

PDE Summit 2013

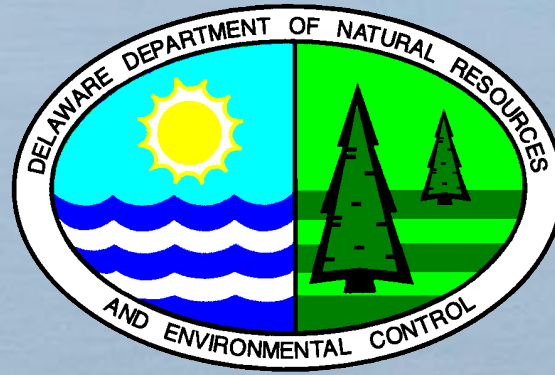
Changing Conditions, Shifting Baselines

Coastal Resiliency – Economics for Changing Environment

Michael Powell, Delaware DNREC
James Eisenhardt, Cardno ENTRIX



Economics Team for the Delaware Bay Beaches



Baker



- **Seven communities**

- Pickering Beach
- Kitts Hummock
- Bowers Beach
- South Bowers
- Slaughter Beach
- Primehook Beach
- Broadkill Beach

*Not the entire
shoreline*



Certain communities have bayfront development with vast landward marsh and open space



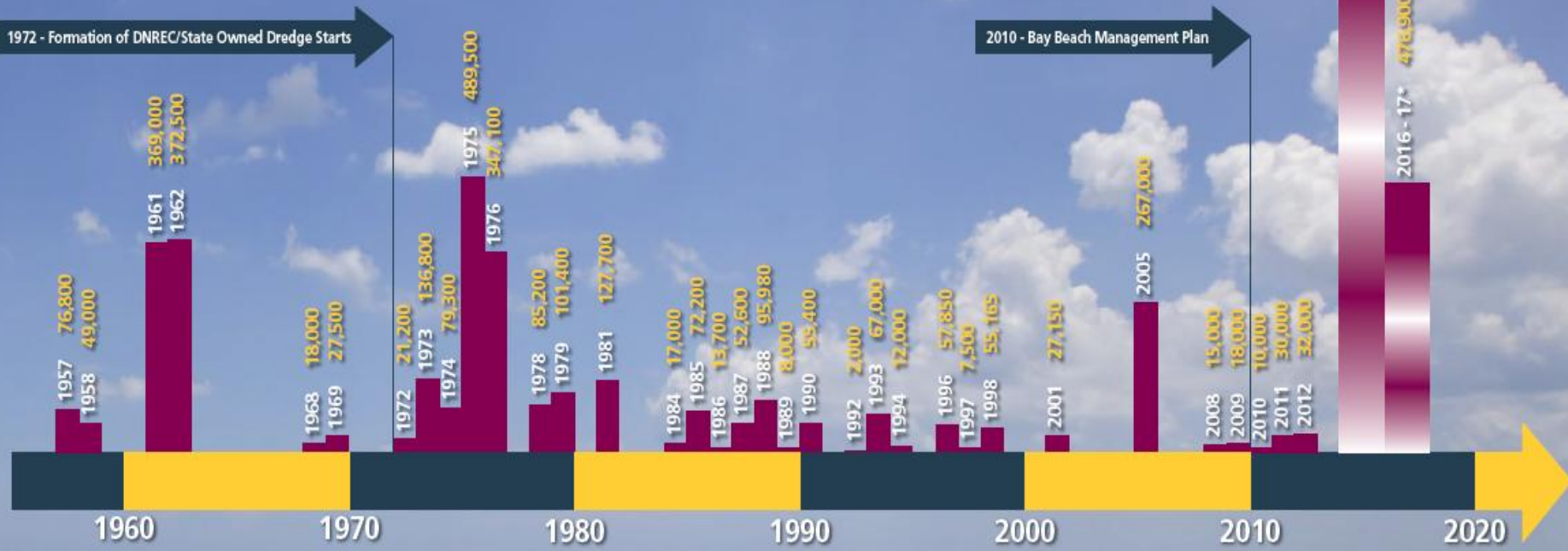


Some communities have development along the bayfront and extending inland



BAY BEACH PROJECTS

Total sand placed (cubic yards) per year



- Calendar Years
- Volume by Year
- Planned future volume
- 1984 Year
- 17,000 Volume of sand placed



* Note: Future work is presented as an anticipated schedule. Depending on funding, environmental permitting and bidding the project schedules may vary. Bay beach projects include Pickering, Kitts Hummock, Bowers, South Bowers, Slaughter, Primehook, and Broadkill



Current management is still resulting in severe erosion problems in critical sections of many communities.

