

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
MARINE RESOURCES				
Soft bottom Communities				
<p>Borrow site dredging for hotspot nourishment events would directly impact ~200 acres of soft bottom habitat at the ODMDS and/or Area Y offshore borrow sites every 11 years. Dredging would remove most of the associated benthic invertebrate infauna and epifauna from the excavation footprints. Sand placement on the hotspot reaches would directly impact additional soft bottom habitat within the subtidal portions of the beach fill footprints, resulting in the loss of the associated benthic invertebrate fauna through direct burial. Dredging and sand placement may indirectly affect demersal fishes by reducing the availability of benthic invertebrate prey. Cumulative impacts are not anticipated.</p>	<p>Alternative 2 would not involve dredging or any other in-water activities. Therefore, no direct, indirect, or cumulative impacts are anticipated.</p>	<p>Sand extraction dredging for County nourishment events would directly impact ~35 to 240 acres of soft bottom habitat at the ODMDS and/or Area Y offshore borrow sites every 3 years. Direct and indirect impacts on soft bottom communities would be the same as those described under Alternative 1; however, Alternative 3 would require more frequent extractions of sand and a larger total volume, thus impacting a larger area of soft bottom habitat over the 50-year life of the project. Although some overlap between the dredging footprints of successive events may occur, repeated dredging in the same footprint is not anticipated due to the relatively shallow and non-renewable nature of the deposits. Therefore, cumulative impacts are not anticipated.</p>	<p>Same as Alternative 3.</p>	<p>Same as Alternative 3.</p>
Hardbottom Communities				
<p>Based on surveys indicating that no hardbottom features are present within 500 m of the sand placement areas or offshore borrow sites; no direct, indirect, or cumulative impacts are anticipated.</p>	<p>Alternative 2 would not involve dredging or any other in-water activities. Therefore, no direct, indirect, or cumulative impacts are anticipated.</p>	<p>Same as Alternative 1.</p>	<p>Same as Alternative 1.</p>	<p>Same as Alternative 1.</p>

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Water Column (Sediment Suspension and Turbidity)				
<p>Sand placement and dredging operations would temporarily increase suspended sediment concentrations and turbidity levels in the surf zone and at the offshore borrow sites, respectively. However, based on the composition of the dredged/placed material (i.e., clean sand with minimal fines), it is expected that sediment suspension and its effects on marine organisms would be localized and short-term. Based on the short-term and localized nature of the anticipated direct and indirect effects, cumulative impacts would not be expected.</p>	<p>Alternative 2 would not involve dredging or any other in-water activities. Therefore, no direct, indirect, or cumulative impacts are anticipated.</p>	<p>Same as Alternative 1.</p>	<p>Same as Alternative 1.</p>	<p>Same as Alternative 1.</p>
Water Column (Noise and Entrainment)				
<p>Noise studies indicate that the sound levels produced by hopper dredges at the offshore borrow sites may exceed the NMFS thresholds for behavioral effects on marine mammals and sea turtles within ~1-2 km of the dredge. Behavioral effects may include avoidance responses such as diving or increased swimming speed, and are expected to be short-term and minor.</p> <p>Dredging operations at the ODMDS and/or Area Y offshore borrow sites would entrain the planktonic larvae of marine fish and invertebrates. However, based on the diffuse distribution of larvae offshore, it is expected that effects on fish and invertebrate populations would be negligible. Hopper dredging at the offshore borrow sites would present an entrainment risk to sea turtles. Mitigation measures such as rigid draghead deflectors, a 16 Nov-30 April hopper dredging window, and relocation trawling would minimize, but not eliminate the risk of sea turtle entrainment.</p>	<p>Alternative 2 would not involve dredging or any other in-water activities. Therefore, no direct, indirect, or cumulative impacts related to underwater noise or entrainment would be expected.</p>	<p>Same as Alternative 1.</p>	<p>Same as Alternative 1.</p>	<p>Same as Alternative 1.</p>

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Water Column (Hydrodynamics)				
