or tolerance to shale extraction activities.

2. Migration- Evaluate health and contaminant load of Pennsylvania migrants by partnering with banding stations to conduct blood and fat analyses for heavy metals and contaminants. Because birds prey on songbirds, their contaminant load may be relevant to tracking exposure in other forest birds.

3. Breeding- Gain better understanding of year-round habitat use and movement patterns of Pennsylvania nesting birds by using radio-telemetry or newly developed small satellite-tags or data loggers. Determine if birds switch to more suburban habitats in winter, move out of Pennsylvania or if sex or age classes use different habitats; and if suburban wintering birds use different habitats than non-suburban wintering birds during nesting.

3. Migration- Use ongoing Pennsylvania migration counts to evaluate trends in PA migrant populations (www.rpi-project.org); tap birders to help refine and improve our knowledge of other migration corridors in the state ridge and valley region, Appalachians, and near Lake Erie, i.e. conduct two-season counts in potential corridors to determine their importance and use by this species and others so migrant populations can be better conserved (e.g. Golden Eagles).

SURVEY NEEDS

1. Breeding- Develop useful survey technique for nesting population stratified by forest type, and a frequency (every 3-5 years) that might monitor population trends effectively. Implement survey within next five years, and include other forest-raptors not well surveyed by other methods.

1. Migration- Conduct 1-2 year counts of numbers of birds using other key ridges in Appalachian chain and along Lake Erie shoreline or other potential concentration areas in spring and fall season. Although much is known about birds using Blue Mountain, less is known about volume using other ridge systems. Counts from Waggoner's Gap suggest some key corridors may occur north of that point .Such data are critical to conservation planning.

2. Breeding- Once wintering region for Pennsylvania Sharp-shinned Hawks is defined, use Christmas Bird Count data from current through historical to examine trends in wintering populations.

2. Migration- Encourage additional banding station on western Appalachians or Allegheny Front region to monitor migrants using those areas for health and to provide additional information on nesting and wintering population extent. Request banders in eastern and western ridges collect and report weight, sex/age ratios, fat levels on migrants to provide index to migrant health annually.

3. Breeding- Once wintering areas defined, examine trends in winter raptor surveys for this species throughout the wintering range and compare to other population indices available.

3. Migration- Encourage consistent migration counts at hawk count sites immediately south of Pennsylvania and during spring in Pennsylvania. Partner with HMANA to identify sites, possibly provide small grants to sustain operation and get each site's historical hourly data entered and part of the current long-term migration monitoring program, particularly for PA spring migration sites (e.g., RPI).

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
National Audubon Society Christmas Bird Counts	National Audubon Society	http://birds.audubon.org/christmas-bird-count	Since 1900, this is an annual winter survey of more than 2,300 count circles worldwide. The longest running Citizen Science survey in the world, Christmas Bird Count provides critical data on population trends.

MONITORING PROGRAMS

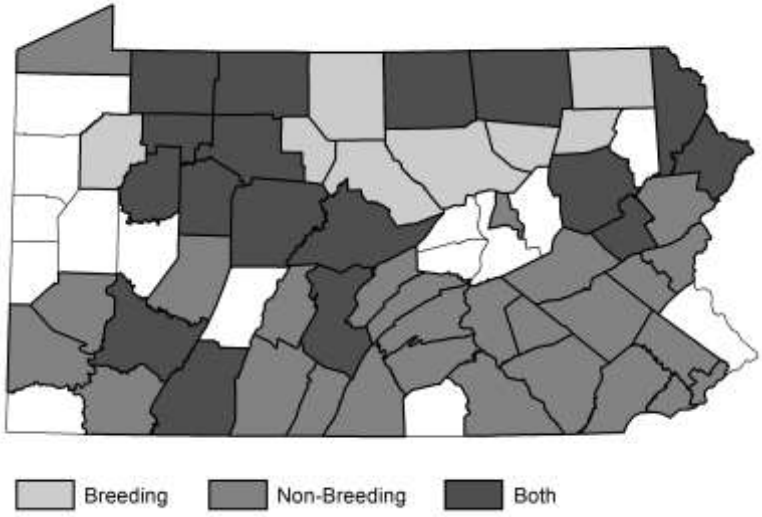
Program Name	Lead Agency	Hyperlink	Description
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals
Raptor Population Index, HMANA	Hawk Migration Association of North America	http://www.rpi-project.org	Trends in migrating birds evaluated biannually by partnership. Trends in sites to south of PA in part represent trends in PA migrating population.
Winter Raptor Survey	HMANA or Pennsylvania Society for Ornithology	http://www.pabirds.org http://www.hmana.org	Road surveys in winter are conducted on the same road route annually; two methods in use currently. Eventually data will be available to researchers on www.hmana.org.

Northern Goshawk

Accipiter gentilis

Daniel W. Brauning
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S2B, S2N (M), S3N (W)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown; (M) Decline of 41 - 60%; (W) Decline of 11 - 40%**

Conservation Goal:

Recover the nesting population to at least 75 nesting pairs statewide with an annual nesting success rate of 75%.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(B) Northern Hardwood & Conifer** **(M) Central Oak-Pine**	
Habitat	**(B) Appalachian (Hemlock)-Northern Hardwood Forest** **(M) Central Appalachian Pine-Oak Rocky Woodland**	

Specific Habitat Requirements:

(B) Large tracks of old growth / mature mixed (hardwood/hemlock) forests with dense canopy for nesting, open understory, near water
(M) Any forested habitat, including edges and ruderal forests, presumably.
(W) Extensive forests; not well known.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Loss of conifers, and even-age management on private land

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning	Conservation of forest blocks	Nesting success.	Nesting population size	1

Model goshawk forest habitat to identify critical habitat, and develop BMPs for timber management within most suitable sites.

Action Location: Physiographic Province: Appalachian Plateaus
HUC4 Watershed: Allegheny, Susquehanna

Associated Species: Interior forest species

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Invasive species.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection	Conservation of forest blocks	Nesting success.	Nesting population size	1

Model goshawk forest habitat to identify critical habitat, and develop BMPs for timber management within most suitable sites.

Action Location: Physiographic Province: Appalachian Plateaus
HUC4 Watershed: Allegheny, Susquehanna

Associated Species: Interior forest species

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Forest fragmentation from any gas, coal, oil, or wind development in forested settings

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Maintain records in PNDI to assure known sites are protected from direct development.	Avoid development within CPP Core buffers during nesting season of all known sites.	Nesting success.	Nest abandonment	2

Action Location: Physiographic Province: Appalachian Plateaus
HUC4 Watershed: Allegheny, Susquehanna

Associated Species: Interior forest species

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Forest fragmentation by gas pipelines, service road expansion, powerlines

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Maintain records in PNDI to assure known sites are protected from direct development.	Avoid development within CPP Core buffers during nesting season of all known sites.	Nesting success.	Nest abandonment	2

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Allegheny, Susquehanna

Associated Species: Interior forest species

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Suburban sprawl into forested stands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Maintain records in PNDI to assure known sites are protected from direct development.	Avoid development within CPP Core buffers during nesting season of all known sites.	Nesting success.	Nest abandonment	3

Action Location: Physiographic Province: Appalachian Plateaus
HUC4 Watershed: Allegheny, Susquehanna

Associated Species: Interior forest species

IUCN Threat: 1.0 Residential and Commercial Development

Season: Migration

Specific Threat: Suburban sprawl into forested stands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 5.0 Facilities and Areas Maintain extensive forest stands along known migratory routes like Kittattiny Ridge	Extensive forest blocks	Forested ridges	Goshawk migrant counts	3

Action Location: Physiographic Province: Statewide

Associated Species: Migrant raptors

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Migration

Specific Threat: Forest fragmentation from any gas, coal, oil, or wind development in forested settings

Action	Objective	Measure	Monitoring	Priority
TRACS Action 5.0 Facilities and Areas	Extensive forest blocks	Forested ridges	Goshawk migrant counts	3
Maintain extensive forest stands along known migratory routes like Kittattiny Ridge				
Action Location: Physiographic Province: Statewide				
Associated Species: Migrant raptors				

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Migration

Specific Threat: Forest fragmentation by gas pipelines, service road expansion, powerlines

Action	Objective	Measure	Monitoring	Priority
TRACS Action 5.0 Facilities and Areas	Extensive forest blocks	Forested ridges	Goshawk migrant counts	3
Maintain extensive forest stands along known migratory routes like Kittattiny Ridge				
Action Location: Physiographic Province: Statewide				
Associated Species: Migrant raptors				

IUCN Threat: 5.0 Biological Resource Use

Season: Migration

Specific Threat: Loss of conifers, and even-age management on private land

Action	Objective	Measure	Monitoring	Priority
TRACS Action 5.0 Facilities and Areas	Extensive forest blocks	Forested ridges	Goshawk migrant counts	3
Maintain extensive forest stands along known migratory routes like Kittattiny Ridge				
Action Location: Physiographic Province: Statewide				
Associated Species: Migrant raptors				

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Migration

Specific Threat: Disruption of foraging opportunities

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Short-term disturbances in extensive forest blocks.	Goshawk numbers at hawk watches	Goshawk migrant counts	3

Model prime goshawk forest habitat, and develop BMPs for timber management within most suitable sites (see Saunders and Arseneault 2013).

Action Location: Physiographic Province: Statewide

Associated Species: Migrant forest raptors, forest interior species

IUCN Threat: 1.0 Residential and Commercial Development

Season: Winter

Specific Threat: Loss of intact forest from suburban sprawl into forested stands.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 9.0	Planning	Extensive forest blocks		Christmas Bird Counts	3

Model prime goshawk forest habitat, and develop BMPs for timber management within most suitable sites.

Action Location: Physiographic Province: Statewide

Associated Species: Interior forest species

RESEARCH NEEDS

1. Breeding- Determine population size and distribution in Pennsylvania to better determine its status, rarity, range, and vulnerability to various human-caused population effects. As part of this, model forest requirements for nesting goshawks, and evaluate factors

1. Migration- Cause of declines in migratory goshawk populations.

1. Wintering- Find if there are any linkages between breeding and wintering populations.

2. Breeding- Determine limiting factors for goshawk breeding populations including response to goshawk nesting pairs to residential and energy-based development effects on forest block size and goshawk territory persistence, or if there are other limiting factors for goshawk populations including diseases such as West Nile Virus, nest predation by fishers and other species, and nest disturbance / taking of young by falconers or wildlife observers.

2. Migration- Use ongoing Pennsylvania migration counts to evaluate trends in PA migrant populations (www.rpi-project.org); tap birders to help efine d improve our knowledge of other migration corridors in the state ridge and valley region, Appalachians, and near Lake Erie, i.e., conduct two-season counts in potential corridors to determine their importance and use by this species and others so migrant populations can be better conserved (e.g. Golden Eagles).

3. Breeding- Determine population densities by region or forest type and develop a long-term monitoring system, possibly a volunteer-based call playback survey for breeding forest raptors in Pennsylvania. This project could be part of a multi-state effort in the Northern Appalachians (WV, MD, PA, NY).

3. Migration- Determine of there are any links between breeding & migrant populations.

SURVEY NEEDS

1. Breeding- Basic status information is lacking. Need basic evaluation of breeding population size and distribution especially outside of best-studied NW region (ANF). Survey spring gobbler turkey hunters for leads on possible nests. A modified duplication of study in western Great Lakes for the northern Appalachians needed.

1. Migration- None

1. Wintering- Connection between breeding population and wintering population through marked birds.

2. Breeding- Detection rates should be established in good habitat to establish a benchmark for evaluating populations and habitat suitability. Test of USDA FS monitoring protocol, perhaps altered for use in region, needed to streamline effective protocol monitoring.

3. Breeding- Evaluation of nesting success, to determine population viability and limiting factors for nesting goshawk populations.

MONITORING PROGRAMS

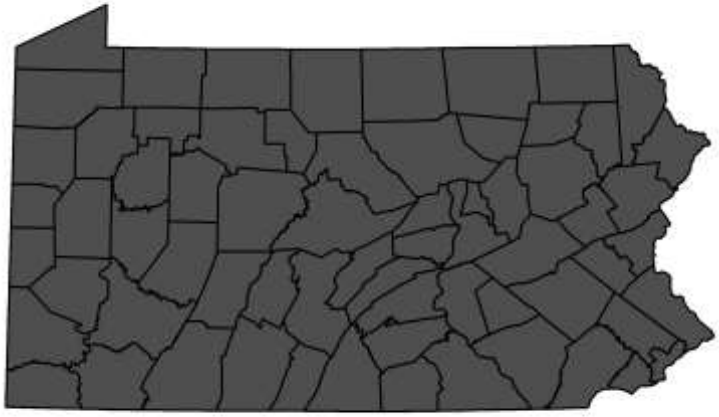
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
National Audubon Society Christmas Bird Counts	National Audubon Society	http://birds.audubon.org/christmas-bird-count	Since 1900, this is an annual winter survey of more than 2,300 count circles worldwide. The longest running Citizen Science survey in the world, Christmas Bird Count provides critical data on population trends.
North American Breeding Bird Survey	U.S. Geological Survey	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals
PGC Species of Special Concern Monitoring and PNDI	Pennsylvania Game Commission		Reports of Northern Goshawk breeding pairs, territories, nests are pursued to verify species presence and find nests
Raptor Population Index, HMANA	Hawk Migration Association of North America	http://www.rpi-project.org	Trends in migrating birds evaluated biannually by partnership. Trends in sites to south of PA in part represent trends in PA migrating population.

Broad-winged Hawk

Buteo platypterus

Laurie J. Goodrich
Hawk Mountain Sanctuary Association

Photo: Jacob Dingel



Breeding & Non-Breeding

CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B, S5N (M)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**40000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change); (M) Increase of >25%**

Conservation Goal:

Maintain breeding range across the state at levels detected during the Second Atlas of Breeding Birds (1725 atlas blocks; Wilson et al. 2012) and increase forest habitat available and species range in southern counties by 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(B) Northern Hardwood & Conifer** **(M) Central Oak-Pine**	
Habitat	**(B) Appalachian (Hemlock)-Northern Hardwood Forest** **(M) Northeastern Interior Dry-Mesic Oak Forest**	

Specific Habitat Requirements:

(B, M) Continuous deciduous or mixed deciduous forests with openings and water source nearby.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Forest fragmentation reduces suitable nesting habitat, prey availability, and may increase interspecific conflict.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection Provide incentives such as tax relief or planning assistance to owners of large forests to conserve forest blocks, particularly in Poconos, Appalachians, and Northern Hardwoods. Work with conservancies to conserve forest blocks owned by smaller landowners particularly in southern counties, through easements and other resources. Pursue forest land acquisition in southeastern and southcentral counties to benefit migrating forest birds in areas where forest has diminished dramatically.	In next 10 years, implement statewide private forest land habitat management incentives to conserve forested blocks and reestablish deciduous forest cover adjacent to large forest patches; In next 10 years, provide educational information and incentives to public land managers to maintain contiguous forest cover particularly in southern counties.	Number of acres of forest per region and number of large forest patches (>1000 acres) and proportion of forest to developed or open areas.	Monitor forest cover by region annually using GIS; Monitor number of landowners participating in forest conservation incentives and acres of forest restored; monitor number of nesting pairs or occurrences of Broad-winged Hawks and in response to forest cover incentives. Monitor acres of public land in forest in southeast and southcentral counties.	1

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Sharp-shinned Hawk, Scarlet Tanager, Northern Waterthrush, Worm-eating Warbler

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Gypsy moth infestations reduce canopy cover at nest sites; Hemlock Wooly Adelgid and pine infections reduce conifer component in forest and white-tailed deer overbrowsing reducing prey dependent on shrub and ground cover.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Work with forest pest management divisions to reduce impact of Hemlock Wooly Adelgid and other nonnative pests, particularly on conifers. Work with game management program to promote sustainable white-tailed deer population numbers in forests throughout the state so forest health is maintained. Action Location: Physiographic Province: Statewide Associated Species: Wood Thrush, Sharp-shinned Hawk, Scarlet Tanager, Northern Waterthrush, Worm-eating Warbler	Minimize impacts of nonnative invasive insects and deer on forest-nesting raptors.	Acres defoliated and proportion of hemlocks infested and numbers of white-tailed deer per acre.	Monitor numbers and distribution of Broad-winged Hawks; and, monitor forest health.	1

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Fragmentation of forest habitat and disturbance of nesting forests with activities around extraction sites.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Provide protocols to shale gas and oil drilling operators and wind energy developers to exclude heavy activities during peak nesting season (May, June, through July 15) and keep forest fragmentation to a minimum. Encourage clustering of active areas to conserve areas of undisturbed forest and restoration of forest canopy and understory post-drilling. Exclude activities within known nesting areas if identified, during the summer months. Action Location: Physiographic Province: Statewide Associated Species: Wood Thrush, Sharp-shinned Hawk, Scarlet Tanager, Northern Waterthrush, Worm-eating Warbler	Maintain undisturbed forest cover for nesting Broad-winged Hawks, particularly during May through mid-July	Number of nesting pairs per forest unit before, during and after activities.	Estimate number of nesting pairs using forest raptor surveys in select forest blocks per region with and without energy development and during next 10 years.	2

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: May be killed by cars when hunting along roadside.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Avoid placement of new high volume use roads in large forested blocks or expansion of existing low volume roads into higher volume usage. Work with Department of Transportation to guide future road development away from contiguous forest blocks.	Reduce traffic fatalities and interactions of fast-moving vehicles and forest raptors	Number of road-killed hawks; miles of roads by road category (dirt, two lane paved, four lane paved) within large forested areas	Quantify miles of roads by type within large forested areas by region.	3

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Sharp-shinned Hawk, Scarlet Tanager, Northern Waterthrush, Worm-eating Warbler

IUCN Threat: 1.0 Residential and Commercial Development

Season: Migration

Specific Threat: Forest fragmentation along migratory routes.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection Designate important forest blocks within known migration corridors or areas, even in developed regions as high value for migration stopover. Work with communities to maintain low use forested areas, parks, etc. along migration routes.	Maintain forested areas for stopover particularly in southern, highly developed areas also used by birds and along Lake Erie shoreline or within five miles of such.	Acres of conserved public and private forest per County within main migration pathways.	Monitor forest cover and conserved forest land by county particularly in Appalachian Mountains and regions to south and east of Appalachians and Eastern Lake region.	1

Action Location: Physiographic Province: Statewide

Associated Species: Neotropical migrant songbirds including Scarlet Tanager.

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Migration

Specific Threat: Reduction and fragmentation of large forested areas along Lake Erie shoreline and on and near Appalachian ridges and establishment of industrial wind farms in migration corridors e.g. ridges and shoreline.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Maintain undisturbed migration areas and stopover habitat in key migration corridors within the state.	Acres of conserved public and private forest per County within main migration pathways; number of wind farms on ridges and Lake shoreline.	Monitor use of stopover sites along migration corridors; monitor large-scale energy infrastructure within migration corridors.	1

Designate important forest blocks within known migration corridors, even in developed regions as high value for migration stopover sites. Prohibit wind farms in such zones.

Action Location: Physiographic Province: Statewide

Associated Species: Golden Eagle, Scarlet Tanager, Cerulean Warbler, Golden-winged Warbler.

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Migration

Specific Threat: Large volume roadways may reduce stopover habitat for migrating flocks.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Limit high volume highways within migration corridors, primarily Appalachian Mountains, Blue Mountain and Eastern Lake shore..	Miles of two and four lane highways within migration corridors.	Track number of miles of highway within key migration corridors.	3

Designate important forest blocks within known migration corridors, even in developed regions as high value for migration stopover sites. Prohibit large-volume highways in such zones.

Action Location: Physiographic Province: Statewide

Associated Species: Golden Eagle, Sharp-shinned Hawk, Northern Harrier, Short-eared Owl, American Kestrel.

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Migration

Specific Threat: Reduction of large forest patches for roosting migrants.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Maintain forested areas for stopover particularly in southern, highly developed areas also used by birds and along Lake Erie shoreline or within five miles of each key corridor.	Acres of forest within migration corridors and nearby areas (4-5 mile radius)	Track acres of forest cover by county and along migration corridors.	3
Designate important forest blocks within known migration corridors, even in developed regions as high value for migration stopover sites. Promote sustainable forest harvest practices in such areas.					

Action Location: Physiographic Province: Statewide

Associated Species: Neotropical migrant songbirds including Scarlet Tanager.

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Migration

Specific Threat: Reduction of undisturbed stopover or roosting sites.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Maintain corridor of undisturbed or low disturbance areas of forest for stopover particularly in Appalachians, Blue Mountain, in Piedmont and along Lake Erie shoreline.	Acres of forest within or near migration corridors.	Track acres of forest cover by county and along migration corridors and zoning and use of such areas.	3
Designate important forest blocks within known migration corridors, even in developed regions as high value for migration stopover sites. Limit recreation to passive recreation or hunting, no ATVs or race cars or high volume human activities and such particularly during migration periods.					

Action Location: Physiographic Province: Statewide

Associated Species: Neotropical migrant songbirds including Scarlet Tanager.

RESEARCH NEEDS

1. Breeding- Determine population densities by region or forest type and develop a long-term monitoring system, possibly a volunteer-based call playback survey for breeding forest raptors in Pennsylvania.

1. Migration- Use satellite telemetry or band recoveries on migrating Broadwings to define nesting and wintering range of Pennsylvania migrants, i.e. define source populations. Augment this work with band recovery data and possibly stable isotopes from feathers of birds trapped during migration. Identify key stopover sites and their characteristics to inform conservation planning.

2. Breeding- Gain better understanding of year-round habitat use and movement patterns of Pennsylvania nesting birds by using radio-telemetry or newly developed small satellite-tags. Determine if sex or age classes use different habitats and winter in different locations.

2. Migration- Use ongoing Pennsylvania migration counts to evaluate trends in PA migrant populations (www.rpi-project.org); tap birders to help refine and improve our knowledge of other migration corridors in the state ridge and valley region, Appalachians, in Piedmont, and near Lake Erie, i.e. conduct three-season counts during peak migration period in potential hotspots or corridors to determine their importance and use by this species and others so migrant populations can be better conserved and stopover habitat defined (e.g. other species include Golden Eagles).

3. Breeding- Improve our understanding of prey selection in different forest types across the state conducting observations of nest sites for several years. Such data are important to understanding forest health impacts on the species. Conduct research in fragmented and unfragmented landscapes to evaluate impacts.

3. Migration- Use Satellite telemetry or standard telemetry to examine how far from migration streams birds travel in search of stopover sites. Use data to inform conservation planning around migration corridors.

SURVEY NEEDS

1. Breeding- Develop effective monitoring technique for nesting population stratified by forest type, and an appropriate frequency (every 3-5 years?) that might track population trends effectively. Implement survey within next five years, and include other forest-raptors not well surveyed by other methods.

1. Migration- Conduct 1-2 year counts of numbers of birds using other key ridges in Appalachian chain and along Lake Erie shoreline or other potential concentration areas in spring and fall season. Although much is known about birds using Blue Mountain and in south east, less is known about volume using other ridges or valleys. Such data are critical to conservation planning.

2. Breeding- Monitor productivity at Broad-winged Hawk nests across the state periodically; have birders and land managers report on nests they locate and number of young produced.

2. Migration- Encourage additional banding station on western Appalachians or Allegheny Front region to monitor migrants using those areas for health and to provide additional information on nesting and wintering population extent. Request banders in eastern and western ridges collect and report weight, sex/age ratios, fat levels on migrants to provide index to migrant health annually.

3. Breeding- Once wintering areas defined, partner with other conservation groups and state or federal agencies to implement trail or road surveys for Broadwings on the wintering grounds.

SURVEY NEEDS

3. Migration- Encourage consistent migration counts at hawk count sites immediately south of Pennsylvania and during spring in Pennsylvania. Partner with HMANA to identify key sites, possibly provide small grants to sustain operation and to encourage each site's historical hourly data entered and part of the current long-term migration monitoring program particularly for PA spring migration sites (e.g. RPI).

MONITORING PROGRAMS

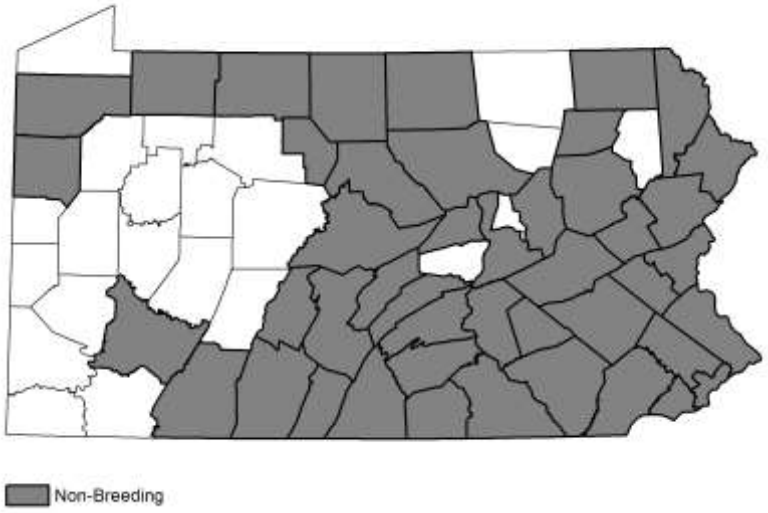
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Hawk Mountain Broad-wing Project	Hawk Mountain Sanctuary Association	http://www.hawkmountain.org/Broadwing	In 2014 with SWG grant, HMS established a webpage to collect sightings of nesting Broadwings from general public; observations are solicited from birders through e-lists and collected from eBird.
Raptor Population Index, HMANA	Hawk Migration Association of North America	http://www.rpi-project.org	Trends in migrating birds evaluated biannually by partnership. Trends in sites to south of PA in part represent trends in PA migrating population.

Golden Eagle

Aquila chrysaetos

Nathan J. Zalik
Pennsylvania Game Commission

Photo: Hal Korber



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4N (M), S5N (W)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / High Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(M) Increase of 11 - 25%; (W) Increase of >25%**

Conservation Goal:

At least 150 migrants in both spring and fall at 2 or more hawk migration count sites in Pennsylvania.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(M,W) Central Oak-Pine**	
Habitat	**(M) Central Appalachian Dry Oak-Pine Forest** **(W) Central Appalachian Pine-Oak Rocky Woodland**	

Specific Habitat Requirements:

(M) Inhabit rugged, mostly wooded terrain throughout the Allegheny Plateau and Valley and Ridge regions (Ombalski and Brandes 2010).
(W) Habitat use poorly understood, although telemetry data show that golden eagles are primarily using forested areas in the winter (Katzner et al. 2012, Miller 2012).

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Migration

Specific Threat: Loss of forest cover due to development in remote areas, including from shale gas and wind energy development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Maintain unfragmented forest blocks through land use planning efforts.	Site new commercial or residential development in non-forested areas that will minimize fragmentation of forested habitat.	Percent forested habitat and core forest patch size.	Spatial analyses of forested area and forest patch size completed at regular intervals (e.g., every 5 years).	1

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Broad-winged Hawk, Cerulean Warbler, Kentucky Warbler, Sharp-shinned Hawk

IUCN Threat: 3.0 Energy Production and Mining

Season: Migration

Specific Threat: Collisions with wind turbines during migration.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Site new wind development projects in areas of low risk to wildlife, with special attention to golden eagles, which migrates earlier in the spring and later in the fall than other raptors.	All wind energy development companies operating in Pennsylvania participate in the PGC Wind Energy Voluntary Cooperative Agreement.	Number of wind companies participating in the agreement; number of wildlife mortalties.	Pre- and post-construction monitoring at potential and existing wind energy facilities.	1

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Silver-haired bat, little brown bat, big brown bat, tricolored bat

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Migration

Specific Threat: Electrocution by power lines and/or collisions with utility poles, cell towers and power lines.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Encourage utility companies to implement an avian protection plan to minimize avian mortality risks.	Reduce avian mortality	Number of utility companies with avian protection plans	Number of avian mortalities.	1

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Bald Eagle, Peregrine Falcon

IUCN Threat: 5.0 Biological Resource Use

Season: Migration

Specific Threat: Loss of suitable forest habitat from logging.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Maintain unfragmented forest blocks through land use planning efforts.	No net loss of forested habitat.	Percent forested habitat and core forest patch size.	Spatial analyses of forested area and forest patch size completed at regular intervals (e.g., every 5 years).	1

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Broad-winged Hawk, Cerulean Warbler, Kentucky Warbler, Sharp-shinned Hawk

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Migration

Specific Threat: Disturbance during migration from human activity at energy development sites.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Maintain unfragmented forest blocks through land use planning efforts.	Site new commercial or residential development in non-forested areas that will minimize fragmentation of forested habitat.	Percent forested habitat and core forest patch size.	Spatial analyses of forested area and forest patch size completed at regular intervals (e.g., every 5 years).	1

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Broad-winged Hawk, Cerulean Warbler, Kentucky Warbler, Sharp-shinned Hawk

IUCN Threat: 1.0 Residential and Commercial Development

Season: Winter

Specific Threat: Loss of forest cover due to energy development in remote areas.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Maintain unfragmented forest blocks through land use planning efforts.	Site new commercial or residential development in non-forested areas that will minimize fragmentation of forested habitat.	Percent forested habitat and core forest patch size.	Spatial analyses of forested area and forest patch size completed at regular intervals (e.g., every 5 years).	1

Action Location: Physiographic Province: Statewide

Associated Species: Broad-winged Hawk, Cerulean Warbler, Kentucky Warbler, Sharp-shinned Hawk

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Winter

Specific Threat: Disturbance during wintering from human activity at energy development sites.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Maintain unfragmented forest blocks through land use planning efforts.	Site new commercial or residential development in non-forested areas that will minimize fragmentation of forested habitat.	Percent forested habitat and core forest patch size.	Spatial analyses of forested area and forest patch size completed at regular intervals (e.g., every 5 years).	1

Action Location: Physiographic Province: Statewide

Associated Species: Broad-winged Hawk, Cerulean Warbler, Kentucky Warbler, Sharp-shinned Hawk

RESEARCH NEEDS

1. Migration- None

1. Wintering- To what degree is lead toxicity, ingested through scavenging on hunter-killed carcasses, a threat to wintering golden eagles?

2. Wintering- What are the habitat characteristics of areas used by wintering golden eagles and what prey items are important?

3. Wintering- With what frequency are golden eagles captured incidentally in leg-hold traps set for mammals?

SURVEY NEEDS

1. Migration- Encourage consistent migration monitoring effort, especially during the spring migration.

1. Wintering- Continue trail camera surveys especially in remote forested regions.

2. Migration- Pre- and post-construction monitoring at potential and existing wind energy facilities.

2. Wintering- Surveys that document areas consistently used by wintering golden eagles are needed.

3. Wintering- Pre- and post-construction monitoring at potential and existing wind energy facilities.

MONITORING PROGRAMS

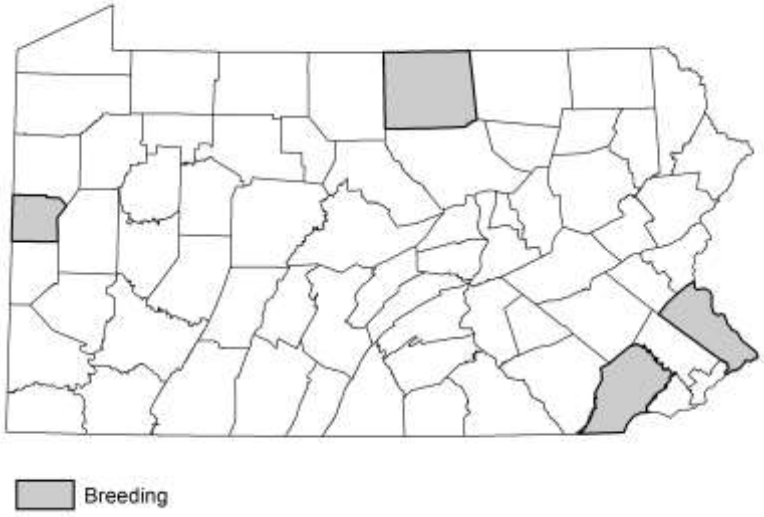
Program Name	Lead Agency	Hyperlink	Description
Appalachian Eagles Project	West Virginia University	http://www.appalachianeagles.org/	Volunteers operate trail cameras at bait piles (road-killed deer) during the winter.
Raptor Population Index, HMANA	Hawk Migration Association of North America	http://www.rpi-project.org	Trends in migrating birds evaluated biannually by partnership. Trends in sites to south of PA in part represent trends in PA migrating population.

King Rail

Rallus elegans

Kim Van Fleet
Dickinson College

Photo: Jim Rathert



CONSERVATION PROFILE

Global Rank	**G4**	State Rank	**S1B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Endangered**
Northeast Region	**Very High Concern / High Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Confirm 1-3 breeding pairs in each of three wetland complexes where King Rail were documented as possible, probable or confirmed breeders in the Second Breeding Bird Atlas of Pennsylvania (Wilson et al. 2012).

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Emergent Marsh**	**Wet Meadow / Shrub Marsh**
Habitat	**Laurentian-Acadian Freshwater Marsh**	**Laurentian-Acadian Wet Meadow-Shrub Swamp**

Specific Habitat Requirements:

Freshwater marshes (tidal and non-tidal), brackish tidal marshes, shrub swamps, sedges, rushes and cattails.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Habitat encroachment, loss of native plants that provide cover, food, nest materials; increase in plant species that afford little to no value for wetland bird species

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Employ IPM strategies and actions to remove invasives and revegetate with appropriate native plants if and when necessary	Provide optimal to near optimal habitat conditions for successful habitation and breeding success	Increased breeding success and survivorship of adults and young.	PGC marsh bird monitoring	1

Action Location: Physiographic Province: Appalachian Plateaus, Atlantic Coastal Plains, Central Lowland

Associated Species: Rails, Pied-billed Grebe, herons, passerines

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Accumulation of Methylmercury (neurotoxin) in body tissues as a result of agricultural runoff (pesticides and sediments)

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Monitor and assess all coal and oil fired power plants to ensure compliance with EPA's 2011 Mercury and Air Toxics Standards(MATS). Monitor and assess mercury emissions from concrete production facilities. Identify local and regional sources of non-point pollution including sedimentation of waterways and wetlands from agricultural, suburban and urban areas where stormwater runoff has become an increasing issue.	Reduce pollutant levels from point and non-point sources on lands and in waterways / wetlands including methyl mercury, agricultural chemicals (pesticides, herbicides and rodenticides), fertilizers, stormwater runoff.	Measureable reduction of specific pollutants [e.g. methyl mercury, lead, fertilizers (nitrogen, phosphorus), residual pesticides, sediment loads, . Reduced eutrophication and clearer water column), increased nesting success	PGC marsh bird monitoring	1

Action Location: Physiographic Province: Appalachian Plateaus, Atlantic Coastal Plains, Central Lowland

Associated Species: Rails, Pied-billed Grebe, herons, passerines

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Natural succession, filling in of wetlands for agriculture or land development

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Reclaim, revegetate and expand wetland areas that provide appropriate ratio of emergent vegetation and open water.	Increase in number of breeding pairs of King Rail	PGC marsh bird monitoring	2
Habitat restoration projects					

Action Location: Physiographic Province: Appalachian Plateaus, Atlantic Coastal Plains, Central Lowland

Associated Species: Rails, Pied-billed Grebe, herons, passerines

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Increase in water depth during breeding season, extended periods of drought resulting in insufficient water levels for prey and nest safety

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Maintain adequate water levels (< 10 cm) during breeding and fledging seasons to accommodate specific need of birds relative to nesting and foraging habitat.	Occurrence of breeding pairs and measurable reproductive success.	PGC marsh bird monitoring	2
Implement wetland mitigation projects that would enable raising or lowering of water levels in response to extreme weather events. Create additional habitat in areas surrounding core habitat					

Action Location: Physiographic Province: Appalachian Plateaus, Atlantic Coastal Plains, Central Lowland

Associated Species: Rails, Pied-billed Grebe, herons, passerines

RESEARCH NEEDS

1. Breeding- Determine current status and distribution of King Rail in PA using best available information and conducting additional surveys in areas of known and historic occurrences. Support research to examine where the northern migrating population overwinters.

2. Breeding- Assess current marsh habitat quality and quantity as well as surrounding landscape that serves as a buffer area to determine if and where overall improvements can be made. Model potential impacts of extreme weather events associated with global climate change on existing habitats and develop sound mitigation scenarios that could be employed in the future.

3. Breeding- Determine other factors besides loss of wetlands contributing to the decline of King Rail in Pennsylvania including agricultural practices, runoff and sedimentation, methyl mercury pollution, potential sources of lead contamination, mammalian predators of King Rail and their nests, muskrat trapping in areas where King Rail occur. Work collaboratively with other states and countries to determine where northern migrating populations of King Rail over-winter and assess possible impacts to this species on wintering grounds.

SURVEY NEEDS

1. Breeding- Breeding season surveys in areas where birds have been documented during 2nd BBA, recent eBird reports (within safe dates for sp.) and historic occurrences to determine number of breeding pairs within the state. urveys should be done on foot and or by kayak or canoe depending on location.

2. Breeding- Survey and assess habitat quality relative to ecological needs of king rail in areas of present and historic occurrences. Focus should be on quality and quantity of vegetative cover (native, invasive and exotic plants), quality and quantity of water (sedimentation, pollution and water levels), rey abundance, and potential risk of disturbance.

3. Breeding- Water quality monitoring and invertebrate studies to examine factors contributing to prey availability and abundance. Plus surveys to determine presence/absence of known predators of King Rail and their nests.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
Pennsylvania Game Commission Marsh Bird Surveys	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt/community/birding_and_bird_conservation/21066/marsh_bird_survey?qid=81806114&rank=4	During breeding seasons, PGC staff, partners, and volunteers conduct standardized audio playback surveys for secretive marsh birds across the state including: pied-billed grebe, American bittern, least bittern, black rail, king rail, Virginia rail, sora, common moorhen, and American coot. Protocol adapted from North American Marsh Bird Monitoring Protocols (Conway 2011) and is very similar to that used in the 2nd Pennsylvania Breeding Bird Atlas. Survey results

MONITORING PROGRAMS

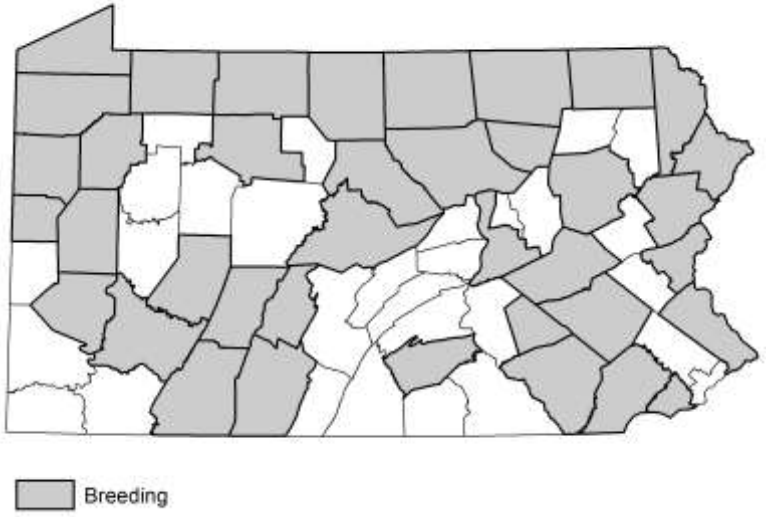
Program Name	Lead Agency	Hyperlink	Description
			inform management of these wetlands.
Work collaboratively with other eastern and southern states as well as Canada and Mexico examining the migrating population of King Rail to assess potential impacts to this northern population on their wintering grounds.	Pennsylvania Game Commission		Project would be a multi-member effort which would involve numerous state, federal and national agencies, NGOs, academic and independent researchers with vested interests in management and conservation of North American KIRA populations.

Virginia Rail

Rallus limicola

Robert Ross
U.S. Geological Survey, Retired

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3?B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Breeding-season detection in at least 150 wetland sites statewide through 2025, as reflected in the Second Atlas of Breeding Birds (Wilson et al. 2012).

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Emergent Marsh**	
Habitat	**Laurentian-Acadian Freshwater Marsh**	

Specific Habitat Requirements:

Shallow-intermediate depth emergent wetlands with a mosaic of open water and dense emergent vegetation.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Wetland filling/encroachment

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Avoid, minimize, or mitigate wetland losses, even those < 5 acres	No net loss of wetland habitat	No net loss of wetland habitat in 10 years	Stable to increased occupancy statewide	1

Action Location: Physiographic Province: Statewide

Associated Species: All rails, most ardeids and ducks, shorebirds, facultative wetland songbirds

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Array of wetland plants including phragmites, purple loosestrife, and narrow-stemmed cattail

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Largely physical removal with motorized and/or hand tools; long-term and less reliable biological control with insect predator from native continent may be available.	Remove dense invasive growth in large wetlands.	Number of acres treated	Increased occupancy of Virginia Rail at treatment site	2

Action Location: Physiographic Province: Statewide

Associated Species: All rails, most ardeids and ducks

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Bioaccumulation of toxins from agricultural runoff, industrial and municipal waste.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Sustain wetland quality through wastewater treatment operations in municipalities where water feeds into high priority breeding sites. Strengthen nonpoint source pollution regulations and technical assistance.	Number of facilities meeting standards; number of nonpoint source improvements	Monitor pollutant levels with known toxic effects on waterfowl at priority sites. Monitor annually.	3

Enforcement of local, state and regional waste water treatment regulations. Strengthening of nonpoint source pollution regulations and technical assistance in areas draining into high priority sites.

Action Location: Physiographic Province: Statewide

Associated Species: Other rails

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Greater frequency/severity of drought in summers

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Maintain large-wetland water levels.	Number of facilities meeting standards; number of nonpoint source improvements	Monitor pollutant levels with known toxic effects on waterfowl at priority sites. Monitor annually.	3

Acquire, restore, and manage a diversity of wetlands to build resiliency of landscape-level habitat and Virginia rail populations against potential climate-related habitat loss and degradation.

Action Location: Physiographic Province: Statewide

Associated Species: All rails, most ardeids and ducks

RESEARCH NEEDS

1. Breeding- Continued research into Best Management Practices for maintaining mosaic of emergent vegetation and open water in light of declines, including response to wetland management.

2. Breeding- Effectiveness of vocalization surveys for estimating population density or indexing population trends

3. Breeding- Factors affecting adult and brood survival, nesting success, site fidelity, and recruitment in Virginia rails. Effects of noise, ambient light, and other industrial/commercial disturbances on nesting success in Virginia rails.

SURVEY NEEDS

1. Breeding- Continue PGC marshbird surveys annually and expand efforts to smaller wetlands when possible, especially those with history of this species, or that are newly created (e.g., Great Lakes Marsh Monitoring Survey, Bird Studies Canada).

2. Breeding- Use PA eBird as an efficient way to gather information on Virginia rail distribution, breeding locales, migratory stopover sites, and timing of migration.

3. Improve methods to track hunter participation and harvest during the migratory period (e.g., human dimensions surveys, in collaboration with USFWS Harvest Information Program.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
Audubon PA Important Bird Area Surveys	Audubon Pennsylvania		Marsh bird surveys at Important Bird Areas designated due to their importance to wetland birds. Standardized marshbird protocols as described in PGC Marsh Bird Surveys and volunteer surveys.
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.

MONITORING PROGRAMS

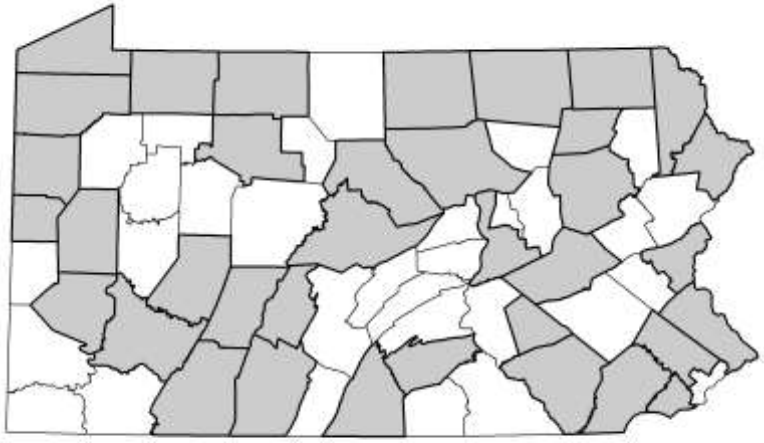
Program Name	Lead Agency	Hyperlink	Description
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals
Pennsylvania Game Commission Marsh Bird Surveys	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt/community/birding_and_bird_conservation/21066/marsh_bird_survey?qid=81806114&rank=4	During breeding seasons, PGC staff, partners, and volunteers conduct standardized audio playback surveys for secretive marsh birds across the state including: pied-billed grebe, American bittern, least bittern, black rail, king rail, Virginia rail, sora, common moorhen, and American coot. Protocol adapted from North American Marsh Bird Monitoring Protocols (Conway 2011) and is very similar to that used in the 2nd Pennsylvania Breeding Bird Atlas. Survey results inform management of these wetlands.
USFWS Harvest Information Program	U.S. Fish & Wildlife Service	http://www.fws.gov/hip/	Annual survey of migratory game bird license purchasers that provides hunter participation and harvest data for waterfowl and webless migratory game birds.

Sora

Porzana carolina

Lisa M. Williams
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Maintain breeding season presence in at least 100 wetland sites statewide through 2025, as reflected in the Second Atlas of Breeding Birds (Wilson et al. 2012).

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Emergent Marsh**	**Northern Swamp**
Habitat	**Laurentian-Acadian Freshwater Marsh**	**North-Central Appalachian Acidic Swamp**

Specific Habitat Requirements:

Large shallow-intermediate depth emergent wetlands with a mosaic of open water, dense emergent vegetation, and mudflats.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Conversion of emergent wetlands to open water wetlands; draining of minor emergent wetlands; alteration and/or development of surrounding uplands

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Long term protection and wetland management agreement should be secured for privately owned breeding locations.	Land and Water Rights Acquisition and Protection	Approach all adjoining landowner(s) to discuss water/lake management agreements that are compatible with planned use of surrounding uplands.	Number of landowners approached; Number of agreements reached.	Annually monitor breeding marsh birds via (PA modified) North American Marsh Bird Monitoring Protocol. Use Large Wetland species playback. Record vegetation condition. Conduct survey annually during Early (May15-June15) and Late (June 16 - July 15) seasons. 10 year duration.	1

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont

Associated Species: King Rail, Virginia Rail, American Coot, Common Gallinule, Least Bittern, American Bittern, multiple waterfowl

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Invasive species in breeding sites provide inferior food and cover and may choke out open water areas necessary for breeding.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Actively manage invasive plants that threaten large marsh mosaics of open water and emergent vegetation in large publicly-owned marshes in Crawford, Mercer, Lawrence, Cumberland, Susquehanna and Tioga counties in particular. Elimination of invasives is not likely, but a mosaic of vegetation and open water must be restored to sustain suitability of breeding locations.	Investigate and implement best management practices to maintain emergent/open water mosaics.	Number of acres restored; Number of suitable acres maintained.	Annually monitor breeding marsh birds via (PA modified) North American Marsh Bird Monitoring Protocol. Use Large Wetland species playback. Record vegetation condition. Conduct survey annually during Early (May15-June15) and Late (June 16 - July 15) seasons. 10 year duration.	1

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont

Associated Species: King Rail, Virginia Rail, American Coot, Common Gallinule, Least Bittern, American Bittern, multiple waterfowl

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Reproduction would be impacted by severe spring precipitation events as well as spring or summer droughts.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Active management and planning on confirmed breeding wetlands in Crawford, Lawrence, Mercer, Tioga, Cumberland, and Susquehanna counties for adaptive management of marshes and associated uplands. Maintenance of mosaic of shallow (<50 cm) wetlands with open/emergent portions.	Adaptable approach to water level management so open water mosaics can be sustained in periods of high or low precipitation. Includes replacement and upgrade of water control devices suitable for handling predicted precipitation changes.	# sites with adaptive management plans in place; # water control devices upgraded	Monitor progress in development and implementation of Adaptation Plans at high-priority sites. Monitor installation of water control devices.	1

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont

Associated Species: King Rail, Virginia Rail, American Coot, Common Gallinule, Least Bittern, American Bittern, multiple waterfowl

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Bioaccumulation of toxins from pollution sources including agricultural runoff, industrial and municipal waste.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Sustain wetland quality through wastewater treatment operations in municipalities where water feeds into high priority breeding sites (Crawford, Lawrence, Erie, Tioga, Bucks counties). Strengthen nonpoint source pollution regulations and technical assistance.	# facilities meeting standards; # nonpoint source improvements	Monitor pollutant levels with known toxic effects on waterfowl at priority sites. Monitor annually.	3
Enforcement of local, state and regional waste water treatment regulations. Strengthening of nonpoint source pollution regulations and technical assistance in watersheds draining into high priority sites.					

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont

Associated Species: King Rail, Virginia Rail, American Coot, Common Gallinule, Least Bittern, American Bittern, multiple waterfowl

RESEARCH NEEDS

1. Breeding- Continued research into Best Management Practices for maintaining mosaic of emergent vegetation and open water in light of declines, including response to wetland management.

2. Breeding- Determine relationships between habitat factors (both site- and landscape-level) and breeding site occupancy and demographic rates.

3. Breeding- For currently and formerly occupied marshes, conduct a retrospective analysis of changes in overall percentages and amount of interspersion of emergent vegetation and open water, to inform selection of target values for these parameters to be achieved through habitat management activities.

SURVEY NEEDS

1. Breeding- Continue PGC marshbird surveys annually and expand efforts to smaller wetlands when possible, especially those with history of this species, or that are newly created.

2. Breeding- Use PA eBird as an efficient way to gather information on sora distribution, breeding locales, migratory stopover sites, and timing of migration.

3. Improve methods to track hunter participation and harvest during the migratory period (e.g., human dimensions surveys, in collaboration with USFWS Harvest Information Program.

MONITORING PROGRAMS

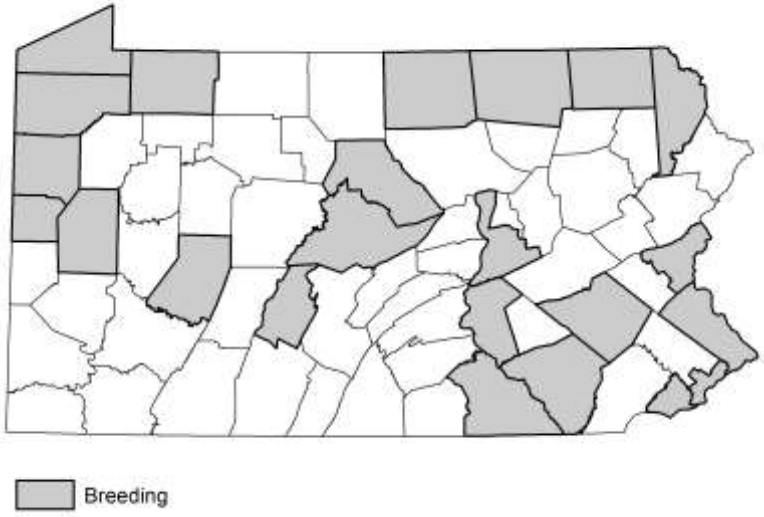
Program Name	Lead Agency	Hyperlink	Description
Audubon PA Important Bird Area Surveys	Audubon Pennsylvania		Marsh bird surveys at Important Bird Areas designated due to their importance to wetland birds. Standardized marshbird protocols as described in PGC Marsh Bird Surveys and volunteer surveys.
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals
Pennsylvania Game Commission Marsh Bird Surveys	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt/community/birding_and_bird_conservation/21066/marsh_bird_survey?qid=81806114&rank=4	During breeding seasons, PGC staff, partners, and volunteers conduct standardized audio playback surveys for secretive marsh birds across the state including: pied-billed grebe, American bittern, least bittern, black rail, king rail, Virginia rail, sora, common moorhen, and American coot. Protocol adapted from North American Marsh Bird Monitoring Protocols (Conway 2011) and is very similar to that used in the 2nd Pennsylvania Breeding Bird Atlas. Survey results inform management of these wetlands.
USFWS Harvest Information Program	U.S. Fish & Wildlife Service	http://www.fws.gov/hip/	Annual survey of migratory game bird license purchasers that provides hunter participation and harvest data for waterfowl and webless migratory game birds.

