

RAPTORS AND WATERBIRDS ON THE GREAT EGG HARBOR RIVER

ATLANTIC COUNTY, NJ

WINTER, 2008 - 2009

*The Sixth Field Season of a Systematic Study
of an Important Avian Wintering Area*

including Key Comparisons to the MULLICA RIVER

*and a continuing investigation of
FALL MIGRATION
on the Great Egg Harbor River*

Submitted to: The Great Egg Harbor River Council and Watershed Association



**by Clay Sutton and James Dowdell
April 30, 2009**

Submitted to:
The Great Egg Harbor River Council and Watershed Association
c/o Fred Akers, River Administrator
PO Box 109
Newtonville, NJ 08346

Submitted by:
Clay and Pat Sutton LLC
129 Bucks Avenue
Cape May Court House, NJ 08210
609-465-3397
claysutton@comcast.net



Above:

Expanded seasonal coverage discovered large numbers of **Osprey** using the Great Egg Harbor River and Bay during autumn of 2008.

(Photo by Clay Sutton)

On the cover:

The large and successful **Black Skimmer colony** on Great Egg Harbor Bay at the Longport Sod Banks (Malibu Beach WMA). The discovery and documentation of this booming colony, the only successful one in New Jersey in 2008, was a glowing highlight of the 2008-2009 expanded studies, and a strong validation of the decision to make Great Egg studies a year-round investigation.

(Photo by Clay Sutton)

RAPTORS AND WATERBIRDS ON THE GREAT EGG HARBOR RIVER

Fall and Winter, 2008-2009

During the fall of 2008 and the winter of 2008-2009, raptor and waterbird counts were conducted on the Great Egg Harbor River for the sixth consecutive field season. Survey locations and methodology remained the same as in the first five seasons of study (see: *Wintering Raptors and Waterbirds of the Great Egg Harbor River, Atlantic County, NJ – A Summary of the First Five Years of Study, 2003-2008*). **Map 1** shows the nine bird census locations on the Great Egg Harbor River and Bay. Eight core program winter surveys were conducted between the first week of December 2008 and the last week of March 2009. The results of these counts are shown in **Table 1**. **Peak counts** are shown in **Bold Face**. Also shown are seasonal averages for key winter species. As in the first five seasons of study, rare, threatened, and endangered species mapping for 2008-2009 is included at the end of this report.

While the core winter segment of this survey was carried out in the exact same way as the prior five seasons of survey efforts, in 2008-2009 the survey scope was expanded to include the full seasonal cycle, which is: fall, winter, spring, and summer. Survey efforts are now conducted year round in order to assess and document spring and fall migration, breeding species, and the all-important winter concentrations of raptors and waterbirds.

Accordingly, Table 1, beyond showing the results of winter studies, also shows the inaugural systematic fall migration counts along the Great Egg Harbor River. In-depth analysis will be offered at the conclusion of the first full year of expanded seasonal studies. Spring migration studies will be ongoing April through June 2009 and summer (“breeding bird”) counts / studies will be conducted through August 2009.

Even though a full seasonal analysis will follow, it is important to note that the first year of late summer and fall studies were highly successful. Considerable fall raptor migration was documented on the Great Egg Harbor River and late fall waterfowl totals were excellent – proving the Great Egg is highly important to ducks for an extended period well outside the classic and previously documented “winter season.” Also, it was proven that fall shorebird use rivals the levels previously noted during limited spring migration counts, with, for example, over 2,500 shorebirds counted on the Great Egg on September 2, 2008. Indeed, migration counts on the Great Egg Harbor River for all species hold great promise and potential as the first full season of counts unfold. Ten Red Knots were recorded at a high tide roost on the south side of Great Egg Inlet on September 24, 2008, and a Black Tern, always a good find, was present at the Tuckahoe WMA impoundments on September 24, 2008 as well. Fifteen Brown Pelicans were seen migrating across the mouth of Great Egg Inlet on October 10, 2008.

A major discovery of the early fall surveys was the discovery of a major Black Skimmer breeding colony at the Longport Sod Banks (Malibu Beach WMA), to our knowledge the only successful Black Skimmer colony in all of New Jersey for the 2008 breeding season. Nearly 1,000 individual Black Skimmers were present in the colony (September 24, 2008) and about one-third of these were estimated to be nearly fledged chicks. Common Terns and Least Terns also bred here in good numbers. The NJDEP Division of Fish and Wildlife Endangered and Nongame Species Program (ENSP) should eventually provide a full report on the success of the colony.

While this important colony was known to the ENSP and appropriately marked and flagged, it was this survey project that brought it to the attention of the Great Egg Harbor Watershed Association and to interested and concerned individuals, thereby realizing an intended value of year-round studies. The documentation of Rare, Threatened, and Endangered species breeding locations was determined as a major goal and objective of the expanded seasonal studies. The discovery of a large, robust, and successful Black Skimmer breeding colony was a glowing highlight of 2008-2009 survey efforts, and the anticipated return of this breeding colony will be closely monitored in spring and summer 2009.

CORE WINTER STUDIES

Winter 2008-2009 compared highly favorably with the previous five seasons of study. While January temperatures were 2.1 degrees below normal, December, February, and March were above normal in temperature (and rainfall). (Source: AccuWeather data for Atlantic City, NJ). Accordingly, it was largely a “normal” winter with little ice or snow effecting raptor or waterfowl numbers or distribution. Perhaps as a result, waterfowl populations were judged “normal” or average in relation to the previous five years of survey. Only Bufflehead set a new peak (1,280 on March 16, 2009) and new high seasonal average (474 per survey). Bufflehead were present throughout the study season, primarily in Great Egg Harbor Bay east of the Garden State Parkway bridge.

Among raptors, Sharp-shinned Hawk set a clear new winter-season daily high on December 4 with 17 individuals recorded. This number led in part to a new seasonal high average of 4.38 birds per survey. It should be noted that a number of the Sharp-shinned Hawks recorded on December 4, 2008, were not true “wintering birds,” but late fall migrants heading south. Nonetheless, due to the date, regular survey protocol requires them to be included as part of the winter “average.”

Of great interest, Bald Eagle set a new winter season high count on January 29 when 22 were carefully recorded. Present all winter in good numbers, Bald Eagle also posted a new record seasonal average of 12.75 birds per survey. An amazing eleven eagles were seen over Lake Lenape on December 15, 2008. A new Bald Eagle nest was discovered during the survey of March 16, 2009, when a pair was found nesting (with one bird either incubating eggs or brooding young) on an Osprey platform near the confluence of the main stem of the Tuckahoe River with Great Egg Harbor Bay. (This active nest was later confirmed by ENSP personal, but sadly failed for unknown reasons.)

Two Cooper's Hawks were seen displaying (courtship flight) at Tuckahoe WMA on March 27, 2009, indicating probable eventual breeding there. (Also a displaying Cooper's Hawk was noted at Green Bank on the Mullica River on March 3, 2009).

An Iceland Gull, always an uncommon but welcome winter find, was found on the beach on the south side of Great Egg Inlet on January 29, 2009. A female eider, unidentified to species due to distance, was at the Longport Jetty on January 29, 2009, and 5 Redheads were tallied in Great Egg Harbor Bay on December 15, 2008.

Beyond raptors and waterbirds, other interesting 2008-2009 avian sightings included a Common Yellowthroat recorded at Tuckahoe WMA on the very late date of December 15, 2008. (Also, a Palm Warbler was seen on the Mullica River survey on Great Bay Boulevard on the very late date of January 8, 2009.) A Pileated Woodpecker was heard drumming behind the Corbin City Impoundments on March 27, 2009, providing yet another record for this rare and elusive resident bird. Other significant records reported to us by other observers included 3 Short-eared Owls seen at the Corbin City Unit of the Tuckahoe WMA on February 28, 2009 (seen by Tom Reed) and an American Avocet at the Tuckahoe WMA Impoundments on August 28, 2008 (seen by Sandra Keller). Beyond birds, a Harbor Seal was seen during the regular survey on January 29, 2009, near the Longport Bridge, and 2 Harbor Seals were seen "hauled out" on February 9, 2009, one at Longport and one at Drag Island.

COMPARISONS TO THE MULLICA RIVER

Comparative winter studies were conducted on the Mullica River in 2008-2009 for the fifth consecutive winter season. These ongoing core studies are also a part of the expanded Great Egg Harbor Watershed Association project. Findings confirmed, corroborated and expanded previous findings on the Mullica River (see: *Wintering Raptors and Waterbirds of the Great Egg Harbor River, Atlantic County, NJ – A Summary of the First Five Years of Study, 2003-2008*). The nine bird census locations on the Mullica River are shown on **Map 2**. Four surveys were conducted for comparison purposes between December 13, 2008, and March 3, 2009. Results are included here as **Table 2**. Shown are seasonal results and averages for key species. **Peak counts** are shown in **Bold Face**.

Canada Geese posted a new seasonal high average and Mallard set both a new seasonal high daily count (772 on February 5, 2009) and seasonal average (687 birds per survey). These high numbers were due in large part to a large wild Mallard flock attracted, fed, and protected on private property in Mystic Islands.

As on the Great Egg, Bald Eagles posted a new high seasonal average on the Mullica River as well, with an average of 12.75 Bald Eagles per survey. Interestingly, this is exactly the same Bald Eagle daily average as was recorded on the Great Egg Harbor River.