11/12/2010

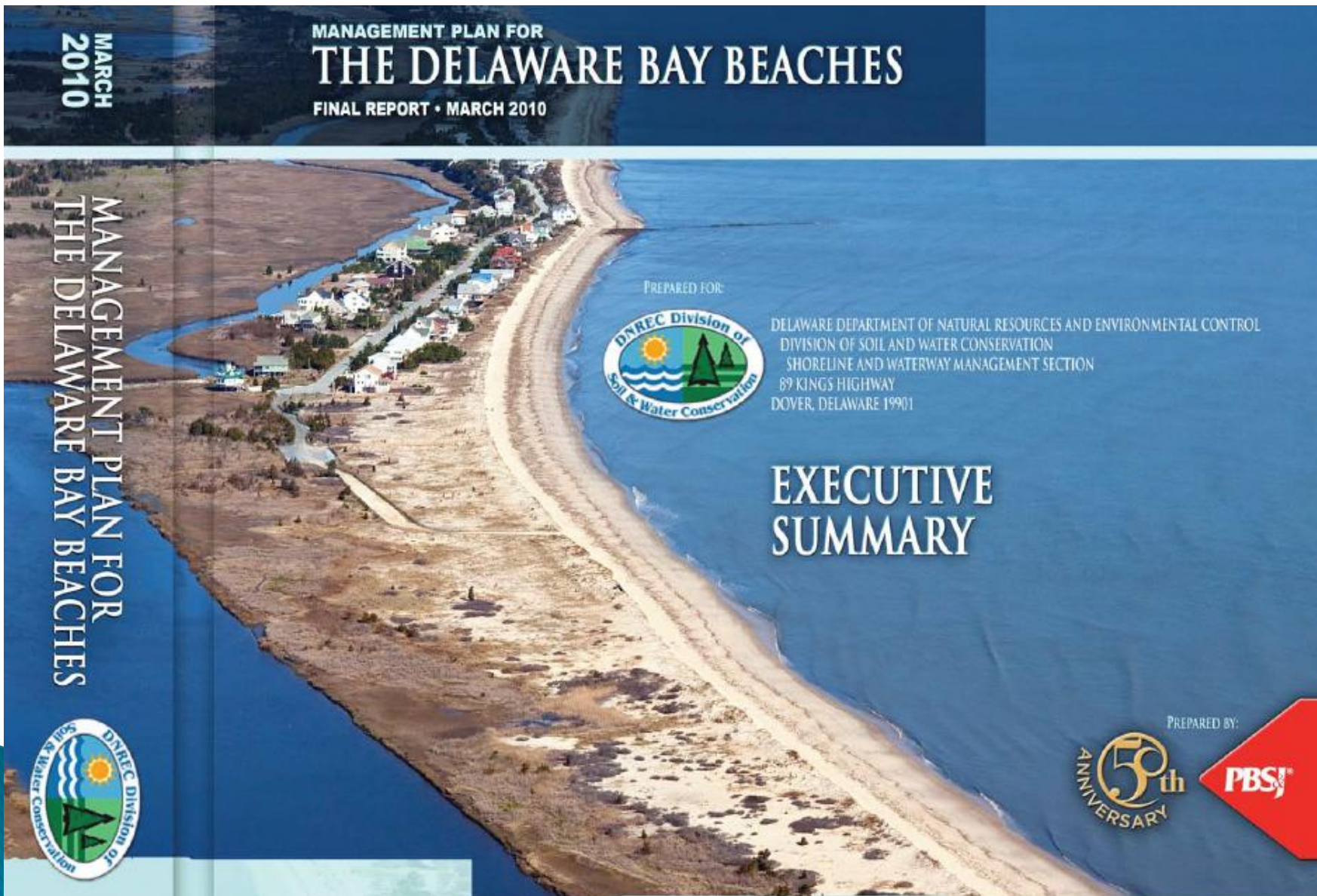


Severe flooding problems exist in many of the communities

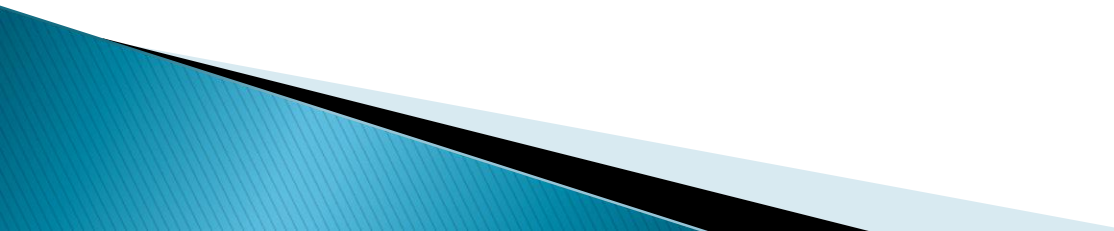
By the 1990's - 2000's
Increasingly clear that
staying the course of
100% state funded minor
intervention projects was
not achieving adequate
outcomes



Designs for 10-year storm protection dune/beach systems for seven communities



Central Management Issues (reason for economic study):

- Costs of providing shore protection have increased and are expected to increase further due to a variety of factors.
 - Beach and dune construction and management plans developed in 2010 to provide 10-year storm protect
 - No cost sharing strategies were developed during decades of low-cost management using state-owned equipment and labor.
 - The types of, and distribution of benefits provided by providing protection in these communities differs from ocean resorts.
- 

GOALS/CONTEXT

Determine the **distribution** of **benefits** for different management **scenarios**.

Expected outcome:

- By late 2012 Delaware will have an economic analysis summarizing the costs and benefits of four alternative shoreline management alternatives for these seven communities.
- Costs and benefits for each alternative will be quantified and allocated to recipient categories such as federal, state, community residents, property owners.
- The outcome of this study can serve as a basis for decision making regarding which alternatives make sense in a given area and for determine equitable cost sharing.



Management Scenarios

Scenario 1: Beach Nourishment – construct and maintain 10-year storm beach/dune system.

Scenario 2: Enhanced Retreat – allow erosion to occur naturally, acquire buildings/land to maintain wide beach.

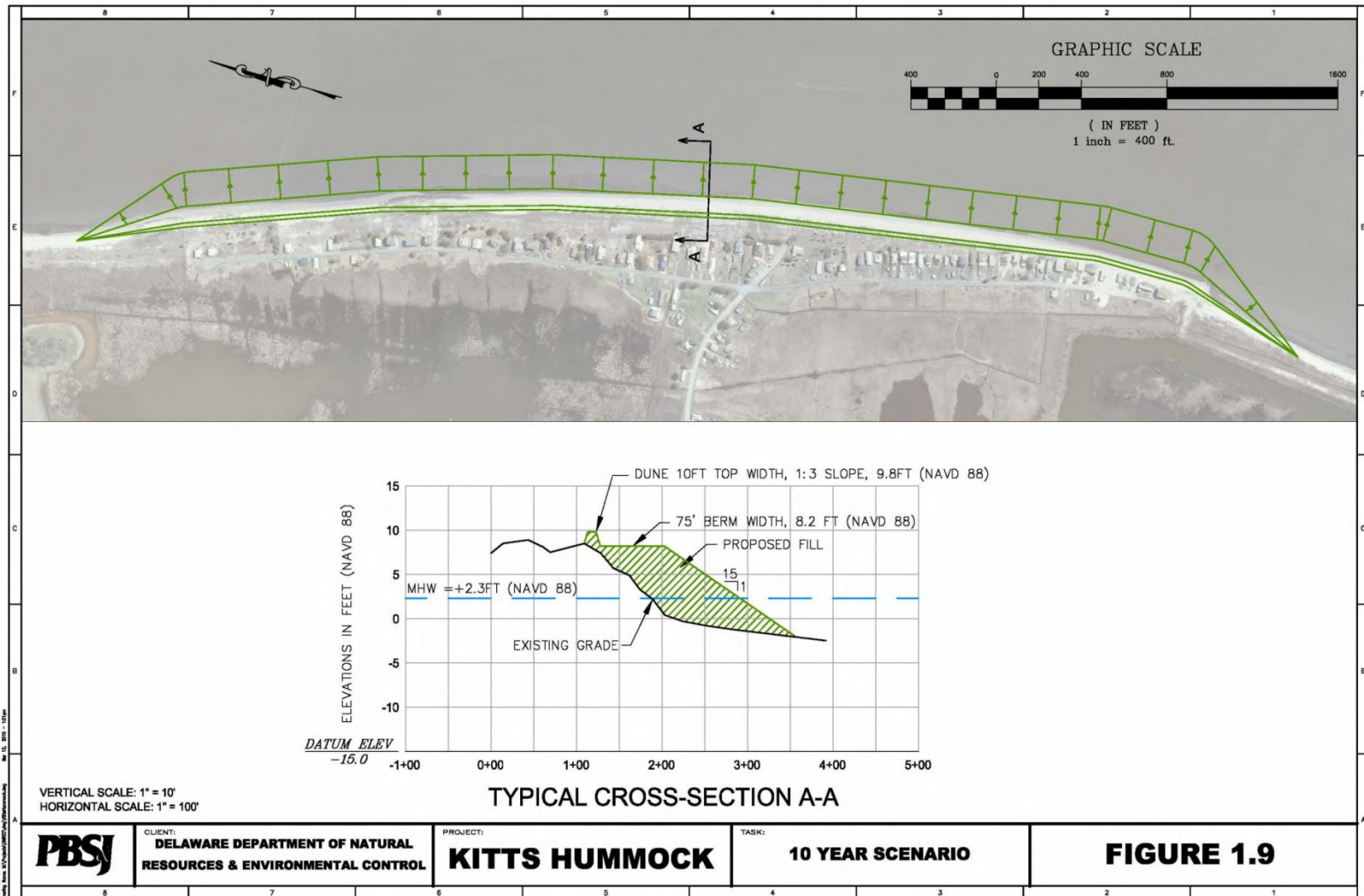
Scenario 3: Basic Retreat – Allow erosion to occur naturally, acquire buildings/land to maintain current conditions.

Scenario 4: Do Nothing – No government intervention or management.

Evaluation of the economic costs and benefits of each alternative 2011-2041

Scenario 1: Beach Nourishment - Defined

- construct and maintain 10-year storm beach/dune system in front of existing development



Beach Nourishment



After Nourishment



Scenario 4 - Do Nothing : Baseline

-No government intervention or management (*this is NOT Status Quo*).



Remnant foundations/debris of
structures removed after
abandoned

Scenario 3 - Basic Retreat - Defined

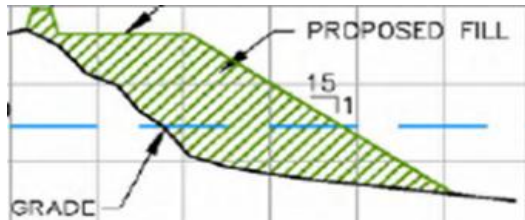
Initially remove structures to allow a beach/dune width equal to the current widths in each community.

Where existing structures occupy the beach, initial removal occurs .

As additional erosion/shoreline migration occurs, additional structures removed to maintain this beach width.



