Economic Valuation of Crab and Oyster Fisheries in Puget Sound

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NOAA Chesapeake Bay Office

Presentation to

Chesapeake Bay Sustainable Fisheries Goal Implementation Team

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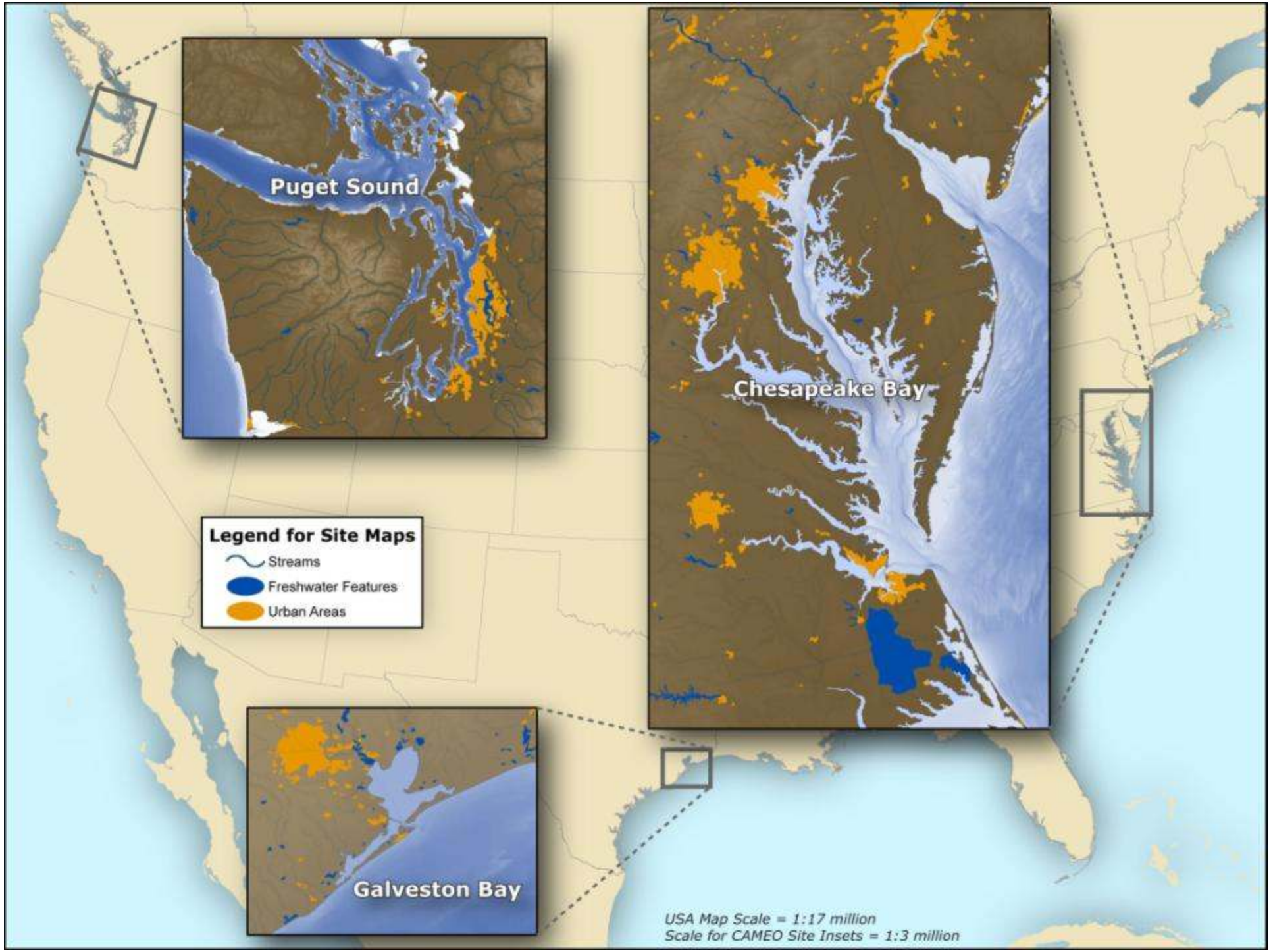
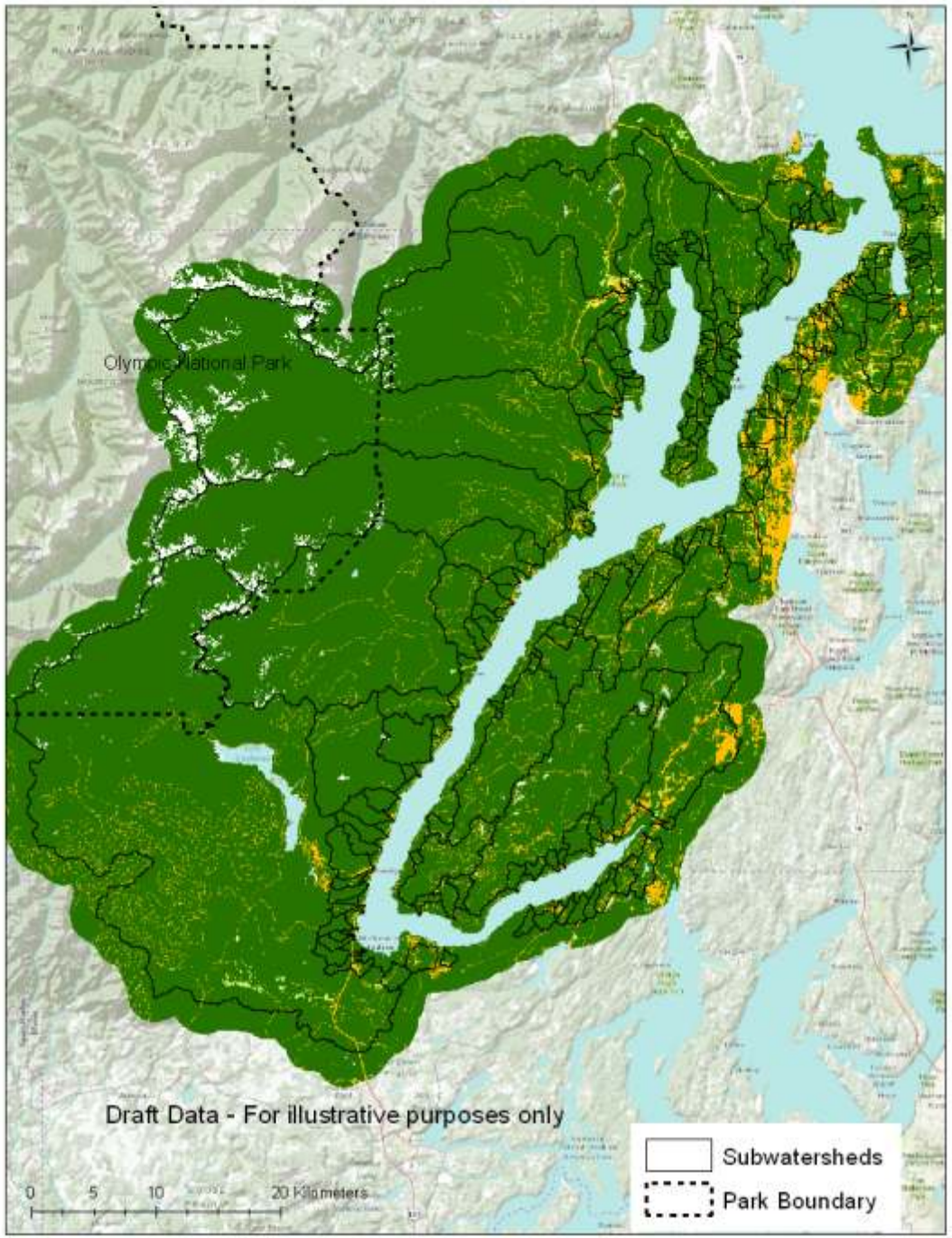
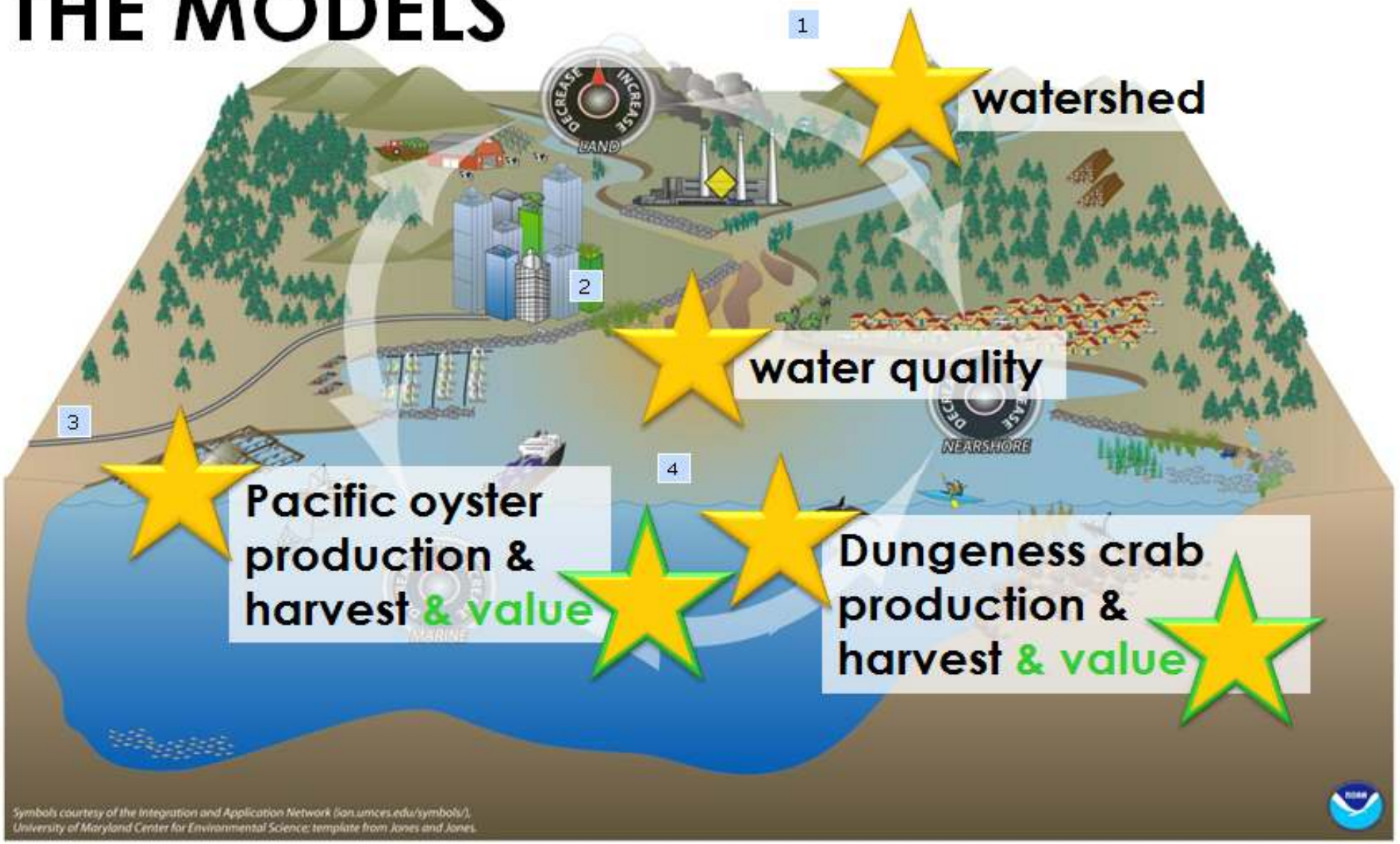

