

WINTERING RAPTORS AND WATERFOWL

ON THE MAURICE RIVER

CUMBERLAND COUNTY, NJ

A TWENTY-YEAR SUMMARY

OF OBSERVED STATUS AND TRENDS

1987-2007

Research sponsored by

Citizens United to Protect the Maurice River and its Tributaries, Inc.



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Submitted to:

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On the cover:

An **adult Bald Eagle in flight over the Heislerville WMA impoundments**. Bald Eagles are a hallmark of the Maurice River system, as breeders, migrants, and particularly as wintering birds.

– Photo by Clay Sutton, December 22, 2008

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EXECUTIVE SUMMARY

Initially in response to proposed land-use changes and potential threats to the Maurice River, and thereafter in an attempt to establish baseline data on raptor and waterfowl use, a systematic study was established during the winter of 1987-1988 and continued through 2006-2007 (and beyond to the present). For this twenty-year period, data was gathered at nine established sites on the lower Maurice River watershed. Raptors and waterfowl were counted for forty-five minutes per site at a rate of approximately every 10-14 days during the period from the first week of December through the last week of March in order to assess winter populations (as well as spring staging) and distribution of raptors and waterfowl.

The goal was to obtain information that over time could be used to determine status and trends in avian use and populations. Substantial avian ecovalues were discovered and extraordinary use of the Maurice River was proven. Twenty years of systematic sampling of the Maurice River, one of the very few true long-term studies being carried out in the Delaware Estuary on any group of animals, has determined raptor use of the Maurice River to be substantial and highly significant in the Delaware Estuary, in New Jersey, and in the entire Mid-Atlantic Region. Principal and significant raptor species include Bald Eagle, Red-tailed Hawk, and Northern Harrier among up to fifteen species observed annually.

Winter waterfowl numbers were equally substantial and significant for both the Delaware Estuary and for New Jersey. Populations of Snow Geese, Canada Geese, American Black Ducks, Mallards, Northern Pintail, and Green-winged Teal were substantial and represent some of the highest concentrations reported for New Jersey. Numbers and a wide variety of diving ducks were recorded as well.

In twenty years of systematic studies, Maurice River winter raptor and waterfowl were documented in numbers judged to be regionally significant. Status and observed trends have been reported and discussed, and studies remain ongoing. 2008-2009 marked the twenty-second season of continuous survey efforts, and the sixth year of expanded seasonal scope that now includes year-round monitoring of all waterbirds and shorebird species. Winter 2008-2009 also marked the second year of the fifth five-year block of ongoing core winter raptor and waterfowl studies.

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BACKGROUND AND INTRODUCTION

“As you head into Maurice River Cove from Delaware Bay by boat, the great eagle’s nest of Garron’s Neck Swamp soon looms into view. It is a famous nest, and an ancient nest, for it has a place in the chart of every boat that sails up the river, and has had for I don’t know how many years. Beyond the swamp and the nest stretched a vast wild marsh-land, where the reeds grew, and the tides came in, and the mud hens lived. And beyond that flowed the river, and beyond the river lay another marsh, and beyond the marsh another swamp. And over all this vast wild world towered the nest of the eagles, like some ancient castle . . .

“Over it all – swamp and marsh and river – ruled the eagles, as bold and free as the mighty barons of old.”

Dallas Lore Sharp, *The Fall of the Year*, 1911

The Maurice River, including its important Menantico, Manumuskin, Muskee, and Buckshutem tributaries, is one of New Jersey’s great river systems. The Maurice River easily rivals the Mullica River / Wading River complex, the Great Egg Harbor River, and the Cohansey River as being among the largest and most important river and estuary systems in southern New Jersey. Despite a long history of settlement in the areas surrounding the river, and despite recent and substantial regional growth and development, much of the Maurice River remains wild and scenic, and many areas would yet qualify as pristine under many standards of review. The Maurice River is certainly one of South Jersey’s gems - in scenic vistas, natural resources, wildlife use, and recreation and ecotourism opportunities.

Despite its well-established reputation for substantial wildlife populations and avian-use, prior to 1987 surprisingly little systematic ornithological data had been gathered on the Maurice River. Most published avian use data was anecdotal at best -- chance sightings or non-systematic surveys. State and federal waterfowl counts documented substantial use, yet were conducted infrequently and with results generally unavailable to the public. In short, available

records hinted at exceptional bird use of the Maurice River region, but unfortunately offered biologists or planners little definitive data or mapping for resource management, land use planning options, decision-making, and protection strategies.

Beginning in 1987, numerous studies have been conducted by Citizens United on the birds of the Maurice River region. These research efforts have taken place throughout the seasons, investigating the breeding birds of the river and its tributaries (principally the Manumuskin), winter bird populations, and the use of the area by migratory birds in spring and fall. Also, key parcels of land have been specifically surveyed for bird use, an important aspect of assessing the preservation potential and priority of undeveloped or threatened lands.

The principal on-going Citizens United project has been an investigation of the status and trends in wintering raptors and waterfowl on the Maurice River. This study is one of very few true long-term systematic monitoring studies conducted in the Delaware Estuary. The winter of 2006-2007 marked the twentieth year of this study. The methodology employed has been the same for all twenty years; nine sites are surveyed for 45 minutes per site on an average of every ten days throughout the winter. Winter here is defined as the time between the first week of December and the fourth week of March. Raptors and waterfowl are counted concurrently. In the twenty years of study, over 188 individual winter surveys have been carried out, creating a substantial and broad long-term database, and one equaled by few, if any, other avian studies in the Delaware Estuary or in New Jersey.

Raptors (hawks and eagles) have been monitored, concurrently with waterfowl, for twenty winter seasons, beginning in 1987-1988. Raptor studies have yielded significant long-term data on the status and trends of birds of prey in the Maurice River region. Raptors are predators at the top of the food chain. Accordingly, raptor numbers are a good barometer of an area's environmental quality. The Maurice River system continues to support one of the largest wintering hawk and eagle concentrations known in New Jersey or the Delaware Estuary region. Fourteen species of raptors are recorded most winters.

Turkey Vultures are the most numerous species found. Regional Turkey Vulture roosts support up to 300 birds each winter. Formerly, Turkey Vultures were near the northern limit of their winter range in southern New Jersey, but mild winters continue to change winter vulture distribution in eastern North America, and increasing numbers are wintering farther and farther north.

Red-tailed Hawks are the second most numerous species on the winter river. Average daily counts of 40-50 birds are achieved along the 14.4 mile stretch of river surveyed. Northern Harrier, formerly known as "Marsh Hawk," are another representative species of the vast marshes of the Maurice River. Counts of over 30 N. Harriers per day are achieved most winters.

The Bald Eagle is a hallmark species on the Maurice River and its tributaries. The numbers found here each winter are regionally significant and generally the highest concentration in both New Jersey and in the entire Delaware Estuary region. Numbers have grown significantly over the twenty years of study. Currently peak daily counts of over 20 Bald Eagles are achieved each winter.

