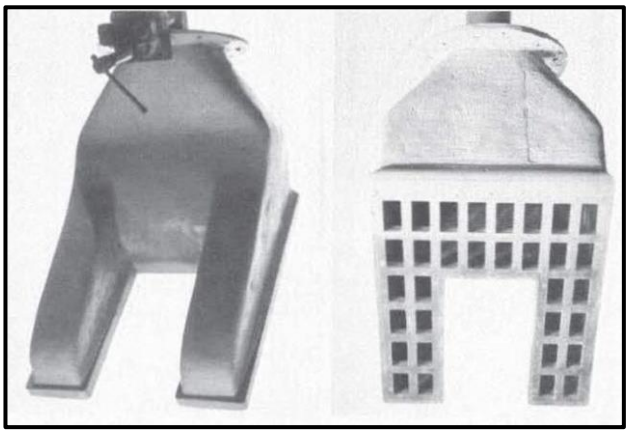
Physical Model of Flow Field around a Draghead

Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS BUILDING STRONG®

Problem

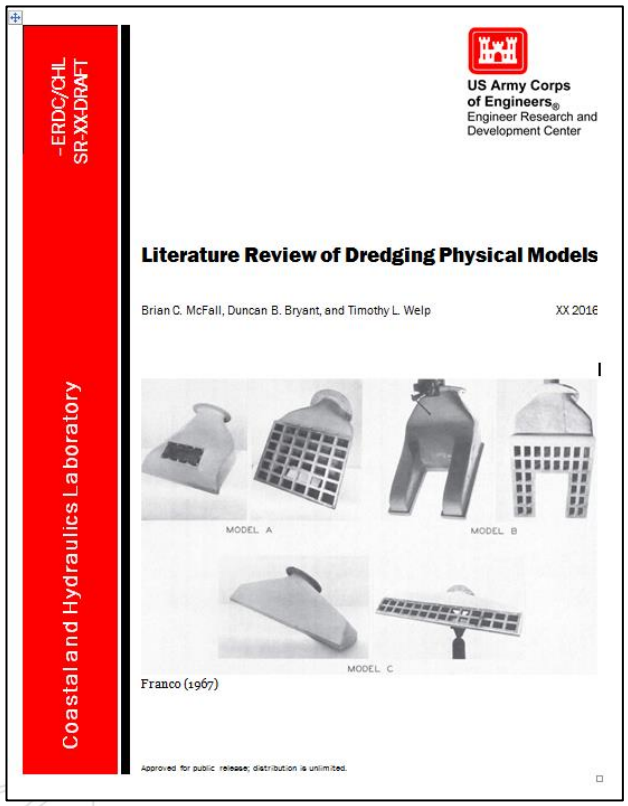
USACE dredging projects that use hopper dredges (both contractor and District-owned) are increasingly being challenged with regulatory agency concerns about entrainment of fish and other species (e.g., sea turtles). Approximately 60M yd^3 of material are dredged annually by hopper dredges (34% of all USACE dredging). Some regulatory agencies are considering limiting or completely eliminating hopper dredging in certain areas because of the lack of understanding of entrainment risk to special status species. Coastal USACE Districts currently work with regulatory agencies to determine hopper monitoring techniques, entrainment risk, and entrainment risk reduction, but a major challenge confronting these activities is that there are extremely limited published data on the hydraulic flow field around hopper dragheads. This study aims to fill in knowledge gaps by conducting a physical model of a draghead to measure the flow field around it.



Franco, 1967

Study Description

The project team will consist of a multi- disciplinary group of members with varied, but complimentary, qualifications and skills to provide tools and quantify the flow field around a draghead (e.g., USACE biologists, scientists, and engineers, and dredging industry engineers). This study will be closely coordinated with the Smelt entrainment study to investigate the correlation of draghead flow field vectors to actual entrainment risk analyses. This study will review historical dredging physical models and conduct a draghead physical model at the Haynes Laboratory at Texas A&M University. The flow field around this model draghead will be quantified and used to validate numerical hydraulic models.



Products

A literature review of previous dredging physical modeling efforts will be written in a special report. This review includes plain suction, draghead, and cutterhead dredging physical models. Results from the physical model will be presented in an ERDC technical report and journal paper.

Summary

Coastal USACE Districts currently work with regulatory agencies to determine hopper monitoring techniques and entrainment risk, but there are extremely limited published data on the hydraulic flow field around hopper dragheads. This study is conducting a scaled physical model of a draghead to quantify flow field around a draghead. The collected from this model can be used to validate numerical hydraulic and entrainment models.

Balancing operational and environmental initiatives and meeting complex challenges of dredging and dredged material placement in support of the navigation mission.

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