

VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

3D Relative Risk Profile Comparison
Potential Collision Accident Frequency

CASE T – GW – KM – DP & 6 RMM's

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VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010



RMM 1: Max. Speed of Container Vessels at 17 knots.

RMM 2: Reduce Human Error incident on Oil Barges by 50%

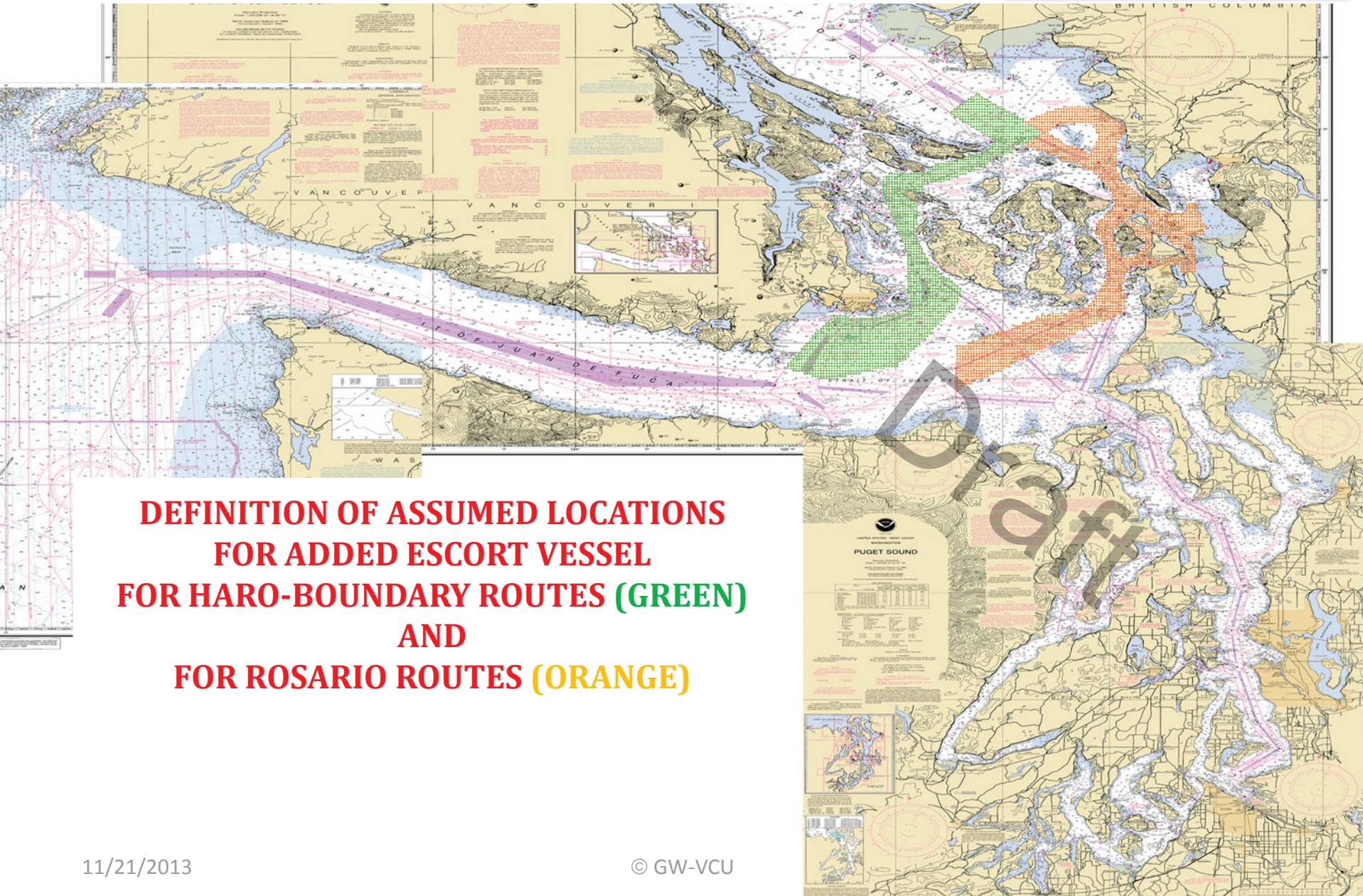
RMM 3: No Bunkering for Gateway Vessels

RMM 4: ATB Vessels obey Rosario one-way regime

RMM 5: + 1 Escort for Laden Tank Focus Vessels (except Oil Barges) and Cape size Bulk Carriers on Rosario Routes (see next page)