Scenario 2 - Enhanced Retreat - Defined

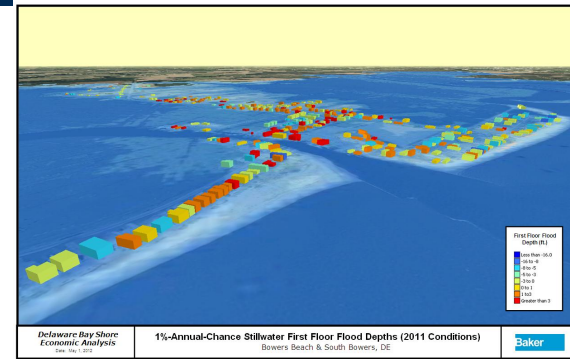
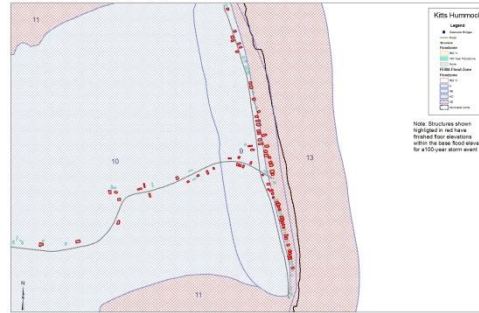


Initially remove structure to allow a beach/dune width equal to the recommended beach nourishment templates for each community.

As additional erosion/shoreline migration occurs, additional structures are removed to maintain this beach width



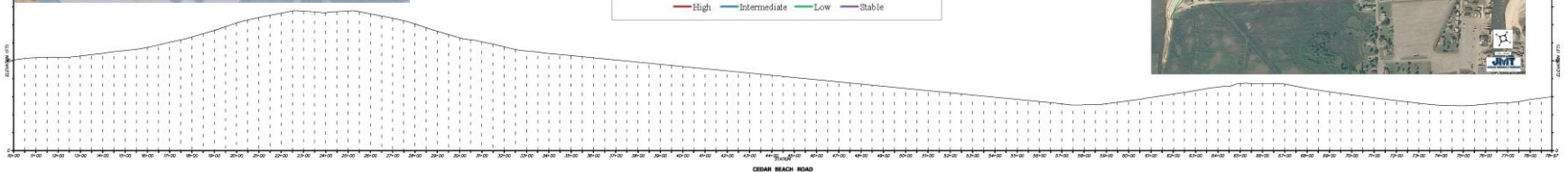
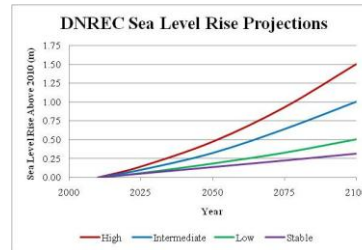
Data Collection



Attributes of DE_Bay_Bldgs

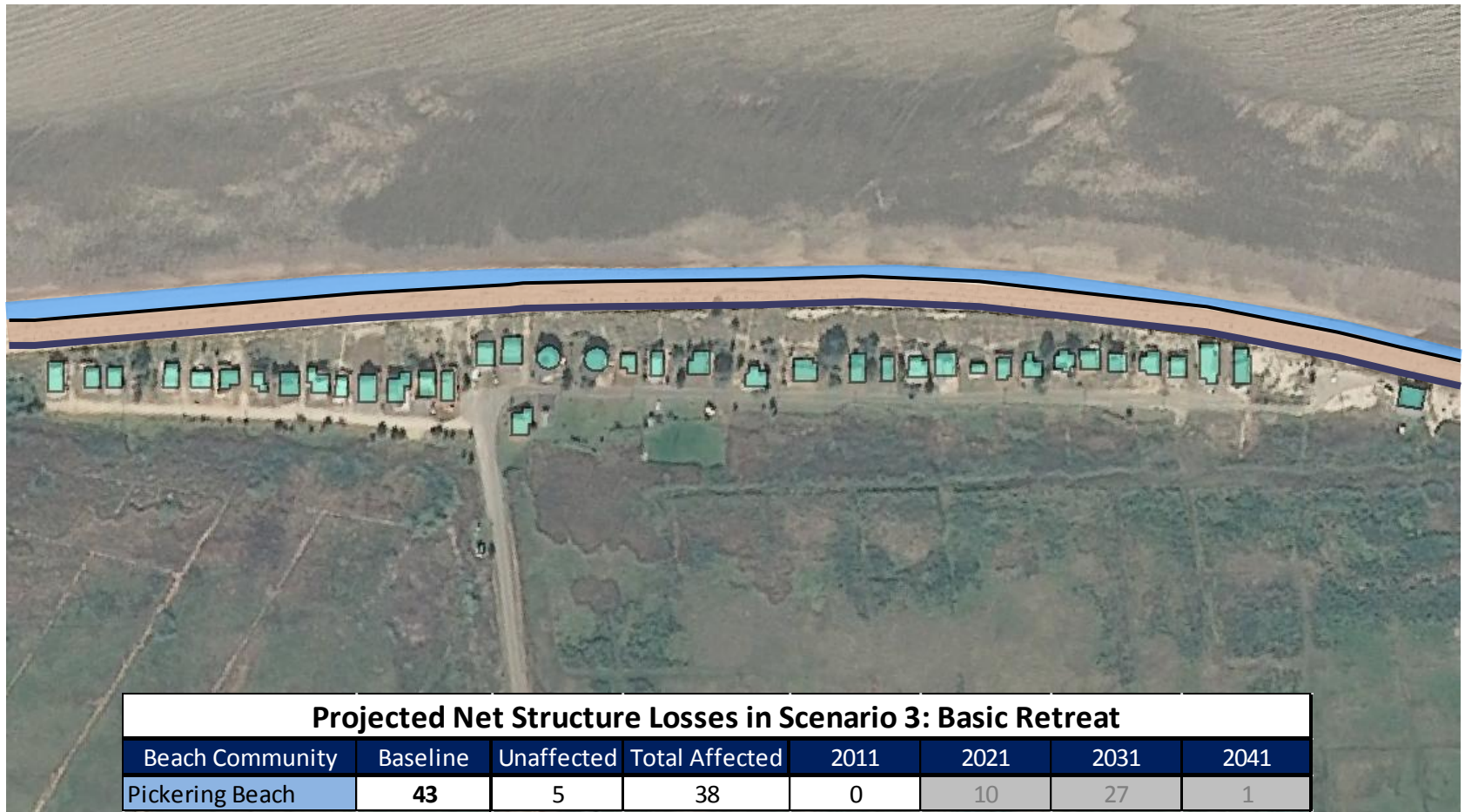
JMT_Classific	Res_Bldg_Type	lides_Bld	lides_Bldg_Name	Constr_Type	FoundationType	Kent Fo	FF_SQFT	Bldg_SQFT	Kent St
Residential	Two or More Stories without Basement	<Nul>	<Nul>	Engineered	Pile	<Nul>	1423.8307	2847.661479	<Nul>
