

Conch Bait and Gear Workshop Summary

March 3, 2004

A workshop to discuss the use of horseshoe crabs as bait was held outside of Baltimore on February 11th and 12th. It was sponsored by Atlantic States Marine Fisheries Commission (ASMFC), Ecological Research and Development Group (ERDG), New Jersey, Delaware, and University of Delaware Sea Grant. Below is a summary of that workshop.

Objective

To exchange and explore ideas to find ways to increase or maintain conch fishing success while decreasing dependence on horseshoe crabs as bait.

Participants

Watermen

Bert Adams (DE)
Ken Bailey (NJ)
Danny Dwyer (MA)
Frank Eicherly (DE)
Charlie Givens (NJ)
John Hanos (RI)
George Hanos (RI)

David Kielmeier (NJ)
Fred Layton (NJ)
Keith Lewis (MA,VA)
Mike Litchko (NJ)
David Tahtinen (MA)
Harry Tull (NJ)

University Researchers

Bob Bayer (Lobster Institute, UMaine)
Bob Fisher (VIMS)
Carl Shuster (VIMS)

Nancy Targett (U. of Delaware)
Kirsten Wakefield (U. of Delaware)

State/Federal Personnel

Greg Breese (USFWS)
Steve Doctor (MD DNR)
Pete Himchak (NJ DWF)
Gina Hunt (MD DNR)

Stew Michels (DNREC)
Brad Spear (ASMFC)

Other

Ron Berzofsky (Cambrex; biomedical)
Glenn Gauvry (ERDG; conservation)
Michael Oates (Anew; media)
Rick Robins (Chesapeake Bay Packing;
processor)

Melissa Rossi (Associates of Cape Cod;
biomedical)
Tim Thomson (Hydrophilix; bait/gear
development)

Gear

Findings from Watermen

One overall finding from experiences of the watermen is that no specific gear designed to catch conch works all the time in all areas. The watermen are very innovative, continually experimenting with gear modifications to catch the most conch with the least amount of horseshoe crab. Their pots are made of a variety of materials from all wood to all plastic to mostly wire and virtually any combination of the three. Reactions to the use of bait bags in the pots ranged from 'won't fish effectively, so won't use them' to 'saves bait and money, so won't fish without them'. Others have experimented with bait boxes made with perforated steel, bait cups filled with ground horseshoe crabs, and bait cavities built into the pots with varied success. The problem of predation of sea lice on the bait has led to modifications in bait receptacles. Though not mutually exclusive, the differences in watermen's experiences with gear appeared to be affected by latitude, water temperature, season, and depth of water (bay vs. ocean), among other things.

Again, watermen are trying to design their conching gear to get the most return for the least amount of horseshoe crab. They like the idea that they can experiment with different types of gear at different times of the season. They stated that regulation mandating the use of bait saving devices does not recognize the fact that watermen are constantly trying to save bait. Furthermore, mandatory use of bait saving devices discourages experimentation with new designs.

Bait

Findings from Watermen

Horseshoe crab is, without question, the most effective bait currently available to catch conch. Watermen have experimented with everything from bycatch found in their pots (green crabs, spider crabs, blue crabs, mussels) to other marine species (menhaden, skate, dogfish heads, herring, sea clams, bluefish, scup) to random, non-marine things (chicken, venison, dirty diapers, licorice). While many of these different baits (not the diapers) have caught conch, none are as effective on a consistent basis as horseshoe crab. Many watermen use a mix of different baits with pieces of horseshoe crab and have had fishing success. The mixed results seen by watermen have varied by area, water temperature, and season.

Watermen have also experimented with injecting hemolymph, the byproduct from the biomedical bleeding process, into various substrates. One watermen injected hemolymph into menhaden and had as much success catching conch as with horseshoe crab. He obtained another batch of hemolymph and had much less success. He was unsure what caused the different results. Some have speculated that the hemolymph may have been stored in different conditions or that there were chemicals present in the second batch that were not in the first. Several watermen were interested in obtaining hemolymph from the biomedical companies to experiment with it.

