



COMMONWEALTH of VIRGINIA

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May 9, 2013

**TO: Marin Hawk, FMP Coordinator,
Atlantic States Marine Fisheries Commission**

**FROM: Robert O'Reilly, Chief, Fisheries Management,
Virginia Marine Fisheries Commission**

RE: Virginia Horseshoe Crab Landings Data

The most recent year of data in any of the compliance reports is subject to change as offshore data becomes available to the state and Virginia data becomes finalized. The March 1 due date for the compliance report requires Virginia to submit preliminary data which is denoted in Table 1 of the compliance report.

There were updates to the 2010 and 2011 landings from previous compliance reports. However, it is evident that the increase in landings for 2009, described in the 2013 compliance report but not in the 2012 compliance report, is what caused concern for the PRT. The 2013 report contained an error, in that it included the 2009 duplicate records that had not been reported in 2012.

In the 2012 compliance report it had been noted that the 2009 offshore landings were not validated, although it had earlier been confirmed that VMRC's Mandatory Reporting database and ACCSP's database contain duplicate records. These duplicate records were correctly excluded from the 2012 compliance report by the previous VMRC plan writer, but were reported in error in the most recent report. The 2012 Virginia Horseshoe Crab Compliance Report contains the correct number of horseshoe crabs landed in Virginia in 2009, at 187,546 crabs. VMRC is currently working with ACCSP to determine why these 2009 records are duplicated and were not caught during the merging process.

RLOR:ak

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**2013 REVIEW OF THE
ATLANTIC STATES MARINE FISHERIES COMMISSION
FISHERY MANAGEMENT PLAN FOR**

HORSESHOE CRAB
(Limulus polyphemus)

2012 Fishing Year



Horseshoe Crab Plan Review Team:
Sheila Eyler, U.S. Fish and Wildlife Service
Stewart Michels, Delaware Department of Natural Resources and Environmental Control
Marin Hawk, Chair, Atlantic States Marine Fisheries Commission

May 2013

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DRAFT

I. Status of the Fishery Management Plan

<u>Date of FMP Approval:</u>	December 1998
<u>Amendments</u>	None
<u>Addenda</u>	Addendum I (April 2000) Addendum II (May 2001) Addendum III (May 2004) Addendum IV (June 2006) Addendum V (September 2008) Addendum VI (August 2010) Addendum VII (February 2012)
<u>Management Unit:</u>	Entire coastwide distribution of the resource from the estuaries eastward to the inshore boundary of the EEZ
<u>States With Declared Interest:</u>	New Hampshire - Florida
<u>Active Boards/Committees:</u>	Horseshoe Crab Management Board, Advisory Panel, Technical Committee, and Plan Review Team; Shorebird Advisory Panel; Delaware Bay Ecosystem Technical Committee

a) Goals and Objectives

The Interstate Fishery Management Plan for Horseshoe Crabs (FMP) established the following goals and objectives.

2.0. Goals and Objectives

The goal of this Plan is to conserve and protect the horseshoe crab resource to maintain sustainable levels of spawning stock biomass to ensure its continued role in the ecology of the coastal ecosystem, while providing for continued use over time. Specifically, the goal includes management of horseshoe crab populations for continued use by:

- 1) *current and future generations of the fishing and non-fishing public (including the biomedical industry, scientific and educational research);*
- 2) *migrating shorebirds; and,*
- 3) *other dependent fish and wildlife, including federally listed (threatened) sea turtles.*

To achieve this goal, the following objectives must be met:

- (a) prevent overfishing and establish a sustainable population;*
- (b) achieve compatible and equitable management measures among jurisdictions throughout the fishery management unit;*
- (c) establish the appropriate target mortality rates that prevent overfishing and maintain adequate spawning stocks to supply the needs of migratory shorebirds;*
- (d) coordinate and promote cooperative interstate research, monitoring, and law enforcement;*

- (e) identify and protect, to the extent practicable, critical habitats and environmental factors that limit long-term productivity of horseshoe crabs;*
- (f) adopt and promote standards of environmental quality necessary for the long-term maintenance and productivity of horseshoe crabs throughout their range; and,*
- (g) establish standards and procedures for implementing the Plan and criteria for determining compliance with Plan provisions.*

b) Fishery Management Plan Summary

The framework for managing horseshoe crabs along the Atlantic coast was approved in October 1998 with the adoption of the Interstate Fishery Management Plan for Horseshoe Crabs (FMP). The goal of this plan is to conserve and protect the horseshoe crab resource to maintain sustainable levels of spawning stock biomass to ensure its continued role in the ecology of coastal ecosystems, while providing for continued use over time.

In 2000, the Horseshoe Crab Management Board approved Addendum I to the FMP. Addendum I established a state-by-state cap on horseshoe crab bait landings at 25 percent below the reference period landings (RPL's), and *de minimis* criteria for those states with a limited horseshoe crab fishery. Those states with more restrictive harvest levels (Maryland and New Jersey) were encouraged to maintain those restrictions to provide further protection to the Delaware Bay horseshoe crab population, recognizing its importance to migratory shorebirds. Addendum I also recommended that the National Marine Fisheries Service (NMFS) prohibit the harvest of horseshoe crabs in federal waters (3-200 miles offshore) within a 30 nautical mile radius of the mouth of Delaware Bay, as well as prohibit the transfer of horseshoe crabs in federal waters. A horseshoe crab reserve was established on March 7, 2001 by NMFS in the area recommended by ASMFC.

In 2001, the Horseshoe Crab Management Board approved Addendum II to the FMP. The purpose of Addendum II was to provide for the voluntary transfer of harvest quotas between states to alleviate concerns over potential bait shortages on a biologically responsible basis. Voluntary quota transfers require Technical Committee review and Management Board approval.

In 2004, the Board approved Addendum III to the FMP. The addendum sought to further the conservation of horseshoe crab and migratory shorebird populations in and around the Delaware Bay. It reduced harvest quotas and implemented seasonal bait harvest closures in New Jersey, Delaware, and Maryland, and revised monitoring components for all jurisdictions.

Addendum IV was approved in 2006. It further limited bait harvest in New Jersey and Delaware to 100,000 crabs (male only) and required a delayed harvest in Maryland and Virginia. Addendum V, adopted in 2008, extends the provisions of Addendum IV through October 31, 2010. In early 2010, the Board initiated Draft Addendum VI to consider management options that will follow expiration of Addendum V. The Board voted in August 2010 to extend the Addendum V provisions, via Addendum VI, through April 30, 2013. The Board also chose to include language, allowing them to replace Addendum VI with another Addendum during that time, in anticipation of implementing the ARM framework.

The Board approved Addendum VII in February 2012. This addendum implemented the ARM Framework for use during the 2013 fishing season. The Framework considers the abundance levels of horseshoe crabs and shorebirds in determining the optimized harvest level for the Delaware Bay states of New Jersey, Delaware, Maryland, and Virginia (east of the COLREGS).

