

**Barnegat Bay Partnership / Ocean County Health Department
2010 Sea Nettle Warning System Pilot Project**

January 2010

Introduction

Anecdotal evidence suggests the stinging sea nettle (*Chrysaora quinquecirrha*) is increasing in abundance and becoming more widely distributed within the Barnegat Bay. The medusa, the free-floating adult form of this jellyfish, poses a potential hazard for bathers and other recreational users of the bay due to the stinging nematocysts located in its tentacles. When the tentacles brush against an unsuspecting bather the nematocysts fire, creating a painful burning sensation. This jellyfish is making portions of the bay and major tributaries “unswimmable” for parts of the summer tourist season.

The reason(s) behind the apparent changes in jellyfish abundance and distribution are not known. Based on the consensus of scientists gathered at the “Jellyfish Jam” in May 2009, five potential factors leading to the expansion of the sea nettle population were identified (*Barnegat Bay Beat*, Summer/Fall 2009): 1) Increased development around the bay, including bulkheads, pilings, and floating docks, may be providing more structure to which an early life-stage of jellyfish can attach and reproduce; 2) Changes in the bay’s salinity may also have an effect as sea nettles prefer a narrow salinity zone; therefore, large-scale changes in the bay’s salinity may affect their abundance and distribution; 3) Increasing water temperatures, which can accelerate growth rates and maturation, also may play a role; 4) The removal of predators and potential competitors for food through increased fishing pressure may also affect sea nettle abundance; however, we do not know which species, if any, prey on sea nettles in Barnegat Bay; and 5) Lastly, poor water quality associated with eutrophication (*i.e.*, high nutrient concentrations and/or low dissolved oxygen) may contribute to greater food supplies for jellyfishes or to lower abundances of their competitors and predators, such as fishes.

At the recommendation of the panelists at the “Jellyfish Jam,” the Barnegat Bay Partnership and the Ocean County Health Department (OCHD) decided to pursue a pilot project to create a “warning network” for selected beaches along with a county-wide education campaign in an effort to address the paucity of “hard” information regarding the distribution and abundance of medusa during the summer season.

Methodology

The pilot project consisted of two distinct, but complementary, aspects: (1) an educational campaign; and (2) a monitoring program. Each segment of the project is discussed below.

Education and Awareness

Prior to the initiation of this project, the lead article of the Summer/Fall 2009 edition of the *Barnegat Bay Beat* summarized the findings of the “Jellyfish Jam” and provided the public with a basic background on sea nettles in the bay (<http://bbp.ocean.edu/pages/258.asp>). In a continuing effort to educate the public regarding the potential reasons behind the sea nettle increase, as well as to provide information about what to do should one encounter sea nettles, an informative full-color glossy card was designed by the BBP for broad distribution (Appendix 1). The cards (n=4,000) were 4 by 9-inches, four-color, two-sided, and produced on weatherproof synthetic paper by Gangi Graphics (Brick Township, NJ). The front side included photographs and descriptions of the three major jellyfish found in Barnegat Bay; sea nettle (*Chrysaora quinquecirrha*), moon jelly (*Aurelia aurita*), and lion’s mane (*Cyanea capillata*). The back of the card included information on how to avoid stings, what to do if stung, information on the jellyfish warning network (discussed below), and where to get more information. The rack cards were distributed to the municipalities taking part in the pilot network (see below) for disbursement at lifeguard stands and municipal buildings, and at various sites throughout the watershed, on request (Table 1).

Monitoring Program

In order to inform the public about the current abundance of sea nettles at their favorite beach, the BBP and OCHD developed a two-part plan. Nine municipalities were chosen to take part in the pilot study, with an attempt made to include both river and bay beaches in the central and northern portion of the bay (Figure 1, Table 2). Datasheets (Appendix 3) were distributed to the beach managers or other municipal officials at the beginning of the summer season for the lifeguards to complete on a daily basis. No set protocol was provided for completing the datasheets. Among the data collected by lifeguards at each beach were water temperature, wind direction, number of jellyfish observed, number of sea nettle stings, and a threat level (index) relating the number of sea nettle medusa to a color rating (green, yellow, orange, red). The

completed datasheets were collected by OCHD personnel during their weekly water-sampling visits at each beach. The information on the datasheets was entered into Microsoft Excel by BBP personnel and analyzed for trends. To analyze the threat level, the color codes were transformed into a numeric score, ranging from “1” for green to “4” for red.

