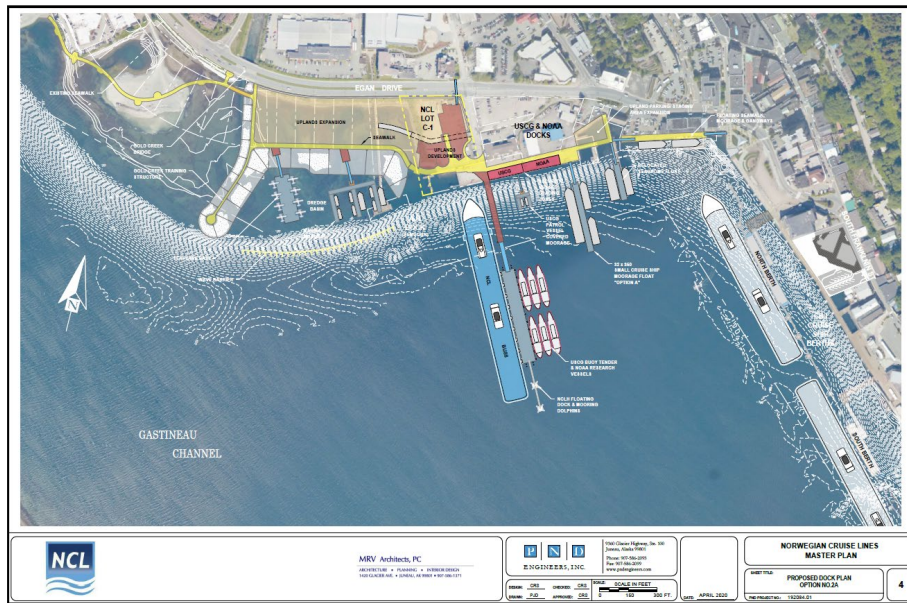




PORT OF JUNEAU SMALL CRUISE SHIP STUDY

Evaluation of Winds and Historical Vessel Transits in the Vicinity of Proposed Piers



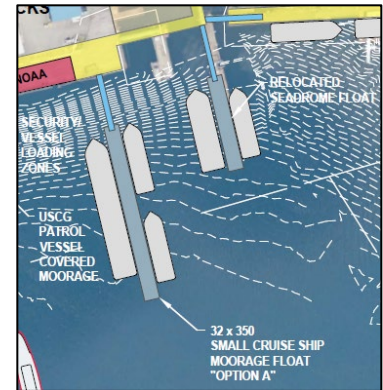
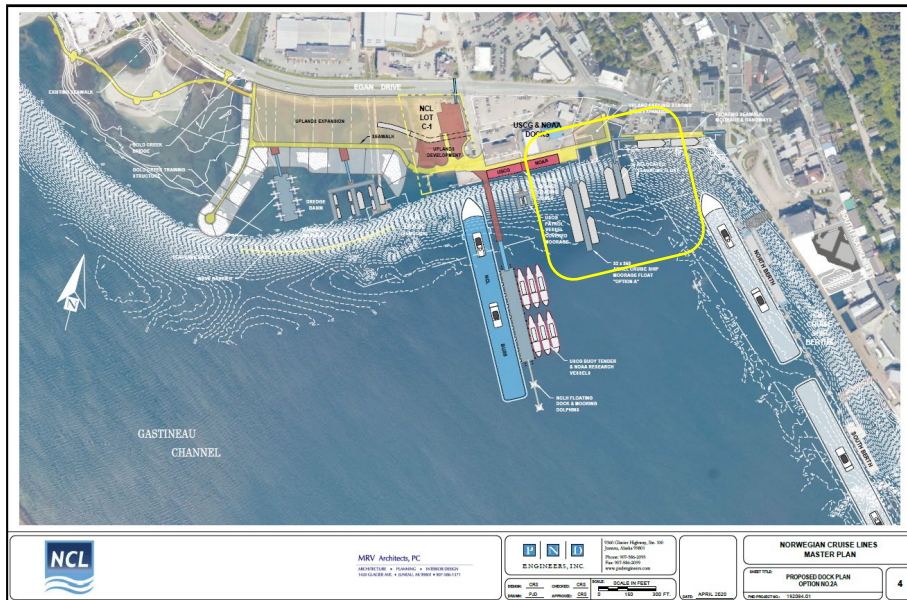
Abstract

This report presents data and information obtained and reviewed by the Marine Exchange of Alaska that determined the position and location of proposed docks for accommodating small cruise ships is a suitable for safe transits to and from port.

