Marine Debris: Lost Commercial Fishing Gear in Virginia Waters

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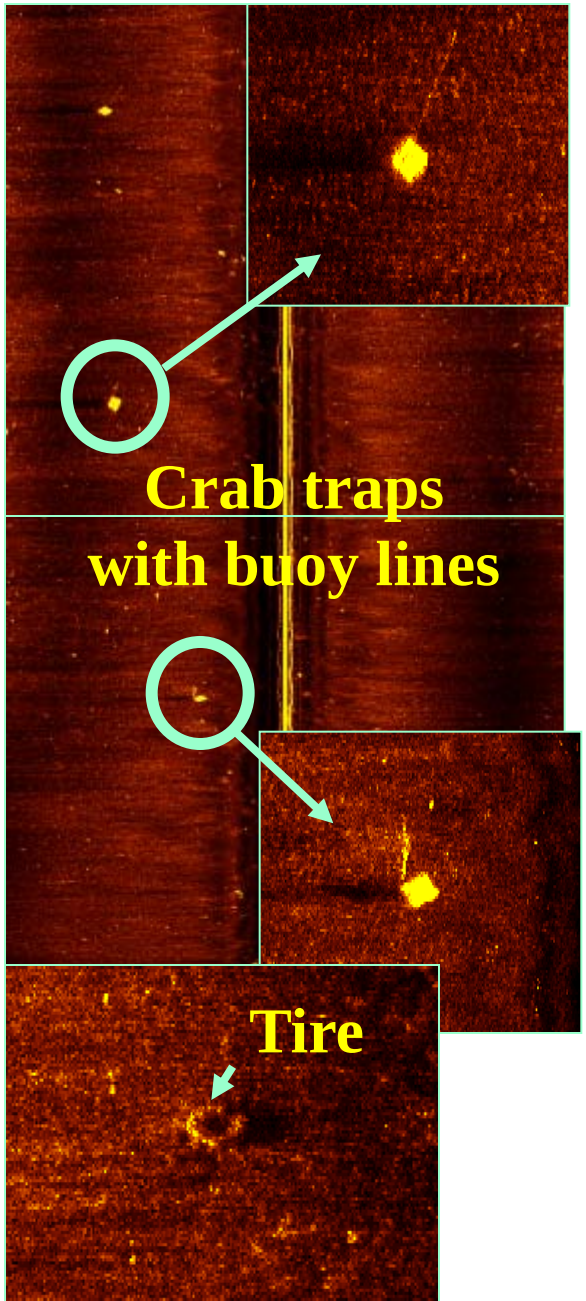
Initial Observations

600kHz Side Scan Sonar images



Are derelict crab traps a problem in the Chesapeake Bay?

How many are out there?

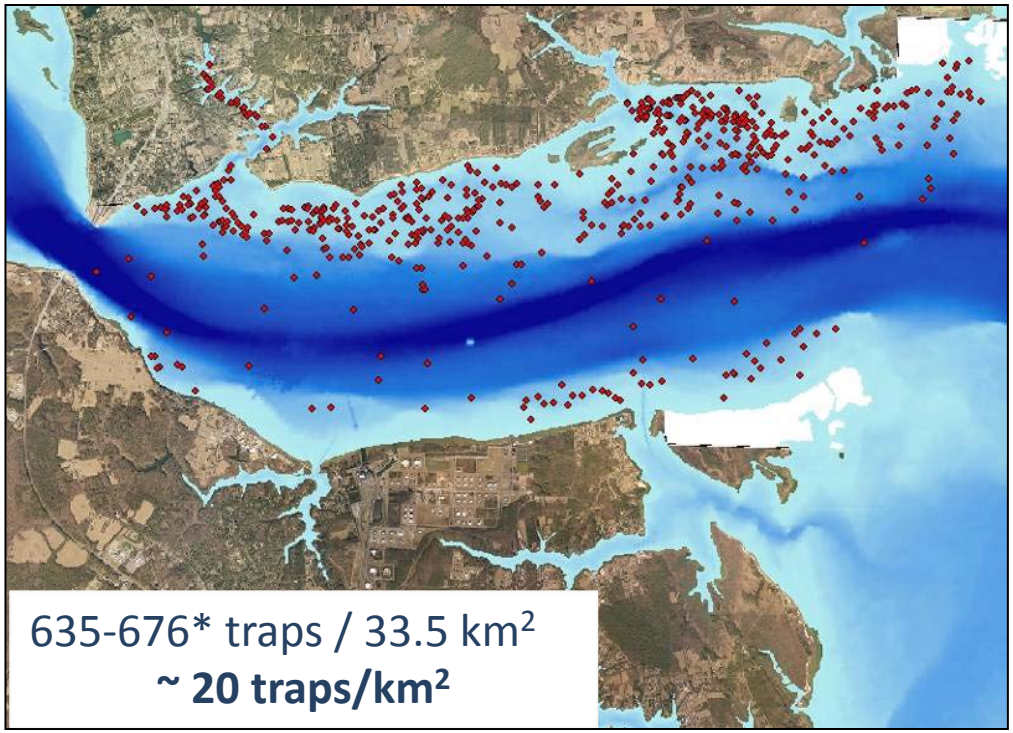
What is the annual accumulation rate of crab traps?

Are traps still actively fishing, and for how long?

Solutions?

Derelict Trap abundance – Lower York River

Pilot Study: Lower York River
Jan/Feb 2006



Havens, K.J. et al. 2008. NAJFM 28:1194-1200.

**Includes a 6% identification error estimated from a subset of SSS targets in Sarah Creek*

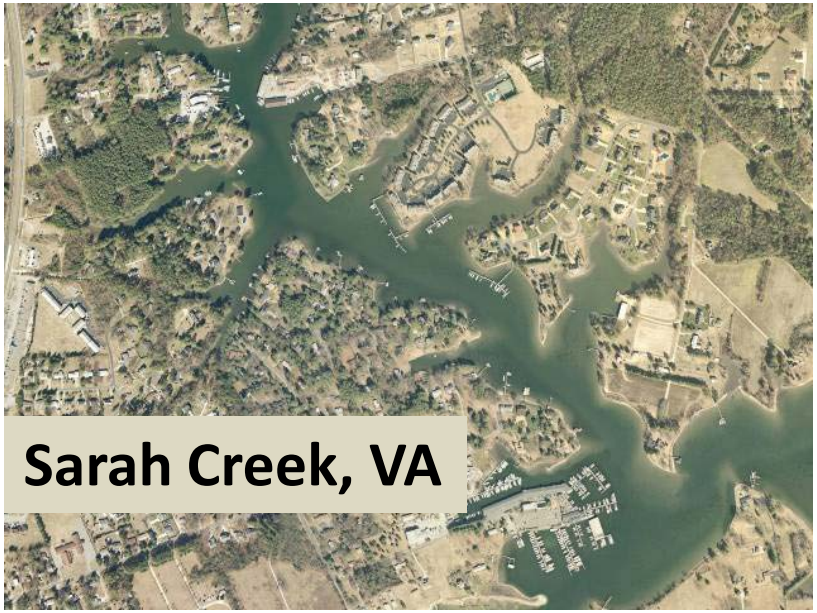
Lower York River Derelict Trap Catch

27 of 33 (82%) derelict traps removed from York River and Sarah Creek were deemed still functional

Species trapped in derelict traps recovered from the York River (Aug 2006) -27 Pots