Ducks and geese have been counted, concurrently with raptors, along the tidal portions of the Maurice River for the past twenty winters, also beginning in 1987-1988. Each season, surveys have been conducted between the first week of December and the fourth week of March, on an average of once every ten days. (The March survey dates have allowed for a broad understanding of spring staging in the area by waterfowl.) Through this methodology, the status and trends of waterfowl on the Maurice River can be fully assessed. A total of 33 species of waterfowl have been recorded on the Maurice River between 1987 and 2007. Key species on the Maurice River and its tributaries include Snow Goose, Canada Goose, American Black Duck, Mallard, Northern Pintail, and Green-winged Teal.

Snow Geese are characteristically found in the salt marshes on the lower river, with an average of 3,000 to 4,000 found each winter. The peak daily high count was 14,000 recorded in 1990. Canada Geese are widespread along the river, but are usually most numerous on the brackish upper river. American Black Ducks are found in large numbers along the length of the river, with average counts between 1,000 and 3,000 each winter. Peaks have been as high as 8,000 birds for this species of special concern to the US Fish and Wildlife Service.

Mallard and Northern Pintail are found primarily on the wild rice fresh to brackish marshes of the upper river, with largest numbers usually recorded in late winter and early spring. Pintails, along with Green-winged Teal, are also numerous at the tidal impoundments of the Commercial Township (Bivalve) Estuary Enhancement Program (EEP) of Public Service Electric and Gas (PSE&G). Early March is generally best -- the time of spring migration "staging" for these handsome ducks. Average numbers vary considerably due to the severity of the winter, but peaks of nearly 4,000 Mallards and 3,000 N. Pintails have been recorded. Also found along the river in significant numbers each winter are Bufflehead, Red-breasted Merganser, and many other diving duck species. During some winters, scaup are abundant in Maurice River Cove.

GOALS AND OBJECTIVES

In the mid-Atlantic region, winter is an exceptional time for bird-use, particularly raptor and waterfowl use of regional river and coastal wetlands habitats. Vast river and bay systems attract and support both a wide variety and large numbers of winter birds - birds which have migrated in autumn from regions farther north and west, including high Arctic regions, to feed in milder, ice-free river and bay habitats. Winter is key time of bird-use in southern New Jersey and a crucial time in the life cycle and survival of all Mid-Atlantic region hawks, eagles, and waterfowl.

Although important avian use of the Maurice River occurs on a year-bound basis, the suspected importance of the area as a key wintering area called for systematic surveys to be conducted during the highly important winter season - at a time when raptor and waterfowl numbers are at their seasonal highest in the region. The goals of this Maurice River raptor and waterfowl survey, as determined in concert with Citizens United to Protect the Maurice River and its Tributaries, Inc., were as follows:

1. The establishment of an avian database which, over time, can be used to determine status and trends in bird populations and bird use - such baseline data would be of particular importance as land use changes accelerate in the watershed.

2. The determination of key use areas by birds - possible eventual habitat rankings could be of real value in directing resource protection and acquisition prioritization, as well as wildlife management needs.

3. Submission of rare, threatened and endangered species records to the Endangered and Nongame Species Project (ENSP) of the NJDEP Division of Fish and Wildlife. By submission of copies of these ongoing reports, findings of this study will supplement and aid ENSP's Landscape Project, upcoming proposed Habitat Rules, Wildlife Incentive Programs, and other Department programs in protecting key Maurice River region habitats.

4. Bring recognition and publicity to the considerable avian resources of the Maurice River watershed. While there was considerable anecdotal information on the area's bird life, no systematic raptor or waterbird studies had been carried out prior to 1987 on the Maurice River (excepting the DFW's twice-annual waterfowl counts). The lack of Maurice River data on winter raptors, a hallmark feature of South Jersey river systems, was noteworthy in its absence prior to 1987.

5. The key objective of the survey efforts is to discover and provide cornerstone avian resource data to be used in river management and protection. Baseline knowledge backed by strong systematic data can play a crucial role in decision making, land-use planning, and resource management on the Maurice River. Long-term monitoring, leading to a true understanding of avian status and trends over time (and in relation to a rapidly changing landscape), should play an important part in planning and protection for the wild and scenic Maurice River.

METHODOLOGY

For twenty full winter seasons, from the inaugural winter 1987-1988 study and continuing through the 2006-2007 season, raptor and waterbird surveys on the Maurice River were conducted systematically between the first week of December and the fourth week of March. An average of nine surveys were conducted each field season, at roughly the rate of once every ten days to two weeks during this winter period. It should be noted that early December sees some late “fall” migration into the South Jersey region, and that March is a time of substantial spring migration build-up, particularly in waterfowl numbers.

Two observers working in concert, Clay Sutton and James Dowdell, spent 45 minutes apiece at each of nine sampling sites. All raptors and waterbirds were tallied at each site, whether in flight or sitting (perched or on the water). All hawks and eagles were searched for in accordance with Sutton and Sutton (1996). Raptors were identified, aged, and sexed in accordance with Dunne, Sibley, and Sutton (1986), Clark and Wheeler (1987), and Wheeler and Clark (1995). Waterbirds were found and identified in accordance with Sibley (2000), Sutton, *et al.*, (2004), and, additionally, the two authors’ many years of extensive field experience throughout southern New Jersey and elsewhere.

Additional birds, most often raptors, observed *between* official count sites were recorded if, *and only if*, the observers were confident they had not previously been counted. For example, a low-flying Cooper’s Hawk dashing across the road would be added to the count if it had not been observed at the previous site. While the nine sampling sites were generally far enough apart to preclude “double-counting,” the observers used extreme care to avoid recounting the same bird or birds. For example, eagles range widely up and down the river; a Bald Eagle perched or roosting at the Peek Preserve near Millville may range south to the Maurice River Causeway or farther. A “new” eagle would only be counted when direction of flight, age, plumage, or circumstance (such as concurrent sightings) would allow the observers to confidently assess that it could not possibly have been counted previously.

Waterfowl counts are thought to be largely conservative; unless flushed by hunters, boats, or raptors, many ducks consistently remained out of sight in creek beds or guts. Also many distant ducks were often largely unseen due to heat waves, haze, rough water (Maurice River Cove), or distance from the observers. Due to similar factors and constraints, counts of raptors, particularly vultures, are thought to be conservative as well. As discussed below, the Maurice River basin is a very large area, and fairly wide in the lower portions. Counts are representative, but by no means exhaustive or complete. Total birds present are most always certainly higher than those counted and recorded. Note that this study counted the mainstem river only, from the Peek Preserve near Millville south to East Point (a 14.4-mile stretch), and did not census the major tributaries to the Maurice River.

The nine count locations, the official “Point Count” methodology sampling sites, are shown on **Map 1**. Some sites did have supplemental count locations (labeled A, B, and C on our field maps, but not on Map 1) to allow for all areas to be seen and thereby most birds counted.

For example, the Heislerville WMA site, Site 7, at Matt's Landing has three impoundment pools, and not all pools can be viewed or counted from the same immediate location. Therefore, the Site 7 count is a composite of tallies taken at three separate locations, but only one final tally is given for the site on the daily and summary data sheets. In this case, the 45 minutes are expended at the three stops put together. A similar situation exists at Bivalve EEP as well. Only by using such supplemental viewing locations could all birds, particularly waterfowl, be reasonably and reliably tallied to the greatest extent possible.