Puget Sound
Chesapeake Bay
Galveston Bay
Legend for Site Maps
Streams
Freshwater Features
Urban Areas
USA Map Scale = 1:17 million
Scale for CAMEO Site Insets = 1:3 million

Hood Canal


Olympic National Park
Draft Data - For illustrative purposes only
0 5 10 20 Kilometers
Subwatersheds
Park Boundary

THE MODELS


1
watershed
2
water quality
3
Pacific oyster production & harvest & value
4
Dungeness crab production & harvest & value
DECREASE
INCREASE
LAND
NEARSHORE
MARINE
Symbols courtesy of the Integration and Application Network (ian.umces.edu/symbols/).
University of Maryland Center for Environmental Science; template from Jones and Jones.

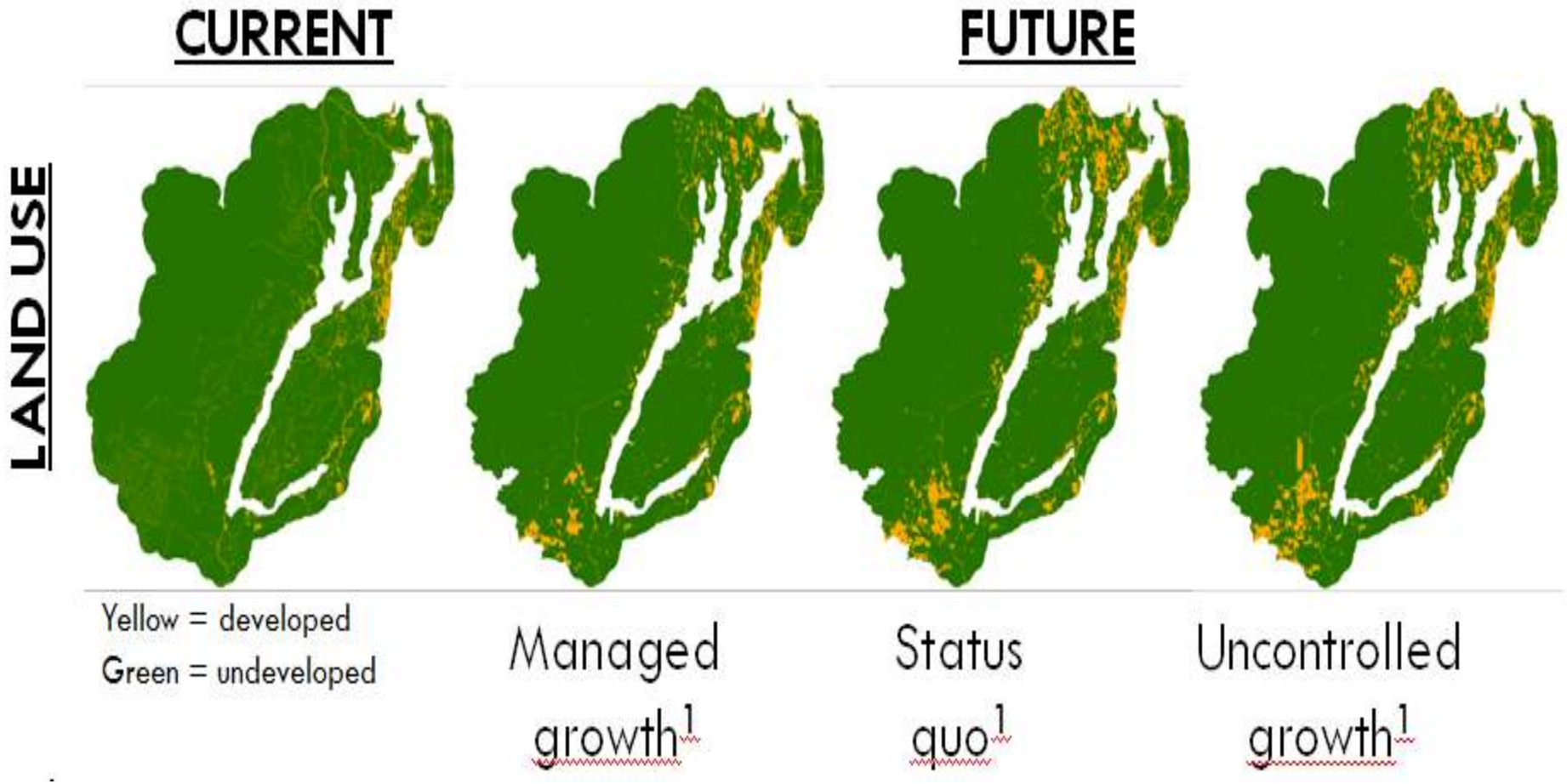
The Results

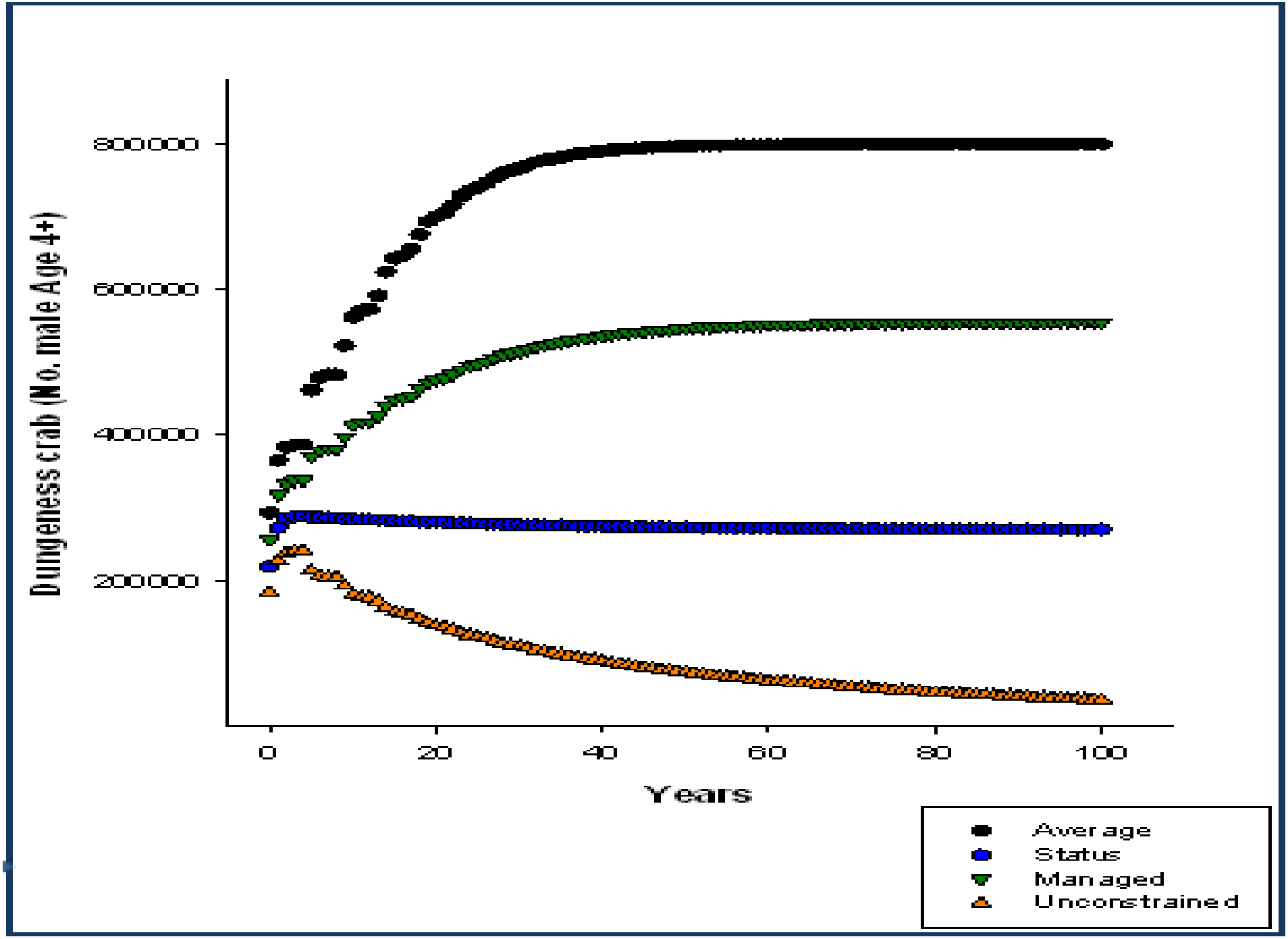
•Under a scenario of unrestricted growth we expect economic losses to the Dungeness Crab recreational fishery.