<p>Based on the mounded nature of the dredged material deposits at the ODMDS and the limited areal extent and shallow depth of sand deposits at Area Y, borrow site excavation under Alternative 1 would not be expected to have any adverse effects on hydrodynamics.</p>	<p>Alternative 2 would not involve dredging or any other in-water activities. Therefore, no direct, indirect, or cumulative impacts are anticipated.</p>	<p>Same as Alternative 1.</p>	<p>Same as Alternative 1.</p>	<p>The potential impacts of offshore borrow site dredging on hydrodynamics would be the same as those described under Alternative 1. The terminal groin would have localized effects on longshore currents and associated sediment transport processes along the west end Emerald Isle shoreline. The modeling results indicate accretion and an increase in bed elevation ranging from 0.8 to 1.1 ft over an area of ~22 acres along the downdrift inlet side of the groin. Projected effects on the updrift oceanfront shoreline to the east are limited to shoreline accretion within approximately one mile of the groin.</p>
OCEANFRONT BEACH AND DUNE RESOURCES				
Intertidal Beach Communities				
<p>Sand placement on the Pine Knoll Shores and Emerald Isle hotspot reaches would directly impact ~7.0 miles of intertidal beach habitat every 11 years. Sand placement on western Emerald Isle via Bogue Inlet ebb channel realignments would impact ~5.5 miles of intertidal beach habitat every 20 years. Direct impacts would include the temporary loss of benthic invertebrate infauna due to burial and the temporary displacement of shorebirds from intertidal beach foraging habitats due to construction-related disturbance. Sand placement would indirectly impact shorebirds and surf zone fishes by temporarily reducing the availability of their benthic invertebrate prey. Intertidal beach communities would be expected to recover during the intervals between nourishment events. Therefore, cumulative impacts would not be expected.</p>	<p>Structure relocations and demolitions may involve heavy equipment operations on the beach, resulting in minor, short-term direct impacts on intertidal beach communities via substrate disturbance. Relocations and demolitions would occur incrementally as individual structures become threatened, thus it is expected that the extent of impacts at any given time would be negligible. In the absence of beach management, it is expected that unmitigated shoreline erosion and associated shoreface steepening would reduce the extent of intertidal beach habitat along Pine Knoll Shores, Indian Beach/Salter Path, and Emerald Isle. Unmitigated shoreline erosion may negatively affect shorebirds and surf zone fishes by reducing the availability of intertidal beach foraging habitat and associated benthic invertebrate prey.</p>	<p>Sand placement on the Pine Knoll Shores, Indian Beach/Salter Path, and Emerald Isle East management reaches would directly impact ~ ten miles of intertidal beach habitat. Direct and indirect impacts on intertidal beach communities would be the same as those described under Alternative 1; however, the individual management reaches would experience more frequent recurring maintenance nourishment impacts at average intervals of three or six years. Additional storm-response nourishment events would result in some shorter impact recurrence intervals over the life of the 50-year project. Intertidal beach communities would be expected to recover during the intervals between nourishment events. Therefore, cumulative impacts would not be expected.</p>	<p>Sand placement on the Pine Knoll Shores; Indian Beach/Salter Path; Emerald Isle East, Central, and West; and Bogue Inlet management reaches would directly impact ~18 miles of intertidal beach habitat. Direct and indirect impacts on intertidal beach communities would be the same as those described under Alternative 1; however, the individual management reaches would experience more frequent recurring maintenance nourishment impacts at average intervals of three, six, or nine years. Additional storm-response nourishment events would result in some shorter impact recurrence intervals over the life of the 50-year project. Intertidal beach communities would be expected to recover during the intervals between nourishment events. Therefore, cumulative impacts would not be expected.</p>	<p>The direct, indirect, and cumulative impacts of sand placement on intertidal beach communities would be the same as those described under Alternative 3. Additional impacts related to construction of the terminal groin would include the permanent loss of ~0.2 acre of intertidal beach habitat. Based on the minimal extent of permanent impact, it is expected that associated effects on intertidal beach benthic infaunal communities, surf zone fishes, and shorebirds would be negligible. The projected indirect and cumulative effects of the terminal groin on the updrift Emerald Isle oceanfront shoreline are limited to shoreline accretion within approximately one mile of the groin</p>

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Dry Beach and Dune Communities				