II. Status of the Stock and Assessment Advice

No definitions for overfishing or overfished status have been adopted by the Management Board. However, the majority of evidence in the most recent stock assessment, the 2009 Benchmark Horseshoe Crab Stock Assessment (available at <http://www.asmfc.org/horseshoeCrab.htm>), indicates abundance has increased in the Southeast and Delaware Bay Regions. In the Delaware Bay Region, increasing trends were most evident in juvenile indices, followed by indices of adult males. Over the time series of the survey, no trend in the abundance of female crabs is evident. In contrast, declining abundance was evident in the New York and New England regions. Declines in the New England Region had been evident in the 2004 assessment; however, declines in the New York Region noted in the 2009 stock assessment represent a downturn from the 2004 assessment. Decreased harvest quotas in Delaware Bay have potentially redirected harvest to nearby regions. Current harvest within the New England and New York Regions may not be sustainable. Continued precautionary management is therefore recommended coastwide to anticipate effects of redirecting harvest from Delaware Bay to outlying populations. A stock assessment update is currently being conducted (2013).

The Stock Assessment was externally peer reviewed by a panel of experts. The panel included their comments and recommendations in the 2009 Horseshoe Crab Terms of Reference and Advisory Report, available at <http://www.asmfc.org/horseshoeCrab.htm>.

The PRT and TC will continue to monitor any harvest increases in regions outside of Delaware Bay, which are coincident with harvest reductions within Delaware Bay. An overarching conclusion of recent coastwide assessments has been that management should be regional or embayment specific. Current harvest levels of the Delaware Bay population appear consistent with population growth. However, it is unclear whether harvest of crabs in the outlying regions is sustainable.

III. Status of the Fishery

Bait Fishery

For most states, the bait fishery is open year round. However, because of seasonal horseshoe crab movements (to the beaches in the spring; deeper waters and offshore in the winter), the fishery operates at different times. State waters of New Jersey and Delaware are closed to horseshoe crab harvest and landing from January 1st through June 7th each year, and other state horseshoe crab fisheries are regulated with various seasonal/area closures.

Reported coastwide bait landings in 2012 remained well below the coastwide quota (Table 1, Figure 1). Bait landings increased 11.9% from the previous year, due to increased landings in Massachusetts, New York, and Virginia. Except for Delaware, which will account for its 255 crab overage in 2013, there were no overages.

Table 1: Reported commercial horseshoe crab bait landings by jurisdiction.

Jurisdiction	RPL	Addendum IV Quota	State Quota 2012	2008	2009	2010	2011	2012
ME	13,500	13,500	-	0	0	0	0	-
NH	350	350	350	0	41	0	0	0
MA	440,503	330,377	165,000	103,963	98,332	54,782	67,087	106,821
RI	26,053	26,053/19,540	14,348	15,549	18,729	12,502	12,632	19,306
CT	64,919	48,689	48,689	32,565	27,065	30,036	24,466	18,958
NY	488,362	366,272	150,000	148,719	123,653	124,808	146,995	167,723
NJ	604,049	100,000	0	0	0	0	0	0
PA	-	0	-	-	-	-	-	-
DE	482,401	100,000	100,000	102,113	102,659	61,751	95,663	100,255
MD	613,225	170,653	170,653	163,495	165,434	165,344	167,053	169,087
PRFC	-	0	-	0	0	0	0	0
DC	-	0	-	0	0	0	0	0
VA	203,326	152,495	130,933	68,338	187,546	145,357	121,650	124,048
NC	24,036	24,036	24,036	26,191	33,025	9,938	27,076	22,902
SC	-	0	-	0	0	0	0	0
GA	29,312	29,312	29,312	0	0	0	0	0
FL	9,455	9,455	9,455	50	0	993	0	0
TOTAL	2,999,491	1,345,139		660,983	817,265	605,511	662,622	729,100

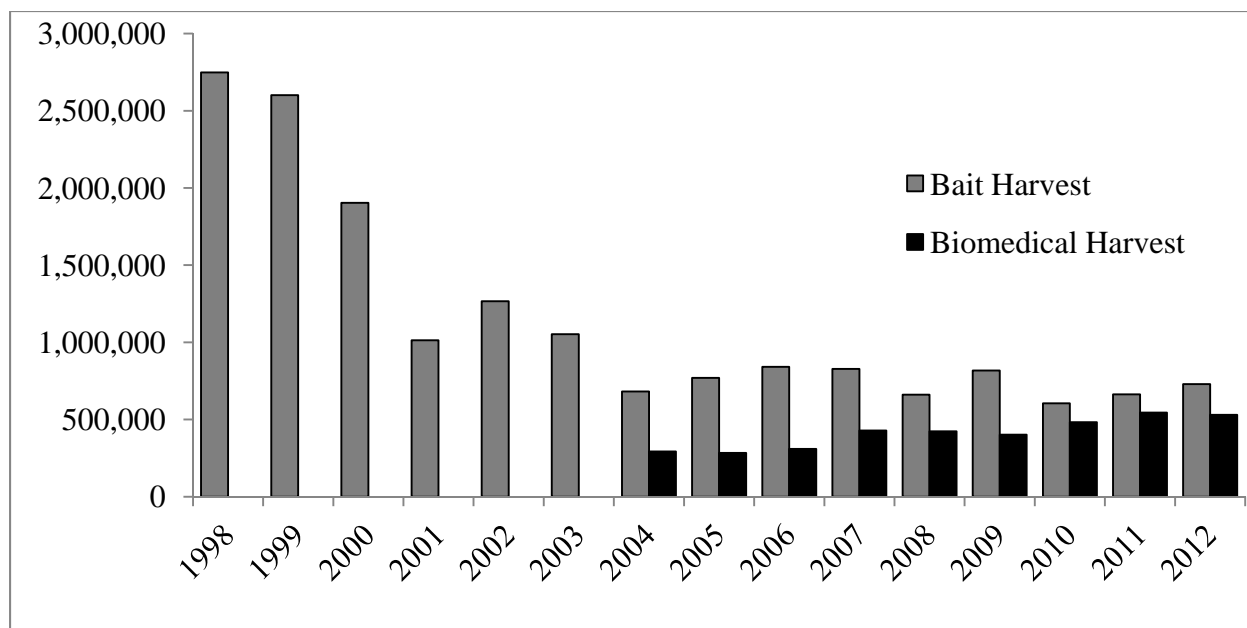


Figure 1: Number of horseshoe crabs harvested in the bait and biomedical industry, 1998-2012 (Biomedical harvest includes rejected crabs but not crabs counted as bait).

Reported coastwide landings since 1998 show more male than female horseshoe crabs were harvested annually. Several states presently have sex-specific restrictions in place to limit the harvest of females. The American eel pot fishery prefers egg-laden female horseshoe crabs as bait, while the whelk (conch) pot fishery is less dependent on females. Unclassified landings have generally accounted for around 10% of the reported landings since 2000, although 2008 had a slightly higher proportion of unclassified landings (14%). In 2012, unclassified landings accounted for approximately 11.7% of total bait landings.

The hand, trawl, and dredge fisheries typically account for over 85% of the reported commercial horseshoe crab bait landings, however, in 2012, these gears accounted for slightly less with 84.3% of commercial landings. Other methods that account for the remainder of the harvest include gill nets, pound nets, and traps.

The dominance of the hand fishery was reflected in the seasonal distribution of landings. Most of the monthly reported coastwide harvest since 1998 came during May and June as crabs come ashore to spawn and, thus, were readily available to the fishery. There is typically a secondary mode in monthly landings during the late summer or fall. This secondary peak coincides with an increased demand for horseshoe crabs in the conch pot fishery, and these crabs are generally harvested by dredge or trawl.

