# Observations from the 2005 Pennsylvania Migration Count (PAMC) 

Bill Etter

## Overview

Our $14^{\text {th }}$ annual Pennsylvania Migration Count occurred on Saturday, 14 May 2005. As usual, weather was a factor in certain areas, but plenty of birders managed to get out to witness and report upon the spectacle that is spring migration in Pennsylvania!

Here are the numbers for 2005:
956 observers contributed
3,367 field hours logged
247,992 birds tallied
231 species found
Reports received from 55 counties
Following several years of steadily growing interest in the count, participation was down slightly this year. Of note is the fact that, while there were significantly fewer observers, total field hours were only 50 fewer than the 2004 total. This is good news, though the loss of participants this year is unfortunate. More on that later...

## Weather

Not surprisingly, as count day approached, weather predictions were all over the place. The forecast looked less than desirable for many parts of Pennsylvania. There were showers in many areas, but overall, PAMC 2005 turned out to be a fairly good day, from the average birder's perspective.

In Butler, there were pre-dawn downpours, with early morning temperatures around $60^{\circ} \mathrm{F}$. In the words of compiler Gene Wilhelm, "The earlier thunderstorms and low ceiling forced many migrants down...resulting in one of the best fallouts in years. Migrants were actively feeding and singing throughout the morning. An on and off drizzle returned about 1330 hours but never interfered with avian activities, nor observer enjoyment of seeing and hearing the many migrants." Good birders understand the benefits of seemingly adverse weather!

Further north in Erie, Ben Coulter reported a partly cloudy day, with periods of rain in the afternoon. In Centre, Bob Snyder reported light rain through 9:30 am, followed by a partly cloudy afternoon, with highs in the 70s.

The further east, the better the weather: in Bucks, thick early cloud cover yielded to blue skies by 8:30am. Conditions were bright and breezy, turning muggy toward afternoon with a high of $78^{\circ} \mathrm{F}$. By 8:00 pm, wind picked up as $100 \%$ cloud cover moved in.

## Participation

Participation was lessened this year for a variety of reasons. Several key organizers and participants were simply unavailable on count day. A few others simply never turned in reports. Furthermore, New Jersey's World Series of Birding (held annually on the same day as PAMC) proved a greater drain than usual, attracting several of our more enthusiastic birders on 14 May, 2005. On the positive side, PAMC hours per observer were way up in 2005 , so it seems that those who participated actually stayed out longer and birded harder. Field hours were up significantly over last year in several counties - doubly so in certain areas.

Reports were received from all counties but Beaver, Cameron, Columbia, Elk, Fayette, Jefferson, Lawrence, Montour, Northumberland, Somerset, Sullivan and Union.

Participation was definitely up in Schuylkill, where 39 observers put in 256 hours, for the greatest PAMC hourly county effort of ' 05 (and likely ever). Franklin was the only other county with greater than 200 field hours (213). The greatest numbers of participants were in Franklin and Indiana, with 74 and 73 respectively. Great totals!

Table 1. Counties with the most field hours

| 1 | Schuylkill | 256 |
| :--- | :--- | :---: |
| 2 | Franklin | 213 |
| 3 | Bucks | 189 |
| 4 | Indiana | 186 |
| 5 | Bedford | 184 |
| 6 | Lancaster | 162 |
| 7 | Berks | 141 |
| 8 | Allegheny | 139 |
| 9 | Westmoreland | 135 |
| 10 | Greene | 99 |
|  |  |  |

Table 2. Counties with the most participants

| 1 | Franklin | 74 |
| :--- | :--- | :---: |
| 2 | Indiana | 73 |
| 3 | Bucks | 61 |
| 4 | Lancaster | 41 |
| 5 | Schuylkill | 39 |
| 6 | Bedford | 36 |
|  | Berks | 36 |
|  | Westmoreland | 36 |
| 9 | Greene | 35 |
| 10 | Delaware | 31 |

## Species encountered

PAMC ' 05 yielded new High Counts (HC) for 30 species, and resulted in two species totally new to the count (Long-eared Owl, Cumberland, and California Gull, Lancaster). Since 1992, a total of 285 species has now been found on the PAMC!

Mute Swan, Wood Duck and Bald Eagle were all found in record numbers for the second consecutive year. Several shorebird species were found in unprecedented numbers (Semipalmated Plover, Dunlin, Short-billed Dowitcher). Other new HCs included both cuckoos, Olivesided and Willow Flycatcher, Eastern Kingbird, Red-eyed Vireo, Blue Jay, Winter Wren, and both orioles. There were new HCs for five warblers, including Blackpoll, Prothonotary and Mourning, as well as for the Brewster's hybrid. Certain new High Counts can undoubtedly be attributed to the late date of the 2005 count.

As usual, American Robin was the most commonly reported species. While the order has shifted around a bit, there has been very little change in the top five most abundant PAMC species for several years now, with one notable exception: when present, as this year and in ' 03 , the Bucks flock of Laughing Gulls has been known to push Canada Goose out of the top five.

Table 3. Most abundant species

| 13 | American Robin | 16,101 |
| :--- | :--- | :---: |
|  | Laughing Gull | 15,058 |
|  | Red-winged Blackbird | 11,678 |
| 4 | Common grackle | 11,078 |
| 5 | European Starling | 10,145 |
| 6 | Canada Goose | 9,641 |
| 7 | Blue Jay | 7,800 |
| 8 | Gray Catbird | 7,222 |
| 9 | American Crow | 5,509 |
| 10 | Tree Swallow | 5,461 |
| 11 | Barn Swallow | 5,301 |
| 12 | Red-eyed Vireo | 4,918 |
| 13 | Northern Cardinal | 4,898 |
| 14 | Mourning Dove | 4,782 |
| 15 | American Goldfinch | 4,409 |
| 16 | House Sparrow | 4,298 |
| 17 | Song Sparrow | 4,233 |
| 18 | Yellow Warbler | 4,052 |
| 19 | Common Yellowthroat | 3,957 |
| 20 | Baltimore Oriole | 3,899 |

## Count highlights

Now, a closer look at some highlights from Pennsylvania's $14^{\text {th }}$ annual Migration Count:

## Geese through ducks

Canada Goose numbers actually decreased for the first time since 1999, with 'only' 9,641 counted statewide. Mute Swan continued to increase: 129 were reported, the majority from the southeast, with 49 in Bucks alone. A more welcomed new HC was 1,218 Wood Ducks in 46 counties. Only 14 species of duck were found, mostly in small numbers. Among the more interesting late waterfowl migrants were single Gadwall in Butler and Philadelphia, a Common Goldeneye in Lancaster, and 20 Ruddy Ducks (19 in Butler and 1 in Chester).

## Fowl through waders

Reports of Ruffed Grouse, our state bird, continued to decline, with just 75 reported from 26 counties (. 0223 RUGR / field hour). This is the lowest total ever, with the exception of 1992 , when there were only 141 observers. The 1993 count of 79 RUGR was similar to this year's, but field hours were vastly lower in ' 93 $(1,545 \mathrm{hrs}=.0511 \mathrm{RUGR} / \mathrm{hr})$. The highest ' 05 count was only 8 (Blair and Schuylkill).

Red-throated Loon was found in Berks (1), and in Cambria, where Judy Johns found 13 RTLO associated with a flock of Common

Loons at Beaverdale Reservoir.
Al and Nancy Bilheimer found two Great Cormorants near Tullytown, Bucks, where the species is notable, yet not completely unexpected in spring. Least Bittern (3) was found in Berks only. Two rare but regular PAMC species, Little Blue Heron and Yellowcrowned Night-Heron, were notably absent from the count this year.

## Vultures, Raptors

Mississippi Kite is becoming a PAMC regular in the southeast, where it was found for the third time in four years, this time in Bucks and Northampton. The Northampton MIKI was a first summer bird, found by Mike Schall at Jacobsburg State Park. The other was an adult female, observed well at Nockamixon State Park, in upper Bucks. The preponderance of recent spring records for this species in the southeastern corner is certainly of interest!

A new HC for Bald Eagle is indicative of the species' continued success in Pennsylvania. This year, 115 BAEA were found in 31 counties. Thirty were found in Lancaster alone, followed by 9 in Wayne. Other records were spread all over the state...great news! The five-year PAMC average for BAEA is $71 / \mathrm{yr}$ (2000-2004), while the ten-year average is $45.2 / \mathrm{yr}$.

A mere 16 Northern Harriers in 8 counties was the lowest count since 1994 - again, likely due to the late date. Northern Goshawk put in a relatively good showing, with 5 birds in 4 counties. Two were found in Franklin. One, seen along Licking Creek by Delores Purnell and Florence Pyle, was very agitated, hopefully indicative of breeding activity. The other Franklin NOGO was observed at the feeders of Ken Gabler, in a wooded area west of Chambersburg.

Elsewhere in Franklin, a late Rough-legged Hawk was noted (for the second straight year) by Dan and Barb Higgins, Bill Oyler, and Lori Nichols in Amberson Valley. In Centre, Dorothy Bordner and Alison Norris reported a lingering RLHA in the George's Valley area.

There was one more exceptional raptor reported from Franklin (where a cool dozen raptor species was found for the day). The previously mentioned Purnell-Pyle team noted a Golden Eagle in the mountains of Buchanan State Park, one of three GOEA found in the state on 14 May . Another was found in the
far western end of Greene (Paul Braddock), and the third was in Indiana. Golden Eagle is a PAMC rarity, but three birds were also reported in 1998 (with two in Franklin that year).

Rounding out the raptor category, American Kestrel reports continued to decline, 195 birds being far below the five-year average of 241 per year.

## Rails and shorebirds

Sandhill Crane was found in Butler (1), where they are somewhat expected, and in Luzerne (2), where they are not. Unfortunately, there was no PAMC report from Lawrence, where they've been most commonly found in recent years.

American Coot is an odd bird, both anatomically and statistically...at least according to PAMC results. This year, only five were reported. Last year, 88 were found, but only 3 were noted in 2003. PAMC reports for the species bounce back and forth like that regularly. This year's 5 coots were all seen in different counties.

It was an interesting year for shorebirds, with notable HCs established for three of the less common species found in PA. 158 Semipalmated Plovers were noted in 21 counties, including 70 in Bedford. There were 215 Dunlin in 6 counties, including 46 in Cambria, and 141 in Erie. Short-billed Dowitcher made an excellent showing of 134 in three flocks. Tom Dick reported 50 from the wetland he's created in northwestern Bedford. Another 51 were at Presque Isle in Erie, and 33 were reported from Westmoreland.

A lone Willet was reported from Bedford. As last year, the only report of Upland Sandpiper was from Venango, but just one bird this time. Single Ruddy Turnstone reports came from Erie's Presque Isle, and Cambria's Prince Gallitzin State Park, where Rory Bower described one mixed in with a flock of 17 Dunlin. Our only Sanderlings (3) were observed by Debbie Darney, on the sandy beach of Butler's Moraine State Park. Rounding out the semirarities, 3 White-rumped Sandpipers touched down on Lancaster's Conejohela Flats. In total, 19 shorebird species were found during PAMC '05.

## Gulls and terns

Huge numbers of Laughing Gulls winter annually around the dump in Tullytown, Bucks County. If they stick around long enough to
be counted for the PAMC, they can account for a significant percentage of all birds found on the count. They stuck around this year: $15,057 \mathrm{LAGU}$ were reported from lower Bucks. These birds (plus, for accuracy's sake, one in Philadelphia) accounted for over 6\% of all birds found on the PAMC. Pretty impressive, but many PA birders (listers in particular) would trade all of them for this year's most unusual PAMC bird: while surveying Lancaster's Conejohela Flats, Bob Schutsky found an adult, breeding plumaged California Gull! This excellent gull was subsequently seen by several birders, documented with photographs, and stands as one of a scant few solid reports for the state!

Other highlights in this category include three Lesser Black-backed Gulls - two in Bucks, and, more notably, one in Erie. Tern numbers were slightly below average. The only Black Tern was found in Venango.

## Doves through nightjars

Eurasian Collared-dove (3) was reported for the third time in four years, from Shady Grove, Franklin. Compiler Donna Hocker reports that local birders noted as many as six at this location in spring 2005. The size of the local population, while certainly small, remains a mystery.

Black-billed and Yellow-billed Cuckoos were found in numbers well above average this year. Black-billed Cuckoo (159) was found in 35 counties, with high counts in Westmoreland and Indiana (18 and 14 , respectively). The max count for Yellow-billed was 42 in Bucks, where the previous PAMC high was just 11, according to compiler Diane Allison. Across the state, 350 YBCU were noted, blowing away the previous high of 213 in 2000 !

Barn Owl reports hit a new low. Five were reported from Juniata, where they remain an annual PAMC find. The only other was of a single Barn Owl in Lebanon.

PAMC participants recorded 94.5 hours of nocturnal birding. Of our three most common owls, only Barred (66) was reported in numbers above the 5 and 10-year averages (63.8 and 49, respectively). Eastern Screech and Great Horned reports were both significantly below average. There were no reports of Northern Saw-whets for the first time since 1997. Effort to find them this year is unknown, but will hopefully increase in 2006 as folks concentrate on locating Saw-whets
for Pennsylvania's $2^{\text {nd }}$ Breeding Bird Atlas.

Surprisingly, Long-eared Owl has never been reported with convincing detail on the PAMC...until now! Compiler Ramsay Koury's Cumberland report included news of two Long-eared Owls. They were found on private property; it is hoped that they were a breeding pair! Only slightly less rare, our only Short-eared Owl report this year came from Indiana.

## Swifts through swallows

The total for Ruby-throated Hummingbird was officially average. Not just sort of average, or more or less average, but exactly average. 637 were found this year, matching the species' exact five-year PAMC average. To further expound upon the theme of PAMC hummer consistency, exactly 691 RTHU were reported in both 2003 and 2004. It's nice to report on a species that's constant and dependable!

There was speculation on the PABIRDS listserv in spring 2005 that the Belted Kingfisher population may have suffered a recent decline. Belted Kingfishers are early migrants, often arriving as soon as open water is available. As such, resident numbers are probably at or near peak by mid May. This year, 208 kingfishers were found in 47 counties.

The following table shows total kingfishers per year, then kingfishers per PAMC party hour each year, followed by kingfishers as a percentage of all birds recorded on PAMC each year.

Table 4. Occurrence of Belted Kingfisher on PAMC since1996.

| Year | Total | Birds/hr | \% of all |
| :---: | :---: | :---: | :---: |
| 1996 | 165 | na | $0.079 \%$ |
| 1997 | 190 | na | $0.087 \%$ |
| 1998 | 279 | 0.1290 | $0.138 \%$ |
| 1999 | na | na | na |
| 2000 | 246 | 0.0897 | $0.121 \%$ |
| 2001 | 177 | 0.0571 | $0.085 \%$ |
| 2002 | 288 | 0.0879 | $0.111 \%$ |
| 2003 | 298 | 0.0862 | $0.103 \%$ |
| 2004 | 291 | 0.0846 | $0.115 \%$ |
| 2005 | 208 | 0.0618 | $0.084 \%$ |

Knowledge of party hours would be helpful for some of the earlier counts, but alas. So, based on PAMC observations, it seems that Belted Kingfisher numbers may have indeed been down a bit this year. The dip, however, doesn't appear to
be entirely out of step with past fluctuations (i.e. 2001 ). Geographically, they were distributed fairly evenly across the state. Top counts occurred in Lancaster (13) and Schuylkill (12).

Yellow-bellied Sapsucker was reported about half as frequently as it was last year, with 80 in 23 counties. Northern Flicker $(1,068)$ was well below its PAMC average odd for such an easily identifiable bird. Based on birds per hour (0.317), the species was at an all-time low on this year's count.

Olive-sided Flycatcher (12) was found in 11 counties. Only one Yellow-bellied Flycatcher was found, in Greene. Alder Flycatcher was found in particularly good numbers: 28 in 10 counties, including 9 in Wayne. Willow Flycatcher (212) was far above the five-year average of 76.8 per year!

Loggerhead Shrike was missed for the second straight year, but, with the exception of Franklin, PAMC participation tends to be low in the counties where it is most likely to be seen. Single shrikes were reported in '02 and '03, but it's been seven years since multiple birds have been found on the PAMC.

Two common birds were even more common on this year's count: both Red-eyed Vireo $(4,918)$, and Blue Jay $(7,800)$ set new PAMC records. Blue Jays must have been on the move that day - the total found was far above average. Not surprisingly, they were found in every county reporting.

Common Raven (215) was found in 30 counties. As in 2003, an amazing report was received from Jack Mitterer. On count day, Mr. Mitterer had 75 ravens at the feeding platform on his farm in northern Potter. Jack feeds scavengers through the colder months, which includes early May in Potter. 75 birds was far short of his seasonal max of 250 Corvus corax! 111 ravens were reported from here in 2003 .

## Chickadees through waxwings

Following an apparent recent population crash over winter 20022003 , Carolina Wren reports $(1,054)$ continued to rise. This year's bird per hour ratio was 0.313 , compared to 0.287 in 2002 , and 0.231 the previous year. Winter Wren was a new HC. Ninety were found, nearly half of which (43) were in McKean. The second highest count (9) was from Blair.

Golden-crowned Kinglet (50) tied its 1992 High Count, while Bluegray Gnatcatcher $(1,415)$ came in just under last year's HC. Nocturnal thrush counts were attempted in at least five counties, but no particularly large flights were noted.

During the week prior to the count, there was speculation on the state listserv that Cedar Waxwing numbers had been particularly low over the winter and early spring. The consensus among the group was that, while some were being seen in small numbers, CEWA seemed to have been largely absent. Let's see what the PAMC numbers were: Cedar Waxwing $(1,096)$ was found in 42 counties, at a count ratio of 0.325 birds/hour. This total is well below the five-year average (1783.4 per year and $0.587 \mathrm{birds} / \mathrm{hr}$ ), yet is more than double last year's PAMC low of just 525 birds.

## Warblers

Of the 35 warbler species reported this year, 20 were found at or above PAMC average. There were new HCs for five species, most notably Blackpoll Warbler (420), which is a late migrant. The previous HC was 319 in 2000, when the count occurred on May $13^{\text {th }}$

Reports of Prothonotary Warbler increase annually on the PAMC. This year, 18 were found in 7 counties: Berks, Bucks (4), Butler, Lancaster (8), Philadelphia, Westmoreland, and York (2). New HCs were also attained for Northern Waterthrush (198), Mourning Warbler (20), and Yellow-breasted Chat (169).