In addition to the datasheets, each beach was provided with a display sign to be hung on the back of the lifeguard stand. The signs were 24 by 30 inches, contained the same information as on the rack cards, and had magnetic strips for the attachment of interchangeable, magnetic, color panels (9 by 23 inches) to indicate the current threat level (Appendix 2). A vinyl, zip-lock pouch was attached to the back of each sign to conveniently hold the panels and rack cards.

The final part of the network was a website hosted by the OCHD. The website, <http://www.ochd.org/jellyfish.htm>, contained the same information available on the rack card and lifeguard signs. Contact information for the beaches was also included on the website so that a visitor to the site could call and inquire as to the current threat level at one of the pilot beaches.

Results

Education and Awareness

Over 3,900 rack cards were distributed to the 9 municipalities, Ocean County Park system locations, non-profit organizations, and at various festivals and public outings (Table 1). Most of the distribution locations handed out their allotment of cards. Both the BBP and OCHD received requests for cards from bay and river user groups, including yacht clubs, sailing schools, and beach associations.

Monitoring Program

Data Collection

Completion of the datasheets by lifeguards varied between municipalities, with anywhere from 1 to 32 datasheets turned in to the OCHD from July 1 to August 31, 2010 (Table 3). Data was collected by lifeguards fairly irregularly, with some collecting data every three or four days, some once a week (typically the day the OCHD arrived to collect the sheets), and others for

blocks of consecutive days broken by long stretches of no recordings. Of the 146 total datasheets returned, one omitted the date, five omitted all quantitative information of jellyfish, and numerous others left the weather and water temperature variables blank. For the 10 that left the threat level blank but included data on the number observed, the missing information was filled in during data entry. On a number of datasheets the “number of jellyfish observed” did not match the “threat level assessment.” When this occurred, the analysis utilized the threat level assessment variable.

Threat Level

The average threat level index for July and August across all beaches was 2.3 and 2.2, respectively, indicating that, for the days on which data was collected, jellyfish abundance was generally low in the northern and central sections of the bay. While the average threat index did not change much between months, there was variation between beaches (Figure 2). Toms River and Pine Beach had the highest average score (2.6), with Beachwood (2.4) and Lavallette (2.3) also having average scores above two. The highest threat level was recorded eight times: three times at Pine Beach, twice at Island Heights, and once each at Lavallette, Ocean Gate, and Toms River.

There were nine days between July 22 and August 9 where five or more beaches recorded data on the same date (Figure 3). During this timeframe most of the beaches displayed a fluctuation in scores, with nearly all recording the presence of sea nettles throughout the two and a half week period. Six of the eight “red” threat levels were recorded during this time period. Five occurred on one of the nine-days displayed in Figure 3, while the sixth was the only data collected on July 27. The other two “red” level days were July 19th, just prior to the start of that period, and August 10, just after the period.

Discussion

Education and Awareness

While well intentioned, there were a number of issues with this pilot project that prevented it from being as informative, and ultimately as useful, as was originally envisioned. The most “successful” aspect of the project was the production and dissemination of the rack cards.

Anecdotally, the cards were well received by the public and were highly requested by various user groups. The cards proved to be so popular at some locations that many of the distribution points indicated that they would have liked to have had the cards earlier in the season. Several municipalities even suggested that the cards be available over the winter, so that when residents and visitors came in to purchase beach badges in advance of the summer, they could be handed a card.

Monitoring Program

The data collection was more problematic. Without a proscribed collection procedure, different beaches recorded different amounts and types of data, when data was provided at all. There was no standardization regarding at what time to take the data, how to count jellyfish (*i.e.* walk along the beach for 50 feet and count, stand at one point for 5 minutes and count), or even how often to take the data. This lack of standardization may have led beaches to display different threat levels on their signs for similar conditions.

