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Alan Sorum
Dr. Rob Campbell
Joe Banta

Prince William Sound Regional Citizens' Advisory Council (Council) Support for Metocean (Meteorology and Physical Oceanography) Research Projects

The Council has long held an interest in metocean conditions that effect the safe transportation of crude oil through Prince William Sound. It has supported numerous research projects focused on improving our understanding of the meteorological and physical oceanographic environment of the Sound.

This interest in physical oceanography and weather conditions stems from one of the duties given to the Council in the Oil Pollution Act of 1990, which is to "…study wind and water currents and other environmental factors in the vicinity of the terminal facilities which may affect the ability to prevent, respond to, contain, and clean up an oil spill." This paper will provide some background on this interest in metocean conditions and describe some of the reasons this topic is important in supporting the Council's mission.

Metocean data comes from measuring instruments deployed in or near the area of interest, regional and global modeling and remote sensing. The availability of metocean data can be extended to where no measurements are available, if there is data available in a nearby location. Modeling can also be employed to expand estimates of conditions to the nearshore locations. Our recent project conducting a hindcast or retrospective analysis of weather at Hinchinbrook Entrance is an excellent example of this capability. The following are some examples of metocean data sets of interest.

Meteorology:

- Measurement of wind speed, direction, and sustained gusts.
- Development of wind roses at various time scales (e.g., hourly to climatologies)
- Recording air temperature and humidity
- Ascertaining the occurrence of severe storms (barometric pressure)

Physical Oceanography:

- Water level fluctuations and classification of wave phenomena – sea level changes, storm surges, tsunamis, seiches, tides, currents, significant wave heights and periods, propagation directions, and (directional) of wave spectra
- Bathymetry – Depth contours, navigational safety concerns, and water movement effects

- Stratification caused by salinity, density, and temperature – Density-driven currents and internal waves
- Salinity – Water chemistry, density, and heat capacity
- Ice occurrence and movement

Safe Vessel Navigation – Professional aviators and mariners are required to fully appreciate weather conditions in which they are required to operate their craft. Licenses require masters to understand weather and the effects it has on vessel operation. Vessels must adjust their headings and speeds to compensate for wind and sea current. Severe wind, waves, and currents can force a disabled or inappropriately designed vessel onto shoals. Weather conditions dictate the time needed to reach a port of refuge and the time required to mount a potential rescue.

Working with marine pilots and the full ship bridge simulator at AVTEC, the Council has undertaken a project to verify the utility of potential places of refuge that could be used by a vessel in distress. This study depended on development of improved electronic charts of the Sound, bathymetry, and estimates of seasonal winds. The Council contracted with the University of Alaska Anchorage Experimental Forecast Facility to develop wind roses, graphical representations of wind speed and direction, for a number of sites in the Sound. This wind data was vital to performing realistic simulations of potential mooring sites. Initial results of the project showed many previously identified sites were not safe for the mooring of tankers. The first phase of the project, "Ship Simulation and Mariner Study of the Maritime Implications for Tank Vessels Utilizing Potential Places of Refuge, Mid-Prince William Sound Alaska," was well received by regulators and industry, its next two phases will likely continue forward.

Vessel and Crew Performance – Wind and current strength impacts vessel fuel burn and transit times. Wind and wave conditions effect the ability of crews to work safely on deck. These factors, along with the performance limitations of spill cleanup equipment, greatly influence the ability of shippers to adequately respond to an oil spill. The Council has looked at this gap that exists between the ability of response equipment to operate and the weather tankers are allowed to operate. An example report is "Response Gap Methods," prepared by Nuka Research and Planning Group, LLC.

The effect of wind and currents must be considered in the seakeeping and handling of vessels. Current effects are especially important when a ship is maneuvering in narrow channels and under the influence of on shore winds. Metocean related concerns for the incoming Edison Chouest Offshore tugboats were addressed in the Robert Allan Ltd. report titled, "A Review of the Proposed New Escort and Support Tugs for Tanker Operations in Prince William Sound." This report reviewed the new tug designs and specifications related to safe operation in the Alaska climate.

Drift Effects of Current and Wind on Vessels – Wind and current will move a disabled vessel towards the shore. The Council has documented the existence of extreme barrier jet winds near the entrance to Prince William Sound that can damage vessels and limit rescue attempts. Understanding these forces allows regulators to establish policies that attempt to mitigate these risk factors. An example for us would be the wind speed limits and weather closure limitations set for outbound laden tanker passage through Hinchinbrook Entrance.