Species		Abundance	Percent of catch
Blue crab	*Callinectes sapidus*	11	34%
Atlantic croaker	*Micropogonias undulatus*	7	22%
Oyster toadfish	*Opsanus tau*	6	19%
Black seabass	*Centropristis striata*	4	13%
Spot	*Leiostomus xanthurus*	2	6%
Flounder	*Paralichthys dentatus*	1	3%
Pigfish	*Orthopristis chrysoptera*	1	3%

ANNUAL LOSS RATE OF BLUE CRAB TRAPS



Derelict traps identified & removed:

2005	16 derelict traps (40 traps-2 yrs)
2006	12 derelict traps (54 traps)
2007	11 derelict traps (51 traps)
2008	13 derelict traps (53 traps)
2009	23 derelict traps (54 traps)

Trap loss rate approx. 20 – 43% per yr

Traps become lost from

- Severed buoy lines by vessel propellers
- Lines break with age
- Pots abandoned or vandalized
- Storms

- In Gulf of Mexico, Guillory (2001) applied a **25%** loss rate to approximate a 250,000 annual trap loss
- Our study found an average annual trap loss rate of **26%** for Sarah Creek
- Anecdotally, watermen have indicated that their annual loss of traps is ~ **20%**

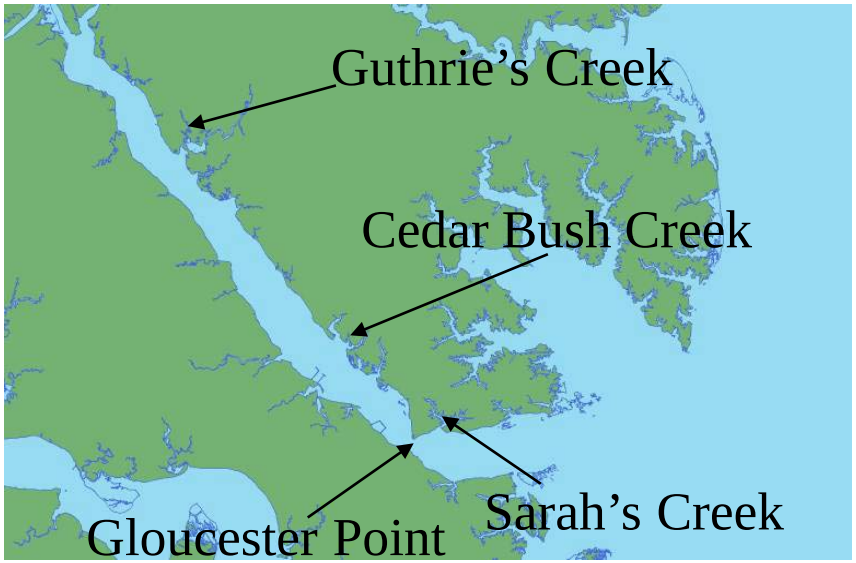
Blue Crab Catch Rates In Derelict Traps

Site	Salinity	Catch rate (crabs/trap/d)
GC	5.9	0.26 (SE=0.08)
CBC	16.2	0.27 (SE=0.08)
SC	19.8	0.20 (SE=0.06)
GP	20.0	0.21 (SE=0.09)

Average = 0.24 crabs/trap/day

or **~ 50 crabs/trap/season***

** Season based on April – October 2006*



4 sites on the York River

14 crab traps per site

**This number doubled in baited traps that simulating self-baiting - 100 crabs/trap/y

Poon (2005), in a review of published blue crab mortality rates for derelict traps, calculated an average of 53.8 blue crabs/trap/year.

Havens et al. 2008. NAJFM

How long do they last?

New

> 2 yrs old
high salinity & energy

Derelict trap decay rates vary

- **High salinity, main stem traps collapse after 2 years**
- **Brackish, tributary traps still effectively trapping after 4 yrs**

1 yr old

> 3 yrs old
high salinity &
low energy

> 4 yrs (brackish)

- COMMERCE DEPARTMENT DECLARES BLUE CRAB FISHERY A DISASTER
- *BLUE CRAB FISHERY IN BAY TO GET FEDERAL ECONOMIC AID*
- *WINTER CRAB DREDGE FISHERY CLOSED*

Virginia Marine Debris Location & Removal Program

- Participants – Virginia winter crab dredgers (58 - 70)
- Goal – Locate and remove derelict crab traps and other marine debris from Virginia tidal waters
- Timeframe – December through March, 2008- 2012
- A collaborative project between: Virginia Watermen, VMRC, and VIMS

