

## SHORELINES – February 2007

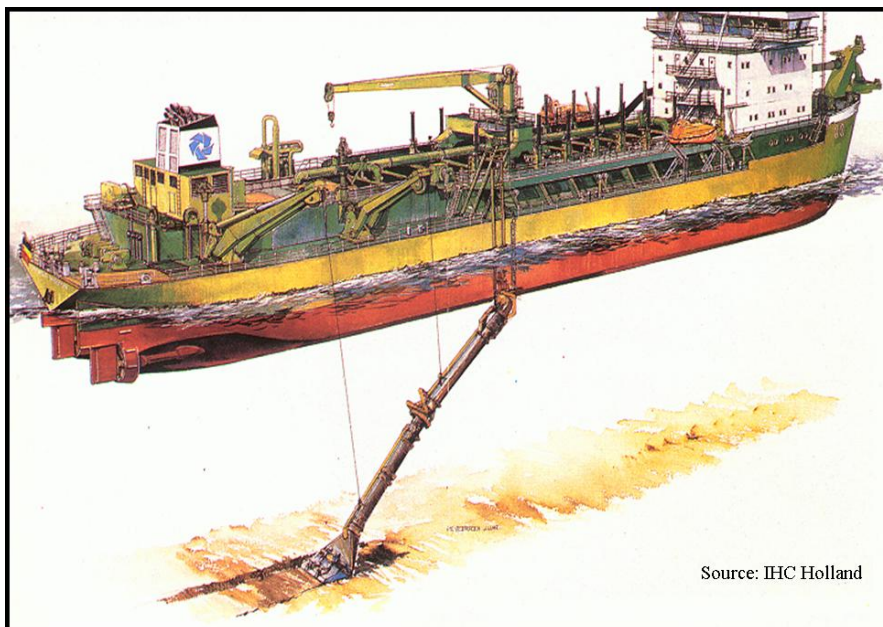
As presented to the *Island Review Magazine*

### Dredging 101

There should be a mountain's worth of dredging activity at or near the Morehead City Harbor by the time or shortly after this edition of the *Island Review* arrive at our local newsstands -- (1) Approximately 800,000 cubic yards of dredged sand from the ocean entrance channel at the harbor will be placed along the beaches of Pine Knoll Shores as part of a "Section 933 Project", (2) Approximately 1.1 million cubic yards of sand will be obtained from the offshore dredged material disposal mound located near the harbor and placed along the beaches of Emerald Isle, Indian Beach/Salter Path, and Pine Knoll Shores to replace the volume of sand lost during *Ophelia* in September 2005, (3) dredged sand from the interior portion of the harbor will be placed along the oceanfront region near the "bathhouse" of Fort Macon State Park, and (4) the fine-grained (or muddy) fraction of dredged material from the interior portion of the harbor will be dumped offshore in an approved disposal site.

The first two aforementioned projects are more large-scale and cumulatively involve almost 2 million cubic yards at a total cost of roughly \$24 million. Conversely, the latter two projects entail possibly a couple 100,000 total cubic yards of material and costs in the few to several million dollar range. Add to this, the distinct possibility Bogue Inlet and the its connecting channel to the Atlantic Intracoastal Waterway may need some maintenance work utilizing the government-owned side-cast dredging fleet, and we will have just about every type of dredge visiting Carteret County at one point or another this winter/early Spring. So with this spate of dredging activity in front of us, there is no better time than the present to engage in a very non-exhaustive "dredging 101" primer.

There are basically four types of dredges commonly utilized to maintain the Nation's waterways and nourish beaches; (1) hopper, (2) pipeline - cutter-head for our discussion, (3) side-cast, and (4) grab - bucket or clamshell. Each has specific applications and accordingly, their unique set of "pros and cons". For beach nourishment, hopper and pipeline dredges are the *modus operandi*. For waterway maintenance, any of these types of dredges can be employed.



**Fig. 1 – Artist rendition of a hopper dredge with the draghead/suction pipe in the process of excavating the seafloor. This type of dredge will be conducting the lion's share of beach nourishment work along Bogue Banks this winter.**

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A ***hopper dredge*** trails its suction pipe(s) along the seafloor when excavating, loading the dredged material in the belly, or “hopper” of the vessel. When the hopper dredge is full, the vessel can either; (a) sail to an offshore disposal area and dump the material through the doors of its split hull, or (b) can sail to a target beach, connect to an offshore buoyed pipeline and pump the material to the shoreline via this pipeline. The hopper dredge’s major advantage lies in its ability to withstand relatively unstable seas and haul material long distances. The major disadvantages include the propensity of this dredging method to “take” sea turtles and inherent draft restrictions (i.e., the vessel needs water depth to operate). Hopper dredges will be utilized for almost all the beach nourishment work planned in 2007.

A ***cutter-head suction pipeline dredge***, as the name implies, utilizes a steel cutter-head analogous to the tip of an auger or drill-bit to loosen seafloor sediment, or even rock. The dredged material is immediately “sucked up” by a wear resistant centrifugal pump and discharged through a pipeline to the disposal area or beach. Pipeline dredges are essentially mounted on flat-hull barges and utilize spuds as a part of its anchoring mechanism. The dredge simply pivots back and forth extracting sediment from the “face” of the cut. The upshot of this dredging methodology includes very strong productivity (no sailing back and forth like the hopper), the dredge can work in both shallow and deep water, and are known to *not* “take” turtles. The down sides includes short-range pumping distances (can’t sail back and forth from dredge site to target), and pipeline vessels are relatively unstable in even mild sea conditions. The beach nourishment work planned for Fort Macon in 2007 will employ this type of equipment.

***Grab dredges*** are almost exclusively utilized in estuarine or river environments and most applications utilize a bucket grab apparatus similar to a land-based excavator, or a “clamshell” that opens on the way down to capture sediment and closes on the way up from the bottom. Dredged material is often placed in barges that are subsequently tugged back and forth to a target disposal site. And finally, there is the ***side-cast dredge***, which is really the oddball in the group. The side-cast dredge does not have the capability to place dredged material on the beach or in upland disposal sites, but rather “sprays” shoal material approximately 100 – 150 foot to the port (left) or starboard (right) side of the vessel and away from a navigation channel. Accordingly, side-cast dredging has been compared to mowing the lawn both figuratively and literally. The shoal material is sprayed from the side of the vessel similar to how a lawnmower spreads grass clippings. That’s the literal image. From a figurative sense, just as grass begins to grow as soon as the lawnmower engine is cut, shoal material begins to enter channels requiring future maintenance dredging.

And finally, although the real action begins this winter, it has taken years of effort to plan and secure the appropriate funding to get many of these types of dredges to Carteret County in 2007!