Economic Impacts of Derelict Crab Pots

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College of William & Mary

Costs of derelict gear

Derelict gear may impose a variety of economic costs:

- Replacement gear
- Navigational hazards
- Habitat/ecological damage
- Inefficiencies in production

Photos: VIMS/CCRM

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Blue crab in the Chesapeake Bay

Image: Landsat/NASA

- Commercially significant with annual revenues of $80-100 million
- Chesapeake Bay landings account for 35-50% of US total
- Iconic Bay species

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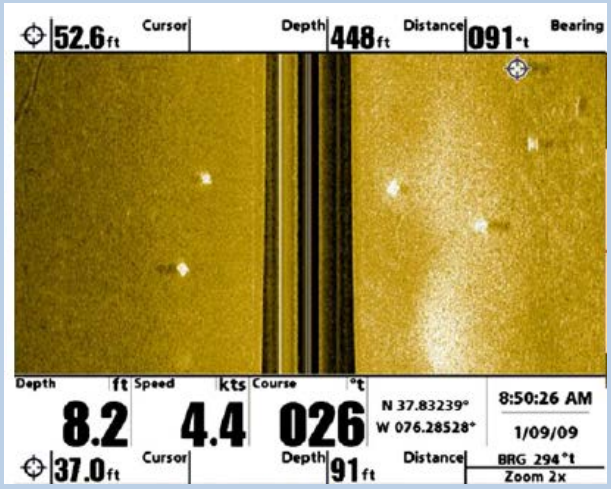
Derelict crab pots in the Bay

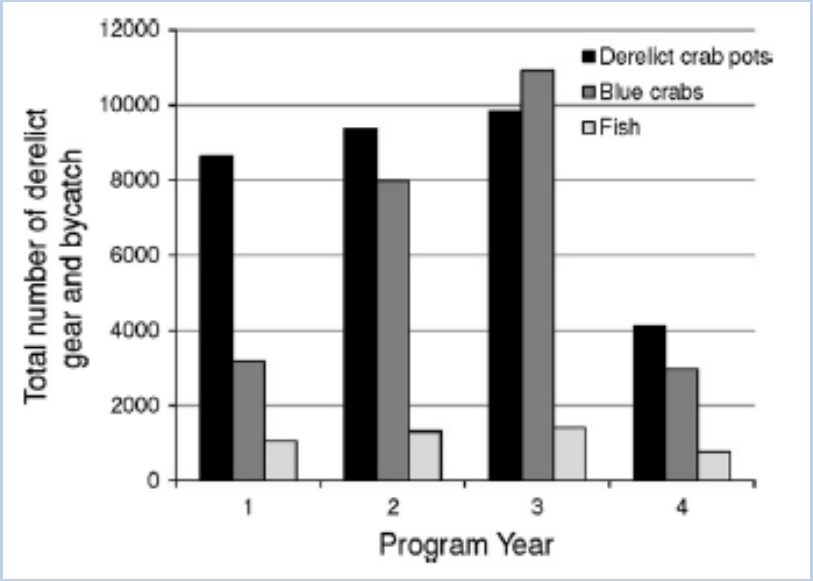
Photo: http://www.tangierisland-va.com

800,000 commercial crab pots licensed in the Chesapeake Bay → 10-30% become derelict each year

Virginia Marine Debris Location and Removal Program

Havens, Kirk, et al. "Fishery failure, unemployed commercial fishers, and lost blue crab pots: an unexpected success story." *Environmental Science & Policy* 14.4 (2011): 445-450.





Bilkovic, Donna M., et al. "Derelict fishing gear in Chesapeake Bay, Virginia: Spatial patterns and implications for marine fauna." *Marine Pollution Bulletin* 80.1 (2014): 114-123.

