

UPSTATE NEW YORK'S FIRST GREAT EGRET COLONY

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ABSTRACT

The first documented colonization of Great Egrets (*Ardea alba*) in upstate New York was studied at Motor Island in the Niagara River during the 1995 to 2000 breeding seasons. The mixed colony of Great Blue Herons, Great Egrets, Black-crowned Night-Herons, and Double-crested Cormorants was studied at a distance of 2000 feet in an effort to unobtrusively study Great Egret breeding behaviors and document the colony's progress. The author presents evidence that egg dates in New York State should be extended from 23 May - 4 Jun to 18 Apr - 7 Aug, unfledged juvenile dates from 25 Jun - 25 Jul to 16 May - 18 Sep and the fledging date of 25 Jul to 12 Jul - 18 Sep.

INTRODUCTION

The Great Egret (*Ardea alba*) population has made a spectacular recovery from near extirpation by plume hunters during the late nineteenth century. The species returned as a breeder to New Jersey in the late 1920's (Walsh et al. 1999) and the first New York State breeding was confirmed in 1953 on Fisher's Island in extreme eastern Suffolk County (Griffith 1998). Since that date the species has established itself as a regular breeder on Long Island (which includes Kings, Queens, Nassau and Suffolk counties) as well as in Richmond, Bronx and Westchester counties, with numerous colonies. The colony described here is the first recorded in upstate New York.

David M. Peterson (1988) states, "The Great Egret record in central New York was of birds flying in and out of a Great Blue Heron colony. The Atlas also documents a record on Lake Champlain. However, breeding has never been confirmed there or on the Vermont side, where a pair was recorded by the Vermont Atlas at Missisquoi NWR in 1977 (Fichtel 1985). The Great Egret recently nested to the west of New York on the Canadian side of Lake Erie in 1981 and 1982 (Weir 1982), and to the north at Dundee, Quebec, in 1984 (J. Peterson 1984). It may be just a matter of time before the Great Egret is found breeding either on Lake Champlain or the Great Lakes basin of New York."

This prediction would be fulfilled.

In the spring of 1995 I was studying the dates of Great Blue Heron incubation in several western New York colonies, when on 13 May, I was surprised to observe four Great Egrets at a colony on Motor Island in the Niagara River. I was even more astonished to see some of these egrets carrying sticks for the purpose of building nests! This observation represented the first confirmed nest building of Great Egrets in upstate New York State, and further study at this site documented Great Egret copulation, incubation, and nestlings.

THE NESTING SITE

Motor Island (also called Pirate's Island) is located in the east branch of the Niagara River, due east of Beaver Island State Park, Grand Island, New York at 78° 55' 30" W longitude and 42° 53' 40" N latitude. It is teardrop shaped with a maximum length of slightly more than 1000 feet and a maximum width of nearly 400 feet. At the southern end is a colony of Great Blue Herons, established in 1990 (Watson 1994). By 1994 there were eight Great Blue Heron nests and twelve Black-crowned Night-Heron nests. By 2001 the colony completely covered Motor Island with 108 Great Blue Heron nests, 102 Black-crowned Night-Heron nests, and eight Great Egret nests.

Double-crested Cormorants built fifteen nests in a tree at the edge of the colony in 1997, but only three produced young. In 1998, a Red-tailed Hawk nested in the same tree, which probably discouraged the cormorants from nesting. The last attempt in 1999 was thwarted by the NYSDEC when, on 11 Jun, they knocked down eight cormorant nests, most of which contained eggs.

Canada Geese and Ring-billed Gulls also nest on Motor Island.

OBSERVATIONS

Observations were made from a distance of 2200 feet with an 8-inch Celestron telescope from the boat launch at the west end of Sheridan Drive in the Township of Tonawanda, and from Beaver Island State Park on Grand Island from a distance of 1800 feet. To use the sun to best advantage most morning observations were from Sheridan Drive and most afternoon and evening observations were from Beaver Island.

