

Executive Summary

Ten-year Projection Study of Maritime Activity in the U.S. Arctic

The purpose of this report is to assess possible scenarios for vessel activity in the U.S. Arctic over the next ten years, 2015-2025. This report, “Ten-year Projection Study of Maritime Activity in the U.S. Arctic,” completes the first milestone of the National Strategy for the Arctic Region Implementation Plan. The Implementation Plan is designed to guide Federal activities to protect U.S. national and homeland security interests, promote responsible stewardship, and foster international cooperation. The Implementation Plan tasked the U.S. Department of Transportation to lead the development of the report, and with the assistance of the U.S. Committee on the Marine Transportation System, was completed and submitted to the National Security Council.

This report and its findings are the first step in establishing a Federal framework for the construction, maintenance, and improvement of ports and other infrastructure needed to preserve the mobility and safe navigation of U.S. military and civilian vessels throughout the Arctic Region.

Overview

The United States is an Arctic nation. In total, Alaska accounts for 56 percent of the U.S. coastline,ⁱ with approximately 6,640 miles of coast for the entire state.ⁱⁱ Three Arctic seas bound the state of Alaska: the Bering, the Chukchi, and the Beaufort. These seas are frozen for more than half the year. The general Arctic maritime season lasts only from June through October, and unaided navigation occurs within a more limited time frame. This pattern appears to be rapidly changing, however, as ice-diminished conditions become more extensive during the summer months.

On September 16, 2012, Arctic sea ice reached its lowest coverage extent ever recorded,ⁱⁱⁱ paving the way for the longest Arctic navigation season on record.^{iv} While this may increase the season available for navigation in the Arctic, marine transportation in the region will be challenging and potentially hazardous.

The area of focus for this report is Arctic traffic through the Bering Strait and the North Slope of Alaska as influenced by potential growth in the Northern Sea Route (NSR) and Northwest Passage (NWP), in addition to resource exploration and development activities.

Report Components

This report has four components: 1.) a comprehensive literature review of current publications, reports, and strategies, 2.) review of current U.S. Arctic vessel patterns to provide a baseline for comparison, 3.) a regression analysis of economic development factors that may affect vessel activity, and 4.) vessel activity progression scenarios.

To better understand vessel distribution and density as activity increases, satellite automatic identification system (S-AIS) data were analyzed for the U.S. Arctic above the Aleutian Islands. Satellite AIS data was available for July-November of 2011 and 2012, but only for August and September of 2013. This study uses track line analysis to determine the total kilometers traveled within a given area. Comparing track line

distance between years provides a proxy to determine areas of high and low vessel traffic and changes in vessel distribution over time.

Vessel Activity Analysis

The extent to which the Arctic will develop into a global shipping route is difficult to predict. The section on forecasting explores information and reports that discuss growth potential or the specifics of future planned activities that could directly influence maritime activity in the U.S. Arctic. This section is divided into three parts addressing natural resource development, including oil and gas exploration and production, growth of trade in the Arctic region, and the potential for diversion of vessel traffic from other international shipping routes. These analyses form the basis for combinations of growth (or the lack of) to inform the 10-year projection scenarios.

In order to estimate the business as usual growth (BAU) of vessel activities in the Arctic region, a literature survey on historic and projected growth of international shipping and regional ship activities was conducted. The literature review and analysis, based on a number of sources, bounded shipping activity growth at around 3.3 percent for a high in projected growth and 1.3 percent as the low for projected growth, with 3 percent as the midrange scenario.

Vessel transits via the Northern Sea Route and Northwest Passage may also divert vessel traffic from the Suez and Panama Canals. A voyage from Rotterdam to Shanghai via the Northern Sea Route, for example, is 22% shorter than by the current route through the Suez Canal. Navigating the Northwest Passage would cut the Suez distance by 15 percent.^v Given the economic and seasonal uncertainties, a 2- 8 percent diversion rate is assumed between July and November^{viii}, with 5 percent being the best estimate, from the Suez Canal and the Panama Canal. Based on the application of various growth and development scenarios, there is considerable variability in potential growth projections. Based on global GDP growth, it is more likely that the rate of increase in activity is within the 1-3.5 percent range and that diversion of vessels from other international routes will increase gradually, possibly between 2-8 percent in 2025. A central estimate combining these two yields approximately 710 vessels in 2025.

A large number of factors influence vessel growth in the Arctic. The report identified three categories of such factors: economic drivers (i.e. risk assessment, investment, Arctic port development), other commercial and safety considerations (i.e. tourism, military assets, search and rescue), and geopolitical variables (i.e. polar code, Law of the Sea, and global politics). Although difficult to quantify, these factors will impact U.S. Arctic vessel activity over the next decade.