<p>Sand placement on the Pine Knoll Shores and Emerald Isle hotspot reaches would impact ~7.0 miles of dry beach and dune habitat every 11 years, while placements on western Emerald Isle via Bogue Inlet ebb channel realignments would impact ~5.5 miles of dry beach and dune habitat every 20 years. Direct impacts would include the burial and temporary loss of ghost crabs and short-term displacement of shorebirds and waterbirds from dry beach roosting habitats due to construction-related disturbance. Sand placement may have short-term indirect adverse effects on shorebirds/waterbirds and sea turtles due to physical beach and dune habitat modification.</p> <p>Hotspot nourishment projects may have short-term beneficial effects on dry beach habitat via increases in beach width; however, it is expected that any beneficial effects would be limited by considerable unmitigated erosion during the lengthy interim periods between nourishment events.</p>	<p>Structure relocations and demolitions may involve heavy equipment operations on the beach, resulting in minor, short-term direct impacts on dry beach and dune communities via substrate disturbance. However, relocations and demolitions would occur incrementally as individual structures become threatened, thus it is expected that the extent of direct impacts at any given time would be negligible.</p> <p>It is expected that unmitigated shoreline erosion and associated shoreface steepening would reduce the quality and quantity of dry beach and dune habitat along Pine Knoll Shores, Indian Beach/Salter Path, and Emerald Isle. The modeling results show an overall net loss of ~78 acres of dry beach habitat and an overall net reduction in average beach width of ~14 feet along the ~18 miles of unmanaged shoreline at the end of the 12-year model simulations.</p>	<p>Sand placement on the Pine Knoll Shores, Indian Beach/Salter Path, and Emerald Isle East management reaches would directly impact approximately ten miles of dry beach and dune habitat. The individual management reaches would experience recurring maintenance nourishment impacts at average intervals of three or six years. Additional storm-response nourishment events would result in some shorter impact recurrence intervals over the life of the 50-year project.</p> <p>Direct impacts would include the burial and temporary loss of ghost crabs and short-term displacement of shorebirds and waterbirds from dry beach roosting habitats due to construction-related disturbance. Sand placement may have short-term indirect adverse effects on shorebirds/waterbirds and sea turtles due to physical beach and dune habitat modification. Conversely, the maintenance of wider and higher oceanfront dry beaches along the managed reaches would be expected to increase the quantity and quality of potential sea turtle nesting habitat and high tide roosting habitat for coastal waterbirds. Based on the model-projected MHW line changes, average dry beach width at the end of the 12-year simulation period is 40 feet wider than the projected average width under Alternative 2.</p>	<p>Sand placement on the Pine Knoll Shores; Indian Beach/Salter Path; Emerald Isle East, Central, and West; and Bogue Inlet management reaches would directly impact ~18 miles of dry beach and dune habitat. The individual management reaches would experience recurring maintenance nourishment impacts at average intervals of three, six, or nine years. Additional storm-response nourishment events would result in some shorter impact recurrence intervals over the life of the 50-year project.</p> <p>The direct and indirect impacts of sand placement events on benthic communities, shorebirds, and surf zone fishes would be similar to those described under Alternative 3. Based on the model-projected MHW line changes, average dry beach width at the end of the 12-year simulation period is 53 feet wider than the projected average width under Alternative 2.</p>	<p>The direct, indirect, and cumulative impacts of sand placement on dry beach and dune communities would be the same as those described under Alternative 3. Additional impacts related to construction of the terminal groin would include the permanent loss of ~0.3 acre of dry beach habitat. Based on the minimal extent of habitat loss, it is expected that associated effects on dry beach communities would be negligible. The groin would be a low profile structure with the majority of the landward segment remaining buried. Based on the groin's low profile design and its location at the western terminus of the oceanfront beach, it is expected that any impacts on nesting sea turtles would be minimal.</p>

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INLET AND ESTUARINE RESOURCES				
Intertidal Flats and Shoals				
