

**WINTERING RAPTORS and WATERFOWL**  
**on the MAURICE RIVER**

**CUMBERLAND COUNTY, NEW JERSEY**

*The THIRTY-FOURTH FIELD SEASON*  
*of a Long-term Avian Use Study*

**Findings for the WINTER PERIOD: December 2020 through March 2021**

*Research and Monitoring Sponsored by:*  
**CU Maurice River**



We'll start off with the good news: Both Bald Eagles and Osprey continue to increase on the Maurice River and along the entire Delaware Bayshore. Populations of both species are healthy. Here a young Bald Eagle chases an Osprey near the Delaware Bay, attempting to pirate the Osprey's fish. *Photo by Clay Sutton, October 2020.*

**Clay Sutton and James Dowdell**

**April 2021**



And now the bad news: Both Northern Pintail (above) and Red-tailed Hawk (below), two of the Maurice River's signature species, again showed very low numbers during the winter of 2020-2021. These severe declines have continued and accelerated in recent years. *Photos by Clay Sutton, 2020.*



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## **Findings for the WINTER PERIOD: December 2020 through March 2021**

Following thirty-three years of in-depth, long-term winter raptor and waterfowl status and distribution studies on the Maurice River (a major Delaware Bay tributary), and following the landmark report in March of 2018 detailing the first thirty years of findings in regard to significant observed trends of the tidal river's substantial avian resources, this current report presents the results of a continuation of these unique studies: the 34<sup>th</sup> consecutive winter-season of study of the birds of prey and waterfowl populations that spend the winter on the Maurice River.

The comprehensive 30-year report was finalized and presented to CU Maurice River in March of 2018, detailing the findings, and particularly the observed long-term trends, of the annual winter raptor and waterfowl population studies on the tidal Maurice River. This report is available on the CU Maurice River website at [www.cumauriceriver.org/raptor-and-waterfowl-surveysstudies/](http://www.cumauriceriver.org/raptor-and-waterfowl-surveysstudies/) . Summary reports have also been completed at each five-year interval throughout these studies and over the years, and are also available at this website.

Because these reports, as well as all of the thirty-three years of *individual* season reports are available on-line, little discussion of methodology and techniques is offered in this short-form yearly single-season summary. The basic methodology of the core winter raptor and waterfowl studies *has remained the same since 1987*: nine established sites (point counts) on the tidal Maurice River between Millville and East Point were sampled by Sutton and Dowdell for a period of approximately 45 minutes each during each survey. Consistent monitoring has been conducted approximately every ten days between 1 December and 31 March each season. Visit the CU website for in-depth review of all methodologies and sampling locations, as well as the important goals and objectives of this long-term project.

Because the recent 30-year report detailed highly alarming downward trends in the winter numbers of both raptors and waterfowl on the Maurice River, it was decided by CU Maurice River to continue these long-term studies (and highly significant data set) into the current 34<sup>th</sup> winter season. Without reiterating the extensive findings and reporting related in the 30-year summary report, suffice it to say that there are well-documented declines in both raptors and waterfowl on the river, with strong evidence suggesting that these downward trends are linked to sea level rise on the Maurice River and in the greater Delaware Bay region. It was this disturbing and compelling evidence – the hard facts of observed major declines in many key species – that prompted CU Maurice River to continue these studies and the highly important documentation of the local adverse impacts resulting from the international phenomenon of climate change on our hallmark avian resources. Changes on the Maurice have been rapid, significant, ongoing, and accelerating.

Of note is that this 34<sup>th</sup> winter season monitoring was inevitably impacted by the Coronavirus Pandemic. Social distancing requirements meant that the project's normal protocol of two observers working together (Sutton and Dowdell) could not be reasonably or easily followed. Therefore we split up the work, with Sutton covering four of the survey dates and Dowdell covering the other four. We do not feel that this unavoidable change in methodology impacted our data and findings to any great degree. Extra effort, particularly in extra time spent at each point count site, should have, in large part, made up for this change in protocol. While perhaps a few less common species (for example, swift and secretive Accipiters) might have been missed without the second observer, we feel that overall counts of principal species were not impacted to any great degree if at all. For instance, a count of 32 Bald Eagles might have been 33 or 34 with a second observer, but this type of "error" should impact the long-term findings to only a very small degree or percentage.

Also of interest is that during the winter of 2020-2021 we continued to work on scientific papers detailing and analyzing all previous 33 years of winter raptor and waterfowl data. Working with Dr. Paul Kerlinger, a former Director of the Cape May Bird Observatory and more recently a consultant to the wind power industry (and now retired), we continued the in-depth process of review and statistical analysis of our previous findings and preliminary conclusions, particularly those detailed and expressed in both the 25-year report and the 30-year report prepared for CU Maurice River. Having read these two reports, Paul Kerlinger previously described our long-term research and data as "a goldmine of information and insight." With CU Maurice River's approval, Sutton and Kerlinger in 2020 began to review and analyze all 33 years of data as to what it may tell us regarding observed changes in Maurice River raptor numbers over time, and what this data may indicate in regards to climate change and sea level rise. See the introduction to the 30-year report for 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.