Virginia Marine Debris Location and Removal Project 2008-2012

Center for Coastal Resources Management
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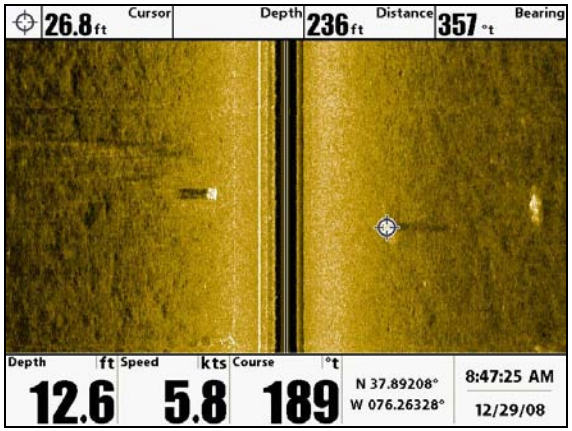
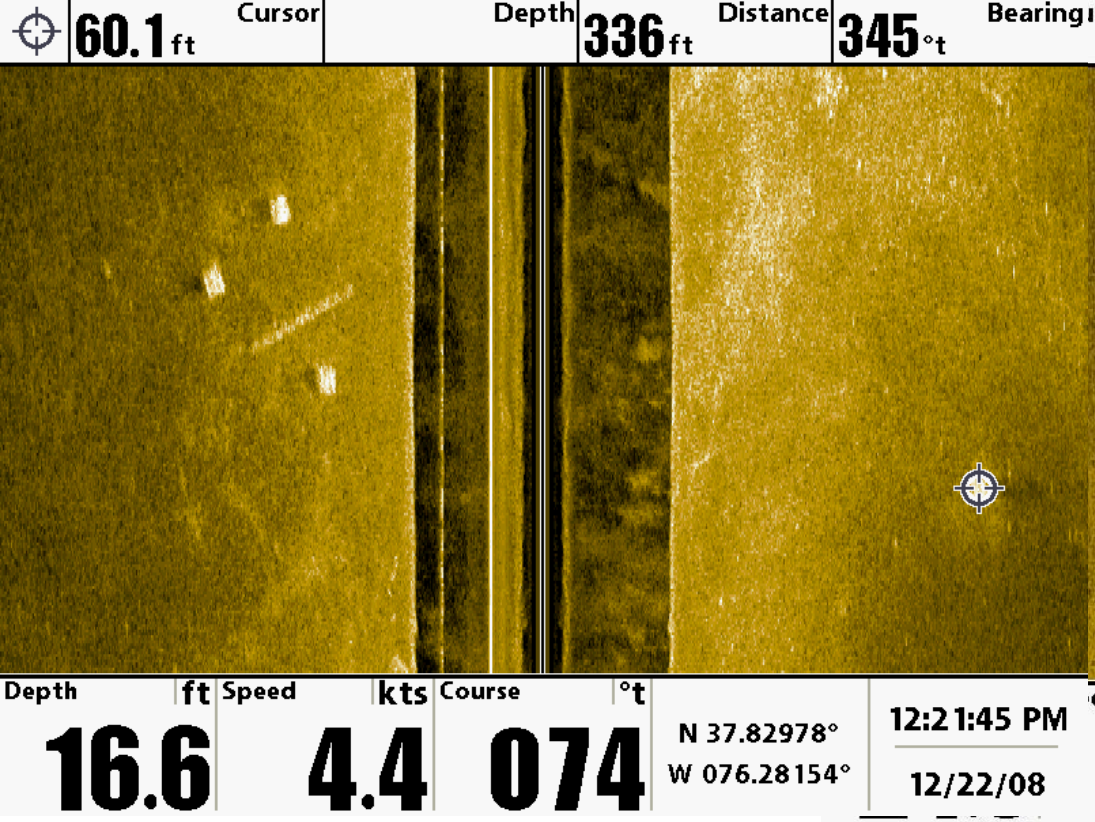
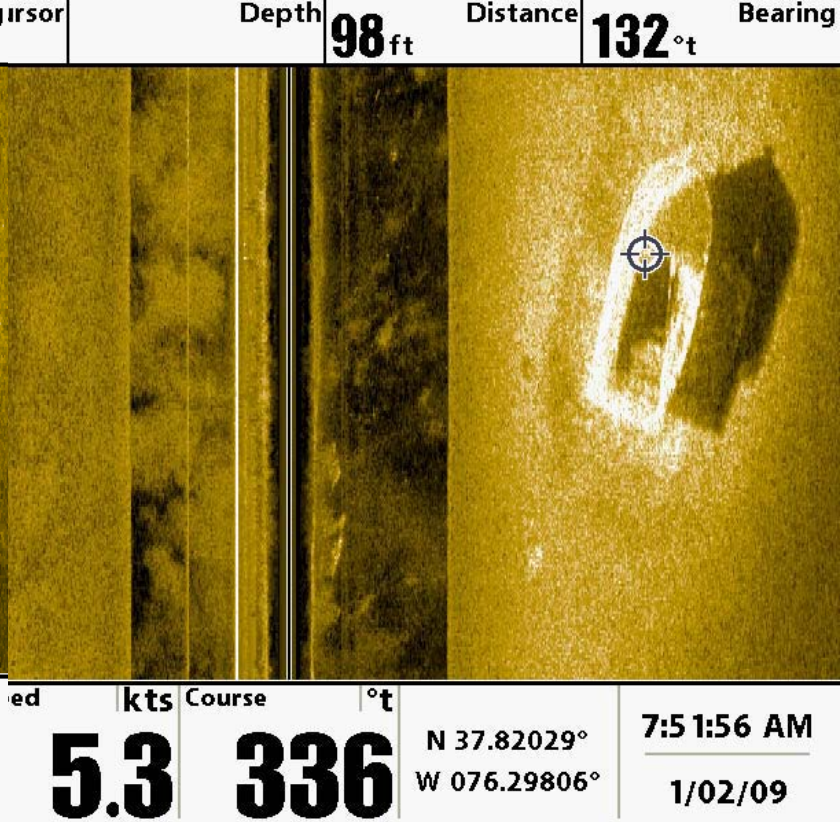
- Participants outfitted & trained on Humminbird side imaging units for locating marine debris
- Boat track lines recorded on Side Imaging unit
- Participants use unit to 'mark' marine debris with GPS location & unit takes a picture of scanned object
- Participants return to GPS marked item & recover it using approved grappling device
- Participants provided with detailed map of sensitive habitat zones to avoid oyster reefs & SAV
- Digital photo taken of all items removed
- Participants log item & condition, bycatch, etc. on data sheet developed in cooperation with NOAA Marine Debris Program
- Traps were disposed of OR recycled





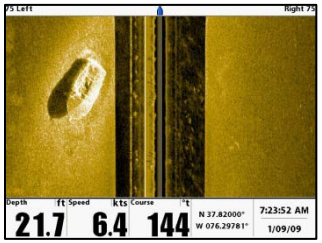


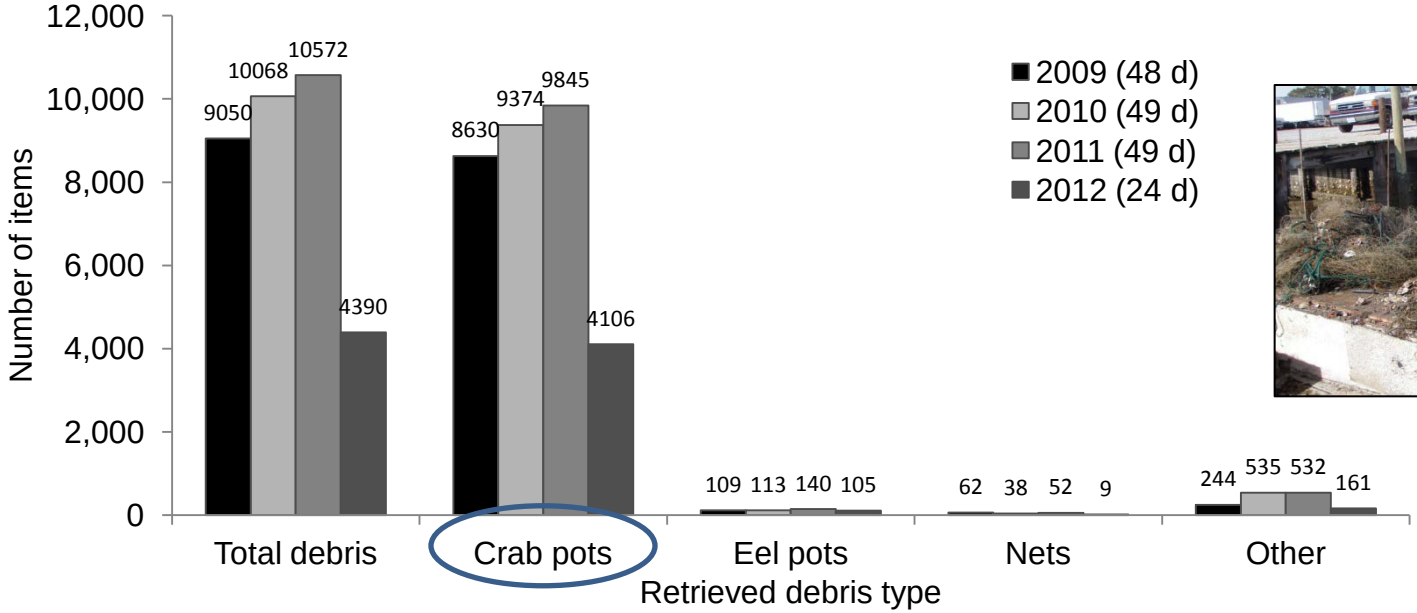
Designed to ride above the bottom with only the hooks dragging through the sediment.