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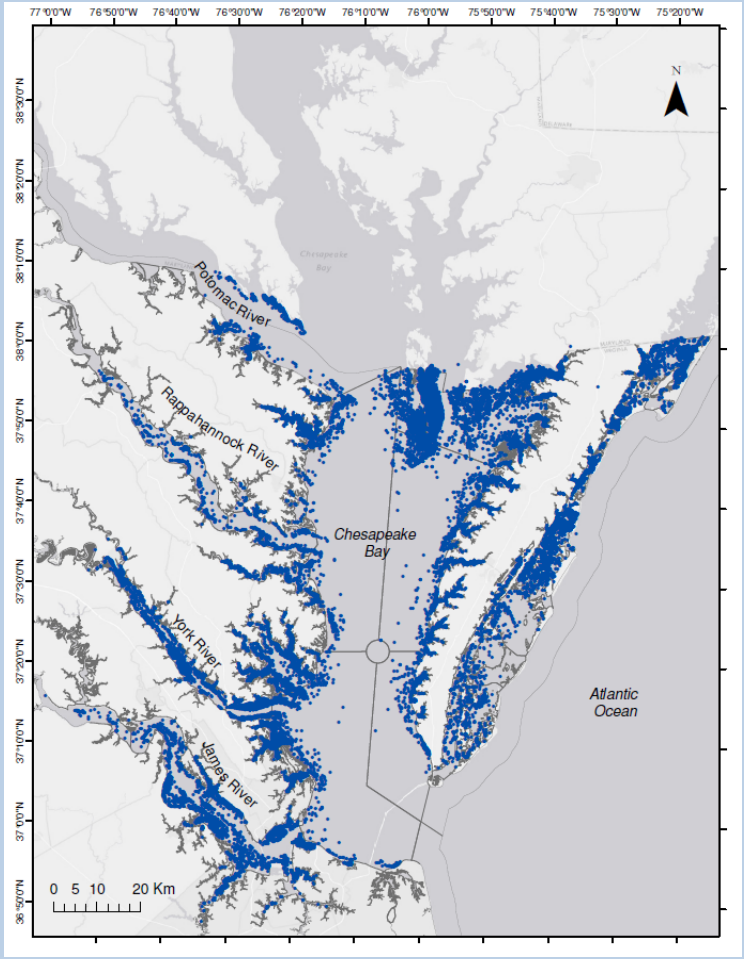