Red-tailed Hawk set a new high daily count in 2008-2009 when 46 individuals were recorded on March 3, 2009. A new high seasonal average of 40 birds per survey was posted as well. Finally, Merlin also set a new high seasonal average on the Mullica River with 0.5 birds per survey. An Osprey was seen at Green Bank on December 13, 2008, possibly attempting to winter. It was not subsequently seen, indicating either very late migration out of the area or a failed attempt at wintering on the Mullica River.

The Mullica will continue to be sampled in the winter as an adjunct to the Great Egg Harbor River core studies. The projected average of 4 times per winter will allow for a continued comparison to the Great Egg for the key winter period and for key wintering species. The perspective provided by the comparisons and contrasts with the Mullica River is important to evaluating Great Egg Harbor avian resources, in both a single season, and over time.

In summary, expanded seasonal scope and coverage in fall 2008 continued to discover the extent and depth of the avian resources of the Great Egg Harbor River. Expanded monitoring efforts provided important information on breeding species and fall migration through the Great Egg Harbor River system, and increased our understanding of the temporal aspects of Great Egg Harbor migrants and wintering birds. Core winter season studies confirmed, corroborated, and expanded upon previous findings, and continued to document and support the Great Egg status as one of the most important wintering areas for raptors and waterfowl in both New Jersey and in the Mid-Atlantic states.

We thank the officers, trustees, and members of the Great Egg Harbor River Council and Watershed Association for the continuing opportunities to be a part of these important avian surveys, and we thank the National Park Service for their support to the Great Egg Harbor River Council and Watershed Association that enables these survey efforts.

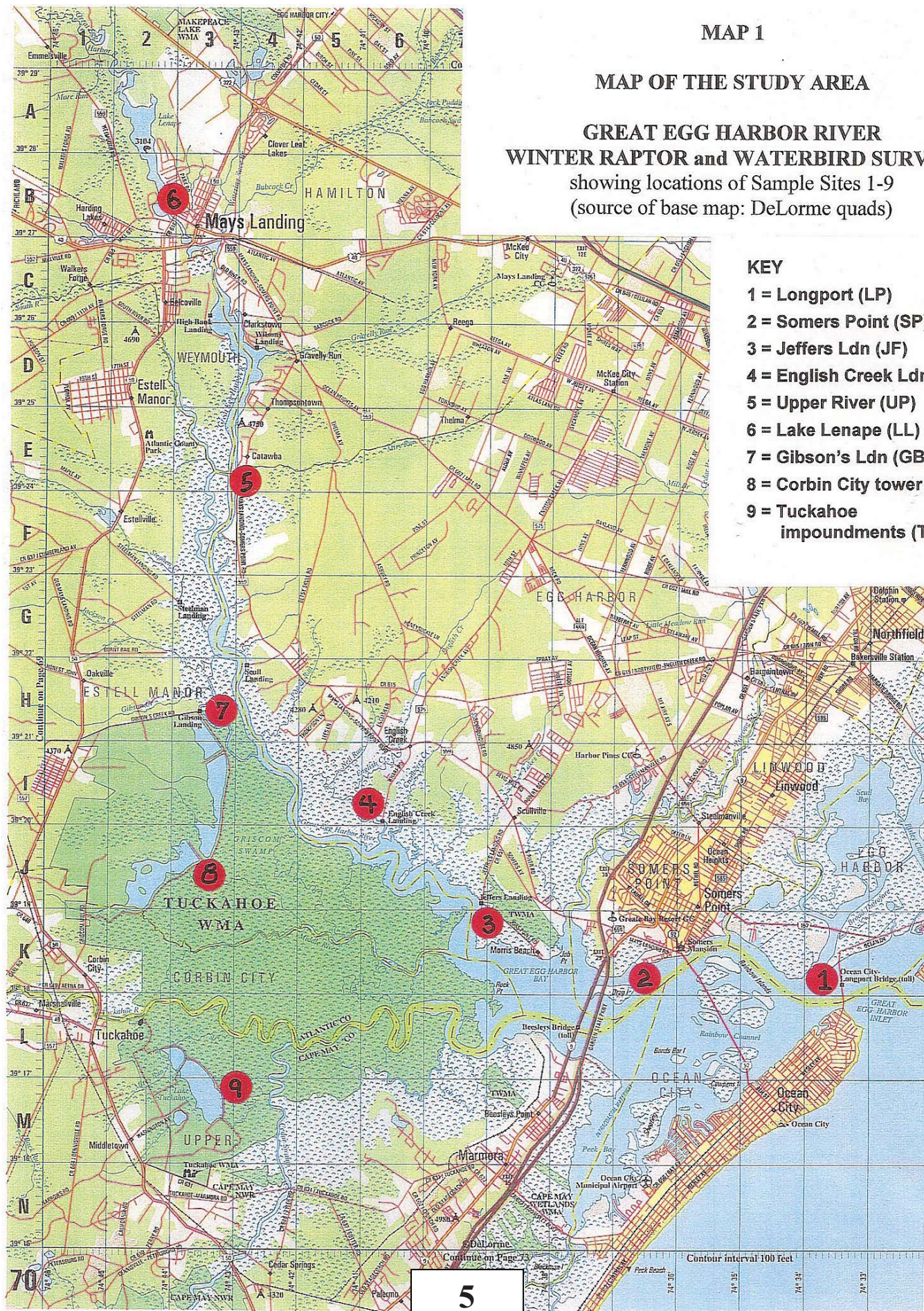
MAP 1

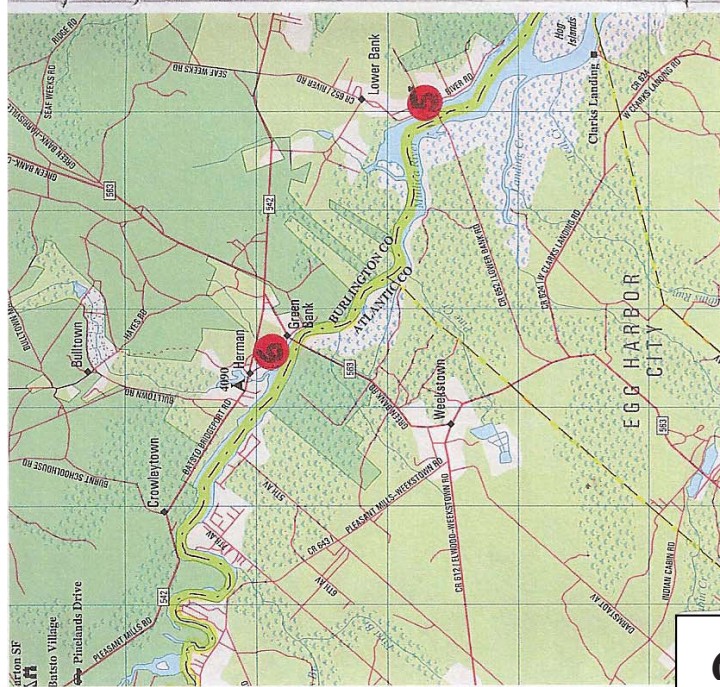
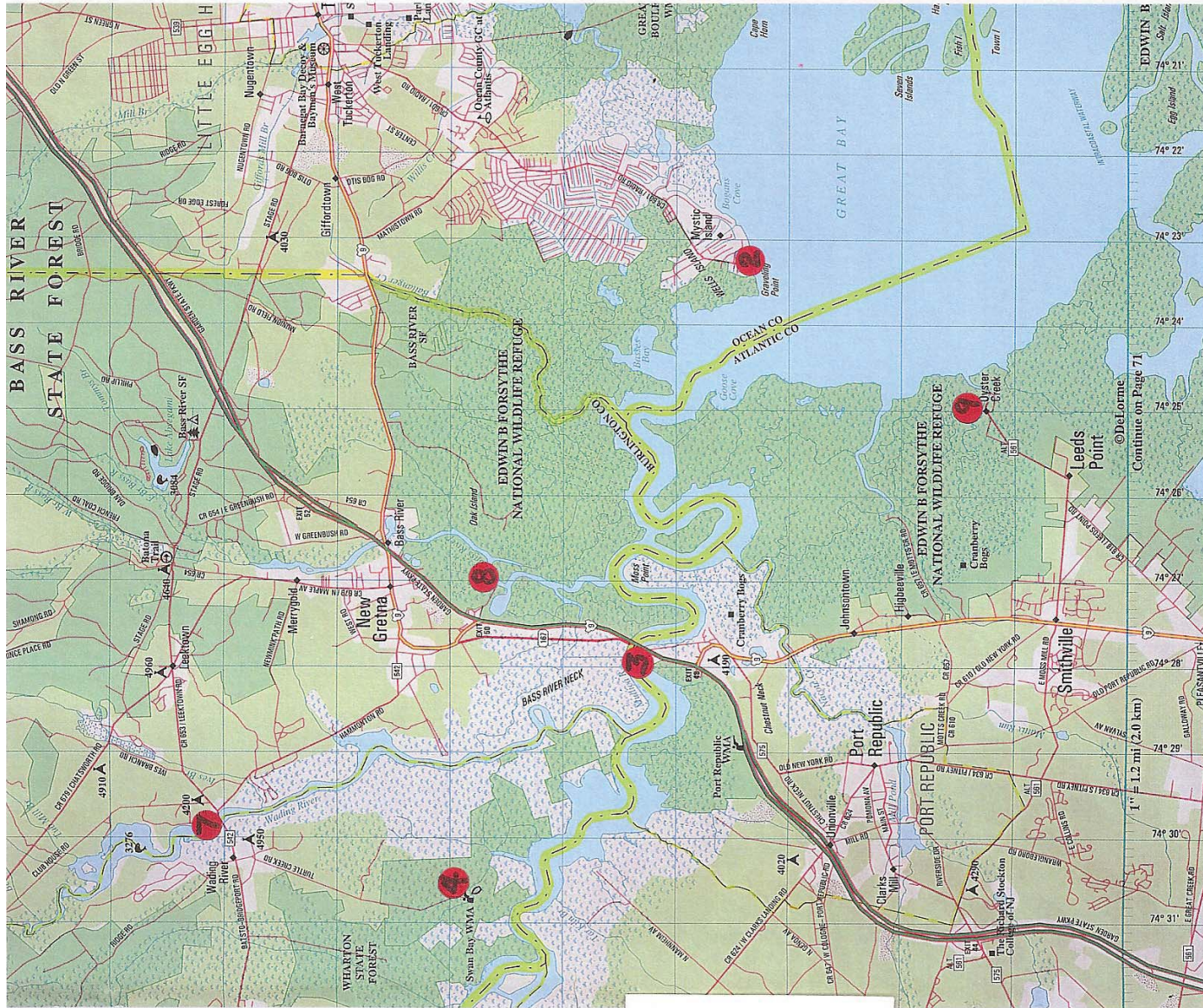
MAP OF THE STUDY AREA