Residential	Two or More Stories without Basement	<Nul>	<Nul>	Engineered	Slab	<Nul>	1131.6068	2263.213629	<Nul>
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Residential	One-Story without Basement	<Nul>	<Nul>	Engineered	Crawlspace	<Nul>	3036.8643	3036.864387	<Nul>
Residential	One-Story without Basement	<Nul>	<Nul>	Engineered	Pile	<Nul>	1456.5210	1456.521015	<Nul>
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Residential	One-Story without Basement	<Nul>	<Nul>	Engineered	Pile	<Nul>	1270.3472	1270.34724	<Nul>
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Residential	One-Story without Basement	<Nul>	<Nul>	Engineered	Pile	<Nul>	1791.8626	1791.862604	<Nul>
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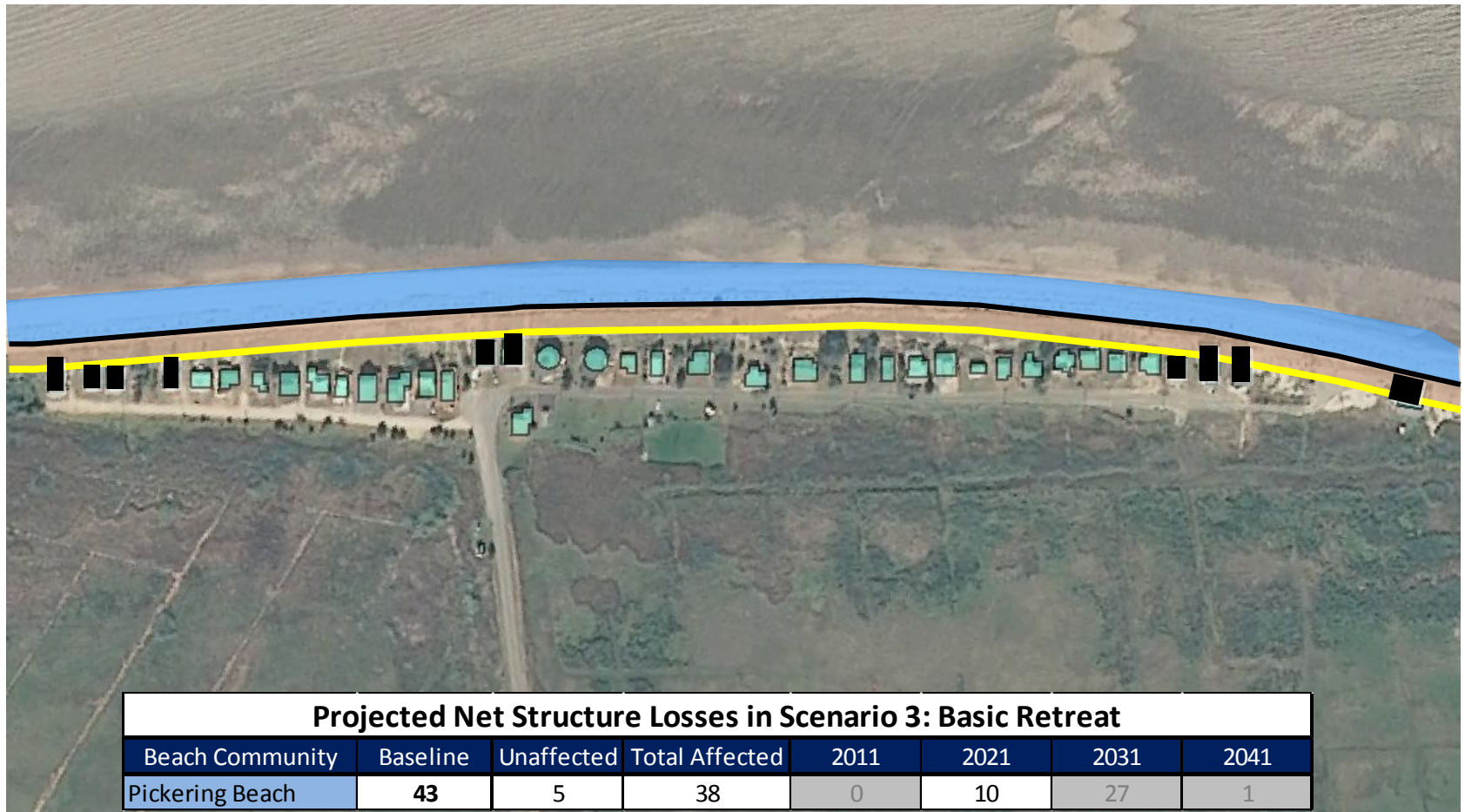
Pickering Beach

