Statewide Census of Great Blue Herons and Other Colonial Wading Birds – Summary Report

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Summary

Maine is home to several colonial wading birds during the spring and summer: great blue herons, snowy egrets, great egrets, and black-crowned night-herons, as well as occasional cattle egrets, little blue herons, tricolored herons, and glossy ibis. These magnificent birds build large stick nests in trees or shrubs and nest in groups. The great blue heron is the largest of Maine's wading birds and nests in the greatest numbers both inland and along the coast.

As recent as 1995, there were as many as 14 coastal islands occupied by 644 pairs of nesting great blue herons. More recently we noticed that many of these colonies no longer existed or that the numbers of nesting birds had waned. There had not been a comprehensive wading bird survey of the coastal islands since the mid-1990s, and there had never been a comprehensive survey effort for the rest of the state.

With funding from State Wildlife Grants and the Oil Spill Recovery Fund, we set out to conduct a nearly statewide census for great blue herons and other colonial wading birds. With the help of pilots from the Warden Service and Forest Service, biologists conducted over 60 hours of aerial surveys. Over 180 historical locations were checked, and 73 new sites were discovered during the surveys or as a result of information provided by the public or other biologists. In addition to aerial surveys, biologists visited 38 colony sites on the ground to help verify colony locations and to gather more precise counts of active nests.

Survey efforts revealed 1,071 nesting pairs of great blue herons at 83 colonies, ranging in size from 1 to 120 active nests. A majority of the colonies were small in size (less than 10 nests) and located in beaver flowage settings. As in the past, the largest colonies were located on coastal islands, with the exception of a colony located on an island in Aziscohos Lake in Lynchtown. With approximately 65 active nests, the Aziscohos Lake colony is the largest inland colony in the state and has persisted for at least 23 years.

The coastal breeding population of great blue herons experienced a 46.7% decline between 1983 and 1995. Consideration of this decline, evidence of fewer active nests in recent years, and observations of predation by an increasing eagle population prompted Maine Department of Inland Fisheries and Wildlife (MDIFW) to list the great blue heron as a state Species of Special Concern in 2007. This year's census revealed 430 pairs on 9 coastal islands, a 33.3% decrease from 1995, and a 64.4% decrease from 1983. While we are fairly certain we've thoroughly surveyed the coastal islands and have detected most colonies containing more than 1 pair, we expect there are many inland colonies that have gone undetected. Thus, it is difficult to make an accurate estimate of the statewide breeding population of great blue herons. Without consistent historical data for inland breeding sites, we intend to use this year's survey results as a new baseline from which to detect breeding population trends in the future. Given the available data and trend analyses using Breeding Bird Survey and Christmas Bird Count data, Maine's great blue heron population appears to be experiencing some level of decline, the causes of which are largely unknown.

Additional on-the-ground efforts included surveys of two coastal islands for nesting black-crowned night-herons, a species that was recently listed as Threatened in Maine. It was encouraging to find 87 active nests between these two islands. National Audubon also reported 21 nesting pairs on Stratton Island, bringing our known total to

108 pairs at these 3 sites. Black-crowned night-heron colonies can be difficult to detect from the air because they tend to nest beneath the canopy of deciduous trees or shrubs. Future efforts will be made to conduct on-the-ground surveys on additional islands.

This year's survey effort was extremely time and labor intensive, and thus cannot be performed on an annual basis. To ensure that we continue to collect nesting data for great blue herons and other colonial wading birds, we began a volunteer adopt-a-colony program this year called the Heron Observation Network (or HERON for short). Seventy-eight people across the state signed up to be a part of HERON this year! More than half of these volunteers are tracking and reporting their time, which can be used as a match for federal funds for future research and monitoring. We plan to continue this program in the coming years, and appreciate all who have contributed thus far. If you know of a wading bird colony, we'd love to know about it too! Please don't hesitate to contact Danielle D'Auria (danielle.dauria@maine.gov, 941-4478) with information about wading bird colonies, or if you'd like to sign up to be a HERON volunteer.

2009 Survey Efforts and Results

Aerial Surveys

Aerial survey efforts were scheduled to begin mid-April, depending on pilot and biologist availability and suitable weather conditions. Prior to the first dedicated flight, great blue heron nests were detected during 8 aerial survey flights for nesting bald eagles between 26 March and 18 April. Twenty-six great blue heron colonies were observed during these early eagle flights, of which 10 were observed to be active (i.e., herons present at nest trees). Two out of 8 colonies seen on the first (26 March) flight had birds present at the nest trees. Eight additional colonies became active sometime before subsequent visits made between 25 April and 18 May.

Dedicated aerial survey efforts began on 20 April and extended through 18 June (Table 1). In addition, great blue heron colonies were surveyed opportunistically on 3 eagle flights during that time period. An additional colony was detected during an aerial survey for adult loons on 28 June, but the colony was inactive at that time.

Surveys generally targeted specific areas or regions of the state. Flights originated from Luckey Landing on Pushaw Lake in Glenburn; Old Town Municipal Airport; Bangor International Airport; and Twitchell's on the Androscoggin River in Turner.

All historic and newly reported wading bird colony sites were targeted for at least one aerial visit between 15 April and 15 May. Weather and scheduling constraints caused survey efforts to be delayed until 20 April and to extend well into June. In transit, suitable sites were surveyed opportunistically. On inland surveys, wetlands with dead standing trees were targeted; on coastal surveys, islands were targeted.

It became clear that aerial survey was very effective for detecting nests of great blue heron colonies, but not of other wading birds such as egrets, night-herons, and ibises. This is due to several factors. These other waders tend to build smaller nests that are most often well beneath a closed canopy. In addition, surveys after complete leaf-on

were not as efficient at detecting great blue heron nests located in live deciduous trees. Likewise, nests in live conifers were also difficult to detect due to the abundance of this habitat type across the landscape as well as the amount of live foliage concealing the nests. In live conifer settings, a nest would often only be detected once the plane was completely above the nest and the observer was looking straight down into it.

Table 1. 2009 Colonial Wading Bird Census Flight Summary[a]

Date	Flight Hours	General Survey Mission	Second[b] Observer	Pilot / Agency[c]	
4/20	6.3	Southern Maine	Judy Camuso	Dan Dufault	W
4/25	3.8	Central Maine	Charlie Todd	Charlie Later	W
4/27	3.0	Penobscot Bay to Blue Hill	Brad Allen	Shawn Rogers	F
4/29	3.0	Old Town west to Farmington	(none)	Chris Blackie	F
5/4	4.3	Augusta area	Charlie Todd	Chris Blackie	F
5/6	4.5	Midcoast	Charlie Todd	Dan Dufault	W
5/13	3.6	Region F	Mark Caron	Shawn Rogers	F
5/15	3.9	Primarily Region E	(none)	Charlie Later	W
5/18	4.0	Region C	Rich Bard	Shawn Rogers	F
5/28	5.5	Northern Maine	(none)	Daryl Gordon	W
6/4	3.6	Southcentral Maine	Cheryl Daigle	Dan Dufault	W
6/5	3.6	Western and southern Maine	Charlie Todd	Dan Dufault	W
6/16	5.5	Coastal islands	(none)	Dan Dufault	W
6/18	2.2	Northwestern Maine	Robby Lambert	Charlie Later	W

Total Hours = 56.8

[a]Additional colonies were surveyed or detected on aerial surveys for bald eagles and common loons, which are not included here.
[b]Danielle D'Auria was primary observer on all flights.
[c]Pilots were from Maine Warden Service (W) or Maine Forest Service (F).

Biologists observed or searched for 240 colony sites during aerial surveys. Many were observed more than once, giving a total of 303 aerial survey observations. The initial dedicated flight on 20 April revealed the difficulty of navigating without the help of GPS coordinates for the colony sites; thus on all subsequent flights GPS coordinates were used to locate colony sites. Most of the pilots had the GPS coordinates pre-programmed in their plane's GPS system. In other cases, GPS coordinates were plugged in during the flight. Flight paths were not tracked using GPS.

Once a colony was located it was either flown by or circled at least once to get an accurate count of the number of nests and the number that were active or inactive. In some cases, information regarding habitat setting, tree species, birds' behavior, on-the-ground access, and presence of eagle or osprey nests was also recorded.

Ground Surveys

The accuracy of aerial GPS can be extremely limited depending on weather conditions, the speed of the plane, and the offset of the plane to the targeted location. To make up for this potential inaccuracy, many colony sites were visited on the ground to verify the GPS location. This was most often done when the aerial GPS location was in an area with several wetlands that appeared suitable based on aerial imagery. Ground visits were also conducted when a nest count was difficult to obtain from the air, or when an early season aerial survey showed inactive or partially occupied colonies.

