

Appendix L

Camille Cut Closure Desktop Analysis

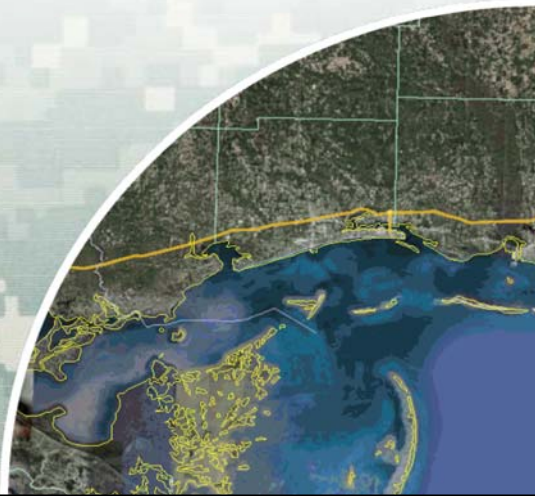
Camille Cut Closure

A desk-top analysis of closure options

MsCIP Multi-Agency Meeting
January 13, 2011



US Army Corps of Engineers
BUILDING STRONG



Presentation Outline

- Assumptions in the Desktop Study Analysis
- Orientation to the Camille Cut Study Area
 - Proposed Restoration
 - Identified Sand Sources
- Overview of Closure Options
- Sediment Budget with the Study Area
- Cross-Shore Equilibrium of the Fill
- Volume Estimates
- Longevity Estimates
- Cost Comparison
- Closing Points
- Open Discussion



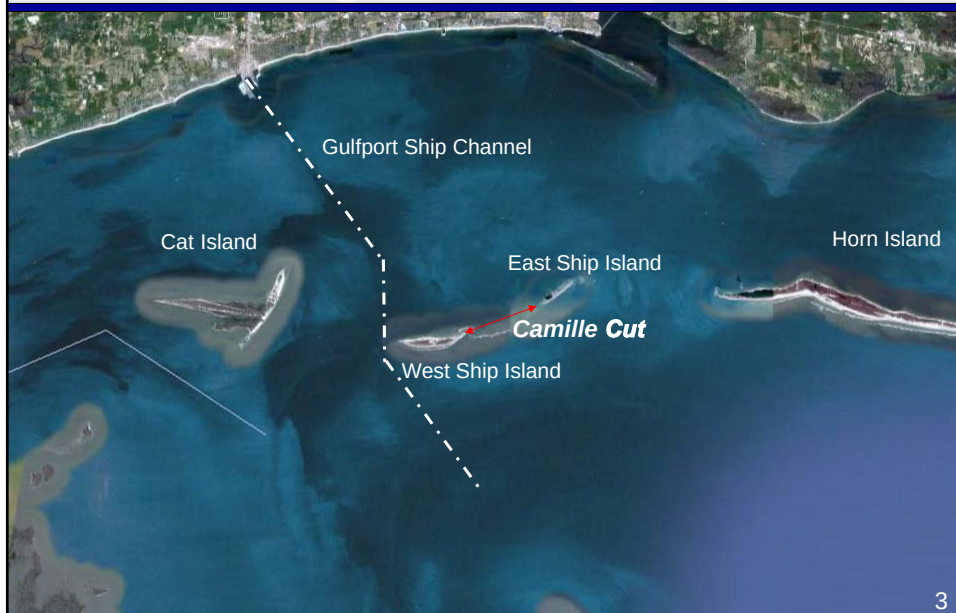
Assumptions in Desk-Top Analysis

- The analysis is meant to provide relative comparisons between borrow sources and is intended as a screening tool
 - Modeling and further analysis will be required for a subset of selected alternatives
- Assumed that historical processes (as inferred from sediment budget) will continue through time
- Severe, catastrophic storms (*Camille*; *Katrina*) are not incorporated into analysis
- An island width greater than 500-700 ft will be less likely to breach
 - This width is termed "critical width"
 - Critical width defined from historical width of Ship Island
 - Better fill alternatives are those that maintain critical width or greater over a specified life time
- Native sand has a median grain size, $D_{50}=0.30$ mm
 - The most compatible fill sands could range from $D_{50}\geq 0.28$ mm
 - Sand greater than native, $D_{50}>0.30$ mm, will be more stable
 - Sand finer than native, $D_{50}<0.30$ mm, will erode faster
- Assumed that East Ship remains an integral part of the restored Ship Island and continues to provide a source of sand to Camille Cut Fill
- This analysis does not include the potential effect of littoral zone placement or offshore borrow sources.