Photo credit: Matt Stewart

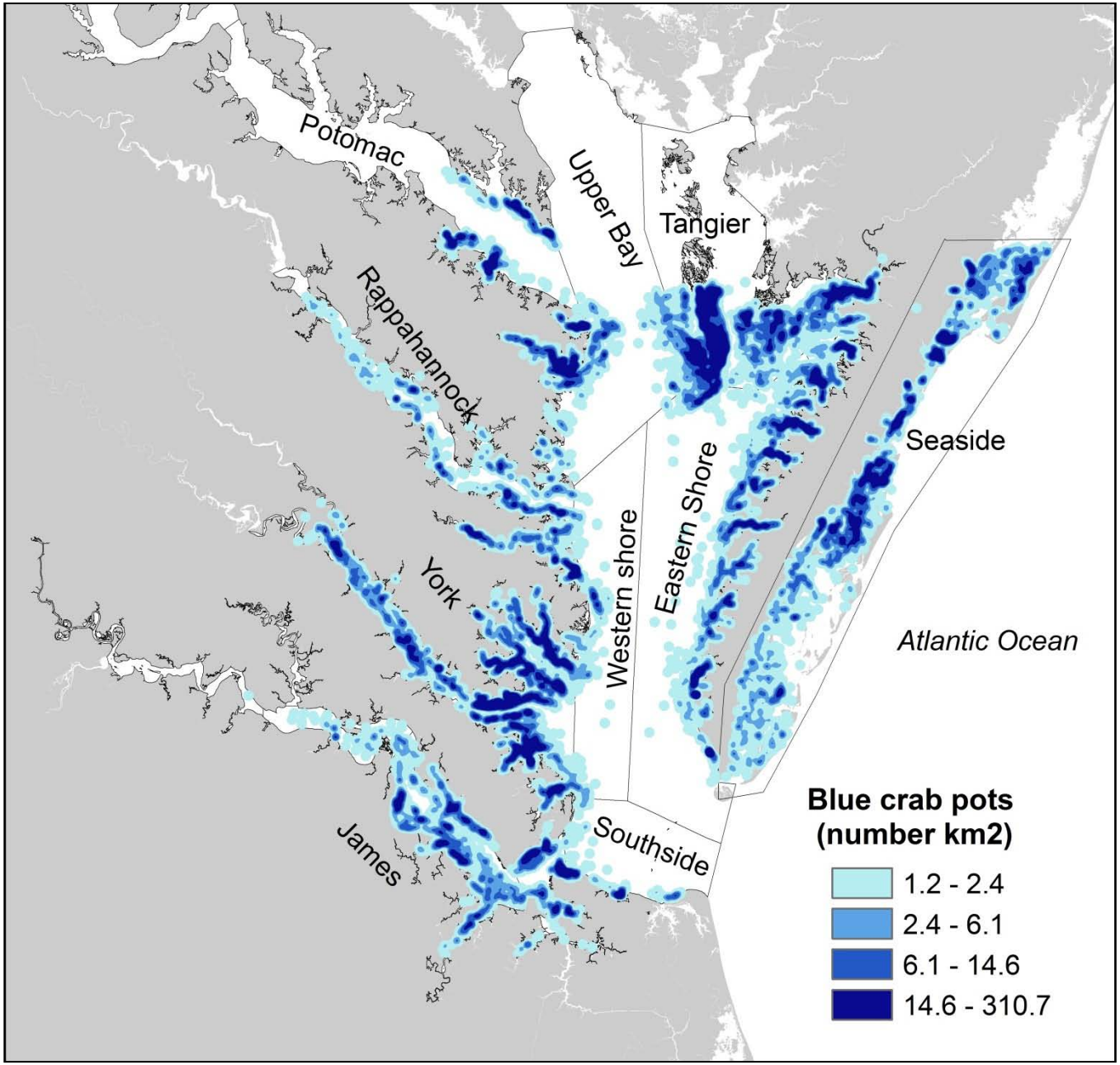
Marine Debris in Virginia tidal waters

Marine Debris Removal Counter				
Season	'11 - '12	'10 - '11	'09 - '10	'08 - '09
Number of days worked	(24 days)	(49 days)	(49 days)	(48 days)
Number of watermen	70	70	65	58
Bycatch (animals) in pots	4,137	12,850	9,827	4,790
Total crab pots removed:	3,438	8,395	8,655	7,809
Total peeler pots removed:	672	1,435	719	820
Total eel pots removed:	105	140	113	109
Total nets removed:	9	52	38	62
Total other debris removed:	161	532	535	246
Boats id'd (not removed):	9	3	8	5
Total items removed:	4,385	10,554	10,060	9,046