Whelk Fishery

The Atlantic States Marine Fisheries Commission does not manage whelk, but there is concern with the recent increase in catch and effort in the whelk fishery on the Atlantic Coast and the potential impacts of these trends on the horseshoe crab fishery. Coastwide landings of all four whelk species have increased 62% since 2005 (Figure 2). The status of each state's whelk fishery (as reported in their compliance reports) is below.

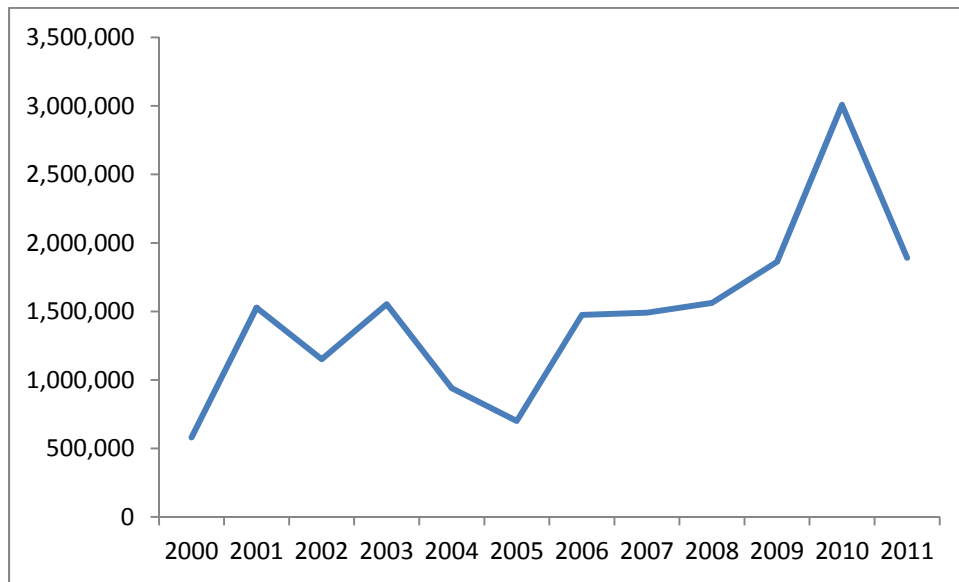


Figure 2: Coastwide landings of all four species of whelk in live pounds from 2000-2011. Source: ACCSP Data Warehouse, 2013.

Massachusetts

Since 2006, annual whelk landings in Massachusetts have increased dramatically from around 2 million pounds to over 2.5 million pounds in some years. Effort has also increased during that time period. This increase in effort is not due to latent permit holders becoming active, but rather already active permit holders fishing longer and harder. In 2011 only 55.5% of the potential pots permitted were actively fished. With the ex-vessel price of conch doubling in last 5 years, there is a substantial financial incentive for latent permit holders to start fishing.

At the current minimum shell width for channeled whelk of 2 ¾", none of the females in Massachusetts coastal waters are sexually mature. The life history characteristics of channeled whelk, specifically the slow maturation, slow growth rate and lack of a dispersal mode for larvae, make them especially prone to depletion. There is no evidence to suggest that the fate of channeled whelk in Massachusetts will be any different if the high harvest rates of sexually immature whelk continue. This is supported by the dramatically declining trend of channeled whelk relative abundance in the MADMF trawl survey as well as anecdotal reports from commercial fishermen who report that portion of Buzzards Bay and Nantucket Sound are already devoid of whelk.

Rhode Island

Rhode Island has monitored its whelk fishery since 2006. Landings have increased 150% from around 300,000 pounds in 2006 to almost 750,000 pounds in 2011.

New York

Permits that require NY fishermen to submit their landings via vessel trip reports have only been required to include all species they fish for since 2010. Therefore, prior to 2010 whelk landings were only reported voluntarily on vessel trip reports. Any trends in landings may be a result of

increased reporting. However, market prices for whelk are at all time highs and wholesaler ads have appeared in local papers promising top price for any sized whelk or horseshoe crab for the past 2 years. Some sea sampling partners who no longer consider lobster to be economically viable have converted their lobster traps to whelk pots. Vessel trip reports since 2010 indicate many other lobstermen have also switched to whelk.

Delaware

In 2007, Delaware's size limit for whelks increased from 5" to 5 ¼" by regulation. Each ensuing year, the size limit was increased ¼" until reaching 6" in 2010. This 6" size limit was based on a number of factors. Delaware Division of Fish and Wildlife (DDFW) research revealed biological traits that were highly sensitive to overfishing, namely slow growth, low reproductive potential, and extended age to maturity and recruitment into the fishery. By 2006, Delaware saw a "boom and bust" profile unfolding; a huge explosion in landings occurred in 2001, followed by falling fishery CPUE and landings every year after 2003. At the time, data suggested that only 12% of the spawning biomass was being conserved at the 5" size limit under the current high harvest levels. Lastly, the number of eligible dredge licenses was about to double in 2006, necessitating action by the DDFW to prevent overfishing.

Fishery effort has dropped considerably since that harvest peak in the early 2000s due to declining stock abundance. Lower prices for whelk and high fuel prices also contributed to this trend.

Biomedical Fishery

The horseshoe crab is an important resource for research and manufacture of materials used for human health. There are four companies along the Atlantic Coast that process horseshoe crab blood for use in manufacturing Limulus Amebocyte Lysate (LAL): Associates of Cape Cod, Massachusetts; Lonza (formerly Cambrex Bioscience) and Wako Chemicals, Virginia; and Charles River Endosafe, South Carolina. There is one company that bleeds horseshoe crabs but does not manufacture LAL: Limuli Labs, New Jersey. Addendum III requires states where horseshoe crabs are collected for biomedical use to collect and report harvest data and characterize mortality.

The Plan Review Team annually calculates total coastwide harvest and estimates mortality. It was reported that 611,827 crabs (including crabs harvested as bait) coastwide were brought to biomedical companies for bleeding in 2012 (see Table 2 below). This represents a 13% increase over the average of the previous five years but a slight decrease from 2011. Of this total, 81,030 crabs were reported as harvested for bait and counted against state quotas, representing a 3% decrease over the average of the previous five years (Table 2: row C). These crabs were not included in the mortality estimates (Rows D, F, and G) below. It was reported for 2012 that 530,797 crabs were harvested for biomedical purposes only. Males accounted for 58% of total biomedical harvest; females comprised 34%; 8% of the harvest was unknown. Crabs were rejected prior to bleeding due to mortality, injuries, slow movement, and size. Based on state reports for 2012, approximately 7.3% of crabs (or 44,832 crabs) harvested and brought to bleeding facilities were rejected. Approximately 1.3% of crabs, collected solely for biomedical purposes, suffered mortality from harvest up to the point of release.

The Technical Committee has reviewed, multiple times, the available literature for estimating crab mortality during and after the bleeding process. It had previously concluded that using an estimate of 15% mortality is reasonable; most recently, in June 2011, the TC recommended using a range of values (5-30%) for estimating mortality, in order to include the known variances in conditions and situations that can occur over the geographical and temporal range of collecting and bleeding the horseshoe crabs. Total estimated mortality of biomedical crabs for 2012 was 79,786 crabs (at 15% post-release estimated mortality), with a range of 31,189 to 152,681 crabs (5-30% post-release estimated mortality).

