

## **The 2008 Delaware Bay Horseshoe Crab Spawning Survey**

Benjie Lynn Swan  
William Hall  
Carl N. Shuster, Jr.

### **Abstract**

In May and June, the shores of Delaware Bay play host to hundreds of spawning horseshoe crabs. During this same period, on 12 nights timed to coincide with the new and full moon phases, the yearly Delaware Bay horseshoe crab survey is conducted. All systematic counts are taken in or near darkness at high tides along 25 beaches – 12 in New Jersey and 13 in Delaware.

The scheduled 300 dates for surveying resulted in 254, or 85 percent, of the dates completed. Cancellations were due to: flooding (8), weather (20), volunteer unavailability (6), or miscellaneous reasons (12).

In New Jersey and Delaware, the counts produced the single day peak estimate of 346,319 on June 3, 2008, the new moon date. It proved lower than the last three years' estimates. Delaware's 2008 peak estimate was considerably lower than 2007 and comparable to the 2006 and 2005 estimates. On the New Jersey shores, the peak estimate of 69,669 was considerably lower than the previous year's estimates of 112,497 in 2007, 222,653 in 2006, 222,168 in 2005, and 105,973 in 2004.

The 2008 male to female sex ratio was equal to last year's ratio of 4.90. Previous years' ratios ranged from 3.67 in 2000 to 3.38 in 2001, 3.48 in 2002, 3.61 in 2003, 3.85 in 2004, 3.89 in 2005, and 4.53 in 2006.

The aggregate total of seasonal activity for New Jersey and Delaware was 1,578,618 horseshoe crabs (267,562 females and 1,311,054 males), lower than the 2007 and 2006 estimates of 1,947,372 and 1,885,355 individuals respectively. The high sex ratio of male to female crabs resulted in 267,562 females estimated to be spawning.

### **Introduction**

Since its inception in 1999, our survey has made tremendous strides and is now considered the premier method of estimating the spawning population of horseshoe crabs. To continue with this undertaking each year we rely on many eager and energetic groups and volunteers who generously give of their time to count, enter and analyze the data reaped from the results of the survey.

### **Methods**

Horseshoe crabs were enumerated in the months of May and June 2008 along the shores of the Delaware Bay. The beaches represented in this year's count totaled 25

(13 along the state of Delaware's coast and 12 along the Delaware Bay coast of New Jersey). The Delaware beaches north to south were Woodland, Pickering, Kitts Hummock, Ted Harvey Wildlife Management Area (WMA), North Bowers, South Bowers, Bennetts Pier, Big Stone, Slaughter, Fowler, Primehook, Broadkill, and Cape Henlopen. New Jersey beaches included Sea Breeze, Fortescue, Gandys, Reeds, Pierces Point, Highs, South Cape Shore Lab, Norburys Landing, Villas, North Cape May, Higbees, and Sunset Beach.

Counts were taken simultaneously along the beaches on both sides following the peak high tide up the bay following the new and full moons. The dates of counting were: May 3, 5, 7, 17, 19, 21 and June 1, 3, 5, 16, 18, and 20. High tide times ranged from 6:39 p.m. to 10:58 p.m. allowing adjustments for tidal flow entering the bay.

## **Results**

Coverage by the volunteers accounted for 85 percent, or 254, of the entire 300 scheduled counts. In New Jersey, 28 dates were not staffed. Six of these dates were due to volunteer no-shows, eight were weather related, four due to flooding, and 10 for miscellaneous circumstances. The cancellations due to volunteer no-shows occurred at North Cape May and Villas in the beginning of the season (5) and Gandys on May 17. On June 16, five beaches were not sampled due to adverse weather. Access problems were encountered at Gandys beach on May 3 and 7, and June 3, and at Sea Breeze on May 3 (Table 1A).

Eighteen cancellations occurred in Delaware during the 2008 spawning season. Of these, 12 were canceled due to weather, four for no access, and two for other reasons. Nine of the 12 Delaware cancellations due to weather occurred on June 16 (5) and June 18 (4). Access problems arose at Fowler beach on May 19 and 21, Kitts Hummock on May 17 and Woodland on June 3 (Table 1B).

This year's (2008) survey produced a decrease in the estimated number of spawners along Delaware and New Jersey's shores as compared to 2007. The peak of activity was June 3, the new moon date with 346,319 individuals estimated. Delaware spawners were calculated to be 276,650 on this date and New Jersey spawners 69,669. The June 3 estimate was the peak count of the 12 nights along the Delaware shores. However, New Jersey's highest estimate was achieved on June 1 with an estimate of 72,155 spawners.

Good spawning numbers were observed on only five dates during the 12 seasonal counts. Both in New Jersey and Delaware, counts taken on May 5 and 7, and June 1, 3 and 5 comprised most of the spawning – 86 percent of the total seasonal estimate.

