

# WINTERING RAPTORS and WATERFOWL

on the MAURICE RIVER

CUMBERLAND COUNTY, NEW JERSEY

*The 37th FIELD SEASON*

*of a Long-term Avian Use Study*

*and the Second Season of the new and revised Volunteer Count Protocol*

**Findings for the WINTER PERIOD: December 2023 through March 2024**

*Research and Monitoring Sponsored by:*

**CU Maurice River**



Although many dabbling ducks have declined on the river over time, diving ducks continue to be abundant each winter season, particularly on the lower river and in Maurice River Cove. Here a **drake Red-breasted Merganser** in Delaware Bay is in fine form. *(photo by Clay Sutton)*

**Clay Sutton**

**May 2024**



A special find of Season 37, and a glowing highlight of all the years of study, was this **Snowy Owl** (*upper left*) found at East Point during the January 12 survey (see page 8). Bald Eagles continue to impress on Bayshore rivers; here is an **adult Bald Eagle** (*upper right*), one of 14 in sight at once (!) at Heislerville WMA on January 18. Our surveys count all raptors and waterbirds, including shorebirds; this **American Woodcock** (*bottom*) was at Heislerville WMA on January 22, 2024. (Photos by Clay Sutton).

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## *The 37<sup>th</sup> FIELD SEASON of a Long-term Avian Use Study*

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### **Introduction and Background: “The Changing Times Continue”**

Following the previous thirty-six years of long-term winter raptor and waterfowl status and distribution studies on the Maurice River (a major Delaware Bay tributary), this current report presents the results from a continuation of these unique studies: the 37<sup>th</sup> consecutive winter-season monitoring of the regionally significant birds of prey and waterfowl populations that spend the winter on the tidal Maurice River. All previous seasonal summary reports, as well as a comprehensive 30-year report detailing long-term trends in raptors and waterfowl on the Maurice River, are available on the Citizens United to Protect the Maurice River and its Tributaries, Inc. (CU Maurice River) website at:

[www.cumauriceriver.org/raptor-and-waterfowl-surveysstudies/](http://www.cumauriceriver.org/raptor-and-waterfowl-surveysstudies/)

During the winter of 2023-2024, Maurice River raptors and waterfowl were monitored for the 37<sup>th</sup> consecutive season. However, for the second time in these 37 years, count protocols and techniques were changed somewhat dramatically. Due to the continuing documented decline of some raptors and most waterfowl on the river, and more importantly, changes on the river itself, the protocols used for the first 35 years were found to be no longer applicable or doable. Without going into all causes and effects (see previous reports referenced above), suffice it to say that continuing and emergent access issues, and associated declining views (viewability of birds) have combined to render original protocols no longer valid or usable. The major decline of wild rice acreage, and the rapid and accelerating encroachment of *Phragmites* have resulted in fully half of prior point count sites being increasingly and severely compromised. With this the reality, and following consultation with CU Maurice River, it was deemed necessary and timely to revamp our studies, choosing new protocols for these studies as they go forward. In summary, as it became imperative to either change tactics or end the studies, we chose to continue.

The new methods/protocols, first used during Year 36, again used during the current season (Year 37), and to be used in subsequent future seasons as long as they are practicable, are as follows:

1. Instead of the two observers used for the first 35 years (the same observers: Clay Sutton and Jim Dowdell), **only one observer** conducted the counts (Clay Sutton). While the first 35 years were contracted by CU Maurice River, the Year 36 and Year 37 counts were carried out on a volunteer (*pro bono*) basis, and this will be the case going forward.

2. One-half of the original point counts were used. **Four sites** (East Point, Heislerville WMA, Bivalve, and the Galetto dock [on the upper river]), were employed in Years 36 and 37. By “half,” that is to say that of the prior nine, the causeway Bridge North and Bridge South were in effect counted as a single site in recent past years as the *Phragmites* continued to impact views. Bridge North and Bridge South were dropped; also eliminated were Leesburg, the Sweet Meadow area, and the Peek Preserve.
3. Because of “half the observers” and “half the sites,” **observation time was doubled** at the 4 remaining point count locations. Where previous protocol called for 45 minutes of observation at a site, the **new methodology required 90 minutes** (1.5 hours) per site. It was assumed that greater time spent in-part made up for the lack of the second observer and the fewer sites visited. It was theorized that additional time spent would increase the potential that hidden, distant, and itinerant birds would be spotted and counted.
4. The final change is less tangible. Because of fewer sites and one less observer, **the scope of the count (the “reach” of the observations) saw subtle changes and was broadened**. In past years, the nine point count sites gave ample geographic coverage of the river. Obviously, four sites give less coverage (viewability, or likelihood to observe all birds present). In the past, since there was closer proximity (and some possible overlap) of sites, Sutton and Dowdell needed to be quite conservative at times to avoid any over-counting (counting the same individuals twice). An imaginary but real-world example might best illustrate this concept: perhaps at the Galetto dock site, 8 Red-tailed Hawks were observed. But 3 of those 8 were soaring far or very far to the north. Eight would be tallied, but we would make a note that at the next site, the Peek Preserve to the north, the first 3 Red-tails could *not* be counted. Any *more* than 3 and we could add them to the daily count. Conversely, any Red-tails seen from Peek soaring far to the south (over the Galetto dock) could not be added either – due to the likelihood that they had previously been counted. Now, with less geographical coverage, these issues are less of a concern. Currently, those three Red-tails over Peek *can* be counted because Peek is no longer employed as a count site. While overcounting is still a concern to be judiciously considered, monitored, and avoided, with the new protocols there is somewhat less concern of this than previously. The reach and scope (the “viewscape”) of the coverage has changed, and will be somewhat more liberal than in the past, but I have confidence that the past 35 years of effort lends substantial understanding and credibility as to what should be recorded (or not recorded) at each site.

Based on the findings of the 36<sup>th</sup> season, and now the additional 37<sup>th</sup> season, it preliminarily appears that the new protocols are working and lend good, substantial (if not perfect...) comparability and corroboration with the techniques employed during our first 35 winter seasons (see additional discussion in Summary and Conclusions section).

There is valid scientific precedent and cause for a long-term monitoring study to reduce the effort (if and when necessary) and include only a subset of original data points (in this case: count sites). When any study finds it difficult to carry out data gathering due to site changes, for example when some sites produce good data and other sites no longer contribute, there is good cause to downsize to a subset of points. Essentially, if a subset produces good results, comparable

to the past, while others produce little, there is little need to continue to expend time and energy on those sites which have changed and are no longer applicable. Those point count sites eliminated in Years 36 and 37 were no longer producing results due to change of habitat: primarily extensive *Phragmites* encroachment that was both reducing wildlife use (raptors and waterfowl) and the basic ability to see and count any birds in the event they were still present. (The Leesburg site loss of visibility was due more to land-use and access changes – the industrialization of the site). These changes and reduction to a subset of data can be reviewed and evaluated in a few years to see if our suppositions here are correct, but based on the preliminary findings of Years 36 and 37, the subset provided valid results that are surprisingly comparable to our (most recent) past efforts, methodologies, and findings.

### **Findings:**

Core winter raptor and waterfowl monitoring continued for the 37<sup>th</sup> consecutive winter season. The Maurice River was sampled on five dates between December 13, 2023 and March 20, 2024. These findings are presented in **Table 1**. Also shown in Table 1 are the winter 2023-2024 average counts and peak daily counts for key species. The five survey dates in this past winter season, “Year 37” of monitoring on the Maurice, bring our cumulative total of winter surveys to 350 over the 37 years, dating back to the study’s inception in 1987. Such consistent coverage and methodology give us an unparalleled perspective on the changing avian resources of the Maurice River. (See 30-year report). Always remember and note however, that protocols were changed considerably in Years 36 and 37, in order to react to and accommodate changing physical conditions on the Maurice River.