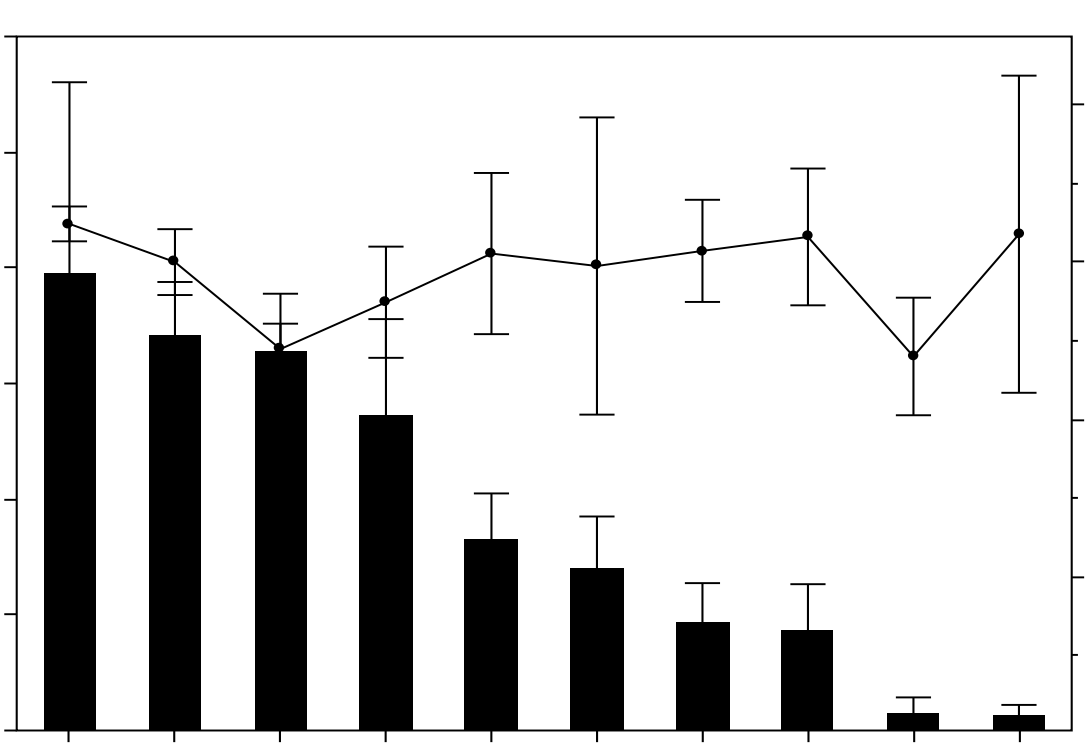


Derelict Crab Traps Removed from Virginia waters: 2008- 2012



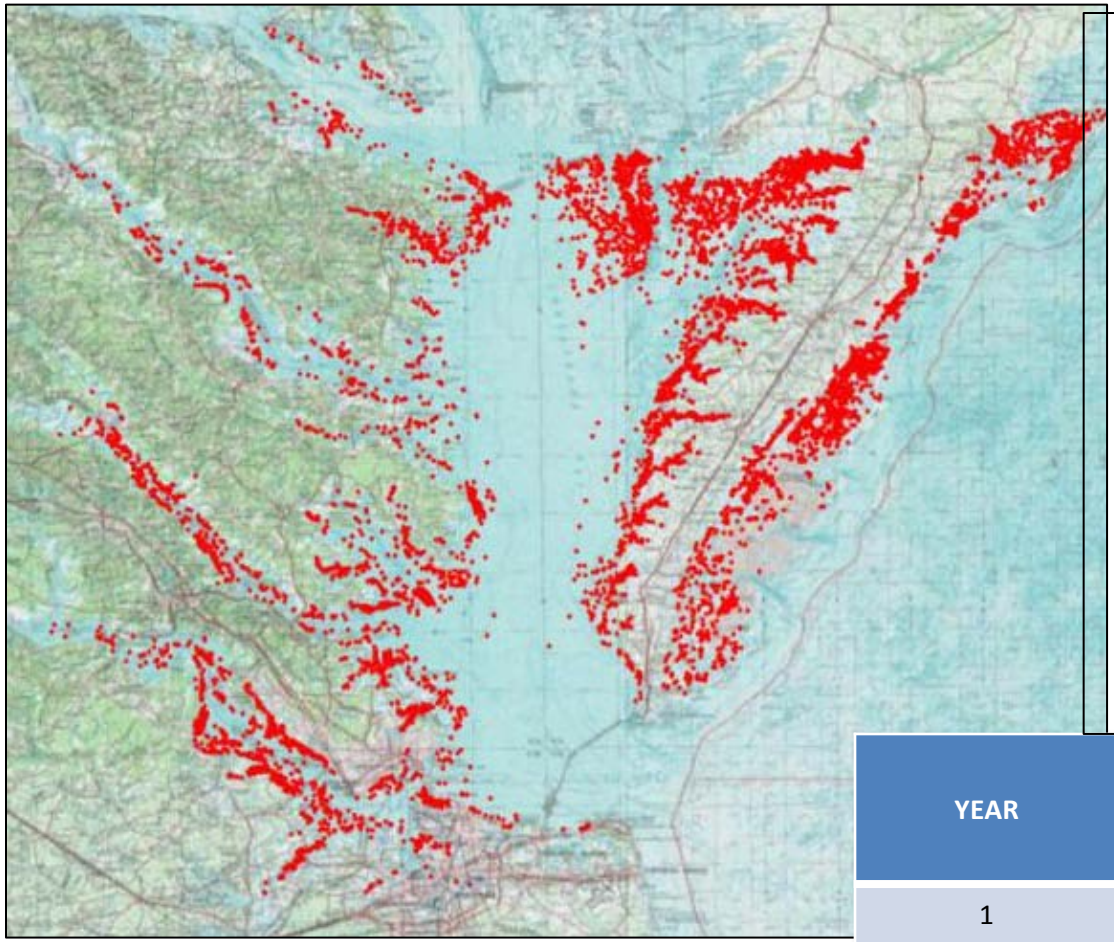
Over 32,000 crab traps removed

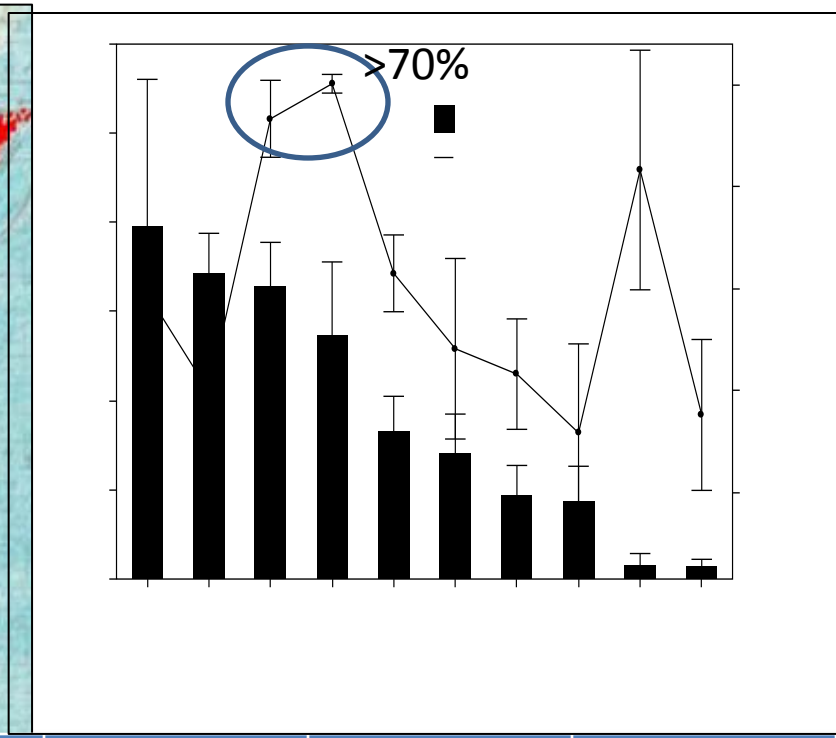
Derelict Crab traps Actively Fishing



~ 40% of the derelict traps were actively fishing when retrieved

Abandoned (Buoyed) Derelict Traps Removed: overall = 40%

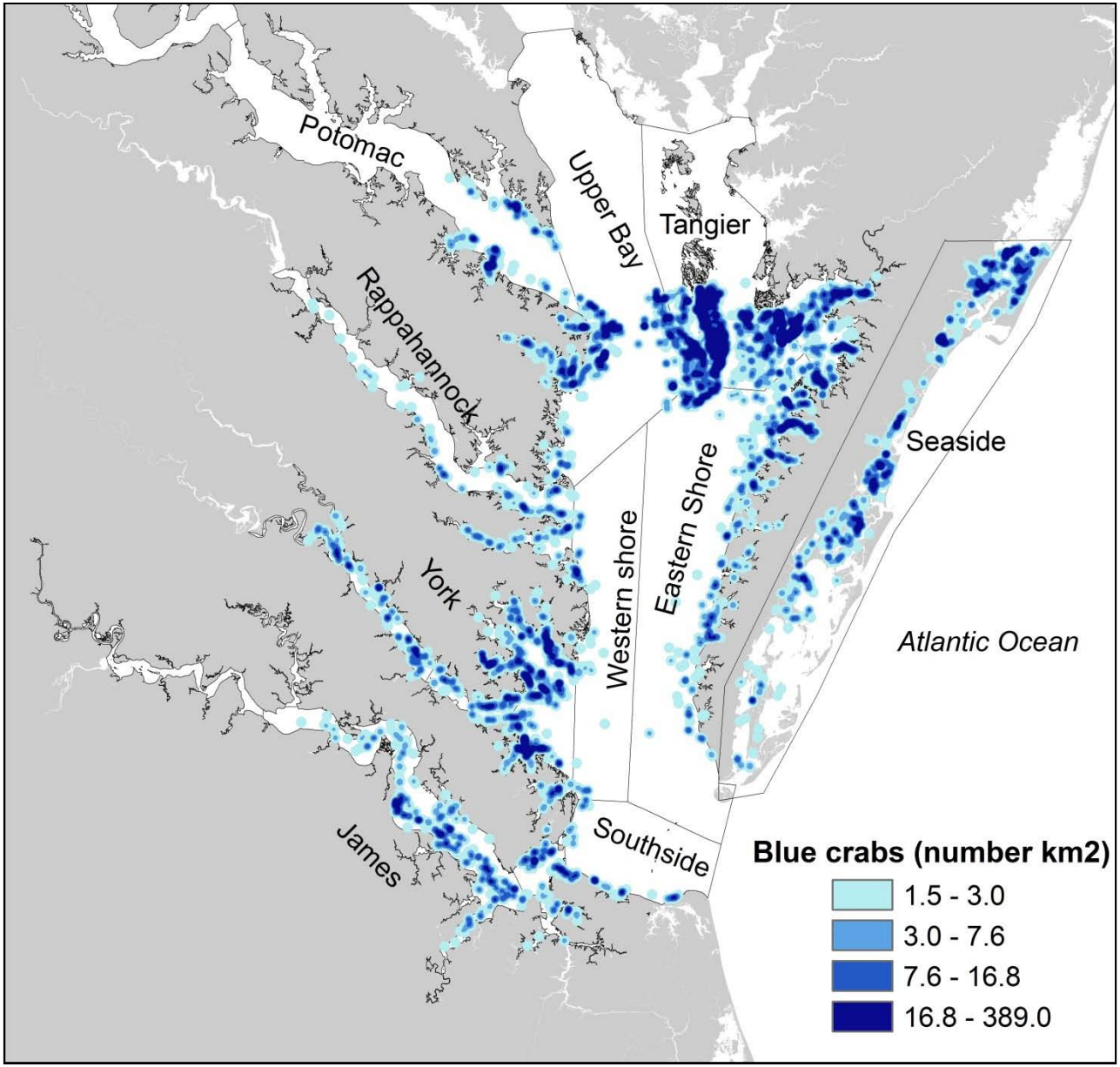




YEAR	BUOYED POTS	TOTAL POTS REMOVED	PERCENT BUOYED
1	3,202	8,738	36.7 %
2	3,696	9,415	39.3 %
3	3,890	9,907	39.3 %
4	1,889	4,142	45.6 %
TOTAL	12,677	32,202	39.4 %

* Buoyed eel pots were not included.

Blue Crab Catch in Derelict Traps

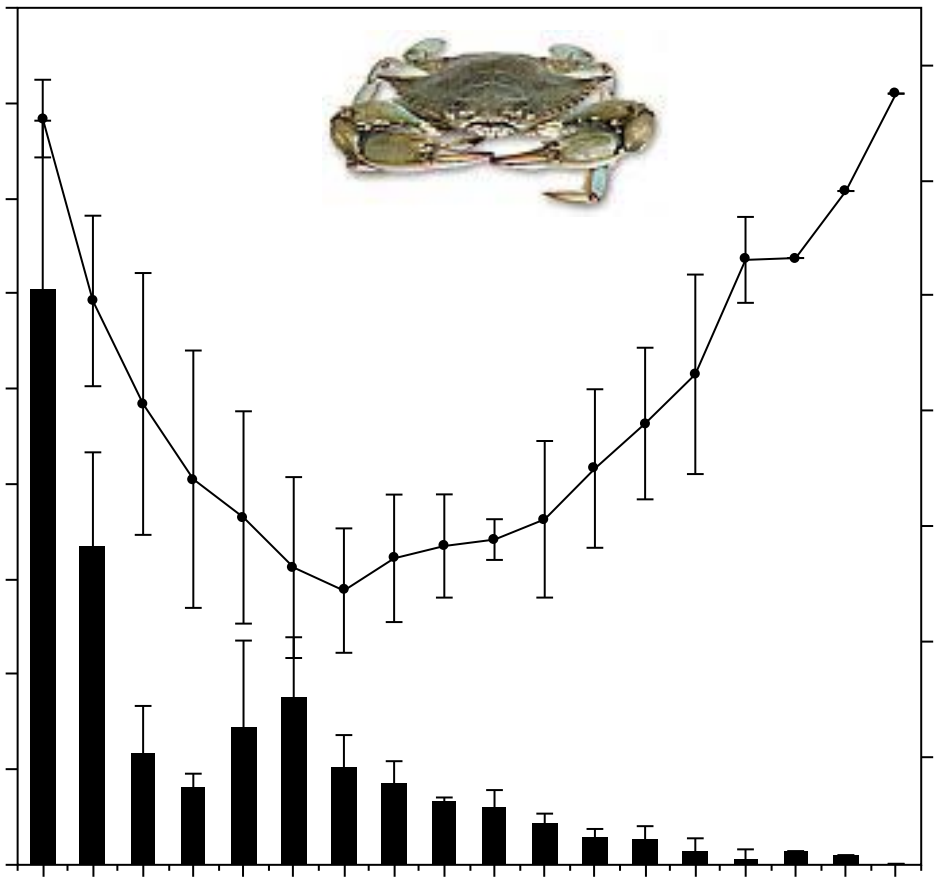


Total Female Crabs: 14,740

Total Male Crabs: 10, 577

TOTAL: 25,317

Blue Crab Catch over time



Date

<u>>50%</u> of the crabs recorded in the derelict traps were captured in the first 4 weeks of the program Dec 1- 28th.

Summer catch rates from derelict pots anticipated to be much higher!

Potential Fishery losses to Derelict Traps

The maximum allowable crab pots in Virginia waters currently is 385,000.
If we conservatively estimate:

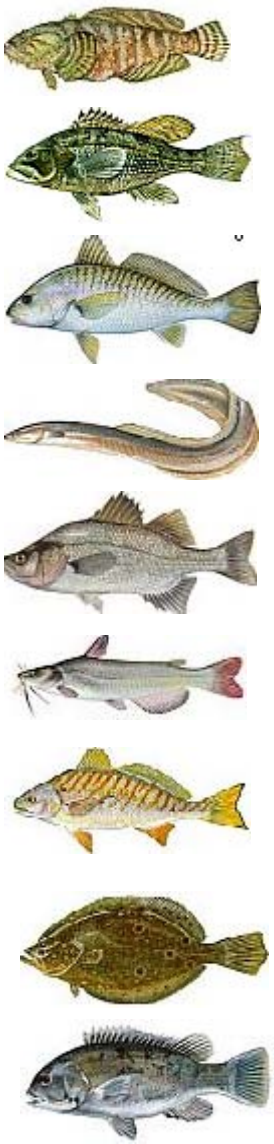