In order to avoid time-of-day bias in the sampling technique, the route was reversed on each subsequent sampling date, run "upriver" and then "down river" on alternate sampling days. The nine sites ultimately settled upon as a reasonable and "doable" sampling route are as follows. They essentially monitor the 14.4-mile long tidal stretch of the river between the dam at Millville (Union Lake) and the Delaware Bay at East Point (Maurice River Township):

- (1) Peek Preserve. The Natural Lands Trust, Inc. This site, at the modest canoe landing by the office, allowed counting of the largely fresh water section adjacent to The Nature Conservancy (TNC) Maurice River Bluffs Preserve.
- (2) Private dock at the Galetto Property (private property used with permission). Near Laurel Lake. Allowed for a key overview of a major section of the brackish (tidal) portion of the Maurice River.
- (3) West bank of Maurice River, near Buckshutem road, just south of Laurel Lake. Small bluff at a New Jersey Conservation Foundation property.
- (4) Foot of the Maurice River Bridge on the Maurice River Causeway. West side of the river, on the berm of the bridge, looking north over the tidal river and wetlands.
- (5) Foot of the Maurice River Bridge on the Maurice River Causeway. East side of the river, looking south over the tidal river and wetlands. (Note: although these two sites are immediately adjacent, the bridge and embankments do not allow a view in both directions at once; #4 faces to the north and #5 faces to the south).
- (6) East bank of the Maurice River adjacent to Maurice River Road just south of Leesburg in Maurice River Township. Tidal river and wetlands overlook.
- (7) Heislerville Wildlife Management Area (WMA). This is actually three "mini sites" in one, to allow for the counting of waterfowl in each of the three tidal impoundments. The three overlooks or "views" are counted as one site in all analysis (no single spot allows one to see all three key impoundments at once.) Also allows for a view of the Basket Flats area mudflats (at low tide) and the shallow bay (at high tide).

- (8) East Point Lighthouse. The seawall at the parking lot / boat ramp offers a view of all of Maurice River Cove. A shallow, open-water area, used by substantial numbers of diving ducks.
- (9) Bivalve, the Commercial Township Estuary Enhancement Program (EEP) of Public Service Electric and Gas (PSE&G). As with Heislerville WMA, no single point allows one to see all the tidal impoundments at once. Therefore #9 is three mini sites in one: (1) the berm and boardwalk off CR 631 south of Port Norris; (2) the boardwalk and observation platform of Strawberry Avenue, south of Route 553, in Port Norris; and (3) the berm at the west end of the impoundments at Berrytown Road.

To the greatest extent practicable, all counts were conducted in good weather. The observers carefully selected sampling days which were sunny and breezy, conditions which readily facilitate raptor hunting and movement along the river. Such conditions particularly allow for the best raptor counts. On cloudy, windless days, raptors often spend much of their time perched, and therefore often are out of sight.

While the technique used might be considered to be a combination of the time-honored “point count” and “transect” methods, birds recorded during the transits from site to site were infrequent and only included under the caveats expressed above. None-the-less, the route was always virtually the same, decreasing any variability possibly associated with this technique. Therefore, in essence this was a standard point count study, yet one which attempted to maximize sightings and gain a full picture of the numbers and diversity of the considerable avian resources present.



FINDINGS

Twenty seasons of winter raptor and waterfowl studies have now been conducted on the Maurice River under the auspices of Citizens United to Protect the Maurice River and its Tributaries. **Table 1** shows the results of twenty seasons of waterfowl counts on the Maurice River. Shown are high counts for each specie for each winter season from the inaugural 1987-1988 study and concluding with the 2006-2007 season. Note that the twenty years of study are divided into equal five-year segments. **All-time high daily counts** are shown in **Bold Face**. 188 individual winter surveys were conducted over the twenty seasons of study for an average of 9.4 per winter (the arbitrary winter period is established as the period from the first week of December through the last week of March).

Table 2 shows yearly peak and average numbers of key species of wintering waterfowl on the Maurice River from the period of 1987-1988 to 2006-2007. The number of surveys for each season are shown and the data is shown in four five-year segments.

Finally, **Table 3** shows the best count, the five-year average peak count, and the five-year mean of average (mean) counts for key waterfowl species for each five-year segment of study. These three barometers are the best way to review and ascertain changes and trends in waterfowl populations on the Maurice River over time.

While average counts are of value in comparing data from year to year, and in part reflect the amount of time over the season that birds spend on the river (as well as the inevitable impacts of both daily and prolonged weather conditions upon count results), the peak seasonal count for many species far better reflects the true numbers present. For example, the peak of 8,120 American Black Ducks recorded in 1987-1988 far better reflects the true number present than the average seasonal count of 2,611. Weather, ice, cloud conditions, tide, and access can greatly vary and alter the results of any given survey. This is why a minimum of 7-10 surveys per season are required to truly assess bird populations present in the system.

Table 4 shows Maurice River winter raptor peaks and averages for each of the twenty seasons of study. Here also, data is shown for each five-year segment of the twenty years of study.

Table 5 depicts Maurice River raptor findings in five-year segments, showing the best count, the average peak count, and the mean of average (mean) counts for each of the four five-year segments of the study. **All-time high daily counts** for each species are shown in **Bold Face**.

Table 1

Peak Numbers of Wintering Waterfowl on the Maurice River -- Twenty-Year Summary: 1987-2007

Species	0 Segment I					Segment II					Segment III				
	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02
Snow Goose	5000	1550	14000	3500	3500	6500	9200	2355	13100	5150	8500	4300	7910	4300	6107
Ross' Goose					1		1								
Brant			2	2	25				5	20	9				13
Canada Goose	899	110	450	37	1000	187	880	290	475	660	709	650	775	1038	620
Tundra Swan	19	12	14		3	7			13	4	10	1			2
Mute Swan	8	9	21	25	21	25	19	40	14	17	45	76	11	26	21
Wood Duck	1	1	4	6	3	4	5	2	12	4	1	13	4	2	5
Gadwall	60	39	20	40	11	3	7	8	6	25	132	400	565	270	130
American Wigeon	38	32	8	30	10	6		7	1	4	147	160	260	8	42
Eurasian Wigeon													1		
American Black Duck	8120	4470	4867	5448	4290	4877	1488	1509	1149	1495	2660	8060	3310	3027	2270
Mallard	3250	2660	2179	3758	2180	3896	547	671	356	1320	2868	3325	370	958	703
Blue-winged Teal	3	1		1		1	1		1	2	3		12	2	2
Northern Shoveler	6		2	1		1	3	4		3	130	154	105	20	62
Northern Pintail	3020	547	1227	1503	850	3293	347	680	240	1712	1012	569	300	810	1069
Green-winged Teal	1378	330	625	1045	562	765	355	544	229	1170	1495	950	3914	4071	3521
Common Teal													2		
Canvasback	5	51	6	9		23	32	9	50	32	20	27	19	23	19
Redhead							1								
Ring-necked Duck	7	3	79		4	1	1	31	60	1	10	22	3	1	430
Greater Scaup	18	12	226	930	40	83	67	4	10	19	140	50	126	160	500
Lesser Scaup	26	3		12	1	10	19	68	21	19	30	53	3	1	140
scaup species		690	20	400		50	40	1000	100	50	61	5100	100	135	2500
Black Scoter	1	1		2				3	1	1		6	5		
Surf Scoter				2160				1	6	2	1	75	61		2
White-winged Scoter				200				1	2	1					
scoter species					1000	5		15	15	8	3	5008	2		5
Long-tailed Duck	1	3			4	1	2	5	1	1	4	1		1	
Bufflehead	55	154	125	60	108	108	150	125	181	177	110	259	180	482	210
Common Goldeneye	20	24	36	48	305	55	900	22	65	51	11	47	30	160	12
Barrow's Goldeneye														1	
Hooded Merganser	3	3		12	3	20	19	8	20	10	30	25	14	10	35
Common Merganser	9	74	51	5	1	4	4	33	34	32	4	9	51	47	1
Red-breasted Merganser	25	20	150	28	62	32	85	82	144	47	63	164	35	308	144
Ruddy Duck		1				1	34	3	2	6	53	4	52		74
Unid diving ducks							4000								

