

Chapter 5

Biota of the Lehigh Gap Wildlife Refuge – Birds



LGWR Biota - Birds

A Survey of the Birds at LGWR

The following information is occurrence data for the birds of the LGWR. The data was collected during bird surveys conducted by Corey, Diane, and Dave Husic as well as Dan Kunkle. The data presented is from 77 surveys conducted between March 2006 and May 2009.



Blue Grosbeak

Over 31,000 birds of 139 species were recorded during the survey. The highest species count on a single survey was on October 5, 2008 with 59 species. The highest bird count in a single day was on March 14, 2007 with 5,676 individual birds. Surveys were conducted around the nature center grounds, along the Prairie Warbler Trail, and on the Osprey Loop (consisting of transects along the LNE, Bobolink, and D&L Trails; see map at end of this chapter). Transect data can be used as a baseline to monitor changes in various sections of the Refuge (different habitats) over time.

The data on subsequent pages is split into four seasons: spring,

summer, fall, and winter. Occurrence is displayed as percentages; the percent of surveys on which the particular species has been observed. Occurrence terms: rare, uncommon, fairly common, and common, are used as well. A high count is also given for each species. This number is the most individuals of a single species that has been seen on a single survey.

Other bird sightings have been recorded at the Refuge throughout the past seven years by the study authors and others, but only those sightings from the formal surveys are included in the data below. A complete list of all bird species (164 total) observed to date throughout the entire Refuge property can be found in Appendix B.

Species that require grasslands to breed, are noted as *grassland species*. Species that are extremely common some years, but absent in others are listed as *irruptive species*. Because of this irruptive behavior, this occurrence data may be misleading.



Prairie Warbler

Order and nomenclature follows the American Birding Association Checklist, Version 7.0.

Spring-March, April, May

Summer-June, July, August

Fall-September, October, November

Winter-December, January, February

Rare- seen on 6% or less of surveys

Uncommon- seen on more than 6% and less than 50% of surveys

Fairly common- seen on 50% or more and less than 90% of surveys

Common- seen on 90% or more of surveys

Snow Goose spring-uncommon (11%); summer-no record; fall-no record; winter-uncommon (14%); high count: 4520 on February 14, 2009

Ross's Goose one record, March 14, 2007

Canada Goose spring-fairly common (89%); summer-fairly common (53%); fall-fairly common (52%); winter-fairly common (86%); high count: 1886 on March 14, 2007

Wood Duck spring-uncommon (11%); summer-rare (5.9%); fall-no record; winter-no record; high count: 2 on March 14, 2007 and August 3, 2008

American Black Duck spring-uncommon (11%); summer-no record; fall-rare (4.4%); winter-fairly common (57%); high count: 4 on March 17, 2008; November 28, 2008; and December 26, 2008

Mallard spring-fairly common (79%); summer-uncommon (47%); fall-uncommon (35%); winter-uncommon (43%); high count: 13 on March 28, 2009

Ring-necked Duck one record, 2 on March 3, 2007

Bufflehead spring-no record; summer-no record; fall-uncommon (8.7%); winter-no record; high count: 5 on November 2, 2008

Hooded Merganser one record, 1 on April 6, 2007

Common Merganser spring-common (93%); summer-fairly common (59%); fall-uncommon (26%); winter-common (100%); high count: 30 on August 12, 2007

Ring-necked Pheasant one record, 1 on October 1, 2006; *grassland species*

Common Loon spring-uncommon (14%); summer-no record; fall-rare (4.4%); winter-no record; high count: 17 on April 13, 2008