If hemolymph is used at least in part for bait, conch may ingest it while in the pots. An issue that needs to be evaluated is whether the substances used by the biomedical facilities in the processing of the blood that remain in the hemolymph, meet the requirements for human consumption of conch meat.

One waterman had experience using horseshoe crabs that had been bled in the biomedical process. He reported decreased effectiveness in catch of conch.

In the past, the phrase “alternative bait” has been used generically to refer to bait used to supplement horseshoe crabs and synthetic bait used to replace horseshoe crabs. An effective alternative to horseshoe crab does not exist and, therefore, use of the phrase can be misleading by setting up false expectations that there is an alternative bait that is as effective as horseshoe crab. The watermen distinguished between supplemental bait and synthetic bait. Supplemental bait is described as bait that is used simultaneously with horseshoe crab and that allows fishermen to use lesser amount of horseshoe crab than they would if they only used crab while still maintaining fishing success. Examples are using menhaden with a piece of crab or injecting hemolymph in to menhaden. Synthetic bait is described as artificially developed bait that can fish as or more profitably than horseshoe crabs without using any part of crab. Synthetic baits are many years away from being a viable product.

Findings from Researchers/Industry

Bob Fisher (VIMS) conducted research on supplemental baits and came to the same conclusion as the watermen: no other bait catches conch as effectively as horseshoe crabs. Further backing up what the watermen have found, he noted that seasonalities affected fishing success. One supplemental bait he tested, cownose ray flesh, showed the most promising response to attracting conch. He remains hopeful that the cownose ray may be a viable supplement to horseshoe crabs.

Bob also experimented with other supplemental baits, such as hemolymph and hemolymph with surf clam waste in a gelatin brick. In laboratory tests, conch showed no response to the hemolymph. In field tests, Bob saw very limited fishing success with the gelatin bricks. One problem may be the bricks might not release the “essence” of the hemolymph into the water effectively over time.

Hydrophilix is a private company that has developed a synthetic, Hydrophilic Polyurethane, which may address the release over time problem mentioned above.

It produces 1' x 1' sheets of synthetic "scaffold" that have about 12 sq ft of surface area and can be used to release substances into the water. Two key components for successful fishing with the sheets are finding what substance can be used to attract conch and developing the "infrastructure" to recharge and reuse the sheets. Hydrophilix has experimented with incorporating herring "essence" into its sheets and fishing for lobster. The sheets as bait in lobster traps were shown to be about 55% as effective as natural herring. Hydrophilix determined that 80% is the minimum percent for viability. If conch fishing effectiveness can be demonstrated, potential benefits include decreased dependence on horseshoe crabs, ease of handling "bait", decrease in cost of bait, and ability to reuse and recycle sheets.

Nancy Targett of University of Delaware Sea Grant (UDSG) has been working for several years to isolate what attracts conch to horseshoe crabs. They believe they have isolated the natural compound from the horseshoe crabs and have gotten good response from snails and eel in the laboratory. To date the isolated compound has not been tested on conch in the lab or in the field. UDSG produced 500 pounds of bait matrix that contains the isolated compound. They will make the bait matrix available to watermen who are willing to experiment with it in the field and report back on the results. Ultimately, UDSG would like to develop an artificial version of the natural attractant found in horseshoe crabs, thereby reducing or eliminating dependence on horseshoe crabs as bait. The workshop group saw much potential in UDSG partnering with Hydrophilix to combine the natural or synthetic attractant with the Hydrophilic Polyurethane sheets.

Bob Bayer at the Lobster Institute, University of Maine, presented to the group his experiences with testing supplemental bait in the lobster industry. Testing of bait in the lobster industry can serve as a model for testing of bait in the conch industry. The first phase of testing occurs in the lab to detect response. Next the Institute gives a little bit of the experimental bait to get initial feedback from field tests. If the fishermen report a good level of positive response, the Institute will launch a full scientifically designed field experiment using fishermen's expertise. Bob explained different ways to reimburse fishermen for their time. Compensation for fishermen's time and expertise can be based on loss of catch if the experimental bait is not as effective or can be for a days work.

