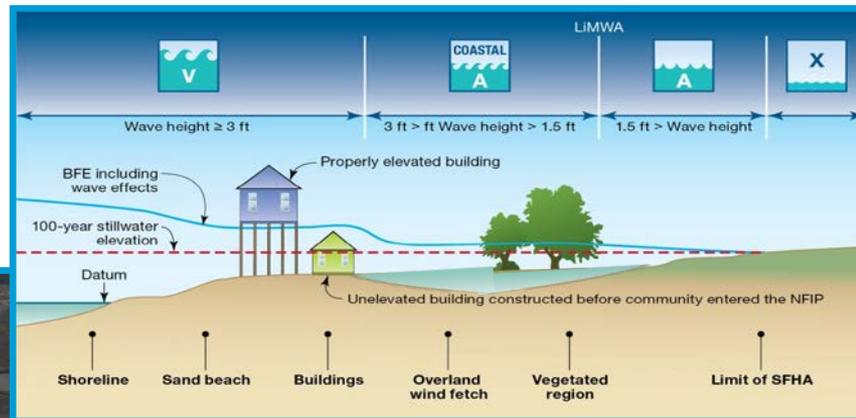




# Economic Analysis Delaware Bayshore Communities: Delaware Bay Beach Work Group Briefing



March 21, 2014

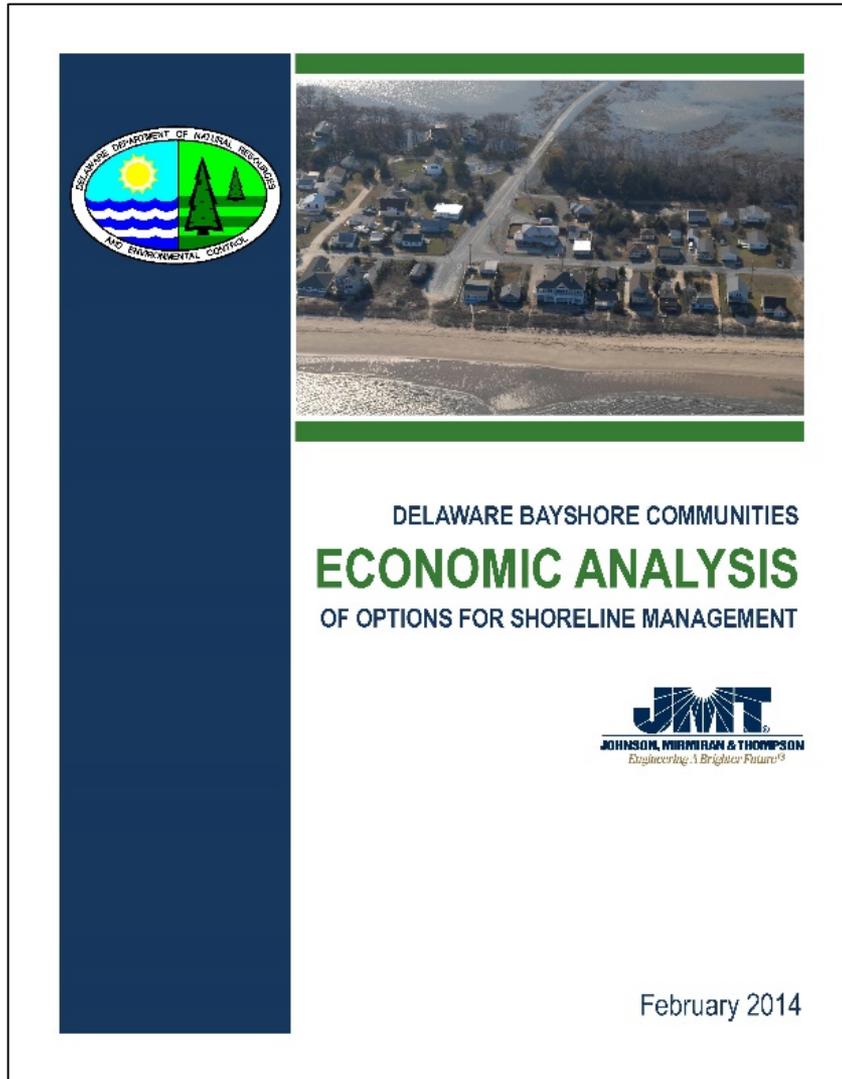
# Summary – History of Presentations

## *Multiple Presentations to Date – Since January 2011*

### TOPICS

- Geographic Coverage
- Management Scenario Development
- Data Collection
  - Structure Inventory - Elevations
  - Structure Metrics
  - Modeling Flood/Erosion/SLR
  - Flood/Erosion Damages
  - Recreational Beach Widths
- Economic Studies – Approach
  - Flood/Erosion Damages Avoided
  - Recreation
  - Tax Revenues
  - Ecosystem Services
- Economic Studies Preliminary Findings – Costs/Benefits
  - All Scenarios
  - All Communities