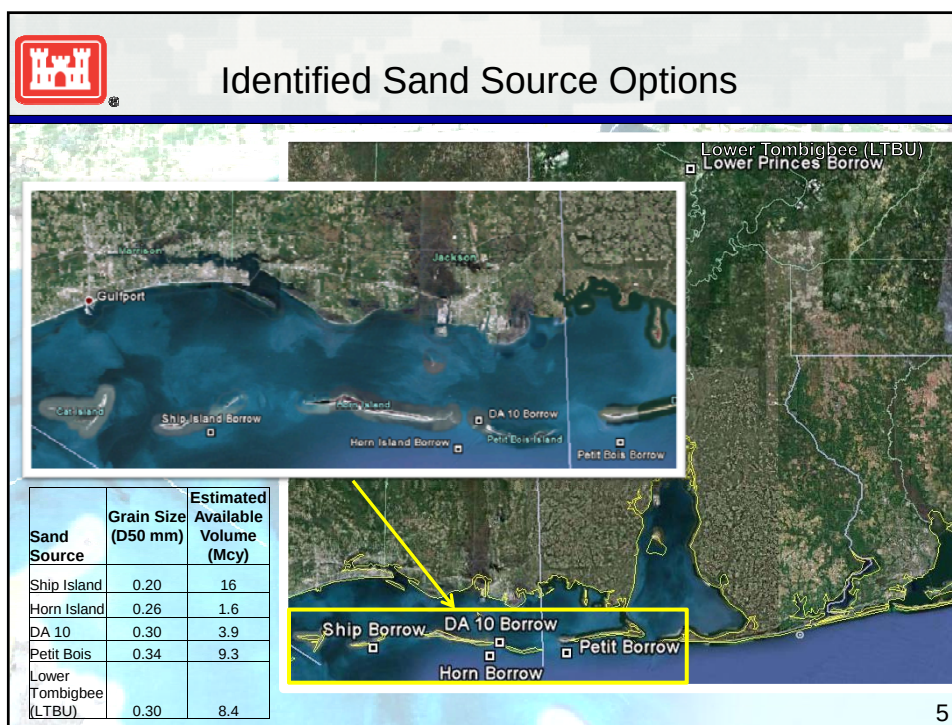
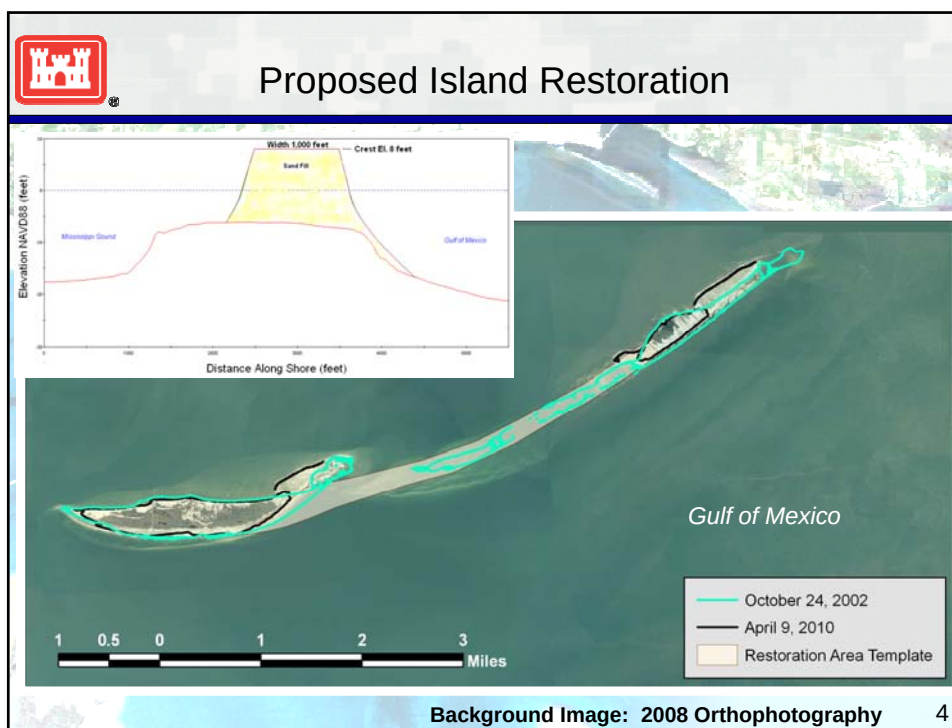
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Orientation to Study Area