Blackburnian Warbler showed well, anchored by two great reports. In Warren, Scott Stoleson counted 59. In McKean, the next county to the east, John Fedak reported 135! More PAMC reports from this birdrich area of the state would be wonderful!

Twelve Brewster's hybrids were found in 10 counties, with no Lawrence's reported. Of the true "winged" species, both were reported at a rate below average. Blue-winged Warbler (510) was found in 42 counties, but the bird per hour ratio was only 0.152 . This same ratio, on average from 1998 to 2004 was 0.192 birds per hour. Golden-winged fared even worse. The average bird per hour ratio from 1998 to 2004 was 0.0247 , compared to 0.0145 this year. Only 36 were found in 11 counties, the lowest total in years. The highest counts came from Blair (11), Huntingdon (7), and Perry (4).

Several participants were surprised to have blanked on Nashville Warbler this year. The species was certainly scarce on count day. Only 136 were found, far below average, and less than half of last year's total! The only double-digit counts were from Luzerne (19), Allegheny (18), and Schuylkill (10).

## Tanagers through cardinal

No Summer Tanagers were found, only the fourth miss in count history, but the third miss since 2000. Scarlet Tanager $(1,956)$ did well, however, with it's second highest showing ever.

Clay-colored Sparrow seems to be annual in Erie, where two were found. Vesper (40), Savannah (162) and Grasshopper Sparrow (149) were all reported well below average. In fact, the former two were each reported at an eleven-year low. Grasshopper Sparrow, anchored by 27 in Franklin, was at it's lowest total since 1997.

Blue Grosbeak (7) was seen in five counties, and Dickcissel (1) was found in Westmoreland.

## Blackbirds through finches

Record counts were attained for Rusty Blackbird (110), Orchard Oriole (450) and Baltimore Oriole $(3,899)$. Rusties were in six counties, including 89 in Erie, and 16 in Wyoming.

House Finch $(1,622)$ declined for the fourth consecutive year. Similarly, there were "only" 4,198 House Sparrows reported this year, resulting in the lowest bird per hour ratio ( 1.276 / hr) of all years where such data are available!

One of the more unexpected reports this year came from Robert Bailey, who had two Common Redpolls at his feeders near Blackwell in southeastern Tioga. Robert had noted redpolls in April, as well as over the winter. This is the fifth PAMC report of the species, and the first since 2001.

## The PAMC Future

The Pennsylvania Migration Count is at an interesting point in its existence. After many years of steady growth, participation seems to have leveled out. Compared to 2004, the number of participants was lower this year, yet field hours were nearly equivalent. It seems that those birders who remain dedicated to the count are more involved than ever, which is fantastic!

It has been noted that some former NAMC (with an 'N')
participants have embraced the fact that our PAMC is no longer part of a continent-wide effort as a reason to bail out. Such reaction seemed inevitable to some degree; fortunately, the fall-out has been limited, at least so far! Still, a few points for the consideration of those who may have been thusly influenced:

Full NAMC reports were never made available. No one knows where the information is or if it even exists. Pennsylvania's results, on the other hand, have been kept faithfully and published annually since 1992!

Outside of Pennsylvania, effort for the former NAMC was lame, to put it bluntly. While interesting, the concept of lumping Pennsylvania's migration count data with random bits of data from Michigan and Nova Scotia and Arizona never really made a whole lot of sense anyway. Perhaps it was a bold idea, ahead of its time.

Information of this sort is of the greatest significance at a local level! It seems kind of silly to abandon a perfectly valid and thriving state bird count due to the fact that other states aren't doing it too. But - to each his or her own...

As state compiler for the PAMC, I'm deeply grateful to all who've stuck with the count through the transition, and would encourage anyone who jumped ship to re-think the issue. To my knowledge, no count of this scale occurs anywhere else in the country at this time of year. As with any census, critics may find plenty of faults with the survey methods, but over the years, the data that we collect on the second Saturday of May establish a pretty good picture of the shape of spring birdlife in the state. While PAMC participation has come to rival that of our Christmas Bird Counts, it can only be hoped that our spring count will prove to be as long-lived!

## Summary

As I read reports from some of the more remote locations within our state, I'm often amazed to be reminded of the numbers of what many have come to regard as 'unusual' species that occur in Pennsylvania's wild places! Reports from the northern tier counties can be particularly intriguing. Reports are rarely, if ever, received from certain high plateau counties (Forest, Jefferson, Elk, Cameron), or from those in the Pocono region (Pike, Monroe, Carbon, etc). It has been suggested that individuals or
bird clubs might take an interest in doing a little traveling on count day. This would be a welcomed effort! A truly solid PAMC report from a place like Cameron or Pike would be well worth an occasional birder exodus from one or two more established counties. A bird club trip of this sort might raise the interest of new (or bored) participants, and would definitely result in some neat sightings!

Again... many thanks to all who helped out with the count this year! The accumulated information is certainly of value!

Please note that next year's PAMC will take place on Saturday, 13 May, 2006. Please reserve the date!

Appendix. List of coordinators
Many thanks to the following people for making the PAMC possible. For contact info for the following PAMC county compilers / participants, please contact the state coordinator.

Adams - Peter Robinson
Allegheny - Carol and Fred McCullough
Armstrong - Margaret Higbee

Bedford - Ron Kidd
Berks - Matt Wlasniewski
Blair - Stan Kotala
Bradford - Trudy Gerlach
Bucks - Diane Allison
Butler - Gene Wilhelm
Cambria - Dave Gobert
Carbon -Rich and Barbara Rehrig
Centre - Bob Snyder
Chester - Martin Page
Clarion - Margaret Buckwalter
Clearfield - Steve Belin
Clinton - Wayne Laubscher
Crawford - Marvin Byler
Cumberland - Ramsay Koury
Dauphin - Jan Getgood, Carl and Nancy Juris
Delaware - Jim Lockyer
Erie - Ben Coulter
Forest - Flo McGuire
Franklin - Donna Hocker
Fulton - Dan Snell, Regina Reeder
Greene - Kathy Kern
Huntingdon-Doug Wentzel
Indiana - Margaret Higbee
Juniata - Elmer Petersheim, Linda Whitesel, Chad Kaufman
Lackawanna - Michael Carey
Lancaster - Bruce Carl
Lawrence - Linda Wagner
Lebanon - Randy Miller
Lehigh - Jon Levin

Luzerne - Jim Shoemaker
Lycoming - Dave Ferry
McKean - John Fedak
Mercer - Neil Troyer
Mifflin - Jesse Swarey, Margaret Kenepp, Jay Zook
Montgomery - Bill Etter
Montour - Jon D. Beam
Northampton - Michael Schall
Northumberland - Deuane Hoffman
Perry - Mickey Wesler
Philadelphia - Doris McGovern
Schuylkill - Mike Ward
Snyder - Mick and Donna Brown
Tioga - Ann Vayansky
Venango - Russ States
Washington - Amy Taracido
Wayne - Voni and Joe Strasser
Westmoreland - Dick Byers
Wyoming - Bill Reid
York - Randy Phillips

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## Answer to Photo Quiz \#8 Rick Wiltraut



Some species of small shorebirds (or "peeps" as they are collectively called) are notoriously difficult for many birders to identify, even when they get a "good" look. Aging these birds can be even more problematic. Most of these birds belong to the genus Calidris. There are several field marks that can help identify this group of shorebirds including bill shape and length and body proportions. Habitat and foraging techniques can also be useful in their identification as well. One identification mark, which can be useful in separating species in this group, is leg color.

All Calidris sandpipers that occur in North America have dark legs except for three species of stints (Temminck's, Long-toed, and Least Sandpiper), Pectoral Sandpiper and the very similar Sharp-tailed Sandpiper, the "rock" sandpipers (Purple and Rock), Red Knot, and Great Knot. These species have yellowish or greenish-yellow legs.

This bird appears to have dark legs. Also notice that as this bird stretches, it exhibits very long wings. Among Calidris species with dark legs, two species, the Baird's Sandpiper and White-rumped Sandpiper, have noticeably long wings, which at rest, extend beyond the tip of the tail and are very useful their identification. Notice this bird has a dark center through the tail which rules out White-rumped Sandpiper.

This Baird's Sandpiper was photographed on the beach at Bald Eagle State Park, Centre County.

| PENNSYLVANIA MIGRATION COUNT May 14, 2005 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | ADAM | ALLE | ARMS | BEDF | BERK | BLAI | BRAD | BUCK | BUTL | CAMB | CARB | CENT | CHES | CLAR | CLEA | CLIN | CRAW | CUMB |
| Snow Goose |  |  |  |  | 30 |  |  |  |  |  |  | 1 |  |  |  |  |  |  |
| Canada Goose | 32 | 205 | 28 | 233 | 629 | 68 | 164 | 923 | 165 | 55 | 23 | 144 | 254 | 15 | 26 | 30 | 79 | 182 |
| Mute Swan |  |  |  | 1 | 10 |  |  | 49 |  |  |  |  | 9 |  |  |  |  |  |
| Tundra Swan |  |  |  | 4 |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 |
| Wood Duck | 3 | 8 |  | 52 | 60 | 21 | 44 | 75 | 59 | 24 |  | 4 | 47 | 2 | 2 |  | 18 | 53 |
| Gadwall |  |  |  |  |  |  |  |  | 1 |  |  |  |  |  |  |  |  |  |
| American Black Duck |  |  |  |  |  |  |  | 2 | 1 |  |  | 7 |  |  |  |  |  |  |
| Mallard | 12 | 87 | 13 | 62 | 180 | 17 | 29 | 332 | 18 | 7 | 3 | 67 | 79 | 2 | 60 | 7 | 7 | 107 |
| Blue-winged Teal |  | 1 |  | 6 |  |  |  |  | 4 |  |  |  | 1 |  |  |  |  |  |
| Green-winged Teal |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ring-necked Duck |  | 2 |  |  |  |  |  |  | 2 |  |  |  |  |  |  |  |  |  |
| Lesser Scaup |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| scaup sp. |  |  |  |  |  |  |  |  |  |  |  |  | 3 |  |  |  |  |  |
| Bufflehead | - | - | - | - | - |  | - | - | 3 | 4 |  |  |  |  |  |  |  |  |
| Common Goldeneye |  |  |  |  | - |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hooded Merganser |  |  | - | - |  |  |  |  | 5 |  |  |  |  |  |  |  |  |  |
| Common Merganser |  |  |  |  | 1 |  | 19 | 2 | 6 |  | 9 |  |  | 14 |  |  |  |  |
| Red-breasted Merganser |  |  |  |  |  |  |  |  |  | 1 |  |  |  |  |  |  |  |  |
| Ruddy Duck |  |  |  |  |  |  |  |  | 19 |  |  |  | 1 |  |  |  |  |  |
| Ring-necked Pheasant |  | 1 | 2 | 10 | 1 | 12 |  |  | 3 |  |  | 3 | 3 |  |  |  | 1 | 2 |
| Ruffed Grouse |  |  |  | 4 | 1 | 8 | 2 |  | 1 |  |  |  |  | 1 | 6 | 1 |  |  |
| Wild Turkey |  | 58 | 30 | 16 | 37 | 29 | 7 | 36 | 7 | 10 |  | 1 |  | 15 | 3 |  |  | 13 |
| Northern Bobwhite |  |  |  |  |  |  |  |  |  |  |  | 1 |  | 1 |  |  |  |  |
| Red-throated Loon |  |  |  |  | 1 |  |  |  |  | 13 |  |  |  |  |  |  |  |  |
| Common Loon |  |  |  | 1 | 2 | 2 | 2 | 1 | 1 | 9 | 3 |  | 6 |  |  |  |  | 2 |
| Pied-billed Grebe |  |  |  |  | 6 |  |  | 1 |  |  |  |  |  |  |  |  |  | 1 |
| Double-crested Cormorant |  |  |  | 2 | 36 |  |  | 274 | 8 |  |  | 1 | 24 |  |  |  |  | 1 |
| Great Cormorant |  |  |  |  |  |  |  | 2 |  |  |  |  |  |  |  |  |  |  |
| American Bittern |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Least Bittern |  |  |  |  | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Great Blue Heron | 5 | 24 |  | 14 | 17 | 4 | 13 | 59 | 10 | 5 |  | 3 | 12 |  | 5 | 3 | 3 | 12 |
| Great Egret |  |  |  | 4 |  |  |  | 1 | 1 |  |  |  | 4 |  |  |  |  | 2 |
| Green Heron | 2 | 5 | 1 | 10 | 6 | 4 | 1 | 15 | 4 | 2 | 1 | 3 | 7 |  |  | 2 | 2 | 5 |
| Black-crowned Night-Heron |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 8 |
| Black Vulture | 5 |  |  | 1 | 2 |  |  | 16 |  |  |  |  | 17 |  |  |  |  | 3 |
| Turkey Vulture | 10 | 11 |  | 94 | 119 | 26 | 31 | 166 | 12 | 9 | 7 | 10 | 102 | 19 | 11 | 4 | 2 | 55 |
| Osprey |  |  |  | 4 | 2 | 2 | 2 | 22 | 9 | 1 |  |  | 5 |  |  |  |  | 2 |
| Mississippi Kite |  |  |  |  |  |  |  | 1 |  |  |  |  |  |  |  |  |  |  |
| Bald Eagle |  |  |  | 1 | 5 |  | 3 | 3 | 2 |  |  | 3 | 3 |  |  |  |  |  |

PENNSYLVANIA BIRDS

| PENNSYLVANIA MIGRATION COUNT May 14, 2005 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | ADAM | ALLE | ARMS | BEDF | BERK | BLAI | BRAD | BUCK | BUTL | CAMB | CARB | CENT | CHES | CLAR | CLEA | CLIN | CRAW | CUMB |
| Bonaparte's Gull |  |  |  | 1 |  | 1 |  |  | 11 | 1 |  |  |  |  |  |  |  |  |
| Ring-billed Gull |  | 5 |  | 1 | 7 |  | 6 | 48 | 17 | 3 |  |  |  | 1 |  | 1 |  |  |
| California Gull |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Herring Gull |  | 13 |  | 1 |  |  |  | 420 |  |  |  |  |  |  |  |  |  |  |
| Lesser Black-backed Gull |  |  |  |  |  |  |  | 2 |  |  |  |  |  |  |  |  |  |  |
| Great Black-backed Gull |  |  |  |  |  |  |  | 8 |  |  |  |  |  |  |  |  |  |  |
| gull sp. |  | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Caspian Tern |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Common Tern |  |  |  |  |  |  | - |  | 2 |  |  |  |  |  |  |  |  |  |
| Forster's Tern |  |  |  | 1 |  |  |  |  | 3 | 18 |  |  |  |  |  |  |  |  |
| Black Tern |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Rock Pigeon |  | 23 | 35 | 40 | 79 | 76 | 75 | 108 | 176 | 2 | 2 | 39 | 52 | 4 | 4 | 21 | 9 | 77 |
| Eurasian Collared-Dove |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mourning Dove | 20 | 120 | 25 | 147 | 207 | 22 | 111 | 394 | 35 | 120 | 16 | 58 | 131 | 26 | 59 | 40 | 19 | 105 |
| Black-billed Cuckoo |  | 9 |  | 7 | 2 |  | 1 | 3 | 6 |  |  |  | 5 | 4 |  |  | 2 | 2 |
| Yellow-billed Cuckoo | 1 | 15 |  | 10 | 25 | 4 | 1 | 42 | 8 |  | - | 1 | 9 |  |  |  |  | 15 |
| Barn Owl |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern Screech-Owl |  | 2 |  | 4 | 8 | 2 |  | 3 | 1 |  |  |  | 5 |  |  |  |  |  |
| Great Horned Owl |  |  |  | 2 | 4 | 1 |  | 1 | 4 | 1 |  |  | 3 |  | 1 |  |  |  |
| Barred OwI |  |  |  |  | 1 | 4 |  |  | 2 | 1 |  |  | 3 |  |  |  |  | 4 |
| Long-eared Owl |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Short-eared Owl |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Common Nighthawk |  | 6 |  | 3 | 11 | 6 |  | 7 |  |  |  |  |  |  |  |  |  |  |
| Whip-poor-will |  |  |  | 6 |  | 5 | - |  |  |  |  |  |  |  |  | 3 |  |  |
| Chimney Swift | 16 | 182 | 23 | 76 | 146 | 26 | 28 | 129 | 103 | 40 | 12 | 46 | 87 | 61 | 9 | 13 | 2 | 51 |
| Ruby-throated Hummingbird | 2 | 8 | 4 | 99 | 21 | 12 | 9 | 13 | 9 | 21 | 1 | 4 | 9 | 5 | 7 | 11 | 1 | 10 |
| Belted Kingfisher | 1 | 2 | 1 | 11 | 12 | 9 | 5 | 8 | 4 | 1 |  | 1 | 7 |  |  | 1 | 1 | 4 |
| Red-headed W oodpecker |  |  |  | 7 | 2 |  | 1 | 2 | 4 |  |  |  |  |  | 1 |  | 2 | 2 |
| Red-bellied Woodpecker | 9 | 69 | 6 | 29 | 87 | 21 | 17 | 175 | 15 | 11 | 1 | 12 | 78 | 2 | 2 | 7 | 3 | 56 |
| Yellow-bellied Sapsucker |  |  |  | 2 |  |  | 8 |  | 2 | 3 |  |  |  |  |  |  | 1 |  |
| Downy W oodpecker | 4 | 31 | 4 | 43 | 51 | 18 | 18 | 57 | 15 | 15 | 5 | 6 | 30 | 6 | 3 | 8 | 6 | 21 |
| Hairy W oodpecker |  | 11 |  | 11 | 17 | 6 | 8 | 17 | 8 | 4 |  | 1 | 4 | 3 | 3 | 6 | 3 | 2 |
| Northern Flicker | 1 | 40 | 4 | 36 | 43 | 11 | 18 | 69 | 10 | 11 | 4 | 16 | 45 | 16 | 8 | 7 | 4 | 32 |
| Pileated W oodpecker | 1 | 21 |  | 18 | 11 | 12 | 10 | 7 | 7 | 6 | 1 | 10 | 8 | 3 | 3 | 4 | 1 | 13 |
| Olive-sided Flycatcher |  | 2 |  |  |  |  |  | 1 | 1 |  |  |  |  |  |  |  |  |  |
| Eastern Wood-Pewee | 6 | 14 |  | 3 | 29 | 16 | 2 | 20 | 8 | 3 | 1 | 2 | 28 | 1 |  |  |  | 15 |
| Yellow-bellied Flycatcher |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Acadian Flycatcher | 4 | 29 |  |  | 5 | 16 |  | 3 | 10 | 2 |  |  | 14 | 1 |  |  |  | 2 |
| Alder Flycatcher |  | 3 |  |  |  | 2 |  |  | 5 |  |  |  |  |  |  |  |  |  |