These scientific papers are well underway as this seasonal report is written. The waterfowl paper is nearing completion and will soon be finalized and submitted. Following CU Maurice River's review and approval, the raptor paper has been submitted for publication to the *Journal of Raptor Research*. It has been peer-reviewed there, and requested revisions and clarifications (a normal process) are underway. The eventual publication of this peer-reviewed paper 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 confirm the trends that we have discovered over time. Recent alarming trends, particularly the recent precipitous declines in Northern Harrier and Red-tailed Hawk wintering numbers, have galvanized us into the decision to publish as soon as possible. The dire findings of the past ten years have dictated that these trends need to be documented and disseminated now. These findings are too significant, and frankly too disturbing, to wait any longer.

Core winter raptor and waterfowl studies continued for the 34<sup>th</sup> consecutive winter season. The Maurice River was sampled on eight dates between 15 December 2020 and 30 March 2021. These findings are presented in **Table 1**. Table 1 also shows winter 2020-2021 average counts for key species. The eight survey dates in this current season, the 34<sup>th</sup> winter season of monitoring on the Maurice, bring our cumulative total of winter surveys to 304 over the 34 years, dating back to the study's inception in 1987. This gives us an unparalleled perspective on the changing avian resources of the Maurice River. (See 30-year report).



As in past seasons, Cumberland County's other major Delaware Bay tidal tributary, the Cohansey River, was again sampled (albeit on only two occasions) during the winter period. For 31 years the Cohansey has been monitored as a "comparison river" or "control" to ascertain whether findings on the Maurice are representative; that is, whether they are either localized or more widespread on the Delaware Bayshore. Cohansey River results for winter 2020-2021 are shown in **Table 2**. *(Note that the Cohansey River survey was conducted on a volunteer basis at no cost to CU Maurice River. Also note that four additional volunteer/pro bono days were donated in the preparation of this short-form summary report on the winter 2019-2020 effort).* The two survey dates (one a partial or incomplete survey only) on the Cohansey River during the current season bring our cumulative total to 53 winter surveys over the 31 years of this comparative study dating back to 1990. The depth of this effort and data allow for strong comparisons and contrasts.

**Table 3** shows peak and average numbers of winter raptors and key waterfowl species on the Maurice River during winter 2020-2021, shown in relation to both Segment V (2007-2012) and Segment VI (2012-2017) of this long-term study, as well as the individual single-season results from Year 31, Year 32, and Year 33. The findings are straight-forward and self-explanatory, particularly when viewed with and against the findings and extensive discussion in the 30-year report presented in March 2018.

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. While winter 2020-2021 was a cold one, with temperatures near long-term averages, there was virtually no bitter cold spells that led to freeze-ups either on the Bayshore or to our north, conditions that can bring large numbers of waterfowl to our region. There was virtually no snow, snow cover, or prolonged or widespread ice during the winter of 2019-2020. So while we saw a relatively cold winter, the requisite snow and ice that is needed to push birds to the Bayshore Region in possible above average numbers were absent.

After 33 years of previous studies, we believe that the findings on the Maurice for winter 2020-2021 (Year 34) were about what we have come to expect for a winter without lengthy or deep freeze-ups. Snow Geese were present, yet itinerant as usual, with most regional geese remaining west and north of the Maurice River region. The numbers of Snow Geese were well below long-term average. Canada Goose numbers were modest as well, 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 unremarkable. The lack of ice, and relatively mild winter and early spring led to early departures of ducks for their northern breeding areas, and this too was once again a factor in very low average numbers for all ducks in 2020-2021.

American Black Duck, Mallard, and Northern Pintail numbers were once again very low compared to long-term averages. **In fact, in winter 2020-2021, Black Duck, Mallard, and Pintail all showed the lowest (worst) peaks and averages, by far, found in all 34 years of monitoring.** For all three species, their absence was presumably due to both the weather 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 (a habitat that supported large numbers of ducks) has been rapidly disappearing, presumably due to sea level rise (see 30-year report). *Phragmites* encroachment continues and is rapidly accelerating along much of the Maurice River as well.

Maurice River Northern Harrier and Red-tailed Hawk numbers continued to be extremely low compared to the earlier segments of the study, and well below long-term peaks and averages. In Year 34, the downward trend continued for these two Maurice River and Delaware Bay signature raptors.

