

The Horseshoe Crab (*Limulus Polyphemus*) Technical Report

The American horseshoe crab *Limulus polyphemus* is found along the Atlantic coast from northern Maine to the Yucatan Peninsula and the Gulf of Mexico. Horseshoe crabs play a vital role in the ecology of migratory shorebirds along the Atlantic coast; they provide bait for American eel and conch fisheries; and their blood is harvested by the biomedical industry to produce LAL reagent.

Horseshoe Crab Population Update

Concern about the horseshoe crab population centers around the decreasing numbers of migratory shorebirds such as the red knot, which feed on horseshoe crab eggs, mainly in the Delaware Bay area. The major factor affecting the horseshoe crab population is their use as bait by eel and conch fisheries.

The bleeding of horseshoe crabs for LAL reagent production is carried out using strictly controlled and monitored procedures. The process of acquiring blood from horseshoe crabs does not necessarily harm these remarkable animals. However, the mere handling and transport of tens of thousands of horseshoe crabs is thought to be associated with a mortality rate of less than 10%. The animals are returned to the waters they were harvested from within 24 hours of bleeding. The total number of horseshoe crabs harvested for LAL is thought to be around 200-250,000 per year¹.

The Horseshoe Crab Fishery Management Plan

The independent Atlantic States Marine Fisheries Commission (ASMFC), responsible for the management of 23 different fish species, approved an interstate Fishery Management Plan (FMP) for the horseshoe crab in 1998, which was implemented in 1999. The primary measures are:

- 1) All horseshoe crab fishermen must obtain a permit to collect horseshoe crabs.
- 2) All Atlantic states must report the number of horseshoe crabs harvested for use as bait each year.

The ASMFC also introduced quotas on the harvest of horseshoe crabs for use as bait in 2000. Data from 1999 on the numbers of horseshoe crabs harvested for bait (or landings) were used as the reference year, with the quota being set at 25% less than the reference year. This plan ensures that the numbers of harvested horseshoe crabs are monitored, with an independent report published every 5 years^{2,3}. The last Stock Assessment report was published in 2004², based on data up to and including 2003³. A recently approved addendum (IV) to the Fishery Management Plan (June 2006) has published data up to 2005 (see Table 1 on other side).

The latest figures (up to 2005) show that the number of horseshoe crabs used as bait has decreased by 76% since 1998⁴ (see also Table 1).

The 2004 ASMFC Stock Assessment report also looked at horseshoe crab populations in different regions along the Atlantic coast, over time:

Regional Trends in Horseshoe Abundance Source: ASMFC Horseshoe Crab Assessment Report, 2004

Region	Sub-region	Time Series duration of longest dataset	Conclusion about population change
Southeast		1995-2003	Stable
Delaware Bay		1988-2003	Declined
New York	W. Long Island Sound, various bays	1987-2003	Stable or increased
	E. Long Island Sound, Peconic Bay	1980-2003	Declined from peak levels in early to mid 1990s, but consistent with mid 1980s levels
New England	Cape Cod	1978-2002	Declined or stable
	Naragansett Bay	1975-2002	Declined

The findings are complex, with evidence of sub-populations within the coastal regions having different population movements. These figures show that a definite decrease during the time period 1998 to 2003 occurred around Delaware Bay. Around New England the population data was less clear, but around the southeast (including South Carolina) the population is stable.

The Situation for Charles River Laboratories

Horseshoe crabs have been banned for use as bait in the eel, conch and whelk industries in the state of South Carolina since 1992.

Charles River Labs is in a unique position regarding the horseshoe crab population in South Carolina (the location of Charles River's crab bleeding facility) thanks to the foresight of company founder, James F. Cooper, PhD. Dr. Cooper initiated a dialogue with the ASMFC and the South Carolina Department of Natural Resources, resulting in a regulatory environment which protects the indigenous crab population. In South Carolina, horseshoe crabs can only be used for biomedical applications (LAL production) and marine biological research. In South Carolina, the horseshoe crabs cannot be used as bait.

This has led to the horseshoe crab population remaining stable in South Carolina.