<p>Realignments of the Bogue Inlet ebb channel would directly impact any intertidal flats and shoals that are present within the new mid-inlet channel footprint. Excavation would remove the associated intertidal benthic invertebrates and convert the affected intertidal flat/shoal habitats to subtidal soft bottom habitat. Realignments may indirectly impact shorebirds and surf zone fishes by temporarily reducing the availability of intertidal foraging habitat and associated benthic infaunal prey. Fluctuations in the distribution and extent of intertidal flats and shoals would be expected during the post-realignment inlet adjustment period; however, it is expected that these changes would be consistent with the dynamic nature of the inlet and the habitat changes that follow natural ebb channel repositioning events.</p>	<p>Alternative 2 would not involve dredging or any other in-water activities. Therefore, no direct, indirect, or cumulative impacts on intertidal flats and shoals would be expected.</p>	<p>Alternative 3 would not encompass any inlet dredging or sand placement activities. Therefore, no direct, indirect, or cumulative impacts on estuarine intertidal flats and shoals would be expected.</p>	<p>The direct and indirect impacts of Bogue Inlet ebb channel realignment events on intertidal flat and shoal communities would be the same as those described under Alternative 1. Alternative 4 would involve more frequent realignments approximately every 10-15 years; however, based on the relatively long intervals between realignment events, cumulative impacts would not be expected.</p>	<p>The modeling results indicate that any groin-related effects on east-west longshore sediment transport and wave-driven sediment transport from the ebb tidal delta into the inlet would be minimal. The modeling results do not indicate any effects on the east end of Bear Island, which is consistent with past studies indicating that the primary sediment source for the eastern end of Bear Island is the ebb-shoal and not sediment bypassing from Bogue Banks across Bogue Inlet. Therefore, adverse effects on intertidal flats and shoals would not be expected under Alternative 5.</p>
Inlet Dry Beach, Overwash, and Dune Communities				
<p>Based on the mid-inlet location of the new channel excavation footprint, Bogue Inlet ebb channel realignments would not be expected to have any direct impacts on inlet dry beach, overwash, or dune communities. Based on the current ebb channel migration pattern, it is anticipated that most of the inlet dry beach, overwash, and dune habitat associated with the Bogue Banks inlet shoreline would be converted to subtidal soft bottom within the next eight to 12 years. Prior to the initiation of an ebb channel realignment project, sandbags would likely be placed along the inlet shoreline, resulting in degraded habitat conditions similar to those leading up to the 2005</p>	<p>Based on the current Bogue Inlet ebb channel eastward migration pattern, it is anticipated that most of the inlet dry, beach, overwash, and dune habitat along the Bogue Banks inlet shoreline would be converted to subtidal soft bottom within the next eight to 12 years.</p>	<p>Same as Alternative 2.</p>	<p>Based on the mid-inlet location of the new channel excavation footprint, Bogue Inlet ebb channel realignments would not be expected to have any direct impacts on inlet dry beach, overwash, or dune communities. Realignments would occur before the ebb channel reaches an extreme westward alignment, thereby preempting a recurrence of the extreme erosional conditions that eliminated essentially all inlet dry beach and overwash habitat along the Bogue Banks inlet shoreline during the period leading up to the 2005 realignment project. Fluctuations in the distribution and extent of inlet dry beach, overwash, and dune habitats would be expected during the</p>	<p>The modeling results do not indicate any erosional or sediment transport effects that would adversely affect dry beach, overwash, and dune habitats along the downdrift Bogue Banks inlet shoreline or the Bear Island inlet shoreline. Therefore, adverse effects on inlet dry beach, overwash, and dune communities would not be expected under Alternative 5.</p>

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<p>Bogue Inlet Channel Erosion Project. Fluctuations in the distribution and extent of inlet dry beach, overwash, and dune habitats would be expected during the post-realignment inlet adjustment period; however, it is expected that these changes would be consistent with the dynamic nature of the inlet and the habitat changes that follow natural ebb channel repositioning events.</p>			<p>post-realignment inlet adjustment period; however, it is expected that these changes would be consistent with the dynamic nature of the inlet and the habitat changes that follow natural ebb channel repositioning events.</p>	
<p>Upland Dredged Material Disposal Islands (Shorebird/Waterbird Nesting Habitat)</p>				