**The average of 12.25 Northern Harriers is the lowest-ever in 34 years of monitoring. The 2020-2021 Red-tailed Hawk average of 19.50 is the second-lowest average seen in all 34 years of study.** This follows the previous Red-tail record low in winter 2019-2020. These low numbers were possibly in-part due to an unremarkable fall migration as well as the comparatively mild winter (cold, but no snow cover or ice). Over time the higher numbers of raptors have normally occurred during colder winters, when raptors are pushed to our region from farther north. But although winter 2020-2021 was average in temperature, other causal factors clearly seem to be at work here. The long-term downward trends for N. Harriers and Red-tailed Hawks continue to be significant, dramatic, and disturbing. The recent downward trends in Northern Harrier and Red-tailed Hawk are shown below. When viewed in relation to the findings of the previous years, the entire 34 years of study, it is clear that things have changed drastically for these two hallmark raptors of the Maurice River. As charted below, the numbers speak for themselves; Northern Harrier and Red-tailed Hawk winter populations have crashed on the Maurice River.

### **Northern Harrier Seasonal Average (birds per survey)**

|                |              |                        |
|----------------|--------------|------------------------|
| Year 27        | 15.25        | 4 <sup>th</sup> lowest |
| Year 30        | 15.88        | 6 <sup>th</sup> lowest |
| Year 31        | 15.57        | 5 <sup>th</sup> lowest |
| Year 32        | 13.13        | 2 <sup>nd</sup> lowest |
| Year 33        | 14.57        | 3 <sup>rd</sup> lowest |
| <b>Year 34</b> | <b>12.25</b> | <b><u>lowest</u></b>   |

### **Red-tailed Hawk Seasonal Average (birds per survey)**

|                |              |                                     |
|----------------|--------------|-------------------------------------|
| Year 29        | 26           | 4 <sup>th</sup> lowest              |
| Year 30        | 28           | 6 <sup>th</sup> lowest              |
| Year 31        | 23.14        | 3 <sup>rd</sup> lowest              |
| Year 32        | 27.88        | 5 <sup>th</sup> lowest              |
| Year 33        | 13.57        | lowest                              |
| <b>Year 34</b> | <b>19.50</b> | <b><u>2<sup>nd</sup> lowest</u></b> |

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. As we have explored previously, 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 no doubt severely impacted (nearly eliminated?) marsh rodents from much of the formerly productive Maurice River marshes. The findings from winter 2019-2020 again show that this trend is continuing and most probably accelerating. An additional factor is that pervasive, increasing, and rapid *Phragmites* encroachment is continuing to eliminate hunting habitat for raptors – areas that were previously dominated by *Spartina* wetlands. Simply put, Harriers and Red-tails cannot hunt in areas of exclusive and thick (impenetrable) *Phragmites*.

Although the two comparative Cohansey River surveys of winter 2020-2021 are inconclusive due to their limited number, these findings and the three Cohansey River dates for winter 2019-2020 (see previous year's report) show the exact same picture. Northern Harrier and Red-tailed Hawk numbers continue 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.

At least there is some good news. Bald Eagle numbers continue to soar on the Maurice River. The winter of 2020-2021 again saw the third-highest average ever achieved in our 34 years of monitoring. The peak of 58 individual Bald Eagles carefully counted by Dowdell on 25 February 2021 is second only to the Year 31 daily record of 59 eagles. Today, Bald Eagles are in sight at virtually all times during our surveys, and very heartening in light of those declining species we have discussed above. Another highlight was the Common Raven recorded and photographed by Sutton at the Peek Preserve on 15 March, 2021, the first ever in our 34 years of studies. Ravens are making a slow comeback and return to South Jersey after many years of absence; they have now been found nesting in Cumberland County for the past two years. These distinctive and entertaining Corvids are a welcome sight (and sound) in the skies of Cumberland.

A final aspect of our 2020-2021 project activities was revisiting the Cumberland County Coastal Zone raptor studies dating back to January 1990. This effort was originally carried out as part of our investigations for the following:

*Cumberland County Delaware Estuary Study*. Robert Zappalorti, Clay Sutton, and Rick Radis. Herpetological Associates, Inc., 1993.

|           |   |         |
|-----------|---|---------|
| Vol. I:   | Rare, Threatened, and Endangered Species Study. | 151 pp. |
| Vol. II:  | Appendices and Mapping.                         | 270 pp. |
| Vol. III: | Land Use Recommendations.                       | 105 pp. |

These were the products of a USEPA Delaware Estuary Program Grant to Cumberland County. Cumberland County Department of Planning and Development, Bridgeton, NJ.