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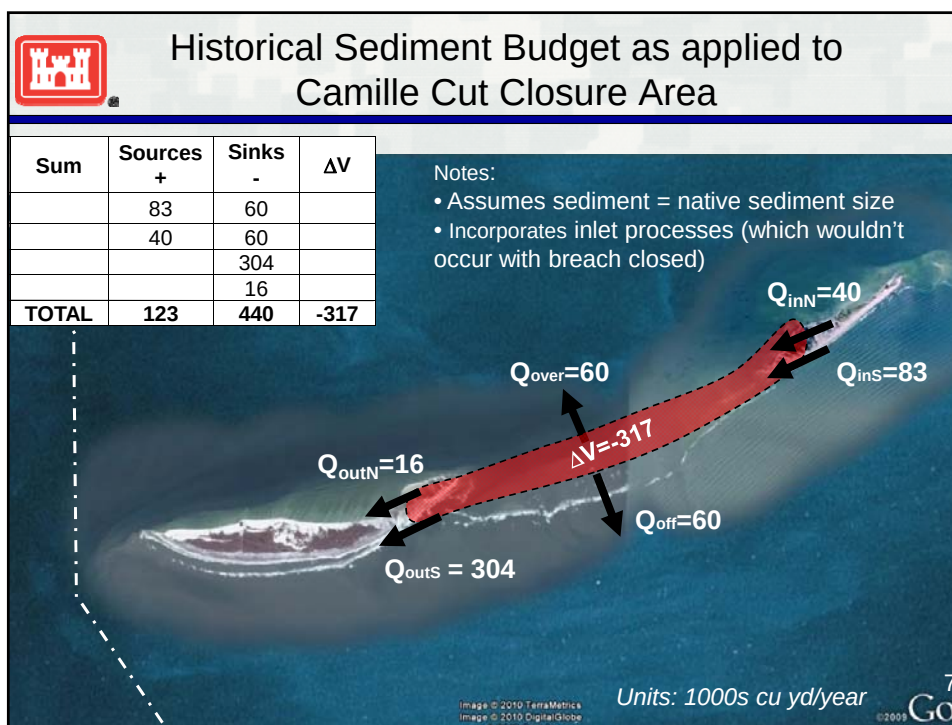


Overview of Closure Options

Alternative	Ship D50 = 0.20 mm	Horn or Borrow Combo D50 = 0.26mm	Borrow combo D50 = 0.28 mm	DA-10, LTBU or Borrow Combo D50 = 0.30 mm	Petiti D50 = 0.34 mm
Fill	1S	1H	1C	1T	1P
Fill + Vegetation	2S	2H	2C	2T	2P
Fill + Terminal Groin	3S	3H	3C	3T	3P
Fill + Term. Groin + Vegetation	4S	4H	4C	4T	4P

Note: Borrow Area Combo is a combination of 2 or more of the 5 identified borrow area sources which make up the specified grain size
LTBU = Lower Tombigbee Upland Sites

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Overview of Closure Options

Identifier and Slide Number associated with Closure Options

Alternative	Ship D50 = 0.20 mm	Horn or Borrow Combo D50 = 0.26mm	Borrow combo D50 = 0.28 mm	DA-10, LTB or Borrow Combo D50 = 0.30 mm	Petit Bois D50 = 0.34 mm
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Fill + Terminal Groin	3S	3H	3C	3T	3P
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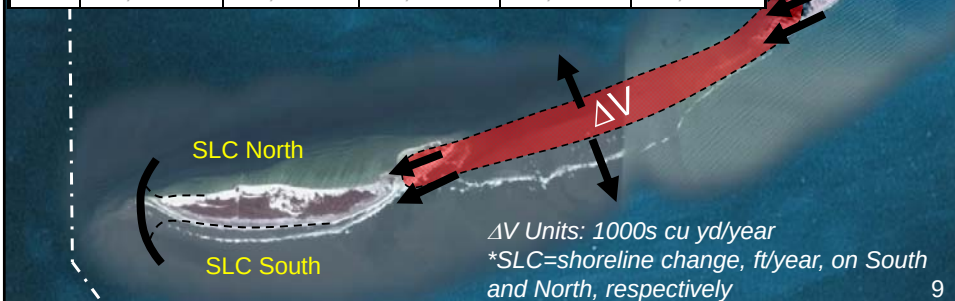
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Summary of Fill Alternatives

