Bake Oven Knob Autumn Hawk Count Manual



Photo by Scott Keys

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Bake Oven Knob (BOK) Autumn Hawk Count Manual

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Introduction

Hawk migration counts are often carried out at lookouts, or watchsites, which are generally at concentration bottlenecks or along leading-lines (Heintzelman 1975b, 1986; Zalles Bildstein 2000). Data produced at these hawk-counting sites are difficult to use effectively because they are collected under widely varying conditions with many variables. Observer experience, optical equipment, lighting conditions, flight patterns of the birds on a given day, weather conditions, observation hours, and number of observers are some of the variables that can influence the data being collected (Heintzelman 1986; Bednarz and Kerlinger 1989; Bildstein 1998; McDermott 1998).

Although weather and the flight patterns of raptors cannot be controlled, it is possible to standardize the methods of data collection. This manual explains methods and practices of hawk counting at Bake Oven Knob, Lehigh County, Pennsylvania, which began in 1957. One observer, Donald S. Heintzelman, was the site leader for nearly 40 years and used a standardized methodology from the outset (Heintzelman 1963, 1968, 1970, 1975a, 1975b, 1982a, 1982b, 1983, 1984a, 1985, 1986, 1987, 1988, 1989, 1990, 1993a, 1994, 1995, 1996, 1997; Heintzelman and MacClay 1972. 1973, 1975, 1976, 1979; Heintzelman and Reed 1982; Heintzelman, et al. 1992). Since Heintzelman's retirement from the count after the 1997 season, his methods have been used by others whom he trained (Kunkle 1998, 1999, 2000, 2001).

History

In the second half of the 19th century and the first half of the 20th century, raptors were considered vermin, a threat to poultry and game animals. In those times, animals were informally classified as good or bad, and it was commonly believed that the only *good* predator was a *dead* predator (Fisher 1893; Warren 1897; May 1935; Heintzelman 1979b; Bildstein 2001). Many states even placed bounties on predators as an incentive for hunters and trappers to kill them (Broun 1948; Heintzelman 1975b, 1979b; Bildstein 2001).

Thus, each autumn, as raptors flew along the Kittatinny Ridge, gunners hid in blinds, tethered pigeons as bait, and then shot the migrating birds of prey as they flew past the lookouts or made passes at the pigeons. The most famous lookout for this carnage was Hawk Mountain (Pough 1932; Collins 1933; Poole 1934; Broun 1948; Brett 1991). In 1934, Rosalie Edge raised the money to buy the mountain near Drehersville, established Hawk Mountain Sanctuary, and hired Maurice Broun to staff the Sanctuary and stop the shooting (Broun 1948). Broun would become the "Father of Hawkwatching" (Heintzelman 2001a).

Eventually, laws were passed in Pennsylvania and Washington, D.C. that protected some of the raptors. In the 1950s, Broun sent some of his young protégés out to other lookouts to monitor the shooting for illegal activity. In 1956, one of those "ridge runners" was Donald S. Heintzelman (1975b), who came to Bake Oven Knob (BOK) and witnessed the slaughter there firsthand. Heintzelman began his field studies at Bake Oven Knob the next year, when hawk shooting was banned in this part of eastern Pennsylvania (Heintzelman 1975a, 2001a; Bildstein 2001).

Annual autumn hawk counts began at Bake Oven Knob in 1961 and continue to the present. With the help of some dedicated volunteers like Bob and Anne MacClay, Heintzelman directed the count at BOK through 1997. He spent thousands of hours at BOK and, for nearly 40

years, compiled and published data he and his volunteers collected. In 1986, Heintzelman and Ben Sinclair founded Wildlife Information Center, Inc. which began sponsoring the count. Heintzelman retired as count director after the 1997 season. The count continues under the auspices of the Wildlife Center, now doing business as Lehigh Gap Nature Center (LGNC).



