Regional Impact Assessment of Derelict Fishing Gear in the Chesapeake Bay

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Briefing for:
Chesapeake Bay Program
Sustainable Fisheries GIT Executive Committee

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Goal

Develop a comprehensive, regional impact assessment aimed at estimating the cumulative impacts of derelict crab pots on natural resources in Chesapeake Bay

Global Science & Technology, Inc.

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Virginia Institute of Marine Science

CSS-Dynamac

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Objectives

1) Identify/evaluate factors contributing to distribution and densities of derelict blue crab traps

2) Inventory available data with regard to Obj. 1

3) Identify and fill data gaps

4) Develop a spatial model to evaluate Obj. 1 factors

5) Quantify ecological/economic impacts of DFG

6) Develop a DFG framework for use in other fisheries

Objective 4 – spatial model

Geographic Weighted Regression

Response variable = derelict fishing gear density*

Predictor variables = fishing effort†, depth**, vessels††, location***

*MD: systematic, side scan sonar surveys (2007); watermen clean ups (2010, 2012)
VA: fishermen field surveys/removals (2008-2012); tributary-specific surveys (2005-2011, 2015)

†MD: active traps field surveys (2007-2012); MD DNR reports (1994-2014); interviews (2014-2016)
VA: active traps field survey (2010); VMRC reports (1994-2014)