•Under a scenario of managed land use growth, we might expect to see an appreciable increase in Dungeness Crab abundance and $10 million increase in the value of the recreational fisheries.

•A model for the demand for Washington state shellfish predicts that a 20% increase in Hood Canal harvest of oysters will increase sales by 16% or $1 million per year. The net present value (NPV) of this change is $15 million. Prices will decrease by 3% thus benefiting consumers. The economic benefits for consumers are estimated at $134,000 per year or a NPV of $2 million.

THE SCENARIOS



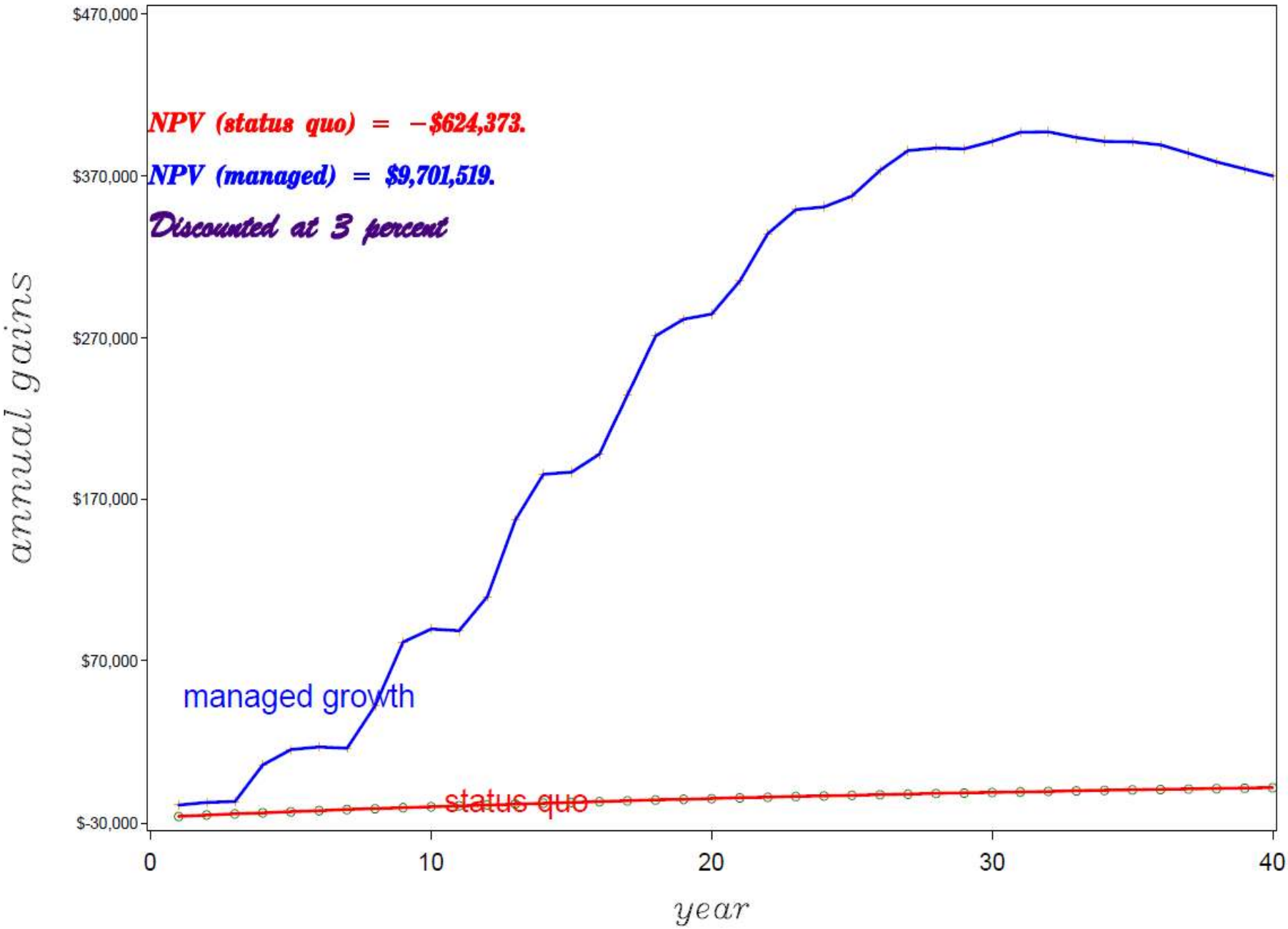

Dungeness crab (No. male Age 4+)
800000
600000
400000
200000
0
20
40
60
80
100
Years
Average
Status
Managed
Unconstrained

Framework for Recreational Dungeness crab Non-market Valuation

- Using the travel cost model: widely used model for valuing recreational trips and amenities. The model is accepted by courts in assessing damages to recreational fishing.
- Links crab abundance and fishers characteristics to expected catch per trip.
- Estimates the implicit price of expected catch.
- Monetizing the economic gains and losses from changes in crab abundance under status quo, managed growth and unconstrained growth scenarios.

McConnell,Strand and Blake-Hedges 1995 Marine Resource Economics.

Managed growth economic gains



Commercial Oyster Fishing and Aquaculture Valuation

I. A reduced form inverse demand model:

$$Log(oyster\ price) = b_0 + b_1 * log(oyster\ production) + b_2 * log(geoduck\ production) + b_3 * log(manila\ clams\ production) + b_4 * log(blue\ mussel\ production).$$