Alt	S- Ship D50 = 0.20 mm	H- Horn D50 = 0.26mm	C- Combo D50 = 0.28 mm	T- LTBU D50 = 0.30 mm	P- Petit D50 = 0.34 mm
ΔV , 1000s cu yd/year					
1	-418	-344	-312	-290	-256
2	-364	-298	-268	-248	-219
3	-418	-344	-312	-290	-256
SLC*	+26, +5	+22, +4	+20, +3.8	+21, +4	+18, +3.5
4	-364	-298	-268	-248	-219
SLC*	+23, +4.5	+20, +3.8	+19, 3.5	+18, +3.3	+17, 3.3



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Overview of Closure Options

Identifier and Slide Number associated with Closure Options

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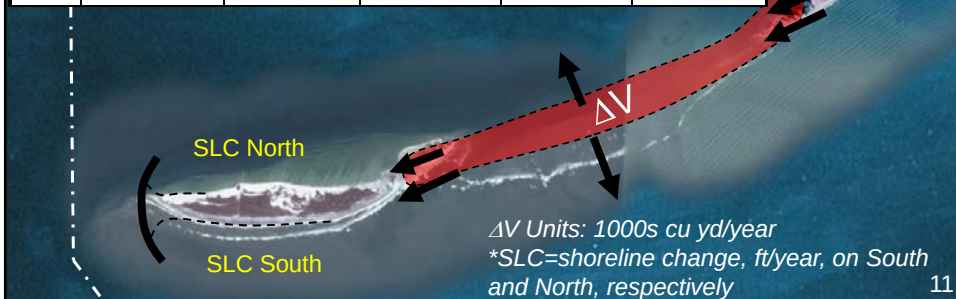
Note: Borrow Area Combo is a combination of 2 or more of the 5 identified borrow area sources which make up the specified grain size
LTBU = Lower Tombigbee Upland Sites

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Summary of Fill + Vegetation Alternatives

Alt	S- Ship D50 = 0.20 mm	H- Horn D50 = 0.26mm	C- Combo D50 = 0.28 mm	T- LTBU D50 = 0.30 mm	P- Petit D50 = 0.34 mm
ΔV , 1000s cu yd/year					
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2	-364	-298	-268	-248	-219
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Overview of Closure Options

Identifier and Slide Number associated with Closure Options

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Fill + Term. Groin + Vegetation	4S	4H	4C	4T	4P

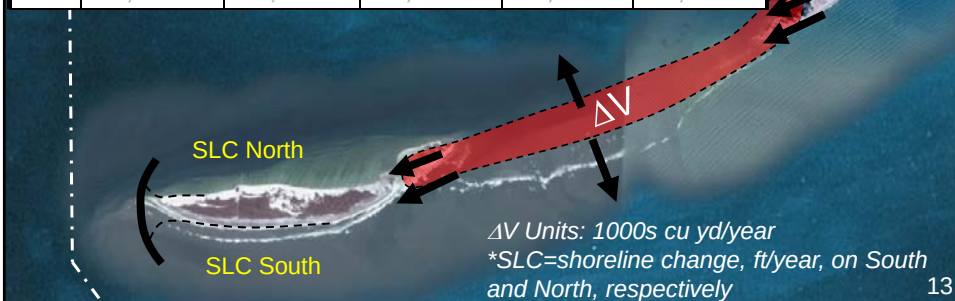
Note: Borrow Area Combo is a combination of 2 or more of the 5 identified borrow area sources which make up the specified grain size
LTBU = Lower Tombigbee Upland Sites

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Summary of Fill + Terminal Groin Alternatives

Alt	S- Ship D50 = 0.20 mm	H- Horn D50 = 0.26mm	C- Combo D50 = 0.28 mm	T- LTBU D50 = 0.30 mm	P- Petit D50 = 0.34 mm
ΔV, 1000s cu yd/year					
1	-418	-344	-312	-290	-256
2	-364	-298	-268	-248	-219
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SLC*	+23, +4.5	+20, +3.8	+19, 3.5	+18, +3.3	+17, 3.3