Table 2: Numbers of horseshoe crabs harvested, bled and estimated mortality for the biomedical industry.

		2007	2008	2009	2010	2011	2012
A	Number of crabs brought to biomedical facilities (bait and biomedical crabs)	500,251	511,478	512,552	548,751	628,476	611,827
B	Number of biomedical-only crabs harvested (not counted against state bait quotas)	428,872	423,614	402,202	482,704	545,164	530,797
C	Number of bait crabs bled	71,379	87,864	110,350	66,047	83,312	81,030
D	Reported mortality of biomedical-only from harvest to release	3,599	2,973	6,298	9,665	6,917	6,891
E	Number of biomedical-only crabs bled	398,844	402,080	362,291	438,417	492,734	485,965
F	Estimated mortality of bled biomedical-only crabs post-release (15% est. mortality)	59,833	60,312	54,344	65,763	73,910	72,895
G	Total estimated mortality on biomedical crabs not counted against state bait quotas (15% est. mortality)	63,432	63,285	60,642	75,428	80,827	79,786

The 1998 FMP establishes a mortality threshold of 57,500 crabs, where if exceeded the Board is required to consider action. Based on an estimated total mortality of 79,786 crabs for 2012, this threshold has been exceeded. The PRT notes that estimated mortality from biomedical use is approximately 10.1% of the total horseshoe crab mortality (bait and biomedical) coastwide for 2012, down from 11.1% in 2011. The reported biomedical use of horseshoe crabs has increased 85% since the biomedical landings have been tracked (2004). Given the increased demand for LAL product and the continued increase in biomedical harvest and mortality, the PRT recommends the Board continue efforts to reduce mortality in the biomedical industry through development and implementation of Best Management Practices and other state efforts.

IV. Status of Research and Monitoring

The Horseshoe Crab FMP set forth an ambitious research and monitoring strategy in 1999 and again in 2004 to facilitate future management decisions. Despite limited time and funding there are many accomplishments since 1999. These accomplishments were largely made possible by forming partnerships between state, federal and private organizations, and the support of over a hundred public volunteers.

Addendum III Monitoring Program

Addendum III requires affected states to carry out three monitoring components. All states who do not qualify for *de minimis* status report monthly harvest numbers and subsample of portion of the catch for gender and harvest method. In addition, those states with annual landings above 5% of the coastwide harvest report all landings by sex and harvest method. Although states with annual landings between 1 and 5% of annual coastwide harvest are not required to report landings by gender, the PRT recommends all states require gender reporting for horseshoe crab harvest.

States with biomedical fisheries landings are required to monitor and report harvest numbers and mortality associated with the transportation and bleeding of the crabs. States must identify spawning and nursery habitat along their coasts. All states have completed this requirement and a few continue active monitoring programs.

Virginia Tech Research Projects

The VT benthic survey was conducted for its tenth year in a row for the Delaware Bay region. The survey was unable to sample in the NY Apex in 2011 and 2012, although the area was covered in 2010.

Major findings through the 2012 survey include: 1) relative abundance of immature horseshoe crabs in the coastal Delaware Bay area did not change significantly from 2011, although 2010-2011 relative abundance was significantly lower than in 2009; 2) this difference is apparently due to large numbers of small immature crabs in the peripheral region associated with later sampling in 2009; 3) relative abundances of mature females and males in the coastal Delaware Bay area have not changed significantly since 2002; and 4) relative abundances of horseshoe crabs in the lower Delaware Bay and coastal Delaware Bay area did not significantly differ.

The total annual cost of the survey is \$200,000 and full funding was not achieved for 2012. Members of the horseshoe crab and whelk industry from the Chesapeake Bay Packing, LLC and Bernie's Conchs, LLC, collectively pledged \$10,000 to support the Horseshoe Crab Trawl Survey. An additional \$500 was contributed by Parenteral Drug Association, a pharma/biopharmaceutical scientific organization. Lonza Walkersville, Inc., a biomedical company, donated \$25,000 to support the Horseshoe Crab Trawl Survey. Funding for the survey in 2013 has still not been found, and a long-term funding solution is not solidified. The PRT stresses the importance of the survey, as it is expected to provide the most reliable estimates of horseshoe crab population abundance. Even more importantly, the PRT stresses the need for the abundance data as inputs into the newly-approved ARM Framework for management under Addendum VII.

Spawning Surveys

The redesigned spawning survey was completed for the fourteenth year in 2012; however, results for 2012 are not yet available. For 2011, no trend was detected in the baywide index of female spawning activity for the time series (1999 – 2011). There was a significant increase in the index of male spawning activity over the time series. Most spawning activity was observed in May in 2011. Sex ratios observed in the surveys have increasingly favored males, which is consistent with the sex-specific trends in spawning activity. The range of observed spawning sex ratio in 2011 was 3.1:1 to 5.2:1.

Egg Studies

Delaware includes a report on their egg sampling efforts in their annual compliance report. Results from Delaware indicated an average surface egg density of 35,008 eggs/m² for 2012, a significant decrease compared to 2010 and 2011 but similar to other years since 2005.

Though the survey has been conducted on a baywide basis since 2005, the results have not been reported regularly. Survey researchers from both sides of the Delaware Bay have met to discuss reporting details and responsibilities. Concerns were raised over the large discrepancies in mean egg abundance found on Delaware beaches versus New Jersey beaches. Although the large differences in mean egg abundance between the two sides may be real, researchers conducted side-by-side sampling in 2008 to ensure these differences were not the result of sampling and/or counting procedures. The draft report of this study, summarizing data from 2005-09, concluded that the side-by-side differences, while not statistically significant, did raise concerns about the consistently higher counts by Delaware samplers (35%) than by New Jersey samplers. Delaware has requested an evaluation of the horseshoe crab egg survey monitoring requirement to examine the need, utility, and requirement for continuance of the survey given survey costs and applicability of the survey as a model input.

Tagging Studies

The USFWS continues to maintain a toll-free telephone number as well as a website for reporting horseshoe crab tag returns and assists interested parties in obtaining tags. Tagging work continues to be conducted by biomedical companies and other parties involved in outreach and spawning surveys. As noted in past PRT and other reports, the tagging efforts would benefit by establishing clearly defined objectives and insuring better coordination among researchers. To increase quality of tagging data being collected and supplied to the USFWS in Annapolis, the Horseshoe Crab Technical Committee developed guidelines for the program specifying desired distribution of tags along the coast, data requirements for tagging and resighting, effort requirements for resighting, as well as required information for applying and receiving tags. An application based on these requirements was completed in 2012. The program guidelines will give the USFWS and the managers a better understanding of taggers' objectives and data that are more applicable to existing management questions. The PRT recommends all tagging programs, approved by the state, coordinate with the USFWS tagging program, in order to ensure a consistent coastwide program for providing management input.

Since 1999, over 226,000 crabs have been tagged and released through the USFWS tagging program along the Atlantic coast. Over 11% of tagged crabs have been recaptured and reported.

Crabs have been tagged and released from every state on the Atlantic Coast from Georgia to Massachusetts. In the early years of the program, tagging was centered around Delaware Bay; however, in recent years, more tagging has occurred in the Long Island Sound and the New Hampshire Coast as well as tagging programs in South Carolina and Georgia. The Technical Committee noted that recapture rates inside and outside Delaware Bay are likely not directly comparable due to increased re-sighting effort and spawning concentration in Delaware Bay compared to other areas along the coast. There may be data in the USFWS tagging database to determine differences in effort and recapture rates.