All surveys conducted between the 1st week of December and the 4th week of March

All time high daily counts shown in bold face.

Table 1
Peak Numbers of Wintering Waterfowl on the Maurice River -- Twenty-Year Summary: 1987-2007

Segment IV					
Species	2002-03	2003-04	2004-05	2005-06	2006-07
Snow Goose	3600	4000	5350	5251	7150
Ross' Goose		1			
Brant	4	11		19	
Canada Goose	1081	1520	1111	423	415
Tundra Swan	5	4	3	15	7
Mute Swan	37	39	34	54	18
Wood Duck	4	22	8	2	11
Gadwall	65	50	23	30	65
American Wigeon	12	10	3	20	42
Eurasian Wigeon					
American Black Duck	2578	1950	2432	2858	1046
Mallard	302	994	793	478	431
Blue-winged Teal				1	
Northern Shoveler	2			5	10
Northern Pintail	755	1495	796	1225	910
Green-winged Teal	1261	1793	1358	3779	2110
Common Teal		1			1
Canvasback	42	40	44	14	17
Redhead				1	1
Ring-necked Duck	314	680	375	13	311
Greater Scaup	30	850	110	15	30
Lesser Scaup	106	79	87	19	38
scaup species	400	250	187	200	50
Black Scoter		100	2		
Surf Scoter	40	100	3	47	1
White-winged Scoter	1	3			
scoter species		25	7	8	3
Long-tailed Duck	2	18	28	2	25
Bufflehead	410	326	320	323	188
Common Goldeneye	498	235	271	68	147
Barrow's Goldeneye					
Hooded Merganser	9	8	12	48	81
Common Merganser	62	52	96	13	24
Red-breasted Merganser	172	331	111	264	109
Ruddy Duck	6	6	102	16	22
Unid diving ducks					

All surveys conducted between the 1st week of December and the 4th week of March

All time high daily counts shown in **bold face**.

Table 2
Peak and Average Numbers of Key Species of Wintering Waterfowl on the Maurice River
Twenty-Year Summary: 1987-2007

Segment I	1987-88	N = 13	1988-89	N = 8	1989-90	N = 11	1990-91	N = 7	1991-92	N = 7
	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg
Snow Goose	5000	1333	1550	299	14000	3898	3500	1352	3500	2356
Canada Goose	899	112	110	30	450	110	37	21	1000	249
Am. Black Duck	8120	2611	4470	2343	4867	2411	5448	3804	4290	1983
Mallard	3250	1247	2660	1010	2179	825	3758	2585	2180	846
Green-winged Teal	1378	301	330	44	625	111	1045	360	562	161

Segment II	1992-93	N = 8	1993-94	N = 9	1994-95	N = 9	1995-96	N = 10	1996-97	N = 10
	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg
Snow Goose	6500	2724	9200	3796	2355	779	13100	3422	5150	1288
Canada Goose	187	96	880	144	290	96	475	134	660	193
Am. Black Duck	4877	2916	1488	953	1509	810	1149	595	1495	893
Mallard	3896	2048	547	318	671	375	356	185	1320	687
Northern Pintail	3293	1630	347	131	680	360	240	72	1712	532
Green-winged Teal	765	225	355	130	544	179	229	77	1170	374

Segment III	1997-98	N = 10	1998-99	N = 9	1999-00	N = 10	2000-01	N = 9	2001-02	N = 10
	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg
Snow Goose	8500	3212	4300	2121	7910	2432	4300	1743	6107	2461
Canada Goose	709	337	650	262	775	326	1038	436	620	245
Am. Black Duck	2660	1465	8060	2456	3310	1285	3027	1381	2270	1387
Mallard	2868	906	3325	1189	370	160	958	469	703	396
Northern Pintail	1012	410	569	369	300	122	810	327	1069	518
Green-winged Teal	1495	320	950	438	3914	1331	4071	758	3521	882

Segment IV	2002-03	N = 11	2003-04	N = 10	2004-05	N = 8	2005-06	N = 10	2006-07	N = 9
	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg
Snow Goose	3600	2129	4000	1342	5350	2261	5251	2135	7150	2091
Canada Goose	1081	440	1520	497	1111	523	423	287	415	311
Am. Black Duck	2578	1116	1950	1035	2432	1118	2858	1357	1046	768
Mallard	302	198	994	504	793	456	478	298	431	296
Northern Pintail	755	350	1495	528	796	364	1225	478	910	326
Green-winged Teal	1261	310	1793	501	1358	362	3779	1049	2110	565

N = number of surveys; all surveys conducted between 1st week of December and 4th week of March

TABLE 3
Wintering Waterfowl on the Maurice River, Cumberland County, NJ
Twenty-year Summary: 1987-2007

	1987-1992 Segment I			1992-1997 Segment II			1997-2002 Segment III			2002-2007 Segment IV		
	Best	Avg. Peak Count	Mean of Means	Best	Avg. Peak Count	Mean of Means	Best	Avg. Peak Count	Mean of Means	Best	Avg. Peak Count	Mean of Means
Snow Goose	14,000	5,510	1,848	13,100	7,261	2,402	7,910	6,223	2,394	7,150	5,070	1,992
Canada Goose	1,000	499	104	880	498	133	1,038	758	321	1,520	910	412
Am. Black Duck	8,120	5,439	2,630	4,877	2,103	1,233	8,060	3,865	1,595	2,858	2,173	1,079
Mallard Duck	3,758	2,805	1,303	3,896	1,358	723	3,325	1,645	624	994	600	350
Northern Pintail	3,020	1,429	539	3,293	1,254	545	1,069	752	349	1,495	1,036	409
Green-winged Teal	1,378	788	195	1,170	613	197	4,071	2,790	746	3,779	2,060	557