Scenario 3 – 2011 Shoreline



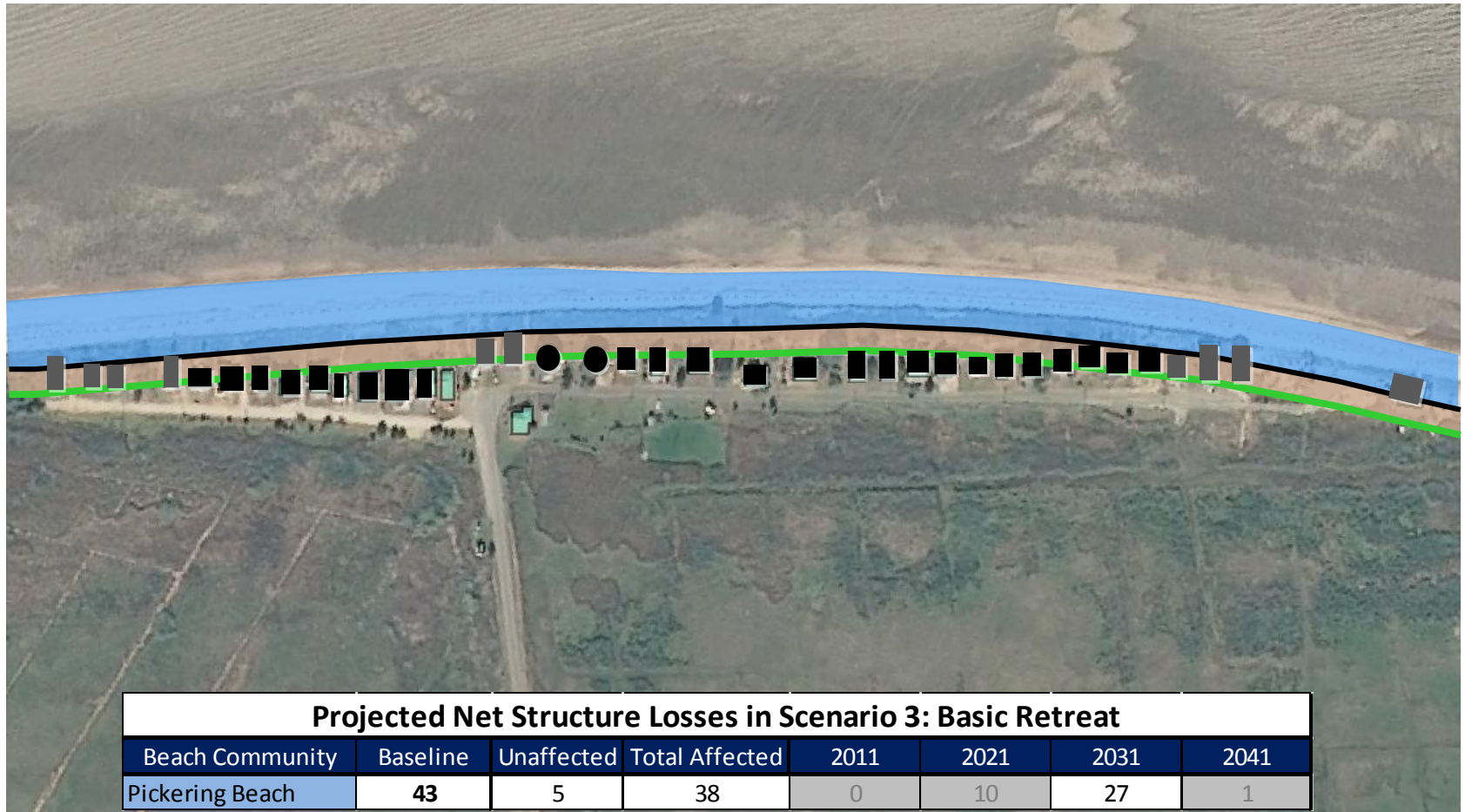
Pickering Beach

Scenario 3 – 2021 Shoreline



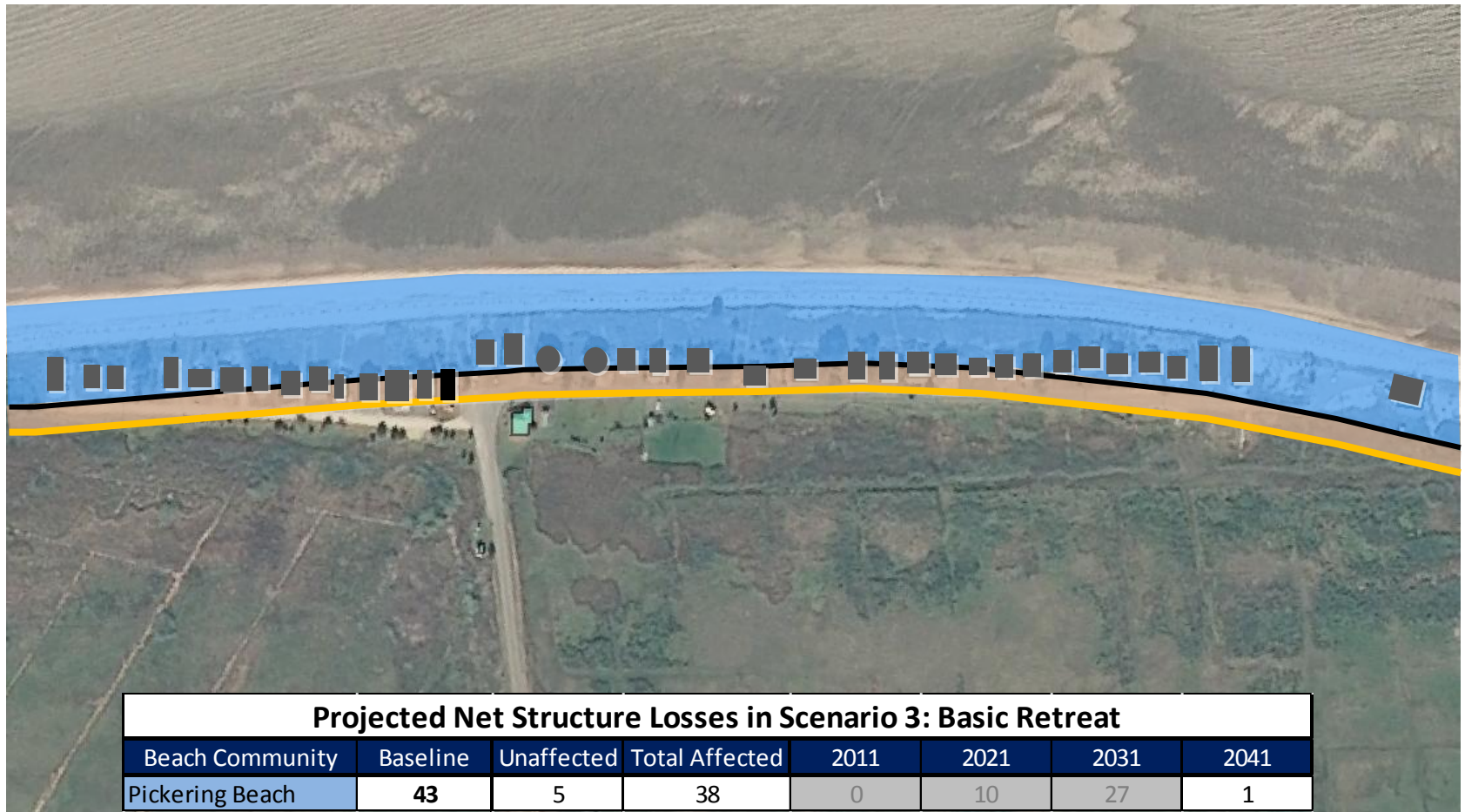
Pickering Beach

Scenario 3 – 2031 Shoreline



Pickering Beach

Scenario 3 – 2041 Shoreline



Bowers Beach

Scenario 3 – 2041 Shoreline



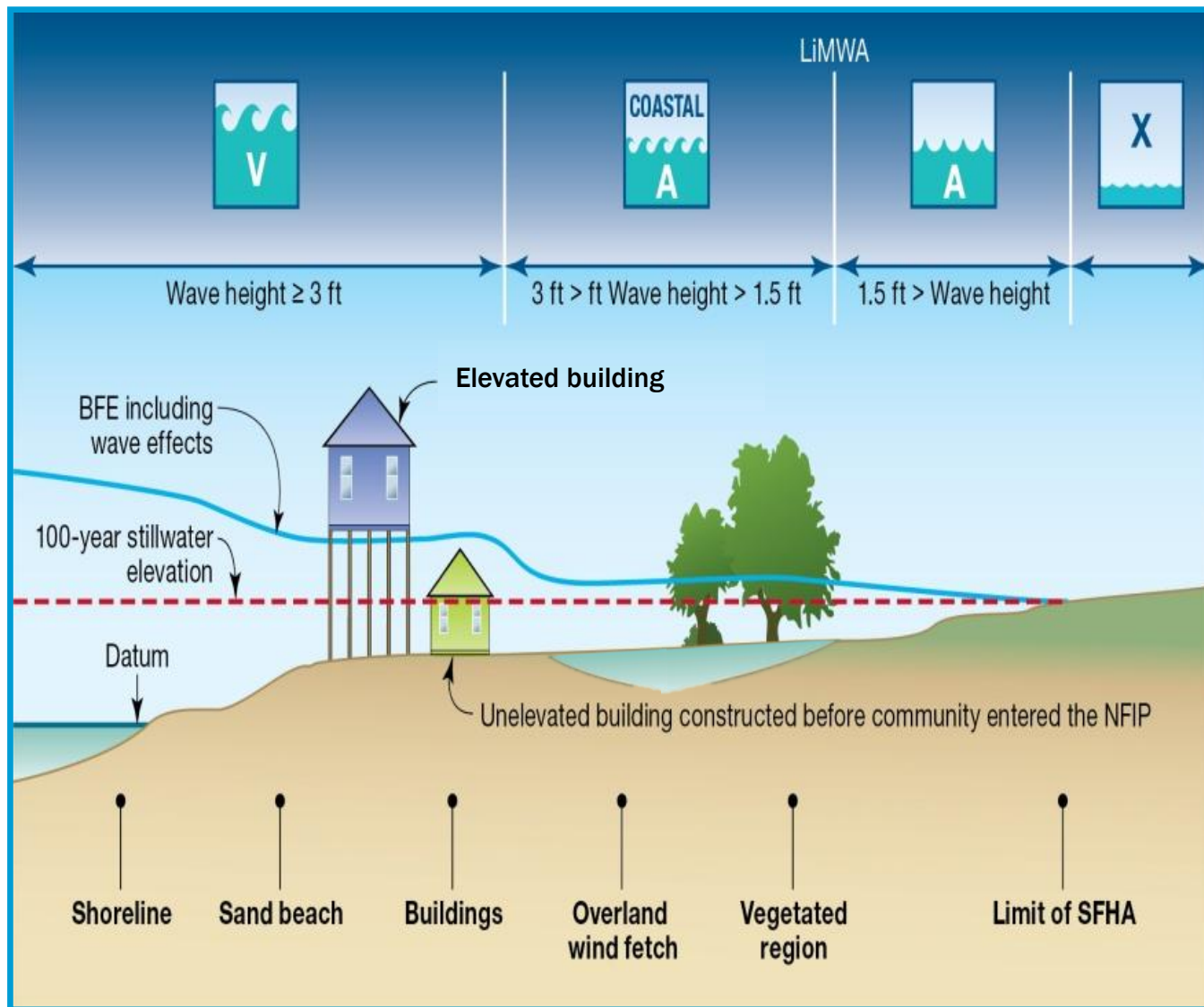
Approach

ECONOMIC ANALYSES -

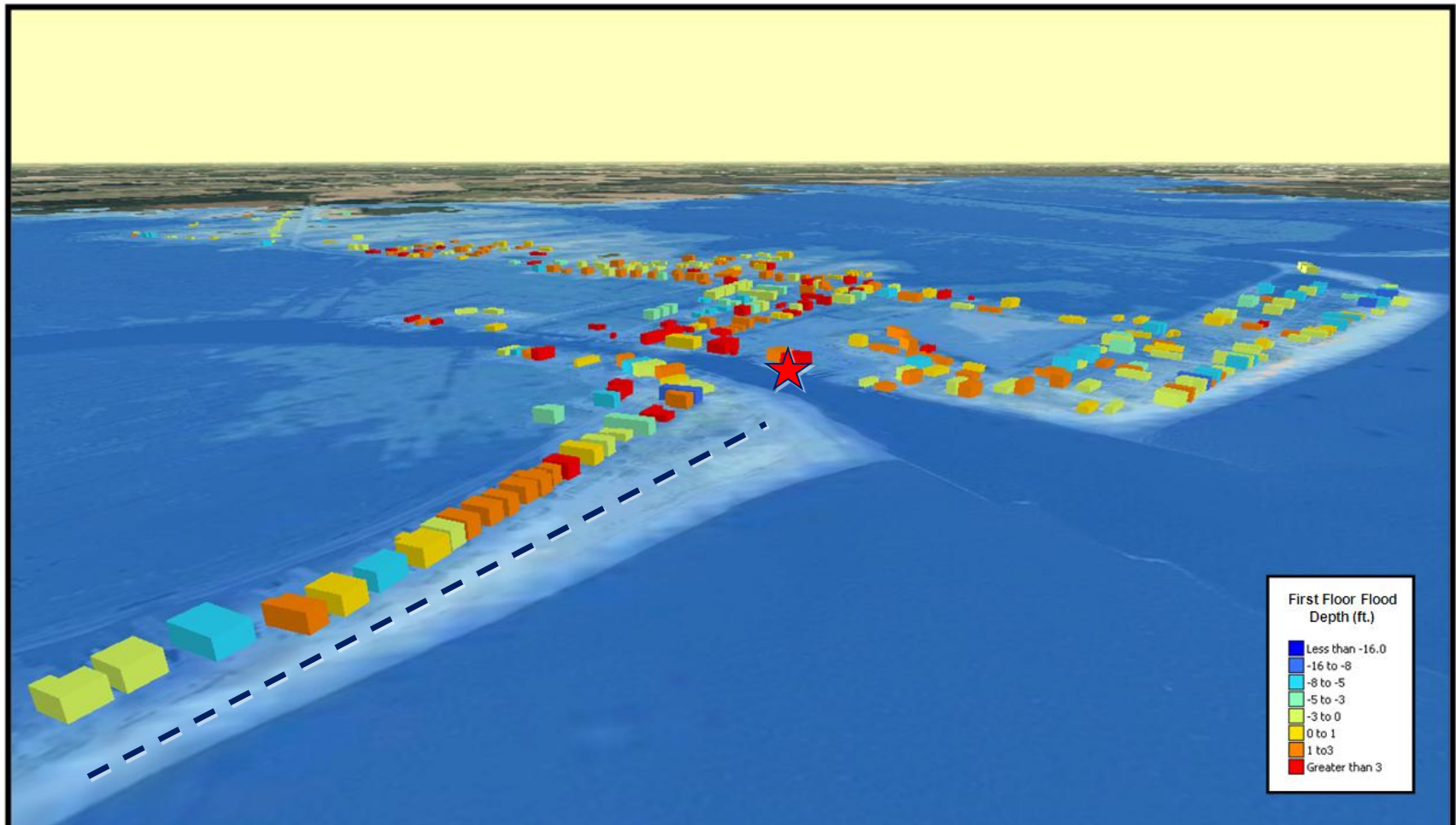
- Categories of Economic Effects to be Analyzed
 - Structures/Assets Damages
 - Recreation
 - Tourism Revenues
 - Property values
 - Local/Statewide business revenues
 - Population demographics – shifts
 - Natural Resource Capital Valuation
Wetlands, Wildlife, Fisheries, Etc.
 - Others



Flood/Erosion Impact Assessment



Database/GIS Product - Current



*Delaware Bay Shore
Economic Analysis*

Date: May 1, 2012

1%-Annual-Chance Stillwater First Floor Flood Depths (2011 Conditions)

Bowers Beach & South Bowers, DE

Baker

Scenario Highlights – Expected Outcomes

NO ACTION

- Houses are lost
- Some communities lose all houses others only a portion
- Limited costs to government (clean up only)
- Recreational benefits remain to visitors

BEACH NOURISHMENT

- Houses are protected/maintained (to design criteria)
- Flood/erosion benefits are gained for owners (damages avoided)
- Recreational benefits are realized for owners and visitors
- Government bears cost for protection (currently)

RETREAT

- Houses (select) are removed systematically
- Some communities lose all houses others only a portion
- Flood/erosion benefits are gained (damages avoided)
- Recreational benefits are gained from maintained/increased beach widths
- Government bears the costs for removal

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
- Refined retreat scenarios, managed properly, could reduce overall costs if that management scenario is selected