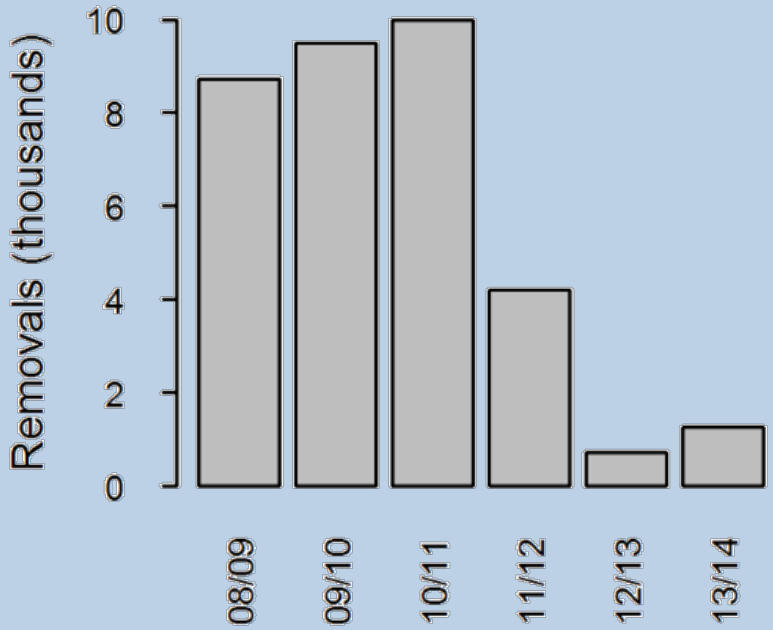

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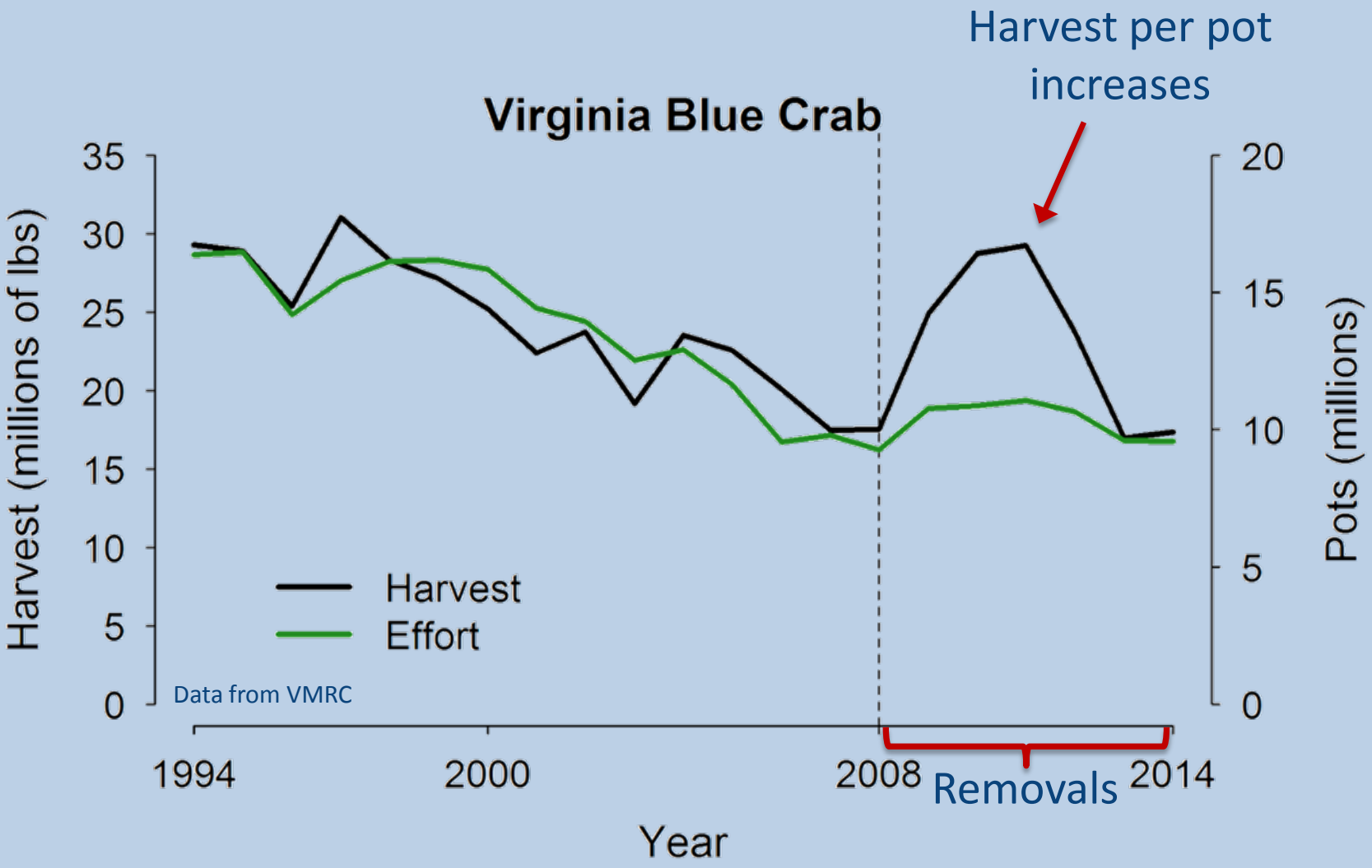
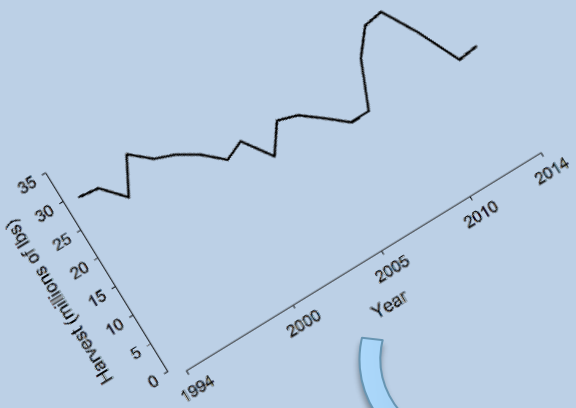
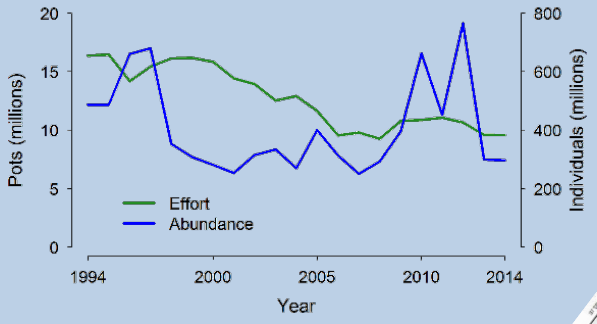
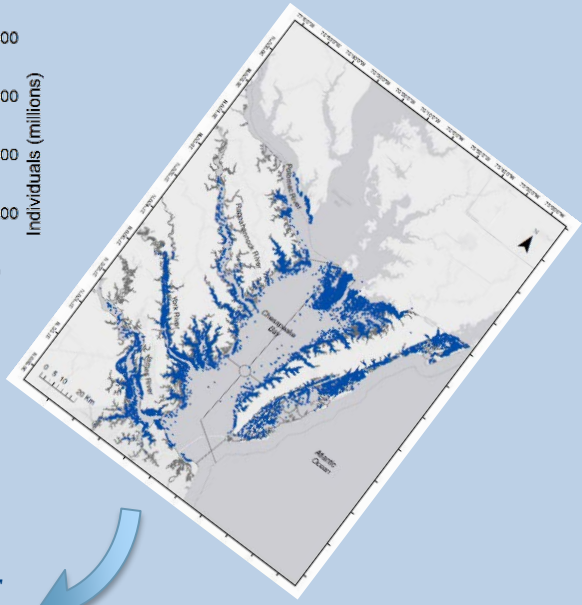