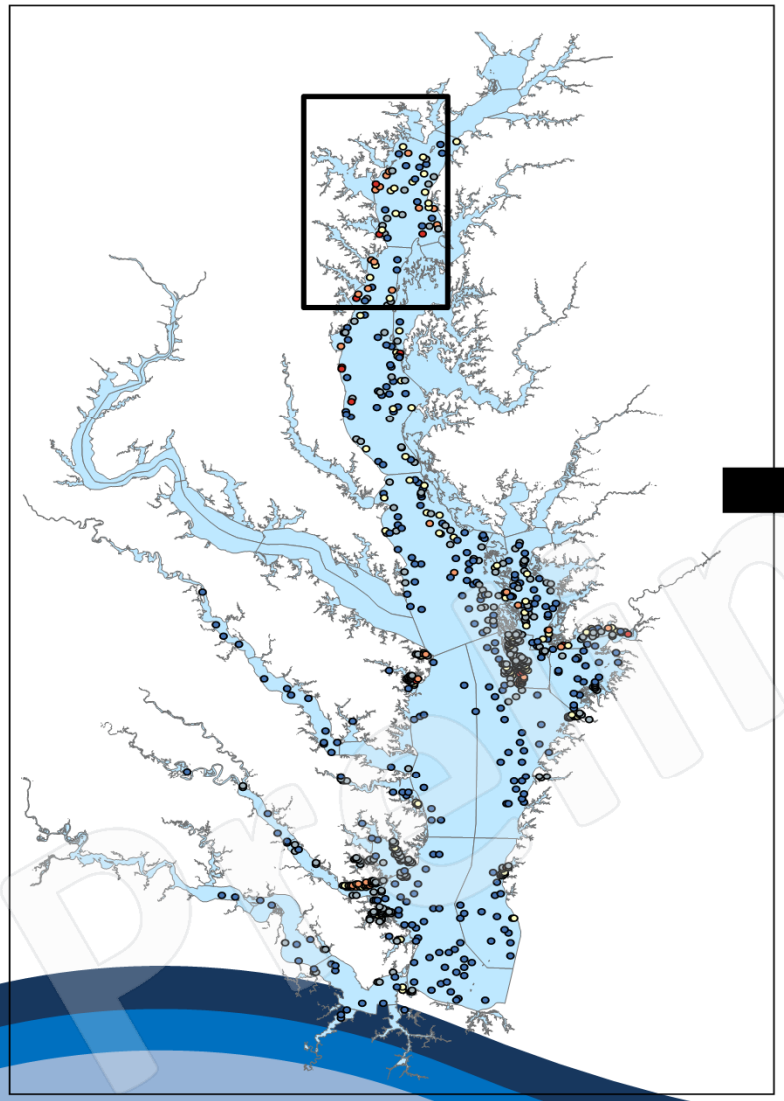
**1995 NOAA Hydrographic Survey data

††expert knowledge, Automatic Identification System data

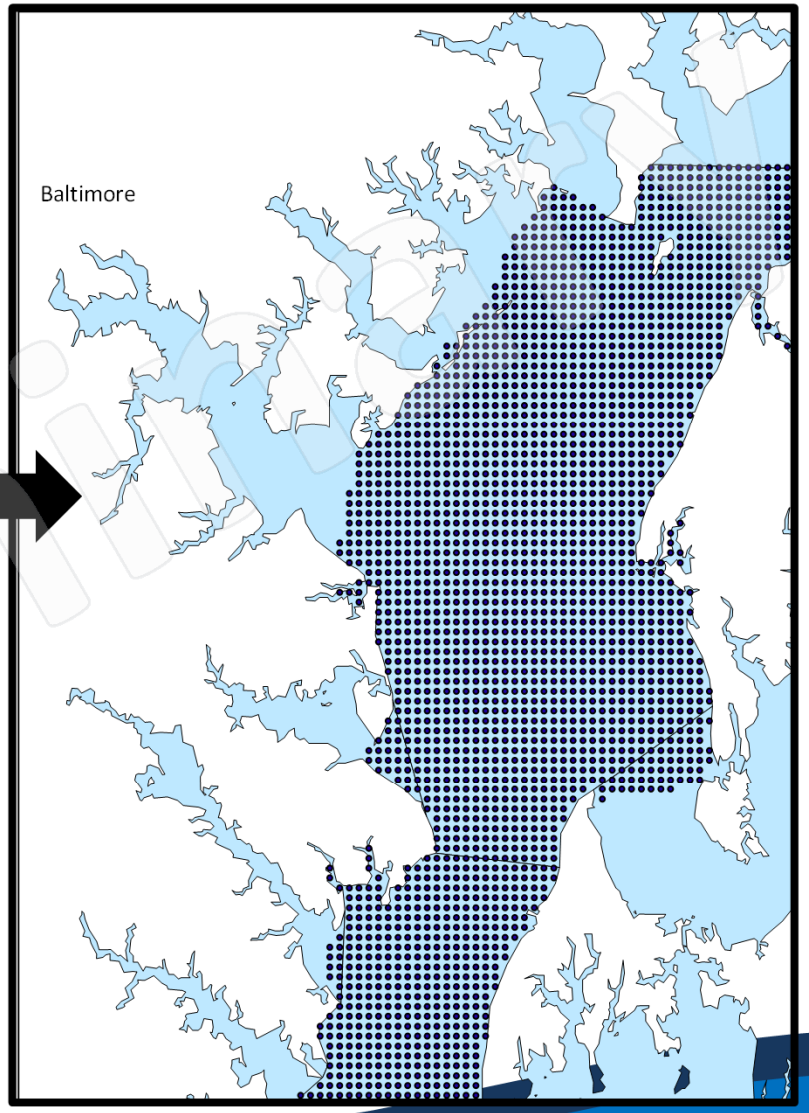
