



**Restoration
Ecological
Services**

311 N. Aurora St.

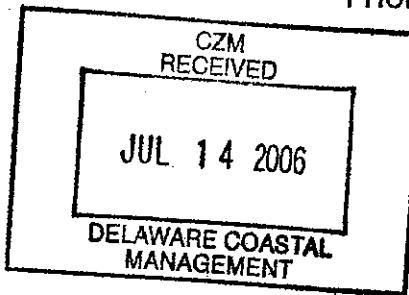
Easton, MD 21601

Phone/Fax 410-820-7465

July 5, 2006

RES#0014-0001

Ms Sarah Cooksey
DNREC-Coastal Management Program
89 Kings Highway
Dover, DE 19901



RE: Swains Wharf Marina (FC 05:083)
Response to March 23, 2006 letter and May 4, 2006 email

Dear Ms Cooksey:

I am responding to your March request for additional information regarding shorebird use of the projects site, an observation of oysters, and a question regarding water depths.

CMP Policies for Nongame and Endangered Species and Policies for Marinas

We conducted a visual survey of shorebirds using the project site and beach areas directly across Mispillion River and Cedar Creek on 6 different days between May 17 and May 27, 2006. Both weekday and weekend days were chosen along with varying tide heights to obtain a broader perspective of the activities of the red knot (*Calidrus canutus*) and apparent impacts by boats. Six beach segments were monitored at one half (½) hour intervals to determine species utilization and presence (Figure 1). All surveys were conducted from Swain's Wharf Marina site using a 20-60x spotting scope in order to minimize disturbance from survey personnel moving about. We recorded boat traffic and relative speed (no wake and obviously above no wake) and any apparent response by birds to boat passage, noise, or wake.

The survey data of bird usage is provided as Table 1. Most of the species moved freely between the stations with a preference to the sandy beaches on Mispillion River when compared to the shell fragmented beaches of the project site. A total of ten shorebird species were observed; ruddy turnstone (*Arenaria interpres*), long-billed dowitcher (*Limnodromus scolopaceus*), greater yellow legs (*Totanus melanoleucus*), willet (*Catoptrophorus semipalmatus*), semipalmated sandpiper (*Charadrius pusilla*), red knot (*Calidrus canutus*), dunlin (*Erolina alpina*), American oystercatcher (*Haematopus palliatus*), black-bellied plover (*Squatarola squatarola*), and black-necked stilt (*Himantopus mexicanus*). Ruddy turnstone was the most commonly observed species on the project site beaches and all other beaches. Long-billed dowitcher was the next most common species observed during the first half of the survey period, although semipalmated sandpiper replaced dowitcher as the second most common species during the second half of the survey period. Birds used the Mispillion River 1 and Cedar Creek 1 sites in far greater numbers than other sites.

Red knot used the Mispillion River 1 beach on the project site, although sparingly. The maximum

number recorded was 40 individuals and most use occurred around low tide. Little to no feeding was observed by the species at this location. The main use appeared to be as a loafing site. The On-site location on Cedar Creek only had one red knot recorded over all six days of surveys, despite fairly good use by other species when the beach was exposed.. Most red knot use occurred at Mispillion River 2, across the river from the project site, followed by Cedar Creek 1, which was partially on Cedar Creek and partially on Mispillion River.

Use of the north beach, Mispillion 1, on the site by horseshoe crabs was minimal. Due to the coarse nature of the beach, mostly oyster shells and rocks, few crabs even attempted to nest in this section and any nest divots were not discernable. The On-site beach was being used by horseshoe crabs, but divots were largely indiscernible. Whether this is a result of wave wash, nesting activity obscuring already laid nests, or the stony nature of the sediments was not apparent. Many crabs are currently trapped on this beach above the concrete and under the erosion control fabric.

A total of 257 boats were observed during the survey, with 72 boats (28%) appearing to cause a reaction by birds. Twenty-eight boats (11% of the total) were up to plane to some extent (above "no-wake" speed) as they passed the site. Nineteen (68%) of these 28 boats caused a reaction. The remaining 229 (89%) were traveling at, or close to "no-wake" speed, and caused 53 reactions (23% of total).