Thirty-eight colonies were visited during 42 ground visits. Most of these ground visits were conducted by Michael Merchant, a contract worker hired by MDIFW. During ground visits, the observer would attempt to locate the colony and observe the number of active and inactive nests, describe the habitat setting, note signs of anthropogenic or ecological disturbances to the colony, and describe how to access the site on foot. This was all done in as short amount of time and as far away from the nesting birds as possible in order to minimize disturbance. Landowner permission for the lands traversed by the observer was obtained as often as possible. If land was posted and landowner permission could not be obtained, the observer did not proceed.

As a result of aerial and ground survey efforts, biologists detected 83 active great blue heron colonies located as far south as Eliot, as far downeast as Beddington, and as far north as Weston (Figure 1). Prior to this year's survey efforts, MDIFW had approximately 180 historical wading bird colony locations on file. As a result of a public information request, 39 new sites were added to MDIFW's database and targeted during the surveys (Figure 2). An additional 34 sites were newly discovered during aerial surveys.

Ground surveys specifically targeting wading birds other than great blue herons were conducted on 2 coastal islands: Ram Island in Casco Bay, and Damariscove Island in Boothbay Harbor. Ram Island was surveyed on foot on 26 May by Danielle D'Auria, Brad Allen, and Kelsey Sullivan (all from MDIFW's Bird Group); Phil Bozenhard (retired MDIFW biologist); and Bob Houston (USFWS biologist). We detected 68 black-crowned night-heron nests, 16 glossy ibis nests, and 2 snowy egret nests. Damariscove Island was visited on 8 June by Danielle D'Auria, Brad Allen, and Becca Allen (volunteer). We detected at least 19 active black-crowned night-heron nests. Due to transportation timing constraints, we missed a small area at the north end of the island, which we estimated may have revealed up to 5 additional nests.

Figure 1. Great Blue Heron Colonies in Maine

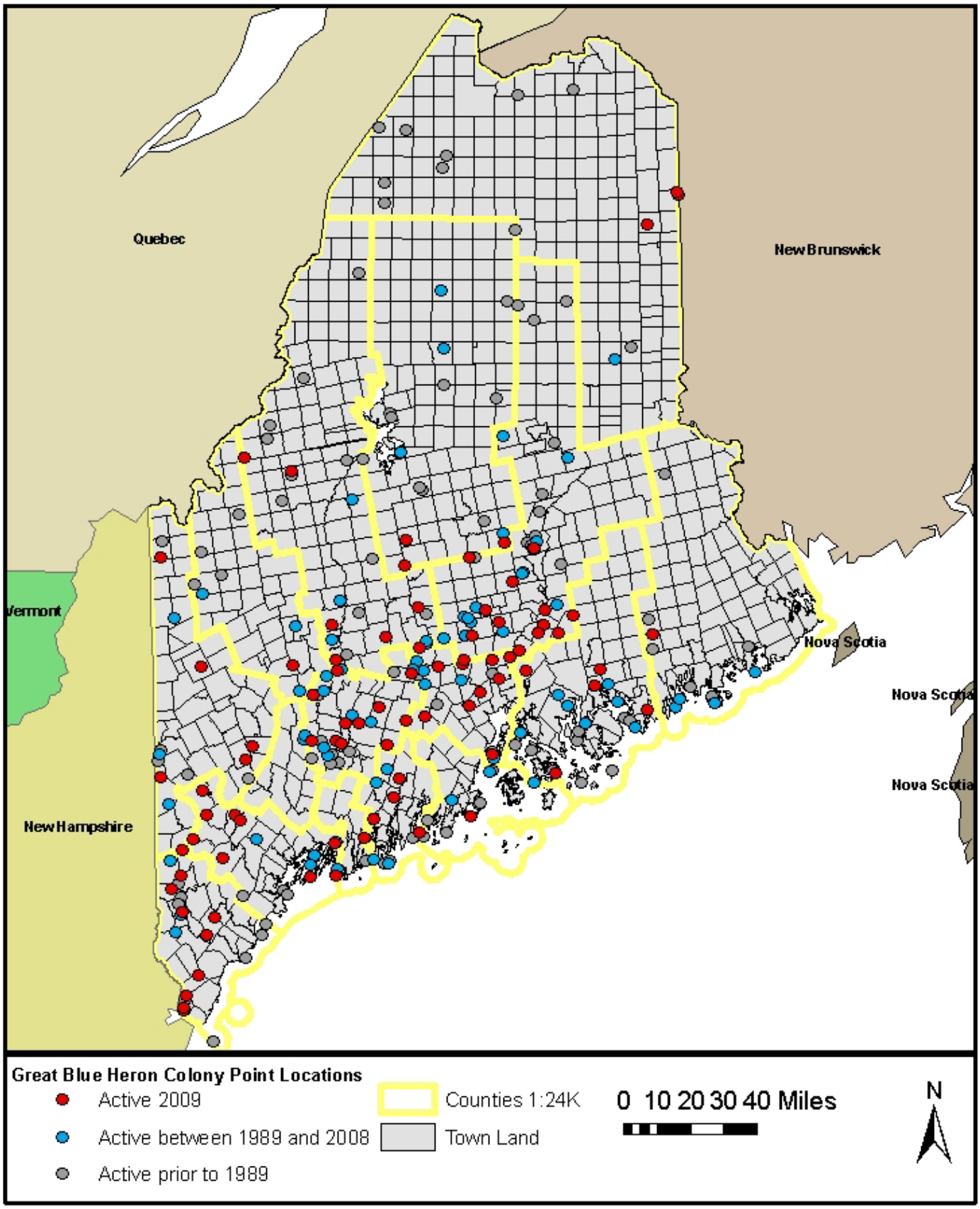
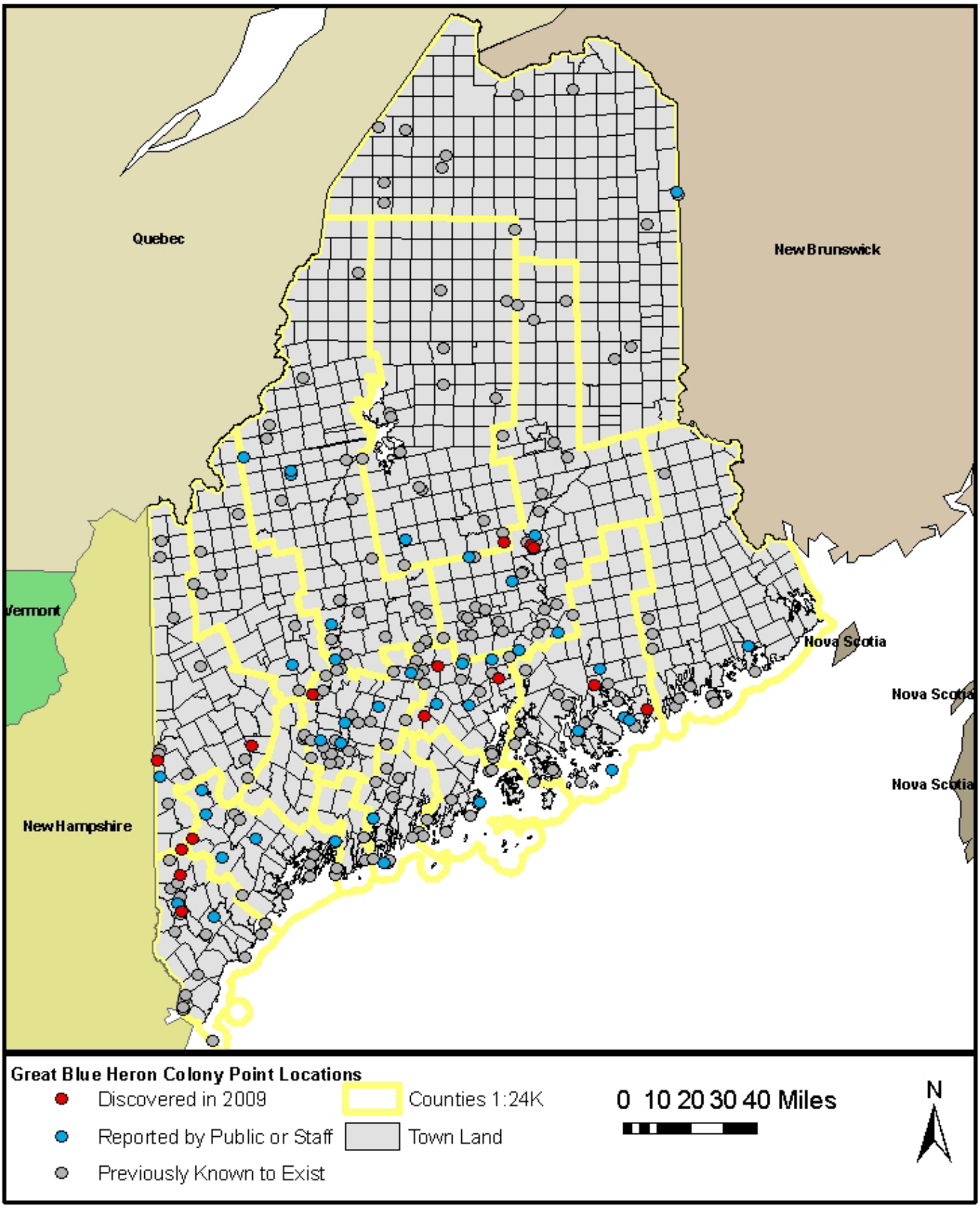