II. Data comes from a voluntary survey of Washington producers (1972-2008). Includes production in pounds and dollar value, by month, year, fisher type (farmed, treaty and non-treaty), catch area and specie.

III. 19 species are produced (18 farmed and 3 targeted by treaty and non-treaty fishers. Keep the four species with 2% of production or more. Drop catch areas with infrequent and non-recurring production.

Lipton 2008 Journal of Shellfish Research "*Economic Benefits of a Restored Oyster Fishery in Chesapeake Bay*".

Economic Losses/Gains from changes in oyster abundance

Using the model results from slide 2, a price response to a 20% increase in Hood Canal oyster production is estimated. Assumption: production of other species and production of oysters in other areas of Washington are held constant.

Using data from the most recent full year (2007) production is expected to gain 187,286 pounds. Predicted price falls by 3 percent from $4.42 to $4.29. Sales increase by 16% or by $1,086,259.

Consumer surplus increases by $134,156. Of this, $121,960 is an economic transfer from producers to consumers. It is not a net gain to society. The rest, $12,191, is a net gain to society, resulting from expanded market.

Lacking data on production costs it is not possible to estimate all elements of producer surplus and total net economic gain to society.

Note that because this is a voluntary survey, it probably underestimates total economic gains.

Chesapeake Bay Application

•Timeline: March – May Rappahannock watershed

•Benefits for fishery managers:

• Measure the relative importance of land use decisions for fishery outcomes and indicate where it is worthwhile to pursue coordination.

• Provide decision support tool for smaller scale decisions.

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