- Double-crested Cormorant** spring-uncommon (14%); summer-rare (5.9%); fall-uncommon (17%); winter-no record; high count: 13 on May 5, 2007
- Great Blue Heron** spring-uncommon (14%); summer-uncommon (12%); fall-uncommon (17%); winter-no record; high count: 6 on October 5, 2008
- Green Heron** spring-no record; summer-uncommon (12%); fall-no record; winter-no record; high count: 1 on June 24, 2007 and August 9, 2008
- Black Vulture** spring-fairly common (57%); summer-uncommon (18%); fall-rare (4.4%); winter-no record; high count: 6 on April 6, 2008
- Turkey Vulture** spring-common (93%); summer-fairly common (76%); fall-fairly common (61%); winter-no record; high count: 49 on April 13, 2008
- Osprey** spring-uncommon (21%); summer-uncommon (24%); fall-uncommon (30%); winter-no record; high count: 8 on April 19, 2009
- Bald Eagle** spring-uncommon (14%); summer-uncommon (41%); fall-uncommon (13%); winter-uncommon (14%); high count: 3 on August 12, 1007
- Northern Harrier** spring-rare (3.6%); summer-no record; fall-rare (4.4%); winter-uncommon (14%); high count: 2 on April 19, 2009; *grassland species*
- Sharp-shinned Hawk** spring-uncommon (21%); summer-uncommon (18%); fall-fairly common (52%); winter-uncommon (29%); high count: 12 on October 5, 2008
- Cooper's Hawk** spring-no record; summer-uncommon (12%); fall-uncommon (17%); winter-no record; high count: 1 on October 28, 2007; August 3, 2008; August 24, 2008; September 1, 2008; September 7, 2008; and October 26, 2008
- Northern Goshawk** one record, 1 on May, 18, 2008
- Red-shouldered Hawk** spring-uncommon (7.1%); summer-rare (5.9%); fall-rare (4.4%); winter-no record; high count: 10 on March 14, 2007
- Broad-winged Hawk** spring-uncommon (7.1%); summer-rare (5.9%); fall-uncommon (8.7%); winter-no record; high count: 17 on April 19, 2009
- Red-tailed Hawk** spring-uncommon (46%); summer-fairly common (65%); fall-fairly common (57%); winter-uncommon (43%); high count: 6 on November 16, 2008
- Rough-legged Hawk** one record, 1 on February 24, 2008; *grassland species*
- Golden Eagle** spring-no record; summer-no record; fall-uncommon (8.7%); winter-no record; high count: 1 on October 28, 2007 and November 2, 2008

American Kestrel spring-fairly common (57%); summer-fairly common (76%); fall-uncommon (43%); winter-uncommon (14%); high count: 5 on April 19, 2009; *grassland species*

Merlin spring-no record; summer-rare (5.9%); fall-uncommon (26%); winter-no record; high count: 3 on September 14, 2008

Peregrine Falcon spring-rare (3.6%); summer-rare (5.9%); fall-uncommon (8.7%); winter-no record; high count: 2 on October 5, 2008

Killdeer spring-uncommon (29%); summer-uncommon (47%); fall-no record; winter-no record; high count: 3 on May 20, 2007

Spotted Sandpiper spring-uncommon (7.1%); summer-uncommon (18%); fall-uncommon (8.7%); winter-no record; high count: 9 on May 20, 2007

Ring-billed Gull spring-uncommon (25%); summer-no record; fall-rare (4.4%); winter-uncommon (29%); high count: 121 on January 28, 2007

Herring Gull spring-uncommon (11%); summer-no record; fall-uncommon (8.7%); winter-fairly common (57%); high count: 19 on January 27, 2008

Great Black-backed Gull one record, 1 on January 27, 2008

Rock Pigeon spring-fairly common (71%); summer-fairly common (71%); fall-common (91%); winter-fairly common (86%); high count: 70 on November 2, 2008

Mourning Dove spring-common (100%); summer-common (100%); fall-common (96%); winter-common (100%); high count: 24 on May 3, 2008

Yellow-billed Cuckoo spring-uncommon (7.1%); summer-uncommon (18%); fall-rare (4.4%); winter-no record; high count: 2 on May 26, 2007 and June 14, 2007

Chimney Swift spring-uncommon (25%); summer-fairly common (65%); fall-uncommon (8.7%); winter-no record; high count: 62 on August 24, 2008

Ruby-throated Hummingbird spring-uncommon (18%); summer-fairly common (88%); fall-uncommon (22%); winter-no record; high count: 7 on August 12, 2007

Belted Kingfisher spring-uncommon (36%); summer-uncommon (41%); fall-uncommon (26%); winter-uncommon (14%); high count: 3 on March 28, 2009

Red-bellied Woodpecker one record, 1 on November 2, 2008

Yellow-bellied Sapsucker one record, 1 on October 1, 2006

Downy Woodpecker spring-uncommon (43%); summer-fairly common (65%); fall-common (91%); winter-fairly common (71%); high count: 11 on November 26, 2006

Hairy Woodpecker spring-uncommon (7.1%); summer-no record; fall-uncommon (8.7%); winter-uncommon (14%); high count: 1 on April 16, 2006; November 4, 2007; April 6, 2008; September 21, 2008; and February 14, 2009