- For some communities, such as Pickering Beach, if assumptions on erosion rates are true, and management activities cease, the community would be lost over the planning horizon
- While some communities will continue to be viable without intervention, composition will change and still be at risk
- 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

Where Do We Go from Here

- **We have all of this data (technical and financial) – what next?**
- **Given the information developed today, what would be the path forward to develop a Course of Action for Delaware for the Bay Beach Communities?**

ECONOMIC ANALYSIS OF DELAWARE BAY SHORE MANAGEMENT OPTIONS - BENEFITS AND COSTS BY SCENARIOS: TOTALS

Community	Structures		Costs				Benefits				Net Impact (D-C) (\$mill)	Impact per Structure [(D-C)/A] (\$thousand)
	Existing (A)	Removed (B)	Demolition (\$mill)	House Value (\$mill)	Nourishment (\$mill)	Total Cost (C) (\$mill)	Property Owners		Non Resident	Total Benefits (D) (\$mill)		
							Avoided Flood / Erosion Loss (\$mill)	Recreation (\$mill)	Recreation (\$mill)			
Scenario 1 Total	1763	0	\$0	\$0	\$61.65	\$61.65	\$2.72	\$3.13	\$12.93	\$18.79	-\$42.87	-24.3
Scenario 2 Total	1763	451	\$5.12	\$149.5	\$0	\$154.58	\$10.64	\$0.88	\$9.88	\$21.40	-\$133.18	-75.5
Scenario 3 Total	1763	244	\$1.13	\$61.1	\$0	\$62.28	\$2.99	\$1.40	\$10.13	\$14.52	-\$47.76	-27.1
Scenario 4 Total	1763	129	\$0.60	\$0	\$0	\$0.60	-\$18.19	\$0.00	\$0.00	-\$18.19	-\$18.79	-10.7

NOTES: (1) All values reported 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%. (2) House value reflects purchase costs (reported in Table 5.1-5.3 of the Baker reports). Demolition costs are from JMT file, Bay_shore_cost_estimates_rev_discount.xls. (3) Scenario 1, 2, & 3 involve only voided flood benefits to owners, and Scenario 4 reflects only avoided erosion loss.

SOURCE: Baker. 2012. Economic Analysis of Delaware Bay Shores Management Alternatives. Phase 1C, 1D, & 2C Report. August 29, 2012.