Table 4
Wintering Raptors on the Maurice River
Twenty-Year Summary: 1987-2007

Species	Segment I									
	1987-88	N = 14	1988-89	N = 7	1989-90	N = 10	1990-91	N = 7	1991-92	N = 7
	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg
Black Vulture	6	0.5	3	0.7	9	2.4	35	9	45	12
Turkey Vulture	82	44	209	116	123	58	105	61	160	79
Osprey *	10						1			
Bald Eagle	6	2.7	4	2.6	15	5.7	10	5.4	10	5.9
Northern Harrier	32	20.5	32	21	22	18	23	17	31	24
Sharp-shinned Hawk	12	3	8	2	5	2.3	5	2.7	13	3.7
Cooper's Hawk	3	1.1	2	0.7	5	1.3	3	1.4	3	1.1
Northern Goshawk			1		1					
Red-shouldered Hawk	1		1		2				1	
Red-tailed Hawk	40	33	44	33	59	38	53	37	58	41
Rough-legged Hawk	3	1	2	1	4	2	4	2	3	2
Golden Eagle	1		1		2				1	
American Kestrel	6	2.5	4	2.9	8	2.3	4	2	5	2.6
Merlin					1					
Peregrine Falcon	1		1				1			

Species	Segment II									
	1992-93	N = 8	1993-94	N = 9	1994-95	N = 9	1995-96	N = 10	1996-97	N = 10
	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg
	22	9	58	25	45	21	30	14	21	8
	77	59	266	107	99	59	120	84	93	55
			10				10		15	
	11	8.4	16	9.5	6	3.9	20	10.1	14	7
	30	16	33	19	28	24	29	20	23	15
	11	2.5	8	2	6	2.8	16	3.5	5	1.6
	5	1.5	4	1.7	3	1.4	4	1.5	7	2.2
	1						1			
	3		1		2		2		2	
	57	41	47	36	52	42	52	41	59	41
	1	0.25	1	0.22	1	0.44	3	1.2	1	0.3
	1				1		1		1	
	4	1.9	5	1.7	3	1.1	3	1.5	3	0.7
	1		2				1		1	
			1		1		1		2	

Species	Segment III									
	1997-98	N = 10	1998-99	N = 10	1999-00	N = 10	2000-01	N = 10	2001-02	N = 10
	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg
Black Vulture	76	17	37	10	18	9	31	13	51	20
Turkey Vulture	89	60	137	81	133	84	195	96	175	108
Osprey *			1		19		31		13	
Bald Eagle	11	6.6	12	7	17	9.3	20	10.4	15	8.5
Northern Harrier	25	22	34	23	33	23	38	23	30	24
Sharp-shinned Hawk	7	2.6	7	3.2	6	2.1	6	2.8	7	2.9
Cooper's Hawk	5	3	4	1.7	4	2.4	5	2.2	4	2.1
Northern Goshawk					1				1	
Red-shouldered Hawk	1		1		2		2		1	
Red-tailed Hawk	56	42	57	45	49	37	52	42	53	42
Rough-legged Hawk					1		1		1	
Golden Eagle	1		1		1		1			
American Kestrel	2	0.5	3	0.9	2	0.66	2	1.3	4	1.3
Merlin					1		1		1	
Peregrine Falcon	1		1		1		1		2	

Species	Segment IV									
	2002-03	N = 11	2003-04	N = 10	2004-05	N = 8	2005-06	N = 10	2006-07	N = 9
	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg
	36	13	75	23	68	19	35	18	53	22
	117	89	142	95	154	95	129	95	155	96
	14		34		18		41		18	
	25	14.2	28	13.7	25	15.1	26	13	31	18.6
	36	26	40	29	39	26	33	25	35	26
	11	4.2	5	2.3	8	2.9	6	2.3	5	1.4
	3	2	5	2.4	5	2.8	7	2.4	5	2.8
	1									
	2		8		3		3		1	
	55	45	87	50	63	43	64	42	61	41
	1		1		2		1			
	1		1		1		1		1	
	2	0.73	2	0.3	1	0.25	2	1	4	1.2
	1				1		2			
	2		2		2		1		3	

N = number of surveys; all surveys conducted between the 1st week of December and the 4th week of March.

* Osprey are not a wintering species; table shows peak spring counts attained during standard survey period.

Table 5
Wintering Raptors on the Maurice River, Cumberland County, NJ
Twenty-Year Summary: 1987-2007

	1987-1992 Segment I			1992-1997 Segment II			1997-2002 Segment III			2002-2007 Segment IV		
	Best	Avg. Peak Count	Mean of Means	Best	Avg. Peak Count	Mean of Means	Best	Avg. Peak Count	Mean of Means	Best	Avg. Peak Count	Mean of Means
Black Vulture	45	19.6	4.92	58	35.2	15.40	76	42.6	13.80	75	53.4	19.00
Turkey Vulture	209	135.8	71.60	266	131.0	72.80	195	145.8	85.80	155	139.4	94.00
Bald Eagle	15	9.0	4.46	20	13.4	7.78	20	15.0	8.36	31	27.0	14.92
Northern Harrier	32	28.0	20.10	33	28.6	18.80	38	32.0	23.00	40	36.6	26.40
Sharp-shinned Hawk	13	8.6	2.74	16	9.2	2.48	7	6.6	2.72	11	7.0	2.62
Cooper's Hawk	5	3.2	1.12	7	4.6	1.66	5	4.4	2.28	7	5.0	2.48
Northern Goshawk	1	2 total		1	2 total		1	4 total		1	1 total	
Red-shouldered Hawk	2	9 total		3	14 total		2	11 total		8	36 total	
Red-tailed Hawk	59	50.8	36.40	59	53.4	40.20	57	53.4	41.60	87	66.0	44.20
Rough-legged Hawk	4	51 total		3	24 total		1	6 total		2	8 total	
Golden Eagle	2	10 total		1	5 total		1	5 total		1	7 total	
American Kestrel	8	5.4	2.46	5	3.6	1.38	4	2.6	0.93	4	2.2	0.70
Merlin	1	1 total		2	8 total		1	7 total		2	10 total	
Peregrine Falcon	1	5 total		2	12 total		2	18 total		3	25 total	

All-time high daily counts shown in **Bold Face**

DISCUSSION

WINTER WATERFOWL OF THE MAURICE RIVER

The analysis of twenty years of systematic data allows for considerable insight into status and trends of waterfowl on the Maurice River. Spatial distribution of ducks and geese along the river is easily ascertained in the raw data from these twenty years of regular counts, although this will not be explored or analyzed in this report. Likewise, phenology of waterfowl (and raptor) populations is also easily discernable. The trend toward the milder falls and winters associated with climate change have generally meant that waterfowl numbers are lower today than historically; twenty years of data shows that the largest numbers of ducks and geese occur during the colder winters – when birds are pushed here by harsh conditions, snow cover, and freeze-ups to our north. On milder winters, many waterfowl simply remain north of the Delaware Bay region.

A second observable trend is the loss in numbers of upper river waterfowl from the low salinity areas dominated by wild rice. This drop in waterfowl numbers is presumed to be due to the impacts of sea level rise and increasing salinity due to the salt line moving upriver (a factor of both climate change and withdrawals upstream), and the effects of Canada Goose herbivory on wild rice stands.

