

## **Alternative Bait - Trap Design Workshop**

### **for Horseshoe Crabs**

**October 5, 1999**

**Essington, PA**

## **INTRODUCTION**

The horseshoe crab is an extremely important resource to man and to the ecology migratory shorebirds, Atlantic loggerhead turtles and several finfish. The horseshoe crab is a primary bait source in the American eel and conch (whelk) pot fisheries. Localized horseshoe crab declines noted in the Mid-Atlantic region, coupled with the region's environmental sensitivity in regard to migrating shorebirds, prompted the states of NJ, DE and MD to impose significant restrictions on horseshoe crab harvest. These restrictions were upheld with the adoption of the Atlantic States Marine Fisheries Commissions Horseshoe Crab Fishery Management Plan in October 1998. However, these restrictions have strained the horseshoe crab bait market, causing prices to escalate and periodically, at least, localized bait shortages.

The Atlantic States Marine Fisheries Commissions Horseshoe Crab Technical Committee (HSC TC) supports the wise conservation and use of the horseshoe crab. Recognizing that the development of an effective (in terms of catch, cost, ease of use, etc...) alternative bait and/or modified trap design could immediately reduce horseshoe crab exploitation and satisfy the needs of many fishermen, the HSC TC convened an alternative bait - trap design workshop.

The objective of this workshop was to begin a dialog amongst fishermen, scientists and others which would lead to the identification of successful strategies that fishermen can employ to reduce their dependence on horseshoe crabs for bait and to disseminate these strategies coastwide ASAP (year 2000). In addition, it was the intent of the workshop to: 1) support the needs of the fisherman and the horseshoe crab resource; 2) assemble the current knowledge of fishermen and researchers in this regard; 3) foster working relationships between fishermen, researchers and conservationists; and 4) promote the use of alternative baits and trap designs.

## **REPORT FROM HORSESHOE CRAB TECHNICAL COMMITTEE - Peter Himchak**

Peter Himchak (TC Chairperson) described the uncertainties of the status of the

horseshoe crab coastwide and the difficulties in managing the resource in the absence of a quantitative stock assessment. Perhaps the most important component of the Horseshoe Crab Fishery Management Plan adopted in October of 1998 was the identification of a number of research and management needs. Among these needs was the development of alternative bait sources and trap designs for the fisheries that rely on the horseshoe crab. It is in an attempt to foster the development of these alternative baits and trap designs that has prompted the ASMFC to host this workshop.

### **REPORT FROM HORSESHOE CRAB ADVISORY PANEL - Robert Munson**

Robert Munson (AP Chairperson) stressed the need for an alternative that allows both the eel and the conch fisheries to obtain an adequate bait supply. Mr. Munson noted that in NJ bait (HSCs) available to eel fishermen has declined. Horseshoe crabs taken in NJ during spring and harvest season (the only harvest allowed) are often shipped out of state, due to a lack of adequate freezer space, and are not returned to supply the fall eel fishery. Those crabs that are sent back attain costs of \$1.50 each.

Personal knowledge and results of the NJ and DE bait needs questionnaires indicate that baits other than horseshoe crabs have been used, but it is generally agreed that they, at least currently, under perform horseshoe crabs. Otherbaits sometimes used in the absence of horseshoe crabs include Atlantic menhaden, female blue crabs, cat food, cheese and assorted fish roe. A company in Maine has developed a heavily salted ground fish product (herring), which is available in a pre-packaged form and has been successfully used for blue crabs. This product may have some potential as an alternative eel bait, but no known tests have been conducted. In Maryland, razor clams are sometimes used with success; however, razor clams are unavailable in NJ and many other areas. In previous years, NJ eel potters used clam bellies with success. This bait was readily available as a by-product from clam processing facilities. Further, much of this waste was discarded into local waters, which resulted in eels readily exploiting and "imprinting" on this food source. Clam processors are no longer permitted to dispose of their waste in such a manner, causing the bait to lose its appeal to eels. It was also noted that when alternative baits are tried, they sometimes meet with success, but only after allowing several days of acclimation (for eels to begin to concentrate on them). This results in lost fishing time.

Mr. Munson offered the following information as to what an alternative bait must offer to be effective:

1. Last 2 – 3 days in the pot
2. Low cost (< \$0.75/day/pot)
3. Be attractive to eels (or conch)
4. Readily available

In the absence of a good alternative bait, many fishermen have been looking for ways

to extend the use of horseshoe crabs. Initially, conch fishermen began substituting a whole female horseshoe crab with a whole male and a half of a female. Some conchers are also using such things as skate, dogfish and Atlantic menhaden in conjunction with horseshoe crabs. The addition of a companion bait reduces bait use by redirecting the foraging of non-target species (sea lice, crab and snails) on the companion bait rather than the horseshoe crab.