Speeding boats resulted in nearly three times as many reactions (68% vs. 23%) as boats at "no-wake" speed. Reactions were typically in response to the boat induced wake striking the shoreline than the presence of the boat itself. Shorebirds such as the semipalmated sandpiper were more susceptible to a reaction due to their size and waters edge shoreline utilization. Shorebirds such as ruddy turnstones and red knot were more tolerant to boat disturbance due to their general position higher up from the water's edge. When there was an influx of boats the shorebirds tended to move higher up the beach to avoid the disturbances.

The docks adjacent to the site on the west were being used by commercial fisherman which would dock and unload their catch or load up bait before going out. This was similar to activity expected to occur in the marina when operating. This activity occurred 200-250 feet from the Mispillion River 1 location on the project site. Despite the sometimes high level of noise, none of the shorebirds showed any discernable response to this disturbance.

The presence of the marina and docked boats along Cedar Creek and Mispillion River should result in more boats observing a "no-wake" speed until they are past the marina and in the Mispillion River channel.

Delaware boating regulations require "The speed of all vessels on the waters of this State shall be limited to a Slow-No-Wake speed when within 100 feet of:

- Any shoreline where "Slow-No-Wake" signs have been erected by the Department;

- . Floats;
- . Docks;
- . Launching ramps;
- . Marked swimming areas;
- . Swimmers; or
- . Anchored, moored, or drifting vessels."

Boats traveling within the navigation channel of Cedar Creek will be within or near 100 feet from boats moored in the marina. A greater presence of people in the marina ready to report violators, especially of any wake that damages their boat will serve as a deterrent to speeding.

CMP Policies Specific for Subaqueous Lands and Coastal Strip Management (#20)

The March 23, 2006 letter raised a question regarding the shallow water depths recorded by the USACOE during a March, 2005 bathymetry survey in the area of the proposed ramp and adjacent larger boat slips. We gathered additional soundings in this area on June 13, 2006 using the Corps benchmark and matched the Corps findings fairly closely for most similar points. We were able to determine the relation of the USACOE Philadelphia District Mean Lower Low Water (MLLW) benchmark to other datums using datum information on maps provided by the Corps. The Corps MLLW is -1.07 feet below MLLW as reported by the National Ocean Survey and used in the predicted tide tables. As an example, if the Corps survey shows a depth of 1 foot at MLLW the navigation charts for that same location would show a depth of 2 feet MLLW. We have redesigned the piers to insure boats will have sufficient water under them at low tide.

We reviewed the site for other suitable ramp locations and determined the proposed location is still the best in regards to traffic flow within the parking lot, minimizing disruptions to navigation by ramp users and overall marina design. The relatively shallow depths mean the ramp will not be usable during low water, but that is acceptable to the applicant.

CMP Policies Specific for Fish and Wildlife (#1) and Policies Specific to Marinas (#5)

Your letter reported finding viable oyster beds in the area of the proposed boat ramp. We reviewed this area from the shore at low tide during the bird surveys and again on June 13, 2006

Ms Sarah Cooksey
DNREC-Coastal Management Program
Swains Wharf Marina (FC 05.083)
July 5, 2006

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with a boat during low tide. The oysters we found consisted of small clumps attached to relatively small concrete blocks and similar debris or were loose on the river bottom. Many of the attached closed shells were easy to loosen from the clumps. Many shells were recently dead.. Given the water movement demonstrated in the area by the number of large oyster shells, stones, pieces of concrete and other heavy debris that are thrown onto the adjacent uplands and are gradually filling the tide marsh on the west side of the uplands, we feel most, if not all, of the observed oysters have originated at other locations, probably further out in deeper water. The west edge of the deposited shells has progressed almost a foot in places into the *Spartina alterniflora* marsh since I conducted the wetland delineation several year ago. The large number of recently dead shells indicates this location may be extremely stressful for oysters. The indicated level of water movement would make it difficult for oyster beds to establish or survive for any substantial length of time.

While negative impacts, such as you cite in your letter, have been documented for some marinas, those negative impacts are typically a result of poor flushing of the marina waters. This site, at the confluence of two tidal rivers and in close proximity to Delaware Bay, will have excellent flushing. As a result, dissolved oxygen levels will remain at the ambient levels of the adjacent waterways. Shellfish and other benthic organisms currently occupying the sediments adjacent to the marina are already experiencing periodic sediment resuspension and resettling to a degree beyond what boats at the marina will cause. The marina has been designed to minimize boat operations in shallow water. Lack of fueling facilities will minimize petroleum inputs to marina waters. Boaters following the marina O & E manual will have oil absorbent "sponges" in their bilge to minimize oil contaminated water from being pumped into marina waters.