Photo by David Levandusky

Site Description

Bake Oven Knob is a prominent feature along the Appalachian Trail (AT) on the Kittatinny Ridge (Blue Mountain) in northern Lehigh County, Pennsylvania near the Carbon County border. There, two major rock outcroppings are used as lookouts, or watchsites, for the annual Bake Oven Knob Hawk Count. The lookouts are on State Game Land 217, which is open to the public. Caution should be used when hiking to the lookouts during hunting seasons. From November 15 through December 15, the Pennsylvania Game Commission requires all non-hunters on State Game Lands to wear fluorescent orange. During that time frame, state regulations require non-hunters to wear at least 250 square inches of fluorescent orange clothing on the head, chest, and back combined, visible from 360 degrees. The most prominent hawk watching lookout at BOK is the **South Lookout** (see below for directions to all lookouts). One landmark reference mentions the bowl-like depression in the mountain below the South Lookout as the possible source for the name Bake Oven Knob (Miller 1941). The South Lookout has an elevation of 1,600 feet (Lat. 40• 44'N; Long. 75• 44'W) and stands at the top of a cliff facing southeast with a viewing arc of about 200 degrees. It lies about 500 feet above the forest floor at the base of the ridge and more than 1,000 feet above the town of Slatington to the east. The lookout lies on a south-facing bulge in the mountain, so raptors passing on the south side of the ridge are often very close to the observers, whereas those on the north side are typically seen 200 yards more distant. Raptors passing directly over the center of the ridge (usually on calm days or days with light winds) and those passing on the south side (on days with southerly component winds) are best observed from this lookout.

Observers on the South Lookout position themselves on the edge of the rocks to have an unobstructed view from due north to southwest, plus above and below eye-level. Hawks sometimes pass very low over the forest below the cliff and escape detection by an observer positioned too far back on the lookout.

On days with northerly winds, identifying raptors passing along the north side of the ridge may be difficult from the South Lookout, and sometimes raptors pass too low along the north side of the ridge to be seen. Trees also block the viewing of eye-level birds passing on the north.



View from the South Lookout

Photo by Donald S. Heintzelman

Directly opposite the South Lookout on the north side of the ridge is a small field of boulders called the North Side Lookout. While this site was once a viable alternative for hawk viewing on north wind days, its use is now limited by trees and is seldom used today. Its viewing angle lies between 30 degrees (northeast) and 270 degrees (west) with a clear view to the north. Counting is done here on north winds when adverse conditions prevent a counter from reaching the North Lookout or when a counter is physically unable to reach the North Lookout.

The North Lookout (called "The Point" in some early Bake Oven Knob publications) is about 200 yards farther along the AT beyond the South and North Side lookouts. This lookout has an unobstructed view to the northeast along the ridge, as does the South Lookout, but it also has a clear view to the north and west. The view to the southwest is obscured by trees. A viewing arc of about 260 degrees allows the observer to see clearly from 180 degrees (due South) through east and north to 300 degrees (WNW). This lookout is used on days when winds have northerly components.



In the early years of the count, observers used the far eastern part of the North Lookout (the Point) as a viewing position. By the late 1980s, trees made viewing low-flying birds difficult, so most counters began using the higher rocks toward the back of the lookout.

As a result of limited viewing areas at both the North and South lookouts, both are used under different wind conditions, but only one site at any given time is used for data collection. Counters use the North Lookout on days with northerly winds and the South Lookout on calm days or days with southerly winds. On days when a shift in wind direction occurs, observers sometimes change lookouts. One observer moves first to the other lookout and assumes the count at a designated time. At that designated time, the observer who remained behind leaves the lookout to join the observer who moved first.

This protocol has been applied consistently since the inception of the count. The only exception has been on days when an observer is not physically able to reach the North Lookout and instead counts from the South Lookout. This is always noted on the data sheets since observers always record the lookout used and the wind direction.

Landmarks have historically been referenced by observers to help others spot migrating raptors from the lookouts. The practice of calling out the location of birds in relation to nearby landmarks is particularly helpful to the official counters, as it allows them to more readily observe migrating raptors and make a positive identification. The most common landmarks visible from the North and South lookouts are illustrated in Appendix C.

Accessing the Site

The Bake Oven Knob lookouts can be reached by walking in from the parking lot along Bake Oven Road, at the crest of the Kittatinny Ridge (see map in Appendix B).