While the hanging display signs on the lifeguard stands were not immediately installed by all the lifeguards, by the end of the season all signs had been erected. Feedback from municipal beach managers (provided as part of a follow-up survey) indicated that they would have liked to have had the display signs and data sheets prior to the start of the summer season so that they could have incorporated it into the lifeguard's daily procedures from the start of the summer. Additionally, some beach managers indicated that because no training regarding the data collection process was provided they simply passed the signage and datasheets onto the lifeguards and told them to "do their best."

The haphazard means of data collection led to too many irregularities to do much in-depth analysis regarding sea nettle distribution or abundance at the pilot beaches. What can be said is that sea nettles appear to be present in relatively low abundance at most of the beaches throughout July and August. Peaks in abundance appeared to be centered around the end of July and beginning of August, but that could be an artifact of more data collected during that time bay-wide as compared to earlier or later in the season. If abundances of sea nettles did peak

during that time, more accurate assessments of wind direction and water temperature, as well as other environmental variables, would be needed to allow for valid correlations to be made.

It is unclear how well utilized the OCHD website was as a means of informing the public about sea nettles and the current beach conditions. Due to technological constraints, visitors to the site were directed to call the municipal department responsible for bathing beaches rather than having an up-to-date threat level for each beach displayed on the site. While not as efficient as originally planned, this procedure still allowed beachgoers to make an informed decision before travelling.

If this project is to continue in the future, it is imperative that a number of changes be incorporated. First, the materials (rack cards, display signs, and datasheets) need to be delivered to the appropriate people well in advance of the summer. The month of April should be the targeted date for distribution of the material. Secondly, a standardized protocol for data collection should be developed and clearly written out. This protocol should then be provided to the individual responsible for lifeguards and their training at each beach, with a request for them to provide feedback. This should be done prior to the beaches opening. A training session should be held with the head lifeguard (and, if possible, all lifeguards) at each municipality to review the protocol and stress to them the importance of consistent and accurate data collection. An incentive program to promote increased compliance rates might be helpful.

One way to increase the functionality of the website for the public would be to include an up-to-date threat level listing for each beach. This would require a dedicated person at the OCHD who could update the webpage every day. If that is not feasible, then an update every Thursday or Friday, and before the major holidays (Memorial Day, July 4th, Labor Day) would be the next most useful. This would require each municipality to communicate this information in near-real time to the OCHD. While this could be done via telephone, given the ubiquity of smart phones, the BBP/OCHD may want to consider the creation of an application that would allow the lifeguards to transmit a datasheet automatically to the OCHD. With the inclusion of more timely data, the website could play a prominent role in informing the public, and should receive additional attention in education and outreach materials.

Organization	Location	Number
Berkeley Island County Park	Berkeley Twp	
Cattus Island County Park	Toms River	
Berkeley Striper Club		10
Brick Twp. Dept. of Rec.	Brick Twp	250
Island Heights Heritage Day	Island Heights	20
JCNERR	Little Egg Harbor	200
Jenkinson's Aquarium	Pt. Pleasant Beach	100
Britta Wenzel	Lavallette	
Nelson's Marina	Island Heights	
Ocean County Dept. of Parks and Recreation	Various locations	250
Ocean County College	Toms River	25
Point Pleasant Environmental Commission	Pt. Pleasant Beach	30
Save Barnegat Bay	Lavallette	
Sedge Island Natural Resource Education Center	Sedge Islands	100
Silver Beach Association	Toms River	20
Vanada Woods Beach Association		
Barnegat Bay Partnership	Various festivals and outreach opportunities	

Municipality	Beach	Type
Pt. Pleasant Borough	River Avenue	River
Brick Township	Windward Beach	River
Toms River	Shelter Cove	Bay
Lavallette	Brooklyn Avenue	Bay
Seaside Heights	Hancock Avenue	Bay
Ocean Gate	Wildwood Avenue	River
Island Heights	Summit Avenue	River
Pine Beach	Station Avenue	River
Beachwood	Beachwood Beach	River

Table 3: The number of datasheets turned in by each municipality for each month over the summer of 2010. Lavallette submitted an additional undated datasheet.

