

## Marine Debris Survey in Virginia – Interim Progress Report 2

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### ***Introduction***

This project demonstrates the feasibility of using side scan sonar surveys to locate abandoned or “ghost” fishing gear, particularly crab pots, in the Virginia tidal waters of the Chesapeake Bay. In addition, the project involves analysis of existing ghost pot data retrieved from Chesapeake Bay Multispecies Monitoring and Assessment Program (ChesMMAP) trawl surveys and an investigation of the potential effect of ghost pots on fish communities in Virginia waters.

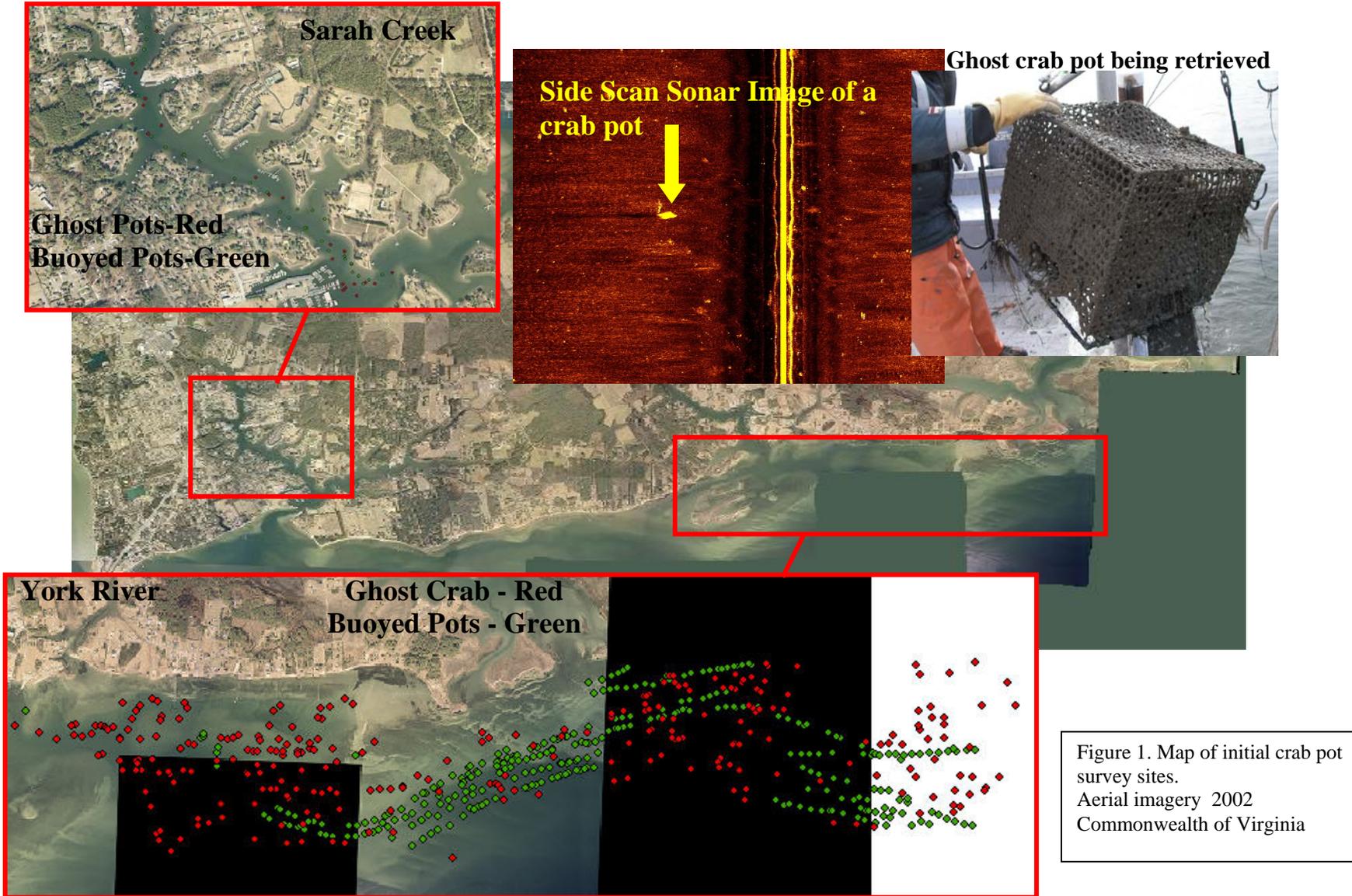
The project was divided into a number of tasks that called for development and testing of the detection methodology using side scan sonar at the outset. This would be followed by a larger scale effort that will produce a map of the surveyed area annotated with the location of all identifiable fishing gear detected by the side scan survey. Another task in the project involves organizing and summarizing the limited data on ghost pots retrieved through the ChesMMAP surveys.