Harvest per pot increases
Virginia Blue Crab
Harvest (millions of lbs)
Pots (millions)
35
30
25
20
15
10
5
0
20
15
10
5
0
Harvest
Effort
Data from VMRC
1994
2000
2008
2014
Removals
Year

Modeling harvests



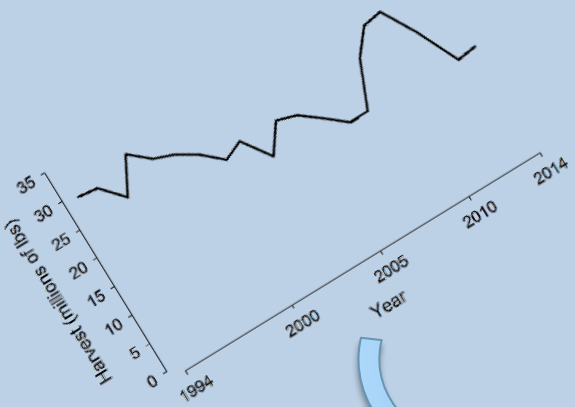


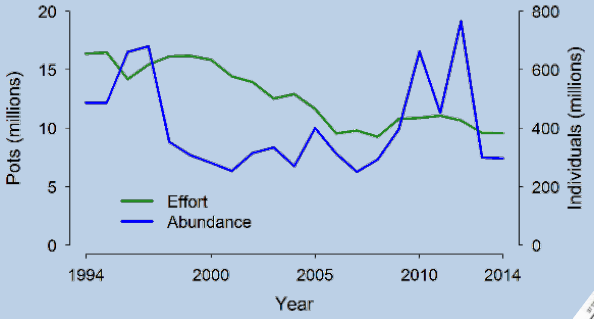


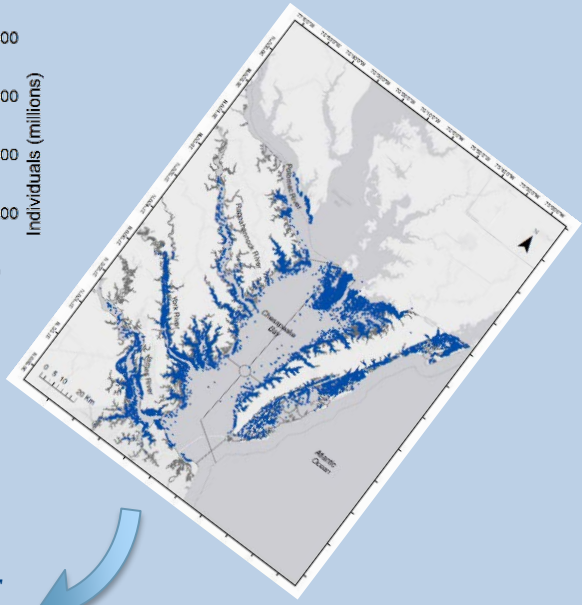
$$H_{it} = q_{it} E_{it}^{\eta_e} X_t^{\eta_x} R_{it}^{\eta_r}$$

Harvest in area *i* at time *t* depends on area and time specific catchability (*q*), effort (*E*), stock (*X*), and derelict gear removals (*R*)