# Sources/Credits



Credits: Sources for Tables, Images, Data in Presentation

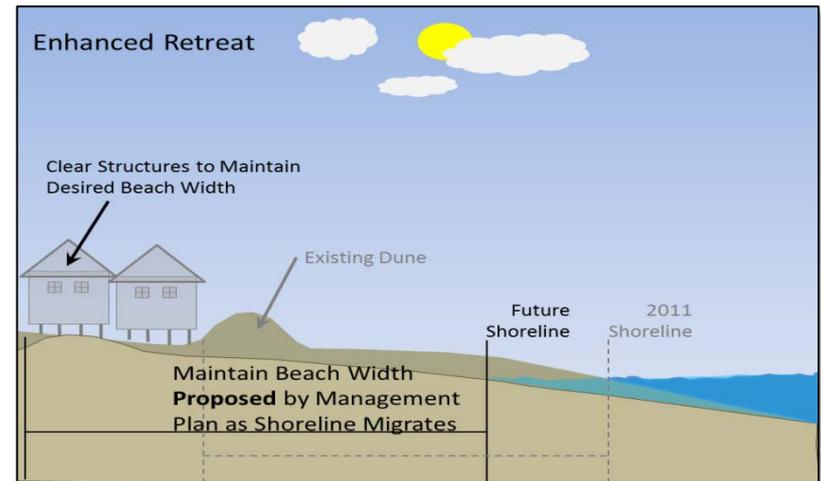
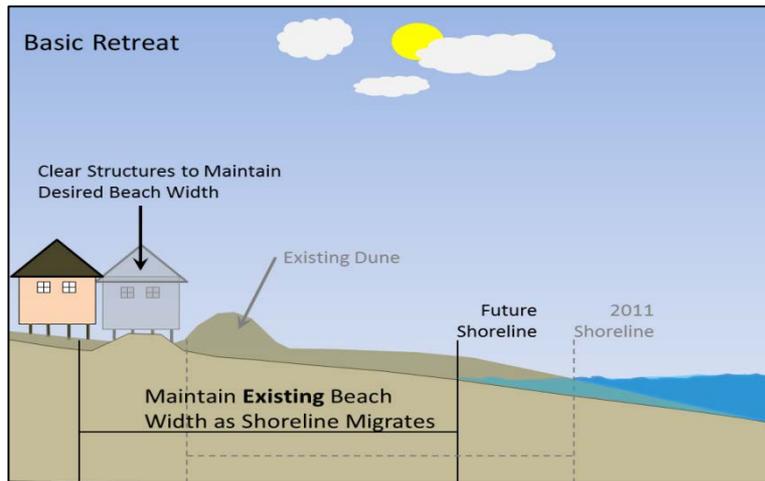
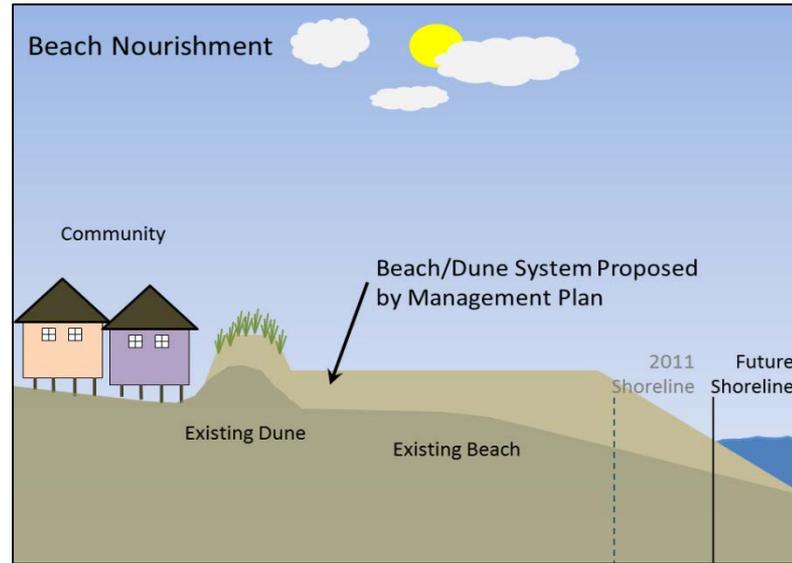
Determine the:

- **Distribution** and
- **Benefits** of different management
- **Scenarios.**

*All scenarios compared to the **No-Action Scenario***



# Background – “BUILD/ACTION” Scenarios



# Background - Benefits Quantified

## ECONOMIC ANALYSES -

- General Categories of Economic Effects Analyzed/Quantified
  - **Structures/Assets Damages**
    - Property values
  - **Recreation**
    - Tourism Revenues
    - Local/Statewide business revenues
    - Natural Resource Capital Valuation
      - Wetlands, Wildlife, Fisheries, Etc.
    - Others

# Benefit, Cost or Transfer Analysis

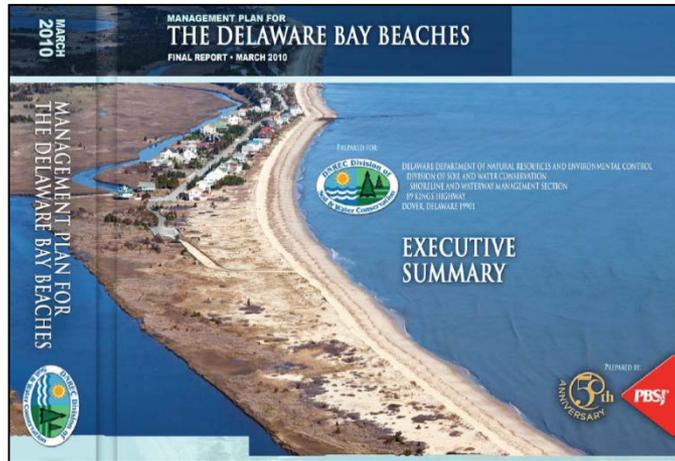
BENEFIT, COST OR TRANSFER	HOW MEASURED	DESCRIPTION AND ECONOMIC INTERPRETATION
<b>Sand, Fill and Demolition Costs</b>	Change in costs paid by the State. Quantified using predicted market costs.	These reflect the opportunity cost of resources used for management.
<b>Housing Service Benefits</b>	Change in the net present value of services received from homes, as reflected in property values.	These reflect gains or losses to homeowners related to the continued existence of a housing structure into the future. According to economic theory, equilibrium property values should reflect the capitalized present value of future housing services.
<b>Recreational Benefits</b>	Change in the net present value of beach recreation, quantified using changes in discounted consumer surplus.	Beach recreation generates non-market use values. These values can be quantified using consumer surplus, defined as the difference between what an individual would be willing to pay for beach recreation and what is actually paid in travel and access costs.
<b>Flood and Erosion Damages</b>	Change in net damages to homes (repair and replacement costs).	Changes in beach management can influence the likelihood and severity of flood and erosion damage to homes. This is in addition to homes that are entirely lost. The true relationship between damage costs and the willingness to pay to avoid flood damage (a true measure of benefit) is generally undefined, although these are sometimes interpreted as an approximation of benefit losses.
<b>Housing Acquisition Payments (Transfer)</b>	Payments from the State to homeowners to compensate for lost housing services.	These reflect a transfer payment from the State to homeowners. That is, for each \$1 paid by the State, \$1 is received by homeowners; these payments are a simple transfer of funds from one group to another, the net benefit of which is zero.