### ***Task 1***

The first objective was to conduct preliminary side scan sonar surveys in a pilot study area of the York River to locate crab pots and distinguish buoyed from non-buoyed pots. These surveys were conducted with two boats, one boat collecting side scan imagery, and the second collecting GPS locations for all visible buoys. The area was re-surveyed during the closure period for crab potting and compared with the initial surveys to confirm that the unbouyed pots are indeed “ghost” pots.

Figure 1 depicts the location of the two initial side scan sonar trials in the York River conducted near the end of crabbing season (early-November). The Sarah Creek survey (approximately 50 acres) resulted in the location 26 non-buoyed ghost pots. The Sarah Creek site was ground-truthed by returning to GPS marked ghost pots and retrieving 17 of the marked items. The remaining pots will be collected and the area re-scanned to verify that there are no pots remaining. All of the surveyed targets identified were ghost pots except for one, which was a trash can, and was removed. The pots retrieved contained whelks, oyster toadfish, white perch, and the remains of blue crabs. Figure 1 shows the York River test sites (approximately 2400 acres) depicting ghost crab pots (red) and buoyed crab pots (green). The York River test site had 288 potential ghost pots out of 590 total pots.

## GHOST CRAB POTS SIDE SCAN SURVEY



### **Task 2**

A second objective of the project was to examine existing ghost pot data retrieved from Chesapeake Bay Multispecies Monitoring and Assessment Program (ChesMMAP) trawl surveys as the only currently available information on the potential effect of ghost pots on fish communities in Virginia waters. Since 2002, ChesMMAP has attempted to sample 90 stations in the mainstem Chesapeake Bay ranging from the southern edge of the Susquehanna Flats to the Bay mouth in all depths to a minimum of 10 feet during each cruise. There are approximately 4-5 cruises per year and a large mesh bottom trawl is used to capture

adult fish of a variety of species. During this sampling time frame (2002-2005), when abandoned or “ghost” crab pots were inadvertently dredged up with the trawl, observations on fish and shellfish species trapped within were made.

During ChesMMAP surveys from 2002-2005, ghost crab pots were obtained at 28 stations. Catches within the crab pots were predominately blue crabs (*Callinectes sapidus*) at 32.1% of the total catch. Species accounting for greater than 97% of the total catch were in order of abundance: blue crab (*Callinectes sapidus*, 32.1%), oyster toadfish (*Opsanus tau*, 27.2%), Atlantic croaker (*Micropogonias undulatus*, 9.3%), spot (*Leiostomus xanthurus*, 9.3%), scup (*Stenotomus chrysops*, 8.0%), white perch (*Morone americana*, 4.9%), black seabass (*Centropristis striata*, 2.5%), pigfish (*Orthopristis chrysoptera*, 1.9%), and redhake (*Urophycis chuss*, 1.2%), and striped bass (*Morone saxatilis*, 1.2%). Other species occurring in lower abundance were Atlantic spadefish (*Chaetodipterus faber*, 0.6%), feather blenny (*Hypsoblennius hentzi*, 0.6%) and summer flounder (*Paralichthys dentatus*, 0.6%) (Table 1). The average length of fish and shellfish captured in ghost pots was 188.67 mm, including both juvenile and adult life stages of blue crab.

Common Name	Latin Name	Total Abundance	Average Length	Proportion of Catch
Oyster toadfish	<i>Opsanus tau</i>	44	263.70	27.2
Blue crab, male	<i>Callinectes sapidus</i>	30	143.00	18.5
Blue crab, adult female	<i>Callinectes sapidus</i>	21	144.14	13.0
Atlantic croaker	<i>Micropogonias undulatus</i>	15	316.13	9.3
Spot	<i>Leiostomus xanthurus</i>	15	209.60	9.3
Scup	<i>Stenotomus chrysops</i>	13	161.15	8.0
White perch	<i>Morone americana</i>	8	210.88	4.9
Black seabass	<i>Centropristis striata</i>	4	202.25	2.5
Pigfish	<i>Orthopristis chrysoptera</i>	3	181.33	1.9
Red hake	<i>Urophycis chuss</i>	2	246.50	1.2
Striped bass	<i>Morone saxatilis</i>	2	264.00	1.2
Atlantic spadefish	<i>Chaetodipterus faber</i>	1	100.00	0.6
Blue crab, juvenile female	<i>Callinectes sapidus</i>	1	53.00	0.6
Bluefish	<i>Pomatomus saltatrix</i>	1	251.00	0.6
Feather blenny	<i>Hypsoblennius hentzi</i>	1	60.00	0.6
Summer flounder	<i>Paralichthys dentatus</i>	1	212.00	0.6

<u>Summary Numbers</u>	
Average Length (mm) of fish in pots	<b>202.30</b>
Average Length (mm) of blue crabs in pots	<b>113.38</b>
Average Length (mm) of all species in pots	<b>188.67</b>
Total number of animals in pots (2002-05)	<b>162</b>
Proportion of catch = blue crabs	<b>32.1</b>

Table 1. Abandoned crab pot catches from ChesMMAP trawl survey data (2002-2005).