GREAT EGG HARBOR RIVER WINTER RAPTOR and WATERBIRD SURVEY showing locations of Sample Sites 1-9 (source of base map: DeLorme quads)

KEY

- 1 = Longport (LP)
- 2 = Somers Point (SP)
- 3 = Jeffers Ldn (JF)
- 4 = English Creek Ldn (EC)
- 5 = Upper River (UP)
- 6 = Lake Lenape (LL)
- 7 = Gibson's Ldn (GB)
- 8 = Corbin City tower (CC)
- 9 = Tuckahoe impoundments (TK)





MAP 2

MULLICA RIVER

WINTER RAPTOR and WATERBIRD SURVEY
showing locations of Sample Sites 1-9
(source of base map: DeLorme quads)

KEY

- 1 = Great Bay Blvd WMA (Seven Bridges Road)
- 2 = Graveling Point (GP)
- 3 = Gdn St Pkwy Bridge (BR)
- 4 = Swan Bay WMA (SW)
- 5 = Lower Bank (LB)
- 6 = Green Bank (GB)
- 7 = Wading River Bridge (WD)
- 8 = Amassas Landing (AM)
- 9 = Leeds Point (LD)

TABLE 1.1
Great Egg Harbor River
Fall and Winter Raptor and Waterbird Survey
2008-2009

	FALL				WINTER								Winter
DATE	9/2	9/24	10/10	11/22	12/4	12/15	1/12	1/29	2/9	2/25	3/16	3/27	Avg. (N = 8)
LOONS to CORMORANTS													
Red-throated Loon				1	1	3	18	12	15	4	33	6	
Common Loon				11	11	8	8	18	14	9	58	17	
Pied-billed Grebe		1			1		1						
Horned Grebe				2		2	3	10	9	6	77	15	
Northern Gannet			2		2						2	3	
Brown Pelican			15										
Double-cr Cormorant	176	192	259	103	124	83	106	28	71	52	90	129	
Great Cormorant									1		1	1	
HERONS to VULTURES													
Great Blue Heron	20	10	29	17	35	15	38	17	17	19	15	11	
Great Egret	90	76	78	2	3	1						11	
Snowy Egret	91	107	38									1	
Little Blue Heron	16	5	3										
Tricolored Heron	2	1	1										
Green Heron	1												
Black-cr Nt-Heron	10	2	2						1				
Yellow-cr Nt-Heron	6												
Black Vulture	2	8	7	9	12	4	2	5	5	2	5	1	4.5
Turkey Vulture	73	76	97	83	71	89	53	82	111	101	70	116	87.0
WATERFOWL													
Snow Goose				124									
Canada Goose	19	90	93	337	88	186	110	205	573	282	213	43	213.0
Brant			185	1835	3505	2400	1310	2452	1417	1802	961	1511	1920.0
Mute Swan	47	57	62	78	65	65	62	62	72	69	77	44	
Tundra Swan				6		14	23	24	39	54	42		
Wood Duck						2							
Gadwall		2			2	2	13	3	10	39	71	33	
American Wigeon					6				59	158	178	41	
Am Black Duck	43	46	69	554	307	286	595	705	480	859	904	518	582.0
Mallard	66	23	26	82	48	25	48	33	99	93	130	31	63.0
Northern Shoveler					1						2		
Northern Pintail	14	32	18	19	54	22	181	266	629	761	635	161	339.0
Green-winged Teal	240	42	464	141	345	28	10	2	435	981	1763	1636	650.0
Redhead						5							
Ring-necked Duck								2			12		
Greater Scaup			3				2				4		

Peak Winter Counts shown in BOLD FACE

TABLE 1.2
Great Egg Harbor River
Fall and Winter Raptor and Waterbird Survey
2008-2009

	FALL				WINTER								Winter
DATE	9/2	9/24	10/10	11/22	12/4	12/15	1/12	1/29	2/9	2/25	3/16	3/27	Avg. (N = 8)
Lesser Scaup											28		
Scaup (sp.)					780		20	1	9	1300	3100	1083	
Eider (sp.)								1					
Surf Scoter						6	20	30	7	1	1		
Black Scoter			1			30	40	40					
Scoter (sp.)											2		
Long-tailed Duck				4	15	42	94	69	52	16	87	21	
Bufflehead				138	285	91	217	262	703	666	1280	284	474.0
Com. Goldeneye							2	15	9	12	49		
Hooded Merganser				34	40	32	86	30	192	68	72	6	
Com. Merganser					2	4	5	130	133	20	20	5	
Red-br Merganser				18	4	10	67	31	119	121	144	44	68.0
Ruddy Duck			3	1									
DIURNAL RAPTORS													
Osprey	46	11	25	2								17	
Bald Eagle	5	8	7	10	9	14	16	22	14	8	9	10	12.8
Northern Harrier	2	15	18	35	37	34	28	24	34	30	33	26	31.0
Sharp-sh Hawk		28	2	1	17	4	3	1	8	1		1	4.4
Cooper's Hawk	1	4	8	1	2	3	3		3	1	1	2	1.9
Northern Goshawk						1							0.1
Red-sh Hawk				1	1		1		1	1			0.5
Red-tailed Hawk	9	15	25	62	30	26	34	49	46	45	14	34	35.0
Rough-leg. Hawk				1	1	1	3	2	1	1	1		1.3
Golden Eagle								1	1				0.3
American Kestrel		6	1										
Merlin		4		1									
Peregrine Falcon		2	3	2	2	3	3	1	3	4	3	2	2.6
GROUSE to SHOREBIRDS													
Ring-nk Pheasant			1	1	1								
Wild Turkey		2											
Clapper Rail	5		1										
Virginia Rail									1				
Black-bellied Plover	48	24	75	17	55	52	24		19				
Semipalmated Plove	158	6											
Killdeer			1	1					1	2	7		
Am Oystercatcher	24	38	101	10	20	55	14		42	57	45	17	
Greater Yellowlegs	127	27	53	9	11	14	27		12	9	18	16	

Peak Winter Counts shown in BOLD FACE

TABLE 1.3
Great Egg Harbor River
Fall and Winter Raptor and Waterbird Survey
2008-2009

	FALL				WINTER								Winter
DATE	9/2	9/24	10/10	11/22	12/4	12/15	1/12	1/29	2/9	2/25	3/16	3/27	Avg.
													(N = 8)
Lesser Yellowlegs	120	1	4										
Willet	4 *												
Spotted Sandpiper	3		1										
Ruddy Turnstone	8		5		48	48	21	31					
Red Knot		10		2									
Sanderling	620	65	120	60	85	130	74	4	20	12			
Semipalmated Sdp	666	1											
Western Sandpiper	6				2	1							
Least Sandpiper	484												
Pectoral Sandpiper			1										
Purple Sandpiper						1	30	12	20		1		
Dunlin			227	167	2460	2233	1400	13	220	485	630	640	
Stilt Sandpiper	1												
Sh-billed Dowitcher	74												
Wilson's Snipe										1	1		
American Woodcock					1								
peep (sp.)	200												
TOTAL SHOREBIRDS	2543	172	588										
GULLS to ALCIDS													
Laughing Gull	√	√	√										
Bonaparte's Gull						2	3						
Ring-billed Gull	√	√	√	√	√	√	√	√	√	√	√	√	
Herring Gull	√	√	√	√	√	√	√	√	√	√	√	√	
Iceland Gull								1					
Gt Bl-backed Gull	√	√	√	√	√	√	√	√	√	√	√	√	
Caspian Tern	6	8	4										
Royal Tern	15	27	6										
Common Tern	342	72											
Forster's Tern	187	135	64	4									
Least Tern	10												
Black Tern		1											
Black Skimmer	940	981	700	45	2								
OWLS to KINGFISHERS													
Great Horned Owl					2								
E. Screech Owl					1								
Belted Kingfisher	2	2	4	1	4	7	4	2		1	3	1	

Peak Winter Counts shown in BOLD FACE

* Of 4 Willet on 9/2/08, 1 was an "Eastern Willet, 2 were "Western Willets, and 1 was undetermined.