As in past seasons, Cumberland County’s other major Delaware Bay tidal tributary, the Cohansey River, was also sampled (albeit on only two occasions) during the winter period. For 34 years the Cohansey has been monitored as a “comparison river” or “control” to ascertain whether findings on the Maurice were representative; that is, whether they were either localized or more widespread on the Delaware Bayshore. Cohansey River results for winter 2023-2024 are shown in **Table 2**. The two survey dates on the Cohansey River during the current season bring the cumulative total to 59 winter surveys over the 34 years of this comparative study dating back to 1990. The depth of this effort and data set allows for strong comparisons, contrasts, and corroborations. Without elaborating, as this is an emerging “work in progress,” Cohansey River protocols were adjusted slightly too in this past season, for similar reasons to the Maurice and in an effort to keep the comparisons as similar and valid as possible. Cohansey River surveys were also carried out on a volunteer basis by Clay Sutton.

**Table 3** shows peak and average numbers of key waterfowl species and all raptor species on the Maurice River during winter 2023-2024, shown in relation to the Segment VII summary (2017-2022) of this long-term study, as well as the individual single-season results from Years 31 through 36. (Note that Year 35 completed the seventh five-year segment of the study, segments that date back for 35 years to 1987). The findings for Years 36 and 37 are straight-forward and self-explanatory, particularly when viewed with and against: **1.** The previous Segment VII; **2.** The discussion in the 30-year report presented in February 2018; **3.** The recorded presentation, *35 Years on the Maurice*, presented to CU Maurice River at the members meeting on January 10, 2024, and available on the CU website.

## Discussion – Waterfowl:

As with every winter season, the relative abundance and phenology of wintering raptors and waterfowl found on the Maurice River were in large part dictated by the weather. As has been the trend in most recent winters, the winter of 2023-2024 was a mild one. As **Attachment 1** (from March 2) readily attests, the winter of 2023-2024 was the warmest nationwide in recorded history. This fact has huge implications for winter bird populations in the Mid-Atlantic region and on the Maurice River; many birds do not travel as far south in warm winters, and those that do don't remain south for nearly as long (due to early and warmer spring weather). **Attachment 2** (from March 16) follows up on this thread, indicating that the winter of 2023-2024 was among the five warmest ever in the Northeast. This article discusses the implications of such warming trends on a host of species and issues. **Attachment 3** (March 5) explores the warmer temperatures of the late winter/early spring, with early March temperatures (and rainfall) well above average. In further reporting, New Jersey annual temperature has increased by 3.9 degrees since 1895, with much of this coming in recent years. **Attachment 4** (March 20) further explores how the winter of 2023-2024 was one of the wettest seasons recorded in recent years, with record rainfall finally ending the drought conditions of recent years. It may have been wet, but there was virtually no ice or snow seen in our region during the winter past. (All weather data/attachments from *The Press of Atlantic City*). Finally, *The Weather Channel* reported that on February 28<sup>th</sup>, the Great Lakes showed the least “sea-ice” coverage (the lowest percentage) since record-keeping began in the 1970s, and that upstate New York had a snowfall deficit of six feet. Ice coverage and snowfall are major factors that spur the southbound movement of both raptors and waterfowl, both during fall migration and (sporadic, if needed) mid-winter weather-related exoduses.

In short, we experienced a very mild winter, without the requisite snow and ice that is needed to push birds to the Bayshore region in possibly average or above average numbers. While these harsh conditions were again absent, there was also, as expected in recent years, considerable tidal flooding in the area, both at higher levels and greater frequency than was recorded decades ago.

After 36 years of previous study, we believe that the findings on the Maurice for winter 2023-2024 (Year 37) were about what we have come to expect for a winter without lengthy or deep freeze-ups. Snow Geese were nearly absent, and itinerant as usual, with most regional geese remaining west and north of the Maurice River region (and the Cohansey as well). The numbers of Snow Geese found were the fewest ever, and well below the long-term average. Canada Goose numbers were modest also, as many remained north of the Delaware Bayshore due to the lack of Northeast Region snow cover and frozen conditions early in the winter. Diving duck numbers were solid, yet down from what we have seen in recent years. The lack of ice, and the relatively mild late winter and early spring led to very early departures of ducks for their northern breeding grounds, and this too was (once again) a factor in very low average numbers for all ducks in 2023-2024.

American Black Duck and Mallard numbers were once again very low compared to long-term averages. In fact, both species posted their second-lowest numbers ever, second only to the previous winter, Year 36. Northern Pintail were virtually absent, with only an abysmal ten (total!) seen. The absence of these formerly flagship species was presumably due to both the weather (lack of a harsh winter, and subsequent early spring, leading to early duck departure or complete bypassing) and to the long-term and on-going diminishing of quality brackish wild rice habitat. This degradation of habitat is anecdotally observed to be continuing and accelerating. The crucial wild rice acreage that was once prevalent on the brackish tidal upper river (the habitat that previously supported large numbers of dabbling ducks) has been rapidly disappearing, presumably due to sea

level rise and probable increasing salinity (see 30-year report and subsequent yearly reports). In addition, *Phragmites* encroachment continues and is accelerating along much of the Maurice River, rapidly out-competing (“crowding out”) and replacing both wild rice and *Spartina alterniflora*. Non-native *Phragmites*, or Common Reed, is well known to be aggressively invasive, and indeed catastrophic to native wetlands ecosystems in many places.

While most duck numbers were well below average in winter 2023-2024, Green-winged Teal numbers continued to be high on the Maurice. Green-winged Teal are benefitting from mild winters. They are both wintering farther north in higher numbers than previously, and the lack of ice cover allows them to remain all winter, rather than be pushed farther south by harsh conditions. Common Teal were found among the Green-winged Teal on February 5 and March 1. While some consider Common Teal to be a subspecies of Green-winged Teal, many ornithologists feel that this is indeed a full species, and that it will probably be “split” in the near future. This is a Eurasian duck, and it is significant that they are found on the Maurice River almost every winter.

### **Discussion – Raptors:**

While winter raptor numbers remained regionally significant, among hawks, no American Kestrels were recorded during the past winter season. This is only the third time in 37 years that Kestrel have been missed during our survey efforts. As past reports have explored, this is undoubtedly linked to the loss of high marsh, and the loss and conversion (to ornamental nurseries) of former agricultural lands along the Maurice River survey route.

Two of the Maurice River’s hallmark hawks, Northern Harrier and Red-tailed Hawk, continued to show extremely low counts compared to the earlier segments of the study. In Year 37, tallies were well below long-term peaks and averages, and the alarming downward trend continued for these two Maurice River and Delaware Bay signature raptors. Red-tails posted their lowest-ever average, and while Harriers rebounded a bit from the previous winter, their numbers were still alarmingly low. Such low numbers for both species were no doubt linked in-part due to an unremarkable fall migration, as well as the mild winter. Over time, the higher numbers of raptors have normally occurred during colder winters, when raptors are pushed to our region by harsh conditions and snow cover farther north. But such drastically low numbers are also inextricably related to the habitat loss and degradation discussed above. The long-term downward trends for Northern Harrier and Red-tailed Hawk continue to be significant, dramatic, and disturbing. When viewed in relation to the findings of previous years, the entire 36 years of study, it is clear that things have changed drastically for these two keystone raptors of the Maurice River.

As extensively reviewed and discussed in the 30-year report and subsequently, we strongly believe that the cause for these distressing downward trends is the lack of marsh rodent prey availability. We hypothesize that the frequent and persistent tidal flooding from winter storms, as well as from monthly Full Moon and New Moon high tides, has severely impacted (nearly eliminated?) marsh rodents from much of the formerly productive Maurice River marshes. The findings from winter 2023-2024 again support the likelihood that this trend is continuing and most probably accelerating. An additional factor is that pervasive, rapid, and increasing *Phragmites* encroachment is continuing to eliminate *hunting habitat* for raptors – areas that were previously dominated by *Spartina* and wild rice wetlands. Not only are voles either absent or less numerous in *Phragmites*, but also Harriers and Red-tails simply cannot hunt in areas of exclusive and thick (impenetrable) *Phragmites*.