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JUNEAU SMALL CRUISE SHIP PIERS

For reference, the below graphic displays the proposed location and orientation of pier facilities to be built to accommodate smaller cruise ships calling on the port of Juneau.



SUITABILITY OF PROPOSED PIERS

To evaluate the proposed position and orientation of these piers, the ability for small cruise ships to safely approach and depart the proposed facilities in prevailing weather and sea conditions were reviewed, taking the following factors into consideration:

1. **Vessel Size:** The size of the vessels the facilities are designed to accommodate. All of the small cruise ships that will use the proposed facilities will be less than 250 feet long and provide a relatively low profile/sail area exposed to the wind. In light of their low profile they are less subject to wind induced drift when maneuvering at reduced speeds as required when approaching and departing a pier.
2. **Vessel Maneuverability:** All of the vessels have been constructed with enhanced maneuverability features. They all are configured with twin screw and many also have bow thrusters making them highly maneuverable. The small cruise ships that have called on Juneau in the past and their maneuvering characteristics are listed below.

UnCruise: All twin screw vessels and equipped with bow thruster.

Lindblad: All vessels twin screw

Boat Company: Both vessels twin screw – one has a bow thruster.

American: Twin Screw vessels, one with a bow thruster

3. Prevailing environmental conditions: Wind direction and velocity present the most significant impact to the safe navigation of vessels when approaching and departing a dock or pier. Strong winds on a vessel's beam greatly complicates maneuvering in tight spaces such as approaching a dock. Winds on the bow or stern are far less problematic and preferable as the vessel exposes less surface area to the wind, and thus wind induced drift is less. The analysis of historical wind in the vicinity of the piers indicates winds are generally in a favorable direction, placing winds on the bow or stern of the vessels when they moor or depart.

Tidal current in the vicinity of the proposed piers is not available, however, their location is approximately 700 yards from the primary current flow in Gastineau Channel and thus the current is not a significant factor.

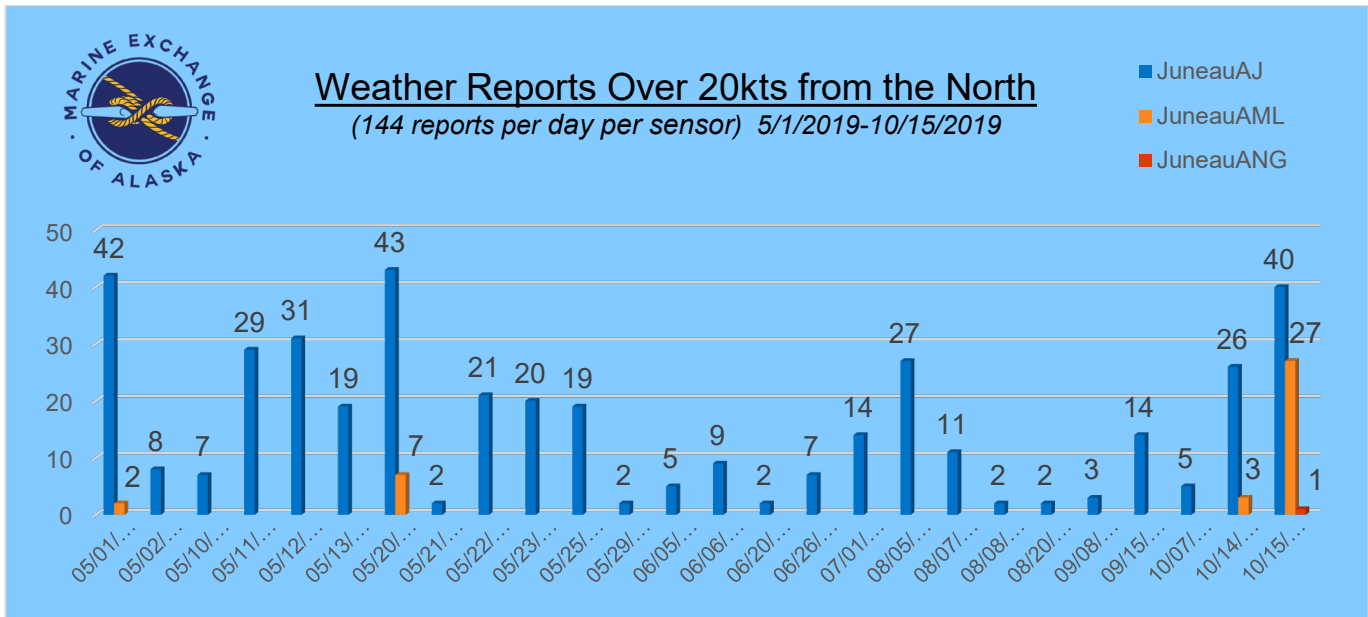
4. Historical tracks of vessels' approaches and departures: Small cruise ships are required to be equipped with AIS (Automatic Identification System) transponders that transmit a vessel's dimensions, course, speed and heading several times a minute. The Marine Exchange's AIS network receives, processes and retains this data. The AIS data has been graphically presented to show the historical tracks of vessels approaching and departing the existing Seadrome dock. Based on these historical AIS tracks, it is evident the location and orientation of the proposed small cruise ship piers will minimize the adverse impact on small cruise ships' approaches and departures. These tracklines also show the alignment of the proposed piers would not interfere with the past approaches and departures of vessels in the area under consideration.

