WINTERING RAPTORS and WATERFOWL

on the MAURICE RIVER

CUMBERLAND COUNTY, NEW JERSEY

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

Findings for the WINTER PERIOD: December 2022 through March 2023

Research and Monitoring Sponsored by:
CU Maurice River

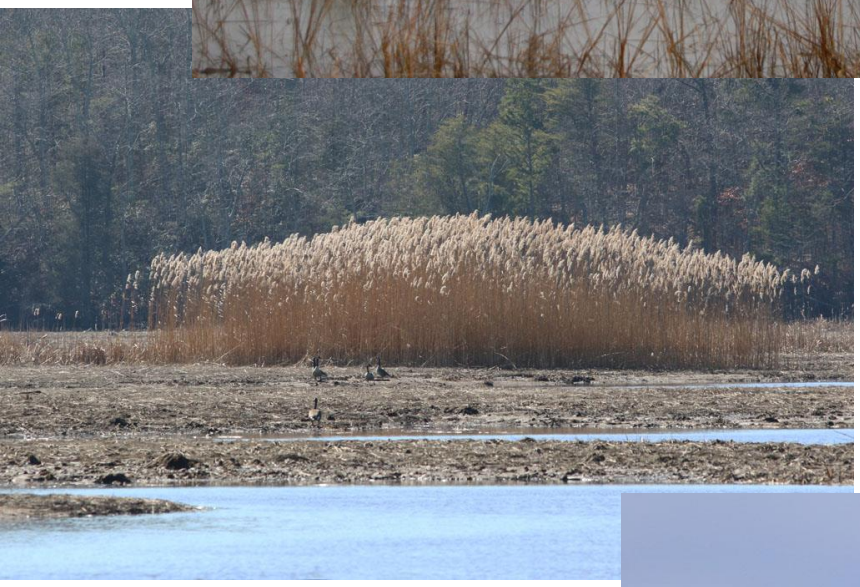
Although faced with habitat challenges relating to climate change and sea level rise, the Maurice River can still be magical. Three **Common Teal** were found among nearly 1,000 Green-winged Teal on the lower Maurice on February 22, 2023. This is a high count for the Maurice, and ties the maximum number ever recorded in New Jersey of this handsome Eurasian duck. (*file photo by Pat Sutton*)

Clay Sutton

May 2023

Above: Although numbers may vary, the Maurice River can still hold significant numbers of waterfowl in winter. Here a **Lesser Scaup** banks for a landing on the river. Below: While some raptors continue to decline, ever-increasing numbers of **Bald Eagles** are always cause for celebration and optimism. *Photos by Clay Sutton.*

These images were included in last year's report, but are included here again because pictures can be worth a thousand words: Many of the declines of raptor and waterfowl species on the Maurice River and the Delaware Bayshore can be traced to sea level rise and related *Phragmites* encroachment. Here a **"normal" high tide** is shown on a Delaware Bay tributary (top), and a rapidly **expanding stand of *Phragmites*** is shown at Natural Land's Peek Preserve in February 2022 (middle). These issues continue to adversely impact many key species on the Maurice, including the hallmark **Northern Harrier** (bottom). *Photos by Clay and Pat Sutton.*



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Introduction and Background: *"Changing Times"*

Following the previous thirty-five 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 36th 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 CU Maurice River website at:

www.cumauriceriver.org/raptor-and-waterfowl-surveysstudies/

During the winter of 2022-2023, the Maurice River raptors and waterfowl were monitored for the 36th consecutive season. However, for the first time in 36 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 previous 35 years were found to be no longer applicable or doable. Without going into all causes and effects (see those 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 prior 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 used during Year 36, 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 past 35 years (the same observers: Clay Sutton and Jim Dowdell), only **one observer** conducted the counts (Clay Sutton). While the past 35 years were contracted by CU Maurice River, the Year 36 count was 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 Year 36. By "half," that is to say that of the prior nine, the causeway Bridge North and Bridge South were effectively counted as a single site in recent past years as the *Phragmites* continued to impact views. 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 counts 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 9 point count sites gave ample geographic coverage of the river. Obviously, 4 sites give less coverage (viewability, or likelihood to observe all birds present). In the past, since there was some 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. 8 would be tallied, but we would make a note that at the next site, the Peek Preserve to the north, that 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 been previously 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 less concern of this than previously. The reach and scope of the coverage has changed, and will be somewhat more liberal than in the past, but I have faith that the past 35 years of effort lends substantial understanding and credibility as to what should be recorded at each site.