Municipality	July	August	Total
Pt. Pleasant Borough	2	2	4
Brick Township	3		3
Toms River	7	16	23
Lavallette	5	14	20
Seaside Heights	1		1
Ocean Gate	4	18	22
Island Heights	21	11	32
Pine Beach	6	9	15
Beachwood	7	18	25



Figure 1: The nine pilot beaches in Ocean County, New Jersey.

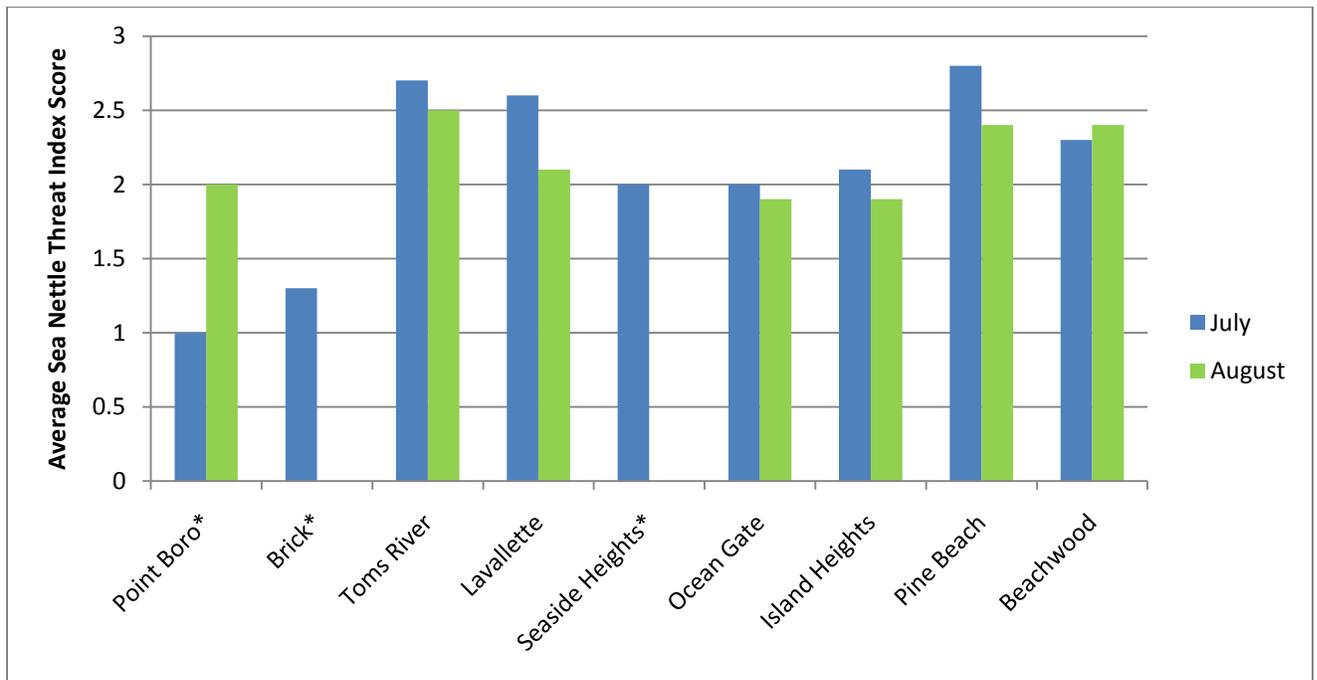


Figure 2: The average threat index score for each beach, by month. Seaside Heights (n=1), Point Boro (n=2), and Brick (n=3) values are based on limited data and should be used with caution.