HISTORICAL WEATHER

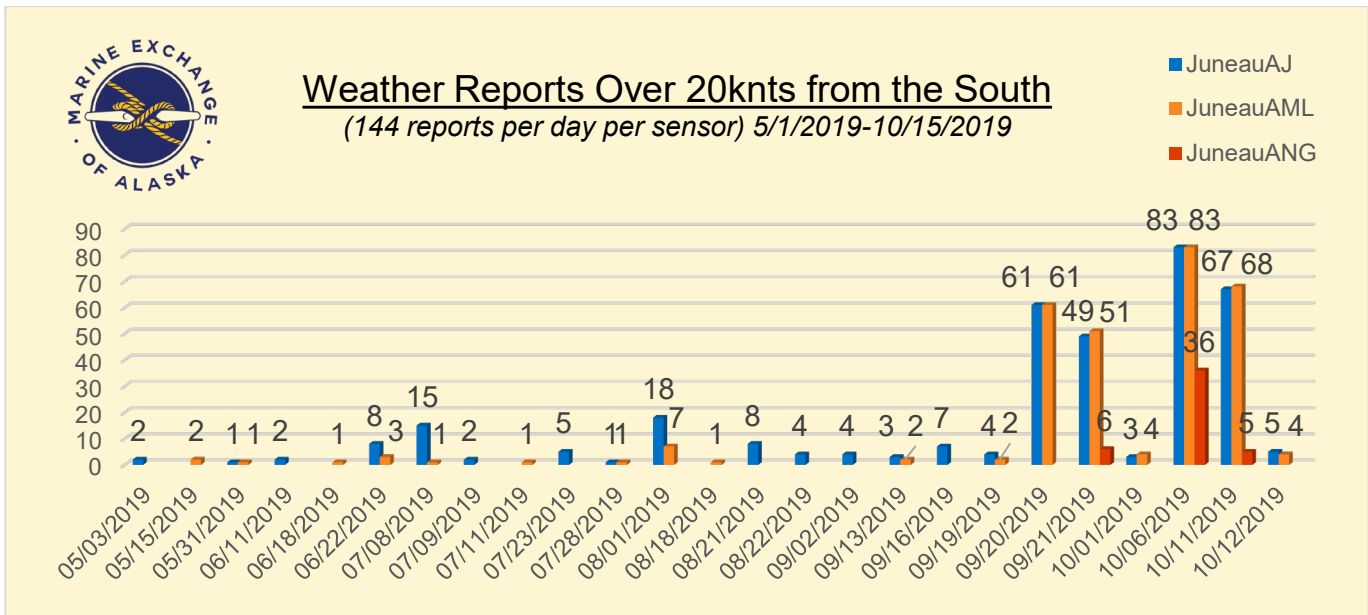
Amplifying information on the navigational impacts of wind and historical tracks are provided below.

Weather Data: The wind data evaluated was obtained from the Marine Exchange sensors located on the AJ Dock (JuneauAJ), on a tower at the Alaska Marine Lines facility (JuneauAML), at the Alaska National Guard (ANG) Dock (JuneauANG), and a sensor on top of the Juneau Library (JuneauLIBRARY). The first two locations are more exposed to the elements and consequently provide data that is more relevant to the proposed small cruise ship dock near the NOAA facility than the ANG Dock and the Juneau Library, the latter of which had no recordings over wind speeds over 20 knots. We also reviewed data from the NOAA facility in the port, however, as the wind speeds were less than 10 knots, possibly due to nearby structure interference, it was of little value. We focused on winds in excess of 20 knots, as that wind strength can have an impact on vessels' maneuverability, especially in the wind is on a vessel's beam. The proposed piers are in general alignment with the prevailing northerly and southerly winds encountered in the port, and thus provide the preferred aspect to a vessel to minimize wind generated drift of a vessel that complicates slow speed maneuvers taken when approaching and departing piers.