***NOAA fishing location codes

Objective 4 – spatial model

Field Data

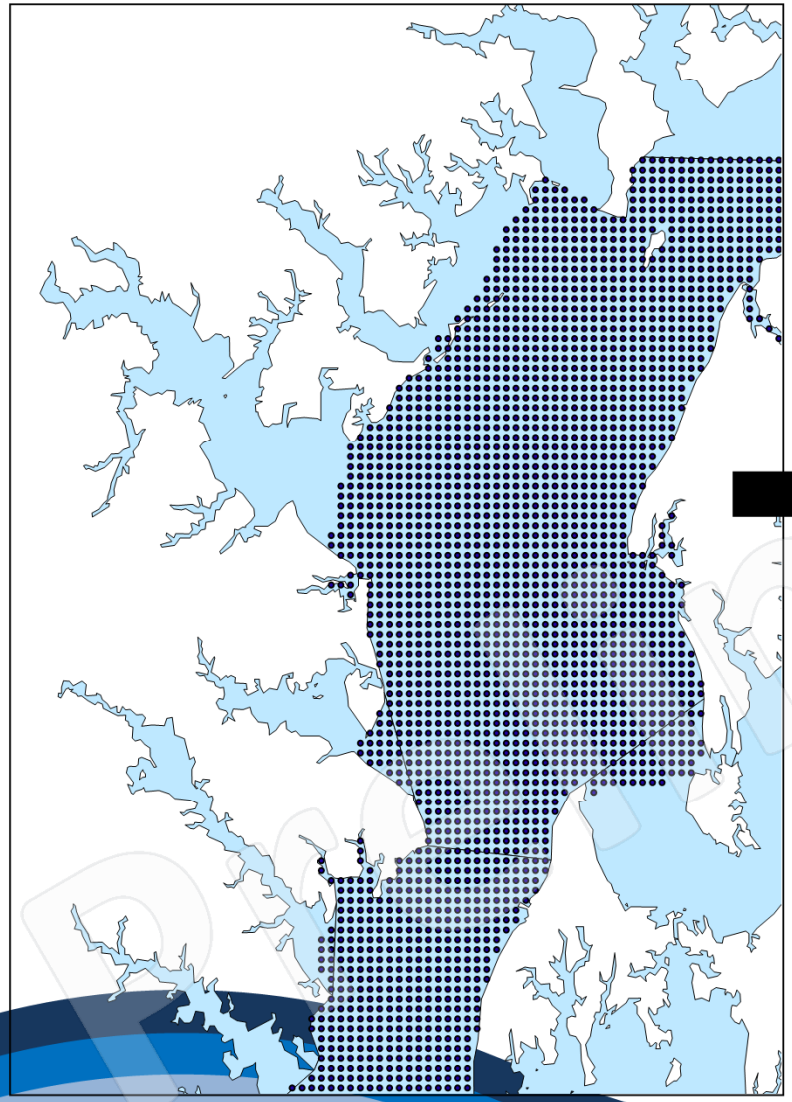


Prediction Grid

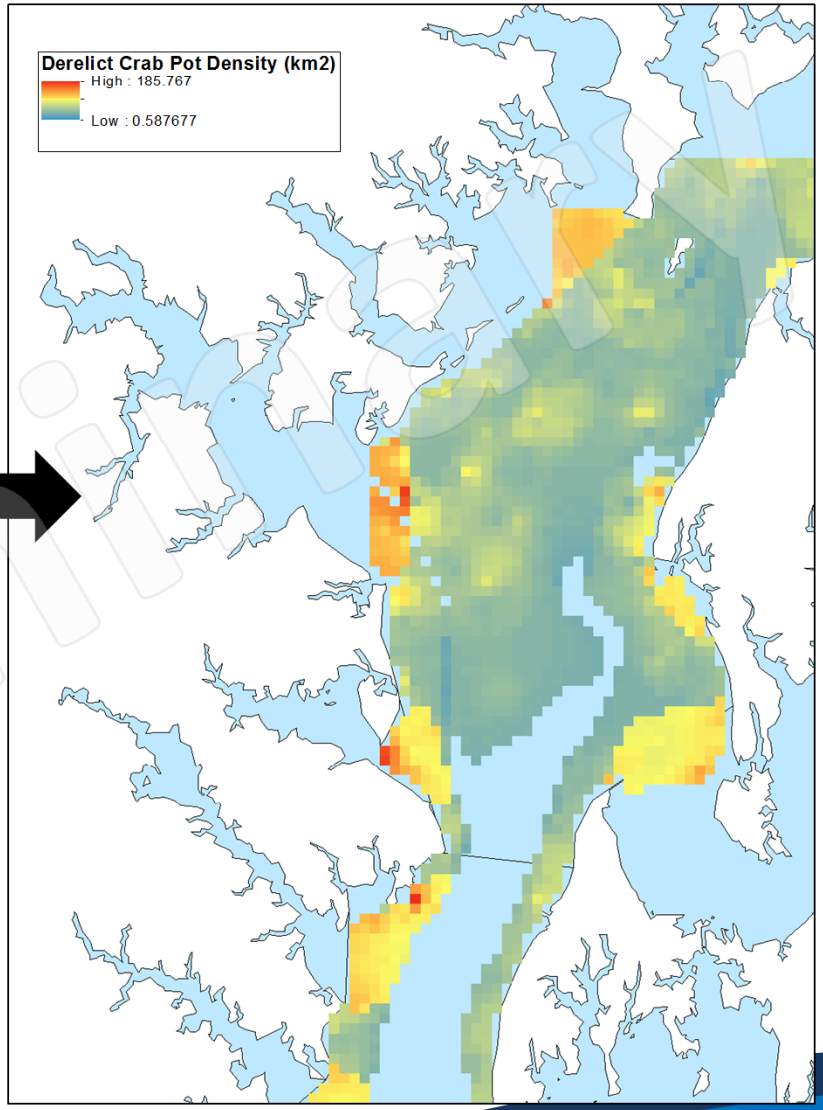