This upriver “loss” however has been countered by a downriver “gain” in waterfowl numbers resulting from the creation, management, and continuing recruitment of ducks by the PSE&G Estuary Enhancement Program (EEP) saltmarsh restoration at Bivalve. As this project has come on line, and has continued to attract greater and greater numbers of ducks each season, the loss of upriver birds has been offset considerably. Interestingly, it is not known, nor can be, whether the EEP is simply pulling in birds that would otherwise be upriver were the EEP not in place. This massive salt marsh restoration project may well be concentrating regional birds due to its high quality habitat. It is important to note, however, that these efforts may be in fact temporary, as *Spartina alterniflora* continues to replace mudflats favored by ducks (and shorebirds). This in its own right is due cause to continue this current long-term monitoring project.

Comparison of successive five-year segments allows for a good analysis of trends in Maurice River waterfowl. Observed peak seasonal counts best illustrate the true Maurice River potential for each species, although averages help us understand the amount of time birds spend on the river in a given winter. The average of the peak counts and the average of mean counts for each five-year segment (seen in Table 3) perhaps best show changing numbers and trends over time.

Diving Ducks

Diving ducks can be abundant on the extreme lower river and in Maurice River Cove, yet varying numbers no doubt have more to do with food resources than seasonal temperatures or

climate change.

In some seasons, large numbers of scoter and scaup are present near the mouth of the river, attracted by exceptional “sets” of molluscs – small clams and oysters – that vary greatly from year to year in quantity and location. Common Goldeneye numbers vary greatly as well, but this seems more related to the amount of ice in the Delaware Bay; Goldeneye are probably present in the bay in good numbers every year, but highest counts occur when offshore ice in the bay pushes them to open water in Maurice River Cove.

Among diving ducks, Bufflehead have been seen to exhibit a strong increasing trend, as numbers have grown considerably over the five-year segments of this study. Bufflehead are found mainly at Heislerville WMA, on the lower river, and in Maurice River Cove. The substantial increase in Ring-necked Ducks is linked solely to the high numbers recently attracted each season to the large fresh water sand plant lake just off the river at Mauricetown.

Canada Goose and Snow Goose

Among the species considered to be “signature species” or key species on the Maurice River, Canada Geese show a clear, greatly increasing trend, with best counts, highest average peak count, and highest average count all coming in the 2002-2007 segment (Segment IV – see Table 3). Snow Goose numbers have remained remarkably steady on the lower Maurice River however. In any given season, Snow Goose numbers vary greatly from survey to survey as these somewhat nomadic geese range widely up and down the Delaware Bayshore.

American Black Duck

American Black Duck, a species of special concern, are a true hallmark species of southern New Jersey salt marshes. On the Maurice River they are found in substantial and significant numbers along the length of the river. Black Ducks have shown a steady, moderate decline on the Maurice River, as they have throughout most of their range. Numbers remain regionally high on the Maurice River, but declining peaks and averages give cause for concern. With their preferred salt marsh habitat intact, declines may be linked only to mild winters – with fewer pushed south in winter by freeze-ups and ice to the north of New Jersey.

Mallard and Northern Pintail

Mallards and Northern Pintails are highly representative species of the low salinity brackish tidal (wild rice) marshes of the Maurice River. Both have shown considerable decline; mallard has shown the largest decline of any species during this long-term study. Northern Pintail, while showing a decline from Segment I through Segment III has made a slight rebound. More than any species, Pintails seem to have left the northern upper river rice marshes, but have instead gravitated to the EEP mudflats and shallow waters at Bivalve.

Green-winged Teal

Green-winged Teal have also increased substantially over time. At one time distributed along the river (and always numerous at Heislerville WMA), today very large numbers are consistently present at the Bivalve EEP site. Green-winged Teal show a clear upward trend, but

this is primarily linked to ever-increasing numbers in the quality shallow water and mudflat emergent habitat offered at Bivalve.

Overall, waterfowl populations have remained remarkably stable on the Maurice River over twenty years of study. Declines in some species have been offset by increases in others, with the seemingly increasing diversity made possible by waterfowl management techniques at Heislerville WMA, and at the emergent quality wetlands at Bivalve EEP.

Ducks and geese remain key components of the Maurice River fauna as they have for centuries. Twenty years of study have shown that over the length of the river and over time, Maurice River waterfowl are present in substantial and significant numbers for both the Delaware Estuary and the entire Mid-Atlantic region. And, few areas can boast the extensive long-term spatial and temporal documentation that Maurice River waterfowl now enjoy.

DISCUSSION

WINTER RAPTORS OF THE MAURICE RIVER

Twenty years of systematic winter counts of vultures, hawks, and eagles have greatly contributed to our understanding of these iconic symbols of the wintertime Maurice River marshes. Perhaps more so than with waterfowl, clear pictures of status and trends have emerged. Findings have documented the Maurice River to be exceptional and important raptor habitat by any criteria or measure.

Fifteen species of raptors have been documented in winter on the Maurice River, with all but one (the Osprey) being true wintering species. At least thirteen species are encountered every winter season. Eight species show clear increasing trends, four show relatively stable patterns of occurrence, and two species exhibit precipitous declines over the twenty-year period.

Black Vulture

Vulture populations are known to have increased substantially in both the Mid-Atlantic and the Northeast in recent decades, and the Maurice River shows no exception. It bears mentioning that it is long-term studies like these on the Maurice River that underpin our broader knowledge of increases or decreases in status of birds.

Black Vultures, formerly thought of as a “southern vulture,” have rapidly increased their range in the northeastern states. Black Vulture populations have exploded, with theories ranging from global warming (increasing temperatures) to the burgeoning White-tailed Deer population offering greatly increased feeding opportunities – through hunting effort (lost animals and gut piles) and road kills. As Table 5 amply shows, peaks and average counts have increased steadily over twenty years from an average 4.92 Black Vultures present in 1987-1992 to an average of 19 present in 2002-2007.

Turkey Vulture

Turkey Vultures have increased as well, but more slowly – from an average 72 in 1987-1992 to 94 in 2002-2007. Turkey Vultures are by far the most numerous “raptor” species present on the Maurice River in winter or at any season.

Northern Harrier

Northern Harrier is an icon of Delaware Bayshore winter marshes. Harriers have remained remarkably steady over the twenty years of study, despite the many habitat changes observed in the Maurice River system during the twenty years of survey efforts (see above discussion on waterfowl).

Sharp-shinned Hawk

Likewise, wintering Sharp-shinned Hawk numbers have remained quite steady over all four segments of counts. A secretive, forest-dwelling hawk, this small accipiter is far more

numerous than recorded daily counts indicate.

Cooper's Hawk

Cooper's Hawks have increased steadily and dramatically, today over twice as common on the Maurice River than at the outset of these studies. This reflects known region-wide trends as this bird completes a recovery from population declines linked to the DDT era. Like Sharpshins, Cooper's Hawks are furtive and secretive in winter, and far less detectable than Red-tailed Hawks or harriers for example. Numbers present are no doubt considerably higher than recorded averages would suggest.

Northern Goshawk

The largest accipiter, Northern Goshawk, is peripheral on the Maurice River, but sightings remain roughly equal throughout the segments. In most winters, few if any goshawks (an accipiter of northern forests) winter as far south as the Maurice River region.

Red-shouldered Hawk

Red-shouldered hawk also continues to recover from declines linked to the DDT era. They were four times more common in 2002-2007 than in 1987-1992.

