

Environmental Studies Program: Studies Development Plan | FY 2025–2026

Field	Study Information
Title	
Administered by	Marine Minerals Program (MMP)
BOEM Contact(s)	Jennifer Bucatari (jennifer.bucatari@boem.gov)
Procurement Type(s)	Contract
Performance Period	FY 2025–2026
Final Report Due	TBD
Date Revised	January 22, 2024
Problem	Appropriate tools are needed to estimate a BOEM MMP proposed activity's emissions of pollutants over the shallow inner shelf and coastal region. In 2013, MMP developed the Dredging Project Emission Calculator (DPEC) to assess air quality impacts from dredging projects. This calculator is outdated and needs revisions to address new methodology and inclusion of methane and sulfur dioxide emissions (which was previously omitted).
Intervention	The 2013 DPEC will be updated to incorporate new methodology and address changes in the guide that was developed for the pre-existing DPEC.
Comparison	N/A
Outcome	Enable accurate evaluation of the potential effects from dredging projects on local air quality and the potential contribution to climate change.
Context	Atlantic, Pacific, Gulf of Mexico, and Alaska Outer Continental Shelf waters, up to 50m depth for sand dredging.

BOEM Information Need(s): BOEM needs an updated tool to calculate emissions from BOEM-authorized dredging activities. The need to estimate air emissions from beach renourishment projects is necessary for BOEM to evaluate the potential impacts to air quality under BOEM's National Environmental Policy Act (NEPA) mandate. Existing NEPA requirements and guidance require analysis of greenhouse gas (GHG) and climate change effects of proposed actions under NEPA. In addition, the Clean Air Act (CAA) requires that any action authorizing the use of OCS sand resources does not cause or contribute to air quality violations in areas not meeting the National Ambient Air Quality Standards (NAAQS) or does not cause a violation of these standards in areas that meet the NAAQS. Estimating a proposed activity's emissions is critical in evaluating the potential effect of the proposed activities on air quality and determining appropriate mitigation.

Background: BOEM is required to analyze emissions from proposed dredging activities which includes criteria pollutants: carbon monoxide (CO), nitrogen dioxide (NO₂), lead (Pb), sulfur dioxide (SO₂), ozone (O₃) and particulate matter (PM). BOEM is also interested in inventorying emissions of greenhouse gases (CO₂, CH₄, N₂O) and hazardous air pollutants (HAPs) (for onshore equipment). In recognition of the need for greater scrutiny of air quality impacts for all types of projects, BOEM created the Dredging Project Emissions Calculator (DPEC) database program to develop accurate emission estimates in support of Environmental Assessments and Environmental Impact Statements for beach nourishment

projects (ENVIRON International Corp. and Woods Hole Group 2013). The DPEC uses the project's design parameters and basic information about the diesel-powered equipment to be used to estimate a project's emissions. These design parameters include estimates for all facets of the project including the time dredging, pumping out material to the shoreface, associated onshore equipment, as well as transit. Emissions associated with beach nourishment and coastal restoration projects result from use of main and auxiliary engines on marine vessels including dredges, tugs, barges and support craft, as well as shore-based equipment including construction equipment (e.g., loaders, dozers), and material handling equipment such as pumps, cranes and forklifts (to move pipes, for example) and other industrial equipment. Consideration of operational outputs that were not previously considered such as the rehandling of dredged material and the potential for truck haul of material. After 10 years of use for MMP environmental analyses, the DPEC needs updates including updates to emissions and loading factors, updates to equipment types and use, and the addition of methane to the estimates.

Objective(s): Update the DPEC in order to estimate air emissions from dredging projects.

Methods:

1. Collect updated data from past (historical) beach nourishment projects to reexamine typical project parameters, engine and equipment characteristics, and their relationship to fuel consumption and emissions. Use this historic data to ensure the preexisting heuristic relationships between project design parameters, engine requirements and fuel consumption, are still valid for calculating air emissions from future projects using time in mode, fuel consumption and other operational data.
2. Complete an updated literature and/or technical report review, including BOEM-funded studies, to compile and refine information about operational characteristics, activity profiles, loading factors, and emission factors. This includes an update on emission factors provided by the EPA for onshore and offshore equipment types as listed in ENVIRON International Corp. and Woods Hole Group (2013) Appendix B. In the case of onshore equipment, the EPA NONROAD model was run to develop gram per horsepower-hour emission factors for each type of equipment.
3. Add additional emissions that were not previously considered (such as methane, nitrous oxide, sulfur dioxide, hazardous air pollutants) to the DPEC using EPA emissions factors.
4. Update the DPEC User's Guide (Shah et al. 2012) as needed. In addition, develop a video tutorial on how to use the DPEC for users internal and external stakeholders.
5. Analyze the 50-year contribution (to match typical lead agency, USACE, 50-year planning horizon) of dredging emissions to climate change by reviewing previous projects in a given region (Atlantic, Gulf of Mexico).

Specific Research Question(s):

1. What are the priority pollutants and GHG emissions associated with all facets of a beach renourishment project?
2. How can we quantify these emissions in relation to our projects to understand the impacts and apply mitigation measures when necessary?
3. What is the cumulative impact of dredging associated emissions?

References:

ENVIRON International Corp., Woods Hole Group. 2013. Improving emission estimates and understanding of pollutant dispersal for impact analysis of beach nourishment and coastal restoration projects. Herndon (VA): U.S. Department of the Interior, Bureau of Ocean Energy Management Headquarters. 69 p. Report No.: OCS Study BOEM 2013-123.

Shah T, Lindhjem C, Stoeckenius T. 2012. User's manual for Dredging Projects Emission Calculator. ENVIRON International Corp.