From 13 May 1995 to 20 Jul 1995, a total of forty-five observations of Great Egrets was made on thirty-two different days, totaling 20 1/4 hours. Thirty-seven were made from the boat launch at Sheridan Drive and averaged 30 minutes each, while eight made from Beaver Island averaged 17 minutes each. Observations ranged in duration from checks and counts of egrets lasting only 3 to 5 minutes, to longer behavioral studies lasting 85 minutes. The following contains highlights from eight of the forty-five observations in 1995, which were made from the Sheridan Drive boat launch unless noted otherwise.

13 May 10:48-11:21 AM - While studying incubating Great Blue Herons at Motor Island, I was surprised to observe a Great Egret on the ground below the heron colony. I initially assumed that the egret was scavenging for dropped food under the herons' nests. However, subsequent observations revealed that there were four Great Egrets, and they were picking up sticks instead of food! After a stick was deemed acceptable, the egret flew off with the stick and disappeared behind a scrubby fruit tree. This procedure was repeated several times. Between 8:05 and 8:15 PM that same day, observations were made from Beaver Island to

better study the location where the nest was being built. The upper half of a Great Egret was observed at the presumed location (as well as on 14, 15 and 17 May) but the presumed nest was obstructed by foliage. As early as 14 May, as well as later, observations indicated that the four Great Egrets had staked out two nesting territories within the colony. One territory was in the eastern central half of the rookery and best studied from Sheridan Drive, and the other was near the north-western margin of the rookery and best studied from Beaver Island.

22 May 3:50-4:17 PM - White spots at the east nest indicated incubation. At 4:05 the incubating egret stood, stretched, and radiated its long breeding body plumage into a beautiful display looking much like a pincushion, and three minutes later a second Great Egret landed next to it. At 4:14, this second egret flew to and mounted the largely obscured egret at the northwest nest location and copulated with it. After about 15 seconds it returned to its original mate at the eastern nest. Observations from Beaver Island between 4:33 and 4:52 suggested that the egret at the northwestern nest had dropped into a hidden sitting position and might also be incubating.

27 May 7:55-9:18 AM - One egret was in incubating position on the east nest, a second egret gathered sticks in the heron colony and a third gathered sticks in a field just north of the colony. The Great Egret collecting sticks in the Great Blue Heron colony was then chased away by a Great Blue Heron. Between 7:55 and 8:10, adult egrets landed four times at the supposed northeast nest location. At 8:14 an egret in the field radiated the breeding plumage on its back into a striking display. Then suddenly at 8:27 two egrets and five Great Blue Herons in the field rose into the air. At 8:33 about 20 seconds of copulation was observed at the east nest where the incubating egret was now standing. Then at 8:35 the Great Egret at the east nest returned to its incubating position.

29 Jun 8:20-9:20 AM - Five adult, not four, Great Egrets were observed around the east nest, and at 8:59 a sixth egret landed at the nest and appeared to be feeding young! At 9:06 an egret using bill thrusts drove three young Black-crowned Night-Herons off a nest, and was then itself chased by a Great Blue Heron. The end result was that two egrets now occupied the Black-crowned Night-Heron site.

6 Jul 6:49-7:45 AM - Two wing flaps of an egret nestling were observed at the east nest. This represented the first documented record of Great Egret nestlings in upstate New York. When a third egret landed near the nest, the adult egret standing on the nest tentatively pecked at it causing it to retreat a couple of feet south of the nest. White spots representing nestling(s) could be seen at the feet of the egret on the nest. A fourth egret was seen near the location of the northwest nest.

11 Jul 6:25-6:47 AM - An adult Great Egret flew from the northwest nest location to the east nest, then left the east nest a minute later. At 6:37 an egret landed at the east nest and two egret nestlings grabbed the adult's bill with their bills and a tug-of-war ensued until the adult disgorged the food for the nestlings. A second egret landed at the nest at 6:40, and after a minute the feeding egret left. Three egret nestlings were counted on that nest. At the Beaver Island observation site, the west side of Motor Island was observed from 8:10 to 8:45 PM. Four adult egrets were observed. Two appeared to be at or near the location of the east nest, one was on top of the bush at the southernmost point of the colony, and the head and bill of the fourth egret was briefly seen near the northwest nest. The foliage obscured viewing to such an extent that only the head of an erect standing adult could be observed, and observations did not produce any evidence of nestlings on the supposed northwest nest.