In New Jersey, sixty-seven percent of the seasonal spawning occurred during the new moon dates in early June (June 1, 3 and 5). Considerable spawning occurred in the beginning of the season, May 5 (26,917) and 7 (41,980). (Table 1. Figure 1)

Spawning activity for the overall season was the greatest at South Cape Shore Lab with 62,733 individuals, however this estimate was approximately 100,000 less than last year's estimate of 162,316 horseshoe crabs. A close second in greatest seasonal numbers was observed at Norburys Landing (61,601). Reeds Beach and Fortescue had slightly greater numbers than last year with 36,047 spawners and 37,102 respectively. Densities along the New Jersey shoreline never reached 10 animals per square meter. The highest densities were 9.39 crabs per meter at South Cape Shore Lab and 9.26 crabs per meter at Highs on the date of June 3 and 9.39 crabs per meter at Reeds beach on June 5 (Table 1A).

In Delaware, 53 percent of the estimated number of spawners were observed during the counts on June 1, 3 and 5. The highest seasonal activity occurred on Big Stone beach and was estimated to be 235,400 spawners, however this estimate is almost 100,000 less than 201,270 at Slaughter and 180,660 at Pickering. The greatest single night density of horseshoe crabs occurred at Pickering Beach with 30.28 crabs per meter on June 3. Overall, Pickering had the highest count densities throughout the season. Densities at Pickering were 21.94 crabs per meter on May 5, 24.02 crabs per meter on May 7, 23.98 on June 1, and 23.32 crabs per meter on June 5 (Table 1B).

The 2008 male to female ration was 4.90 – equal to the 2007 ratio. Previous year's estimates were lower with ratios of 3.72, 3.67, 3.38, 3.48, 3.61, 3.85, 2.89 and 4.53 during the years 1999 to 2006 respectively. (Sex ratios are computed by averaging the total number of males and females counted throughout the entire season.) The ratio of males to females continues to be high and should be an area of concern to managers.

The seasonal estimate of 1,578,618 is a decrease over the previous two years' estimates (Table 4 and Figure 4). New Jersey's estimate was the lowest seasonal estimate since 1999, when the sampling methodology was standardized. Utilizing the sex ratios, the decrease translated to a moderate male level – less than 2006 and 2007, but greater than the years 2000 to 2005. The number of females estimated was less than the years 2006 and 2007 and roughly comparable to the years 2000 to 2005 (Table 5 and Figure 5).

We observe and utilize four levels of spawning activity to categorize the densities for each count. No spawning activity equals 0 crabs, low activity equals less than 5 crabs per meter, moderate activity equals 5 to 10 crabs per meter, and high activity equals greater than 10 crabs per meter. The data is then analyzed in percentages since dates and/or beaches may change yearly. As in previous years, the majority of the dates surveyed (42 percent in DE and 51 percent in NJ) showed horseshoe crabs densities lower than five crabs per meter. High and moderate densities of horseshoe crabs were observed in Delaware at the same percentage of 17 percent, similar to last year. However, more than 10 horseshoe crabs per meter were not observed in New Jersey during the entire spawning season. The percentage of

moderate densities in New Jersey was 8 percent, comparable to previous years with the exception of last year's percentage of 1 percent (Table 3 and Figure 3).

Fifty dates (17 percent) with zero crabs observed were in New Jersey (31) and in Delaware (19). Twenty-seven of these zero counts occurred during the full moon dates of May 17, 19 and 21 – 20 in New Jersey and 7 in Delaware. All ten surveyed dates at Woodland Beach, the most northern beach in Delaware recorded no crabs.

## **Discussion**

This year the trends in spawning numbers deviated from the previous two years' data. Spawning estimates were drastically reduced along the New Jersey shores and slightly decreased in Delaware. The Northeast storm, during the second round of counts, May 17, 19 and 21, adversely affected the spawning of the horseshoe crabs. Very few horseshoe crabs were noted during those days.

The 2008 peak estimate for Delaware of 276,650 spawners is comparable to previous years with the exception of last year's estimate of 351,090. Due to its expansive length, Big Stone Beach is the main spawning beach in Delaware. This year's estimate was approximately 100,000 horseshoe crabs less than last year's seasonal estimate for the beach.

New Jersey's peak estimate June 3 was greatly reduced with only 69,669 animals. This number is less than half of last year's estimate of 112,497 individuals and almost 75 percent less than 2006 (222,653) and 2005 (222,168). One-meter quadrants containing greater than 10 spawners was not achieved in New Jersey in the 2008 census. New Jersey's prime beach, South Cape Shore Lab, experienced an estimated 100,000 fewer horseshoe crabs during the 2008 spawning season than the previous year.