Modeling harvests



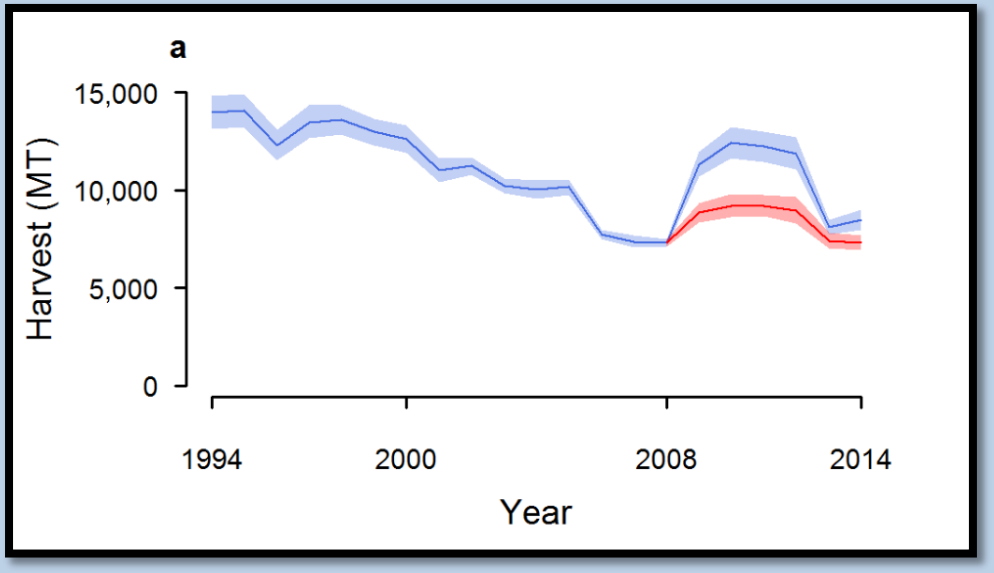




$$H_{it} = q_{it} E_{it}^{\eta_e} X_t^{\eta_x} R_{it}^{\eta_r}$$

Predict harvests **with** and
without derelict gear removals

Results

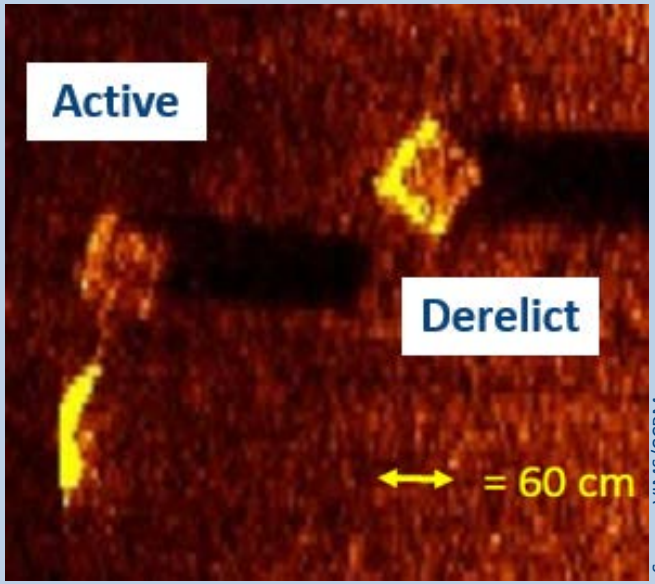


Scheld et al. The Dilemma of Derelict Gear. Sci. Rep. 6, 19671 (2016)

Predict harvests **with** and **without** derelict gear removals

Difference in predictions is a measure of program effects

Removals increased harvests by 27%, or 30 million lbs ($21 M)