Common Gallinule

Gallinula galeata

Lisa M. Williams
Pennsylvania Game Commission

Photo: Jim Rathert



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S2B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Reliable detection of nesting birds at minimally three nest sites, as indicated in the Second Atlas of Breeding Birds (Wilson et al. 2012), through 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Lakes**	**Emergent Marsh**
Habitat	**Eutrophic, High Alkalinity Lake**	**Laurentian-Acadian Freshwater Marsh**

Specific Habitat Requirements:

Large shallow-intermediate depth wetlands with a 1:1 ration of open water and emergent vegetation and vegetated fringes.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Invasive species in breeding sites provide inferior food and cover and may choke out open water areas necessary for breeding.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Actively manage invasive plants that threaten large marsh mosaics of open water and emergent vegetation in large publicly-owned marshes in Crawford, Mercer, Lawrence and Tioga counties. Elimination of invasives is not likely, but a mosaic of vegetation and open water must be restored to sustain suitability of breeding locations.	Investigate and implement best management practices to maintain emergent/open water mosaics.	# acres restored; # suitable acres maintained	Annually monitor breeding marsh birds via (PA modified) North American Marsh Bird Monitoring Protocol. Use Large Wetland species playback. Record vegetation condition. Conduct survey annually during Early (May15-June15) and Late (June 16 - July 15) seasons. 10 year duration.	1

Action Location: Physiographic Province: Appalachian Plateaus, Atlantic Coastal Plains; HUC8 Watershed: Lwr Delaware

Associated Species: King Rail, Virginia Rail, American Coot, Sora, Least Bittern, American Bittern, multiple waterfowl

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Reproduction would be impacted by severe spring precipitation events as well as spring or summer droughts.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 5.0 Facilities and Areas Active management and planning on publicly owned wetlands in Crawford, Lawrence, Mercer, Tioga, Bucks, and Philadelphia counties for adaptive management of marshes and associated uplands. Maintenance of mosaic of shallow (<50 cm) wetlands with open/emergent portions.	Adaptable approach to water level management so open water mosaics can be sustained in periods of high or low precipitation. Includes replacement and upgrade of water control devices suitable for handling predicted precipitation changes.	# sites with adaptive management plans in place; # water control devices upgraded	Monitor progress in development and implementation of Adaptation Plans at high-priority sites. Monitor installation of water control devices.	1

Action Location: Physiographic Province: Appalachian Plateaus, Atlantic Coastal Plains; HUC8 Watershed: Lwr Delaware

Associated Species: King Rail, Virginia Rail, American Coot, Sora, Least Bittern, American Bittern, multiple waterfowl

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Conversion of emergent wetlands to open water wetlands; draining of minor emergent wetlands; alteration and/or development of surrounding uplands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 5.0 Facilities and Areas Prioritize invasive species control, water level management, and management of recreational disturbance in suitable sites. Pursue management agreements on large, privately-owned marshes.	Identify best management practices on public sites. Inventory private parcels which may support breeding pairs.	# best management practices developed; # landowners approached; # agreements reached.	Annually monitor breeding marsh birds via (PA modified) North American Marsh Bird Monitoring Protocol. Use Large Wetland species playback. Record vegetation condition. Conduct survey annually during Early (May15-June15) and Late (June 16 - July 15) seasons. 10 year duration.	2

Action Location: Physiographic Province: Appalachian Plateaus, Atlantic Coastal Plains; HUC8 Watershed: Lwr Delaware

Associated Species: King Rail, Virginia Rail, American Coot, Sora, Least Bittern, American Bittern, multiple waterfowl

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Bioaccumulation of toxins from pollution sources including agricultural runoff, industrial and municipal waste.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Enforcement of local, state and regional waste water treatment regulations. Strengthening of nonpoint source pollution regulations and technical assistance in areas draining into high priority sites.	Sustain wetland quality through wastewater treatment operations in municipalities where water feeds into high priority breeding sites (Crawford, Lawrence, Erie, Tioga, Bucks counties). Strengthen nonpoint source pollution regulations and technical assistance.	# facilities meeting standards; # nonpoint source improvements	Monitor pollutant levels with known toxic effects on waterfowl at priority sites. Monitor annually.	3

Action Location: Physiographic Province: Appalachian Plateaus, Atlantic Coastal Plains; HUC8 Watershed: Lwr Delaware

Associated Species: King Rail, Virginia Rail, American Coot, Sora, Least Bittern, American Bittern, multiple waterfowl

RESEARCH NEEDS

1. Breeding- Continued research into Best Management Practices for maintaining mosaic of emergent vegetation and open water in light of invasive species issues.

2. Breeding- Determine relationships between habitat factors (both site- and landscape-level) and breeding site occupancy and demographic rates.

3. Breeding- For currently and formerly occupied marshes, conduct a retrospective analysis of changes in overall percentages and amount of interspersion of emergent vegetation and open water, to inform selection of target values for these parameters to be achieved through habitat management activities.

SURVEY NEEDS

1. Breeding- Continue PGC marshbird surveys annually and expand efforts to smaller wetlands when possible, especially those with history of this species, or that are newly created (e.g., Great Lakes Marsh Monitoring Survey, Bird Studies Canada).

2. Breeding- Use PA eBird as an efficient way to gather information on common gallinule distribution, breeding locales, migratory stopover sites, and timing of migration.

3. Improve methods to track hunter participation and harvest during the migratory period (e.g., human dimensions surveys, in collaboration with USFWS Harvest Information Program.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
Audubon PA Important Bird Area Surveys	Audubon Pennsylvania		Marsh bird surveys at Important Bird Areas designated due to their importance to wetland birds. Standardized marshbird protocols as described in PGC Marsh Bird Surveys and volunteer surveys.
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals

MONITORING PROGRAMS

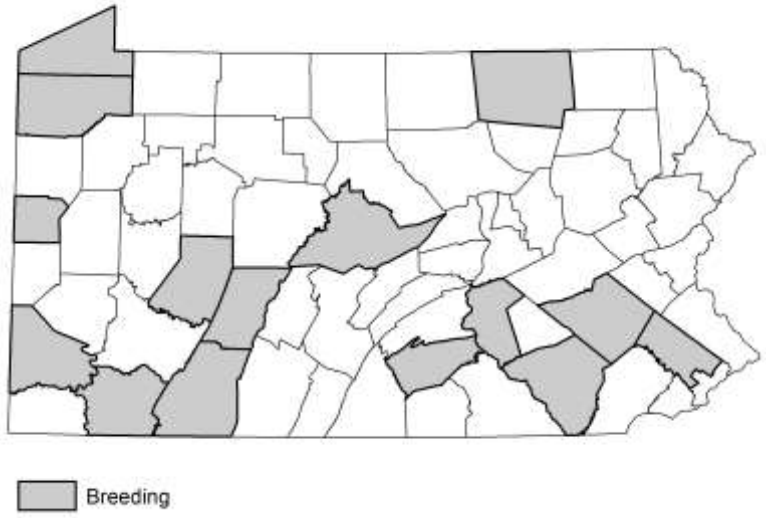
Program Name	Lead Agency	Hyperlink	Description
Pennsylvania Game Commission Marsh Bird Surveys	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt/community/birding_and_bird_conservation/21066/marsh_bird_survey?qid=81806114&rank=4	During breeding seasons, PGC staff, partners, and volunteers conduct standardized audio playback surveys for secretive marsh birds across the state including: pied-billed grebe, American bittern, least bittern, black rail, king rail, Virginia rail, sora, common moorhen, and American coot. Protocol adapted from North American Marsh Bird Monitoring Protocols (Conway 2011) and is very similar to that used in the 2nd Pennsylvania Breeding Bird Atlas. Survey results inform management of these wetlands.
USFWS Harvest Information Program	U.S. Fish & Wildlife Service	http://www.fws.gov/hip/	Annual survey of migratory game bird license purchasers that provides hunter participation and harvest data for waterfowl and webless migratory game birds.

American Coot

Fulica americana

Lisa M. Williams
Pennsylvania Game Commission

Photo: Joe Kosack



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S2B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Maintain stable to increasing population levels in PA through 2025 via active management and protection of breeding habitat.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Wet Meadow / Shrub Marsh**	**Emergent Marsh**
Habitat	**Laurentian-Acadian Wet Meadow-Shrub Swamp**	**Laurentian-Acadian Freshwater Marsh**

Specific Habitat Requirements:

Large shallow-intermediate depth wetlands with a mosaic of open water and floating vegetation and vegetated fringes.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Conversion of emergent wetlands to open water wetlands; draining of minor emergent wetlands; alteration and/or development of surrounding uplands

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Approach all adjoining landowner(s) to discuss water/lake management agreements that are compatible with planned use of surrounding uplands.	# landowners approached; # agreements reached	Annually monitor breeding marsh birds via (PA modified) North American Marsh Bird Monitoring Protocol. Use Large Wetland species playback. Record vegetation condition. Conduct survey annually during Early (May15-June15) and Late (June 16 - July 15) seasons. 10 year duration.	1
Long term protection and wetland management agreement(s) should be secured for the sole Eastern PA site (Berks county) that has been regularly documented as a breeding location.					

Action Location: Physiographic Province: Piedmont

Associated Species: King Rail, Virginia Rail, Common Gallinule, Sora, Least Bittern, American Bittern, multiple waterfowl

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Invasive species in breeding sites provide inferior food and cover and may choke out open water areas necessary for breeding.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Actively manage invasive plants that threaten large marsh mosaics of open water and emergent vegetation in large publicly-owned marshes in Crawford, Mercer and Lawrence counties. Elimination of invasives is not likely, but a mosaic of vegetation and open water must be restored to sustain suitability of breeding locations.	Investigate and implement best management practices to maintain emergent/open water mosaics.	# acres restored; # suitable acres maintained	Annually monitor breeding marsh birds via (PA modified) North American Marsh Bird Monitoring Protocol. Use Large Wetland species playback. Record vegetation condition. Conduct survey annually during Early (May15-June15) and Late (June 16 - July 15) seasons. 10 year duration.	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: King Rail, Virginia Rail, Common Gallinule, Sora, Least Bittern, American Bittern, multiple waterfowl

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Reproduction would be impacted by severe spring precipitation events; spring or summer droughts; possible expansion of AVM (avian vacuolar myelinopathy) risk due to proliferation of cyanobacteria in warmer wetlands in summer/fall.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 5.0 Facilities and Areas Active management and planning on publicly owned wetlands in Crawford, Lawrence and Mercer counties for adaptive management of marshes and associated uplands. Prompt investigation of coot mortality events to determine causative agent.	Adaptable approach to water level management so open water mosaics can be sustained in periods of high or low precipitation. Includes replacement and upgrade of water control devices suitable for handling predicted precipitation changes.	# sites with adaptive management plans in place; # water control devices upgraded	Monitor progress in development and implementation of Adaptation Plans at high-priority sites. Monitor installation of water control devices.	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: King Rail, Virginia Rail, Common Gallinule, Sora, Least Bittern, American Bittern, multiple waterfowl

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Bioaccumulation of toxins from agricultural runoff, industrial, and municipal waste.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Sustain wetland quality through wastewater treatment operations in municipalities where water feeds into high priority breeding sites (Crawford, Lawrence, Berks counties). Strengthen nonpoint source pollution regulations and technical assistance.	Number of facilities meeting standards; number of nonpoint source improvements	Monitor pollutant levels with known toxic effects on waterfowl at priority sites. Monitor annually.	3
Enforcement of local, state and regional waste water treatment regulations. Strengthening of nonpoint source pollution regulations and technical assistance in areas draining into high priority sites.					

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont

Associated Species: King Rail, Virginia Rail, Common Gallinule, Sora, Least Bittern, American Bittern, multiple waterfowl

RESEARCH NEEDS

1. Breeding- Continued research into Best Management Practices for maintaining mosaic of emergent vegetation and open water in light of invasive species issues.

2. Breeding- Determine relationships between habitat factors (both site- and landscape-level) and breeding site occupancy and demographic rates.

3. Breeding- For currently and formerly occupied marshes, conduct a retrospective analysis of changes in overall percentages and amount of interspersion of emergent vegetation and open water, to inform selection of target values for these parameters to be achieved through habitat management activities.

SURVEY NEEDS

1. Breeding- Continue PGC marshbird surveys annually and expand efforts to smaller wetlands when possible, especially those with history of this species, or that are newly created (e.g., Great Lakes Marsh Monitoring Survey, Bird Studies Canada).

2. Breeding- Use PA eBird as an efficient way to gather information on coot distribution, breeding locales, migratory stopover sites, and timing of migration.

3. Improve methods to track hunter participation and harvest during the migratory period (e.g., human dimensions surveys, in collaboration with USFWS Harvest Information Program.

MONITORING PROGRAMS

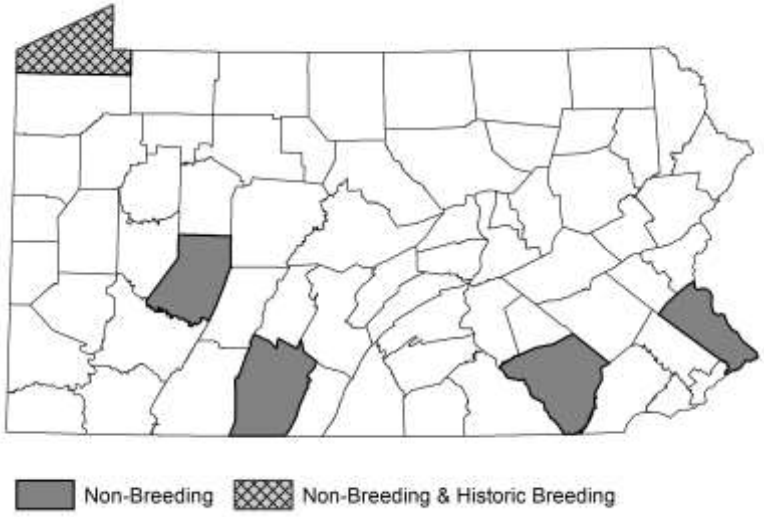
Program Name	Lead Agency	Hyperlink	Description
Audubon PA Important Bird Area Surveys	Audubon Pennsylvania		Marsh bird surveys at Important Bird Areas designated due to their importance to wetland birds. Standardized marshbird protocols as described in PGC Marsh Bird Surveys and volunteer surveys.
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals
Pennsylvania Game Commission Marsh Bird Surveys	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt/community/birding_and_bird_conservation/21066/marsh_bird_survey?qid=81806114&rank=4	During breeding seasons, PGC staff, partners, and volunteers conduct standardized audio playback surveys for secretive marsh birds across the state including: pied-billed grebe, American bittern, least bittern, black rail, king rail, Virginia rail, sora, common moorhen, and American coot. Protocol adapted from North American Marsh Bird Monitoring Protocols (Conway 2011) and is very similar to that used in the 2nd Pennsylvania Breeding Bird Atlas. Survey results inform management of these wetlands.
USFWS Harvest Information Program	U.S. Fish & Wildlife Service	http://www.fws.gov/hip/	Annual survey of migratory game bird license purchasers that provides hunter participation and harvest data for waterfowl and webless migratory game birds.

Piping Plover (Great Lakes population)

Charadrius melodus

Catherine D. Haffner
Pennsylvania Game Commission

Photo: Alice Van Zoeren



CONSERVATION PROFILE

Global Rank	**G3**	State Rank	**SXB, DDN (M)**
IUCN Red List	**NT Near Threatened**	PA Legal Status	**Protected (extirpated)**
Northeast Region	**Very High Concern / High Responsibility**	PA Abundance	**Unknown**
Federal Status	**Endangered(B), Threatened(M)**	PA Short-Term Trend (10 year)	**(B, M) Unknown**

Conservation Goal:

Successful fledging of a single chick from at least one nest by 2025. Also, maintain (n=5) or increase regular migratory stopovers.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(B,M) Coastal Grassland & Shrubland**	
Habitat	**(B,M) Great Lakes Dune and Swale**	

Specific Habitat Requirements:

(B) Great Lakes beaches (see USFWS 2003). Presque Isle State Park, Erie Co. is an historic nesting beach and remains the only location with suitable habitat for nesting Piping Plovers (McWilliams and Brauning 2000, Price 2002, Haffner 2007).
(M) Great Lakes beaches and inland riverine and lacustrine mud flats. Gull Point, Erie Co. is the primary location for migrants, however they have also been observed along the lower Susquehanna Rivers (e.g., Conejohela Flats, Lancaster Co.) (McWilliams and Brauning 2000).

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Breeding

Specific Threat: Disturbance from human recreational activities

Action	Objective	Measure	Monitoring	Priority
TRACS Action 7.0 Law enforcement Conduct a pre-season and post-season conference call with the PA Piping Plover Recovery Team (PGC, PA DCNR, USFWS, USACOE, Audubon PA, WPC, Presque Isle Audubon) to review educational signage needs and strategies for addressing violations within the USFWS designated critical habitat area, with special attention to the Gull Point Natural Area.	Reduce the number of trespassers in the Gull Point Natural Area (April - November) by 2025.	Number of warnings/violations	Each year during the restricted use timeframe, record the number of personal interactions/warnings/violation sin the Gull Point Natural Area.	1

Action Location: Physiographic Province: Central Lowland

Associated Species: Common Tern, Spotted Sandpiper, all shorebirds

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Loss/alteration of palustrine sand plain/dune habitat by invasive giant reed, purple loosestrife, and native trees.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Implement the 10-year adaptive management plan (WPC and Audubon PA 2012) to continue 2012-13 restoration activities in the Gull Point Natural Area. This plan includes inventory and management actions to prevent recolonization of Phragmites, and other species treated during the restoration effort	Annually evaluate and spot-treat 33 acres within the Gull Point Natural Area to continue control of non-native invasive and aggressive native species and maintain suitable habitat for piping plovers and other beach-nesting birds in the short-term, while promoting natural occurring, native plant species of the Palustrine Sand Plain, Dry Sand Plain, and Dune communities common to the area over the next 10 years.	Frequency of occurrence of invasive plant species as measured along vegetation transects.	Plants: Survey for rare plants within the 30 acre Gull Point Natural Area using a meander approach and along established transects to assess extent of all plant communities. Birds: Conduct daily shorebird monitoring April through June within the Gull Point Natural Area.	1

Action Location: Physiographic Province: Central Lowland

Associated Species: Red Knot, Common Tern, Spotted Sandpiper, all shorebirds, and obligate palustrine sand plain plant communities

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Migration

Specific Threat: Collisions with offshore wind turbines in Lake Erie and potential degradation of onshore habitat.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Review all proposed wind energy development projects within Pennsylvania borders of Lake Erie to avoid, minimize and mitigate impacts. Implement best practices to the fullest extent practicable.	Minimize direct mortality and habitat loss to turbine development in Lake Erie.	Number of wind project review letters containing recommendations to avoid and minimize impacts to piping plover.	No net reduction in shorebirds numbers over a 10 year period following coastal or offshore wind development.	2

Action Location: Physiographic Province: Central Lowland

Associated Species: Red Knot, Common Tern, all shorebirds, migratory tree bats

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Migration

Specific Threat: Disturbance from human recreational activities

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach Educate beach users through presentations, brochures, and casual conversation of the importance of Presque Isle State Park as a migratory stopover site for shorebirds.	Reduce the number of trespassers in the Gull Point Natural Area (April - November) by 2025.	Number of warnings/violations	Each year during the restricted use timeframe, record the number of personal interactions/warnings/violation sin the Gull Point Natural Area.	2

Action Location: Physiographic Province: Central Lowland

Associated Species: Common Tern, Spotted Sandpiper, all shorebirds

RESEARCH NEEDS

1. Breeding- Shorebird community response to non-native and native invasive vegetation management in the Gull Point Natural Area.

1. Migration- Shorebird community response to non-native and native invasive vegetation management in the Gull Point Natural Area.

2. Breeding- Invertebrate abundance and biomass along the Presque Isle peninsula, specifically, Gull Point. See Nordstrom 1996.

3. Breeding- Assessment of avian and/or mammalian predator abundance, distribution, and space use on the Presque Isle peninsula.

SURVEY NEEDS

1. Breeding- Enlist volunteers and professionals to survey the designated critical habitat area at Presque Isle State Park at least twice per week, April through July.

1. Migration- Enlist volunteers and professionals to survey the designated critical habitat area at Presque Isle State Park at least twice per week, August through September.

2. Breeding- Use eBird to encourage observations of piping plover and other beach species.

2. Migration- Use eBird to encourage observations of piping plover and other beach species.

3. Migration- International Shorebird Survey continued and expanded to more locations where shorebirds regularly stop.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
Great Lakes Piping Plover Recovery Effort	U.S. Fish & Wildlife Service; University of Minnesota	https://glpipl.wordpress.com/	Updates on the status of the Great Lakes Piping Plover population
International Shorebird Survey	Manomet Center for Conservation Sciences	https://www.manomet.org/program/shorebird-recovery/international-shorebird-survey-iss	A volunteer-based international shorebird survey conducted in spring and fall at focal sites to detect trends in migrant shorebirds

MONITORING PROGRAMS

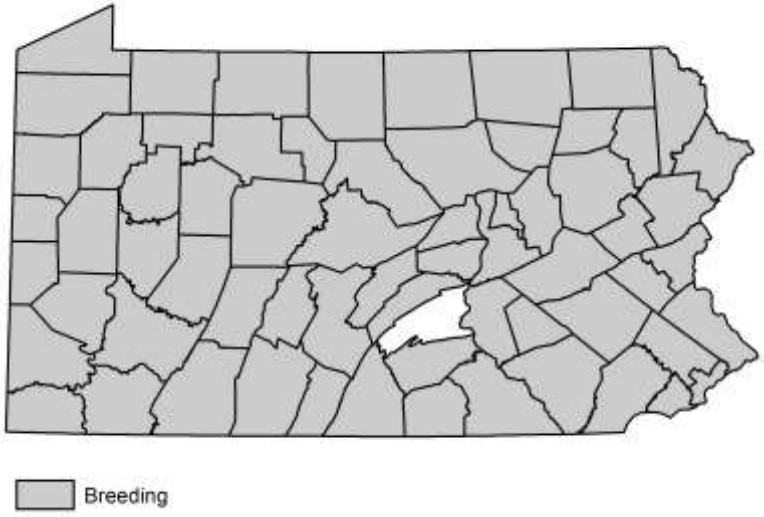
Program Name	Lead Agency	Hyperlink	Description
Presque Isle Piping Plover Recovery Team	Audubon PA		Shorebird monitoring from April through July, following a protocol established through consultation between the Army Corps of Engineers and the U.S. Fish and Wildlife Service.

Spotted Sandpiper

Actitis macularius

Catherine D. Haffner
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Recover nest-site detections to at least 500 Breeding Bird Atlas blocks by 2025, as measured by the Breeding Bird Atlas (Wilson et al. 2012).

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Lakes**	**Lakes**
Habitat	**Eutrophic, Medium Alkalinity Lake**	**Hypereutrophic, High Alkalinity Lake**

Specific Habitat Requirements:

Nests are always associated with water (river, lake, wetland, gravel pit, farm pond, etc.), typically within 100 m of water's edge, but up to 300 m. Shoreline is used for foraging, semi-open nesting habitat with patches of dense vegetation assists brood protection (Reed et al. 2013).

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Heavy metal contamination in major waterways impacts reproductive capacity and suppresses macroinvertebrate prey communities.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Install treatment systems to reduce heavy metal pollution to waterways. Action Location: HUC4 Watershed: Statewide Associated Species: Aquatic macroinvertebrates, river otter, obligate riparian songbirds	Remediate stream degradation from acid mine drainage and other point-source pollutants.	Documented nesting along major waterways by 2025.	Survey for nesting Spotted Sandpipers along degraded rivers segments.	1

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Water level fluctuation due to erratic weather patterns.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Identify and evaluate the condition of lacustrine nesting sites. Action Location: Physiographic Province: Statewide	Develop and implement habitat management plans to secure inland nesting sites in light of changing climatic conditions.	Number of management plans that include Spotted Sandpiper	Persistence of Spotted Sandpipers at known inland nesting sites for multiple years.	2

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Breeding

Specific Threat: Recreational activities (e.g., boating, fishing) along major river drainages and lakes.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach Educate boaters about how to minimize disturbance to nesting shorebirds.	Increase awareness of boaters about ways to minimize disturbance to shorebirds.	Number of citizens reached.	Survey for nesting Spotted Sandpipers in high human disturbance areas.	3

Action Location: HUC4 Watershed: Delaware-Mid Atlantic Coastal, Susquehanna

Associated Species: Killdeer

RESEARCH NEEDS

1. Breeding- Is the decline in breeding Spotted Sandpipers an artifact of sampling effort or indicative of direct or indirect threats to the breeding populations?

2. Breeding- Is this an appropriate species to monitor for stream quality and response to energy extraction threats?

SURVEY NEEDS

1. Breeding- Establish survey routes along major drainages and request local birding organizations to adopt these routes.

2. Breeding- Important Bird Area monitoring including surveys that capture riparian species in point counts.

3. Breeding- Use eBird to encourage observation of this and other riparian habitat species.

MONITORING PROGRAMS

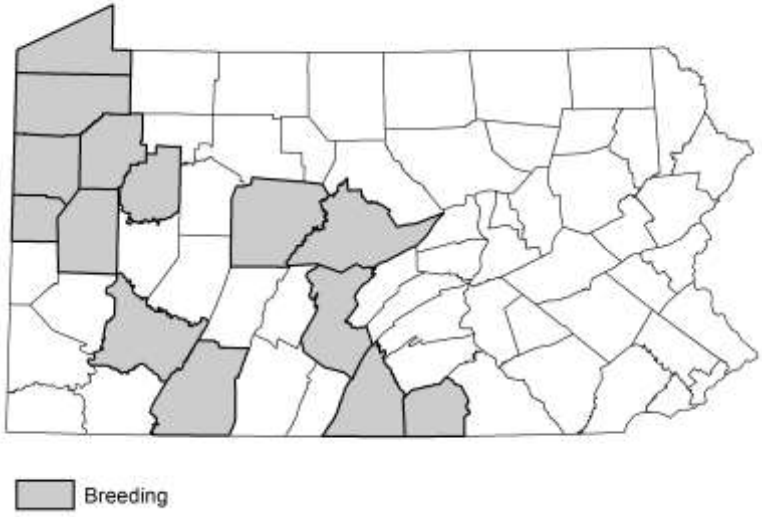
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals

Upland Sandpiper

Bartramia longicauda

Andy Wilson
Gettysburg College

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S2B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Endangered**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Maintain breeding population of at least 20 pairs in suitable sites statewide annually through 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Agricultural**	**Ruderal Shrubland & Grassland**
Habitat	**Agriculture (NLCD 81-82)**	**Shrubland & grassland (NLCD 52/71)**

Specific Habitat Requirements:

Large tracts of contiguous grassland with mosaics of tall (15-35 cm) stands of grass for nesting and short stands (< 15 cm), often in weed rich pasture, for foraging.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 2.0 Agriculture and Aquaculture

Season: Breeding

Specific Threat: Loss of nests to trampling by livestock or loss of young to mowing operations. Reduced suitability of cattle pastures due to spring grazing (e.g. Bowen and Kruse 1993). Conversely, lack of lightly grazed cattle pastures could be detrimental.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Ensure that grassland heterogeneity is maintained (Houston and Bowen 2001)	Maintenance of extant populations	Spring (late May) counts of adult birds	1

Maintain lightly grazed pasture in close proximity to undisturbed grassland (Dechant et al. 1999).

Action Location: Physiographic Province: Appalachian Plateaus

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Vegetative succession of surface mines reclaimed to grassland.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Ensure that extensive habitat patches, sufficient to support >1 breeding pair, are available	Maintenance of extant populations	Spring (late May) counts of adult birds	1

Manage large (>100ha) reclaimed surface mines specifically for grassland biodiversity

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Northern Harrier, Short-eared Owl, American Kestrel, Vesper Sparrow, Savannah Sparrow, Henslow's Sparrow, Grasshopper Sparrow, Bobolink, Eastern Meadowlark

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Successional change of grassland habitats

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Prevent natural succession from encroaching important grassland sites	Maintenance of extant populations	Spring (late May) counts of adult birds	1

Mowing, burning and removing invasive woody vegetation

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Northern Harrier, Short-eared Owl, American Kestrel, Vesper Sparrow, Savannah Sparrow, Henslow's Sparrow, Grasshopper Sparrow, Bobolink, Eastern Meadowlark

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Habitat loss from residential development.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Prevent loss of habitat in areas close to extant populations	Maintenance of extant populations	Spring (late May) counts of adult birds	3

Purchase land that may otherwise be sold for development

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Northern Harrier, American Kestrel, Vesper Sparrow, Savannah Sparrow, Henslow's Sparrow, Grasshopper Sparrow, Bobolink, Eastern Meadowlark

RESEARCH NEEDS

1. Breeding- Are Pennsylvanian populations self-sustaining, or do they rely on immigration / rescue effect?

2. Breeding- Can Upland Sandpipers be lured back to apparently well-managed habitats using nocturnal call broadcasting?

3. Breeding- How can grassland habitats be managed to better support Upland Sandpipers in PA?

SURVEY NEEDS

1. Breeding- Conduct a statewide survey. Sampling based on known recent locations and randomly selected quadrats of high habitat suitability. Survey could include volunteers and students.

2. Breeding- Monitoring of nesting success wherever there are breeding Upland Sandpipers.

3. Breeding- Use eBird to encourage volunteer to report any Upland Sandpiper observations and discover newly colonized sites including IBAs.

MONITORING PROGRAMS

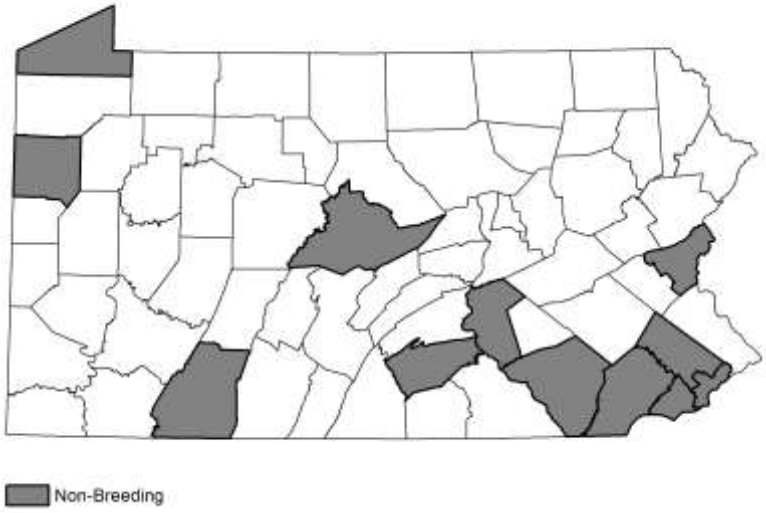
Program Name	Lead Agency	Hyperlink	Description
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals
Upland Sandpiper Breeding Surveys	Pennsylvania Game Commission with Gettysburg College		Search areas with recent UPSA activity using a visual search augmented by an audio playback in likely habitat.

Red Knot

Calidris canutus rufa

Catherine D. Haffner
Pennsylvania Game Commission

Photo: Greg Breese



CONSERVATION PROFILE

Global Rank	**G4**	State Rank	**S2N (M)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / High Responsibility**	PA Abundance	**Unknown**
Federal Status	**Threatened**	PA Short-Term Trend (10 year)	**(M) Unknown**

Conservation Goal:

Maintain protected shorebird habitat at Gull Point, Pesque Isle State Park.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Lakes**	**Lakes**
Habitat	**Oligotrophic, High Alkalinity Lake**	**Hypereutrophic, High Alkalinity Lake**

Specific Habitat Requirements:

Great Lakes beaches and inland riverine and lacustrine mud flats (often reservoirs). Most sightings in Pennsylvania are from Gull Point, Erie Co., and Conejohela Flats, Lancaster Co. (McWilliams and Brauning 2000).

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Migration

Specific Threat: Loss/alteration of palustrine sand plain/dune habitat by invasive giant reed, purple loosestrife, and native trees.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Implement the 10-year adaptive management plan (WPC and Audubon PA 2012) to continue 2012-13 restoration activities in the Gull Point Natural Area. This plan includes inventory and management actions to prevent recolonization of Phragmites, and other species treated during the restoration effort.	Direct Management of Natural Resources	Annually evaluate and spot-treat 33 acres within the Gull Point Natural Area to continue control of non-native invasive and aggressive native species and maintain suitable habitat for migrant Red Knots and other migrant shorebirds in the short-term, while promoting natural occurring, native plant species of the Palustrine Sand Plain, Dry Sand Plain, and Dune communities common to the area over the next 10 years.	Frequency of occurrence of invasive plant species as measured along vegetation transects.	Plants: Survey for rare plants within the 30 acre Gull Point Natural Area using a meander approach and along established transects to assess extent of all plant communities. Birds: Conduct the International Shorebird Survey following specified protocols and encourage color-band reporting through bandedbirds.org.	1

Action Location: Physiographic Province: Central Lowland

Associated Species: Piping Plover, Common Tern, Spotted Sandpiper, all shorebirds, and obligate palustrine sand plain plant communities

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Migration

Specific Threat: Changing climate conditions favoring invasive plant species.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Implement the 10-year adaptive management plan (WPC and Audubon PA 2012) to continue 2012-13 restoration activities in the Gull Point Natural Area. This plan includes inventory and management actions to prevent recolonization of Phragmites, and other species treated during the restoration effort.	Annually evaluate and spot-treat 33 acres within the Gull Point Natural Area to continue control of non-native invasive and aggressive native species and maintain suitable habitat for migrant Red Knots and other migrant shorebirds in the short-term, while promoting natural occurring, native plant species of the Palustrine Sand Plain, Dry Sand Plain, and Dune communities common to the area over the next 10 years.	Frequency of occurrence of invasive plant species as measured along vegetation transects.	Plants: Survey for rare plants within the 30 acre Gull Point Natural Area using a meander approach and along established transects to assess extent of all plant communities. Birds: Conduct the International Shorebird Survey following specified protocols and encourage color-band reporting through bandedbirds.org.	1

Action Location: Physiographic Province: Central Lowland

Associated Species: Piping Plover, Common Tern, Spotted Sandpiper, all shorebirds, and obligate palustrine sand plain plant communities

IUCN Threat: 3.0 Energy Production and Mining

Season: Migration

Specific Threat: Collisions with offshore wind turbines in Lake Erie and potential degradation of onshore habitat.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Review all proposed wind energy development projects within Pennsylvania borders of Lake Erie to avoid, minimize and mitigate impacts. Implement best practices to the fullest extent practicable.	Minimize direct mortality and habitat loss to turbine development in Lake Erie.	Number of wind project review letters containing recommendations to avoid and minimize impacts to Red Knot.	No net reduction in shorebird numbers over a 10 year period following coastal or offshore wind development.	2

Action Location: Physiographic Province: Central Lowland

Associated Species: Piping Plover, Common Tern, all shorebirds, migratory tree bats

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Migration

Specific Threat: Loss of habitat to energy development infrastructure.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Review all proposed wind energy development projects within Pennsylvania borders of Lake Erie to avoid, minimize and mitigate impacts. Implement best practices to the fullest extent practicable.	Minimize habitat loss to wind and other energy infrastructure.	Number of wind project review letters containing recommendations to avoid and minimize impacts to Red Knot.	No net reduction in shorebird numbers over a 10 year period following coastal or offshore wind development.	2

Action Location: Physiographic Province: Central Lowland

Associated Species: Piping Plover, Common Tern, all shorebirds, migratory tree bats

IUCN Threat: 9.0 Pollution

Season: Migration

Specific Threat: Point, nonpoint and atmospheric pollution into Lake Erie such as human waste and toxic metals, fertilizers and soil runoff, and mercury and polychlorinated biphenyls (PCBs) from burning of fossil fuels.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 7.0 Law enforcement Enforce state regulations regarding point and nonpoint source pollution, including compliance with NPDES permit requirements.	Reduce point and nonpoint source pollutants to waterways, particularly Lake Erie.	No net reduction in Red Knot numbers over a 10 year period.	International Shorebird Survey Statistics	2

Action Location: Physiographic Province: Central Lowland
HUC8 Watershed: Lwr Susquehanna

Associated Species: Aquatic and riparian species

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Migration

Specific Threat: Loss of habitat to development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Revise municipal planning codes to avoid and minimize impacts to migrant shorebirds and their habitats.	Integrate fish and wildlife conservation needs into municipal planning code.	Number of revisions to municipal planning code benefitting wildlife.	No net reduction in shorebird numbers.	3

Action Location: Physiographic Province: Central Lowland

RESEARCH NEEDS

1. Migration- Shorebird community response to non-native and native invasive vegetation management in the Gull Point Natural Area.

2. Migration- Where are other stopover locations in PA?

3. Migration- How does PA fit into Red Knot migration pattern, especially as coastal sites are lost to climate change, storms, and development?

SURVEY NEEDS

1. Migration- International Shorebird Survey continued and expanded to more locations where shorebirds regularly stop.

2. Migration- Monitoring of marked individuals through http://www.bandedbirds.org/index.html

3. Migration- Promote Red Knot observation reports through the PA eBird portal so the agency & partners can learn of stopover habitats.

MONITORING PROGRAMS

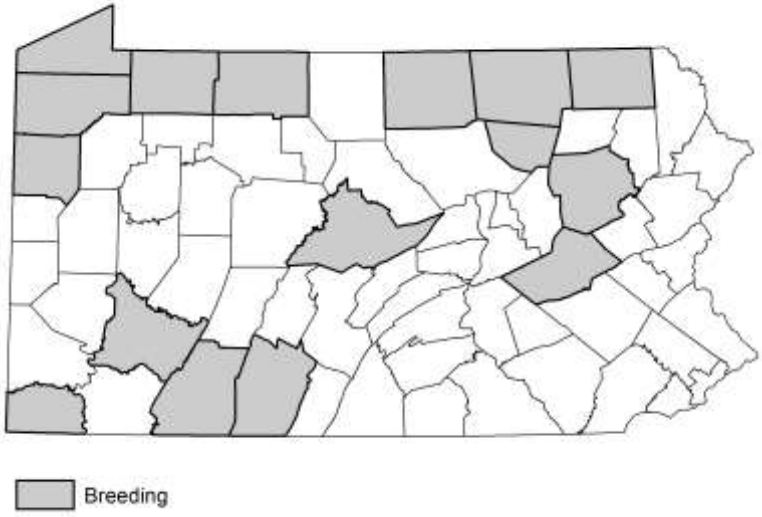
Program Name	Lead Agency	Hyperlink	Description
Bandedbirds.org	Multiple	http://www.bandedbirds.org	Web-accessible database for reporting and retrieving information on color-banded shorebirds along the Atlantic Flyway.
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
International Shorebird Survey	Manomet Center for Conservation Sciences	https://www.manomet.org/program/shorebird-recovery/international-shorebird-survey-iss	A volunteer-based international shorebird survey conducted in spring and fall at focal sites to detect trends in migrant shorebirds

Wilson's Snipe

Gallinago delicata

Lisa M. Williams
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**NE Not Evaluated**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Maintain stable to increasing population levels in PA through 2025 via active management and protection of breeding habitat.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Swamp**	**Emergent Marsh**
Habitat	**North-Central Appalachian Acidic Swamp**	**Laurentian-Acadian Freshwater Marsh**

Specific Habitat Requirements:

Wet meadows and poorly drained pastures where moderate grazing maintains the vegetation in a cropped condition.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Draining of minor emergent wetlands; alteration and/or development of surrounding uplands; reversion of lightly grazed pastures to shrublands (or human developments) as grazing operations are abandoned. Feral and domestic cats in habitats surrounding human development likely impact this ground nesting species. Invasive species are related concern.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection Long term protection and wetland management agreements should be secured for long-term, privately owned breeding locations.	Approach landowner(s) of regular breeding locations to discuss long term management agreements and best management practices for cropping/grazing.	# landowners approached; # agreements reached	Annually monitor breeding marsh birds via (PA modified) North American Marsh Bird Monitoring Protocol. Data from the breeding bird atlas efforts should be used to determine primary breeding areas in the state. Monitoring programs (at least three surveys per breeding season) should be established in five areas supporting substantial populations (e.g., >5 pairs). 5 year duration.	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: King Rail, Common Gallinule, Least Bittern, American Bittern, American Coot, multiple waterfowl

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Mining/quarrying and energy development may lead to loss of wet meadows and negatively impact adjoining wetlands.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Approach landowner(s) of regular breeding locations to discuss long term management agreements and best management practices for cropping/grazing.	# landowners approached; # agreements reached	Annually monitor breeding marsh bird via (PA modified) North American Marsh Bird Monitoring Protocol. Data from the breeding bird atlas efforts should be used to determine primary breeding areas in the state. Monitoring programs (at least three surveys per breeding season) should be established in five areas supporting substantial populations (e.g., >5 pairs). 5 year duration.	1
Enforcement of local, state and regional waste water treatment regulations. Strengthening of nonpoint source pollution regulations and technical assistance in areas draining into high priority sites. Landowner management agreements at priority sites. Wetland/farmland protection and prioritization.					

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: King Rail, Common Gallinule, Least Bittern, American Bittern, American Coot, multiple waterfowl

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Breeding

Specific Threat: Off road vehicles in wet meadows; domestic/feral dog and cat activity at breeding sites can impact reproductive success of this ground nesting species.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach Education regarding the impacts of off road recreation in wet, saturated meadows; Increased outreach regarding the impact of dogs and cats to ground nesting birds and the need to keep pets on leash or indoors during breeding season.	Develop and disseminate education programs at high priority breeding locations.	# programs developed; # public education events provided; # people reached	Pre- and post-testing of public event audiences. Human dimensions surveys on public's awareness of dog/cat impacts on ground nesting wildlife.	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: King Rail, Common Gallinule, Least Bittern, American Bittern, American Coot, multiple waterfowl

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Conversion of emergent wetlands to open water wetlands; draining of minor emergent wetlands; alteration and/or development of surrounding uplands

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Actively manage invasive plants that threaten habitat structure in all documented breeding locations. Elimination of invasives is not likely, but a mosaic of short vegetation and open water must be restored to sustain suitability of breeding locations.	To maintain habitat quality at known breeding habitats	# acres restored; # suitable acres maintained	Annually monitor breeding marsh bird via (PA modified) North American Marsh Bird Monitoring Protocol. Record vegetation condition. Conduct survey annually three times during the breeding season, 5 +year duration.	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Virginia Rail, Sora, Common Gallinule, Least Bittern, American Bittern, multiple waterfowl

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Reproduction would be impacted by severe spring precipitation events as well as spring or summer droughts, extreme changes in water levels.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 5.0 Facilities and Areas Active management and planning on publicly owned wetlands in Erie, Crawford, and Mercer counties, as well as northern tier counties. Goal is adaptive management of marshes and associated uplands to handle increases in rainfall and severe spring precipitation events.	Adaptable approach to water level management so wet grasslands and open water mosaics with grassland uplands can be sustained in periods of high or low precipitation. Includes replacement and upgrade of water control devices suitable for handling predicted precipitation changes.	# sites with adaptive management plans in place; # water control devices upgraded	Monitor progress in development and implementation of Adaptation Plans at high-priority sites. Monitor installation of water control devices.	1

Action Location: Physiographic Province: Appalachian Plateaus, Central Lowland

Associated Species: Virginia Rail, Sora, Common Gallinule, Least Bittern, American Bittern, American Coot, multiple waterfowl

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Bioaccumulation of toxins from pollution sources including agricultural runoff, industrial and municipal waste, possibly impacting reproductive success and/or juvenile survival.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Enforcement of local, state and regional waste water treatment regulations. Strengthening of nonpoint source pollution regulations and technical assistance in areas draining into high priority sites.	Sustain wetland quality through wastewater treatment operations in municipalities where water feeds into high priority breeding sites. Strengthen nonpoint source pollution regulations and technical assistance.	# facilities meeting standards; # nonpoint source improvements	Monitor pollutant levels with known toxic effects at priority sites. Monitor annually.	3

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Virginia Rail, Sora, Common Gallinule, Least Bittern, American Bittern, multiple waterfowl

RESEARCH NEEDS

1. Breeding- Continued research into Best Management Practices for maintaining mosaics of short grasslands within emergent marshes in light of invasive species issues.

2. Breeding- Determine relationships between habitat factors (both site- and landscape-level) and breeding site occupancy and demographic rates.

3. Breeding- Better determine the state's breeding population and distribution and identify important migratory stopover sites.

SURVEY NEEDS

1. Breeding- Continue PGC marshbird surveys annually and expand efforts to additional sites with suitable habitat for snipe.

2. Breeding- Use PA eBird as a time-effective way to gather information on snipe distribution, breeding locations including new sites, migratory stopover sites, and timing of migration; encourage searches on private lands with cooperative landowners.

MONITORING PROGRAMS

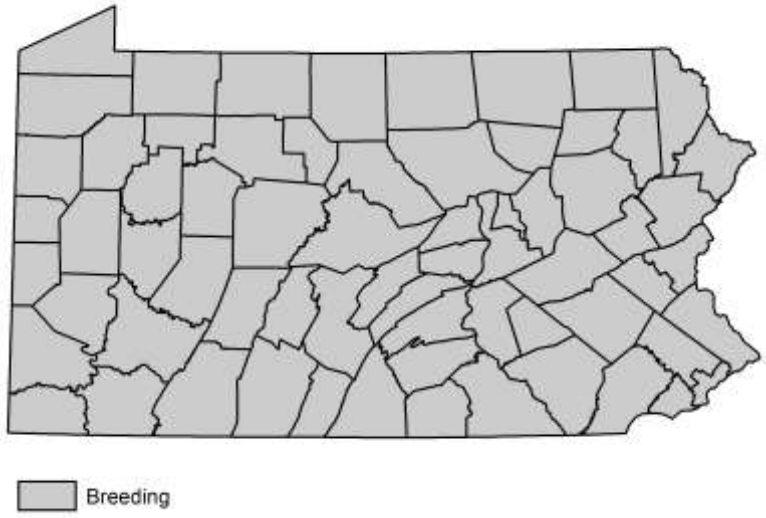
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals
USFWS Harvest Information Program	U.S. Fish & Wildlife Service	http://www.fws.gov/hip/	Annual survey of migratory game bird license purchasers that provides hunter participation and harvest data for waterfowl and webless migratory game birds.

American Woodcock

Scolopax minor

Lisa M. Williams
Pennsylvania Game Commission

Photo: Hal Korber



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively stable (<= 10% change)**

Conservation Goal:

Increase populations to 1980 levels as stated in Pennsylvania Woodcock Management Plan (Palmer 2008).

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Ruderal Shrubland & Grassland**	**Agricultural**
Habitat	**Shrubland & grassland (NLCD 52/71)**	**Agriculture (NLCD 81-82)**

Specific Habitat Requirements:

Habitat mosaics that include small, scattered openings and dense stands of shrubs and young trees on moist soils.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Residential and commercial development destroys, fragments, and simplifies habitats, and feral and domestic pets likely have negative impact.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach Education regarding the impacts of "hands-off" habitat management in early succession communities. Increased outreach regarding the impact of dogs and cats to ground nesting birds and the need to keep pets on leash or indoors during breeding season.	Develop and disseminate education programs.	# programs developed; # public education events provided; # people reached	Pre- and post-testing of public event audiences. Human dimensions surveys on public's awareness of dog/cat impacts on ground nesting wildlife and attitudes toward active forestry.	1

Action Location: Physiographic Province: Statewide

Associated Species: Blue-winged Warbler, Golden-winged Warbler, Prarie Warbler, Eastern Whip-poor-will, Appalachian cottontail, eastern box turtle, eastern fence lizard, wood turtle

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Prevention of shrub/sapling development in right-of-ways prevents nesting; mortality from tower strikes.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Allow rights-of-way to succeed to shrubs; create wide borders of young forest along edges of transportation corridors; utilize mitigation measures at energy towers to reduce collision mortality.	Incorporate habitat planning into energy development planning at suitable moist soil sites.	# plans developed; # operators contacted; # cooperative agreements	Project mapping and permitting that reflects habitat concerns.	1

Action Location: Physiographic Province: Statewide

Associated Species: Blue-winged Warbler, Golden-winged Warbler, Prarie Warbler, Eastern Whip-poor-will, Appalachian cottontail, eastern box turtle, eastern fence lizard, wood turtle

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Young forest acreage is below the 12-15% of forested acreage needed to maintain woodcock populations, and where private landowners are undertaking active forest management, it is often not appropriate for long term habitat quality.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Provide technical assistance, and (where necessary) funding to implement non-commercial treatments to increase proportion of young forest on the landscape.	By 2025, reverse trend of % young forest on the landscape from declining to increasing.	% young forest (seedling / sapling) forest cover as measured by USFS, DCNR, and PGC forest inventory programs	Monitor trends in proportion of young forest as measured by forest inventory programs conducted by U.S. Forest Service, PA Department of Conservation and Natural Resources, and Pennsylvania Game Commission. Monitor condition of young forests and moist thickets on public lands; monitor populations of woodcock in good habitats based upon hunter flush rates and targeted Singing Ground Surveys.	1

Action Location: Physiographic Province: Statewide

Associated Species: Blue-winged Warbler, Golden-winged Warbler, Prarie Warbler, Eastern Whip-poor-will, Appalachian cottontail, eastern box turtle, eastern fence lizard, wood turtle

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Invasive vegetation reduces availability of singing grounds and reduces quality of brood cover by hastening succession of old fields to dense thickets.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Investigate and implement best management practices to maintain high-quality young forest and old-field habitats.	# acres restored; # suitable acres maintained	Monitor condition of young forests and moist thickets on public lands; monitor populations of woodcock in good habitats based upon hunter flush rates and targeted singing ground surveys.	1
Actively manage invasive plants that threaten old field habitats and young forest regeneration and with a focus on those that limit timber harvest opportunities for landowners. Elimination of invasives is not likely, but a focus on prevention of new invasives may slow ingress into PA.					

Action Location: Physiographic Province: Statewide

Associated Species: Blue-winged Warbler, Golden-winged Warbler, Prarie Warbler, Eastern Whip-poor-will, Appalachian cottontail, eastern box turtle, eastern fence lizard, wood turtle

RESEARCH NEEDS

1. Breeding- Investigate impact of changing spring weather conditions on migratory chronology, peak display period, and juvenile production.

2. Breeding- Evaluate population response to habitat management prescriptions used to create, maintain or enhance breeding habitat.

SURVEY NEEDS

1. Breeding- Expand annual Singing Ground Surveys at targeted habitat management sites to determine population response to active habitat management.

2. Breeding- Use PA eBird as a time-effective way to gather information on woodcock distribution, breeding locations including new sites, migratory stopover sites, and timing of migration; encourage searches on private lands with cooperative landowners.

3. Breeding- Conduct USFWS Singing Ground Survey annually

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
PGC Game Take Survey	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt/document/1460119/11101-13z_pdf	Annual survey of license buyers that reveals WMU of hunt, effort, and harvest figures for a random sample of woodcock hunters.
Singing Ground Survey	U.S. Fish & Wildlife Service / Pennsylvania Game Commission	https://migbirdapps.fws.gov/mbdc/databases/awsgs/awsgsdb.asp?opt=1	Roadside surveys conducted annually to detect male courtship display as an index to population trends over time.
USFWS Harvest Information Program	U.S. Fish & Wildlife Service	http://www.fws.gov/hip/	Annual survey of migratory game bird license purchasers that provides hunter participation and harvest data for waterfowl and webless migratory game birds.
USFWS Parts Collection Survey	U.S. Fish & Wildlife Service	http://www.fws.gov/birds/surveys-and-data/harvest-surveys/parts-collection-surveys.php	Classification by age and sex of woodcock using wings submitted by successful hunters.
Woodcock Hunter Cooperator Survey	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt?open=514&objID=601998&mode=2	Cooperating hunters keep field diaries of hunting trips (county, # flushes, # bagged) annually as a way to monitor population trends in appropriate habitat.

Black Tern

Chlidonias niger

Daniel W. Brauning
Pennsylvania Game Commission

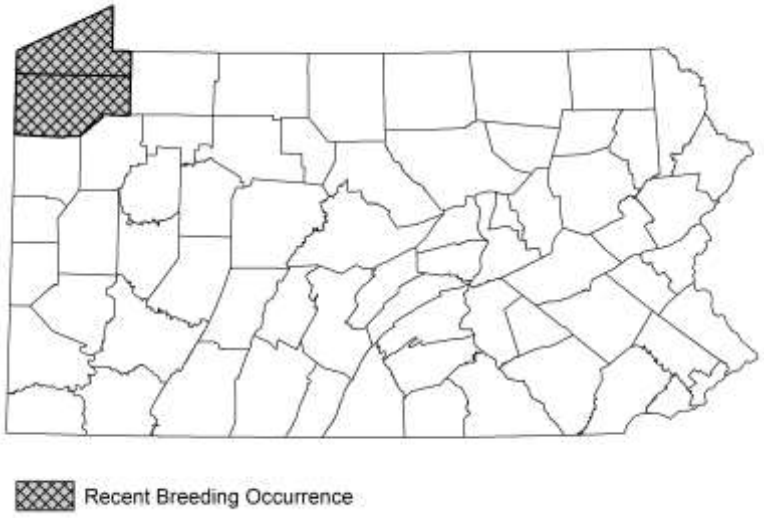
Photo: Wikimedia/Reago and McClarren

CONSERVATION PROFILE

Global Rank	**G4**	State Rank	**S1B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Endangered**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**Presumed Extirpated**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Re-establish three nesting colonies, each containing at least 10 nesting pairs, by 2025.



HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Wet Meadow / Shrub Marsh**	**Emergent Marsh**
Habitat	**Laurentian-Acadian Wet Meadow-Shrub Swamp**	**Laurentian-Acadian Freshwater Marsh**

Specific Habitat Requirements:

Open-water emergent marsh (> 20 hectares or part of a larger complex) with stable water levels during nesting.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Water-level adjustments for multi-species management in wetlands supporting historic populations may have contributed to the disappearance of this species from Pennsylvania over a 70-year period.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Manage for stable water level at historic black tern locations during breeding season.	Water level remains within 4 inches from May through July.	Weekly monitor wetland levels.	1
Determine capacity to maintain water level in tern's historic wetlands.					

Action Location: Physiographic Province: Central Lowland, Appalachian Plateaus
HUC10 Watershed: Conneaut Cr., Crooked Cr.-Frontal Lake Erie, Elk Cr. (Chautauqua-Conneaut)

Associated Species: Emergent wetland birds including American Bittern, Least Bittern, American Coot, Common Gallinule, Pied-billed Grebe, Sora, Virginia Rail.

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Natural wetland succession.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Establish balance of open and emergent vegetation, and then manage water level during breeding season in historic locations.	Vegetation interspersion.	Aerial measurement of wetland interspersion.	1
Evaluate vegetation structure at historic sites for suitable interspersion.					