Although the two comparative Cohansey River surveys of winter 2023-2024 are inconclusive at best due to their limited number, these findings and those of recent years show the exact same picture. Northern Harrier and Red-tailed Hawk numbers continued to be very low, and well below the long-term averages, on the Cohansey River as well. Importantly, see our discussion in the earlier reports to further understand how Cohansey River findings support and confirm Maurice River findings over time. Whatever is adversely impacting Northern Harriers and Red-tailed Hawks on the Maurice River is clearly happening on the Cohansey River also.

While the issues of habitat change and resultant prey availability on the Maurice River are clearly adversely impacting Harrier and Red-tailed Hawk numbers, other widespread factors are involved as well. It is now well-documented that these two species have declined at many hawkwatches (hawk migration monitoring sites) in the Northeast and Mid-Atlantic regions in recent years. For one example, at Hawk Mountain Sanctuary in Pennsylvania, the autumn 2023 Red-tailed Hawk count was 34% below average, and was the lowest count (989) in Hawk Mountain's 89-year history (*Hawk Mountain News*, Spring 2024). Without intensively investigating this issue here, in summary, most watch sites consider climate change to be a major factor. Simply put, warmer temperatures and the concomitant lack of snow cover are allowing many hawks to remain farther north in winter. (See further in-depth discussion/elaboration in previous reports). There are population concerns too (for both raptors and waterfowl), particularly regarding the impacts of avian disease – West Nile Virus and Avian Flu – on bird populations. These are emerging and unknown factors, issues that cannot be explored here, that may well be impacting Maurice River wintering numbers.

At least there is considerable good news to balance the bad. Bald Eagle numbers continue to soar on the Maurice River. The winter of 2023-2024 again saw eagles present in continuing high numbers largely akin to recent winters. (That said, eagle numbers were down a bit due to the extremely mild winter; fewer birds came this far south). Today, multiple Bald Eagles are in sight at virtually all times during our surveys, and this is very heartening in light of those declining species we have discussed above. An amazing 14 Bald Eagles were in sight at once at Heislerville Wildlife Management Area (WMA) on January 18, a day that saw the only ice cover encountered during winter 2023-2024 (thin ice was on the impoundments, but not the river). Raptor diversity was good, and high Black Vulture and Turkey Vulture numbers continued. Vultures are well known to be increasing throughout the Northeast, and wintering in higher numbers and farther north than in previous years (a range expansion and population increase thought to be in-part resulting from the warmer winters of climate change).

A glowing highlight of the winter season past, and one of the top highlights of all these 37 years, was the discovery of a Snowy Owl, an immature female, sitting on a rooftop at East Point on January 12. It was only our third record of Snowy Owl on the Maurice in our 37 years of study. What is interesting is that it was found during what was clearly a non-invasion winter for Snowy Owls. (The Snowy Owl is not a regular migrant, but is known for “invasions,” or winter incursions, as an irregular or eruptive migrant). In fact, on January 12, *eBird* showed only two Snowy Owl sightings for all of North America east of the Great Lakes (one in New England, and one at Chincoteague, VA). When we couldn't re-find it the following day, we thought that the sighting was a “one day wonder,” but what was presumably this same Snowy was photographed at Matt's Landing about a week later, and at Shellpile a week after that (*fide eBird*). Apparently, this Snowy Owl liked what it found on the Maurice, be it ducks on the lower river and bay, or gulls at Bivalve.

Subsequently, I read an interesting February 14 blog post from Project SNOWstorm, the Snowy Owl research and tracking collaboration ([projectsnowstorm.org](http://projectsnowstorm.org)). They were having a very slow year, pretty much, until January 14 when TWO of their telemetry birds showed up on the



SAME DAY (came back south into cell phone range, and off-loaded all the GPS data on where they had been). The researchers linked their appearance to the fact that the last bits of open water in Hudson Bay froze over on January 10; the GPS tracks showed that this is where they had been. Our East Point Snowy showed up on January 12, and was maybe/probably (?) part of the same movement, an evacuation from Hudson Bay. Snowy Owls are known to hunt a lot of ducks that are either on open water or at the edge of the ice, but with their prey forced south and gone, the Snowies had to leave too. (And there were a bunch of Scoter and other ducks to be found in the Delaware Bay off East Point on January 12)!

Norman Smith with Massachusetts Audubon, who was a founding member of the SNOWstorm team, has been banding and relocating Snowy Owls from Boston's Logan Airport since 1981. As of February 14, this had been the slowest winter in all 43 of his years there, with just a single Snowy Owl caught and moved from Logan, an adult female back in December. (There also had been only a handful of Snowy Owl reports anywhere along the Massachusetts coast, and the photos Norman Smith saw convinced him they were all the same owl, the one he transported from Logan). Norman's previous record low was four owls; by contrast and for comparison, during the major invasion of 2013-14 he moved more than 150 Snowies. But the point is, this commentary on the scarcity of Snowy Owls in the East during winter 2023-2024 truly puts our East Point Snowy in perspective. It was an amazing and lucky find, and an exceptional highlight of not only Year 37, but of all these many years on the Maurice.

Another highlight of the Year 37 winter work was the continued and dramatic increase of Sandhill Cranes wintering on and near the Cohansey River in western Cumberland County. (See Table 2). The increase of Sandhill Cranes in the East is well-known and documented, and the saga of the "Cohansey Cranes" has also been well-written and expounded upon. (See "Old Crooked Toe" and the *Grus* Cranes of Southern New Jersey, by William J. Boyle Jr. and Laurie Larson, in *Records of New Jersey Birds*, Spring 2009, Vol. XXXV, No. 2., New Jersey Audubon Society). In quick summary, a captive Common Crane (a Eurasian species) was hatched in upstate New York in 1988, escaped in 1990, migrated to New Jersey, and readily took to the wild. He (or she?) lived to at least 23 years old, and has attracted and augmented a growing flock of wild Sandhills that spend the winter along and around the Cohansey. (In the early years, many of the cranes were hybrids; today most appear to be pure Sandhill Cranes). This flock then widely disperses in spring to breed in New Jersey and no doubt beyond.

On this year's January 3 survey of the Cohansey River, an amazing 68 Sandhills were seen together, a new *maxima* for New Jersey. **Figure 1** depicts the rising numbers and upward trend of wintering Sandhill Cranes on the Cohansey River over the past 25 winter seasons. Numbers shown are either the counts taken from our Cohansey River surveys, or those from the published Cumberland County Christmas Bird Count (CBC) data (whichever was higher for the given winter season). The 25-year span reflects the wintering numbers recorded in the years since the Common Crane successfully nested with a wild Sandhill Crane at Bostwick Lake, on the Salem-Cumberland county line, in 2000. (They had first nested at nearby Seeley Lake in 1995, but the cranes were not found on the CBC until 2002). The growing presence of Sandhill Cranes on our comparative river, the Cohansey, has for several decades been a welcome aspect of these studies.

