

WHAT'S HAPPENING TO ALABAMA'S BEACHES?... WHERE WE ARE, AND WHERE WE ARE GOING

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Robert Louis Stevenson wrote a poem with the line,
"... golden is the sand..."

many years ago. This line applies to the sand that makes up Alabama's beaches! The sand is like gold, i.e., money to the Alabama economy.

Beaches are the preferred vacation destinations for both American and foreign visitors and are thus the key component of the largest industry in the nation - travel and tourism. In Baldwin County, Alabama, the beaches form the backbone of a \$170 million dollar per year industry. Nice beaches mean jobs to coastal Alabama. The added value of real estate along the Alabama coast due to the presence of the beaches is roughly estimated at \$7 billion. Beaches attract money from outside the state. Beaches are also valued by most Alabamians for their contribution to the quality of life. Many Alabamians would list Gulf Shores as one of their favorite places in the state.

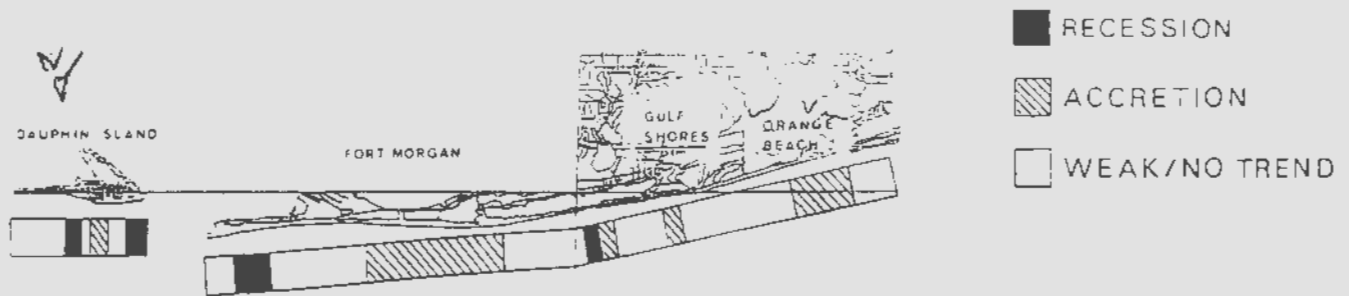
This paper outlines "where we are" as far as our understanding of the beach erosion problem by summarizing some recent work on quantifying the health of Alabama's Gulf of Mexico beaches. The paper also discusses a bit of the existing management framework concerning beaches and discusses "where we are going" by outlining an ongoing effort to treat the beach sands as a valuable resource.

Where We Are...In Fairly Good Shape

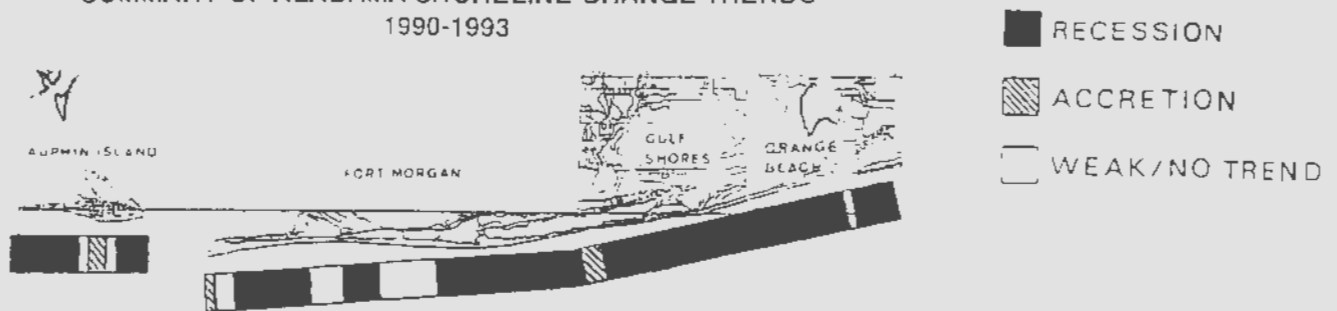
It appears that Alabama is not only blessed with beautiful beaches, but also relatively stable beaches. Using historic air photos, the University of South Alabama has looked very carefully at the fluctuations in shoreline position during the last 25 years. The results are summarized in figure 1.

The figure is a generalized summary that lumps large stretches into broad categories. More detailed results are presented for about 100 specific locations along the Alabama coast in Sanchez and Douglass (1994). Accretion is defined as a southward movement of the shoreline, i.e., a wider beach. Recession is the opposite, i.e., erosion. The upper half of the figure shows that, by and large, most of the beaches had little or no overall trend 1970 to 1990. "Weak/No trend" does not mean that the beaches didn't change in width, only that there was no trend. All of the beach widths fluctuated about 100 to 200 feet. In other words, most of the beaches come and go and come again in response to changes in the waves. Exceptions that showed clear trends occurred within a few miles of each of the engineered inlets in the state, Perdido Pass, Little Lagoon Pass, and Mobile Pass.