In reviewing the wind velocity and direction data for the 2019 small cruise ship season, the prevailing winds (>15 reports from a station within a 24-hour timeframe) within the Juneau Harbor came out of the north 8.4% of the time (14 out of 167 days).

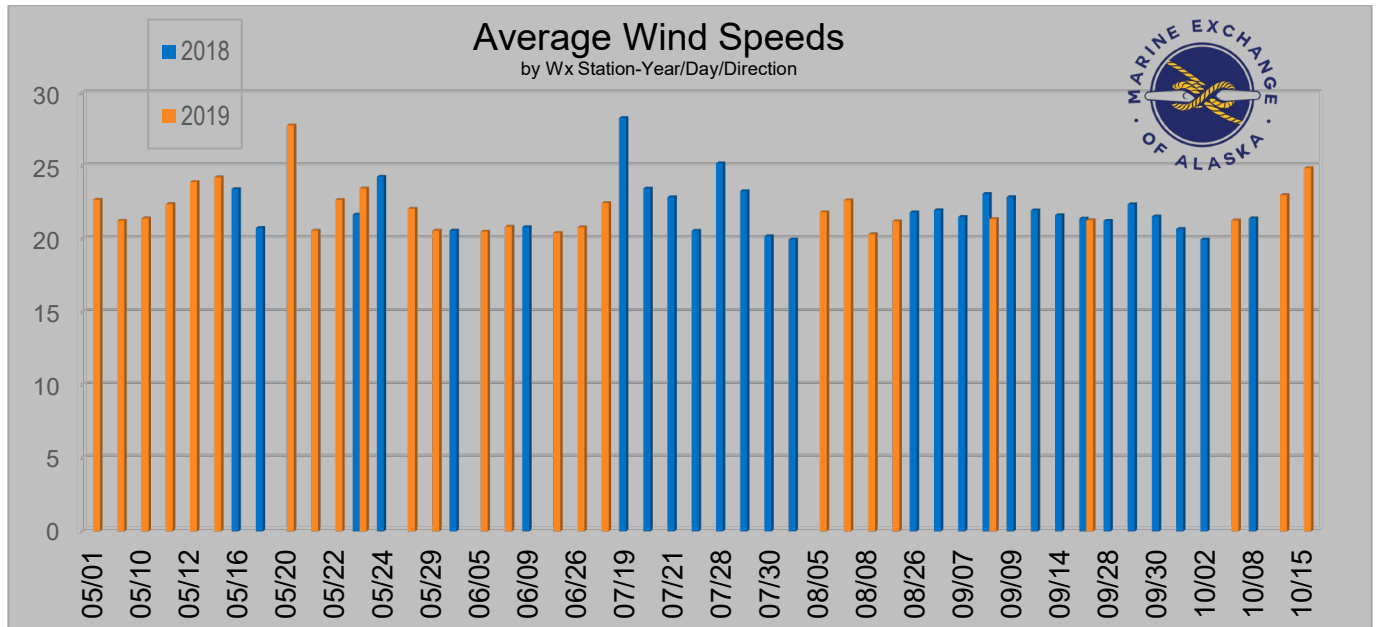


In comparison, during that same timeframe, the prevailing winds came out of the south less than 5% of the time. “On the dock” winds can be somewhat more challenging when it comes to mooring, as timing the effects of the wind and drift on the vessel become more critical.