Northern Flicker spring-uncommon (29%); summer-uncommon (29%); fall-uncommon (26%); winter-no record; high count: 27 on April 19, 2009

Pileated Woodpecker one record, 1 on June 1, 2008

Eastern Wood-Pewee spring-rare (3.6%); summer-uncommon (18%); fall-rare (4.4%); winter-no record; high count: 1 on May 20, 2006; September 10, 2006; June 24, 2007; July 1, 2007; and August 26, 2007

Least Flycatcher one record, 2 on May 5, 2007

Eastern Phoebe spring-fairly common (86%); summer-fairly common (88%); fall-fairly common (52%); winter-no record; high count: 20 on April 6, 2007

Great Crested Flycatcher spring-uncommon (21%); summer-uncommon (29%); fall-no record; winter-no record; high count: 2 on June 3, 2007 and June 14, 2007

Eastern Kingbird spring-uncommon (25%); summer-fairly common (88%); fall-uncommon (8.7%); winter-no record; high count: 75 on August 12, 2007

Blue-headed Vireo spring-no record; summer-no record; fall-uncommon (22%); winter-no record; high count: 5 on October 5, 2008

Warbling Vireo spring-uncommon (29%); summer-uncommon (41%) fall-uncommon (17%); winter-no record; high count: 4 on June 24, 2007

Philadelphia Vireo one record, 2 on May 28, 2006

Red-eyed Vireo spring-uncommon (36%); summer-fairly common (88%); fall-uncommon (35%); winter-no record; high count: 14 on June 3, 2007

Blue Jay spring-fairly common (75%); summer-fairly common (59%); fall-fairly common (83%); winter-uncommon (43%); high count: 174 on September 23, 2007

American Crow spring-common (100%); summer-common (100%); fall-fairly common (87%); winter-common (100%); high count: 154 on November 2, 2008

Fish Crow spring-uncommon (21%); summer-rare (5.9%); fall-no record; winter-no record; high count: 6 on May 20, 2006

Common Raven spring-uncommon (11%); summer-uncommon (18%); fall-uncommon (26%); winter-uncommon (29%); high count: 3 on June 1, 2008

Tree Swallow spring-fairly common (82%); summer-fairly common (82%); fall-uncommon (17%); winter-no record; high count: 204 on September 7, 2008

Northern Rough-winged Swallow spring-fairly common (57%); summer-fairly common (65%); fall-rare (4.4%); winter-no record; high count: 45 on May 3, 2008

Bank Swallow spring-rare (3.6%); summer-uncommon (24%); fall-no record; winter-no record; high count: 2 on May 28, 2006

Barn Swallow spring-uncommon (36%); summer-fairly common (53%); fall-uncommon (17%); winter-no record; high count: 7 on September 2, 2007

Carolina Chickadee one record, 1 on December 21, 2006

Black-capped Chickadee spring-common (93%); summer-fairly common (71%); fall-common (91%); winter-common (100%); high count: 26 on September 23, 2007

Tufted Titmouse spring-fairly common (82%); summer-fairly common (82%); fall-fairly common (78%); winter-common (100%); high count: 15 on June 17, 2006

Red-breasted Nuthatch one record, 1 on October 26, 2008

White-breasted Nuthatch spring-uncommon (21%); summer-uncommon (18%); fall-uncommon (43%); winter-uncommon (43%); high count: 4 on June 24, 2007

Brown Creeper spring-uncommon (7.1%); summer-no record; fall-rare (4.4%); winter-no record; high count: 1 on March 14, 2007; April 1, 2007; and October 5, 2008

Carolina Wren spring-fairly common (79%); summer-common (94%); fall-common (96%); winter-common (100%); high count: 8 on August 12, 2007 and October 13, 2007

House Wren spring-uncommon (25%); summer-uncommon (41%); fall-uncommon (26%); winter-no record; high count: 7 on September 14, 2008

Golden-crowned Kinglet spring-uncommon (14%); summer-no record; fall-uncommon (35%); winter-no record; high count: 11 on November 5, 2006

Ruby-crowned Kinglet spring-uncommon (14%); summer-no record; fall-uncommon (48%); winter-no record; high count: 24 on October 1, 2006

Blue-gray Gnatcatcher spring-uncommon (14%); summer-uncommon (41%); fall-rare (4.4%); winter-no record; high count: 2 on May 5, 2007; May 20, 2007; May 26, 2007; June 3, 2007; June 14, 2007; and May 3, 2008