Directions to Parking Lot: From the intersection of Rts. 22 and 309, near Allentown, take 309 north for 14.5 miles to Mountain Rd. (After passing through Schnecksville, take the left fork at the "Y", staying on 309.) Turn right on Mountain Rd. (SR4024), continue for just over two miles, and then turn left onto Ulrich Rd. (T808). Continue straight on Urlich when it turns onto an unpaved road, then merges with Bake Oven Road as it ascends the Kittatinny Ridge. At the crest of the ridge, turn into the parking lot on the right.

From north of the Kittatinny Ridge on Route 309, travel south over the ridge, and make the first left turn at the base of the mountain onto Mountain Road and proceed as above.

From the intersection of Rts. 22 and 145 (MacArthur Rd.) near Allentown, follow 145 north for 14.5 miles to its junction with Rt. 248. Turn left onto 248 and stay in the left lane. Turn left at the traffic light, and cross the bridge over the Lehigh River. Bear right at the west end of the bridge up the steep hill, which is Mountain Rd. (SR4024). Drive west on Mountain Rd. for 6.2 miles, then turn right onto Church Rd. (SR4014). At 0.2 miles, Church Rd. bears hard to the left with a farm road continuing straight ahead. Bear left on Church Rd. After 0.2 more miles, turn right onto the unpaved road and ascend the mountain. Park in the lot on the right upon reaching the crest of the ridge.

From the U.S. 209 and Rt. 248 intersection near Lehighton, travel south on Rt. 248 to Bowmanstown, and turn west onto Rt. 895. Travel 4.5 miles to Germans Road, and turn left. Follow Germans Road for 1.1 miles, and turn left again onto Bake Oven Road, which becomes unpaved. Follow Bake Oven Road to the crest of the mountain, and park in the lot on your left (east of road).

Trail to the Lookouts: The trail enters the forest at the southeast corner of the parking lot. Walk along the AT (marked with white blazes, or paint marks, on the trees and rocks) for 0.4 miles. This very rocky trail climbs steadily as it follows the ridge top through an oak dominated, mixed hardwood forest. When the trail becomes quite steep next to a rock slide, then levels off at what is obviously the highest point on the ridge, you will see an old concrete foundation of an abandoned beacon tower for airplanes. To your left is the North Side Lookout, a jumble of boulders with a view of the Ridge and Valley Province to the north. To your right, about 25 yards away, is the dramatic South Lookout, offering a panoramic view of the Lehigh Valley.

To reach the North Lookout, continue straight past the concrete foundation 0.1 miles along a very rocky, downhill trail. At about 0.1 miles, the trail drops over several very large boulders to a flat, grassy spot. The North Lookout is the pile of boulders just east through the trees. Scramble over the top of the boulders to the front of the lookout. Alternatively, skirt the lookout to the north following the AT blazes on the rocks for about 50 feet and then climb up the side of the North Lookout on your right. From here, you will be able to see both sides of the ridge, but you will not be able to look directly down on the forest canopy below as at the South Lookout.

Dates, Times, and Weather

The official daily count at Bake Oven Knob begins on 15 August and ends on the Friday after Thanksgiving each year. The site is on Pennsylvania State Game Lands, and deer hunting makes hiking to and from the lookouts, and presence on the lookouts, risky when hunting is occurring. Since deer hunting season now begins on the weekend after Thanksgiving and the migration has usually slowed considerably by that time, we officially end the count on that Friday. Orange clothing or an orange hat is recommended for observers walking to the lookout during any hunting season. From November 15 through December 15, the Pennsylvania Game Commission requires all non-hunters on State Game Lands to wear fluorescent orange (refer to p. 2).

Observation times have varied through the years, depending on observers and weather conditions. Since hourly counts are recorded, any analysis can standardize the counts by including only certain hours and by reporting hawks seen per hour. The count each day should extend from at least 8:30 a.m. to 4:30 p.m. EST (Heintzelman 1975b). Additional hours from sunrise to sunset may be included and are especially important early in the season. Late in the season, the count day may be compressed between 9:00 a.m. and 4:00 p.m. EST. Throughout the entire season, all data are recorded with times in Eastern Standard Time, not Daylight-Saving Time. Thus, in September, for example, a clock time of 11:00 a.m. DST is actually 10:00 a.m. EST.

