Environmental Studies Program: Studies Development Plan | FY 2024–2025

Field	Study Information
Title	Using Coast Guard's AIS Vessel and Federal Aviation Administration's NextGen Helicopter Data to Track BOEM-Authorized Activities
Administered by	Office of Environmental Programs
BOEM Contact(s)	Holli Wecht (Holli.Wecht@boem.gov)
Procurement Type(s)	Contract
Performance Period	FY 2024–2027
Final Report Due	TBD
Date Revised	May 10, 2023
Problem	BOEM requires a better understanding of the environmental impacts from the numerous vessel and helicopter trips conducted in support of BOEM's oil and gas (O&G) program in the Gulf of Mexico (GOM).
Intervention	By using the U.S. Environmental Protection Agency's Automatic Identification System (AIS) emissions dataset and the Federal Aviation Administration's (FAA) NextGen data, vessels and helicopter data for BOEM's O&G sources could be tracked, spatially allocated, and emissions calculated for calendar year 2023 in the GOM.
Comparison	In 2017, AIS and NextGen data were used to calculate and spatially allocate vessel and helicopter emissions in the GOM. By analyzing 2023 AIS emissions data, BOEM can allocate vessel emissions into BOEM's O&G categories and analyze activity density and emissions trends.
Outcome	Improved activity density and gridded emissions for BOEM's tools and reports.
Context	Gulf of Mexico OCS planning areas.

BOEM Information Need(s): BOEM needs to analyze the environmental impacts from the numerous vessel and helicopter trips in support of BOEM's oil and gas (O&G) activity in the GOM for required impact assessments under the National Environmental Policy Act (NEPA) and the Outer Continental Shelf Lands Act (OCSLA), to generate emissions factors for the Offshore Environmental Cost Model (OECM), and for the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA) consultation reporting requirements per the 2020 National Marine Fisheries Service (NMFS) Biological Opinion (BiOP) for O&G activity (NMFS 2020).

Background: BOEM's mission is to manage development of OCS energy and mineral resources in an environmentally and economically responsible way. In 2021, there were approximately 1,738 oil and gas facilities in the Gulf of Mexico (GOM), along with exploratory drilling activities. BOEM last conducted a comprehensive vessel and helicopter analysis for air quality impact assessments in the GOM under the *Year 2017 Emissions Inventory Study* (Wilson, et. al, 2019). Figure 1 shows activity density maps for oil and gas activity support vessels and helicopters. In addition, vessel and helicopter emissions data was calculated and spatially allocated for future modeling efforts.

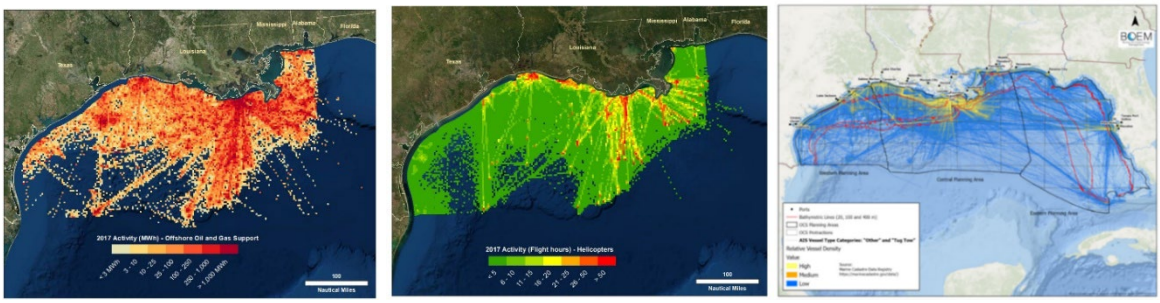

Figure 1. 2017 Support Vessel (on left) and Helicopter Activity (in center) in the GOM (Wilson, et al., 2019), with Vessel Density Map between March 2020-2021 (on right) (NMFS, 2020).

The U.S. Environmental Protection Agency (EPA) has calculated vessel emissions data for calendar year (CY) 2020 in the GOM using an Automatic Identification System (AIS). However, the EPA's oil and gas source categories do not match source categories of the past BOEM's inventory efforts or that of OECM. Therefore, BOEM needs mapping of the EPA's offshore oil categories into the OECM categories (pipelaying, support, survey, drilling, etc.). The EPA will be calculating vessel emissions data using AIS for CY2023 in the GOM with the same format as their CY2020 emissions. BOEM can use the EPA's CY2023 vessel emissions data, map into our O&G categories, and form CY2023 density and emissions maps by area/block in the GOM. In addition, BOEM needs detailed vessel and helicopter emissions factors for BOEM's OECM model, which supports the national oil and gas program, and an additional source category for tankers and barges for oil transport. This effort would tie into BOEM's 2023 emissions inventory. BOEM would have a comprehensive CY2023 oil and gas emissions inventory in the GOM, and not just facility emissions, included in BOEM's emissions reporting tool, the Outer Continental Shelf Air Quality System (OCS AQS), for impact assessments (future cumulative modeling efforts).