Projection Scenarios

Vessel projections are compiled based on possible scenarios for global economic growth, vessel diversion, and natural resources exploration and production. The scenarios presented in the report are based on a variable set of assumptions. Generally speaking, these scenarios assume: 1) There will not be a U.S. Arctic deep-water port available in the next decade; 2) No increase in military presence or Coast Guard assets to the region; and 3) Numbers for research vessels, cruise ships and adventure tourism will remain consistent with 2013 levels.

The methodology for this analysis is based on three major assumptions: first, business as usual growth can be uniformly applied to the general region; second, 90 percent of vessel diversions from other international shipping lanes will use the NSR, not the NWP; and third, oil and gas exploration will occur in the Chukchi or Beaufort seas within the limitations of the National Marine Fisheries Service Draft Environmental Impact Statement, the BOEM draft Supplement Environmental Impact Statement^{viii} for the Chukchi Sea, and be constrained to the lease block areas. These assumptions are based on the best available information and serve only as potential scenarios, not predictions for the future.

The projections are separated into three general categories of growth. The first is based on business as usual (BAU) growth reflecting the estimated growth in GDP and the associated growth in global trade. The second type of growth is based on the assumption that some international vessel traffic will divert from the Suez and Panama Canals in favor of Arctic shipping routes. The third is based on the assumption that oil and gas exploration and production will increase in the next decade. For each type of growth, low, medium, and high scenarios are explored.

The scenarios span a range of intentionally conservative assumptions and less likely development patterns with higher rates of vessel diversion enabled by the increased accessibility of a melting Arctic.

Summary of 10-Year Projection of Maritime Activity in the U.S. Arctic Region

A conservative estimate of the number of unique vessels operating in the Bering Strait and U.S. Arctic in 2025 is 420, resulting in approximately 877 transits through the Bering Strait, or an increase of 100 percent over current transit levels. The number of vessels for the high-growth scenario - incorporating all of the maximum growth elements for 2025 - is 1262, resulting in approximately 2637 transits, about a 500 percent increase in Bering Strait transits over current levels.

Table 1. Summary table of estimated growth for the U.S. Arctic and the North Slope

Vessel and Transit Growth for the Bering Strait and North Slope					
Type			Low	Medium	High
Bering Strait	2025 percent change including container diversion	Vessels	120%	275%	430%
		Transits	150%	325%	500%
	2025 percent change without container diversion	Vessels	75%	170%	255%
		Transits	100%	200%	300%
North Slope	2025 percent change	Vessels	165%	260%	340%

Although the total number of vessels and transits is small when compared with other major shipping routes such as the Great Circle Route in the Pacific, the relative increase in activity is significant for the region. Whether these or other maritime activity projections for the U.S. Arctic will be accurate in 2025 depends on a number of additional elements, including extent of ice-diminished conditions in the Arctic. However, the projections provided by this report do incorporate a large number of variables to

provide best estimates of U.S. Arctic maritime activity in 2025, which may be used to complement and provide additional context for decisions regarding Arctic infrastructure support.

ⁱ Alaska Arctic Policy Commission (2014). Preliminary Report. Retrieved from <http://www.akarctic.com/preliminary-report-and-executive-summary/>.

ⁱⁱ NOAA (2013). Arctic Nautical Charting Plan. Office of Coast Survey, Nautical Charting Division. Retrieved from http://www.nauticalcharts.noaa.gov/mcd/docs/Arctic_Nautical_Charting_Plan.pdf

ⁱⁱⁱ Biello, David (2012). What Will Ice-Free Arctic Summers Bring? *Scientific American*, 12 September 2012. Retrieved from <http://www.scientificamerican.com/article.cfm?id=arctic-sea-ice-loss-implications>.

^{iv} McGrath, Matt (2012). Gas tanker Ob River attempts first winter Arctic crossing, *BBC News*. Retrieved from <http://www.bbc.co.uk/news/science-environment-20454757>.

^v <http://www.economist.com/node/21556803>

^{vi} <http://www.atmos-chem-phys-discuss.net/10/10271/2010/acpd-10-10271-2010.pdf>

^{vii} <http://www.atmos-chem-phys.net/11/5305/2011/acp-11-5305-2011.html>

^{viii} Bureau of Ocean Energy Management, November 2014 Draft Second Supplemental Environmental Impact Statement OCS ESA/EIS BOEM 2014-653 Retrieved from http://www.boem.gov/uploadedFiles/BOEM/About_BOEM/BOEM_Regions/Alaska_Region/Leasing_and_Plans/Leasing/Lease_Sales/Sale_193/Lease_Sale_193_DraftSSEIS_vol1.pdf

This report was contracted and coordinated under the US Committee on the Marine Transportation System. The entire report is available at www.cmts.gov