Observation is generally halted during rain, although a flight of Broad-winged Hawks was reported in the rain in 1989 (Kunkle 1989). Counters are expected to remain in shelter on the parking lot or nearby during rain and to proceed to the lookout as the weather clears. In the case of an all-day rain, no observations are made. Counters on the lookout should be prepared for brief showers and remain on the lookout during these events. If thunderstorms are approaching, the counters are advised to seek shelter in their cars as quickly as possible, returning to the lookouts as the weather allows.

Fog can also create adverse viewing conditions. Fog can be very patchy and deceptive, and it is difficult to assess fog conditions at the lookouts from the parking lot. Counters are expected to be on the

lookout during fog conditions.





Photos by Scott Keys

Data Collection and Reporting Weather

Although we can standardize data collection methods to reduce variability, one variable over which we have no control is weather. Collecting weather data is essential for rigorous analysis of data. It is also interesting for observers to try to determine which kinds of weather patterns produce large flights of raptors (Heintzelman 1975b). The following weather data are collected hourly and recorded on the Hawk Count Data Sheet (Appendix D):

Maximum Visibility (in miles). The landmarks below can be seen clearly at the distances indicated and should be used in estimating maximum visibility. When recording visibility, record in miles up to 20 miles. If you can see clearly beyond the distance to South Mountain, "unlimited" may be used.

- Lehigh Furnace Gap 3 miles
- Troxell's Farm (North Lookout only) 4 miles
- Towers 5.5 miles
- Slatington 7 miles
- Lehigh Gap 7.5 miles
- Little Gap 11 miles
- South Mountain at Allentown 20 miles
- Martin's Creek Power Plant 30 miles



View from North Lookout Photo by Donald S. Heintzelman

Air Temperature (degrees Fahrenheit in a shaded location). The official counter must bring a thermometer to the lookout each day and place it in a shaded location to obtain temperature readings. In the event the observer has a Celsius thermometer, here are some conversions: Celsius Fahrenheit Celsius Fahrenheit Celsius Fahrenheit

elsius	Fahrenheit	Celsius	Fahrenheit	Celsius	Fahrenhei
0	32	12	35	24	75
1	34	13	55	25	77
2	36	14	57	26	79
3	37	15	59	27	81
4	39	16	61	28	82
5	41	17	63	29	84
6	43	18	65	30	86
7	45	19	67	31	87
8	47	20	68	32	89
9	48	21	70	33	91
10	50	22	72	34	92
11	52	23	73	35	94

Wind Speed (in miles per hour [mph]). This can be measured with a pocket wind meter or estimated using the scale below:

- 1-3 mph smoke drifts slowly in direction of wind
- 4-7 mph leaves rustle, breeze felt on face
- 8-12 mph small twigs and leaves in constant motion
- 13-18 mph smaller branches in motion
- 19-24 mph smaller trees with leaves sway
- 25-31 mph larger branches in motion
- 32-38 mph whole trees in motion
- 39-46 mph small branches and twigs breaking off trees
- >47 mph get off the mountain!

Wind Direction. Note that wind is recorded as the direction from which the wind is coming. A north wind is blowing from the north to the south. Use a compass to determine directions, or use the following landmarks:

South Lookout

- Slatington 10 degrees S of E
- Kittatinny Ridge ENE
- Red and White (Checkerboard) Tower NE
- Air Strip/Pig Farm SE
- PP&L Building SE
- Macungie Tank Farm SSE

- Northwestern High School SSW
- Carbon County Communication Tower NNE North Lookout
- Troxell's Farm (silo) 10 degrees E of N
- Middle of Slope of #1 E
- Red and White (Checkerboard) Tower NE

Cloud Cover (%). Estimate the percentage of sky obscured by clouds

Hawks

Data for each hour are tallied on a worksheet, or on hand tally counters for each species, then transferred to the Hawk Count Data Sheet (Appendix D) on an hourly basis. Totals are calculated at the end of the day. The following raptors are tallied at Bake Oven Knob:

- Black Vulture (*Coragyps atratus*)
- Turkey Vulture (Cathartes aura)
- Osprey (Pandion haliaetus)
- Bald Eagle (Haliaeetus leucocephalus)
- Northern Harrier (*Circus hudsonius*)
- Sharp-shinned Hawk (Accipiter striatus)
- Cooper's Hawk (Accipiter cooperii)
- American Goshawk (Accipiter atricapillus)
- Red-shouldered Hawk (Buteo lineatus)
- Broad-winged Hawk (Buteo platypterus)
- Red-tailed Hawk (Buteo jamaicensis)
- Rough-legged Hawk (Buteo lagopus)
- Golden Eagle (Aquila chryseatos)
- American Kestrel (Falco sparverius)
- Merlin (Falco columbarius)
- Peregrine Falcon (Falco peregrinus)
- Rare: Mississippi Kite (Ictinia mississippiensis)
- Rare: Swainson's Hawk (Buteo swainsoni)
- Rare: Gyrfalcon (Falco rusticolus)



Comments

The following are recorded in the comments section of the Hawk Count Data Sheet:

- Special plumages, such as dark morphs, albinos, or other unusual looking raptors
- Daily totals for:
 - Ravens
 - Monarch Butterflies
 - Great Blue Herons
 - Canada Geese (record by flock size)
 - Ruby-throated Hummingbirds
 - Double-crested Cormorants (record by flock size)
 - Any other migratory species seen (Heintzelman and Armentano 1965; Heintzelman 1969, 1982c, 1984b)

Age/Sex Data Sheet

Whenever possible, ages and sexes of raptors are identified and tallied on the Age/Sex Data Sheet (Appendix E). Tally marks are used throughout the day, with totals written in the rectangular boxes for each species. In addition, times of passage of Bald and Golden eagles, Peregrine Falcons, and Rough-legged Hawks are recorded on this sheet.



Field Notes/Observations

Each year, LGNC publishes interesting field notes from observations made at Bake Oven Knob during the autumn hawk count in *American Hawkwatcher*. Field notes can include natural history observations that involve raptors and other wildlife encountered at the lookouts.



Rare Species Report

In the event that a locally rare bird is seen on the lookouts or trails at Bake Oven Knob, it is important to document the sighting carefully. If you are fortunate enough to be able to document the bird with a photograph or video, a copy should be submitted to LGNC with your written report. Extralimital raptor species that have been seen at Bake Oven Knob include Mississippi Kite, Swainson's Hawk, and Gyrfalcon. Non-raptor birds might include seabirds and wading birds moved out of their normal range by hurricanes, or vagrant midwestern or western migrants such as Sandhill Cranes and Yellow-headed Blackbirds (Heintzelman 1969, 1984b).

To document an unusual bird, first watch the bird as long as possible and note as many field marks and behaviors as possible. Next, record observation notes immediately after observing the bird, before looking at guides. Finally, consult field guides to positively identify the species. If it cannot be positively identified, report the sighting as possible or probable. Record the following information:

- Species and number seen
- Date, time, and weather conditions
- Equipment used and length of sighting
- Location of sighting (as precise as possible)
- Habitat
- Description (inc. size, plumage, fieldmarks, vocalizations, etc.)
- Behavior
- Explanation of your identification call and identification skills
- Additional observers
- Photographs or video taken
- Your name, address, phone number, and email address

Identification Criteria for Raptors

Identification criteria for raptors seen at Bake Oven Knob are set forth in *A Guide to Hawk Watching in North America* (Heintzelman 1979a). Later works that may help clarify observations include:

- The Mountain and the Migration (Brett 1991)
- Hawks in Flight (Dunne, et al, 1988)
- A Photographic Guide to North American Raptors (Wheeler and Clark 1995)

• *A Field Guide to Hawks: North America* (Clark and Wheeler 2001) Counters are encouraged to read current hawk identification articles and review the published ID criteria each autumn.

Counting Techniques Counting Raptors

In most cases, raptors tend to pass the lookouts individually or in small groups. These are easily tallied on a worksheet or a hand tally counter for later transfer to the official data sheets. Sometimes a counter is lucky enough to witness large or multiple kettles (flocks) of Broadwinged Hawks (Bildstein 1999).

In the case of a single kettle, the observer may simply watch until the

birds begin gliding out of the top of the kettle, then click off birds on a hand tally counter individually as they leave the thermal. If birds leaving a kettle overlap an hour change, a second tally counter can be used for the second hour. Sometimes a kettle drifts out of view or rises so high the observer can no longer see it. Therefore, it is valuable for the observer to have estimated the approximate



number of birds in the kettle. Practice doing this, then click off the birds when they leave visibly from kettles to gain experience in estimating numbers. Be conservative when recording estimates – do not overestimate.