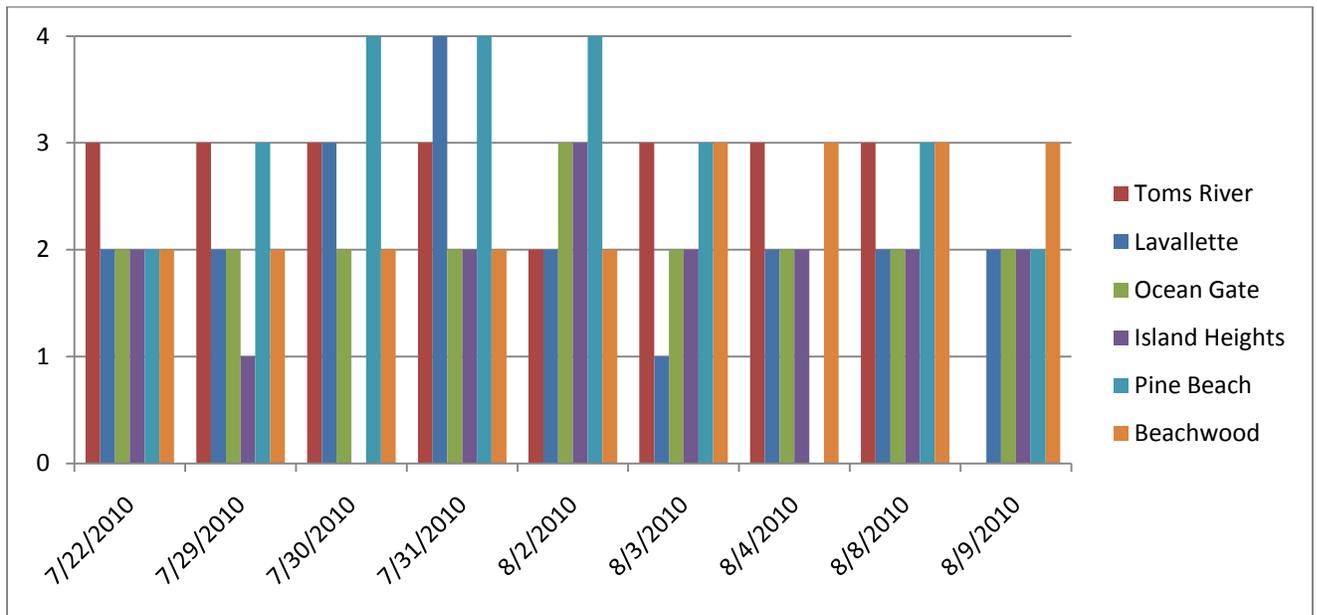


Figure 3: Threat index score for the 9 days where data was available from 5 or more beaches. Not included are Point Boro, Brick, and Seaside Heights.

IS IT SAFE TO SWIM HERE?

Generally, it is safe to swim and enjoy the water in the bay and its tributaries. However, swimming when sea nettles and lion's mane are clearly visible does increase your likelihood of being stung. Precautionary measures to avoid being stung include checking with the lifeguard at the beach regarding the presence of stinging jellyfishes and covering unprotected skin with petroleum jelly or lightweight protective clothing such as a Lycra "swim skin" or pantyhose.

WHAT SHOULD I DO IF I'M STUNG?

Liberally sprinkling meat tenderizer or baking soda on the afflicted area may reduce the irritation. Please notify the lifeguard on duty about your sting.

WHY ARE THEY HERE?

Sea nettles have always been a part of the Barnegat Bay's ecosystem; their apparent increase in abundance may have more than one cause: ① Increased development around the bay, including bulkheads, pilings, and floating docks, may be providing more structure to which an early life-stage of jellyfish can attach and reproduce. ② Changes in the bay's salinity or hydrology may also have an effect. Sea nettles prefer a narrow salinity zone, so large-scale changes in salinity, such as during dry years, may affect their abundance and distribution in the bay. ③ The removal of predators and potential competitors for food through increased fishing pressure may also affect sea nettle abundance. However, we do not know which species, if any, prey on sea nettles in Barnegat Bay. ④ Lastly, poor water quality (i.e., high nutrient concentrations and/or low dissolved oxygen) may contribute to greater food supplies for jellyfishes or to lower abundances of the competitors and predators, such as fishes. Thus, poor water quality may increase the abundance of jellyfishes.