Source: VIMS/CCRM

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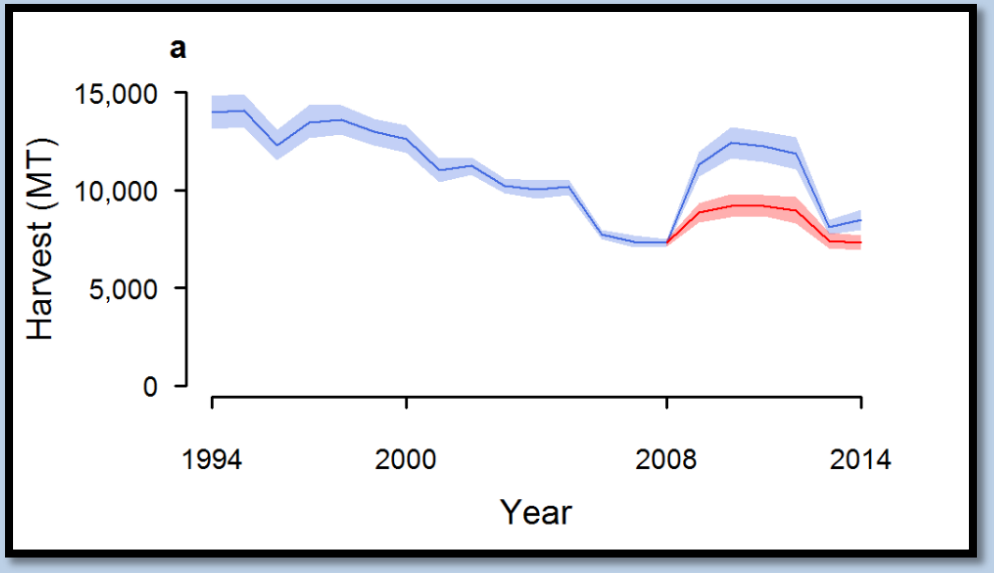
Results



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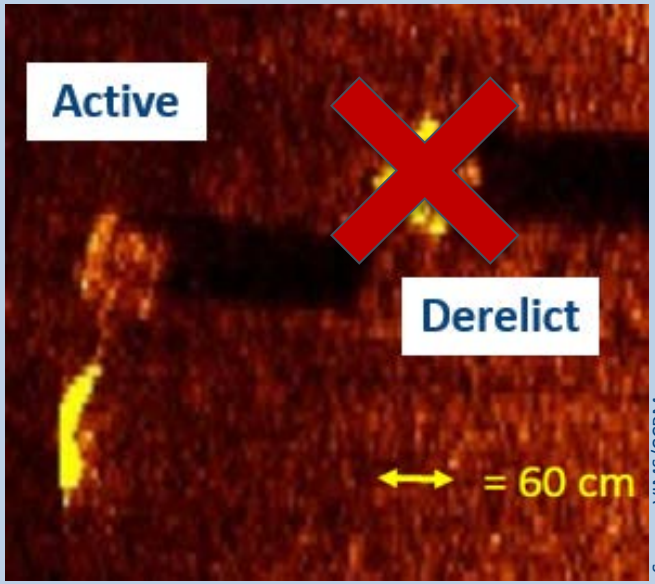

Source: VIMS/CCRM

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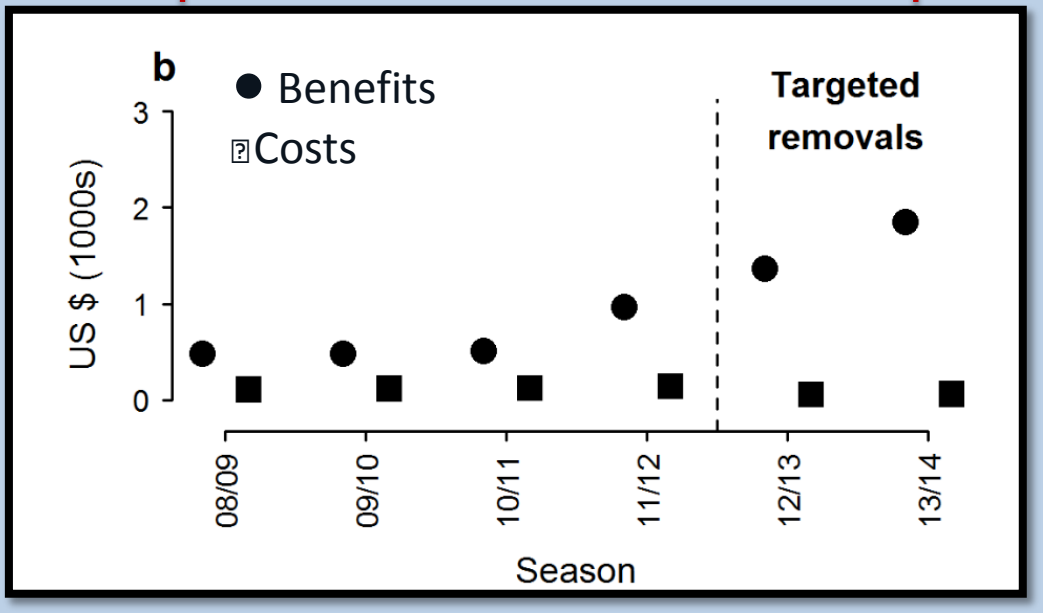
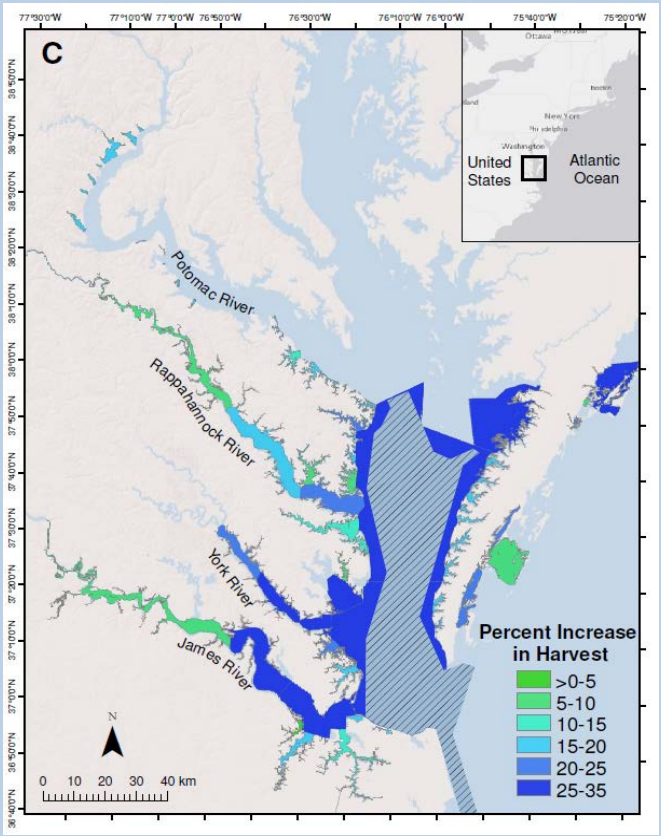
Results