Eastern Bluebird spring-fairly common (86%); summer-fairly common (88%); fall-fairly common (61%); winter-uncommon (43%); high count: 41 on October 5, 2008

Swainson's Thush one record, 1 on May 20, 2007

Hermit Thrush one record, 1 on October 9, 2006

American Robin spring-fairly common (75%); summer-fairly common (71%); fall-fairly common (65%); winter-uncommon (29%); high count: 379 on October 5, 2008

Gray Catbird spring-uncommon (39%); summer-common (94%); fall-fairly common (52%); winter-no record; high count: 17 on June 24, 2007 and May 25, 2009

Northern Mockingbird spring-fairly common (57%); summer-fairly common (82%); fall-uncommon (22%); winter-uncommon (29%); high count: 8 on June 24, 2007

Brown Thrasher one record, 1 on August 24, 2008

European Starling spring-uncommon (39%); summer-uncommon (47%); fall-uncommon (22%); winter-no record; high count: 133 on June 21, 2006

Cedar Waxwing spring-uncommon (14%); summer-fairly common (82%); fall-uncommon (43%); winter-no record; high count: 37 on October 5, 2008

Blue-winged Warbler spring-rare (3.6%); summer-no record; fall-rare (4.4%); winter-no record; high count: 1 on May 20, 2006 and September 10, 2006

Tennessee Warbler spring-no record; summer-rare (5.9%); fall-rare (4.4%); winter-no record; high count: 2 on August 20, 2006

Orange-crowned Warbler one record, 1 on October 5, 2008

Nashville Warbler spring-no record; summer-no record; fall-uncommon (13%); winter-no record; high count: 4 on September 10, 2006

Northern Parula spring-no record; summer-no record; fall-uncommon (8.7%); winter-no record; high count: 3 on October 5, 2008

Yellow Warbler spring-uncommon (43%); summer-fairly common (71%); fall-no record; winter-no record; high count: 18 on May 20, 2007 and May 26, 2007

Chestnut-sided Warbler spring-no record; summer-rare (5.9%); fall-uncommon (8.7%); winter-no record; high count: 1 on August 20, 2006; September 12, 2006; and October 1, 2006

Magnolia Warbler spring-no record; summer-rare (5.9%); fall-uncommon (26%); winter-no record; high count: 3 on August 20, 2006

Cape May Warbler one record, 1 on October 5, 2008

Black-throated Blue Warbler spring-rare (3.6%); summer-no record; fall-uncommon (17%); winter-no record; high count: 7 on October 5, 2008

Yellow-rumped Warbler spring-uncommon (11%); summer-no record; fall-uncommon (30%); winter-no record; high count: 6 on October 5, 2008

Black-throated Green Warbler spring-uncommon (7.1%); summer-rare (5.9%); fall-uncommon (39%); winter-no record; high count: 29 on October 1, 2006

Blackburnian Warbler one record, 3 on October 5, 2008

Pine Warbler spring-rare (3.6%); summer-no record; fall-rare (4.4%); winter-no record; high count: 1 on April 29, 2006 and September 10, 2006

Prairie Warbler spring-uncommon (46%); summer-common (94%); fall-uncommon (30%); winter-no record; high count: 20 on May 5, 2007

Palm Warbler spring-uncommon (11%); summer-no record; fall-uncommon (8.7%); winter-no record; high count: 5 on May 5, 2007

Bay-breasted Warbler one record, 1 on October 5, 2008

Blackpoll Warbler spring-uncommon (7.1%); summer-no record; fall-uncommon (13%); winter-no record; high count: 20 on October 5, 2008

Black-and-white Warbler spring-uncommon (46%); summer-common (94%); fall-rare (4.4%); winter-no record; high count: 9 on May 3, 2008

American Redstart spring-uncommon (11%); summer-uncommon (24%); fall-rare (4.4%); winter-no record; high count: 5 on May 20, 2006

Worm-eating Warbler spring-uncommon (7.1%); summer-rare (5.9%); fall-no record; winter-no record; high count: 1 on May 3, 2006; May 18, 2008; and May 25, 2009

Mourning Warbler spring-rare (3.6%); summer-rare (5.9%); fall-no record; winter-no record; high count: 1 on May 28, 2006 and June 1, 2008

Common Yellowthroat spring-uncommon (39%); summer-fairly common (76%); fall-uncommon (43%); winter-no record; high count: 10 on September 2, 2007