Based on the findings of the 36th season of effort, it preliminarily appears that the new protocols are working and lend good, if not perfect, comparability and corroboration with the techniques employed during our first 35 winter seasons (see below).

There is valid scientific precedent and reason 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. In short, 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 Year 36 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 very preliminary findings of Year 36, the subset provided valid results that are comparable to our past efforts and methodologies.

Findings and Discussion:

Core winter raptor and waterfowl monitoring continued for the 36th consecutive winter season. The Maurice River was sampled on four dates between January 16, 2022 and March 20, 2023. These findings are presented in **Table 1**. Also shown in Table 1 are the winter 2022-2023 average counts and peak daily counts for key species. The four survey dates in this past winter season, "Year 36" of monitoring on the Maurice, bring our cumulative total of winter surveys to 345 over the 36 years, dating back to the study's inception in 1987. Such consistent methodology gives us an unparalleled perspective on the changing avian resources of the Maurice River. (See 30-year report). Note however that protocols were changed considerably in Year 36 in order to 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 33 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 2022-2023 are shown in **Table 2**. The two survey dates on the Cohansey River during the current season bring the cumulative total to 57 winter surveys over the 33 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 slightly adjusted 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 2022-2023, shown in relation to Segment VII (2017-2022) of this long-term study, as well as the individual single-season results from Years 31 to 35 (those individual seasons that comprise Segment VII. Year 35 completed the seventh five-year segment of the study, segments that date back for 35 years to 1987). For perspective and ease of access, all seven five-year segments are shown for waterfowl in **Table 4**, and for raptors in **Table 5**. The findings for Year 36 are straight-forward and self-explanatory, particularly when viewed with and against previous segments and the discussion in the 30-year report presented in February 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. As has been the trend in most recent winters, the winter of 2022-2023 was a mild one. It began with a bitter cold snap at Christmas, but this was followed by a very mild January, a January that showed March-like temperatures. In the end, Millville saw the 4th warmest meteorological winter in recorded history. March was at or below average, but never during the winter season was there any snow to speak of; Atlantic City International Airport recorded its lowest snowfall ever, and there was little to no prolonged ice cover on the region's waters at any time during winter 2022-2023. (All weather data from *The Press of Atlantic City*). 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 conditions were again absent, there was however, as expected in recent years, considerable tidal flooding in the region, both higher levels and greater frequency than was recorded decades ago.

After 35 years of previous study, we believe that the findings on the Maurice for winter 2022-2023 (Year 36) 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 found were well below the 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 the relatively mild late winter and early spring led to very 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 2022-2023.

American Black Duck, Mallard, and Northern Pintail numbers were once again very low compared to long-term averages. In fact, all three posted their lowest numbers ever. Their near absence was presumably due to both the weather (lack of a harsh winter, and subsequent early spring, leading to early duck departure or complete bi-passing) 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 possibly increasing salinity (see 30-year report). 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.

Winter raptor numbers on the Maurice remained regionally significant, but 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. Tallies were well below long-term peaks and averages. In Year 36, the alarming downward trend continued for these two Maurice River and Delaware Bay signature raptors. This sadly but clearly follows recent trends. These low numbers were possibly 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. 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 35 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. 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 severely impacted (nearly eliminated?) marsh rodents from much of the formerly productive Maurice River marshes. The findings from winter 2022-2023 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 2022-2023 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. Without intensively investigating this issue here, in summary, most of these 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 Year 35 Report). 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 numbers. 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 2022-2023 again saw eagles present in continuing high numbers akin to recent winters. 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. Raptor diversity was good, and high Black Vulture and Turkey Vulture numbers continued. Vultures are well known to be increasing throughout the Northeast, 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).

