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Virginia Institute of Marine Science
Center for Coastal Resources Management

FACT SHEET

Polyhydroxyalkanoate (PHA) biodegradable escape panel (biopanel) for crab, lobster, and fish traps.

Polyhydroxyalkanoates (PHAs) are a family of naturally occurring biopolyesters that are produced by bacteria and are completely biodegradable by microbes typically found in the marine environment. Bacteria create PHA and use it to store energy in a similar way that humans store energy as fat. In aquatic environments, bacteria recognize the material as a food source and consume it thus converting PHA to biomass, water, carbon dioxide, and naturally occurring monomers. PHA meets the American Society of Testing and Materials certification as well as European Standards for biodegradation in the marine environment [1]. PHA has physical characteristics similar to non-degradable plastics and can be formulated for extrusion into molded forms. A number of companies produce and sell a variety of PHA formulations [2]. The rate of biodegradation can be controlled by adjusting the thickness of the polymer [3].

Researchers at the Center for Coastal Resources Management, Virginia Institute of Marine Science, College of William & Mary, tested PHA as the material of choice for use in developing escape panels for crab, lobster, and fish traps (Fig. 1). VIMS researchers documented the extent of lost and abandoned blue crab traps and the effect on entrapped animals in the Virginia portion of the Chesapeake Bay. Over four consecutive winters, fishermen hired to recover lost traps removed almost 32,000 traps which contained almost 32,000 animals [4, 5]. The issue of lost and abandoned traps is a global problem in almost all the trap fisheries. Fishermen lose anywhere from 10 – 70% of their traps annually [6]. Problems with lost traps are compounded by the advent of long lasting synthetic material in trap construction with some trap types lasting up to 15 years.

Figure 1. PHA biodegradable escape panel for blue crab traps.

Earlier methods of providing escape vents for animals captured in lost traps were prone to failure either by degrading too quickly or not at all [7]. Since PHA is consumed by bacteria, panels constructed of PHA have a high level of certainty of dissolving and providing an avenue for escape. Since PHA is consumed by bacteria naturally occurring in water, PHA biopanels have an added benefit of lasting longer if regularly fished. This is because microbes feeding on the PHA have inhibited or delayed growth when exposed to UV light during trap retrieval requiring constant regrowth of bacteria on biopanels of active traps. Lost traps however, remain on the bottom out of UV light exposure and populations of bacteria can proliferate and more quickly consume the PHA [8, 9].

In addition to blue crab traps, VIMS researchers developed prototype biopanels for a number of fisheries including lobster, Dungeness crab, black sea bass, and stone crab as well as a universal biopanel to fit most trap fisheries worldwide [*]. VIMS researchers working with fishermen found that using biopanels in blue crab traps did not affect catch rates [6].

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* The College of William & Mary has licensed the intellectual property rights to a Virginia-based company and, in accordance with university policy, researchers share in any net revenues.

PO Box 1346 • 1375 Greate Road • Gloucester Point, Virginia 23062-1346 USA
804.684.7380 • FAX 804.684.7179 • www.vims.edu/ccrm