Fig. 1. Summary of Alabama shoreline trends, 1970 - 1990.



SUMMARY OF ALABAMA SHORELINE CHANGE TRENDS
1990-1993



...Maybe a Problem in the 1990's?

From 1990-93 however, there was clearly something else occurring. The lower half of the figure shows that there was shoreline recession along most of the Alabama Gulf coast. Preliminary data from 1994 and 1995 indicate some beach width recovery. However, it is not clear at this time whether or not the 90's trend is significant and permanent, or if it is just another fluctuation due to changes in the wave climate. Unfortunately, there has been no monitoring of the wave climate to address the question of the cause of the observed shoreline changes.

...Most Shoreline Changes Near the Inlets

The most striking shoreline changes are near the state's tidal inlets. With a few exceptions (most notably the middle of Fort Morgan Peninsula), most of the shoreline fluctuations in Alabama are near the tidal inlets. The influence of the inlet processes extends up to five miles from the inlets. These shoreline changes are due to both natural fluctuations and man-induced impacts such as jetties and dredging. Probable causes of some of the shoreline changes near the inlets are as follows.

Perdido Pass

The beaches to the immediate west of Perdido Pass have widened substantially since 1970. This is probably in response to the construction of the Perdido Pass jetties in the late 1960's. Sand has been trapped in a thin, long triangle of sand that extends from the west jetty for several miles to the west. The west jetty has apparently permanently repositioned the shoreline in this area.

Little Lagoon Pass

The beaches within about a mile of Little Lagoon Pass (or Calloway Cut) have shown some "classic" responses to engineering. The shoreline accreted on the east side of the pass while receding on the west side after construction of jetties in the early 1980's. In the 1990's, the beaches on the west side widened in response to two beachfills, the shortening of the jetties, and the sand-bypassing afforded by repeated dredging of the pass with sand disposal on the west side. The beaches to the east side have receded since the jetty shortening. The 1990's engineering has added sand to the west beach and replaced the natural beach sand movement across the pass, called inlet sand-bypassing, while maintaining the pass depths, flow, and location as desired.

Dauphin Island - Mobile Pass

The eastern end of Dauphin Island is one area where the trend during the 1980's is the same as the trend during the 1990's. There are two areas of significant recession, at rates up to 50 feet per year, on either side of an area of significant accretion. The shoreline changes on Dauphin Island apparently are a response to changes in the wave sheltering provided by the shoals (Dixie Bar and Sand Island) and islands (Sand and Pelican) immediately offshore. These shoals and islands are part of the ebb-tidal delta formed by Mobile Pass.

Man, through dredging and coastal structures, has had a clear impact on the width and shape of Dauphin Island's beaches. The natural fluctuations in shoreline position have been modified by engineering and will continue to be modified, either intentionally or not, for years to come. One example of an intentional impact of engineering on the island is that the eastern end of the island would probably now be about a half mile west if the seawall built around Fort Gaines in the early 1900's had not been successful. Thus, the fort and much of the Dauphin Island Sea Lab property would probably be in the water today if that seawall had not been built.

There are also less intentional impacts of engineering projects, including dredging and structures, on the coastal processes of the island. The largest constructed project in the coastal area is the dredging of the Mobile Ship Channel. Tremendous amounts, perhaps as much as 50 million cubic yards, of sand have been permanently removed from the ebb-tidal shoal and disposed of in deeper water this century. The rate of removal has been increased in the past several decades. The natural sand-bypassing from Dixie Bar to the Sand Island shoals has thus probably been completely interrupted by the deep water disposal. It is probable that the removal

of such large volumes of sand, immediately up drift of the Sand Island shoals has impacted the shoals. And thus, because of the sensitivity of the Dauphin Island beaches to wave sheltering provided by those shoals, has impacted the beaches of Dauphin Island. Disposing of the dredged sand in the Sand Island shoal system instead of removing it to deep water was shown to be technically feasible in 1987. This replaces the natural sand bypassing processes instead of interrupting them. The environmental impacts of the permanent removal from the littoral system has not been adequately determined. More detail on the coastal processes of Dauphin Island can be found in Douglass (1994) or Douglass and Haubner (1992).