Action Location: Physiographic Province: Central Lowland, Appalachian Plateaus
HUC10 Watershed: Conneaut Cr., Crooked Cr.-Frontal Lake Erie, Elk Cr. (Chautauqua-Conneaut)

Associated Species: Emergent wetland birds including American Coot, Common Gallinule, Pied-billed Grebe, Sora, Virginia Rail.

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Loss/alteration of habitat by invasive aquatic vegetation.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Reduce invasive aquatic vegetation to manageable levels	Vegetation interspersion.	Annually estimate percent of wetlands covered with invasive aquatics.	2

Control invasive aquatic plants

Action Location: Physiographic Province: Central Lowland, Appalachian Plateaus
HUC10 Watershed: Conneaut Cr., Crooked Cr.-Frontal Lake Erie, Elk Cr. (Chautauqua-Conneaut)

Associated Species: Emergent wetland birds including American Bittern, Least Bittern, American Coot, Common Gallinule, Pied-billed Grebe, Sora, Virginia Rail.

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Direct, air-borne pollution (mercury and others) could impact productivity or survival

Action		Objective	Measure	Monitoring	Priority
TRACS Action 100.0	Law and Policy	Reduce contaminants below long-term exposure toxic levels.	Parts per million mercury.	Monthly water chemistry sampling.	3

Pass legislation to reduce contaminants.

Action Location: Physiographic Province: Central Lowland, Appalachian Plateaus
HUC10 Watershed: Conneaut Cr., Crooked Cr.-Frontal Lake Erie, Elk Cr. (Chautauqua-Conneaut)

Associated Species: American Bittern, Least Bittern, American Coot, Common Gallinule, Pied-billed Grebe, Sora, Virginia Rail, Wilson's Snipe, American Black Duck, Wood Duck.

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Extremes in precipitation threaten nesting; mismatch of insect outbreaks and migration / nesting.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Maintain water level in wetlands occupied by nesting black terns within 4 inches from April through June.	Water level remains within 4 inches from May through July.	Weekly monitor wetland levels.	3

Monitor and manage water level in wetlands with nesting colonies.

Action Location: Physiographic Province: Central Lowland, Appalachian Plateaus
HUC10 Watershed: Conneaut Cr., Crooked Cr.-Frontal Lake Erie, Elk Cr. (Chautauqua-Conneaut)

Associated Species: American Bittern, Least Bittern, American Coot, Common Gallinule, Pied-billed Grebe, Sora, Virginia Rail, Wilson's Snipe, American Black Duck, Wood Duck.

RESEARCH NEEDS

1. Breeding- Do emergent marshes in the Black Tern's range support the interspersion of habitats needed to sustain a nesting colony?

2. Breeding- What is the colonization potential for Black Terns in northwestern Pennsylvania?

SURVEY NEEDS

1. Breeding- As an extirpated species, the potential suitability of large wetland complexes in northwestern PA should be evaluated for potential recovery.

2. Breeding- Conduct PGC Marsh Bird Monitoring program annually at former nesting grounds to identify if there are any reeding populations.

3. Breeding- Use eBird to encourage volunteers to report any Black Tern observations that would inform PGC of any potential breeding populations.

MONITORING PROGRAMS

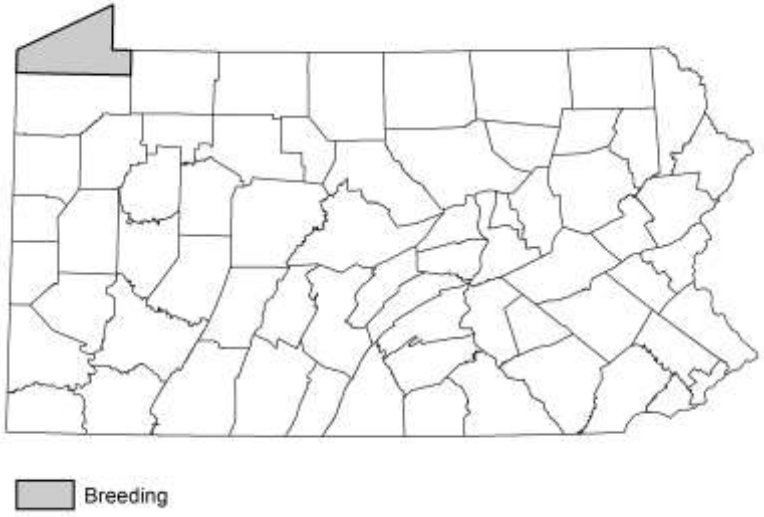
Program Name	Lead Agency	Hyperlink	Description
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals
Pennsylvania Game Commission Marsh Bird Surveys	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt/community/birding_and_bird_conservation/21066/marsh_bird_survey?qid=81806114&rank=4	During breeding seasons, PGC staff, partners, and volunteers conduct standardized audio playback surveys for secretive marsh birds across the state including: pied-billed grebe, American bittern, least bittern, black rail, king rail, Virginia rail, sora, common moorhen, and American coot. Protocol adapted from North American Marsh Bird Monitoring Protocols (Conway 2011) and is very similar to that used in the 2nd Pennsylvania Breeding Bird Atlas. Survey results inform management of these wetlands.

Common Tern

Sterna hirundo

Sarah Sargent
Audubon Pennsylvania

Photo: Mary Birdsong



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**Data Deficient (B)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Endangered**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Successful fledging of chicks from at least one nest per year by 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Coastal Grassland & Shrubland**	
Habitat	**Great Lakes Dune and Swale**	

Specific Habitat Requirements:

Sandy beaches (Presque Isle State Park is only historic nesting location) and rocky maritime sites.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Breeding

Specific Threat: Disturbance of nesting pairs by people walking within the restricted area at Gull Point, sometimes with dogs, arriving either on foot or by boat.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 7.0 Law enforcement Improved signage delimiting the restricted area. Better enforcement of restriction by Park Rangers. Consider having a person posted at observation tower during all daylight hours. Person would educate visitors, deter scofflaws, and report violators to Rangers. Action Location: Physiographic Province: Central Lowland HUC10 Watershed: Lake Erie Associated Species: Piping Plover	No disturbance of nesting attempts by people or dogs.	Zero instances of people entering restricted area at Gull Point during tern nesting season.	Observers needed each year during nesting season to detect nesting attempts, establish fencing/exclosures and signage.	1

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Encroachment by native and non-native vegetation; terrestrial and aerial nest predation.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources 1. Continue to control woody plant establishment on the outermost parts of Gull Point. 2. Employ exclosures to protect nests from predation, as used in other places. Action Location: Physiographic Province: Central Lowland HUC10 Watershed: Lake Erie Associated Species: Piping Plover	1. Maintain at least 100m wide zone from waterline without woody plants around outer edge of Gull Point, 2. Protect nests and young from predators.	Width and total area without woody plants.	Assess recruitment of woody seedlings and regrowth of willows, etc., from residual roots each year. Control growth with herbicides when needed.	2

RESEARCH NEEDS

1. Breeding- Nest predation: What are the densities of predators at Gull Point? Are exclosures feasible?

2. Breeding- What are the levels of (illicit) human disturbance in the vicinity of recent nest sites?

3. Breeding- What is the feasibility of creating a man-made nest site near Gull Point that is better protected from predators and human disturbance?

SURVEY NEEDS

1. Breeding- Enlist volunteers and professionals to survey designated critical habitat area at Presque Isle State Park at least twice per week from April through July, coordinated with Piping Plover surveys. Unobtrusive monitoring from the observation tower at Gull Point works best.

2. Breeding- Encourage surveys of additional possible breeding habitat in the state.

3. Breeding- Use eBird to encourage volunteers to report any Common Tern observations that would inform PGC of any potential breeding populations.

MONITORING PROGRAMS

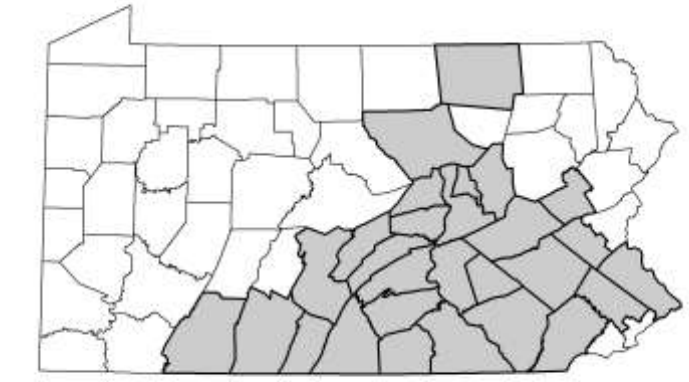
Program Name	Lead Agency	Hyperlink	Description
Presque Isle Shorebird Surveys	Audubon PA		Coordinated with Piping Plover survey efforts during the breeding season.

Barn Owl

Tyto alba

Daniel P. Mummert
Pennsylvania Game Commission

Photo: Hal Korber



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S2B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Documentation of at least 100 active nest sites within a minimum of 15 counties by the year 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Agricultural**	
Habitat	**Agriculture (NLCD 81-82)**	

Specific Habitat Requirements:

Low altitude grasslands (meadows, hayfields and abandoned arable fields) w/ natural and/or artificial cavities (barns, silos).

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Fragmentation of agriculturally dominated landscapes and conversion of pasture, hayfields, and other foraging habitat due to residential and commercial development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Expand upon economic incentives for the provision of long-term conservation easements of farms and farmland.	Finalize long-term conservation easements which prevent the development of farmland of >10,000 acres within targeted, agriculturally rich landscapes. Install >100 barn owl nest boxes at suitable locations.	Number of agricultural acres preserved in conservation easements.	Surveys for sign of barn owls should be conducted. Surveys of barns, silos, and installed nest boxes should be conducted between May 1 and July 15 and should include searches for individuals as well as their sign such as fresh barn owl pellets, feathers and eggs.	1

Action Location: Physiographic Province: Piedmont, Ridge and Valley

Associated Species: Eastern Meadowlark, Grasshopper Sparrow, Northern Harrier, Upland Sandpiper, North American least shrew

IUCN Threat: 2.0 Agriculture and Aquaculture

Season: Breeding

Specific Threat: Conversion of hayfields, pastureland and other grassland habitat types to row crops such as corn and soybean fields and removal of cavity tree nest sites .

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Provide economic incentives that encourage establishment and maintenance of grassland habitats such as hayfield and pastureland.	Establish grassland habitat on > 50,000 acres within agriculturally dense landscapes	Number of grassland acres established	Surveys for sign of barn owls within barns and silos and should be conducted within barns and silos between May 1 and July 15 and should include searches for individuals as well as their sign such as fresh barn owl pellets, feathers and eggs.	1

Action Location: Physiographic Province: Piedmont, Ridge and Valley

Associated Species: Eastern Meadowlark, Grasshopper Sparrow, Northern Harrier, Upland Sandpiper, North American least shrew

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Removal of snags and cavity trees reduces the availability of potential nest sites

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Replace snags and cavity trees that have been removed by installing nest boxes within landscapes containing suitable foraging habitat	Install at least 200 new barn owl nest boxes in suitable habitat over the next 10 years	Number of nest boxes installed in suitable habitat	Monitor nest boxes between May and July for nesting activity	1

Action Location: Physiographic Province: Piedmont, Ridge and Valley

Associated Species: American Kestrel

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Reduction of suitable foraging habitat due to development of solar and wind farms

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach Establish cooperative agreements with wind and solar energy companies to avoid development of facilities in areas of optimal habitat	Have all wind and energy developers sign cooperative agreements agreeing to avoid development in optimal habitat.	Number of cooperative agreements completed	Count number of confirmed nest sites annually documented by the PGC's Barn Owl Conservation Initiative	3

Action Location: Physiographic Province: Piedmont, Ridge and Valley

Associated Species: Henslow's Sparrow, Dickcissel, Short-eared Owl, Savannah Sparrow

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Increased development and use of roads leading to increases in vehicle collision mortality

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Estimate percentage of population killed each year by vehicle collisions	Number of mortality events caused by vehicle collisions	Conduct surveys of dead barn owls along roadways during the breeding season	3

Estimate the number of barn owls killed by vehicle collisions

Action Location: Physiographic Province: Piedmont, Ridge and Valley

RESEARCH NEEDS

1. Breeding- Determine if a nest box program, in regions where nesting habitat is likely a limiting factor, has a significant effect on the state's population and distribution; reclaimed strip mines for example.

2. Breeding- Increase knowledge of barn owl abundance and distribution throughout the state and its relationship to habitat quality and human use.

3. Breeding- Increase knowledge of habitat usage throughout the winter months when mortality is highest.

SURVEY NEEDS

1. Breeding- Potential nest sites should be monitored annually for breeding activity as conducted by the PGC's Barn Owl Conservation Initiative.

2. Breeding- Banding of nestlings should continue as conducted by the PGC's Barn Owl Conservation Initiative to help provide information about fledgling dispersal and longevity.

3. Breeding- Nest sites should be monitored during the winter to learn more about habitat usage and migration patterns.

MONITORING PROGRAMS

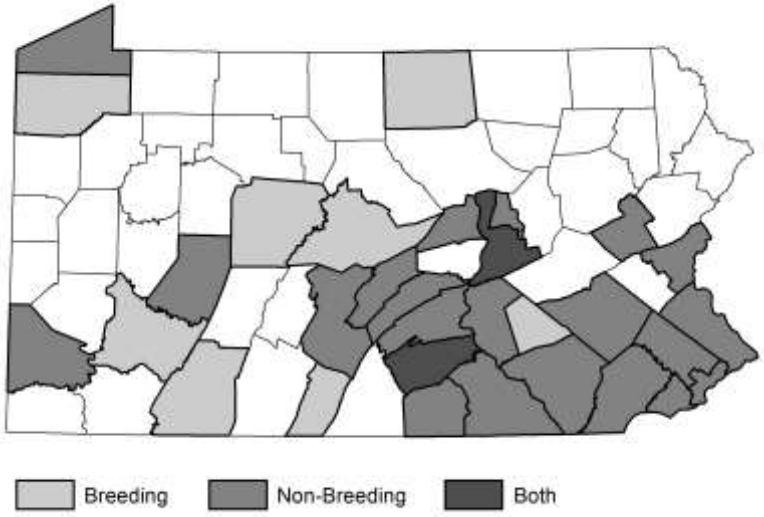
Program Name	Lead Agency	Hyperlink	Description
Barn Owl Conservation Initiative	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt?open=514&objID=1702875&mode=2	Each year PGC biologists across the state monitor potential nest sites to determine nesting success and band nestlings.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Long-eared Owl

Asio otus

Daniel W. Brauning
Pennsylvania Game Commission

Photo: Joe Kosack



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S1B, S3N (W)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Threatened**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change); (W) Decline of 50 - 70%**

Conservation Goal:

Ten successful nest sites annually.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(B) Northern Hardwood & Conifer (W) Agricultural**	**(B) Central Oak-Pine**
Habitat	**(B) Appalachian (Hemlock)-Northern Hardwood Forest (W) Agriculture (NLCD 81-82)**	**(B) Central Appalachian Dry Oak-Pine Forest**

Specific Habitat Requirements:

(B,W) Conifer woods, often plantations, intermingled with field and meadows. Few breeding sites and widespread apparent potential makes characterization difficult.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Loss of conifer habitat nesting sites, through management, succession, or disease.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Improve healthy forests metrics.	Conifer regeneration in FIA data.	Determine the number of young produced per nest.	1

Maintain deer population levels that provide for healthy forest regeneration.

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: None

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss of habitat to development is a minor threat.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Reduce nesting disturbance at established nests.	Nesting success.	Determine the number of young produced per nest.	3

Seek agreements from landowners to protect nesting sites from disturbance during nesting season.

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: None

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Loss of habitat to energy production could alter nest sites.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Maintain records in PNDI to assure known sites are protected from direct development. Action Location: Physiographic Province: Statewide; HUC4 Watershed: Statewide Associated Species: None	Avoid development within CPP Core buffers during nesting season of all known sites.	Nesting success.	Determine the number of young produced per nest.	3

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Long-eared Owls are vulnerable to vehicle strikes.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Maintain records in PNDI to assure known sites are protected from direct development. Action Location: Physiographic Province: Statewide; HUC4 Watershed: Statewide Associated Species: None	Avoid development within CPP Core buffers during nesting season of all known sites.	Nesting success.	Determine the number of young produced per nest.	3

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Loss of conifer habitat nesting sites, through management, succession, or disease.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance On public land, designate known nesting (and winter) roost areas for protection from disturbance or harvest. For private sites, establish a conservation agreement. Action Location: Physiographic Province: Statewide; HUC4 Watershed: Statewide Associated Species: None	Avoid disturbance within CPP Core buffers during nesting season of all known sites.	Number of nest sites protected.	Determine the number of young produced per nest.	3

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Loss of conifer habitat nesting sites, through management, succession, or disease.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Plant dense stands of native conifers that could provide nesting structures. Action Location: Physiographic Province: Statewide; HUC4 Watershed: Statewide Associated Species: None	Establish 10 new conifer groves in suitable sites on Game Lands statewide in 10 years.	Number of suitable habitat patches.	Number of long-eared owl nest sites	3

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Winter

Specific Threat: Any activity (even recreation) around winter roosts can result in abandonment.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning On public land, designate known nesting (and winter) roost areas for protection from disturbance or harvest. For private sites, establish a conservation agreement. Action Location: Physiographic Province: Statewide HUC4 Watershed: Statewide Associated Species: None	Protect long-eared owl winter roosts from disturbance.	Multi-year occupancy of winter roosts.	Number of owls at winter roosts at end of winter season.	1

IUCN Threat: 1.0 Residential and Commercial Development

Season: Winter

Specific Threat: Displacement/abandonment of winter roosts due to development

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection Seek agreements from landowners to protect nesting sites from disturbance during nesting season. Action Location: Physiographic Province: Statewide HUC4 Watershed: Statewide Associated Species: None	Establish conservation agreements with landowner/manager of all known winter roosts.	Multi-year occupancy of winter roosts.	Number of conservation agreements.	3

RESEARCH NEEDS

1. Breeding- Is it possible to conduct a survey of Long-eared Owl nesting population in the state using a standardized protocol? Some precedent set in other parts of range including Canada and Europe.

1. Wintering- Are winter roost sites potential breeding locations?

2. Breeding- What are site and landscape characteristics that have supported Long-eared Owl nest sites? odel these sites.

2. Wintering- What are site and landscape characteristics that have supported long-eared owl winter roosts?

3. Breeding- Study persistence of LEOW at winter roosts (easier to find) into breeding season. Does this enable us to determine if unoccupied sites are available?

3. Wintering- Are unoccupied sites available?

SURVEY NEEDS

1. Breeding- Long-eared owl nesting population is poorly known. etermine extent of breeding population through volunteer surveys.

1. Wintering- Locate winter roosts which often are sites of breeding birds later in season.

2. Breeding- Conduct a state-wide Long-eared Owl survey using a methodology used elsewhere successfully.

3. Breeding- Conduct Northern Saw-whet Owl breeding surveys in forested areas which includes quiet period when all species are recorded including this species, and including areas where this species could occur.

MONITORING PROGRAMS

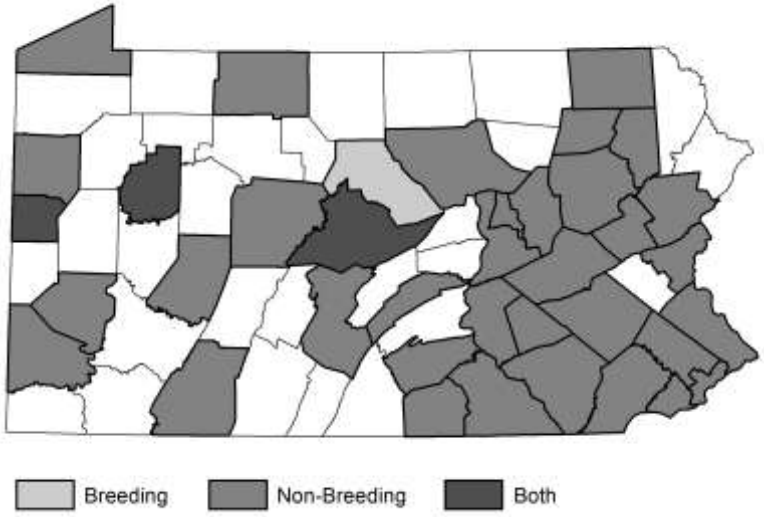
Program Name	Lead Agency	Hyperlink	Description
Long-eared Owl monitoring	Pennsylvania Game Commission		Searches for Long-eared Owl nesting in target areas
National Audubon Society Christmas Bird Counts	National Audubon Society	http://birds.audubon.org/christmas-bird-count	Since 1900, this is an annual winter survey of more than 2,300 count circles worldwide. The longest running Citizen Science survey in the world, Christmas Bird Count provides critical data on population trends.
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals

Short-eared Owl

Asio flammeus

Laurie J. Goodrich
Hawk Mountain Sanctuary Association

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S1B, S3N (W)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Endangered**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Decline of 11-40%; (W) Decline of 30-50%**

Conservation Goal:

Minimum of 5-10 nesting pairs by 2025 with habitat available for 25 pairs statewide.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(B,W) Agricultural**	
Habitat	**(B,W) Agriculture (NLCD 81-82)**	

Specific Habitat Requirements:

(B,W) Large fields or wetlands.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Development has reduced availability of large, unfragmented grassland blocks needed by this species

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Work cooperatively to establish and manage large (>100 ha) blocks of grassland, focusing first on reclaimed strip mine areas, to maintain or create the habitat needed for this species. Prioritize areas recently used by the owls in western and southwestern counties.	Establish 5 suitable nesting habitat blocks in areas used by owls (based on Atlas and eBird) in next 5 years; with another five in following 5 years.	Number of grassland blocks exceeding 100 ha in size	Monitor number of nesting owls in large blocks of grassland across the state with targeted surveys.	1

Action Location: Physiographic Province: Statewide

Associated Species: Upland Sandpiper, Northern Harrier, Bobolink

IUCN Threat: 2.0 Agriculture and Aquaculture

Season: Breeding

Specific Threat: Conversion from pasture/hay crops to corn/soybeans and associated pesticide use reduces quantity and quality of wintering habitat for owls.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Promote pasture and set aside fields in key areas including CREP areas and educate farmers on impacts of high intensity and GMO crops on wildlife.	Reestablish contiguous 150 acre or more blocks of pasture or grassland type habitat in existing farms in five areas within counties that had nesting owls.	Grassland or pasture acreage, fallow field acreage in large blocks greater than 150 acres.	Monitor nesting owls across the state with targeted surveys of large grasslands.	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Ring-necked Pheasant, Northern Harrier, Northern Bobwhite, Upland Sandpiper.

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Afforestation of grassy strip mine reclamation areas.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach Reach out to Bureau of Mine Reclamation and move strongly toward requiring grassy reclamation goal without trees or shrubs, particularly in western counties. And, work towards agreement to keeping part of each reclaimed area free of other structures and disturbances, i.e. drilling and wind power.	Restore and maintain grasslands on reclaimed strip mines that are greater than 150 acres in size. Target 1000 acres of reclaimed and maintained grassy habitats in 2-5 blocks by 2015.	Acreage of contiguous grassland on reclaimed strip mines	Monitor acreage of undisturbed grassland on previously strip mined areas.	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Ring-necked Pheasant, Northern Harrier, Northern Bobwhite, Upland Sandpiper.

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Planting of trees and shrubs in grassland reclamation areas; draining and fragmentation of wetlands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection Reach out to groups doing mine reclamation including State Bureau of Forestry and obtain agreement to reestablish grassy land cover on reclaimed mine areas in blocks greater than 150 acres to provide habitat for owls; Work to conserve or reestablish large contiguous blocks of wetlands where possible; work with conservancies and PGC or USFWS funding to conserve, reestablish large wetland blocks.	Restore and maintain grasslands on reclaimed strip mines that are greater than 150 acres in size. Target 1000 acres of reclaimed and maintained grassy habitats in 2-5 blocks by 2015; Restore or conserve large blocks of wetlands in PA.	Acreage of contiguous grassland on reclaimed strip mines exceeding 150 acres in size; acreage of large wetlands >150 acres.	Monitor acreage of undisturbed grassland on previously strip mined areas.	1

Action Location: Physiographic Province: Statewide

Associated Species: Ring-necked Pheasant, Northern Harrier, Northern Bobwhite, Upland Sandpiper, American Bittern, Least Bittern, other wetland birds.

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Non-native plants in large wetlands reducing habitat quality for owls.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Reduce invasive wetland plants in large wetlands by 50% in 10 years.	Acres of native wetland habitat restored per year.	Monitor restored wetlands for use by owls and harriers.	1

Work with large wetland land owners to reduce invasive or nonnative wetland plants and restore habitat conducive to owls and other wetland nesting birds.

Action Location: Physiographic Province: Statewide

Associated Species: Northern Harrier, American Bittern, Least Bittern, other wetland birds.

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Sewage, industrial waste effluents in wetland habitats

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Restore 500 to 1000 acres of healthy wetlands along Lake Erie shoreline or Delaware Bay by 2025.	Acres of natural un-degraded wetland habitat in two regions	Monitor wetland health and degradation by pollutants or effluents on Lake Erie shoreline and Delaware Bay.	2

Promote wetland conservation and reduction of pollutants into bays and lakes

Action Location: Physiographic Province: Statewide

Associated Species: Northern Harrier, American Bittern, Least Bittern, other wetland birds.

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Climate change may reduce or change nesting habitat suitability or needs due to range shifts or influence on prey abundance.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Maintain or increase size of large grassland habitat blocks to provide larger blocks of suitable habitat and prey numbers. Sites useful as wintering or nesting areas.	Restore pasture or grassland or purchase in blocks of 1000 acres in at least 4 sites across the state by 2025.	number of contiguous blocks of suitable habitat	Monitor number of large conserved blocks of pasture or grassland	2

Action Location: Physiographic Province: Statewide

Associated Species: Northern Harrier, Upland Sandpiper, Ring-necked Pheasant.

IUCN Threat: 1.0 Residential and Commercial Development

Season: Winter

Specific Threat: Development has reduced availability of large, unfragmented and undisturbed grassland blocks needed by this species

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Encourage set aside acres in CREP throughout the state to allow taller, old field habitat conservation; pursue land acquisition for significant grassland areas as future gamelands	Conserve larger blocks of grassland with some older field (1 to 3 year old) habitat	Number of CREP acres in contiguous blocks of 50 plus acres; number acres of contiguous grassland in state	Monitor number of large blocks of CREP across state; monitor for use by owls, perhaps using eBird and PA Farmland Raptor network	1

Action Location: Physiographic Province: Statewide

Associated Species: Northern Harrier, Dickcissel, sparrows, Ring-necked Pheasant, Barn Swallow

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Winter

Specific Threat: Development has reduced availability of large, unfragmented and undisturbed grassland blocks needed by this species

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Work cooperatively to establish and manage large (>100 ha) blocks of grassland, focusing first on reclaimed strip mine areas, to maintain or create the habitat needed for this species. Prioritize areas recently used by the owls in western and southwestern counties.	Establish 5 suitable nesting habitat blocks in areas used by owls (based on Atlas and eBird) in next 5 years; with another five in following 5 years.	Number of grassland blocks exceeding 100 ha in size	Monitor number of nesting owls in large blocks of grassland across the state with targeted surveys.	1

Action Location: Physiographic Province: Statewide

Associated Species: Upland Sandpiper, Northern Harrier, Bobolink

IUCN Threat: 2.0 Agriculture and Aquaculture

Season: Winter

Specific Threat: Conversion from pasture/hay crops to corn/soybeans and associated pesticide use reduces quantity and quality of wintering habitat for owls.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Work with Department of Agriculture to reduce or limit use of damaging pesticides and herbicides in grassland blocks important to nesting or wintering birds, particularly neonicotinoids.	Reduce use of neonicotinoids by 75-100% by 2025	Acres of Round-up Ready corn or soybean and Acres planted with neonicotinoids GMO seeds.	Monitor use of farmland habitats by owls and acres of GMO corn and soybean fields	2

Action Location: Physiographic Province: Statewide

Associated Species: American Kestrel, Barn Owl, Northern Harrier, Ring-necked Pheasant, Barn Swallow, Cliff Swallow, Purple Martin

RESEARCH NEEDS

1. Breeding- Conduct study of PA nesting short-eared owls to assess productivity, home range, and threats for remaining nesting pairs.

1. Wintering- Use banding recoveries and telemetry to identify source population for PA wintering birds, and winter range and timing or duration within the state.

2. Breeding- Assess impacts of Marcellus Shale and other energy extraction activities on nesting owls, disturbance distances, impacts on productivity, etc.

2. Wintering- Determine habitat use and range size of wintering birds using telemetry.

3. Breeding- Research relationship of territory size, habitat type, and prey abundance to inform management and conservation planning.

3. Wintering- Evaluate CREP fields, and pheasant recovery areas as suitable owl habitat , determine if species habitat management goals might overlap.

SURVEY NEEDS

1. Breeding- Develop appropriate survey technique and Conduct survey during breeding season to determine number and location of remaining nesting pairs in large grassland habitats across the state.

1. Wintering- Conduct survey of wintering short-eared owls and northern harriers across the state to determine key wintering sites for the two species (possibly incorporate citizen scientist outreach).

2. Breeding- Survey and map potential grassland or marsh land habitats greater than 100 hectares. Use ownership analyses and GIS land cover to determine potential to reclaim grassland or wetland habitats.

2. Wintering- Use Winter Raptor Surveys and Christmas Bird Counts to identify possible wintering hotspots for the species.

3. Breeding- Monitor use of agricultural pesticides and herbicides and rodenticides across the state and particularly in regions used by wintering birds.

3. Wintering- Monitor use of agricultural pesticides and herbicides and rodenticides across the state and particularly in regions used by wintering birds.

MONITORING PROGRAMS

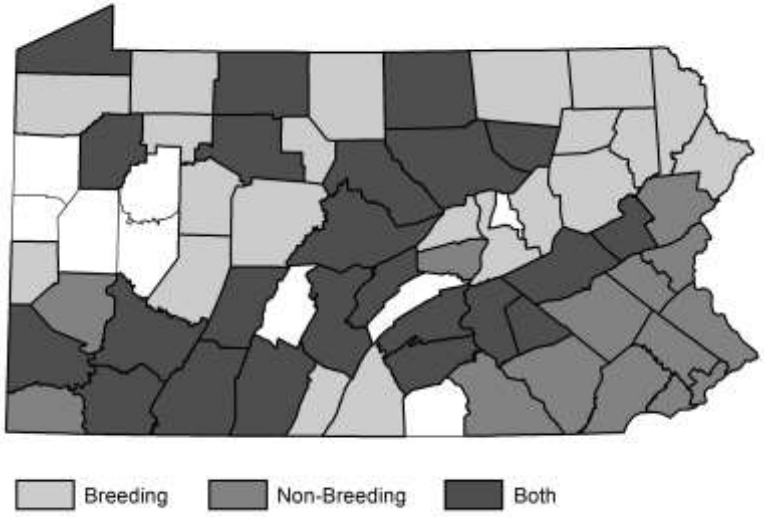
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
National Audubon Society Christmas Bird Counts	National Audubon Society	http://birds.audubon.org/christmas-bird-count	Since 1900, this is an annual winter survey of more than 2,300 count circles worldwide. The longest running Citizen Science survey in the world, Christmas Bird Count provides critical data on population trends.
PA Farmland Raptor project (Hawk Mountain) and eBird may be useful in locating possible nesting areas within the state by tapping birdwatchers and farmland owners	Hawk Mountain Sanctuary for Farmland Raptors; eBird at Cornell Lab of Ornithology	http://www.ebird.org http://www.hawkmountain.org	Birder or landowner driven reporting through website.
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals
Winter Raptor Survey	HMANA or Pennsylvania Society for Ornithology	http://www.pabirds.org http://www.hmana.org	Road surveys in winter are conducted on the same road route annually; two methods in use currently. Eventually data will be available to researchers on www.hmana.org.

Northern Saw-whet Owl

Aegolius acadicus

Daniel W. Brauning
Pennsylvania Game Commission

Photo: Joe Kosack



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B, S3N (M)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change); (M) Unknown**

Conservation Goal:

Toot-route detection rate (to be determined).

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(B) Central Oak-Pine** **(M) Northern Hardwood & Conifer**	
Habitat	**(B) Northeastern Interior Dry-Mesic Oak Forest** **(M) Appalachian (Hemlock)-Northern Hardwood Forest**	

Specific Habitat Requirements:

(B) Dense shrubby understory, including ericaceous shrubs, young conifers.
(M) Any forested habitat, including edges and ruderal forests, presumably.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Forest fragmentation reduces habitat quality for Saw-whets and increases competition with larger owl species.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Protect large blocks of forest from fragmentation.	Avoid development within known nesting areas during nesting season of all known sites.	Forest fragmentation index	Detection on toot-Route surveys and Breeding Bird Atlas surveys.	2

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: Allegheny, W. Br. Susquehanna

Associated Species: Forest wildlife

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Loss of conifer habitat nesting sites, through management, succession, or disease.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Develop BMPs for timber harvest that retains multi-age structure and complex understory (see Saunders and Arseneault 2013).	Maintenance of complex forest structure in north-central forests and ANF	Forest understory index in FIA data	Detection on every-3-year toot-Route surveys and Breeding Bird Atlas surveys.	2

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: Allegheny, W. Br. Susquehanna

Associated Species: Forest wildlife

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Forest fragmentation reduces habitat quality for Saw-whets and increases competition with larger owl species.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Avoid development within known nesting areas during nesting season of all known sites.	Forest fragmentation index	Detection on every-3-year toot-Route surveys and Breeding Bird Atlas surveys.	3
Restore complex forest structure, including conifers, to replace lost habitat.					

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: Allegheny, W. Br. Susquehanna

Associated Species: Forest wildlife

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Road mortality and fragmentation will result from transportation and energy rights-of-way.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 9.0	Planning	Avoid development within known nesting areas during nesting season of all known sites.	Forest fragmentation index	Detection on every-3-year toot-Route surveys and Breeding Bird Atlas surveys.	3
Protect large blocks of forest from fragmentation.					

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: Allegheny, W. Br. Susquehanna

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Increased predation from loss of understory habitat, by management, succession, or deer browse.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Eastern Hemlock conservation	Hemlock prevalence in FIA data	Detection on every-3-year toot-Route surveys and Breeding Bird Atlas surveys.	3

Address or remediate impacts of woolly adelgid on hemlock.

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: Allegheny, W. Br. Susquehanna

Associated Species: Conifer forest wildlife

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Climactic changes that reduce conifer habitat could change forests to be less suitable for nesting Saw-whet Owls.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Maintenance of complex forest structure in north-central forests and ANF	Area of complex forest	Detection on every-3-year toot-Route surveys and Breeding Bird Atlas surveys.	3

Promote growth of complex forest structure, including conifers and ericaceous understory, to maintain suitable habitat for a variety of species.

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: Allegheny, W. Br. Susquehanna

Associated Species: Forest wildlife

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Migration

Specific Threat: Road mortality from collisions may impact migrant populations.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 3.0 Data Collection and Analysis Request road kill reports of Northern Saw-whet Owls from the public.	Estimate if road mortality is a significant limiting factor to the migratory population.	Number of road kill reports received	Northern Saw-whet Owl migrant population estimate	3

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: None

RESEARCH NEEDS

1. Breeding- What is annual population and distribution of nesting saw-whet owls? A volunteer-based survey may be a needed part of this research question.

1. Migration- Project OwlNet expanded and including breeding population.

2. Breeding- Are Northern Saw-whet Owls philopatric in PA or in certain areas of the state?

3. Breeding- How do saw-whet owls respond to loss of hemlocks and understory where those changes occur?

SURVEY NEEDS

1. Breeding- Saw-whet owl nesting populations are poorly known. Determine extent of breeding population through volunteer surveys.

1. Migration- Project OwlNet at more locations.

2. Breeding- Conduct nest-box surveys to determine saw-whet owl occupancy and persistence at known breeding grounds.

2. Migration- Banding of breeding birds to make Project OwlNet more effective at studying PA breeding population migration pattern.

3. Breeding- Conduct banding studies to determine where PA nesting saw-whet owls migrate in the winter.

MONITORING PROGRAMS

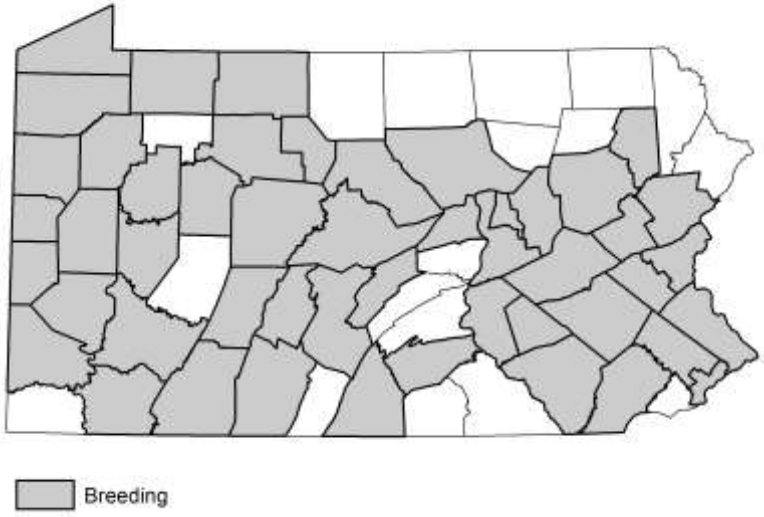
Program Name	Lead Agency	Hyperlink	Description
Northern Saw-whet Owl breeding surveys ("Toot-Route" survey)	Pennsylvania Game Commission		Point count routes with 8 points each using a audio-lure protocol.
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals
Saw-whet owl banding	Project Owlnet	http://www.projectowlnet.org/?page_id=201	

Common Nighthawk

Chordeiles minor

Nathan J. Zalik
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**2000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Halt current population decline; maintain nesting presence in at least 250 Breeding Bird Atlas (Wilson et al. 2012) blocks by 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Urban/Suburban Built**	
Habitat	**Developed (NLCD 21-24 & 31)**	

Specific Habitat Requirements:

Rock outcrops; gravel rooftops in cities and towns; barrens; former strip mines.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss of suitable nesting substrates in urban areas caused by a shift from small gravel to large gravel, rubberized, or PVC material on flat roofs.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Assess the availability of suitable roofs in urban/suburban areas. Where suitable roofs exist, conduct landowner outreach to increase awareness of Common Nighthawks and encourage the retention of existing gravel roofs.	Assess the availability of suitable roofs in at least three urban/suburban areas by 2025. Distribute educational material to landowners where suitable roofs exist.	Number of areas assessed for suitable rooftop nesting habitat; Number of landowner contacts made.	Follow up with landowners to assess changes in roofing material. Annual surveys of nighthawks in urban areas during the breeding season. Evening surveys could be conducted by citizen scientists, with potential follow up surveys by professionals to locate nests in areas with nighthawk activity.	1

Action Location: Physiographic Province: Statewide

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Increased abundance of crows in urban areas increases predation risk of eggs and young.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Develop methods (e.g., predator exclosures) to protect known nighthawk nests from avian predators.	Test the effectiveness of predator exclosures on nighthawk nests.	Number of nests protected.	Assess tolerance of nighthawks to predator exclosure. Assess effectiveness of exclosures at deterring predators.	1

Action Location: Physiographic Province: Statewide

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Fire suppression limits the creation of natural forest openings suitable for nesting.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Maintain an active prescribed burn program to encourage grassy openings and bare patches likely to attract nesting nighthawks.	Double the acreage of prescribed burns conducted annually in the state by 2025.	Number of acres of prescribed burns conducted annually.	Evening surveys for nighthawks in burned areas during the breeding season.	1

Action Location: Physiographic Province: Statewide

Associated Species: Golden-winged Warbler, Olive-sided Flycatcher, Prairie Warbler, Red-headed Woodpecker, Yellow-breasted Chat

IUCN Threat: 10.0 Geological Events

Season: Breeding

Specific Threat: Increased frequency of heavy rain events due to climate change could damage or destroy potential cliff and talus nest sites.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Support development and implementation of climate change mitigation strategies that minimize impacts to wildlife.	Reduce potential impacts to wildlife from climate change.	# climate change mitigation strategies developed that minimize impacts to wildlife.	# of cliff and talus nest sites	2

Action Location: Physiographic Province: Statewide

Associated Species: Peregrine Falcon, Bank Swallow

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Climate change may alter the timing of insect emergences and abundance so that prey is less available during the nesting season or in migration.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Support development and implementation of climate change mitigation strategies that minimize impacts to wildlife. Action Location: Physiographic Province: Statewide Associated Species: Aerial insectivores.	Reduce potential impacts to wildlife from climate change.	# climate change mitigation strategies developed that minimize impacts to wildlife..	# of cliff and talus nest sites	2

RESEARCH NEEDS

1. Breeding- Research on migratory connectivity is needed to determine where Pennsylvania's Common Nighthawks overwinter. This would be a first step towards evaluating potential threats on the wintering grounds.

2. Breeding- Assess the threat of nest predation by crows to rooftop nesting nighthawks.

3. Breeding- Experiments with gravel-filled "nest patches" have been attempted with limited success. However, it is possible that nighthawks may use nest patches that are placed in close proximity to recently used nest sites (Marzilli 1989, New Hampshire Bird Records, Project Nighthawk 2013 Summary).

SURVEY NEEDS

1. Breeding- Survey the availability of suitable gravel roofs; Identify areas that harbor large nighthawk populations.

2. Breeding- Annual monitoring of urban/suburban areas that harbor substantial populations of nighthawks. This effort could be carried out by volunteers.

MONITORING PROGRAMS

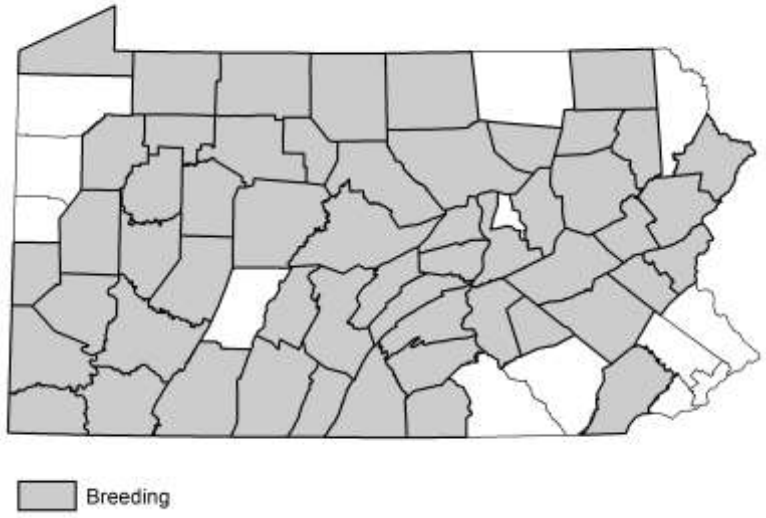
Program Name	Lead Agency	Hyperlink	Description
Nightjar Survey Network	Center for Conservation Biology	http://www.nightjars.org/	Nationwide survey effort that uses volunteers to conduct night-time, roadside counts of all nightjars along fixed survey routes systematically distributed throughout Pennsylvania, and all other states.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals

Eastern Whip-poor-will

Antrostomus vociferus

Christopher B. Goguen
The Pennsylvania State University, Hazleton

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**11000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Stabilize population size of this declining species with a target of at least 8000 breeding pairs in Pennsylvania (a 2004 population estimate; Rich et al. 2004 cited in the Second Atlas of Breeding Birds in Pennsylvania) by 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Central Oak-Pine**	**Central Oak-Pine**
Habitat	**Northeastern Interior Dry-Mesic Oak Forest**	**Central Appalachian Dry Oak-Pine Forest**

Specific Habitat Requirements:

Early to mid successional and open, forested habitats near clearings.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Suppression of fire reduces availability of forest openings and early to mid-successional forest habitats favored by this species.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Initiate prescribed burning or forest harvest management at at least 1 new state or private managed forest site each year.	Number of new forest sites at which management practices are performed.	Nocturnal surveys to detect singing males should be conducted during the summer breeding season.	1
Use prescribed burning where possible, or forest management practices (e.g., timber harvest) in other areas, to reduce understory and create forest openings and early successional habitats.					

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Ruffed Grouse, Gray Catbird, Eastern Towhee, Golden-winged Warbler

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Reduction of lepidopteran prey due to pesticide use, especially aerial spraying of forest habitats to control gypsy moths.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Reduce aerial spraying of pesticides to control gypsy moths by at least 50% by 2025.	Annual percent reduction of pesticide use.	Nocturnal surveys to detect singing males should be conducted during the summer breeding season.	1
Reduce or stop use of aerial pesticides as a main strategy to control gypsy moth infestations.					

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Wood Thrush, Blackburnian Warbler, Black-throated Green Warbler, Black-throated Blue Warbler, Eastern Wood-Pewee

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss of habitat due to suburban growth and reduction in remaining forest habitat quality due to fragmentation.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection In areas vulnerable to forest loss to suburban sprawl (particularly SE and SW PA), purchase unprotected forest habitats to maintain as many large (>100 ha)forest patches as possible. Purchases should be prioritized to target protection of the largest forest patches remaining first.	Protect at least 1000 additional ha of currently unprotected forest habitats in areas vulnerable to sprawl by 2025.	Hectares of vulnerable forest protected	Nocturnal surveys to detect singing males should be conducted during the summer breeding season.	2

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont, Ridge and Valley

Associated Species: Red-eyed Vireo, Wood Thrush, Black-and-white Warbler, Ovenbird, Scarlet Tanager.

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Breeding habitat loss.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Prevent harvest of large areas of contiguous forest in a short time period and ensure that forest regeneration is encouraged on harvested sites.	Coordinate long-range forest management plans among state land management agencies to ensure that harvest is well spaced, both temporally and spatially.	Development of inter-agency forest harvest plans	Nocturnal surveys to detect singing males should be conducted during the summer breeding season.	2

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Ruffed Grouse, Gray Catbird, Eastern Towhee, Golden-winged Warbler

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Potential mismatch of migration, nesting season, and prey emergences.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Develop a land management/protection strategy with other states and the federal government to attempt to accommodate shifts in distribution that may be necessary for many species due to climate change. Action Location: Physiographic Province: Statewide	Develop land management strategy with other states and the federal government to accommodate shifts in distribution that may be necessary for many species due to climate change.	Development of an interstate/interagency management strategy.	Nocturnal surveys to detect singing males should be conducted during the summer breeding season.	2

RESEARCH NEEDS

1. Breeding- Determine the key features that constitute high quality Whip-poor-will habitat in Pennsylvania.

2. Breeding- Identify key factors that influence Whip-poor-will calling rate to maximize the effectiveness of population surveys.

3. Breeding- Determine response of this species and others to silvicultural treatments especially for young forest / early succession habitats.

SURVEY NEEDS

1. Breeding- Long-term, statewide, nocturnal bird surveys are required in Pennsylvania to better document whip-poor-will abundance, distribution, and population trends.

2. Breeding- Conduct post-treatment surveys of silvicultural treatments to determine reaction of young forest and shrub species.

3. Breeding- Conduct Northern Saw-whet Owl breeding surveys in forested areas which includes quiet period when all species are recorded including this species.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
Nightjar Survey Network	Center for Conservation Biology	http://www.nightjars.org/	Nationwide survey effort that uses volunteers to conduct night-time, roadside counts of all nightjars along fixed survey routes systematically distributed throughout Pennsylvania, and all other states.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals

Chimney Swift

Chaetura pelagica

Nathan J. Zalik
Pennsylvania Game Commission

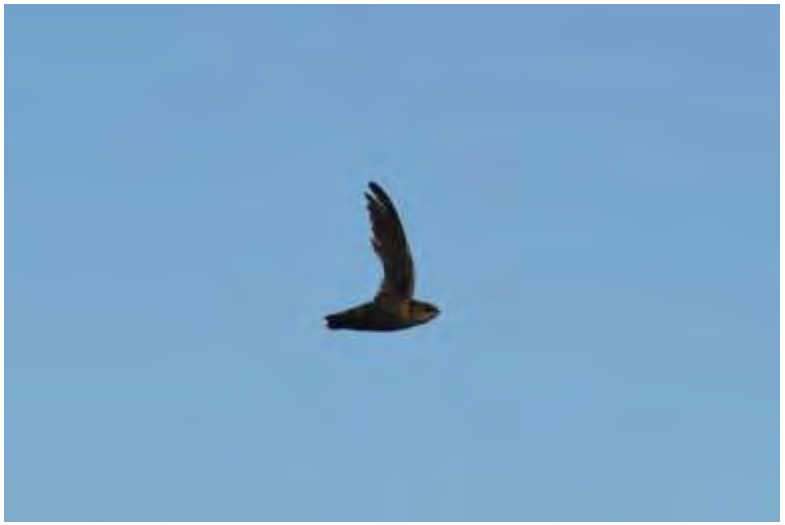
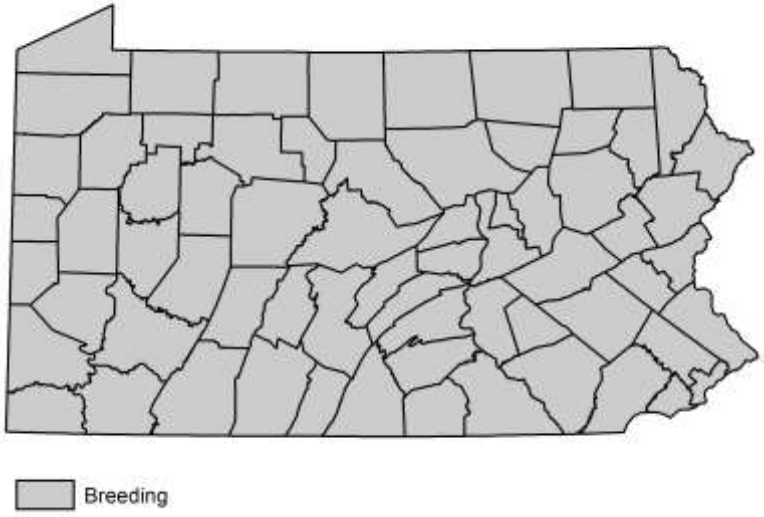


Photo: Wikimedia Commons



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**NT Near Threatened**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**430000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Decline of 11 - 40%**

Conservation Goal:

Maintain species population at or above Second Breeding Bird Atlas (Wilson et al. 2012) levels of 430,000 birds through 2025, or a Breeding Bird Survey detection rate of 12 birds per route, on average, across 95% of all routes.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Urban/Suburban Built**	**Agricultural**
Habitat	**Developed (NLCD 21-24 & 31)**	**Agriculture (NLCD 81-82)**

Specific Habitat Requirements:

Dark vertical hollow shafts, chimneys, hollow logs, silos and old barns.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss of open chimneys with rough-textured interiors for nesting or roosting.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Conduct landowner outreach to increase awareness of Chimney Swifts and encourage the retention of suitable chimneys. Recommend that private landowners keep suitable chimneys open. Chimney swift towers could be installed to mitigate for the loss of chimneys. Action Location: Physiographic Province: Statewide	Distribute educational materials to landowners.	Number of landowner contacts made.	Breeding Bird Survey.	1

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Reduced insect food supply caused by pesticide use.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Implement integrated pest management (IPM) strategies as an alternative to broad-scale pesticide use in agricultural and forestry operations. Action Location: Physiographic Province: Statewide Associated Species: Bank Swallow, Common Nighthawk, Eastern Whip-poor-will, Purple Martin	Reduce the use of pesticides in agricultural and forestry operations by 2025.	Amount of pesticides applied annually.	Monitoring the amount of pesticides sold and/or applied annually.	1

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Climate change may alter the timing of insect emergences and abundance so that prey is less available during the nesting season or in migration.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Develop a land management/protection strategy with other states and the federal government to attempt to accommodate shifts in distribution that may be necessary for many species due to climate change.	Develop land management strategy with other states and the federal government to accommodate shifts in distribution that may be necessary for many species due to climate change.	Development of an interstate/interagency management strategy.	Nocturnal surveys to detect singing males should be conducted during the summer breeding season.	1

Action Location: Physiographic Province: Statewide

Associated Species: Nearly all species.

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Loss of old forest containing large, hollow trees suitable as natural nesting and roosting sites.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Promote the retention of old-growth forest and designate management areas where forests can develop old-growth characteristics, including large, hollow trees and snags.	By 2025, agencies with major public land holdings (DCNR, PGC, USFS) designate areas to be managed for old-growth forest characteristics.	Acreage of forest designated for old forest management.	Acreage of forest designated for old forest management.	2

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Northern Flying Squirrel, Northern Goshawk, Olive-sided Flycatcher, Swainson's Thrush, Yellow-bellied Flycatcher

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Reduced insect food supply caused by anthropogenic activities (e.g., pesticide use and acid precipitation).

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach Research is needed to assess the relationships between pesticides, flying insects, and aerial insectivores.	Conduct research leading to best management practices by 2025.	Development of best management practices.	Regular assessments of research progress.	2

Action Location: Physiographic Province: Statewide

Associated Species: Bank Swallow, Common Nighthawk, Eastern Whip-poor-will, Purple Martin

RESEARCH NEEDS

1. Breeding- Investigations into the relationships between pesticide use, flying insects, and aerial insectivores are needed.

2. Breeding- Evaluation of the effectiveness of Chimney Swift towers in attracting Chimney Swifts.

3. Breeding- Do any Chimney Swifts nest in large trees and old growth forests in the state?

SURVEY NEEDS

1. Breeding- Annual monitoring of urban areas that harbor large populations of chimney swifts. A volunteer survey network could be developed to perform these surveys.

