

Sand Beaches and Boat Launches in Mississippi

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Issues Associated with Boat Launches on the Sand Beaches

In response to the growing need to provide boat launch facilities, new sites along the renourished beaches are becoming candidates. Unlike the present locations in harbors and in sheltered locations such as bayous and bays where boating interests have a long history, conflicts can exist between boat launches and the dynamic conditions, traditional recreational uses, and esthetics of the sand beaches.

This review of issues, from a coastal geologist point of view, is meant to be an outline to the public and groups involved in the where and if decisions regarding boat launches. The examples and processes cited come from various sources and individual studies. The information is weighted in regards to the effects on the natural system by the physical creation of the boat launch structures. Human, Biologic, and pollution issues are addressed but should be augmented by those in the respective fields. Hopefully this document will serve as a skeleton from which a fully functioning report or recommendation is one day produced.

Sediment transport

Sediment transport occurs somewhat differently on the three parts of the beach, the portion below mean low water (Nearshore), the wave-dominated portion (Beach face), and the dry beach where wind blown transport dominates.

Nearshore

There will be about ¼ mile of riprap that extends seaward from the beach in these types of boat launch projects. This is a major drawback from many points of view, including sediment transport. The broad nearshore platform has a significant effect on the sand budget. We know that lots of sand from the beach (above MLW) is ending up on the nearshore platform and that there are abundant large bedforms (sand waves, bars) indicating transport in many directions. Moreover, shoreline structures (culverts, harbors) affect the patterns of the bedforms and thus the transport direction. What is less apparent is the magnitudes of longshore/offshore transport, when are the bars active, and how the change in nearshore transport would effect shoreline change (erosion). Based on previous works and data available on the Mississippi Gulf Coast, large structures (harbors) in Harrison County typically have an effect locus located about as far along the shoreline as the structure is offshore, i.e. a 1500 ft jetty would have the zone of highest erosion at about 1500 ft downdrift of the structure. This will change depending on the beach orientation and is going to be different in Jackson or Hancock Counties. To limit the longshore consequence, boat launch locations could be chosen with respect to the long-term bar morphology, which indicates general sediment transport direction. For example, fewer disturbances may occur in places with more onshore-offshore sediment transport.

Beach face

Sediment transport on the beach face is more easily understood, and is active almost all the time. Culverts readily display the consequences of placing an impasse in the beach drift system. This will be the most visible effect, especially in areas with higher longshore components. It appears that the longshore component varies at fairly short intervals – 100's of meters. The magnitude of the consequence will depend on this factor and this factor may be changed by the placement of the structure, both in a negative and positive way. I would suggest looking closely at the site's shoreline change character (MOG Biannual Reports of Sand Beaches) in the planning stage to gauge the present conditions. Areas with highly negative shoreline change should be avoided, as problems may be accentuated and structural damage to the parking or jetties could result. For

example, erosion of the adjacent shoreline may be severe enough to undercut parking lots or make the jetties unstable. In any case, the maintenance costs of a highly eroding downdrift beach section will increase.

Onshore (wind blown)

This issue can be handled via best management practices, but can also be a problem if not handled correctly. If sand is allowed to blow across the paved surface more will be lost to the streets and thus from the system. If, on the other hand, dunes or other sand trapping structures are erected and maintained well the problem can probably be largely avoided. Unlike the nearshore and beach face transport where the system is open (to the MS Sound), this system is or could be largely closed if dunes are maintained or other measures are taken. The exception to this is during storms – as seen during the tropical storms in October 2002, when large portions of the dunes were lost. It appears that during these large storms the sand in the dunes is largely lost seaward (in the case of Harrison County – not necessarily in Hancock). I don't think there is much to be done about this problem – and the presence of dunes is an important protective feature.

Siltation and Dredging

Given the propensity for sediment to be transported and deposited in the beach environment siltation and dredging are two offsetting processes.

Siltation

Siltation of the basin, once the project is completed, will be an ongoing problem. Siltation will probably occur as two main processes. First, and probably most problematic, will be settling from the water column in the relatively quiet, deep basin. In a harbor study in Bay St Louis, which likely has notably higher suspended sediment loads than the Sound, the amount of siltation in the harbor was extensive in a relatively short period of time. The siltation rates along sand beaches should not reach these levels; nevertheless, it will be a considerable problem. I do not think that a flow through structure will adequately stop the process; if the structure is open at the bottom (where the siltation will occur) to help keep the basin scoured then sediment (sand) will be allowed in. If it is not open at the bottom then scouring will not occur and siltation will

not be reduced, significantly. Take for example the borrow pit in Hancock County, it is below wave base (no scouring) and is filling with mud despite being open to the system. The other process (like in the Bay St Louis Harbor case) may be a shallowing near the end of the basin from sand transport around the ends of the jetties. The rate that sediment is transported first offshore and then alongshore will be dependent on the nearshore transport regime (1a). Removal of this sediment (dredging) is a direct loss of sediment from the system.

Dredging

There appears to be several issues associated with dredging. To start, removal of about 15,000 to 20,000 cubic yards of sediment, depending on the project, is about ½ of volume of sand lost on the entire Harrison County shoreline in one year (Open Fille 111B).

Obviously this sediment is worth a lot to the County, and should be used – not removed from the system – to renourish parts of the shoreline. In the most recent certification for the Biloxi project, one stipulation was for the removal of the sediment to an upland site. I have, and still do, disagree with this process. Suffice to say, there is virtually no difference between this sediment and the sediment pumped in to renourish the beach. If questions remain about the level of pollutants in the sediments – they should be tested. Beyond the initial dredging, there will be a need to do maintenance dredging, at which point the sediments should be largely mud (silt and clay) that may contain some toxic substances (fuels, etc). Here, the need to remove the sediment to a disposal site is called for. Will it be classified as toxic waste? If so then there will be a higher cost associated with the removal.