CAN WE GET RID OF THEM?

Since jellyfishes have always been a part of the bay's ecosystem, eradicating them could have unpredictable effects on the bay. Attempts to control jellyfishes worldwide have largely failed. A combination of actions that target the potential reasons for their increase as outlined above may be the best long-term solution.

CHECK

for the presence of sea nettles BEFORE you head out for a swim by visiting the Ocean County Health Department's Jellyfish Warning Webpage at www.ochd.org/jellyfish.htm

NOTIFY

the beach's lifeguard if you are stung or if you spot sea nettles in the water.

FOR MORE INFORMATION

about sea nettles in Barnegat Bay, contact the Barnegat Bay Partnership at (732) 255-0472, or visit www.bbneq.org

SEA NETTLE WARNING SYSTEM

Coming to an Ocean County bay beach near you.

LOW	MEDIUM
No jellyfish observed. Threat level is low.	Few jellyfish (1-5) observed/low abundance. Threat level is moderate.
HIGH	DANGEROUS
Many jellyfish (6-10) observed/abundant. Potential threat is present.	Abundant jellyfish (10 or more). Threat level is high.

THIS WARNING SYSTEM IS FOR INFORMATION PURPOSES ONLY. The Ocean County Health Dept., the Barnegat Bay Partnership, and this municipality are NOT responsible for injury caused by jellyfish stings.

Get informed about

STINGING JELLYFISHES

in these waters.

SEA NETTLES (*Chrysaora quinquecirrha*) are a type of stinging jellyfish present in the waters of the Barnegat Bay and other coastal waterways of New Jersey.

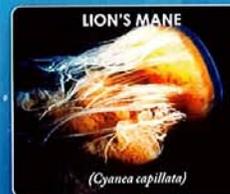
WHAT DO THEY LOOK LIKE?



SEA NETTLES are bell-shaped; the bell is pale white and often has reddish markings along its surface. They have long thin tentacles around the edge of the bell. Sea nettles may be present in large numbers during the summer months, and have a painful sting.



MOONJELLIES (*Aurelia aurita*) have a flattened disk shape; the disk is translucent in appearance. Moon jellies have numerous small tentacles around the edge and a horseshoe-shaped white or pinkish body in the center of the disk. They are abundant during the summer months, but have a mild sting and do not pose a threat to swimmers.



LION'S MANE JELLYFISH (*Cyanea capillata*) are yellowish-brown or reddish in color and are saucer-shaped with fairly thick jelly. This species does pose a threat to swimmers because of its painful sting, but lion's mane are more common in the ocean than in the bay.



Ocean County Health Department



BARNEGAT BAY PARTNERSHIP
RESEARCH · EDUCATE · RESTORE

Get informed about STINGING JELLYFISHES in these waters.



SEA NETTLES

(*Chrysaora quinquecirrha*)
are a type of stinging jellyfish present in the waters of the Barnegat Bay and other coastal waterways of New Jersey.



WHAT DO THEY LOOK LIKE?

Sea nettles are bell-shaped; the bell is pale white and often has reddish markings along its surface. They have long thin tentacles around the edge of the bell (image 1). Sea nettles may be present in large numbers during the summer months, and have a painful sting.

Moon jellies (*Aurelia aurita*) have a flattened disk shape; the disk is translucent in appearance. Moon jellies have numerous small tentacles around the edge and a horseshoe-shaped white or pinkish body in the center of the disk (image 2). They are abundant during the summer months, but have a mild sting and do not pose a threat to swimmers.

Lion's mane jellyfish (*Cyanea capillata*) are yellowish-brown or reddish in color and are saucer-shaped with fairly thick jelly. This species **does** pose a threat to swimmers because of its painful sting, but lion's mane are more common in the ocean than in the bay (image 3).

IS IT SAFE TO SWIM HERE?