Another way to extend the use of horseshoe crabs is by grinding it and incorporating the parts into a useable medium. In this form, other additives (fish, clam, shrimp parts, etc..) may also be incorporated. Mediums suggested included tallow, gelatin, or commercially available binders.

The desire to further reduce bait needs in the conch fishery have lead some fishermen to use bait bags. Bait bags (or compartments) have been successfully used in other fisheries (most notably the crab pot and lobster pot fisheries) as a method to extend bait "life". The addition of a bait bag with floatation to suspend the bait off the bottom has reportedly met with some success in the conch fishery.

#### REPORT FROM CONCH AND EEL FISHERMEN AND RESEARCHERS:

Frank Eicherly, a Delaware conch pot fisherman, described his success with bait bags in the conch pot fishery. The bags are constructed of ¼ -inch extruded plastic netting (the same commonly used in aquaculture). Each bag is constructed by folding a section of the netting in half and sealing two of the sides with stainless steel hog rings. He has tried three different sizes. The bags are placed in the bottom of the pot and secured with a bungee cord. The bungee cord also serves to close the open bag end.

Often, the bags are used with a device called a "bait enhancer", which is commercially available. The bait enhancer (commercially available) consists of a loop of shock cord, fed through two short lengths of ¾ -inch PVC with a small hook at either end for attachment to the top of the pot.

Mr. Eicherly has reduced his bait needs by 75%, while increasing his conch harvest. Whereas he formerly used 1 whole female, he now baits each pot with a quarter of a female in a bait bag. By keeping undesirable species from devouring the bait, the bag allows the bait to fish longer, thus increasing catch. When the old bait is removed, he often attaches it to the "bait enhancer ". At times, he may add a piece of menhaden to the enhancer.

The bags are easily constructed. His mate can construct them en route to the fishing grounds. The placement of fresh bait and removal of old bait is easily accomplished: although, a brief adjustment period may be necessary for a potter to get a system down and it may slightly slow down the overall process. If enough bags were available, the placement of bait into the bags could be made ahead of time. Although he has only been using the bags for two years, he estimates that a bag will last or at least several

years. The initial costs in supplies amounted to only about \$200 for all his pots, which was quickly recovered in bait savings.

John Henry, ASMFC American Eel Advisory Panel Chairperson and MA eel potter, suggested the use of Vexlar(Sp.) since it seems to be more flexible and durable. Mr. Eicherly stated that he wanted to use that product initially, but could not locate a source. Mr. Henry stated that in MA they use clams for eel bait because they work well and are cheap.

Mr. Glenn Gauvry of the Ecological Research & Development Group, Inc. suggested soliciting the manufacturers of the materials used to make the bags for the donation of material. He thought that with his volunteer base, he could produce enough bags to distribute an ample number of bags to some fishermen to try. He suggested targeting larger operations or those fishermen that would be influential in terms of promoting innovative fishing techniques. Mr. Bob Fisher of the Virginia Institute of Marine Sciences (VIMS) Sea Grant Program informed workshop participants that some Sea Grant money may be available to obtain a small amount of material to begin constructing some of the bags for testing by fishermen. Mr. Gauvry and Mr. Fisher agreed to investigate this possibility further.

Mr. Tom O'Connell noted that biologists in NC reported the use of shrimp heads, crab and cheese being used in the conch fishery.

Dr. Nancy Targett from the University of Delaware gave a review of her work in isolating the compound from horseshoe crabs that serves as an attractant to eels (and conch). To date, they have isolated a stable compound that is attractive to eels and mud snails. Mud snails are used in laboratory because of their availability. The snails are similar to conch in that they are bottom dwellers and feed on carrion. The compound isolated from female horseshoe crabs is particularly attractive to eels. It is a very large compound, making it difficult to tease out the active component.

Currently, Dr. Targett and her student (Ms. Kristin Ferrari) are researching an appropriate medium that can support the compound, such that it can be used as bait (technically, a bait extender). They are working with manufacturers of other (deer) baits and attractants and hope to begin field testing this winter. Ultimately, the intent is to synthetically reproduce the attractive compound - horseshoe crabs are presently required for the current process.

Mr. Eric Paus, Associates of Cape Cod (biomedical facility) reported that large quantities of hemolymph are a by-product of the lysate manufacturing process. His company distributed some to fishermen for use as eel bait. The fishermen reported success, but seemed to lack an appropriate medium in which they could place the hemolymph. He questioned whether the attractive compound that Dr. Targett spoke of could be in the hemolymph. Dr. Targett stated that it was possible for the compound to be in the hemolymph, especially given that the fishermen reported success. Both parties agreed

that they should further collaborate and research the possible use of the hemolymph by-product.