Canada Warbler one record, 1 on August 26, 2007

Scarlet Tanager spring-uncommon (14%); summer-uncommon (12%); fall-uncommon (22%); winter-no record; high count: 3 on May 18, 2009

Eastern Towhee spring-fairly common (50%); summer-fairly common (82%); fall-uncommon (30%); winter-no record; high count: 6 on October 5, 2008

American Tree Sparrow spring-rare (3.6%); summer-no record; fall-rare (4.4%); winter-uncommon (14%); high count: 2 on February 24, 2008

Chipping Sparrow spring-fairly common (57%); summer-common (100%); fall-fairly common (65%); winter-no record; high count: 61 on October 13, 2007

Field Sparrow spring-fairly common (61%); summer-fairly common (76%); fall-fairly common (74%); winter-no record; high count: 40 on September 4, 2006

Vesper Sparrow spring-no record; summer-no record; fall-uncommon (8.7%); winter-no record; high count: 1 on November 5, 2006 and October 26, 2008; *grassland species*

Savannah Sparrow spring-no record; summer-no record; fall-uncommon (17%); winter-no record; high count: 2 on September 21, 2008; *grassland species*

Grasshopper Sparrow one record, 1 on September 10, 2006; *grassland species*

Fox Sparrow spring-rare (3.6%); summer-no record; fall-rare (4.4%); winter-no record; high count: 4 on November 2, 2008

Song Sparrow spring-common (100%); summer-common (100%); fall-common (100%); winter-common (100%); high count: 48 on March 30, 2008

Swamp Sparrow one record, 1 on October 5, 2008

White-throated Sparrow spring-uncommon (36%); summer-no record; fall-fairly common (52%); winter-fairly common (57%); high count: 60 on November 5, 2006

White-crowned Sparrow one record, 1 on November 4, 2007

Dark-eyed Junco spring-fairly common (71%); summer-uncommon (35%); fall-fairly common (57%); winter-common (100%); high count: 157 on November 2, 2008

Northern Cardinal spring-common (96%); summer-common (100%); fall-common (91%); winter-fairly common (71%); high count: 14 on September 7, 2008

Rose-breasted Grosbeak spring-no record; summer-rare (5.9%); fall-uncommon (13%); winter-no record; high count: 2 on September 10, 2006 and September 12, 2006

Blue Grosbeak one record, 1 on August 9, 2008; *grassland species; first Carbon County breeding record*

Indigo Bunting spring-uncommon (32%); summer-common (94%); fall-uncommon (17%); winter-no record; high count: 23 on May 25, 2009

Red-winged Blackbird spring-common (93%); summer-fairly common (82%); fall-uncommon (8.7%); winter-uncommon (14%); high count: 401 on March 17, 2008

Eastern Meadowlark one record, 2 on March 28, 2009; *grassland species*

Common Grackle spring-fairly common (57%); summer-fairly common (76%); fall-uncommon (8.7%); winter-no record; high count: 100 on August 20, 2006

Brown-headed Cowbird spring-fairly common (68%); summer-fairly common (65%); fall-uncommon (8.7%); winter-uncommon (14%); high count: 54 on October 14, 2006

Orchard Oriole spring-rare (3.6%); summer-rare (5.9%); fall-no record; winter-no record; high count: 3 on May 25, 2009

Baltimore Oriole spring-uncommon (39%); summer-fairly common (82%); fall-rare (4.4%); winter-no record; high count: 9 on May 20, 2007 and May 18, 2009

Purple Finch spring-no record; summer-uncommon (12%); fall-uncommon (8.7%); winter-no record; high count: 1 on June 4, 2006; June 1, 2008; and November 28, 2008; *irruptive species*

House Finch spring-fairly common (61%); summer-fairly common (76%); fall-fairly common (74%); winter-fairly common (57%); high count: 38 on October 5, 2008

White-winged Crossbill one record, 2 on February 14, 2009; *irruptive species*

Common Redpoll one record, 37 on November 25, 2007; *irruptive species*

Pine Siskin spring-uncommon (11%); summer-no record; fall-uncommon (17%); winter-uncommon (29%); high count: 531 on November 2, 2008; irruptive species

American Goldfinch spring-fairly common (75%); summer-common (94%); fall-common (96%); winter-uncommon (29%); high count: 60 on December 26, 2008

House Sparrow spring-rare (3.6%); summer-uncommon (12%); fall-no record; winter-no record; high count: 2 on June 14, 2007 and June 1, 2008