Adaptive Resource Management Modeling

The ARM Work Group is a subset of the ASMFC Horseshoe Crab (HSC) and the former USFWS Shorebird (SHBD) Technical Committees. The ARM Work Group is chaired by David Smith (USGS-Leetown), with lead modeler Conor McGowan (Auburn University).

The Work Group developed models to estimate horseshoe crab harvest levels that will support the energetic needs of the red knot population passing through Delaware Bay. A peer review of the ARM framework/model in 2009 concluded it is a useful tool for management and recommended improvements as it continues refinement. The Management Board sees value in this tool and adopted its use in management through Addendum VII. Although data will be available for implementation of the ARM harvest output for the 2013 fishing season, continued implementation of the ARM Framework is uncertain due to funding challenges for the Virginia Tech Trawl Survey, the source of horseshoe crab abundance data for the model.

V. Status of Management Measures and Issues

ASMFC

Initial state-by-state harvest quotas were established through Addendum I. Addendum III outlined the monitoring requirements and recommendations for the states. Addendum IV set harvest closures and quotas, and other restrictions for New Jersey, Delaware, Maryland, and Virginia, which were continued in Addendums V and VI.

The Board approved Addendum VII, implementation of the ARM Framework, in February 2012 for implementation in 2013. Addendum VII includes an allocation mechanism to divide the Delaware Bay optimized harvest output from the ARM Framework among the four Delaware Bay states (New Jersey, Delaware, Maryland, and Virginia east of the COLREGS). Season closures and restrictions, present within Addendum VI, remain in effect as part of Addendum VII.

Included in this report are state-by-state charts outlining compliance and monitoring measures. The PRT recommends all jurisdictions were in compliance with the FMP and subsequent Addenda in 2012.

NEW HAMPSHIRE		
	2012 Compliance Report	2013 Management Proposal
<i>De minimis status</i>	<i>De minimis</i> status granted.	<i>De minimis</i> requested and meets criteria.
- Ability to close fishery if <i>de minimis</i> threshold is reached	Yes	Yes
- Daily possession limit <25 for <i>de minimis</i> state	Yes – 10/day	Yes – 10/day
- HSC landing permit	Permit required, but not limited to historical participation.	Permit required, but not limited to historical participation.
Bait Harvest Restrictions and Landings		
- ASMFC Quota	350	350
- Other Restrictions	None	None
- Landings	0	--
Monitoring Component A₁		
- Mandatory monthly reporting	Yes	Yes
- Characterize commercial bait fishery	Not Required	Not Required
Monitoring Component A₂		
- Biomedical harvest reporting	Not Applicable	Not Applicable
- Required information for biomedical use of crabs	Not Applicable	Not Applicable
Monitoring Component A₃ Identify spawning and nursery habitat	Yes, by state personnel, Great Bay Watch and volunteers	Yes
Monitoring Component B₁ Coastwide benthic trawl survey	No	No
Monitoring Component B₂ Continue existing benthic sampling programs	Not Applicable	Not Applicable
Monitoring Component B₃ Implement spawning survey	As part of Component A ₃ , NH conducts a limited spawning survey	Yes
Monitoring Component B₄ Tagging program	No	No

Note: In New Hampshire, six permits were open for horseshoe crab harvesting in 2012. NH has continued its spawning and nursery survey since 2001.

MASSACHUSETTS		
	2012 Compliance Report	2013 Management Proposal
<i>De minimis status</i>	Did not qualify for <i>de minimis</i>	Does not qualify for <i>de minimis</i>
Bait Harvest Restrictions and Landings		
- ASMFC Quota (Voluntary State Quota)	330,377 (165,000)	330,377 (165,000)
- Other Restrictions	Bait: 400 crab daily limit through Jan 1- June 30; 600 crab daily limit after June 30-Dec 31; limited entry; Biomedical: 1,000 crab daily limit; Conch pot and eel fishermen: no possession limit All: May and June 5-day lunar closures; No mobile gear harvest Fri-Sat during summer flounder season; 7" PW minimum size; Pleasant Bay Closed Area	Bait: 400 crab daily limit through Jan 1- June 30; 600 crab daily limit after June 30-Dec 31; limited entry; Biomedical: 1,000 crab daily limit; Conch pot and eel fishermen: no possession limit All: May and June 5-day lunar closures; No mobile gear harvest Fri-Sat during summer flounder season; 7" PW minimum size; Pleasant Bay Closed Area
- Landings	106,821	--
Monitoring Component A₁		
- Mandatory monthly reporting	Yes, plus weekly dealer reporting through SAFIS	Yes, plus weekly dealer reporting through SAFIS
- Characterize commercial bait fishery	Yes	Yes
Monitoring Component A₂		
- Biomedical harvest reporting	Yes	Yes
- Required information for biomedical use of crabs	Yes	Yes
Monitoring Component A₃ Identify spawning and nursery habitat	Yes	Yes
Monitoring Component B₁ Coastwide benthic trawl survey	Supports it, but lacks resources to expand state trawl survey	State trawl survey
Monitoring Component B₂ Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B₃ Implement spawning survey	Yes, began in 2008 and adapted from DE Bay survey	Yes
Monitoring Component B₄ Tagging program	Yes – w/NPS and USFWS; Pleasant Bay, Monomy NWR, Waquoit Bay	Yes – w/NPS and USFWS; Pleasant Bay, Monomy NWR, Waquoit Bay

RHODE ISLAND		
	2012 Compliance Report	2013 Management Proposal
<i>De minimis status</i>	Did not qualify for <i>de minimis</i>	Does not qualify for <i>de minimis</i>
Bait Harvest Restrictions and Landings		
- ASMFC Quota (Voluntary State Quota)	26,053 (12,345)	26,053 (12,545)
- Other Restrictions	None	None
- Landings	19,306	--
Monitoring Component A₁		
- Mandatory monthly reporting	Yes, though exempt, with weekly call in and monthly on paper.	Yes, though exempt, with weekly call in and monthly on paper.
- Characterize commercial bait fishery	Yes	Yes
Monitoring Component A₂		
- Biomedical harvest reporting	Yes	Yes
- Required information for biomedical use of crabs	Yes, details within Massachusetts' reports	Captured in Massachusetts' reports
Monitoring Component A₃ Identify spawning and nursery habitat	Yes	Yes
Monitoring Component B₁ Coastwide benthic trawl survey	No	No
Monitoring Component B₂ Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B₃ Implement spawning survey	Yes, since 2000 (methods unspecified)	Yes
Monitoring Component B₄ Tagging program	RI DEM 2001-2004 only Outside, independent groups currently	No

Note: Rhode Island did not characterize their commercial catch for 2012. The PRT requests that this requirement is completed for the 2013 fishing year and included in the Rhode Island compliance report.