TABLE 2.1
Mullica River
Fall and Winter Raptor and Waterbird Survey
2008-2009

					WINTER
DATE	12/13	1/8	2/5	3/3	AVG.
					(N = 4)
LOONS to CORMORANTS					
Red-throated Loon	7	8	2	6	
Common Loon	6	12			
Pied-billed Grebe		1	4		
Horned Grebe	3	15	4	16	
Double-cr Cormorant		2		1	
Great Cormorant		1			
HERONS to VULTURES					
Great Blue Heron	17	19	10	10	
Great Egret	4	6	2		
Tricolored Heron	1		1		
Black Vulture		2	3	4	2.3
Turkey Vulture	39	80	33	75	57.0
WATERFOWL					
Snow Goose		50		505	
Canada Goose	614	712	446	359	553.0
Brant	214	1278	465	1559	879.0
Mute Swan	5	2	4	2	
Tundra Swan			4		
Wood Duck				1	
American Wigeon				1	
Am Black Duck	412	453	282	218	341.0
Mallard	697	630	772	649	687.0
Northern Pintail		7		6	3.3
Green-winged Teal	4		2	28	8.5
Redhead			3		
Ring-necked Duck		14	3	11	
Greater Scaup		20	20		
Lesser Scaup			2	2	
Scaup (sp.)	720	1200	1900	900	
Surf Scoter		1			
Long-tailed Duck	46	33	28	15	
Bufflehead	241	317	538	258	339.0
Com. Goldeneye	8	8	4	5	
Hooded Merganser	439	309	98	94	
Com. Merganser		3	25	7	
Red-br Merganser	33	111	76	29	62.0
Ruddy Duck	16			2	

Peak Winter Counts
shown in BOLD FACE

TABLE 2.2
Mullica River
Fall and Winter Raptor and Waterbird Survey
2008-2009

					WINTER
DATE	12/13	1/8	2/5	3/3	AVG.
					(N = 4)
DIURNAL RAPTORS					
Osprey	1				
Bald Eagle	12	17	10	12	12.8
Northern Harrier	40	33	41	32	37.0
Sharp-sh Hawk	2	5			1.8
Cooper's Hawk	2	1	3	2	2.0
Red-sh Hawk				2	0.5
Red-tailed Hawk	35	34	43	46	40.0
Rough-leg. Hawk	5	3	3	6	4.3
Golden Eagle	1				0.3
American Kestrel				1	0.3
Merlin			1	1	0.5
Peregrine Falcon	1	4	2	4	2.8
GROUSE to CRANES					
American Coot	4				
SHOREBIRDS					
Black-bellied Plover	7	7			
Killdeer		1	1	14	
Am. Oystercatcher		2			
Greater Yellowlegs	3				
Sanderling	4	5	12		
Dunlin	350	60	427	4	
Wilson's Snipe				2	
American Woodcock			2		
GULLS to ALCIDS					
Bonaparte's Gull		1	1		
Ring-billed Gull	√	√	√	√	
Herring Gull	√	√	√	√	
Lesser Bl-bkd Gull				1	
Gt Bl-backed Gull	√	√	√	√	
PIGEONS to WOODPECKERS					
Great Horned Owl	1				
Belted Kingfisher	6	4	1	2	

Peak Winter Counts
shown in BOLD FACE

Rare, Threatened, and Endangered Species

Field Mapping

2008 – 2009

BE Bald Eagle

NH Northern Harrier

CP Cooper's Hawk (also: Coop.)

NG Northern Goshawk

RS Red-shouldered Hawk

GE Golden Eagle

PF Peregrine Falcon

SE Short-eared Owl

AB American Bittern

RH Red-headed Woodpecker

OS Osprey

a Adult

i Immature



—MAP OF THE STUDY AREA—

**GREAT EGG HARBOR RIVER
WINTER RAPTOR and WATERBIRD SURVEY**
showing locations of Sample Sites 1-9
(Source of base map: DeLorme quads)

KEY

LP = Longport

SP = Somers Point

JF = Jeffers Landing

EC = English Creek Ldn

UP = Upper River

LL = Lake Lenape

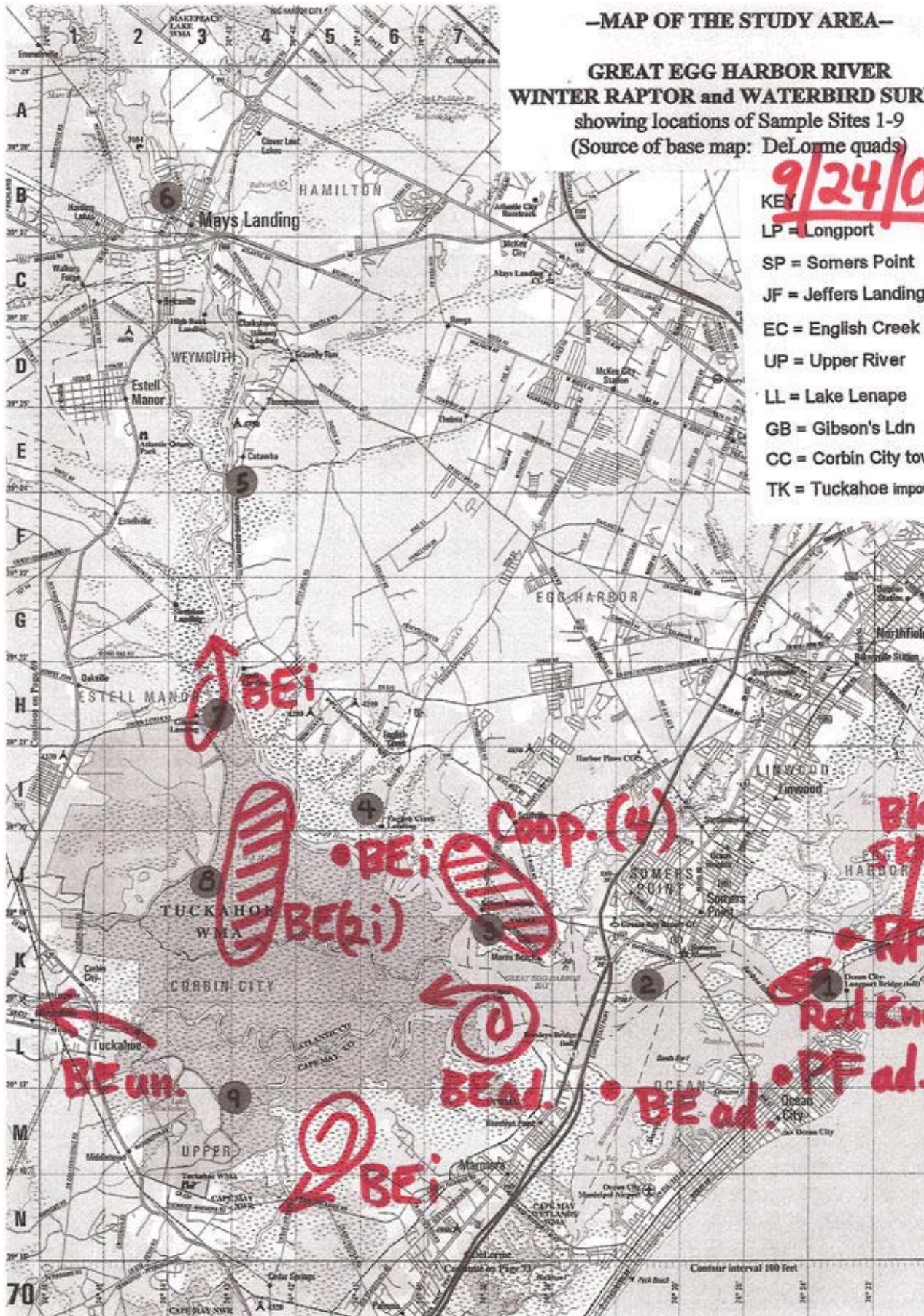
GB = Gibson's Ldn

CC = Corbin City tower

TK = Tuckahoe impoundments

**GREAT EGG HARBOR RIVER
WINTER RAPTOR and WATERBIRD SURVEY**
showing locations of Sample Sites 1-9
(Source of base map: DeLorme quads)

TK = Tuckahoe impoundments



—MAP OF THE STUDY AREA—

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WINTER RAPTOR and WATERBIRD SURVEY**
showing locations of Sample Sites 1-9
(Source of base map: DeLorme quads)