2. Breeding- Identify communal roosts that contain large concentrations of Chimney Swifts prior to migration. This survey could be based on the "Swift Night Out" program conducted by the Chimney Swift Conservation Association (see Monitoring and Adaptive Management).

MONITORING PROGRAMS

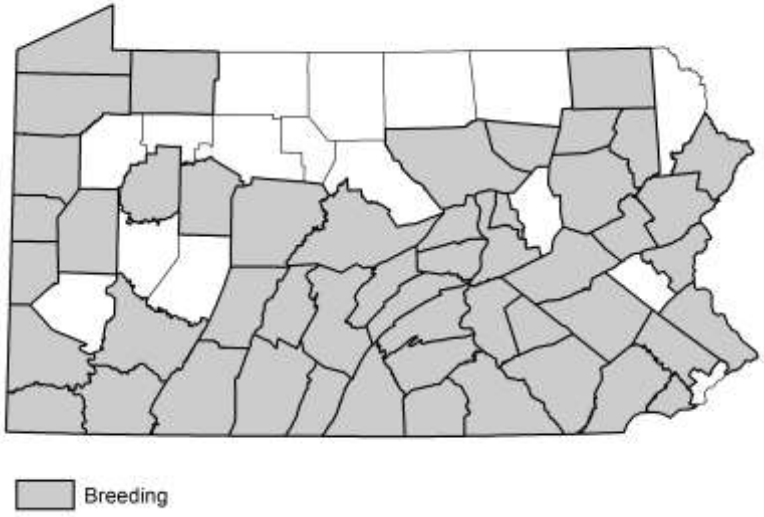
Program Name	Lead Agency	Hyperlink	Description
A Swift Night Out	Chimney Swift Conservation Association	http://www.chimneyswifts.org	An annual nationwide survey of swifts returning to roost. Volunteers count chimney swifts entering roosts in August and September.
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Red-headed Woodpecker

Melanerpes erythrocephalus

Richard Fritsky
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B**
IUCN Red List	**NT Near Threatened**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**4500**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Within 10 years, expand range from current 54% of historical range to 80% of historical range in Pennsylvania, or at least 500 blocks, as indicated by Second Breeding Bird Atlas (Wilson et al. 2012).

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Urban/Suburban Built**	**Agricultural**
Habitat	**Developed (NLCD 21-24 & 31)**	**Agriculture (NLCD 81-82)**

Specific Habitat Requirements:

Woodlots at least 2 hectares in size with snags near open pasture. Savannah-like forests, parks, swamps.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Wetland alteration and drainage.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 7.0 Law enforcement Laws pertaining to wetland drainage and modification should be enforced.	No additional loss of wetlands.	Acres of wetlands	Count number of wetland acres in PA annually.	1

Action Location: Physiographic Province: Statewide

Associated Species: King Rail, Virginia Rail, Sora, American Coot, Wood Duck

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Removal of snags in residential areas for aesthetic and safety concerns.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach Landowner outreach to retain non-hazardous snags	Provide News Releases on importance of snag and dead limb retention (4 per annum), contact large landowner groups directly (public and private)	Number of new cavity nests	Count number of singing males during Breeding Season for the BBS annually for 10 years.	2

Action Location: Physiographic Province: Statewide

Associated Species: Red-bellied Woodpecker, Downy Woodpecker, Hairy Woodpecker, Northern Flicker, Pileated Woodpecker

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Removal of snags during commercial timber harvests.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach Outreach to foresters, loggers, forest landowner associations to retain snags	Contact forestry associations and landowner groups directly (public and private) on importance of snag retention	Number of new cavity nests	Count number of singing males during Breeding Season for the BBS annually for 10 years.	2

Action Location: Physiographic Province: Statewide

Associated Species: Red-bellied Woodpecker, Downy Woodpecker, Hairy Woodpecker, Northern Flicker, Pileated Woodpecker

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Increased development and use of roads leading to increases in vehicle collision mortality

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Estimate the number killed on roads	Determine percent of population susceptible to road-kill	Number of road kill	Roadside survey for road-killed RHWO from June to Sept.	3

Action Location: Physiographic Province: Statewide

RESEARCH NEEDS

1. Breeding- Breeding success and habitat condition throughout the state.

2. Breeding- Response of Red-headed Woodpecker to silviculture treatments including salvage cuttings of diseased trees.

SURVEY NEEDS

1. Breeding- Annual BBS.

2. Breeding- Track changes of wetland acreage throughout PA using the National Wetlands Inventory.

MONITORING PROGRAMS

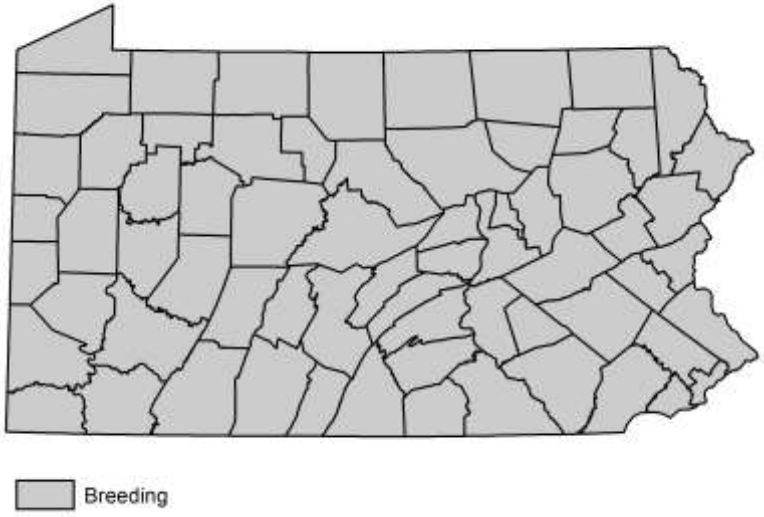
Program Name	Lead Agency	Hyperlink	Description
National Wetlands Inventory	U.S. Fish & Wildlife Service	http://www.fws.gov/Wetlands/NWI/Overview.html	A nationwide inventory of wetlands providing distribution maps of wetlands.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

American Kestrel

Falco sparverius

Laurie J. Goodrich
Hawk Mountain Sanctuary Association

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**13600**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Maintain statewide breeding distribution of at least 25,000 birds (0.9 birds per Breeding Bird Survey route on at least 80% of all routes) by 2025 and increase Breeding Bird Survey detection rate in southeastern and southwestern counties by 10%.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Agricultural**	
Habitat	**Agriculture (NLCD 81-82)**	

Specific Habitat Requirements:

Uses variety of grassland habitats with short herbaceous vegetation and sparse woody vegetation preferred; use meadows, agricultural fields, pastures, large lawn areas. Requires nest tree with cavity or nest box on tree, barn, or pole. Prime habitat includes 25 or more hectares of contiguous grassland. Areas used consistently include >65% open habitat in 1 hectare around nest site and distances from woodland >350 meters (Smallwood and Bird 2002).

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Reduction and fragmentation of grassland habitat statewide, particularly pasture land. Increased exposure to Cooper's Hawks and other predators that are attracted to suburban development and woodlots.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection Develop CREP type program to promote grassland/pasture habitat for grassland birds on private lands, prioritize clustering of grassland farms in program to maximize open areas. Provide incentives for management for (1) short grass foragers (kestrel, barn owl) or tall grass ground nesters (harrier, short-eared owl). Establish nest boxes in short grass areas. Encourage nest box placement in larger grassland areas. Consider purchase of grassland habitat for gamelands in southern or western counties.	Establish or restore grassland or pasture on 5000 acres or more in 10 years; Conserve remaining grassland farms at 2014 levels.	Number of acres of restored or conserved pasture/grassland.	Use Breeding Bird Survey and Winter Raptor Survey data to monitor status of species over time by region. Work with PA Farmland Raptor Project or AK Partnership to monitor number of nest box programs and their productivity	1

Action Location: Physiographic Province: Piedmont

Associated Species: Henslow's Sparrow, Grasshopper Sparrow, Eastern Meadowlark, Barn Owl

THREATS AND ACTIONS

IUCN Threat: 2.0 Agriculture and Aquaculture

Season: Breeding

Specific Threat: Intensification in agriculture and shift to row crops; greater use of pesticides and herbicides reducing insect prey. Use of highly toxic rodenticides such as brodifacum.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Develop recommendations for farmland management to encourage less pesticide, herbicide use, and reversion to lower impact rodenticides. Farmer education campaign to create wildlife-friendly farmland.	Reduce pounds of pesticides and herbicides used per 100 acres of farmland by 30% in 10 years.	Number of successful nesting attempts by Kestrels per 100 acres by county	Use Breeding Bird Survey and Winter Raptor Survey data to monitor status of species over time by region. Work with PA Farmland Raptor Project or AK Partnership to monitor number of nest box programs and their productivity; monitor acres of wildlife friendly farms over time	1

Action Location: Physiographic Province: Statewide

Associated Species: Eastern Meadowlark, Barn Owl, Grasshopper Sparrow, monarch butterfly , honey bee

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Conversion from pasture/alfalfa to corn/soybeans reduces habitat quality.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Work with Department of Agriculture to create incentives for pasture or hay crops across the state; Provide information on impacts of herbicides and pesticides on wildlife to farmers to encourage less use on corn and soybean and more wild spaces.	Increase pasture or hay crop acreage in state by 5% per year over next 10 years	Acres of pasture or hay crops versus acres corn and soybean	Monitor grassland bird numbers using Breeding Bird Survey; monitor acres in pasture with dept. of agriculture data.	1

Action Location: Physiographic Province: Statewide

Associated Species: Ring-necked Pheasant, Eastern Meadowlark, Barn Owl, Bobolink

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Fragmentation and disturbance of field habitats primarily in northern counties.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach Encourage energy developers in Marcellus region to cluster well access points and infrastructure to minimize disturbance of pasture land.	Reduce number of new drilling operations in important grassland habitats by 10% in next 10 years (use row crops instead).	Marcellus Shale well distribution. Acres of undisturbed grassland or pastureland per region.	Monitor grassland habitat area per region and number of fields with wells. Monitor kestrel distribution through Shale drilling area using road surveys.	2

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Eastern Meadowlark, Barn Owl, Grasshopper Sparrow, Northern Harrier, Short-eared Owl

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Competition for nest boxes with European Starling.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Work with Conservation Districts and Department of Agriculture to educate farmers on reducing West Nile Virus exposure on their properties; Work with nest box programs to reduce starling infestations by nest box placement and cleaning practices	Decrease or limit use of nest boxes by starlings by 30% in next 10 years; reduce occurrence of West Nile virus in agricultural areas by 10% in next 10 years.	25% less box occupancy by starlings; decrease WNV annual infection rates for wild birds below 2014.	Monitor wild bird infection rates from rehab center reporting and from Dept. of Ag. Veterinary labs., monitor box occupancy by kestrels in all state box programs	2

Action Location: Physiographic Province: Statewide

Associated Species: Barn Owl, Eastern Meadowlark, Ring-necked Pheasant

RESEARCH NEEDS

1. Breeding- Assess adult survivorship and mortality rates and causes in grassland and row crop habitats. Compare by sex.

2. Breeding- Assess the impacts of modern day farming pesticides and herbicides as well as rodenticides on prey diversity and abundance n kestrel nesting areas, and the level of exposure in current kestrel populations.

3. Breeding- Evaluate nest success in current nest box programs in relation to habitat cover in different areas of state.

SURVEY NEEDS

1. Breeding- Survey city environments (Philadelphia and Pittsburgh) for evidence and abundance of urban kestrel populations.

2. Breeding- Encourage or continue winter raptor surveys within winter range for Pennsylvania nesting birds to assess winter range by sex and to provide additional monitoring tool for Pennsylvania population.

3. Breeding- Monitor use of agricultural pesticides and herbicides and rodenticides across the state and their potential impacts.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
American Kestrel nest box programs	Hawk Mountain Sanctuary Association; American Kestrel Partnership, private banders	http://kestrel.peregrinefund.org http://www.hawkmountain.org	Many people maintain kestrel nest box networks that they monitor for nest success and band young; Hawk Mt's was established in 1960s. Partnership is new effort to coordinate across continent.
National Audubon Society Christmas Bird Counts	National Audubon Society	http://birds.audubon.org/christmas-bird-count	Since 1900, this is an annual winter survey of more than 2,300 count circles worldwide. The longest running Citizen Science survey in the world, Christmas Bird Count provides critical data on population trends.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

MONITORING PROGRAMS

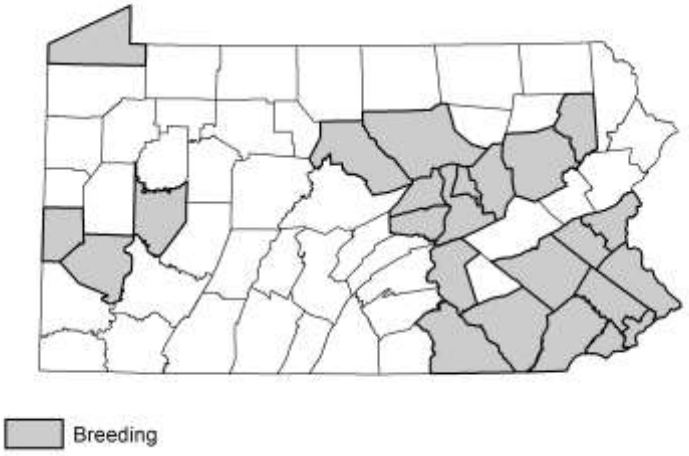
Program Name	Lead Agency	Hyperlink	Description
PA Winter Raptor Surveys	Pennsylvania Society for Ornithology and HMANA	http://www.pabirds.org	Roadside counts during winter months of raptors, conducted by volunteers and analyzed annually in PA Birds magazine.
Raptor Population Index, HMANA	Hawk Migration Association of North America	http://www.rpi-project.org	Trends in migrating birds evaluated biannually by partnership. Trends in sites to south of PA in part represent trends in PA migrating population.

Peregrine Falcon

Falco peregrinus

F. Arthur McMorris
Pennsylvania Game Commission

Photo: Joe Kosack



CONSERVATION PROFILE

Global Rank	**G4**	State Rank	**S1B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Endangered**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**46 nesting pairs**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Achieve a state de-listing threshold: namely, when the total number of cliff-nesting pairs plus 25% of the pairs nesting on man-made structures equals half the historic total (i.e., equals 22), at least half the pairs produce fledglings, and productivity equals at least 1.5 fledglings per occupied nest, for at least 3 consecutive years (Brauning et al., 2013).

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Urban/Suburban Built**	**Cliff and Talus**
Habitat	**Developed (NLCD 21-24 & 31)**	

Specific Habitat Requirements:

Nesting requires tall structures to provide nest security and open areas for foraging. Large cliffs across the state, most often associated with rivers, were formerly (pre-DDT) the predominant habitat for nesting; now used to a more limited extent. At present, most nests are on tall man-made structures: large and medium-sized bridges, tall buildings, and other tall structures (e.g. smokestacks, water towers). Open areas distant from nest site are used for hunting during the non-nesting season; these include agricultural areas and areas hosting large concentrations of avian prey (e.g. wintering waterfowl).

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: (i) Nesting on man-made structures (buildings, bridges, smokestacks, water towers, etc.) exposes nesting birds to human presence from many sources, such as maintenance and repair of structure or associated equipment, potentially resulting in nest failure, abandonment, or loss of nest site (due to modification or demolition of structure); (ii) Nesting in urban/commercial/industrial environment puts young at risk of death from collision (with buildings, especially glass; or with aircraft at nearby airports), electrocution on power lines, etc.; (iii) bridge/building site often inadequate for successful nesting & fledging; (iv) urban environment exposes young to lethal infection by Trichomonas carried by feral pigeons; (v) recreational rock climbing can limit adoption and success of cliff nesting; (vi) nests in active rock quarries are exposed to disturbance by quarrying activities; (vii) urban location of nests exposes adults and young to avicides used to control "pest" species (e.g. feral pigeons), which are frequent prey items; (viii) Human presence resulting from development and urban sprawl can degrade suitability of formerly-remote cliffs for nesting.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach (i) Negotiations with site owners/managers and legal restrictions; (ii) rescue and rehabilitation, especially at time of fledging; (iii) provision of nest boxes or other enhancements; (iv) disease diagnosis and medication during banding visit to nest; (v) negotiation with site managers to close cliff to climbing during nesting season; (vi) Negotiations with site owners/managers and legal restrictions; (vii, viii) education of site owners/managers, negotiations, and legal restrictions.	(i) Reduce disturbance;(ii) reduce mortality; (iii) improve nesting and fledging success; (iv) control disease; (v, vi) reduce disturbance; (vii) remove threat; (viii) reduce disturbance.	(i) Number of occupied nests that are successful; (ii) reduced number of injuries/mortalities; (iii) number of occupied nests that are successful; (iv) reduced mortality from disease; (v) number of occupied & successful nests on cliffs; (vi) reduced nest failure/abandonment; (vii) reduced avicide use; (viii) number of occupied & successful nests on cliffs.	Monitor nesting pairs to document site occupancy, nesting success and productivity, and mortality of young and adults. Monitoring done by agency personnel and volunteers coordinated by agency. Timeline: ongoing; continue >10 years.	1

Action Location: Physiographic Province: Statewide

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Injury or death from vehicle collisions

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Monitoring and rescue of young during early post-fledging period; attempt to attract parental birds to safer nesting location with nest box/tray; relocate pre-fledged young to safer location at appropriate age.	Reduce fledgling mortality	Number of fledglings that survive 30 days after fledging.	Monitor nest and vicinity from time of fledging to 30 days after fledging; rescue fledglings from life-threatening situations; rehabilitate injured fledglings. Timeline: ongoing; continue > 10 years.	1

Action Location: Physiographic Province: Statewide

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Adults and young are exposed to a huge array of pollutants that are pervasive in the environment.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Legislation to control release of harmful pollutants into the environment.	Reduce morbidity & mortality	Nest success and productivity; longevity and fecundity of adults.	Testing of unhatched eggs, prey remains, or feather samples, collected during banding visit to nest, for contaminants.	1

Action Location: Physiographic Province: Statewide

THREATS AND ACTIONS

IUCN Threat: 10.0 Geological Events

Season: Breeding

Specific Threat: Geological events, storms, and vegetation overgrowth can degrade quality of cliff ledges for nesting.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Clearing of excess vegetation and debris from historically-used nest ledges.	Improve ledge suitability for nesting	Increased adoption of cliff sites by peregrines for nesting	Monitoring of cliffs to document nesting	2

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont, Ridge and Valley

Associated Species: Common Ravens

RESEARCH NEEDS

1. Breeding- Annually inventory nesting population and monitor all nesting peregrines state-wide. Band all young produced in PA nests.

2. Breeding- Evaluate contaminant load in population by conducting chemical analyses on unhatched eggs and, where appropriate, feather samples.

3. Breeding- Determine why re-colonization of cliffs for nesting is proceeding slowly.

SURVEY NEEDS

1. Breeding- Survey all historic nesting cliffs for nesting peregrines. Survey tall man-made structures (bridges, buildings, etc.) for new nesting pairs.

2. Breeding- Encourage volunteer participation with searches for nest sites on cliffs with or without previous history of falcon occupancy.

3. Breeding- Monitor Peregrine Falcon migrant numbers at the regular hawk watch sites.

MONITORING PROGRAMS

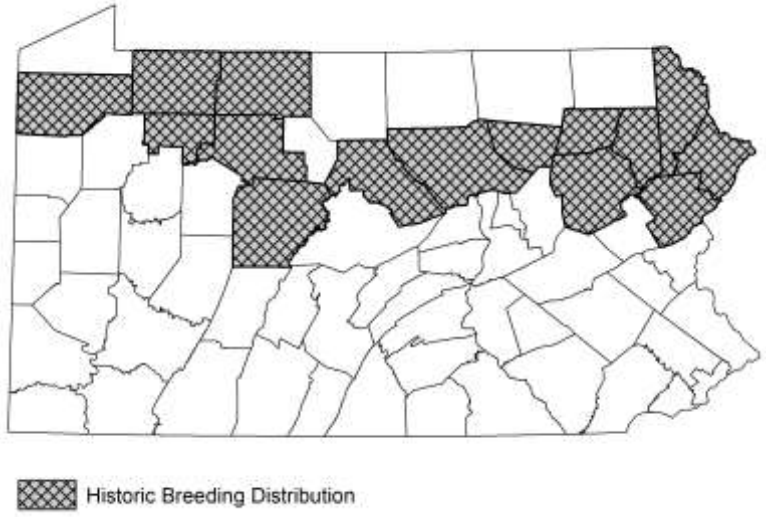
Program Name	Lead Agency	Hyperlink	Description
Pennsylvania Peregrine Falcon Management Program	Pennsylvania Game Commission	https://www.portal.state.pa.us/portal/server.pt/document/1333817/peregrine_falcon_management_plan_pdf http://www.portal.state.pa.us/portal/server.pt?open=514&objID=563596&mode=2	All known peregrine falcon nesting sites are monitored throughout the nesting season for nesting activity and nesting results. Potential new nest sites (natural and man-made) are regularly searched for. Nests are visited wherever possible to verify nest results, perform medical exams on young, and band young. Nests are monitored during fledging period to reduce fledgling mortality. Re-sights of banded birds are recorded to map movements, longevity, and entry of young into the breeding population. Longevity and fecundity of adults are monitored and recorded. Negotiations are conducted with property owners/managers to protect peregrines, especially while nesting. Threats are evaluated and managed. Program is ongoing.

Olive-sided Flycatcher

Contopus cooperi

Douglas A. Gross
Pennsylvania Game Commission

Photo: Lauri Shaffer/ BirdingPictures.com



CONSERVATION PROFILE

Global Rank	**G4**	State Rank	**Data Deficient (B)**
IUCN Red List	**NT Near Threatened**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Reestablish breeding population in Pennsylvania by 2025. Maintain passage migrant population.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Swamp**	**Northern Hardwood & Conifer**
Habitat	**North-Central Appalachian Acidic Swamp**	**Appalachian (Hemlock)-Northern Hardwood Forest**

Specific Habitat Requirements:

A characteristic member of the North American boreal conifer forest bird community, it is most strongly associated with the northern conifer forests that extend into Pennsylvania and down the Appalachian Mountains at higher elevations. Nests in both mature forests and forest edge or burned over areas. Often found in bogs, semi-open forest, and the edges of wetlands, ponds, and forest. Territories include conifers such as spruces, tamaracks, hemlocks, and firs, but also deciduous trees such as maples, aspens, and mountain ash.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Deforestation linked to decline and disappearance of species, but it is unknown why it has not recolonized from "rescue effect" since it is a regular passage migrant and forests have recovered substantially since extirpation. Marcellus shale, shallow oil well, and wind energy infrastructure permanently replaces or fragments forest.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase spruce, hemlock, and fir forest acreage and number of blocks.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	1
Make boreal conifer forest management a priority in appropriate areas; conserve mature spruce / hemlock / fir forest, release spruce seedlings & saplings, plant spruce & fir seedlings to fill conifer forest gaps and increase conifer component in appropriate locations.					

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC6 Watershed: U. Susquehanna, W. Br. Susquehanna, U. Delaware

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

RESEARCH NEEDS

1. Breeding- What are the limiting factors for this species across its range leading to its long-term decline?

2. Breeding- Are there forest conditions in the region and nearby regions (that would allow rescue effect) that do not allow this species to breed in the Appalachian Mountains including Pennsylvania?

3. Breeding- What are the linkages between eastern populations of OSFL and wintering grounds in South and Central America?

SURVEY NEEDS

1. Breeding- Locate any breeding populations in the state (Now considered Extirpated, no confirmed records since 1930's). Includes active searches at best potential sites.

2. Breeding- Establish off-road point counts for boreal conifer forest guild species similar to Mountain Bird Count project at some locations with a history of breeding OSFL.

3. Breeding- Establish off-road point forest bird counts in large forest blocks as part of state network of point counts (not as technical as Mountain Bird Count).

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Mountain Bird Watch	Vermont Center for Ecostudies	http://vtecostudies.org/projects/mountains/mountain-birdwatch/	Mountain Birdwatch (MBW) monitors songbirds that breed in the montane fir and spruce forests of the Northeast. MBW data provide the only region-wide source of population information on these high-elevation breeding birds. MBW's primary focus is Bicknell's Thrush, a montane fir specialist that breeds only in the northeastern U.S. and adjacent areas of Canada, but this project also tracks nine other high-elevation avian breeders, red squirrels, and the conifer seeds that these avian nest predators eat. A PA version of this project will not include Bicknell's Thrush and will focus on state priority mountain forest species for the PA and the Appalachian Mountains.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

MONITORING PROGRAMS

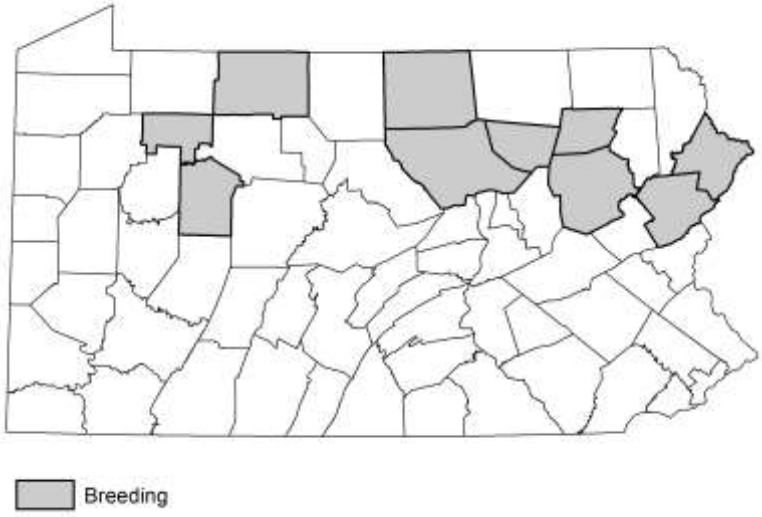
Program Name	Lead Agency	Hyperlink	Description
Yellow-bellied Flycatcher / Rare Mountain Forest Bird Studies and Conservation	Pennsylvania Game Commission / Cornell Laboratory of Ornithology	http://www.portal.state.pa.us/portal/server.pt?open=514&objID=621014&mode=2	Area searches in targeted locations with history of mountain forest bird breeding populations. Geospatial and behavioral data collected for each location / territory found for priority species: Yellow-bellied Flycatcher, Blackpoll Warbler, Olive-sided Flycatcher, Swainson's Thrush, Red Crossbill, Pine Siskin.

Yellow-bellied Flycatcher

Empidonax flaviventris

Douglas A. Gross
Pennsylvania Game Commission

Photo: Doug Gross



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S1B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Endangered**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**< 25 pairs**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

50 Yellow-bellied Flycatcher territorial pairs in at least 5 locations by 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Swamp**	**Northern Peatland & Fens**
Habitat	**North-Central Appalachian Acidic Swamp**	**North-Central Interior and Appalachian Acidic Peatland**

Specific Habitat Requirements:

Cool, shady conifer-dominated forested wetlands and conifer forests. Nest sites are associated with conifer cover (spruce, hemlock), sphagnum moss cover, numerous shrubs and saplings, and a rich layer of ground herbs, species typical of boreal forests (goldthread, starflower, bunchberry, creeping snowberry). Ferns can be numerous. There can be canopy gaps and territories can have less than 50% canopy cover and many deciduous trees.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Marcellus shale, shallow oil well, and wind energy infrastructure permanently replaces or fragments forest.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Protect high quality and larger blocks of boreal and northern conifer forest including wetlands with PNDI and best management practices of forested wetlands.	Protect core habitat areas for endangered and threatened species.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	1

Action Location: Physiographic Province: Appalachian Plateaus
HUC8 Watershed: U. Susquehanna, U. Delaware, U. Susquehanna-Tunkhannock

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Permanent deforestation and replacement of conifer with deciduous forest.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase spruce, hemlock, and fir forest acreage and number of blocks.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	1
Make boreal conifer forest management a priority in appropriate areas; conserve mature spruce / hemlock forest, release spruce seedlings & saplings, plant spruce & fir seedlings to fill conifer forest gaps and increase conifer component in appropriate locations.					

Action Location: Physiographic Province: Appalachian Plateaus
HUC8 Watershed: U. Susquehanna, U. Delaware, U. Susquehanna-Tunkhannock

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Conversion of palustrine wetlands to open water or uplands.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Protect boreal conifer swamps from flooding or conversion.	Number of swamps not flooded or converted.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	1
Avoid destruction of conifer swamps by damming or increasing water levels.					

Action Location: Physiographic Province: Appalachian Plateaus
HUC8 Watershed: U. Susquehanna, U. Delaware, U. Susquehanna-Tunkhannock

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Residential and road development replaces forest and wetlands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Promote forest conservation even where there is light development while protecting known locations through PNDI / environmental review process.	Protect boreal conifer forest and swamps.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	2

Action Location: Physiographic Province: Appalachian Plateaus
HUC8 Watershed: U. Susquehanna, U. Delaware, U. Susquehanna-Tunkhannock

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Road-building and right-of-way removal of forest and wetlands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Protect high quality and larger blocks of boreal and northern conifer forest including wetlands with PNDI and best management practices of forested wetlands.	Protect core habitat areas for endangered and threatened species.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	2

Action Location: Physiographic Province: Appalachian Plateaus
HUC8 Watershed: U. Susquehanna, U. Delaware, U. Susquehanna-Tunkhannock

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Deer browsing is oversimplifying the forest species diversity and structure. Invasives are decreasing health and vigor of hemlocks and other conifers.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Maintain vegetation complexity of forest around boreal swamps.	Retain current population size and number of locations occupied by breeding birds. Number of points along transects in habitat blocks.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	2
Maintain healthy forests with good regeneration and complex vegetative structure and diversity through deer management. Treat hemlock woolly adelgid and related conifer pests at high priority locations.					

Action Location: Physiographic Province: Appalachian Plateaus
HUC8 Watershed: U. Susquehanna, U. Delaware, U. Susquehanna-Tunkhannock

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Decrease in insects and other prey items composed of a lot of calcium.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Decrease acidification of the soil by liming or other means in addition to standard air pollution regulations.	Maintain high nest success rate in monitored locations.	Nest success rate of known territories remain above 50%.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	2

Action Location: Physiographic Province: Appalachian Plateaus
HUC10 Watershed: Upper Loyalsock Creek, Mehoopany Creek, Bowman's Creek, Cherry Run (ANF), Lycoming Creek.

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Palustrine wetlands are reduced in health and vigor where conifers grow that this and other species are dependent. Northern conifers will be stressed by warmer conditions.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Retain and promote conifer forest vegetation as a means to counteract the effects of climate change since forests are relatively resilient to the factors expected.	Direct Management of Natural Resources	No net loss of populations.	Retain current population size and number of locations occupied by breeding birds. Number of points along transects in habitat blocks.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	2

Action Location: Physiographic Province: Appalachian Plateaus
HUC8 Watershed: U. Susquehanna, U. Delaware, U. Susquehanna-Tunkhannock

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

RESEARCH NEEDS

1. Breeding- What is the continued breeding population, habitat, and persistence, & nesting success in YBFL in Pennsylvania? The species seems to persist despite limited range and population.

2. Breeding- What management approaches can maintain and increase the possibility of this boreal forest species and its ecosystem cohorts to continue in Pennsylvania?

3. Breeding- What are the limiting factors for this species through its full life cycle? What linkages can be ade between the NE USA and its Middle American wintering ground?

SURVEY NEEDS

1. Breeding- Continuous monitoring of known and recent breeding populations including breeding confirmation, success, habitat association, continuity of occupation.

2. Breeding- Find undiscovered or new locations that may have been overlooked or newly colonized, allowing study of population and protection of site.

3. Breeding- Establish off-road point counts for boreal conifer forest guild species similar to Mountain Bird Count project.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Mountain Bird Watch	Vermont Center for Ecostudies	http://vtecostudies.org/projects/mountains/mountain-birdwatch/	Mountain Birdwatch (MBW) monitors songbirds that breed in the montane fir and spruce forests of the Northeast. MBW data provide the only region-wide source of population information on these high-elevation breeding birds. MBW's primary focus is Bicknell's Thrush, a montane fir specialist that breeds only in the northeastern U.S. and adjacent areas of Canada, but this project also tracks nine other high-elevation avian breeders, red squirrels, and the conifer seeds that these avian nest predators eat. A PA version of this project will not include Bicknell's Thrush and will focus on state priority mountain forest species for the PA and the Appalachian Mountains.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

MONITORING PROGRAMS

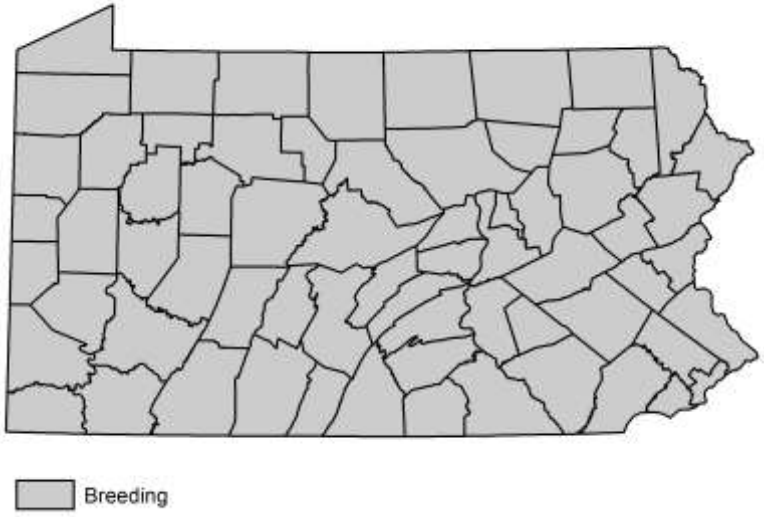
Program Name	Lead Agency	Hyperlink	Description
Yellow-bellied Flycatcher / Rare Mountain Forest Bird Studies and Conservation	Pennsylvania Game Commission / Cornell Laboratory of Ornithology	http://www.portal.state.pa.us/portal/server.pt?open=514&objID=621014&mode=2	Area searches in targeted locations with history of mountain forest bird breeding populations. Geospatial and behavioral data collected for each location / territory found for priority species: Yellow-bellied Flycatcher, Blackpoll Warbler, Olive-sided Flycatcher, Swainson's Thrush, Red Crossbill, Pine Siskin.

Willow Flycatcher

Empidonax traillii

Sarah Sargent
Audubon Pennsylvania

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**270000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Increase estimated population by 10%, from 250,000 males (from Breeding Bird Survey, PIF 2013) to 275,000, by 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Wet Meadow / Shrub Marsh**	**Agricultural**
Habitat	**Laurentian-Acadian Wet Meadow-Shrub Swamp**	**Agriculture (NLCD 81-82)**

Specific Habitat Requirements:

Low-elevation shrub swamp, wet meadow, and brushy habitats along streams and the edges of ponds and marshes; sometimes dry upland sites.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Land use conversion from brushy, wet meadows to housing or other development. Creation of ponds or draining of wet, brushy areas.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning 1. Limit or prevent development in suitable habitat. 2. Enforce wetland protection. 3. Discourage pond creation in shrubby wetlands.	No net loss of habitat.	Assess habitat available by region using GIS, focusing on regions under most development risk. Reassess at intervals.	Use GIS to track development and habitat conversion. Track implementation of habitat management projects by different organization.	1

Action Location: Physiographic Province: Atlantic Coastal Plains, Central Lowland, New England, Piedmont, Ridge and Valley
HUC4 Watershed: Statewide

Associated Species: American Woodcock, Mourning Warbler, Swamp Sparrow.

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Control of woody vegetation in utility rights-of-way.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Negotiate with powerline/pipeline companies to allow soft edges and shrub component within at least certain portions of rights-of-way.	Get at least 3 major companies to adopt bird friendly ROW maintenance standards in PA.	Number of miles of ROW managed under new standards.	Conduct follow up study on bird abundance or productivity in ROWs under new management. Spot check implementation quality by companies.	2

Action Location: Physiographic Province: Atlantic Coastal Plains, Central Lowland, New England, Piedmont, Ridge and Valley
HUC4 Watershed: Statewide

Associated Species: Prairie Warbler, Eastern Towhee, Brown Thrasher

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Loss of shrubby habitat to forest succession.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Maintain or increase area of suitable habitat in regions of the state where this species occurs.	Assess habitat available by region using GIS, focusing on regions under most development risk. Reassess at intervals.	Develop coordinated system for assessing land area in shrublands for at least some portions of the state.	2
Create or restore habitat on state lands and through cost share programs for private landowners.					

Action Location: Physiographic Province: Atlantic Coastal Plains, Central Lowland, New England, Piedmont, Ridge and Valley
HUC4 Watershed: Statewide

Associated Species: American Woodcock, Mourning Warbler, Swamp Sparrow.

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Overbrowsing limits shrub and sapling density.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Reduce browsing pressure enough to allow shrub and sapling growth.	Assess browse damage in systematic way in representative habitats in each WMU.	Annual browse damage survey conducted systematically in shrubland habitat.	3
Control deer herd through hunting.					

Action Location: Physiographic Province: Atlantic Coastal Plains, Central Lowland, New England, Piedmont, Ridge and Valley
HUC4 Watershed: Statewide

Associated Species: All forest and shrub dependent species.

RESEARCH NEEDS

1. Breeding- Habitat Associations: Assess the relative contributions of wet vs. upland habitats used by this species. Perhaps use BBA point count data, assess vegetation within 100m of points with WIFL.

2. Breeding- Mortality factors: Investigate sources of nest mortality in different habitats. Are upland habitats just as productive as wetter ones, or less?

3. Breeding- Investigate the effect of habitat management for other priority species (such as American Woodcock) on Willow Flycatchers.

SURVEY NEEDS

1. Breeding- Riparian shrubland monitoring especially in Important Bird Areas.

2. Breeding- Conduct post-treatment surveys of silvicultural treatments to determine reaction of young forest and shrub species.

3. Breeding- Watershed quality monitoring of riparian bird species.

MONITORING PROGRAMS

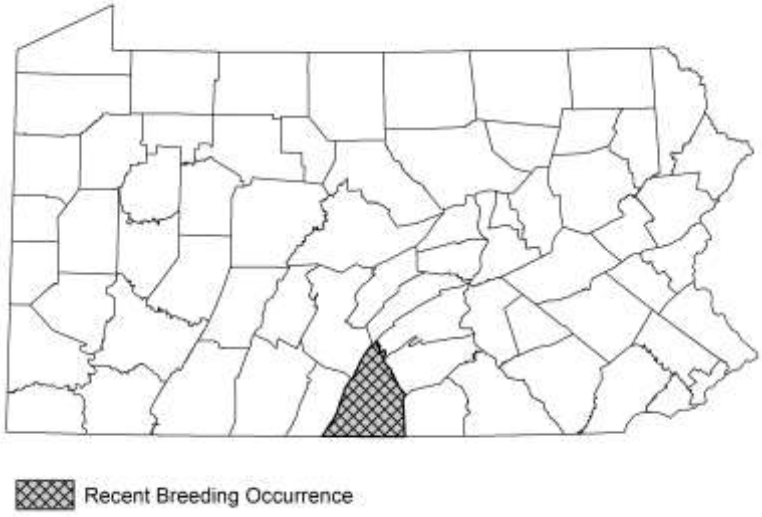
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Loggerhead Shrike

Lanius ludovicianus

Kathy Korber
Pennsylvania Game Commission

Photo: Dave Menke



CONSERVATION PROFILE

Global Rank	**G4**	State Rank	**S1B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Endangered**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**Apparently extirpated**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Determine population status of the species and protect/manage nesting sites where found. Re-establish a breeding population of at least 10 nesting pairs annually within Pennsylvania by 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Agricultural**	
Habitat	**Agriculture (NLCD 81-82)**	

Specific Habitat Requirements:

Open country with short grasses and forbs of low stature interspersed with bare ground and shrubs or small trees.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: "Appears to be currently "extirpated" from PA"

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Maintain and possibly expand the existing suitable habitat in all historical and recent Loggerhead Shrike population areas.	Provide suitable breeding habitat in areas where there is potential for reappearance.	Presence/absence of species	Analyze BBS and CBC population data, eBird.	1

Action Location: Physiographic Province: Piedmont, Ridge and Valley

Associated Species: Northern Bobwhite, Short-eared Owl, Upland Sandpiper, Dickcissel, Henslow's Sparrow, Northern Harrier, Barn Owl, Eastern Meadowlark, Grasshopper Sparrow

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: "Appears to be currently "extirpated" from PA"

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Restore Loggerhead Shrike breeding habitat in the south central region by cutting overgrown and woody vegetation on SGL in areas of historic and recent occurrence. Maintain essential foraging and nesting habitat features including potential hunting perch sites and suitable nest trees and shrubs.	Maintain suitable habitat for grassland and shrubland species.	Presence/absence of species	Analyze BBS and CBC population data, eBird.	1

Action Location: Physiographic Province: Piedmont, Ridge and Valley

Associated Species: Northern Bobwhite, Short-eared Owl, Upland Sandpiper, Dickcissel, Henslow's Sparrow, Northern Harrier, Barn Owl, Eastern Meadowlark, Grasshopper Sparrow

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Mortality from vehicle collision

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning For specific sites in the Northeast where it is important to maintain a given shrike territory, landscape features that could attract activity to roadways, such as perches and potential nesting trees near highways, might be eliminated if similar features occur away from roadways. (NatureServe, 2014).	Reduce mortality resulting from collisions with vehicles.	Presence/absence of species	Analyze BBS and CBC population data, eBird.	3

Action Location: Physiographic Province: Piedmont, Ridge and Valley

RESEARCH NEEDS

1. Breeding- Investigate and document all reports of loggerhead shrike during nesting season; determine species status as a PA breeding bird; enter sighting locations into Pennsylvania Natural Diversity Inventory (PNDI).

2. Breeding- Gain a better understanding of the landscape composition and habitat characteristics required for LOSH breeding habitat.

3. Breeding- Evaluate feasibility of possible reintroduction.

SURVEY NEEDS

1. Breeding- Encourage searches for LOSH by Pennsylvania birding community; working with LOSH Working Group.

2. Breeding- Conduct annual surveys during nesting season to confirm extirpation or document reoccurrence of breeding loggerhead shrike in the state. Searches should concentrate on suitable habitat in areas of most recent reports such as Cumberland, Franklin, Adams and Lancaster counties.

MONITORING PROGRAMS

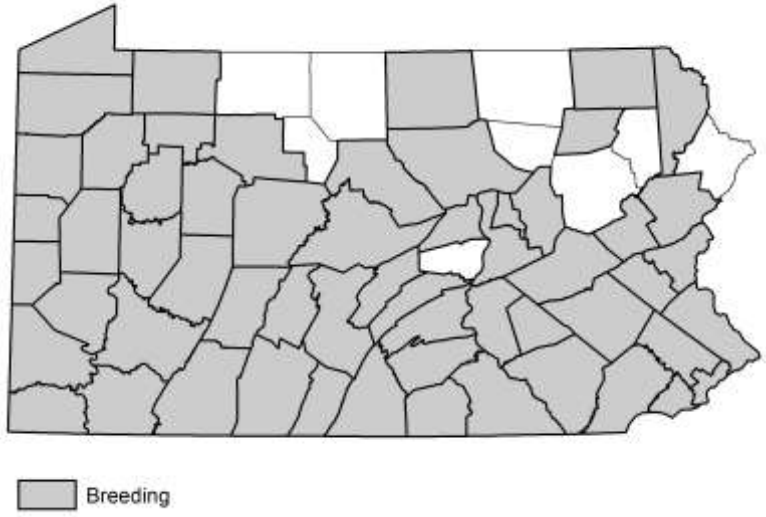
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Loggerhead Shrike searches based on observation reports	Pennsylvania Game Commission		Follow-up surveys based on reports submitted to eBird, PA Birds Listserve and other sources.
Loggerhead Shrike Working Group	Partners in Flight		An informal working group consisting of partners from the U.S. and Canada, has been coordinating a regional approach to answering questions on the population ecology of Loggerhead Shrike on its breeding and wintering grounds within the framework of an initial 5-year plan.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Purple Martin

Progne subis

Bob Aeppli, Joe Siegrist
Purple Martin Conservation Association

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**15000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

20% increase in the number of active colonies throughout Pennsylvania within the next ten years.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Agricultural**	
Habitat	**Agriculture (NLCD 81-82)**	

Specific Habitat Requirements:

Having nearby water sources is not necessary in a Purple Martins habitat, however it can be helpful as a food source. Martin housing should be placed in the most open spot available (at least 40', but preferably 60' from trees or buildings) and within 100' of human housing or activity. Proximity to humans and a wide-open location and flight area will help protect the martins from predators.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Availability of nesting locations is decreasing.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach Education of the general public is key to combating this threat. Completed by using existing, and developing new, educational curriculum to be used by state parks and other organizations.	Complete development of educational programs by 1/31/2016.	Completion of 200 Purple Martin specific educational programs within the next ten years.	Monitoring can be completed through the use of three Programs. The Purple Martin Conservation Associations (PMCA) Colony Registration program, The Breeding Bird Survey and The PA Breeding Bird Atlas. Breeding Bird Survey and PA Atlas protocols should be used. Annually for the next ten years for the different surveys. The PMCA's Colony Registration is a live web-based program.	1

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: None

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Specific prolonged weather events have been shown to cause major problems in reproductive success.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Actively manage martin colonies so that problems can be readily identified.	Educate about and encourage the need for best management practices and invasive species control throughout the breeding season. Management would include supplemental feeding in times of low prey density and housing modifications to moderate temperature extremes. This is ongoing for the last 10 years.	Improved reproductive success during seasons experiencing inclement weather.	Using the PMCA's Project Martin Watch Study reproductive success can be measured throughout the state from year to year.	1

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: None

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Decrease in insect prey

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Complete additional research pertaining to the effects that pesticide usage and the decline of flying insect populations will have on Purple Martins.	Assess the decline of flying insect populations within the next 6 years and provide management recommendations within the next 10 years.	Completion of research and management plan.	Annual reports of research progress.	3

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Aerial Insectivores

RESEARCH NEEDS

1. Breeding- What is the general makeup of a Purple Martin landlord. What drives an individual to supply martin housing and manage an active colony.

2. Breeding- How is the decline in flying insect abundance affecting the reproductive success of Purple Martins.

3. Breeding- What are the habitat requirements of Purple Martins at migration stop-over locations throughout North, Central and South America.

SURVEY NEEDS

1. Breeding- Accurately document the locations of active and inactive Purple Martin colonies throughout the Commonwealth.

2. Breeding- Continued management and collection of reproductive data through Project MartinWatch.

MONITORING PROGRAMS

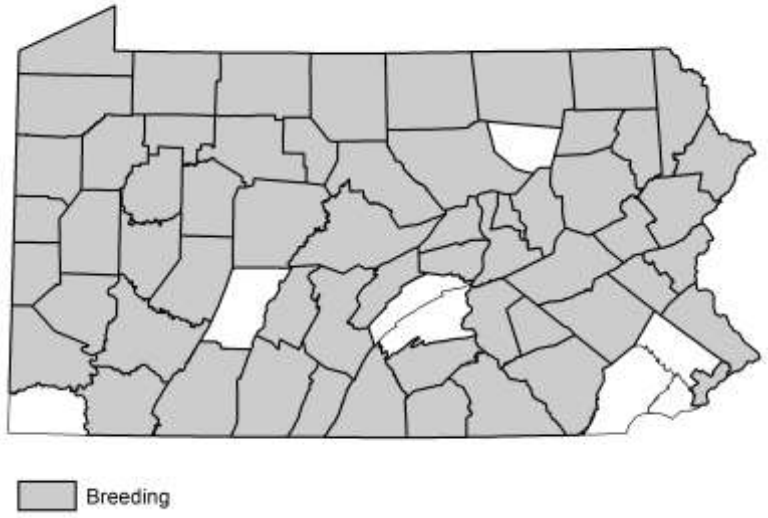
Program Name	Lead Agency	Hyperlink	Description
Colony Registration	Purple Martin Conservation Association	http://www.purplemartin.org/main/research.html	Colony Registration: Supplies a method for locating and mapping colonies throughout North America, while collecting other data such as colony age and size.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.
Project MartinWatch	Purple Martin Conservation Association	http://www.purplemartin.org/pmw/	Project MartinWatch-Reproductive success of Purple Martins at the colony site. Collects data such as parental age, first egg date, nest success.
Scout-Arrival Study	Purple Martin Conservation Association	http://www.purplemartin.org/scoutreport/	Documents first arrival dates of adult and subadult Purple Martins throughout North America.

Bank Swallow

Riparia riparia

Nathan J. Zalik
Pennsylvania Game Commission

Photo: Alan Vernon



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**13000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Maintain a stable number of nesting pairs with the number of colonies documented in the Second Atlas of Breeding Birds in Pennsylvania (Wilson et al. 2012), through 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Agricultural**	**Urban/Suburban Built**
Habitat	**Agricultural (NCLD 81-82)**	**Developed (NCLD 21-24 & 31)**

Specific Habitat Requirements:

Near-vertical banks/bluffs along rivers and streams w/sandy, compacted soils; sand quarries.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Habitat and nest site destruction in sand and gravel quarries.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Develop management guidelines and an educational program for the sand and gravel industry. In nesting locations, encourage workers to delay operations until after fledglings have left the nest. (Wilson 2010) Action Location: Physiographic Province: Statewide Associated Species: Northern Rough-winged Swallow	Development and distribution of education materials to all known active sand and gravel operations within the next ten (10) years.	Number of quarry operations made aware of Bank Swallow nesting requirements; Number of quarries implementing recommendations.	Follow up surveys at sand and gravel operations to determine bank swallow use and colony size.	1

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Climate change may alter the timing of insect emergences and abundance so that prey is less available during the nesting season or in migration.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Encourage legislation to limit greenhouse gas emissions. Maintain high quality, functional ecosystems that provide abundant invertebrate prey. Action Location: Physiographic Province: Statewide Associated Species: Nearly all species.	Reduction in greenhouse gas emissions.	Greenhouse gas emission levels.	Monitoring of greenhouse gas emissions.	1

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Breeding

Specific Threat: Recreational ATV use in sand and gravel quarries may destroy nests and/or suitable nesting habitat.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Develop management guidelines and an educational program for the sand and gravel industry. Describe nesting requirements of the species, and discourage ATV use in sand and gravel quarries used by Bank Swallows, especially during the nesting season. Action Location: Physiographic Province: Statewide Associated Species: Northern Rough-winged Swallow	Development and distribution of education materials to all known active sand and gravel operations within the next ten (10) years	Number of quarry operations made aware of Bank Swallow nesting requirements; Number of quarries implementing recommendations	Follow up surveys with sand and gravel operations to assess frequency of ATV use	2

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Reduced insect food supply caused by anthropogenic activities (e.g., pesticide use and acid precipitation).

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach Research is needed to assess the relationships between pesticides, flying insects, and aerial insectivores. Action Location: Physiographic Province: Statewide Associated Species: Common Nighthawk, Chimney Swift, Eastern Whip-poor-will, Purple Martin	Conduct research leading to best management practices by 2025.	Development of best management practices.	Regular assessments of research progress.	2

RESEARCH NEEDS

1. Breeding- Investigations into the relationships between pesticide use, flying insects, and aerial insectivores are needed.

2. Breeding- Assess persistence of Bank Swallow colonies in watersheds impacted by energy extraction industry or heavy pesticide use by agriculture.

3. Breeding- Assess response of Bank Swallow and other riparian birds to stream health especially as it relates to energy development (mostly shale drilling).