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Overview of Closure Options

Identifier and Slide Number associated with Closure Options

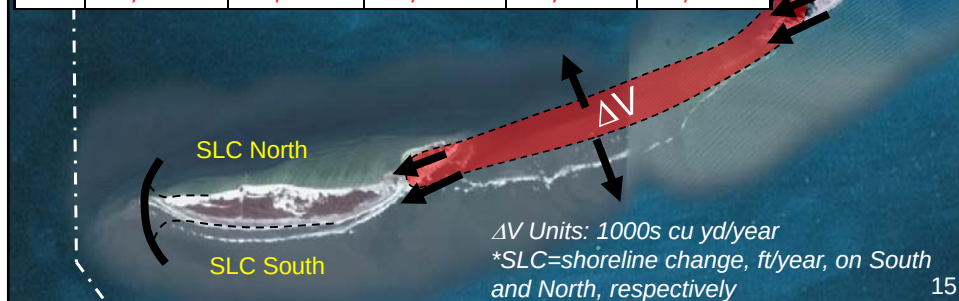
Alternative	Ship D50 = 0.20 mm	Horn or Borrow Combo D50 = 0.26mm	Borrow combo D50 = 0.28 mm	DA-10, LTB or Borrow Combo D50 = 0.30 mm	Petiti D50 = 0.34 mm
Fill	1S	1H	1C	1T	1P
Fill + Vegetation	2S	2H	2C	2T	2P
Fill + Terminal Groin	3S	3H	3C	3T	3P
Fill + Term. Groin + Vegetation	4S	4H	4C	4T	4P

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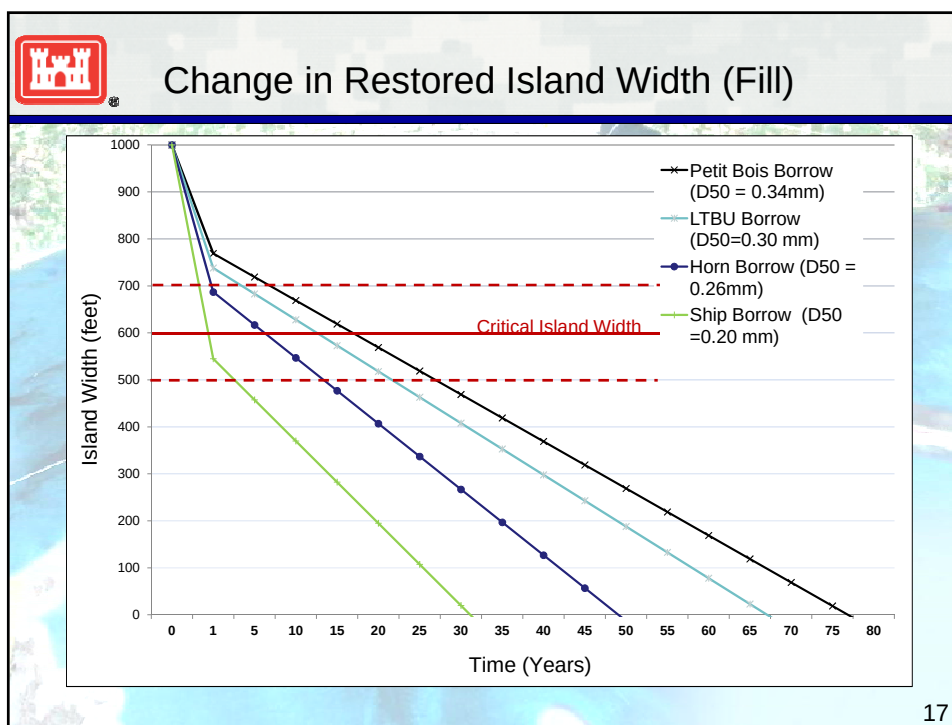
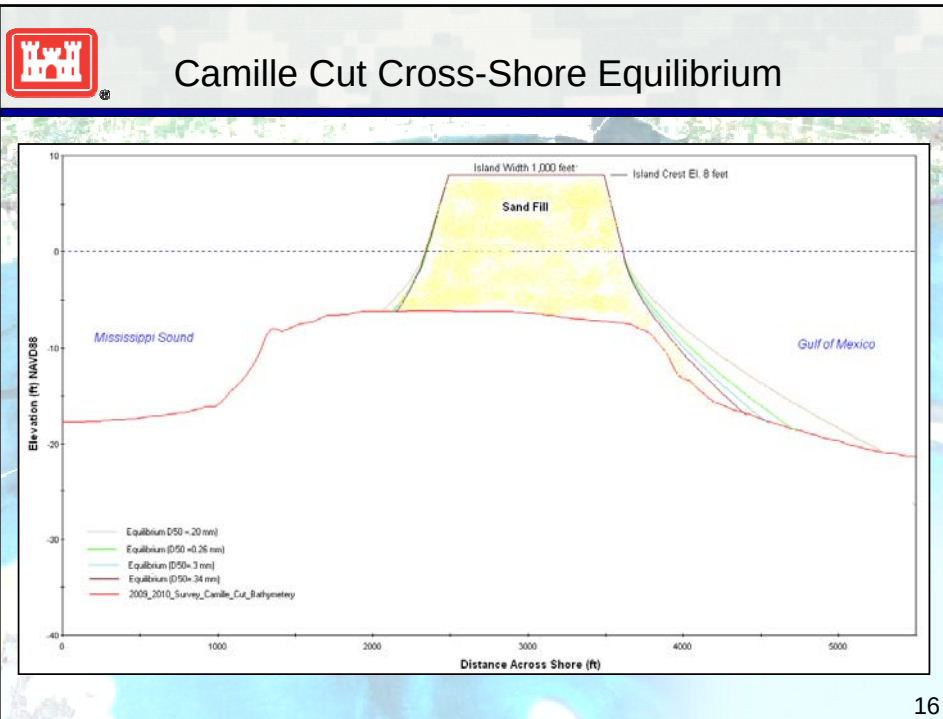