<p>Alternative 1 would not include any use of disposal islands as a borrow source. Therefore, no direct, indirect, or cumulative impacts are anticipated.</p>	<p>Alternative 2 would not include any activities that would affect dredged material disposal islands. Therefore, no direct, indirect, or cumulative impacts are anticipated.</p>	<p>Pump-outs of sand from AIWW dredged material disposal islands would adhere to a 16 Nov-31 March environmental window, and thus would not be expected to have any direct impact on shorebird and waterbird nesting. Excavation below MHW is not proposed; and therefore, Alternative 3 would not reduce the area of potential supratidal nesting habitat. Sand extraction would likely increase the area of sparsely vegetated supratidal habitat, thereby potentially enhancing the quality of nesting habitat for some species. Sand extraction would also result in lower disposal island elevations, thereby potentially enhancing nesting habitat by reducing the exposure of birds and nests to high winds and sand movement. Therefore, adverse indirect or cumulative effects on shorebird/waterbird nesting would not be expected.</p>	<p>Same as Alternative 3.</p>	<p>Same as Alternative 3.</p>

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Estuarine Soft bottom Communities				
<p>Realignment of the Bogue Inlet ebb channel would directly impact subtidal soft bottom communities within the new mid-inlet channel excavation footprint. Dredging would remove the associated benthic infaunal/epifaunal invertebrates. Direct impacts on soft bottom benthic invertebrates would temporarily reduce the availability of benthic prey for demersal fishes. Based on avoidance of peak benthic recruitment periods and the rapid recovery capabilities of soft bottom communities that occur in shallow, frequently disturbed habitats; it is anticipated that direct and indirect impacts would be short term and localized. No cumulative impacts would be expected.</p>	<p>Alternative 2 would not involve dredging or any other in-water activities. Therefore, no direct, indirect, or cumulative impacts are anticipated.</p>	<p>Submerged pipelines leading from the AIWW upland disposal island borrow sites to the oceanfront beach would have minor, short-term direct and indirect effects on soft bottom communities. No cumulative effects would be expected.</p>	<p>Same as Alternative 1.</p>	<p>Same as Alternative 3.</p>
Shellfish, SAV, and Tidal Marsh				
<p>No direct impacts shellfish, SAV, and tidal marsh would be expected, as these habitats are confined to waters inshore of the Bogue Inlet ebb channel realignment footprint. Some of the sediments suspended by the dredging process may be transported inland and deposited in areas containing shellfish, SAV, and/or tidal marsh. However, based on the composition of the dredged material (i.e., clean sand with minimal fines), it is expected that any sediment redeposition effects would be minor and short-term. The post-realignment inlet adjustment process would lead to fluctuations in the distribution and extent of estuarine habitats within the inlet complex; however, this process would be consistent with the dynamic nature of the inlet and the changes that follow natural ebb channel repositioning events.</p>	<p>Alternative 2 would not involve dredging or any other in-water activities that would affect shellfish, SAV, or tidal marshes. Demolition and relocation activities would not be expected to have any direct, indirect, or cumulative impacts on these estuarine communities.</p>	<p>Submerged pipelines leading from the AIWW upland disposal island borrow sites to the oceanfront beach would be routed to avoid shellfish, SAV, and tidal marsh communities. Therefore, no direct, indirect, or cumulative effects would be expected.</p>	<p>Same as Alternatives 1 and 3.</p>	<p>The potential impacts of AIWW disposal island pump-outs would be the same as those described under Alternative 3. The modeling results indicate that groin-related effects would be confined to the inlet throat and the Emerald Isle oceanfront beach. Therefore, impacts on shellfish, SAV, and tidal marsh communities, which occur inshore of the groin-affected area, would not be expected.</p>

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Estuarine Water Column (Hydrodynamics)				