### **Discussion and Update – Analyses and Reporting:**

Beyond the field work, during winter 2023-2024 we also continued to work on scientific papers detailing and analyzing the initial 35 years of winter raptor and waterfowl data. Working with Dr. Paul Kerlinger, a former Director of New Jersey Audubon's Cape May Bird Observatory

and more recently a consultant to the wind power industry (now retired), we continued the in-depth review and statistical analysis of our previous findings and preliminary conclusions, particularly those detailed and expressed in both the 30-year report and the prior 25-year report (October 2012) prepared for CU Maurice River. (To recap, having read these two reports, Dr. Kerlinger once described our long-term monitoring research and data as “a goldmine of information and insight”). With CU Maurice River’s approval, Sutton and Kerlinger have continued to review and analyze the 35 years of data as to what they might reveal regarding observed changes in Maurice River raptor and waterfowl numbers over time, and what this data may indicate in regards to climate change and sea level rise. Specifically, we are now trying to link long-term changes on the river to the documented declines in bird species by linking avian trends to corresponding vegetation changes. This is being done through the analyses of various aerial mapping results over the same time periods. See the introduction to the 30-year report for much more information on the strong value of long-term monitoring, the need for further analyses of our data set, as well as possible theories and scenarios in regard to the potential impacts of sea level rise and habitat change on the Maurice River.

The eventual publication of these studies, whether in scientific journals, conference proceedings, or perhaps even as a monograph, will be a milestone for our long-term Maurice River studies, one that will not only bring recognition to both the Maurice River and CU, but also strongly support and bring attention to the trends that we have discovered over time. Emergent alarming trends, particularly the rather recent precipitous declines in wintering Northern Harriers and Red-tailed Hawks, have galvanized the decision to publish as soon as possible. The dire findings of the most recent years (and now including Year 37), particularly when viewed in relation to the bountiful earlier years of the study, have urgently dictated that these trends need to be highlighted and publicized.

### **Summary and Conclusions:**

It might be said that Years 36 and 37 of our long-term Maurice River winter raptor and waterfowl studies were watershed years. Drastically changing and accelerating conditions on the river dictated major changes to our approach. Protocols were changed substantially, including going to a subset of point count data that we hope will prove beneficial, accurate, and valid. While one cannot fully compare and contrast the findings of these two years with the former 35, there are certain “markers” in the data set that hint at the new protocol being quite valid. Even though the numbers of many ducks were down, high teal numbers compared favorably with recent (old protocol) segments. Although Red-tailed Hawk and Northern Harrier numbers were again low, raptor diversity and numbers of low-density (and low detection-rate) species such as secretive Cooper’s Hawks were similar to recent years. Vulture numbers continued high, and Bald Eagle peaks and averages were on par with recent high numbers. Guardedly, I can say that I think the new protocols allow for a favorable comparison with the old, allowing us to continue to compare, contrast, confirm and corroborate current findings with our past data. This should allow us to confidently observe, record, and evaluate long-term population trends.

There is one caveat that should be recognized. Because Year 36 had only four survey dates and data sets, and Year 37 had five, these seasons should be regarded as transitional years. While more surveys were planned (to more closely correspond to the 35 year averages of 7-8), weather issues, scheduling, and observer availability combined to confound intentions, and only 5 Maurice River surveys (plus 2 on the Cohansey) were accomplished in 2023-2024. Because of fewer surveys, this probably means that peak numbers should be given greater weight and higher value than averages. With fewer surveys, there is less likelihood to hit the true peak numbers present

(those dictated by weather, cloud cover, wind, tide, etc.). Conversely, more surveys should yield higher averages as “better days” occur weather-wise.

**When reviewing the data, I feel that in Table 3, for all species, it is more applicable to compare Year 36 and Year 37 peaks with the averages shown for Segment VII (as well as the individual averages shown for Years 31-35). Using Year 36 and 37 peaks in the comparison, somewhat mitigates the fewer observers, fewer sites, and the fewer surveys of Years 36 and 37.**

To this end, **Table 4** presents the same data as Table 3, but the columns are shaded and presented differently in order to show the comparisons as outlined and recommended here. Given the new protocol and the inherent difficulties of comparing new data to the old protocol data, I feel that Table 4 is the best real-world representation and comparison of our findings.

Beyond the count protocol, we may have introduced a possible negative bias by carrying out fewer surveys, but a bias that can also be possibly minimized by using peak values rather than the average. We of course will see where the next few years take us, and we will continue to evaluate the success of the new protocols. After our two fact-finding transition years, I will strive to evaluate both the validity of the new methods (protocols) and the efficacy of the comparisons as we go forward.

An associated additional caveat is that we might have possibly missed the (brief) peak numbers of dabbling ducks, but anecdotal evidence leads us to believe that this is not the case. Both CU Maurice River staff and Natural Lands staff related and confirmed that Northern Pintails and Mallards were virtually absent on the river during the winter. We also know that on March 1, when there were just 10 Northern Pintails recorded on the Maurice, there were over 600 at Tuckahoe WMA two days later on March 3 (seen by Sutton). See **Table 5** for data on the partial (incomplete/irregular) survey findings for the Tuckahoe and Great Egg Harbor Rivers. In short, Pintails (and Mallards) were present in the South Jersey region, they just weren't on the Maurice River. But we do feel that such anecdotal evidence, however limited (and negative), confirms the new protocols and the validity of the findings. This all bolsters the sobering theory that we didn't miss these ducks (and raptors), they just weren't there like they used to be.

Given the above caveats, the results of our 37<sup>th</sup> winter season of raptor and waterfowl studies on the Maurice River have not only again verified and confirmed our observed long-term trends over the many years, but also have strongly supported and substantiated the alarming findings from the most recent decade. There is now little doubt that the compounding and cumulative effects of climate change and resultant sea level rise continue to accelerate and negatively impact the raptor and waterfowl populations of the river and the region. While this remains a hypothesis, it is a strong theory and a basis for extreme concern and needed action. These hypotheses, as outlined in both our 25 and 30-year reports, are being explored in much greater depth in the upcoming scientific papers that are currently in the works by Clay Sutton and Dr. Paul Kerlinger in concert with CU Maurice River staff and volunteers (see above). Regional warming, sea level rise, increasing salinity, and the changing habitats – the initial loss of *Spartina patens*, the more recent loss of wild rice, and the rapid and accelerating encroachment of *Phragmites*, in-turn eliminating *Spartina alterniflora* – will all be further addressed and evaluated in these upcoming papers.

To continue to document these disturbing changes and unsettling downward trends is today an important goal of this long-term project, even though this was not something even remotely considered at the outset of these conservation and protection-oriented studies 37 years ago, way back in December 1987. Such documentation is why long-term studies are highly important, and

why we continue to monitor raptor and waterfowl populations in these times of great and rapid change. Much of what we have chronicled in recent years is not good news, but it is critical news that needs to be reported.

The Maurice River continues to exhibit substantial avian ecovalues, and remains a regionally important bird area by all standards and barometers, but the documented declines in birds and the habitats on which they depend are real and need to be acknowledged and addressed. The findings of these CU Maurice River long-term monitoring studies join those region-wide, nation-wide, and indeed world-wide efforts in focusing us on the immediacy of the issues and the urgent need for real and comprehensive actions on sea level rise and associated habitat changes on both the Delaware Bayshore and beyond.

### **Acknowledgements:**

I commend and thank CU Maurice River for sharing these concerns, and continuing to encourage and support this important work. I thank the officers, staff, volunteers, and all of the members of CU Maurice River for their yeoman efforts in protecting the river and its resources, and for their continuing vision and belief in the innate and deep values of this long-term research effort. I particularly recognize and thank Karla Rossini and Tom McKee for their deep concern for the changes on the river and their exceptional expertise and interest in the pending scientific papers. I thank Paul Kerlinger for his genuine and generous interest, and remain grateful to Jim Dowdell for his amazing 35 years of keen involvement and collaboration; these studies would be far the poorer without his great interest, efforts, and skill. I thank Pat Sutton for her insight and patience in helping me put the Year 36 and Year 37 reports together. I couldn't have done it without her!

I continue to be proud to represent CU Maurice River as we all learn together. And we can join together to celebrate the good news – that in winter season 37 we have continued the long-term data set, a continuous monitoring effort, and consecutive data set, with no breaks. Each year we continue to “take the pulse of the river.” There is no other study like this in New Jersey.