In the event that multiple kettles appear simultaneously, counters and other qualified volunteers should carefully share responsibility for counting different kettles with numbers added together. Avoid counting out loud, as it may confuse other counters.

Criteria for Counting Raptors as Migrants

Most raptors seen at Bake Oven Knob appear on the horizon to the northeast and eventually pass the lookout heading southwest. Generally, these birds are migrants. However, especially early in the season, various species (e.g., Red-tailed Hawks and often Sharp-shinned Hawks) sometimes hunt locally and are not migrating. The criterion for counting a raptor as a migrant is that the bird must appear to the north, northeast, or east of the lookout and pass by the lookout or cross the ridge heading south, southwest, or west. Vultures that roost in the forest are not counted, nor are birds that approach the lookout and return to the north or east. Red-tailed Hawks slowly hunting their way down ridge are also not considered migrants.

Counting Vultures

Both Turkey and Black vultures are seen regularly at the lookouts, and determining which are migrants is problematic. Heintzelman (2001b; Heintzelman and MacClay 1972) developed a method for counting vultures that has been used at Bake Oven Knob since the inception of the count. It is extremely important that this method be followed to maintain the consistency of the database.



Vultures are not counted in a cumulative fashion because the same individuals may pass the lookout several or many times per day. Instead, the maximum number of vultures seen at any one time is recorded. For each hour, the maximum number seen at one time within the hour is recorded. The total count for the day for each of the two vulture species is simply the largest maximum hourly count (or the maximum number seen during that day at one time).

Examples: In one hour, 2 Black Vultures are seen, then later 4, then near the end of the hour, 3 more are sighted. Count for the hour = 4 BV.

In one day, the hourly counts for six hours of observation are 2, 3, 5, 2, 2, and 8 Turkey Vultures. Count for the day = 8 TV.

Late in the season, it may be necessary to count Turkey Vultures cumulatively if large numbers of them are streaming past the lookouts and not returning. This method should be used judiciously. When this method is used, it must be documented on the data sheet, and the maximum daily count should be recorded as well.

Submitting Data

All data must be submitted to the BOK Hawk Count Coordinator via an emailed Excel spreadsheet by the end of the count day. The counter is also responsible for submitting data to the Hawk Migration Association of North America (HMANA) through its website, *hawkcount.org*. Contact the Count Coordinator or LGNC staff to obtain a copy of the Excel spreadsheet and login information/ instructions for the HMANA website.

Scanning Techniques and Optical Equipment

Visual observation is the standard method used in hawk counts at Bake Oven Knob (Heintzelman 1975b, 1979a, 1986). Observers should scan all parts of the sky, being especially careful to check directly overhead, particularly when thermals are forming or on days with clear blue skies. A bird overhead is far more visible than when it was some distance away (Kerlinger 1989: 209).

In addition to naked-eye scanning, observers should scan with binoculars of 7X to 10X magnification. Scanning with binoculars can be done in a horizontal or vertical pattern that covers an entire area of the sky.

Scanning should not be done with spotting scopes, radar equipment or other devices, as that would change the long-standing protocol and corrupt the data. Spotting scopes and higher powered binoculars should be used only for identification of distant birds already detected with the unaided eye or binoculars as described above.

One more note about detecting migrating raptors: Sometimes an eagle or other interesting bird will take several minutes to pass the lookout. Be sure to look away from this "special" bird to scan for other migrants, then return to the bird for more observation. No one knows how many migrants slip past hawk watchers while they are riveted to a spectacular bird! Be careful not to lose the original bird if it has not yet been identified and aged. Coordinate with other members of the count team so someone stays on the original bird while another counter scans for other migrants.



Count Team

Two-person teams are assigned whenever possible for each count day. Data recording duties may be shared, or one person can fill out all data sheets for the day. Be sure to print clearly. The two members of the team should coordinate their times on the lookout to achieve maximum coverage. One counter may cover the earliest hour or two with the other counter staying later. On occasions when there are many hawks in the sky at one time, the two should divide the sky to maximize counting effectiveness while ensuring that no double counting occurs. Beginning in 1999, a student intern has become a member of the count team, primarily on weekdays.