# Key Benefits, Costs and Impacts Assessed in the Management Scenarios

Benefit or Cost Category	Measure	Description	Beneficiaries (for quantified benefits)
<b>COSTS OF MANAGEMENT (RELATIVE TO NO ACTION)</b>			
Shoreline management	Sand or fill costs	<ul style="list-style-type: none"> <li>Applies to beach nourishment activity</li> <li>Based design specifications for volume of sand needed over time and unit costs of fill</li> <li>Unit fill costs account for excavation, hauling and placement of beach fill material</li> </ul>	N/A
	Demolition	<ul style="list-style-type: none"> <li>Costs of clean up for structures with 100% damage due to erosion</li> </ul>	N/A
<b>QUANTIFIED BENEFITS OF MANAGEMENT (RELATIVE TO NO ACTION)</b>			
Erosion- shoreline migration	Recreational activity	<ul style="list-style-type: none"> <li>Change in values of recreational beach trips</li> <li>Based on recreation demand model estimates</li> </ul>	<ul style="list-style-type: none"> <li>Community residents</li> <li>Beach visitors</li> </ul>
	Housing services	<ul style="list-style-type: none"> <li>Change in annualized service flows provided by housing</li> <li>Based on real estate price used to estimate the capitalized service value of property suffering 100% loss</li> </ul>	Property owners
Coastal flooding	Avoided property and content damage	<ul style="list-style-type: none"> <li>Cost of replacement less depreciation of assessed parcel value (avoided damages do not typically provide an exact measure of economic benefit; see Chapters 3 and 5).</li> </ul>	Property owners
<b>UNQUANTIFIED BENEFITS, COSTS OR IMPACTS</b>			
Erosion - shoreline migration	Economic activity in service sectors	<ul style="list-style-type: none"> <li>Productivity impacts local economy (e.g., restaurants, hotels, retail) measured in jobs and business revenue</li> <li>Not assessed, but assumed to positively correlated with recreational activity</li> <li>Not a valid measure of economic benefit or cost</li> </ul>	<ul style="list-style-type: none"> <li>Government</li> <li>Businesses</li> <li>Residents</li> </ul>
	Habitat protection and other ecosystem services	<ul style="list-style-type: none"> <li>Ecosystem service flows not assessed in this analysis/ natural resource capital valuation</li> <li>Omission likely understates total benefit of shoreline management to a small degree</li> <li>Available evidence suggests that effects on these ecosystem service values are likely to be minor</li> </ul>	Passive use values for the public
Tax revenue	Lost tax revenue for Kent and Sussex Counties	<ul style="list-style-type: none"> <li>Estimated but not included in net impact of management options</li> <li>Reflects transfers between property owners to the County for services</li> <li>Not a valid measure of economic benefit or cost</li> </ul>	N/A

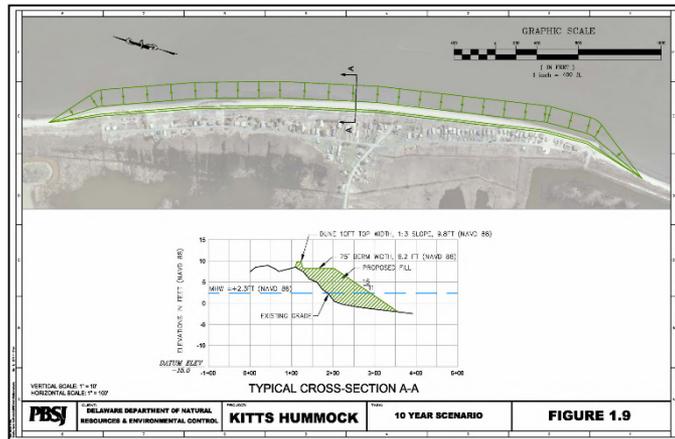
# Focus Presentation

## Beach Nourishment



Versus

## No Action



# Net Benefits - Aggregate

Scenario	(A) Sand, Fill and Demolition (PV, \$mill)	(B) Housing Acquisition Payments (paid by State) (PV, \$mill)	(C) Housing Acquisition Payments (received by property owners) (PV, \$mill)	(D) Recreation (PV, \$mill)	(E) Housing Services <sup>2</sup> (PV, \$mill)	(F) Reduction in Additional Flood and Erosion Damages <sup>3</sup> (PV, \$mill)	(G) Net Benefits (PV, \$mill; sum of A through F)
<b>Beach Nourishment (Scenario 1)</b>	<b>-\$61.1</b>	<b>\$0</b>	<b>\$0</b>	<b>\$16.1</b>	<b>\$18.2</b>	<b>\$2.7</b>	<b>-\$24.1</b>
<b>Basic Retreat (Scenario 3)</b>	<b>-\$0.5</b>	<b>-\$61.3</b>	<b>\$61.3</b>	<b>\$10.8</b>	<b>-\$43.1</b>	<b>\$3.0</b>	<b>-\$29.8</b>

<sup>1</sup> Costs (or reduced benefits) enter as negative numbers. Benefits (or reduced costs) enter as positive numbers. All benefits and costs are relative to the No Action alternative.