– *Clay Sutton*

May 2024



Here is the initial view of the **Snowy Owl** found at East Point on January 12. An exceptional find, it was one of very few recorded anywhere in the East during winter 2023-2024.  
*(photo by Clay Sutton)*

**Sandhill Cranes** continue to increase in the Cohansey River region. Here are 25 of the amazing 68 cranes recorded on January 3, 2024.  
*(photo by Clay Sutton)*



An earlier image (taken on January 11, 2010) of the ever-growing **Sandhill Crane** flock on and near the Cohansey River. Note that the bottom-most bird is the **Common Crane**, “Old Crooked Toe,” that started it all; the distinctive injured toe is visible in this photograph (see page 9). This escaped Eurasian Common Crane lived to at least 23 years old, and was a progenitor of the “Cohansey Cranes.”  
*(photo by Clay Sutton)*

**TABLE 1**  
**Maurice River**  
**Winter Raptor and Waterbird Survey – Year 37**  
**December 2023 through March 2024**

	Maurice River - Winter 2023-2024					
DATE	12/13	1/12	2/5	3/1	3/20	AVG.
<b>LOONS to CORMORANTS</b>						
Red-throated Loon	5	1	1		2	
Common Loon				2		
Pied-billed Grebe	1					
Horned Grebe	1					
Northern Gannet					20	
Dbl-cr Cormorant	12	14	5	5	266	
<b>BITTERNS to VULTURES</b>						
Great Blue Heron	11	9	8	8	7	
Great Egret						
Black-cr Night-Heron						
Black Vulture	21	16	20	24	<b>46</b>	25.4
Turkey Vulture	<b>156</b>	136	116	148	131	137
<b>WATERFOWL</b>						
Snow Goose	95	0	0	0	<b>200</b>	59
Canada Goose	16	87	<b>344</b>	315	135	179
Mute Swan	6	2	4	3	4	
Tundra Swan						
Wood Duck					2	
Gadwall	24			4	12	
American Wigeon						
Am Black Duck	49	<b>110</b>	26	72	39	59
Mallard	19	<b>44</b>	0	4	6	15
Blue-winged Teal						
Northern Shoveler					1	
Northern Pintail	0	0	0	<b>10</b>	0	2
Green-winged Teal	570	45	245	1331	<b>2355</b>	909
Common Teal			1	1		
Canvasback						
Redhead						
Ring-necked Duck			4	40		
Greater Scaup						
Lesser Scaup					40	
Scaup (sp.)		14	172	525		

Peak counts  
shown in **Bold Face**

\* Seen on date other than official  
survey date or by other observers

**TABLE 1 (page two)**  
**Maurice River**  
**Winter Raptor and Waterbird Survey – Year 37**  
**December 2023 through March 2024**

	Maurice River - Winter 2023-2024					
DATE	12/13	1/12	2/5	3/1	3/20	AVG.
<b>WATERFOWL (continued)</b>						
Surf Scoter		37	8	20	18	
Black Scoter		1			10	
White-winged Scoter						
Scoter (sp.)	10	48		200	30	
Long-tailed Duck		1		2		
Bufflehead	42	99	130	181	<b>186</b>	128
Com. Goldeneye				1		
Hooded Merganser		8	4	22	2	
Com. Merganser			1			
Red-br Merganser	10	10	2	<b>72</b>	4	20
Ruddy Duck	4	45	9	19	35	
<b>DIURNAL RAPTORS</b>						
Osprey					39	
Bald Eagle	21	28	24	34	<b>36</b>	28.6
Northern Harrier	15	13	8	<b>18</b>	10	12.80
Sharp-shinned Hawk	<b>2</b>	2	0	2	1	1.40
Cooper's Hawk	<b>2</b>	1	0	2	2	1.40
Northern Goshawk						
Red-shouldered Hawk	<b>1</b>	1	0	0	0	0.40
Rough-legged Hawk						
Red-tailed Hawk	11	10	12	11	<b>16</b>	12.00
Golden Eagle						
American Kestrel	0	0	0	0	0	0.00
Merlin	0	0	0	0	0	0.00
Peregrine Falcon	0	1	1	<b>2</b>	1	1.00
<b>GROUSE to CRANES</b>						
Ring-nk Pheasant						
Wild Turkey		15	20	12	20	
Clapper Rail	1			1		

Peak counts  
shown in **Bold Face**

\* Seen on date other than official  
survey date or by other observers

**TABLE 1 (page three)**  
**Maurice River**  
**Winter Raptor and Waterbird Survey – Year 37**  
**December 2023 through March 2024**

	Maurice River - Winter 2023-2024					
DATE	12/13	1/12	2/5	3/1	3/20	AVG.
<b>SHOREBIRDS</b>						
Sandhill Crane						
Black-bellied Plover	20					
Killdeer				2	2	
Am. Oystercatcher						
Greater Yellowlegs	7	12	3	1	8	
Lesser Yellowlegs						
Pectoral Sandpiper						
Sanderling						
White-rumped Sandpiper	1					
Dunlin	320	90	203	165	110	
Long-billed Dowitcher						
Wilson's Snipe			2			
American Woodcock		2				
<b>JAEGERS to ALCIDS</b>						
Laughing Gull	1				1	
Bonaparte's Gull	40	2			6	
Ring-billed Gull	√	√	√	√	√	
Herring Gull	√	√	√	√	√	
Iceland Gull			1*			
Lesser BI-backed Gull						
Glaucous Gull			1*	1*		
Gt BI-backed Gull	√	√	√	√	√	
Forster's Tern				1	2	
<b>PIGEONS to WOODPECKERS</b>						
E. Screech Owl						
Great Horned Owl						
Snowy Owl		1				
Short-eared Owl						
Belted Kingfisher	1	4	2	1	2	
Common Raven					1*	

Peak counts  
shown in **Bold Face**

\* Seen on date other than official  
survey date or by other observers



**TABLE 2**  
**Cohansey River**  
**Winter Raptor and Waterbird Survey**  
**2023 - 2024**

Cohansey River - Winter 2023-2024			
DATE	1/3/24	1/20/24	Avg.
<b>BITTERNS to VULTURES</b>			
Red-throated Loon		2	
Great Blue Heron	2	4	
Black Vulture	<b>13</b>	9	11
Turkey Vulture	114	<b>122</b>	118
<b>WATERFOWL</b>			
Snow Goose	<b>900</b>	0	450
Canada Goose	480	<b>1742</b>	1111
Gadwall		1	
Am. Black Duck	33	<b>74</b>	53.5
Mallard	<b>100</b>	40	70
Northern Pintail	0	0	0
Green-winged Teal	0	<b>2</b>	1
<b>DIURNAL RAPTORS</b>			
Bald Eagle	<b>42</b>	37	39.5
Northern Harrier	18	<b>22</b>	20
Sharp-shinned Hawk	0	<b>1</b>	0.5
Cooper's Hawk	1	<b>2</b>	1.5
Red-shouldered Hawk	<b>2</b>	1	1.5
Red-tailed Hawk	16	<b>18</b>	17
American Kestrel	<b>2</b>	2	2
Merlin	<b>1</b>	0	0.5
Peregrine Falcon	0	0	0
<b>GROUSE to CRANES</b>			
Ring-necked Pheasant		1	
Sandhill Crane	68	19	
Black-bellied Plover	10		
Killdeer	1	9	
Greater Yellowlegs	36		
Dunlin	10	8	
Wilson's Snipe		1	
<b>JAEGERS to ALCIDS</b>			
Ring-billed Gull	√	√	
Herring Gull	√	√	
Great Black-backed Gull	√	√	
Great Horned Owl		1	
Short-eared Owl	4*	2	
Belted Kingfisher	2	1	