Objective 4 – spatial model

Prediction Grid

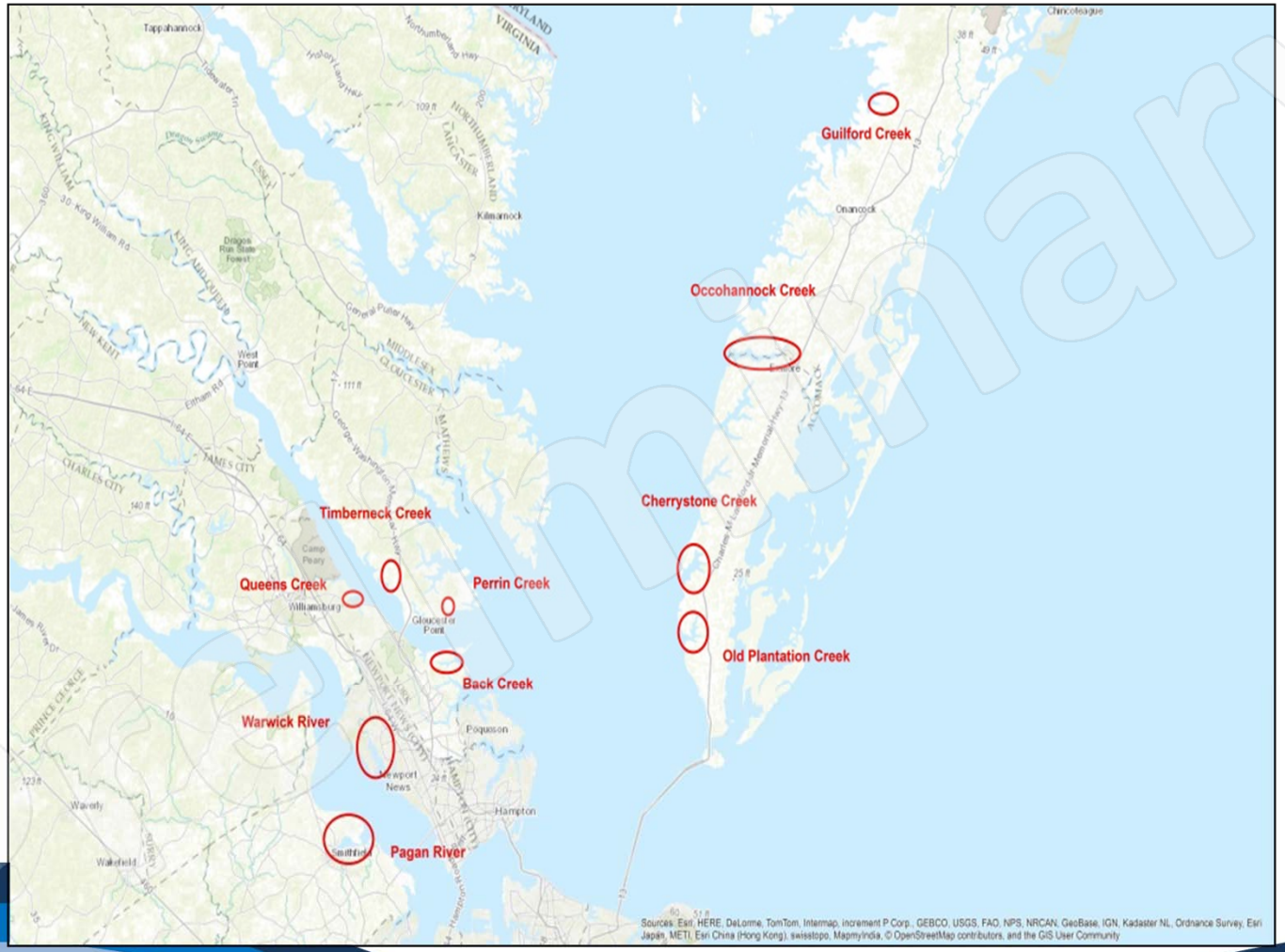


Predicted Hot spots



Objective 4 – spatial model

Tributary-specific work (10)