While most duck numbers were well below average in winter 2022-2023, Green-winged Teal numbers continued 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. One major highlight of the season past was the presence of three drake Common Teal on February 22. 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 the three recorded ties the previous all-time maxima for New Jersey. As the cover photo attests (*a file photo taken by Pat Sutton of a drake Common Teal in Japan*), they are a handsome bird, and an example of how the Maurice can still surprise and entertain, attracting birders and fulfilling a role as a major destination for ecotourism at any season.

Beyond our field work, during winter 2022-2023 we continued to work on scientific papers detailing and analyzing all 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. 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 it 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. 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 us into the decision to publish as soon as possible. The dire findings of the most recent years (and now including Year 36), 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 now.

Summary and Conclusions:

It might be said that Year 36 of our long-term Maurice River winter raptor and waterfowl studies was a watershed year. 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 really compare and contrast one year's findings with 35, there are certain "markers" in the data set that hint at the new protocol being valid. Even though the numbers of many ducks were down, high teal numbers compared favorably with recent 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 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 4 survey dates and data sets, this season should be regarded as a transitional year. While more surveys were planned (to more closely correspond to the recent average of 7-8), weather issues, scheduling, and observer availability combined to confound intentions, and only 4 Maurice River surveys (plus 2 on the Cohansey) were accomplished. 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 (dictated by weather, cloud cover, wind, tide, etc.). Conversely, more surveys should yield higher averages as "better days" occur weather-wise. I feel that in Table 3, for all species, it is more applicable to compare Year 36 *peaks* with the *averages* shown for Segment VII, and the individual *averages* shown for Years 31-35. Using Year 36 peaks in a comparison, somewhat mitigates the fewer observers, fewer sites, but most importantly the fewer surveys of Year 36. We have introduced a possible negative bias by carrying out fewer surveys, but a bias that can be 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 fact-finding transition year, I will strive to increase the number of surveys 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. CU Maurice River staff and members also related and confirmed that Northern Pintails and Mallards were virtually absent on the river during the winter. We also know that on January 16, 2023, when there were zero Northern Pintails recorded on the Maurice, there were over 100 at Tuckahoe WMA the next day (seen by Sutton); on February 6, when there were again zero Pintails on the Maurice, there were 1000+ Pintails seen at Tuckahoe WMA two days later (on February 8, again by Sutton).

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 them, they just weren't there.

Given the above caveats, the results of our 36th 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, again 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. 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-oriented studies 36 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.

I commend and thank CU Maurice River for sharing these concerns and continuing to encourage 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 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 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 36 we have continued the long-term data set, a continuous monitoring effort with no breaks, as each year we continue to "take the pulse of the river." There is no other study like this in New Jersey.

– *Clay Sutton* May 2023

TABLE 1
Maurice River Raptor and Waterbird Survey – Year 36
December 2022 through March 2023

	Maurice River - Winter 2022-2023				
DATE	1/16	2/6	2/22	3/20	AVG.
LOONS to CORMORANTS					
Red-throated Loon	1	1	3	2	
Common Loon					
Pied-billed Grebe					
Horned Grebe					
Northern Gannet		750	56	40	
Dbl-cr Cormorant	1		5	198	
BITTERNS to VULTURES					
Great Blue Heron	10	5	6	9	
Great Egret	1		1		
Black-cr Night-Heron					
Black Vulture	19	**71**	24	21	33.75
Turkey Vulture	138	**161**	68	155	131
WATERFOWL					
Snow Goose	0	**1000**	0	400	350
Canada Goose	153	288	**296**	200	234
Mute Swan	14	6	6	4	8
Tundra Swan					
Wood Duck					
Gadwall				17	
American Wigeon				10	
Am Black Duck	56	**64**	39	32	48
Mallard	4	**12**	10	2	7
Blue-winged Teal				2	
Northern Shoveler			7	1	
Northern Pintail	0	0	8	**42**	13
Green-winged Teal	110	**1240**	980	1194	881
Common Teal			3	1	
Canvasback					
Redhead					
Ring-necked Duck			70	14	
Greater Scaup		10	2		
Lesser Scaup		10	2	2	
Scaup (sp.)	143	57	314	200	

Peak counts shown in **Bold Face**

TABLE 1 (page two)
Maurice River Raptor and Waterbird Survey – Year 36
December 2022 through March 2023