One example of research conducted in this area is the recent drift study conducted by Robert Allan Ltd. titled, "Sentinel Tug Requirements for Gulf of Alaska: Ship Drift Study." A significant finding of this work centered on the closure conditions for outbound laden tankers at Hinchinbrook Entrance of 45-knot winds or 15-foot seas, as measured by the buoy at Seal Rocks. It was noted that due to effects including wave sheltering, topographic sheltering, and buoy anemometer height, this closure condition is actually equivalent to approximately 57 knots of wind (at 10 meter elevation) and 20-foot seas in the Gulf of Alaska areas offshore of Hinchinbrook Entrance.

A number of oil tanker safety related decisions are based on the weather reported at this buoy. The wave and wind climate at the Entrance effects the drift of disabled vessels, helps determine the performance of rescue tugboats, and impacts strategies used in oil spill response efforts. Development of best practices to be employed in the save of an oil tanker in distress in these adverse conditions depends on having adequate metocean information. Currently, the Council is developing a better understanding of the metocean forces that exist during extreme weather events at the Entrance in a project titled "Hinchinbrook Entrance Wind and Wave Extremes," being conducted under contract by Tetra Tech Canada.

Movement, Fate, and Behavior of Spilled Crude Oil – Metocean mechanisms greatly influence the behavior and transport of spilled oil. Current and especially wind will move an oil slick in undesired directions. Tides, currents, and wave affect the mixing and emulsification of oil into the water column. These same factors influence the effectiveness of oil spill dispersant chemicals.

Understanding the history of wind and current profiles assists in the development of effective oil spill response plans and trajectory modeling.

There is a lack of recorded metocean data available for the Valdez Marine Terminal (VMT). The Council has repeatedly requested permission to install a weather station at the terminal near the loading berths. There has been recent discussions focused on the possibility of installing an Acoustic Doppler Current Profiler (ADCP) near the loading berths. However, at this time none of requests have been addressed or approved.

Weather Criteria for Crude Oil Loading Operations and Severe Weather Protocols – Wind and current can cause oil to be spilled during the loading of a tanker and prevent mitigation measures from performing correctly. Weather can drive a tanker into the dock, causing damage or make it difficult to moor it as well. Wind can form waves that overtop protective booming around tankers. Severe weather can reduce the effectiveness of oil spill response and firefighting efforts.

Port Operations and Vessel Traffic System (POVTS) Committee and Board member Dr. Orson Smith worked with a graduate student from the University of Alaska Anchorage to look at extreme easterly winter winds that can either render oil boom deployed around a moored tanker to be overtopped by waves or prevent the safe deployment of the boom on arrival of a tanker. Their report, "Wave-Induced Delays in Cargo Transfer at Valdez Marine Terminal – Berth 4," highlighted the need for better wind data measurements at the VMT and noted some potential ways to mitigate the effect of these winds. These included positioning an ocean tug upwind (with or without a barge) as a wave barrier, temporary and permanent deployment of harbor-type floating breakwater, and deployment of an extra oil boom upwind as a partial wave barrier.

Research Focus and Lack of Data – It has been noted for many years that there is a lack of adequate metocean data being collected in Prince William Sound. The Council has worked with groups like the Prince William Sound Science Center (PWSSC), Alaska Ocean Observing System, and Department of Agriculture to extend our understanding of conditions that exist in the Sound. Overlapping observations are also useful, to provide cross-validation of different observations and redundancy when platforms go offline. For instance, the Seal Rocks buoy at Hinchinbrook Entrance stopped transmitting in May 2018, and was still inoperable at the time of this report.

There are gaps in our knowledge base, such as a lack of understanding on the generation and extent of barrier jet winds along the outside boundary of the Sound. Another is delineation of the wind and current environment found in Port Valdez. Installing a weather station at the VMT would help. This last year, the Council worked with the Prince William Sound Science Center to study currents in Port Valdez, detailed in the "Port of Valdez Circulation Study." However, no measurements were permitted to be taken inside of the security zone at the VMT, and therefore, no data for that area is available.

Technical Committee Resources and Council Staffing Constraints – Several years ago, the responsibility for weather and metocean related projects was shifted from the Council Project Manager supporting the Scientific Advisory Committee (SAC) to the one supporting the POVTS Committee. This was done to improve work load efficiency within staff and to take advantage of member knowledge and experience. The Project Manager for POVTS has an undergraduate degree in aeronautical science, has taken formal coursework in meteorology, is a commercial aircraft pilot, and holds a master mariner's license.