SURVEY NEEDS

1. Breeding- Identify and monitor large nesting colonies.

2. Breeding- Watershed quality monitoring of riparian bird species.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Brown Creeper

Certhia americana

Scott H. Stoleson
USDA Forest Service, Northern Research Station

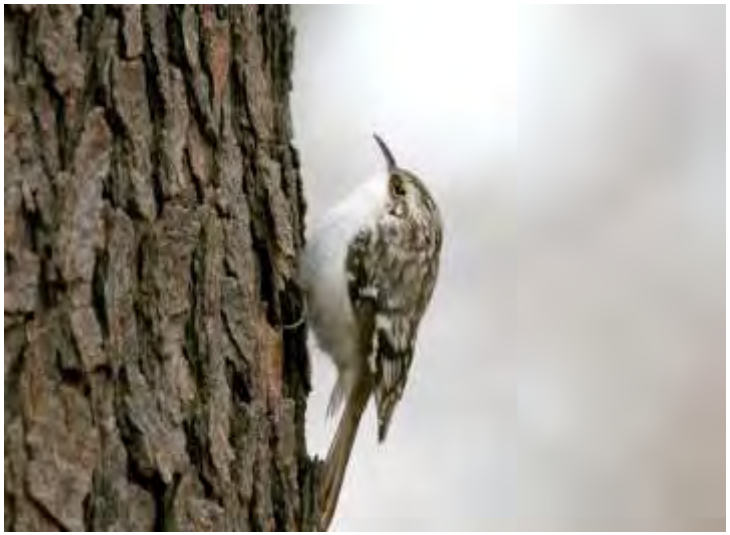
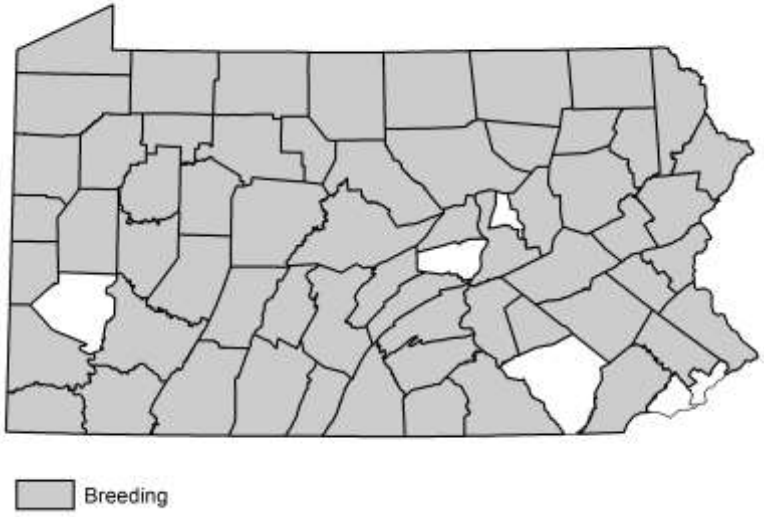


Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**68000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Maintain or increase the currently stable population of Brown Creepers in Pennsylvania, est. at 34,000 singing males (Wilson et al. 2012) through 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Hardwood & Conifer**	**Urban/Suburban Built**
Habitat	**Appalachian (Hemlock)-Northern Hardwood Forest**	**Developed (NLCD 21-24 & 31)**

Specific Habitat Requirements:

Requires dead trees with loose bark for nesting in late-successional forest.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Significant forest fragmentation from well-drilling sites, wind turbines, pipelines and roads

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Enforce regulations and codes prohibiting energy development in or adjacent to known occupied habitat	Create regulations that would maintain extensive conifer forest off-limits to energy development	Degree of fragmentation as quantified by FRAGSTATS	Assessment of new well/turbine locations in relation to known habitat	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Swainson's Thrush, Winter Wren, Blue-headed Vireo, northern flying squirrel

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Highly vulnerable to loss of hemlock to wooly adelgid and deer overbrowse.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Maintain current science-based deer policy in state; identify and disseminate biocontrol for HWA	Keep deer at levels that allow for conifer regeneration; reduce or eliminate HWA in areas in habitats with significant populations of SWTH	Hemlock regeneration, infestation rate, survival	Annual or semi-annual surveys of hemlock infestation, survival, and regeneration success in random sample of large hemlock-dominated tracts	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Swainson's Thrush, Winter Wren, Blue-headed Vireo, northern flying squirrel

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Habitat changes due to climate change likely to reduce or eliminate suitable habitat within state

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Legislation required at national level to reduce carbon emissions, promote or incentivize carbon sequestration	Reduce levels of atmospheric carbon to slow or reverse global climate change	Atmospheric carbon levels	Maintain existing atmospheric monitoring	1

Action Location: Physiographic Province: Statewide

Associated Species: Swainson's Thrush, Winter Wren, Blue-headed Vireo,

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Fragmentation from exurban development

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Develop landscape-level planning agreements across ownerships in areas where species occurs	Minimize fragmentation of current occupied habitat	Degree of fragmentation as quantified by FRAGSTATS	Use annual Breeding Bird Surveys to assess local (route/region)population trends	2

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Swainson's Thrush, Winter Wren, Blue-headed Vireo, northern flying squirrel

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Poor management converting mature conifer-dominated forest to young red maple, birch forest; loss of suitable nest sites with removal of larger snags

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection Develop and disseminate guidelines for preserving large core areas of mature conifer plus 100 m buffer	Establish minimum of 2 conservation areas of >250 ha annually for 10 yrs.	Acres preserved following guidelines	Use annual point counts in preserved core areas to monitor population levels of BRCR and other spp that use habitat	2

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Swainson's Thrush, Winter Wren, Blue-headed Vireo, northern flying squirrel

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Acid deposition depletes populations of invertebrate prey.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Legislation required at national level (since most of acid deposition originates west of PA) to reduce allowable levels of acid discharge	Reduce levels of acid deposition to level where invertebrates not depleted	Anion levels in precipitation	Maintain existing NOAA meteorological stations	2

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Wood Thrush, Veery, Ovenbird, Kentucky Warbler, Canada Warbler

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Roads, pipelines, and powerlines fragment forest and facilitate passage by brood parasites and mesopredators

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Designate & acquire conservation areas to maintain large unfragmented areas of mature conifer forest	Land and Water Rights Acquisition and Protection	Create 2-4 conservation areas, based on PA-BBA data, where most at risk of road/pipeline/powerline development	Acreage of mature conifer forest preserved	Use annual point counts in conservation areas to monitor population levels of BRCR and other spp that use habitat	3

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Swainson's Thrush, Winter Wren, Blue-headed Vireo, northern flying squirrel

RESEARCH NEEDS

1. Breeding- Evaluate Brown Creeper response to varying levels of habitat damage by hemlock woolly adelgid.

2. Breeding- Assess suitability of hemlock surrogates (e.g., Norway and red spruce, fir, larch) as Brown Creeper habitat to inform restoration efforts in areas hit hard by HWA.

3. Breeding- Assess response of Brown Creeper to various timber management practices.

SURVEY NEEDS

1. Breeding- Off road point counts in large-scale forests, mostly PA IBA's.

2. Breeding- Mountain Bird Watch extended to PA.

MONITORING PROGRAMS

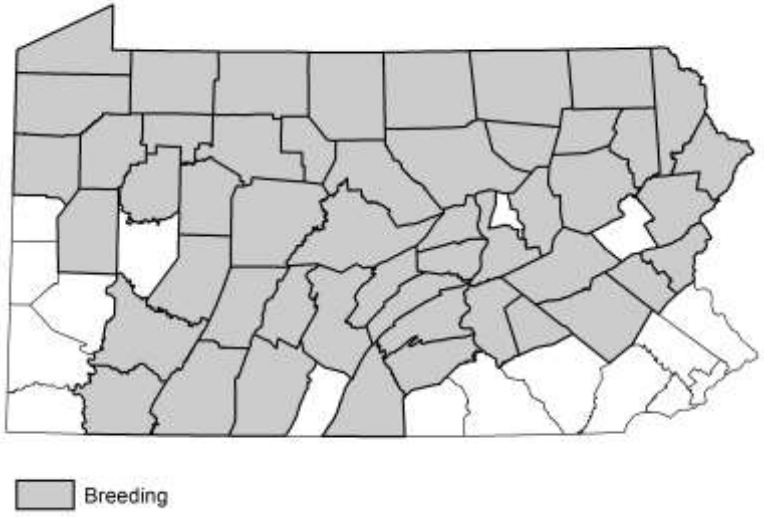
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations

Winter Wren

Troglodytes hiemalis

Scott H. Stoleson
USDA Forest Service, Northern Research Station

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**< 4 States / High Responsibility**	PA Abundance	**56000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Maintain or increase the currently stable population of Winter Wrens in Pennsylvania, est. at 32,000 singing males (Wilson et al. 2012) through 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Hardwood & Conifer**	
Habitat	**Appalachian (Hemlock)-Northern Hardwood Forest**	

Specific Habitat Requirements:

High elevation, coniferous/mixed forests, w/a substantial hemlock component. Nests often near water, particularly streams in hemlock ravines but sometimes near bogs or swamps; require substantial downed woody debris, standing dead trees, or large-diameter logs.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Significant forest fragmentation from well-drilling sites, pipelines and roads.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Enforce regulations and codes prohibiting energy development in or adjacent to known occupied habitat	Create regulations that would maintain extensive conifer forest off-limits to energy development	Degree of fragmentation as quantified by FRAGSTATS	Assessment of new well/turbine locations in relation to known habitat	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Brown Creeper, Swainson's Thrush, Blue-headed Vireo, northern flying squirrel

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Highly vulnerable to loss of hemlock to wooly adelgid and deer overbrowse.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Maintain current science-based deer policy in state; identify and disseminate biocontrol for HWA	Keep deer at levels that allow for conifer regeneration; reduce or eliminate HWA in areas in habitats with significant populations of SWTH	hemlock regen, infestation rate, survival	Annual or semi-annual surveys of hemlock infestation, survival, and regeneration success in random sample of large hemlock-dominated tracts	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Brown Creeper, Swainson's Thrush, Blue-headed Vireo, northern flying squirrel

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Habitat changes due to climate change likely to reduce or eliminate suitable habitat within state

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Legislation required at national level to reduce carbon emissions, promote or incentivize carbon sequestration	Reduce levels of atmospheric carbon to slow or reverse global climate change	Atmospheric carbon levels	Maintain existing atmospheric monitoring	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Wood Thrush, Veery, Ovenbird, Kentucky Warbler, Canada Warbler

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Fragmentation from exurban development

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Develop landscape-level planning agreements across ownerships in areas where species occurs	Minimize fragmentation of current occupied habitat	Degree of fragmentation as quantified by FRAGSTATS	Use annual Breeding Bird Surveys to assess local (route/region)population trends	2

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Brown Creeper, Swainson's Thrush, Blue-headed Vireo, northern flying squirrel

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Poor management converting mature conifer-dominated forest to young red maple, birch forest

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Establish minimum of 2 conservation areas of >250 ha annually for 10 yrs.	Acres preserved following guidelines	Use annual point counts in preserved core areas to monitor population levels of WIWR and other spp that use habitat	2
Develop and disseminate guidelines for preserving large core areas of mature conifer plus 100 m buffer					

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Brown Creeper, Swainson's Thrush, Blue-headed Vireo, northern flying squirrel

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Acid deposition depletes populations of invertebrate prey.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 100.0	Law and Policy	Reduce levels of acid deposition to level where invertebrates not depleted	Anion levels in precipitation	Maintain existing NOAA meteorological stations	2
Legislation required at national level (since most of acid deposition originates west of PA) to reduce allowable levels of acid discharge					

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Wood Thrush, Veery, Ovenbird, Kentucky Warbler, Canada Warbler

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Roads, pipelines, and powerlines fragment forest and facilitate passage by brood parasites and mesopredators

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Create 2-4 conservation areas, based on PA-BBA data, where most at risk of road/pipeline/powerline development	Acreage of mature conifer forest preserved	Use point counts in conservation areas to monitor population levels of WIWR and other spp that use habitat	3
Designate & acquire conservation areas to maintain large unfragmented areas of conifer forest					

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Brown Creeper, Swainson's Thrush, Blue-headed Vireo, northern flying squirrel

RESEARCH NEEDS

1. Breeding- Evaluate Winter Wren response to varying levels of habitat damage by hemlock woolly adelgid including suitability of hemlock surrogates (e.g., Norway and red spruce, fir, larch) as Winter Wren habitat to inform restoration efforts in areas hit hard by HWA.

2. Breeding- What are effects of energy and residential development on area-sensitve forest birds in the large forest blocks of the state?

3. Breeding- Determine Winter Wren responses to silvicultural practices.

SURVEY NEEDS

1. Breeding- Off road point counts in large-scale forests, mostly PA IBA's.

2. Breeding- Mountain Bird Watch extended to PA.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Sedge Wren

Cistothorus platensis

Richard Fritsky
Pennsylvania Game Commission

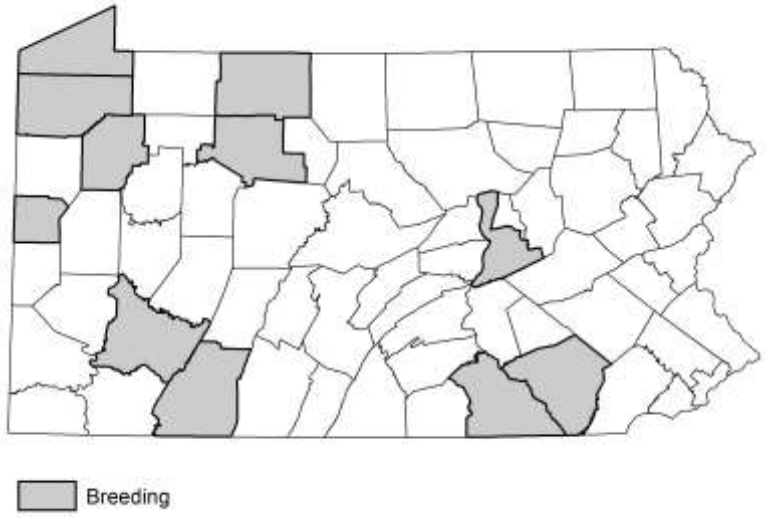
Photo: Andy Reago & Chrissy McClarren

CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S1B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Endangered**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**170**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Maintain species population in Pennsylvania at current levels (~2 nesting territories per year) through 2025.



HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Agricultural**	
Habitat	**Agriculture (NLCD 81-82)**	

Specific Habitat Requirements:

Densely-vegetated wet meadows, hayfields, retired croplands, and upland pond and lake margins, and in coastal, brackish marshes with limited standing water

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss of grassland and wetland habitat due to development

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Find and secure nesting colonies and individual nests.	Secure 20 nest sites each year.	Number of nest sites secured.	Count number of singing males during Breeding Season for the BBS annually for 10 years.	1

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Wetland habitat degradation by invasive exotic species (e.g. Phragmites, reed canary grass, purple loosestrife), plus loss of shallow, short-term grassy wetlands where this species visits.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 5.0 Facilities and Areas Restore ecological integrity to historic Sedge Wren nesting habitat site and monitor for recolonization.	Territorial pair present for 2 successive years.	# pairs	Count number of territorial pairs during breeding season for the BBS annually for 10 years.	1

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont

Associated Species: King Rail, Virginia Rail, Sora, American Coot, Wood Duck

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Increased drought could cause wetlands to dry out, making them unsuitable for nesting. Alternatively, increases in extreme weather (precipitation) events could cause nest flooding. Flooded grassy areas are less likely to occur or persist with extremes in precipition.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Active management and planning on confirmed breeding wetlands for adaptive management of marshes and associated uplands. Maintenance of mosaic of shallow (<50 cm) wetlands with open/emergent portions. Specific local management at smaller wetlands where this species can colonize.	Adaptable approach to water level management so open water mosaics can be sustained in periods of high or low precipitation. Includes replacement and upgrade of water control devices suitable for handling predicted precipitation changes.	# sites with adaptive management plans in place; # water control devices upgraded	Monitor progress in development and implementation of Adaptation Plans at high-priority sites. Monitor installation of water control devices.	1

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont

Associated Species: Virginia Rail, Sora, American Coot, Least Bittern, American Bittern, multiple waterfowl

IUCN Threat: 2.0 Agriculture and Aquaculture

Season: Breeding

Specific Threat: Intensive ag practices-frequent mowing, overgrazing, and plowing

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Enroll potential nesting areas into the Conservation Reserve Enhancement Program (CREP)	Eliminate intensive ag practices in breeding areas	Number of acres enrolled in CREP	Annually check a sample of CREP fields for contract compliance.	2

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont

Associated Species: Bobolink, Red-wingedBblackbird, Eastern Meadowlark, Grasshopper Sparrow, Henslow's Sparrow

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Wetland alteration and drainage.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 7.0 Law enforcement Laws pertaining to wetland drainage and modification should be enforced.	No additional loss of wetlands.	Acres of wetlands	Count number of wetland acres in PA annually.	2

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont

Associated Species: King Rail, Virginia Rail, Sora, American Coot, Wood Duck

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Presence of wind turbines discourages nesting.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach Create cooperative agreements with wind energy developers to avoid siting wind-turbines in potential nesting habitat	Have 100% participation of active wind developers sign cooperative agreements	Number of cooperative agreements completed	Count number of singing males during Breeding Season for the BBS annually for 10 years.	3

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont

Associated Species: Savannah Sparrow, Dickcissel, Bobolink, Red-winged Blackbird, Common Yellowthroat

RESEARCH NEEDS

1. Breeding- All known locations where breeding activity has been confirmed during the last 20 years should be surveyed during 3 periods – early June, late June – early July, and late July, for three consecutive years. Sedge Wrens are vocal, and frequently sing during both daylight and nighttime hours and survey effort should be directed accordingly. Taped playback recordings may be effective in locating territorial males.

2. Breeding- Determine population structure, productivity and threats, and monitor active breeding sites for 5 consecutive years to determine degree of site-fidelity, and changes in population, productivity, and habitat.

3. Breeding- Habitat characteristics at surveyed breeding sites should be evaluated, especially at the more reliable locations, in an effort to predict potential habitat elsewhere.

SURVEY NEEDS

1. Breeding- Constant search and inventory of the few sites where located.

2. Breeding- Local reaction of species to management of wetlands / wet meadows where found.

3. Breeding- Surveys for secretive wetland birds should include audio recordings of marsh wren or at least register any encounters with the species.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

MONITORING PROGRAMS

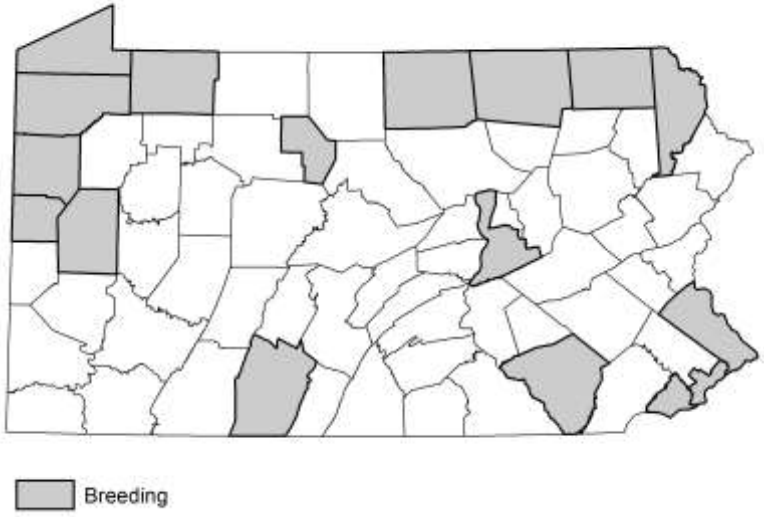
Program Name	Lead Agency	Hyperlink	Description
Pennsylvania Game Commission Marsh Bird Surveys	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt/community/birding_and_bird_conservation/21066/marsh_bird_survey?qid=81806114&rank=4	During breeding seasons, PGC staff, partners, and volunteers conduct standardized audio playback surveys for secretive marsh birds across the state including: pied-billed grebe, American bittern, least bittern, black rail, king rail, Virginia rail, sora, common moorhen, and American coot. Protocol adapted from North American Marsh Bird Monitoring Protocols (Conway 2011) and is very similar to that used in the 2nd Pennsylvania Breeding Bird Atlas. Survey results inform management of these wetlands.

Marsh Wren

Cistothorus palustris

Daniel P. Mummert
Pennsylvania Game Commission

Photo: Carl Freeman



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S2B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**1300**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Expand the breeding populations from 53 Breeding Bird Atlas blocks (see Wilson et al. 2012) to at least 60 Breeding Bird Atlas blocks.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Emergent Marsh**	**Wet Meadow / Shrub Marsh**
Habitat	**Laurentian-Acadian Freshwater Marsh**	**Laurentian-Acadian Wet Meadow-Shrub Swamp**

Specific Habitat Requirements:

Large (>20 acre) cattail and bulrush marshes tidal marshes of the lower Delaware River with an abundance of standing water.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Loss of emergent vegetation due to fluctuating water levels.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources In Conneaut Marsh, where hydrology is primarily controlled by dams, water levels should be managed to enhance cattails, reeds and other preferred vegetation structure	In Conneaut Marsh, manage water levels to maintain vegetative structure critical to successful nesting	Number of acres of emergent vegetation suitable for nesting substrate	Use aerial photos once every five years to survey the acreage of emergent vegetation	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: American Bittern, Least Bittern, King Rail, Sora, Virginia Rail

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Increased drought could cause wetlands to dry out, making them unsuitable for nesting. Alternatively, increases in extreme weather (precipitation) events could cause nest flooding.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Active management and planning on confirmed breeding wetlands in Crawford, Lawrence, Mercer, Tioga, Cumberland, and Susquehanna counties for adaptive management of marshes and associated uplands. Maintenance of mosaic of shallow (<50 cm) wetlands with open/emergent portions. Also isolated populations of this species where found in the SE region including John Heinz NWR.	Adaptable approach to water level management so open water mosaics can be sustained in periods of high or low precipitation. Includes replacement and upgrade of water control devices suitable for handling predicted precipitation changes.	# sites with adaptive management plans in place; # water control devices upgraded	Monitor progress in development and implementation of Adaptation Plans at high-priority sites. Monitor installation of water control devices.	1

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont

Associated Species: Virginia Rail, Sora, American Coot, Least Bittern, American Bittern, multiple waterfowl

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Marsh Wrens avoid otherwise suitable emergent wetlands that contain an abundance of purple loosestrife

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Monitor and control purple loosestrife in wetlands with nesting marsh wren	Use biological, chemical and/or mechanical methods to reduce the abundance of purple loosestrife in wetland used by marsh wren	Number of acres with a reduced density of purple loosestrife	Use vegetation surveys every five years to determine effectiveness of control measures	2

Action Location: Physiographic Province: Appalachian Plateaus, Atlantic Coastal Plains

Associated Species: American Bittern, Least Bittern, King Rail, Sora, Virginia Rail

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Mercury contamination

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Seek legislation that significantly reduces atmospheric concentrations of mercury.	Promote legislation that reduces anthropomorphic causes of mercury contamination	Reduced levels of mercury in large emergent wetlands	Sample large wetlands for mercury pollution once every five years	3

Action Location: Physiographic Province: Appalachian Plateaus, Atlantic Coastal Plains

Associated Species: Bald Eagle, Osprey, Virginia Rail

RESEARCH NEEDS

1. Breeding- Increase knowledge of marsh wren abundance and distribution throughout the state.

2. Breeding- Increase knowledge about the impact of invasive species such as purple loosestrife on marsh wren habitat usage.

3. Breeding- Increase knowledge about the effect of mercury contamination on marsh wren productivity.

SURVEY NEEDS

1. Breeding- Breeding bird survey should be continued to help annual monitoring of abundance and distribution.

2. Breeding- Surveys for secretive wetland birds should include audio recordings of marsh wren or at least register any encounters with the species.

3. Breeding- Monitor changes in abundance and distribution of suitable emergent wetland habitat (e.g., Great Lakes Marsh Monitoring Survey, Bird Studies Canada).

MONITORING PROGRAMS

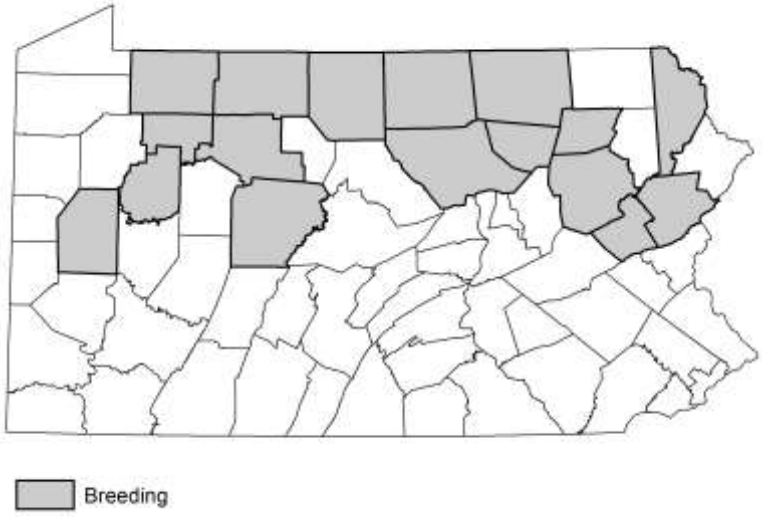
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.
Pennsylvania Game Commission Marsh Bird Surveys	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt/community/birding_and_bird_conservation/21066/marsh_bird_survey?qid=81806114&rank=4	During breeding seasons, PGC staff, partners, and volunteers conduct standardized audio playback surveys for secretive marsh birds across the state including: pied-billed grebe, American bittern, least bittern, black rail, king rail, Virginia rail, sora, common moorhen, and American coot. Protocol adapted from North American Marsh Bird Monitoring Protocols (Conway 2011) and is very similar to that used in the 2nd Pennsylvania Breeding Bird Atlas. Survey results inform management of these wetlands.

Swainson's Thrush

Catharus ustulatus

Scott H. Stoleson
USDA Forest Service, Northern Research Station

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / High Responsibility**	PA Abundance	**5200**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Increase statewide population by 50%, to an estimated 3,900 singing males, particularly in northcentral and northeastern counties.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Hardwood & Conifer**	
Habitat	**Appalachian (Hemlock)-Northern Hardwood Forest**	

Specific Habitat Requirements:

High elevation conifer-dominated forests, typically in extensive unfragmented forest near water.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Highly vulnerable to loss of hemlock to wooly adelgid and deer overbrowse.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Maintain current science-based deer policy in state; identify and disseminate biocontrol for HWA	Keep deer at levels that allow for conifer regeneration; reduce or eliminate HWA in areas in habitats with significant populations of SWTH	hemlock regen, infestation rate, survival	annual or semi-annual surveys of hemlock infestation, survival, and regeneration success in select areas of importance to SWTH	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Brown Creeper, Winter Wren, Blue-headed Vireo, northern flying squirrel

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Habitat changes due to climate change likely to reduce or eliminate suitable conifer habitat within state

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Legislation required at national level to reduce carbon emissions, promote or incentivize carbons sequestration	Reduce levels of atmospheric carbon to slow or reverse global climate change	Atmospheric carbon levels	Maintain existing atmospheric monitoring	1

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Veery, Ovenbird, Kentucky Warbler, Canada Warbler

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Fragmentation from exurban development

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Develop landscape-level planning agreements across ownerships in areas where species occurs	Minimize fragmentation of current occupied habitat	Degree of fragmentation as quantified by FRAGSTATS	Annual or biannual surveys using tape-playback for SWTH, BBS-style point counts for associated species	2

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Brown Creeper, Winter Wren, Blue-headed Vireo, northern flying squirrel

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Significant forest fragmentation from well-drilling sites, wind turbines, pipelines and roads

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Enforce regulations and codes prohibiting energy development in or adjacent to known occupied habitat	Create regulations that would maintain extensive conifer forest off-limits to energy development	Degree of fragmentation as quantified by FRAGSTATS	Assessment of new well/turbine locations in relation to known habitat	2

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Brown Creeper, Winter Wren, Blue-headed Vireo, northern flying squirrel

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Roads, pipelines, and powerlines fragment forest and facilitate passage by brood parasites and mesopredators

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Create 2-4 conservation areas, based on PA-BBA data, where most at risk of road/pipeline/powerline development	Acreage of habitat protected by designated areas	Annual or biannual surveys using tape-playback for SWTH, BBS-style point counts for associated species	2
Designate SWTH-specific conservation areas to maintain large unfragmented areas of conifer forest					

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Brown Creeper, Winter Wren, Blue-headed Vireo, northern flying squirrel

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Poor management converting mature conifer-dominated forest to young red maple, birch forest

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Establish minimum of 2 conservation areas of >250 ha annually for 10 yrs.	Acres preserved following guidelines	Use annual point counts in preserved core areas to monitor population levels of SWTH and other spp that use habitat	2
Develop and disseminate guidelines for preserving large core areas of mature conifer plus 100 m buffer					

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Brown Creeper, Winter Wren, Blue-headed Vireo, northern flying squirrel

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Acid deposition depletes populations of invertebrate prey.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Legislation required at national level (since most of acid deposition originates west of PA) to reduce allowable levels of acid discharge	Reduce levels of acid deposition to level where invertebrates not depleted	Anion levels in precipitation	Maintain existing NOAA meteorological stations	2

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Veery, Ovenbird, Kentucky Warbler, Canada Warbler

RESEARCH NEEDS

1. Breeding- Evaluate Swainson's thrush response to varying levels of habitat damage by hemlock woolly adelgid and Assess suitability of hemlock surrogates (e.g., Norway and red spruce, fir, larch) as Swainson's thrush habitat to inform restoration efforts in areas hit hard by HWA.

2. Breeding- Assess fledgling survival and post-fledging dispersal patterns.

3. Breeding- Where possible long term point count surveys and territory mapping of forest interior birds such as conducted at Hawk Mountain Sanctuary and Powdermill Nature Reserve should be established to identify population change at a range of sites.

SURVEY NEEDS

1. Breeding- Identify and map areas of SWTH occurrence in PA to inform further conservation actions, enlisting volunteers to assist with searches

2. Breeding- Expand Mountain Bird Watch into PA including SWTH as a target species.

3. Breeding- Conduct off-road point count surveys and spot-mapping for forest interior birds to determine habitat requirements and association with current forest management practices.

MONITORING PROGRAMS

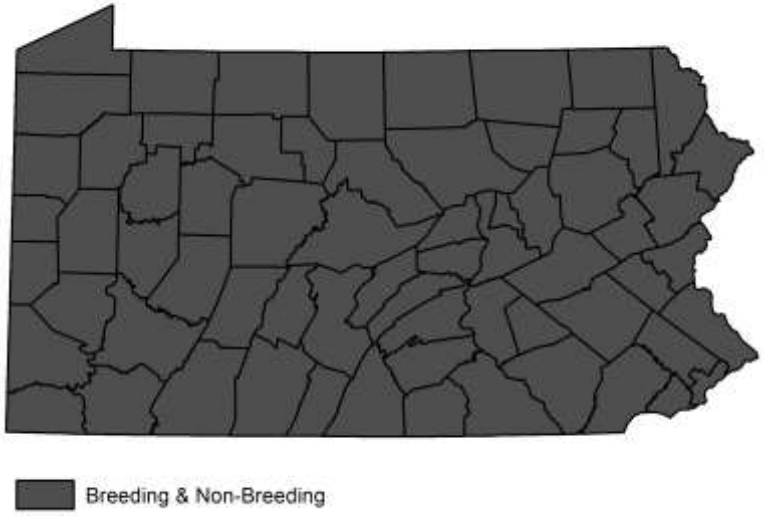
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.
Yellow-bellied Flycatcher / Rare Mountain Forest Bird Studies and Conservation	Pennsylvania Game Commission / Cornell Laboratory of Ornithology	http://www.portal.state.pa.us/portal/server.pt?open=514&objID=621014&mode=2	Area searches in targeted locations with history of mountain forest bird breeding populations. Geospatial and behavioral data collected for each location / territory found for priority species: Yellow-bellied Flycatcher, Blackpoll Warbler, Olive-sided Flycatcher, Swainson's Thrush, Red Crossbill, Pine Siskin.

Wood Thrush

Hylocichla mustelina

David Yeany II
Western PA Conservancy

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B, S4N (M)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / High Responsibility**	PA Abundance	**1320000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Decline of 11 - 40%; (M) Unknown**

Conservation Goal:

Maintain an estimated breeding population of 660,000 singing males across more than 90% of Pennsylvania Breeding Bird Atlas blocks (see Wilson et al. 2012) during the next 10 years.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(B) Northern Hardwood & Conifer** **(M) Central Oak-Pine**	
Habitat	**(B) Appalachian (Hemlock)-Northern Hardwood Forest** **(M) Northeastern Interior Dry-Mesic Oak Forest**	

Specific Habitat Requirements:

(B)Second-growth deciduous forest and forest-edge habitats; often with available fruit.
(M) Second-growth, closed-canopy deciduous and mixed forest often near water.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Forest loss and fragmentation from new building and infrastructure development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Promote and implement land use planning strategies for residential and commercial development which avoid placement of new construction within significant areas of interior forest and utilize existing infrastructure.	Within 3 years develop a comprehensive statewide strategy that addresses forest fragmentation issues and provides protection to forest interior habitat which can be implemented by municipal and county planning departments.	Number of municipalities and counties adopting the plan with intent to implement.	1. Monitor number of development projects/acreage in municipalities/counties implementing that results in loss of interior forest; 2. Survey participating municipalities/counties for data; 3. Monitor for 5 years after completion of plan.	1

Action Location: Physiographic Province: Statewide

Associated Species: Eastern Whip-poor will, Winter Wren, Swainson's Thrush, Cerulean Warbler, Canada Warbler

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Forest loss and fragmentation from pad (turbine and well) and infrastructure (roads and pipelines) development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Promote and implement land use planning strategies for shale gas and wind development which site projects outside significant areas of interior forest and coincide infrastructure with existing roads and pipelines.	Within 3 years develop a comprehensive statewide strategy that addresses forest fragmentation issues and provides protection to forest interior habitat which can be implemented by municipal and county planning departments.	Number of municipalities and counties within areas of high shale gas and wind development adopting the plan with intent to implement.	1. Monitor development projects/acreage in municipalities/counties implementing that results in loss of interior forest; 2. Survey participating municipalities/counties for data; 3. Monitor for 5 years after completion of plan.	1

Action Location: Physiographic Province: Statewide

Associated Species: Eastern Whip-poor will, Winter Wren, Swainson's Thrush, Louisiana Waterthrush, Canada Warbler

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Forest loss and fragmentation from development of transportation and service corridors.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Promote and implement land use planning strategies for residential and commercial development which avoid placement of new construction within significant areas of interior forest and utilize existing infrastructure.	Within 3 years develop a comprehensive statewide strategy that addresses forest fragmentation issues and provides protection to forest interior habitat which can be implemented by municipal and county planning departments.	Number of municipalities and counties adopting the plan with intent to implement.	1-monitor number of development projects/acreage in municipalities/counties implementing that results in loss of interior forest, 2-survey participating municipalities/counties for data, 3-monitor for 5 years after completion of plan	1

Action Location: Physiographic Province: Statewide

Associated Species: Eastern Whip-poor will, Winter Wren, Swainson's Thrush, Louisiana Waterthrush, Canada Warbler

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Non-native species (plants and insects) and overbrowsing by abundant deer populations degrade the health of natural forest ecosystems, reducing breeding success of forest birds, and free-ranging cats kill an estimated 500 million to 1 billion birds each year in the U.S.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources 1. Increase promotion of deer hunting statewide, and create and implement urban/suburban deer hunting programs in regions where forest interior birds have greatest declines, 2. Coordinate invasive species management on conservation lands, 3. Educate Pennsylvania residents about the effects of free-ranging cats on birds and implement mitigation measures.	1. Target 5 PGC WMUs with highest deer densities, lowest hunter recruitment, and/or highest declines in forest interior birds with programs to boost deer hunter numbers and deer harvest (where needed), and create urban/suburban deer hunting initiatives in Pittsburgh and Philadelphia. 2. Establish a statewide strategy for invasive species management, drawing upon DCNR's established guidelines and implement on 50 properties (i.e. State Forest, Game Lands, land trusts properties). 3. Provide means for statewide promotion of American Bird Conservancy's "Cats Indoors Campaign".	1. Reduction of deer populations and increased hunter recruitment in priority units and urban areas. 2. Successful removal of invasive species on 50 conservation properties. 3. Number of groups promoting "Cats Indoors" and number of people reached.	1. Deer densities/hunter numbers, conservation lands with invasive species management, reach of "Cats Indoors" campaign; 2. Standard agency/program tracking and monitoring; 3. Anually for 10 years.	1

Action Location: Physiographic Province: Statewide

Associated Species: Eastern Whip-poor will, Winter Wren, Swainson's Thrush, Louisiana Waterthrush, Canada Warbler

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Reduced abundance and availability of calcium-rich invertebrate prey in areas with high acidic atmospheric deposition (rain).

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Determine target areas with acidified soils on state managed lands and implement terrestrial lime applications to increase calcium-rich prey abundance for forest birds.	Select 10 of the most severely acidified sites on state managed lands in western and northcentral Pennsylvania and treat them with lime applications over the next 5 years to increase invertebrate prey abundance.	Change in soil chemistry, invertebrate prey abundance, and forest bird abundance/productivity (i.e. Wood Thrush) at treated sites.	1. Monitor soil pH, invertebrate abundance, forest breeding bird abundance & productivity (i.e. Wood Thrush); 2. See Pabian and Brittingham (2007, 2011); 3. Monitor annually for 5 years.	2

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Kentucky Warbler, Ovenbird, Veery, Louisiana Waterthrush

IUCN Threat: 1.0 Residential and Commercial Development

Season: Migration

Specific Threat: Forest loss and fragmentation, threat of window strikes from new building and infrastructure development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach Implement regional projects to monitor window collisions on residential and commercial buildings, develop/implement mitigation solutions, and provide community outreach to increase awareness of the threat.	Ensure funding is available during the next 3-5 years to enable current bird collision conservation efforts (i.e. Philadelphia and Pittsburgh) to continue and grow.	Successful continuation of existing Pennsylvania projects addressing bird collisions.	1. Partnership projects focused on bird collisions in Philadelphia and Pittsburgh are able to expand efforts; 2. Evaluate program reach (#buildings monitoring/mitigating, #groups/individuals educated about problem); 3. Duration of	1

Action Location: Physiographic Province: Statewide

Associated Species: Kentucky Warbler, Canada Warbler, American Woodcock, Golden-winged Warbler, Swainson's Thrush

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Migration

Specific Threat: Forest loss and fragmentation from pad (turbine and well) and infrastructure (roads and pipelines) development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Promote and implement land use planning strategies for shale gas and wind development which site projects outside significant areas of interior forest and coincide infrastructure with existing roads and pipelines.	Within 3 years develop a comprehensive statewide strategy that addresses forest fragmentation issues and provides protection to forest interior habitat which can be implemented by municipal and county planning departments.	Number of municipalities and counties within areas of high shale gas and wind development adopting the plan with intent to implement.	1. Monitor number of development projects/acreage in municipalities/counties implementing that results in loss of interior forest; 2. Survey participating municipalities/counties for data; 3. Monitor for 5 years after completion of plan	1

Action Location: Physiographic Province: Statewide

Associated Species: Eastern Whip-poor will, Winter Wren, Swainson's Thrush, Louisiana Waterthrush, Canada Warbler

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Migration

Specific Threat: Forest loss and fragmentation from development of transportation and service corridors.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Promote and implement land use planning strategies for residential and commercial development which avoid placement of new construction within significant areas of interior forest and utilize existing infrastructure.	Within 3 years develop a comprehensive statewide strategy that addresses forest fragmentation issues and provides protection to forest interior habitat which can be implemented by municipal and county planning departments.	Number of municipalities and counties adopting the plan with intent to implement.	1-monitor number of development projects/acreage in municipalities/counties implementing that results in loss of interior forest, 2-survey participating municipalities/counties for data, 3-monitor for 5 years after completion of plan	1

Action Location: Physiographic Province: Statewide

Associated Species: Eastern Whip-poor will, Winter Wren, Swainson's Thrush, Louisiana Waterthrush, Canada Warbler

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Migration

Specific Threat: Non-native plants, insects, and deer overbrowsing degrade forest ecosystems, leading to reduced breeding success, while feral cats may cause direct mortality.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources 1. Increase promotion of deer hunting statewide, and create and implement urban/suburban deer hunting programs in regions where forest interior birds have greatest declines, 2. Coordinate invasive species management on conservation lands, 3. Educate Pennsylvania residents about the effects of free-ranging cats on birds and implement mitigation measures.	1. Target 5 PGC WMUs with highest deer densities, lowest hunter recruitment, and/or highest declines in forest interior birds with programs to boost deer hunter numbers and deer harvest (where needed), and create urban/suburban deer hunting initiatives in Pittsburgh and Philadelphia. 2. Establish a statewide strategy for invasive species management, drawing upon DCNR's established guidelines and implement on 50 properties (i.e. State Forest, Game Lands, land trusts properties). 3. Provide means for statewide promotion of American Bird Conservancy's "Cats Indoors Campaign".	1. Reduction of deer populations in priority units and urban areas. 2. Successful removal of invasive species on 50 conservation properties. 3. Number of groups promoting "Cats Indoors" and number of people reached.	1. Deer densities/hunter numbers, conservation lands with invasive species management, reach of "Cats Indoors" campaign; 2. Standard agency/program tracking and monitoring; 3. Monitor annually for 10 years	1

Action Location: Physiographic Province: Statewide

Associated Species: Eastern Whip-poor will, Winter Wren, Swainson's Thrush, Louisiana Waterthrush, Canada Warbler

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Migration

Specific Threat: Loss and alteration of forested migration stopover habitat.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Implement whole life cycle conservation by identifying critical forested stopover habitat in Pennsylvania and protecting it from harmful silvicultural practices while simultaneously engage partners in Central America to do the same.	Within 3 years, utilize the work of the International Wood Thrush Conservation Alliance to identify migration habitat priorities for protection in Pennsylvania and match those with priorities in Central America.	Number of Wood Thrush stopover sites identified as priorities for land protection.	1. Number of Wood Thrush migration habitat sites; 2. Monitor work of IWOTHCA; 3. 3-year time frame.	2

Action Location: Physiographic Province: Statewide

Associated Species: Neotropical migrants, Eastern Whip-poor will, Swainson's Thrush, Louisiana Waterthrush, Cerulean Warbler, Canada Warbler

RESEARCH NEEDS

1. Breeding- Utilize 2nd Breeding Bird Atlas and LiDAR data to conduct analyses that improve our understanding of the relationship between forest structure and forest interior bird breeding densities.

1. Migration- Identify key components of important stopover habitats during migration and determine priority areas.

2. Breeding- Long-term studies of seasonal fecundity to identify source/sink populations throughout the state and investigate effects of forest age on nest success, adult survival, and return rates.

2. Migration- Quantify effects of Wood Thrush, and other Neotropical migrants, with glass and buildings in Pennsylvania. Research solutions to mitigate bird mortalities with glass.

3. Breeding- Where possible long term point count surveys and territory mapping of forest interior birds such as conducted at Hawk Mountain Sanctuary and Powdermill Nature Reserve should be established to identify population change at a range of sites.

3. Migration- Investigate links between breeding demographics and non-breeding activities/migratory connectivity.

SURVEY NEEDS

1. Breeding- Conduct off-road point count surveys and spot-mapping for forest interior birds to determine habitat requirements and association with current forest management practices.

1. Migration- Continue statewide migration counts and integrate eBird data to better understand migratory patterns of Wood Thrush through Pennsylvania and to help identify stopover priority areas and habitats.

2. Breeding- Surveys to assess response of forest species to silviculture treatments and other management.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
Carnegie Museum of Natural History's Powdermill Avian Research Center	Carnegie Museum of Natural History	http://www.powdermillarc.org/	Powdermill Avian Research Center (PARC) is part of Carnegie Museum of Natural History's biological research station Powdermill Nature Reserve. PARC operates a bird banding station, conducts bioacoustical research, and performs flight tunnel analysis with the goal of reducing window collisions. With more than 50 years experience, and having surpassed a milestone of 500,000 birds banded in 2001, PARC is uniquely situated to capitalize on its bird capture techniques. Birds studied through our banding program may also be utilized for bioacoustical, window avoidance, telemetry studies and more, all while handling these species in a gentle and humane manner.
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

MONITORING PROGRAMS

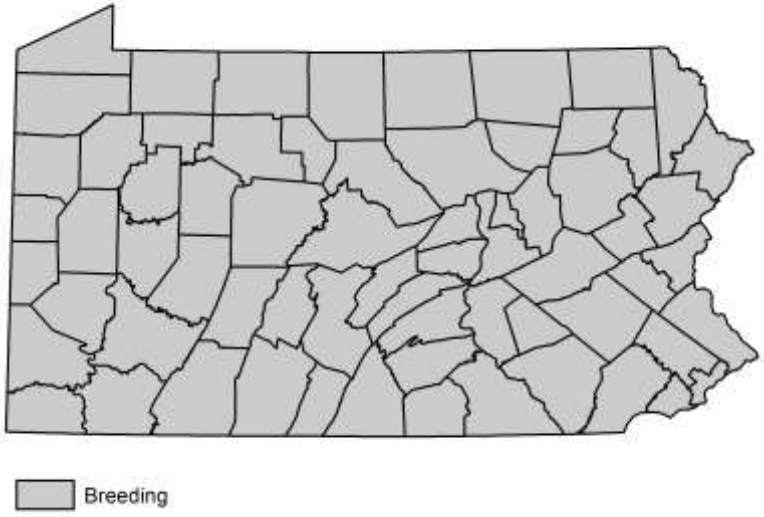
Program Name	Lead Agency	Hyperlink	Description
Pennsylvania Annual Migration Count (PAMC)	Pennsylvania Society for Ornithology	http://www.pabirds.org/PAMC/Index.html	Held on the second Saturday in May, this event is similar to the Christmas Bird Count except it is done on a county basis. Participants go out and identify and count all of the birds they can find on that day (including owling at night if so inclined).

Gray Catbird

Dumetella carolinensis

Nathan J. Zalik
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S5B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**4760000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Increase of 11 - 25%**

Conservation Goal:

Maintain species population at or above current levels of 25 birds per Breeding Bird Survey route, statewide, through 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Urban/Suburban Built**	
Habitat	**Developed (NLCD 21-24 & 31)**	

Specific Habitat Requirements:

Dense, shrubby vegetation, including thickets, hedgerows, woodland edges, and regenerating clearcuts.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Loss of shrubby vegetation in utility rights-of-way (e.g., gas pipelines) as a result of intensive maintenance practices that do not allow for woody plants within rights-of-way.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Encourage utility companies to create shrubby edges along edges of rights-of-way.	Within the next five years, develop and distribute best management practices for creating early successional habitat within utility rights-of-way.	Number of companies implementing best management practices.	Avian point count surveys within rights-of-way.	1

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Chestnut-sided Warbler, Eastern Towhee, Prairie Warbler, Golden-winged Warbler, Blue-winged Warbler

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss of habitat to high density urban development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Creation of early successional habitat.	Increase the statewide acreage of early successional habitat.	Number of acres of habitat.	Breeding Bird Survey trends.	2

Action Location: Physiographic Province: Statewide

Associated Species: American Woodcock, Blue-winged Warbler, Golden-winged Warbler, Yellow-breasted Chat

RESEARCH NEEDS

1. Breeding- What is Gray Catbird response to silviculture / young forest management in PA?

2. Breeding- What is Gray Catbird response to scrub barrens management in PA?

SURVEY NEEDS

1. Breeding- Conduct post-treatment surveys of silvicultural treatments to determine reaction of young forest and shrub species.

2. Breeding- MAPS program for selected locations.

MONITORING PROGRAMS

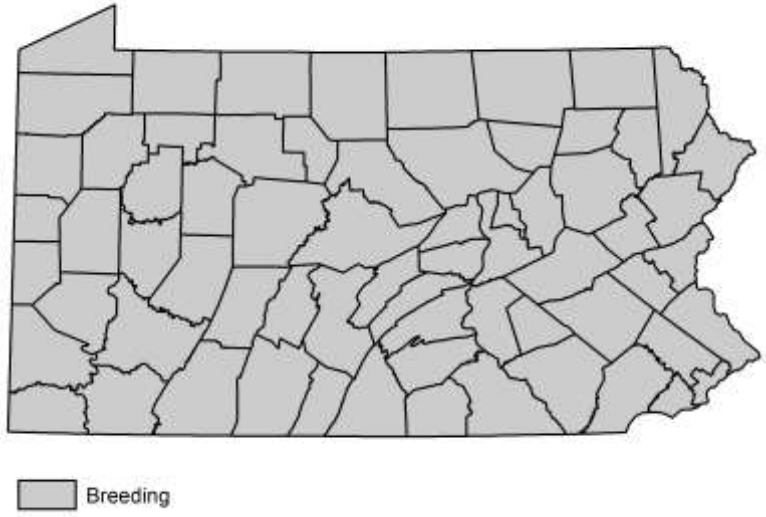
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Louisiana Waterthrush

Parkesia motacilla

Terry L. Master
East Stroudsburg University of Pennsylvania

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**70000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Maintain the current population level of at least 0.4 birds per route with detection on at least 50% of Breeding Bird Survey routes, and distribution of at least 1700 Breeding Bird Atlas (Wilson et al. 2012) blocks.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Hardwood & Conifer**	
Habitat	**Appalachian (Hemlock)-Northern Hardwood Forest**	

Specific Habitat Requirements:

Mature, forested watersheds w/ med-high gradient headwater (1st-3rd order) streams, with well developed banks (ravines) and/or plentiful overturned trees with exposed root masses. High-quality stream indicator.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Natural gas development may lead to increased acidification, sedimentation, and altered/reduced prey base in headwater stream reaches inhabited by Louisiana Waterthrushes.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Strengthen regulations at the state level, reduce drilling/compressor station footprints, secure waste/drilling water retention ponds, prevent spillage and dumping of waste/drilling water, combine pipeline rights-of-way and eliminate impacts on state forest lands.	Prevent decrease in density/productivity of breeding Waterthrushes.	Breeding density (pairs per km of stream reach) and nest success (number of fledglings per nest).	Monitor breeding densities (pairs per km of stream reach) and reproductive success (number of fledglings per nest).	1

Action Location: HUC10 Watershed: Statewide

Associated Species: Belted Kingfisher, Eastern Phoebe, Winter Wren, Acadian Flycatcher, Bank Swallow

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Increased pollution, runoff, and sedimentation, especially in headwater streams.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Recent legislation weakening requirements for stream buffers along our most pristine streams of "exceptional quality", mitigate acid mine drainage and enforce existing water pollution laws, especially with regard to headwater streams.	Re-establish breeding populations/increase breeding density/productivity on acid impacted streams. Prevent decrease in density/productivity of breeding Waterthrushes.	Breeding density (pairs per km of stream reach) and nest success (number of fledglings per nest).	Monitor breeding densities (pairs per km of stream reach) and reproductive success (number of fledglings per nest).	1

Action Location: HUC10 Watershed: Statewide

Associated Species: Belted Kingfisher, Eastern Phoebe, Winter Wren, Acadian Flycatcher, Bank Swallow

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Expected increase in extreme flooding events and droughts will impact nesting success through nest inundation/destruction and water temperature increases reducing both abundance and diversity of aquatic macroinvertebrate prey.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Monitor headwater stream temperatures/effects on macroinvertebrate population and diversity.	Prevent decrease in density/productivity of breeding Waterthrushes.	Breeding density (pairs per km of stream reach) and nest success (number of fledglings per nest).	Monitor breeding densities (pairs per km of stream reach) and reproductive success (number of fledglings per nest).	1

Action Location: HUC10 Watershed: Statewide

Associated Species: Belted Kingfisher, Eastern Phoebe, Winter Wren, Acadian Flycatcher, Bank Swallow

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Forest fragmentation and sedimentation of foraging sites from residential and commercial development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Recent legislation weakening requirements for stream buffers along our most pristine streams of "exceptional quality". Restrict likelihood of fragmentation of large tracts of forest by restricting development through land use planning.	Prevent decrease in density/productivity of breeding Waterthrushes.	Breeding density (pairs per km of stream reach) and nest success (number of fledglings per nest).	Monitor breeding densities (pairs per km of stream reach) and reproductive success (number of fledglings per nest).	2

Action Location: HUC10 Watershed: Statewide

Associated Species: Belted Kingfisher, Eastern Phoebe, Winter Wren, Acadian Flycatcher, Bank Swallow

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Mining and Quarrying fragment extensive forest tracts and increase stream sedimentation.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Recent legislation weakening requirements for stream buffers along our most pristine streams of "exceptional quality". Restrict likelihood of fragmentation of large tracts of forest by restricting development through land use planning. Require use of existing service corridors by multiple entities.	Prevent decrease in density/productivity of breeding Waterthrushes.	Breeding density (pairs per km of stream reach) and nest success (number of fledglings per nest).	Monitor breeding densities (pairs per km of stream reach) and reproductive success (number of fledglings per nest).	3

Action Location: HUC10 Watershed: Statewide

Associated Species: Belted Kingfisher, Eastern Phoebe, Winter Wren, Acadian Flycatcher, Bank Swallow

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Breeding

Specific Threat: Human disturbance early in breeding/nesting season

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection Protect and monitor habitat.	Prevent decrease in density/productivity of breeding Waterthrushes.	Breeding density (pairs per km of stream reach) and nest success (number of fledglings per nest).	Monitor breeding densities (pairs per km of stream reach) and reproductive success (number of fledglings per nest).	3

Action Location: HUC10 Watershed: Statewide

Associated Species: Belted Kingfisher, Eastern Phoebe, Winter Wren, Acadian Flycatcher, Bank Swallow

RESEARCH NEEDS

1. Breeding- Effects of Marcellus Shale drilling activity (ongoing - Steven Latta and Margaret Brittingham).

2. Breeding- Effect of disappearance of riparian hemlock stands (ongoing - Terry Master and graduate students).

3. Breeding- Post breeding habitat use.

SURVEY NEEDS

1. Breeding- Monitoring of breeding densities, productivity and chemical residues in tissues in areas of high Marcellus Shale drilling activity (ongoing - Steven Latta and Margaret Brittingham).

2. Breeding- Monitoring of breeding densities and productivity in hemlock dominated riparian areas with differing hemlock woolly adelgid infestation levels.

3. Breeding- Conduct off-road point count surveys and spot-mapping for forest interior birds to determine habitat requirements and association with current forest management practices.