Figure 2. Great Blue Heron Colonies Newly Discovered or Reported in 2009



Volunteer Observations

Volunteers were recruited across the state to join the Heron Observation Network (HERON), an adopt-a-colony program started this year. Through this program, volunteers are assigned a colony to monitor for activity over time. Seventy-eight people signed up to be a part of HERON. Several were from organizations and agencies such as Maine Coast Heritage Trust, Friends of Abbott Mountain, Friends of Unity Wetlands, Kennebec Land Trust, Lakes Environmental Association, Holden Land Trust, Maine Coastal Islands National Wildlife Refuge, MDIFW, Maine Department of Marine Resources, Penobscot River Restoration Trust, and Penobscot Valley Chapter of Maine Audubon. The remaining majority did not identify themselves as being associated with a natural resource organization or agency.

HERON volunteers were assigned colonies that were within or near their area of interest, that were relatively easy to access, and that were active within recent years. Forty-seven HERON volunteers adopted 68 wading bird colonies this year (Figure 3). Sixty of the colonies were active this year and eight were not. Many of the volunteers were assigned their colony late in the season, thus they were not able to observe the colony during its active period. However, these volunteers are now ready to observe their assigned colony in 2010 and beyond. To date, 17 volunteers have turned in observational data from the 2009 nesting season for 28 colonies, tallying 186 hours of observations. All of the volunteers who reported time had completed volunteer paperwork prior to their activity, allowing MDIFW to officially document their time and potentially use it as a match for future research funding.

Volunteers are asked at a minimum to visit the colony once between early May and early June to document whether or not the colony is active. As long as the nests are not obscured by deciduous vegetation, early June is preferred since this timing should reveal a peak in number of active nests. If deciduous vegetation limits the view of the nests, early May prior to leaf-out is preferred. Those volunteers who are willing to perform repeat observations within a season should try to begin between mid-May and early June and observe approximately once every 2 weeks until the birds have fledged and left the colony, which is usually by mid-August.

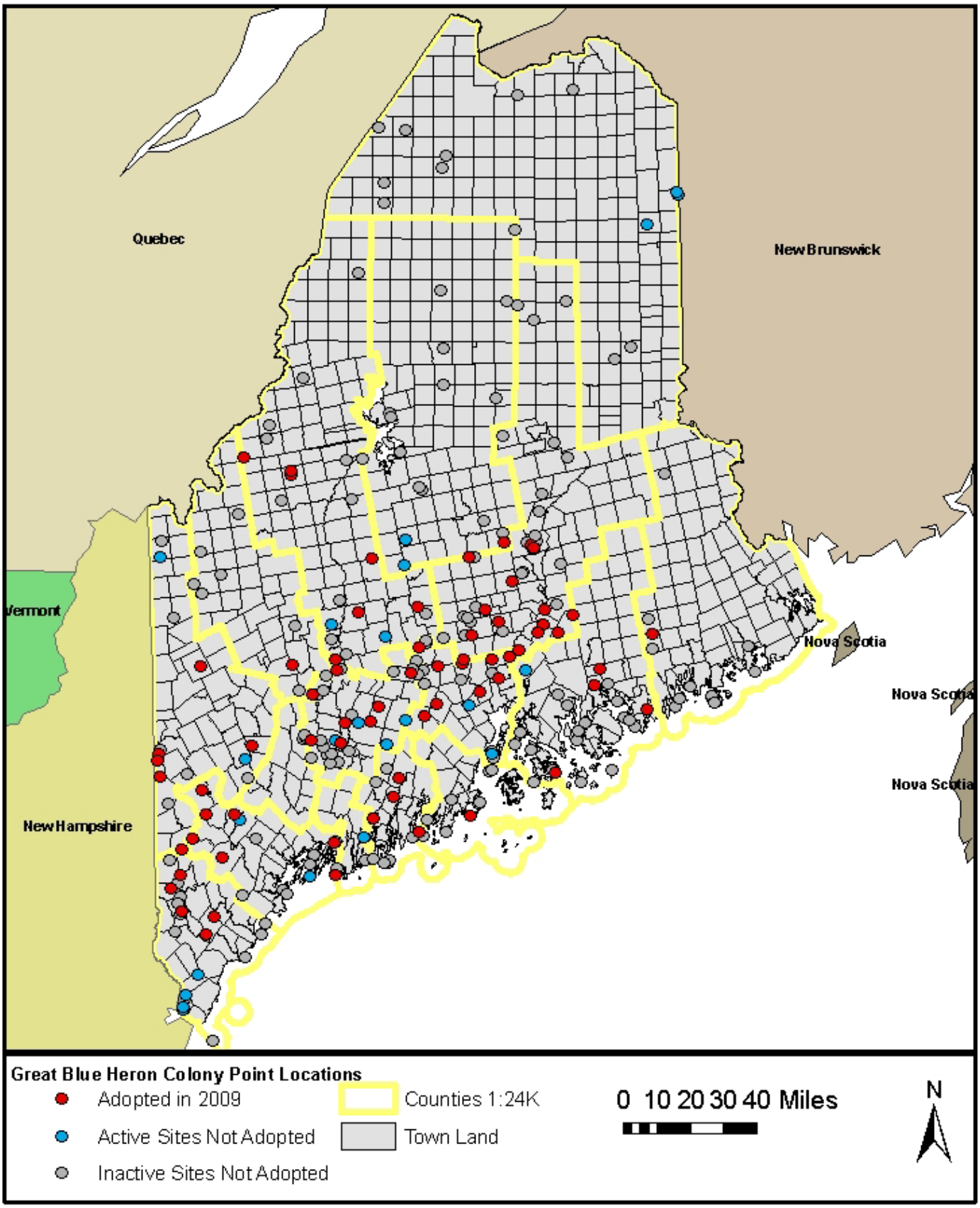
Volunteers are strongly advised to avoid disturbance to the nesting birds. Nesting herons can be extremely sensitive to human disturbance, and may even abandon a colony as a result of human intrusion. From the onset of courtship behavior through fledging, it is extremely important to keep a distance of 200 m (656 ft) from the colony. If a volunteer's presence causes birds to leave their nest, scream, or flush from the site, the volunteer is advised to leave the area immediately and choose an alternative location for subsequent observations.

Volunteers had the option to record more details including for each visit: number of active nests, number of inactive nests, number of young in the nests, and number of fledglings seen out of nests. They also were given the option of recording basic habitat information including the condition (dead/poor, intermediate, good) and type (hardwood

or softwood) of nest trees in the colony, and any anthropogenic or ecological disturbances.

Most volunteers filled out the optional information and visited their colony more than once. This has provided some key information regarding habitat settings, potential reasons colonies fail, as well as the timing of the various nesting stages.

Figure 3. Great Blue Heron Colonies "Adopted" by Volunteers in 2009



Habitat Setting

Great blue heron colonies are found in a wide diversity of habitat settings. They may place their nests in live or dead trees, hardwood or softwood. Colonies may be located in the middle of a wetland, on the shore of a river or lake, or on an island. All great blue heron colonies on coastal islands are found in an upland setting. Their nests are usually in live trees, including both hardwoods and softwoods. This year, nine coastal colonies were active at some point this year, all of which were on islands in live trees in upland habitat.