13 Jul 8:37-9:20 AM- There appeared to be evidence of communal protection and feeding. Four adult egrets were observed. Three appeared to be standing about two, five and seven feet south of the east nest and the fourth was standing on top of the main south bush. A Great Egret arose from an incubating position on the east nest and now appeared to be tending to young or rearranging nesting material. At 9:03 a fifth egret flying in from the north landed on the nest. Three young egrets raised their heads, pulled at the bill of the adult with their bills and feeding activity commenced. At 9:15 there were still four adult egrets and three nestling egrets at the rookery in about the same positions. The nestlings became more active after the arrival of the food-carrying adult and were stretching their necks, exercising their wings and preening their feathers.

16 Jul 6:30-7:55 AM- Strangely no adult egrets could be seen, but the three nestlings were preening and exercising their wings. At 6:42 an adult landed at the east nest and the young egrets seized its bill with their shorter bills and the usual tug-of-war transpired. Every so often the adult broke free raising its head above the fray as though rearranging the regurgitated food in its throat or simply resting for a minute. At 6:44 the adult left, and the young egrets were so spread out, that it appeared as if they might be walking outside the nest or at least on the edge of the nest. At 7:37 an adult landed and a second session of bill grabbing and feeding ensued. From 7:37 to 7:48 the adult roosted on top of the south bush and then flew toward Beaver Island State Park. All three young with their spiky head feathers were visible. From 9:35 to 9:40 the colony was checked again with the adult roosting on the south bush and all three young were observed. Unfortunately that was the last time that there was an unequivocal observation of these egret nestlings.

On 18 Jul between 6:20 and 6:40 AM white specks , probably representing egret plumage, were observed at the nest, but oddly no motion was evident. An adult landed at 6:31, but there still was no movement on the nest. On 19 Jul the nest site was studied from 8:15 to 9:40 AM and from 3:00 to 3:48 PM. For all except for three periods totaling 19 minutes of the 18 Jul 133 minute study period , an adult Great Egret was observed spending practically all of its time maintaining a vigil atop the south bush.

Concerned about the absence of young egrets at the nest site, the author called Senior Wildlife Biologist Mark Kandel of the NYSDEC and an excursion to Motor Island was arranged for 20 Jul. When on 20 Jul the nest site was observed from 8:33 to 9:30 AM without any sign of adult or young Great Egrets, Mark Kandel, John Curtis and the author investigated the Motor Island colony. Two dead Great Egret nestlings were found under a nest believed to be the northwest nest. The two birds were severely desiccated being only about an inch or less in thickness, and had probably been dead for at least two weeks. The estimated length of these nestlings was 12-15 inches.

Near the eastern nest site large stones were strewn around on the ground and larger than fist-sized stones were found in tree crotches and even in a Black-crowned Night-Heron nest. The nest believed to be the eastern egret nest had a stone in its center that was about 8x4x4 inches in size. None of the three egret nestlings previously observed on the east nest was found.

All of this evidence is proof of an act of willful vandalism. It is difficult to understand the reasoning and motivation of the perpetrators of such a heinous crime.

The 1995 study documents the first stick-carrying, display, copulation, and feeding behavior of Great Egrets, as well as the first documented egret nestlings observed in upstate New York. All other nestings in the state have taken place well downstate in Suffolk, Nassau, Queens, Kings, Bronx, Westchester and Richmond counties.

Since the two nests were not directly observed, but inferred from the territorial behavior of the Great Egrets in the mixed Great Blue Heron and Black-crowned Night-Heron colony, most of the observations described the location of the egrets within the colony. Preening and incubation were common behaviors observed. Incubation was inferred on all thirteen study days from 22 May to 24 Jun. Stick-carrying behavior to build or repair nests occurred on 13 and 27 May. Displays occurred on 22, 27, and 29 May and as late as 11 and 17 June, while copulation was observed the 22, 27, and 29 May. All three acts of copulation occurred following displays of four, nine, and nineteen minutes. Oddly, the observed displays and copulation were after the start of incubation. This, and the fact that on 22 May an egret tending the east nest flew to the egret tending the northwest nest and copulated with it, possibly attests to the Great Egrets' promiscuous nature. In the last two weeks in this May of 1995, the author saw more copulation while studying egrets, than in five years of studying Great Blue Herons at the same colony.