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10/10/08

BEi

BEi

BEi

BEi

BEi

BEi

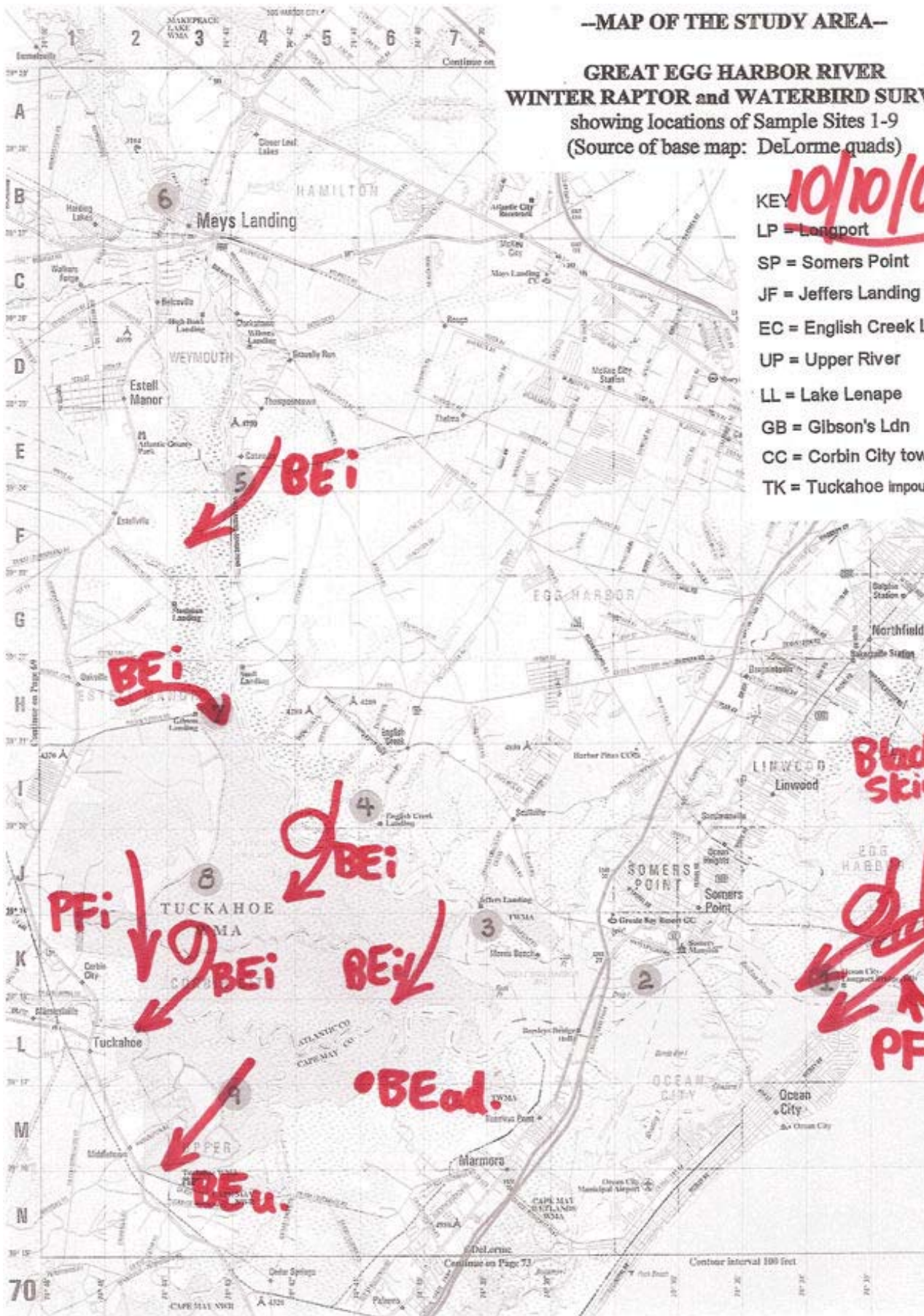
BEad.

BEu.

Black Skimmers

PF(2i)

PFi



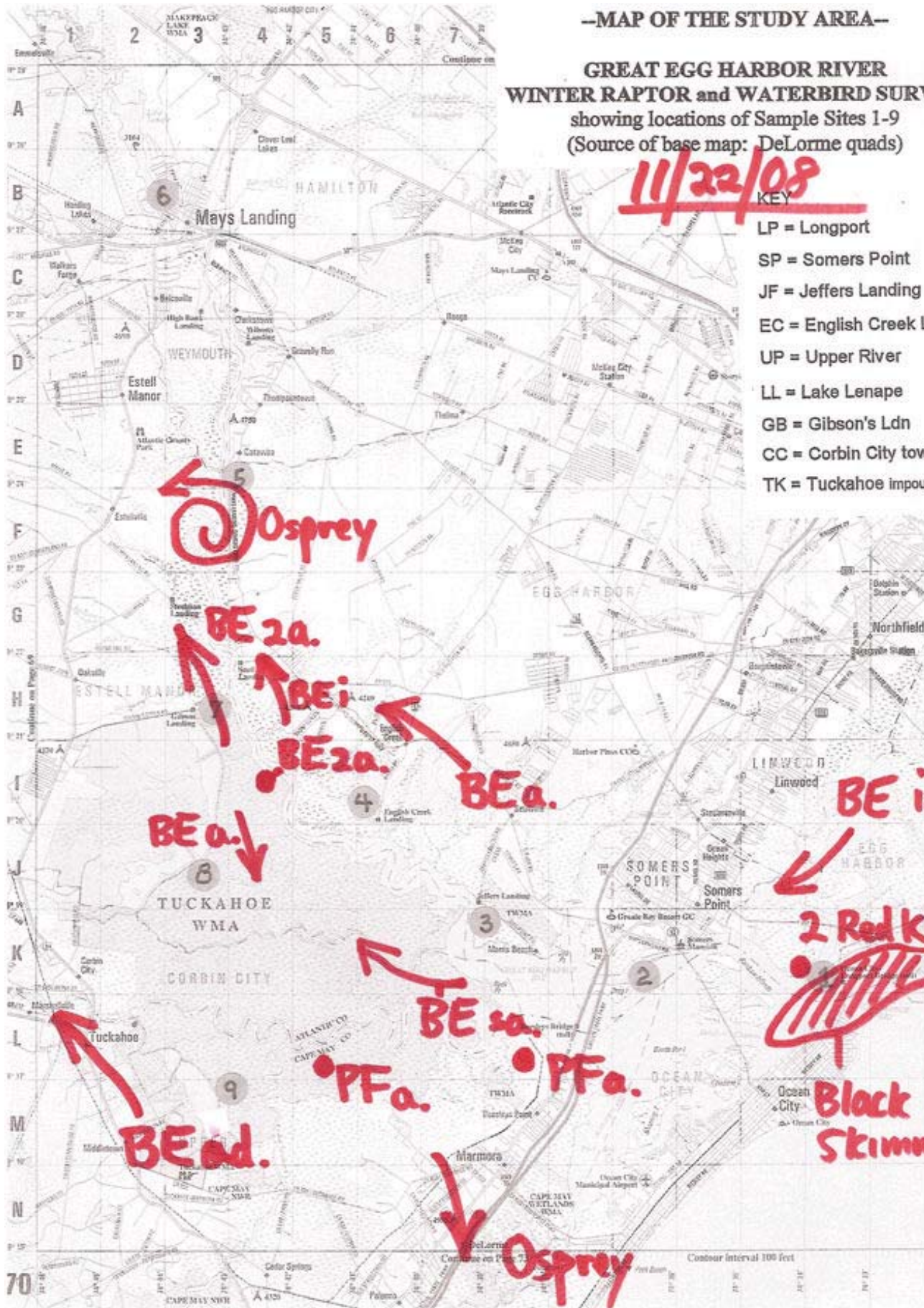
-MAP OF THE STUDY AREA-

**GREAT EGG HARBOR RIVER
WINTER RAPTOR and WATERBIRD SURVEY**
showing locations of Sample Sites 1-9
(Source of base map: DeLorme quads)

11/22/08

KEY

- LP = Longport
- SP = Somers Point
- JF = Jeffers Landing
- EC = English Creek Ldn
- UP = Upper River
- LL = Lake Lenape
- GB = Gibson's Ldn
- CC = Corbin City tower
- TK = Tuckahoe impoundments



map. Deformed quad)

12/04/08

KEY

P = Longport

TK = Tuckahoe impoundments

K Bl. Skinner (2)

—MAP OF THE STUDY AREA—

**GREAT EGG HARBOR RIVER
WINTER RAPTOR and WATERBIRD SURVEY**

showing locations of Sample Sites 1-9
(Source of base map: DeLorme quads)