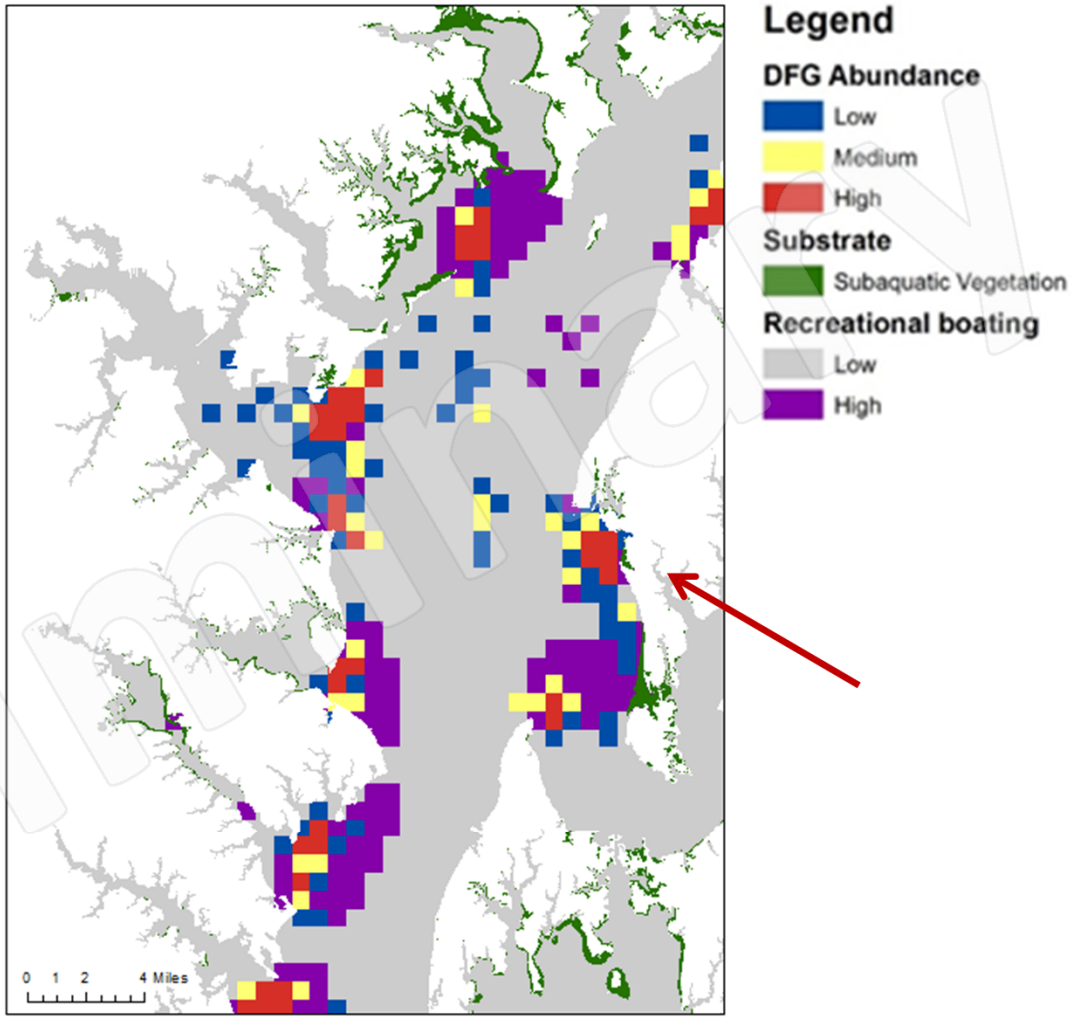


Objective 5 – ecological impacts

Mortality
- Blue crab

Bycatch mortality
- Terrapin
- White perch
- Croaker
- Black seabass
- Spot
- Red drum