The raptor studies that were part of the above project were also published in part in the following paper:

Sutton, C. and P. Kerlinger. 1997. "The Delaware Bayshore of New Jersey: A Raptor Migration and Wintering Site of Hemispheric Significance." *The Journal of Raptor Research* (Journal of the Raptor Research Foundation), 31 (1): 54-58.

One part of this large project was an attempted assessment of the total winter raptor populations of the Cumberland County portion of the Delaware Estuary, an area that corresponds loosely to the mapped Cumberland County Coastal Zone. The raptor census, while far from extensive or definitive due to time and budget constraints, tallied raptor numbers from West Creek on the eastern border of Cumberland County to Stow Creek on the western border. For methodology, we used the results of the Maurice River survey (done for CU Maurice River), the results of the comparative Cohansey River Survey, and then spent two field days filling in the blanks between and beyond (so to speak). All field days were as close together as possible, in order not to have seasonal raptor movements confuse the data. This informal census was carried out for three winters, in January of 1990, 1991, and 1992. After the fact, Sutton added a fourth winter season, in January of 1994.

Knowing the realities of the current vastly changing trends in raptor numbers, we repeated this informal Coastal Zone count in February of 2021. As in the 1990s, we added the totals for the Maurice River, the Cohansey River, and then counted those raptors in between and beyond the rivers. The results of this informal and adjunct project are found in **Table 4**. The findings and comparisons over this 30 year time period are admittedly somewhat anecdotal in that they represent a one-time, single-window census effort for each winter season. However the changes recorded are rather astonishing. The increase in vultures, particularly Black Vultures, is expected but dramatic. The increase in Bald Eagles, from 17 to 153, is nothing short of astounding and cause for celebration. Sharp-shinned Hawk and Cooper's Hawk have risen, then declined, reflecting a well-known regional trend as fewer birds migrate this far south in winter. Peregrines have increased as expected, reflecting their nation-wide recovery. We have discussed the sad loss of American Kestrel and Rough-legged Hawk in both our 25-year and 30-year reports, but to see their decline illustrated here in this additional forum is sobering; Rough-legs went from 17 to 0 (zero), and Kestrel from 43 to 2 within the Cumberland County Delaware Estuary boundaries.

It is for Northern Harrier and Red-tailed Hawk that this snapshot is most valuable if devastating; these findings well confirm and corroborate the results of our Maurice River studies over time. Numbers are not averaged, but using high and low counts, Cumberland Coastal Zone Harriers have gone from 171 to 56. Harrier numbers in 2021 are a third of what they were (as high as 171) in the 1990s. Red-tailed Hawks have declined from as high as 159 to 71. Today there are less than half the Red-tails that we documented in the 1990s. Again, this rough snapshot is brief, and far from definitive, but it provides real concern if not proof that the issues of climate change, sea level rise, changing habitats, and prey availability may be much more widespread than the confines of the Maurice River.

The results of our 34<sup>th</sup> winter season of raptor and waterfowl studies on the Maurice River have again verified and confirmed not only our observed long-term trends over the many years, but also have strongly supported and substantiated the alarming results 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.

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 studies 34 years ago, way back in 1987. Such documentation is why long-term studies are highly important as we continue to monitor raptor



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

We commend and thank CU Maurice River for sharing these concerns and continuing to support this important work. We thank the officers, staff, volunteers, and all the members of CU Maurice River for their continuing vision and belief in the innate and deep values of this long-term research effort. We continue to be proud to represent CU Maurice River as we all learn together.

The Maurice River continues to be an important regional 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 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 change on both the Delaware Bayshore and beyond.