Benefits ($21 M) > Costs ($4.2 M)

Benefits > Costs
in every year





Spatially heterogeneous

Figures: Scheld et al. The Dilemma of Derelict Gear. Sci. Rep. 6, 19671 (2016)

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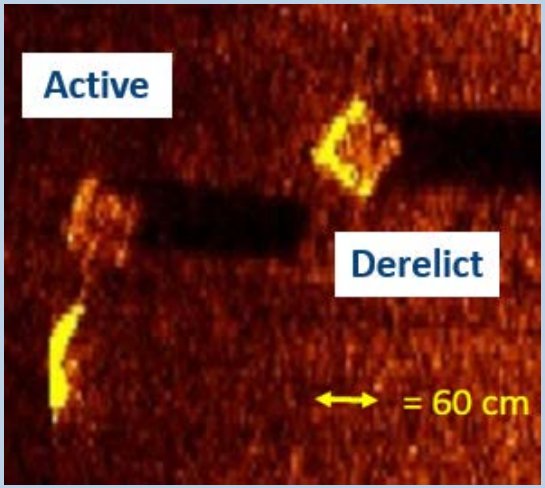
Conclusions

Source: Havens et al. (2011)



Source: VIMS/CCRM

- Derelict gear can impose several different economic costs
- Decreased harvests and production inefficiencies arising from gear competition may be substantial
- Targeted hotspot removals and preventative/mitigating measures (e.g., biodegradable escape mechanisms) effective strategy

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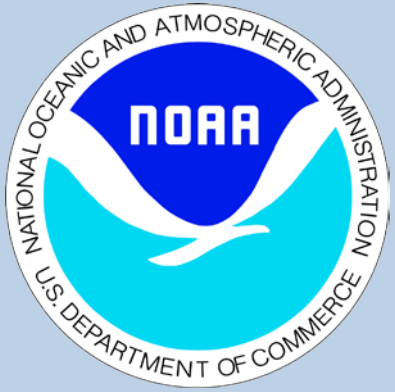
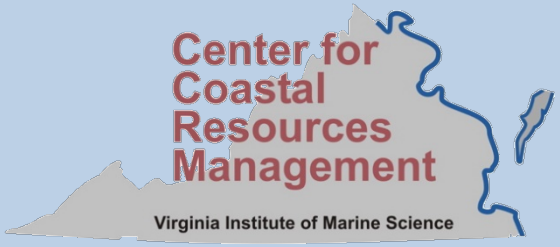
Thanks!

contact: scheld@vims.edu





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