### Task 3

The third task was initiated in November 2005 and completed in 5 months. The primary objective of this task was to investigate the fishing potential of ghost pots. A secondary objective was to document encrusting/decomposition rate of test pots to estimate the length of time they might continue to effectively fish. To address these objectives, we deployed seven experimental ghost pots in each of four locations in the York River Watershed stratified by salinity and flushing regime. One week per month, the pots were actively fishing, the remaining three weeks per month the pots were closed, but remained in the water to investigate degradation/encrustation. Incidentally trapped organisms were identified, measured, and released during the week the pots are actively fishing. The species caught during the winter five months were: summer flounder, blue crabs, sunfish, white perch and muskrats. Figure 3 shows the average increase in the crab pot weight over time as they became encrusted. The crab pots at the York River site almost tripled in weight, had evidence of rusting and showed significant growth of algae, barnacles and mussels. Two pots were noted to have started to collapse due to the weight of the growth. Pots in the less energetic systems had minimal recruitment and very little rusting of the metal. This leads us to believe that pots that are lost in the less energetic, lower salinity tributaries are more likely to last longer and have a much larger potential by-catch.

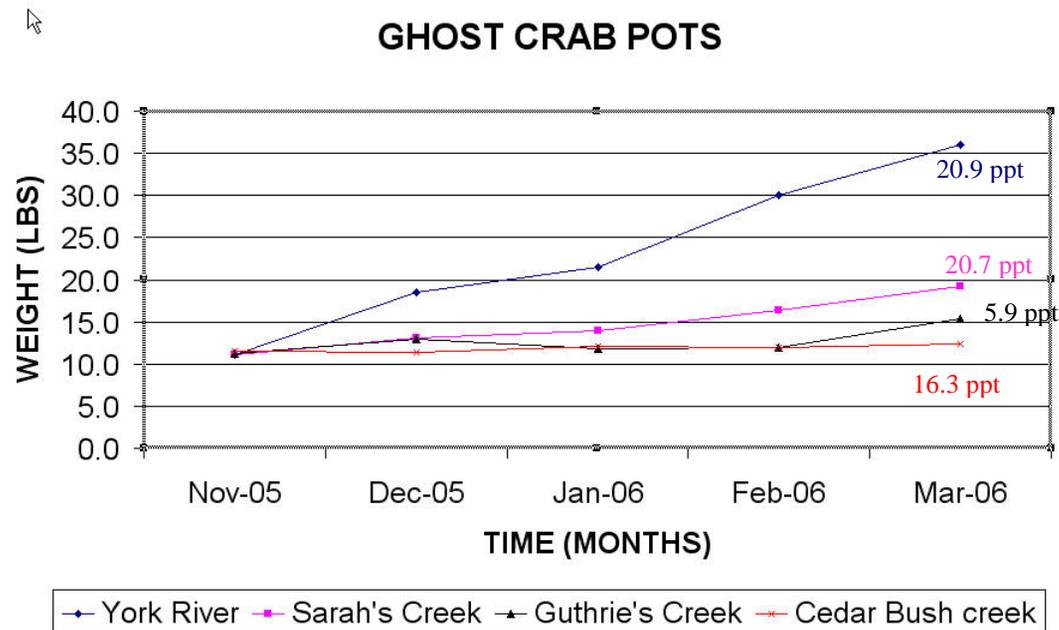


Figure 2. Average wet weight of ghost pots over time by average salinity.

### Task 4

Following protocols developed in the two test surveys (task 1) and consultation with NOAA personnel and others involved with side scan surveys and derelict fishing gear (Appendix I), the investigators surveyed the lower York River. This survey included all inshore waters from the Coleman Bridge at Gloucester Point to the mouth of the York River (Guinea Marshes on the north shore and Goodwin Island on the south shore). A survey of the channel was also conducted to look for ghost pots or other fishing gear that may have been carried from the areas of original deployment. A total of 33.5 square kilometers was surveyed using a 600kHz side scan sonar resulting in the identification of 587 un-buoyed potential ghost crab pots (yellow) as well as 89 buoyed crab pots (red) that were abandoned and still fishing illegally. The survey showed a ghost pot density of 1ghost pot / 0.06 km<sup>2</sup> for the total area surveyed. In the actual crabbing area the density was about 1ghost pot / 0.03 km<sup>2</sup>. Also, 29 lost oyster culture trays were identified in the channel leading out of Sarah Creek. The oyster culture trays were reported to the owner who is currently retrieving them.