| PENNSYLVANIA MIGRATION COUNT May 14, 2005 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | ADAM | ALLE | ARMS | BEDF | BERK | BLAI | BRAD | BUCK | BUTL | CAMB | CARB | CENT | CHES | CLAR | CLEA | CLIN | CRAW | CUMB |
| Eastern Bluebird | 8 | 34 | 12 | 43 | 48 | 61 | 16 | 72 | 5 | 21 | 4 | 14 | 62 | 11 | 7 | 11 | 11 | 48 |
| Veery | 2 | 9 |  |  | 37 |  | 5 | 67 | 7 | 5 | 1 | 1 | 56 | 3 | 2 | 1 | 3 |  |
| Gray-cheeked Thrush |  | 2 |  |  | 1 |  |  | 2 | 1 |  |  |  |  |  |  |  |  |  |
| Swainson's Thrush | 1 | 20 |  |  | 10 |  |  | 22 | 4 |  |  | 1 | 3 | 1 |  | 1 |  |  |
| Hermit Thrush |  | 1 |  |  | 3 |  | 7 | 2 | 1 | 7 |  |  |  |  |  | 7 |  |  |
| Wood Thrush | 20 | 136 | 9 | 34 | 218 | 44 | 41 | 257 | 23 | 16 | 3 | 36 | 143 | 38 | 11 | 33 | 19 | 83 |
| thrush sp. |  | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| American Robin | 76 | 694 | 66 | 365 | 784 | 108 | 244 | 1402 | 128 | 157 | 40 | 215 | 320 | 99 | 64 | 184 | 85 | 324 |
| Gray Catbird | 24 | 116 | 9 | 65 | 507 | 66 | 58 | 862 | 17 | 37 | 90 | 115 | 389 | 40 | 17 | 49 | 32 | 182 |
| Northern Mocking bird | 14 | 33 |  | 17 | 57 | 13 | 3 | 78 | 3 |  | 2 | 8 | 57 |  |  | 1 | 4 | 33 |
| Brown Thrasher | 2 | 16 |  | 26 | 16 | 12 | 6 | 7 | 10 | 9 | 6 | 8 | 17 | 11 |  | 4 |  | 16 |
| European Starling | 35 | 277 | 17 | 302 | 531 | 166 | 145 | 756 | 106 | 71 | 17 | 138 | 205 | 53 | 48 | 84 | 19 | 251 |
| American Pipit |  |  |  |  |  |  |  |  |  |  |  | 1 | 1 |  |  |  |  |  |
| Cedar Waxwing | 25 | 41 |  | 29 | 32 | 9 | 2 | 63 | 19 | 12 |  | 5 | 9 | 2 | 2 | 8 |  | 152 |
| Blue-winged W arbler | 1 | 19 |  | 2 | 26 |  | 3 | 46 | 16 |  | 1 |  | 26 | 4 |  |  | 3 | 12 |
| Golden-winged W arbler |  |  |  | 3 |  | 11 |  |  |  |  |  |  |  | 1 |  |  |  |  |
| Brewster's Warbler |  | 1 |  |  |  |  | 1 |  |  |  |  |  |  |  |  |  |  |  |
| Tennessee W arbler |  | 22 |  | 1 |  | 7 |  | 1 | 47 |  |  |  |  | 1 |  |  | 2 |  |
| Orange-crowned W arbler |  |  |  |  |  |  |  |  | 2 |  |  |  |  |  |  |  |  |  |
| Nashville W arbler | 1 | 18 |  |  | 4 | 2 |  |  | 3 |  |  |  | 3 |  |  |  |  | 3 |
| Northern Parula | 2 | 4 |  | 4 | 33 | 2 | 1 | 55 | 1 |  | 2 | 2 | 25 | 1 |  | 9 |  | 8 |
| Yellow W arbler | 11 | 149 | 2 | 35 | 106 | 24 | 112 | 360 | 44 | 39 | 23 | 84 | 145 | 47 | 4 | 53 | 32 | 59 |
| Chestnut-sided W arbler |  | 36 |  | 11 | 15 | 6 | 24 | 12 | 18 | 32 |  | 31 | 14 | 20 | 4 | 9 | 3 | 20 |
| Magnolia Warbler | 1 | 61 |  | 2 | 9 | 18 | 1 | 25 | 10 | 6 | 1 | 5 | 5 | 4 | 2 | 1 | 2 | 11 |
| Cape May W arbler |  | 1 |  |  |  |  |  |  | 4 |  |  |  |  |  |  |  |  |  |
| Black-throated Blue W arbler | 1 | 20 |  | 10 | 25 |  | 3 | 63 | 2 | 2 |  | 6 | 18 | 2 |  | 5 | 1 | 7 |
| Yellow-rumped W arbler | 6 | 52 |  | 5 | 58 | 12 | 19 | 107 | 8 | 8 | 1 | 6 | 24 | 2 |  | 4 | 4 | 14 |
| Black-throated Green W arbler |  | 33 |  | 11 | 30 | 37 | 28 | 17 | 12 | 19 | 5 | 28 | 8 | 19 |  | 20 |  | 15 |
| Blackburnian W arbler |  | 33 |  | 5 | 6 | 14 | 2 | 6 | 10 |  |  | 6 |  |  |  | 6 |  | 7 |
| Yellow-throated W arbler | 1 | 4 |  |  |  |  |  |  | 3 |  |  |  |  |  |  |  |  |  |
| Pine W arbler |  |  |  | 1 | 6 |  |  | 4 |  |  | 1 |  |  |  |  |  |  | 6 |
| Prairie W arbler | 1 | 6 |  |  | 8 |  | 3 | 64 | 3 |  | 18 | 1 | 12 |  | 1 |  |  | 10 |
| Palm Warbler |  |  |  |  | 1 |  |  |  | 1 |  |  |  |  |  |  |  |  |  |
| Bay-breasted W arbler |  | 18 |  |  | 2 | 8 |  | 3 | 6 |  |  |  |  | 2 |  |  |  | 1 |
| Blackpoll W arbler | 7 | 7 |  | 9 | 16 | 5 |  | 86 | 4 |  |  | 1 | 18 | 1 |  |  |  | 22 |
| Cerulean W arbler |  | 11 |  | 1 | 2 | 14 |  |  | 10 |  |  | 1 |  | 7 |  | 1 |  | 2 |
| Black-and-white W arbler |  | 29 |  | 12 | 60 | 12 | 3 | 47 | 22 | 2 | 9 | 4 | 7 |  | 3 | 8 |  | 7 |
| American Redstart | 9 | 55 |  | 15 | 67 | 37 | 27 | 129 | 25 | 10 | 5 | 7 | 42 | 13 | 1 | 28 | 5 | 22 |
| Prothonotary W arbler |  |  |  |  | 1 |  |  | 4 | 1 |  |  |  |  |  |  |  |  |  |


| SSYLVANIA BIRDS |  |  |  |  |  |  |  |  | 94 |  |  |  |  |  |  | 200 | - VOL | ME 1 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| PENNSYLVANIA MIGRATION COUNT May 14, 2005 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | ADAM | ALLE | ARMS | BEDF | BERK | BLAI | BRAD | BUCK | BUTL | CAMB | CARB | CENT | CHES | CLAR | CLEA | CLIN | CRAW | CUMB |
| W orm-eating W arbler |  | 2 |  | 6 | 23 |  |  | 11 | 1 |  | 1 | 6 |  |  |  |  |  | 3 |
| Ovenbird | 6 | 21 |  | 41 | 215 | 48 | 50 | 207 | 36 | 47 | 16 | 34 | 91 | 20 | 16 | 20 | 1 | 41 |
| Northern W aterthrush | 4 |  |  |  | 10 |  | 1 | 33 | 10 |  | 1 | 5 | 8 |  |  |  |  | 2 |
| Louisiana W aterthrush | 6 | 9 |  |  | 20 | 14 | 3 | 12 | 2 |  |  | 1 | 9 |  |  | 3 |  | 1 |
| Kentucky W arbler |  | 12 |  | 5 | 1 |  |  | 2 | 4 |  |  |  | 3 |  |  |  |  | 3 |
| Mourning Warbler | , | - | - |  |  | - | - | 1 | 1 | - |  | - |  |  |  |  |  | 1 |
| Common Yellowthroat | 8 | 46 | 2 | 99 | 134 | 49 | 49 | 329 | 42 | 38 | 24 | 93 | 164 | 61 | 3 | 38 | 43 | 56 |
| Hooded W arbler |  | 66 | 2 |  | 29 |  | - | 3 | 16 | 3 |  | 4 |  | 18 |  | 6 | 6 | 22 |
| W ilson's W arbler |  | 1 |  |  | 2 | - | - |  | 2 |  | 1 |  |  | 1 |  |  |  | 3 |
| Canada W arbler |  | 5 |  | 1 | 3 | - | 2 | 5 |  | 2 | 1 |  | 1 |  |  |  |  | 1 |
| Yellow-breasted Chat |  | 8 |  | 2 | 8 | 2 |  | 5 | 1 |  |  | 4 | 7 | 1 |  |  |  | 11 |
| Scarlet Tanager | 7 | 116 |  | 46 | 83 | 46 | 18 | 86 | 16 | 18 | 2 | 17 | 49 | 19 | 6 | 14 | 5 | 27 |
| Eastern Towhee | 21 | 218 | 9 | 127 | 103 | 57 | 25 | 126 | 36 | 52 | 10 | 97 | 101 | 42 | 21 | 25 | 5 | 66 |
| American Tree Sparrow |  |  |  | 2 |  |  |  |  | 1 |  |  |  |  |  | 1 |  |  |  |
| Chipping Sparrow | 23 | 110 | 14 | 81 | 144 | 84 | 67 | 107 | 117 | 106 | 24 | 68 | 68 | 43 | 13 | 53 | 22 | 79 |
| Clay-colored Sparrow |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Field Sparrow | 13 | 67 |  | 27 | 49 | 47 | 25 | 42 | 24 | 16 | 7 | 38 | 30 | 13 | 8 | 6 | 25 | 27 |
| Vesper Sparrow |  | 3 |  |  |  |  |  |  | 1 | 3 |  |  |  |  |  |  |  |  |
| Savannah Sparrow |  | 4 |  | 3 | 1 |  | 2 | 7 | 20 | 2 |  | 2 | 1 | 3 |  |  |  |  |
| Grasshopper Sparrow |  | 6 | - | 1 | 1 |  | 2 | 4 | 10 | 1 | 2 | 1 | 4 | 6 |  | 2 |  | 11 |
| Henslow's Sparrow |  | 2 |  |  |  |  |  |  | 2 | 1 |  |  |  | 9 |  |  |  |  |
| Fox Sparrow |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 |  |
| Song Sparrow | 15 | 207 | 2 | 46 | 143 | 88 | 129 | 232 | 35 | 23 | 30 | 44 | 161 | 36 | 21 | 60 | 27 | 107 |
| Lincoln's Sparrow |  | 1 |  |  |  |  |  |  | 1 |  |  |  |  |  |  |  |  |  |
| Swamp Sparrow |  |  |  | 14 | 1 | 28 | 4 | 38 | 14 | 2 |  | 4 | 10 | 5 |  |  | 6 |  |
| W hite-throated Sparrow | 9 | 11 |  | 7 | 13 | 21 | 3 | 7 | 3 | 4 |  | 1 | 11 |  |  | 5 | 1 | 17 |
| White-crowned Sparrow | 1 | 13 |  | 15 | 3 | 12 | 5 | 2 | 16 | 3 | 1 | 3 |  |  |  | 4 | 1 | 2 |
| Dark-eyed Junco |  |  |  | 1 | 2 | 2 | 16 | 2 |  | 8 |  | 3 |  | 7 |  | 1 | 1 |  |
| Northern Cardinal | 34 | 363 | 20 | 126 | 241 | 61 | 67 | 410 | 63 | 33 | 20 | 89 | 199 | 31 | 20 | 29 | 27 | 43 |
| Rose-breasted Grosbeak | 4 | 46 | 11 | 28 | 23 | 19 | 36 | 43 | 25 | 32 | 2 | 7 | 12 | 23 | 8 | 8 | 10 | 6 |
| Blue Grosbeak |  |  |  |  |  |  |  | 1 |  |  |  |  |  |  |  |  |  |  |
| Indigo Bunting | 2 | 82 | 3 | 36 | 151 | 31 | 10 | 41 | 13 | 20 | 1 | 16 | 40 | 10 | 3 | 8 | 5 | 67 |
| Dickcissel |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Bobolink |  | 3 |  | 18 | 16 |  | 64 | 84 | 9 | 6 | 6 |  | 117 | 55 |  |  | 11 | 9 |
| Red-winged Blackbird | 16 | 295 | 48 | 185 | 280 | 56 | 312 | 820 | 125 | 223 | 67 | 136 | 315 | 141 | 39 | 45 | 185 | 174 |
| Eastern Meadowlark | 3 | 5 |  | 22 | 7 | 20 | 14 | 8 | 16 | 8 | 8 | 2 | 35 | 11 | 3 |  | 3 | 20 |
| Rusty Blackbird |  |  |  |  |  |  | 1 | 1 |  |  |  |  |  |  |  |  |  |  |
| Common Grackle | 32 | 193 | 71 | 200 | 613 | 101 | 207 | 569 | 135 | 61 | 20 | 150 | 192 | 15 | 70 | 253 | 21 | 409 |
| Brown-headed Cowbird | 11 | 76 |  | 92 | 105 | 21 | 19 | 247 | 24 | 54 | 9 | 7 | 61 | 2 | 7 | 18 | 6 | 57 |


| PENNSYLVANIA MIGRATION COUNT May 14, 2005 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | ADAM | ALLE | ARMS | BEDF | BERK | BLAI | BRAD | BUCK | BUTL | CAMB | CARB | CENT | CHES | CLAR | CLEA | CLIN | CRAW | CUMB |
| blackbird sp. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Orchard Oriole |  | 28 |  | 9 | 22 |  |  | 38 | 10 |  | 1 | 35 | 25 |  |  |  |  | 6 |
| Baltimore Oriole | 17 | 152 | 9 | 91 | 200 | 44 | 87 | 300 | 21 | 35 | 18 |  | 164 | 17 | 7 | 16 | 24 | 119 |
| Purple Finch |  |  | 2 | 29 | 7 | 7 | 14 |  | 13 | 1 |  |  |  | 15 | 4 |  | 3 |  |
| House Finch | 22 | 50 | 6 | 43 | 56 | 46 | 44 | 114 | 26 | 8 | 4 | 26 | 43 |  | 12 | 17 | 5 | 78 |
| Common Redpoll |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Pine Siskin |  |  |  |  |  |  |  |  |  | 3 |  | 1 |  |  | 2 | 3 |  |  |
| American Goldfinch | 39 | 201 | 15 | 96 | 228 | 70 | 111 | 285 | 44 | 56 | 16 | 43 | 105 | 31 | 37 | 52 | 21 | 77 |
| House Sparrow | 5 | 102 | 5 | 101 | 153 | 105 | 94 | 229 | 108 | 36 | 11 | 45 | 56 | 10 | 10 | 41 | 5 | 92 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Total birds | 922 | 6859 | 628 | 4908 | 10059 | 2788 | 3610 | 31177 | 3222 | 2592 | 952 | 2850 | 6418 | 1542 | 855 | 1819 | 1145 | 4913 |
| Total species | 96 | 139 | 46 | 141 | 152 | 113 | 114 | 152 | 160 | 116 | 79 | 119 | 126 | 93 | 71 | 89 | 81 | 128 |
| Total participants | 15 | 54 | 6 | 36 | 36 | 17 | 25 | 61 | 10 | 19 | 3 | 7 | 25 | 5 | 9 | 7 | 3 | 18 |
| Subtotal - feeder watchers | 0 |  | 3 | 19 | 3 | 0 | 2 | 0 | 1 | 6 | 0 |  | 0 |  | 3 | 1 |  | 0 |
| Subtotal - nocturnal | 1 |  | 0 | 4 | 3 | 4 | 2 | 6 | 1 | 2 |  |  | 2 |  | 0 | 2 |  | 0 |
| Total Hours | 36.5 | 139 | 18.5 | 183.5 | 141 | 40 | 96.05 | 188.5 | 25 | 74.5 | 5.5 | 42.25 | 82 | 25 | 32.5 | 32.5 | 10 | 66 |
| Subtotal - feeder | 0 | 5.5 | 6.5 | 37 | 12 | 4 | 0.14 |  | 1 | 29.5 |  |  | 0 | 4 | 11 | 8 |  | 0 |
| Subtotal - nocturnal | 1 | 0.5 |  | 5 | 5 | 4 | 6 | 4 | 1 | 2 |  |  | 3 |  | 0 | 1 |  | 0 |
| Hours/observer | 2.43 | 2.57 | 3.08 | 5.10 | 3.92 | 2.35 | 3.84 | 3.09 | 2.50 | 3.92 | 1.83 | 6.04 | 3.28 | 5.00 | 3.61 | 4.64 | 3.33 | 3.67 |
| Miles foot, approx: | 7 | 75.5 | 4 | 67.5 | 42 | 60 | 36.25 | 94 | 3 | 21 | 2 | 17 | 44 | 5.5 | 4.5 | 10 | 5.5 | 23 |
| Miles car, other: | 31 | 165 | 20 | 186.5 | 266 | 100 | 291.70 | 318 | 172 | 128 | 28 | 151.5 | 173 | 74 | 33 | 55 | 21 | 378 |
| Total miles: | 38 | 240.5 | 24 | 254 | 308 | 160 | 327.95 | 412 | 175 | 149 | 30 | 168.5 | 217 | 79.5 | 37.5 | 65 | 26.5 | 401 |