Mr. Bob Fisher (VIMS) reported on a grant he received from Sea Grant to investigate alternative baits. He noted that there is a tremendous amount of waste (liquids and solvents (solids) discarded in the surf clam industry and that some fishermen use surf clam as a bait (5-6/pot). This, combined with the abundance of cownose rays (considered a nuisance species) prompted him to begin investigating their use as an alternative bait or bait extender in the conch (lightning whelk) pot fishery. He is currently looking into incorporating the clam waste and ground horseshoe crab into the cownose ray fish that can then be used as a bait. Mr. Fisher also stated that he is investigating incorporating female horseshoe crabs with the clam waste and binders (buffered blood plasma, gums, etc...) to produce a chub that can be easily used to bait pots. Chub is a term used to describe a formed disc, sausage or similar configuration resulting from the binding / packaging process. Mr. Fisher, Dr. Targett and Mr. Paus agreed that there is also great potential for using the horseshoe crab hemolymph in Mr. Fisher's work.

## **FEASIBILITY AND RECOMMENDED STRATEGY FOR IMPLEMENTING ALTERNATIVE BAIT - TRAP DESIGNS IN THE YEAR 2000**

### **Short-term:**

- 1) Test (lab and field) natural active compound in binders;
- 2) Test natural active compound response to conch (focus has been on eels); and
- 3) Test eel and conch response with hemolymph.

### **Long-term:**

- 1) Incorporate the short-term findings into the development of a synthetic (artificial) bait.

### **SYNTHETIC HORSESHOE CRAB BAIT**

<b>STATUS</b>	<b>YEAR 2000 FEASIBILITY</b>	<b>STRATEGY</b>

**Short-term:**

Very promising for the year 2000.

**Long-term:**

Promising but still 2-3 years away.

- 1) Proceed with lab and field tests.
- 2) Identify binder that works and is cost effective. (Work with Dr. Bob Fisher, contact feed companies, aquaculture feed industry, US Patent Office - Search for Fish Bait on internet.)
- 2) Obtain and test response to hemolymph.

**BAIT BAGS**

**STATUS**

**YEAR 2000 FEASIBILITY**

**STRATEGY**

- 1) Reported success in DE by conch fishermen who have reduced horseshoe crabbait needs by 50-75% and increased catch rates of conch.
- 2) Reported success in MA by conch fishermen who have reduced bait needs by 50%.

Definitely.

- 1) Identify vendors for bait bags immediately (Frank Eicherly, Glenn Gauvry, Bob Fisher).
- 2) Manufacture bait bags for dissemination (Glenn Gauvry, Frank Eicherly, Bob Fishery)
- 3) Distribute "free" bait bags to fishermen (States provide Glenn Gauvry with names of fishermen).
- 4) Disseminate information on the use of bait bags to fishermen (States distribute this summary report).
- 5) Conduct field tests (as broad geographic coverage as possible) immediately (Bob Fisher, Rick Robbins).

<b>COMPOSIT BAIT</b>		
<b>STATUS</b>	<b>YEAR 2000 FEASIBILITY</b>	<b>STRATEGY</b>
1) Sea Grant funded composit bait development project initiated by VIMS.  2) Field tests planned for fall 1999.	Definitely.	1) Proceed with field tests.  2) Maintain industry support.  3) Examine use with bait bags.
<b>HEMOLYMPH BAIT</b>		
<b>STATUS</b>	<b>YEAR 2000 FEASIBILITY</b>	<b>STRATEGY</b>
1) Reported success by MA conch fishermen.  2) Biomedical companies beginning to collaborate with researchers.	Definitely.	1) Examine the possibility of biomedical companies working with researcher.  2) Provide hemolymph samples to Bob Fisher and Nancy Targett for lab and field tests.  3) Identify sources of hemolymph for experimental use by fishermen.  4) Identify additional funding sources (Jim Berkson?)
<b>SUSPENDED BAIT</b>		
<b>STATUS</b>	<b>YEAR 2000 FEASIBILITY</b>	<b>STRATEGY</b>
1) Bait floats are being utilized by conch fishermen in NJ and MA.  2) Bait floats are reported to work better in areas with muddy substrates.	Definitely.	1) Contact fishermen utilizing bait floats to determine level of success (Bob Munson). If results are successful, disseminate information to fishermen.

## **SUMMARY**

There was much optimism amongst the technical committee members, advisors and researchers about the potential of implementing alternative bait and trap design strategies in the year 2000. Our success with implementing these strategies in the year

2000 will depend upon the formation of partnerships and cooperative efforts amongst state and federal agencies, fishermen and researchers. The names and contact information for the meeting participants is attached.

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