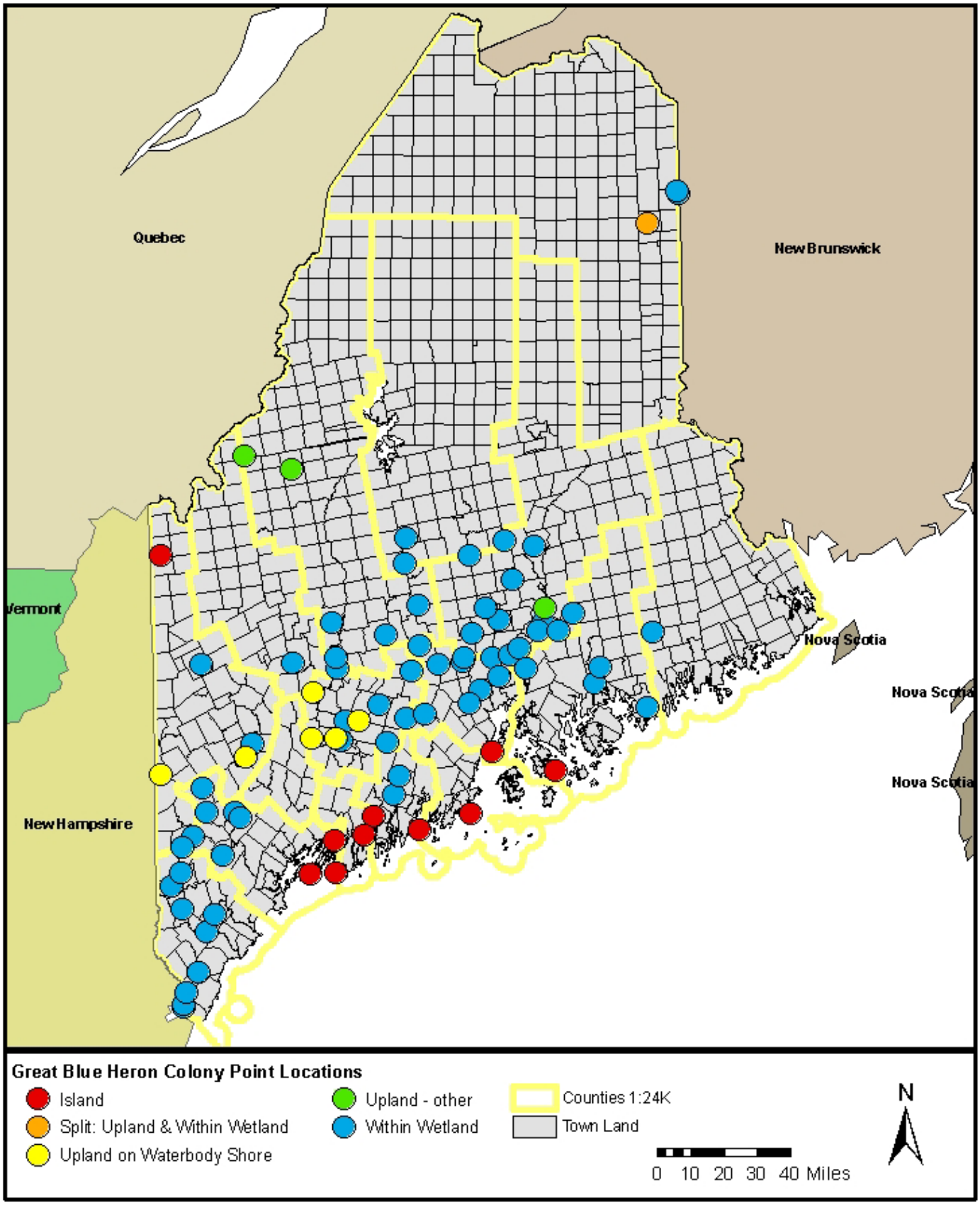
In contrast, the inland colonies show great variability in habitat setting (Table 2; Figure 4). Most of the colonies were found in beaver flowage settings with nests in snags. Other settings included live trees on an island within a lake or pond; live trees in an upland along the shore of a lake; live trees in an upland not adjacent to a waterbody; and a mix of live and dead trees both in and adjacent to a wetland.

Table 2. Habitat Setting for Active Great Blue Heron Colonies, 2009.

Habitat Setting	# Colonies	# Total Pairs	Range, # Pairs/Colony
Coastal			
[a]island	9	430	1-120
	9	**430**	
Inland			
within wetland	62	420	1-38
split: upland & within wetland	1	25	25
[a]upland - island	2	71	6-65
[b]upland - waterbody shore	6	112	5-45
upland - other	3	13	2-8
	74	**641**	

[a]upland, live trees, softwoods and/or hardwoods
[b]non-island, live trees, softwoods and/or hardwoods

Figure 4. Great Blue Heron Colonies by Habitat Setting in 2009.



Pairs Per Colony

In addition to habitat setting, the size of great blue heron colonies in terms of number of breeding pairs was quite different for coastal and inland colonies (Table 3). Colonies on coastal islands tend to have more pairs per colony than inland colonies. Inland colonies in live trees in upland settings tend to be larger than other inland colonies. The largest coastal colony is found on Wreck Island in Muscongus Bay, with approximately 120 breeding pairs. The largest inland colony is located on an island within Aziscohos Lake in Lynchtown Twp, with approximately 65 breeding pairs.

The statewide average number of breeding pairs per colony is 12.9. The average number of breeding pairs per colony on just the coastal islands is much larger, 47.7 pairs; whereas the average across only inland colonies is 8.6 pairs. Over half of all active colonies had five pairs or less; whereas over half of all the breeding pairs were found in only nine colonies that had 37 or more pairs (Table 4, Figures 5 and 6).

Table 3. Size[a] Comparison of Coastal and Inland Great Blue Heron Colonies Active in 2009.

	Range	Average	Median	Mode	Total Pairs	Total Colonies
Coastal	1-120	47.7	40.0	25	430	9
Inland	1-65	8.6	3.5	1	641	74
Statewide	1-120	12.9	5	1	1071	83

[a]Pairs per colony

Table 4. Size Distribution of Active Great Blue Heron Colonies, 2009.

		Cumulative Totals (top to bottom)			
#pairs	#colonies	# colonies	# pairs	% total pairs	% total colonies
120	1	1	120	11.2%	1.2%
90	1	2	210	19.6%	2.4%
65	2	4	340	31.7%	4.8%
60	1	5	400	37.3%	6.0%
45	1	6	445	41.5%	7.2%
40	1	7	485	45.3%	8.4%
38	1	8	523	48.8%	9.6%
37	1	9	560	52.3%	10.8%
33	1	10	593	55.4%	12.0%
28	1	11	621	58.0%	13.3%
26	1	12	647	60.4%	14.5%
25	3	15	722	67.4%	18.1%
24	1	16	746	69.7%	19.3%
22	1	17	768	71.7%	20.5%
19	1	18	787	73.5%	21.7%
14	1	19	801	74.8%	22.9%
13	2	21	827	77.2%	25.3%
12	1	22	839	78.3%	26.5%
11	2	24	861	80.4%	28.9%
10	1	25	871	81.3%	30.1%
9	3	28	898	83.8%	33.7%
8	4	32	930	86.8%	38.6%
7	2	34	944	88.1%	41.0%
6	5	39	974	90.9%	47.0%
5	3	42	989	92.3%	50.6%
4	3	45	1001	93.5%	54.2%
3	9	54	1028	96.0%	65.1%
2	14	68	1056	98.6%	81.9%
1	15	83	1071	100.0%	100.0%

