Vessel Movement Module: Rules that may affect vessel movements in the Salish Sea
Technical Discussion
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Ecology Staff:

Brian Kirk, *Prevention Section Manager*

Jase Brooks, *Legislative Policy Analyst and Tribal Liaison*

Adam Byrd, *Research and Information Technology Unit Supervisor*

Alex Suchar, *Expert Model and Analysis Scientist*

Melba Salazar-Gutiérrez, *Model and Analysis Scientist*

JD Ross Leahy, *Maritime Risk Modeling Specialist*

Justine Asohmbom, *Shorelines and Stormwater Education Manager*

Rachel Assink, *Washington Sea Grant Hershman Fellow*

Participants:

Andrea Nesdoly, *University of Victoria*	Kelly Baughman, *Crowley*
Benoit Philippe, *Transport Canada*	Kim Pearce, *Transport Canada*
Blair Bouma, *Puget Sound Pilots*	Mike Moore, *Pacific Merchant Shipping Association*
Bob Poole, *Western States Petroleum Association*	Norma Serra, *University of Victoria*
Bretwood Higman, *Nuka Research and Planning*	Rein Attemann, *Washington Environmental Council*
Dan Morrison, *Centerline Logistics*	Ross McDonald, *Sause Bros*
Don Noviello, *WA Department of Fish and Wildlife*	Sadie Donovan, *Transport Canada*
Fred Felleman, *Wave Consulting*	Salma Abdel-Raheem, *The Whale Museum*
Jaimie Bever, *WA Board of Pilotage Commissioners*	Sven Titland, *Centerline Logistics*
Jerry Popovice, *GMP Consulting*	Todd Hass, *Puget Sound Partnership*
John Veentjer, *Marine Exchange of Puget Sound*	Tom Ehrlichman, *Swinomish Indian Tribal Community*
Kayla Dunlap, *Port of Grays Harbor*	

The following summary notes are not intended to be a transcript but rather a review of the discussion session. Participant questions and comments are shown in bold text followed by Ecology responses.

Discussion of Existing Rules

You might want to include the COLREGs as well as rules. (Blair Bouma)

JD Leahy: Our thought is that the COLREGs (International Regulations for Preventing Collisions at Sea 1972) will be incorporated by default. When we look at historical movements of vessels, the patterns will reveal themselves. The COLREGs also have a challenge in that they don't necessarily mandate behavior for all situations, but provide a framework instead.

I suggest you include the no meeting recommendation in Rosario Strait, also known as the Rosario 1-way rule? (Fred Felleman)

JD: That is one of the rules we are considering. It is included in our list under its formal name: "The Eastern San Juan Island Archipelago VTS Special Area."

How do you see balancing deterministic vs. probabilistic approaches? I'd imagine from a deterministic perspective, you might start with some "best" route between points and then come up with rules that would modify that - e.g. related to collision avoidance or response to specific weather, current, or tide conditions. Probabilistically, you could try to capture the breadth of possible paths with statistical variation around a mean, with correlations between various variables like ship characteristics and conditions. (Bretwood Higman)

Alex: Our model will be a probabilistic model. The reason for these rules is to eliminate impossible scenarios from taking place in the simulation. The Rosario rule provides a clear example of this. In addition, we need to figure out, for example, how do to decide which vessel goes first, if they are restricted from meeting.

Please note that Haro strait lane is technically 2-way but vessels don't always stay in different lanes. Also, when there's 2-way traffic and overtaking - please take special note around the region of Kelp Reef. (Fred Felleman)

I would support JD's suggestion about including the new commercial whale watch rules, which come into effect in Jan 2021. 2. One of the rules that's listed in the fact sheet is lateral displacement in SJDF. Is that the same as the traffic separation scheme the Canadians were looking at a year or two ago? (Rein Attemann)

JD Leahy: No, it's not a traffic separation scheme or navigational guidance. It's a recommendation that vessels that don't need to operate in a specific area limit their presence there. The voluntary program is designed to protect Southern Resident killer whales, and isn't necessarily about collision avoidance.

Brian Kirk: The lateral separation trial by Transport Canada was partly an exploration to determine if there would be value to shifting the location of the TSS, that's the link between the two topics.