Habitat
- SAV, oyster beds



Objective 5 – economic impacts

Spatially-explicit harvest model*

- Estimates annual harvests as a function of effort (number of pots), stock, and derelict gear removals
- Predicts harvests with and without derelict gear removals
- Compares model predictions to evaluate effect of removals on commercial harvests

**Scheld et al. 2016. The dilemma of derelict gear. Scientific Reports 6:19671*

Objective 5 – economic impacts

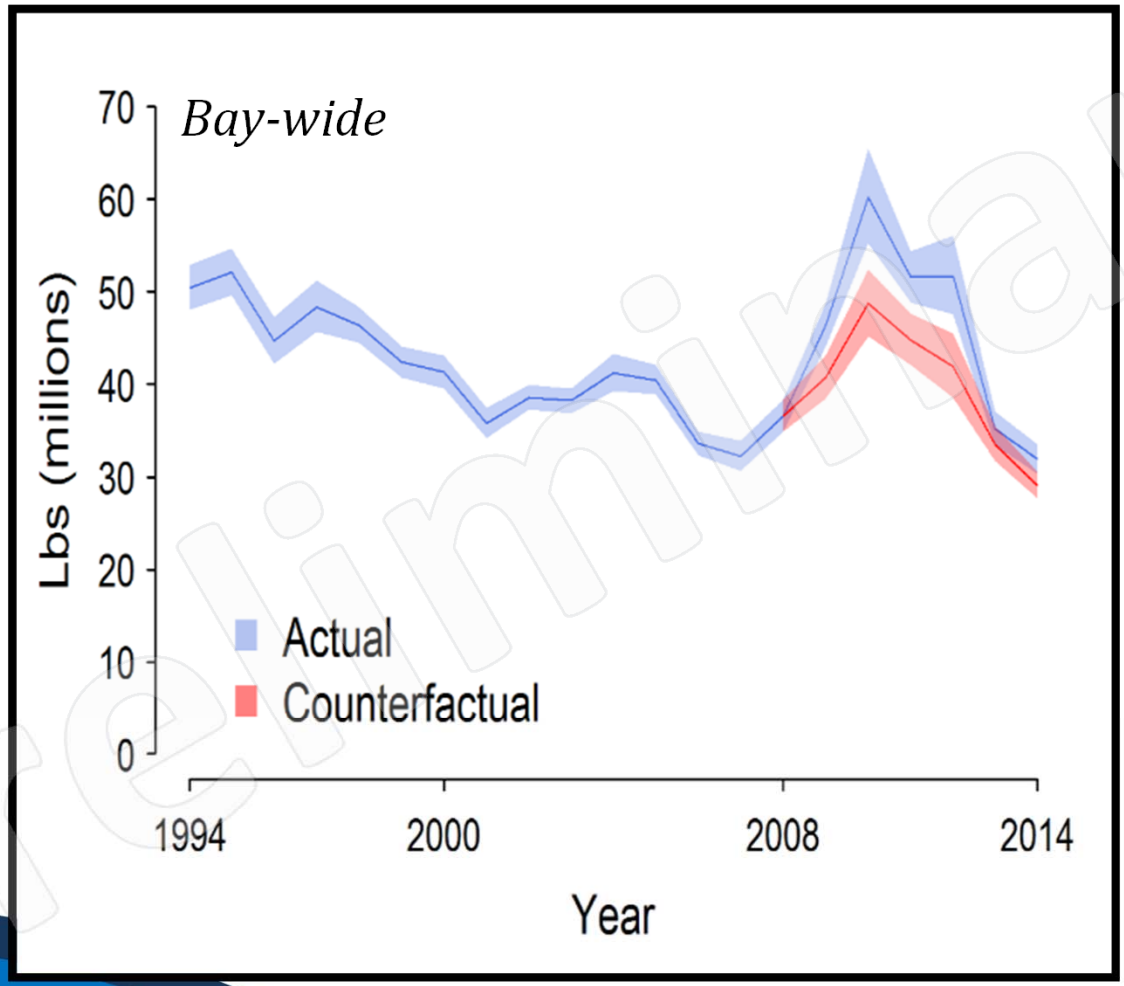