Figure 5. Distribution of Active Great Blue Heron Colonies by # Pairs

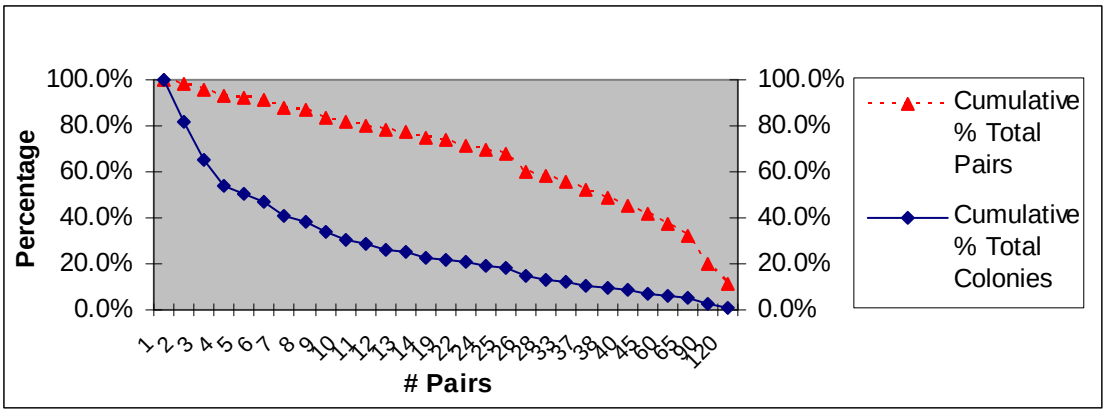
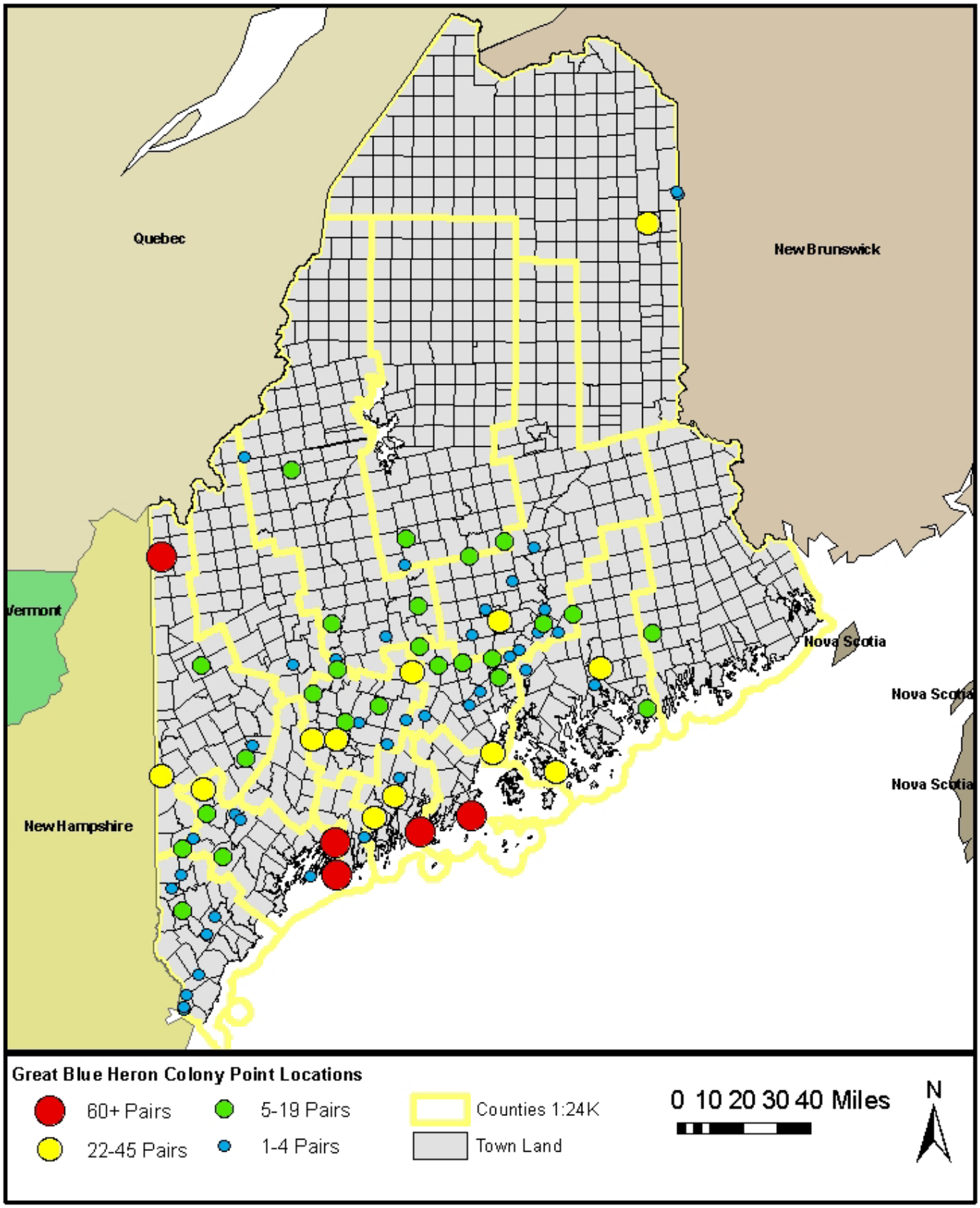


Figure 6. Great Blue Heron Colonies by Size (Pairs Per Colony) in 2009



Protection Status

Wading bird colonies are not automatically protected as Significant Wildlife Habitat (SWH), even though there are two specific categories devoted to wading birds: Inland Waterfowl and Wading Bird Habitat (IWWH), and Tidal Waterfowl and Wading Bird Habitat (TWWH). These habitats were mapped based on the habitat itself rather than the presence of certain species or their abundance. Colonial wading birds use a variety of habitat settings, many of which would not qualify under the stringent habitat mapping criteria used to designate the high or moderate value IWWH. TWWH include habitats that are important as feeding or loafing areas, rather nesting habitat. There is a portion of wading bird colonies that do fall within already designated SWH, including IWWH and Seabird Nesting Islands (SNI; Table 5). Out of all the active great blue heron colonies in 2009, 51.8% are protected as IWWH (41) or SNI (2). When considering all great blue heron colonies active sometime in the last 20 years, 44.8% are protected as IWWH (61) and SNI (8). The other colonial wading bird species have been known to nest primarily on coastal islands and as a result of this are for the most part protected as SNI. The exception is the snowy egret. There are 4 undesignated islands that have hosted breeding snowy egrets within the past 20 years.

Table 5. Wading Bird Colonies Protected by Significant Wildlife Habitat Designation

	Active in 2009						Active in last 20 years					
Species[a]	**Active**[b]	**Unprotected**[c]	**IWWH**[d]	**SNI**[e]	**Protected**		**Active**	**Unprotected**	**IWWH**	**SNI**	**Protected**	
GBHE	83 *(1071)*[f]	40 *(592)*	41 *(358)*	2 *(121)*	43 *(479)*	51.8% *(44.7%)*	154	85	61	8	69	*(44.8%)*
BCNH	3 *(106)*	0	0	3 *(106)*	3 *(106)*	100.0% *(100.0%)*	7	0	0	7	7	*(100.0%)*
CAEG							1	0	0	1	1	*(100.0%)*
GLIB	2 *(113)*	0	0	2 *(113)*	2 *(113)*	100.0% *(100.0%)*	3	0	0	3	3	*(100.0%)*
GREG	1 *(19)*	0	0	1 *(19)*	1 *(19)*	100.0% *(100.0%)*	2	0	0	2	2	*(100.0%)*
LBHE							2	0	0	2	2	*(100.0%)*
SNEG	4 *(137+)*[g]	1 *(3)*	0	3 *(134+)*	3 *(134+)*	75.0% *(97.8%)*	8	4	0	4	4	*(50.0%)*
TRHE							1	0	0	1	1	*(100.0%)*

[a]AOU alpha code
[b]Known to be active; census likely missed some active colonies, especially waders other than GBHE
[c]Not designated as IWWH or SNI
[d]Inland Waterfowl and Wading Bird Habitat
[e]Seabird Nesting Island
[f]Number of pairs is italicized and in parentheses below the number of colonies.
[g]One additional snowy egret colony protected as a SNI was noted in 2009, but the number of pairs was not recorded.

Designation as IWWH or SNI does not guarantee that the breeding birds have everything they need to breed successfully and thrive for multiple years at a site. The review process for activities on or near Seabird Nesting Islands exempts aquaculture practices, which most likely would cause disturbance to breeding birds using the island. Under IWWH, forestry practices are exempt, which has resulted in the removal of trees that surround a colony, are part of the stand the birds nest in, and in some cases may even contain nests. Removal or destruction of an active nest (containing eggs or nestlings) is a violation of the Migratory Bird Treaty Act; whereas removal or destruction of an empty nest is not considered a violation.

In addition, wading birds are extremely sensitive to disturbance during their breeding season, which begins around 1 April and extends to approximately 15 August. Activities that are often permitted even in IWWHs without a permit review by MDIFW (e.g., limited land development, road or property maintenance, and recreation) may cause enough disturbance to potentially cause cooling or breaking of eggs; young being accidentally kicked from the nest or falling from the nest after being frightened; increased predation; and complete nest abandonment.

Given the limitations of Significant Wildlife Habitat designation, conservation ownership of colony sites is a more reliable method of protection. Several key heronries and many historically active colony sites are protected in perpetuity by conservation organizations such as MDIFW, The Nature Conservancy, Maine Coast Heritage Trust, the U.S. Fish and Wildlife Service, and others. By working closely with conservation landowners and other private landowners, we can provide management guidance that will allow for an active colony to remain active and prosper for many years to come.

Colony Longevity

Using historic data, we identified the number of years each great blue heron colony has persisted by looking at the first and last years the colony was observed active. We did not include colonies that were first identified as active in 2009, since many of these colonies probably have a longer history of activity than just 1 year. In addition, there are many other colonies for which we have only 1 year of activity data, but they may not have been surveyed again within their active timeframe. For example, Colony # 501 was active in May of 1996 and was not resurveyed until 2009. This colony may have been active only in 1996 or it could have been active for anywhere between 2 and 13 years. In addition, some colonies may have been inactive for a time period between the first and last active years. For example, four colonies observed to be inactive in the 1990's were active in 2009. Despite the blinking on or off and the potential causes (i.e., human disturbance, predator disturbance, etc.), the habitat at these sites must have remained suitable over time.