**TABLE 1**  
**Maurice River: Raptor and Waterfowl Survey**  
**December 2020 through March 2021**

|                             | CORE WINTER PERIOD 2020-2021 |       |            |             |      |            |             |      |      |
|-----------------------------|------------------------------|-------|------------|-------------|------|------------|-------------|------|------|
| DATE                        | 12/15                        | 12/30 | 1/12       | 1/27        | 2/10 | 2/25       | 3/15        | 3/30 | AVG. |
|                             | JD                           | CS    | JD         | CS          | CS   | JD         | CS          | JD   | N=8  |
| <b>LOONS to CORMORANTS</b>  |                              |       |            |             |      |            |             |      |      |
| Red-throated Loon           |                              |       | 3          |             | 3    |            |             |      |      |
| Common Loon                 | 1                            |       |            |             |      |            |             |      |      |
| Pied-billed Grebe           | 1                            |       |            | 1           |      |            |             |      |      |
| Horned Grebe                |                              |       |            |             |      | 1          | 2           |      |      |
| Northern Gannet             |                              |       |            |             |      |            | 100+        | 120  |      |
| Dbl-cr Cormorant            | 4                            | 2     | 2          |             |      | 3          | 43          | 464  |      |
| <b>BITTERNS to VULTURES</b> |                              |       |            |             |      |            |             |      |      |
| Great Blue Heron            | 16                           | 11    | 13         | 7           | 7    | 7          | 5           | 7    |      |
| Great Egret                 |                              |       |            |             | 1    |            |             | 14   |      |
| Snowy Egret                 |                              |       |            |             |      |            |             | 2    |      |
| Black Vulture               | <b>68</b>                    | 64    | 41         | 38          | 18   | 58         | 2           | 44   | 42   |
| Turkey Vulture              | 170                          | 150   | 174        | <b>180</b>  | 94   | 144        | 105         | 148  | 146  |
| <b>WATERFOWL</b>            |                              |       |            |             |      |            |             |      |      |
| Snow Goose                  | 0                            | 0     | 12         | <b>2000</b> | 0    | 548        | 0           | 0    | 320  |
| Canada Goose                | 206                          | 262   | <b>703</b> | 159         | 192  | 482        | 201         | 194  | 300  |
| Mute Swan                   | 2                            | 4     | 6          | 5           | 4    | 2          | 2           | 6    |      |
| Tundra Swan                 | 2                            |       |            |             | 2    |            |             |      |      |
| Wood Duck                   |                              |       |            |             |      | 10         |             |      |      |
| Gadwall                     |                              | 6     |            |             | 8    | 4          | 48          | 10   |      |
| Am Black Duck               | 84                           | 63    | 92         | 171         | 133  | <b>241</b> | 160         | 79   | 128  |
| Mallard                     | 44                           | 5     | 122        | 28          | 76   | <b>132</b> | 81          | 12   | 63   |
| Northern Shoveler           |                              |       |            |             | 1    |            |             | 16   |      |
| Northern Pintail            | 0                            | 6     | 6          | 10          | 33   | <b>68</b>  | 8           | 0    | 16   |
| Green-winged Teal           | 304                          | 401   | 244        | 459         | 404  | 806        | <b>1018</b> | 224  | 483  |
| Canvasback                  |                              |       |            |             |      | 3*         |             |      |      |
| Ring-necked Duck            |                              | 4     | 44         |             | 190  | 720        | 40          | 110  |      |
| Greater Scaup               | 5                            |       | 1          |             |      | 85         |             |      |      |
| Lesser Scaup                |                              |       |            |             | 10   | 36         |             | 4    |      |
| Scaup (sp.)                 |                              | 5     |            | 60          | 60   | 40         |             | 5    |      |
| Surf Scoter                 | 2                            |       | 7          |             |      |            |             | 16   |      |
| Black Scoter                | 1                            |       | 1          |             |      |            |             |      |      |
| Scoter (sp.)                |                              | 38    |            | 1           |      |            |             | 7    |      |