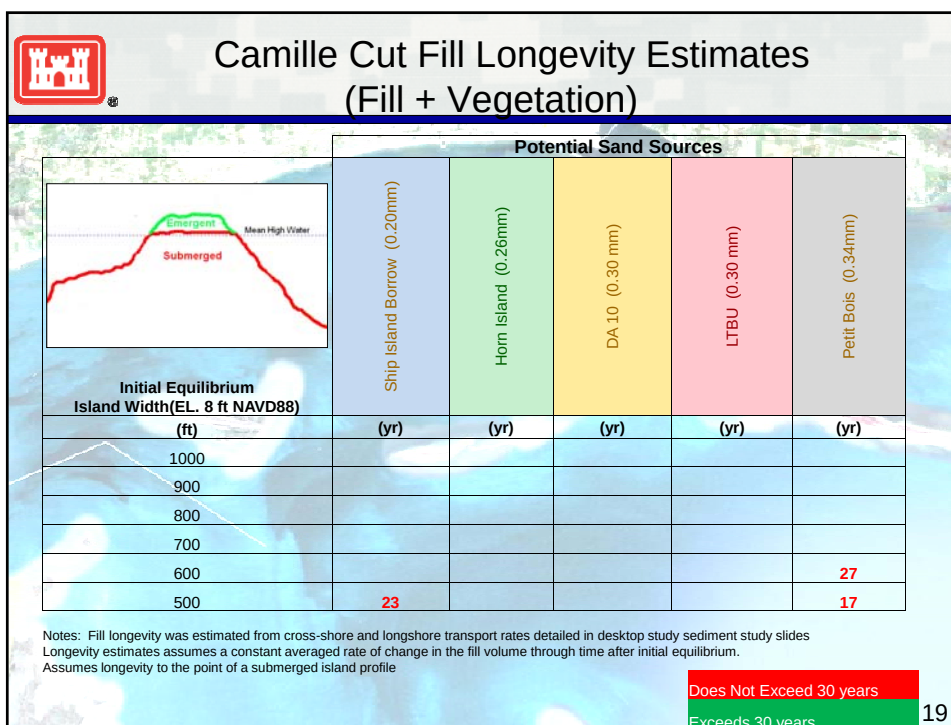
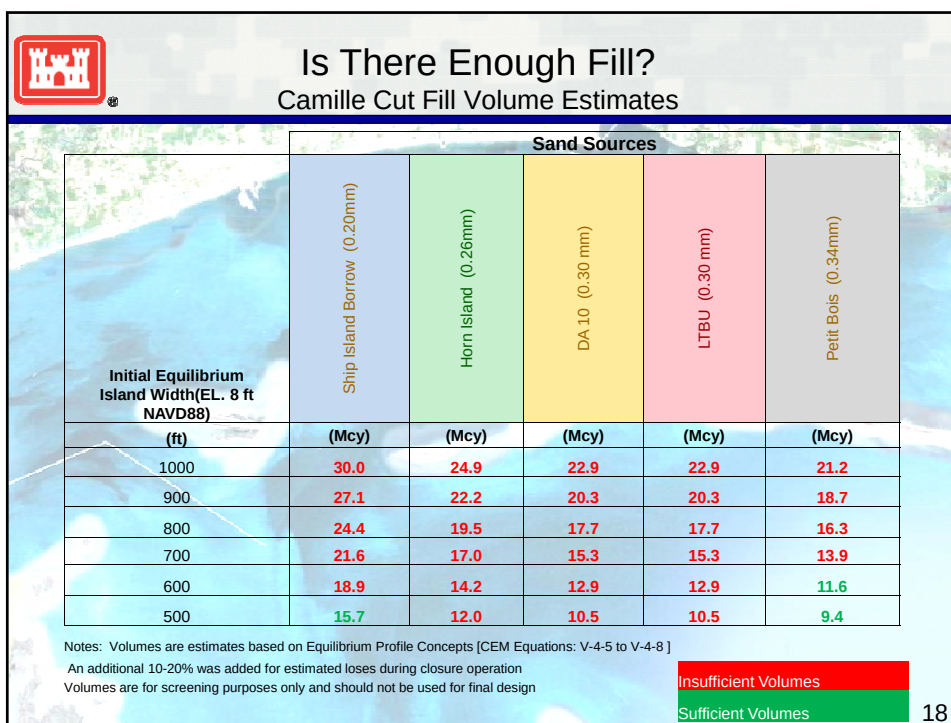
Summary of Fill + Vegetation + Terminal Groin Alternatives