Sometimes other qualified observers are on the lookout with the official counters. These observers can be assigned duties such as watching a particular area or a particular bird. They may be consulted about puzzling identifications, but the official counters should make final judgement on the identification of any particular bird. Don't forget that there is an unidentified raptor category; never hesitate to use it.

Educational Role of Counters

Education has long been an important part of the Bake Oven Knob Hawk Count. Teachers from the elementary school through college level have brought students to the Knob in autumn for over 45 years (Heintzelman 1982d), and Heintzelman used hawk watching at Bake Oven Knob as the impetus for government proclamations concerning the Kittatinny Raptor Migration Corridor and hawk watching (Heintzelman

1984c, 1992b, 2001c).

Educating members of the public who visit Bake Oven Knob during autumn is a high priority for the Center. People who learn about raptors and their migrations may become advocates for protection of raptors, their habitats, and the Kittatinny Ridge. Hawk count volunteers can play an important role in outreach to the public by engaging visitors in conversations about the



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hawk count and raptor migration. These members of the public should be invited to join the Center. A count board can be displayed to stimulate public interest in the count.

While engaging visitors at the lookouts is important, it should never compromise the accuracy and integrity of the count. The count comes first and visitors second. Other hawk count volunteers not acting as official counters can be especially useful in this role of engaging the public. It is very helpful to carry an extra pair of binoculars to share with interested individuals who may become interested in the migration and LGNC.

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SPECIES	Earliest Date	Latest Date	Max Daily Count	Date	Record High Season	Year	Record Birds per Hour	Year	Hours
Black Vulture	1-Aug-85	29-Nov-97	23	15-Nov-15	391	2013	0.53	2022	676
Turkey Vulture	1-Aug-82	7-Dec-73	104	8-Nov-09	1,174	2022	1.74	2022	676
Osprey	5-Aug-97	28-Nov-09	155	18-Sep-04	839	2007	1.65	1990	293
Mississippi Kite	23-Aug-09	29-Sep-04	٢	29-Sep-04	2	2009	0.001	2016	813.5
Bald Eagle	1-Aug-98	13-Dec-76	40	5-Sep-13	455	2020	0.6	2020	756
Northern Harrier	1-Aug-85	4-Dec-71	62	28-Oct-74	369	1970	0.84	1977	381
Sharp-shinned Hawk	1-Aug-92	2-Dec-77	1,265	13-Oct-79	8,873	1977	24.8	1979	197
Cooper's Hawk	1-Aug-97	4-Dec-88	69	19-Oct-05	492	2005	0.68	1980	175
American Goshawk	15-Aug-09	13-Dec-76	35	3-Nov-72	357	1972	0.54	1972	654
Red-shouldered Hawk	15-Aug-18	4-Dec-88	79	27-Oct-75	350	1975	0.97	1968	349
Broad-winged Hawk	1-Aug-82	18-Nov-71	5,655	14-Sep-78	15,599	1978	41.2	1978	378
Swainson's Hawk	30-Aug-92	12-Nov-89	2	17-Sep-85	2	1985			
Red-tailed Hawk	1-Aug-82	13-Dec-76	700	2-Nov-80	3,843	1999	8.9	1980	175
Rough-legged hawk	9-Sep-73	5-Dec-71	7	9-Nov-71	37	1971	0.06	1971	591
Golden Eagle	16-Aug-16	9-Dec-76	42	3-Nov-12	167	2012	0.22	2012	769
American Kestrel	1-Aug-71	1-Dec-70	51	15-Oct-05	318	2001	0.96	1979	197
Merlin	15-Aug-19	27-Nov-14	38	15-Oct-05	150	2005	0.18	2005	844
Gyrfalcon	18-Sep-84	18-Nov-83	٦	18-Nov-83	1	1983			
Peregrine Falcon	15-Aug-19	23-Nov-20	28	27-Sep-11	76	2007	0.11	2018	655