| PENNSYLVANIA MIGRATION COUNT May 14, 2005 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | DAUP | DELA | ERIE | FORE | FRAN | FULT | GREE | HUNT | INDI | JUNI | LACK | LANC | LEBA | LEHI | LUZE | LYCO | McKE | MERC |
| Merlin |  |  | 2 |  |  |  |  |  | 1 |  |  |  |  |  |  |  |  |  |
| Peregrine Falcon |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 4 |  |  |  |
| Virginia Rail |  |  | 1 |  |  |  |  |  |  |  |  | 1 |  |  | 2 |  | 6 | 3 |
| Sora |  |  | 1 |  |  |  |  |  |  |  |  | 1 |  |  | 1 |  | 7 | 1 |
| Common Moorhen |  |  | 3 |  |  |  |  |  |  |  |  | 1 |  |  |  |  |  | 2 |
| American Coot |  |  |  |  | - |  |  |  | 1 | 1 |  |  |  |  |  |  |  |  |
| Sandhill Crane |  |  |  |  | - |  |  |  |  |  |  |  |  |  | 2 |  |  |  |
| Semipalmated Plover | 4 |  | 1 |  | 16 |  | 10 |  | 3 |  | 3 | 15 | 7 |  | 3 |  |  |  |
| Killdeer | 16 |  | 12 | 5 | 83 | 9 | 39 | 6 | 57 | 39 | 18 | 38 | 28 | 3 | 20 | 5 | 9 | 3 |
| Greater Yellowlegs | 1 |  | 1 |  |  |  | 2 | 2 | 7 |  |  | 4 | 6 | 2 |  |  | 1 |  |
| Lesser Yellowlegs | 4 |  | 3 | 5 |  | 3 | 4 |  | 2 |  | 3 | 14 | 6 | 1 | 4 |  |  | 2 |
| Solitary Sandpiper | 11 |  | 1 |  | 24 | 1 | 3 | 2 | 9 | 45 | 37 | 39 | 26 | 1 | 37 | 5 | 3 | 1 |
| W illet |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Spotted Sandpiper | 13 | 3 | 13 | 3 | 19 | 1 | 7 | 5 | 29 | 166 | 12 | 66 | 6 | 8 | 12 | 9 | 7 | 2 |
| Upland Sandpiper |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ruddy Turnstone |  |  | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Sanderling |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Semipalmated Sandpiper | 1 |  | 3 |  | 1 |  |  |  | 3 |  | 1 | 1 | 6 |  | 2 |  |  |  |
| Least Sandpiper | 25 |  | 4 | 10 | 16 |  | 4 | 8 | 5 |  | 44 | 165 | 17 | 10 | 45 |  | 3 |  |
| peep sp. |  |  |  |  | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| White-rumped Sandpiper |  |  |  |  |  |  |  |  |  |  |  | 3 |  |  |  |  |  |  |
| Pectoral Sandpiper | 1 |  |  |  | 10 |  |  |  |  |  |  | 5 |  |  | 1 |  | 2 |  |
| Dunlin |  |  | 141 |  |  |  |  |  | 2 |  |  | 21 |  |  |  |  |  |  |
| Short-billed Dowitcher |  |  | 51 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Wilson's Snipe |  |  |  |  | 3 |  |  |  | 1 |  |  | 1 |  |  | 2 |  | 15 |  |
| American Woodcock |  |  | 6 |  | 1 |  |  |  | 10 | 1 | 1 | 14 | 3 |  |  |  | 15 |  |
| Laughing Gull |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Bonaparte's Gull |  |  | 2 |  |  |  |  |  |  |  |  | 12 |  |  |  |  |  |  |
| Ring-billed Gull | 65 | 5 | 400 |  |  |  |  |  | 19 | 26 |  | 2179 | 13 | 2 |  | 5 | 1 |  |
| California Gull |  |  |  |  |  |  |  |  |  |  |  | 1 |  |  |  |  |  |  |
| Herring Gull |  | 15 | 250 |  |  |  |  |  |  |  |  | 3 |  |  | 3 |  |  |  |
| Lesser Black-backed Gull |  |  | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Great Black-backed Gull |  |  | 100 |  |  |  |  |  |  |  |  | 4 |  |  |  |  |  |  |
| gull sp. |  |  |  |  |  |  |  |  |  | 1 |  |  |  |  |  |  |  |  |
| Caspian Tern |  |  | 27 |  |  |  |  |  |  |  |  | 1 |  |  |  |  |  |  |
| Common Tern |  |  | 3 |  |  |  |  |  | 23 |  |  | 2 |  |  |  |  |  |  |
| Forster's Tern |  |  | 1 |  |  |  |  |  | 1 |  |  | 1 |  |  |  |  | 1 |  |
| Black Tern |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Rock Pigeon | 36 | 14 |  | 1 | 271 | 30 | 36 | 13 | 53 | 231 | 35 | 173 | 130 | 20 | 69 | 23 | 23 | 6 |



PENNSYLVANIA BIRDS




| ENNSYLVANIA BIR |  |  |  |  |  |  |  |  |  | 108 |  |  |  |  |  |  | 05 - V | LUM | 19 N |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| PENNSYLVANIA MIGRATION COUNT May 14, 2005 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | MIFF | MONR | MONTG | NORH | PERR | PHIL | PIKE | POTT | SCHU | SNYD | SUSQ | TIOG | VENA | WARR | WASH | WAYN | WEST | WYOM | YORK |
| Swamp Sparrow |  | 2 |  | 2 |  | 13 | 3 | 1 |  |  |  | 45 | 7 | 1 |  | 8 | 7 | 10 | 1 |
| W hite-th roated Sparrow | 7 | 1 | 1 | 9 |  | 9 |  |  | 44 |  |  | 7 |  |  |  | 6 | 4 | 2 | 6 |
| W hite-crowned Sparrow | 1 |  |  | 2 |  |  |  |  | 9 |  |  | 2 | 1 | 4 |  | 2 | 8 | 10 |  |
| Dark-eyed Junco | 1 |  |  |  |  |  |  | 12 | 4 | 5 | 8 | 17 | 3 | 15 |  | 23 | 12 | 3 |  |
| Northern Cardinal | 49 | 9 | 29 | 79 | 22 | 81 |  | 2 | 193 | 18 | 2 | 45 | 22 | 16 | 14 | 42 | 375 | 80 | 133 |
| Rose-breasted Grosbeak | 9 | 4 | 2 | 14 |  | 6 |  | 2 | 44 |  | 9 | 15 | 18 | 5 | 3 | 22 | 121 | 25 | 1 |
| Blue Grosbeak |  |  |  |  |  | 2 |  |  |  |  |  |  |  |  |  |  | 1 |  | 1 |
| Indigo Bunting | 83 | 3 | 5 | 23 | 29 | 8 |  | 5 | 147 | 3 | 1 | 11 | 14 | 3 | 17 | 18 | 205 | 31 | 78 |
| Dickcissel |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 |  |  |
| Bobolink |  | 8 |  | 17 | 1 | 14 |  | 18 | 7 |  | 225 | 35 | 24 | 4 | 1 | 120 | 11 | 169 | 3 |
| Red-winged Blackbird | 121 | 23 | 5 | 126 | 9 | 241 | 13 | 127 | 475 | 40 | 115 | 271 | 150 | 22 | 68 | 617 | 968 |  | 112 |
| Eastern Meadowlark | 7 |  |  | 4 |  |  |  | 2 | 5 | 1 | 3 | 6 | 9 |  | 9 | 14 | 61 | 252 | 4 |
| Rusty Blackbird |  |  |  |  |  |  |  |  | 1 |  |  |  |  |  |  |  |  | 16 |  |
| Common Grackle | 180 | 14 | 5 | 311 | 18 | 62 | 1 | 29 | 548 | 43 | 3 | 90 | 51 | 15 | 30 | 112 | 521 |  | 201 |
| Brown-headed Cowbird | 48 | 10 | 5 | 49 | 17 | 110 | 1 | 13 | 121 | 5 | 5 | 31 | 5 | 6 |  | 40 | 129 | 182 | 95 |
| blackbird sp. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 39 |  |
| Orchard Oriole | 8 | 1 |  | 10 |  | 30 |  |  | 2 | 2 |  |  | 3 |  | 4 |  | 19 | 1 | 4 |
| Baltimore Oriole | 49 | 22 | 18 | 110 | 7 | 108 |  | 1 | 137 | 23 | 6 | 29 | 9 | 13 | 5 | 71 | 220 | 90 | 92 |
| Purple Finch |  | 5 | 2 |  |  |  |  | 5 | 9 |  | 4 | 16 | 2 | 5 |  | 37 | 1 | 3 |  |
| House Finch | 15 | 6 | 14 | 30 | 2 | 29 |  | 6 | 95 | 3 | 4 | 15 | 2 | 1 | 5 | 11 | 66 | 23 | 24 |
| Common Redpoll |  |  |  |  |  |  |  |  |  |  |  | 2 |  |  |  |  |  |  |  |
| Pine Siskin |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| American Goldfinch | 73 | 39 | 25 | 67 | 4 | 106 | 7 | 20 | 172 | 10 | 50 | 121 | 33 | 19 | 7 | 119 | 104 | 131 | 58 |
| House Sparrow | 89 | 11 | 20 | 29 | 1 | 143 |  | 17 | 378 | 19 | 16 | 37 | 28 |  | 8 | 47 | 389 | 44 | 75 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Total birds | 2610 | 928 | 680 | 3970 | 671 | 5202 | 85 | 880 | 10890 | 1005 | 1209 | 2929 | 1375 | 769 | 611 | 5839 | 12601 | 3659 | 4202 |
| Total species | 120 | 110 | 73 | 134 | 77 | 134 | 22 | 63 | 150 | 80 | 85 | 110 | 121 | 86 | 76 | 126 | 154 | 116 | 131 |
| Total participants | 16 | 11 | 3 | 11 | 3 | 20 | 1 | 1 | 39 | 3 | 3 | 24 | 5 | 4 | 2 | 11 | 36 | 9 | 10 |
| Subtotal - feeder watchers |  | 0 |  | 0 |  |  |  |  | 11 | 0 |  | 6 |  |  | 0 | 0 | 3 |  | 0 |
| Subtotal - nocturnal |  | 0 |  | 1 | 1 |  |  |  | 8 | 1 | 2 | 0 |  |  | 0 | 0 | 2 | 1 | 1 |
| Total Hours | 93 | 12 | 13 | 63.5 | 17 | 65 | 5 | 12 | 256 | 9 | 12.75 | 55 | 17 | 21 | 4.5 | 54 | 134.75 | 65 | 47.5 |
| Subtotal - feeder |  | 0 | 1 | 0 |  |  |  |  | 28 | 0 |  | 8 |  | 0 | 0 | 2 | 2 |  | 45.5 |
| Subtotal - nocturnal |  | 0 |  | 3 | 0.5 |  |  |  | 9.5 | 2 | 0.75 |  |  | 0 | 0 | 0 | 1.5 |  | 2 |
| Hours/observer | 5.81 | 1.09 | 4.33 | 5.77 | 5.67 | 3.25 | 5.00 | 12.00 | 6.56 | 3.00 | 4.25 | 2.29 | 3.40 | 5.25 | 2.25 | 4.91 | 3.74 | 7.22 | 4.75 |
| Miles foot, approx: | 18 | 4 | 5.5 | 27 | 9 | 32 |  | 2 | 88 | 4 | 1 | 7 | 2 | 3.5 | 1 | 12 | 73 | 11 | 22 |
| Miles car, other: | 40 | 101 | 24 | 154 | 14 | 12 |  | 93 | 420.5 | 75 | 118 | 149 | 118.4 |  | 40 | 352 | 718 | 363 | 288 |
| Total miles: | 58 | 105 | 29.5 | 181 | 23 | 44 |  | 95 | 508.5 | 79 | 119 | 156 | 120.4 | 3.5 | 41 | 364 | 791 | 374 | 310 |