American Goldfinch

Two previous bird studies have been conducted in the Lehigh Gap area: one in 1900-1903 (Rehn, 1903)¹ and one in 1982-1983 (Reed 1984)². Rehn conducted his survey just a few years after the zinc smelting industry began in the region (1898) – long before most of the damage was done. Additionally, the chestnut blight, which eliminated the once common American Chestnut trees from the region, had not yet been introduced. Reed conducted his study in the early 1980s after the smelters had been shut down and at a point when the environmental damage was at its worse. Both studies were conducted during the summer months (June, July, August) as opposed to the most recent longitudinal study, which was conducted year-round. It is difficult to directly compare results from the studies for a number of reasons. Rehn and Reed did not count individuals, only species, and they did not define the limits of their study areas. However, based on some of their sightings, they must have included some forested areas in their surveys, and in Rehn's case, nearby farms. The Husic study was conducted in the area around the Osprey House, the shrub habitat in the Prairie Warbler trail area, in the restoration area, and along the old rail beds where primary succession is occurring.



**Scrub Habitat in the
Prairie Warbler Trail Area**

To compare the current results with the previous findings, only data collected in June, July, and August of 2006 and June of 2007 were compared. (Note: Reed's surveys were conducted primarily in those same months over two years, but he also had one survey date in April and one in May.) All current bird names used are from Peterson (2002)³.

During the summers of 2006 and 2007, a total of 76 different species were observed during the study period, as opposed to 50 reported by Rehn and 70 reported by Reed. They both reported Ovenbirds and Wood Thrushes, woodland birds that were not seen in the early successional habitats of the recent study. Tables 5-1 and 5-2 (p. 5-16) show species seen by Rehn and Reed, respectively, that were not seen in the current study and Table 5-3 shows the species observed recently that were not reported by Rehn or Reed.

When Rehn conducted his survey (1900-1903), he visited several nearby

¹ Rehn, J.A.G. 1903. Notes on the Summer Birds of Lehigh Gap Pennsylvania. *Cassinia* 7(1): 11-16.

² Reed, B.P. 1984. An Eighty Year Comparison of Bird Species Utilization at Lehigh Gap, Pennsylvania. Independent research problem, East Stroudsburg State College, East Stroudsburg, PA. 24 pp.

³ Peterson, R.T. *A Field Guide to the Birds of Eastern and Central North America*. Houghton Mifflin, 2002.

farms. Here, he found species such as Eastern Meadowlark (*Sturnella magna*) and Northern Bobwhite (*Colinus virginianus*). When this habitat was altered, both of these species disappeared from the area. Rehn also conducted his study before the effects of DDT on raptors. As a result, Peregrine Falcons (*Falco peregrinus*) were more common than they are now, and they nested in the cliffs of Devil's Pulpit. As seen in Table 5-1, Rehn had also seen species that are unusual today during the breeding season such as Savannah Sparrow (*Passerculus sandwichensis*) and Purple Martin (*Progne subis*).

Rehn reported that the predominant trees of the forests were Eastern Hemlock and American Chestnut. Since Rehn's study, most American Chestnut have been killed by Chestnut Blight (caused by *Endothia parasitica*) brought in with Chinese Chestnuts in 1904. Hemlocks have also been attacked by an insect called Hemlock Woolly Adelgid (*Adelges tsugae*), that was brought to the United States in 1954.

Air pollution, primarily sulfur-based acid deposition from zinc smelting from 1898 to 1980 killed off all of the vegetation on the Kittatinny Ridge near Palmerton. Deposition of heavy metals (zinc, lead, and cadmium) prevented re-growth and led to the demise of soil microbes. This ecological damage took place between the studies of Rehn and Reed, so in the 1980's when Reed conducted his bird survey, the area was probably barren along the slopes of the ridge, but some trees may have begun to grow back along the Lehigh River, creating brush habitat for several bird species (Table 5-2). Yellow-breasted Chats (*Icteria virens*), which prefer

brushy habitat, are not found in the Lehigh Gap anymore, possibly because the habitat has changed along the river as the trees have grown much taller. Reed did not see some common birds such as Song Sparrow (*Melospiza melodia*) probably a result of the habitat destruction, but he did see birds such as Hooded Warblers (*Wilsonia citrina*) which are uncommon today. During the time of Reed's survey, the reported predominant tree in the forested area was Chestnut Oak (*Quercus montana*); only a few American Chestnut shoots remained.