KEY

LP = Longport

SP = Somers Point

JF = Jeffers Landing

EC = English Creek Ldn

UP = Upper River

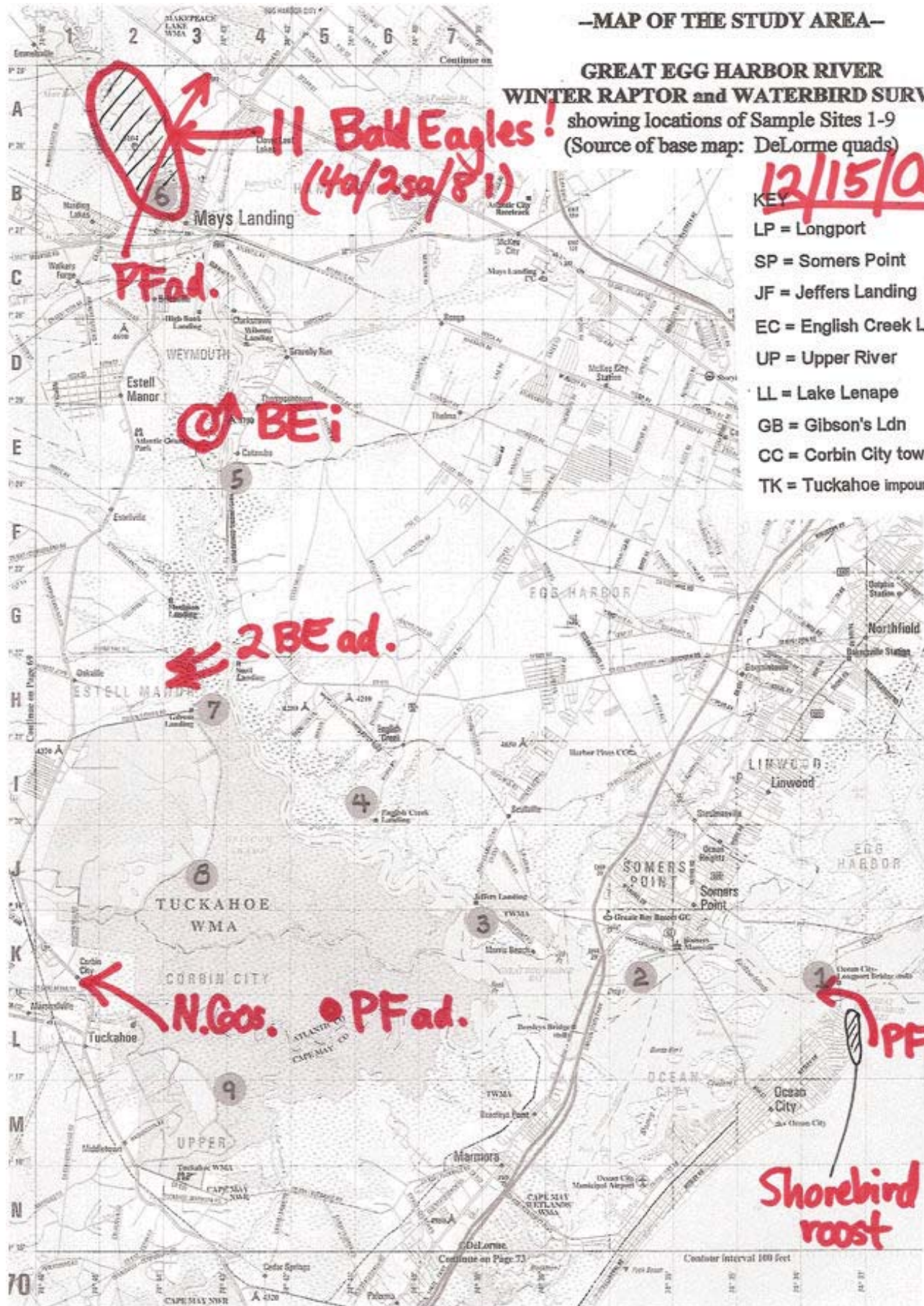
LL = Lake Lenape

GB = Gibson's Ldn

CC = Corbin City tower

TK = Tuckahoe impoundments

12/15/08



—MAP OF THE STUDY AREA—

**GREAT EGG HARBOR RIVER
WINTER RAPTOR and WATERBIRD SURVEY**
showing locations of Sample Sites 1-9
(Source of base map: DeLorme quads)

12/28/08

KEY

LP = Longport

SP = Somers Point

JF = Jeffers Landing

EC = English Creek Ldn

UP = Upper River

LL = Lake Lenape

GB = Gibson's Ldn

CC = Corbin City tower

TK = Tuckahoe impoundments

only

x BEa

BEa x

x BEa

PF(1)
(Box)

x PF(2)
(tower)

all PF simultaneous —

—MAP OF THE STUDY AREA—

**GREAT EGG HARBOR RIVER
WINTER RAPTOR and WATERBIRD SURVEY**
showing locations of Sample Sites 1-9
(Source of base map: DeLorme quads)

KEY

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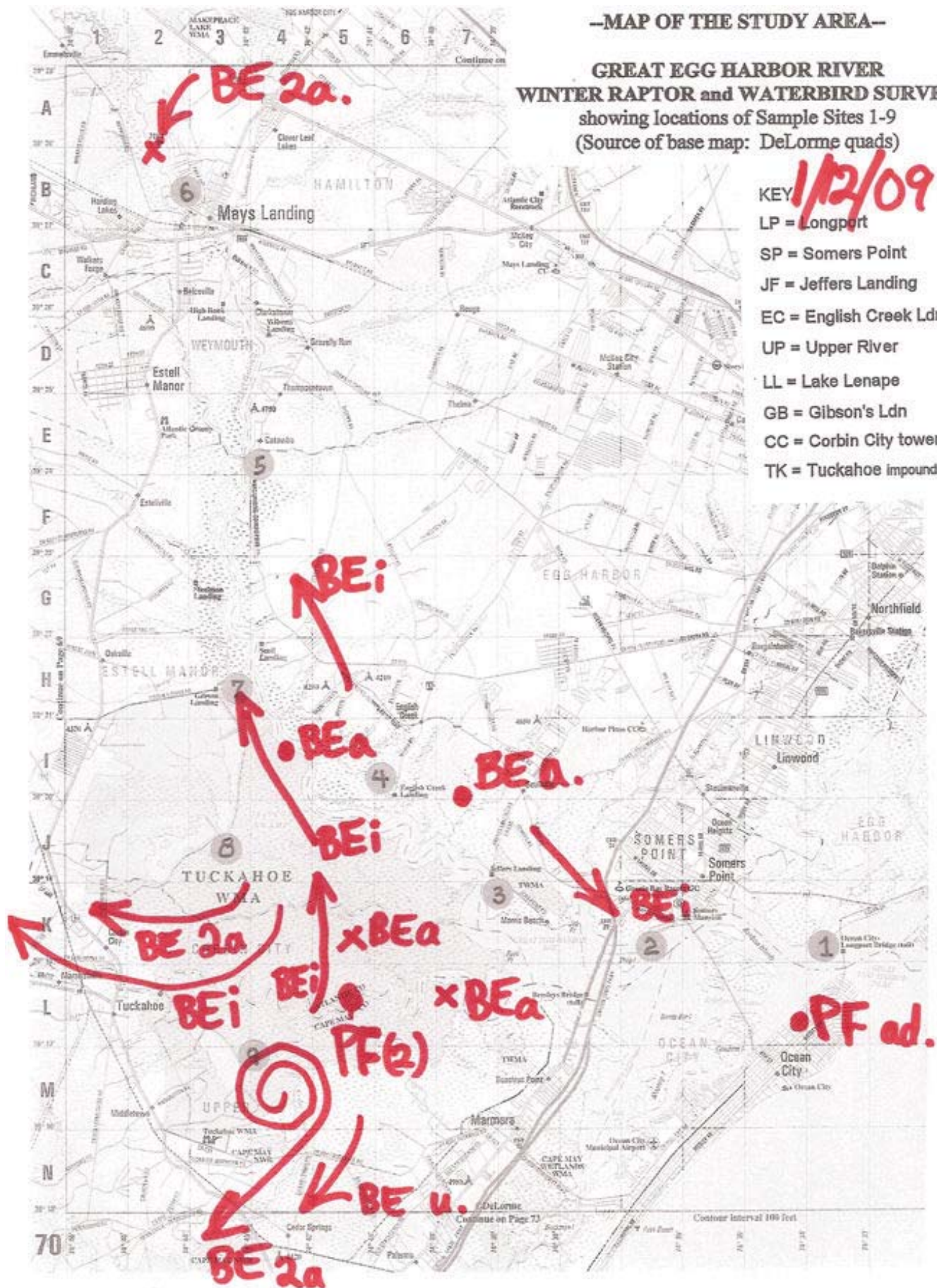
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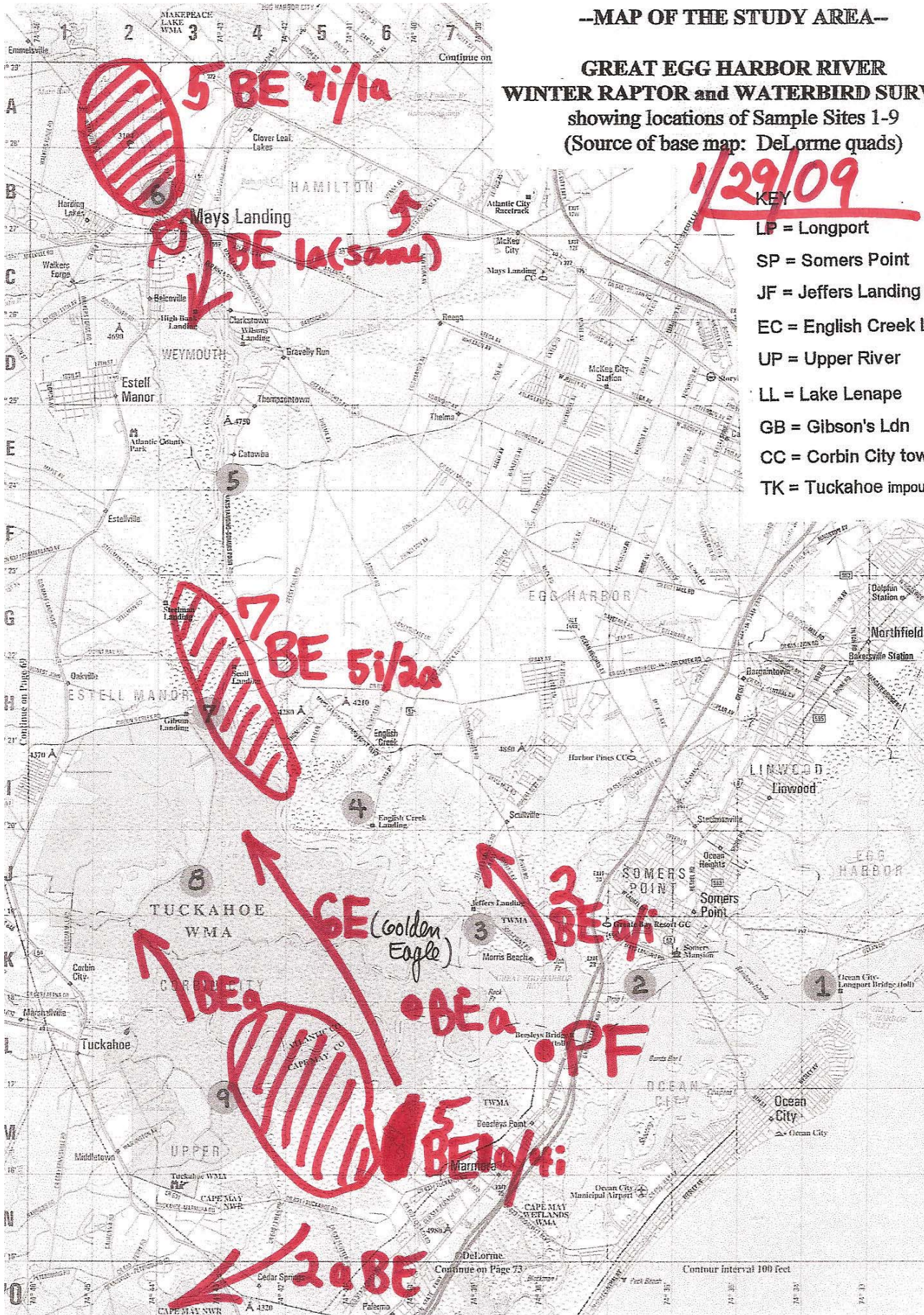