| $\begin{array}{\|l} \text { 등 } \\ \hline \underline{I} \end{array}$ | 云 | $\wedge$ | $\begin{aligned} & 0 \\ & \underset{4}{2} \\ & \hline \end{aligned}$ | $\underset{\sim}{\stackrel{r}{4}}$ | $\stackrel{\searrow}{\vdots}$ | $\infty$ | $\left\lvert\, \begin{gathered} \underset{\substack{\underset{\sim}{4}}}{\substack{2}} \mid \\ \hline \end{gathered}\right.$ | $\underset{\underset{\sim}{\Psi}}{\text { 프N }}$ | $\left\lvert\, \begin{aligned} & \mathbb{\Phi} \\ & \underset{\sim}{w} \end{aligned}\right.$ | $\begin{gathered} \underset{\sim}{2} \\ \underset{\sim}{U} \end{gathered}$ | $\begin{aligned} & \mathrm{y} \\ & \mathrm{O} \\ & \mathrm{D} \\ & \infty \end{aligned}$ | $\sigma$ | 으 | Г | $\underset{\beth}{\underset{\beth}{2}}$ | $\begin{aligned} & \underset{\underset{\sim}{\underset{~}{\sim}}}{ } \end{aligned}$ | $\begin{aligned} & \mathrm{H} \\ & \mathrm{~S} \\ & \hline \end{aligned}$ | $\begin{aligned} & \infty \\ & \stackrel{\Phi}{\Psi} \\ & \stackrel{\rightharpoonup}{U} \end{aligned}$ | $\begin{array}{\|c} \underset{\sim}{x} \\ \stackrel{\rightharpoonup}{0} \end{array}$ | $\begin{aligned} & \underset{\sim}{\underset{\sim}{x}} \\ & \underset{\sim}{2} \end{aligned}$ | $\stackrel{\sim}{\sim}$ | $\begin{aligned} & \underset{\sim}{\mathrm{N}} \\ & \hline \end{aligned}$ |  | $\begin{aligned} & \underset{\sim}{\underset{\sim}{\underset{~}{4}}} \\ & \underset{\sim}{2} \end{aligned}$ | $\begin{aligned} & \text { y } \\ & 0 \\ & \text { O } \end{aligned}$ | $\begin{aligned} & 0 \\ & \underset{~}{~} \end{aligned}$ | $\underset{\supset}{\bar{z}}$ | $\left\|\begin{array}{l} \stackrel{u}{u} \\ \underset{\sim}{\omega} \end{array}\right\|$ | $\underset{\beth}{\bar{z}}$ |  | $\stackrel{\square}{-}$ | $\stackrel{\rightharpoonup}{\stackrel{1}{5}}$ | $\underset{\text { I }}{\text { ㄹ }}$ | O | $\begin{aligned} & \leftarrow \\ & \stackrel{n}{w} \\ & 3 \end{aligned}$ | O |  | $\underset{\sim}{\underset{\sim}{\sim}}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{array}{\|l\|l} \times \\ \sum_{\Sigma}^{\pi} \end{array}$ | $\left\|\begin{array}{l} \bar{c} \\ 0 \\ 0 \end{array}\right\|$ | － | ¢ | ＋ | － | の | $\sim$ | $\sim$ | $\bigcirc$ | $\stackrel{\text { 안 }}{ }$ | $\stackrel{\infty}{\circ}$ | － | － | － | $\stackrel{\infty}{\sim}$ | $\sim$ | ＋ | $\wedge$ | $\wedge$ | ๓ | － | $\sim$ | 아상 | ¢ | $\bigcirc$ | $\underset{\sim}{*}$ | $\stackrel{\circ}{\square}$ | － | $\stackrel{\odot}{\bullet}$ | － | － | ल | ¢ | $\stackrel{6}{6}$ | ल |  | 으 | $\bar{\square}$ |
| $\begin{aligned} & n \\ & \vdots \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\left.\begin{aligned} & \mathrm{0} \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned} \right\rvert\,$ | $\sim$ | $\overline{\text { m }}$ | $\infty$ | ¢ | $\overline{\text { m }}$ | ＊ | $\infty$ | $\stackrel{\sim}{\sim}$ | 앙 | ก | $\sim$ | ल | ल | ๆ | － | － | $\stackrel{\sim}{\sim}$ | $\infty$ | － | $\sim$ | $\sim$ | $\stackrel{\text { N }}{ }$ | － | $\bar{\sim}$ | $\stackrel{\sim}{\sim}$ | $\stackrel{\text { ¢ }}{ }$ | － | $\stackrel{\infty}{+}$ | － | $\sim$ | － | $\stackrel{\sim}{\sim}$ | 웅 | $\sim$ |  | Г | $\infty$ |
|  |  | $\left\|\begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{array}\right\|$ | $\begin{gathered} \infty \\ \stackrel{0}{0} \\ 0 \\ 0 \end{gathered}$ | $\begin{gathered} \underset{N}{N} \\ \underset{0}{0} \end{gathered}$ | $\begin{gathered} \underset{\sim}{J} \\ \underset{O}{0} \end{gathered}$ | $\begin{gathered} \infty \\ \stackrel{0}{+} \\ 0 \\ 0 \end{gathered}$ | $\begin{aligned} & 0 \\ & \stackrel{0}{0} \\ & \vdots \\ & 0 \end{aligned}$ | $\begin{aligned} & 10 \\ & \stackrel{L}{O} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} \circ \\ \stackrel{\circ}{0} \\ \stackrel{1}{0} \\ 0 \end{gathered}$ | $\begin{aligned} & 0 \\ & \underset{0}{0} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} \infty \\ \stackrel{\sim}{\sim} \\ \stackrel{1}{0} \end{gathered}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \overline{-} \\ & \stackrel{0}{0} \\ & \dot{0} \end{aligned}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \hat{0} \\ & \infty \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \hat{0} \\ & \circ \\ & 0 \\ & 0 \end{aligned}$ | $\left.\begin{aligned} & \stackrel{\circ}{0} \\ & 0 \\ & 0 \\ & 0 \end{aligned} \right\rvert\,$ | $\begin{aligned} & \stackrel{N}{0} \\ & \stackrel{\rightharpoonup}{0} \\ & \dot{O} \end{aligned}$ | $\begin{aligned} & \stackrel{0}{2} \\ & \stackrel{\rightharpoonup}{4} \\ & 0 \end{aligned}$ | $\begin{aligned} & \stackrel{9}{N} \\ & \stackrel{0}{0} \\ & \dot{O} \end{aligned}$ | $\begin{aligned} & \circ \\ & \stackrel{0}{\top} \\ & \vdots \\ & 0 \end{aligned}$ | $\begin{aligned} & \circ \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \circ \\ & \hline \\ & \stackrel{0}{0} \\ & 0 \end{aligned}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \stackrel{+}{\infty} \\ & \underset{y}{0} \\ & 0 \end{aligned}$ | $\begin{aligned} & \hat{\infty} \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} \underset{N}{N} \\ \stackrel{0}{\dot{O}} \end{gathered}$ | $\begin{aligned} & N \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & 0 \\ & \stackrel{0}{N} \\ & \underset{N}{U} \end{aligned}$ | $\begin{aligned} & \bar{N} \\ & \stackrel{0}{0} \\ & 0 \end{aligned}$ | $\begin{aligned} & 0 \\ & 0 . \\ & 0 . \\ & 0 \end{aligned}$ | $\begin{aligned} & \circ \\ & \stackrel{\circ}{0} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \text { 응 } \\ & \stackrel{\rightharpoonup}{0} \\ & \hline \end{aligned}$ | $\begin{aligned} & \infty \\ & \infty \\ & \infty \\ & \infty \end{aligned}$ | $\begin{aligned} & \circ \\ & \stackrel{\circ}{\circ} \\ & \stackrel{+}{\circ} \end{aligned}$ | $\begin{aligned} & \circ \\ & \vdots \\ & \vdots \\ & \vdots \end{aligned}$ | $\begin{aligned} & \text { J } \\ & \hline \text { O } \\ & \hline . \end{aligned}$ | $\stackrel{m}{\stackrel{m}{\square}}$ |
|  | $\left.\begin{aligned} & \bar{\omega} \\ & \stackrel{y}{c} \\ & \hat{e} \\ & \stackrel{\sim}{e} \end{aligned} \right\rvert\,$ | $\left\|\begin{array}{l} 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{array}\right\|$ | $\begin{aligned} & \underset{\sim}{\tilde{W}} \\ & 0 \\ & 0 \end{aligned}$ | $\stackrel{\infty}{\circ}$ | $\begin{gathered} \underset{N}{N} \\ \underset{0}{0} \end{gathered}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \stackrel{n}{\circ} \\ & \stackrel{O}{0} \\ & \vdots \end{aligned}$ | $\begin{aligned} & N \\ & \stackrel{N}{0} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} \stackrel{9}{5} \\ \stackrel{+}{\dot{0}} \end{gathered}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \stackrel{\infty}{+} \\ & \stackrel{\sim}{4} \\ & 0 \end{aligned}$ | $\begin{aligned} & \circ \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & 0 \\ & \stackrel{0}{0} \\ & \dot{B} \\ & 0 \end{aligned}$ | $\begin{aligned} & 0 \\ & \stackrel{0}{0} \\ & \dot{B} \end{aligned}$ | $\begin{aligned} & o \\ & \stackrel{0}{0} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \stackrel{\circ}{2} \\ & \stackrel{0}{0} \\ & 0 \end{aligned}$ | $\begin{aligned} & \underset{\sim}{2} \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\left.\begin{aligned} & \dot{d} \\ & \vdots \\ & 0 \\ & 0 \end{aligned} \right\rvert\,$ | $\begin{aligned} & \stackrel{\infty}{0} \\ & \stackrel{0}{0} \\ & \stackrel{+}{0} \end{aligned}$ | $\begin{aligned} & \underset{\sim}{0} \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \stackrel{\circ}{2} \\ & \stackrel{0}{0} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & 0 \\ & \stackrel{0}{0} \\ & 0 \\ & 0 \end{aligned}$ | $\left.\begin{aligned} & 0 \\ & \dot{0} \\ & 0 \\ & 0 \end{aligned} \right\rvert\,$ | $\begin{gathered} \underset{\infty}{\infty} \\ \infty \\ \stackrel{1}{0} \\ \hline \end{gathered}$ | $\begin{aligned} & \circ \\ & \stackrel{\circ}{7} \\ & \stackrel{\rightharpoonup}{0} \end{aligned}$ | $\begin{gathered} \stackrel{\circ}{0} \\ \stackrel{0}{0} \\ 0 \end{gathered}$ | $\begin{gathered} \frac{0}{m} \\ \frac{m}{\dot{0}} \end{gathered}$ | $\begin{aligned} & 0 \\ & \hline 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} \stackrel{O}{n} \\ \stackrel{B}{4} \\ 0 \end{gathered}$ | $\begin{aligned} & 0 \\ & 0 . \\ & 0 . \\ & 0 \end{aligned}$ | $\begin{aligned} & \circ \\ & \stackrel{\circ}{0} \\ & \dot{\circ} \end{aligned}$ | $\begin{aligned} & 0 \\ & \stackrel{0}{0} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \text { N } \\ & \text { N } \\ & \text { ón } \end{aligned}$ | $\begin{aligned} & \stackrel{\sim}{0} \\ & \stackrel{1}{0} \\ & 0 \end{aligned}$ | $\begin{aligned} & N \\ & \stackrel{N}{0} \\ & \dot{0} \end{aligned}$ | $\begin{aligned} & 0 \\ & \stackrel{0}{0} \\ & \dot{O} \end{aligned}$ | $\begin{aligned} & \infty \\ & \stackrel{\circ}{\circ} \\ & \stackrel{0}{0} \end{aligned}$ | － |
| $\left\lvert\, \begin{gathered} \stackrel{*}{\dddot{\circ}} \\ \stackrel{5}{\circ} \end{gathered}\right.$ | ＊ | $\sim$ | $\stackrel{\circ}{7}$ | $\stackrel{\square}{\circ}$ | $\stackrel{\text { ® }}{ }$ | $\stackrel{\rightharpoonup}{\circ}$ | ค | － | 아 | $\stackrel{\sim}{\circ}$ | $\begin{aligned} & \infty \\ & \infty \\ & \infty \end{aligned}$ | $\sim$ | ल | m | $\stackrel{\circ}{\circ}$ | $\sim$ | $\infty$ | ¢ | $\stackrel{-}{\bullet}$ | $\infty$ | ค | m | $\stackrel{\infty}{\sim}$ | $\stackrel{\Gamma}{\circ}$ | ¢ | $\stackrel{+}{\circ}$ | $\stackrel{\Im}{寸}$ | － | $\underset{\sim}{N}$ | － | $\sim$ | の | ® | $\stackrel{\sim}{\infty}$ | － |  | ¢ | $\stackrel{\sim}{\sim}$ |
|  |  |  | $\begin{aligned} & \frac{0}{\pi} \\ & \tilde{\pi} \\ & \frac{0}{0} \\ & \stackrel{0}{0} \\ & \hline 0 \end{aligned}$ |  |  |  |  | $\left.\begin{aligned} & \dot{0} \\ & 0 \\ & \vdots \\ & \vdots 0 \\ & \vdots 0 \\ & \dot{4} \end{aligned} \right\rvert\,$ |  |  |  |  | $\begin{gathered} \dot{0} \\ 0 \\ 0 \\ 0 \\ \vdots \\ \vdots \end{gathered}$ | $\begin{gathered} \frac{0}{0} \\ \tilde{\sim} \\ \stackrel{\rightharpoonup}{c} \\ \frac{0}{0} \\ \frac{0}{0} \\ \hline \end{gathered}$ |  | $\begin{gathered} \stackrel{\Xi}{\grave{1}} \\ \sum_{2}^{0} \end{gathered}$ | $\begin{gathered} \stackrel{ᄃ}{\circ} \\ \frac{0}{\tilde{N}} \\ \stackrel{1}{\sim} \\ 0 \\ \vdots \\ \vdots \\ 0 \\ \stackrel{\rightharpoonup}{0} \\ 0 \\ \hline \hline \end{gathered}$ |  | $\begin{aligned} & \frac{\pi}{0} \\ & \vdots \\ & 0 \end{aligned}$ |  |  |  |  |  |  |  |  | $\begin{aligned} & \stackrel{\rightharpoonup}{\omega} \\ & \stackrel{\underline{\overline{3}}}{ } \end{aligned}$ |  |  |  |  |  |  | $\begin{aligned} & \dot{0} \\ & \stackrel{\Delta}{2} \\ & \stackrel{\otimes}{0} \\ & \stackrel{2}{2} \end{aligned}$ |  |  | － |
| $\begin{array}{\|l\|l\|} \hline \text { 둘 } \end{array}$ | $\left\|\begin{array}{l} 2 \\ 0 \\ 0 \\ 0 \\ 0 \end{array}\right\|$ |  |  | $\begin{aligned} & \mathrm{Y} \\ & 0 \\ & \underset{\sim}{\mathrm{O}} \end{aligned}$ | $\left\lvert\, \begin{aligned} & \stackrel{\rightharpoonup}{u} \\ & \stackrel{\rightharpoonup}{0} \end{aligned}\right.$ | $\bar{\Sigma}$ | － | $\underset{\text { を }}{\underset{\sim}{\underset{U}{2}}}$ | $\begin{aligned} & \text { Y } \\ & 0 \\ & \underset{\sim}{n} \end{aligned}$ | $\left\|\begin{array}{l} \stackrel{u}{0} \\ \stackrel{山}{\infty} \end{array}\right\|$ | ～ | ल | $\begin{array}{\|l\|} \stackrel{\underset{\sim}{\underset{\sim}{\sim}}}{\sim} \end{array}$ | $\left\lvert\, \begin{aligned} & \infty \\ & \stackrel{1}{T} \\ & \substack{0} \end{aligned}\right.$ | $\sum_{\substack{\infty}}^{\infty}$ | $\begin{gathered} 0 \\ z \\ \mathbf{y} \end{gathered}$ | $\begin{aligned} & \frac{\pi}{x} \\ & \underset{\sim}{c} \\ & \vdots \end{aligned}$ | $\begin{aligned} & z \\ & \vdots \\ & k \\ & 3 \end{aligned}$ | $\frac{\underset{\sim}{\underset{\sim}{x}}}{\stackrel{\rightharpoonup}{\sim}}$ | $\begin{aligned} & \stackrel{\rightharpoonup}{5} \\ & \stackrel{\rightharpoonup}{2} \end{aligned}$ | $\underset{\infty}{\lesssim}$ | － | $\begin{aligned} & \underset{\sim}{w} \\ & \underset{\sim}{\sim} \\ & \underset{\sim}{n} \end{aligned}$ | $\begin{aligned} & \llcorner \\ & \omega \\ & \omega \\ & 3 \end{aligned}$ | $\sum_{\Delta}^{\infty}$ | $\sim$ | $\begin{aligned} & \underset{\sim}{\underset{\sim}{\underset{~}{u}}} \\ & \underset{\sim}{u} \end{aligned}$ | $\begin{aligned} & \text { y } \\ & 0 \\ & \underset{\sim}{0} \end{aligned}$ | $\begin{aligned} & \text { 〕̌ } \\ & \text { O} \\ & 0 \end{aligned}$ | － | $\begin{aligned} & \underset{\sim}{\underset{\sim}{x}} \\ & \underset{\sim}{u} \end{aligned}$ | $\begin{aligned} & \stackrel{\circlearrowleft}{\circ} \\ & \stackrel{O}{\vdash} \end{aligned}$ | $\frac{0}{2}$ | $\underset{\rightharpoonup}{\underset{\rightharpoonup}{2}}$ | $\begin{aligned} & \underset{\sim}{\mathrm{x}} \\ & \underset{\sim}{\mathrm{O}} \end{aligned}$ | $\underset{\substack{0 \\ \hline}}{ }$ | $\begin{aligned} & 0 \\ & \underset{~}{2} \end{aligned}$ | ¢ |
| $\begin{array}{\|l\|l} \times \\ { }_{\Sigma}^{\pi} \end{array}$ | $\begin{aligned} & \mathrm{I} \\ & \overrightarrow{0} \\ & 0 \end{aligned}$ | へ | $\begin{aligned} & 0 \\ & \stackrel{0}{0} \end{aligned}$ | $\stackrel{\circ}{\square}$ | － | $\stackrel{\circ}{\circ}$ | － | $\wedge$ | $\stackrel{\sim}{ల}$ | $\bigcirc$ | － | ～ | $\stackrel{\sim}{\sim}$ | ल | － | － | F | $\stackrel{\sim}{\sim}$ | $\stackrel{\sim}{\sim}$ | $\stackrel{\circ}{-}$ | $\stackrel{\sim}{\sim}$ | $\infty$ | $\stackrel{\sim}{\sim}$ | ल | $\stackrel{\sim}{-}$ | の | － | N | $\sim$ | － | $\infty$ | $\stackrel{\infty}{\circ}$ | $\stackrel{\sim}{\sim}$ | $\bigcirc$ | $\bar{\sim}$ | N | $\stackrel{\text { ¢ }}{\text { N }}$ | N |
| $\begin{aligned} & n \\ & \vdots \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \mathrm{F} \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\infty$ | L | $\stackrel{ }{-}$ | ๓ | $\stackrel{\circ}{\square}$ | $\sim$ | $\wedge$ | － | $\wedge$ | ～ | $\sim$ | － | $\sim$ | $\bullet$ | － | $\infty$ | $\stackrel{\sim}{\sim}$ | $\sim$ | $\sim$ | へ | $\stackrel{\odot}{\sim}$ | $\stackrel{\text { ¢ }}{ }$ | $\bullet$ | $\sim$ | $\stackrel{\sim}{\sim}$ | $\infty$ | $\stackrel{\sim}{\sim}$ | － | ＊ | － | $\stackrel{\infty}{+}$ | $\stackrel{\sim}{\sim}$ | $\stackrel{8}{8}$ | $\sim$ | N | N | $\overline{\text { m }}$ |
|  |  | $\left\|\begin{array}{l} m \\ \stackrel{m}{0} \\ \dot{0} \end{array}\right\|$ | $\begin{aligned} & \stackrel{\varrho}{\mathrm{N}} \\ & \stackrel{N}{\mathrm{~N}} \end{aligned}$ | $\begin{gathered} \stackrel{\sim}{n} \\ \underset{\sim}{0} \\ 0 \end{gathered}$ | $\begin{aligned} & \overline{-} \\ & \stackrel{\rightharpoonup}{0} \\ & \dot{O} \end{aligned}$ | $\begin{gathered} \stackrel{n}{f} \\ \stackrel{y}{m} \\ 0 \end{gathered}$ | $\begin{aligned} & \circ \\ & \stackrel{0}{0} \\ & \vdots \\ & 0 \end{aligned}$ | $\begin{gathered} N \\ \stackrel{N}{2} \\ \dot{O} \end{gathered}$ | $\left\lvert\, \begin{aligned} & 0 \\ & \stackrel{0}{0} \\ & \stackrel{1}{-} \\ & \hline \end{aligned}\right.$ | $\begin{aligned} & \circ \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \infty \\ & \stackrel{\infty}{0} \\ & \stackrel{\rightharpoonup}{0} \end{aligned}$ | $\left.\begin{aligned} & \dot{J} \\ & \dot{0} \\ & 0 \end{aligned} \right\rvert\,$ | $\begin{aligned} & \infty \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\stackrel{\rightharpoonup}{\circ}$ <br>  | $\begin{aligned} & \pm \\ & \stackrel{0}{0} \\ & 0 \\ & 0 \end{aligned}$ | 듬 | $\begin{aligned} & \bar{J} \\ & \stackrel{\rightharpoonup}{0} \\ & 0 \end{aligned}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\infty$ <br>  <br>  <br> 0 <br> 0 | $\infty$ $\stackrel{\infty}{+}$ $\stackrel{+}{0}$ 0 | $\begin{array}{\|c} \bar{\sim} \\ \dot{0} \\ \dot{0} \end{array}$ | $\left.\begin{aligned} & 0 \\ & \stackrel{\rightharpoonup}{t} \\ & \dot{0} \end{aligned} \right\rvert\,$ | $\begin{aligned} & \hat{0} \\ & \stackrel{\rightharpoonup}{N} \\ & 0 \end{aligned}$ | $\left.\begin{aligned} & 0 \\ & \stackrel{0}{0} \\ & 0 \\ & 0 \end{aligned} \right\rvert\,$ | $\begin{aligned} & \hat{0} \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \stackrel{\rightharpoonup}{\mathrm{N}} \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \text { N} \\ & \stackrel{\rightharpoonup}{\circ} \\ & \dot{O} \end{aligned}$ | $\begin{gathered} \infty \\ \stackrel{\sim}{4} \\ \stackrel{\infty}{0} \\ 0 \end{gathered}$ | 듬 | $\begin{aligned} & \stackrel{0}{\mathrm{~N}} \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & t \\ & \stackrel{\rightharpoonup}{0} \\ & \dot{O} \end{aligned}$ | $\begin{gathered} \stackrel{\infty}{N} \\ \underset{0}{+} \end{gathered}$ | $\begin{aligned} & 0 \\ & \\ & 0 . \end{aligned}$ | $\begin{aligned} & \circ \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} N \\ \frac{1}{0} \\ 0 \\ 0 \end{gathered}$ | $\begin{aligned} & \text { O} \\ & \stackrel{n}{0} \\ & \stackrel{0}{0} \end{aligned}$ | $\begin{aligned} & \text { O} \\ & \\ & \stackrel{0}{0} \end{aligned}$ | N |
|  | $\begin{aligned} & \widehat{m} \\ & \stackrel{y}{c} \\ & \hat{\sim} \\ & \stackrel{e}{0} \\ & \hline \end{aligned}$ | $\left\|\begin{array}{l} 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{array}\right\|$ | $\begin{aligned} & \underset{0}{0} \\ & 0 \\ & \infty \\ & \dot{\infty} \end{aligned}$ | $\begin{aligned} & \infty \\ & \infty \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \infty \\ & \stackrel{\infty}{\circ} \\ & \vdots \\ & \hline \end{aligned}$ | $\begin{aligned} & \hat{N} \\ & \stackrel{0}{0} \\ & \dot{0} \end{aligned}$ | $\begin{aligned} & \circ \\ & \hline 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\left\|\begin{array}{l} 10 \\ 0 \\ 0 \\ 0 \\ 0 \end{array}\right\|$ | $\begin{aligned} & \hat{N} \\ & \hat{N} \\ & \dot{o} \\ & \dot{o} \end{aligned}$ | $\begin{aligned} & \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \circ \\ & \hline \\ & \circ \\ & 0 \end{aligned}$ | $\begin{aligned} & \bar{N} \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\left.\begin{aligned} & 0 \\ & \stackrel{0}{0} \\ & \dot{0} \end{aligned} \right\rvert\,$ | $\begin{aligned} & N \\ & \stackrel{N}{0} \\ & \dot{O} \end{aligned}$ | $\begin{aligned} & \tilde{0} \\ & \stackrel{O}{0} \\ & \dot{0} \end{aligned}$ | 응 | $\begin{gathered} \stackrel{\sim}{N} \\ \stackrel{0}{0} \\ 0 \end{gathered}$ | $\left.\begin{gathered} \dot{d} \\ \dot{~} \\ 0 \\ 0 \end{gathered} \right\rvert\,$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \circ \\ & \stackrel{\circ}{\circ} \\ & \dot{O} \\ & 0 \end{aligned}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $$ | $\begin{aligned} & \infty \\ & \infty \\ & \stackrel{\infty}{\circ} \\ & \hline \end{aligned}$ | $\begin{aligned} & \hat{N} \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \underset{\sim}{3} \\ & \stackrel{\rightharpoonup}{0} \\ & 0 \end{aligned}$ | $\begin{aligned} & \underset{\sim}{N} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & 0 \\ & \stackrel{0}{0} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} \bar{N} \\ \stackrel{N}{N} \\ \dot{0} \end{gathered}$ | $\begin{aligned} & \circ \\ & \circ \\ & \circ \\ & 0 \end{aligned}$ | $\begin{aligned} & N \\ & \stackrel{N}{0} \\ & \dot{O} \end{aligned}$ | $\begin{aligned} & \circ \\ & \stackrel{\circ}{\circ} \\ & \dot{O} \end{aligned}$ | $\begin{aligned} & \underset{\sim}{\infty} \\ & \infty \\ & \stackrel{\infty}{\circ} \end{aligned}$ | $\begin{aligned} & N \\ & \stackrel{N}{0} \\ & \hline \mathbf{O} \end{aligned}$ | $\begin{aligned} & \infty \\ & \stackrel{0}{\circ} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \stackrel{\circ}{8} \\ & \stackrel{\circ}{\circ} \\ & \dot{O} \end{aligned}$ | $\begin{aligned} & \circ \\ & \stackrel{\circ}{\circ} \\ & 0 . \\ & 0 . \end{aligned}$ | $\begin{aligned} & \text { N } \\ & \\ & \end{aligned}$ | セ－ |
|  | ＊ | $\stackrel{\rightharpoonup}{\circ}$ | $\begin{aligned} & \bar{子} \\ & \stackrel{\circ}{\circ} \end{aligned}$ | $\stackrel{\text { ® }}{\mathrm{N}}$ | － | $\stackrel{\infty}{\underset{\sim}{N}}$ | $\sim$ | $\stackrel{\infty}{\sim}$ | $\begin{aligned} & \circ \\ & \stackrel{\rightharpoonup}{0} \\ & \hline \end{aligned}$ | $\stackrel{\infty}{\sim}$ | ～ | $\wedge$ | $\stackrel{\sim}{\sim}$ | － | $\bar{\square}$ | － | \％ | $\stackrel{0}{6}$ | 소 | 소 | 읃 | $\stackrel{\llcorner }{\sim}$ | $\stackrel{8}{0}$ | の | $\pm$ | 「 | $\stackrel{\sim}{\sim}$ | $\begin{aligned} & \overline{0} \\ & \stackrel{0}{2} \end{aligned}$ | $\sim$ | － | ल | $\frac{\nabla}{\omega}$ | $\stackrel{\infty}{\circ}$ | N๊ | ～ | $\stackrel{\square}{\text { a }}$ | $\stackrel{-}{\sim}$ | ¢ |
|  |  | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 3 \\ & 0 \\ & \vdots \\ & \hline \end{aligned}$ | $\begin{aligned} & \dot{\otimes} \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & \tilde{\pi} \\ & \underset{\sim}{\tilde{0}} \\ & \tilde{0} \\ & \hline \end{aligned}$ |  |  | $\begin{aligned} & \text { r} \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 3 \\ & 3 \end{aligned}$ | $\left.\begin{aligned} & \overline{\bar{\pi}} \\ & \sum_{0}^{3} \\ & \tilde{0} \end{aligned} \right\rvert\,$ |  |  |  |  |  | $\begin{aligned} & \stackrel{0}{3} \\ & \widetilde{0} \\ & 0 \\ & 0 \\ & \stackrel{\rightharpoonup}{0} \\ & 0 \\ & 0 \\ & \hline \end{aligned}$ | $\begin{aligned} & \dot{o} \\ & \dot{\omega} \\ & \stackrel{0}{0} \\ & \stackrel{\oplus}{0} \end{aligned}$ |  |  |  |  |  | $\begin{aligned} & \\ & \\ & \\ & 0 \\ & 0 \\ & 0 \\ & \frac{2}{0} \\ & 0 \\ & \end{aligned}$ |  |  | $\begin{aligned} & \stackrel{\rightharpoonup}{\stackrel{1}{2}} \\ & \stackrel{\rightharpoonup}{3} \\ & \stackrel{\rightharpoonup}{\wedge} \\ & \stackrel{0}{3} \end{aligned}$ |  |  | $\begin{aligned} & 5 \\ & 0 \\ & 0 \\ & \check{c} \\ & 0 \\ & \vdots \\ & \vdots \\ & 0 \\ & 0 \end{aligned}$ |  |  |  |  |  |  |  |  |  |  |  | ¢ ¢ ¢ 0 0 |


