



# THE SHIFTING SANDS

Photographing the dynamic shoreline around Fripp Island, SC

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This is the view from the southern tip of Harbor Island looking south along the front face of Hunting Island. The beach at Hunting Island recently completed a 1.2 million cubic yard sand renourishment project visible in this photo. In the distance, the entire northern tip of Fripp Island can be seen poking out beyond the Hunting Island land mass. As the south end of Hunting Island erodes, more and more of Fripp Island will be exposed to the direct ocean current.



This is a beach nourishment list of the islands in the vicinity of Fripp Island and how often they have been adding sand to their beaches as well as the cost. It's from fall of 2012, pre Matthew and Irma, so I imagine the numbers are much higher. (I'm not a member of the Shore & Beach organization, so I couldn't get the most current data, but it still makes the point)

All of the islands in the surrounding area are experiencing some form of sand erosion. Edisto, Folly Beach, Harbor Island, Hunting Island, Prichard's Island, Hilton Head...

The only island gaining sand in large measure is Fripp Island. So the question before the house has to be,

*What's different about Fripp Island when compared to the islands nearby....?*

**Table 2.**

South Carolina beach nourishment projects generally involving non-beach sand sources in geographic and chronological order from north to south (see Figs. 3 and 4). See Table 1 for key.

Locality north to south (fund <sup>1</sup> )	Year completed	Length (ft)	Volume (cy)	Unit vol. (cy/ft)	Orig cost (estimate)	Means <sup>2</sup> borrow <sup>3</sup>	Const. <sup>4</sup> index (USACE)	Adjusted cost 2010\$\$	Adjusted unit vol cost (\$/cy)	Adjusted unit length cost (\$/ft)
Folly Beach (1) F	1993	28,200	2,695,900	95.6	\$12,538,693	D-Lag	0.596	\$21,039,064	\$7.80	\$746.07
Folly Beach (2) F	2005	28,880	2,395,200	82.9	\$14,227,825	D-Off	0.832	\$17,093,165	\$7.14	\$591.87
Folly Beach (3) F	2007	10,140	486,100	47.9	\$8,185,024	D-Off	0.910	\$8,989,992	\$18.49	\$886.59
Folly Beach Spit (1) F-N	1979	1,500	20,022	13.3	\$33,000	Nav-Dis	0.330	\$100,083	\$5.00	\$66.72
Folly Beach Spit (2-7) F-N	1982-88	1,500	305,560	203.7	\$500,000	Nav-Dis	0.464	\$1,077,435	\$3.53	\$718.29
Folly Beach Spit (8) F-N	1990	1,500	200,000	133.3	\$500,000	Nav-Dis	0.547	\$914,426	\$4.57	\$609.62
Folly Beach Spit (9) F-N	1990	1,500	40,000	26.7	\$100,000	Nav-Dis	0.547	\$182,885	\$4.57	\$121.92
Folly Beach Spit (10) F-N	1998	2,000	40,000	20.0	\$120,000	Nav-Dis	0.670	\$179,187	\$4.48	\$89.59
Folly Beach Spit (11) F-N	2000	2,000	101,513	50.8	\$307,610	Nav-Dis	0.704	\$437,240	\$4.31	\$218.62
Seabrook Isl.	1990	5,850	684,474	117.0	\$1,660,000	D-Off	0.547	\$3,035,896	\$4.44	\$518.96
Edisto Beach (1) L	1954	5,400	830,000	153.7	\$400,000	D-Lag	0.080	\$5,000,000	\$6.02	\$925.93
Edisto Beach (2) L	1995	10,371	148,414	14.3	\$1,100,000	D-Off; Tr	0.626	\$1,756,882	\$11.84	\$169.40
Edisto Beach State Park L	2006	3,200	181,728	56.8	\$1,593,866	D-Off	0.872	\$1,828,792	\$10.06	\$571.50
Edisto Beach (3) L	2006	15,058	695,919	46.2	\$6,103,634	D-Off	0.872	\$7,003,276	\$10.06	\$465.09
Hunting Isl. (1) F	1968	10,000	750,000	75.0	\$435,178	D-Lag	0.140	\$3,105,134	\$4.14	\$310.51
Hunting Isl. (2) F	1971	10,000	761,324	76.1	\$534,000	D-Lag	0.168	\$3,184,570	\$4.18	\$318.46
Hunting Isl. (3) F	1975	8,860	612,974	69.2	\$971,540	D-Sh.	0.249	\$3,904,517	\$6.37	\$440.69
Hunting Isl. (4) F	1980	12,160	1,412,692	116.2	\$1,267,201	D-Sh.	0.361	\$3,514,227	\$2.49	\$289.00
Hunting Isl. (5) L	1991	7,800	757,644	97.1	\$2,876,250	D-Off	0.562	\$5,116,397	\$6.75	\$655.95
Hunting Isl. (6) F	2003	2,484	230,031	92.6	\$2,480,250	D-Sh.	0.772	\$3,212,146	\$13.96	\$1,293.13
Hunting Isl. (7) F	2005	2,484	87,092	35.1	\$1,666,326	D-Sh.	0.832	\$2,001,907	\$22.99	\$805.92
Hunting Isl. (8) L	2006	7,985	644,222	80.7	\$4,379,300	D-Off	0.872	\$5,024,784	\$7.80	\$629.28
Hilton Head Island (1) L	1969	14,600	1,600,000	109.6	\$1,000,000	Tr-In	0.150	\$6,680,783	\$4.18	\$457.59
Hilton Head Island (2) L	1980	14,600	550,000	37.7	\$1,100,000	Tr-In	0.361	\$3,050,542	\$5.55	\$208.94
Hilton Head Island (3) L	1990	35,000	2,338,000	66.8	\$9,044,760	D-Off	0.547	\$16,541,536	\$7.08	\$472.62
Hilton Head Island (4) L	1997	43,500	3,383,000	77.8	\$8,711,342	D-Off	0.654	\$13,310,924	\$3.93	\$306.00
Hilton Head Island (5) L	2007	45,500	2,724,900	59.9	\$16,709,831	D-Off	0.910	\$18,353,183	\$6.74	\$403.37
Hilton Head-Sea Pines (1) L	1969	1,200	150,000	125.0	\$100,000	Tr-In	0.150	\$668,078	\$4.45	\$556.73
Hilton Head-Sea Pines (2) L	1999	3,400	245,000	72.1	\$1,140,000	D-Off	0.689	\$1,654,004	\$6.75	\$486.47
Daufuskie L	1999	18,500	1,410,000	76.2	\$5,500,000	D-Off	0.689	\$7,979,842	\$5.66	\$431.34