If you have any questions, please call or email me at dhardin@restorationes.com.

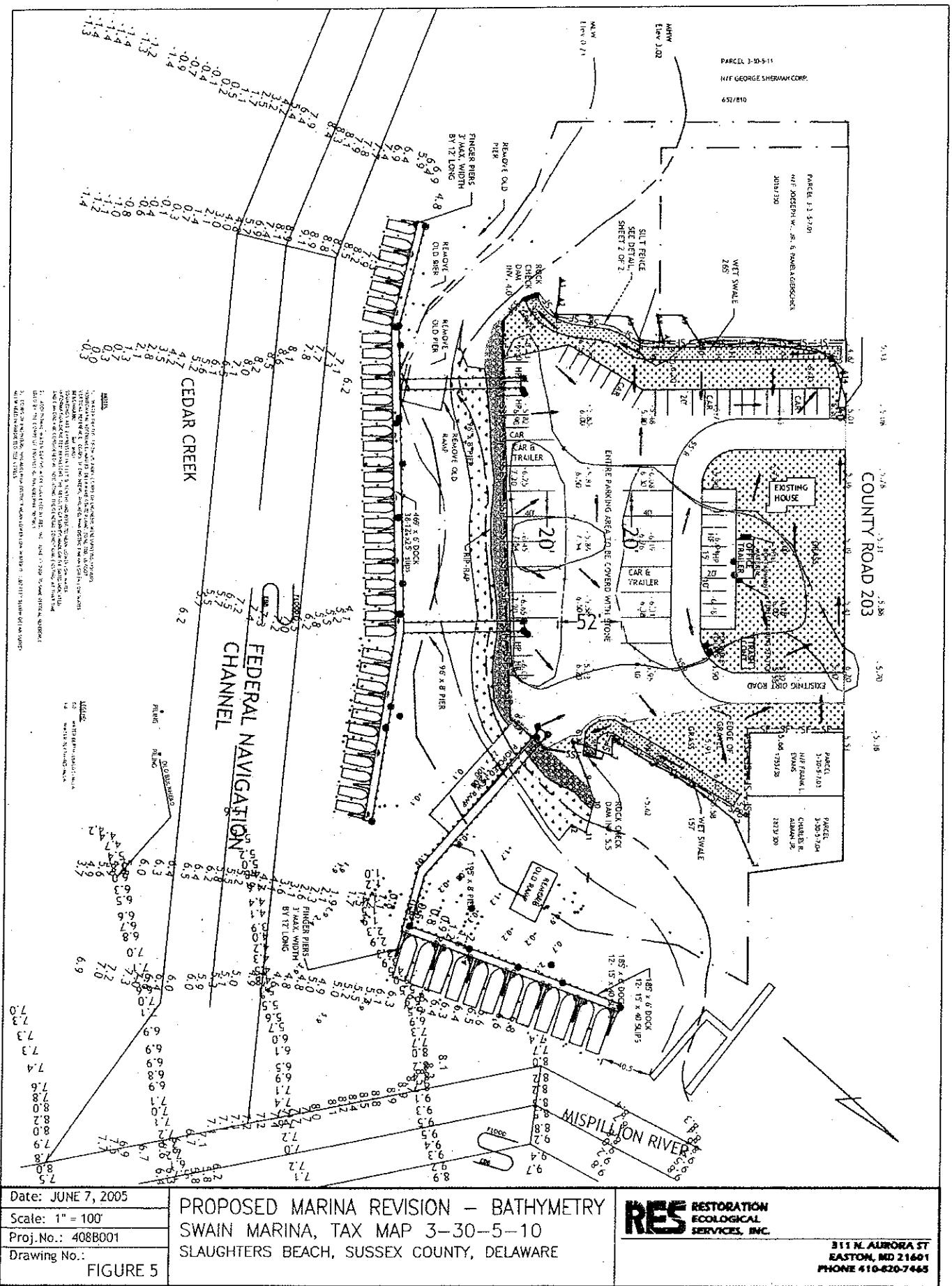
Sincerely,



David L. Hardin

projects\0014-0001 Swain Marina July 2006 response to CMP

cc: Jim Chaconas
Kevin Faust



Date: JUNE 7, 2005

Scale: 1" = 100'