<sup>2</sup> Change in benefits due to the total loss of housing structures.

<sup>3</sup> Damages to remaining housing structures. Although the beach width is similar under nourishment and enhanced retreat, damages avoided differ due to (a) the construction of additional protective dunes under beach nourishment and the removal of homes under enhanced retreat that would otherwise be subject to damage.

# Net Benefit by Scenario and Community

Community	Beach Nourishment	Basic Retreat
	Net Benefit (PV, \$mill)	Net Benefit (PV, \$mill)
Pickering	-\$3.2	-\$0.5
Kitts Hummock	-\$4.6	-\$1.6
Bowers	-\$3.1	-\$2.9
South Bowers	-\$3.8	-\$0.4
Slaughter	-\$11.6	\$0.7
Prime Hook	-\$4.6	-\$3.4
Broadkill	<b>\$6.8</b>	-\$21.9
<b>Total</b>	<b>-\$24.1</b>	<b>-\$29.8</b>

Notes: Net benefits calculated relative to the No Action Scenario. The table reports all figures in 2011 dollars. The reported values are the present value of the stream of annual estimates aggregated across 30 years (from 2011 to 2041) and discounted at 4%.

# Distribution of Net Benefits by Management Scenario

Metric	Units	Beach Nourishment		Basic Retreat	
		Taxpayers & Non-Residents	Residents	Taxpayers & Non-Residents	Residents
Net Benefits	PV, \$mill	-\$48.1	\$24.0	-\$52.3	\$22.5

Notes: All values reported in 2011 dollars. The figures are the present value of the stream of costs and benefits aggregated across 30 years (from 2011 to 2041) and discounted at 4%.

# Distribution of Net Benefits by Management Scenario, By Community

Community	Beach Nourishment (PV, \$mill)		Basic Retreat (PV, \$mill)		Enhanced Retreat (PV, \$mill)	
	Taxpayers & Non-Residents	Residents	Taxpayers & Non-Residents	Residents	Taxpayers & Non-Residents	Residents
Pickering	-\$5.8	\$2.6	-\$3.3	\$2.8	-\$5.1	\$3.2
Kitts Hummock	-\$7.3	\$2.7	-\$4.5	\$2.9	-\$11.1	\$4.2
Bowers	-\$4.1	\$1.0	-\$3.6	\$0.7	-\$7.2	\$1.4
South Bowers	-\$4.2	\$0.5	-\$0.8	\$0.4	-\$2.2	\$0.8
Slaughter	-\$12.9	\$1.2	\$0.2	\$0.5	-\$9.4	\$0.9
Prime Hook	-\$6.7	\$2.1	-\$4.7	\$1.3	-\$39.0	\$2.6
Broadkill	-\$7.1	\$13.9	-\$35.8	\$13.9	-\$69.7	\$16.6
<b>Total</b>	<b>-\$48.1</b>	<b>\$24.0</b>	<b>-\$52.3</b>	<b>\$22.5</b>	<b>-\$143.7</b>	<b>\$29.7</b>

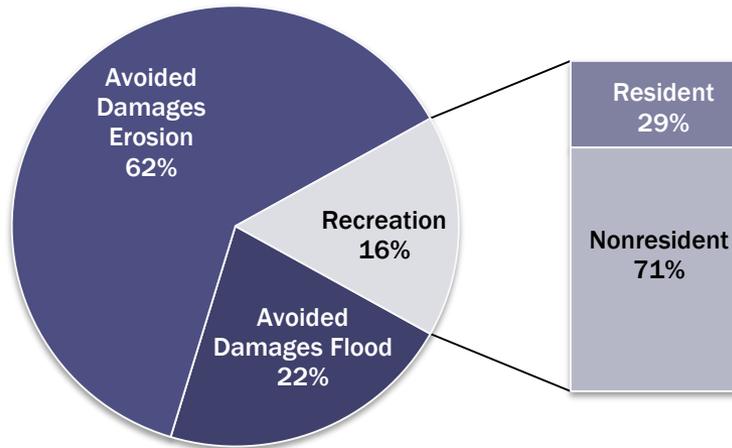
Notes: All values reported in 2011 dollars. The figures are the present value of the stream of costs and benefits aggregated across 30 years (from 2011 to 2041) and discounted at 4%.