By the time of Husic's study period in 2006 and 2007, sections of the mountainside had been planted with warm-season grasses, creating the beginnings of grassland and providing new habitat for birds. Gray and sweet birch, sassafras, and species of aspen had begun to repopulate the area on the mountainside along the west side of the Lehigh Gap that was not directly seeded but may have benefited from some of the lime applications and other soil amendments spread in the nearby areas of grass seeding. The birches—which are both young and stunted (probably from stress of poor soil, the uptake of the heavy metals, and dry conditions

since there is little organic matter to hold soil moisture)—have created an unusual habitat, ideal for species such as Prairie Warbler (*Dendroica discolor*) and Indigo Bunting (*Passerina cyanea*). Breeding Prairie Warblers are difficult to find elsewhere in the region.



Indigo Bunting

Similar to the time of Reed, the predominant tree is Chestnut Oak, but now, other oaks, maples, sassafras, black gum, and birches are populating the area.



The area that was seeded is starting to attract some grassland species, especially during migration and in winter. Grassland species that have been found include Savannah (*Passerculus sandwichensis*), Grasshopper (*Ammodramus*

savannarum), and Vesper Sparrow (*Pooectes gramineus*), and in the winter, a single sighting of a Snow Bunting (*Plectrophenax nivalis*). Perhaps most exciting was the confirmed breeding of Blue Grosbeaks (*Passerina caerulea*; confirmed breeding in 2008, probable in 2009 and 2010). This represents the first documented report of breeding of this species in Carbon County. It should be noted that there has been an increased incidence of sightings and breeding of Blue Grosbeaks in Lehigh and Northampton counties. This is a species that is susceptible to decreasing open space and the conversion of farmland to housing and industrial developments.

Many of the species that were not seen by Rehn or Reed are water birds, or birds that live near the water (Table 5-3). Previously, the river had been dramatically affected by sewage from towns upstream, acid mine drainage, coal dust from shipping coal on the river, and effluent from the zinc smelting industry and tanneries. Even though Rehn's study was done early in the 1900s, the some of the sources of pollution in the river were likely already present.



Red-tailed Hawk

Table 5-1. Species reported by Rehn (Rehn 1903), not seen by Husic⁴

Current proper name in parentheses

Black-crowned Night Heron (Black-crowned Night-Heron)
Quail (Northern Bobwhite)
Meadow-lark (Eastern Meadowlark)
Savanna Sparrow (Savannah Sparrow)
Purple Martin
Oven-bird (Ovenbird)
Yellow-breasted Chat
Wood Thrush

Purple Finch^{† ‡}

*nest and feed near water

†nest and feed in forests

‡only seen once

Table 5-2. Species Reported by Reed (Reed 1984) not seen by Husic⁴

Current proper name in parentheses

Ring-billed Gull
Willow Flycatcher
Least Flycatcher
Wood Thrush
Ovenbird
Hooded Warbler
White-throated Sparrow

Table 5-3. Species reported by Husic that were not reported by Reed or Rehn⁴

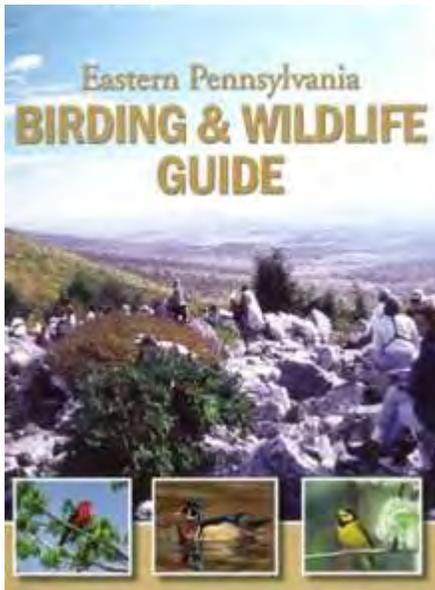
Double-crested Cormorant*
Great Blue Heron*
Wood Duck*
Green Heron* ‡
Sharp-shinned Hawk†
Bald Eagle*
Warbling Vireo*
Common Raven
White-breasted Nuthatch†
Chestnut-sided Warbler†
Magnolia Warbler†
Prairie Warbler
Dark-eyed Junco
Orchard Oriole‡

⁴ Updated from Corey Husic's original paper of 2007.