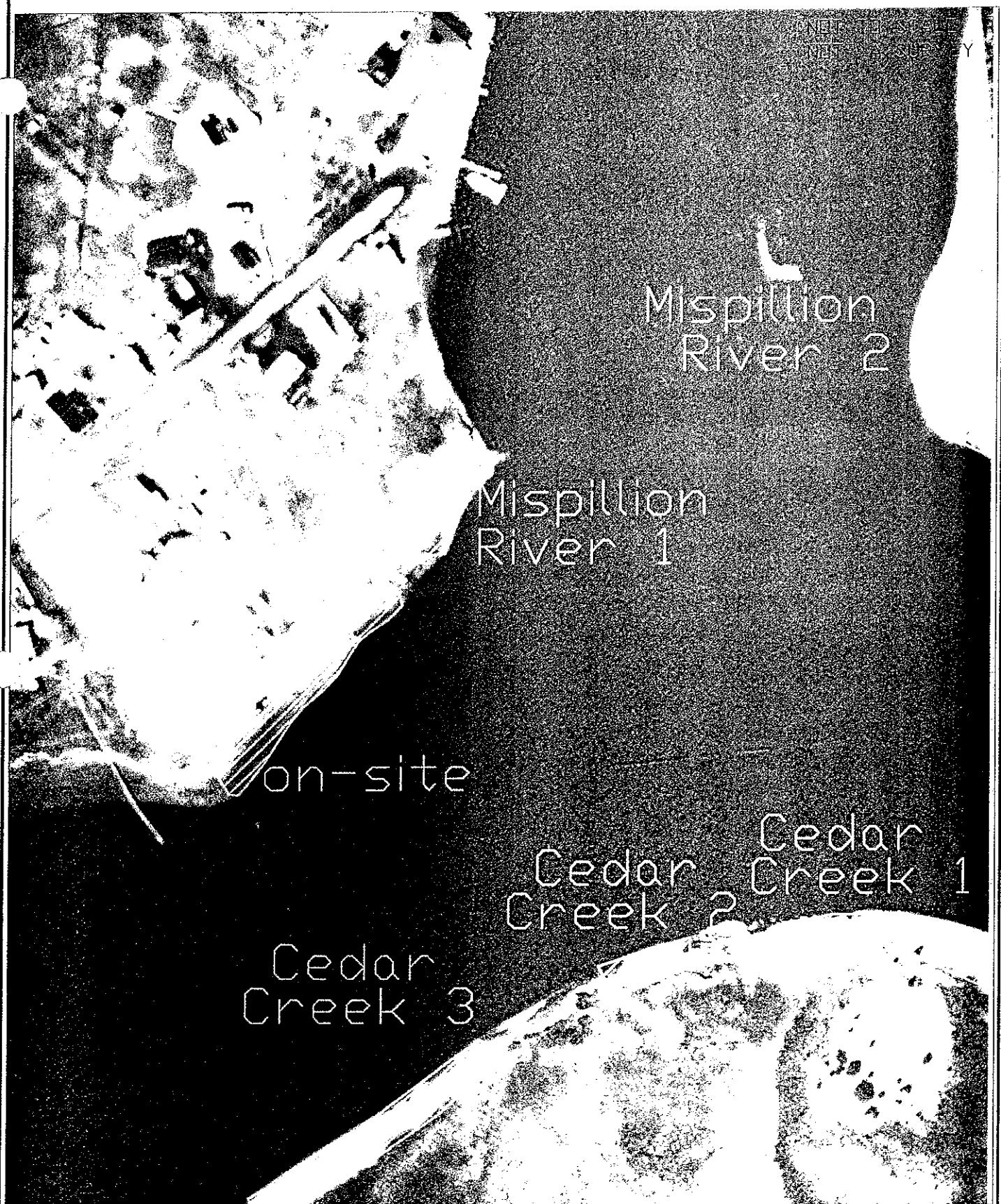
Proj.No.: 408B001

Drawing No.: FIGURE 5

PROPOSED MARINA REVISION - BATHYMETRY
SWAIN MARINA, TAX MAP 3-30-5-10
SLAUGHTERS BEACH, SUSSEX COUNTY, DELAWARE



**311 N. AURORA ST
EASTON, MD 21601
PHONE 410-820-7463**



LEGEND:

- OBSERVATION STATIONS

FIGURE	10F1	DATE	06-07-05
			000X-00X

SWAINS MARINA
OBSERVATION STATIONS
FIGURE 1

REPS
REPUBLICAN PLATE
MANUFACTURERS ASSOCIATION
111 E. AURORA ST.
WILMINGTON, NC 28401
PHONE: 910-642-7480

111 E. AURORA ST.
WILMINGTON, NC 28401
PHONE: 910-642-7480

TABLE 1. SHOREBIRD OBSERVATIONS IN THE VICINITY OF SWAINS WHARF MARINA

DATE: MAY 17, 2006

12:53PM HIGH TIDE

LOCATION: MISPILLION RIVER 1

SPECIES:

	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM	3:30PM	4:00PM	4:30PM	5:00PM	5:30PM	6:00PM
RUDDY TURNSTONE	70	60	20	20	12	105	50	80	100	90	160	150
LONG-BILLED DOWITCHER	50	30	40	60	3	32	30	10	25	20	20	0
GREATER YELLOW LEGS	1	0	0	0	0	0	0	0	0	0	0	0
WILLET	10	0	0	0	0	0	0	0	0	0	0	0
SEMIPALMATED SANDPIPER	0	0	0	0	0	0	0	2	0	0	3	0
RED KNOT	0	0	0	0	0	0	0	0	25	10	6	0

LOCATION: MISPILLION RIVER 2

SPECIES:

	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM	3:30PM	4:00PM	4:30PM	5:00PM	5:30PM	6:00PM
RUDDY TURNSTONE	0	0	0	0	40	0	0	0	0	30	60	15
LONG-BILLED DOWITCHER	0	0	0	0	0	0	0	0	0	10	20	0
RED KNOT	0	0	0	0	0	0	0	0	0	0	24	0

LOCATION: CEDAR CREEK 1

SPECIES:

	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM	3:30PM	4:00PM	4:30PM	5:00PM	5:30PM	6:00PM
RUDDY TURNSTONE	30	30	0	60	40	100	50	120	40	160	200	300
LONG-BILLED DOWITCHER	30	0	0	0	0	0	30	20	0	50	40	40
SEMIPALMATED SANDPIPER	0	0	0	0	0	0	0	0	0	20	0	0
RED KNOT	0	0	0	0	0	0	0	0	0	7	0	20

TABLE 1. SHOREBIRD OBSERVATIONS IN THE VICINITY OF SWAINS WHARF MARINA (continued)

DATE: MAY 17, 2006 (CONTINUED)

LOCATION: CEDAR CREEK 2

SPECIES:

	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM	3:30PM	4:00PM	4:30PM	5:00PM	5:30PM	6:00PM
RUDDY TURNSTONE	10	0	15	10	0	0	10	0	0	0	0	0
LONG-BILLED DOWITCHER	30	0	20	30	0	0	20	2	0	0	0	0
WILLET	0	0	0	2	0	2	0	0	0	0	0	0
SEMIPALMATED SANDPIPER	0	0	2	0	0	0	20	0	0	0	0	0

LOCATION: CEDAR CREEK 3

SPECIES:

	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM	3:30PM	4:00PM	4:30PM	5:00PM	5:30PM	6:00PM
RUDDY TURNSTONE	45	10	0	6	10	20	30	20	12	60	180	250
LONG-BILLED DOWITCHER	0	0	30	3	10	70	10	30	0	30	50	100
WILLET	0	0	0	2	5	0	10	0	0	0	0	6
SEMIPALMATED SANDPIPER	0	0	0	0	10	2	0	0	0	10	0	0

LOCATION: ON-SITE

SPECIES:

	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM	3:30PM	4:00PM	4:30PM	5:00PM	5:30PM	6:00PM
RUDDY TURNSTONE	5	0	0	0	0	7	12	6	18	5	16	60
LONG-BILLED DOWITCHER	3	0	0	0	0	3	9	0	2	0	0	0
WILLET	0	0	0	2	0	2	0	0	0	0	1	0
SEMIPALMATED SANDPIPER	0	0	0	0	1	1	1	0	0	0	2	1

TABLE 1. SHOREBIRD OBSERVATIONS IN THE VICINITY OF SWAINS WHARF MARINA

DATE: MAY 19, 2006

9:05AM LOW TIDE

2:49PM HIGH TIDE

LOCATION: MISSILLION RIVER 1

LOCATION: MISSISSIPPI RIVER

LOCATION: CEDAR CREEK

TABLE 1. SHOREBIRD OBSERVATIONS IN THE VICINITY OF SWAINS WHARF MARINA (continued)