Peak counts shown in **Bold Face**

\*Seen on date other than official  
Survey date or by other observers



**TABLE 4**  
**Wintering Waterfowl and Raptors on the Maurice River 2017–2024**  
**Comparison of Year 37 to Segment VII (2017-2022)\*, and Years 31, 32, 33, 34, 35, and 36**

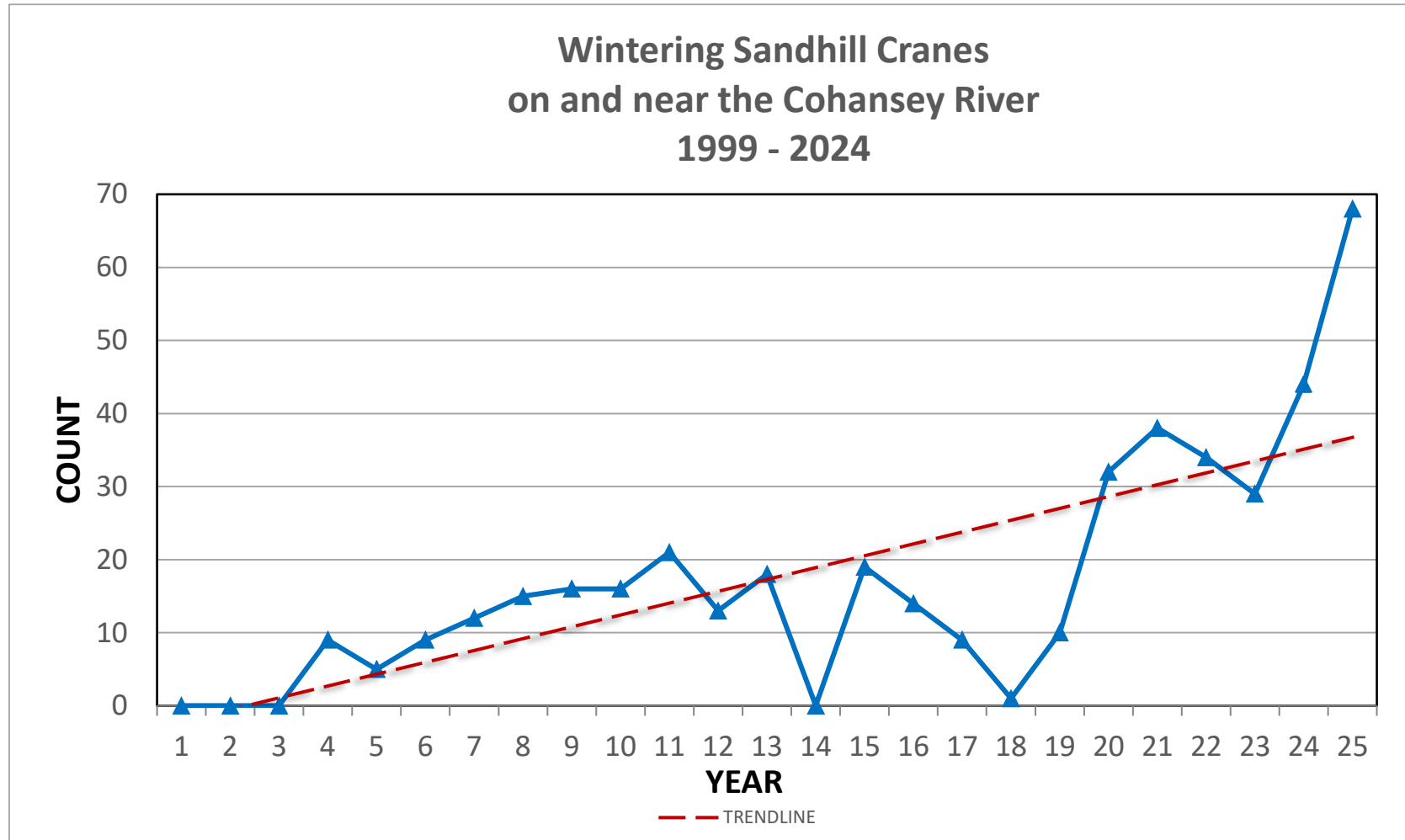
	Year 31		Year 32		Year 33		Year 34		Year 35		2017-2022			YEAR 36		YEAR 37	
	2017 - 2018		2018 - 2019		2019 - 2020		2020 - 2021		2021 - 2022		Segment VII			2022 - 2023		2023 - 2024	
	Best	Avg	Best	Avg	Best	Avg	Best	Avg	Best	Avg	Best	Avg Peak Count	Avg of Average Counts	Best	Avg	Best	Avg
Snow Goose	3,800	1,053	3,000	1,410	3,100	854	2,000	320	2,000	616	3,800	2,780	851	1,000	350	200	59
Canada Goose	1256	498	291	215	361	243	703	300	538	324	1,256	630	316	296	234	344	179
Am. Black Duck	635	440	357	209	400	263	241	128	423	220	635	411	252	64	48	110	59
Mallard	509	266	311	142	427	197	132	63	353	180	509	346	170	12	7	44	15
Northern Pintail	300	90	324	130	320	87	68	16	63	24	324	215	69	42	13	10	2
Green-winged Teal	2,317	890	1,426	405	569	260	1,018	483	2,113	703	2,317	1,489	548	1,240	881	2355	909
	Year 31		Year 32		Year 33		Year 34		Year 35		2017-2022			YEAR 36		YEAR 37	
	2017 - 2018		2018 - 2019		2019 - 2020		2020 - 2021		2021 - 2022		Segment VII			2022 - 2023		2023 - 2024	
	Best	Avg	Best	Avg	Best	Avg	Best	Avg	Best	Avg	Best	Avg Peak Count	Avg of Average Counts	Best	Avg	Best	Avg
Black Vulture	57	32	73	54	61	43	68	42	84	39	84	69	42	71	36	46	25
Turkey Vulture	196	135	185	159	216	155	180	146	318	234	318	219	166	161	131	156	137
Bald Eagle	59	44.14	53	38.88	53	42	58	39	57	36.25	59	56	40	42	38	36	28.6
Northern Harrier	21	15.57	18	13.13	25	14.57	18	12.25	21	13.63	25	20.6	13.83	13	10.25	18	12.8
Sharp-shinned Hawk	6	2.71	4	1.63	6	1.71	3	1.13	4	2.13	6	4.6	1.86	1	0.75	2	1.4
Cooper's Hawk	7	2.71	4	2.00	4	1.71	3	1.50	6	3.63	7	4.8	2.31	3	1.75	2	1.4
Northern Goshawk											(0 total)						
Red-sh Hawk	7	2.00	5	1.75	1	0.14	3	1.50	2	0.75	7(41 total)	3.6	1.23	2	1.50	1	0.4
Red-tailed Hawk	40	23.14	41	27.88	27	13.57	30	19.50	27	18.75	41	33	20.57	16	14.25	16	12
Rough-legged Hawk	1	0.14									1 (2 total)						
Golden Eagle	1								1		1 (2 total)						
American Kestrel	1	0.71	1	0.25	1	0.29	1	0.25	2	0.75	2	1.2	0.45	2	0.50	0	0
Merlin			1	0.25	1	0.14	1	0.25			1 (5 total)			1	0.25	0	0
Peregrine Falcon	2	1.14	3	1.25	2	1.14	3	2.13	2	1.50	3(55 total)	2.4	1.43	1	0.75	2	1

\*Segment VII summarizes (combines) Years 31-35

**TABLE 5**  
**Great Egg Harbor River**  
**Winter Raptor and Waterbird Survey**  
**2023 - 2024**

Great Egg Harbor River - Winter 2023-2024		
DATE	3/3/24	3/22/24
	Tuckahoe	Corbin City
<b>BITTERNs to VULTURES</b>		
Great Blue Heron		
Black Vulture		
Turkey Vulture	15	8
<b>WATERFOWL</b>		
Snow Goose		
Canada Goose	250	200
Mute Swan	4	200
Gadwall	2	20
Am. Black Duck	400	140
Mallard	40	20
Northern Pintail	600	25
Green-winged Teal	500	1700
Bufflehead	1	
Hooded Merganser		20
Ruddy Duck		2
<b>DIURNAL RAPTORS</b>		
Bald Eagle	1	7
Northern Harrier	4	2
Red-tailed Hawk		2
<b>GROUSE to CRANES</b>		
Killdeer	2	
Greater Yellowlegs	2	12
Dunlin	20	

FIGURE 1



**NOTE:** “Lean years” (years 14 and 18) with few or no crane sightings probably are a result of the failure of observers to locate the flock, as opposed to an absence of cranes. The cranes (presumably) also frequent Mannington Marsh in Salem County.