Melissa Rossi of Associates of Cape Cod (ACC) made note that ACC, in the past, experimented internally with supplemental bait using hemolymph. Researchers there used the hemolymph with guar gum to make semi-solid bait. ACC reported that the supplemental bait caught as many conch as horseshoe crab. ACC has since stopped experimentation with supplemental bait. However, ACC and Cambrex are willing to provide hemolymph to watermen interested in doing their own experimentation. Both companies are interested in working with watermen to alter their process, including the addition of chemicals and storage of byproduct, to make the hemolymph as useful as possible.

As noted above, if hemolymph is used at least in part for bait, conch may ingest it while in the pots. An issue that needs to be evaluated is whether the substances used by the biomedical facilities in the processing of the blood that remain in the hemolymph, meet the requirements for human consumption of conch meat.

Potential Outcomes Achieved through Cooperation

From Cooperation among Watermen

- Implementation of gear modification, bait storage, and sea lice mitigation tips that were shared among watermen at the workshop
- Initiation of a non-profit Conch Fishermen's Association was discussed and there was considerable interest in moving forward on this idea

From Cooperation between Watermen and the Biomedical Industry

- Distribution of hemolymph by ACC and Cambrex to watermen interested in experimentation
 - Exchange information about how to handle and store the material
 - If positive results are seen, watermen, biomedical companies, and any others who may be involved will have to answer questions such as:
 - Whether substances used in processing of blood that remain in hemolymph are meet requirements for human consumption of conch meat?
 - What can the biomedical companies do to alter their process to make hemolymph as useful as possible?
 - How much hemolymph do the watermen need?
 - How much hemolymph will be available to watermen?
 - How will it be distributed?
 - What are the business details and implications of distributing hemolymph on a large scale?
- If horseshoe crab blood proves to be effective supplemental bait, watermen asked that the biomedical industry teach them how to properly handle, bleed, and release crabs to minimize mortality. This may be a solution if hemolymph from biomedical companies is less effective than whole blood or if substances used by biomedical companies prohibit the byproduct from being used as conch bait.

From Cooperation among Researchers, Private Industry, and Watermen

- Cooperative work between researchers, such as Bob Fisher at VIMS, and watermen to test supplemental or synthetic baits and develop a standardized testing protocol (See Recommendation 2. below)
 - Watermen are willing to work with Bob especially if there will be compensation
- Distribution of small portions of bait matrix by Univ. of Delaware Sea Grant to watermen for initial testing with the understanding that watermen would report back findings by answering a questionnaire
 - Questionnaire would ask watermen for such details as:
 - soak time of pots/bait

- bottom type
- type of gear/bait bag
- water temperature
- weather (wind and moon phase)
- bait used in combination or in other nearby pots (male/female crabs, etc.)
- average catch per pot
- Exploration of a partnership between Hydrophilix and Univ. of Delaware Sea Grant to develop a truly alternative, synthetic bait

From Cooperation among Various Interests

- Printing and distribution of a bait and gear newsletter to keep watermen and interested parties informed of new issues and innovations
 - Ecological Research Development Group, Associates of Cape Cod, and Univ. of Delaware Sea Grant have already expressed interest in contributing to the effort

Recommendations

To Researchers

1. Develop a standardized protocol for testing supplemental and synthetic baits.
2. Investigate the impact of sea lice predation on bait and how to avoid it.
3. Investigate conch diet, feeding habits, and other behavior.
4. Explore other funding sources and collaborations. Horseshoe crab research is being conducted at Univ. of Maryland – Eastern Shore and Virginia Tech

To Managers

1. Do not encourage or mandate the use of bled crabs for bait until sufficient testing has been conducted to determine effectiveness and practicality. Incorporate such language into Addendum III.
2. Do not encourage or mandate the use of bait bags or other gears until sufficient testing has been conducted to determine effectiveness and practicality in the waters of intended use.
3. If hemolymph is seen to be effective supplemental bait, encourage all biomedical companies on the Atlantic coast of the U.S. to provide the byproduct.
4. Adopt a standardized protocol for testing supplemental and synthetic baits, once it is developed.
5. Adopt the words bait, supplemental bait and synthetic bait as language to describe the attractant.