It was determined that the POVTS Committee had a good mix of subject matter experts in this field. This includes members that are mariners, chief engineers, and coastal engineers. The SAC Committee, with its historic focus, has members that are more related to biology and natural sciences. We have routinely moved across committee boundaries to secure assistance as needed. The Oil Spill Prevention and Response (OSPR) Committee has an experienced meteorologist that has contributed significantly to our metocean and weather related projects.

Use of Metocean Data and Cooperative Efforts – The Council regularly shares research results with industry, regulators, and public through the transmission of final reports, issuance of advice letters, submitting editorial comments, conducting social media outreach, and by hosting events like Science Night*.* The Council operates two weather stations at Cape St. Elias and Nuchek. Weather data from these stations is made available to stakeholders and the public through the internet. Near real-time cameras like the PWSRCAC camera at Nuchek on Hinchinbrook Island are extremely popular with mariners and aviators. Data is provided to the Alaska Ocean Observing System (AOOS) and the PWSRCAC sponsored PWS AOOS Workbench for use in weather research. The AOOS site acts as a data clearinghouse for academic researchers as well as operational modelers (e.g., NWS weather models, NOAA GNOME oil spill trajectories).

Potential Council Weather/Metocean Projects

Valdez Marine Terminal Weather Station: The Council Board and POVTS Committee support a request to Alyeska that we be allowed to install an autonomous weather station at the VMT. Weather on the southern side of Port Valdez is remarkably different than that seen at the Valdez town site or at its airport. Little information is publicly available about the wind and wave climate experienced on the southern side of Port Valdez. Weather is a major risk factor that affects the safe operation of marine vessels. Wind and wave conditions have substantial influence on the safe loading of crude oil tankers at the VMT. Climatic conditions greatly affect the effectiveness of oil spill recovery and shoreline protection operations.

Lower Copper River Delta Weather Station: The Copper River Valley can funnel extremely high offshore winds when there is a high pressure system over interior Alaska and a low pressure system over the Gulf of Alaska. The combination of the pressure gradient and altitude difference between the interior and the Gulf produce very strong “downsloping” (aka katabatic) winds that are steered by the Copper River valley and delta in an offshore direction, producing sustained winds of 30 to 50 knots, with much higher gusts.

A weather station deployment in the lower Copper River delta would be important to the PWSRCAC mission as an aid to the oil transportation industry and for spill response. It would provide real time observations of wind and other weather and air quality parameters that could be made available to traffic transiting through the shipping lanes 20 nautical miles to the southwest. It would also be an important asset in the event of a breach in the Trans Alaska Pipeline System at one of the points where it crosses the Copper River. A spill in the upper Copper River would be rapidly transported downstream and would likely involve a spill response in the delta and adjacent coastal ocean. Weather information in such a scenario would be of high value. The data would also complement the existing PWSRCAC weather station at Cape St. Elias and SNOTEL station on Strawberry Reef (both tend to underestimate northerly winds) and be useful for the production of contingency plans.

Cape Hinchinbrook Weather Surveillance: Working cooperatively with the PWSSC, this project seeks to provide improved observations of weather and wave conditions seen at the Hinchinbrook Entrance to Prince William Sound. The primary focus of this effort will be the eastern portion of the Entrance that encompasses the established vessel traffic lanes that pass by Cape Hinchinbrook. It is proposed to install an X-band (8.0 to 12.0 GHz) wave radar, upland weather station, and supporting equipment at Cape Hinchinbrook. This equipment will be used to measure the spectra of wave height and direction on the water at the Entrance and provide observations of standard meteorological variables, wind speed and direction, temperature, humidity, and barometric pressure at the Cape. A subsurface moored wave gauge will be installed to ground truth the radar observations. Power to the equipment installed on the uplands will be provided by solar panels and a wind generator. Data generated by the equipment will be telemetered out via cellular modem link to the Naked Island communications site.