Feeding was inferred 2 and 4 Jul solely from the behavior of adults, and directly observed 11, 13 and 16 Jul. Great Egret nestlings were observed at the east nest on 6, 10, 11, 13, 14 and 16 Jul. Curiously there was bill-to-bill activity at the east nest 29 May between an incubating bird and its mate, as well as a display and copulation. The bill-to-bill activity is probably an attempt to secure food by the incubating mate, or some other pair bonding behavior, and occurred ten minutes after sexual activity.

Minor territorial squabbles occurred with Great Blue Herons chasing Great Egrets, or Great Egrets chasing Black-crowned Night-Herons.

Although the actual nests were not directly observed from the observation sites, it is reasonably certain, based on behavior, territorialization, and a subsequent on-site investigation of the colony, that two pairs of Great Egrets built two nests, bred, incubated eggs, and started raising young at the Motor Island colony on the Niagara River from at least 13 May until 16 Jul 1995.

During the observation window as many as six adult egrets were observed at one time (29 Jun) on the colony. Based on the dead nestlings, the northwest nest, had contained at least two nestlings. I was never able to actually see into the the northwest nest and had inferred breeding activity from the activities of the adults, and of course later, from the two dead nestlings under the nest.

Direct observations established that the east nest contained three nestlings. The nesting at the east nest was probably terminated on 17 Jul due to stone throwing vandals but it is not known what happened to the nestlings as we could find no sign of their remains. The demise of the northwest nesting is more mysterious. The state of desiccation suggested a death date prior to 6 Jul at least two weeks previous to 20 Jul, the day we made the discovery. This is confirmed in part by the changes in territorialization of the adult egrets with evidence of communal protection and possible feeding by four adults at the east nest.

THE 1996-2000 BREEDING SEASONS

1996 - With the willful destruction of the colony in 1995, and the failure to sight any returning egrets as late 13 Apr 1996, the hope that Great Egrets would make a second nesting attempt on Motor Island was regarded with pessimism. On 19 Apr, pessimism changed to optimism when Michael Galas reported a Great Egret at the Motor Island colony. Observations 19, 20 and 21 Apr, demonstrated that at least three Great Egrets had territorialized two areas in the colony, with one Great Egret sitting on a nest all three days. By 5 May there were as many as nine Great Egrets and one Snowy Egret in the colony. Although a Great Blue Heron confiscated the nest upon which a Great Egret was standing and sitting on 19, 20 and 21 Apr, other egrets were observed incubating and carrying sticks. On 16 Jun between 12:00 and 12:48 PM one Great Egret was observed carrying sticks to the same location seven times. By this date, evidence indicated that egrets were incubating on three nests. In July, three groups of nestlings (one with

two nestlings and two with three nestlings each) were studied. These late fledging egrets showed uncharacteristic nesting site fidelity even after they fledged. All eight could be found on Motor Island during September, while five of the presumed juvenile egrets remained until 7 Oct and one as late as 24 Oct .

The nest with two egret nestlings set unprecedented late nesting records for New York State. On 28 Jul (nearly two months after the New York State late egg date of 4 Jun) a Great Egret repeatedly carried sticks to the same location. On 9 Aug the adult spent an unusually long period of time in a standing position with its head down tending the nest. My experience suggests this long duration nest tending behavior of the adults indicates the presents of newly hatched egret chicks. This is supported by Douglas W. Mock's observations at distances of less than 50 feet. Great Egrets spend a lot more time in a nest tending position when the chicks are hatching, "watching the chicks, regurgitating food, reswallowing food (the new babies can't eat much), and preening the albumen out of the down" (Mock pers. comm). The nestlings were directly observed 22 Aug while being fed by an adult. As late as 2, 5, 9, and 12 Sep these birds were never more than a couple of feet from the nest. From 13 Sep to 18 Sep they were found farther and farther from the nest. A short flight of about four feet (consisting of a hop, one flap and a glide) by one of the two egret nestlings was observed 16 Sep (38 days after the 9 Aug hatching) and a flight of about twenty yards was observed on 18 Sep. These dates are nearly two months later than the late nestling date of 25 Jul and fledging date of 25 Jul in *The Atlas of Breeding Birds of New York State*, Andrle & Carroll eds., Cornell University Press 1988 (hereafter *The 1988 Atlas*).