250,000 traps are fished
10% are lost annually
50 crabs per trap/yr are captured

Approximately,
***25,000 traps** would be introduced to the VA waters every year*

***1.25 million blue crabs** captured annually by derelict traps*

***$417,000** value (6.6 crab/kg, $2.20/kg) potentially lost*

Fish Catch in Derelict Traps



FISH - Bycatch	ABUNDANCE	% of TOTAL	Cumulative %
OYSTER TOADFISH	3348	66.8	66.8
BLACK SEABASS	415	8.3	75.1
ATLANTIC CROAKER	313	6.2	81.3
AMERICAN EEL	184	3.7	85.0
WHITE PERCH	174	3.5	88.5
CATFISH SPP	171	3.4	91.9
SPOT	93	1.9	93.7
FLOUNDER	52	1.0	94.8
TAUTOG	52	1.0	95.8
MINNOW	47	0.9	96.7
UNKNOWN FISH	43	0.9	97.6
SHEEPSHEAD	29	0.6	98.2
STRIPED BASS	24	0.5	98.7
PIGFISH	19	0.4	99.0
ATLANTIC SPADEFISH	6	0.1	99.2
REDDRUM	6	0.1	99.3
STARGAZER	5	0.1	99.4
MULLET	4	0.1	99.5
PUFFERFISH	4	0.1	99.5
BUTTERFISH	3	0.1	99.6
ATLANTIC MENHADEN	2	0.0	99.6
HOGCHOKER	2	0.0	99.7
BLACK DRUM	2	0.0	99.7
SOLE	2	0.0	99.8
STRIPED BURRFISH	2	0.0	99.8
BOWFIN	1	0.0	99.8
CUNNER	1	0.0	99.8
PORGY SPP	1	0.0	99.9
SCUP	1	0.0	99.9
BLUEFISH	1	0.0	99.9
FEATHER BLENNY	1	0.0	99.9
PINFISH	1	0.0	99.9
SHAD	1	0.0	100.0
SPADEFISH	1	0.0	100.0
STRIPED KILLIFISH	1	0.0	100.0