<p>The post-realignment hydrodynamic performance of the Bogue Inlet ebb channel would be expected to approximate that of the 2005 realignment channel. The results of flow and sediment volume change analyses indicate that the constructed 2005 channel performed largely as anticipated with minimal negative effects on hydrodynamics and associated sediment transport processes. Therefore, no direct, indirect, or cumulative effects on hydrodynamics would be expected.</p>	<p>Alternative 2 would not involve dredging or any other in-water activities. Therefore, no direct, indirect, or cumulative impacts on estuarine hydrodynamics would be expected.</p>	<p>Alternative 3 would not encompass any inlet or estuarine dredging activities. Therefore, no direct, indirect, or cumulative impacts on estuarine hydrodynamics would be expected.</p>	<p>Same as Alternative 1.</p>	<p>The model-projected effects of the terminal groin on inlet and estuarine hydrodynamics are limited to a slight increase in ebb channel depth along its western edge and a negligible reduction in the tidal prism of 0.4% across spring and neap tides. Therefore, adverse effects on inlet and/or estuarine hydrodynamics would not be expected under Alternative 5.</p>
Estuarine Water Column (Sediment Suspension and Turbidity)				
<p>During Bogue Inlet ebb channel realignments, dredging- induced sediment suspension would temporarily increase turbidity levels in the immediate vicinity of the new channel footprint. However, based on the composition of the dredged material (i.e., clean sand with minimal fines), it is expected that sediment suspension and its effects on marine organisms would be localized and short-term.</p>	<p>Alternative 2 would not involve dredging or any other in-water activities. Therefore, no direct, indirect, or cumulative impacts on the estuarine water column would be expected.</p>	<p>Alternative 3 would not encompass any inlet or estuarine dredging or sand placement activities. Therefore, no direct, indirect, or cumulative impacts on the estuarine water column would be expected.</p>	<p>Same as Alternative 1.</p>	<p>Sediments suspended by the groin and fillet construction process could potentially be transported through the inlet into estuarine waters. However, groin construction would occur within the inlet-dominated littoral system, where sediments consist of relatively coarse-grained sands with a very small fine sediment fraction; and the placed fillet material would consist of beach compatible material with minimal fines. Therefore, it is anticipated that sediment suspension effects would be minor, short-term, and localized.</p>
Estuarine Water Column (Underwater Noise and Larval Transport)				
<p>Noise studies indicate that the sound levels produced by cutterhead dredges in Bogue Inlet would not exceed the NMFS thresholds for behavioral or injurious effects on marine mammals or sea turtles. Dredges generally produce low levels of sound energy that are of short duration, thus indicating that effects on fish are likely to be temporary and localized. Based on studies conducted at</p>	<p>Alternative 2 would not involve dredging or any other in-water activities. Therefore, no direct, indirect, or cumulative impacts related to underwater noise or larval entrainment would be expected.</p>	<p>Alternative 3 would not encompass any inlet or estuarine dredging activities. Therefore, no direct, indirect, or cumulative impacts related to underwater noise or larval entrainment would be expected.</p>	<p>Same as Alternative 1.</p>	<p>Alternative 5 would not encompass any inlet or estuarine dredging activities. Therefore, no dredging-related adverse effects related to underwater noise or larval entrainment would be expected.</p>

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Beaufort Inlet, larval entrainment by cutterhead dredges operating in Bogue Inlet would not be expected to have any measurable effect on estuarine dependent fish and invertebrate populations.				
CULTURAL RESOURCES				
Remote sensing surveys have not identified any potential archaeological resources in the vicinity of the ODMDS or Area Y offshore borrow sites. Ebb channel relocations would realign the channel to the previously dredged 2005 channel footprint; which prior surveys indicate does not contain cultural resources. Therefore, Alternative 1 would not be expected to have any adverse effects on cultural resources.	Demolition and relocation activities would be confined to the shoreline above MLW; and therefore, would not be expected to have any direct, indirect, or cumulative impacts on cultural resources.	Remote sensing surveys have not identified any potential archaeological resources in the vicinity of the ODMDS or Area Y offshore borrow sites. Therefore, Alternative 3 would not be expected to have any adverse effects on cultural resources.	Same as Alternative 1.	The potential effects of offshore borrow site dredging activities on cultural resources would be the same as those described under Alternatives 1, 3, and 4. The terminal groin would be confined to the upper shoreface where erosional conditions are such that the likelihood of any cultural resource site occurrences is considered very low. Therefore, adverse effects on cultural resources would not be expected under Alternative 5.