MONITORING PROGRAMS

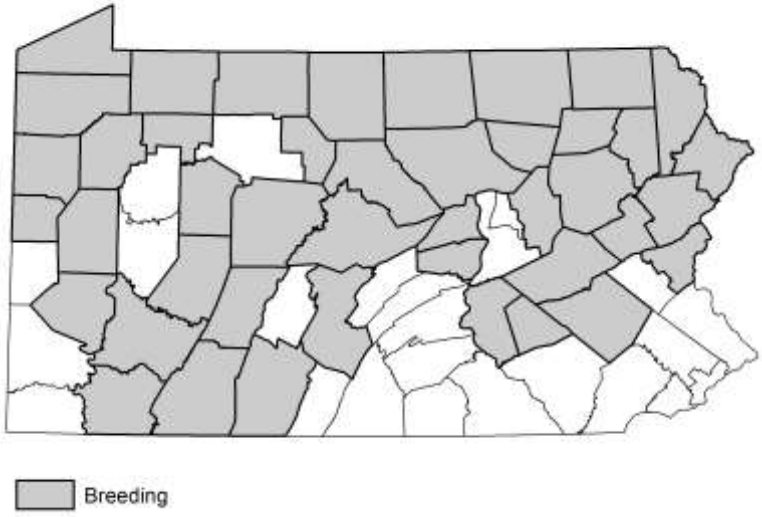
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Ongoing monitoring of population densities and productivity in areas of high Marcellus Shale drilling activity (Steven Latta and Margaret Brittingham) and Hemlock Woolly Adelgid infestation (Terry Master and graduate students)	Marcellus Shale impacts - Penn State University and The National Aviary, Hemlock Woolly Adelgid Impacts - East Stroudsburg University.		Monitoring of population densities on designated stream reaches, nest monitoring to determine productivity, tissue analysis and Hemlock Woolly adelgid infestation level surveys.

Northern Waterthrush

Parkesia noveboracensis

Daniel W. Brauning
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S2B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**2000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Expand breeding population at least 10% to detection of territorial males in at least 250 breeding bird atlas blocks by 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Hardwood & Conifer**	
Habitat	**Appalachian (Hemlock)-Northern Hardwood Forest**	

Specific Habitat Requirements:

Forested swamps, scrub-shrub wetlands, and beaver swamps.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss of habitat to development could potentially fragment forest blocks and development could change hydrology that would reduce habitat availability.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Establishing management guidance to maintain Northern Waterthrush's suitable habitat, whether on public or private property, and use the regulatory protections of wetland is the best mechanism for this non-listed species	Develop BMPs for development in forested landscapes	Forest fragmentation index	Species-specific presence/absence surveys of forested wetlands every 5 years.	1

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: U. Susquehanna, W. Br. Susquehanna, Allegheny

Associated Species: Forested wetland species

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Browsing and insect pests alter forest structure that makes habitat less suitable.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 101.0 Species Management Manage deer for healthy forests.	Healthy forest metrics	FIA understory metrics	Species-specific presence/absence surveys of forested wetlands every 5 years.	1

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: U. Susquehanna, W. Br. Susquehanna, Allegheny

Associated Species: Forested wetland species

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Fragmentation of contiguous forests would undermine the integrity of forested wetlands.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Secure forested wetland environments	Forest block size around wetlands	Species-specific presence/absence surveys of forested wetlands every 5 years.	2
Designate core forested wetland habitats for Northern Waterthrush and other associated species, and develop best management practices within and around these areas.					

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: U. Susquehanna, W. Br. Susquehanna, Allegheny

Associated Species: Forested wetland species

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Pipelines and energy corridors have the potential to fragment contiguous forested blocks and change hydrology, affecting habitat suitability.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Maintain large unfragmented forest blocks	Forest fragmentation index	Species-specific presence/absence surveys of forested wetlands every 5 years.	2
Designate core forested wetland habitats for Northern Waterthrush and other associated species, and develop best management practices within and around these areas.					

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: U. Susquehanna, W. Br. Susquehanna, Allegheny

Associated Species: Forested wetland species

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Forest fragmentation reduces habitat quality for Northern Waterthrushes.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Develop BMPs for forested wetlands that highlight Northern Waterthrush's requirements and promote, whether on public or private property, and use the regulatory protections of wetland as the best mechanism for non-listed species.	Secure forested wetland environments	Forest block size around wetlands	Species-specific presence/absence surveys of forested wetlands every 5 years.	2

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: U. Susquehanna, W. Br. Susquehanna, Allegheny

Associated Species: Forested wetland species

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Flooding of forested wetlands, either by human activity or due to beavers, may have short-term impacts on nesting success.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Develop BMPs for forested wetlands that highlight Northern Waterthrush's requirements and promote, whether on public or private property, and use the regulatory protections of wetland as the best mechanism for non-listed species.	Secure forested wetland environments	Forest block size around wetlands	Species-specific presence/absence surveys of forested wetlands every 5 years.	2

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: U. Susquehanna, W. Br. Susquehanna, Allegheny

Associated Species: Forested wetland species

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Acid deposition leads to reduced calcium availability in diet.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Pass legislation to reduce contaminants.	Reduce contaminants below long-term exposure toxic levels.	Mercury and PCBs PPM.	Species-specific presence/absence surveys of forested wetlands every 5 years.	3

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: U. Susquehanna, W. Br. Susquehanna, Allegheny

Associated Species: Forested wetland species

RESEARCH NEEDS

1. Breeding- What are site and landscape characteristics that have supported northern Waterthrush nest sites? Model these sites.

2. Breeding- Are unoccupied habitats available?

3. Breeding- What are population sizes and productivity in boreal forested wetlands and high elevation palustrine habitats (headwaters) that are off-road and poorly monitored currently?

SURVEY NEEDS

1. Breeding- Northern Waterthrush breeding populations are poorly known. Determine extent of breeding population through volunteer surveys.

2. Breeding- Expand Mountain Bird Watch into PA including NOWA as a target species in palustrine habitats and off-road point count surveys and spot-mapping for forest interior birds to determine habitat requirements and association with current forest management practices.

3. Breeding- MAPS program for selected locations.

MONITORING PROGRAMS

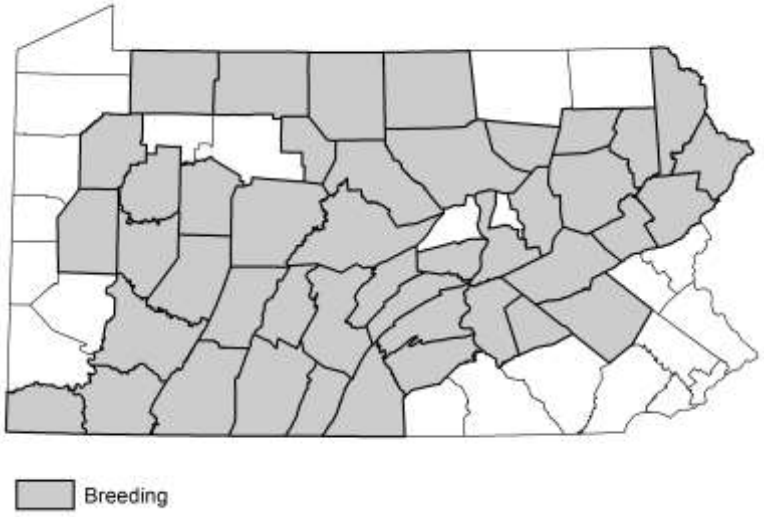
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Monitoring Avian Productivity and Survivorship (MAPS)	The Institute for Bird Populations	http://www.birdpop.org/MAPSPROG.htm	A continent-wide network of constant-effort mist netting stations, including several stations in Pennsylvania. Data collected provides survival and productivity information for many songbird species and can be a useful measurement of temporal patterns.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals
Yellow-bellied Flycatcher / Rare Mountain Forest Bird Studies and Conservation	Pennsylvania Game Commission / Cornell Laboratory of Ornithology	http://www.portal.state.pa.us/portal/server.pt?open=514&objID=621014&mode=2	Area searches in targeted locations with history of mountain forest bird breeding populations. Geospatial and behavioral data collected for each location / territory found for priority species: Yellow-bellied Flycatcher, Blackpoll Warbler, Olive-sided Flycatcher, Swainson's Thrush, Red Crossbill, Pine Siskin.

Golden-winged Warbler

Vermivora chrysoptera

Kathy Korber
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G4**	State Rank	**S2B**
IUCN Red List	**NT Near Threatened**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**12600**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Double detection of territories using the Conservation Initiative Monitoring protocol to at least 2 birds per 10 points surveyed, distributed over 20 randomly established quads throughout the focal area.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Central Oak-Pine**	
Habitat	**Northeastern Interior Dry-Mesic Oak Forest**	

Specific Habitat Requirements:

Mosaic of herbaceous patches and shrubby thickets located along a forest edge, often at higher elevations; increasingly found in higher elevation bogs and forested wetlands.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss of forest and wetland forest habitats to development in the Appalachian and Pocono Plateaus and Ridge and Valley regions.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	To create and continuously maintain early successional patches within largely forested landscapes to ensure long-term breeding populations. (Bakerman et al. 2011)	Acreage of available young forest and early successional habitats.	Annual breeding season monitoring of territorial males in new areas.	1
Significantly increase suitable, early successional and young forest habitat within focal areas of southwest, southcentral, northcentral and northeast Pennsylvania.					

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Ruffed Grouse, American Woodcock, Gray Catbird, Prairie Warbler, Eastern Towhee, Field Sparrow, Appalachian cottontail, snowshoe hare

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Loss of young forest habitat to succession and the lack of a disturbance regime in Pennsylvania forests.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Mimic natural forest disturbances, particularly through prescribed fire which initiates regeneration prior to timber harvesting and maintains early successional structural components, including savannah-type scrub habitats.	Measure GWWA response through breeding population monitoring.	Annual breeding season monitoring of territorial males.	1
Intensively manage for early successional habitat, specifically patches of early successional habitat within the forest landscape, and include a variety of habitat management techniques such as prescribed burning, mechanical clearing and timber management to create the structural diversity critical for quality breeding habitat.					

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Ruffed Grouse, American Woodcock, Gray Catbird, Prairie Warbler, Eastern Towhee, Field Sparrow, Appalachian cottontail, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Hybridization and competition with Blue-winged Warbler as a result of its range expansion.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Identify important populations of GWWA in areas devoid of Blue-winged Warblers and protect and intensively manage those areas; identify habitat features that are more favorable to GWWA and manage for those conditions, especially in forested landscapes at higher elevations (>1500 ft).	Identify populations and habitats that have the highest potential for management success (CWCS Priority Species Account); minimize hybridization with Blue-winged Warbler.	Preserved areas of "pure" Golden-winged Warbler populations.	Annual breeding season monitoring of territorial males, including the presence of BWWA and hybrids.	1

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Ruffed Grouse, American Woodcock, Gray Catbird, Prairie Warbler, Eastern Towhee, Field Sparrow, Appalachian cottontail, snowshoe hare

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Vegetation management along roadways and utility right-of-ways may lead to population sinks.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Identify ROWs within focal areas that are suitable for GWWA and that have potential for habitat management on adjoining land. Collaborate with public utilities to develop habitat management strategies that incorporate the regulatory requirements for vegetation maintenance of ROWs while creating or enhancing habitat for GWWA	Use the ROW to provide the herbaceous or shrub components within a larger scale management strategy involving adjacent land, including savannah-type scrub habitats (Golden-winged Warbler Working Group 2012).	Measure GWWA response through breeding population monitoring.	Annual breeding season monitoring of territorial males.	2

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Ruffed Grouse, American Woodcock, Gray Catbird, Prairie Warbler, Eastern Towhee, Field Sparrow, Appalachian cottontail, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: White-tailed deer browsing inhibits growth of suitable breeding habitat.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Increase deer harvest in areas where populations may be limited by overbrowsing; erect deer fencing.	Improve forest regeneration and structural diversity of vegetation in areas with overbrowsing.	Measure GWWA response through breeding population monitoring of treatment areas.	Long-term breeding season monitoring of territorial males and territory density before and after management action.	2

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Ruffed Grouse, American Woodcock, Gray Catbird, Prairie Warbler, Eastern Towhee, Field Sparrow, Appalachian cottontail, snowshoe hare

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Acid deposition leads to reduced calcium availability in diet.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 3.0 Data Collection and Analysis Determine the role acidified forest soils (particularly at higher elevations) play in limiting Golden-winged Warbler populations in Pennsylvania. Explore terrestrial liming as a potential restoration technique to increase soil pH and calcium availability in the form of calcium-rich invertebrate prey.	Determine the influence of soil calcium depletion on GWWA decline, particularly at higher elevations; and test liming on sample sites for its potential as a mitigation technique.	Test site breeding population monitoring before treatment and post-treatment annually for five years.	Breeding season monitoring of territorial males and territory density before and after application; annually for five years to show initial short-term trend in response to treatment.	2

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Ruffed Grouse, American Woodcock, Gray Catbird, Prairie Warbler, Eastern Towhee, Field Sparrow, Appalachian cottontail, snowshoe hare

RESEARCH NEEDS

1. Breeding- In addition to continued breeding population monitoring within PA focal areas, identify and monitor specific populations that occur in areas devoid of Blue-winged Warbler and areas that have lower rates of hybridization.

2. Breeding- Evaluate population response to habitat management prescriptions used to create, maintain or enhance breeding habitat.

3. Breeding- Find linkage between PA GWWA populations and wintering grounds in Central and NW South America.

SURVEY NEEDS

1. Breeding- Long-term monitoring of Golden-winged Warbler, Blue-winged Warbler and hybrids as part of the Golden-winged Warbler (CLO) Conservation Initiative Monitoring to collect focal area abundance and distribution data.

2. Breeding- Post-treatment monitoring of locations managed for Golden-winged Warblers.

3. Breeding- Monitor high priority populations within GWWA focal areas, searching for new populations that have responded to disturbances.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Golden-winged Warbler Conservation Initiative Monitoring	Golden-winged Warbler Working Group; Coordinated by the Cornell Lab of Ornithology (CLO)		PGC works with partners to monitor GWWA, BWWA, and hybrids as part of the regional and national conservation monitoring project. This program helps to inform the agency of management potintial for implementing best management practices where they are most appropriate.

MONITORING PROGRAMS

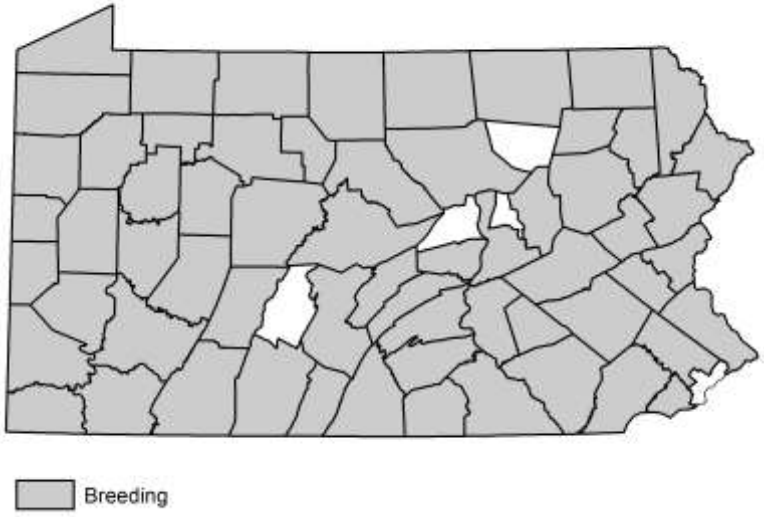
Program Name	Lead Agency	Hyperlink	Description
Golden-winged Warbler Monitoring on state game lands, forest land and adjacent lands within focal areas.	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt/document/1460133/71040-13z_pdf	In addition to CLO surveys, the PGC staff and volunteers conduct GWWA surveys of game lands, forest lands and other areas where there is potential for management within GWWA focal areas.
Nicaragua Highlands Project	El Jaguar Reserva / American Bird Conservancy		PGC supports this important project which monitors wintering grounds in Central America shade grown coffee plantations and uses native species reforestation to create habitat corridors and protect water sources that can help restore habitat and connectivity for migratory birds in the El Jaguar-Volcan Yali Corridor.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Blue-winged Warbler

Vermivora cyanoptera

Kathy Korber
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / High Responsibility**	PA Abundance	**104000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Protect existing populations of Blue-winged Warblers in northwestern and southeastern regions of Pennsylvania where Golden-winged Warblers do not occur, and maintain a detection rate of at least 0.50 singing males per Breeding Bird Survey route within those regions.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Agricultural**	
Habitat	**Agriculture (NLCD 81-82)**	

Specific Habitat Requirements:

Early-mid successional forests and thickets w/openings; areas marked by patches of herbs, shrubs, and trees and often located near a forest edge.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Residential and commercial development is depleting existing habitat and eliminating potential habitat.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	To maintain productive Blue-winged Warbler populations outside of Golden-winged Warbler focal areas through active habitat management.	An increase in the amount of quality habitat in the northwest and southeast regions.	Breeding Bird Surveys	1
Increase optimal habitat availability in areas outside of the Golden-winged Warbler's state breeding range, which includes the northwest and southeast regions of Pennsylvania or anywhere in the state with agricultural landscapes or below 1500 ft.					

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont

Associated Species: American Woodcock, Ruffed Grouse, Prairie Warbler, Nashville Warbler, Mourning Warbler

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Loss of early successional habitat through forest maturation in the absence of disturbance regimes such as wildfire and timber harvest.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase the amount of suitable habitat and improve the quality of existing habitat outside of Golden-winged Warbler focal areas.	An increase in the amount of suitable habitat in the northwest and southeast regions.	Breeding Bird Surveys	1
Identify areas in northwest and southeast regions that are appropriate for BWWA conservation and actively manage forests for early successional habitat. Include a variety of habitat management techniques such as prescribed burning, mechanical clearing and silviculture treatments to create the structural diversity critical for quality breeding habitat.					

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont

Associated Species: American Woodcock, Ruffed Grouse, Prairie Warbler, Nashville Warbler, Mourning Warbler

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Vegetation management along roadways and utility right-of-ways may reduce habitat quality and suitability.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Improve habitat quality of ROWs and incorporate the habitat components into a larger scale management strategy involving the adjacent lands.	The amount and quality of habitat available through ROW management.	Breeding Bird Surveys	2

Identify ROWs within northwest and southeast regions that are suitable for BWWA and that have potential for habitat management on adjoining land. Next, collaborate with public utilities to develop habitat management strategies that incorporates the regulatory requirements for vegetation maintenance of ROWs while creating or enhancing BWWA habitat.

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont

Associated Species: Prairie Warbler, Field Sparrow, Brown Thrasher, Eastern Towhee, Indigo Bunting

RESEARCH NEEDS

1. Breeding- Population, range, and distribution through annual statewide monitoring of Golden-winged and Blue-winged Warblers and hybrids, with emphasis on northwestern and southeastern regions or anywhere within agricultural landscapes or below 1500 feet.

2. Breeding- An intensive demographic study of multiple breeding populations of Blue-winged Warblers to identify the most productive breeding areas and habitat types. (Kubel in Steele et al. 2010).

3. Breeding- A field study that investigates what habitat conditions , if any, favor blue-winged warblers to the exclusion of golden-winged warblers and hybrids. (Kubel in Steele et al. 2010); also, an international research collaboration that identifies wintering grounds for Pennsylvania Blue-winged Warblers as well as habitat associations and conditions of wintering grounds.

SURVEY NEEDS

1. Breeding- Long-term monitoring of BWWA and hybrids as part of the Golden-winged Warbler Conservation Initiative Monitoring to collect abundance and distribution data.

2. Breeding- Conduct additional surveys in the northwest and southeast regions (outside of GWWA focal areas) and encourage the Pennsylvania birding community to concentrate search efforts in these regions.

3. Breeding- Post-treatment monitoring of locations in the northwest and southeast regions that are managed for Blue-winged Warblers or managed for early successional species.

MONITORING PROGRAMS

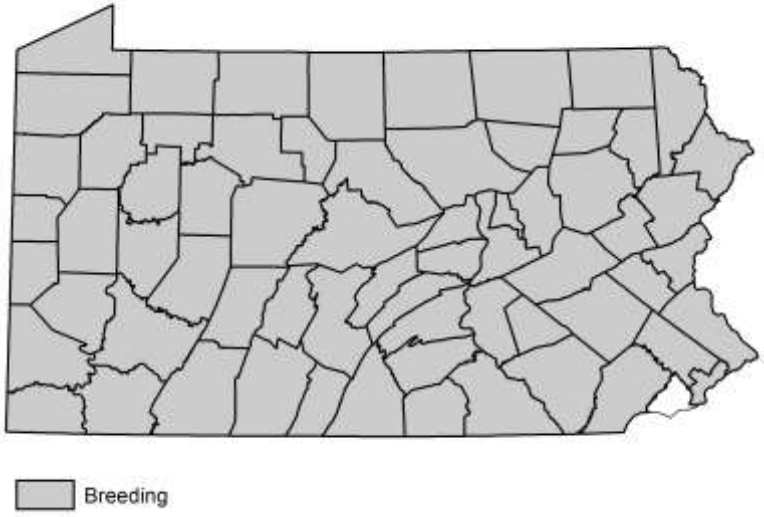
Program Name	Lead Agency	Hyperlink	Description
Blue-winged Warblers and hybrids are monitored on state game lands, forest land and adjacent lands within the Golden-winged winged warbler focal areas.	Pennsylvania Game Commission	http://www.portal.state.pa.us/portal/server.pt/document/1460133/71040-13z_pdf	The PGC staff and volunteers collect Blue-winged Warbler and hybrid count data on searches for Golden-winged Warbler on game lands, forest lands and other areas where there is potential for management.
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	U.S. Geological Survey	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations
Surveys for Blue-winged Warblers and hybrids as part of the Golden-winged Warbler Conservation Initiative Monitoring	Golden-winged Warbler Working Group; Coordinated by the Cornell Lab of Ornithology (CLO)	http://www.birds.cornell.edu/page.aspx?pid=2679	The study monitors golden-winged warblers, Blue-winged Warblers and hybrids during the breeding season in PA as part of a regional and national conservation monitoring project.

Black-and-white Warbler

Mniotilta varia

Scott H. Stoleson
USDA Forest Service, Northern Research Station

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**500000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Increase statewide population estimate to 1.0 bird per route on three-quarters of routes, as indicated by Breeding Bird Survey data.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Hardwood & Conifer**	**Central Oak-Pine**
Habitat	**Appalachian (Hemlock)-Northern Hardwood Forest**	**Northeastern Interior Dry-Mesic Oak Forest**

Specific Habitat Requirements:

Reported by some as an area-sensitive forest breeder, although apparently accepts early-successional forest; most abundant in forest with dense understory, including scrubby barrens.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Preferred dense understory reduced or eliminated by heavy deer browsing

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Maintain current science-based deer policy in state	Keep deer at levels that allow for shrubby understory regeneration	Woody understory cover, as assessed by FIA	Point counts to quantify avian populations; FIA-style understory plots to assess vegetation responses	1

Action Location: Physiographic Province: Statewide

Associated Species: Hooded Warbler, Canada Warbler, Black-throated Blue Warbler, Kentucky Warbler

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Significant forest fragmentation from well-drilling sites, wind turbines, pipelines and access roads

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Enforce regulations and codes limiting energy development in or adjacent to areas of known concentrations of BAWW	Create regulations that would limit density of energy development in large tracts of forest	Degree of fragmentation as quantified by FRAGSTATS	Assessment of new well/turbine locations in relation to known habitat	2

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Ovenbird, Worm-eating Warbler, Scarlet Tanager

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Roads, pipelines, and powerlines fragment forest and facilitate passage by brood parasites and mesopredators

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Coordinate planning of new roads, pipelines, and powerlines to avoid large blocks of forest or utilize existing corridors	Discourage placement of new roads/pipelines/powerlines in extensive forest habitat	Degree of fragmentation as quantified by FRAGSTATS	use annual Breeding Bird Surveys to assess local (route/region)population trends	2

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Ovenbird, Worm-eating Warbler, Scarlet Tanager

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Fire suppression reduces area and quality of scrub barrens highly favored by BAWW

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Promote a coordinated program of prescribed burning of current and past scrub barrens	Increase and sustain acreage in scrub barren habitat across state	Acreage classified as scrub barrens	Point counts to quantify avian populations within barrens management areas	2

Action Location: Physiographic Province: Statewide

Associated Species: Prairie Warbler, Eastern Whip-poor-will, Field Sparrow, Gray Catbird

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Forest fragmentation from exurban, suburban development

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Develop landscape-level planning agreements across ownerships in areas where species occurs	Minimize fragmentation of current occupied habitat	Degree of fragmentation as quantified by FRAGSTATS	use annual Breeding Bird Surveys to assess local (route/region)population trends	3

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Ovenbird, Worm-eating Warbler, Scarlet Tanager

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Acid deposition depletes populations of invertebrate prey.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Legislation required at national level (since most of acid deposition originates west of PA) to reduce allowable levels of acid discharge	Reduce levels of acid deposition to level where invertebrates not depleted	Anion levels in precipitation	Maintain existing NOAA meteorological stations	3

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Veery, Ovenbird, Kentucky Warbler, Canada Warbler

RESEARCH NEEDS

1. Breeding- Determine habitat correlates of nest success, abundance, and site fidelity to identify optimal habitat of BAWW in PA.

2. Breeding- Evaluate population response to habitat management prescriptions, including silviculture, used to create, maintain or enhance breeding habitat of forest birds.

3. Breeding- Determine the adequacy of BBS to monitor populations compared to off-road surveys.

SURVEY NEEDS

1. Breeding- Conduct off-road point count surveys and spot-mapping for forest interior birds to determine habitat requirements and association with current forest management practices.

MONITORING PROGRAMS

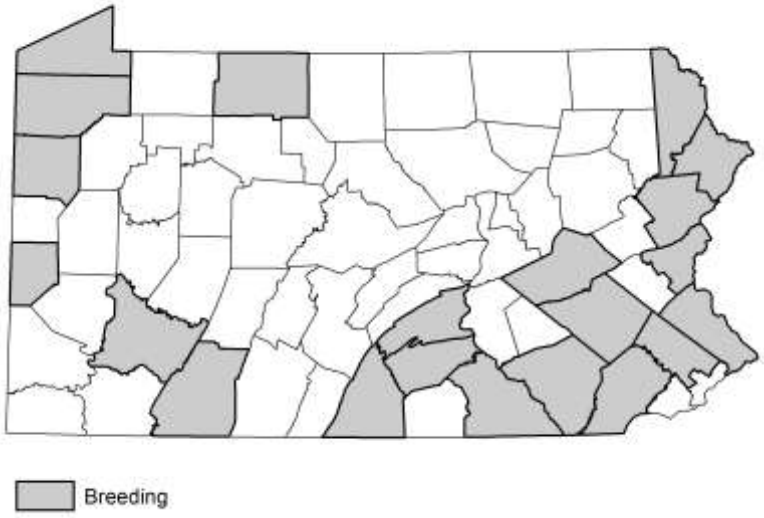
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Prothonotary Warbler

Protonotaria citrea

Daniel P. Mummert
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**400**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Documentation of at least 45 active nest sites distributed across at least 6 counties annually by the year 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Swamp**	
Habitat	**North-Central Appalachian Acidic Swamp**	

Specific Habitat Requirements:

Wooded swamps or other flooded forest types > 100 hectares; swampy riparian forest > 30 meters wide.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss of potential nest sites due to removal of snags and cavity trees within bottomland forests

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Focus management on maintaining large blocks of floodplain forest; implement nest box program to provide alternative nesting substrate.	Establish nest boxes within stretches of suitable habitat of the Susquehanna, Schuylkill and Delaware Rivers	Number of nest boxes installed	Nest boxes should be monitored for nesting success annually for ten years.	1

Action Location: Physiographic Province: Piedmont

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Nesting/prey availability impacted by severe precipitation and/or drought

Action	Objective	Measure	Monitoring	Priority
TRACS Action 5.0 Facilities and Areas Active management and planning on publicly owned wetlands in Erie, Crawford, and Mercer counties in the NE, as well as riparian areas where species occurs. Goal is adaptive management of wetlands associated uplands to handle increases in rainfall and severe spring precipitation events. Riparian areas need protection from extreme water level changes during nesting season.	Adaptable approach to water level management so wetlands and riparian forests can be sustained in periods of high or low precipitation. Includes replacement and upgrade of water control devices suitable for handling predicted precipitation changes.	# sites with adaptive management plans in place; # water control devices upgraded	Monitor progress in development and implementation of Adaptation Plans at high-priority sites. Monitor installation of water control devices.	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Virginia Rail, Sora, Common Gallinule, Least Bittern American Bittern, American Coot, Wilson's Snipe.

THREATS AND ACTIONS

IUCN Threat: 6.0 Human Intrusions and Disturbance

Season: Breeding

Specific Threat: Disturbance of nest sites due to human activities such as motorboats and fishing

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Establish protected areas where human activity is restricted during the breeding season.	Number of acres protected from human activity	Annual surveys should be conducted within protected management areas once every five years during the breeding season to determine population trend	2
Areas of significant importance to Prothonotary warblers should be protected from human activity during the breeding season when possible.					

Action Location: Physiographic Province: Statewide

Associated Species: Red-headed Woodpecker, Bald Eagle, Osprey, Cerulean Warbler, Louisiana Waterthrush

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Loss of suitable habitat due to draining of bottomland wetland forests

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Eliminate loss of bottomland swamp forest habitat	Number of acres of protected bottomland swamp forest habitat	Annual point count surveys should be conducted within protected management areas once every five years during the breeding season to determine population trend	2
Areas of significant importance to Prothonotary warblers should be protected from draining of suitable bottomland forest habitat					

Action Location: Physiographic Province: Statewide

Associated Species: Red-headed Woodpecker, Bald Eagle, Osprey, Cerulean Warbler, Louisiana Waterthrush

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Loss of suitable habitat due to excessive pollution along riparian corridors and within bottomland wetland forests

Action	Objective	Measure	Monitoring	Priority
TRACS Action 7.0 Law enforcement Laws need to be enforced to minimize pollution to our rivers and wetlands	Minimize pollution in our rivers and wetlands	Amount of pollutants within our rivers and wetlands	Sample suitable wetlands and riparian corridors for pollutants once every five years	3

Action Location: Physiographic Province: Statewide

Associated Species: Great Egret, Black-crowned Night-Heron, Yellow-crowned Night-Heron, Bald Eagle, Osprey, Spotted Sandpiper, Belted Kingfisher, Louisiana Waterthrush, Prothonotary Warbler.

RESEARCH NEEDS

1. Breeding- Determine if a nest box program, in regions where natural cavities at low heights over standing water is likely a limiting factor, has a significant effect on the state's population and distribution.

2. Breeding- Increase knowledge of abundance and distribution throughout the state.

3. Breeding- Determine wetland management options that favor better Prothonotary Warbler productivity.

SURVEY NEEDS

1. Breeding- Nest boxes placed for Prothonotary warblers should be annually monitored for nesting success and productivity

2. Breeding- Surveys for secretive marsh birds should include audio recordings of Prothonotary warbler or at least registering observations of this species.

3. Breeding- Monitor changes in abundance and distribution of suitable bottomland riparian and forested wetland habitat.

MONITORING PROGRAMS

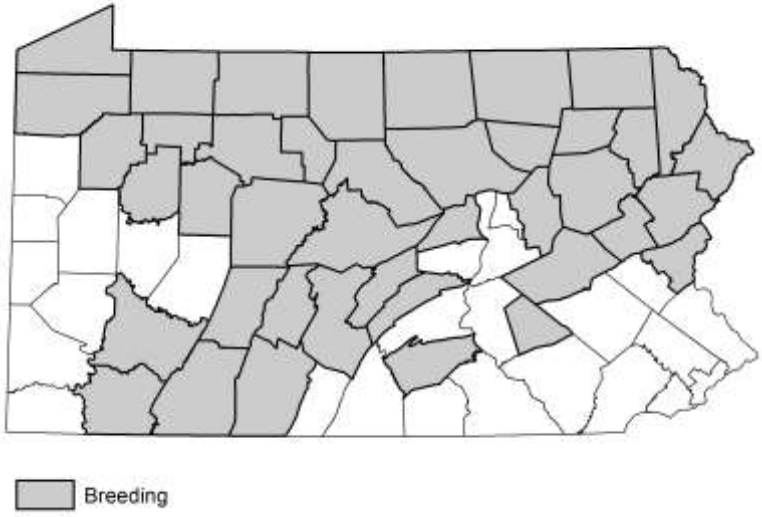
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Nashville Warbler

Oreothlypis ruficapilla

Darryl Speicher and Jackie Speicher
Pocono Avian Research Center

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**3000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Maintain nesting distribution with pairs in at least 200 Breeding Bird Atlas (Wilson et al. 2012) blocks annually through 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Peatland & Fens**	**Northern Swamp**
Habitat	**North-Central Interior and Appalachian Acidic Peatland**	**North-Central Appalachian Acidic Swamp**

Specific Habitat Requirements:

Shrub oak barrens and scrub shrub wetlands, higher elevations (greater than 457 meters).

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Natural gas pipelines

Action		Objective	Measure	Monitoring	Priority
TRACS Action 1.0	Coordination and Administration	Minimize long-term impact	vegetation surveys	vegetation surveys	1

Restoration of disturbed areas.

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Habitat degradation

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Understanding of effects of invasive species	Bird surveys	population size	1

Monitoring

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Disruption of food chain

Action		Objective	Measure	Monitoring	Priority
TRACS Action 1.0	Coordination and Administration	Increase quality of food supply	Invertebrate surveys	species productivity and health	1

Reduction of air pollution

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Peat Mining

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Habitat protection	Stable populations	Bird surveys	3

Acquisition of open space lands surrounding sphagnum dominated wetlands.

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Habitat loss and degradation

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	management of stand composition	Bird surveys	population stability	3

Selective harvest and planting

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Habitat degradation

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Maintain habitat quality	Bird surveys	Population stability	3

Uncertain

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

RESEARCH NEEDS

1. Breeding- What is the species sensitivity to disturbance along the fringe of the habitat?

2. Breeding- How close can disturbance be to their breeding habitat without affecting breeding activities?

3. Breeding- Following disturbance, what is the timeline for the return of a viable breeding population?

SURVEY NEEDS

1. Breeding- Conduct off-road point count surveys and spot-mapping for forest interior birds to determine habitat requirements and association with current forest management practices focused in the Allegheny Plateaus and Ridge and Valley provinces.

2. Breeding- Mountain Bird Watch / Rare Mountain Bird Surveys.

3. Breeding- Monitoring avian productivity and survivorship surveys (Institute for Bird Populations protocols). Site: Tom Darling Preserve.

MONITORING PROGRAMS

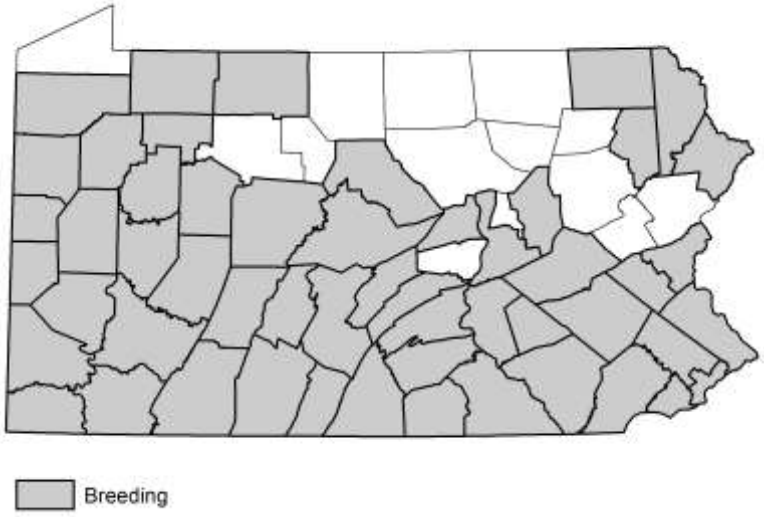
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Monitoring Avian Productivity and Survivorship (MAPS)	The Institute for Bird Populations	http://www.birdpop.org/MAPSPROG.htm	A continent-wide network of constant-effort mist netting stations, including several stations in Pennsylvania. Data collected provides survival and productivity information for many songbird species and can be a useful measurement of temporal patterns.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Kentucky Warbler

Geothlypis formosa

David Yeany II
Western PA Conservancy

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**35400**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Stabilize or increase an estimated breeding population of 17,700 singing males in Pennsylvania as reflective of detections on Breeding Bird Survey routes statewide as through 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Central Oak-Pine**	**Northern Hardwood & Conifer**
Habitat	**Northeastern Interior Dry-Mesic Oak Forest**	**South-Central Interior Mesophytic Forest**

Specific Habitat Requirements:

Lowland deciduous forests with well developed ground cover and a dense brushy or vine-filled understory, often near streams.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Forest loss and fragmentation from new building and infrastructure development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Promote and implement land use planning strategies for residential and commercial development which avoid placement of new construction within significant areas of interior forest and utilize existing infrastructure.	Within 3 years develop a comprehensive statewide strategy that addresses forest fragmentation issues and provides protection to forest interior habitat which can be implemented by municipal and county planning departments.	Number of municipalities and counties adopting the plan with intent to implement.	1-monitor number of development projects/acreage in municipalities/counties implementing that results in loss of interior forest, 2-survey participating municipalities/counties for data, 3-monitor for 5 years after completion of plan	1

Action Location: Physiographic Province: Statewide

Associated Species: Eastern Whip-poor will, Winter Wren, Swainson's Thrush, Louisiana Waterthrush, Canada Warbler

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Forest loss and fragmentation from pad (turbine and well) and infrastructure (roads and pipelines) development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Promote and implement land use planning strategies for shale gas and wind development which site projects outside significant areas of interior forest and coincide infrastructure with existing roads and pipelines.	Within 3 years develop a comprehensive statewide strategy that addresses forest fragmentation issues and provides protection to forest interior habitat which can be implemented by municipal and county planning departments.	Number of municipalities and counties within areas of high shale gas and wind development adopting the plan with intent to implement.	1-monitor number of development projects/acreage in municipalities/counties implementing that results in loss of interior forest, 2-survey participating municipalities/counties for data, 3-monitor for 5 years after completion of plan	1

Action Location: Physiographic Province: Statewide

Associated Species: Eastern Whip-poor will, Winter Wren, Swainson's Thrush, Louisiana Waterthrush, Canada Warbler

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Forest loss and fragmentation from development of transportation and service corridors.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Promote and implement land use planning strategies for residential and commercial development which avoid placement of new construction within significant areas of interior forest and utilize existing infrastructure.	Within 3 years develop a comprehensive statewide strategy that addresses forest fragmentation issues and provides protection to forest interior habitat which can be implemented by municipal and county planning departments.	Number of municipalities and counties adopting the plan with intent to implement.	1-monitor number of development projects/acreage in municipalities/counties implementing that results in loss of interior forest, 2-survey participating municipalities/counties for data, 3-monitor for 5 years after completion of plan	1

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont

Associated Species: Eastern Whip-poor will, Winter Wren, Swainson's Thrush, Louisiana Waterthrush, Canada Warbler

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Non-native plants, insects, and deer overbrowsing degrade forest ecosystems, leading to reduced breeding success, while feral cats may cause direct mortality.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources 1. Increase promotion of deer hunting statewide, and create and implement urban/suburban deer hunting programs in regions where forest interior birds have greatest declines, 2. Coordinate invasive species management on conservation lands, 3. Educate Pennsylvania residents about the effects of free-ranging cats on birds and implement mitigation measures.	1. Target 5 PGC WMUs with highest deer densities, lowest hunter recruitment, and/or highest declines in forest interior birds with programs to boost deer hunter numbers and deer harvest (where needed), and create urban/suburban deer hunting initiatives in Pittsburgh and Philadelphia. 2. Establish a statewide strategy for invasive species management, drawing upon DCNR's established guidelines and implement on 50 properties (i.e. State Forest, Game Lands, land trusts properties). 3. Provide means for statewide promotion of American Bird Conservancy's "Cats Indoors Campaign".	1. Reduction of deer populations in priority units and urban areas. 2. Successful removal of invasive species on 50 conservation properties. 3. Number of groups promoting "Cats Indoors" and number of people reached.	1 - deer densities/hunter numbers, conservation lands with invasive species management, reach of "Cats Indoors" campaign, 2 - standard agency/program tracking and monitoring, 3- annually for 10 years	1

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont, Ridge and Valley

Associated Species: Eastern Whip-poor will, Winter Wren, Swainson's Thrush, Louisiana Waterthrush, Canada Warbler

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Reduced abundance and availability of calcium-rich invertebrate prey in areas with high acidic atmospheric deposition (rain).

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Select 10 of the most severely acidified sites on state managed lands in western and northcentral Pennsylvania and treat them with lime applications over the next 5 years to increase invertebrate prey abundance.	Change in soil chemistry, invertebrate prey abundance, and forest bird abundance/productivity (i.e. Kentucky Warbler) at treated sites.	1-Soil pH, invertebrate abundance, forest breeding bird abundance & productivity (i.e. Kentucky Warbler), 2-see Pabian and Brittingham (2007, 2011), 3-annually for 5 years	2
Determine target areas with acidified soils on state managed lands and implement terrestrial lime applications to increase calcium-rich prey abundance for forest birds.					

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Wood Thrush, Ovenbird, Veery, Louisiana Waterthrush

RESEARCH NEEDS

1. Breeding- Assess the effects of forest fragmentation on forest interior birds, including predation/parasitism rates, minimum area requirements, as well as minimum viable population sizes, utilizing population trend data from the 2nd Breeding Bird Atlas to select sites of stability and decline for comparison.

2. Breeding- Conduct landscape level analysis of areas of forest interior bird species (e.g. Kentucky Warbler) using 2nd Breeding Bird Atlas data in areas of range change to investigate land use factors influencing that change.

3. Breeding- Evaluate population response to habitat management prescriptions used to create, maintain or enhance breeding habitat.

SURVEY NEEDS

1. Breeding- Conduct off-road point count surveys and spot-mapping for forest interior birds to determine habitat requirements and association with current forest management practices focused in the Allegheny Plateaus and Ridge and Valley provinces.

2. Breeding- Design and conduct off-road point count surveys to estimate Kentucky Warbler (and other forest interior bird) populations to enable evaluation of roadside point counts and associated population estimates from the 2nd Breeding Bird Atlas.

MONITORING PROGRAMS

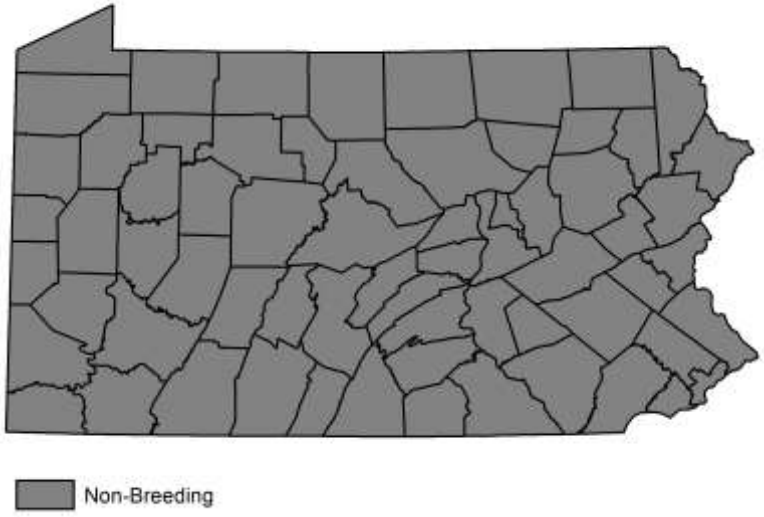
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Hooded Warbler

Setophaga citrina

Scott H. Stoleson
USDA Forest Service, Northern Research Station

Photo: Lauri Shaffer/ BirdingPictures.com



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4N (M)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**528000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(M) Unknown**

Conservation Goal:

Sustain abundance during spring and fall migration in Pennsylvania through maintenance of appropriate migratory stopover habitat.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(M) Central Oak-Pine**	**(M) Northern Hardwood & Conifer**
Habitat	**(M) Northeastern Interior Dry-Mesic Oak Forest**	**(M) Appalachian (Hemlock)-Northern Hardwood Forest**

Specific Habitat Requirements:

(M) Most frequent during migration in edges and early-successional deciduous forest (Rodewald & Matthews 2005).

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Migration

Specific Threat: Fragmentation from exurban and suburban development

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Develop landscape-level planning agreements across ownerships in areas where species occurs	Minimize fragmentation of current occupied habitat	Degree of fragmentation as quantified by FRAGSTATS	use annual Breeding Bird Surveys to assess local (route/region)population trends	3

Action Location: Physiographic Province: Appalachian Plateaus, Central Lowland

Associated Species: Wood Thrush, Ovenbird, Worm-eating Warbler, Scarlet Tanager

IUCN Threat: 3.0 Energy Production and Mining

Season: Migration

Specific Threat: Significant forest fragmentation from well-drilling sites, pipelines and roads.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Enforce regulations and codes limiting energy development in large tracts of forest	Create regulations that would limit density of energy development in large tracts of forest	Degree of fragmentation as quantified by FRAGSTATS	Assessment of new well/turbine locations	3

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Ovenbird, Worm-eating Warbler, Scarlet Tanager

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Migration

Specific Threat: Roads, pipelines, and powerlines fragment forest and facilitate passage by mesopredators

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Coordinate planning of new roads, pipelines, and powerlines to avoid large blocks of forest or utilize existing corridors	Discourage placement of new roads in extensive forest habitat	Degree of fragmentation as quantified by FRAGSTATS	Use existing network of migration banding stations (e.g., Powdermill) to test for trends in populations over time	3

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Ovenbird, Worm-eating Warbler, Scarlet Tanager

IUCN Threat: 5.0 Biological Resource Use

Season: Migration

Specific Threat: Unsustainable harvesting (high-grading)

Action	Objective	Measure	Monitoring	Priority
TRACS Action 8.0 Outreach Disseminate information to landholders, private foresters on sustaining habitats through proper forestry techniques	Increase proportion of lands assessed to be sustainably managed 50% by 2025	Number of acres deemed sustainable	Use existing network of migration banding stations (e.g., Powdermill) to test for trends in populations over time	3

Action Location: Physiographic Province: Statewide

Associated Species: Black-throated Blue Warbler, Wood Thrush, Swainson's Thrush, Scarlet Tanager, Eastern Towhee

RESEARCH NEEDS

1. Migration- Determine what stopover habitats migrant Hooded Warblers use.

2. Migration- What is the linkage of Pennsylvania's nesting Hooded Warbler population on wintering ground?

3. Migration- Evaluate population response to habitat management prescriptions including silviculture used to create, maintain or enhance breeding habitat of forest species.

SURVEY NEEDS

1. Migration- None

MONITORING PROGRAMS

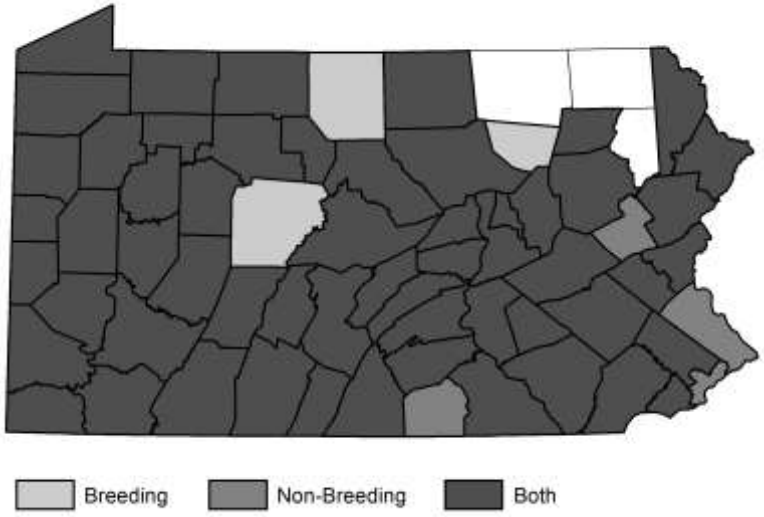
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Powdermill bird banding program	Powdermill Avian Research Center	http://www.powdermillarc.org/research/bird-banding.aspx	Constant-effort banding station with continuous operation since 1962.

Cerulean Warbler

Setophaga cerulea

Scott H. Stoleson
USDA Forest Service, Northern Research Station

Photo: Wayne Miller



CONSERVATION PROFILE

Global Rank	**G4**	State Rank	**S3B, S4N (M)**
IUCN Red List	**VU Vulnerable**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**48000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change); (M) Unknown**

Conservation Goal:

Stabilize apparent decline in statewide population indicated by Breeding Bird Survey data to at least 0.25 birds per route on no fewer than 35 routes statewide annually, by 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(B,M) Central Oak-Pine**	
Habitat	**(B) Central Appalachian Dry Oak-Pine Forest** **(M) Northeastern Interior Dry-Mesic Oak Forest**	

Specific Habitat Requirements:

(B) Large stands of mature deciduous forest with large, well-spaced trees with dense, high, often broken or heterogeneous canopies. Especially bottomland forests dominated by sycamore or ridgetop mixed oak with major white oak component.
(M) Poorly known. Assumed to be similar to breeding habitat.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Significant forest fragmentation from well-drilling sites, wind turbines, pipelines and access roads

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Designate 10 CERW conservation areas distributed across the state by 2025	Acreage designated as CA for CERW, OR number of breeding pairs within conservation areas	Tape-playback surveys following COL protocol in designated areas	1

Identify and establish development-free conservation areas in locations with high densities of CERW

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Ovenbird, Worm-eating Warbler, Scarlet Tanager

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Unsustainable harvesting (high-grading) converts to unsuitable red maple, black birch forest type

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Sustainably create oak-dominated, structurally complex forests, in 10 areas with significant CERW populations, by 2025	Acres or proportion of oak forest treated following guidelines	Survey for presence/abundance/nest success of Cerulean Warblers in treated areas, compare with untreated areas	1

Implement Cerulean Management Guidelines (Wood et al. 2013) in appropriate areas; follow sustainable oak forestry guidelines generally (Brose et al 2008).

Action Location: Physiographic Province: Statewide

Associated Species: Yellow-throated Vireo, Worm-eating Warbler

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Oak regeneration problems, replacement by red maple/black birch threaten suitability of future forests; structural simplification and homogenization of forests impacts structural complexity required by CERW

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Implement Cerulean Management Guidelines (Wood et al. 2013) in appropriate areas; follow sustainable oak forestry guidelines generally (Brose et al 2008).	Sustainably create oak-dominated, structurally complex forests, in 10 areas with significant CERW populations, by 2025	Acres or proportion of oak forest treated following guidelines	Survey for presence/abundance/nest success of Cerulean Warblers in treated areas, compare with untreated areas	1

Action Location: Physiographic Province: Statewide

Associated Species: Yellow-throated Vireo, Worm-eating Warbler

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Significant forest fragmentation and structural simplification from development

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Develop landscape-level planning agreements across ownerships in areas where species occurs	Minimize fragmentation of current occupied habitat	Degree of fragmentation as quantified by FRAGSTATS	use annual Breeding Bird Survey to assess local (route/region)population trends	2

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Scarlet Tanager, Black-throated Blue Warbler, Wood Thrush, Hooded Warbler

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Roads, pipelines, and powerlines fragment forest and facilitate passage by brood parasites and mesopredators

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Coordinate planning of new roads, pipelines, and powerlines to avoid large blocks of forest or utilize existing corridors	Discourage placement of new roads/pipelines/powerlines in extensive forest habitat	Degree of fragmentation as quantified by FRAGSTATS	use annual Breeding Bird Surveys to assess local (route/region)population trends	2

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Ovenbird, Worm-eating Warbler, Scarlet Tanager

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Gypsy moth, oak wilt facilitate conversion to non-favored forest types

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Identify, test and disseminate biocontrols for gypsy moth, oak wilt, sudden oak death	Minimize impacts of gypsy moth and pathogens on oak survival & regeneration	Oak importance value, regeneration	FIA-style overstory inventories every 5 yrs. to determine oak IV, survival, recruitment	2

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Ovenbird, Worm-eating Warbler, Scarlet Tanager

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Acid deposition depletes populations of invertebrate prey.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Legislation required at national level (since most of acid deposition originates west of PA) to reduce allowable levels of acid discharge	Reduce levels of acid deposition to levels where invertebrates not depleted	Anion levels in precipitation	Maintain existing NOAA meteorological stations	2

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Veery, Ovenbird, Kentucky Warbler, Canada Warbler

IUCN Threat: 5.0 Biological Resource Use

Season: Migration

Specific Threat: Unsustainable harvesting (high-grading) converts to unsuitable red maple, black birch forest type

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Implement Cerulean Management Guidelines (Wood et al. 2013) in appropriate areas; follow sustainable oak forestry guidelines generally (Brose et al 2008).	Sustainably create oak-dominated, structurally complex forests, in 10 areas with significant CERW populations, by 2025	Acres or proportion of oak forest treated following guidelines	Survey for presence/abundance/nest success of Cerulean Warblers in treated areas, compare with untreated areas	1

Action Location: Physiographic Province: Statewide

Associated Species: Yellow-throated Vireo, Worm-eating Warbler

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Migration

Specific Threat: Significant forest fragmentation and structural simplification from development

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Develop landscape-level planning agreements across ownerships in areas where species occurs	Minimize fragmentation of current occupied habitat	Degree of fragmentation as quantified by FRAGSTATS	Use existing network of migration banding stations (e.g., Powdermill) to test for trends in migrant populations over time	3

Action Location: Physiographic Province: Statewide

Associated Species: Scarlet Tanager, Black-throated Blue Warbler, Wood Thrush, Hooded Warbler

IUCN Threat: 3.0 Energy Production and Mining

Season: Migration

Specific Threat: Significant forest fragmentation from well-drilling sites, wind turbines, pipelines and access roads

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Enforce regulations and codes limiting energy development in large tracts of forest	Create regulations that would limit density of energy development in large tracts of forest	Degree of fragmentation as quantified by FRAGSTATS	Assessment of new well/turbine locations	3

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Ovenbird, Worm-eating Warbler, Scarlet Tanager

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Migration

Specific Threat: Roads, pipelines, and powerlines fragment forest and facilitate passage by brood parasites and mesopredators

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Coordinate planning of new roads, pipelines, and powerlines to avoid large blocks of forest or utilize existing corridors	Discourage placement of new roads/pipelines/powerlines in extensive forest habitat	Degree of fragmentation as quantified by FRAGSTATS	Assess levels of fragmentation of important areas fro CERW using GIS, FRAGSTATS	3

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Ovenbird, Worm-eating Warbler, Scarlet Tanager

RESEARCH NEEDS

1. Breeding- How does management following forestry guidelines (Wood et al.) affect nest success, survival?

1. Migration- What stopover habitats do migrant ceruleans use?

2. Breeding- What habitats do Cerulean Warblers use post-breeding before migration?

2. Migration- Determine migratory routes and stop-over areas for Cerulean Warblers breeding in PA, using light-detecting geolocators.