1997 - The 1997 Great Egret nesting season had both unusually early and unusually late records. By 19 Apr four Great Egrets had arrived at the Motor Island colony. On 24 Apr three Great Egrets were on nests in incubating position. If any of them were on eggs, this would be nearly a month earlier than *The 1988 Atlas* early egg date of 23 May. The number of adult Great Egrets increased to fourteen on 21 May. On 5 Jun an adult egret was feeding three sizable nestlings. This is twenty days earlier than the earliest unfledged juvenile date of 25 Jun in *The 1988 Atlas*. On 11 Jun these three very active nestling egrets were waddling around the nest as well as vigorously pulling on the beak of an adult forcing the adult to regurgitate food. On 20 Jun they were exercising their wings with as many as thirteen flaps, walking about the nest , and one nestling was pecking at a nearby old nest, probably for food. A second nest with at least one nestling was also observed. On 7 Jul a total of ten nestling Great Egrets was counted indicating four successful nests. One or two other nests were inferred by observing adult Great Egrets repeatedly follow the same route to disappear into the foliage. Over the next two weeks the older nestlings lost their downy crests, wandered farther from their nests and were difficult to distinguish from adults unless they were being fed. Also the number of nestlings decreased from the 7 Jul maximum of ten. On 22 Jul a presumed nestling egret took a short flight. Three presumed young egrets feeding at the shoreline of the colony, later flew upriver. A 22 Jul

fledging date would be three days earlier than the 25 Jul date stated in the The 1988 Atlas. On 3 Aug four nestling Great Egrets were fed by an adult. This is nine days later than the latest date of 25 Jul stated in The 1988 Atlas. Egrets were observed at the colony until 27 Aug..

1998 - The 1998 Great Egret breeding season was highlighted by unusually early nesting and a record eight nests. In previous years, seven of these nests might not have been visible, but now were, due to the defoliation of one of the nesting trees. This year, the colony's Great Egrets, Great Blue Herons, and Black-crowned Night-Herons would continue to breed successfully, but the tree where Double-crested Cormorants nested in 1997, now would only contain a Red-tailed Hawk nest. Actually the hawk had appropriated a Great Blue Heron's nest. No interaction between the hawk and the other occupants of the colony was observed.

On 21 Apr five Great Egrets were on the colony. On 23 Apr a Great Egret was observed sitting on a nest. When the nest was checked to confirm incubation three hours later, a Great Blue Heron was on the egret nest and three Great Egrets were now sitting on nests located in a tree further to the north. The first Great Egret nestling was observed 23 May. This is almost a month earlier than the earliest unfledged juvenile date of 25 Jun in the The 1988 Atlas. There were seven egret nests in the tree at the north edge of the colony, and another that I could see in the colony's center. On 7 Jun four of the eight egret nests contained young. At 8:20 PM a second adult egret landed at nest 3, and three of the nestlings grabbed its bill to feed, but their attention quickly diverted to the fourth nestling, savagely and relentlessly striking their sibling with their bills for about three minutes. These three egret nestlings were clearly more interested in killing their sibling than they were in feeding. This was the last time that four nestlings were seen on nest 3.

On 2 Jul a record 21 Great Egret nestlings were counted on eight egret nests. By 8 Jul the three nestlings on the southernmost nest had widely dispersed from the nest and had no down on their heads. On 13 Jul there were only two Great Egrets near this nest and these flew away at 9:35. This is twelve days earlier than the fledging date in The 1988 Atlas. Twenty-four Great Egrets were counted on the colony, with only thirteen of these being identified as certain nestlings. Although there were 21 Great Egrets on the colony (including five nestlings that still showed a little down) on 21 Jul, by 2 Aug no egrets were observed on Motor Island.