...We Aren't Treating Sand as a Valuable Resource

There is very little in the way of mechanisms for the active management of the beach sands as a valuable resource in the state or local legislative and executive branches of government. There is no organization that is tasked with monitoring the resource. For example, no one knows how much sand is being added or removed from the littoral system by beachfills and inlet dredging. Likewise, there is very little governmental help for property owners with erosion problems. There is no organization tasked with solving beach erosion problems. For example, the West Beach/Lagoon Pass homeowners fixed their problem in the court system after repeated failures through other channels. Since erosion problems are part of the large littoral, sand-sharing system and engineering can affect both adjacent and distant property owners, as well as the beaches of the state that belong to the people of the state, effective solutions are usually not possible on a lot-by-lot basis.

The state level coastal management framework is a federally approved and joint state-federal-funded program that is administered at the state level by the Alabama Department of Economic and Community Affairs (ADECA) and the Alabama Department of Environmental Management (ADEM). Some of the responsibility has been passed on to local governments.

Some regulations that indirectly treat the beach sand as a valuable resource are restrictions on seawalls and the coastal construction control line (CCL). The state adopted a coastal CCL in 1985. Most officials believe that the line has been fairly effective at reducing the problems caused by erosion by restricting encroachment on the beach. Essentially, the CCL has provided a "buffer zone" for the shoreline fluctuations documented above. A portion of the CCL in the eastern area of recession on Dauphin Island is now in the water and the line placement is currently being reevaluated.

Where We Are Going. It's Up to Us

The direction government takes related to the beaches is up to the citizens. The growing recognition that "golden is the sand" which makes up our beaches and that we can both cause and solve beach erosion problems may encourage politicians and other decision-makers to begin to treat the sand as a valuable resource.

For the past two years, a limited shoreline management task force appointed by a previous Director of ADECA met and discussed the issues. That task force included state and federal level agencies with responsibilities in the coastal area as well as state legislators. However, to date, local government input has been limited. In its 1995 session, the Alabama legislature passed a resolution calling for the formation of a new Shoreline Erosion Task Force with many of the same agencies as well as representatives from the Gulf counties and municipalities. The new task force will exchange information and technical results of studies of shoreline changes, investigate the feasibility of developing a shoreline management plan for the state, and report back to the legislature before the next legislative session.

Consideration should be given to specifically tasking some portion of local or state government with looking out for the local and state interests on the beaches including:

1. monitoring the resource (i.e., the beach sand), such as natural fluctuations and man-induced manipulations such as dredging and beachfills;
2. developing and funding beach erosion solutions and inlet improvement solutions; and
3. representing the local and state beach interests when manipulation of the sand resource is considered.

The ongoing reevaluation of the CCL will probably lead to limited adjustments to incorporate our improved knowledge of the range of shoreline positions that are possible. For instance, the size of the "buffer zone" may have to be increased on Dauphin Island since the recession/accretion/recession pattern is better understood than it was a decade ago.

Opinions expressed during a series of public meetings held in the fall of 1994 indicate that there is also much citizen concern about the bay and bayou shoreline erosion problems.

The impacts of the removal of the tremendous amounts of sand from the state's littoral system at Mobile Pass due to the choice of disposal locations should be properly determined.

...And Mother Nature!

Meanwhile, regardless of decisions made by man, waves will continue to move sand along the coast of Alabama. One very dramatic event may happen in the next few years at Dauphin Island. A closure of Pelican Passage and a permanent realignment somewhere to the south with the subsequent transport of a very large amount of sand from Pelican Island to Dauphin Island is probable. Historic records indicate that such a dramatic movement of sand has occurred at least twice in recorded history - roughly 1710 and 1860. Perhaps this is a phenomenon that occurs roughly every 150 years! The tall sand dunes at that location on the island (near the country club) are some indirect evidence that sand comes onto the island in these large pulses. If the sands in Pelican Island do, indeed, move rapidly northward onto Dauphin Island, then the fishing pier, which is currently experiencing the highest rates of erosion on the island, may be high and dry in a sand dune field!

A single hurricane hitting southwest of Alabama could force the pass closure. Rough calculations indicate that Pelican Island and Passage are poised so that a single large storm could close the passage in several days or a number of smaller storms could do it during the next two to ten years. In any case, this is truly an opportunity for Alabamians to watch a geologic process in action!

...In Summary

Most of Alabama's shoreline fluctuations and erosion problems occur near the inlets. These fluctuations are partly natural and partly affected by engineering. It is clear that engineering can be successful at manipulating the beach sands. These manipulations can have both direct, intentional impacts and less direct, unintentional impacts on the beaches.

Alabama's beach sands are a valuable resource that directly impacts much of the economy along the coast as well as the quality of life. Consideration should be given to treating this valuable resource as we treat other valuable resources.

Alabama's beaches are some of the most beautiful beaches in the world today and the decisions we make in the next few years and decades are going to determine whether or not they are still the most beautiful beaches in the world for our grandchildren's children.

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