Out of 175 traditional great blue heron colonies (first known to be active prior to 2009), there are 47 that are known to have persisted for 10-35 years (Table 6). Eighteen of these 47 colonies were active in 2009. There is no obvious habitat type that appears to stand up over time better than others: 6 of these colonies are in uplands, 5 of which are on islands; and the remaining 12 are within wetlands (Figures 7 and 8; Table 7).

Table 6. Great Blue Heron Colony[a] Longevity

# Years	# Colonies	# Years	# Colonies	# Years	# Colonies
1	85	10	1	21	5
2	11	11	12	24	4
3	4	12	3	25	4
4	10	13	2	26	2
5	3	14	3	29	1
6	2	16	1	30	1
7	6	17	3	33	1
8	3	18	1	35	2
9	3	19	1	Total Colonies=175	

[a]This does not include colonies newly discovered in 2009.

Figure 7. Great Blue Heron Colony Longevity

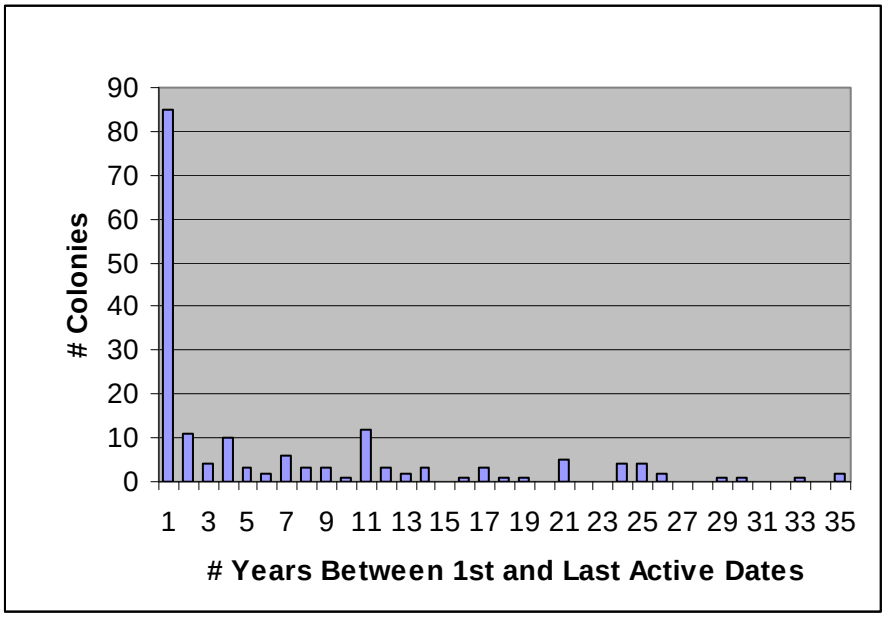
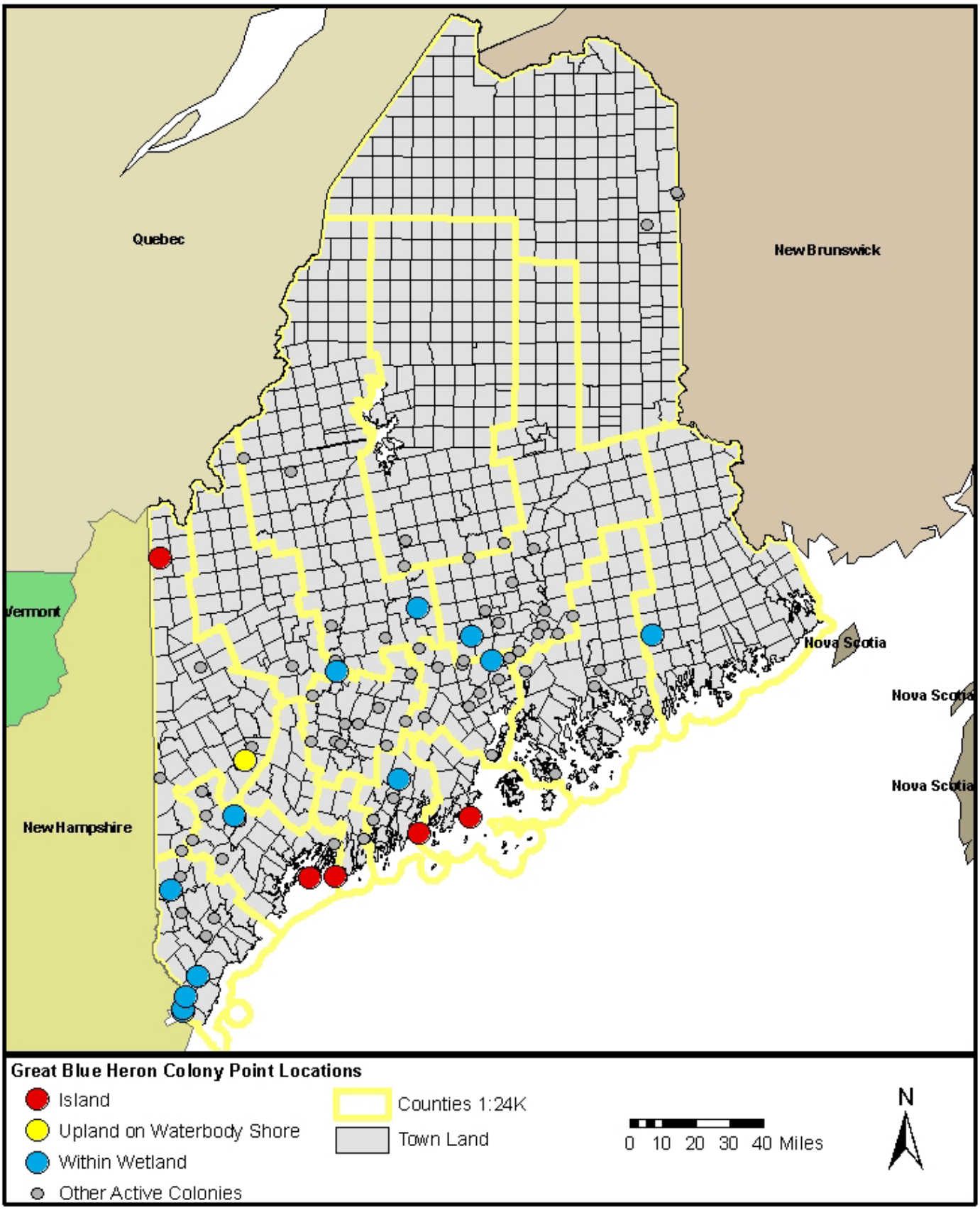


Table 7. Great Blue Heron Colonies Active in 2009 for 10 Years or More

ID	Town	Island or Wetland (or nearest wetland to colony)	Years	First Active
8	Muscle Ridge Shoals Twp	Muscle Ridge Channel - Graffam Island	35	1975
7	Bristol	Muscongus Bay - Wreck Island	35	1975
23	Harpswell	Casco Bay - Mark Island	33	1977
123	Beddington	Bog Brook Flowage	26	1984
101	Eliot	York Pond (wetland to W)	26	1984
646	Eliot	Addington Creek	25	1985
4	Harpswell	Casco Bay - Broad Sound - Eagle Island	25	1985
100	Eliot	Great Creek - The Heath	25	1985
166	Saint Albans	Indian Stream (wetland to S)	25	1985
106	Jefferson	Deer Meadow Pond	24	1986
119	Rome	Rome Trout Brook	24	1986
131	Lynchtown Twp	Aziscohos Lake (large island)	24	1986
604	Paris	Hall Pond	19	1991
102	South Berwick	Boyd Brook (wetland b/w Brown and Spring Hills)	17	1993
505	Etna	Tracy Brook (unnamed branch E of Etna Bog)	14	1996
649	Newfield	Symmes Pond	14	1996
601	Casco	Meadow Brook (Rolfe Brook)	11	1999
612	Winterport	Clements Brook	11	1999

Figure 8. Habitat Setting of Great Blue Heron Colonies Active in 2009 for 10 Years or More



Coastal Trend

The last comprehensive survey conducted along the coast was in 1995. That year, 644 pairs of great blue herons were detected on 14 coastal islands. This was a 46.7% decline from a previous coastal census done in 1983, when 1208 pairs were nesting on 20 coastal islands (Table 8). This year's census revealed 430 pairs on 9 coastal islands, a 33.3% drop from 1995, and a 64.4% drop from 1983.

Table 8. Changes in Great Blue Heron Colonies on Coastal Islands, 1975-2009.