3. Breeding- Assess landscape-level characteristics of cerulean habitat (degree of fragmentation, slope, aspect, elevation, patch size, proximity to water/anthropogenic habitats/gas & oil infrastructure).

SURVEY NEEDS

1. Breeding- Identify and map areas of high CERW abundance in PA to inform further conservation actions.

1. Migration- None

2. Breeding- Conduct off-road point count surveys and spot-mapping for forest interior birds to determine habitat requirements and association with current forest management practices.

MONITORING PROGRAMS

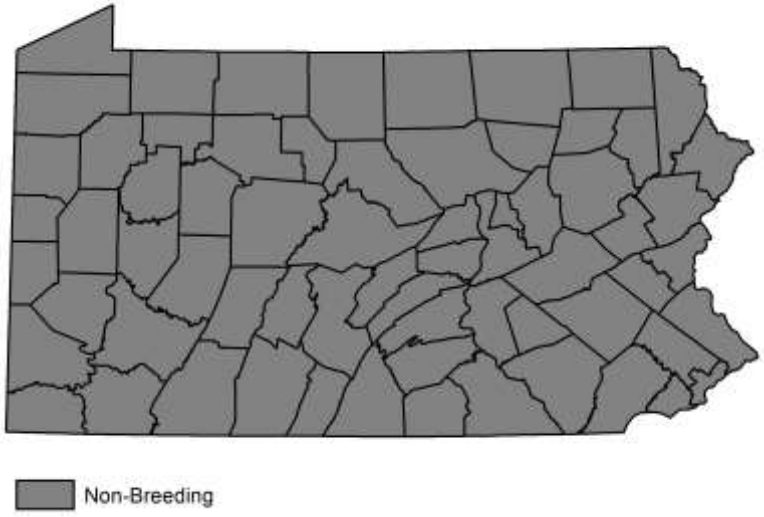
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.
Powdermill bird banding program	Powdermill Avian Research Center	http://www.powdermillarc.org/research/bird-banding.aspx	Constant-effort banding station with continuous operation since 1962.

Blackburnian Warbler

Setophaga fusca

Sarah Sargent
Audubon Pennsylvania

Photo: Shawn Collins



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4N (M)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**720000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(M) Unknown**

Conservation Goal:

Sustain abundance during spring migration in Pennsylvania through maintenance of appropriate migratory stopover habitat.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(M) Central Oak-Pine**	
Habitat	**(M) Northeastern Interior Dry-Mesic Oak Forest**	

Specific Habitat Requirements:

(M) Not very specific during migration. Any habitat with at least some woody vegetation may be used.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Migration

Specific Threat: Loss and degradation of habitat due to urbanization and development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Restore or enhance natural habitat in areas that are heavily used during migration, as identified by radar analysis or surveys. (E.g., Fairmount Park.) Also promote "lights out" programs in cities during migration, and use of bird-friendly glass options.	Improve quantity and quality of stopover habitat in urban/heavy use areas. Reduce mortality of migrants due to glass/lights in major cities during migration.	Area of restored/enhance habitat (acres). Number of dead/injured birds found on survey routes.	Habitat use of restored areas can be assessed by surveys or mist netting. Volunteer programs for survey routes for finding dead/injured birds below skyscrapers can be established.	1

Action Location: Physiographic Province: Atlantic Coastal Plains, Central Lowland, Piedmont
HUC4 Watershed: Statewide

Associated Species: Other migrant land birds.

IUCN Threat: 3.0 Energy Production and Mining

Season: Migration

Specific Threat: Energy development resulting in loss of intact forest habitat and other direct effects.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy 1. Continue wind-wildlife monitoring program. 2. Develop BMPs for gas wells to minimize risk to birds from lights and flares, and to speed habitat restoration after drilling.	Require compliance with BMPs on state lands (at least). Develop strategy for promoting compliance on private lands.	Number of well sites with BMPs in place.	Conduct study comparing sites with and without BMPs, assess abundance of migrant songbirds within 100m of well site.	3

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Statewide

Associated Species: Forest breeding birds and other migrant land birds.

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Migration

Specific Threat: Reduction in size of large, intact forested landscapes will reduce habitat available for migrants.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Work with power line and pipeline companies to route new corridors in close proximity to existing roads or rights-of-way.	Minimize or prevent new utility rights-of-way through existing forest blocks larger than 1000 acres.	Miles of new ROWs.	Monitor creation of new ROWs via GIS in priority forest blocks.	3

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Statewide

Associated Species: Forest breeding birds and other migrant land birds.

IUCN Threat: 5.0 Biological Resource Use

Season: Migration

Specific Threat: Poor forestry practices may reduce quality of habitat available for migrants in the long term.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Develop BMPs for forestry that give specific recommendations regarding the needs of forest birds. Make sure these are used by foresters throughout the state (see Saunders and Arseneault 2013; Wurzbacher 2013).	Develop information regarding bird requirements that can be used by foresters and incorporated into tools used by foresters (e.g., SILVAH).	Foresters using bird friendly management.	Either conduct detailed studies comparing bird use of areas with and without bird friendly management, or just track areas reported as managed in compliance with recommendations.	3

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Statewide

Associated Species: Forest Breeding birds and other migrant land birds.

RESEARCH NEEDS

1. What stopover habitats do migrant Blackburnians use?

2. Where are the breeding grounds of Blackburnian Warblers that pass through Pennsylvania during migration?

3. Does the loss of hemlock have a negative effect on Blackburnian Warbler as a stopover passage migrant?

SURVEY NEEDS

1. Conduct off-road point count surveys and spot-mapping for forest interior birds to determine habitat requirements and association with current forest management practices.

2. Conduct mist netting and banding at heavily used migration sites to monitor frequency of this species and others.

MONITORING PROGRAMS

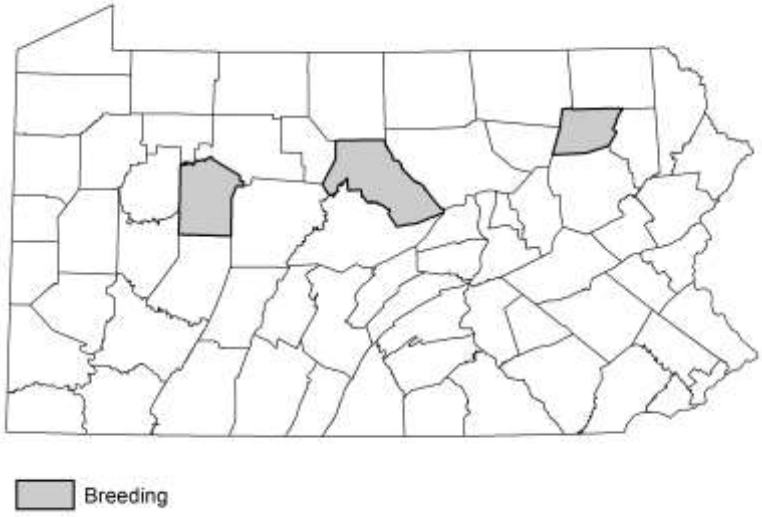
Program Name	Lead Agency	Hyperlink	Description
Banding at migration banding stations, e.g., Powdermill Avian Research Center.	NGOs, data centralized at the USGS Bird Banding Laboratory.		The timing and relative frequency of this species can be assessed at sites where migration banding occurs (or used to occur).
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.

Blackpoll Warbler

Setophaga striata

Douglas A. Gross
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S1B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Endangered**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**< 50 pairs**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

50 Blackpoll Warbler territorial pairs in at least 5 locations by 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Peatland & Fens**	**Northern Hardwood & Conifer**
Habitat	**North-Central Interior and Appalachian Acidic Peatland**	**Appalachian (Hemlock)-Northern Hardwood Forest**

Specific Habitat Requirements:

Boreal conifer swamps that are headwater wetlands above 2000 feet elev. Pennsylvania Blackpolls are associated with red spruce, eastern hemlock, eastern larch, eastern white pine, and northern hardwoods, as well as dense shrub cover (blueberry, mountain holly, swamp azelea). They generally occupy dense conifer stands, but some territories have sparse conifer cover. Some blackpoll warblers have been found in upland conifer stands as they are found elsewhere in their breeding range. Blackpoll warbler occupation of spruce, fir, pine, or hemlock summits is possible and perhaps overlooked.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Marcellus shale and wind energy infrastructure permanently replaces or fragments forest.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Protect high quality and larger blocks of boreal and northern conifer forest including wetlands with PNDI and best management practices of forested wetlands.	Protect core habitat areas for endangered and threatened species.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	1

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: U. Susquehanna, U. Delaware, W. Br. Susquehanna

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Permanent deforestation and replacement of conifer with deciduous forest.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase spruce, hemlock, and fir forest acreage and number of blocks.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	1
Make boreal conifer forest management a priority in appropriate areas; conserve mature spruce / hemlock forest, release spruce seedlings & saplings, plant spruce & fir seedlings to fill conifer forest gaps and increase conifer component in appropriate locations.					

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: U. Susquehanna, U. Delaware, W. Br. Susquehanna

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Residential and road development replaces forest and wetlands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Promote forest conservation even where there is light development.	Protect boreal conifer forest and swamps.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	2

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: U. Susquehanna, U. Delaware, W. Br. Susquehanna

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Residential and road development replaces forest and wetlands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Protect high quality and larger blocks of boreal and northern conifer forest including wetlands with PNDI and best management practices of forested wetlands.	Protect core habitat areas for endangered and threatened species.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	2

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: U. Susquehanna, U. Delaware, W. Br. Susquehanna

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Deer browsing is oversimplifying the forest species diversity and structure. Invasives are decreasing health and vigor of hemlocks and other conifers.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Protect boreal conifer swamps from flooding or conversion.	Number of swamps not flooded or converted.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	2

Maintain healthy forests with good regeneration and complex vegetative structure and diversity through deer management. Treat hemlock woolly adelgid and related conifer pests at high priority locations.

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: U. Susquehanna, U. Delaware, W. Br. Susquehanna

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Decrease in insects and other prey items composed of a lot of calcium.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Decrease acidification of the soil by liming or other means in addition to standard air pollution regulations.	Direct Management of Natural Resources	Maintain vegetation complexity of forest around boreal swamps.	Retain current population size and number of locations occupied by breeding birds. Number of points along transects in habitat blocks.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	2

Action Location: Physiographic Province: Appalachian Plateaus
HUC10 Watershed: Lwr Susquehanna R. (U. Susquehanna)

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Palustrine wetlands are reduced in health and vigor where conifers grow that this and other species are dependent. Northern conifers will be stressed by warmer conditions.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Maintain high nest success rate in monitored locations.	Nest success rate of known territories remain above 50%.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	2
Retain and promote conifer forest vegetation as a means to counteract the effects of climate change since forests are relatively resilient to the factors expected.					

Action Location: Physiographic Province: Appalachian Plateaus
HUC6 Watershed: U. Susquehanna, U. Delaware, W. Br. Susquehanna

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

RESEARCH NEEDS

1. Breeding- What is the continued breeding population, habitat vegetation, and persistence, & nesting success in BLPW in Pennsylvania? The species seems to persist despite limited range and population.

2. Breeding- What management approaches can maintain and increase the possibility of this boreal forest species and its ecosystem cohorts to continue in Pennsylvania.

3. Breeding- What are the limiting factors for this species through its full life cycle? Is the long-distance migration a major limiting factor?

SURVEY NEEDS

1. Breeding- Continuous monitoring of known and recent breeding populations including breeding confirmation, success, habitat association, continuity of occupation.

2. Breeding- Find undiscovered or new locations that may have been overlooked or newly colonized, allowing study of population and protection of site.

3. Breeding- Establish off-road point counts for boreal conifer forest guild species similar to Mountain Bird Count project.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Mountain Bird Watch	Vermont Center for Ecostudies	http://vtecostudies.org/projects/mountains/mountain-birdwatch/	Mountain Birdwatch (MBW) monitors songbirds that breed in the montane fir and spruce forests of the Northeast. MBW data provide the only region-wide source of population information on these high-elevation breeding birds. MBW's primary focus is Bicknell's Thrush, a montane fir specialist that breeds only in the northeastern U.S. and adjacent areas of Canada, but this project also tracks nine other high-elevation avian breeders, red squirrels, and the conifer seeds that these avian nest predators eat. A PA version of this project will not include Bicknell's Thrush and will focus on state priority mountain forest species for the PA and the Appalachian Mountains.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations

MONITORING PROGRAMS

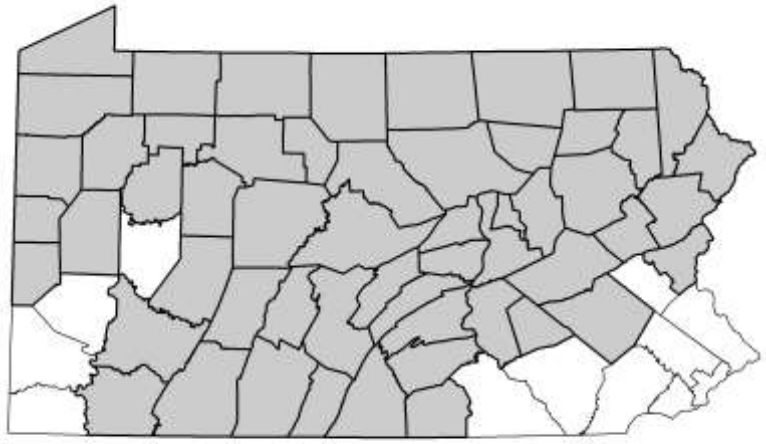
Program Name	Lead Agency	Hyperlink	Description
Yellow-bellied Flycatcher / Rare Mountain Forest Bird Studies and Conservation	Pennsylvania Game Commission / Cornell Laboratory of Ornithology	http://www.portal.state.pa.us/portal/server.pt?open=514&objID=621014&mode=2	Area searches in targeted locations with history of mountain forest bird breeding populations. Geospatial and behavioral data collected for each location / territory found for priority species: Yellow-bellied Flycatcher, Blackpoll Warbler, Olive-sided Flycatcher, Swainson's Thrush, Red Crossbill, Pine Siskin.

Black-throated Blue Warbler

Setophaga caerulescens

Sarah Sargent
Audubon Pennsylvania

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**300000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Increase estimated population by 10% by 2025 from 150,000 males (from Wilson et al 2012) to 165,000.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Hardwood & Conifer**	
Habitat	**Appalachian (Hemlock)-Northern Hardwood Forest**	

Specific Habitat Requirements:

Unfragmented mixed, coniferous forest with structural diversity, elevation > 800 m.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Poor forest management during harvesting leading to shift in species composition.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Promote forestry practices that provide adequate nesting substrate and regenerate conifers.	Train forest managers within BTBW range in PA on BMPs for birds.	Acres under management by trained foresters	Assess bird responses to management in subset of areas.	1

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Statewide

Associated Species: Forest breeding birds and other migrant land birds.

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Overbrowsing limits shrub and sapling density. This species nests in understory.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Control deer herd through hunting. Maintain concurrent seasons in WMUs at core of species breeding range.	Reduce browsing pressure enough to allow shrub and sapling growth.	Assess browse damage in systematic way in representative habitats in each WMU.	Annual browse damage survey conducted systematically in forest habitat.	1

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Statewide

Associated Species: All forest and shrub dependent species.

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Fragmentation of large forested areas. This species is area sensitive.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Restrict new well pad development to already disturbed areas on public lands.	Maintain integrity of large forest landscapes.	Number of miles of new roads into forest blocks over 1000a (should be as close to 0 as possible)	GIS, satellite imagery inspection.	2

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Statewide

Associated Species: Other forest breeding birds.

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Fragmentation of large forested areas. This species is area sensitive.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Work with power line and pipeline companies to route new corridors in close proximity to existing roads or rights-of-way.	Minimize or prevent new utility rights-of-way through existing forest blocks larger than 1000 acres.	Miles of new ROWs.	GIS, satellite imagery inspection.	2

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Statewide

Associated Species: Forest breeding birds and other migrant land birds.

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Fragmentation of large forested areas. This species is area sensitive.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Promote smart development. Limit development in priority areas.	No net loss of habitat.	Assess habitat available by region using GIS, focusing on regions under most development risk. Reassess at intervals.	Use GIS to track development and habitat conversion. Track implementation of habitat management projects by different organization.	3

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Statewide

Associated Species: Other forest breeding birds.

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Acid deposition leads to reduced calcium availability in diet.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Reduce air pollution upwind. (This problem is largely under control already. No new action needed at this time. See link in Comments column.)	Reduce acid deposition.	Acidity of precipitation.	Sample precipitation, measure pH.	3

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Statewide

Associated Species: Wood Thrush

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Change in species composition in forest, including loss of hemlock.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Develop plans to 1. protect most resilient areas, 2. increase resiliency of other significant areas. Action Location: Physiographic Province: Statewide HUC4 Watershed: Statewide Associated Species: All wildlife species.	Select top 10-20% sites in state to develop plans for, to protect the most species.	Areas identified and plans created.	Not sure.	3

RESEARCH NEEDS

1. Breeding- What are effects of energy and residential development on area-sensitve forest birds in the large forest blocks of the state?

2. Breeding- What are the limiting factors for this species through its full life cycle? Is the long-distance migration and winter habitat important limiting factors?

3. Breeding- Evaluate population response to habitat management prescriptions used to create, maintain or enhance breeding habitat of forest species.

SURVEY NEEDS

1. Breeding- Conduct off-road point count surveys and spot-mapping for forest interior birds to determine habitat requirements and association with current forest management practices.

2. Breeding- Mountain Bird Watch / Rare Mountain Bird Surveys.

MONITORING PROGRAMS

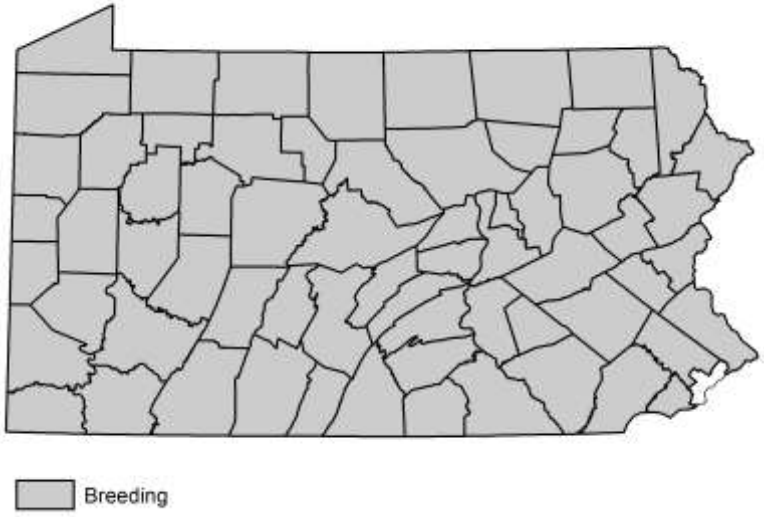
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Prairie Warbler

Setophaga discolor

Jeff Stratford
Wilkes University

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**52000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Stabilize eastern populations, increase western population by 30% by 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Ruderal Shrubland & Grassland**	
Habitat	**Shrubland & grassland (NLCD 52/71)**	

Specific Habitat Requirements:

Brushy second growth, dry scrub, low pine-juniper, pine barrens, burned-over areas, and sproutlands.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: This species requires early successional habitat created by fire and other large-scale disturbances

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase in area of mid-successional habitat by allowing some succession	Increased breeding pairs and reproductive success	1. singing males, 2. BBS,3. annually	1

Create habitat mosaics with fire

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Yellow-breasted Chat, Golden-winged Warbler, Field Sparrow, Eastern Towhee, Chestnut-sided Warbler

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Prevention of shrub growth

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase in area of mid-successional habitat by allowing some succession	Increased breeding pairs and reproductive success	1. singing males, 2. BBS,3. annually	2

Maintain mid-successional habitat

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Yellow-breasted Chat, Golden-winged Warbler, Field Sparrow, Eastern Towhee, Chestnut-sided Warbler

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Invasive shrubs and forbs have unknown effects on foraging quality for this species

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Allow some early succession	Increased breeding pairs and reproductive success	1. singing males, 2. BBS,3. annually	2

Reduce deer population and maintain mid-successional habitat

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Yellow-breasted Chat, Golden-winged Warbler, Field Sparrow, Eastern Towhee, Chestnut-sided Warbler

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Development results in loss of habitat if the developed land is early successional habitat

Action		Objective	Measure	Monitoring	Priority
TRACS Action 9.0	Planning	Minimize impact of suburban sprawl on existing early successional areas	Sustainable populations	1. singing males, 2. BBS,3. annually	3

Reduce suburban sprawl

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Yellow-breasted Chat, Golden-winged Warbler, Field Sparrow, Eastern Towhee, Chestnut-sided Warbler

RESEARCH NEEDS

1. Breeding- What are the effects of controlled burns (fire) on populations?

2. Breeding- What are the effects of right-of-way management and pipelines on populations?

3. Breeding- What are the winter linkage areas for the PA breeding population of this long-distance migrant and what are the conditions of those habitats that may effect breeding condition and success?

SURVEY NEEDS

1. Breeding- Continued breeding bird survey data.

2. Breeding- Continued breeding bird atlas efforts.

MONITORING PROGRAMS

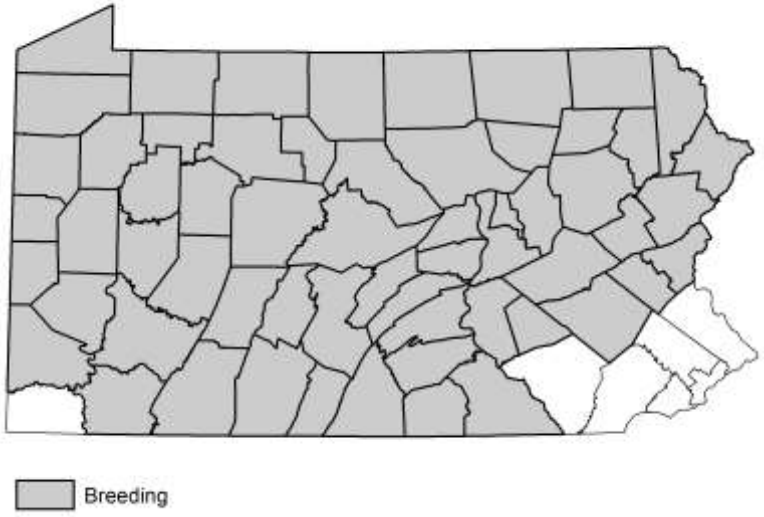
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Black-throated Green Warbler

Setophaga virens

Sarah Sargent
Audubon Pennsylvania

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**710000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Decline of 41 - 60%**

Conservation Goal:

Maintain current estimated population of 355,000 males (from Wilson et al 2012) through 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Hardwood & Conifer**	
Habitat	**Appalachian (Hemlock)-Northern Hardwood Forest**	

Specific Habitat Requirements:

Large tracks of coniferous, deciduous, and mixed forests > 300 m elevation.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Loss of core forest habitat to fragmentation by unconventional gas well development.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Maintain integrity of large forest blocks (at least on state-owned).	Acres of unfragmented forest in selected areas	Monitor public involvement	1

Designate some of the remaining largest forest blocks as High Value Forests where no drilling or ROWs are allowed. On state lands where leasing has not yet taken place.

Action Location: Physiographic Province: Appalachian Plateaus
HUC4 Watershed: Statewide

Associated Species: Forest breeding birds and other migrant land birds.

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Poor forest management during harvesting leading to shift in species composition.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 11.0	Technical Assistance	Train forest managers within BTNW range in PA on BMPs for birds.	Acres under management by trained foresters	Assess bird responses to management in subset of areas.	1

Promote forestry practices that provide adequate nesting substrate and regenerate conifers.

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Statewide

Associated Species: Forest breeding birds and other migrant land birds.

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Overbrowsing limits shrub and sapling density. This species nests in understory.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Reduce browsing pressure enough to allow shrub and sapling growth.	Assess browse damage in systematic way in representative habitats in each WMU.	Annual browse damage survey conducted systematically in forest habitat.	1

Control deer herd through hunting. Maintain concurrent seasons in WMUs at core of species breeding range.

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Statewide

Associated Species: All forest and shrub dependent species.

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Reduction in size of large, intact forested landscapes will reduce habitat available for interior forest breeding birds.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 9.0	Planning	Minimize or prevent new utility rights-of-way through existing forest blocks larger than 1000 acres.	Miles of new ROWs.	GIS, satellite imagery inspection.	2

Work with power line and pipeline companies to route new corridors in close proximity to existing roads or rights-of-way.

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Statewide

Associated Species: Forest breeding birds and other migrant land birds.

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Fragmentation of large forested areas. This species is area sensitive.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Promote smart development. Limit development in priority areas.	No net loss of habitat.	Assess habitat available by region using GIS, focusing on regions under most development risk. Reassess at intervals.	Use GIS to track development and habitat conversion. Track implementation of habitat management projects by different organization.	3

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley, New England
HUC4 Watershed: Statewide

Associated Species: Forest breeding birds and other migrant land birds.

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Acid deposition leads to reduced calcium availability in diet.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Reduce air pollution upwind. (This problem is largely under control already. No new action needed at this time. See link in Comments column.)	Acidity of precipitation.	Acidity of precipitation.	Sample precipitation, measure pH.	3

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Statewide

Associated Species: Wood Thrush

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Change in species composition in forest, including loss of hemlock.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Develop plans to 1. protect most resilient areas, 2. increase resiliency of other significant areas.	Select top 10-20% sites in state to develop plans for, to protect the most species.	Areas identified and plans created.	Not sure.	3

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Statewide

Associated Species: All wildlife species.

RESEARCH NEEDS

1. Breeding- What are effects of energy and residential development on area-sensitve forest birds in the large forest blocks of the state?

SURVEY NEEDS

1. Breeding- Conduct off-road point count surveys and spot-mapping for forest interior birds to determine habitat requirements and association with current forest management practices.

2. Breeding- Mountain Bird Watch / Rare Mountain Bird Surveys.

MONITORING PROGRAMS

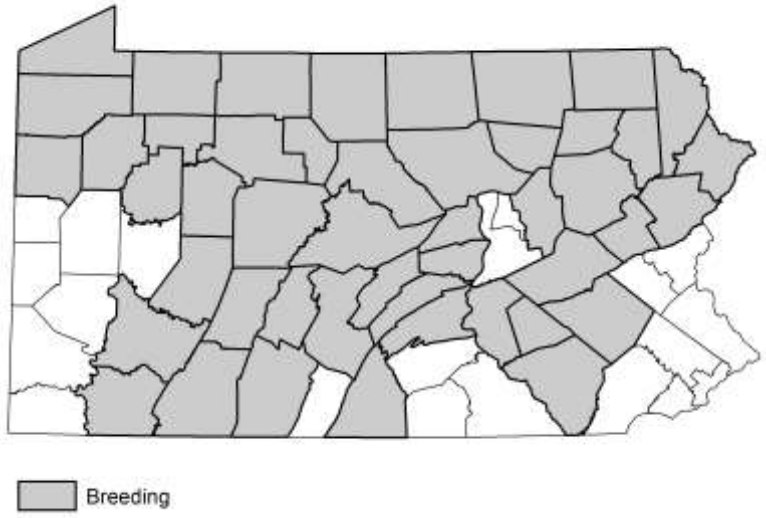
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Canada Warbler

Cardellina canadensis

Darryl Speicher and Jackie Speicher
Pocono Avian Research Center

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**54000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Maintain current estimated population of 27,000 singing males (95% CI, 21,500 - 38,000; Wilson et al. 2012) and seek opportunities to increase population through conservation and management. There is a need for better monitoring of this species as it is not well covered by the Breeding Bird Survey.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Hardwood & Conifer**	**Northern Swamp**
Habitat	**Appalachian (Hemlock)-Northern Hardwood Forest**	**North-Central Appalachian Acidic Swamp**

Specific Habitat Requirements:

Hemlock-dominated ravines and wet sites in northern hardwood and mixed forest with a dense understory of shrubs such as rhododendron or hobblebush; higher elevations (greater than 457 m).

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Habitat loss

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Implement wetland regulations that require upland buffers of at least 150 feet.	Protection of habitat. Stream and wetland functionality.	Comparative studies between sites with buffers and those without buffers	Bird surveys, mammal surveys, rapid bioassessment, vegetation analysis	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Natural gas pipelines

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Restoration of disturbed areas.	Minimize long-term impact	vegetation surveys	vegetation surveys	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Habitat loss and degradation

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Selective harvest and planting	management of stand composition	Bird surveys	population stability	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Habitat degradation

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Protection of habitat. Stream and wetland functionality.	Comparative studies between sites with buffers and those without buffers	Bird surveys, mammal surveys, rapid bioassessment, vegetation analysis	1

Implement wetland regulations that require upland buffers of at least 150 feet.

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Habitat degradation

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Understanding of effects of invasive species	Bird surveys	population size	1

Monitoring

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Disruption of food chain

Action		Objective	Measure	Monitoring	Priority
TRACS Action 1.0	Coordination and Administration	Increase quality of food supply	Invertebrate surveys	species productivity and health	1

Reduction of air pollution

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Peat Mining

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Habitat protection	Stable populations	Bird surveys	3

Acquisition of open space lands surrounding sphagnum dominated wetlands.

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Habitat degradation

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Maintain habitat quality	Bird surveys	Look at population stability	3

Uncertain

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

RESEARCH NEEDS

1. Breeding- What are effects of energy and residential development on area-sensitve forest birds in the large forest blocks of the state?

2. Breeding- What is the species sensitivity to disturbance along the fringe of the habitat? How close can disturbance be to their breeding habitat without affecting breeding activities?

3. Breeding- Following disturbance, what is the timeline for the return of a viable breeding population?

SURVEY NEEDS

1. Breeding- Conduct off-road point count surveys and spot-mapping for forest interior birds to determine habitat requirements and association with current forest management practices.

2. Breeding- Mountain Bird Watch / Rare Mountain Bird Surveys.

3. Breeding- Monitoring avian productivity and survivorship surveys (Institute for Bird Populations protocols).

MONITORING PROGRAMS

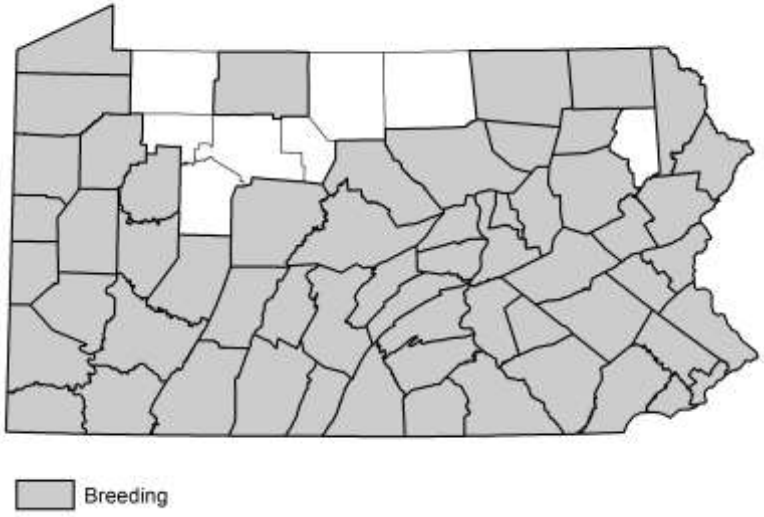
Program Name	Lead Agency	Hyperlink	Description
Monitoring Avian Productivity and Survivorship (MAPS)	The Institute for Bird Populations	http://www.birdpop.org/MAPSPROG.htm	A continent-wide network of constant-effort mist netting stations, including several stations in Pennsylvania. Data collected provides survival and productivity information for many songbird species and can be a useful measurement of temporal patterns.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Yellow-breasted Chat

Icteria virens

Jeff Stratford
Wilkes University

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S2B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**22400**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Decline of 41 - 60%**

Conservation Goal:

Increase statewide population by 33% to a detection rate of 0.3 birds per Breeding Bird Survey route, on at least 50 routes, by 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Hardwood & Conifer**	
Habitat	**South-Central Interior Mesophytic Forest**	

Specific Habitat Requirements:

Low, dense shrub habitats with an open or partially open tree canopy in regenerating clearcuts, forest edges, abandoned farmland, burned forest, and shrubby margins.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: This species requires early successional habitat created by fire and other large-scale disturbances

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Use fire to create a mosaic of habitats including mid-successional habitat	Increase in the number of breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	1

Use fire to create habitat mosaics including mid-successional habitat

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Prairie Warbler, American Kestrel, Blue Grosbeak

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Prevention of shrub growth

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase area of mid-successional habitat	Increase in the number of breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	2

Maintain mid-successional habitat

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Prairie Warbler, American Kestrel, Blue Grosbeak

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Development results in loss of habitat if the developed land is early successional habitat

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Reduce suburban sprawl Action Location: Physiographic Province: Statewide HUC4 Watershed: Statewide Associated Species: Prairie Warbler, American Kestrel, Blue Grosbeak	Minimize impact of development on existing mid-successional habitat	No decrease in breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	3

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Acid deposition leads to reduced calcium availability in diet.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Reduce acid rain Action Location: Physiographic Province: Statewide HUC4 Watershed: Statewide Associated Species: All birds	Increase pH of rainwater	Increased reproductive success	1. singing males, 2. BBS, 3. annually	3

RESEARCH NEEDS

1. Breeding- Effects of fire on populations.

2. Breeding- What are the effects of right-of-way management and pipelines on populations?

3. Breeding- Winter breeding habitat.

SURVEY NEEDS

1. Breeding- Continued breeding bird survey data.

2. Breeding- Continued breeding bird atlas efforts.

MONITORING PROGRAMS

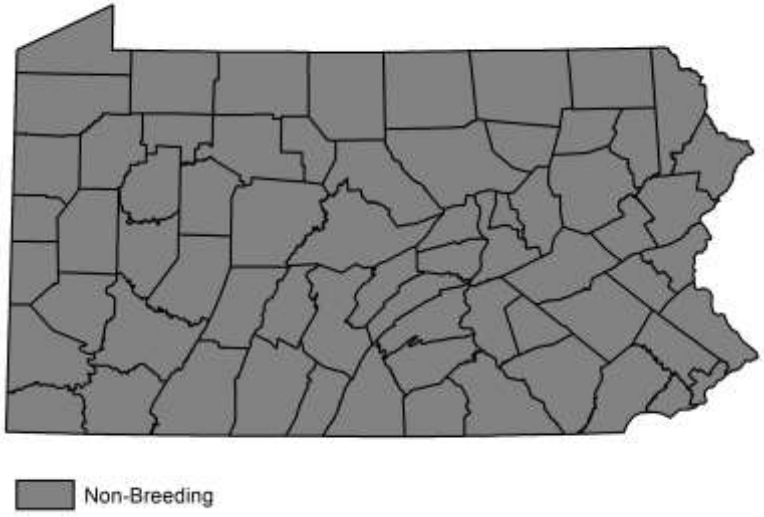
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Eastern Towhee

Pipilo erythrophthalmus

Jeff Stratford
Wilkes University

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4N (M)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**1220000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(M) Unknown**

Conservation Goal:

Sustain abundance during spring and fall migration in Pennsylvania through maintenance of appropriate migratory stopover habitat.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Ruderal Shrubland & Grassland**	
Habitat	**Shrubland & grassland (NLCD 52/71)**	

Specific Habitat Requirements:

Edges, shrublands

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Migration

Specific Threat: Pipelines and gas pads could potentially increase habitat is maintained in early successional habitat.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase the area of mid-successional habitat	increase in the number of breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	1

Maintain or create mid-successional habitat

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Yellow-breasted Chat, Golden-winged Warbler, Field Sparrow, Chestnut-sided Warbler

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Migration

Specific Threat: Prevention of shrub growth

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase the area of mid-successional habitat	increase in the number of breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	1

Maintain or create mid-successional habitat

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Yellow-breasted Chat, Golden-winged Warbler, Field Sparrow, Chestnut-sided Warbler

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Migration

Specific Threat: Logging for this species can be beneficial if scattered trees are left with shrubs

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase the area of mid-successional habitat	increase in the number of breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	2

Maintain or create mid-successional habitat

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Yellow-breasted Chat, Golden-winged Warbler, Field Sparrow, Chestnut-sided Warbler

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Migration

Specific Threat: Invasive shrubs and forbs have unknown effects on foraging quality for this species

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase the area of mid-successional habitat	increase in the number of breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	2

Maintain or create mid-successional habitat

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Yellow-breasted Chat, Golden-winged Warbler, Field Sparrow, Chestnut-sided Warbler

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Migration

Specific Threat: Development results in loss of habitat if the developed land is early successional habitat

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Maintain the amount of existing mid-successional habitat	no decrease in breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	3

Reduce urban sprawl

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Yellow-breasted Chat, Golden-winged Warbler, Field Sparrow, Chestnut-sided Warbler

RESEARCH NEEDS

1. Migration- Evaluate population response to habitat management prescriptions used to create, maintain or enhance breeding habitat of young forest birds?

2. Migration- What are the effects of right-of-way management and pipelines on populations?

3. Migration- How does towhee and other forest understory species react to deer browse effect on forest vegetation structure and diversity?

SURVEY NEEDS

1. Migration- Continued breeding bird survey data.

2. Migration- Continued breeding bird atlas efforts.

MONITORING PROGRAMS

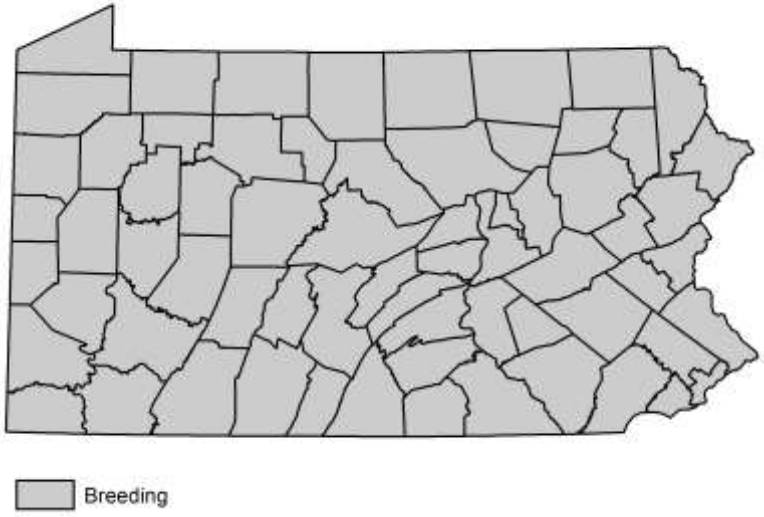
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Monitoring Avian Productivity and Survivorship (MAPS)	The Institute for Bird Populations	http://www.birdpop.org/MAPSPROG.htm	A continent-wide network of constant-effort mist netting stations, including several stations in Pennsylvania. Data collected provides survival and productivity information for many songbird species and can be a useful measurement of temporal patterns.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Field Sparrow

Spizella pusilla

Jeff Stratford
Wilkes University

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**420000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Decline of 11 - 40%**

Conservation Goal:

Stabilize population detection on Breeding Bird Survey routes to an average of 6.0 birds per route statewide.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Agricultural**	
Habitat	**Agriculture (NLCD 81-82)**	

Specific Habitat Requirements:

Mixture of grasses and shrubs

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 2.0 Agriculture and Aquaculture

Season: Breeding

Specific Threat: Species needs early successional habitat.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase in area of early-successional habitat/grasslands	Increase in the number of breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	1

maintain early successional habitat with warm season grasses

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Eastern Meadowlark, Bobolink, Grasshopper Sparrow

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Pipelines and gas pads could potentially increase habitat is maintained in early successional habitat.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase in area of early-successional habitat/grasslands	Increase in the number of breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	1

Create early successional habitat with warm season grasses

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Eastern Meadowlark, Bobolink, Grasshopper Sparrow

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: This species requires early successional habitat created by fire and other large-scale disturbances

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase in area of early-successional habitat/grasslands	Increase in the number of breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	1

Use fire to create habitat mosaics including early-successional habitat

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Eastern Meadowlark, Bobolink, Grasshopper Sparrow

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Development results in loss of habitat if the developed land is early successional habitat

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	minimize impact of development on existing early-successional habitat	No decrease in breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	3

minimize suburban sprawl

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Eastern Meadowlark, Bobolink, Grasshopper Sparrow

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Invasive shrubs and forbs have unknown effects on foraging quality for this species

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase in area of early-successional habitat/grasslands	Increase in the number of breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	3

Use fire or mowing with planting warm season grasses

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Eastern Meadowlark, Bobolink, Grasshopper Sparrow

RESEARCH NEEDS

1. Breeding- Evaluate population response to habitat management prescriptions used to create, maintain or enhance breeding habitat of early succession species?

2. Breeding- What are the effects of Right-of-way management and pipelines on populations?

3. Breeding- What are the effects of controlled burns (fire) on populations?

SURVEY NEEDS

1. Breeding- Continued breeding bird survey data.

2. Breeding- Continued breeding bird atlas efforts.

MONITORING PROGRAMS

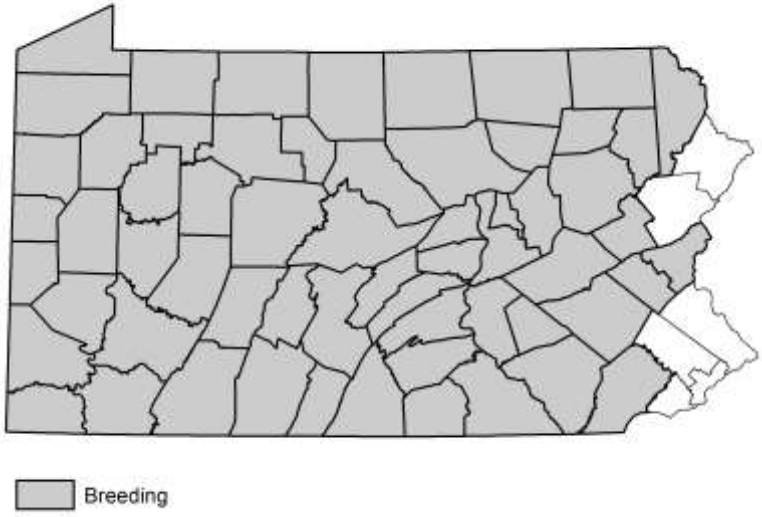
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Vesper Sparrow

Pooecetes gramineus

Andy Wilson
Gettysburg College

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S2B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**34000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Decline of 41 - 60%**

Conservation Goal:

Increase breeding population 10% above 2010 levels as reported by the Second Breeding Bird Atlas (17,000 territorial males in at least 870 atlas blocks) (see Wilson et al. 2012).

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Agricultural**	
Habitat	**Agriculture (NLCD 81-82)**	

Specific Habitat Requirements:

Agricultural lands and reclaimed surface mines (Santner 1992) to shrubs and woodland edges, with bare ground for foraging (Wilson in Wilson et al. 2012).

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Loss of sparsely vegetated reclaimed surface mines due to reforestation and successional change.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Maintain short and spare grassland vegetation	Maintenance of extant populations	USGS Breeding Bird Survey trends	2

Burning or disking of existing reclaimed surface mine grasslands

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland Sandpiper

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss of habitat

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Prevent loss of farmland	Maintenance of extant populations	USGS Breeding Bird Survey trends	3

Purchase land that may otherwise be sold for development

Action Location: Physiographic Province: Statewide

Associated Species: American Kestrel, Savannah Sparrow, Grasshopper Sparrow, Bobolink, Eastern Meadowlark

THREATS AND ACTIONS

IUCN Threat: 2.0 Agriculture and Aquaculture

Season: Breeding

Specific Threat: Lack of crops residue, excessive herbicide use, and frequent mowing, are hypothesized threats.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Maintain weedy areas within agricultural systems	Maintenance of extant populations	USGS Breeding Bird Survey trends	3

Incentivize retention of short-term fallow.

Action Location: Physiographic Province: Statewide

Associated Species: Upland Sandpiper, American Kestrel, Savannah Sparrow, Grasshopper Sparrow, Bobolink, Eastern Meadowlark

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Successional change of grassland habitats

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Prevent natural succession from encroaching important grassland sites	Maintenance of extant populations	USGS Breeding Bird Survey trends	3

Mowing, burning and removing invasive woody vegetation

Action Location: Physiographic Province: Statewide

Associated Species: Northern Harrier, Upland Sandpiper, Short-eared Owl, American Kestrel, Savannah Sparrow, Henslow's Sparrow, Grasshopper Sparrow, Bobolink, Eastern Meadowlark

RESEARCH NEEDS

1. Breeding- Which specific crops and agricultural practices are this species associated with in Pennsylvania?

SURVEY NEEDS

1. Breeding- None: Monitored through USGS Breeding Bird Survey (BBS), but note that if population continues to decline, BBS will no longer adequately monitor populations of this species.

MONITORING PROGRAMS

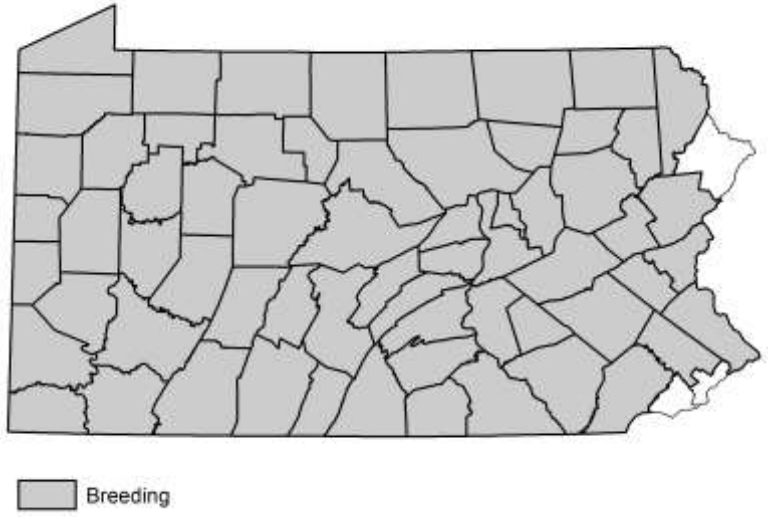
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Savannah Sparrow

Passerculus sandwichensis

Andy Wilson
Gettysburg College

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**290000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Decline of 11 - 40%**

Conservation Goal:

Maintain breeding population at or above 2010 levels as reported by the Second Breeding Bird Atlas (145,000 territorial males in at least 870 atlas blocks)(see Wilson et al. 2012).

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Agricultural**	
Habitat	**Agriculture (NLCD 81-82)**	

Specific Habitat Requirements:

Arable fields, pasture, and reclaimed surface mines (Wilson in Wilson et al. 2012).

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 2.0 Agriculture and Aquaculture

Season: Breeding

Specific Threat: Loss of nests and young in agricultural grasslands is hypothesized to be a major driver of declines.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Prevent loss of nests and nestlings	Maintenance of extant populations	USGS Breeding Bird Survey trends	2

Restrict mowing during peak of breeding season (Nocera et al. 2005; Perlut et al. 2008)

Action Location: Physiographic Province: Statewide

Associated Species: Vesper Sparrow, Grasshopper Sparrow, Bobolink, Eastern Meadowlark

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss of habitat

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Prevent loss of farmland	Maintenance of extant populations	USGS Breeding Bird Survey trends	3

Purchase land that may otherwise be sold for development

Action Location: Physiographic Province: Statewide

Associated Species: American Kestrel, Vesper Sparrow, Grasshopper Sparrow, Bobolink, Eastern Meadowlark

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Reforestation of reclaimed surface mine grasslands.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Maintain grassland habitat	Maintenance of extant populations	USGS Breeding Bird Survey trends	3

Mowing, burning and removing invasive woody vegetation

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Northern Harrier, Upland Sandpiper, Short-eared Owl, Vesper Sparrow, Savannah Sparrow, Henslow's Sparrow, Grasshopper Sparrow, Bobolink, Eastern Meadowlark

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Successional change of grassland habitats

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Prevent natural succession from encroaching important grassland sites	Maintenance of extant populations	USGS Breeding Bird Survey trends	3

Mowing, burning and removing invasive woody vegetation

Action Location: Physiographic Province: Statewide

Associated Species: Northern Harrier, Upland Sandpiper, Short-eared Owl, Vesper Sparrow, Savannah Sparrow, Henslow's Sparrow, Grasshopper Sparrow, Bobolink, Eastern Meadowlark

RESEARCH NEEDS

1. Breeding- Do Conservation Grasslands provide substantial refuges for this species in northern and western Pennsylvania?

2. Breeding- How can reclaimed strip mine grasslands be managed to improve the density and productivity of high priority grassland sparrows?

3. Breeding- Is climate change likely to result in changes to agricultural practices (specifically earlier mowing) that could impact this species over coming decades?

SURVEY NEEDS

1. Breeding- None: Monitored through USGS Breeding Bird Survey (BBS).

2. Breeding- Assessment of use of Conservation Grasslands in north and west of state.

MONITORING PROGRAMS

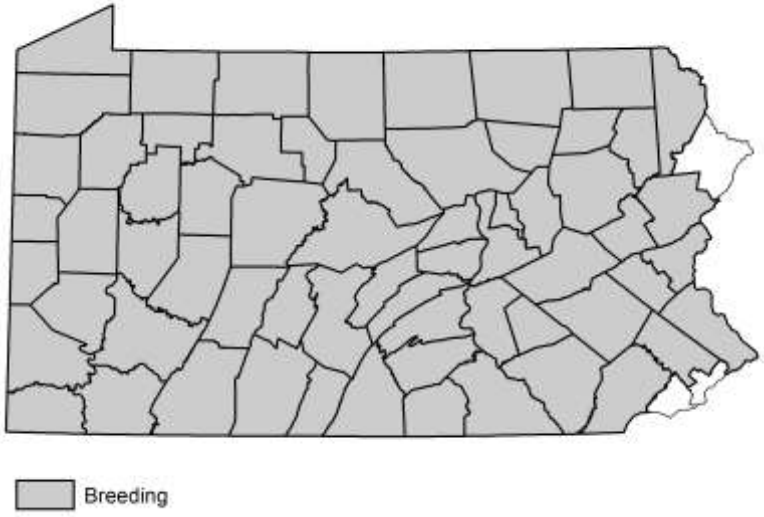
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Grasshopper Sparrow

Ammodramus savannarum

Jeff Stratford
Wilkes University

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**184000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Decline of 41 - 60%**

Conservation Goal:

Increase population to 100,000 singing males by 2025 as reflected in the Second Breeding Bird Atlas (Wilson et al. 2012).

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Agricultural**	
Habitat	**Agriculture (NLCD 81-82)**	

Specific Habitat Requirements:

Indicator for large-scale grasslands; grassland obligate species

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 2.0 Agriculture and Aquaculture

Season: Breeding

Specific Threat: Lack of warm season grasses

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase the amount of early to mid-successional habitat	Increase in the number of breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	1

Create early successional habitat with warm season grasses

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Eastern Meadowlark, American Kestrel

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Pipelines and gas pads not managed using Best Practices

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase the area of early to mid-successional areas	Increase the number of breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	1

Create early successional habitat with warm season grasses

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Eastern Meadowlark, American Kestrel

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Fire suppression

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase the area of early to mid-successional areas	Increase the number of breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	1

Use fire to create early successional habitat

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Eastern Meadowlark, American Kestrel

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Permenant conversion of early successional habitat to developed land cover

Action		Objective	Measure	Monitoring	Priority
TRACS Action 9.0	Planning	Minimize the effect of development on existing early to mid-successional areas	No decline in the number of breeding pairs or reproductive success	1. singing males, 2. BBS, 3. annually	3

Minimize suburban sprawl

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: Eastern Meadowlark, American Kestrel

RESEARCH NEEDS

1. Breeding- What are the effects of controlled burns (fire) on populations?

2. Breeding- How can reclaimed strip mine grasslands be managed to improve the density and productivity of high priority grassland sparrows?