1999 - In 1999, the first week of Apr was more than ten degrees above the average temperature, and southerly winds ushered in a Great Egret on 6 Apr, thirteen day earlier than any of the previous years. This year none of the trees prematurely lost their leaves and egret nest locations could only be inferred by adults repeatedly standing up and sitting at a nest location, or repeatedly disappearing into the same foliage location. The first egret nestlings were only directly observed when they were old enough to wander from the nest to a more conspic-

uous location. On 27 Jun however, once the adult left to hunt for food these youngsters would disappear back to their hidden nest. Three days later, a possible second group was observed, and by 12 Jul short flights were observed moving the previously recorded fledging date of July 25 up thirteen days. A possible third group of two roaming nestlings was found on 20 Jul, but after 26 Jul neither adult nor young Great Egrets were found on Motor Island. Although only groups of three, four and two nestlings were observed, there were probably more than two or three nests in 1999, as suggested by the territorialization of adult egrets in several parts of the colony and the maximum of thirteen adult Great Egrets counted on 9 Jun. This year, Mark Kandel reported an on-site colony complete count of 40 Great Blue Heron nests and an incomplete count (due to dense foliage) of seven Great Egret nests. Counts before foliage leaf-out on 24 Apr by Buffalo State College in 1999, and previous counts by the NYSDEC suggest there are about 60 to 70 Black-crowned Night-Heron nests annually.

2000 - In the year 2000, unusually warm weather at the end of February and in the month of March resulted in very early breeding records for both Great Egrets and Great Blue Herons. As early as February 29 a Great Blue Heron was sitting on a nest. A Great Egret arrived at the colony 1 Apr, the earliest date recorded in this study. By 13 Apr three pairs of Great Egrets were standing or sitting at three different nests. On 18 Apr, one egret was particularly low and still on its nest for the hour long study period. The next day at 10:18 AM this same egret arose from its incubating position for a minute to either roll its eggs or rearrange nesting material and then resumed its incubating position. At the same nest on which a Great Blue Heron was sitting 29 Feb, there was at least one unfledged juvenile Great Blue Heron. This is a month earlier than the earliest date for Great Blue Heron unfledged juveniles of 19 May in the The 1988 Atlas. Also a stick-carrying Great Blue Heron displaced another Great Egret from its nest. On the 16 May two nestling Great Egrets were observed on the same nest on which incubation was observed on 18 Apr. This is 40 days earlier than earliest date for unfledged juveniles of 25 Jun in The 1988 Atlas.

There were three egret nest positions that were not completely hidden by vegetation. These will be called top nest (on which the nestlings were observed 16 May) middle nest, and bottom nest. By 31 May it was determined that there were four nestlings on the top nest and at least two nestlings on the middle nest, while incubation continued on the bottom nest. Both groups of nestlings were extremely early. On 9 Jun the early heron nest is empty and two fledgling Great Blue Herons were feeding along the shore of Motor Island, more than a month earlier than the early fledging date of 17 Jul in The 1988 Atlas. On 22 Jun there were four egret nestlings on or near the top nest, three egret nestlings on the middle nest, and two adult Great Egrets with two nestlings on the bottom nest. By 12 Jul eighteen Great Egrets were observed in the colony. Most of the egrets were believed to be nestlings, but these nestlings were not separated by nest, but mixed together in one large group. A presumed juvenile was observed making a short



Great Egret

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flight. Unlike Great Blue Herons, Great Egret fledglings can be easily confused with adults. This, and the wandering tendencies of the egret nestlings made it difficult to identify them as non-adults. From 12 Jul the number of egrets at the colony gradually decreased until the last two egrets left between 19 Aug and 23 Aug.

The breeding seasons from 1996 to 2000 were highlighted by visiting Snowy Egrets. A single Snowy Egret (*Egretta thula*) was observed on the Motor Island colony in 1996 (6-8 May, 26-28 Jun), in 1997 (5, 23, 25 Jun), none in 1998, in 1999 (8, 12 Jun) and in 2000 (26-28 Apr, 23, 27, 30.) A pair of Snowy Egrets was observed at the colony in 2000 on 28 May, 9 and 26 Jun, raising its status to a possible nesting species. In the evening, the pair would land in the same part of the colony and disappear into the same location, suggesting either a nest or a preferred night roost location. A Tricolored Heron (*E. tricolor*) was observed on the colony in on 2 Jun 1999, and 26 May 2000. It will be interesting to see if these species are confirmed as breeding birds in the near future.