CONNECTICUT		
	2012 Compliance Report	2013 Management Proposal
<i>De minimis status</i>	Did not qualify for <i>de minimis</i>	Does not qualify for <i>de minimis</i>
Bait Harvest Restrictions and Landings		
- ASMFC Quota	48,689	48,689
- Other Restrictions	Limited entry program, possession limits, and seasonal and areas closures	Limited entry program, possession limits, and seasonal and area closures
- Landings	18,958	--
Monitoring Component A₁		
- Mandatory monthly reporting	Yes	Yes
- Characterize commercial bait fishery	No – exempt under Addendum III because landings are < 5% of coastwide total	No – exempt under Addendum III because landings are < 5% of coastwide total
Monitoring Component A₂		
- Biomedical harvest reporting	Not Applicable	Not Applicable
- Required information for biomedical use of crabs	Not Applicable	Not Applicable
Monitoring Component A₃ Identify spawning and nursery habitat	Yes	Yes
Monitoring Component B₁ Coastwide benthic trawl survey	No	No
Monitoring Component B₂ Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B₃ Implement spawning survey	Yes, since 1999 (methods differ from DE Bay survey)	Yes
Monitoring Component B₄ Tagging program	Yes, in collaboration with local universities	Yes

NEW YORK		
	2012 Compliance Report	2013 Management Proposal
<i>De minimis status</i>	Did not qualify for <i>de minimis</i>	Does not qualify for <i>de minimis</i>
Bait Harvest Restrictions and Landings		
- ASMFC Quota (Voluntary State Quota)	366,272 (150,000)	366,272 (150,000)
- Other Restrictions	Ability to close areas to harvest; seasonal quotas and trip limits; 200 crab/harvester daily quota; W. Meadow Beach, Cedar Beach, and Fire Island National Seashore harvest closures	Ability to close areas to harvest; seasonal quotas and trip limits; 200 crab/harvester daily quota; W. Meadow Beach, Cedar Beach, and Fire Island National Seashore harvest closures
- Landings	167,723	--
Monitoring Component A₁		
- Mandatory monthly reporting	Yes (weekly April – July)	Yes
- Characterize commercial bait fishery	No	Yes
Monitoring Component A₂		
- Biomedical harvest reporting	Not Applicable	Not Applicable
- Required information for biomedical use of crabs	Not Applicable	Not Applicable
Monitoring Component A₃ Identify spawning and nursery habitat	Yes	Yes
Monitoring Component B₁ Coastwide benthic trawl survey	No	Dependent on survey funding
Monitoring Component B₂ Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B₃ Implement spawning survey	Yes – adapted from DE Bay survey	Yes
Monitoring Component B₄ Tagging program	Yes, since 2007	Yes

Note: New York exceeded the state's horseshoe crab quota of 150,000, but was well within the Commission's quota. There is a lag of two weeks between when the harvest occurs and when the data is received. New York is actively promoting ACCSP electronic reporting to its fishermen.

NEW JERSEY		
	2012 Compliance Report	2013 Management Proposal
<i>De minimis status</i>	Qualified for <i>de minimis</i>	Qualifies but not requesting <i>de minimis</i>
Bait Harvest Restrictions and Landings		
- ASMFC Quota (Voluntary state quota)	100,000 [male only] (0)	162,136 [male only] (0)
- Other Restrictions	Bait harvest moratorium	Bait harvest moratorium
- Landings	0	--
Monitoring Component A₁		
- Mandatory monthly reporting	N/A	N/A
- Characterize commercial bait fishery	N/A	N/A
Monitoring Component A₂		
- Biomedical harvest reporting	Yes	Yes
- Required information for biomedical use of crabs	Yes	Yes
Monitoring Component A₃ Identify spawning and nursery habitat	Yes	Yes
Monitoring Component B₁ Coastwide benthic trawl survey	Yes	Yes
Monitoring Component B₂ Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B₃ Implement spawning survey	Yes – since 1999	Yes
Monitoring Component B₄ Tagging program	No	No
Monitoring Component B₅ Egg abundance survey	Yes	Yes
Monitoring Component B₆ Shorebird monitoring program	Yes	Yes

Note: A bill was introduced in 2013 (A2653 or S2376) to lift the moratorium on horseshoe crab harvest.

DELAWARE		
	2012 Compliance Report	2012 Management Proposal
<i>De minimis status</i>	Did not qualify for <i>de minimis</i>	Does not qualify for <i>de minimis</i>
Bait Harvest Restrictions and Landings		
- ASMFC Quota (State-reduced quota for overage)	100,000 [male only]	162,136 [male only] (161,881)
- Other Restrictions	Closed season (January 1 – June 7)	Closed season (January 1 – June 7)
- Landings	100,255 males	--
Monitoring Component A₁		
- Mandatory monthly reporting	Yes (weekly reports & monthly logbooks)	Yes
- Characterize commercial bait fishery	Yes	Yes
Monitoring Component A₂		
- Biomedical harvest reporting	Not Applicable	Not Applicable
- Required information for biomedical use of crabs	Not Applicable	Not Applicable
Monitoring Component A₃ Identify spawning and nursery habitat	Yes – updates once every 5 years or as needed	Yes – updates once every 5 years or as needed
Monitoring Component B₁ Coastwide benthic trawl survey	Yes	Yes
Monitoring Component B₂ Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B₃ Implement spawning survey	Yes	Yes
Monitoring Component B₄ Tagging program	No state program but has assisted in the past with various Delaware Bay horseshoe crab tagging initiatives	No
Monitoring Component B₅ Egg abundance survey	Yes	Yes
Monitoring Component B₆ Shorebird monitoring program	Yes	Yes

Note: Delaware requested a review of the utility of the Delaware Bay Egg Survey (egg abundance survey). The review is ongoing and should be completed by the Summer 2013 Board meeting.

MARYLAND		
	2012 Compliance Report	2013 Management Proposal
<i>De minimis status</i>	Did not qualify for <i>de minimis</i>	Does not qualify for <i>de minimis</i>
Bait Harvest Restrictions and Landings		
- ASMFC Quota	170,653	255,980 (male only)
- Other Restrictions	Delayed harvest and closed season/area combinations	Delayed harvest and closed season/area combinations
- Landings	169,087	--
Monitoring Component A₁		
- Mandatory monthly reporting	Yes (weekly reports for permit holders; monthly for non-permit holders)	Yes (weekly reports for permit holders; monthly for non-permit holders)
- Characterize commercial bait fishery	Yes	Yes
Monitoring Component A₂		
- Biomedical harvest reporting	Yes	Yes
- Required information for biomedical use of crabs	Yes	Yes
Monitoring Component A₃ Identify spawning and nursery habitat	Yes	Yes
Monitoring Component B₁ Coastwide benthic trawl survey	Yes	Yes
Monitoring Component B₂ Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B₃ Implement spawning survey	Yes (Counts)	Yes
Monitoring Component B₄ Tagging program	Yes – through biomedical harvest	Yes – through biomedical harvest

POTOMAC RIVER FISHERIES COMMISSION		
	2012 Compliance Report	2013 Management Proposal
<i>De minimis</i> status	<i>De minimis</i> status granted.	<i>De minimis</i> requested and meets criteria.
- Ability to close fishery if <i>de minimis</i> threshold is reached	No horseshoe crab fishery	No horseshoe crab fishery
- Daily possession limit <25 for <i>de minimis</i> state		
- HSC landing permit		
Bait Harvest Restrictions and Landings		
- ASMFC Quota	0	0
- Other Restrictions	None	None
- Landings	0	0
Monitoring Component A₁		
- Mandatory monthly reporting	Yes - weekly	Yes - weekly
- Characterize commercial bait fishery	Not Applicable	Not Applicable
Monitoring Component A₂		
- Biomedical harvest reporting	Not Applicable	Not Applicable
- Required information for biomedical use of crabs	Not Applicable	Not Applicable
Monitoring Component A₃ Identify spawning and nursery habitat	Not Applicable	Not Applicable
Monitoring Component B₁ Coastwide benthic trawl survey	No	No
Monitoring Component B₂ Continue existing benthic sampling programs	Not Applicable	Not Applicable
Monitoring Component B₃ Implement spawning survey	Not Applicable	Not Applicable
Monitoring Component B₄ Tagging program	Not Applicable	Not Applicable