ECONOMIC ANALYSIS OF DELAWARE BAY SHORE MANAGEMENT OPTIONS - BENEFITS AND COSTS BY SCENARIOS: BY COUNTY

Community	Structures		Costs				Benefits				Net Impact (D-C) (\$mill)	Impact per Structure [(D-C)/A] (\$thousand)
	Existing (A)	Removed (B)	Demolition (\$mill)	Public		Total Cost (C) (\$mill)	Property Owners		Non Resident	Total Benefits (D) (\$mill)		
				House Value (\$mill)	Nourishment (\$mill)		Avoided Flood / Erosion Loss (\$mill)	Recreation (\$mill)	Recreation (\$mill)			
Kent County												
Scenario 1	604	0	\$0	\$0	\$23.75	\$23.75	\$0.26	\$0.91	\$1.94	\$3.11	-\$20.64	-\$34.17
Scenario 2	604	165	\$2	\$26	\$0.00	\$27.62	\$3.63	\$0.30	\$1.37	\$5.29	-\$22.33	-\$36.96
Scenario 3	604	112	\$0	\$13	\$0.00	\$13.21	\$0.76	\$0.48	\$1.56	\$2.80	-\$10.39	-\$17.21
Scenario 4	604	76	\$0	\$0	\$0.00	\$0.33	-\$5.65	\$0.00	\$0.00	-\$5.65	-\$5.98	-\$9.90
Sussex County												
Scenario 1	1159	0	\$0	\$0	\$37.90	\$37.90	\$2.46	\$2.22	\$10.99	\$15.67	-\$22.23	-\$19.18
Scenario 2	1159	286	\$3	\$124	\$0.00	\$126.96	\$7.01	\$0.58	\$8.52	\$16.11	-\$110.85	-\$95.65
Scenario 3	1159	132	\$1	\$48	\$0.00	\$49.07	\$2.23	\$0.92	\$8.57	\$11.61	-\$37.46	-\$32.32
Scenario 4	1159	53	\$0	\$0	\$0.00	\$0.27	-\$12.54	\$0.00	\$0.00	-\$12.54	-\$12.81	-\$11.05

ECONOMIC ANALYSIS OF DELAWARE BAY SHORE MANAGEMENT OPTIONS - BENEFITS AND COSTS BY SCENARIOS

Community	Structures		Costs				Benefits				Net Impact (D-C) (\$mill)	Impact per Structure [(D-C)/A] (\$thousand)
	Existing (A)	Removed (B)	Demolition (\$mill)	House Value (\$mill)	Nourishment (\$mill)	Total Cost (C) (\$mill)	Property Owners		Non Resident	Total Benefits (D) (\$mill)		
							Avoided Flood / Erosion Loss (\$mill)	Recreation (\$mill)	Recreation (\$mill)			
SCENARIO 1: BEACH NOURISHMENT - COMPARED TO SCENARIO 4: NO ACTION												
Pickering	44	0	\$0	\$0	\$6.41	\$6.41	-\$0.10	\$0.17	\$0.49	\$0.56	-\$5.85	-133.0
Kitts Hummock	122	0	\$0	\$0	\$7.81	\$7.81	\$0.05	\$0.27	\$0.35	\$0.68	-\$7.13	-58.5
Bowers	354	0	\$0	\$0	\$4.89	\$4.89	\$0.17	\$0.40	\$0.77	\$1.34	-\$3.55	-10.0
South Bowers	84	0	\$0	\$0	\$4.64	\$4.64	\$0.14	\$0.06	\$0.33	\$0.53	-\$4.11	-48.9
Slaughter	372	0	\$0	\$0	\$14.60	\$14.60	\$0.57	\$0.65	\$1.74	\$2.96	-\$11.64	-31.3
Primehook	195	0	\$0	\$0	\$7.32	\$7.32	\$0.37	\$0.49	\$0.60	\$1.46	-\$5.86	-30.0
Broadkill	592	0	\$0	\$0	\$15.98	\$15.98	\$1.52	\$1.08	\$8.65	\$11.25	-\$4.73	-8.0
Scenario 1 Total	1763	0	\$0	\$0	\$61.65	\$61.65	\$2.72	\$3.13	\$12.93	\$18.79	-\$42.87	-24.3
SCENARIO 2: ENHANCED RETREAT - COMPARED TO SCENARIO 4: NO ACTION												
Pickering	44	39	\$0.25	\$5.52	\$0	\$5.77	\$0.74	-\$0.04	\$0.21	\$0.91	-\$4.86	-110.5
Kitts Hummock	122	72	\$0.73	\$10.7	\$0	\$11.40	\$1.69	\$0.08	\$0.20	\$1.97	-\$9.43	-77.3
Bowers	354	42	\$0.52	\$7.43	\$0	\$7.95	\$0.73	\$0.23	\$0.70	\$1.66	-\$6.29	-17.8
South Bowers	84	12	\$0.22	\$2.28	\$0	\$2.50	\$0.47	\$0.03	\$0.26	\$0.76	-\$1.74	-20.7
Slaughter	372	45	\$0.46	\$10.6	\$0	\$11.06	\$0.33	\$0.55	\$1.64	\$2.52	-\$8.54	-22.9
Primehook	195	63	\$1.29	\$37.6	\$0	\$38.89	\$1.64	-\$0.21	-\$0.16	\$1.27	-\$37.62	-192.9
Broadkill	592	178	\$1.65	\$75.4	\$0	\$77.01	\$5.04	\$0.24	\$7.03	\$12.31	-\$64.70	-109.3
Scenario 2 Total	1763	451	\$5.12	\$149.5	\$0	\$154.58	\$10.64	\$0.88	\$9.88	\$21.40	-\$133.18	-75.5

ECONOMIC ANALYSIS OF DELAWARE BAY SHORE MANAGEMENT OPTIONS - BENEFITS AND COSTS BY SCENARIOS

Community	Costs					Benefits					Net Impact (D-C)	Impact per Structure [(D-C)/A]
	Structures		Public			Property Owners		Non Resident	Total Benefits (D)			
	Existing (A)	Removed (B)	Demolition	House Value	Nourishment	Total Cost (C)	Avoided Flood / Erosion Loss	Recreation		Recreation		
SCENARIO 3: STRATEGIC RETREAT - COMPARED TO SCENARIO 4: NO ACTION												
Pickering	44	38	\$0.05	\$3.40	\$0	\$3.45	\$0.21	\$0.05	\$0.25	\$0.52	-\$2.93	-66.7
Kitts Hummock	122	51	\$0.15	\$4.70	\$0	\$4.85	\$0.34	\$0.14	\$0.20	\$0.67	-\$4.18	-34.3
Bowers	354	16	\$0.08	\$3.90	\$0	\$3.98	\$0.11	\$0.19	\$0.39	\$0.69	-\$3.29	-9.3
South Bowers	84	7	\$0.05	\$0.88	\$0	\$0.93	\$0.10	\$0.10	\$0.72	\$0.92	\$0.01	0.12
Slaughter	372	4	\$0.03	\$0.89	\$0	\$0.92	\$0.06	\$0.43	\$1.16	\$1.64	\$0.72	1.9
Primehook	195	12	\$0.11	\$4.68	\$0	\$4.79	\$0.08	\$0.02	\$0.04	\$0.04	-\$4.75	-24.4
Broadkill	592	116	\$0.66	\$42.7	\$0	\$43.36	\$2.09	\$0.47	\$7.37	\$9.93	-\$33.43	-56.5
Scenario 3 Total	1763	244	\$1.13	\$61.1	\$0	\$62.28	\$2.99	\$1.40	\$10.13	\$14.52	-\$47.76	-27.1
SCENARIO 4: NO ACTION												
Pickering	44	38	\$0.15	\$0	\$0	\$0.15	-\$2.54	\$0.00	\$0.00	-\$2.54	-\$2.69	-61.1
Kitts Hummock	122	31	\$0.12	\$0	\$0	\$0.12	-\$2.41	\$0.00	\$0.00	-\$2.41	-\$2.53	-20.7
Bowers	354	4	\$0.03	\$0	\$0	\$0.03	-\$0.42	\$0.00	\$0.00	-\$0.42	-\$0.45	-1.3
South Bowers	84	3	\$0.03	\$0	\$0	\$0.03	-\$0.28	\$0.00	\$0.00	-\$0.28	-\$0.31	-3.7
Slaughter	372	0	\$0.00	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0.0
Primehook	195	4	\$0.04	\$0	\$0	\$0.04	-\$1.19	\$0.00	\$0.00	-\$1.19	-\$1.23	-6.3
Broadkill	592	49	\$0.23	\$0	\$0	\$0.23	-\$11.35	\$0.00	\$0.00	-\$11.35	-\$11.58	-19.6
Scenario 4 Total	1763	129	\$0.60	\$0	\$0	\$0.60	-\$18.19	\$0.00	\$0.00	-\$18.19	-\$18.79	-10.7

NOTES: (1) All values reported 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%. (2) House value reflects purchase costs (reported in Table 5.1-5.3 of the Baker reports). Demolition costs are from JMT file, Bay_shore_cost_estimates_rev_discount.xls. (3) Scenario 1, 2, & 3 involve only voided flood benefits to owners, and Scenario 4 reflects only avoided erosion loss.