This year's spawning estimate of 1,578,168 was lower than the previous two years' estimates. The sex ration of male to female crabs continues the rising trend with this year's male to female ration equal to last year's ratio, the highest since census inception. The ratio of 4.9 coupled with the 2008 seasonal estimate translates into 267,562 females spawning this counting season.

## **Acknowledgements**

Our sincere thanks goes out to all the volunteers who took part in the 2008 survey. The States of New Jersey and Delaware deserve our thanks as well for their support. A special thank you also to Dave Smith for his contributions to the spawning survey.

Figure 1. NJ and DE Spawning Estimates During 2008 Survey

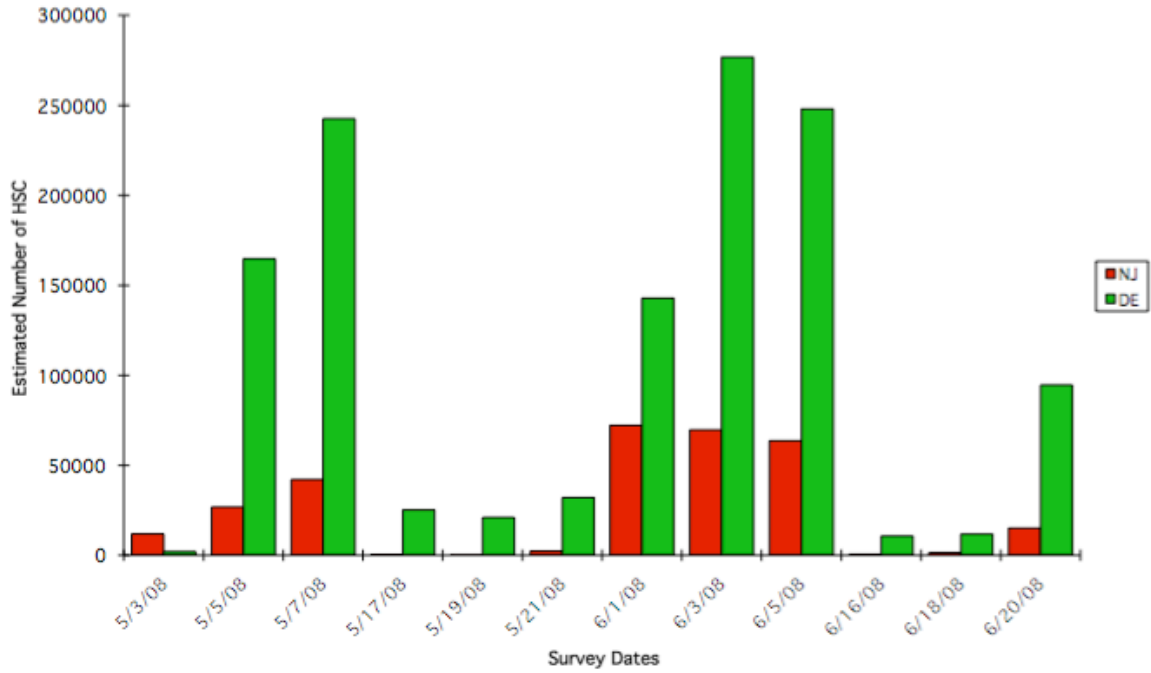


Figure 2. Peak Estimates of Spawning Horseshoe Crabs 1997-2008

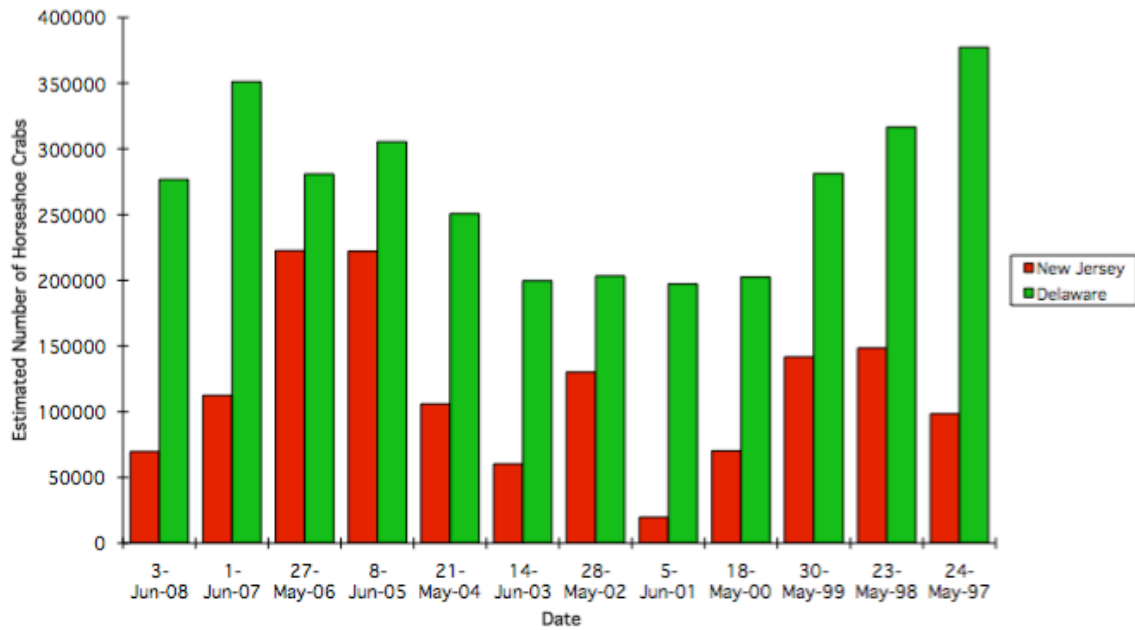


Figure 3. Densities of Horseshoe Crabs 2001-2008

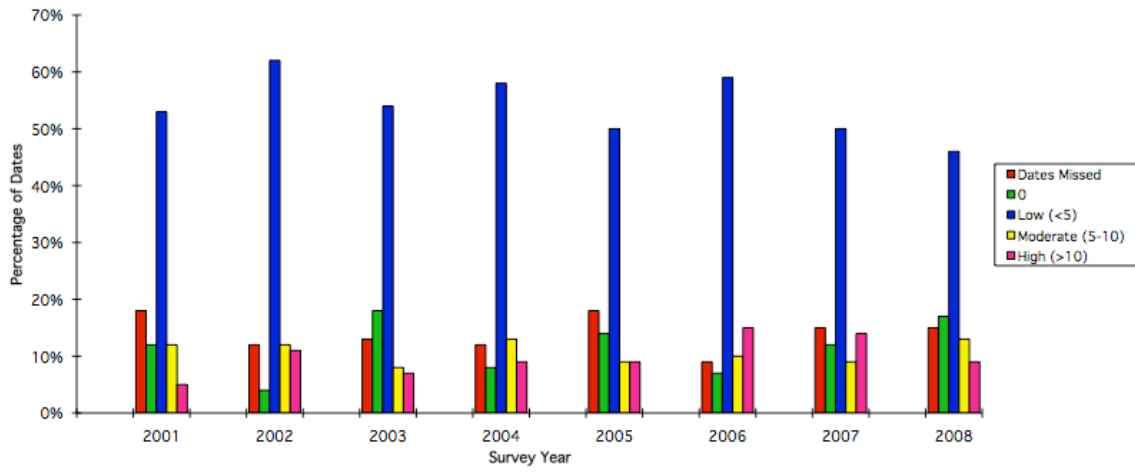


Figure 4. Seasonal Estimates of Spawning Horseshoe Crabs

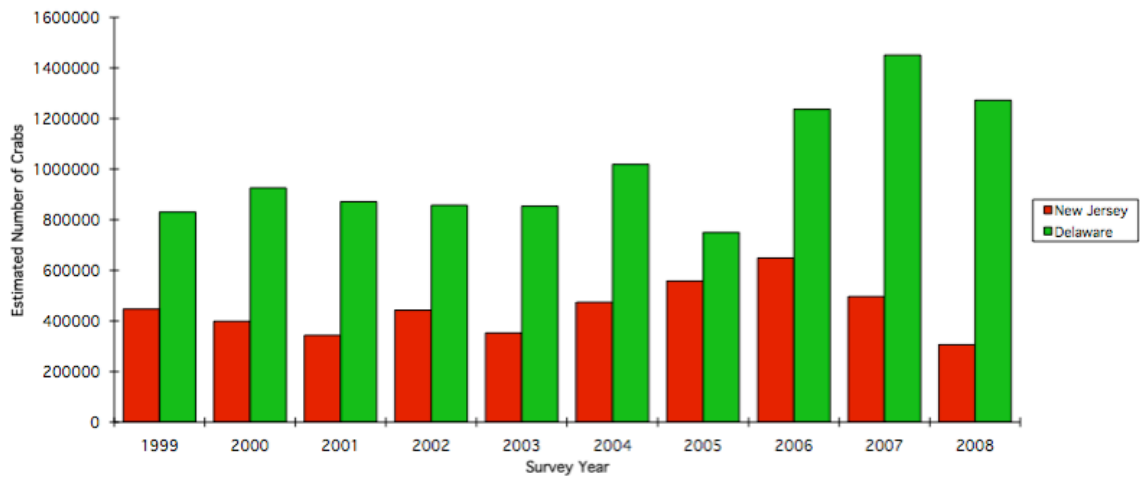
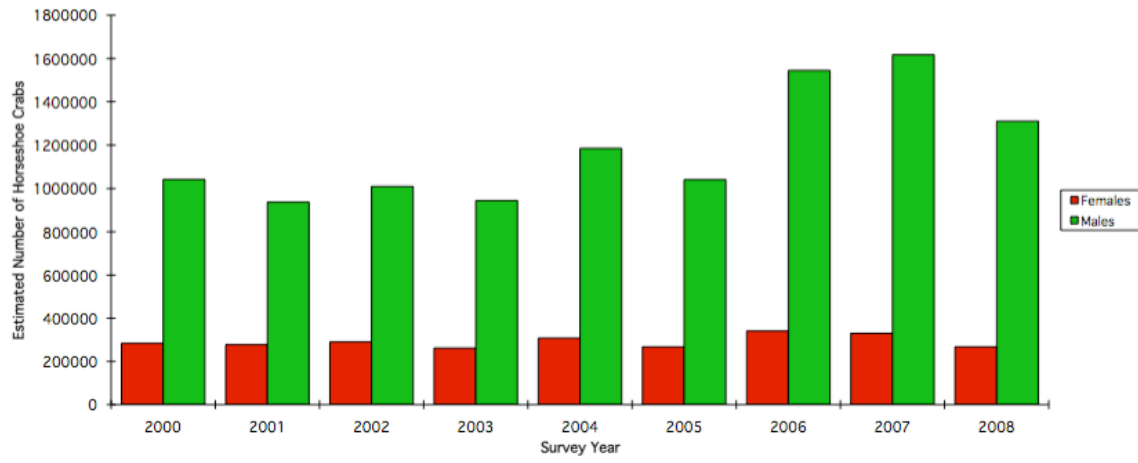