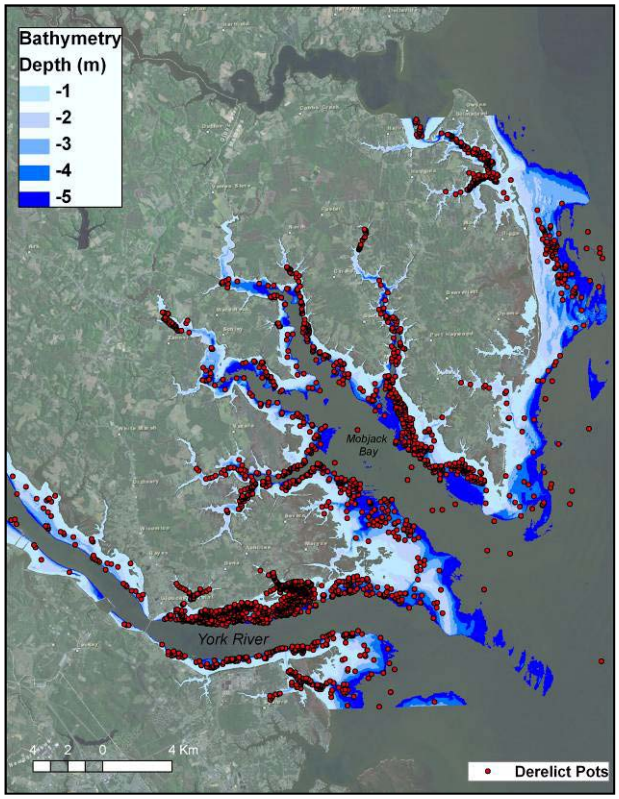
9 species groups made up >95% of catch

Oyster toadfish
Black Sea Bass
Atlantic croaker
America eel
White perch
Catfish
Spot
Flounder
Tautog

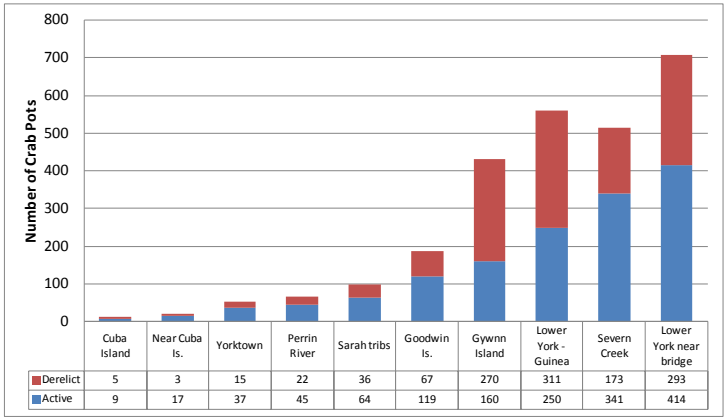
5,112 total fish *during winter*

Diamondback Terrapin Bycatch in Blue Crab traps

Terrapin population declines, reduced growth, & changes in sex ratios have been directly attributed to bycatch mortality in commercial crab pots



Within the pilot study area during a two year retrieval program, 2872 derelict pots were removed. Of these, 22% were within shallow waters (≤ 2 m) where terrapins typically reside

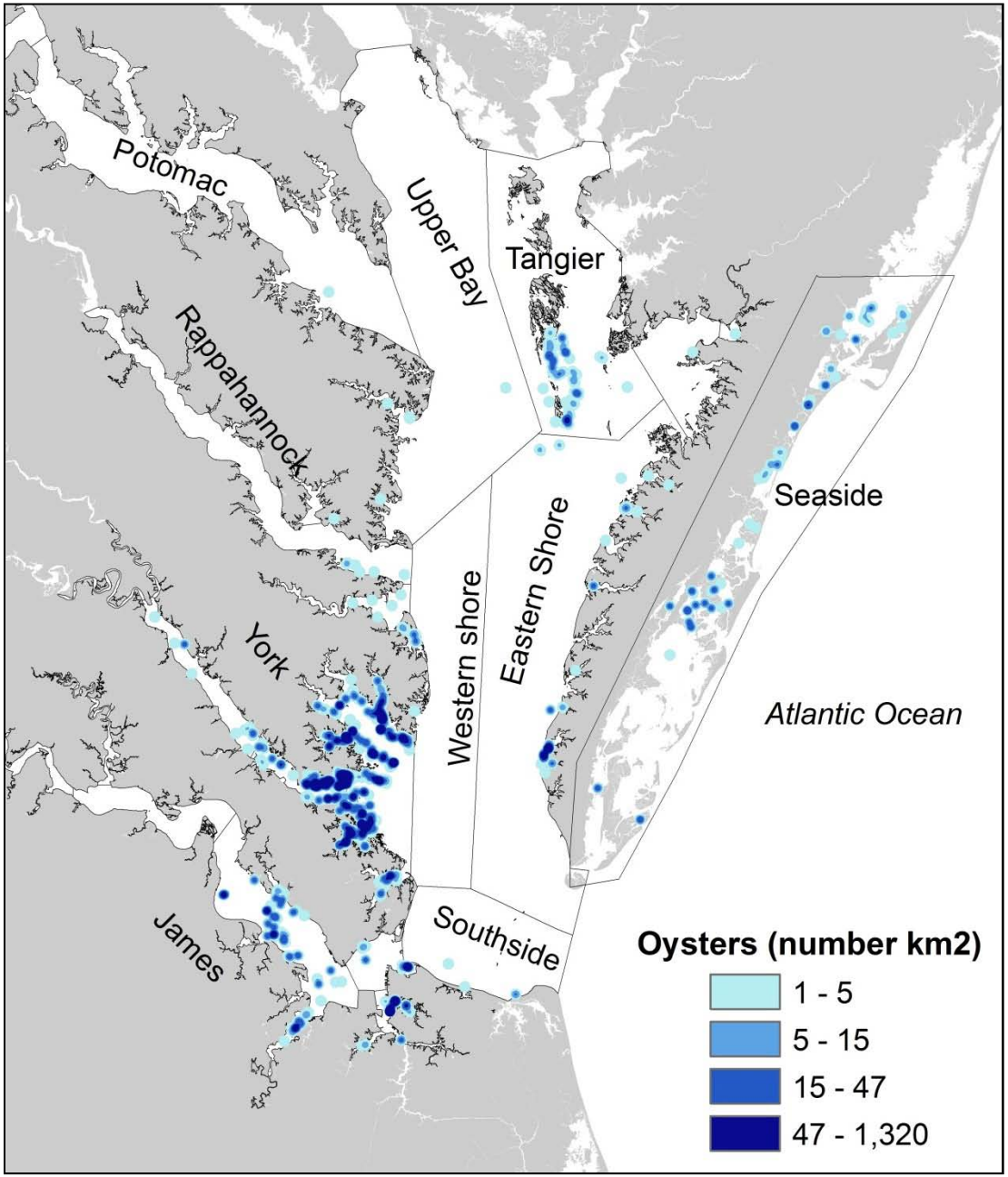


	Cuba Island	Near Cuba Is.	Yorktown	Perrin River	Sarah tribs	Goodwin Is.	Gywnn Island	Lower York - Guinea	Severn Creek	Lower York near bridge
Derelict	5	3	15	22	36	67	270	311	173	293
Active	9	17	37	45	64	119	160	250	341	414

Number of derelict pots generally corresponded to the number of active pots observed at a single point in time. This suggests that derelict pots can be used as a metric for fishing pressure.