DATE: MAY 19, 2006 (CONTINUED)

9:05AM LOW TIDE

2:49PM HIGH TIDE

LOCATION:CEDAR CREEK 2

SPECIES:

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	9:00AM	9:30AM	10:00AM	10:30AM	11:00AM	11:30AM	12:00PM	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM
10	15	30	5	0	30	8	15	20	10	75	17	40	
30	60	20	20	35	60	30	15	20	15	0	9	10	
0	2	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	13	20	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	2	0	0	

LOCATION: CEDAR CREEK 3

SPECIES:

	9:00AM	9:30AM	10:00AM	10:30AM	11:00AM	11:30AM	12:00PM	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM
42	10	15	75	60	20	10	40	0	0	0	0	0	20
13	10	30	75	110	20	70	60	0	0	0	0	0	70
9	0	2	0	0	0	0	15	0	0	0	0	0	5

LOCATION: ON-SITE

SPECIES:

	9:00AM	9:30AM	10:00AM	10:30AM	11:00AM	11:30AM	12:00PM	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM
47	11	11	12	40	3	2	17	17	16	48	1	0	0
17	3	6	3	30	1	0	0	3	7	2	2	0	0
0	0	0	0	0	0	0	0	0	0	0	1	0	0
0	0	0	0	0	2	0	2	0	0	0	0	0	0

TABLE 1. SHOREBIRD OBSERVATIONS IN THE VICINITY OF SWAINS WHARF MARINA

DATE: MAY 20, 2006

10:03AM LOW TIDE

3:53PM HIGH TIDE

LOCATION: MISPILLION RIVER 1

SPECIES:

LOCATION: MISPILLION RIVER 2

SPECIES:

10:00AM	10:30AM	11:00AM	11:30AM	12:00PM	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM
400	230	300	250	200	130	30	175	10	6	180
275	200	200	200	200	100	110	100	80	13	130
20	20	20	0	0	10	0	10	10	0	10

LOCATION: CEDAR CREEK

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10:00AM 10:30AM 11:00AM 11:30AM 12:00PM 12:30PM 1:00PM 1:30PM 2:00PM 2:30PM 3:00PM

TABLE 1. SHOREBIRD OBSERVATIONS IN THE VICINITY OF SWAINS WHARF MARINA (continued)

DATE: MAY 20, 2006 (CONTINUED)

10:03AM LOW TIDE

3:53PM HIGH TIDE

LOCATION: CEDAR CREEK 2

SPECIES:

	10:00AM	10:30AM	11:00AM	11:30AM	12:00PM	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM
RUDDY TURNSTONE	1	0	17	0	0	0	0	0	0	0	0
LONG-BILLED DOWITCHER	7	0	0	4	0	0	0	0	7	0	0

LOCATION: CEDAR CREEK 3

SPECIES:

	10:00AM	10:30AM	11:00AM	11:30AM	12:00PM	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM
RUDDY TURNSTONE	0	65	30	70	110	15	1	31	0	7	13
LONG-BILLED DOWITCHER	0	7	30	35	30	60	0	19	0	1	7
WILLET	0	0	0	0	0	1	0	0	0	0	0
SEMIPALMATED SANDPIPER	0	0	0	20	12	0	0	0	0	0	2

LOCATION: ON-SITE

SPECIES:

	10:00AM	10:30AM	11:00AM	11:30AM	12:00PM	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM
RUDDY TURNSTONE	13	3	0	70	2	2	7	13	0	0	11
LONG-BILLED DOWITCHER	0	2	0	35	1	0	0	6	3	0	0
WILLET	2	0	0	0	1	0	0	0	0	1	0
SEMIPALMATED SANDPIPER	0	1	0	20	2	0	0	2	0	0	1

TABLE 1. SHOREBIRD OBSERVATIONS IN THE VICINITY OF SWAINS WHARF MARINA

DATE: MAY 24, 2006

7:15AM HIGH TIDE

1:38PM LOW TIDE

LOCATION: MISPILLION RIVER 1

SPECIES:

	9:00AM	9:30AM	10:00AM	10:30AM	11:00AM	11:30AM	12:00PM	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM
RUDDY TURNSTONE	1	13	42	50	6	18	18	30	0	0	17	4	0
LONG-BILLED DOWITCHER	13	1	6	20	1	0	2	0	0	0	0	0	2
WILLET	0	0	0	0	0	3	0	0	0	1	1	1	2
SEMIPALMATED SANDPIPER	0	0	0	10	4	2	2	0	0	0	0	0	0
RED KNOT	6	0	2	10	0	0	0	5	0	0	0	0	0
DUNLIN	0	0	0	0	0	0	5	0	0	0	0	0	0
AMERICAN OYSTERCATCHER	0	0	0	0	0	0	0	2	2	0	0	0	0
BLACK-BELLIED PLOVER	0	0	0	0	0	10	0	0	0	5	0	0	0

LOCATION: MISPILLION RIVER 2

SPECIES:

	9:00AM	9:30AM	10:00AM	10:30AM	11:00AM	11:30AM	12:00PM	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM
RUDDY TURNSTONE	0	0	130	130	110	100	80	200	300	200	100	200	200
LONG-BILLED DOWITCHER	0	0	50	100	0	30	40	0	0	0	0	0	0
WILLET	0	2	0	20	30	0	0	0	0	0	0	0	30
SEMIPALMATED SANDPIPER	0	0	0	20	15	210	150	300	300	0	0	0	175
RED KNOT	0	0	50	40	80	110	45	100	150	70	140	200	140
DUNLIN	0	0	0	0	60	0	20	0	0	180	0	0	0
BLACK-BELLIED PLOVER	0	0	0	0	10	0	0	0	5	0	0	0	0

LOCATION: CEDAR CREEK 1

SPECIES:

	9:00AM	9:30AM	10:00AM	10:30AM	11:00AM	11:30AM	12:00PM	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM
RUDDY TURNSTONE	45	0*	0*	0*	0*	0*	0*	0*	0*	0*	40	45	40
LONG-BILLED DOWITCHER	50	0*	0*	0*	0*	0*	0*	0*	0*	0*	0	0	0
WILLET	0	0*	0*	0*	0*	0*	0*	0*	0*	0*	0	0	0
SANDPIPER	0	0*	0*	0*	0*	0*	0*	0*	0*	0*	0	0	0
RED KNOT	20	0*	0*	0*	0*	0*	0*	0*	0*	0*	75	90	40
BLACK-BELLIED PLOVER	0	0*	0*	0*	0*	0*	0*	0*	0*	0*	0	0	20

* NOTE: BIRD BANDING BEING CONDUCTED

TABLE 1. SHOREBIRD OBSERVATIONS IN THE VICINITY OF SWAINS WHARF MARINA (continued)

DATE: MAY 24, 2006 CONTINUED)

7:15AM HIGH TIDE

LOCATION: CEDAR CREEK 2

SPECIES:

	9:00AM	9:30AM	10:00AM	10:30AM	11:00AM	11:30AM	12:00PM	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM
RUDDY TURNSTONE	30	7	30	0	2	0	0	0	0	0	0	0	0
LONG-BILLED DOWITCHER	30	0	2	0	0	0	0	0	0	0	0	0	0
WILLET	0	0	0	0	0	0	4	0	0	0	0	0	0
RED KNOT	15	4	0	0	0	0	0	0	0	2	0	1	0
DUNLIN	0	0	0	0	4	0	0	0	0	0	0	0	0

LOCATION: CEDAR CREEK 3

SPECIES:

	9:00AM	9:30AM	10:00AM	10:30AM	11:00AM	11:30AM	12:00PM	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM
RUDDY TURNSTONE	40	120	30	40	20	70	7	2	3	22	0	11	8
LONG-BILLED DOWITCHER	15	60	30	10	0	25	0	1	0	0	0	0	0
WILLET	1	0	0	20	0	0	0	0	0	0	0	0	0
SEMIPALMATED SANDPIPER	12	5	30	5	40	30	0	1	30	10	15	0	0
RED KNOT	5	10	0	20	10	5	0	0	0	0	0	0	0
DUNLIN	0	0	0	0	35	0	0	0	0	5	0	0	0
BLACK-BELLIED PLOVER	0	0	2	0	0	0	0	0	0	0	0	0	0

LOCATION: ON-SITE

SPECIES:

	9:00AM	9:30AM	10:00AM	10:30AM	11:00AM	11:30AM	12:00PM	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM
RUDDY TURNSTONE	60	20	35	25	1	0	0	1	2	1	1	0	0
LONG-BILLED DOWITCHER	10	0	0	0	0	0	0	0	0	0	0	0	0
WILLET	0	10	15	1	1	1	1	0	0	0	0	0	0
SEMIPALMATED SANDPIPER	0	15	20	30	8	2	0	1	0	0	0	0	0