Red-tailed Hawk

Red-tailed Hawk, the most encountered and most conspicuous of all Maurice River winter raptors, has shown a slight increase over time. The exceptional high daily count of 87 in the final segment was due to the scheduled winter survey coinciding with a very late fall migration movement in early December 2003.

Rough-legged Hawk

Rough-legged Hawk has shown a serious decline over twenty seasons of study. In part linked to climate change (as many birds remain north of us), the local decline is no doubt also due to the complete loss of their preferred high marsh (*Spartina patens*) habitat at Thompson's Beach, East Point, Bivalve, Robbinstown, etc. The creation of the EEP has had significant adverse impacts on high marsh habitat hunters such as Rough-legged Hawk and Short-eared Owl.

Golden Eagle

Golden Eagle is far less common than the Bald Eagle in our region or anywhere in eastern North America. As a northern and western-nesting species, they are another somewhat peripheral Delaware Bayshore species. Golden Eagle numbers have remained somewhat steady with just one or two sightings recorded each season. Nonetheless, when present they are always a highlight of any winter survey.

Merlin

Merlin has increased slightly, as it is known to be doing throughout the Mid-Atlantic in winter. Merlins are highly migratory, and most are well south of the Delaware Bayshore region in winter.

Peregrine Falcon

Peregrine has increased dramatically as the praiseworthy and yeoman Endangered and Nongame Species Program reintroduction effort has come to fruition. Peregrines were five times more abundant in 2002-2007 than in 1987-1992. Two pairs nest in the Maurice River region, and others winter in the area prior to returning to northern nesting territories.

American Kestrel

American Kestrel, once a common daily bird on the Delaware Bayshore, has exhibited the greatest decline of any raptor species, declining by over 75% over the twenty years of study. Never an abundant species on the Maurice River, none-the-less an average of 2.46 were present per survey in Segment I, whereas only 0.696 were found per survey in Segment IV. American Kestrel has declined precipitously as a breeding species and a wintering species in New Jersey and throughout the Northeast and Mid-Atlantic states. On the Maurice River (and the Delaware Bayshore) its disappearance is probably linked to the loss of farmland, fallow fields, and pastures, as well as the loss of high marsh (salt hay / *Spartina patens*) habitats. The American Kestrel is in grave trouble, as this and many other studies attest. The Cumberland County Christmas Bird Count, which once recorded as many as 71 American Kestrel (in 1976 and 1979) now records only about 12 kestrel a year, with an all-time low of 6 counted in 2003. The American Kestrel should be considered for emergency endangered species status immediately.

Bald Eagle

The most dramatic and remarkable increase among raptors has been shown by the Bald Eagle. Best counts, average peak counts, and mean average counts have steadily risen throughout all four segments of study (see Tables 4 and 5). In the 2002-2007 segment eagles were ten times more common (14.92 per survey) than in 1987-1992 (4.46 per survey).

Anecdotally, they have, for us, gone from zero Bald Eagles on the very first survey ever done, in December 1987 (incidentally the only time they have ever been completely missed over 188 surveys) to the remarkable 31 recorded in the last year, on February 15, 2007. Today an average of 15 Bald Eagles are seen on the river each and every day in winter. On the survey route, they are expected at virtually each and every stop, and today the numbers are conservative, simply because so many need to be dropped to avoid potential double-counting. The recovery on the Maurice River mirrors and at the same time strongly represents the Bald Eagle's comeback in New Jersey and throughout North America.

At the same time Bald Eagles may be impacting waterfowl counts. The occasional predation by eagles on ducks or geese is not in any way harming these populations, but they indeed may be affecting our count totals. In our experience, as Bald Eagles have become far more numerous over the years, waterfowl have become far more tolerant of them, "more used to them." Because of hidden coves and guts on the river, best waterfowl counts in the early years were always obtained on days of high eagle activity, as eagles flushed ducks which would have otherwise gone uncounted because they were out of sight. Sometimes, such "flushes" made the difference between a "good" count and a "great" count. We have anecdotally observed that in

recent years, ducks seem to have become acclimated to the constant presence of eagles. When eagles were “rare,” ducks panicked. If they did so today whenever they saw an eagle, they would spend all day in the air, never being able to feed. This could be an unknown (and almost certainly unquantifiable) factor in lower averages of ducks in recent years, yet it is food for thought.

The opportunity to witness and document the recovery of the Bald Eagle, from the dark days of the 1980s to the abundance of today, has been a glowing highlight of these long-term studies. The Bald Eagle is again today an iconic signature species of the Maurice River. The eagles once again “rule the swamp and marsh and river” as Dallas Lore Sharp wrote in 1911. Whether high overhead in the halcyon blue, or commanding a distant mudflat by its very presence, the Bald Eagle is a fitting symbol of the wild and scenic Maurice River.

CONCLUSIONS AND RECOMMENDATIONS

Maurice River raptors and waterfowl have now been systematically studied and reported on for twenty years, from December 1987 through March 2007 (and indeed beyond; studies are now in their twenty-second year and ongoing through the winter of 2008-2009). In 2003 survey efforts were expanded to a year-round study of raptors and all waterbirds and shorebirds. Core winter studies, including coverage and methodology, remain unchanged.

The only major recommendation has already been followed: that these twenty years of studies are so unique in the southern New Jersey region and in the Delaware Estuary that they cannot be allowed to end. A commitment has been made by Citizens United to stretch these twenty years to twenty-five – to continue core winter raptor and waterfowl studies through March 2012. At the conclusion of that segment (a fifth five-year segment that will allow a full comparison to the previous four five-year segments) a major review of status and trends is again planned and will be carried out.

Major analysis have been carried out at the 10-year mark, at the 15-year mark, and now with this report, at the milestone 20-year mark as well. At the conclusion of the twenty-fifth season, a major review and analysis will be performed on this entire body of work to establish the statistical significance of observed status and trends of Maurice River raptors and waterfowl populations.

This 25-year mark will conveniently coincide with the tenth season of expanded seasonal studies as well. In 2004, the core winter studies were expanded to include year-round surveys (spring migration, breeding season, fall migration) of not only raptors and waterfowl, but of all waterbirds and shorebirds as well. Fall migration is highly important in its own right on the Maurice River, but significantly, fall migration is a big factor in the establishment of subsequent winter populations. Likewise, not all “winter” birds leave by March 31, with many lingering well into the spring. It was the desire to explore these important “shoulder seasons” that led to the commitment to expand seasonal scope, and the resultant ten years of year-round data will be analyzed concurrently with the twenty-five years of core winter data in 2012.

Twenty years of ongoing and systematic long-term studies on the Maurice River have discovered and documented regionally significant and extraordinary numbers and diversity of raptors and waterfowl. The length of this study period has clearly demonstrated that these high avian ecovalues are not intermittent or fluctuating, but that they have substantially existed over time. These documented natural resources are of great significance in the Delaware Bayshore region and take on even greater consequence as land-use changes continue, and are proposed to accelerate, in the Maurice River corridor and surrounding area. As the goals of this long-term project state, the key objective of these survey efforts is to discover and provide cornerstone avian resource data to be used in and indeed guide river management, protection, and appreciation. With the publication of this 20-year summary report, this goal has been substantially met.