| $\begin{aligned} & \text { 䭲 } \\ & \hline \mathbf{I} \end{aligned}$ | 2 | $\begin{aligned} & \llcorner \\ & \rightsquigarrow \\ & \underset{3}{3} \end{aligned}$ | $\begin{array}{\|l} \underset{\sim}{\underset{\sim}{v}} \\ \text { ָ } \end{array}$ | $\begin{aligned} & \llcorner \\ & \stackrel{\omega}{3} \\ & \vdots \end{aligned}$ | $\begin{aligned} & z \\ & \vdots \\ & \vdots \\ & 3 \end{aligned}$ | $\begin{aligned} & \llcorner \\ & w \\ & \vdots \end{aligned}$ | $\begin{aligned} & \underset{\sim}{\amalg} \\ & \stackrel{\rightharpoonup}{0} \end{aligned}$ | $\bar{\Sigma}$ | $\stackrel{\overline{\mathrm{a}}}{\underline{\mathrm{~s}}}$ | $\underset{\substack{\bar{z}}}{\substack{2}}$ | $\begin{aligned} & \mathrm{y} \\ & \mathrm{U} \\ & \mathrm{O} \\ & \mathrm{~m} \end{aligned}$ | $\begin{array}{\|l\|} \hline \underset{\sim}{\underset{\sim}{\sim}} \\ \stackrel{\sim}{\circlearrowleft} \end{array}$ | $\begin{aligned} & \text { w } \\ & \stackrel{\rightharpoonup}{0} \\ & \hline \end{aligned}$ | $\underset{\substack{\mathrm{z}}}{\bar{y}}$ |  | $\underset{\supset}{\bar{z}}$ | $\begin{array}{\|l} \mathrm{J} \\ \mathrm{~T} \\ \mathrm{U} \end{array}$ | $\left\|\begin{array}{l} 0 \\ z \\ \vdots \\ \hline \end{array}\right\|$ | $\begin{aligned} & \overline{\mathrm{O}} \\ & \underline{\mathrm{z}} \end{aligned}$ | $\begin{aligned} & 0 \\ & z \\ & \leq \\ & \hline \end{aligned}$ | $\left\lvert\, \begin{aligned} & 0 \\ & z \\ & \vdots \\ & \hline \end{aligned}\right.$ |  | 嗃 | $\left\lvert\, \begin{aligned} & 0 \\ & z \\ & \vdots \\ & \hline \end{aligned}\right.$ | $\underset{\mathrm{I}}{\mathrm{I}}$ | $\begin{aligned} & \llcorner \\ & \omega \\ & \longleftrightarrow \\ & 3 \end{aligned}$ | $\left\lvert\, \begin{aligned} & \underset{\sim}{\sim} \\ & \underset{\sim}{\sim} \end{aligned}\right.$ | $\left\lvert\, \begin{aligned} & \underset{1}{f} \\ & \underset{\sim}{2} \end{aligned}\right.$ | $\begin{array}{\|l\|} \underset{\sim}{\underset{~}{c}} \\ \underset{\sim}{\sim} \end{array}$ | $\left\lvert\, \begin{gathered} \underset{\sim}{\underset{\sim}{\sim}} \\ \hline \end{gathered}\right.$ | $\left\lvert\, \begin{aligned} & \text { y } \\ & 0 \\ & \text { un } \end{aligned}\right.$ | $\left\|\begin{array}{l} \underset{2}{2} \\ \vdots \\ 3 \end{array}\right\|$ | $\begin{array}{\|l\|l} \underset{\sim}{\underset{\sim}{x}} \\ \underset{\sim}{u} \end{array}$ | $\begin{array}{\|l\|l} \text { y } \\ 0 \\ \text { on } \end{array}$ | $\begin{array}{\|l\|l} \underset{y}{u} \\ \stackrel{y}{0} \end{array}$ | 들 |  | $\left\lvert\, \begin{aligned} & \text { y } \\ & 0 \\ & \text { D } \end{aligned}\right.$ | $\begin{array}{\|l} \mathrm{y} \\ \mathrm{U} \\ \mathrm{D} \end{array}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{array}{\|l\|l} \times \\ \stackrel{\pi}{\Sigma} \end{array}$ | $\begin{aligned} & \stackrel{\rightharpoonup}{5} \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\stackrel{\infty}{+}$ | － | \％ | の | ¢ | ¢ | m | $\mp$ | ¢ | ¢ | $\stackrel{\sim}{\sim}$ | ล | $\stackrel{0}{7}$ | $\stackrel{\circ}{\circ}$ | $\stackrel{\circ}{N}$ |  | $\left\|\begin{array}{c} \infty \\ \infty \\ \infty \end{array}\right\|$ | $\begin{gathered} \underset{\sim}{2} \\ \end{gathered}$ | Б | $\stackrel{\infty}{\sim}$ | $\stackrel{\sim}{\sim}$ | へ | $\left.\begin{aligned} & \infty \\ & \stackrel{\infty}{\sim} \end{aligned} \right\rvert\,$ | $\begin{gathered} \sim \\ 0 \\ 0 \end{gathered}$ | $\stackrel{\circ}{\Gamma}$ | O | $\mid \underset{\sim}{\infty}$ | $\frac{0}{7}$ | $\left\|\begin{array}{l} \circ \\ \hline \stackrel{~}{~} \end{array}\right\|$ | ¢ | $\stackrel{\stackrel{\circ}{\mathrm{N}}}{\stackrel{\sim}{2}}$ | ก | $\underset{\sim}{\sim}$ | $\stackrel{ \pm}{\square}$ | $\stackrel{\circ}{\circ}$ | F | Б | $\stackrel{\bigcirc}{\stackrel{-}{\sim}}$ | セั |
| $n$ <br> $\stackrel{n}{c}$ <br> 0 <br> 0 <br> 0 <br> $\vdots$ | $\begin{aligned} & \stackrel{\rightharpoonup}{0} \\ & \stackrel{0}{0} \\ & \stackrel{0}{0} \end{aligned}$ | $\stackrel{1}{8}$ | － | ¢ | 은 | 안 | ๆ | 으 | ค | ¢ | － | $\stackrel{\sim}{\sim}$ | ง | ल | \％ | $\ulcorner$ | 岕 | $\stackrel{\sim}{\circ}$ | 뇨 | $\stackrel{\text { ® }}{ }$ | － | ¢ | $\stackrel{\square}{\circ}$ | $\stackrel{\sim}{\sim}$ | ค | ＇ | ¢ | $\overline{\text { m }}$ | กٌ | － | $\stackrel{\circ}{-}$ | $\stackrel{\infty}{+}$ | $\bullet$ | $\stackrel{\sim}{\circ}$ | $\stackrel{\square}{\square}$ | 우 | $\stackrel{\sim}{\sim}$ |  | ค | N |
|  |  | $\begin{array}{\|c} \frac{0}{6} \\ \frac{1}{0} \\ \hline \end{array}$ | $\begin{aligned} & 0 \\ & \stackrel{0}{0} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & N \\ & \stackrel{N}{0} \\ & 0 \end{aligned}$ | $\begin{aligned} & \text { N } \\ & \text { O} \\ & 0 . \end{aligned}$ | $\begin{aligned} & 0 \\ & \stackrel{0}{N} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \dot{\circ} \\ & \stackrel{\rightharpoonup}{0} \\ & \dot{B} \end{aligned}$ | $\begin{aligned} & \infty \\ & \hline 0 \\ & 0 \\ & 0 \end{aligned}$ | $\left.\begin{aligned} & \underset{0}{0} \\ & \infty \\ & 0 \\ & 0 \end{aligned} \right\rvert\,$ | $\begin{gathered} \underset{+}{0} \\ \underset{\sim}{0} \\ \underset{0}{2} \end{gathered}$ | $\begin{aligned} & \hat{N} \\ & \stackrel{N}{N} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \underset{\sim}{\infty} \\ & 0 \\ & \dot{O} \end{aligned}$ | $\begin{aligned} & \tilde{N} \\ & \tilde{0} \\ & 0 \\ & 0 \end{aligned}$ | $\left\|\begin{array}{l} \infty \\ 0 \\ \hat{0} \\ 0 \end{array}\right\|$ | $\left\|\begin{array}{c} \stackrel{9}{0} \\ \stackrel{0}{0} \\ \dot{\circ} \end{array}\right\|$ | $\left.\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned} \right\rvert\,$ | $\left\lvert\, \begin{aligned} & \infty \\ & \infty \\ & 0 \\ & - \end{aligned}\right.$ | $\left\lvert\, \begin{gathered} N \\ \stackrel{y}{6} \\ \stackrel{-}{2} \end{gathered}\right.$ | $\begin{gathered} \underset{\sim}{N} \\ \stackrel{N}{\sim} \end{gathered}$ | $\begin{gathered} \mathrm{N} \\ \underset{\mathrm{~N}}{\mathrm{O}} \end{gathered}$ | $\left.\begin{aligned} & \tilde{N} \\ & 0 \\ & 0 \\ & 0 \end{aligned} \right\rvert\,$ | $\left\|\begin{array}{c} \stackrel{\circ}{\mathbf{~}} \\ \stackrel{0}{0} \\ \dot{0} \end{array}\right\|$ | $\left\|\begin{array}{l} \sim \\ \infty \\ 0 \\ 0 \\ 0 \end{array}\right\|$ | $\left\|\begin{array}{l} \infty \\ \\ \underset{\omega}{0} \end{array}\right\|$ | $\left\|\begin{array}{l} \underset{\sim}{N} \\ \underset{\sim}{n} \\ \underset{\sim}{2} \end{array}\right\|$ |  | $\left\|\begin{array}{c} \infty \\ \underset{\sim}{0} \\ \underset{\sim}{0} \end{array}\right\|$ | $\left\|\begin{array}{c} \bar{N} \\ 0 \\ 0 \\ 0 \end{array}\right\|$ | $\left\|\begin{array}{l} \circ \\ \stackrel{\circ}{0} \\ \stackrel{0}{\mathrm{~N}} \end{array}\right\|$ | $\left\|\begin{array}{c} 0 \\ \hat{N} \\ 0 \\ 0 \\ 0 \end{array}\right\|$ | $\begin{gathered} \underset{N}{N} \\ \underset{N}{N} \\ \hline \end{gathered}$ | $\begin{aligned} & \hat{0} \\ & \hat{e} \\ & \hat{0} \\ & 0 \end{aligned}$ | $\begin{aligned} & \bar{N} \\ & \hat{0} \\ & 0 \\ & 0 \end{aligned}$ | $\left\|\begin{array}{c} 0 \\ \infty \\ \infty \\ 0 \\ 0 \end{array}\right\|$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\left\|\begin{array}{c} n \\ \underset{\sim}{\sim} \\ \underset{0}{0} \end{array}\right\|$ | $\left\|\begin{array}{l} 9 \\ \stackrel{n}{0} \\ \dot{0} \\ 0 \end{array}\right\|$ | $\left\|\begin{array}{c} \infty \\ \stackrel{N}{N} \\ 0 \end{array}\right\|$ | $\left\|\begin{array}{l} 10 \\ 0 \\ 0 \\ 0 \\ 0 \end{array}\right\|$ | ＋ |
|  |  | $\left\|\begin{array}{c} \bar{o} \\ \dot{寸} \\ \dot{0} \end{array}\right\|$ | $\begin{aligned} & 0 \\ & \hline 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \text { or } \\ & \stackrel{\rightharpoonup}{0} \\ & 0 . \end{aligned}$ | $\begin{aligned} & \infty \\ & 0 \\ & 0 \\ & 0 \\ & \hline 0 \end{aligned}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \hat{0} \\ & \dot{0} \\ & \dot{0} \end{aligned}$ | $\left.\begin{aligned} & \tilde{0} \\ & 0 \\ & 0 \\ & 0 \end{aligned} \right\rvert\,$ | $\begin{gathered} \tilde{N} \\ 0 \\ 0 \\ 0 \end{gathered}$ | $\left.\begin{gathered} N \\ \sim \\ \sim \\ 0 \end{gathered} \right\rvert\,$ | $\begin{gathered} \bar{\lambda} \\ \hat{N} \\ 0 \end{gathered}$ | $\begin{aligned} & \circ \\ & \stackrel{\rightharpoonup}{\lambda} \\ & \dot{0} \end{aligned}$ | $\begin{aligned} & 0 \\ & \stackrel{0}{0} \\ & \vdots \\ & \hline- \end{aligned}$ | $\left\|\begin{array}{l} 0 \\ \infty \\ 0 \\ 0 \\ 0 \end{array}\right\|$ | $\left\|\begin{array}{l} 9 \\ 0 \\ \infty \\ \vdots \\ \hline 0 \end{array}\right\|$ | $\begin{aligned} & \stackrel{m}{\lambda} \\ & \stackrel{0}{\dot{B}} \end{aligned}$ | $\begin{aligned} & \circ \\ & \hline 0 \\ & \dot{+} \\ & - \end{aligned}$ | $\left\|\begin{array}{c} \stackrel{\circ}{0} \\ \stackrel{0}{M} \\ \stackrel{N}{2} \end{array}\right\|$ | $\begin{aligned} & \stackrel{N}{0} \\ & 0 \\ & \stackrel{\varphi}{-} \end{aligned}$ | $\begin{array}{\|l\|} \hline 0 \\ 0 \\ 0 \\ 0 \\ \hline \end{array}$ | $\begin{aligned} & N \\ & \hat{N} \\ & 0 \\ & 0 \end{aligned}$ | $\left\|\begin{array}{l} \stackrel{0}{0} \\ 0 \\ \dot{0} \end{array}\right\|$ | $\left\|\begin{array}{l} n \\ N \\ 0 \\ 0 \end{array}\right\|$ | $\left\|\begin{array}{l} \infty \\ \infty \\ \underset{\sim}{0} \\ 0 \end{array}\right\|$ | $\begin{aligned} & \circ \\ & \stackrel{\rightharpoonup}{N} \\ & - \end{aligned}$ | $\begin{gathered} \hat{o} \\ \underset{~}{\mathbf{n}} \\ \mathbf{o} \end{gathered}$ | $\left\|\begin{array}{c} \tilde{0} \\ ల \\ \\ 0 \end{array}\right\|$ | $\left\|\begin{array}{c} \underset{\sim}{2} \\ ल \\ 0 \end{array}\right\|$ | $\left\|\begin{array}{c} \underset{\sim}{i} \\ \stackrel{i}{2} \end{array}\right\|$ | $\left\|\begin{array}{c} \hat{\infty} \\ 0 \\ 0 \\ 0 \end{array}\right\|$ | $\left.\begin{gathered} \underset{\sim}{\lambda} \\ \stackrel{\rightharpoonup}{0} \end{gathered} \right\rvert\,$ | $\left.\begin{array}{\|c} 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{array} \right\rvert\,$ | $\left\lvert\, \begin{aligned} & \overline{0} \\ & \dot{+} \\ & \dot{O} \end{aligned}\right.$ | $\left\|\begin{array}{l} \circ \\ \infty \\ \vdots \\ 0 \end{array}\right\|$ | $\left.\begin{gathered} \infty \\ 0 \\ 0 \\ 0 \\ 0 \end{gathered} \right\rvert\,$ | $\left\|\begin{array}{c} 0 \\ \underset{N}{N} \\ 0 \end{array}\right\|$ | $\left\|\begin{array}{l} \dot{O} \\ \stackrel{\rightharpoonup}{0} \\ \dot{0} \end{array}\right\|$ | $\left\|\begin{array}{l} o \\ \stackrel{m}{m} \\ \underset{o}{0} \end{array}\right\|$ | $\left.\begin{gathered} \hat{N} \\ \infty \\ \dot{+} \end{gathered} \right\rvert\,$ | N N N O |
|  | ＊ | $\begin{gathered} \sim \\ \underset{子}{\sim} \end{gathered}$ | － | $\stackrel{\sim}{\sim}$ | $\stackrel{\sim}{\sim}$ | $\stackrel{N}{\mathrm{~N}}$ | $\stackrel{\sim}{ల}$ | $\stackrel{\infty}{\sim}$ | $\stackrel{\sim}{N}$ | $\stackrel{N}{N}$ | $\stackrel{ल}{ल}$ | $\stackrel{\sim}{\sim}$ | $\stackrel{\hat{\omega}}{\mathbf{m}}$ | $\begin{aligned} & \circ \\ & \stackrel{\infty}{\infty} \\ & \hline \end{aligned}$ | $\left\|\begin{array}{c} 0 \\ \tilde{\omega} \end{array}\right\|$ | $\stackrel{\circ}{\mathrm{o}}$ | $\begin{aligned} & \infty \\ & \frac{\infty}{\sigma} \end{aligned}$ | $\begin{aligned} & \circ \\ & \stackrel{0}{\infty} \\ & \stackrel{1}{2} \end{aligned}$ | $\begin{aligned} & \circ \\ & i \\ & i \end{aligned}$ | $\frac{\circ}{\infty}$ | $\stackrel{\sim}{\circ}$ | $\left.\frac{\curvearrowleft}{\mathrm{N}} \right\rvert\,$ | あ | $\begin{aligned} & \hat{N} \\ & \stackrel{\rightharpoonup}{+} \end{aligned}$ | $\left\|\begin{array}{l} \overline{0} \\ \dot{5} \end{array}\right\|$ | $\stackrel{N}{\Gamma}$ | $\begin{gathered} \stackrel{\sim}{m} \\ \stackrel{2}{2} \end{gathered}$ | $\begin{gathered} \stackrel{\Gamma}{\mathrm{N}} \end{gathered}$ | $\begin{aligned} & \bar{\circ} \\ & \stackrel{\sim}{0} \end{aligned}$ | $\left.\begin{aligned} & \hat{N} \\ & \stackrel{\rightharpoonup}{N} \end{aligned} \right\rvert\,$ | $\left.\begin{array}{\|l\|} \hline \\ \infty \\ \infty \end{array} \right\rvert\,$ | $\begin{gathered} \overline{5} \\ \stackrel{n}{2} \end{gathered}$ | $\stackrel{\circ}{\oplus}$ | $\begin{gathered} \stackrel{\infty}{N} \\ \underset{\sim}{N} \end{gathered}$ | $\bigcirc$ | $\underset{A}{A}$ | ¢ | $\begin{gathered} \text { t } \\ \text { U } \\ \end{gathered}$ | $\begin{aligned} & \underset{\sim}{\underset{O}{2}} \end{aligned}$ | 8 |
|  |  |  |  |  |  |  |  | $\begin{aligned} & \dot{0} \\ & 0 \\ & 0 \\ & 0.0 \\ & \vdots \\ & \stackrel{\rightharpoonup}{4} \end{aligned}$ |  |  |  | $\begin{aligned} & \stackrel{0}{0} \\ & \stackrel{\vdots}{\vdots} \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & \stackrel{y}{4} \\ & \vdots \\ & 3 \end{aligned}$ |  |  |  |  |  |  | $\begin{aligned} & 3 \\ & \frac{3}{0} \\ & 0 \\ & \frac{1}{0} \\ & \frac{0}{0} \\ & \frac{1}{4} \\ & \hline \end{aligned}$ |  | $\left.\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned} \right\rvert\,$ |  |  |  | $\begin{aligned} & 3 \\ & 0 \\ & \hline \overline{1} \\ & 3 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & \stackrel{0}{2} \\ & \hline \end{aligned}$ |  |  |  |  | $\left\|\begin{array}{l} 0 \\ \infty \\ \vdots \\ \frac{0}{3} \\ \stackrel{\pi}{3} \\ \stackrel{3}{3} \end{array}\right\|$ |  |  | $\left.\begin{array}{\|c} \dot{0} \\ i \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ \vdots \\ 0 \end{array} \right\rvert\,$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & \underline{\xi} \\ & j \\ & \vdots \\ & 0 \\ & 0 \\ & \vdots \\ & \hline \end{aligned}$ |  |  |  |  | $\begin{array}{\|l\|l} \stackrel{c}{0} \\ \vdots \\ \vdots \\ 0 \\ 0 \\ 0 \\ 0 \\ \hline \end{array}$ |  |