Dual Tugboat Rescues and Tows with Review of Ship Arrestor – Sea Anchor: The Council recently completed two studies that call into question the ability of the current escort tug fleet in Prince William Sound to safely complete the save of a distressed tanker in what are termed Closure Conditions. Closure Conditions have been defined as 45-knot winds or 15-foot seas as measured by the buoy at Seal Rocks, near Hinchinbrook Entrance. The first study, titled "A Review of BAT for a Sentinel Tug Stationed at Hinchinbrook Entrance," was completed in 2014, and helped define the bollard pull requirements for assisting a disabled tanker in Closure Conditions. The second study, completed in 2016, was titled "Sentinel Tug Requirements for Gulf of Alaska: Ship Drift Study" and changed our understanding of how much force would need to be applied by a sentinel tugboat to accomplish a save.

Completed Council Metocean Related Research Projects

Field Test Report: Coherent UHF Radar for Ice Detection

C-CORE. June 2003.

The PWSRCAC has a mandate to provide enhancements in the detection of navigation hazards—particularly icebergs—in the traffic lanes of Prince William Sound. It is widely recognized that the detection of growlers and bergy bits under moderate to high sea states, or in pack ice, is outside the capabilities of current marine radar technologies. The C-CORE Coherent UHF Radar has been developed with funding from PWSRCAC as an important component in an ice warning system to help fulfill their ice management responsibilities.

Comparison of Wind Measurements at Nuchek Heights, Hinchinbrook Island, and at Seal Rocks NOAA Data Buoy in Hinchinbrook Entrance Alaska

Richard M. Brown, Micro Specialties, Inc. and Orson P. Smith. 2006.

Concurrent hourly average wind speeds and directions from data collection stations on shore at Nuchek Heights and at sea by the NOAA Seal Rocks data buoy were compared during theperiod from 1600 on 23 August 2004, to 1700 on 18 February 2006 Alaska Standard Time. Archived data records from both stations were retrieved and clipped to the specified time period. Data gaps or clearly anomalous recordings were set to zero so that complete time series of exactly the same length (12315 points) were available for analysis. Wind speeds were converted to statute miles per hour.

Response Gap Methods

Nuka Research and Planning Group, LLC. May 2006.

Sometimes oil is transported in tank vessels at a time when no mechanical oil spill response is possible, due to environmental conditions such as weather and sea state. The term Response Gap is used to refer to such conditions. In Prince William Sound (PWS), closure limits preclude outbound laden tanker transits when conditions at Hinchinbrook Entrance exceed 15 foot seas or 45-knot winds. However, these conditions represent safe operating limits for the tankers themselves, and do not necessarily reflect the limits to mechanical oil spill recovery systems. In Prince William Sound, the Response Gap exists for the range of conditions between the upper limits of mechanical recovery systems and the Hinchinbrook closure limits.

Response Gap Estimates for Two Operating Areas in Prince William Sound

Nuka Research and Planning Group, LLC. February 2007.

Over the past 16 years, technological advancement in oil spill response systems, preparedness programs, and environmental monitoring have contributed to more proficient oil spill response operations in Prince William Sound. Yet, there are still times when oil is being shipped through Prince William Sound, but environmental conditions, such as wind, waves, temperature, and visibility, preclude effective spill response operations. The Prince William Sound Response Gap is this window between the point of maximum mechanical response capacity and the established weather-based closure limits (15-foot seas or 45-knot winds at Hinchinbrook Entrance).

Earthquake, Landslide, and Tsunami Hazards in the Port Valdez Area, Alaska

Alaska Begét Consulting. March 2007.

The 1964 earthquake demonstrated that the Valdez area is subject to enormous earthquakes and coeval tsunamis. The geologic record of prehistoric earthquakes and tsunamis in the Valdez area has not previously been studied.

Historic and prehistoric paleo-tsunami deposits were identified during this study at sites near

Shoup Bay, at Saw Island in the VMT, and at a site near Solomon Gulch. Paleo-tsunami deposits are distinctive sediments found in certain geologic settings that record deposition by large prehistoric tsunamis. Large tsunamis are usually coeval with great earthquakes and the history of tsunamis in the Valdez area is interpreted as a proxy record of past great earthquakes. Multiple accelerator mass spectrometry radiocarbon dates and conventional radiocarbon dates indicate major prehistoric earthquakes also created large tsunamis in the Valdez area ca. 950-1000 year B.P., ca. 3800 year B.P. and ca. 4300 year B.P. A large landslide near the VMT dated to 5800 year B.P. may have been triggered by a still older earthquake.

Non-Mechanical Response Gap Estimates for Two Operating Areas in Prince William Sound

Nuka Research and Planning Group, LLC. April 2008.