Year	Active Colonies	Total Pairs	Range, # Pairs/Colony	% Change from Previous Estimate
2009	9	430	1-120	-33.3
1995	14	644	1-150	-46.7
1983	20	1208	4-252	n/a

It is unknown what has caused these subsequent declines in the coastal breeding population, but the recovery of the bald eagle is often cited as a possibility. In 1983, there were 16 pairs of bald eagles nesting in "marine" habitat plus an additional 22 pairs nesting in "estuarine" habitat (Table 9). In 1995, the number of marine breeding pairs increased to 50 pairs; and the number nesting in marine or estuarine increased to 102 pairs. Between 1995 and 2009, there was an additional increase of 86% in marine pairs alone (93 pairs), and a 117% increase in estuarine pairs (113 pairs).

Table 9. Changes in Breeding Population of Bald Eagles in Coastal Maine, 1983-2009.

	Breeding Pairs			
Year	Marine Habitat	Estuarine Habitat	Total	% Change
2009	93	113	206	+101.9%
1995	50	52	102	+168.4%
1983	16	22	38	n/a

Since the early 1980s, there have been a few coastal islands that have hosted both herons and eagles. In 1983, 3 of the 20 coastal islands occupied by great blue herons were also occupied by breeding bald eagles (Big Ram in Beals, Middle Douglas in Milbridge, and Upper Birch in Addison). In 1995, 3 of the 14 coastal islands occupied by great blue herons were also occupied by breeding bald eagles (Wreck in Bristol, Scraggy in Stonington, and Burying in Franklin). Currently in 2009, 2 of the 9 coastal islands occupied by great blue herons are also occupied by breeding bald eagles (Wreck and Eastern Mark in Stonington). Berry Island in Wiscasset hosted eagles and herons in 2008, but in 2009 the herons arrived late and only occupied the island for a few weeks before abandoning.

Bald eagles have been known to capture nestling, fledgling, and even adult great blue herons (Vennesland and Butler 2004; Todd et al. 1982; Norman et al. 1989), but it is not known how commonly this occurs in Maine. In a Maine study of bald eagle food habits,

the remains of 21 great blue herons were found on 7 bald eagle territories in coastal habitat; whereas the remains of 7 great blue herons were found on 2 bald eagle territories in interior Maine, suggesting a greater interaction of eagles and herons along the coast (Todd et al. 1982). Bald eagles may go after great blue herons when other food resources are limited and the great blue herons are nesting in close proximity; thus giving the bald eagles an attractive food alternative that doesn't require a long-distance commute from their nest. If bald eagles are preying upon great blue herons, it may not be the breeding adults who are doing so, rather the 1, 2, or 3-year-olds that are not breeding and not tied to a territory yet. Perhaps just the increased presence of a top-level predator such as the bald eagle has caused great blue herons to abandon colonies, redistribute into smaller or dispersed groups, or experience declines in success due to stresses associated with increased predator avoidance. On the Pacific Coast of Canada, bald eagles elicited a response from nesting herons significantly more often than from all other antagonists including humans, crows, red-tailed hawks, and ravens (Vennesland and Butler 2004). In this same study, heron nesting productivity per initiated nest was significantly and negatively correlated with the frequency of eagle incursions.

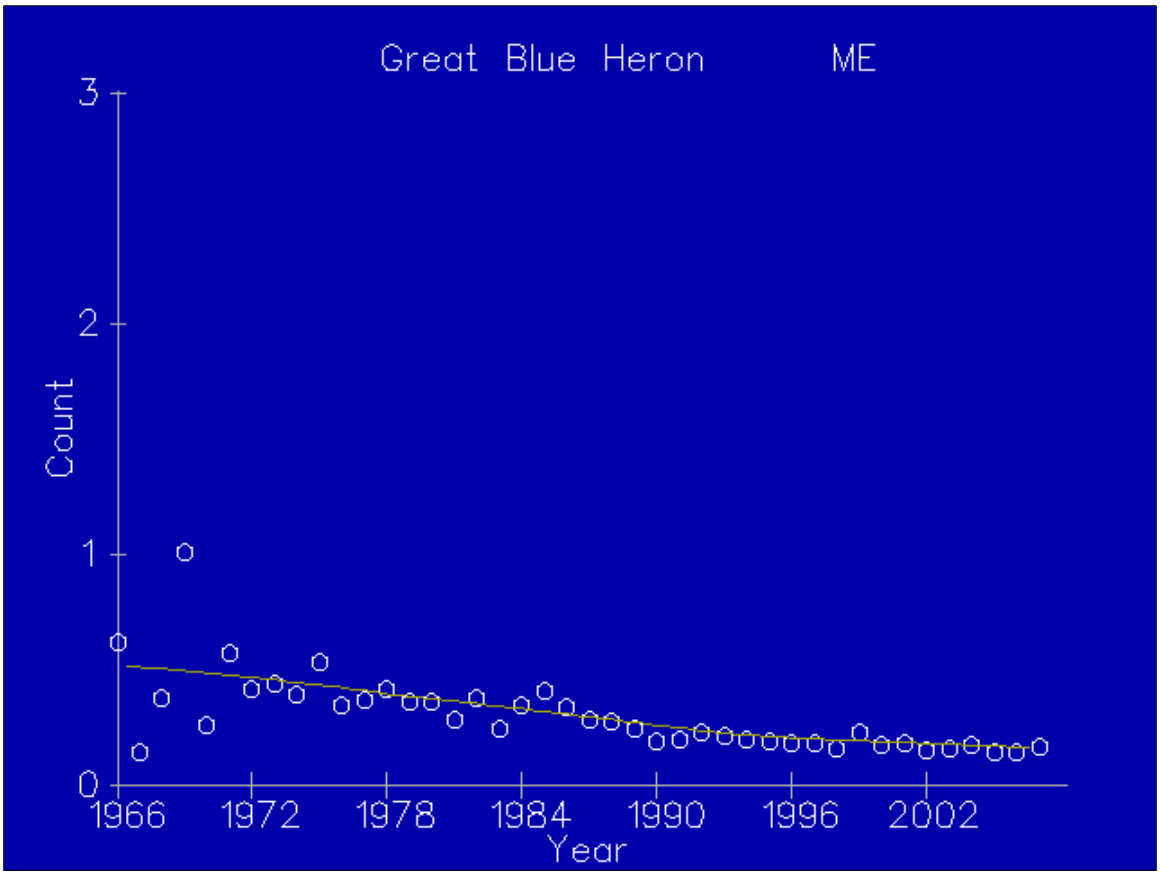
Statewide Population Trend

Even after this year's survey efforts, it is difficult to make an accurate estimate of the statewide breeding population of great blue herons. While we are fairly certain we've thoroughly surveyed the coastal islands and have detected most colonies containing more than 1 pair, we expect there are many inland colonies that have gone undetected. Out of 134 historically active colonies at inland sites, only 32 were active this year (2009). An additional 38 active inland colonies were newly discovered or reported this year. Even if we were to put forth the same amount of effort into press releases and public outreach in 2010, it is very unlikely that we would learn about a similar number of "new" inland colonies. In 2009, many colonies were reported by multiple individuals. The nature of the Maine landscape tends towards inland colonies remaining undetected. Most of the inland sites are in beaver flowage settings which are somewhat inaccessible, especially in areas where surrounded by large swaths of undeveloped land. Except as a possible favorite fishing spot, these areas likely do not get a lot of visitation by humans during the herons' breeding season. It was interesting to find that 18% of active sites (statewide) contained only a single pair; and 49.3% contained 5 pairs or less. These small colonies likely go undetected by the public unless located immediately adjacent to someone's property or a trail.

Given the lack of consistent historical data for inland breeding sites, we intend to use this year's survey results as a new baseline from which to detect breeding population trends in the future. As far as the population as a whole (including non-breeding birds), the data sets that may be used to evaluate trends over time include results from the Breeding Bird Survey (BBS) and the Christmas Bird Count (CBC). The BBS began in 1966 as a continental monitoring program for all breeding birds, designed to provide a perspective of population change. Routes are randomly located so that habitats of the entire region are sampled. It has been designed so that methodology is consistent, observers have a high level of bird identification and detection expertise, the same stops are visited each year, and surveys are conducted under suitable weather conditions. These requirements

produce comparable data over time. The data can be accessed via "The North American Breeding Bird Survey, Results and Analysis 1966 – 2007" website hosted by the Patuxent Wildlife Research Center. According to BBS results, great blue herons in Maine have shown a significant decline over time: a -2.2% annual decline from 1966-1979; 5.5% annual decline from 1980-2007; and overall, a -3.6% annual decline from 1966-2007 (Figure 9; Sauer et al. 2008).