Figure 5. Seasonal Estimates of Male and Female Horseshoe Crabs



**Table 1. 2008 Survey Results - Densities and Estimates  
A. New Jersey Beaches (2 pages)**

<b>Table 1</b>							<b>Table 1</b>							
Moon Phase	New -2	New	New +2	Full -2	Full	Full +2	Moon Phase	New -2	New	New +2	Full -2	Full	Full +2	Totals
Date	3-May	5-May	7-May	17-May	19-May	21-May	Date	1-Jun	3-Jun	5-Jun	16-Jun	18-Jun	20-Jun	
<b>Sunset Beach (2.02 km)</b>							<b>Sunset Beach (2.02 km)</b>							
Density of HSC, Crabs/m	0.00	0.00	0.00	0.00	0.03	0.00	Density of HSC, Crabs/m	0.19	0.00	0.04	canceled	canceled	0.02	
Estimated Number of HSC	0	0	0	0	61	0	Estimated Number of HSC	384	0	81	0	0	40	566
<b>Higbees Beach (0.98 km)</b>							<b>Higbees Beach (0.98 km)</b>							
Density of HSC, Crabs/m	0.00	0.02	0.01	canceled	0.06	0.00	Density of HSC, Crabs/m	0.08	0.20	0.45	canceled	0.00	0.14	
Estimated Number of HSC	0	20	10	0	59	0	Estimated Number of HSC	78	196	441	0	0	137	941
<b>North Cape May* (3 km)</b>							<b>North Cape May* (3 km)</b>							
Density of HSC, Crabs/m	canceled	canceled	0.00	0.00	0.00	canceled	Density of HSC, Crabs/m	0.33	0.22	0.16	canceled	0.00	0.34	
Estimated Number of HSC	0	0	0	0	0	0	Estimated Number of HSC	990	660	480	0	0	1,020	3,150
<b>Villas (2.8 km)</b>							<b>Villas (2.8 km)</b>							
Density of HSC, Crabs/m	canceled	0.96	3.27	0.00	0.00	canceled	Density of HSC, Crabs/m	0.80	4.35	2.42	canceled	0.14	1.65	
Estimated Number of HSC	0	2,688	9,156	0	0	0	Estimated Number of HSC	2,240	12,180	6,776	0	392	4,620	38,052
<b>Norburys Landing (2.43 km)</b>							<b>Norburys Landing (2.43 km)</b>							
Density of HSC, Crabs/m	0.39	1.23	4.59	0.00	0.00	0.01	Density of HSC, Crabs/m	4.20	8.16	5.02	canceled	0.08	1.67	
Estimated Number of HSC	948	2,989	11,154	0	0	24	Estimated Number of HSC	10,206	19,829	12,199	0	194	4,058	61,601
<b>South CSL* (2.2 km)</b>							<b>South CSL* (2.2 km)</b>							
Density of HSC, Crabs/m	1.83	4.05	4.11	0.00	0.00	0.00	Density of HSC, Crabs/m	6.05	9.39	1.62	0.075	0.00	1.39	
Estimated Number of HSC	4,026	8,910	9,042	0	0	0	Estimated Number of HSC	13,310	20,658	3,564	165	0	3,058	62,733
<b>Highs* (0.8 km)</b>							<b>Highs* (0.8 km)</b>							
Density of HSC, Crabs/m	0.40	3.98	4.51	0.00	0.00	0.00	Density of HSC, Crabs/m	7.44	9.26	6.78	0.01	0.03	0.15	
Estimated Number of HSC	320	3,184	3,608	0	0	0	Estimated Number of HSC	5,952	7,408	5,424	8	24	120	26,048
<b>Pierces Point (0.7 km)</b>							<b>Pierces Point (0.7 km)</b>							
Density of HSC, Crabs/m	0.03	4.66	4.09	0.15	0.00	3.05	Density of HSC, Crabs/m	8.50	canceled	canceled	canceled	canceled	canceled	
Estimated Number of HSC	21	3,262	2,863	105	0	2,135	Estimated Number of HSC	5,950	0	0	0	0	0	14,336
<b>Reeds* (1.53 km)</b>							<b>Reeds* (1.53 km)</b>							
Density of HSC, Crabs/m	3.08	0.86	0.00	0.02	0.00	canceled	Density of HSC, Crabs/m	5.61	4.42	9.38	0.07	0.12	canceled	
Estimated Number of HSC	4,712	1,316	0	31	0	0	Estimated Number of HSC	8,583	6,763	14,351	107	184	0	36,047
<b>Gandys* (1.2 km)</b>							<b>Gandys* (1.2 km)</b>							
Density of HSC, Crabs/m	canceled	0.10	canceled	canceled	0.00	0.00	Density of HSC, Crabs/m	2.87	canceled	3.80	0.00	0.02	1.15	
Estimated Number of HSC	0	120	0	0	0	0	Estimated Number of HSC	3,444	0	4,560	0	24	1,380	9,528
<b>Fortescue (2.6 km)</b>							<b>Fortescue (2.6 km)</b>							
Density of HSC, Crabs/m	0.70	1.64	1.66	0.08	0.04	0.06	Density of HSC, Crabs/m	2.74	0.76	6.08	0.09	0.25	0.17	
Estimated Number of HSC	1,820	4,264	4,316	208	104	156	Estimated Number of HSC	7,124	1,976	15,808	234	650	442	37,102
<b>Sea Breeze* (1.65 km)</b>							<b>Sea Breeze* (1.65 km)</b>							
Density of HSC, Crabs/m	canceled	0.10	1.11	0.06	0.00	canceled	Density of HSC, Crabs/m	8.42	canceled	canceled	0.02	canceled	0.11	
Estimated Number of HSC	0	165	1,832	99	0	0	Estimated Number of HSC	13,893	0	0	33	0	182	16,203
<b>Totals</b>	<b>11,847</b>	<b>26,917</b>	<b>41,980</b>	<b>443</b>	<b>223</b>	<b>2,315</b>	<b>Totals</b>	<b>72,155</b>	<b>69,669</b>	<b>63,684</b>	<b>547</b>	<b>1,468</b>	<b>15,057</b>	<b>306,306</b>



**Table 1. 2008 Survey Results - Densities and Estimates**  
**B. Delaware Beaches (2 pages)** \* Beaches Surveyed Every year