	Maurice River - Winter 2022-2023				
DATE	1/16	2/6	2/22	3/20	AVG.
WATERFOWL (continued)					
Surf Scoter	32	45	10	2	
Black Scoter		2	6		
White-winged Scoter					
Scoter (sp.)			60		
Long-tailed Duck		2	2		
Bufflehead	**157**	86	121	129	123
Com. Goldeneye				1	
Hooded Merganser	12	38	6	18	
Com. Merganser			2	2	
Red-br Merganser	13	4	4	**16**	9
Ruddy Duck	1				
DIURNAL RAPTORS					
Osprey				7	
Bald Eagle	**42**	32	42	36	38
Northern Harrier	12	**13**	10	6	10.25
Sharp-shinned Hawk	**1**	0	1	1	0.75
Cooper's Hawk	**3**	2	1	1	1.75
Northern Goshawk					
Red-shouldered Hawk	1	**2**	2	1	1.50
Rough-legged Hawk					
Red-tailed Hawk	15	13	13	**16**	14.25
Golden Eagle					
American Kestrel	0	0	0	2	0.50
Merlin	0	0	1	0	0.25
Peregrine Falcon	0	1	1	1	0.75
GROUSE to CRANES					
Ring-nk Pheasant					
Wild Turkey	30	15		5	
Clapper Rail				1	

Peak counts shown in **Bold Face**

TABLE 1 (page three)
Maurice River Raptor and Waterbird Survey – Year 36
December 2022 through March 2023

	Maurice River - Winter 2022-2023				
DATE	1/16	2/6	2/22	3/20	AVG.
SHOREBIRDS					
Sandhill Crane					
Black-bellied Plover					
Killdeer		2	2	2	
Am. Oystercatcher					
Greater Yellowlegs	43	24	40	70	
Lesser Yellowlegs					
Pectoral Sandpiper					
Sanderling					
Dunlin	5	25	20	130	
Long-billed Dowitcher					
Wilson's Snipe					
American Woodcock			1		
JAEGERS to ALCIDS					
Laughing Gull					
Bonaparte's Gull	1	1	9	19	
Ring-billed Gull	√	√	√	√	
Herring Gull	√	√	√	√	
Iceland Gull	1				
Lesser Bl-backed Gull	1		1		
Glaucous Gull	1				
Gt Bl-backed Gull	√	√	√	√	
Forster's Tern			3		
PIGEONS to WOODPECKERS					
E. Screech Owl					
Great Horned Owl					
Short-eared Owl					
Belted Kingfisher	2	1	2	1	
Common Raven			1		

Peak counts shown in **Bold Face**

TABLE 2
Cohansey River Raptor and Waterbird Survey
December 2022 through March 2023

Cohansey River - Winter 2022-2023			
DATE	12/28/22	2/28/23	Avg.
BITTERNS to VULTURES			
Red-throated Loon	1		
Great Blue Heron	6	2	
Great Egret	1		
Black Vulture	58	**82**	70
Turkey Vulture	**120**	109	114.5
WATERFOWL			
Snow Goose	**7,400**	1,000	4,200
Canada Goose	**650**	415	532.5
Gadwall		1	
Am. Black Duck	**42**	4	
Mallard	**20**	0	
Northern Pintail			
Green-winged Teal	**12**	0	
Bufflehead			
Hooded Merganser	7	1	
DIURNAL RAPTORS			
Bald Eagle	35	**37**	36
Northern Harrier	**20**	14	17
Sharp-shinned Hawk	**2**	1	1.5
Cooper's Hawk	**5**	3	4
Red-shouldered Hawk	**3**	3	3
Red-tailed Hawk	**18**	15	16.5
American Kestrel	**3**	0	1.5
Peregrine Falcon	1	0	0.5
GROUSE to CRANES			
Ring-necked Pheasant		2	
Wild Turkey		50	
Sandhill Crane	6	31*	
Killdeer	2		
Wilson's Snipe	1		
JAEGERS to ALCIDS			
Bonaparte's Gull			
Ring-billed Gull	√	√	
Herring Gull	√	√	
Great Black-backed Gull	√	√	
Great Horned Owl	3		
Belted Kingfisher	2		
Snow Bunting	25		