| $\frac{\mathbf{5}}{\underline{\mathrm{O}}}$ | $\left\|\begin{array}{\|l\|} 2 \\ \vdots \\ 0 \\ 0 \\ 0 \end{array}\right\|$ | $\left\|\frac{山}{\frac{w}{\tilde{w}}}\right\|$ | $\left\|\begin{array}{l} \underset{\sim}{u} \\ \stackrel{0}{0} \end{array}\right\|$ | $\left\|\begin{array}{c} \stackrel{u}{2} \\ \stackrel{\rightharpoonup}{0} \end{array}\right\|$ | $\left\|\begin{array}{l} \check{x} \\ 0 \\ 0 \end{array}\right\|$ | $\left.\begin{aligned} & 0 \\ & \vdots \\ & \vdots \end{aligned} \right\rvert\,$ | $\left\|\begin{array}{l} 0 \\ 2 \\ \vdots \end{array}\right\|$ | $\left\|\begin{array}{l} 0 \\ 2 \\ \leq \end{array}\right\|$ | $\begin{aligned} & \mathrm{y} \\ & 0 \\ & \mathrm{D} \end{aligned}$ |  | $\left\lvert\, \begin{aligned} & \underset{\sim}{u} \\ & \stackrel{1}{\alpha} \end{aligned}\right.$ | $\left\lvert\, \begin{array}{\|l\|l\|} \stackrel{山}{\underset{\sim}{w}} \end{array}\right.$ | $\begin{aligned} & \overline{0} \\ & \underline{y} \end{aligned}$ | $\sum_{0}^{\infty}$ | $\begin{aligned} & \stackrel{\rightharpoonup}{c} \\ & \underset{\sim}{c} \\ & \hline \end{aligned}$ |  | $\begin{aligned} & \text { 등 } \\ & 0 \\ & 0 \end{aligned}$ | $\left\lvert\, \begin{aligned} & \stackrel{\leftarrow}{w} \\ & \stackrel{u}{3} \end{aligned}\right.$ | $\begin{aligned} & x \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} \bar{z} \\ \vdots \end{gathered}$ | $\begin{aligned} & \bar{z} \\ & \vdots \end{aligned}$ |  |  | $\stackrel{\rightharpoonup}{\underline{z}}$ | $\stackrel{\rightharpoonup}{\mathrm{r}}$ | 공 |  |  |  |  |  |  |  |  |  | 亏 | 岗 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\stackrel{\times}{\times}$ | $\left\|\begin{array}{l} \vec{z} \\ \dot{3} \\ 0 \end{array}\right\|$ | is | $\stackrel{\sim}{\sim}$ | $\stackrel{\sim}{\sim}$ | $\left\|\begin{array}{l} \hat{\mu} \\ 0 \\ 0 \end{array}\right\|$ | $\sim$ | $\begin{aligned} & \frac{\Omega}{N} \\ & \underset{N}{2} \end{aligned}$ | － | \％ | $\sim$－ | m | へ | $\sim$ | $\stackrel{\infty}{ }$ | － | － | ¢ | $\stackrel{\infty}{\sim}$ | ชิ | $\llcorner$ | の |  |  |  |  |  |  |  |  |  |  |  |  |  |  | $\infty$ | $\sim$ |
|  | $\begin{aligned} & \stackrel{\rightharpoonup}{0} \\ & \stackrel{0}{0} \\ & \stackrel{0}{0} \\ & \stackrel{y}{0} \end{aligned}$ | $\infty$ | － | N | ～ | － | $\stackrel{\circ}{\sim}$ | － | 응 | $\sim$ | $\sim$ | $\sim$ | $\bullet$ | $\infty$ | － F | － | 岕 | ¢ | $\stackrel{\circ}{\infty}$ | $\sim$ | $\stackrel{\sim}{\sim}$ |  |  |  | 단 |  |  |  |  |  |  |  |  |  | \％ | \％ | F |
|  |  | $\left\|\begin{array}{l} 0 \\ \vdots \\ 0 \\ 0 \\ 0 \end{array}\right\|$ | $\begin{aligned} & \infty \\ & \stackrel{\infty}{0} \\ & \stackrel{-}{0} \end{aligned}$ | $\left\|\begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{array}\right\|$ | $\left\|\begin{array}{l} 0 \\ \stackrel{0}{0} \\ \underset{-}{2} \end{array}\right\|$ | $\begin{aligned} & \stackrel{6}{0} \\ & \stackrel{0}{0} \\ & 0 \end{aligned}$ | $\left\|\begin{array}{c} \tilde{0} \\ \stackrel{y}{0} \\ \dot{0} \end{array}\right\|$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} \infty \\ \stackrel{\infty}{0} \\ \sim \\ 0 \end{gathered}$ |  | $\begin{aligned} & \stackrel{\circ}{0} \\ & 0 \\ & 0 \end{aligned}$ | $\left\|\begin{array}{c} \bar{\infty} \\ 0 \\ 0 \\ 0 \end{array}\right\|$ | $\begin{aligned} & \stackrel{\sim}{0} \\ & \stackrel{0}{0} \end{aligned}$ | $\begin{aligned} & N \\ & \stackrel{N}{0} \\ & 0 \end{aligned}$ | $\stackrel{\infty}{\circ}$ |  |  | $\begin{aligned} & \text { L. } \\ & \text { N} \\ & \text { O. } \\ & \hline \end{aligned}$ |  | $\begin{aligned} & \infty \\ & \substack{0 \\ 0 \\ 0 \\ 0} \end{aligned}$ | $\begin{gathered} 0 \\ \hat{N} \\ 0 \\ \vdots \end{gathered}$ |  |  |  | $\begin{aligned} & 0 \\ & \stackrel{0}{0} \\ & 0 \end{aligned}$ |  |  |  |  |  |  |  |  |  | $\begin{array}{r} \frac{2}{4} \\ \hline \end{array}$ | $\begin{aligned} & \frac{g}{7} \\ & \\ & \hline \end{aligned}$ | － |
|  |  | $\left\|\begin{array}{c} \infty \\ 0 \\ 0 \\ 0 \\ \vdots \end{array}\right\|$ | $\begin{aligned} & \infty \\ & 0 . \\ & 0 \\ & 0 \end{aligned}$ | $\left\|\begin{array}{c} \hat{0} \\ 0 \\ 0 \\ 0 \end{array}\right\|$ | $\left\|\begin{array}{c} \tilde{N} \\ \tilde{f} \\ \dot{\sim} \end{array}\right\|$ | $\left.\begin{aligned} & \infty \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned} \right\rvert\,$ | $\left\|\begin{array}{c} \infty \\ 0 \\ 0 \\ 0 \\ 0 \end{array}\right\|$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\stackrel{\substack{\mathrm{c} \\ \hline \\ \hline \\ \hline}}{ }$ |  | $\stackrel{N}{\circ}$ | $\left\|\begin{array}{l} \infty \\ 0 \\ 0 \\ 0 \\ 0 \end{array}\right\|$ | $\begin{aligned} & \stackrel{\sim}{0} \\ & \stackrel{0}{0} \end{aligned}$ | $\begin{aligned} & \circ \\ & 0 . \\ & 0 \\ & 0 \\ & \hline \end{aligned}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ |  |  | $\left\|\begin{array}{c} N \\ \hat{N} \\ 0 \\ 0 \end{array}\right\|$ | $\begin{array}{\|l\|l\|l\|l\|l\|} \hline 0 \\ \vdots \\ \hline \end{array}$ | $\begin{aligned} & \infty \\ & \stackrel{\infty}{0} \\ & 0 \\ & \hline \end{aligned}$ | $\begin{aligned} & \stackrel{\rightharpoonup}{\infty} \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ |  |  | $\begin{aligned} & 0 \\ & 0 \\ & 0 \end{aligned}$ | $0$ | $\dot{0}$ |  |  |  |  |  |  |  |  |  |  | － |
| $\begin{array}{\|l\|l} \stackrel{*}{\mathrm{x}} \\ \stackrel{\rightharpoonup}{\circ} \end{array}$ | ＊ | ¢ | ¢ | 8 | $\left\|\begin{array}{l\|l\|} \hline 0 \\ 0 \\ 0 \\ \end{array}\right\|$ | $\stackrel{\sim}{\sim}$ | $\left\|\begin{array}{l} \stackrel{0}{0} \\ \stackrel{e}{2} \end{array}\right\|$ | － | N | 0 | － | $\stackrel{\infty}{\sim}$ | ว | へ | － | O | $\infty \underset{\sim}{\infty} \underset{\sim}{\infty}$ | $\stackrel{\circ}{\circ}$ | $\stackrel{\circ}{0}$ | － | ※ |  |  | － | $\infty$ | ¢ |  |  | － | － | － |  |  |  | $80$ | \％ | $\stackrel{\sim}{\sim}$ |
|  |  |  | $\begin{aligned} & 0.0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & \frac{0}{3} \\ & \vdots \end{aligned}$ |  |  | $\begin{aligned} & \overline{5} \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & \\ & \hline \end{aligned}$ |  |  |  |  | $\stackrel{\circ}{0}$ |  | $\begin{aligned} & 5 \\ & \stackrel{5}{0} \\ & \stackrel{5}{0} \\ & 0 \\ & 0 \\ & \vdots \\ & 0 \\ & 0 \end{aligned}$ |  |  |  |  | $\begin{array}{\|l\|l} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ \hline 0 \\ \frac{i}{0} \\ \frac{0}{0} \\ \hline \end{array}$ |  |  |  |  | － |  |  |  |  |  |  | - |  |  |  |  | $\begin{aligned} & \stackrel{5}{2} \\ & 2 \\ & \hline \end{aligned}$ |  |  |