While these twenty years of winter raptor and waterfowl studies are perhaps not “rocket science” of the popular (and costly) twenty-first century remote sensing and tracking genre, this ongoing and systematic survey effort is one of the few long-term ornithological studies being carried out in the entire Delaware Estuary, and have proven to be a valuable tool in the determination of status and trends in the avian resources of the Maurice River.

While some of the trends discussed above, the increases and decreases, may be somewhat well-known, prior to this study much of our information was, for many years, largely anecdotal. For the Maurice River, twenty years of intensive study has now taken our perceptions of status and trends from “suspected” to the realm of proven and documented. An amazing 188 individual surveys have given us a database of significant proportion, and a true baseline from which to draw our conclusions on the health of the Maurice River system and the species dependant upon it. And, importantly, we have a baseline to which we can compare the effects and impacts of future changes on the river, be they man-made or natural.

Very few areas, on the Delaware Bayshore or elsewhere in New Jersey, can today offer such solid proof of its environmental quality as can the Maurice River. Citizens United, through their foresight and commitment to sound and long-term environmental studies, offers such a solid foundation and underlying strength to their exemplary protection efforts. Such a strong baseline provides high confidence that perceived environmental trends are either positive or negative, and that actions can and will be based on hard facts and irrefutable evidence. Of all this, CU can be proud, and we as the “field team” and the authors of this report, continue to be privileged and proud to be a part of this effort.

REFLECTIONS

I will close with a reflection on these past twenty years, as well as with one on the immediate and stark present. As this report literally went to press, the *New York Times* featured an editorial (on March 31, 2009) after Ken Salazar, the Secretary of the Interior, released a new nationwide survey assessing the state of bird populations in America. It is reproduced below:

Ken Salazar, the secretary of the interior, released a new, nationwide survey last month that assesses the state of bird populations in America. The news is grievous. Over all, a third of the bird species in this country are endangered, threatened, or in serious decline.

There is special concern for grassland birds – whose habitat has been vanishing steadily for decades – for birds in Hawaii, where a variety of species face a variety of threats, and for coastal species. The good news is that wherever nature is allowed to recover, especially in the case of wetland birds, it shows its usual resilience.

But there is no glossing over these staggering losses, and there is no dismissing what they mean. There is nothing accidental or inevitable about the vanishing of these birds. However unintentional, it is the direct result of human activity – of development, of global warming, of air and water pollution and of our failure to set aside the habitat these birds need to flourish. Every threatened species reveals some aspect of our lives that could be adjusted.

The survey also shows that where humans have made an effort – as with migratory waterfowl and with endangered species like the Peregrine Falcon – good things have happened, with some species recovering even as others declined. This in turn argues that the programs now in place to protect habitat should not only be spared the budgetary wrecking ball but also expanded – most conspicuously those managed by the Agriculture Department that seek to preserve wetlands and prairie grasslands as well as the Interior Department’s Land and Water Conservation Fund.

The remarkable recovery of ducks and geese and other wetland species – thanks to strong conservation efforts – should remind us of what is possible. The only other outcome is too grim to consider – a landscape steadily emptying of birds.

– *New York Times* editorial
March 31, 2009

The incomparable Maurice River, one of “Down Jersey’s” finest jewels, embodies so much of what Ken Salazar spoke. Human activity has brought change – land use changes that have brought drastic changes to our bird life. We have seen the loss, as with Northern Bobwhite, American Kestrel and “fresh water” duck species, and we have seen the gains – in Osprey,

Peregrine Falcon, and Bald Eagle. But perhaps the greatest and best thing we see in and on the Maurice River is the evidence of what is possible. And with that evidence comes hope.

The Maurice River may have been “recently” studied for over twenty years, but the interest of naturalists in its wonders goes much farther back, as evidenced by Dallas Lore Sharp’s record of the Garron’s Neck Bald Eagle nest that dates to 1911 (see page 1).

Amazingly, the great eagle’s nest still towers over the marsh at the edge of Garron’s Neck Swamp, as it has for at least one-hundred years. It may not be the exact same nest of which Dallas Lore Sharp wrote in 1911, but as near as we can tell, it is in the same location. Although the nest was not active at the time (with the sole surviving pair of Bald Eagles in New Jersey then found in Bear Swamp), I remember a remnant vacant eagle nest where it stands today from my first visit to Garron’s Neck (with naturalist and mentor Al Nicholson) over thirty-five years ago. First reclaimed by Osprey, it was then usurped by Bald Eagles. In 2006 the nest again held Osprey – after the resident eagle pair chose to relocate to a nearby pine. The great nest was eventually too much for the long dead tree; during a violent storm and 60 knot winds the tree snapped off and the nest fell early in 2007. It seemed to be the end of a long era, yet amazingly, by spring 2009, another adjacent tree again held a large nest, perhaps built by Osprey. The nesting eagles, to our knowledge, still reside in the adjacent pine forest, and although their nest is hard to view, the eagles are seen daily.

So, maybe the specific tree and nest of which Dallas Lore Sharp spoke no longer tower over the swamp today, but the Bald Eagles, a century later, still rule Garron’s Neck Swamp and the wondrous Maurice River. The Osprey join them in another comeback that seems to be nothing short of a miracle, and another of many miracles in which Citizens United has played a very major role.

It’s things like this that recall Emily Dickinson’s timeless and poignant words, “Hope is the thing with feathers that perches in the soul.”

– Clay Sutton
May 18, 2009

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We sincerely thank *all* of the officers and members of Citizens United to Protect the Maurice River and its Tributaries for their interest, support, and great enthusiasm for this winter study. We particularly thank Jane Galetto for her advocacy for the study, and for her knowledge and assistance in the planning and preparation for the field work. We had some fun in the field, too! Thanks you, Jane, for nurturing a tiny idea into a landmark and ongoing long-term study, and thanks for your always friendly encouragement and optimistic outlook. Keep up all your good work on the Maurice River.

Finally, we thank the U.S. Department of the Interior's National Park Service, Wild and Scenic Rivers Program for their assistance to Citizens United. The award of a Wild and Scenic River Partnership Grant enabled this survey to be conducted and the report compiled. Thank you for your visions of a wild and scenic Maurice River and Delaware Bayshore.

It was a pleasure and privilege working with all of you, unnamed and named in previous seasonal reports, on this important study aimed at keeping the Maurice River healthy, protected, and available to the myriad of birds and other wildlife so dependent upon it. We look forward to continuing studies with great anticipation, and we look forward to seeing you all in the field.

– Clay Sutton
May 18, 2009

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All comparative Maurice River ornithological studies discussed and / or referenced in this report have been directed and co-authored by Clay Sutton, either as an independent contractor or formerly as staff ornithologist, Southern Regional Manager and Vice President of Herpetological Associates, Inc., Plant and Wildlife Consultants. (Comparative Cohansey River studies are embedded within the Maurice River annual reports). Principal publications resulting (either wholly or in part) from these studies (and funded or co-funded by Citizens United to Project the Maurice River and its Tributaries, Inc.) are as follows:

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