SOURCE: Baker. 2012. Economic Analysis of Delaware Bay Shores Management Alternatives. Phase 1C, 1D, & 2C Report. August 29, 2012.

ECONOMIC ANALYSIS OF DELAWARE BAY SHORE MANAGEMENT OPTIONS - SUMMARY OF BENEFITS AND COSTS BY COMMUNITY

		Costs					Benefits						
Community & Scenario	Structures		Public			Total Cost (C) (\$mill)	Property Owners			Non residents	Total Benefits (D) (\$mill)	Net Impact (D-C) (\$mill)	Impact per Structure [(D-C)/A] (\$thousand)
	Existing (A)	Removed (B)	Demolition (\$mill)	House Value (\$mill)	Nourishment (\$mill)		Avoided Flood / Erosion Loss (\$mill)	Recreation (\$mill)	Total (Owners) (\$mill)	Recreation (\$mill)			
KENT COUNTY													
Pickering													
Scenario 1	44	0	\$0	\$0	\$6.41	\$6.41	-\$0.10	\$0.17	\$0.07	\$0.49	\$0.56	-\$5.85	-\$133
Scenario 2	44	39	\$0.25	\$5.52	\$0	\$5.77	\$0.74	-\$0.04	\$0.70	\$0.21	\$0.91	-\$4.86	-\$110
Scenario 3	44	38	\$0.05	\$3.40	\$0	\$3.45	\$0.21	\$0.05	\$0.26	\$0.25	\$0.52	-\$2.93	-\$67
Scenario 4	44	38	\$0.15	\$0.00	\$0	\$0.15	-\$2.54	\$0.00	-\$2.54	\$0.00	-\$2.54	-\$2.69	-\$61
Kitts Hummock													
Scenario 1	122	0	\$0	\$0	\$7.81	\$7.81	\$0.05	\$0.27	\$0.32	\$0.35	\$0.68	-\$7.13	-\$58
Scenario 2	122	72	\$0.73	\$10.70	\$0	\$11.43	\$1.69	\$0.08	\$1.77	\$0.20	\$1.97	-\$9.46	-\$78
Scenario 3	122	51	\$0.15	\$4.70	\$0	\$4.85	\$0.34	\$0.14	\$0.48	\$0.20	\$0.67	-\$4.18	-\$34
Scenario 4	122	31	\$0.12	\$0.00	\$0	\$0.12	-\$2.41	\$0.00	-\$2.41	\$0.00	-\$2.41	-\$2.53	-\$21
Bowers													
Scenario 1	354	0	\$0	\$0	\$4.89	\$4.89	\$0.17	\$0.40	\$0.57	\$0.77	\$1.34	-\$3.55	-\$10
Scenario 2	354	42	\$0.52	\$7.43	\$0	\$0.52	\$0.73	\$0.23	\$0.96	\$0.70	\$1.66	\$1.14	\$3
Scenario 3	354	16	\$0.08	\$3.90	\$0	\$0.08	\$0.11	\$0.19	\$0.30	\$0.39	\$0.69	\$0.61	\$2
Scenario 4	354	4	\$0.03	\$0.00	\$0	\$0.03	-\$0.42	\$0.00	-\$0.42	\$0.00	-\$0.42	-\$0.45	-\$1
South Bowers													
Scenario 1	84	0	\$0	\$0	\$4.64	\$4.64	\$0.14	\$0.06	\$0.20	\$0.33	\$0.53	-\$4.11	-\$49
Scenario 2	84	12	\$0.22	\$2.28	\$0	\$2.50	\$0.47	\$0.03	\$0.50	\$0.26	\$0.76	-\$1.74	-\$21
Scenario 3	84	7	\$0.05	\$0.88	\$0	\$0.93	\$0.10	\$0.10	\$0.20	\$0.72	\$0.92	-\$0.01	\$0
Scenario 4	84	3	\$0.03	\$0.00	\$0	\$0.03	-\$0.28	\$0.00	-\$0.28	\$0.00	-\$0.28	-\$0.31	-\$4

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Community & Scenario	Structures		Costs				Benefits					Net Impact (D-C) (\$mill)	Impact per Structure [(D-C)/A] (\$thousand)
	Existing (A)	Removed (B)	Demolition (\$mill)	House Value (\$mill)	Nourishment (\$mill)	Total Cost (C) (\$mill)	Property Owners			Non residents	Total Benefits (D) (\$mill)		
							Avoided Flood / Erosion Loss (\$mill)	Recreation (\$mill)	Total (Owners) (\$mill)	Recreation (\$mill)			
SUSSEX COUNTY													
Slaughter													
Scenario 1	372	0	\$0	\$0	\$14.60	\$14.60	\$0.57	\$0.65	\$1.22	\$1.74	\$2.96	-\$11.64	-\$31
Scenario 2	372	45	\$0.46	\$10.60	\$0	\$11.06	\$0.33	\$0.55	\$0.88	\$1.64	\$2.52	-\$8.54	-\$23
Scenario 3	372	4	\$0.03	\$0.89	\$0	\$0.92	\$0.06	\$0.43	\$0.49	\$1.16	\$1.64	\$0.72	\$2
Scenario 4	372	0	\$0.00	\$0.00	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0
Prime Hook													
Scenario 1	195	0	\$0	\$0	\$7.32	\$7.32	\$0.37	\$0.49	\$0.86	\$0.60	\$1.46	-\$5.86	-\$30
Scenario 2	195	63	\$1.29	\$37.60	\$0	\$38.89	\$1.64	-\$0.21	\$1.43	-\$0.16	\$1.27	-\$37.62	-\$193
Scenario 3	195	12	\$0.11	\$4.68	\$0	\$4.79	\$0.08	\$0.02	\$0.10	\$0.04	\$0.04	-\$4.75	-\$24
Scenario 4	195	4	\$0.04	\$0.00	\$0	\$0.04	-\$1.19	\$0.00	-\$1.19	\$0.00	-\$1.19	-\$1.23	-\$6
Broadkill													
Scenario 1	592	0	\$0	\$0	\$15.98	\$15.98	\$1.52	\$1.08	\$2.60	\$8.65	\$11.25	-\$4.73	-\$8
Scenario 2	592	178	\$1.65	\$75.40	\$0	\$77.05	\$5.04	\$0.24	\$5.28	\$7.03	\$12.31	-\$64.74	-\$109
Scenario 3	592	116	\$0.66	\$42.70	\$0	\$43.36	\$2.09	\$0.47	\$2.56	\$7.37	\$9.93	-\$33.43	-\$56
Scenario 4	592	49	\$0.23	\$0.00	\$0	\$0.23	-\$11.35	\$0.00	-\$11.35	\$0.00	-\$11.35	-\$11.58	-\$20

NOTES: (1) Scenario 1 - beach nourishment; scenario 2 - enhanced retreat; scenario 3 - strategic retreat; scenario 4 - no action. (2) The figures are the

SOURCE: Baker. 2012. Economic Analysis of Delaware Bay Shores Management Alternatives. Phase 1C, 1D, & 2C Report. August 29, 2012.