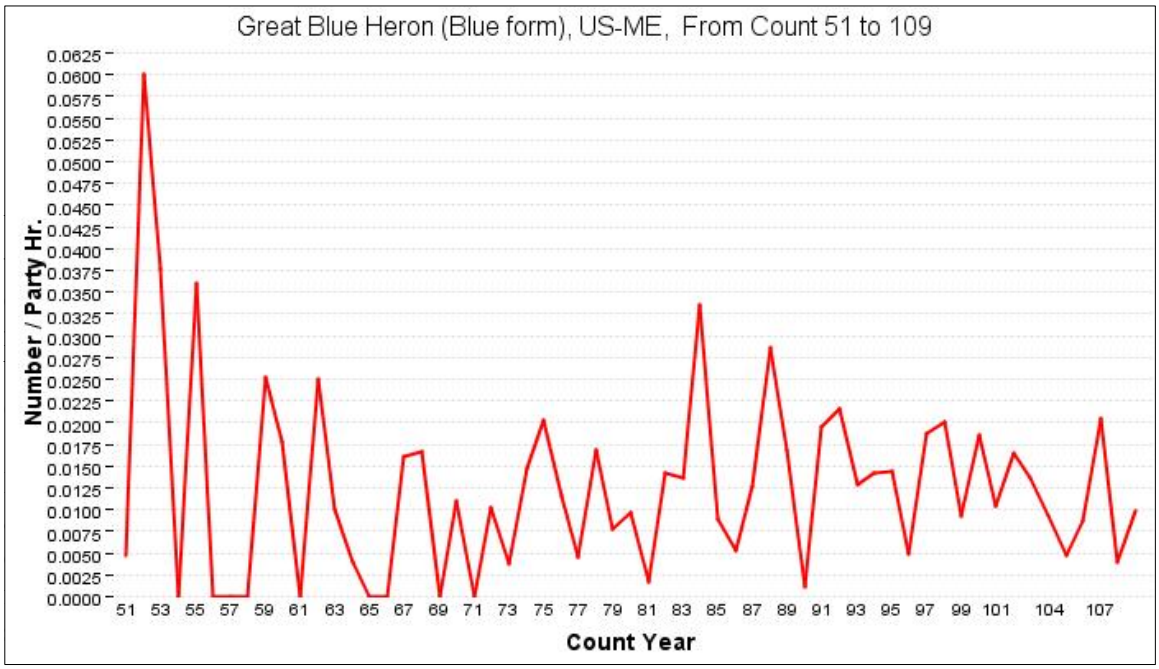
Figure 9. Breeding Bird Survey results, showing the weighted regional (Maine) abundance of the great blue heron as average # birds per route, for 1966-2007 (Sauer et al. 2008).



The CBC first started in 1900 as an alternative to the holiday tradition known as the Christmas "Side Hunt" in which hunters competed to see who could kill the largest number of animals (including birds) in one day. Today, the CBC is an early-winter bird census conducted over a 24-hour period. Count volunteers follow specified routes through a designated 15-mile diameter circle, counting (not killing) every bird they see or hear all day. All birds are counted all day, giving an indication of the total number of birds in the circle that day. All individual CBC's are conducted between December 14 and January 5 each year. The timing of the CBC is such that many great blue herons may have already migrated south for the winter, especially in years when long stretches of freezing temperatures occur prior to mid-December. However, these counts do produce comparable data over time, and corrections are made for changes in effort between years.

The data for the great blue heron in Maine from 1951 to 2009 is available at National Audubon's website. Figure 10 depicts the trend across that time period, showing a general decline from 1951 to present (National Audubon Society 2002).

Figure 10. Christmas Bird Count results for the great blue heron in Maine, 1951-2009 (National Audubon Society 2002).



Given the available data and trend analyses presented above, Maine's great blue heron population appears to be experiencing some level of decline. Within Maine our active colonies have always been concentrated in the southern and western parts of the state, but many of the northern and downeast historic sites are no longer active and few new sites were found in these parts of the state this year. This may indicate a relative "shrinking" of the species' range in the state. Our neighbors to the north and east (Quebec, New Brunswick, and Nova Scotia) also appear to have declining populations; whereas our neighboring states to the west and south (New Hampshire, Massachusetts, and Vermont) appear to have increasing populations (Sauer et al. 2008). Severe winters may reduce northern populations when foraging sites freeze (Blus and Henny 1981). Areas further north, but with a more temperate climate than Maine, host thriving populations of breeding great blue herons. For example, Prince Edward Island calls itself the great blue heron capital of North America (Government of Prince Edward Island).

It is unclear why colonies are lacking in the northern and downeast parts of the state. The human population is less dense in these areas, so colonies may exist but go undetected. Nesting sites are probably not limited; and human disturbance is likely not a big issue except if a colony happens to be within or adjacent to active logging operations. According to Maine's bald eagle biologist, Charlie Todd and regional biologist, Tom Schaeffer, bald eagles are thriving downeast, but good numbers of great blue herons are also seen foraging in tidal areas in this region.

By using this year's data as a baseline, we plan to continuously improve our knowledge of colony activity across the state, and over time answer the many questions we have regarding limiting factors and causes of decline.

Future Plans

Ground Visits and Landowner Contacts

We are currently working to get more accurate information regarding colony locations by visiting more sites on the ground. Immediately prior to ground visits we are also seeking out landowner information and permission to access sites now and in the future during monitoring efforts. During ground visits, we are collecting GPS locations of the colony boundaries (i.e., nest locations) so that they can be mapped more accurately in the state's GIS system.

In seeking out landowner information, the conservation status of a particular colony will also be tracked – for instance, whether or not the colony site is in or adjacent to conservation ownership, or a conservation easement. This will allow us to prioritize sites for conservation management agreements with the landowner, or for acquisition by the state or other conservation organization.

Best Management Practices

We plan to develop a document outlining best management practices for lands containing or adjacent to wading bird colonies. This document would be used during environmental permit reviews, and shared with landowners whose management activities may affect a wading bird colony or its immediate surroundings. Colony sites that are protected as Significant Wildlife Habitat as an Inland Waterfowl and Wading Bird Habitat or as a Seabird Nesting Island, will trigger an environmental permit review by Maine Department of Environmental Protection. Colony sites that are not included as SWH are considered during Site Law permit reviews when a listed species such as the great blue heron (Special Concern) or black-crowned night-heron (Threatened) is known to breed in the immediate area of the proposed activity.

Focus on Other Waders

The 2009 census was intended to document all colonial wading birds, but due to limited resources and the methods chosen (aerial survey), waders other than great blue herons were likely missed. In 2010, we intend to focus our efforts on black-crowned night-herons, a State Threatened species. This will include ground visits to historic sites and additional sites reported by the birding public.

Future Surveys

We hope to repeat a statewide census similar to the 2009 census, once every five years. In the meantime, we will continue to collect information on great blue heron colonies every year, primarily through the Heron Observation Network's volunteer efforts. By repeating the statewide census every 5 years and having volunteers monitor sites on an annual basis, we hope to be able to better evaluate the inland population's trend over time.

Web Services

We recently established a blog on the internet (http://maineheron.wordpress.com) for the Heron Observation Network. This site will enhance information sharing between volunteers, state biologists, and the public regarding colonial wading birds throughout the state.

Acknowledgements

I express my most sincere thanks to the many individuals that contributed to this year's effort. First, thank you to all of the public who took the time to call or email me with information regarding colony locations throughout the state.

I also thank the pilots from the Maine Warden Service (Charlie Later, Dan Dufault, and Daryl Gordon) and the Maine Forest Service (Shawn Rogers and Chris Blackie) for making themselves readily available for the project, being flexible with scheduling and flight plans, and enduring some very long days. Dan Dufault reported several new colony sites, adding significantly to our knowledge of inland colony locations.

I am grateful to our backseat observers Judy Camuso, Charlie Todd, Brad Allen, Mark Caron, Rich Bard, Cheryl Daigle, and Robby Lambert, who all endured less than perfect comfort for hours on end while helping with nest counts and navigation. Special thanks go to Charlie Todd whose expansive knowledge and experience with aerial surveys added tremendously to the quality of work that was accomplished.

My "mountain goat" seasonal worker, Michael Merchant went to many places no man would dare to go during black fly and mosquito seasons, just so we could verify GPS locations on the ground. He also made important contacts with landowners and others that are now part of the Heron Observation Network.

The Heron Observation Network, consisting of 78 people from all walks of life, has really stepped up to the plate to help make this program a success in 2009 and beyond. We look forward to working with each and every volunteer in the future. Thank you for your patience and dedication.

Lastly, the project would not have been possible without important funding sources such as State Wildlife Grants and the Oil Spill Recovery Fund.

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