This effort would also tie into BOEM's BiOP reporting requirements to annually summarize vessel and aircraft traffic data associated with O&G activities. The 2020 NMFS BiOP on the Federally Regulated Oil and Gas Program Activities in the GOM includes a Term and Condition, as amended in 2021, related to gathering and understanding actual annual O&G related vessel traffic in the GOM OCS. Section 15.3.3 Term and Condition #3 Subsection 15.3.3.1 Bureau of Ocean Energy Management Reporting F states, "BOEM, in conjunction with BSEE, shall annually report to NMFS summarized vessel data associated with all oil and gas activities. Reporting shall include: vessel type (barge, tow, tanker, supply, etc.), vessel tracks, vessel size/draft, vessel type/purpose, port name, number of annual port calls for that vessel, outgoing vessel offshore destination (e.g., block area name and water depth), highest travelling vessel speed capability, and other relevant information as identified through annual review process. Vessel captains typically keep vessel logs and know the specifications of their vessels, and therefore this information should be readily available to oil and gas companies" (NMFS 2020).

The past BiOP efforts used broad source categories that overestimated the vessel impacts. Having a specific O&G source category as EPA has defined will led to more accurate vessel impacts. Vessel track mapping will be used for the annual report (Figure 1) as well as a summary of vessel size, vessel speed, vessel draft, port of origin/transit, and OCS destination. O&G-related helicopter flight track mapping and summary of activity will also be included. In addition, this vessel traffic information could be used to develop more informed vessel interaction/strike and noise impact analyses, and vessel traffic characterization in NEPA documents.

Objectives:

- Collect CY2023 AIS vessel emissions data from the EPA datasets, form monthly activity density maps, calculate and spatially allocate those monthly emissions in a form for upload to OCS AQS by BOEM's vessel source category.
- Collect monthly CY2023 FAA NextGen data, form activity density maps, calculate and spatially allocate those emissions in a form for upload to OCS AQS by helicopter source category.
- Provide a final report detailing the methodology and calculation of emissions including final emissions factors for the OECM model, plus final vessel and helicopter EPA National Emissions Inventory (NEI) datasets.
- Perform emission trends analysis for vessel and helicopter (density and emissions).
- Provide AIS vessel data activity density maps and summary information (including speed data), plus a trends analysis of the vessel activity.
- Provide FAA NextGen helicopter data activity maps and summary information, plus a trends analysis of the helicopter activity.

Methods: The contractor would acquire CY2023 EPA's AIS emissions dataset and FAA's NextGen data (or perhaps use the FAA NextGen data from BOEM's 2021-047, if possible). Using this data and other necessary sources, the contractor will generate O&G activity density and gridded emissions (temporally and spatially) that can be incorporated into OCS AQS for air quality impact assessments, plus provide the helicopter data in the format of the EPA's NEI ACCESS database. Vessels to be considered relative to O&G activities include Survey, Drilling, Pipelaying, Support, Well stimulation, etc. Specific to O&G in the GOM, the contractor will provide activity density shapefiles (temporally and spatially), port counts, OCS destination counts, and information on vessel size, draft, and speed. In addition, the final report will include a statement of procedure (SOP) for creating the end result, including mapping of the sources into OECM categories.

Specific Research Question(s):

1. At what locations and what months in the GOM receive high amount of BOEM O&G vessel traffic (spatially and temporally allocate)?
2. At what locations and what months in the GOM receive high amount of BOEM O&G helicopter traffic (spatially and temporally allocate)?
3. What are the emissions from vessels and helicopters supporting BOEM's O&G program (spatially and temporally allocate)?
4. What are the updated OECM emissions factors for CY2023?
5. What are the characteristics of the O&G vessels conducting activities authorized by BOEM?
6. What are the vessel and vessel emissions trends? What are the helicopter and helicopter emissions trends?

Current Status: N/A

Publications Completed: N/A

Affiliated WWW Sites:

https://www.boem.gov/environment/environmental-studies/ocs-emissions-inventories

https://www.boem.gov/about-boem/biological-opinions-evaluations-endangered-species-act-section-7-consultations#:~:text=The%20Biological%20Opinions%20identify%20non,and%20conducting%20the%20proposed%20action.

https://gaftp.epa.gov/air/nei/2020/doc/supporting_data/nonpoint/CMV/2020%20C3%20Marine%20Emissions%20Tool%20%20Documentation.pdf

https://www.boem.gov/sites/default/files/documents/environment/environmental-assessment/nepa/BOEM%20Helicopter%20Report.pdf

References:

NMFS. 2020. Biological opinion on the federally regulated oil and gas program activities in the Gulf of Mexico. FPR-2017-9234. March 13, 2020.

Wilson D, Billings R, Chang R, Do B, Enoch S, Perez H, Sellers J. 2019. Year 2017 emissions inventory study. New Orleans (LA): U.S. Department of Interior, Bureau of Ocean Energy Management. 231 p. Report No.: OCS Study BOEM 2019-072.