# York River

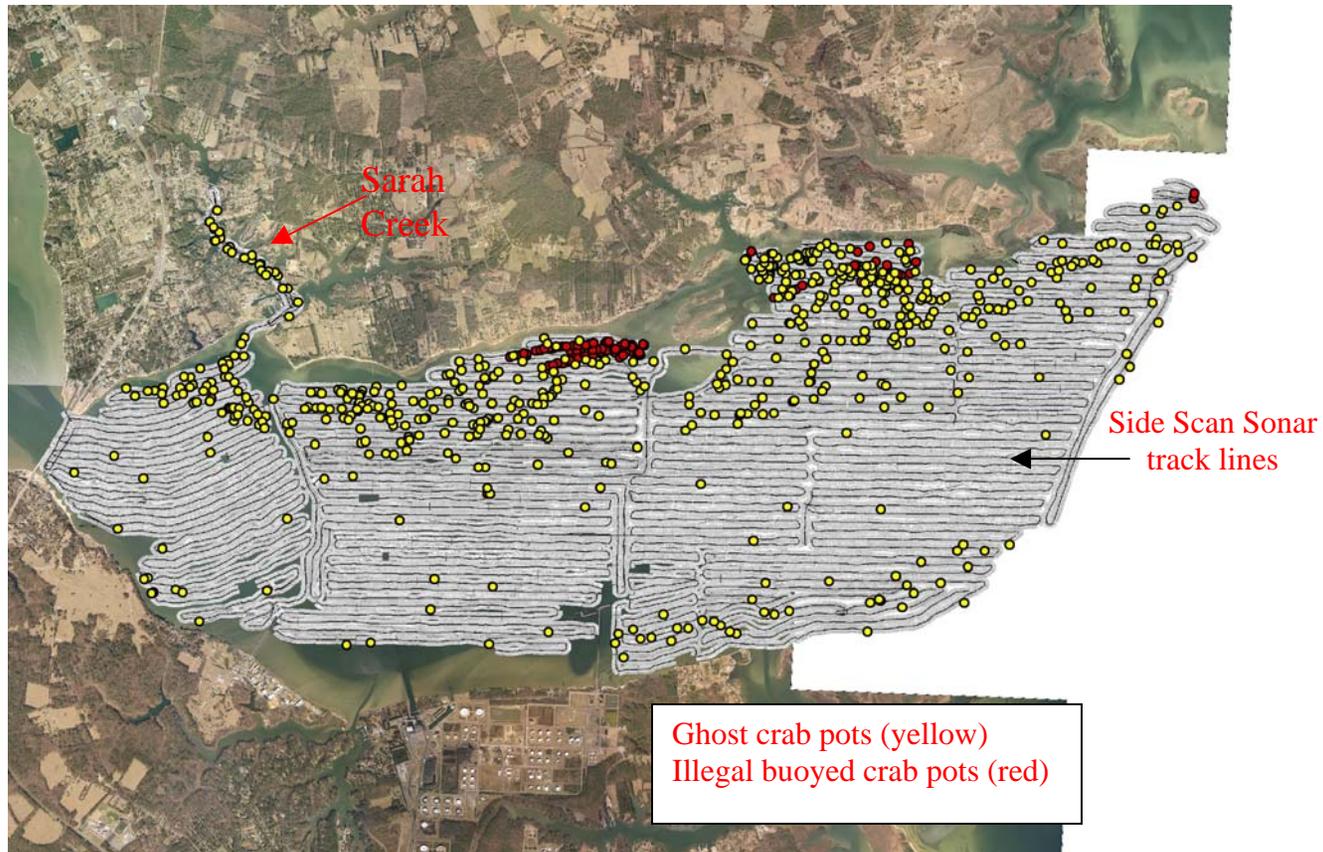


Figure 3. Completed survey of lower York River.  
Aerial imagery 2002 Commonwealth of Virginia

Preliminary data suggests that the issue of ghost crab pots and associated by-catch could be significant in the Virginia bay and tributaries.

Appendix I.

Benthic Mapping and Derelict Fishing Gear Workshop

21 February 2006

Location: Virginia Institute of Marine Science, Gloucester Point, Virginia

**List of Participants**

<u>Name</u>	<u>Organization</u>
Donna Marie Bilkovic	VIMS
Paula Jasinski	NOAA CBO/VIMS
Hans Biberhofer	Environment Canada
Kory Angstadt	VIMS
David Stanhope	VIMS
Jay Lazar	NCBO/ORP
Steve Giordano	NCBO/Annapolis
Roland Owens	NCBO/VIMS
Carl Hershner	VIMS
Kirk Havens	VIMS
Crayton Fenn	IET
Jeff June	NWSC
Brian Conrad	NC DMF
Doug Levin	NOAA/NCBO
Jesse McNinch	VIMS
Bob Gammisch	VIMS