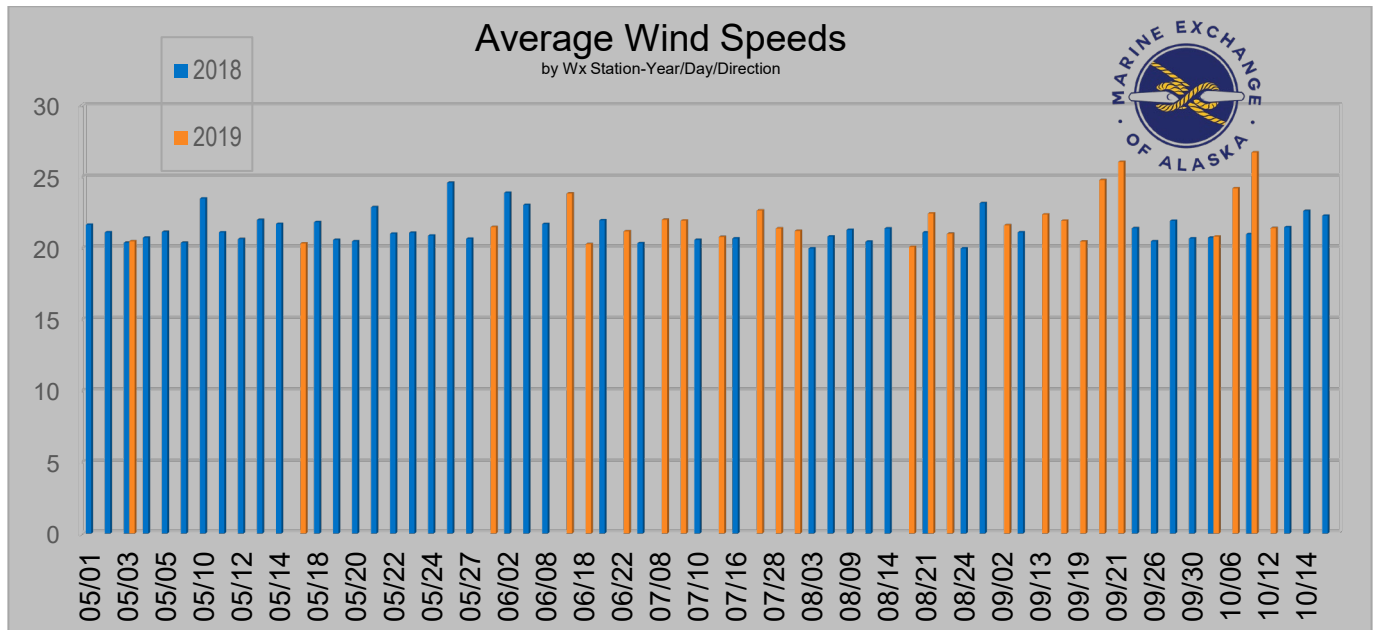


In comparing 2019 data to that captured in 2018, the winds continue to be predominantly from the North.

Juneau Harbor, days with northerly wind speeds averaging over 20 knots:

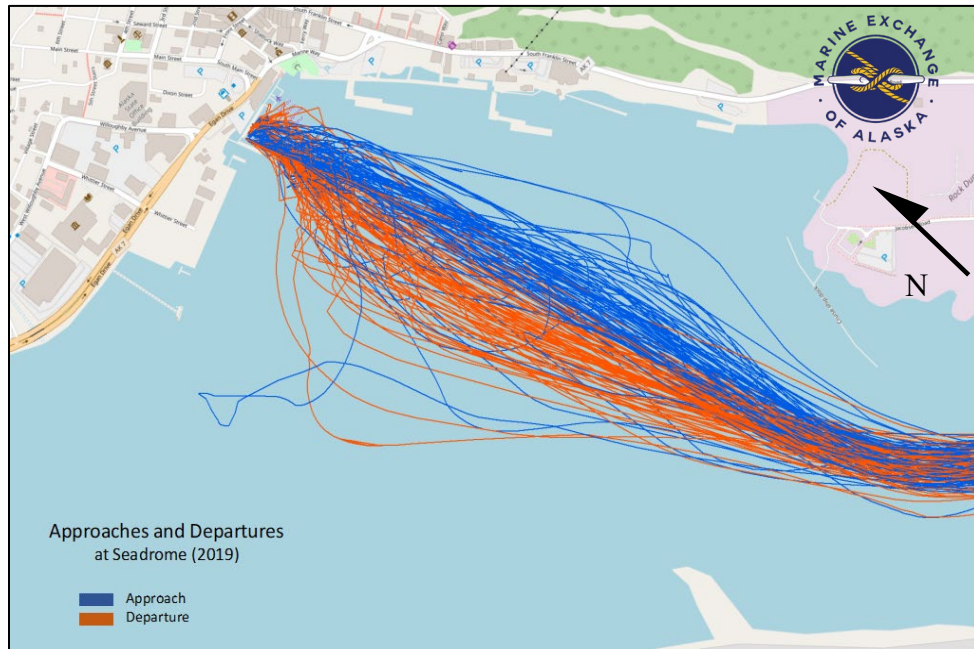


Juneau Harbor, days with southerly wind speeds averaging over 20 knots:



HISTORICAL TRACKLINES

Due to harbor characteristics, small cruise ships approach the Seadrome from the south – see the below image with small cruise ship tracklines from the 2019 season. Taking into consideration the researched historical weather, 96% of the time the approach to the Seadrome is with wind that is less than 20 knots from the south. An “into the wind” approach is typically considered favorable, as the vessel operator has significantly more control over maneuvering the vessel.



CONCLUSION

Based on review and evaluation of historical tracklines of small cruise ships, their size and maneuvering characteristics, and historical weather, we find the positions and orientation of the proposed piers will facilitate safe arrival, departure and mooring of small cruise ships.

APPENDIX:

MXAK Weather Sensors