Moon Phase Date	New -2 3-May	New 5-May	New +2 7-May	Full -2 17-May	Full 19-May	Full +2 21-May	Moon Phase Date	New -2 1-Jun	New 3-Jun	New +2 5-Jun	Full -2 16-Jun	Full 18-Jun	Full +2 20-Jun	Totals
<b>Cape Henlopen (1.5 km)</b>							<b>Cape Henlopen (1.5 km)</b>							
Density of HSC, Crabs/m	0.04	0.30	1.36	0.02	0.05	0.05	Density of HSC, Crabs/m	canceled	2.82	5.92	canceled	canceled	3.53	
Estimated Number of HSC	60	450	2,040	30	75	75	Estimated Number of HSC	0	4,230	8,880	0	0	5,295	21,135
<b>Broadkill (1.5 km)</b>							<b>Broadkill (1.5 km)</b>							
Density of HSC, Crabs/m	0.01	3.47	4.11	0.03	0.03	canceled	Density of HSC, Crabs/m	2.09	7.40	4.34	0.08	canceled	3.89	
Estimated Number of HSC	15	5,205	6,165	45	45	0	Estimated Number of HSC	3,135	11,100	6,510	120	0	5,835	38,175
<b>Primehook* (2.0 km)</b>							<b>Primehook* (2.0 km)</b>							
Density of HSC, Crabs/m	0.00	8.99	6.62	0.00	0.01	0.11	Density of HSC, Crabs/m	9.45	16.04	7.74	canceled	0.62	2.24	
Estimated Number of HSC	0	17,980	13,240	0	20	220	Estimated Number of HSC	18,900	32,080	15,480	0	1,240	4,480	103,640
<b>Fowler* (3 km)</b>							<b>Fowler* (3 km)</b>							
Density of HSC, Crabs/m	0.00	1.50	6.09	0.00	canceled	canceled	Density of HSC, Crabs/m	canceled	8.50	4.97	canceled	canceled	2.82	
Estimated Number of HSC	0	4,500	18,270	0	0	0	Estimated Number of HSC	0	25,500	14,910	0	0	8,460	71,640
<b>Slaughter (3 km)</b>							<b>Slaughter (3 km)</b>							
Density of HSC, Crabs/m	0.43	6.37	11.49	0.02	0.98	1.11	Density of HSC, Crabs/m	6.72	17.00	20.01	canceled	canceled	2.96	
Estimated Number of HSC	1,290	19,110	34,470	60	2,940	3,330	Estimated Number of HSC	20,160	51,000	60,030	0	0	8,880	201,270
<b>Big Stone* (5.0 km)</b>							<b>Big Stone* (5.0 km)</b>							
Density of HSC, Crabs/m	0.00	8.55	10.99	0.01	0.00	0.00	Density of HSC, Crabs/m	5.16	12.57	9.65	canceled	0.30	3.45	
Estimated Number of HSC	0	42,750	54,950	50	0	0	Estimated Number of HSC	25,800	62,850	48,250	0	1,500	17,250	253,400
<b>Bennetts Pier (2.6 km)</b>							<b>Bennetts Pier (2.6 km)</b>							
Density of HSC, Crabs/m	0.01	2.32	7.07	0.01	0.01	0.03	Density of HSC, Crabs/m	1.88	canceled	5.52	0.05	0.52	5.06	