Generally, it is safe to swim and enjoy the water in the bay and its tributaries. However, swimming when sea nettles and lion's mane are clearly visible does increase your likelihood of being stung. Precautionary measures to avoid being stung include: (1) checking the Ocean County Health Department website regarding the presence of stinging jellyfishes; (2) checking with the lifeguard at the beach; and (3) covering unprotected skin with petroleum jelly or lightweight protective clothing such as a Lycra "swim skin" or pantyhose.

WHAT SHOULD I DO IF I'M STUNG?

Liberally sprinkling meat tenderizer or baking soda on the afflicted area may reduce the irritation. Please notify the lifeguard on duty about your sting.

WHY ARE THEY HERE?

Sea nettles have always been a part of the Barnegat Bay's ecosystem; their apparent increase in abundance may have more than one cause:

- (1) Increased development around the bay, including bulkheads, pilings, and floating docks, may be providing more structure to which an early life-stage of jellyfish can attach and reproduce.
- (2) Changes in the bay's salinity or hydrology may also have an effect. Sea nettles prefer a narrow salinity zone, so large-scale changes in salinity, such as during dry years, may affect their abundance and distribution in the bay.
- (3) The removal of predators and potential competitors for food through increased fishing pressure may also affect sea nettle abundance. However, we do not know which species, if any, prey on sea nettles in Barnegat Bay.
- (4) Lastly, poor water quality (i.e., high nutrient concentrations and/or low dissolved oxygen) may contribute to greater food supplies for jellyfishes or to lower abundances of the competitors and predators, such as fishes. Thus, poor water quality may increase the abundance of jellyfishes.

CAN WE GET RID OF THEM?

Since jellyfishes have always been a part of the bay's ecosystem, eradicating them could have unpredictable effects on the bay. Attempts to control jellyfishes worldwide have largely failed, so most efforts focus on reducing their impacts on our use of the bay. Nets and bubble screens have been used to keep them away from swimming areas, but some jellyfishes tended to clog the nets and to break into pieces that continued to sting. The bottom-living stage of their life has been treated with chemicals, but the treatments killed many other organisms. A combination of actions that target the potential reasons for their increase as outlined above may be the best long-term solution.

CHECK for the presence of sea nettles **BEFORE** you head out for a swim by visiting the Ocean County Health Department's Jellyfish Warning Webpage at www.ochnj.org/jellyfish.htm

NOTIFY the beach's lifeguard if you are stung or if you spot sea nettles in the water.

FOR MORE INFORMATION

about sea nettles in Barnegat Bay, contact the Barnegat Bay Partnership at (732) 255-0472, or visit www.bbnp.org

TODAY'S SEA NETTLE INDEX IS:

LOW	MEDIUM
No jellyfish observed. Threat level is low.	Few jellyfish (1-5) observed/low abundance. Threat level is moderate.
HIGH	DANGEROUS
Many jellyfish (6-10) observed/abundant. Potential threat is present.	Abundant jellyfish (10 or more). Threat level is high.

THIS WARNING SYSTEM IS FOR INFORMATION PURPOSES ONLY. The Ocean County Health Department, the Barnegat Bay Partnership, and the municipality are NOT responsible for injury caused by jellyfish stings that occur at the beach.

Appendix 3 – Datasheet

Data Collection Form – Jellyfish at Barnegat Bay bathing beaches Ocean County Health Department

Monitoring should record the following information:

Location (name of beach, municipality)

Date and Time

Name of Individual performing the monitoring

Weather Conditions

Water Temperature

Wind Direction

Jellyfishes Observed:

Abundance – (drop down menu)

0

1-5

6-10

11 or more

Type – (drop down menu) **(provide photo of each)**

Sea nettle

Lion's mane

Other

Threat Level Warning System

Green: No jellyfish observed. Threat level low.

Yellow: Few (1-5) jellyfish observed/low abundance. Threat level moderate.

Orange: Many jellyfish observed (6-10)/abundant. Potential threat present.

Red: Abundant jellyfish (10 or more). Threat level high.

Number of reported stings (with date):