Technological, planning, and environmental monitoring improvements over the past two decades have greatly enhanced the ability to respond to an oil spill in Prince William Sound. The "response gap" is the window between the upper limits of the response system (in terms of environmental conditions) and the conditions at which Hinchinbrook Entrance is closed to laden tankers.

Analysis of SAFETUG Wave Spectra with Respect to PWS Wave Conditions- Project Report

John French, Tom Kuckertz, Steve Lewis, and Stan Stephens. September 2010.

PWSRCAC's participation in the Maritime Institute of the Netherlands' (MARIN) joint industry projects, SAFETUG I and II, has produced considerable quantities of data and tug information that are of interest to PWSRCAC. The SAFETUG Data Analysis Project was formed to analyze the SAFETUG data and information and to report the findings with respect to their applicability to the Prince William Sound tug escort system to the Board. By forming a project broadly representative of Board members, committee members, and staff, it is expected that the SAFETUG data analysis project will enhance understanding of SAFETUG and its applicability to accomplishing PWSRCAC's mission of "citizens promoting environmentally safe operation of the Alyeska terminal and associated tankers."

Saline Layering in Prince William Sound

Prince William Sound Science Center, Musgrave Oceanographic Analysis. October 2010.

From profiles of conductivity, temperature, and depth provided by PWSSC to Musgrave Oceanographic Analysis, we analyzed the mixed layer depth (MLD), the potential energy of mixing, and the salinity and temperature in the upper layers of Prince William Sound by season and region. We defined the MLD as the depth at which a change from the surface density (expressed as) of 0.125 kg m-3 has occurred. As a better measure of the potential for mixing of the upper ocean, we calculated the potential energy of mixing to a depth of 10 meters, the minimum depth over which dispersed oil is expected to mix. The results of this analysis show that the MLD is shallowest in the summer and deepest in the winter.

Escort Winch, Towline, and Tether System Analysis

Robert Allan Ltd. August 2012.

Robert Allan Ltd. was retained by PWSRCAC to conduct an investigation into the nature of the towing systems in use aboard the existing escort tugboats in use within the Ship Escort/Response Vessel System (SERVS) in Valdez, Alaska, and to determine how those systems compare to what can be considered as the current Best Available Technology (BAT) in escort towing systems worldwide.

Wave-Induced Delays in Cargo Transfer at Valdez Marine Terminal – Berth 4

Maria Kartezhnikova, Orson Smith and Peter Olsson. December 2012.

The VMT on the south side of Port Valdez in Prince William Sound, Alaska, occasionally experiences extreme easterly winter winds that either render oil boom deployed around a moored tanker to be overtopped by waves or prevent the safe deployment of the boom on arrival of a tanker. Either contingency results in disruption of oil transfer with the threat of overwhelming storage capacity at the terminus of the Trans Alaska Pipeline System.

Investigations of long-term wind data measured in Port Valdez, the east-west-oriented fjord on which the VMT is located, revealed that easterly winds on the south side by the terminal are typically stronger than on the north side where winds are recorded for public archives. Recorded wind data was not available on the south side of Port Valdez and installation of a recording anemometer in the vicinity of the terminal is recommended. Alternatives investigated to reduce oil transfer disruptions during extreme easterly winds include positioning an ocean tug upwind (with or without a barge) as a wave barrier, temporary and permanent deployment of harbor-type floating breakwater, and deployment upwind of an extra oil boom as a partial wave barrier.

A Review of Best Available Technology in Tanker Escort Tugs

Robert Allan Ltd. November 2013.

Robert Allan Ltd. was retained by PWSRCAC to provide an assessment and professional opinion on the capabilities and performance of the present SERVS escort tug fleet in comparison to the BAT available worldwide in this specialized field of ship design and engineering today.

A Review of Best Available Technology (B.A.T.) for a Sentinel Tug Stationed at Hinchinbrook Entrance

Robert Allan Ltd. January 2014.

Robert Allan Ltd. was retained by PWSRCAC in December 2012, to conduct a broad review of the current Best Available Technology (B.A.T.) in Escort Tug technology worldwide, and to perform a Gap Analysis of the tugs within the SERVS Fleet against that current B.A.T. As an adjunct to that report, a review of the requirements for a "Sentinel Tug" to be stationed at Hinchinbrook Entrance was also requested. It was agreed that this topic should be treated in isolation from the broader Escort Tug B.A.T. study, and hence this report constitutes the findings of this separate Sentinel Tug study.