PUBLIC INTEREST FACTORS				
Public Safety				
Beach construction activities would present a minor safety risk to the public; however, the establishment of construction safety zones and the timing of operations during the colder months would limit public exposure to potential risk. Therefore, no direct, indirect, or cumulative impacts on public safety would be expected.	The relocation or demolition of threatened structures would present a minor short-term risk to public safety. However, operations would be confined to the winter months to the extent possible, thus limiting public exposure to potential risk. Therefore, no direct, indirect, or cumulative impacts on public safety would be expected.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

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Aesthetics and Recreation				
<p>During beach construction, pipelines and construction equipment on the beach along with associated noise emissions and artificial nighttime lighting would temporarily diminish the aesthetic quality of the beach. Temporary construction safety zones would restrict public access within an ~500-foot zone on either side of the active beach fill discharge point, thus temporarily reducing the area available for recreational activities. Public exposure to aesthetic and recreational impacts would be limited, as beach nourishment would take place during the colder months when recreational use is low. The existing federal Bogue Inlet channel would remain open to recreational vessels throughout ebb channel realignment events. Therefore, no direct, indirect, or cumulative impacts on recreational boating would be expected.</p>	<p>During relocation and demolition activities, the presence of construction equipment and demolition debris on the beach along with associated noise emissions would temporarily diminish the aesthetic quality of the beach. However, operations would be confined to the winter months to the extent possible, thus limiting the extent of public exposure to adverse effects. Demolition/relocation projects would occur incrementally as structures become threatened; and therefore, the extent of impacts at any given time would be negligible.</p> <p>In the absence of beach management, unmitigated erosion would result in narrow chronically-eroded oceanfront beaches, thus diminishing the aesthetic quality of the beach and reducing recreational opportunities. It is expected that long-term shoreface steepening and subaerial beach narrowing would eventually eliminate most of the recreational dry beach along the unmanaged reaches, resulting in long-term adverse effects on aesthetics and recreation.</p>	<p>The potential impacts of sand placement on aesthetics and recreation would be the same as those described under Alternative 1.</p>	<p>Same as Alternative 1.</p>	<p>The potential impacts of sand placement on aesthetics and recreation would be the same as those described under Alternative 1. The terminal groin is designed to be a relatively low profile structure, both to promote sand over-passing and to minimize impacts to beach recreation and aesthetics. The majority of the onshore portion of the groin would be covered by sand, with only the seaward groin segment beyond the MHW line exposed. However, the terminal groin would not be consistent with the natural beach aesthetic environment, and thus may detract from the aesthetic quality of the beach for some beachgoers. Aesthetic quality may be reduced relative to that which would exist with a natural and stable shoreline.</p>
Navigation				
<p>Dredging at the ODMDS and Area Y offshore borrow site would be confined to areas outside of the federal MCH and Bogue Inlet navigation channels; and therefore, would not impede commercial or recreational vessel traffic. The existing federal Bogue Inlet channel would remain open to recreational vessels throughout ebb channel realignment events. Therefore, no direct, indirect, or cumulative impacts on navigation would be expected.</p>	<p>Demolition and relocation activities under Alternative 2 would be confined to the oceanfront and inlet shoulder shorelines above the MLW line; and therefore, would not be expected to have any direct, indirect, or cumulative impacts on navigation.</p>	<p>The potential impacts of offshore borrow site dredging on navigation would be the same as those described under Alternative 1.</p>	<p>Same as Alternative 1.</p>	<p>The potential impacts of offshore borrow site dredging on navigation would be the same as those described under Alternative 1. The terminal groin would not be located in a navigation channel, and the potential structural hazard to small recreational watercraft would be mitigated through adherence to USCG marking requirements. Therefore, no direct, indirect, or cumulative groin-related impacts on navigation would be expected.</p>