***~15%** of the study area was considered potential resource conflict areas for terrapin & crabbing*

Oysters associated with derelict crab traps



872 pots with oyster growth

~ 18,900 oysters

Key Points

A. Blue crab traps make up the vast majority of derelict fishing gear in VA

B. ~20% of traps deployed every year are lost or abandoned.

C. “Ghost” traps continue to capture and kill both target and other species.

D. Traps can last several years once lost or abandoned.

E. Approx 40% of traps recovered from program were abandoned (still had buoys attached).

F. “Ghost” traps can have significant impact on diamondback terrapin populations.

G. Once ‘disarmed’ traps could provide some beneficial habitat for oysters and other structure-orientated animals.

H. Side-scan sonar and waterman participants were effective in recovering lost or abandoned pots.

Potential Solutions

Center for Coastal Resources Management
Virginia Institute of Marine Science

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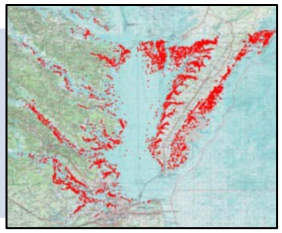
School of Marine Science
www.vims.edu

Stop the cycle of derelict trap loss

- Require proper disposal of traps
- Education – recreational and commercial users

Enforcement of closed potting season

- Provide 1 or 2 week grace period and then begin enforcement, i.e., fines for abandoned pots



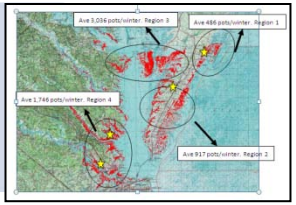
Modify trap design to reduce capture efficiency of lost traps within a year

- Require biodegradable components on traps, such as a truly biodegradable polymer (PHA, PCL)

Example of a biodegradable panel inserted into a crab pot.

Removal of derelict gear

- Continue to hire a subset of watermen to remove pots from targeted hotspot areas

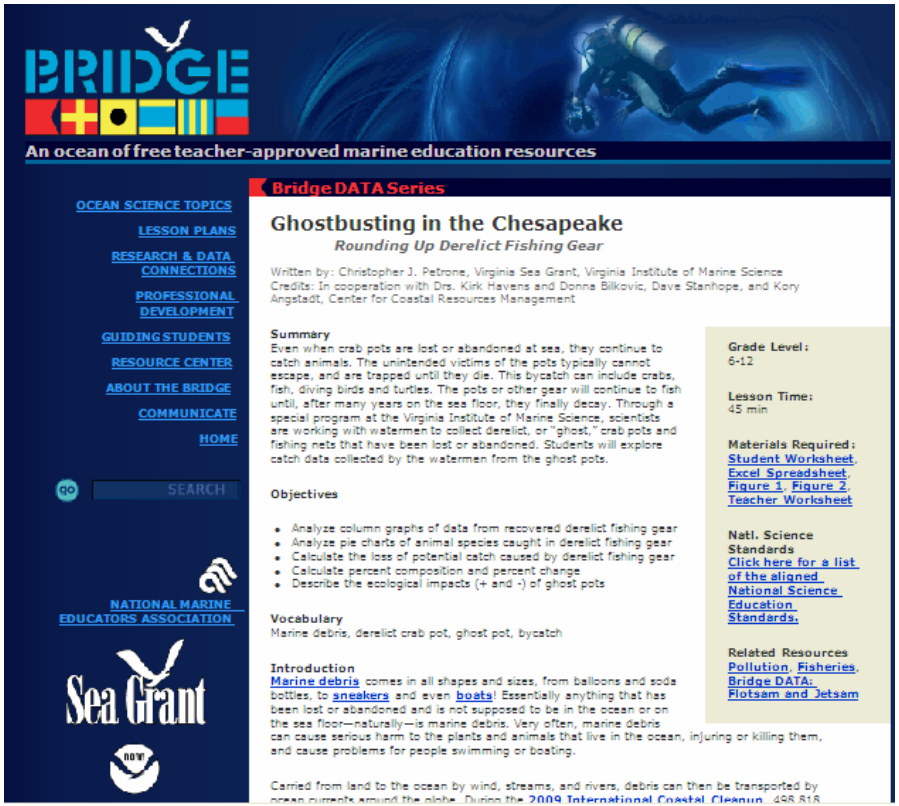


Prevent terrapin bycatch

- Require terrapin excluders in specific areas where terrapin populations and crabbing overlap

Thank You!

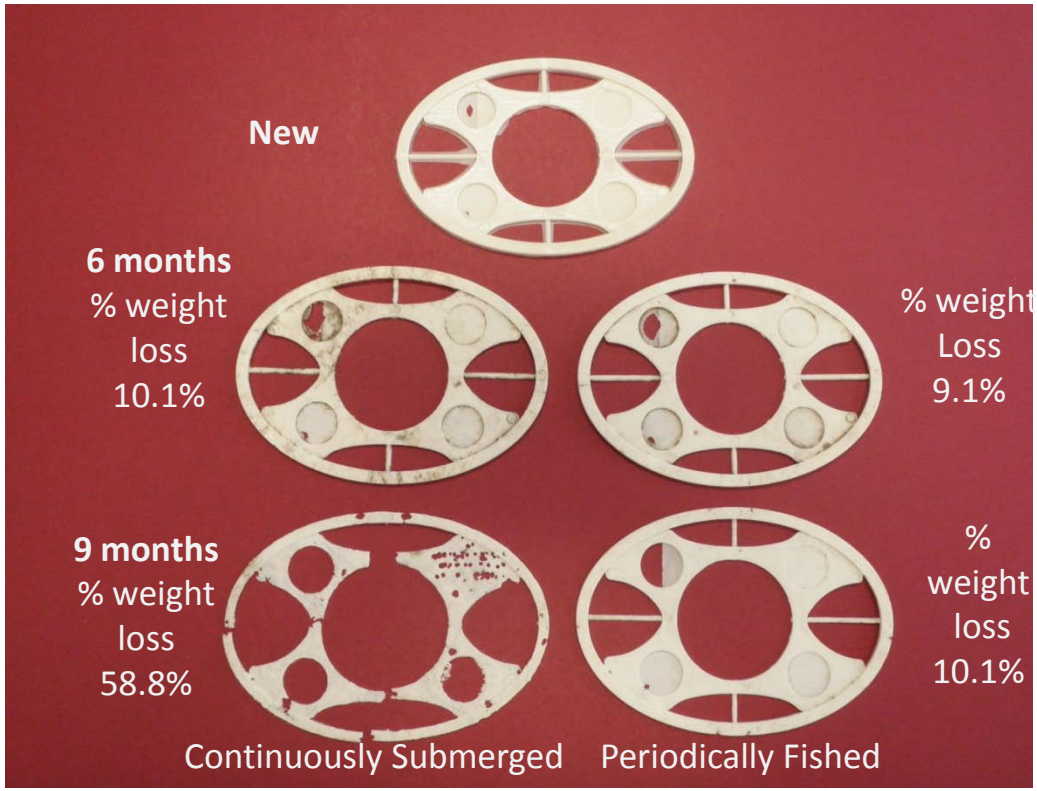
Education and outreach



NOAA Sea Grant

K-12 Marine Education Resources

Course level grades 6-12

http://ccrm.vims.edu/marine_debris_removal/

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