Spatially-explicit harvest model

	# Traps Removed	Avg Pounds of Increased Harvest	Avg Increased Revenue
Virginia*	34,397	30 million (27%)	$21.2 million
Maryland	9,560	8 million (16%)	$10.9 million

Scheld et al. 2016. The dilemma of derelict gear. Scientific Reports 6:19671

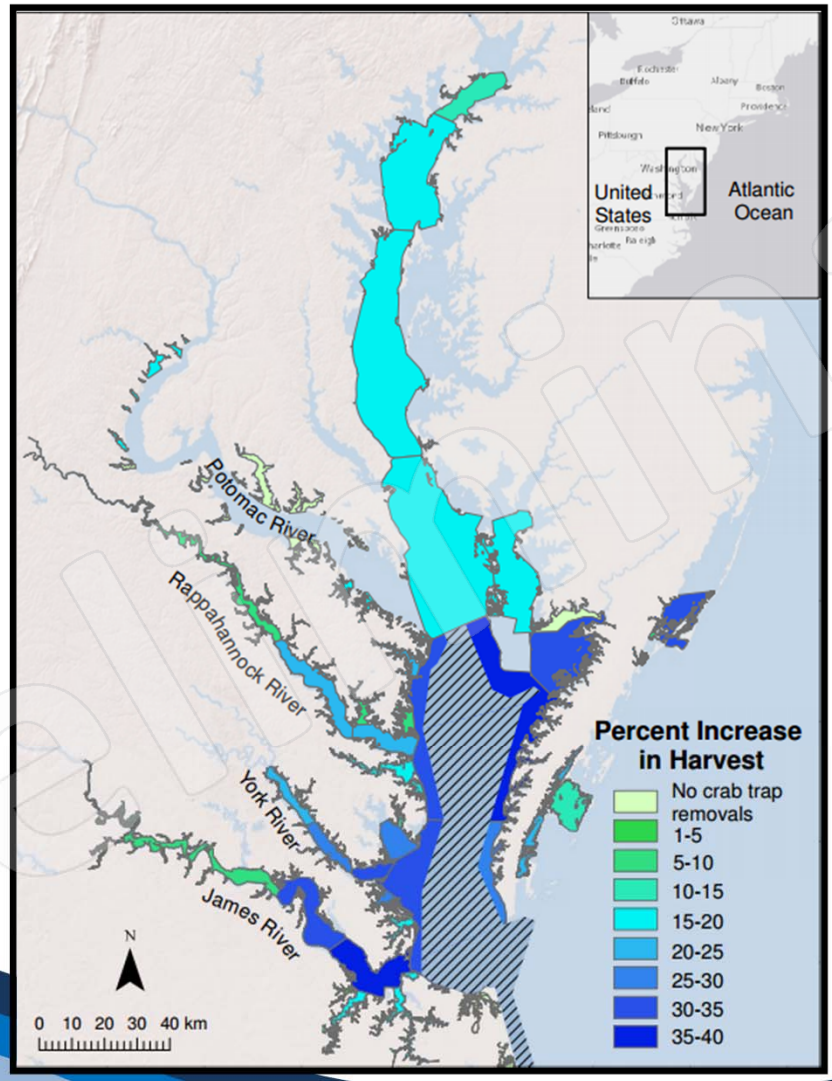
Objective 5 – economic impacts

Spatially-explicit harvest model



Objective 5 – economic impacts

Spatially-explicit harvest model



Objective 6 – guiding framework