--MAP OF THE STUDY AREA--

**GREAT EGG HARBOR RIVER
WINTER RAPTOR and WATERBIRD SURVEY**
showing locations of Sample Sites 1-9
(Source of base map: DeLorme quads)

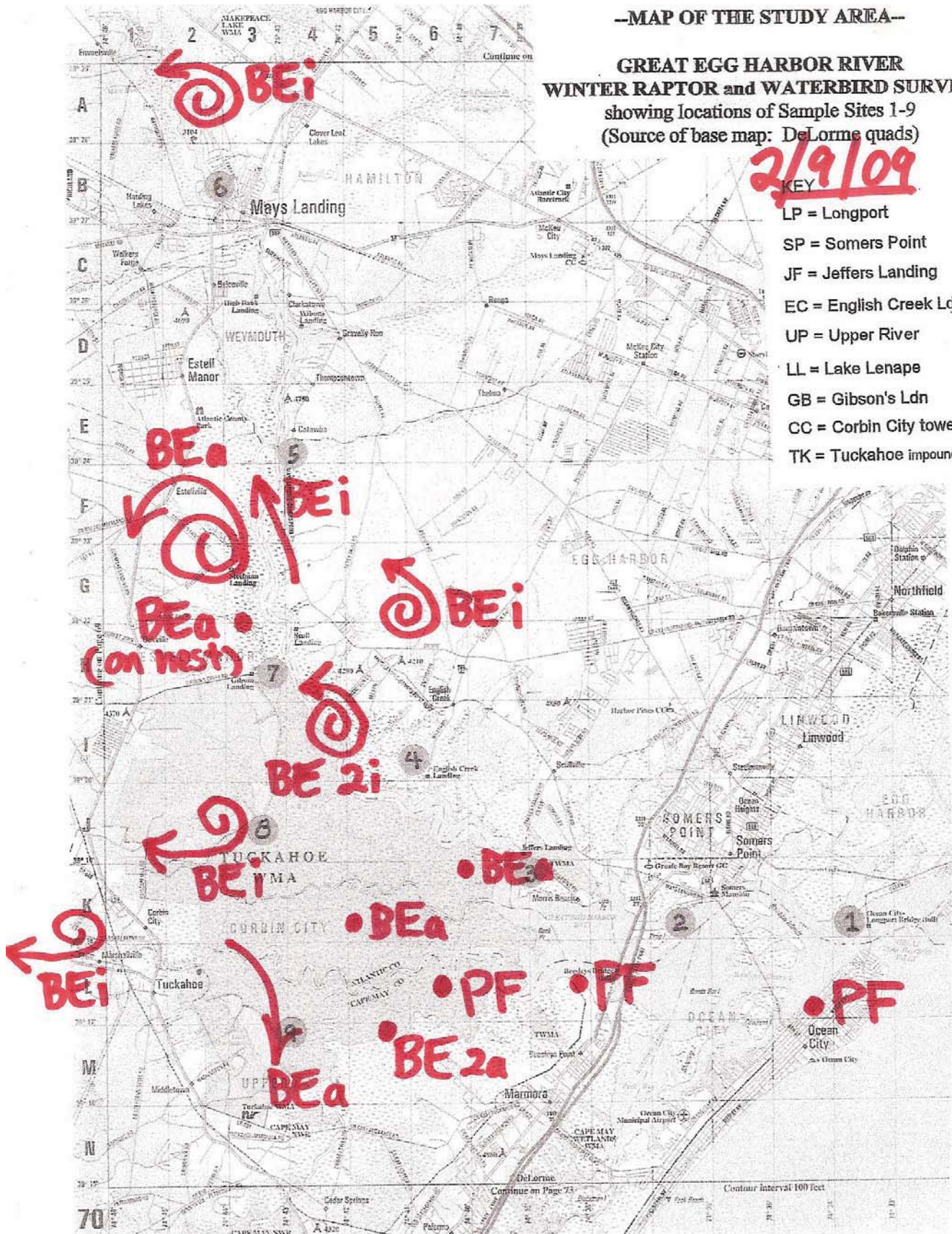
1/29/09
KEY

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2/9/09
KEY

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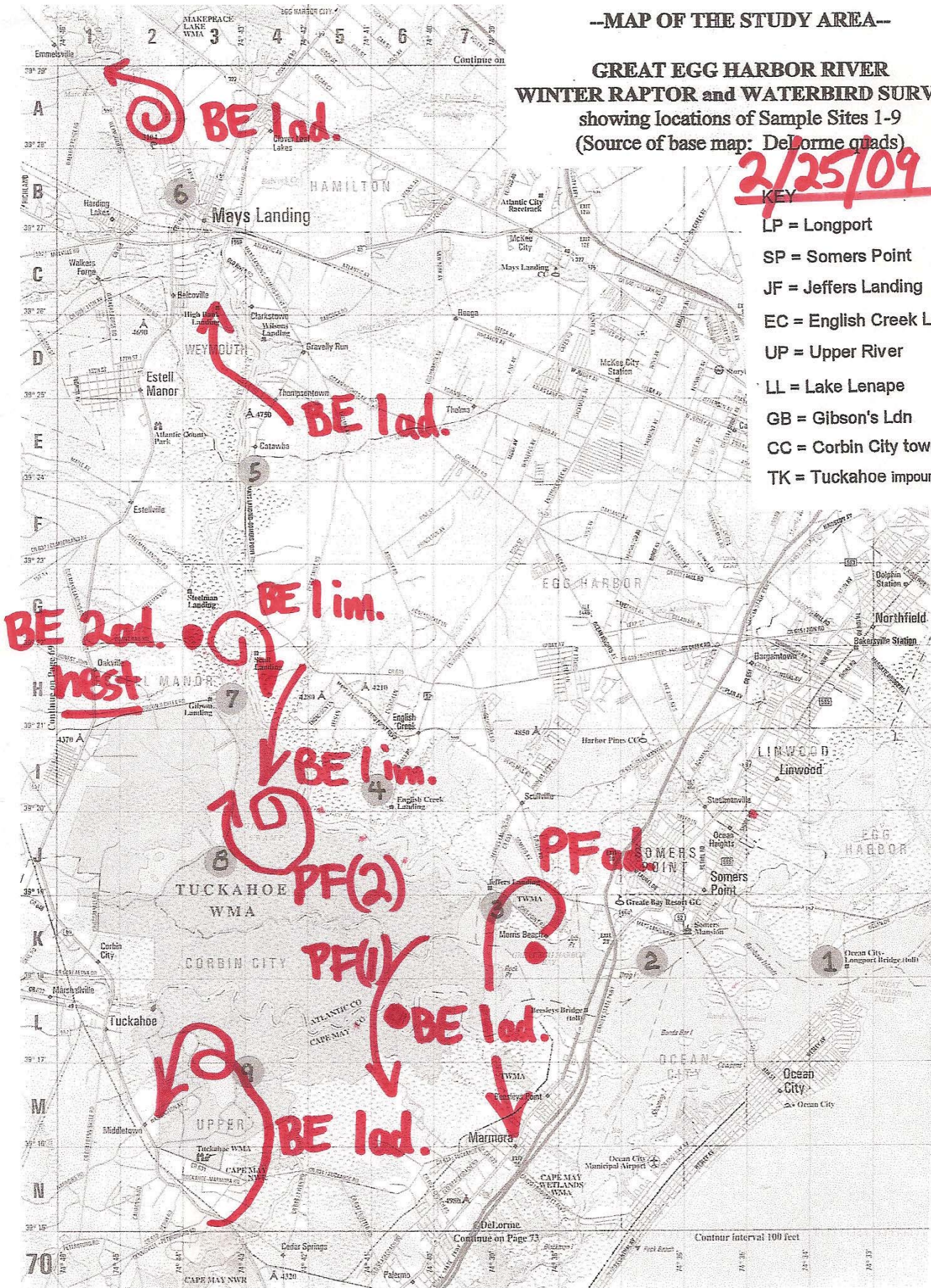