Water Quality

Water quality issues involve the boat basin itself and the farther-reaching consequences on the coastline.

Low dissolved oxygen

This is probably one of the more localized issues. Within the basin, given the highly reduced flushing condition, dissolved oxygen levels will be lower than the surrounding

open areas. I don't know what the relative values will be, i.e. how much less dissolved O₂ is present, or if the effects will be concentrated only in the basin or permeate to the surrounding areas. These are questions that can be answered by a directed study at locations with some of the same properties as a boat launch basin, e.g. The Treasure Bay Casino location.

Turbidity

Turbidity is often cited as a problem associated with dredging, and for a period during dredging, it will probably be so. However, the extent of the turbidity will be dramatically limited if performed when the jetties are in place, and steps are taken to limit outflow (silt curtains at the entrance to the basin).

Reduced circulation – lower flushing in downdrift shadow

Creation of a low circulation zone will likely occur for some portion of the shoreline on both sides of the structure. As with the sediment transport, the zone of influence will probably be nearly as long as the structure is long. The difference is that the areas adjacent to the structure will be affected the most. The level of flow reduction may be looked at as a ¼ bulls eye with high effects directly adjacent to the structure and decreasing outwards and along the shore. This may be a bit simplistic, it is probably squashed in some way, but helpful in visualization. The level of flow or flushing will be different on each side, depending on the wind/wave conditions at any given time. The potential negative outcome of a reduced circulation area is a buildup (concentration) of nutrients, debris (garbage), pollutants, and higher water temperatures. As a result of lower flushing and potentially warmer temperatures, dissolved oxygen levels may be reduced. Obviously, these are potential problems where bathers and beach related activities are concerned. My suggestion is to perform a study (monitoring) on locations with properties similar to a boat launch to document the magnitude of the potential problems. In addition, when choosing boat launch sites, general areas that are prone to beach closing should probably be viewed carefully, as conditions may be further compromised.

Point Source Pollution

Point source pollution at boat launches on the sound will be no different from what occurs in the present locations. The main difference here is the need to block the water flow via the jetties. Creation of the jetties will act to concentrate the pollution, both inside the basin and on the peripheries, which may be in proximity to swimmers or bathers.

Onshore – runoff

Runoff from boats, trailers, cars, etc into the basin is no different than would be experienced at any other boat launch. The only potential difference would be the need to dredge, because of the breakwaters, and concentration of the pollutants in the basin (creation of toxic sediments?).

Boat Fuels in the water

Very similar problems to the runoff as above. In each case, the proximity of the pollutants to swimmers is the important distinction between traditional boat launches and those on the sand beaches.

Garbage (solid waste)

Solid wastes will increase in the area of the boat launch, not only from boaters, but also trapped in the longshore system. A good example is the debris buildup adjacent to the Long Beach and Broadwater harbors. This is unsightly and dangerous to people using the beach to swim or walk along. On the other hand, it is easier to collect the solid waste that would naturally be spread across a larger area.

Biologic Impacts

Given the relatively small footprint of the boat launch, removal of the benthic habitat from production is probably a minor issue, akin to a small dredge project. In all likelihood, given the expected conditions, there probably will be little benthic recolonization in the basin. From a positive standpoint, the creation of a rock habitat may benefit the fish population and serve as a recreational feature. Again, I would largely defer this issue to a biologist.

Aesthetics and Safety

Aesthetics is a complex human issue, development vs. natural scenery. At the heart of the issue is the construction of a set of ¼ mile long jetties, and paving part of the beach.

Large offshore structures

Jetties, especially when built of rubble are permanent features. Once they are constructed, removing them is difficult at best – this is the most important point here. They will extend as far out as large structures such as the Broadwater Harbor. In this regard, they will block the line of sight along the shoreline. They can also add an interesting diversion to the beach. This is an emotional issue, more so than a scientific one.

Trailers, parking, congestion

A possible issue in areas where access to Highway 90 is tight and/or the parking area is constricted (thin beach area).

Increase in paved area

An increase in paved area will accentuate run-off problems if not dealt with adequately. In some areas, run-off across the beach can cause an increase in erosion.

Safety

Safety issues may include boater – swimmer problems, beach parking – boat-launching problems (lots of people in launching facilities). The first probably won't be a problem given the length of jetties, although if shoaling occurs adjacent (up-drift) to the jetties more people may venture offshore. The second issue may be more important, depending on the beach traffic at the chosen location.

Recommendations for Site Locations

In light of the potential issues that surround placement of boat launches on sand beaches, some recommendations are offered.

1. When possible, sites should be chosen that already have part of the infrastructure present, i.e. one or more jetties already present, parking facilities and rip-rap in place, dredged channels already present.
2. A site survey of the long-term shoreline change rates should be conducted. Locations adjacent to areas with high shoreline change rates (>2 m/yr) should be avoided. Caution should also be taken in areas with nearshore bar morphology that indicates high longshore transport.
3. Any sand initially dredged to make the launch basins should be used to renourish beach sections downdrift of the structure.
4. Siltation and subsequent dredging will likely be an ongoing problem and should be factored into the cost of the boat launch.
5. An initial study on water quality aspects of boat launches on sand beaches should be performed before boat launch proliferation. Areas with similar physical qualities to boat launches, such as the boat launch in Bay St Louis and up- and down-drift portions of beaches adjacent to harbors, should be monitored for a period of time to determine if and to what degree water quality parameters are affected by boat launch structures. This should include biologic assessments as well.
6. Alternate solutions to large (long) jetties should be examined. If siltation problems are going occur, dredging will be necessary, so smaller (shorter) or less robust jetties (wood piers) may be an option.