# ATTACHMENT 1

Press of Atlantic City  
March 2, 2024

## CLIMATE CHANGE

# US sees another winter that nearly wasn't

All signs point to nation experiencing warmest on record

Every winter has its cold spells, and this winter was no exception. But from December through February, the coldest months of the year, no place in the continental United



SEAN SUBLETTE

States had a winter that was significantly colder than normal. Although the official National Oceanic and Atmospheric Administration's report comes out next week, a preliminary look at the data suggests 2023-24 will be the warmest winter in the U.S. since regular records began in 1895.

Compared to normal, the warmth increased from south to north across the country, with a broad area from the western Great Lakes into the eastern Dakotas having their warmest winter on record. Minnesota stood out the most, as most of the state was 10 to 12 degrees warmer than normal for the entire winter. The one marquee cold spell this winter came in mid-January. Cold like that still happens in a warming climate, but it does not last as long as in decades past. For example, during an 11-day period in Des Moines, four consecutive nights dropped below -10 degrees.

But during the last nine days of the month, every day was more than 10 degrees warmer than normal. Averaged out, January was very close to normal in Des Moines.

As the global climate warms, winters in the U.S. have followed suit. This was the 10th consecutive winter warmer than the full 20th century average, and only four winters this century have been colder than that average.

The warming climate — a re-



CHARLES REX ARBOGAST, ASSOCIATED PRESS

A cyclist travels around Lake Michigan on Monday near the Adler Planetarium in Chicago during a warm front sweeping spring-like weather across a large swath of the country.



NAM Y. HUH, ASSOCIATED PRESS

A sign shows the outdoor temperature Monday in the Chicago suburb of Wheeling, Ill.

sult of increasing atmospheric greenhouse gases from burning fossil fuels — remains the primary driver of the warming winters. However, there is a secondary effect that likely helped give the temperature a nudge toward the top of the record book.

As winter began, a strong El Niño was underway. This periodic warming of the central and

eastern Pacific Ocean along the equator alters the jet stream pattern and favors winters warmer than normal across the northern part of the country — precisely what was observed.

But turning the calendar back to the mid-to-late 20th century, those El Niño years were much cooler than today, indicating that the presence of El Niño was

a contributor to the peak of the warmth this year, but it was not the driver.

Not surprisingly, snow also suffered, with most areas east of the Rockies getting far less than normal. The lack of snow was especially pronounced from Minnesota and Wisconsin across the Great Lakes into Upstate New York and New England. Some of these locations had 3 to 4 feet less snow than normal.

Snow trends are decreasing for much of the country, as the biggest losses have come where snow happens but is not a regular occurrence. From the plains of Colorado, across Kansas and Missouri, eastward into Kentucky and Virginia, snow has been in decline over the last half century.

Although this may sound great for heating bills, we generally give that money back in higher cooling bills during the summer. Plus, there is another economic dimension to the lack of snow in the country's colder climates, like those along the Great Lakes.

Bryan Mrocza, a physical scientist at the NOAA Great Lakes Environmental Research Lab, sees it firsthand: "Two of the big recreational, tourist economic drivers here in the lakes are ice fishing and snowmobiling. Both of them have been adversely affected by winters like this. Both of those aspects have been very negative economic drivers."

This does not suggest that this winter is the beginning of a new normal, but it is the kind of winter that will become more common in the years and decades to come. By contrast, cold and snowy winters will continue to become more rare as the climate warms.

The end result will be more green Christmases and less ice skating.

It also means an earlier return to pollen and insects as winter yields to spring a bit earlier in the year in the decades to come.

Sean Sublette is the chief meteorologist for the Richmond Times-Dispatch in Virginia.

## ATTACHMENT 2

*Press of Atlantic City*  
March 16, 2024

### WEATHER

# Warm winter

Peaches and pollen are two possible paybacks

Last week, as expected, the National Oceanic and Atmospheric Administration reported that the 2023-24 winter was the warmest on record nationwide — the first



**SEAN  
SUBLETTE**

time winter was more than 5 degrees above the full average over the 20th century. Then this week, NASA, NOAA and the European Union's Copernicus Program reported that it was the warmest winter on record for the Northern Hemisphere.

Not surprisingly, this has given spring blossoms and leaves a jump start for much of the country. From the Central Plains to the Middle Atlantic, the first leaves of spring are showing up two to three weeks ahead of schedule.

This also means blooms are showing up earlier, and with them, pollen. The same carbon dioxide that is driving the warming climate is also a key component of plant photosynthesis, the process in which plants use carbon dioxide along with sunlight, water and chlorophyll to make food.

As a result, the growing season over the last half century has increased an average of two weeks across the United States.

This means that allergy season is starting earlier, and its intensity is also getting worse as the concentration of pollen in the air has also risen. In addition, evidence from both oak and ragweed pollens indicate that the higher carbon dioxide concentration leads to stronger allergens within the pollen, compounding the problem.

A 2021 study examined pollen

counts for 60 sites across North America since 1990, and the majority of locations saw their pollen seasons trending earlier in the year, along with a higher total amount of airborne pollen during the course of the season.

Beyond these health effects, the warmer winter also presents problems for agriculture, especially fruit trees. Warm winters disrupt the natural dormancy of trees during the winter, as the cold weather gives them the break they need before blossoming in the spring and producing fruit toward the summer.

The disruption causes the trees to flower prematurely, well before normal. If there is a brief freeze, even one that is close to the normal time of year, there can be tremendous damage to a fruit crop.

In both South Carolina and Georgia, the 2022-23 winter was the sixth warmest on record. This allowed a brief mid-March freeze to decimate the 2023 peach crop. In South Carolina, production was down 66 percent compared to 2022. In Georgia, it was down 78 percent.

So far this month, most areas east of the Rockies are having one of their 20 warmest starts to March. From the Midwest to the Northeast, it has been among the five warmest. But very cold air has been hovering in Canada, and most of the data suggest one or two more surges of cold air will reach as far south as Alabama, Georgia and Mississippi before the last week of the month.

Warmer winters may sound good, but we may have to pay the price for them during spring and summer in the decades to come.

Sean Sublette is the chief meteorologist for the Richmond Times-Dispatch in Virginia.

## ATTACHMENT 3

*Press of Atlantic City*  
March 5, 2024

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# Weekend brought record rain, record warmth to South Jersey

**JOE MARTUCCI**  
Press Meteorologist

The ups and downs that spring weather brings to South Jersey were clear over the weekend, as a day of record rainfall Saturday was followed by record warmth Sunday.

Both Atlantic City International Airport and Millville set or tied weather records on back-to-back days.

Saturday was a soaker. The airport picked up 1.77 inches of rain, breaking the previous daily precipitation mark of 1.37 inches in 1994.

Farther west, Millville experienced even more rain as 1.91 inches of precipitation fell. That nearly doubled the previous mark of 0.98 inches, also set in 1994.