Peak counts shown in **Bold Face**

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

TABLE 3
Wintering Waterfowl and Raptors on the Maurice River 2007–2023
Comparison of Year 36 to Segment VII (2017-2022)*, and Years 31, 32, 33, 34, and 35

	Year 31 2017 - 2018		Year 32 2018 - 2019		Year 33 2019 - 2020		Year 34 2020 - 2021		Year 35 2021 - 2022		2017-2022 Segment VII			YEAR 36 2022 - 2023	
	Best	Avg	Best	Avg	Best	Avg	Best	Avg	Best	Avg	Best	Avg Peak Count	Avg of Average Counts	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
Canada Goose	1256	498	291	215	361	243	703	300	538	324	1,256	630	316	296	234
Am. Black Duck	635	440	357	209	400	263	241	128	423	220	635	411	252	64	48
Mallard	509	266	311	142	427	197	132	63	353	180	509	346	170	12	7
Northern Pintail	300	90	324	130	320	87	68	16	63	24	324	215	69	42	13
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

	Year 31 2017 - 2018		Year 32 2018 - 2019		Year 33 2019 - 2020		Year 34 2020 - 2021		Year 35 2021 - 2022		2017-2022 Segment VII			YEAR 36 2022 - 2023	
	Best	Avg	Best	Avg	Best	Avg	Best	Avg	Best	Avg	Best	Avg. Peak Count	Avg of Average Counts	Best	Avg
Black Vulture	57	32	73	54	61	43	68	42	84	39	**84**	69	42	71	36
Turkey Vulture	196	135	185	159	216	155	180	146	318	234	**318**	219	166	161	131
Bald Eagle	59	44.14	53	38.88	53	42	58	39	57	36.25	**59**	56	40	42	38
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
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
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
Northern Goshawk											(0 total)				
Red-shouldered 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
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
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
Merlin			1	0.25	1	0.14	1	0.25			1 (5 total)			1	0.25
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

*Segment VII summarizes (combines) Years 31-35

TABLE 4
Wintering Waterfowl on the Maurice River
Comparisons of Five Year Segments for Key Species
1987 - 2022

	1987-1992 Segment I			1992-1997 Segment II			1997-2002 Segment III		
	Best	Avg. Peak Count	Avg of Average Counts	Best	Avg. Peak Count	Avg of Average Counts	Best	Avg. Peak Count	Avg of Average Counts
Snow Goose	**14,000**	5,510	1,848	13,100	7,261	2,402	7,910	6,223	2,394
Canada Goose	1,000	499	104	880	498	133	1,038	758	321
Am. Black Duck	**8,120**	5,439	2,630	4,877	2,103	1,233	8,060	3,865	1,595
Mallard	3,758	2,805	1,303	**3,896**	1,358	723	3,325	1,645	624
Northern Pintail	3,020	1,429	539	**3,293**	1,254	545	1,069	752	349
Green-winged Teal	1,378	788	195	1,170	613	197	4,071	2,790	746

	2002-2007 Segment IV			2007-2012 Segment V			2012-2017 Segment VI		
	Best	Avg. Peak Count	Avg of Average Counts	Best	Avg. Peak Count	Avg of Average Counts	Best	Avg. Peak Count	Avg of Average Counts
Snow Goose	7,150	5,070	1,992	12,324	6,605	2,309	13,000	6,051	1,499
Canada Goose	1,520	910	412	**1,538**	796	268	1,270	764	346
Am. Black Duck	2,858	2,173	1,079	1,274	829	487	1,585	887	500
Mallard	994	600	350	649	463	256	952	579	289
Northern Pintail	1,495	1,036	409	928	628	281	1,621	826	364
Green-winged Teal	3,779	2,060	557	**5,850**	3,270	988	4,182	2,809	1,021

	2017-2022 Segment VII		
	Best	Avg. Peak Count	Avg of Average Counts
Snow Goose	3,800	2,780	851
Canada Goose	1,256	630	316
Am. Black Duck	635	411	252
Mallard	509	346	170
Northern Pintail	324	215	69
Green-winged Teal	2,317	1,489	548

TABLE 5
Wintering Raptors on the Maurice River
Comparisons of Five Year Segments for all Species
1987 – 2022