# Nourishment Costs by Community Relative to No Action

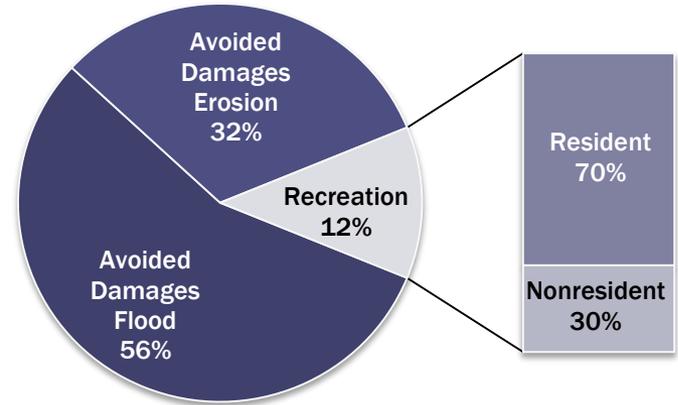
Community	Net Cost Relative to No Action	Demolition Costs Avoided (from Table 4.2a)	Nourishment Cost	Structures	Cost per structure
	(PV \$mill)	(PV \$mill)	(PV \$mill)	(No.)	(\$/structure)
Pickering	<b>\$6.25</b>	-\$0.15	\$6.4	43	<b>\$148,800</b>
Kitts Hummock	<b>\$7.68</b>	-\$0.12	\$7.8	114	<b>\$68,400</b>
Bowers	<b>\$4.87</b>	-\$0.03	\$4.9	<b>325</b>	<b>\$15,100</b>
South Bowers	<b>\$4.57</b>	-\$0.03	\$4.6	69	<b>\$66,700</b>
Slaughter	<b>\$14.60</b>	-\$0.0	\$14.6	<b>308</b>	<b>\$47,400</b>
Prime Hook	<b>\$7.26</b>	-\$0.04	\$7.3	185	<b>\$39,500</b>
Broadkill	<b>\$15.77</b>	-\$0.23	<b>\$16</b>	<b>599</b>	<b>\$26,700</b>
<b>Total</b>	<b>\$61.10</b>	<b>-\$0.6</b>	<b>\$61.7</b>	<b>1,643</b>	<b>\$37,500</b>