Appendix A BOK Autumn Hawk Count Records and Earliest and Latest Record Dates

Appendix B

Map to Bake Oven Knob, Lehigh & Carbon Counties, PA



Appendix C Bake Oven Knob Hawk Watch Landmarks





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Date:					Observers:									Datashee 9 Augu	t Version: st 2016
Location: <u>Pennsylvania, Le</u>	high Cour	ity, Bake (Oven Knot	ام.		Lookout:	N = N G	orth; NS =	North Slop	e; S=So	uth; PL	= Parking L	ot		
Count Hour (EST):	6 - 7	7 - 8	8 - 9	9 - 10	10 - 11	11 - 12		12 - 1	1 - 2	2 - 3	3 - 4	4 - 5	5 - 6	6 - 7	Totals
Lookout: (N, NS, S, PL)															
Max. Visibility (Miles)															
Air Temperature (°F)															
Wind Speed (mph)															
Wind Direction															
Cloud Cover (%)					_										
Black Vulture			L	_	_		B								0
Turkey Vulture							2								0
Osprey							SO								0
Bald Eagle							BE								0
Northern Harrier							ł								0
Sharp-shinned Hawk			L	_	-	L	SS		L			L			0
Cooper's Hawk							ъ								0
Northern Goshawk							g								0
Red-Shouldered Hawk		L	L	_	-	L	ß		L			L		L	0
Broad-winged Hawk							BW								0
Red-tailed Hawk							RT								0
Rough-legged Hawk							R								0
Golden Eagle					_		GE								0
American Kestrel		L	L	_	-	_	AK			L		L	_	L	C
Merlin							Ę								0
Peregrine Falcon							Å								0
Unidentified Raptor							n								0
Count Hour (EST):	6 - 7	7 - 8	8 - 9	- 6	10 10 - 11	11 - 12		12 - 1	1-2	2-3	3 - 4	4 - 5	5 - 6	6 - 7	
Notes:														Total	0

Appendix D

Appendix E

Age/Sex Data Sheet 2001-Present

Date:	1-1an-1;	006	
Species	Age/Sex	Count	Flight Times (*species only, use military time, include duplicate times)
Osprey	Adult		
	Immature		
*Bald Eagle	Adult		
	Immature		
	Un-aged		
Northern Harrier	Male		
	Female		
	Immature		
Sharp-shinned Hawk	Adult		
	Immature		
Cooper's Hawk	Adult		
	Immature		
*Northern Goshawk	Adult		
	Immature		
	Un-aged		
Red-shouldered Hawk	Adult		
	Immature		
Broad-winged Hawk	Adult		
	Immature		
Red-tailed Hawk	Adult		
	Immature		
Rough-legged Hawk	Adult		
	Immature		
*Golden Eagle	Adult		
	Immature		
	Un-aged		
American Kestrel	Male		
	Female		
Merlin	Adult		
	Immature		
*Peregrine Falcon	Adult		
	Immature		
	Un-aged		



About Lehigh Gap Nature Center

Nestled within the Kittatinny Ridge, alongside the Lehigh River, Lehigh Gap Nature Center (LGNC) is a nonprofit environmental education center and wildlife refuge located between Slatington and Palmerton, Pennsylvania. Our mission is to protect the wildlife and enhance the habitats of our Refuge, the neighboring Kittatinny Ridge, and the Lehigh River Watershed through conservation, education, research, and outdoor recreation to improve the quality of life of present and future generations. Through our efforts to revegetate a once barren and lifeless section of the Kittatinny Ridge, LGNC established the only environmental education center in the U.S. on a Superfund site. An outdoor classroom, environmental laboratory, and recreational hotspot, LGNC's 756-acre refuge annually hosts tens of thousands of local, regional, and international visitors.

LGNC was founded in 1986 as Wildlife Information Center, Inc. (WIC). Under the mentorship of Maurice Broun, the pioneering curator of Hawk Mountain Sanctuary, WIC's founder, Donald S. Heintzelman, began the Bake Oven Knob Hawk Count in 1961 during a time when raptor *hunting* was still more common than raptor watching. Heintzelman managed the count for almost 40 years thereafter and continually advocated for raptor conservation through his numerous publications, as well as his work on behalf of WIC. With the support of our many dedicated volunteers and annual Hawk Count Intern, LGNC continues to carry on Don Heintzelman's legacy each year through the autumn Hawk Count at Bake Oven Knob — one of the longest running raptor migration studies in the world.