3. Breeding- Effects of grassland restoration on populations.

SURVEY NEEDS

1. Breeding- Continued breeding bird survey data.

2. Breeding- Continued breeding bird atlas efforts.

MONITORING PROGRAMS

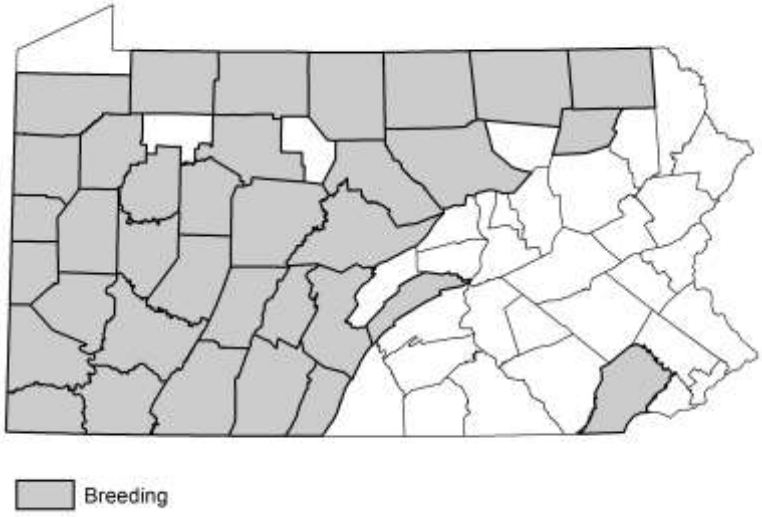
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Henslow's Sparrow

Ammodramus henslowii

Andy Wilson
Gettysburg College

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G4**	State Rank	**S3B**
IUCN Red List	**NT Near Threatened**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**14000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Maintain current population by maintaining habitat on reclaimed strip mines where they occur. Look for opportunities for more management that increases population at appropriate locations where grassland would be priority for habitat management.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Agricultural**	
Habitat	**Agriculture (NLCD 81-82)**	

Specific Habitat Requirements:

Indicator for large-scale grasslands; grassland obligate species

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Reforestation of reclaimed surface mine grasslands.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Prevent grassland loss, and ensure availability of later seral stage grasslands with dead litter and perennial stalks (Herkert et al. 2002)	Maintenance of extant populations	Would require targeted surveys within the species' range	1
Rotational mowing or burning & removal of woody vegetation					

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Northern Harrier, American Kestrel, Short-eared Owl, Savannah Sparrow, Grasshopper Sparrow, Bobolink, Eastern Meadowlark

IUCN Threat: 2.0 Agriculture and Aquaculture

Season: Breeding

Specific Threat: Species prefers undisturbed late seral stage grasslands, which are not commonly found in active agricultural systems.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Increase availability of undisturbed grasslands	Maintenance of extant populations	Would require targeted surveys within the species' range	2
Target enrollment of conservation grassland within the species' range					

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Northern Harrier, American Kestrel, Short-eared Owl, Savannah Sparrow, Grasshopper Sparrow, Bobolink, Eastern Meadowlark

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss of habitat

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Prevent loss of farmland	Maintenance of extant populations	Would require targeted surveys within the species' range	3

Purchase land that may otherwise be sold for development

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Northern Harrier, American Kestrel, Short-eared Owl, Savannah Sparrow, Grasshopper Sparrow, Bobolink, Eastern Meadowlark

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Successional change of grassland habitats

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Prevent grassland loss, and ensure availability of later seral stage grasslands with dead litter and perennial stalks (Herkert et al. 2002)	Maintenance of extant populations	Would require targeted surveys within the species' range	3

Rotational mowing or burning & removal of woody vegetation

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Northern Harrier, American Kestrel, Short-eared Owl, Savannah Sparrow, Grasshopper Sparrow, Bobolink, Eastern Meadowlark

RESEARCH NEEDS

1. Breeding- Can Conservation Grasslands (e.g. CREP) be targeted to provide habitat for this species?

2. Breeding- How can reclaimed strip mine grasslands be managed to improve the density and productivity of high priority grassland sparrows?

SURVEY NEEDS

1. Breeding- Monitor populations on a stratified random selection of reclaimed surface mines every 5 years. Use line transect methods (Diefenbach et al. 2007).

MONITORING PROGRAMS

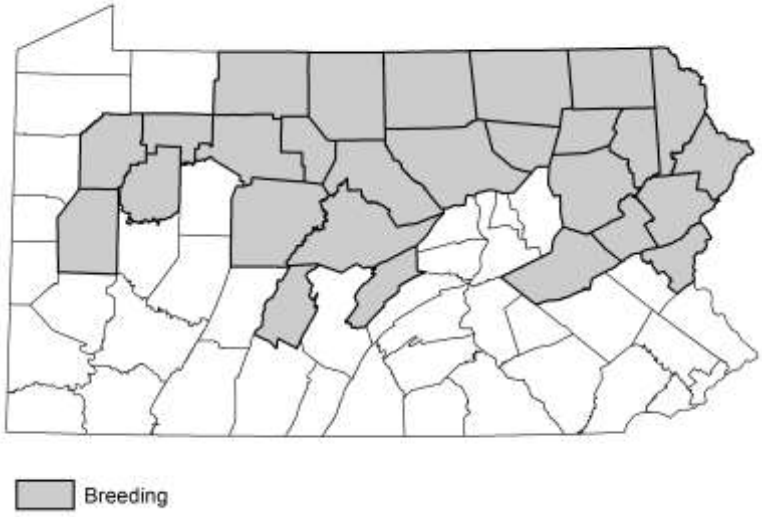
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

White-throated Sparrow

Zonotrichia albicollis

Darryl Speicher and Jackie Speicher
Pocono Avian Research Center

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**3800**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Sustain current populations by protecting nesting sites and their attributes.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Swamp**	
Habitat	**North-Central Appalachian Acidic Swamp**	

Specific Habitat Requirements:

Shrubby wetlands and shrub habitats associated with the glaciated northeast

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Habitat loss

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Implement wetland regulations that require upland buffers of at least 150 feet.	Protection of habitat. Stream and wetland functionality.	Comparative studies between sites with buffers and those without buffers	Bird surveys, mammal surveys, rapid bioassessment, vegetation analysis	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Natural gas well pads

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Require greater setback distances from wetlands	Habitat protection	Determining how many municipal zoning regulations require the additional setback distances.	Site surveys	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Natural gas pipelines

Action	Objective	Measure	Monitoring	Priority
TRACS Action 1.0 Coordination and Administration Restoration of disturbed areas	Minimize long-term impact	vegetation surveys	vegetation surveys	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Habitat degradation

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Protection of habitat. Stream and wetland functionality.	Comparative studies between sites with buffers and those without buffers	Bird surveys, mammal surveys, rapid bioassessment, vegetation analysis	1

Implement wetland regulations that require upland buffers of at least 150 feet.

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Habitat degradation

Action		Objective	Measure	Monitoring	Priority
TRACS Action 101.0	Species Management	Understanding of effects of invasive species	Bird surveys	population size	1

Monitoring

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Disruption of food chain

Action		Objective	Measure	Monitoring	Priority
TRACS Action 1.0	Coordination and Administration	Increase quality of food supply	Invertebrate surveys	species productivity and health	1

Reduction of air pollution

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Habitat loss and degradation

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	management of stand composition	Bird surveys, vegetation analysis	Population stability	3

Selective harvest and plantings

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Habitat degradation

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Maintain habitat quality	Bird surveys	Look at population stability	3

Uncertain

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Upland riparian bird species, mammals, amphibians, and insects and reptiles.

RESEARCH NEEDS

1. Breeding- Evaluate population response to habitat management prescriptions used to create, maintain or enhance breeding habitat of young forest birds?

2. Breeding- What is the effect of human disturbance on breeding populations?

3. Breeding- How sensitive are boreal forest bird species to changes in climate?

SURVEY NEEDS

1. Breeding- Monitoring avian productivity and survivorship surveys (Institute for Bird Populations protocols).

2. Breeding- Off-road forest bird surveys/point counts.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Monitoring Avian Productivity and Survivorship (MAPS)	The Institute for Bird Populations	http://www.birdpop.org/MAPSPROG.htm	A continent-wide network of constant-effort mist netting stations, including several stations in Pennsylvania. Data collected provides survival and productivity information for many songbird species and can be a useful measurement of temporal patterns.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals

MONITORING PROGRAMS

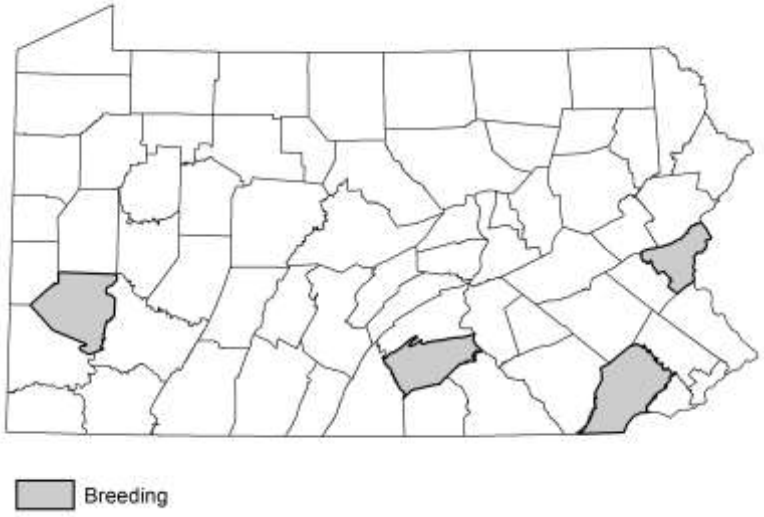
Program Name	Lead Agency	Hyperlink	Description
Yellow-bellied Flycatcher / Rare Mountain Forest Bird Studies and Conservation	Pennsylvania Game Commission / Cornell Laboratory of Ornithology	http://www.portal.state.pa.us/portal/server.pt?open=514&objID=621014&mode=2	Area searches in targeted locations with history of mountain forest bird breeding populations. Geospatial and behavioral data collected for each location / territory found for priority species: Yellow-bellied Flycatcher, Blackpoll Warbler, Olive-sided Flycatcher, Swainson's Thrush, Red Crossbill, Pine Siskin.

Summer Tanager

Piranga rubra

Nathan J. Zalik
Pennsylvania Game Commission

Photo: Dominic Sherony



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S1B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**160**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Prevent species extirpation at the state level. Maintain available habitat for the species.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Glade, Barren and Savanna**	**Central Oak-Pine**
Habitat	**Eastern Serpentine Woodland**	**Northeastern Interior Dry-Mesic Oak Forest**

Specific Habitat Requirements:

Dry, upland forests, particularly oak woodlands with an open understory; often near minor openings.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss and fragmentation of forested breeding habitat due to residential and commercial development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Maintain unfragmented forest blocks through local land use planning efforts.	Site new commercial or residential development in non-forested areas that will minimize fragmentation of forested habitat.	Percent forested habitat and core forest patch size.	Spatial analyses of forested area and forest patch size completed at regular intervals (e.g., every 5 years).	1

Action Location: Physiographic Province: Statewide

Associated Species: Broad-winged Hawk, Cerulean Warbler, Kentucky Warbler, Sharp-shinned Hawk

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Loss and fragmentation of forested breeding habitat due to energy development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Maintain unfragmented forest blocks through local land use planning efforts.	Site new energy development projects and associated infrastructure in non-forested habitat whenever possible. Large forest blocks are particularly important to keep intact.	Percent forested habitat and core forest patch size.	Spatial analyses of forested area and forest patch size completed at regular intervals (e.g., every 5 years).	1

Action Location: Physiographic Province: Statewide

Associated Species: Broad-winged Hawk, Cerulean Warbler, Kentucky Warbler, Sharp-shinned Hawk

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Loss and fragmentation of breeding habitat due to expansion of transportation corridors, gas pipelines, and electric transmission lines.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Maintain unfragmented forest blocks through local land use planning efforts.	Site new transportation corridors and transmission lines in non-forested habitat whenever possible. Large forest blocks are particularly important to keep intact.	Percent forested habitat and core forest patch size.	Spatial analyses of forested area and forest patch size completed at regular intervals (e.g., every 5 years).	1

Action Location: Physiographic Province: Statewide

Associated Species: Broad-winged Hawk, Cerulean Warbler, Kentucky Warbler, Sharp-shinned Hawk

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: As with other songbirds, feral cats may be a cause of mortality.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Develop a statewide comprehensive management plan to control feral cat populations.	Develop a statewide comprehensive management plan for controlling feral cat populations by 2020.	Plan creation.	Once a plan is developed and implemented, assess feral cat populations through regular surveys.	1

Action Location: Physiographic Province: Statewide

Associated Species: Numerous species of songbirds and small mammals.

RESEARCH NEEDS

1. Breeding- How are changes in forest structure and size affecting the range and population of this species at northern extent of range?

2. Breeding- What are the natural history traits of this species that will affect its ability to persist in the state, for instance its preference for Hymenopterans?

3. Breeding- Are changes in climate affecting the range of this southern forest species in the state?

SURVEY NEEDS

1. Breeding- Follow up on reports of birds (e.g. submitted through eBird, PABirds listserv) during the breeding season to determine breeding status.

MONITORING PROGRAMS

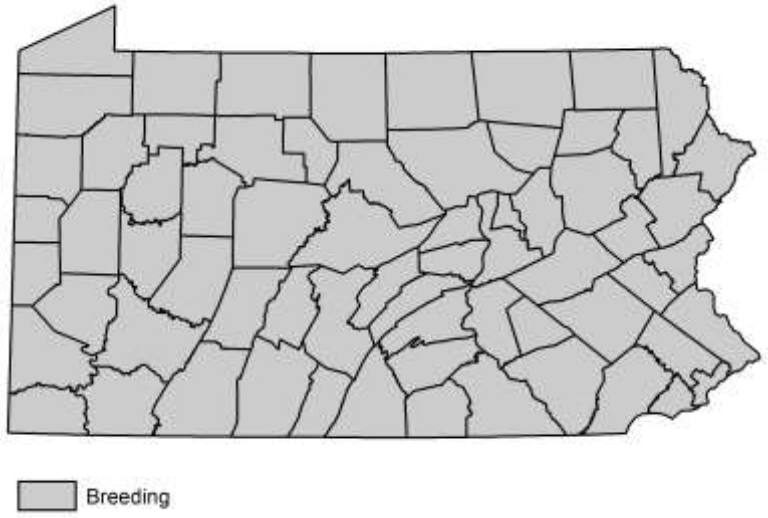
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Scarlet Tanager

Piranga olivacea

Christopher B. Goguen
The Pennsylvania State University, Hazleton

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**High Concern / High Responsibility**	PA Abundance	**1150000**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Decline of 11 - 40%**

Conservation Goal:

Maintain species population in Pennsylvania at current levels (average of 7.5 birds per Breeding Bird Survey route statewide) through 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Hardwood & Conifer**	
Habitat	**Appalachian (Hemlock)-Northern Hardwood Forest**	

Specific Habitat Requirements:

A wide variety of mature deciduous and mixed-deciduous forest types.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Forest fragmentation and direct mortality from natural gas and wind energy development.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Require developers to produce as minimal of a footprint as possible, and to re-forest impacted areas once extraction is completed.	Enhance state regulations to minimize impacts of natural gas extraction industry on forest habitats.	Creation and implementation of appropriate regulations	Annual data from USGS Breeding Bird Survey would provide adequate information concerning population trends of scarlet tanager and other potentially impacted birds.	1

Action Location: Physiographic Province: Appalachian Plateaus

Associated Species: Wood Thrush, Blackburnian Warbler, Black-throated Green Warbler, Black-throated Blue Warbler, Hooded Warbler

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Forest fragmentation

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Create regulations to prevent/minimize development of new road systems through large contiguous forest patches	Develop state regulations that make it more difficult to build new road systems that fragment large forest blocks	Creation and implementation of appropriate regulation(s)	Annual data from USGS Breeding Bird Survey would provide adequate information concerning population trends of scarlet tanager and other potentially impacted birds.	1

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Blackburnian Warbler, Black-throated Green Warbler, Black-throated Blue Warbler, Hooded Warbler

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Breeding

Specific Threat: Reduction of nesting success due to calcium depletion in areas impacted by acid deposition.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 100.0 Law and Policy Seek stricter legislation that further reduces industrial emissions of pollutants that cause acid precipitation.	Develop and implement federal legislation reducing the allowed emissions of acid-precipitation causing pollutants by industry.	Creation and implementation of appropriate legislation	Annual data from USGS Breeding Bird Survey would provide adequate information concerning population trends of scarlet tanager and other potentially impacted birds.	1

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Blackburnian Warbler, Black-throated Green Warbler, Black-throated Blue Warbler, Ovenbird

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss of habitat due to suburban growth and reduction in habitat quality due to fragmentation.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection In areas vulnerable to forest loss to suburban sprawl (particularly SE and SW PA), purchase unprotected forest habitats to maintain as many large (>100 ha)forest patches as possible. Purchases should be prioritized to target protection of the largest remaining forest patches first.	Protect at least 1000 additional ha of currently unprotected forest habitats in areas vulnerable to sprawl by 2025.	Hectares of vulnerable forest protected	Abundance of singing males during the breeding season could be monitored with fixed survey routes, performed annually through newly protected areas.	2

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont

Associated Species: Red-eyed Vireo, Wood thrush, Black-and-white Warbler, Ovenbird, Whip-poor-will

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Loss of understory and sub-canopy forest layers for tanager foraging due to white-tailed deer overabundance.
Predation of adults and fledglings by feral and domestic cats.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Implement state wildlife management strategy emphasizing reduction of white-tailed deer herd.	Implement harvest regulations to reduce white-tailed deer population density by 25% in areas with little forest regeneration/ understory	Reduction in white-tailed deer density	Annual data from USGS Breeding Bird Survey would provide adequate information concerning population trends of scarlet tanager and other potentially impacted birds.	2

Action Location: Physiographic Province: Statewide

Associated Species: Wood Thrush, Black-throated Blue Warbler, Ovenbird, Hooded Warbler, Veery

RESEARCH NEEDS

1. Breeding- Determine key features of high quality breeding habitat (i.e., source habitat) for the Scarlet Tanager in Pennsylvania, particularly within fragmented landscapes.

2. Breeding- Determine how forest management practices (e.g. timber harvest), natural forest maturation, and effects of deer over-browsing affect breeding habitat quality for tanagers.

3. Breeding- Post-nesting dispersal and migration pattern to the wintering ground little known but may be consequential.

SURVEY NEEDS

1. Breeding- None

MONITORING PROGRAMS

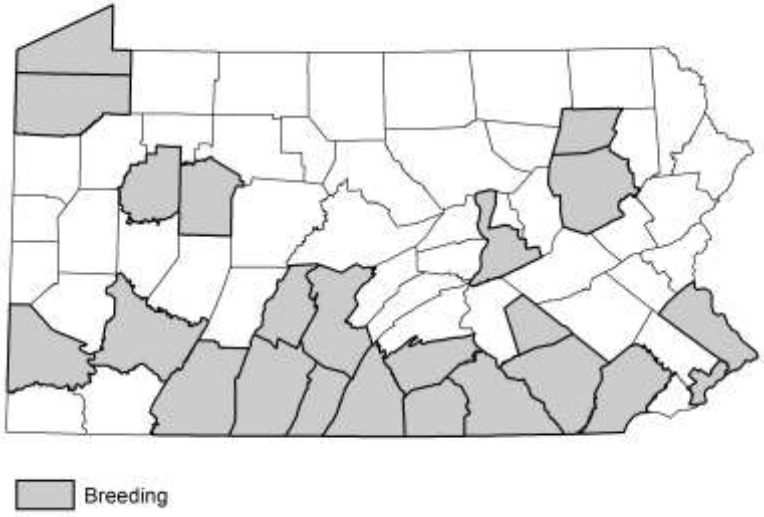
Program Name	Lead Agency	Hyperlink	Description
Monitoring Avian Productivity and Survivorship (MAPS)	The Institute for Bird Populations	http://www.birdpop.org/MAPSPROG.htm	A continent-wide network of constant-effort mist netting stations, including several stations in Pennsylvania. Data collected provides survival and productivity information for many songbird species and can be a useful measurement of temporal patterns.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.
Pennsylvania Breeding Bird Atlas	Pennsylvania Game Commission, Carnegie Museum of Natural History, Audubon Pennsylvania, Pennsylvania Society for Ornithology	http://www.pabirdatlas.psu.edu/	Status of all breeding birds in 5,000+ 2-mile square blocks (presence/absence plus point-count data) at 20-year intervals

Dickcissel

Spiza americana

Kathy Korber
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Endangered**
Northeast Region	**High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Maintain at least 10-15 breeding pairs annually in Pennsylvania through 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Agricultural**	**Ruderal Shrubland & Grassland**
Habitat	**Agriculture (NLCD 81-82)**	**Shrubland & Grassland (NLCD 52/71)**

Specific Habitat Requirements:

Old fields, grasslands with medium to high vegetation and moderate litter

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss and fragmentation of grassland habitat.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	To ensure available habitat for Dickcissel.	Grassland habitat inventory.	Locations within Private Lands Programs and reclaimed surface mines may be monitored through Pennsylvania eBird observation submissions and staff or volunteer follow-up surveys to look for singing male Dickcissel; presence of females; confirmation of nesting; and occurrence over multiple breeding seasons.	1
Encourage the enrollment of fallow fields into the U.S. Department of Agriculture's Conservation Reserve Enhancement Program (CREP) around known or active nesting sites (Haffner and Gross 2014); management of reclaimed strip mines					

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont, Ridge and Valley

Associated Species: Northern Harrier, Sedge Wren, Henslow's Sparrow, Vesper Sparrow, Eastern Meadowlark

THREATS AND ACTIONS

IUCN Threat: 2.0 Agriculture and Aquaculture

Season: Breeding

Specific Threat: Intensified agriculture practices; mowing hay fields during nesting periods

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection Implement the Deferred Grassland Use program; promote enrollment of farm fields in CREP; encourage participation in Private Landowner Assistance Program (PLAP); outreach and consultation with Regional Wildlife Diversity Biologists. Areas with known Dickcissel activity and counties bordering stable populations in neighboring states should be targeted for enrollment.	To increase quantity and quality of grassland habitat and to minimize disturbance during nesting.	Grassland habitat that remains suitable throughout nesting season.	Breeding Bird Surveys and eBird observation submissions will identify locations of Dickcissel activity. Follow-up surveys are required to monitor persistence, breeding confirmation and nesting success.	1

Action Location: Physiographic Province: Piedmont, Ridge and Valley

Associated Species: Sedge Wren, Henslow's Sparrow, Vesper Sparrow, Eastern Meadowlark, Bobolink

RESEARCH NEEDS

1. Breeding- Research should focus on determining the best way to manage agricultural fields and reclaimed strip mines for the guild of grassland obligates that currently breed in Pennsylvania. (Wentworth in Steele et al. 2010)

2. Breeding- Monitor stable populations of Dickcissel that persist on reclaimed surface mine grasslands.

3. Breeding- Closely monitor breeding activity on acreage in the Deferred Grassland Use program to assess effectiveness.

SURVEY NEEDS

1. Breeding- Focused surveys on lands participating in Private Lands Programs. Also, focused surveys in areas with recent nesting activity.

2. Breeding- Encourage Pennsylvania's birding community to survey areas of most recent (previous breeding season) Dickcissel observations.

MONITORING PROGRAMS

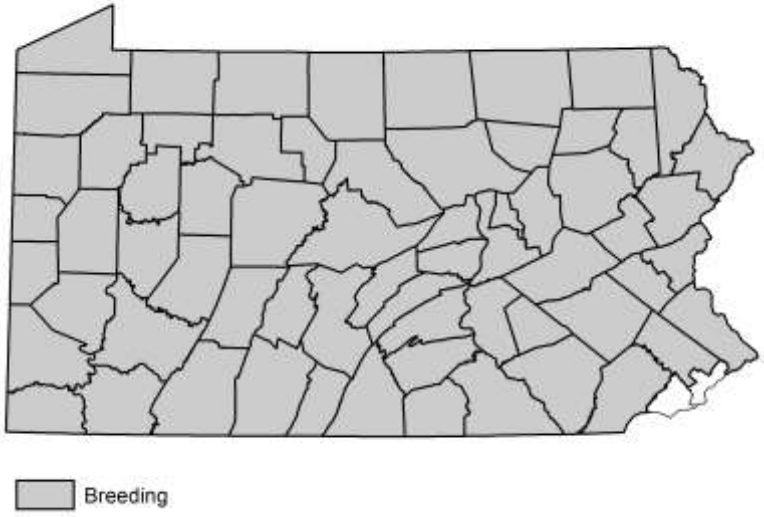
Program Name	Lead Agency	Hyperlink	Description
Dickcissel Surveys based on observation reports	Pennsylvania Game Commission		Follow-up surveys based on reports submitted to eBird, PA Birds Listserve and other sources.
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Bobolink

Dolichonyx oryzivorus

Andy Wilson
Gettysburg College

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S4B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**192500**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change)**

Conservation Goal:

Maintain the breeding population at or above 2012 levels (average of 2.5 birds per route on at least two-thirds of Pennsylvania Breeding Bird Survey routes) by 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Agricultural**	
Habitat	**Agriculture (NLCD 81-82)**	

Specific Habitat Requirements:

Moist meadows and fields of hay, clover, alfalfa and other herbaceous vegetation

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 2.0 Agriculture and Aquaculture

Season: Breeding

Specific Threat: Loss of nests and young in agricultural grasslands is hypothesized to be a major driver of declines.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Prevent loss of nests and nestlings	Maintenance of extant populations	USGS Breeding Bird Survey trends	2

Restrict mowing during peak of breeding season (Perlut et al. 2008)

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: American Kestrel, Grasshopper Sparrow, Savannah Sparrow, Eastern Meadowlark

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Loss of habitat

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Prevent loss of farmland	Maintenance of extant populations	USGS Breeding Bird Survey trends	3

Create grassland habitat and maintain the areas as grass

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont, Ridge and Valley

Associated Species: American Kestrel, Grasshopper Sparrow, Savannah Sparrow, Eastern Meadowlark

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Reforestation of reclaimed surface mine grasslands.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Maintain grassland habitat	Maintenance of extant populations	USGS Breeding Bird Survey trends	3
Mowing, burning and removing invasive woody vegetation					
Action Location:	Physiographic Province: Appalachian Plateaus, Ridge and Valley				
Associated Species:	American Kestrel, Grasshopper Sparrow, Savannah Sparrow, Eastern Meadowlark				

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Successional change of grassland habitats

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Prevent natural succession from encroaching important grassland sites	Maintenance of extant populations	USGS Breeding Bird Survey trends	3
Mowing, burning and removing invasive woody vegetation					
Action Location:	Physiographic Province: Appalachian Plateaus				
Associated Species:	American Kestrel, Grasshopper Sparrow, Savannah Sparrow, Eastern Meadowlark				

RESEARCH NEEDS

1. Breeding- Do Conservation Grasslands provide substantial refuges for this species in northern and western Pennsylvania?

2. Breeding- Is climate change likely to result in changes to agricultural practices (specifically earlier mowing) that could impact this species over coming decades?

SURVEY NEEDS

1. Breeding- None: Monitored through USGS Breeding Bird Survey.

2. Breeding- Assessment of use of Conservation Grasslands in north and west of state.

MONITORING PROGRAMS

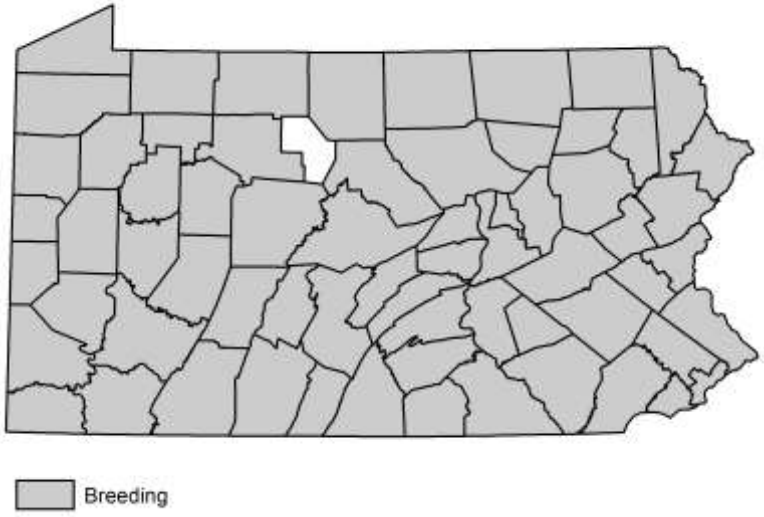
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Eastern Meadowlark

Sturnella magna

Jeff Stratford
Wilkes University

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**155750**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Decline of 11 - 40%**

Conservation Goal:

Increase population to an average of 5.0 birds per Breeding Bird Survey route by 2025.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Agricultural**	
Habitat	**Agriculture (NLCD 81-82)**	

Specific Habitat Requirements:

Prairies, pastures, hayfields, and fallow lands.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 2.0 Agriculture and Aquaculture

Season: Breeding

Specific Threat: Species needs grassland habitat.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	increase areas of pasture that is warm season grasslands	increase in the number of breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	1

Create grassland habitat

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: American Kestrel, Grasshopper Sparrow

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Pipelines and gas pads could potentially increase habitat is maintained in grassland habitat.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Plant impacted areas with warm season grasses that are maintained with mowing	increase in the number of breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	1

Create grassland habitat and maintain the areas as grass

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: American Kestrel, Grasshopper Sparrow

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: This species requires grassland habitat that becomes unsuitable within a few years after disturbance

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	increase areas of grasslands	increase in the number of breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	1

Use fire or mowing to create grassland habitat and plant warm season grasses

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: American Kestrel, Grasshopper Sparrow

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Development results in loss of habitat if the developed land is grassland habitat

Action		Objective	Measure	Monitoring	Priority
TRACS Action 9.0	Planning	reduce development on existing grasslands	maintenance of breeding pairs and reproductive success	1. singing males, 2. BBS, 3. annually	3

Minimize suburban sprawl

Action Location: Physiographic Province: Statewide
HUC4 Watershed: Statewide

Associated Species: American Kestrel, Grasshopper Sparrow

RESEARCH NEEDS

1. Breeding- Effects of grassland restoration on populations, needed habitat block size limitations.

2. Breeding- What are the effects of controlled burns (fire) on populations?

3. Breeding- Effects of pasture management on populations.

SURVEY NEEDS

1. Breeding- Continued breeding bird survey data.

2. Breeding- Continued breeding bird atlas efforts.

MONITORING PROGRAMS

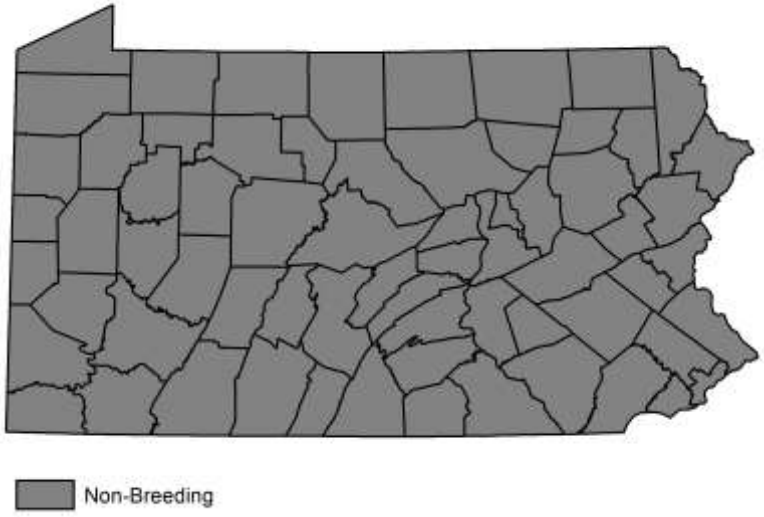
Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

Rusty Blackbird

Euphagus carolinus

Douglas A. Gross
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G4**	State Rank	**S3N (M), S5N (W)**
IUCN Red List	**VU Vulnerable**	PA Legal Status	**Protected**
Northeast Region	**Very High Concern / Low Responsibility**	PA Abundance	**Unknown**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(M) Unknown; (W) Increase of >25%**

Conservation Goal:

Maintain populations at current levels and seek opportunities to increase population.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(W) Lakes**	**(W) Lakes**
Habitat	**(W) Hypereutrophic, Medium Alkalinity Lake**	**(W) Mesotrophic, Medium Alkalinity Lake**

Specific Habitat Requirements:

(M) Generally forages in shallow waters such as streamsides, wet woods, lake and pond-edge, swamps and other wetlands including adjacent fields. Roosts in tree groves and orchards, crop stubble.
(W) Generally winters in swampy areas, pond and stream edges.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Migration

Specific Threat: Residential and road development replaces forest and wetlands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Maintain adequate stream and wetland buffers where Rusty Blackbirds forage in shallow water. Action Location: Physiographic Province: Statewide HUC4 Watershed: Statewide	Maintain streamside and wetland shallow water habitat.	Number of Rusty Blackbird sightings in eBird	eBird, Rusty Blackbird Blitz	2

Associated Species: American Black Duck, Wood Duck, Solitary Sandpiper, Spotted Sandpiper, Wilson's Snipe, other riparian birds, river otter.

IUCN Threat: 3.0 Energy Production and Mining

Season: Migration

Specific Threat: Marcellus shale and wind energy infrastructure.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Prevent pollution from energy production that degrades watershed quality and food availability for shallow water songbirds. Action Location: Physiographic Province: Statewide HUC4 Watershed: Statewide	Prevent pollution to streams and wetlands that provide habitat for species.	Number of Rusty Blackbird sightings in eBird	eBird, Rusty Blackbird Blitz	2

Associated Species: American Black Duck, Wood Duck, Solitary Sandpiper, Spotted Sandpiper, Wilson's Snipe, other riparian birds, river otter.

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Migration

Specific Threat: Road-building and right-of-way removal of forest and wetlands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Maintain adequate stream and wetland buffers where Rusty Blackbirds forage in shallow water. Action Location: Physiographic Province: Statewide; HUC4 Watershed: Statewide	Maintain streamside and wetland shallow water habitat.	Number of Rusty Blackbird sightings in eBird	eBird, Rusty Blackbird Blitz	2

Associated Species: American Black Duck, Wood Duck, Solitary Sandpiper, Spotted Sandpiper, Wilson's Snipe, other riparian birds, river otter.

IUCN Threat: 7.0 Natural System Modifications

Season: Migration

Specific Threat: Conversion of palustrine wetlands to open water or uplands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 6.0 Land and Water Rights Acquisition and Protection Avoid destruction of swamps by damming or increasing water levels. Action Location: Physiographic Province: Statewide; HUC4 Watershed: Statewide	Maintain streamside and wetland shallow water habitat.	Number of Rusty Blackbird sightings in eBird	eBird, Rusty Blackbird Blitz	2

Associated Species: American Black Duck, Wood Duck, Solitary Sandpiper, Spotted Sandpiper, Wilson's Snipe, other riparian birds, river otter.

THREATS AND ACTIONS

IUCN Threat: 9.0 Pollution

Season: Migration

Specific Threat: Decrease in insects and other prey items composed of a lot of calcium.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 7.0 Law enforcement Water pollution is a continued challenge for watersheds used by wildlife especially shallow waters. Action Location: Physiographic Province: Statewide HUC4 Watershed: Statewide	Prevent pollution to streams and wetlands that provide habitat for species.	Number of Rusty Blackbird sightings in eBird	eBird, Rusty Blackbird Blitz	2

Associated Species: American Black Duck, Wood Duck, Solitary Sandpiper, Spotted Sandpiper, Wilson's Snipe, other riparian birds, river otter.

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Migration

Specific Threat: Palustrine wetlands are reduced in health and vigor where conifers grow that this and other species are dependent. Northern conifers will be stressed by warmer conditions.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Protect riparian buffers including shallow water along edges of streams, ponds, lakes. Action Location: Physiographic Province: Statewide HUC4 Watershed: Statewide	Maintain streamside and wetland shallow water habitat.	Number of Rusty Blackbird sightings in eBird	eBird, Rusty Blackbird Blitz	3

Associated Species: American Black Duck, Wood Duck, Solitary Sandpiper, Spotted Sandpiper, Wilson's Snipe, other riparian birds, river otter.

THREATS AND ACTIONS

IUCN Threat: 7.0 Natural System Modifications

Season: Winter

Specific Threat: Conversion of palustrine wetlands to open water or uplands.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 6.0	Land and Water Rights Acquisition and Protection	Maintain streamside and wetland shallow water habitat.	Number of Rusty Blackbird sightings in eBird	eBird, Rusty Blackbird Blitz, National Audubon Society Christmas Bird Counts	1

Avoid destruction of conifer swamps by damming or increasing water levels.

Action Location: Physiographic Province: Atlantic Coastal Plains, Appalachian Plateaus, Piedmont
HUC4 Watershed: Statewide

Associated Species: American Black Duck, Wood Duck, Solitary Sandpiper, Spotted Sandpiper, Wilson's Snipe, other riparian birds, river otter.

RESEARCH NEEDS

1. Migration- What are the limiting factors for this species across its range leading to its long-term decline?

1. Wintering- What are the limiting factors for this species across its range leading to its long-term decline?

2. Migration- What locations are important for this species in Pennsylvania? Where are the larger migration stopover locations and roosts?

2. Wintering- What locations are important winter locations for this species and how can the conditions for these locations be maintained or improved?

3. Migration- What role does PA play in the life cycle of this species and how can the state maintain or increase its role in recovery?

3. Wintering- What role does PA play in the life cycle of this species and how can the state maintain or increase its role in recovery?

SURVEY NEEDS

1. Migration- Rusty Blackbird Spring Blitz, project of the International Rusty Blackbird Working Group (IRBWG). Find locations that are important to this species for foraging and roosting.

1. Wintering- Winter surveys through IRBWB projects and eBird.

2. Migration- Autumn concentration surveys through the IRBWG and eBird. Find locations that are important for foraging and roosting.

2. Wintering- Getting better coverage of winter IBA wetland populations.

3. Migration- Find association between feeding locations and roosts.

3. Wintering- Determine if there is movement between different locations in winter or as winter progresses.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Flyway waterfowl surveys - include Rusty Blackbirds	U.S. Fish & Wildlife Service / Pennsylvania Game Commission		The Flyway waterfowl surveys are made in randomized plots, many of which are appropriate RUBL migration habitat.
National Audubon Society Christmas Bird Counts	National Audubon Society	http://birds.audubon.org/christmas-bird-count	Since 1900, this is an annual winter survey of more than 2,300 count circles worldwide. The longest running Citizen Science survey in the world, Christmas Bird Count provides critical data on population trends.
Rusty Blackbird monitoring through the International Rusty Blackbird Working Group and eBird.	International Rusty Blackbird Working Group	http://rustyblackbird.org/	Search for Rusty Blackbirds in all times of the year including winter when some visit the state, especially in wetlands.

MONITORING PROGRAMS

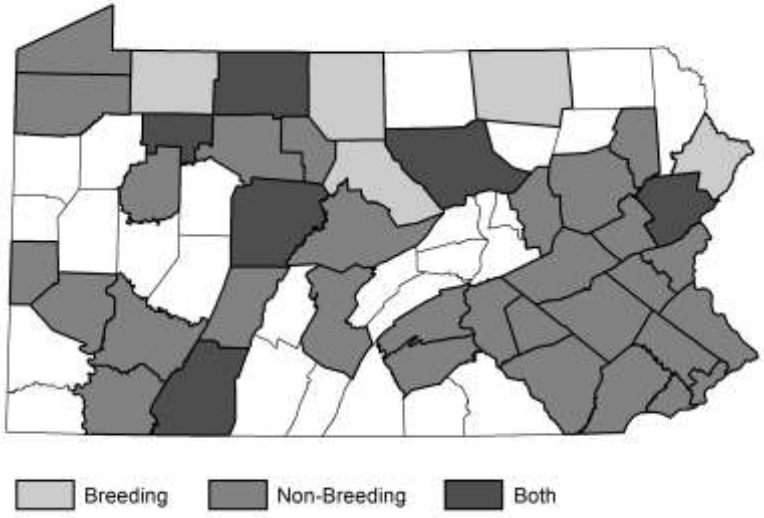
Program Name	Lead Agency	Hyperlink	Description
Rusty Blackbird Spring Migration Blitz	International Rusty Blackbird Working Group	http://rustyblackbird.org/outreach/migration-blitz/	Search for Rusty Blackbirds during spring migration to determine important stopover sites and involve the birding community in monitoring this declined songbird.

Red Crossbill

Loxia curvirostra

Douglas A. Gross
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S1B, S4N (W)**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**Unknown (100 estimated by PIF)**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Relatively Stable (<=10% change); (W) Unknown**

Conservation Goal:

Confirm annual nesting population in state and protect / promote conifer forests that support this species.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**(B) Central Oak-Pine**	**(B) Wet Meadow / Shrub Marsh**
Habitat	**(B) Central Appalachian Dry Oak-Pine Forest**	**(B) Laurentian-Acadian Wet Meadow-Shrub Swamp**

Specific Habitat Requirements:

(B) Northern boreal forest; eastern white pine, red pine, eastern hemlock, red spruce, and white spruce. Has nested in pine barrens. Will nest where there is abundant cone crop at any time of year, but usually in spring. Will nest in non-native conifers such as Norway spruce. May respond to a mix of conifers where each species offers seeds at different times. (W) Irruptive, responding to cone crops including pines, spruces, hemlocks, firs. Winter flocks can be very large and generally responding to mature trees including old growth hemlocks.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Residential and road development replaces forest and wetlands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Promote forest conservation even where there is light development.	Promote conifer tree protection and planting in high elevation, even in developments.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	1

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Delaware-Mid Atlantic Coastal, Susquehanna

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Marcellus shale and wind energy infrastructure permanently replaces or fragments forest.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Protect high quality and larger blocks of boreal and northern conifer forest including wetlands with PNDI and best management practices of forested wetlands.	Protect core habitat areas for endangered and threatened species.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	1

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Delaware-Mid Atlantic Coastal, Susquehanna, Allegheny

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Permanent deforestation and replacement of conifer with deciduous forest.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Make boreal conifer forest management a priority in appropriate areas; conserve mature spruce / hemlock forest, release spruce seedlings & saplings, plant spruce & fir seedlings to fill conifer forest gaps and increase conifer component in appropriate locations.	Increase spruce, hemlock, and fir forest acreage and number of blocks.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	1

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Delaware-Mid Atlantic Coastal, Susquehanna

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

IUCN Threat: 7.0 Natural System Modifications

Season: Breeding

Specific Threat: Fire suppression is decreasing conifer regeneration.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Use prescribed burns to promote pine regeneration for scrub barrens ecosystems and pine stands.	Increase pine component of forest that could support this species.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	1

Action Location: Physiographic Province: Appalachian Plateaus, Piedmont, Ridge and Valley

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Deer browsing is oversimplifying the forest species diversity and structure. Invasives are decreasing health and vigor of hemlocks and other conifers.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase potential for a viable nesting population in mature conifers.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	2
Maintain healthy forests with good regeneration and complex vegetative structure and diversity through deer management. Treat hemlock woolly adelgid and related conifer pests at high priority locations.					

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Palustrine wetlands are reduced in health and vigor where conifers grow that this and other species are dependent. Northern conifers will be stressed by warmer conditions.

Action		Objective	Measure	Monitoring	Priority
TRACS Action 2.0	Direct Management of Natural Resources	Increase potential for a viable nesting population in mature conifers.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	2
Maintain healthy forests with good regeneration and complex vegetative structure and diversity through deer management. Treat hemlock woolly adelgid and related conifer pests at high priority locations.					

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Residential and road development replaces forest and wetlands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Protect high quality and larger blocks of boreal and northern conifer forest including wetlands with PNDI and best management practices of forested wetlands.	Protect core habitat areas for endangered and threatened species.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	3

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley
HUC4 Watershed: Delaware-Mid Atlantic Coastal, Susquehanna

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

IUCN Threat: 1.0 Residential and Commercial Development

Season: Winter

Specific Threat: Residential and road development replaces forest and wetlands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Promote conifer forest conservation even where there is development in the mountains where this species has occurred.	Increase potential for a viable nesting population in mature conifers.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	2

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

RESEARCH NEEDS

1. Breeding- What Red Crossbill call types nest in Pennsylvania and what are their major food sources?

1. Wintering- What conifer resources are limiting Red Crossbill in Pennsylvania and which species can be managed on its behalf?

2. Breeding- What limits Red Crossbills in PA and the northern Appalachians when this species nests nearby in NY?

2. Wintering- Would old growth conifer forest management benefit this species and others that use large conifers for nesting and food?

3. Breeding- Where and how can conifer forests be expanded in PA to expand the NY population into the state?

3. Wintering- What are the source populations for wintering Red Crossbills in PA?

SURVEY NEEDS

1. Breeding- Locate any breeding population in the state.

1. Wintering- Locate wintering populations.

2. Breeding- Establish off-road point counts for boreal conifer forest guild species similar to Mountain Bird Count project.

2. Wintering- Conduct conifer cone surveys where any wintering populations can be found.

3. Breeding- Establish off-road point forest bird counts in large forest blocks as part of state network of point counts (not as technical as Mountain Bird Count).

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
Crossbill research conducted by Cornell Laboratory of Ornithology (Matt Young).	Pennsylvania Game Commission / Cornell Laboratory of Ornithology		Cooperative searches and research for crossbills with M. Young. Red Crossbills nest in New York. Similar conditions may occur in PA also.
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.
Mountain Bird Watch	Vermont Center for Ecostudies	http://vtecostudies.org/projects/mountains/mountain-birdwatch/	Mountain Birdwatch (MBW) monitors songbirds that breed in the montane fir and spruce forests of the Northeast. MBW data provide the only region-wide source of population information on these high-elevation breeding birds. MBW's primary focus is Bicknell's Thrush, a montane fir specialist that breeds only in the northeastern U.S. and adjacent areas of Canada, but this project also tracks nine other high-elevation avian breeders, red squirrels, and the conifer seeds that these avian nest predators eat. A PA version of this project will not include Bicknell's Thrush and will focus on state priority mountain forest species for the PA and the Appalachian Mountains.
National Audubon Society Christmas Bird Counts	National Audubon Society	http://birds.audubon.org/christmas-bird-count	Since 1900, this is an annual winter survey of more than 2,300 count circles worldwide. The longest running Citizen Science survey in the world, Christmas Bird Count provides critical data on population trends.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.

MONITORING PROGRAMS

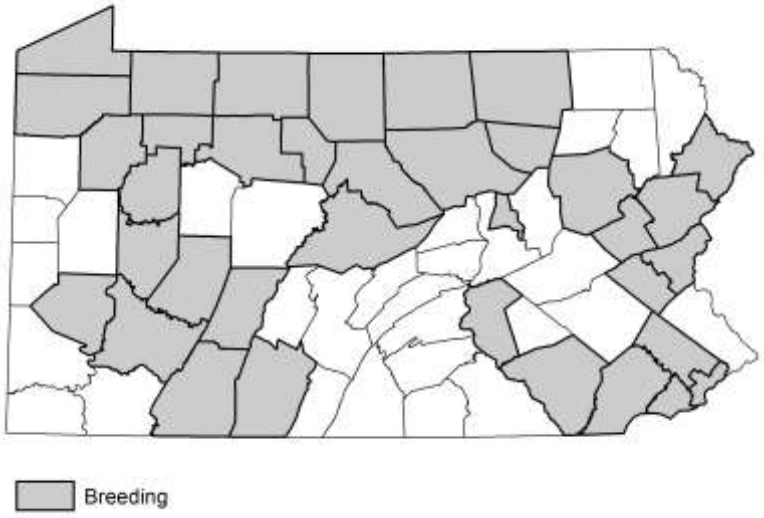
Program Name	Lead Agency	Hyperlink	Description
Yellow-bellied Flycatcher / Rare Mountain Forest Bird Studies and Conservation	Pennsylvania Game Commission / Cornell Laboratory of Ornithology	http://www.portal.state.pa.us/portal/server.pt?open=514&objID=621014&mode=2	Area searches in targeted locations with history of mountain forest bird breeding populations. Geospatial and behavioral data collected for each location / territory found for priority species: Yellow-bellied Flycatcher, Blackpoll Warbler, Olive-sided Flycatcher, Swainson's Thrush, Red Crossbill, Pine Siskin.

Pine Siskin

Spinus pinus

Douglas A. Gross
Pennsylvania Game Commission

Photo: Jacob Dingel



CONSERVATION PROFILE

Global Rank	**G5**	State Rank	**S3B**
IUCN Red List	**LC Least Concern**	PA Legal Status	**Protected**
Northeast Region	**Not NE Regional SGCN**	PA Abundance	**Variable (1700 PIF estimate)**
Federal Status	**Not Listed**	PA Short-Term Trend (10 year)	**(B) Unknown**

Conservation Goal:

Increase knowledge of known breeding population, determining if there are regular breeding locations.

HABITAT ASSOCIATIONS

	Primary	Secondary
Macrogroup	**Northern Hardwood & Conifer**	
Habitat	**Appalachian (Hemlock)-Northern Hardwood Forest**	

Specific Habitat Requirements:

Northern boreal forest, preferring open stands of spruce and pine interspersed with birch and maple hardwood. Also nests in yards and park-like settings that include conifers.

B = Breeding, M = Migration, W = Wintering

THREATS AND ACTIONS

IUCN Threat: 5.0 Biological Resource Use

Season: Breeding

Specific Threat: Permanent deforestation and replacement of conifer with deciduous forest.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Make boreal conifer forest management a priority in appropriate areas; conserve mature spruce / hemlock forest, release spruce seedlings & saplings, plant spruce & fir seedlings to fill conifer forest gaps and increase conifer component in appropriate locations.	Increase spruce, hemlock, and fir forest acreage and number of blocks.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	2

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

IUCN Threat: 8.0 Invasive and Other Problematic Species and Genes

Season: Breeding

Specific Threat: Deer browsing is oversimplifying the forest species diversity and structure. Invasives are decreasing health and vigor of hemlocks and other conifers.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Maintain healthy forests with good regeneration and complex vegetative structure and diversity through deer management. Treat hemlock woolly adelgid and related conifer pests at high priority locations.	Protect boreal conifer swamps from flooding or conversion.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	2

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 1.0 Residential and Commercial Development

Season: Breeding

Specific Threat: Residential and road development replaces forest and wetlands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning Promote forest conservation even where there is light development.	Protect boreal conifer forests.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	3

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

IUCN Threat: 3.0 Energy Production and Mining

Season: Breeding

Specific Threat: Marcellus shale and wind energy infrastructure.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 9.0 Planning	Protect core habitat areas for endangered and threatened species.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	3

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

THREATS AND ACTIONS

IUCN Threat: 4.0 Transportation and Service Corridors

Season: Breeding

Specific Threat: Road-building and right-of-way removal of forest and wetlands.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 11.0 Technical Assistance Protect high quality and larger blocks of boreal and northern conifer forest including wetlands with PNDI and best management practices of forested wetlands.	Protect core habitat areas for endangered and threatened species.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	3

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

IUCN Threat: 11.0 Climate Change and Severe Weather

Season: Breeding

Specific Threat: Northern conifers will be stressed by warmer conditions.

Action	Objective	Measure	Monitoring	Priority
TRACS Action 2.0 Direct Management of Natural Resources Maintain healthy forests with good regeneration and complex vegetative structure and diversity through deer management. Treat hemlock woolly adelgid and related conifer pests at high priority locations.	Maintain vegetation complexity of forest.	Number of hectares of boreal conifer forest and number of boreal conifer blocks greater than 10 hectares.	Monitor boreal forest breeding birds through BBS, eBird, area searches in targeted areas, and off-road point counts (Mountain Bird protocol, other point counts) over an indefinite period since some of these programs are long-term and part of larger projects.	3

Action Location: Physiographic Province: Appalachian Plateaus, Ridge and Valley

Associated Species: Northern Saw-whet Owl, Yellow-bellied Flycatcher, Winter Wren, Swainson's Thrush, Canada Warbler, northern flying squirrel, snowshoe hare

RESEARCH NEEDS

1. Breeding- What are the Pine Siskins breeding populations related to human-modified locations and natural forests that benefit this species for nesting in concentrations?

2. Breeding- What are the causes for the Pine Siskin irruptions and do these irruptions relate to nesting events?

3. Breeding- Would old growth conifer forest management benefit this species and others that use large conifers for nesting and food?

SURVEY NEEDS

1. Breeding- Locate regularly used breeding populations in the state.

2. Breeding- Establish off-road point counts for boreal conifer forest guild species similar to Mountain Bird Count project.

3. Breeding- Establish off-road point forest bird counts in large forest blocks as part of state network of point counts (not as technical as Mountain Bird Count or focused on boreal forests).

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
eBird (PA eBird as state portal)	Pennsylvania Game Commission	http://ebird.org/content/pa	Open database of geospatially designated locations with on-line data entry and portals to the database with news and stories that provide guidance, education, and instructions to participants.

MONITORING PROGRAMS

Program Name	Lead Agency	Hyperlink	Description
Mountain Bird Watch	Vermont Center for Ecostudies	http://vtecostudies.org/projects/mountains/mountain-birdwatch/	Mountain Birdwatch (MBW) monitors songbirds that breed in the montane fir and spruce forests of the Northeast. MBW data provide the only region-wide source of population information on these high-elevation breeding birds. MBW's primary focus is Bicknell's Thrush, a montane fir specialist that breeds only in the northeastern U.S. and adjacent areas of Canada, but this project also tracks nine other high-elevation avian breeders, red squirrels, and the conifer seeds that these avian nest predators eat. A PA version of this project will not include Bicknell's Thrush and will focus on state priority mountain forest species for the PA and the Appalachian Mountains.
North American Breeding Bird Survey	USGS	https://www.pwrc.usgs.gov/bbs/	The BBS is a long-term, large-scale, international avian monitoring program initiated in 1966 to track the status and trends of North American bird populations.
Yellow-bellied Flycatcher / Rare Mountain Forest Bird Studies and Conservation	Pennsylvania Game Commission / Cornell Laboratory of Ornithology	http://www.portal.state.pa.us/portal/server.pt?open=514&objID=621014&mode=2	Area searches in targeted locations with history of mountain forest bird breeding populations. Geospatial and behavioral data collected for each location / territory found for priority species: Yellow-bellied Flycatcher, Blackpoll Warbler, Olive-sided Flycatcher, Swainson's Thrush, Red Crossbill, Pine Siskin.

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