Environmental Studies Program: Ongoing Study

Title	Update of River Overflood on Sea Ice and Strudel Scour Database (AK-20-03)
Administered by	Anchorage, Alaska Office
BOEM Contact(s)	TBD
Conducting Organizations(s)	TBD
Total BOEM Cost	TBD
Performance Period	FY 2020–2022
Final Report Due	TBD
Date Revised	October 16, 2019
PICOC Summary	
Problem	River overflood on the sea ice occurs annually in the nearshore region of the Alaskan Beaufort Sea during a brief period in the spring when river break-up precedes the break-up of the landfast sea ice. River overflood constitutes a potential hazard to offshore oil and gas development, as it relates to facilities access, oil spill spreading and response, and the associated phenomenon of strudel drainage and potential seabed scouring, which can increase the possibility of an oil spill.
Intervention	The Department of the Interior commissioned a study in 2007 (Outer Continental Shelf [OCS] Study MMS-2009-017; Hearon, *et al.*, 2009) designed to map the annual extent of peak river overflooding onto the landfast ice of the Alaskan Beaufort Sea during the 13-year period from 1995 and 2007. The proposed study will update the original by incorporating an additional 12 years of overflood observations, nearly doubling the existing database. In addition, the database of industry-based strudel scour measurements developed during the initial study will be updated to the extent industry is willing to grant access to the information acquired since 2007.
Comparison	The overall goal of this study is to improve the knowledge of the spatial and temporal variability in overflooding and related pipeline and facility siting concerns. The results will be used for environmental assessment and hazard mitigation for present and future oil and gas facilities that may be located within or adjacent to the areas influenced by the overflood.
Outcome	The project will produce a more comprehensive geographic information system (GIS)-based dataset of river overflood boundaries and strudel scour characteristics. The results will include a probabilistic assessment of annual overflood extent, and evaluation of potential changes in river overflood associated with climate change.
Context	Alaska Beaufort Sea nearshore coastal areas.

BOEM Information Need(s): BOEM requires an improved understanding of the spatial and temporal variability in overflooding to evaluate environmental impacts and hazards associated with 1) subsea pipelines traversing through the zone of river overflood from offshore federal leases and 2) ice roads used to access offshore federal

leases. Furthermore, BOEM needs an understanding of the potential impacts of climate change on the overflood phenomena. Because river overflooding marks the transition from winter to break-up, the study results will provide valuable information on the timing, length, and trends associated with the ice road season and the open-water season.

Background: River overflood constitutes a potential hazard to offshore oil and gas development in that it can impede access to facilities, disperse spilled oil, and expose buried subsea pipelines through scouring of the seabed below the landfast ice (strudel scouring). A comprehensive database of river overflood boundaries and strudel scour characteristics will allow BOEM to assess environmental impacts and hazards for present and future oil and gas facilities that may be located within or adjacent to the areas influenced by the overflood. The proposed study will update an earlier project by extending the record of overflood observations by more than a decade (Hearon *et al.*, 2009). While the existing study provides critical information on river overflood, the expanded database will provide additional information on the statistical variability of the phenomena. In addition, because river overflooding marks the transition from winter to break-up, this study also will complement a recent investigation of sea ice break-up commissioned by the Bureau of Safety & Environmental Enforcement (Coastal Frontiers and Vaudrey, 2018).

Objectives: The overall goal of this study is to improve the knowledge of the spatial and temporal variability in overflooding and related pipeline and facility siting concerns. The specific study objectives are to:

- Expand the existing overflood and strudel scour database by documenting maximum river overflood boundaries and collating industry acquired strudel scour data from Smith Bay to Camden Bay between 2008 and 2019.
- Evaluate isolines of annual overflood occurrence probability.
- Assess hazards associated with river overflood.

Methods: Researchers will map river overflood boundaries for all major rivers and streams in the study area for the 12-year period between 2008 and 2019 using satellite imagery. The 2009 study concluded that several imagery platforms are suitable for mapping river overflood boundaries. The study products will be incorporated into an ArcGIS® database that includes interpreted overflood boundaries, isolines of annual overflood occurrence probability, and available strudel drain and scour data.

Specific Research Question(s):

1. Has the seasonal timing of spring overflooding or the spatial extent of the overflooding changed over the last twelve years?
2. Have the ice roads from offshore development impacted the location and extent of overflooding events?

3. What is the severity of strudel scour occurrence associated with the zone of overflooding, areas of ice road construction, and the locations of offshore sub seabed pipelines? Has this changed overtime?

Current Status: Planned new start

Publications Completed: None

Affiliated WWW Sites: http://www.boem.gov/akstudies/

References:

Coastal Frontiers Corporation and Vaudrey and Associates, Inc. 2018. "2017 Break-Up Study of the Alaskan Beaufort and Chukchi Seas", report prepared for Bureau of Safety and Environmental Enforcement, U.S. Dept. of the Interior, Moorpark, CA, 143 pp. + appen.

Hearon, G., D. Dickins, K. Ambrosius, and K. Morris. 2009. Mapping Sea Ice Overflood Using Remote Sensing: Smith Bay to Camden Bay. Report prepared by DF Dickins Associates, Coastal Frontiers Corp., Aerometric, and The Geophysical Institute, University of Alaska for USDOI, Minerals Management Service, Alaska OCS Region under OCS Study MMS 2009-017. www.boem.gov/BOEM-Newsroom/Library/Publications/2009/2009_017.aspx