Supplementary information on the ECHO Program voluntary lateral displacement trial in the Strait of Juan de Fuca:

> "Where it was safe and operationally feasible to do so, all deep-sea vessels transiting outbound through the Strait of Juan de Fuca were requested to navigate as far south as possible within the outbound lane of the traffic separation scheme without entering the separation zone, in the area between 124 [degrees] west and 124 [degrees] 40 [minutes] west. Vessels entering the outbound lane of the traffic separation scheme were asked to remain on the north side of lane as they entered, then shift to the south when safe to do so. Between these same longitudes, all vessels transiting the inshore trial zone were requested to navigate as far south from Vancouver Island as possible without entering the traffic separation scheme. At 124 [degrees] 40 [minutes] west the trial zone concluded and vessels positioned normally for their subsequent passage plan route." (From [ECHO Program 2018 voluntary lateral displacement trial in the Strait of Juan de Fuca Summary findings](#))

Would the Traffic Separation Scheme (TSS) be something to consider adding to the simulated rules? (Rein Attemann)

JD Leahy: We're not trying to build an idealized representation of the way traffic moves based on rules like the COLREGs, TSS and the ATBA (Area To Be Avoided), etc. We want to represent how vessels actually move within the area. Vessels sometimes cross the traffic separation zone, and Haro Strait may be technically two way but vessels sometimes don't operate that way. We need to balance or plan to use actual historical data while still avoiding simulating things that don't actually happen in practice.

Alex Suchar: The existence of the TSS is already showing up in AIS data. Instead of proposing in the model that all vessels stick to TSS, we'll actually model behavior as we observe it in the AIS data. This is why some of the rules we incorporate, and some we see in the AIS data.

Just a thought about the collision regulations as a rule - using the AIS patterns to train the model will have a bias to commercial vessels and mariners as those predominate AIS carrying vessel. Non-AIS vessel have a different pattern of behavior so may need to use other rules to define their distribution and usage patterns. (Kim Pearce)

JD Leahy: It's true that we are starting out with a strong bias toward the AIS data. We are looking at those vessels first and the rules we are considering simulating are focused on those movements. It is true that there will be another set of vessels that don't transmit AIS and we'll have to figure out a manual way for representing them and their movement.

JD's description of WDFW's proposed rule for commercial whale watching deserves a bit more elaboration, as the draft rule would only apply when such vessels encounter 'Southern Resident' orcas, which represent a relatively small fraction of all whale encounters by such vessels-- therefore this may be a challenging modeling proposition to apply to the varied US and Canadian whale watching fleets. (Todd Hass)

Strategies for Modeling Affects of Existing Rules

When considering the relationship between AIS and non-AIS vessels, I think in some cases the existence of non-AIS vessels would explain the behavior of the AIS vessels. So if you see an AIS vessel in area where you wouldn't think it should be, it's almost always because a non-AIS vessel might be there and they are interacting. So they're directly related. There's probably 50 percent random behavior from small vessels, but there are some patterns too, and I'd be happy to connect with you in a different format and go over the patterns we see in our waters from non-AIS vessels. With the one way zone in Rosario, that's rigidly adhered to, but it only applies to the larger vessels, which are usually state ferries or piloted vessels. It's roughly first come first serve, but pilots sometimes talk and say you go first or vice versa, depending on commercial urgency or traffic or tug escort issues or a lot of other factors. There are informal rules, like favoring the inbound vessel because someone is waiting for them. Perhaps they have tugs waiting or a refinery waiting, so we make attempts to get them clear first. There's a few workarounds, like for instance, we may use Haro and Boundary Strait, so that one vessel can take Rosario and the other takes Haro/Boundary. The Coast Guard VTS actually gives approval for the vessels to make their transit. So the vessels that fall in that category are intending to transit that special area, but they have to get approval from VTS, who will screen them. If they have passing arrangement already in place, VTS may honor that. But that's one of the more rigid rules in our area. (Blair Bouma)

JD: We would love to have those conversations about patterns on the waterway. We also have a dedicated conversation on non-AIS vessels planned for Nov. 4th. For the Rosario one-way zone, one of the pieces we'll be looking to determine is the general distance or time from the arrangement where we see a change in behavior, like a vessel slowing down. Once we figure these rules out, we have to start creating an understanding of how vessels handle the existence of those rules. Where and when do they start to change their behavior?

I want to request again that non-AIS treaty tribal fishing vessels are patterned in your model as a separate vessel type, with movements estimated based on their consistent home port return each day (each tribal fishing center), and the general pattern of scheduled fisheries and fishery areas. I also suggest you see if you can apply a rule that takes into account the most dense fishing congregations seasonally, where larger AIS vessels would likely avoid those concentrations. (Tom Ehrlichman)

JD Leahy: Thanks for this suggestion.