| $\frac{\text { 주줄 }}{}$ | 2 0 0 0 | $\begin{aligned} & \stackrel{\rightharpoonup}{山} \\ & \underset{\sim}{\sim} \end{aligned}$ | $\begin{aligned} & \text { T } \\ & \text { T } \\ & \text { O } \end{aligned}$ | $\begin{aligned} & \mathrm{y} \\ & 0 \\ & \mathrm{D} \end{aligned}$ | $\begin{aligned} & 0 \\ & Z \\ & \leq \end{aligned}$ | $\begin{aligned} & 0 \\ & \stackrel{0}{4} \\ & 0 \end{aligned}$ | $\begin{aligned} & \text { T } \\ & \mathbf{T} \\ & 0 \\ & 0 \end{aligned}$ | $\bar{\Sigma}$ | $\begin{aligned} & \vec{T} \\ & \mathbf{T} \\ & 0 \end{aligned}$ | $\begin{aligned} & \llcorner \\ & ⺊ \\ & \underset{3}{w} \end{aligned}$ | $\begin{aligned} & \underset{\sim}{w} \\ & \stackrel{y}{0} \\ & \sum \end{aligned}$ | $\begin{aligned} & \mathrm{y} \\ & 0 \\ & \mathrm{O} \\ & \mathrm{D} \end{aligned}$ | $\begin{aligned} & \stackrel{\llcorner }{\hookleftarrow} \\ & \underset{\sim}{u} \end{aligned}$ | ＾ | $\begin{aligned} & 0 \\ & 2 \\ & 5 \end{aligned}$ | $\begin{array}{\|l} \underset{\sim}{\underset{\sim}{\underset{\sim}{\sim}}} \\ \hline \end{array}$ | $\begin{aligned} & \overline{\mathrm{a}} \\ & \hline \end{aligned}$ | $\begin{aligned} & \overline{\mathrm{a}} \\ & \underline{\mathrm{~s}} \end{aligned}$ | $\begin{array}{\|c} \underset{\sim}{\underset{~}{⿺}} \\ \underset{u}{u} \end{array}$ | $\begin{aligned} & \overline{\mathrm{a}} \\ & \underline{\mathrm{z}} \end{aligned}$ | $\frac{\underset{\sim}{\underset{\sim}{x}}}{}$ |  |  | $\begin{aligned} & \stackrel{\rightharpoonup}{F} \\ & \stackrel{\rightharpoonup}{2} \end{aligned}$ | $\begin{array}{\|c} \underset{\sim}{\underset{\sim}{x}} \\ \underset{\sim}{4} \end{array}$ | $\begin{aligned} & \overline{\mathrm{a}} \\ & \underline{\text { an }} \end{aligned}$ |  | $\begin{array}{\|l\|l} \stackrel{\leftarrow}{0} \\ \omega \\ \vdots \end{array}$ | $\begin{array}{\|l\|l} \underset{\sim}{\underset{\sim}{x}} \end{array}$ | $\begin{aligned} & \mathrm{O} \\ & \mathrm{O} \\ & \hline \end{aligned}$ | $\underset{\substack{\underset{\sim}{\underset{\sim}{u}} \\ \hline}}{ }$ | $\frac{\underset{\sim}{\underset{\sim}{x}}}{}$ | $\begin{aligned} & \text { ש } \\ & \stackrel{\rightharpoonup}{0} \\ & \sum_{0} \end{aligned}$ | $\begin{aligned} & \text { y } \\ & \text { D } \end{aligned}$ | $\overline{\stackrel{\rightharpoonup}{\mathrm{z}}}$ | $\stackrel{\infty}{\sim}$ | $\begin{aligned} & \stackrel{\leftarrow}{9} \\ & \underset{3}{3} \end{aligned}$ | $\begin{aligned} & \llcorner \\ & \stackrel{\sim}{w} \\ & 3 \end{aligned}$ | $\begin{aligned} & 0 \\ & \omega \\ & \omega \\ & \omega \end{aligned}$ | $\stackrel{\leftarrow}{\sim}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \stackrel{x}{\kappa} \\ & \sum_{\Sigma} \end{aligned}$ | $\begin{aligned} & \text { حै } \\ & 0 \\ & 0 \end{aligned}$ | $\stackrel{\sim}{\sim}$ | $\stackrel{\infty}{\sim}$ | $\stackrel{\stackrel{\rightharpoonup}{\mathrm{N}}}{\sim}$ | $\infty$ | N | $\stackrel{\circ}{\dot{\gamma}}$ | $\stackrel{¢}{\circ}$ | $\bar{\sim}$ | $\stackrel{\text { N }}{ }$ | $\wedge$ | $\stackrel{\otimes}{\mathbf{N}}$ | $\overline{0}$ | $\sim$ | $\stackrel{\sim}{\sim}$ | ¢ | $\begin{aligned} & \circ \\ & \stackrel{n}{0} \end{aligned}$ | $\begin{aligned} & \infty \\ & \stackrel{\infty}{\infty} \end{aligned}$ | ค | $\overline{7}$ | ～ | $\stackrel{m}{\Gamma}$ | $\pm$ | 슨 | N | $\stackrel{\infty}{\sim}$ | $\sim$ | $\begin{array}{\|c} \hat{e} \\ \mathbf{e} \end{array}$ | $\bigcirc$ | $\stackrel{\circ}{8}$ | ก | $\stackrel{\llcorner }{\sim}$ | 8 | $\frac{\circ}{\gamma}$ | $\stackrel{\circ}{\bullet}$ | $\sim$ | $\stackrel{\llcorner }{\sim}$ | － | $\stackrel{\sim}{N}$ | $\stackrel{\circ}{\circ}$ |
| $n$ $\vdots$ 0 0 0 $\vdots$ $\vdots$ | $\begin{aligned} & \stackrel{\rightharpoonup}{0} \\ & \text { n } \\ & \stackrel{0}{0} \\ & \stackrel{0}{0} \end{aligned}$ | へ | － | ก | $\wedge$ | $\stackrel{\sim}{\sim}$ | ก | ¢ | $\stackrel{\sim}{\square}$ | $\stackrel{\sim}{-}$ | $\stackrel{\sim}{\sim}$ | $\stackrel{\sim}{6}$ | 广 | ～ | N | $\stackrel{\text { N }}{ }$ | ก | ¢ | ๑ | 岕 | － | $\stackrel{\circ}{7}$ | $\bullet$ | ल | $\stackrel{\sim}{0}$ | の | $\sim$ | $\stackrel{\sim}{\circ}$ | の | $\stackrel{\circ}{\circ}$ | 안 | ल | $\stackrel{\text { ® }}{ }$ | L | ก | n | 岕 | － | \％ | ¢ |
|  |  | $\begin{array}{\|c\|} \infty \\ \stackrel{0}{\circ} \\ \dot{O} \\ \hline \end{array}$ | $\begin{gathered} + \\ \stackrel{\infty}{0} \\ \stackrel{N}{0} \end{gathered}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \overline{0} \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & 0 \\ & \infty \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \stackrel{5}{0} \\ & \stackrel{\sim}{\Gamma} \end{aligned}$ | $\begin{aligned} & \infty \\ & \stackrel{\infty}{0} \\ & 0 \\ & 0 \end{aligned}$ | $\left\|\begin{array}{l} \circ \\ \infty \\ \infty \\ 0 \\ 0 \end{array}\right\|$ | $\begin{aligned} & \hat{\infty} \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \overline{0} \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \overline{\mathrm{N}} \\ & \stackrel{e}{m} \\ & \stackrel{\sim}{2} \end{aligned}$ | $\begin{gathered} \stackrel{\circ}{寸} \\ \underset{\circ}{\circ} \end{gathered}$ | $\begin{aligned} & 0 \\ & \stackrel{\omega}{2} \\ & \stackrel{\rightharpoonup}{0} \end{aligned}$ | $\begin{aligned} & \text { N} \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \underset{\sim}{0} \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \stackrel{0}{N} \\ & \stackrel{0}{0} \\ & 0 \end{aligned}$ | $\begin{aligned} & \bar{\circ} \\ & \stackrel{\circ}{\circ} \\ & \dot{-} \end{aligned}$ | $\begin{aligned} & \infty \\ & \stackrel{\circ}{\circ} \\ & 0 \\ & 0 \end{aligned}$ | $\left.\begin{gathered} \circ \\ \infty \\ \stackrel{\infty}{-} \end{gathered} \right\rvert\,$ | $\begin{aligned} & \circ \\ & \stackrel{O}{O} \\ & 0 . \end{aligned}$ | $\left\lvert\, \begin{aligned} & \circ \\ & \stackrel{~}{J} \\ & \dot{O} \end{aligned}\right.$ | $\begin{aligned} & \text { M } \\ & \underset{\sim}{\mathrm{O}} \end{aligned}$ | $\begin{aligned} & 0 \\ & \stackrel{0}{0} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \bar{N} \\ & \stackrel{0}{0} \\ & \dot{B} \end{aligned}$ | $\begin{aligned} & 0 \\ & \stackrel{0}{N} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \frac{0}{2} \\ & \stackrel{O}{0} \\ & 0 \end{aligned}$ | $\begin{aligned} & \infty \\ & \stackrel{\infty}{f} \\ & \underset{-}{\prime} \end{aligned}$ | $\left\|\begin{array}{l} 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{array}\right\|$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} \underset{N}{N} \\ \text { N } \\ \hline \end{gathered}$ | $\begin{aligned} & \circ \\ & \stackrel{0}{+} \\ & \stackrel{\circ}{\circ} \end{aligned}$ | $\begin{aligned} & \frac{\square}{8} \\ & \stackrel{0}{0} \end{aligned}$ | $\begin{aligned} & \text { N} \\ & \underset{\sim}{N} \end{aligned}$ | $\begin{gathered} \bar{N} \\ \underset{O}{O} \\ \dot{O} \end{gathered}$ | $\begin{aligned} & \bar{\sim} \\ & \stackrel{\circ}{\circ} \end{aligned}$ | $\begin{aligned} & \stackrel{+}{\infty} \\ & \underset{0}{0} \\ & \hline \end{aligned}$ | $\begin{aligned} & \overline{0} \\ & \dot{\circ} \\ & 0 \end{aligned}$ | $\begin{gathered} n \\ \stackrel{0}{0} \\ \dot{0} \end{gathered}$ | $\stackrel{+}{+}$ |
|  |  | $\left.\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned} \right\rvert\,$ | $\begin{gathered} \stackrel{L}{N} \\ \underset{0}{\sim} \end{gathered}$ | $\begin{aligned} & \infty \\ & \stackrel{\infty}{i} \\ & \stackrel{0}{i} \\ & 0 \end{aligned}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \underset{寸}{寸} \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} \underset{\sim}{0} \\ \underset{\sim}{0} \end{gathered}$ | $\begin{aligned} & \infty \\ & \infty \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\left\|\begin{array}{l\|l\|} \infty \\ \infty \\ \infty \\ 0 \\ 0 \end{array}\right\|$ | $\begin{aligned} & \mathscr{\sim} \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} \underset{N}{N} \\ \underset{\sim}{\prime} \end{gathered}$ | $\begin{aligned} & \infty \\ & \infty \\ & \infty \\ & \dot{\infty} \end{aligned}$ | $\begin{aligned} & \ddot{0} \\ & \stackrel{0}{0} \\ & \vdots \\ & 0 \end{aligned}$ | $\begin{gathered} N \\ \stackrel{N}{n} \\ 0 \\ 0 \end{gathered}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \stackrel{0}{0} \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & N \\ & \stackrel{N}{N} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & 00 \\ & 0 \\ & 0 \\ & \dot{0} \end{aligned}$ | $\begin{array}{\|c} \circ \\ \stackrel{0}{\mathrm{~N}} \\ \underset{\sim}{2} \end{array}$ | $\begin{aligned} & \circ \\ & \hline 0 \\ & 0 \\ & 0 \end{aligned}$ | $\left\|\begin{array}{c} 0 \\ \stackrel{0}{0} \\ \underset{\sim}{0} \end{array}\right\|$ | $\begin{aligned} & \stackrel{\circ}{\square} \\ & \stackrel{0}{0} \end{aligned}$ | $\begin{aligned} & -\bar{\infty} \\ & \dot{0} \\ & 0 \end{aligned}$ | $\begin{aligned} & \stackrel{O}{寸} \\ & \dot{G} \end{aligned}$ | $\begin{gathered} \stackrel{\infty}{N} \\ \stackrel{0}{0} \\ 0 \end{gathered}$ | $\begin{aligned} & \circ \\ & \stackrel{\circ}{\circ} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} N \\ ⿳ 亠 丷 厂 犬 \\ \stackrel{N}{-} \end{gathered}$ | $\left\|\begin{array}{l} \infty \\ \stackrel{0}{0} \\ 0 \\ 0 \end{array}\right\|$ | $\begin{aligned} & \underset{~}{寸} \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \stackrel{0}{\mathrm{y}} \\ & \stackrel{\rightharpoonup}{0} \end{aligned}$ | $\begin{aligned} & \text { N} \\ & \stackrel{n}{0} \\ & \vdots \\ & 0 \end{aligned}$ | $\begin{aligned} & \overline{\mathrm{O}} \\ & \mathrm{O} \\ & \hline \end{aligned}$ | $\begin{aligned} & \text { గ్ } \\ & \stackrel{6}{6} \end{aligned}$ | $\begin{aligned} & \text { N} \\ & \text { N} \\ & 0 \end{aligned}$ | $\begin{aligned} & \overline{\mathrm{O}} \\ & \text { O. } \end{aligned}$ | $\begin{aligned} & \bar{\circ} \\ & \infty \\ & 0 \\ & \hline \end{aligned}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} 0 \\ \stackrel{0}{7} \\ \stackrel{-}{4} \end{gathered}$ | $\stackrel{+}{+}$ |
| $\begin{gathered} \stackrel{*}{0} \\ \stackrel{\circ}{\circ} \end{gathered}$ | ＊ | $\begin{aligned} & \mathbf{9} \\ & \stackrel{0}{2} \end{aligned}$ | $\stackrel{\circ}{\sim}$ | $\stackrel{\text { N}}{\sim}$ | $\stackrel{\infty}{\sim}$ | $\underset{\sim}{\infty}$ | $\begin{aligned} & \stackrel{\sim}{0} \\ & \underset{\sim}{m} \end{aligned}$ | $\stackrel{\infty}{\circ}$ | $\begin{aligned} & \stackrel{\infty}{\infty} \\ & \stackrel{1}{2} \end{aligned}$ | $\stackrel{N}{\sim}$ | 산 | $\begin{aligned} & \hat{0} \\ & \stackrel{e}{2} \end{aligned}$ | $\frac{\circ}{6}$ | ค | $\stackrel{\circ}{\circ}$ | $\stackrel{\circ}{\boldsymbol{\circ}}$ | $\begin{aligned} & \circ \\ & \stackrel{\circ}{\circ} \\ & -1 \end{aligned}$ | $\begin{aligned} & \stackrel{\circ}{\mathrm{N}} \end{aligned}$ | $\stackrel{\sim}{-}$ | $\begin{aligned} & \dot{\prime} \\ & \hline \\ & \dot{f} \end{aligned}$ | $\sim$ | $\begin{gathered} \bar{m} \\ \underset{\sim}{2} \end{gathered}$ | 안 | $\stackrel{N}{\underset{\sim}{0}}$ | $\stackrel{\circ}{\square}$ | $\stackrel{\sim}{\square}$ | ๓ | $\begin{gathered} -\bar{\infty} \\ \underset{\sim}{子} \end{gathered}$ | $\bullet$ | $\frac{\infty}{ल}$ | $\stackrel{\circ}{\circ}$ | $\stackrel{\circ}{N}$ | $\stackrel{\infty}{\sim}$ | N్ల へ্~ | $\underset{\sim}{\sim}$ | $\wedge$ | $\stackrel{0}{N}$ | － | $\begin{aligned} & \hat{\infty} \\ & \stackrel{\sim}{\sim} \end{aligned}$ | $\stackrel{\infty}{\stackrel{\circ}{\bullet}}$ |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 0.0 0 0 0 0 0 0 0 0 0 0 |  |  |  |  |  | 3 <br> 0 <br> 0 <br> 0 <br> 0 <br> 0 <br> 0 <br> 0 <br> 0 <br> 0 <br> 0 <br> 0 <br> 0 <br> 1 <br> $\vdots$ <br> 0 | $\begin{aligned} & 3 \\ & \frac{3}{2} \\ & \frac{0}{0} \\ & 0 \\ & 0 \\ & \frac{0}{0} \\ & \frac{0}{0} \\ & \hline i \frac{14}{} \\ & \hline \end{aligned}$ | 3 <br> 3 <br> 0. <br> 0 <br> 0 <br> 0 <br> 0 <br> $\vdots$ <br> 0 <br> 0 <br> 0 <br> 0 |  |  | 3 <br> 3 <br> 0 <br> 0 <br> 0 <br> 0 <br> 0 <br> 3 <br> 3 <br> $\frac{0}{0}$ <br> $\frac{0}{0}$ <br>  | $\begin{aligned} & 3 \\ & 0 \\ & 0.0 \\ & 0 \\ & 0 \\ & 0 \\ & \times \\ & \times \\ & \dot{0} \\ & \hline \end{aligned}$ | $\left.\begin{aligned} & 3 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned} \right\rvert\,$ |  | $\begin{aligned} & 3 \\ & 0 \\ & 0 . \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & \sum_{0}^{0} \\ & 3 \\ & 0 \end{aligned}$ |  |  |  |  |  |  |  | $\begin{aligned} & \overline{0} \\ & \stackrel{e}{0} \\ & \stackrel{0}{0} \\ & \stackrel{0}{0} \\ & \hline \end{aligned}$ |  |  |

Codes for Multiple Counts in High Column

$$
\begin{array}{ll}
1 & \text { BUTL, PHIL } \\
2 & \text { DAUP, LUZE } \\
3 & \text { ALLE, BUTL } \\
4 & \text { BLAI, SCHU } \\
5 & \text { CAMB, LAN } \\
6 & \text { LANC, LEBA } \\
7 & \text { BUCK, NOR } \\
8 & \text { BUCK, LUZ } \\
9 & \text { CENT, FRA } \\
10 & \text { CLEA, CLIN, } \\
11 & \text { FRAN, GRE } \\
12 & \text { BEDF, BERK } \\
13 & \text { CAMB, ERIE } \\
14 & \text { BERK, BUTL } \\
15 & \text { ALLE, BUCK } \\
16 & \text { LACK, SCH } \\
17 & \text { DAUP, LAN } \\
18 & \text { LANC, PHIL }
\end{array}
$$

|  | Tota* | Birds / Hour | Birds / Hour | \# of Counts | Max | High |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | ** | (3367 hrs) | Avg 1998-2004 | (of 55 tot) | Count | County |
| Eastern Meadowlark | 852 | 0.2530 | 0.2794 | 45 | 252 | W YOM |
| Rusty Blackbird | 111 | 0.0330 | 0.0001 | 7 | 85 | ERIE |
| Common Grackle | 11078 | 3.2902 | 0.0051 | 54 | 1383 | JUNI |
| Brown-headed Cowbird | 2939 | 0.8729 | 3.8209 | 53 | 247 | BUCK |
| blackbird sp. | 39 | 0.0116 | 0.8889 | 1 | 39 | W YOM |
| Orchard Oriole | 450 | 0.1337 | 0.0997 | 35 | 51 | GREE |
| Baltimore Oriole | 3899 | 1.1580 | 1.0991 | 53 | 338 | JUNI |
| Purple Finch | 282 | 0.0838 | 0.0988 | 30 | 37 | W AYN |
| House Finch | 1622 | 0.4817 | 0.7586 | 53 | 150 | INDI |
| Common Redpoll | 2 | 0.0006 | 0.0014 | 1 | 2 | TIOG |
| Pine Siskin | 50 | 0.0149 | 0.0229 | 8 | 18 | McKE |
| American Goldfinch | 4409 | 1.3095 | 1.9254 | 55 | 285 | BUCK |
| House Sparrow | 4298 | 1.2765 | 1.6735 | 53 | 389 | WEST |
|  |  |  |  |  |  |  |
| Total birds | 247992 | 73.6537 | * | * | 31177 | BUCK |
| Total species | 234 | * | * | * | 174 | LANC |
| Total participants | 956 | * | * | * | 74 | FRAN |
| Subtotal - feeder watchers | 115 | * | * | * | 29 | INDI |
| Subtotal - nocturnal | 91 | * | * | * | 13 | JUNI |
| Total Hours | 3367 | * | * | * | 256 | SCHU |
| Subtotal - feeder | 377 | * | * | * | 70.75 | INDI |
| Subtotal - nocturnal | 94.5 | * | * | * | 10 | LANC |
| Hours/observer | 3.52 | * | * | * | 13.5 | ERIE |
| Miles foot, approx: | 1273.1 | * | * | * | 94 | BUCK |
| Miles car, other: | 9979.1 | * | * | * | 718 | WEST |
| Total miles: | 11252.2 | * | * | * | 791 | WEST |