DISTRICT OF COLUMBIA – NO REPORT SUBMITTED		
	2012 Compliance Report	2013 Management Proposal
<i>De minimis status</i>		
- Ability to close fishery if <i>de minimis</i> threshold is reached		
- Daily possession limit <25 for <i>de minimis</i> state		
- HSC landing permit		
Bait Harvest Restrictions and Landings		
- ASMFC Quota	0	0
- Other Restrictions		
- Landings		
Monitoring Component A₁		
- Mandatory monthly reporting		
- Characterize commercial bait fishery		
Monitoring Component A₂		
- Biomedical harvest reporting		
- Required information for biomedical use of crabs		
Monitoring Component A₃ Identify spawning and nursery habitat		
Monitoring Component B₁ Coastwide benthic trawl survey		
Monitoring Component B₂ Continue existing benthic sampling programs		
Monitoring Component B₃ Implement spawning survey		
Monitoring Component B₄ Tagging program		

Note: DC was added to the HSC Management Board to close a landings loophole that existed in the late 1990s. Since then DC has adopted regulations that prohibit landings of horseshoe crabs, thereby closing the loophole. In order to free DC of the requirement to submit compliance reports, the PRT recommends DC request removal from the HSC Board. Pennsylvania was in this same situation and was removed from the Board in 2006.

VIRGINIA		
	2012 Compliance Report	2013 Management Proposal
<i>De minimis status</i>	Did not qualify for <i>de minimis</i>	Does not qualify for <i>de minimis</i>
Bait Harvest Restrictions and Landings		
- ASMFC Quota (State-reduced quota for overage)	152,495 (130,933)	172,828 (81,331 male-only east of COLREGS line)
- Other Restrictions	Closed season (January 1 – June 7) for federal waters. Harvest east of COLREGS line must comprise 2 to 1 male to female ratio and make up no more than 40% of total landings.	Closed season (January 1 – June 7) for federal waters. Effective January 1, 2013 harvest of horseshoe crabs, from east of the COLREGS line, is limited to trawl gear and dredge gear only.
- Landings	124,048	--
Monitoring Component A₁		
- Mandatory monthly reporting	Yes – daily call in required for HCEL permit holders	Yes – daily call in required for HCEL permit holders
- Characterize commercial bait fishery	Yes	Yes
Monitoring Component A₂		
- Biomedical harvest reporting	Yes	Yes
- Required information for biomedical use of crabs	Yes	Yes
Monitoring Component A₃ Identify spawning and nursery habitat	Yes – completed	No
Monitoring Component B₁ Coastwide benthic trawl survey	Yes	Yes
Monitoring Component B₂ Continue existing benthic sampling programs	No	No
Monitoring Component B₃ Implement spawning survey	No	No
Monitoring Component B₄ Tagging program	No	No

Note: Virginia's delayed receipt of the NMFS landings from federal waters continues to be of great concern to the PRT. On-going adjustments to prior VA landings continue to confound the PRT's ability to adequately judge bait quota compliance. The PRT recommends that Virginia make a concerted effort to send their data to the PRT as soon as it is available, even if the data is not finalized until after the compliance report deadline.

NORTH CAROLINA		
	2012 Compliance Report	2013 Management Proposal
<i>De minimis status</i>	Did not qualify for <i>de minimis</i>	Does not qualify for <i>de minimis</i>
Bait Harvest Restrictions and Landings		
- ASMFC Quota	24,036	24,036
- Other Restrictions	Trip limit of 0 crabs until April 1, 2012. Trip limit of 50 crabs after April 1, 2012 Proclamation authority to adjust trip limits, seasons, etc.	Trip limit of 50 crabs; Proclamation authority to adjust trip limits, seasons, etc.
- Landings	22,902	--
Monitoring Component A₁		
- Mandatory monthly reporting	Yes – trip level reporting each month	Yes – trip level reporting each month
- Characterize commercial bait fishery	Yes	Yes
Monitoring Component A₂		
- Biomedical harvest reporting	Not Applicable	Not Applicable
- Required information for biomedical use of crabs	Not Applicable	Not Applicable
Monitoring Component A₃ Identify spawning and nursery habitat	Little information available Survey discontinued after 2002 and 2003 due to low levels of crabs recorded	Not specified
Monitoring Component B₁ Coastwide benthic trawl survey	No	No
Monitoring Component B₂ Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B₃ Implement spawning survey	No	No
Monitoring Component B₄ Tagging program	No	No

SOUTH CAROLINA		
	2012 Compliance Report	2013 Management Proposal
<i>De minimis</i> status	<i>De minimis</i> status granted.	<i>De minimis</i> requested and meets criteria.
- Ability to close fishery if <i>de minimis</i> threshold is reached	No horseshoe crab bait fishery	No horseshoe crab bait fishery
- Daily possession limit <25 for <i>de minimis</i> state		
- HSC landing permit		
Bait Harvest Restrictions and Landings		
- ASMFC Quota	0	0
- Other Restrictions	None	None
- Landings	0	--
Monitoring Component A₁		
- Mandatory monthly reporting	Yes (Biomedical)	Yes (Biomedical)
- Characterize commercial bait fishery	Yes (Biomedical)	Yes (Biomedical)
Monitoring Component A₂		
- Biomedical harvest reporting	Yes	Yes
- Required information for biomedical use of crabs	Yes	Yes
Monitoring Component A₃ Identify spawning and nursery habitat	Completed	No
Monitoring Component B₁ Coastwide benthic trawl survey	No	No
Monitoring Component B₂ Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B₃ Implement spawning survey	No	No
Monitoring Component B₄ Tagging program	No	No

GEORGIA		
	2012 Compliance Report	2013 Management Proposal
<i>De minimis</i> status	<i>De minimis</i> status granted.	<i>De minimis</i> requested and meets criteria.
- Ability to close fishery if <i>de minimis</i> threshold is reached	Yes	Yes
- Daily possession limit <25 for <i>de minimis</i> state	25/person; 75/vessel with 3 licensees	25/person; 75/vessel with 3 licensees
- HSC landing permit	Must have commercial shrimp, crab, or whelk license	Must have commercial shrimp, crab, or whelk license
Bait Harvest Restrictions and Landings		
- ASMFC Quota	29,312	29,312
- Other Restrictions	None	None
- Landings	0	--
Monitoring Component A₁		
- Mandatory monthly reporting	Yes	Yes
- Characterize commercial bait fishery	No bait landings	Yes
Monitoring Component A₂		
- Biomedical harvest reporting	Not Applicable	Not Applicable
- Required information for biomedical use of crabs	Not Applicable	Not Applicable
Monitoring Component A₃ Identify spawning and nursery habitat	Completed	Not Applicable
Monitoring Component B₁ Coastwide benthic trawl survey	No	No
Monitoring Component B₂ Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B₃ Implement spawning survey	No	No
Monitoring Component B₄ Tagging program	No	No