Peak counts shown in **Bold Face**

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

**TABLE 1 (page two)**  
**Maurice River: Raptor and Waterfowl Survey**  
**December 2020 through March 2021**

|                              | CORE WINTER PERIOD 2020-2021 |          |            |      |           |           |      |      |       |
|------------------------------|------------------------------|----------|------------|------|-----------|-----------|------|------|-------|
| DATE                         | 12/15                        | 12/30    | 1/12       | 1/27 | 2/10      | 2/25      | 3/15 | 3/30 | AVG.  |
|                              | JD                           | CS       | JD         | CS   | CS        | JD        | CS   | JD   | N=8   |
| <b>WATERFOWL (continued)</b> |                              |          |            |      |           |           |      |      |       |
| Long-tailed Duck             |                              | 2        | 12         | 60   | 7         | 34        |      |      |       |
| Bufflehead                   | 91                           | 137      | <b>194</b> | 155  | 151       | 122       | 116  | 84   | 131   |
| Com. Goldeneye               |                              |          | 1          | 1    | 9         | 25        | 1    |      |       |
| Hooded Merganser             | 22                           | 31       | 4          | 42   | 31        | 18        | 4    | 4    |       |
| Com. Merganser               |                              |          |            |      |           | 1         |      |      |       |
| Red-br Merganser             | 14                           | 3        | 10         | 32   | <b>38</b> | 23        | 5    | 13   | 17    |
| Ruddy Duck                   | 41                           | 10       | 1          | 8    | 10        | 3         | 4    | 12   |       |
| <b>DIURNAL RAPTORS</b>       |                              |          |            |      |           |           |      |      |       |
| Osprey                       |                              |          |            |      |           |           | 1*   | 87   |       |
| Bald Eagle                   | 42                           | 29       | 37         | 38   | 29        | <b>58</b> | 32   | 47   | 39    |
| Northern Harrier             | 13                           | 13       | <b>18</b>  | 12   | 13        | 12        | 7    | 10   | 12.25 |
| Sharp-shinned Hawk           | <b>3</b>                     | 1        | 2          | 0    | 0         | 1         | 0    | 2    | 1.13  |
| Cooper's Hawk                | 2                            | <b>3</b> | 3          | 1    | 1         | 1         | 0    | 1    | 1.50  |
| Northern Goshawk             |                              |          |            |      |           |           |      |      | 0     |
| Red-shouldered Hawk          | <b>3</b>                     | 0        | 0          | 3    | 3         | 1         | 1    | 1    | 1.50  |
| Rough-legged Hawk            |                              |          |            |      |           |           |      |      | 0     |
| Red-tailed Hawk              | 28                           | 20       | 19         | 15   | 15        | <b>30</b> | 13   | 16   | 19.50 |
| Golden Eagle                 |                              |          |            |      |           |           |      |      | 0     |
| American Kestrel             | 0                            | <b>1</b> | 1          | 0    | 0         | 0         | 0    | 0    | 0.25  |
| Merlin                       | <b>1</b>                     | 1        | 0          | 0    | 0         | 0         | 0    | 0    | 0.25  |
| Peregrine Falcon             | <b>3</b>                     | 1        | 2          | 2    | 2         | 3         | 3    | 1    | 2.13  |
| <b>GROUSE to CRANES</b>      |                              |          |            |      |           |           |      |      |       |
| Ring-neck Pheasant           | 1                            |          |            |      |           |           |      |      |       |
| Wild Turkey                  | 7                            | 19       |            |      | 30        | 40        | 5    | 25   |       |
| <b>SHOREBIRDS</b>            |                              |          |            |      |           |           |      |      |       |
| Black-bellied Plover         | 22                           | 12       | 32         | 1    |           | 16        |      |      |       |
| Killdeer                     |                              | 13       | 6          | 2    |           | 22        | 2    | 2    |       |
| Greater Yellowlegs           | 24                           | 5        | 2          | 2    | 6         | 9         | 9    | 45   |       |
| Pectoral Sandpiper           |                              |          |            |      |           |           |      | 5    |       |
| Sanderling                   |                              |          |            |      | 5         |           |      |      |       |
| Dunlin                       | 95                           | 139      | 140        |      |           | 162       |      |      |       |
| Wilson's Snipe               |                              |          |            |      |           |           | 22   | 16   |       |
| American Woodcock            |                              |          |            |      |           |           | 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: Raptor and Waterfowl Survey**  
**December 2020 through March 2021**

| DATE                          | CORE WINTER PERIOD 2020-2021 |       |      |      |      |      |      |      | AVG. |
|-------------------------------|------------------------------|-------|------|------|------|------|------|------|------|
|                               | 12/15                        | 12/30 | 1/12 | 1/27 | 2/10 | 2/25 | 3/15 | 3/30 | N=8  |
|                               | JD                           | CS    | JD   | CS   | CS   | JD   | CS   | JD   |      |
| <b>JAEGERS to ALCIDS</b>      |                              |       |      |      |      |      |      |      |      |
| Laughing Gull                 |                              |       |      |      |      |      |      | 42   |      |
| Bonaparte's Gull              | 1                            |       | 17   |      | 3    |      | 1    | 42   |      |
| Ring-billed Gull              | √                            | √     | √    | √    | √    | √    | √    | √    |      |
| Herring Gull                  | √                            | √     | √    | √    | √    | √    | √    | √    |      |
| Gt Bl-backed Gull             | √                            | √     | √    | √    | √    | √    | √    | √    |      |
| Forster's Tern                |                              |       |      |      |      |      |      | 2    |      |
| <b>PIGEONS to WOODPECKERS</b> |                              |       |      |      |      |      |      |      |      |
| E. Screech Owl                | 2                            |       | 2    |      |      | 1    |      |      |      |
| Great Horned Owl              |                              | 1     |      |      | 1    |      |      |      |      |
| Short-eared Owl               |                              |       |      |      |      |      |      |      | 0    |
| Belted Kingfisher             | 7                            | 7     | 8    | 1    | 4    | 4    | 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 Waterfowl Survey**  
**2020–2021**