Table 1. Reported Horseshoe Crab Landings (in number) for Bait⁴

Jurisdiction	Reference Period Landings (RPL)	ADDENDUM I QUOTA*	ADDENDUM III QUOTA*	1998	1999	2000	2001	2002	2003	2004	Preliminary 2005
ME	13,500	13,500	13,500	13,500	1,500	1,391	100	150	98	0	0
NH	350	350	350	200	350	180	0	120	0	0	0
MA	440,503	330,377	330,377	400,000	545,715	272,930	134,143	138,613	125,364	69,436	73,740
RI	26,053	26,063	26,053	-	26,053	13,809	3,490	3,886	5,824	6,030	8,260
CT**	64,919	48,689	48,689	34,583	45,050	15,921	11,508	32,080	13,386	23,788	15,240
NY	488,362	366,272	366,272	352,462	394,026	628,442	129,074	177,271	134,264	142,279	155,108
NJ	604,049	453,037	150,000	241,456	297,680	398,629	261,239	281,134	113,940	46,569	87,250
PA	-	0	0	75,000	0	0	0	0	0	0	0
DE	482,401	361,801	150,000	479,634	428,980	248,938	244,813	298,318	356,380	127,208	154,269
MD	613,225	459,919	459,919	114,458	134,068	152,275	170,653	278,211	168,865	161,928	169,821
PRFC	-	0	0	-	0	0	0	0	0	0	0
DC	-	0	0	-	0	0	0	0	0	0	0
VA	203,326	152,495	170,653	1,015,700	650,640	145,465	48,880	42,954	106,577	94,713	59,865
NC	24,036	24,036	24,036	21,392	28,094	14,973	9,130	12,906	24,367	9,437	7,337
SC	-	0	0	-	0	0	0	0	0	0	0
GA	29,312	29,312	29,312	-	29,312	0	0	0	0	0	0
FL	9,455	9,455	9,455	200	19,446	10,462	0	200	1,628	0	0
TOTAL	2,999,491	2,275,296	1,471,192	2,748,585	2,600,914	1,903,415	1,013,030	1,265,843	1,050,693	681,388	730,890
Pet. Reduction Relative to RPL				8.4	13.3	36.5	66.2	57.8	66	77.3	75.6
Pet. Reduction Relative to Quota I						16.3	55.5	44.4	53.8	70.1	67.9
Pet. Reduction Relative to Quota III										53.7	50.3

* States that qualify for de minimis status are not being required to reduce landings by 25%

** CT landings prior to 2000 are estimated based on bait usage in the eel and conch fisheries

Charles River Laboratories continues to work with South Carolina Department of Natural Resources to conduct population-tagging studies and to conduct morbidity/mortality studies.

At the end of each bleeding season, we have enough lysate to last a minimum of 24 months.

Addendum IV (June 2006) to the Fishery Management Plan

Further restrictions on the harvest of horseshoe crabs for bait in Delaware and New Jersey have been approved in Addendum IV to the Fishery Management Plan⁴. This addendum was approved in May 2006, and will be implemented by October 2006. However, limited harvesting of horseshoe crabs as bait is still permitted.

The harvest of horseshoe crabs for the LAL industry in these states is unaffected.

It is expected that this latest Addendum will have a similar effect on the horseshoe crab population in the Delaware Bay area as that found in South Carolina. It should be noted that these restrictions are not as stringent as those in South Carolina.

Conclusions

- There is no threat to the horseshoe crab population in South Carolina
- There is no threat to LAL reagent production in South Carolina
- Addendum IV (June 2006) to the Fishery Management Plan protects the harvest of horseshoe crabs for biomedical use in the Delaware Bay area

References

- 1) Horseshoe Crab Factsheet ASMFC
- 2) The Atlantic States Marine Fisheries Commission Horseshoe Crab Stock Assessment Report February 2004
- 3) The 2003 Review of the Fishery Management Plan for Horseshoe Crab (*Limulus Polyphemus*), July 2004.
- 4) Fishery Management Report No. 32d of the Atlantic States Marine Fisheries Commission: Addendum IV to the Interstate Fishery Management Plan for Horseshoe Crab. June 2006.