Iceberg Detection Performance Simulations to Support the Installation of New S6 Processor with the Reef Island Radar

C-CORE. July 2014.

In 2002, under contract from PWSRCAC, C-CORE assisted with the installation of an ice detection radar on Reef Island in Prince William Sound. The primary function of the ice detection radar is to provide a means to locate icebergs as they calve from Columbia Glacier and drift across the Sound towards the shipping lanes. This provides a means for deciding whether it is safe for tankers and other vessels to transect the Sound through the region of highest iceberg density; this region is generally located in front of the Columbia Glacier and in the general vicinity of Point Freemantle and Glacier Island. The installation of the ice radar on Reef Island was a joint initiative, led by PWSRCAC, and involved C-CORE, the U.S. Coast Guard and SERVS.

Iceberg Future Iceberg Discharge from Columbia Glacier, Alaska

W. T. Pfeffer Geophysical Consultants. 2012-Final Report June 2015.

Columbia Glacier, in the northeastern corner of Prince William Sound and ca. 12 miles distant from the path of tankers leaving the southern terminus of the Trans Alaska Pipeline System, has been in a state of rapid tidewater retreat since the early 1980s. Icebergs discharged by the glacier during the retreat have largely been contained within the moraine shoal at the position of the terminus prior to the glacier’s retreat, but the fraction of icebergs crossing the moraine and entering Prince William Sound proper still pose a potential hazard to ship traffic in the Sound.

Sentinel Tug Requirements for Gulf of Alaska: Ship Drift Study

Robert Allan LTD. May 2016.

In 2015, PWSRCAC contracted with Robert Allan Ltd. to conduct this drift study in order to close the gap in the knowledge of ship behavior and response capability within the study area. The drift study modelled both 125,000 deadweight tons (DWT) and 193,000 DWT tankers drifting from pre-determined start points in the shipping lanes, in the defined Closure Condition at Hinchinbrook Entrance of 45-knot winds or 15-foot seas, as measured by the buoy at Seal Rocks. It is important to note that due to effects including wave sheltering, topographic sheltering, and buoy anemometer height, this closure condition is actually equivalent to approximately 57 knots of wind (at 10 meter elevation) and 20-foot seas in the gulf areas offshore of Hinchinbrook, where a rescue tow of a disabled tanker would potentially take place.

Ship Simulation and Mariner Study of the Maritime Implications for Tank Vessels Utilizing Potential Places of Refuge, Mid-Prince William Sound Alaska

Safeguard Marine, LLC. January 2017.

The purpose of this study is to assess the capability of tank vessels (tankers) in distress utilizing mid–Prince William Sound Potential Places of Refuge (PPOR) that were determined in the Prince William Sound Subarea Contingency Plan. This study does not examine PPOR Knowles Head Anchorage, because it is currently utilized as an anchoring site for tankers. North Smith Island, Outside Bay, and McPherson, as identified by the contingency plan are all examined.

A Review of the Proposed New Escort and Support Tugs for Tanker Operations in Prince William Sound

Robert Allan LTD. February 2017.

This review identifies many aspects of both proposed tug designs that indicate (a) a lack of thoroughness in proving suitability for purpose of the tugs, and (b) unfamiliarity with the requirements for safe and sensible operation in the Alaska climate. The latter issues are perhaps not all critical to the vessel base mission but will certainly render the boats difficult to operate and to maintain well. Many other issues are raised that are simply good design practice issues that could be revised at minimal cost to provide a safer and better operating environment for the crew, and result in less downtime and long term maintenance.

Circulation in Port Valdez, Alaska measured by Lagrangian Drifter Experiments, towed acoustic Doppler current profiler and hydrographic profiles in June and September 2016, and March 2017.

Prince William Sound Science Center. March 2018.

The PWSSC conducted a study of circulation for the PWSRCAC to describe and quantify the currents within Port Valdez, Alaska, and to address concerns regarding the potential dispersal of contaminants, such as spilled oil, within the fjord basin. PWSRCAC felt this research would help the oil spill response community to understand the fate and transport effects of oil, gather specific decision making information related to chemical dispersant use, and assist with prioritization and tactics related to sensitive area protection strategies. The knowledge gained from this study would also aid in designing and validating any future models of oil movement and general circulation applied to Port Valdez, including the oil spill contingency and response (OSCAR) model, the general NOAA oil modeling environment (GNOME), and regional ocean modeling system (ROMS).