| COHANSEY RIVER 2020-2021    |          |         |
|-----------------------------|----------|---------|
| DATE                        | 12/28/20 | 2/26/21 |
| <b>BITTERNS to VULTURES</b> |          |         |
|                             | **       |         |
| Great Blue Heron            | 15       | 2       |
| Black-crowned Night-Heron   | 1        |         |
| Black Vulture               | 70       | 50      |
| Turkey Vulture              | 35       | 186     |
| <b>WATERFOWL</b>            |          |         |
| Snow Goose                  | 10,000   | 1,250   |
| Cackling Goose              | 1        | 1       |
| Canada Goose                | 500      | 5,555   |
| Mute Swan                   | 2        |         |
| Gadwall                     | 6        |         |
| Am. Black Duck              | 60       | 138     |
| Mallard                     | 10       | 86      |
| Northern Pintail            |          | 2       |
| Green-winged Teal           | 2        | 195     |
| Greater Scaup               |          | 1       |
| Scaup sp.                   |          | 2       |
| Bufflehead                  | 8        | 2       |
| Hooded Merganser            | 1        |         |
| <b>DIURNAL RAPTORS</b>      |          |         |
| Bald Eagle                  | 15       | 36      |
| Northern Harrier            | 10       | 12      |
| Sharp-shinned Hawk          | 2        | 2       |
| Cooper's Hawk               |          | 1       |
| N. Goshawk                  |          |         |
| Red-shouldered Hawk         |          | 2       |
| Red-tailed Hawk             | 14       | 17      |
| Golden Eagle                |          |         |
| American Kestrel            | 1        | 1       |
| Merlin                      |          |         |
| Peregrine Falcon            |          | 1       |
| <b>GROUSE to CRANES</b>     |          |         |
| Wild Turkey                 |          | 32      |
| Clapper Rail                | 1        |         |
| Sandhill Crane              | 16       |         |
| Killdeer                    |          | 2       |
| Greater Yellowlegs          | 6        |         |
| Wilson's Snipe              | 2        |         |
| <b>JAEGERS to ALCIDS</b>    |          |         |
| Bonaparte's Gull            |          | 1       |
| Ring-billed Gull            | √        | √       |
| Herring Gull                | √        | √       |
| Great Black-backed Gull     | √        | √       |
| Short-eared Owl             | 3        | 2       |
| Belted Kingfisher           | 4        |         |

\*\* Partial Survey Only

**TABLE 3**  
**Wintering Waterfowl and Raptors on the Maurice River 2007–2021**  
**Comparison of Year 34 to Segment V (2007–2012), Segment VI (2012-2017), and Years 31, 32, and 33**