FLORIDA		
	2012 Compliance Report	2013 Management Proposal
<i>De minimis</i> status	<i>De minimis</i> status granted.	<i>De minimis</i> requested and meets criteria.
- Ability to close fishery if <i>de minimis</i> threshold is reached	Yes	Yes
- Daily possession limit <25 for <i>de minimis</i> state	25/person w/ valid saltwater products license; 100/person with marine life endorsement	25/person w/ valid saltwater products license; 100/person with marine life endorsement
- HSC landing permit	See above	See above
Bait Harvest Restrictions and Landings		
- ASMFC Quota	9,455	9,455
- Other Restrictions	None	None
- Landings	0	--
Monitoring Component A₁		
- Mandatory monthly reporting	Yes	Yes
- Characterize commercial bait fishery	No	Yes
Monitoring Component A₂		
- Biomedical harvest reporting	Not Applicable	Not Applicable
- Required information for biomedical use of crabs	Not Applicable	Not Applicable
Monitoring Component A₃ Identify spawning and nursery habitat	Yes	Yes
Monitoring Component B₁ Coastwide benthic trawl survey	No	No
Monitoring Component B₂ Continue existing benthic sampling programs	No	No
Monitoring Component B₃ Implement spawning survey	No	Yes
Monitoring Component B₄ Tagging program	No	Yes

Note: Florida reported an additional 1,208 crabs harvested along the east coast for 'marine life' use in 2012.

Asian Horseshoe Crabs

Bait shortages and the resulting high prices for Atlantic horseshoe crabs have resulted in the importation of Asian horseshoe crabs (*Tachypleus gigas*, *Carcinoscorpius rotundicata* and/or *Tachypleus tridentatus*). Concerns regarding the introduction of non-native parasites and pathogens, as well as concern regarding the potential human health risks associated with the neurotoxin tetrodotoxin (known to be present in *C. rotundicauda*), prompted the Commission to recommend that member states take measures to ban the importation and use of Asian horseshoe crabs (Resolution 13-01).

Alternative Baits

The University of Delaware concluded their alternative bait research, culminating in a Sea Grant publication detailing their findings. The publication will be available online at www.deseagrant.org in late May. The specific chemical cue that makes horseshoe crabs particularly appealing to American eel and whelk could not be isolated from horseshoe crab tissue. However, the research developed an alginate matrix that can be used to reduce the amount of horseshoe crab tissue necessary to effectively catch eel and whelk to as little as 1/24th of a adult horseshoe crab when used in combination with Asian shore crabs (*Hemigrapsus sanguineus*) and bait savings devices. The publication provides an easy-to-follow recipe for producing the bait matrix with off the shelf (FDA approved) ingredients and allows users to modify the bait to meet their specific needs or take advantage of other locally available bait resources.

Law Enforcement Committee

Most states reported no issues with horseshoe crab law enforcement during 2012. Virginia has had issues with harvesting over the daily limit due to the time that the limit is reset (midnight). Since horseshoe crab harvest often happens at night, fishermen harvest the limit before midnight, and then are able to harvest the limit again after midnight. This has created problems for law enforcement because an official would need to see this occur two nights in a row before they could take action.

Shorebird

The US Fish and Wildlife Service formed the Shorebird Technical Committee in 2001 with the purpose of providing technical advice to the Board on how horseshoe crab management action might affect shorebird populations. This Committee was comprised of shorebird experts and a representative of the Horseshoe Crab Technical Committee and Stock Assessment Subcommittee. The group produced a peer-reviewed report that synthesized current literature and data on the status of shorebirds in the Delaware Bay and to determine their energetic dependency on horseshoe crab eggs. The report's findings led to the initiation of Addendum III. In 2010 the Board decided to form the Shorebird Advisory Panel, as well as the Delaware Bay Ecosystem Technical Committee, to split the roles of value-based and technical input.

The USFWS received petitions in 2004 and 2005 to emergency list the red knot under the Endangered Species Act. In fall 2005, it determined that emergency listing was not warranted at the time. As part of a court settlement, the USFWS agreed to initiate proposed listings of over 200 species, including the red knot. Consideration for listing the red knot will occur throughout 2013, with a listing decision expected in the fall.

The state of New Jersey upgraded the state listing of the red knot from threatened to endangered in 2012 based on recent analysis using the Delphi Technique, a method for expert opinion to consider species population and trends, productivity, survival and mortality factors, habitat requirements, and threats to populations and habitats, and come to consensus.

VI. Research Needs/PRT Recommendations

De Minimis

States may apply for *de minimis* status if, for the last two years, their combined average horseshoe crab bait landings (by numbers) constitute less than one percent of coastwide horseshoe crab bait landings for the same two-year period. States may petition the Board at any time for *de minimis* status, if their fishery falls below the threshold level. Once *de minimis* status is granted, designated States must submit annual reports to the Board justifying the continuance of *de minimis* status.

States that qualify for *de minimis* status are not required to implement any horseshoe crab harvest restriction measures, but are required to implement components A, B, E and F of the monitoring program (Section 3.5 of the FMP). Since *de minimis* states are exempt from a harvest cap, there is potential for horseshoe crab landings to shift to *de minimis* states and become substantial, before adequate action can be taken. To control shifts in horseshoe crab landings, *de minimis* states are encouraged to implement one of the following management measures:

1. Close their respective horseshoe crab bait fishery when landings exceed the *de minimis* threshold;
2. Establish a state horseshoe crab landing permit, making it only available to individuals with a history of landing horseshoe crabs in that state; or
3. Establish a maximum daily harvest limit of up to 25 horseshoe crabs per person per day. States which implement this measure can be relieved of mandatory monthly reporting, but must report all horseshoe crabs harvests on an annual basis.

New Hampshire, Potomac River Fisheries Commission, South Carolina, Georgia, and Florida were granted *de minimis* status for the 2012 fishing year. Pennsylvania was removed from the Horseshoe Crab Management Board in 2007, and Maine was removed from the Board in 2011. New Hampshire, South Carolina, Georgia, Florida and the Potomac River Fisheries Commission are requesting *de minimis* status for the 2013 fishing season and meet the FMP requirements for achieving this status (Table 1). The PRT recommends granting all of these states *de minimis* status.

Funding for Research and Monitoring Activities

The PRT strongly recommends the continuation of the VT benthic trawl survey in order to provide the critical information for stock assessments and the ARM model. The survey is a necessity to continue ARM implementation. This effort provides a statistically reliable estimate of horseshoe crab relative abundance at a relatively low cost. Congressional funding seems unlikely, and the PRT recommends seeking funding from multiple avenues, including state and federal governments, as well as industry stakeholders and non-governmental organizations.

Tagging

All entities that currently have tagging programs are encouraged to continue. The PRT recommends using USFWS tags and reporting all data to the repository in the USFWS office in Annapolis.

Biomedical Industry

According to the FMP, the Board must consider potential restrictions on biomedical harvest because estimated mortality exceeded 57,500 horseshoe crabs in 2012. The PRT recommends that the development and implementation of best management practices for biomedical harvest becomes a high priority item especially given the increasing trend in biomedical harvest and mortality.

DRAFT