Estimated Number of HSC	26	6,032	18,382	26	26	78	Estimated Number of HSC	4,888	0	14,352	130	1,352	13,156	58,448
<b>South Bowers (2.3 km)</b>							<b>South Bowers (2.3 km)</b>							
Density of HSC, Crabs/m	0.21	5.68	9.65	1.51	0.50	0.65	Density of HSC, Crabs/m	6.80	10.88	11.07	0.62	0.61	1.86	
Estimated Number of HSC	483	13,064	22,195	3,473	1,150	1,495	Estimated Number of HSC	15,640	25,024	25,461	1,426	1,403	4,278	115,092
<b>North Bowers* (1.3 km)</b>							<b>North Bowers* (1.3 km)</b>							
Density of HSC, Crabs/m	0.03	3.38	9.19	0.31	1.49	1.19	Density of HSC, Crabs/m	1.16	5.42	3.62	0.07	0.10	0.68	
Estimated Number of HSC	39	4,394	11,947	403	1,937	1,547	Estimated Number of HSC	1,508	7,046	4,706	91	130	884	34,632
<b>Ted Harvey WMA (1.0 km)</b>							<b>Ted Harvey WMA (1.0 km)</b>							
Density of HSC, Crabs/m	0.12	13.29	15.71	5.46	1.97	10.06	Density of HSC, Crabs/m	16.72	18.05	17.72	2.40	1.87	8.56	
Estimated Number of HSC	120	13,290	15,710	5,460	1,970	10,060	Estimated Number of HSC	16,720	18,050	17,720	2,400	1,870	8,560	111,930
<b>Kitts Hummock* (1.0 km)</b>							<b>Kitts Hummock* (1.0 km)</b>							
Density of HSC, Crabs/m	0.00	16.01	21.31	canceled	0.72	3.69	Density of HSC, Crabs/m	12.21	9.49	8.43	1.25	1.82	7.36	
Estimated Number of HSC	0	16,010	21,310	0	720	3,690	Estimated Number of HSC	12,210	9,490	8,430	1,250	1,820	7,360	82,290
<b>Pickering (1 km)</b>							<b>Pickering (1 km)</b>							
Density of HSC, Crabs/m	0.00	21.94	24.02	15.63	12.12	11.56	Density of HSC, Crabs/m	23.98	30.28	23.32	5.23	2.39	10.19	
Estimated Number of HSC	0	21,940	24,020	15,630	12,120	11,560	Estimated Number of HSC	23,980	30,280	23,320	5,230	2,390	10,190	180,660
<b>Woodland* (0.5 km)</b>							<b>Woodland* (0.5 km)</b>							
Density of HSC, Crabs/m	0.00	0.00	0.00	0.00	0.00	0.00	Density of HSC, Crabs/m	canceled	canceled	0.00	0.00	0.00	0.00	
Estimated Number of HSC	0	0	0	0	0	0	Estimated Number of HSC	0	0	0	0	0	0	0
<b>Totals</b>	<b>2,033</b>	<b>164,725</b>	<b>242,699</b>	<b>25,177</b>	<b>21,003</b>	<b>32,055</b>	<b>Totals</b>	<b>142,941</b>	<b>276,650</b>	<b>248,049</b>	<b>10,647</b>	<b>11,705</b>	<b>94,628</b>	<b>1,272,312</b>