|                        | 2007-2012 |                 |                       | 2012-2017  |                 |                       | Year 31     |       | Year 32     |       | Year 33     |       | Year 34     |       |
|------------------------|-----------|-----------------|-----------------------|------------|-----------------|-----------------------|-------------|-------|-------------|-------|-------------|-------|-------------|-------|
|                        | Segment V |                 |                       | Segment VI |                 |                       | 2017 - 2018 |       | 2018 - 2019 |       | 2019 - 2020 |       | 2020 - 2021 |       |
|                        | Best      | Avg. Peak Count | Avg of Average Counts | Best       | Avg. Peak Count | Avg of Average Counts | Best        | Avg   | Best        | Avg   | Best        | Avg   | Best        | Avg   |
| Snow Goose             | 12,324    | 6,605           | 2,309                 | 13,000     | 6,051           | 1,499                 | 3,800       | 1,053 | 3,000       | 1,410 | 3,100       | 854   | 2,000       | 320   |
| Canada Goose           | 1538      | 796             | 268                   | 1,270      | 764             | 346                   | 1256        | 498   | 291         | 215   | 361         | 243   | 703         | 300   |
| Am. Black Duck         | 1,274     | 829             | 487                   | 1,585      | 887             | 500                   | 635         | 440   | 357         | 209   | 400         | 263   | 241         | 128   |
| Mallard                | 649       | 463             | 256                   | 952        | 579             | 289                   | 509         | 266   | 311         | 142   | 427         | 197   | 132         | 63    |
| Northern Pintail       | 928       | 628             | 281                   | 1,621      | 826             | 364                   | 300         | 90    | 324         | 130   | 320         | 87    | 68          | 16    |
| Green-winged Teal      | 5,850     | 3,270           | 988                   | 4,182      | 2,809           | 1,021                 | 2,317       | 890   | 1,426       | 405   | 569         | 260   | 1,018       | 483   |
| Bufflehead             | 446       | 316             | na                    | 330        | 238             | 125                   | 265         | 174   | 323         | 234   | 198         | 177   | 194         | 131   |
| Red-breasted Merganser | 207       | 133             | na                    | 320        | 180             | 69                    | 154         | 66    | 69          | 46    | 22          | 17    | 38          | 17    |
|                        |           |                 |                       |            |                 |                       |             |       |             |       |             |       |             |       |
|                        |           |                 |                       |            |                 |                       |             |       |             |       |             |       |             |       |
|                        | 2007-2012 |                 |                       | 2012-2017  |                 |                       | Year 31     |       | Year 32     |       | Year 33     |       | Year 34     |       |
|                        | Segment V |                 |                       | Segment VI |                 |                       | 2017 - 2018 |       | 2018 - 2019 |       | 2019 - 2020 |       | 2020 - 2021 |       |
|                        | Best      | Avg. Peak Count | Avg of Average Counts | Best       | Avg. Peak Count | Avg of Average Counts | Best        | Avg   | Best        | Avg   | Best        | Avg   | Best        | Avg   |
| Black Vulture          | 57        | 38.2            | 22.4                  | 60         | 44.6            | 26.24                 | 57          | 31.71 | 73          | 53.75 | 61          | 43    | 68          | 42    |
| Turkey Vulture         | 162       | 143             | 99                    | 196        | 156             | 123                   | 196         | 135   | 185         | 159   | 216         | 155   | 180         | 146   |
| Bald Eagle             | 48        | 34.6            | 24.15                 | 53         | 44.4            | 29.15                 | 59          | 44.14 | 53          | 38.88 | 53          | 42    | 58          | 39    |
| Northern Harrier       | 43        | 38              | 25.8                  | 30         | 22.8            | 17.45                 | 21          | 15.57 | 18          | 13.13 | 25          | 14.57 | 18          | 12.25 |
| Sharp-shinned Hawk     | 18        | 9.4             | 3.04                  | 6          | 5               | 2.28                  | 6           | 2.71  | 4           | 1.63  | 6           | 1.71  | 3           | 1.13  |
| Cooper's Hawk          | 10        | 6.8             | 3.21                  | 6          | 4.4             | 2                     | 7           | 2.71  | 4           | 2.00  | 4           | 1.71  | 3           | 1.50  |
| Northern Goshawk       | 1         |                 |                       | 2          |                 |                       |             |       |             |       |             |       |             |       |
| Red-shouldered Hawk    | 26        | 8.4             | 1.62                  | 7          | 3.8             | 1.25                  | 7           | 2.00  | 5           | 1.75  | 1           | 0.14  | 3           | 1.50  |
| Red-tailed Hawk        | 64        | 59.4            | 42                    | 57         | 45.2            | 29.75                 | 40          | 23.14 | 41          | 27.88 | 27          | 13.57 | 30          | 19.50 |
| Rough-legged Hawk      | 1         | 0.6             | 0.07                  | 1          |                 |                       | 1           | 0.14  |             |       |             |       |             |       |
| Golden Eagle           | 2         |                 |                       | 1          |                 |                       | 1           |       |             |       |             |       |             |       |
| American Kestrel       | 10        | 3               | 0.77                  | 3          | 1.6             | 0.7                   | 1           | 0.71  | 1           | 0.25  | 1           | 0.29  | 1           | 0.25  |
| Merlin                 | 2         |                 |                       | 1          |                 |                       |             |       | 1           | 0.25  | 1           | 0.14  | 1           | 0.25  |
| Peregrine Falcon       | 4         | 2.4             | 0.98                  | 4          | 2.8             | 1.13                  | 2           | 1.14  | 3           | 1.25  | 2           | 1.14  | 3           | 2.13  |



**TABLE 4**  
**Winter Raptor Totals, 1989-2021**  
**Cumberland County Coastal Zone**  
**(Delaware Estuary Zone)**

| <b>DATE</b>          | Jan 1990 | Jan 1991 | Jan 1992 | Jan 1994 | Feb 2021 |
|----------------------|----------|----------|----------|----------|----------|
| Black Vulture        | 28       | 9        | 77       | 51       | 220      |
| Turkey Vulture       | 165      | 177      | 320      | 501      | 475      |
| Bald Eagle           | 24       | 17       | 20       | 27       | 153      |
| Northern Harrier     | 117      | 119      | 171      | 124      | 56       |
| Sharp-shinned Hawk   | 9        | 27       | 37       | 20       | 5        |
| Cooper's Hawk        | 3        | 14       | 12       | 7        | 3        |
| Northern Goshawk     | 0        | 1        | 2        | 2        | 0        |
| Red-shouldered Hawk  | 3        | 3        | 5        | 5        | 7        |
| Rough-legged Hawk    | 16       | 17       | 10       | 4        | 0        |
| Red-tailed Hawk      | 84       | 116      | 140      | 159      | 71       |
| Golden Eagle         | 3        | 1        | 0        | 0        | 0        |
| American Kestrel     | 18       | 38       | 43       | 26       | 2        |
| Merlin               | 0        | 1        | 2        | 4        | 0        |
| Peregrine Falcon     | 0        | 2        | 1        | 2        | 4        |
| Short-eared Owl      | 2        | 11       | 11       | 0        | 2        |
| <b>TOTAL RAPTORS</b> | 472      | 553      | 851      | 932      | 998      |

*Report Prepared for:*

**CU Maurice River**

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