Both records were confirmed by the National Oceanic and Atmospheric Administration. Weather data at the airport dates to 1943. For Millville, observations date to 1947.

Those weren't even the heaviest amounts in the state. Vineland experienced the most rain at 2.04 inches, according to the Rutgers New Jersey Weather Network. It was the only location in the state with more than two inches reported.

The low-pressure system that brought the record rain

was very weak in terms of air pressure. However, high pressure to the east slowed down the weak storm. Therefore, it sat over New Jersey for hours.

Once the rain cleared, the strong March sunshine and lack of cooling sea breeze allowed temperatures to warm to record levels Sunday.

Both Atlantic City International and Millville tied daily record high temperatures for March 3.

At the airport, the high of 69 degrees tied 1967's mark. Meanwhile, Millville rose to 66 degrees, tying it with 1991.

Both of those high temperatures were between 18 and 20 degrees above the 1991-2020 climate average for the date.

Inland areas weren't alone in the warmth, either.

Seaside Heights rose to 66 degrees, according to the Rutgers NJ Weather Network. Sen. Frank S. Farley State Marina in Atlantic City rose to 61 degrees.

Even Harvey Cedars on Long Beach Island, typically the chilliest weather network station at the Jersey Shore, rose to 59 degrees.

Expect more well-above-average temperatures like Sunday's this month, too.

Temperatures for March will "likely" be above average, according to the Climate Prediction Center, a government forecast agency based in Silver Spring, Maryland. This doesn't mean every day in March will be warm, but, as a whole, the month should be on the milder side.

This comes after a December through February that ranked the 10th warmest at Atlantic City International Airport.

Record warm days like Sunday are expected to happen more often in a climate-changing world.

The last record minimum temperature set at the airport was Dec. 24, 2022. Since then, 12 record maximum temperatures have occurred, not including tied records like Sunday's.

Since 1895, New Jersey's annual temperature has increased 3.9 degrees, according to the state Department of Environmental Protection. Extreme rain events increased by nearly half between 1958 and 2016.

Average annual snowfall has increased as well.

**Contact Joe Martucci:**  
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*Press of Atlantic City*  
March 20, 2024

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# Winter 2024 marked by record rain

**JOE MARTUCCI**  
Press Meteorologist

Since fall, New Jersey has been plain wet. With another record rain occurring two Saturdays ago, farmers and residents are cautiously optimistic that all this rain could be a good thing.

On March 9, Atlantic City International Airport broke a daily rainfall record for the date, according to the National Weather Service.

So did official weather stations in Millville, Long Branch, Trenton-Mercer Airport and Newark-Liberty International Airport, to name a few.

At Atlantic City International Airport, the 1.08 inches of precipitation recorded there bested the previous March 9 mark set in 1998.

It was the second Saturday in a row with record rainfall. On March 2, 1.77 inches of rain set a new mark at the airport.

Year-to-date through March 9, the airport has had five days with over an inch of precipitation.

Please see **RAIN**, Page A10

**Press of Atlantic City  
March 20, 2024**

**Rain**

From AI

That's the second most since records began in 1943. Twenty of New Jersey's 21 counties are more than 50% above their average precipitation for the year, according to the Mid-Atlantic River Forecast Center.

For New Jersey's farmers, this has led to a few issues.

"(For cranberries), all the extra rain the past several months has led to some extra work as far as managing the water across the property and keeping control of it," said Marc Carpenter, of Medford, Burlington County, who works in the Pine Barrens in the cranberry and blueberry industry. "The rainfall hasn't bothered us yet (for blueberries)."

Along the Delaware Bay, the extremely wet weather has proven to be a pain recently.

"It's certainly been the wettest winter that we have had in a long time, and with it being mild temperature-wise, it's been nothing but mud," said Abigail Sickler, owner of Hidden Creek Farm in Stow Creek Township.

However, both farmers are optimistic that short-term pain will bring long-term gain when it comes to the soaking rain of recent months.

Farmers and non-farmers alike have dealt with drought conditions in recent years, in part due to a lack of rain.

In 2023, there were 14 weeks where somewhere in New Jersey was in drought, according to the United States Drought Monitor. In 2022, it was 28 weeks, more than half the year. Vineland put water restrictions in place in July of that year.

A moderate drought brings an uptick in irrigation use, and fish become stressed. In severe drought, irrigation ponds can dry up. Specialty crops become impacted by both yield and fruit size, the drought monitor says.

When it comes to our lawns, soils and pastures, the water year is the best calendar to compare what's happening with precipitation. In the Northern Hemisphere, that runs from Oct. 1 to Sept. 30.

Since Oct. 1, 2023, Atlantic City International Airport and Newark rank in the top 10% for wettest water year through March 9. Estell Manor and Millville rank in the top 15%.

It's not just the rain but the amount of rain that's falling in one day. Atlantic City International broke five daily rainfall records since the water year started. New Jersey has seen up to a 20% increase in annual average rainfall intensity between 1970 and 2019, according to Climate Central, a nonprofit research group based in Princeton.

The plentiful water brings many benefits, farmers say. Less evaporation takes place during the fall and



MATTHEW STRABUK PHOTOS, STAFF PHOTOGRAPHER

"It's certainly been the wettest winter that we have had in a long time, and with it being mild temperature-wise, it's been nothing but mud," said Abigail Sickler, owner of Hidden Creek Farm in Stow Creek Township.

**ACY precipitation records this water year**

- March 9, 2024 – 1.08 inches
- March 2, 2024 – 1.77 inches
- Dec. 28, 2023 – 2.27 inches
- Dec. 10, 2023 – 1.61 inches
- Nov. 22, 2023 – 1.19 inches



All the winter rain could mean less chance of drought or an extended bout of dry-season weather later in the year affecting crops at farms like Hidden Creek in Stow Creek Township.

winter. The weaker sun and cooler temperatures limit the amount of moisture that can be taken from the ground and put into the atmosphere.

"We have plenty of water for frost and freeze protection going into April," Carpenter said. Cranberry farmers spray water onto their plants to protect against the frosts and freezes that may occur during the growing season.

The average last freeze for most of inland New Jersey, like where Carpenter and Sickler farm, is between April 10 and 20.

"We have good coverage on our fields, so the water is being absorbed and come summer we will be thankful that it did," Sickler said.

The soaking cool-season rain acts as a positive. It recharges the ground with moisture and provides an extra reservoir. So when the grass and plants absorb water for nutrients and the strong sun pulls it out of the ground during evaporation, there is a cushion if a

long dry spell occurs.

"So long as our ground is continuing to soak it up, we will take what we are given," Sickler said.

In the coming weeks, pollination will occur and farmers will plant their crops. For both humans and plants, dry weather in April is preferred.

Carpenter says blueberry growers are hoping for mild, sunny and dry weather for pollination. As the average high temperature climbs into the 60s, rain-free weather allows for more outdoor time.

However, in the Pinelands, even brief stretches of dry weather increase the risk for wildfires. The

general rule is that an inch of rain is needed per week to prevent harsh wildfire conditions, and that rain should be spread out during the week.

There's no long-range weather computer model agreement on April's precipitation trend. The European model shows a wet pattern for the month, while the American and Canadian models show somewhat drier than average conditions.

Meanwhile, there is fairly good agreement on a warmer than average month.

Going farther out, there is a slight lean toward a warmer and wetter than average summer in New Jer-

sey, according to the National Oceanic and Atmospheric Administration. That could mean more daily rainfall records. A warmer than average summer would continue the trend. All 10 hottest summers have occurred since 2005 at Atlantic City International.

No matter what the summer brings, though, Sickler says that "come summer, we will be thankful" for all of the cool-season rain at her Cumberland County farm.

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## **For More Information / Literature Referenced:**

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