Common Nighthawk

The value of the Lehigh Gap Wildlife Refuge as an important birding destination site was acknowledged by inclusion of the LGNC in the Eastern Pennsylvania Birding and Wildlife Guide published in 2009. In the State of the Kittatinny Ridge report published by Pennsylvania Audubon in 2010, the LGNC is included as a case study of “Conservation in Action”.⁵

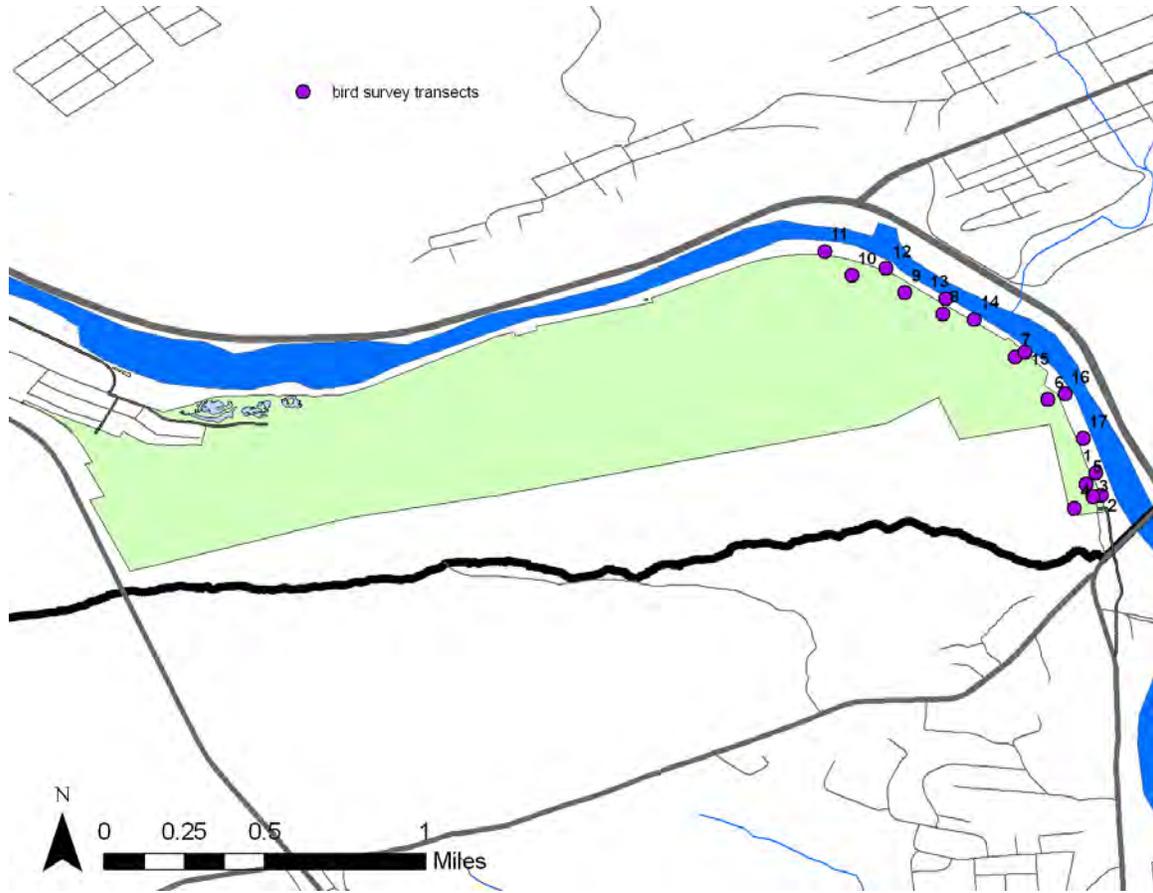


Birders and naturalists hope that birds such as Savannah, Grasshopper, and Vesper Sparrows, Bobolinks (*Dolichonyx oryzivorus*), Eastern Meadowlarks (*Sturnella magna*), and Horned Larks (*Eremophila alpestris*) will breed in the newly created grasslands. Other birds such as Lapland Longspurs (*Calcarius lapponicus*) and Northern Shrike (*Lanius excubitor*) would be important indicators of the restored habitat during the winter. It will be important to continue this study (and other bird surveys throughout the Refuge property) in subsequent years for many years as it will take time for some species to come back and because the area is constantly undergoing change by succession and invasions by alien species.



Common Merganser

⁵ Report can be found at: <http://pa.audubon.org/PDFs/FinalKittatinnyReport.pdf>; case study is on page 11.



Area and Transects Within the LGWR Where Bird Surveys Were Conducted (2006-2009)