TABLE 1. SHOREBIRD OBSERVATIONS IN THE VICINITY OF SWANS WHARF MARINA

DATE: MAY 26, 2006

9:01AM HIGH TIDE

3:13PM LOW TIDE

LOCATION: MISPILLION RIVER 1

SPECIES

LOCATION: MISPILLION RIVER 2

SPECIES:

LOCATION: CEDAR CREEK 1

SPECIES:

TABLE 1. SHOREBIRD OBSERVATIONS IN THE VICINITY OF SWAINS WHARF MARINA (continued)

DATE: MAY 26, 2006 (CONTINUED)

9:01AM HIGH TIDE

3:13PM LOW TIDE

LOCATION: CEDAR CREEK 2

LOCATION: CEDAR CREEK 3

LOCATION: ON-SITE

SPECIES:

TABLE 1. SHOREBIRD OBSERVATIONS IN THE VICINITY OF SWAINS WHARF MARINA

DATE: MAY 27, 2006

9:51AM HIGH TIDE

4:00PM LOW TIDE

LOCATION: MISPILLION RIVER

* NOTE: PEOPLE ON BEACH

SPECIES

Ruddy Turnstone
Long-billed Dowitcher
Willet
Semipalmented Sandpiper
Red Knot
Black-bellied Plover

LOCATION: MISPILLION RIVER 2

SPECIES:

RUDDY TURNSTONE
LONG-BILLED DOWITCHER
WILLET
SEMIPALMATED SANDPIPER
RED KNOT

LOCATION: CEDAR CREEK 1

SPECIES:

	10:00AM	10:30AM	11:00AM	11:30AM	12:00PM	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM
30	15	30	10	0*	0	15	15	3	7	0	0
0	0	0	0	0*	0	0	0	0	0	0	0
2	5	0	0	0*	0*	2	0	0	0	0	0
0	0	10	3	0*	0	0	0	0	0	0	0
30	15	35	0	0*	0	0	0	0	0	0	0
0	0	0	0	0*	0	0	0	1	0	0	0

	10:00AM	10:30AM	11:00AM	11:30AM	12:00PM	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM
0	0	0	0	0	0	0	100	150	200	100	150
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	50	30	0	50	200	50
0	5	0	0	0	0	15	0	50	200	200	200
0	0	0	0	0	0	0	125	150	50	200	200

TABLE 1. SHOREBIRD OBSERVATIONS IN THE VICINITY OF SWAINS WHARF MARINA (continued)

DATE: MAY 27, 2006 (CONTINUED)

9:51AM HIGH TIDE 4:00PM LOW TIDE

LOCATION: CEDAR CREEK 2

SPECIES:

	10:00AM	10:30AM	11:00AM	11:30AM	12:00PM	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM
RUDDY TURNSTONE	6	20	10	20	10	120	10	20	15	0	5
LONG-BILLED DOWITCHER	10	0	0	5	10	0	2	0	5	1	0
WILLET	0	0	0	0	0	30	0	5	5	0	0
SEMIPALMATED SANDPIPER	20	20	10	20	0	40	20	0	0	0	5
RED KNOT	10	20	20	5	10	0	0	0	0	1	0

LOCATION: CEDAR CREEK 3

SPECIES:

	10:00AM	10:30AM	11:00AM	11:30AM	12:00PM	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM
RUDDY TURNSTONE	0	10	0	50	30	15	30	40	40	15	15
LONG-BILLED DOWITCHER	0	0	0	10	0	0	0	0	0	0	0
WILLET	0	0	0	70	0	0	0	3	0	15	0
SEMIPALMATED SANDPIPER	0	20	30	60	100	30	30	0	0	0	0
RED KNOT	0	5	0	30	10	0	0	10	0	0	0

LOCATION: ON-SITE

SPECIES:

	10:00AM	10:30AM	11:00AM	11:30AM	12:00PM	12:30PM	1:00PM	1:30PM	2:00PM	2:30PM	3:00PM
RUDDY TURNSTONE	0	7	0*	0*	1	0	0	0	0	0	0
WILLET	0	1	0*	0*	0	0	0	0	0	0	0
SEMIPALMATED SANDPIPER	0	0	0*	0*	10	15	35	15	10	0	0

*NOTE: 2 FISHERMAN ON BEACH