--MAP OF THE STUDY AREA--

**GREAT EGG HARBOR RIVER
WINTER RAPTOR and WATERBIRD SURVEY**
showing locations of Sample Sites 1-9
(Source of base map: DeLorme quads)

2/25/09
KEY

- LP = Longport
- SP = Somers Point
- JF = Jeffers Landing
- EC = English Creek Ldn
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- LL = Lake Lenape
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- TK = Tuckahoe impoundments

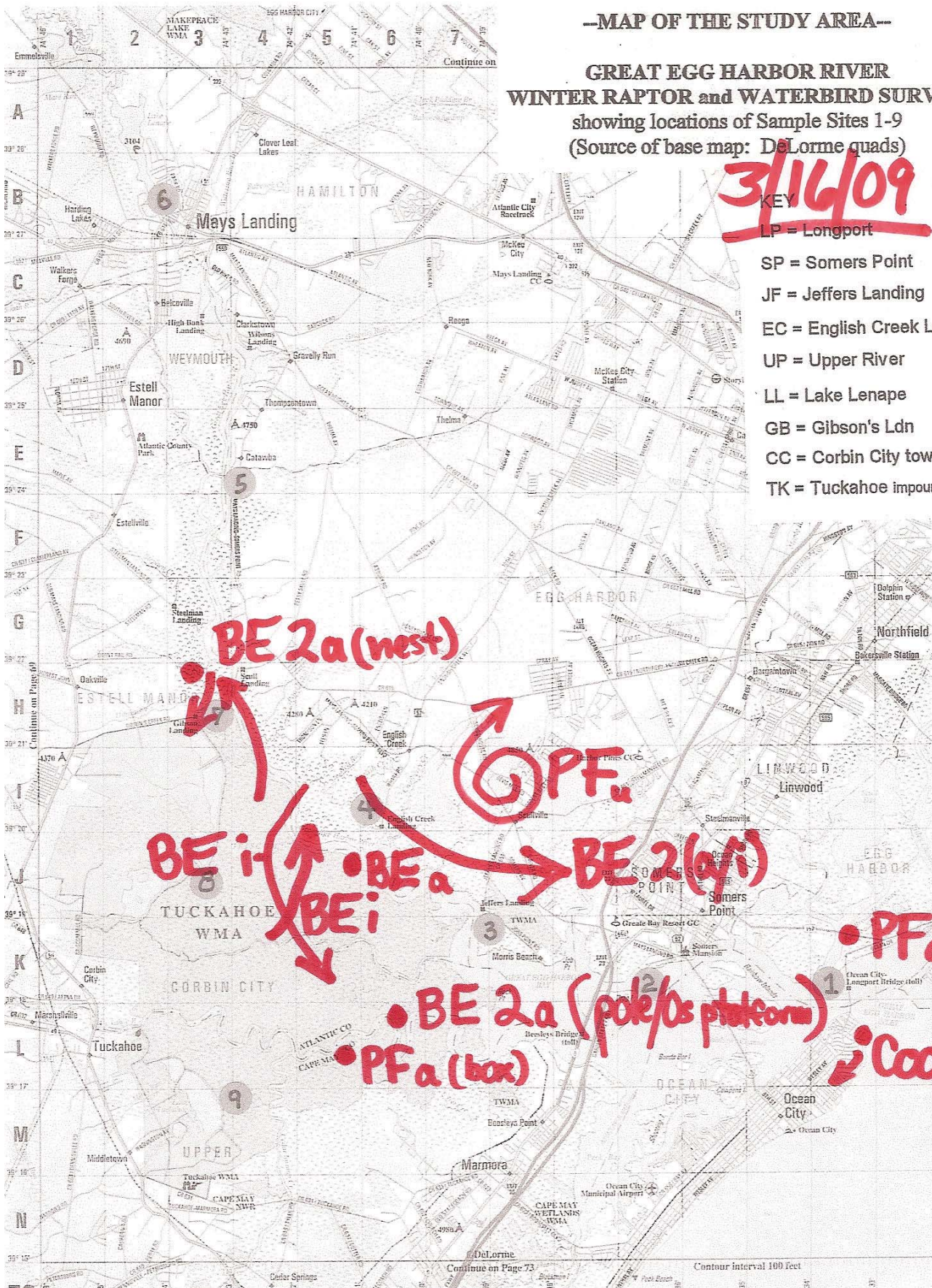


-MAP OF THE STUDY AREA-

**GREAT EGG HARBOR RIVER
WINTER RAPTOR and WATERBIRD SURVEY**
showing locations of Sample Sites 1-9
(Source of base map: DeLorme quads)

3/16/09
KEY
LP = Longport

- SP = Somers Point
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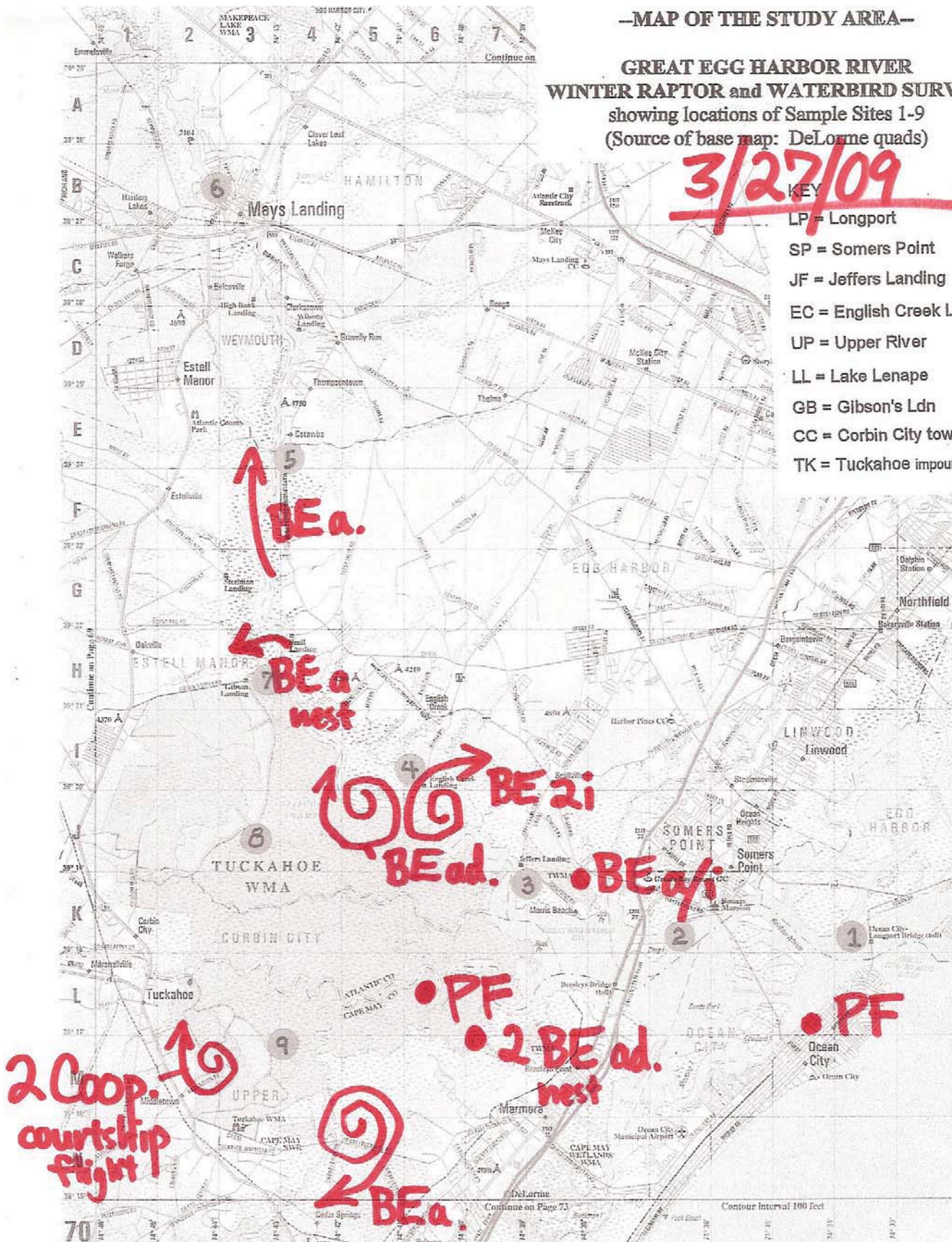
—MAP OF THE STUDY AREA—

**GREAT EGG HARBOR RIVER
WINTER RAPTOR and WATERBIRD SURVEY**
showing locations of Sample Sites 1-9
(Source of base map: DeLorme quads)

3/27/09

KEY

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WATERSHED ASSOCIATION
WITH THE U.S. DEPARTMENT OF THE
INTERIOR, NATIONAL PARK SERVICE:**

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