Alt	S- Ship D50 = 0.20 mm	H- Horn D50 = 0.26mm	C- Combo D50 = 0.28 mm	T- LTBU D50 = 0.30 mm	P- Petit D50 = 0.34 mm
ΔV , 1000s cu yd/year					
1	-418	-344	-312	-290	-256
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SLC*	+26, +5	+22, +4	+20, +3.8	+21, +4	+18, +3.5
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 Camille Cut Fill Volume Estimates (Fill +Vegetation)										
Initial Equilibrium Island Width(EL. 8 ft NAVD88)	Potential Sand Source Combinations									
	(60%) LTBU, (28%) DA 10, (12%) Horn (0.30 mm)	(50%) LTBU, (23%) DA 10, (7%) Horn, (20%) Ship, (0.28 mm)	(35%) LTBU, (16%) DA 10 (7%) Horn, (40%) Ship, (0.26 mm)	(30%) Ship plus (70%) Petit Bois (0.30 mm)	(40%) Ship plus (60%) Petit Bois (0.28 mm)	(55%) Ship plus (45%) Petit Bois (0.26 mm)	(22%) Ship, (60%) Petit, (13%) DA 10, (5%) Horn (0.30mm)	(37%) Ship, (45%) Petit, (13%) DA 10, (5%) Horn (0.28mm)	(52%) Ship, (30%) Petit, (13%) DA 10, (5%) Horn (0.26mm)	(40%) Ship, (49%) DA 10, (11%) Horn (0.26 mm)
(ft)	(Mcy)	(Mcy)	(Mcy)	(Mcy)	(Mcy)	(Mcy)	(Mcy)	(Mcy)	(Mcy)	(Mcy)
1000	22.9	23.6	24.9	22.9	23.6	24.9	22.9	23.6	24.9	24.9
900	20.2	21.0	22.2	20.2	21.0	22.2	20.2	21.0	22.2	22.2
800	17.7	18.4	19.5	17.7	18.4	19.5	17.7	18.4	19.5	19.5
700	15.3	15.9	17.0	15.3	15.9	17.0	15.3	15.9	17.0	17.0
600	12.9	13.5	14.2	12.9	13.5	14.2	12.9	13.5	14.2	14.2
500	10.5	11.1	12.0	10.5	11.1	12.0	10.5	11.1	12.0	12.0

Notes: Volumes are estimates based on Equilibrium Profile Concepts [CEM Equations: V-4-5 to V-4-8]
 An additional 10-20% was added for estimated losses during closure operation
 Volumes are for screening purposes only and should not be used for final design