CONCLUSIONS

In conclusion, based on the study of Great Egrets at Motor Island, the author suggests the following changes be made in established breeding season dates for New York State: (1) egg dates should be expanded from 23 May - 4 Jun to 18 Apr - 7 Aug (2) unfledged juvenile dates from 25 Jun - 25 Jul to 16 May - 18 Sep and (3) the fledging date of 25 Jul should be expanded to 12 Jul - 18 Sep. Egg dates based on observations of the incubation of the adult at a distance of 600 or 700 yards can be treated with a fair degree of skepticism. Birds could be sitting on nests to protect their real estate rather than incubating eggs. To determine if incubation was taking place I considered three factors: duration of incubation period (both on the study day and subsequent days) position of the bird (incubating egrets are lower on the nest and less like to be moving or looking around) and the date nestlings were first observed. Since the incubation period for Great Egrets is 25 to 28 days, an egret sitting on a nest, 25 days before the nestling appears on the nest, must have been incubating. The early egg date of 18 Apr 2000 is mainly based on 60 minutes of observation 18 Apr, 15 minutes of observation 19 Apr, 9 minutes of observation 20 Apr in which possible egg rolling behavior was observed, and the appearance of an unfledged juvenile on the nest 27 days later. Since the unfledged juvenile could be seen in a partially concealed nest at a distance of 700 yards, it was probably more than a few days old, and it is possible that incubation could have started on 13 Apr when the egret was first observed sitting on the nest. However, the 18 Apr early egg date has a much higher degree of certainty. The late egg date of 7 Aug 1996 was the last observation before the long duration nest tending activity (which is indicative of hatching) was observed 9 Aug 1996. Directly observed early unfledged juveniles on 16 May 2000 and 23 May 1998 are certain. The early date for fledglings of 12 Jul is sup-

ported by the previously described observations of 12 Jul 1999 and 13 Jul 98. The first sustained flight of 18 Sep 1996 established the late nestling and late fledging date of 18 Sep. The proposed nestling, egg, and fledging dates cover periods of 125 days, 112 days, and 69 days respectively. One reason for this is that unfledged juveniles can be directly observed and are most easily identified in this unobtrusive study, while fledglings are more difficult to distinguish from adults.

QUESTIONS

The Great Egret (*A. alba*) and the Great Blue Heron (*A. herodias*) are both presently members of the genus *Ardea*, which implies that they may have evolved from a common prehistoric ancestor. What could have caused the ancestral *Ardea* heron to split into distinct species? The possible answer is that a mutation or series of mutations could cause a physical or physiological change that would be great enough to not allow the mutant to interbreed with the stock *Ardea* species, but not a change great enough as to be lethal to the mutated species. But what was the nature of this change? Perhaps the answer lies in studying the behavior between the two species. As discussed in the preceding paragraphs, Great Blue Herons confiscated previously established Great Egret nests on 5 May 1996, 23 Apr 1998, and 19 Apr 2000. The eviction of Great Egrets that attempt to nest early, results in Great Blue Herons breeding about a month earlier than Great Egrets. Only when all the Great Blue Herons have settled into their nests, can Great Egrets successfully nest without the risk of eviction. This behavior could cause temporal reproductive isolation between the two ancestral species. It would be impossible for the ancestral Great Blue Heron's genes to mix with the ancestral Great Egret's genes, because they would not breed at the same time. Over time this asynchronous breeding behavior could result in the evolution of very different species. Over the past six years observations seem to confirm that each year Great Blue Herons as a group breed before Great Egrets as a group. In 2000, when Great Egret nestlings appeared an extremely early 40 days before the published early nestling date, the average temperature for Apr was only a little over one degree above average and the three subsequent months all had below average temperatures. However, Feb was more than five degrees above average and Mar was more than 6 degrees above average. Based on these monthly average temperatures, if one assumes Feb and Mar are the months when Great Blue Herons (and not Great Egrets) make their breeding decisions, one could conclude that the early Great Egret breeding depends on how warm the weather is when Great Blue Herons are making their breeding decisions, not how warm the weather is when Great Egrets are making their breeding decision. Lastly, even if the initial splitting of the ancestral Great Heron-Egret into separate species was not caused by Great Blue Herons confiscating Great Egret nests, this behavior is possibly a mechanism that has helped maintain the separation of these two species.

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