An aerial photograph of Fripp Island, South Carolina. A prominent feature is a long, narrow rock revetment structure that runs along the western and southern shorelines, separating the island from the ocean. The island is lush with greenery, including a large golf course with several sand traps and a central water hazard. Numerous houses, some with large porches, are scattered across the island, interspersed with dense pine trees. The ocean is visible on the left side of the frame, and the sky is clear and bright.

## The Rock Revetment.

Fripp Island has a rock revetment along its most vulnerable shoreline and regardless of the pro's and con's of using man-made structures for coastal erosion control, it's undeniable that Fripp's shoreline has been protected from erosion by this hard barrier.

In fact, not only might this barrier be helping to fight erosion, it may also be helping to ADD sand to the beach at Fripp Island.





# *EXPOSED AREA*

The inlet side of Fripp Island that's exposed to the Atlantic Ocean when viewed from Harbor Island.



Harbor Island has no hard structures to protect its shoreline from the erosive sawing action of the tide entering and leaving Harbor Inlet. As a result an almost perfectly round curve is formed.



The northern tip of Fripp Island is protected by a rock revetment so the rounding doesn't occur. If the same sawing motion were to occur to an unprotected side of Fripp Island, the damage would be catastrophic to a large number of homes.





Without the rock revetment, or any other hard structure wall in its place, the inlet tidal current would round the northern corner and the large sand build-up that continues to replenish Fripp Island's beach would most likely not occur.





The revetment has a jetty at the end of it that may be causing whirlpool rotation from the outflowing current that could prevent sand from filling in the beach area directly next to it at the northern tip of the island.





The bell-shaped mouth of Fripp Inlet was created by the sawing motion of inflowing and outflowing tides. It grows wider as the southern tip of Hunting Island erodes away. The eroding sand supplies a portion of the sand build-up that forms the shoal in the Fripp Inlet.





Another source of sand is the naturally occurring littoral drift that moves south across the face of Hunting island. All the sand builds up parallel to the rock revetment forming a shoal in the middle of the inlet.





As the sand pushes against the immoveable rock revetment, it squeezes the channel opening which increases the velocity and, in turn, the depth of the inlet. Any sand or sediment that gets pushed into the current is immediately flushed out of the inlet due to the increased flow rate.





The south moving sand can't compress the channel any narrower due to increased velocity. Once it clears the revetment it continues its southward push forming an elbow out in front of the island and fills in the once straight-flowing channel. This changes the direction of the outward flowing inlet





The further away from the inlet the current flows, the less energy it has and the carried sand settles forming a detached shoal. The shoal is pushed towards shore by waves and eventually becomes part of the beach. This cycle will continue to create offshore shoals that attach to the beach so long as there is a source of sand built up in the inlet and pushed against the revetment wall.





This outer ring marks the spot where the current, flowing out from the inlet meets up with the waves that push towards the beach. The weakening current runs out of energy and is not strong enough to block the sand so it forms a natural arc of sand as the beach-wards moving current eventually overpowers the south-flowing current and the sand is pushed towards the beach.



# The Timeline of the Attaching Shoal

Capturing an aerial photographic timeline of the formation and attachment of the shoal on the beach at Fripp Island, SC.





June 27, 2017

A detached shoal began to form from the deposited sand.





October 13, 2018

A year later, the sand forms a crescent shaped shoal matching the contour of the beach where it would attach.





July 27, 2019

Two years later the shoal, now increased in size, has begun to attached to the beach.





October 5, 2019

Three months later the south end of the shoal is completely attached to the beach.





February 20, 2020

The shoal has begun to spread out along the beach and is only detached visually by the flowing creeks of the large tidal pool.





April 17, 2020

Both ends of the shoal have attached and traps inflowing sea water into a large tidal pool.





August 18, 2020

The trapped sea water breaks through the shoal wall and begins to drain the tidal pool.





October 12, 2020

The break in the shoal wall is healed but the draining tidal pool forms a small stream along the shoal wall. The new beach area begins to dry out.