Insufficient Volumes
 Sufficient Volumes

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 Camille Cut Fill Longevity Estimates (Fill +Vegetation)										
Initial Equilibrium Island Width(EL. 8 ft NAVD88)	Potential Sand Source Combinations									
	(60%) LTBU, (28%) DA 10, (12%) Horn (0.30 mm)	(50%) LTBU, (23%) DA 10, (7%) Horn, (20%) Ship, (0.28 mm)	(35%) LTBU, (16%) DA 10 (7%) Horn, (40%) Ship, (0.26 mm)	(30%) Ship plus (70%) Petit Bois (0.30 mm)	(40%) Ship plus (60%) Petit Bois (0.28 mm)	(55%) Ship plus (45%) Petit Bois (0.26 mm)	(22%) Ship, (60%) Petit, (13%) DA 10, (5%) Horn (0.30mm)	(37%) Ship, (45%) Petit, (13%) DA 10, (5%) Horn (0.28mm)	(52%) Ship, (30%) Petit, (13%) DA 10, (5%) Horn (0.26mm)	(40%) Ship, (49%) DA 10, (11%) Horn (0.26 mm)
(ft)	(yr)/(feet)	(yr)/(feet)	(yr)/(feet)	(yr)/(feet)	(yr)/(feet)	(yr)/(feet)	(yr)/(feet)	(yr)/(feet)	(yr)/(feet)	(yr)/(feet)
1000									*60 (695)	
900			*52 (595)						*52 (595)	
800			43 (495)			43 (495)		*46 (545)	43 (495)	
700		37 (450)	35 (400)			35 (400)	38 (460)	37 (450)	35 (400)	
600	29 (0)	28 (0)	27 (0)	29 (0)	28 (0)	27 (0)	29 (0)	28 (0)	27 (0)	
500	23 (0)	20 (0)	17 (0)	23 (0)	20 (0)	17 (0)	23 (0)	20 (0)	17 (0)	

Notes: Longevity was estimated from sediment transport rates detailed in the sediment budget slides
 Longevity estimates assumes a constant averaged rate of change in the fill volume through time after
 initial equilibrium of the fill
 Assumes longevity to the point of a submerged island profile
 (feet) = the potential emergent island width remaining at 30 years

Does Not Exceed 30 years
 Exceeds 30 years /
 * Minimum of 500 ft. Critical Width or
 greater at 30 years

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Camille Cut Fill Cost Comparison

Sand Source	Excavation and Haul Cost per Cubic Yard \$
Ship	5
Horn	12
Petit	15
DA 10	20
LTBU	40

Notes: Costs are rough order of magnitude costs for alternative screening purposes only.

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Camille Cut Fill Cost Comparison

Potential Sand Source Combinations										
Camille Cut - Equilibrium Berm (EL. 8 ft NAVD88) Island Width	(60%) LTBU, (28%) DA 10, (12%) Horn (0.30 mm)	(50%) LTBU, (23%) DA 10, (7%) Horn, (20%) Ship, (0.28 mm)	(35%) LTBU, (16%) DA 10, (7%) Horn, (40%) Ship, (0.26 mm)	(30%) Ship plus (70%) Petit Bois (0.30 mm)	(40%) Ship plus (60%) Petit Bois (0.28 mm)	(55%) Ship plus (45%) Petit Bois (0.26 mm)	(22%) Ship, (60%) Petit, (13%) DA 10, (5%) Horn (0.30mm)	(37%) Ship, (45%) Petit, (13%) DA 10, (5%) Horn (0.28mm)	(52%) Ship, (30%) Petit, (13%) DA 10, (5%) Horn (0.26mm)	(40%) Ship, (49%) DA 10, (11%) Horn (0.26 mm)
(ft)	\$ (1,000,000)	\$ (1,000,000)	\$ (1,000,000)	\$ (1,000,000)	\$ (1,000,000)	\$ (1,000,000)	\$ (1,000,000)	\$ (1,000,000)	\$ (1,000,000)	\$ (1,000,000)
1000									*274	
900			*444						*245	
800			391			186		*230	217	
700		421	340			161	212	200	190	
600										
500										

Notes: Costs are rough order of magnitude costs for alternative screening purposes only.
 * Alternative is estimated to maintain a minimum critical island width of 500 ft. or greater at 30 years.

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Closing Points

- The borrow source alternatives with the most compatible grain sizes and sufficient volumes to restore Camille Cut come from a combination of sources.
- Vegetation would encourage the deposition of windblown sand, promote dune growth and reduce loss of sand from the island.
- A terminal groin could provide a positive effect to the shoreline several miles up drift by retaining sand and providing control of large-scale fluctuations of the shoreline.
- A terminal groin is not expected to have a direct effect on Camille Cut without the implementation of backpassing.
- Modeling and further analysis will be required for a subset of selected alternatives.