# BENEFIT DISTRIBUTION – Nourishment

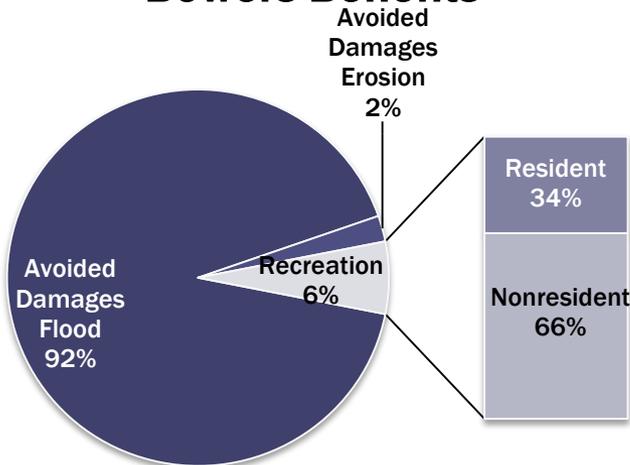
## Pickering Benefits



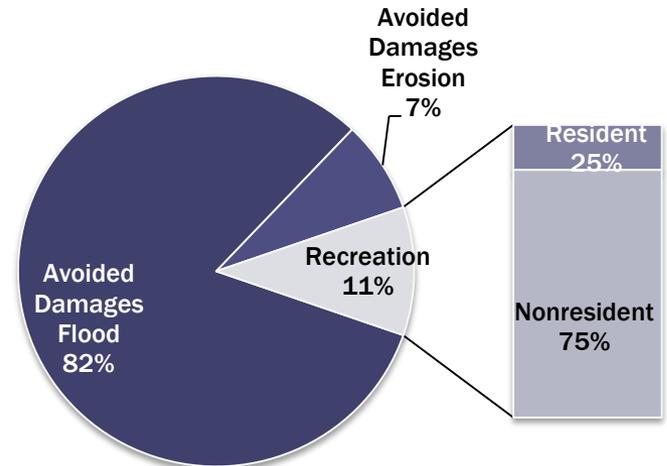
## Kitts Hummock Benefits



## Bowers Benefits

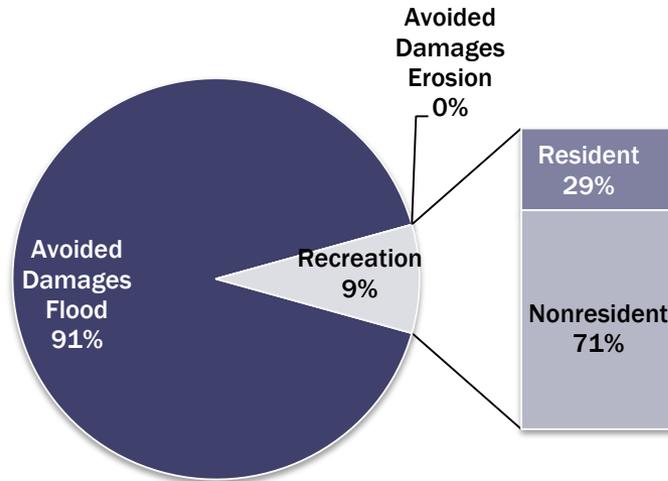


## South Bowers Benefits

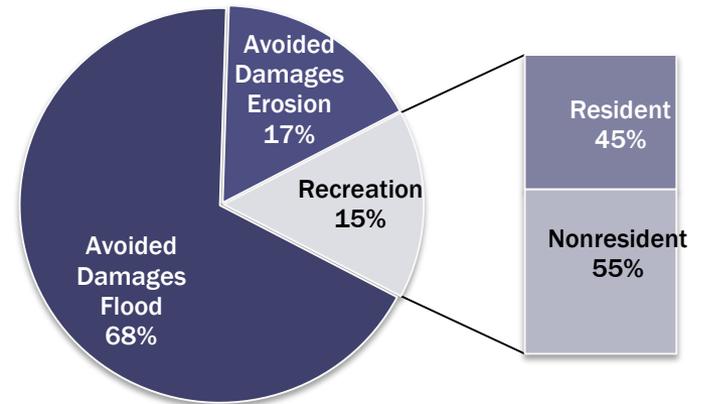


# BENEFIT DISTRIBUTION - Nourishment

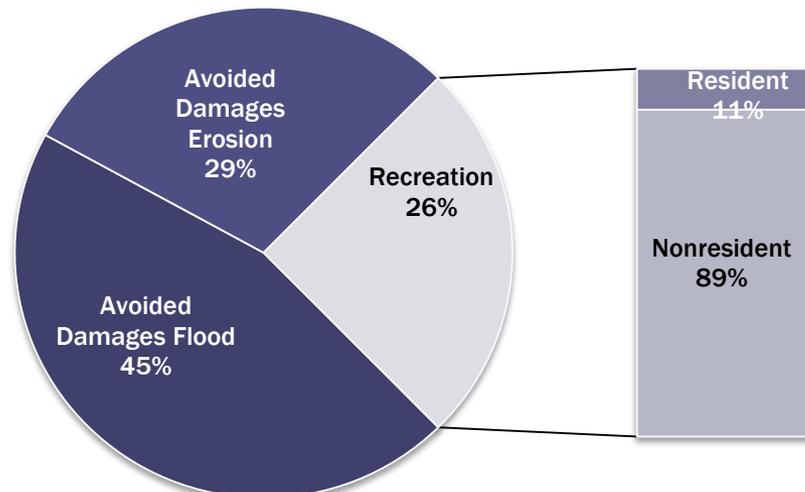
## Slaughter Benefits



## Prime Hook Benefits



## Broadkill Benefits



# General Findings

- **Benefits are limited to:**
  - **Avoided Flood Damages and Erosion Damages (Housing Services)**
  - **Recreational Benefits**
- **Tax revenue impacts are nominal for the communities and determined to be a “wash” for cost/benefit calculations**
- **Benefits (recreational/avoided damages) and their distribution were identified for each community**
- **Only a subset of the properties evaluated (those closest to the shoreline) recognized significant benefit for flood/erosion damage avoidance**

# General Findings (cont.)

- Costs for all scenarios when compared to the No Action exceed identified total benefits and benefits assigned to the public
  - Exception: **Broadkill Beach**
- All scenarios assumed State of Delaware (government) funding
  - Costs identified are significant for any of the communities/counties
    - Alternative sources of revenue generation could be required if other parties are to participate in funding

# ***QUESTIONS***