	1987-1992 Segment I			1992-1997 Segment II			1997-2002 Segment III		
	Best	Avg. Peak Count	Avg of Average Counts	Best	Avg. Peak Count	Avg of Average Counts	Best	Avg. Peak Count	Avg of Average Counts
Black Vulture	45	19.6	4.92	58	35.2	15.40	76	42.6	13.80
Turkey Vulture	209	135.8	71.60	266	131.0	72.80	195	145.8	85.80
Bald Eagle	15	9.0	4.46	20	13.4	7.78	20	15.0	8.36
Northern Harrier	32	28.0	20.10	33	28.6	18.80	38	32.0	23.00
Sharp-shinned Hawk	13	8.6	2.74	16	9.2	2.48	7	6.6	2.72
Cooper's Hawk	5	3.2	1.12	7	4.6	1.66	5	4.4	2.28
Northern Goshawk	1 (2 total)			1 (2 total)			1 (4 total)		
Red-shouldered Hawk	2 (9 total)	1.0	0.18	3 (14 total)	2.0	0.30	2 (11 total)	1.4	0.23
Red-tailed Hawk	59	50.8	36.40	59	53.4	40.20	57	53.4	41.60
Rough-legged Hawk	**4** (51 total)	3.2	1.45	3 (24 total)	1.4	0.50	1 (6 total)	0.6	0.12
Golden Eagle	**2** (10 total)			1 (5 total)			1 (5 total)		
American Kestrel	8	5.4	2.46	5	3.6	1.38	4	2.6	0.93
Merlin	1 (1 total)			**2** (8 total)			1 (7 total)		
Peregrine Falcon	1 (5 total)	0.8	0.11	2 (12 total)	1	0.25	2 (18 total)	1.2	0.37

	2002-2007 Segment IV			2007-2012 Segment V			2012-2017 Segment VI		
	Best	Avg. Peak Count	Avg of Average Counts	Best	Avg. Peak Count	Avg of Average Counts	Best	Avg. Peak Count	Avg of Average Counts
Black Vulture	75	53.4	19.00	57	38.2	22.4	60	44.6	26.24
Turkey Vulture	155	139.4	94.00	162	143	99	196	156	123
Bald Eagle	31	27.0	14.92	48	34.6	24.15	53	44.4	29.15
Northern Harrier	40	36.6	26.40	**43**	38	25.8	30	22.8	17.45
Sharp-shinned Hawk	11	7.0	2.62	**18**	9.4	3.04	6	5	2.28
Cooper's Hawk	7	5.0	2.48	**10**	6.8	3.21	6	4.4	2
Northern Goshawk	1 (1 total)			1 (3 total)			2 (3 total)		
Red-shouldered Hawk	8 (36 total)	3.4	0.75	**26** (69 total)	8.4	1.62	7 (50 total)	3.8	1.25
Red-tailed Hawk	**87**	66.0	44.20	64	59.4	42	57	45.2	29.75
Rough-legged Hawk	2 (8 total)	1.0	0.17	1 (3 total)	0.6	0.07	1 (4 total)		
Golden Eagle	1 (7 total)			**2** (7 total)			1 (4 total)		
American Kestrel	4	2.2	0.70	**10**	3	0.77	3	1.6	0.7
Merlin	2 (10 total)			2 (7 total)			1 (11 total)		
Peregrine Falcon	3 (25 total)	2	0.54	**4** (40 total)	2.4	0.98	4 (50 total)	2.8	1.13

	2017-2022 Segment VII		
	Best	Avg. Peak Count	Avg of Average Counts
Black Vulture	**84**	68.6	41.89
Turkey Vulture	**318**	219	166
Bald Eagle	**59**	56	40.05
Northern Harrier	25	20.6	13.83
Sharp-shinned Hawk	6	4.6	1.86
Cooper's Hawk	7	4.8	2.31
Northern Goshawk	(0 total)		
Red-shouldered Hawk	7 (41 total)	3.6	1.23
Red-tailed Hawk	41	33	20.57
Rough-legged Hawk	1 (2 total)		
Golden Eagle	1 (2 total)		
American Kestrel	2	1.2	0.45
Merlin	1 (5 total)		
Peregrine Falcon	3 (55 total)	2.4	1.43

For More Information / Literature Referenced:

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