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HTRW				
Potential beach fill sediments in the offshore borrow areas and the federal Bogue Inlet channel are derived from sediment transport and deposition by ocean currents. The probability of the areas being contaminated by pollutants is low, and it would not be expected that any hazardous and toxic waste sites would be encountered during dredging operations.	Demolished structures may contain hazardous and toxic materials such as asbestos and lead paint; however, it is assumed that these materials would be removed and disposed of in accordance with applicable state and federal regulations.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Air Quality				
Mobile source emissions generated by dredges and onshore construction equipment would result in minor, temporary increases in concentrations of NO _x , SO ₂ , CO, VOC, and PM; however, it is expected that emissions would be rapidly dispersed, thereby precluding any significant effects on air quality. An emissions analysis conducted by the USACE for the Bogue Banks CSDR project indicates that the combined emissions of dredging and sand placement activities would fall below de minimis levels and would not have any adverse effect on air quality.	During structure relocations Mobile source emissions generated by onshore construction equipment would result in very minor and temporary increases in concentrations of NO _x , SO ₂ , CO, VOC, and PM; however, it is expected that emissions would be rapidly dispersed, thereby precluding any significant effects on air quality.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Infrastructure				
In the absence of a comprehensive, regular nourishment program, unmitigated background and storm erosion would eventually threaten many of the oceanfront structures along Pine Knoll Shores, Indian Beach Salter Path, and Emerald Isle. Based on long-term shoreline erosion rates, 226 oceanfront structures are projected to be at risk over the next 50 years.	In the absence of shore protection efforts, unmitigated background and storm erosion would eventually threaten many of the oceanfront structures along Pine Knoll Shores, Indian Beach Salter Path, and Emerald Isle. Based on long-term shoreline erosion rates, 451 oceanfront structures are projected to be at risk over the next 50 years.	In the absence of shore protection efforts along central and western Emerald Isle, unmitigated background and storm erosion would eventually threaten many of the associated oceanfront structures. Based on the modeled MHW line changes, 122 oceanfront structures are projected to be at risk over the next 50 years under Alternative 3	Under Alternative 4, no properties are projected to be at risk over the next 50 years.	In the absence of effective shoreline management along central and western Emerald Isle, unmitigated background and storm erosion would eventually threaten many of the associated oceanfront structures. Based on the modeled MHW line changes, 103 oceanfront structures are projected to be at risk over the next 50 years

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Economics				
<p>The total cost associated with Alternative 1 is estimated to be \$819.8M over the next 50 years. This total includes \$85.2M for the implementation of hotspot nourishment and Bogue Inlet ebb channel realignment projects, \$392.8M in lost property value, \$96.6M in lost tax revenues, and \$245.2M for USACE sand placements via the MCH and AIWW Bogue Inlet Crossing navigation projects.</p>	<p>The total cost associated with Alternative 2 is estimated to be \$886.5M over the next 50 years. This total includes \$33.8M for structure relocations/demolitions, \$489.0M in lost property value, \$118.6M in lost tax revenues, and \$245.2M for USACE sand placements via the MCH and AIWW Bogue Inlet Crossing navigation projects.</p>	<p>The total cost associated with Alternative 3 is estimated to be \$1.006B over the next 50 years. This total includes \$500.8M for County nourishment events, \$212.1M in lost property value, \$48.2M in lost tax revenues, and \$245.2M for USACE sand placements via the MCH and AIWW Bogue Inlet Crossing navigation projects.</p>	<p>The total cost associated with Alternative 4 is estimated to be \$787.9M over the next 50 years. This total includes \$542.8M for County nourishment events and \$245.2M for USACE sand placements via the MCH and AIWW Bogue Inlet Crossing navigation projects.</p>	<p>The total cost associated with Alternative 5 is estimated to be \$970.1M over the next 50 years. This total includes \$500.8M for County nourishment events, \$4.4M for groin construction, \$179.0 M in lost property value, \$40.7M in lost tax revenues, and \$245.2M for USACE sand placements via the MCH and AIWW Bogue Inlet Crossing navigation projects.</p>