	3-Jun-08	1-Jun-07	27-May-06	8-Jun-05	21-May-04	14-Jun-03	28-May-02	5-Jun-01	18-May-00	30-May-99	23-May-98	24-May-97
<b>Estimated Number of HSC</b>	346,319	463,587	503,435	527,520	356,739	259,957	333,553	216,929	272,770	422,775	464,934	475,810
<b>Estimated Number of HSC - NJ</b>	69,669	112,497	222,653	222,168	105,973	60,272	130,164	19,726	70,293	141,720	148,444	98,487
<b>Estimated Number of HSC - DE</b>	276,650	351,090	280,782	305,352	250,766	199,685	203,389	197,203	202,477	281,055	316,490	377,323
<b>Beaches Surveyed in DE</b>	13	13	13	13	13	13	13	13	11	9	7	7
<b>Beaches Surveyed in NJ</b>	12	11	11	11	11	10	10	10	11	13	12	12
<b>Main Beaches in DE</b>	Big Stone Slaughter Pickering	Big Stone Slaughter S. Bowers	Big Stone Slaughter S. Bowers Pickering	Big Stone S. Bowers Bennetts Slaughter Pickering	Slaughter Big Stone Pickering	Slaughter Big Stone Pickering Ted Harvey	S. Bowers Slaughter Big Stone Pickering	Slaughter Big Stone	Slaughter Big Stone	Slaughter Big Stone	Slaughter Big Stone	Slaughter Big Stone
<b>Main Beaches in NJ</b>	South CSL Norburys	South CSL	South CSL Norburys Forescue	South CSL Norburys Villas	South CSL Fortescue Norburys	South CSL Fortescue Norburys	South CSL Gandys Sea Breeze	South CSL	South CSL	Townbank Norburys South CSL	South CSL Reeds Cooks	Norburys South CSL

**Table 2. Comparison of Data on Horseshoe Crabs Spawning on Delaware Bay Shores - Years 1997-2008**

**Table 3. Percentages of Horseshoe Crab Densities 2001-2008**

Survey Year	State	Percentages				Dates Missed
		0	Low (<5)	Moderate (5-10)	High (>10)	
2001	New Jersey	10	63	5	5	17
	Delaware	13	46	11	6	19
2002	New Jersey	3	61	10	8	13
	Delaware	5	63	13	12	7
2003	New Jersey	17	60	7	3	13
	Delaware	18	50	8	10	13
2004	New Jersey	5	63	9	8	14
	Delaware	10	54	15	10	10
2005	New Jersey	14	48	6	10	21
	Delaware	14	51	11	8	16
2006	New Jersey	5	64	8	12	11
	Delaware	8	54	12	17	8
2007	New Jersey	16	58	1	10	15
	Delaware	10	43	15	18	15
2008	New Jersey	21	51	8	0	19
	Delaware	12	42	17	17	11

**Table 4. Seasonal Estimates Of Horseshoe Crabs 1999-2008**

<b>Year</b>	<b>New Jersey</b>	<b>Delaware</b>	<b>Total</b>
1999	447,128	830,405	1,277,533
2000	398,847	925,837	1,324,684
2001	343,351	871,375	1,214,726
2002	442,586	857,362	1,299,948
2003	352,800	853,721	1,206,521
2004	474,019	1,019,014	1,493,033
2005	557,956	749,473	1,307,429
2006	648,728	1,236,627	1,885,355
2007	496,535	1,450,837	1,947,372
2008	306,306	1,272,312	1,578,618

**Table 5. Seasonal Estimates Of Male and Female Horseshoe Crabs 2000-2008**

<b>Year</b>	<b>Females</b>	<b>Males</b>
<b>2000</b>	283,658	1,041,026
<b>2001</b>	277,335	937,391
<b>2002</b>	290,167	1,009,781
<b>2003</b>	261,718	944,803
<b>2004</b>	307,842	1,185,191
<b>2005</b>	267,368	1,040,061
<b>2006</b>	340,932	1,544,423
<b>2007</b>	330,064	1,617,308
<b>2008</b>	267,562	1,311,054