RMM 6: + 1 Escort for All Focus Vessels on Haro-Boundary Pass Routes (see next page)

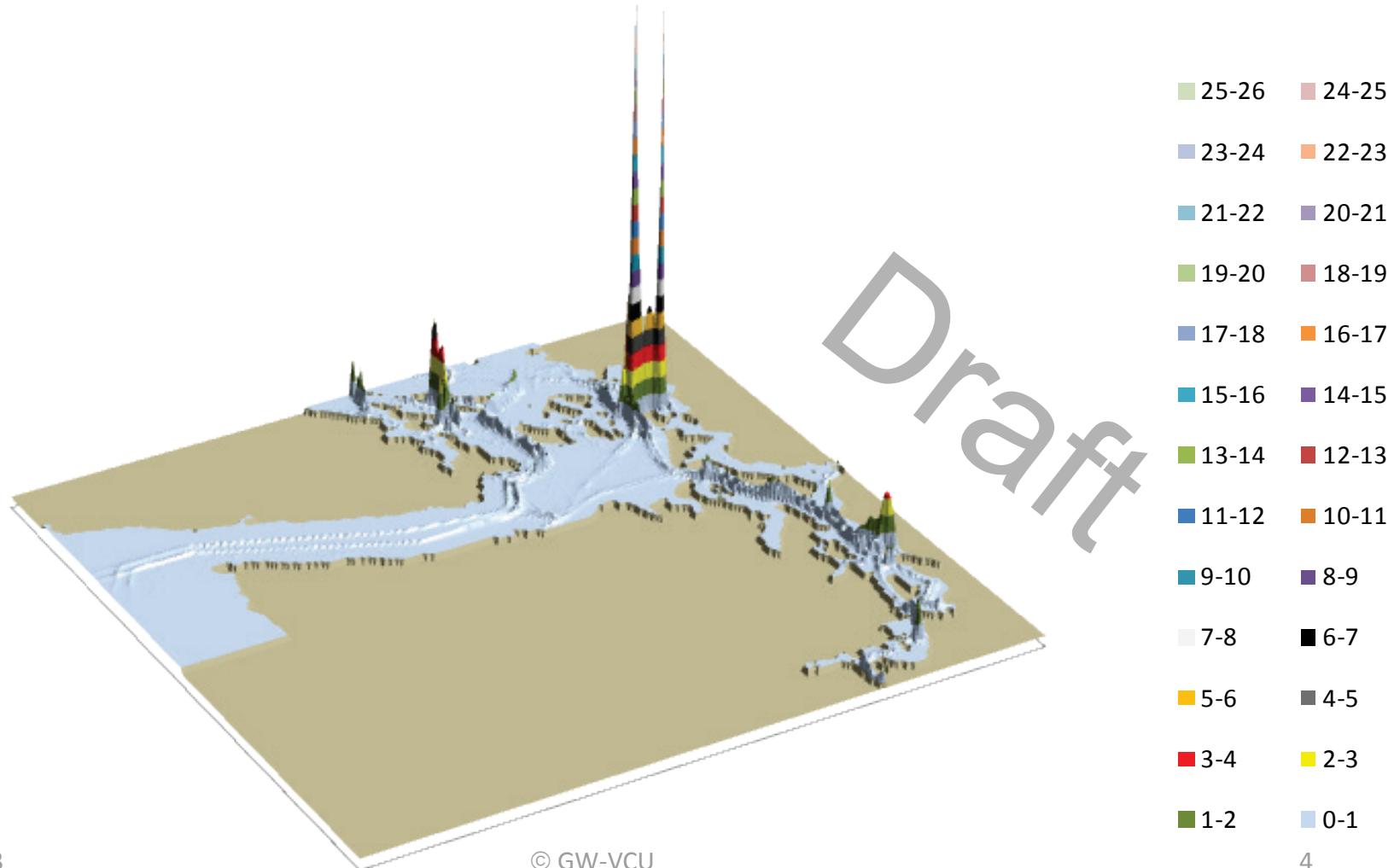
VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010



**DEFINITION OF ASSUMED LOCATIONS
FOR ADDED ESCORT VESSEL
FOR HARO-BOUNDARY ROUTES (GREEN)
AND
FOR ROSARIO ROUTES (ORANGE)**

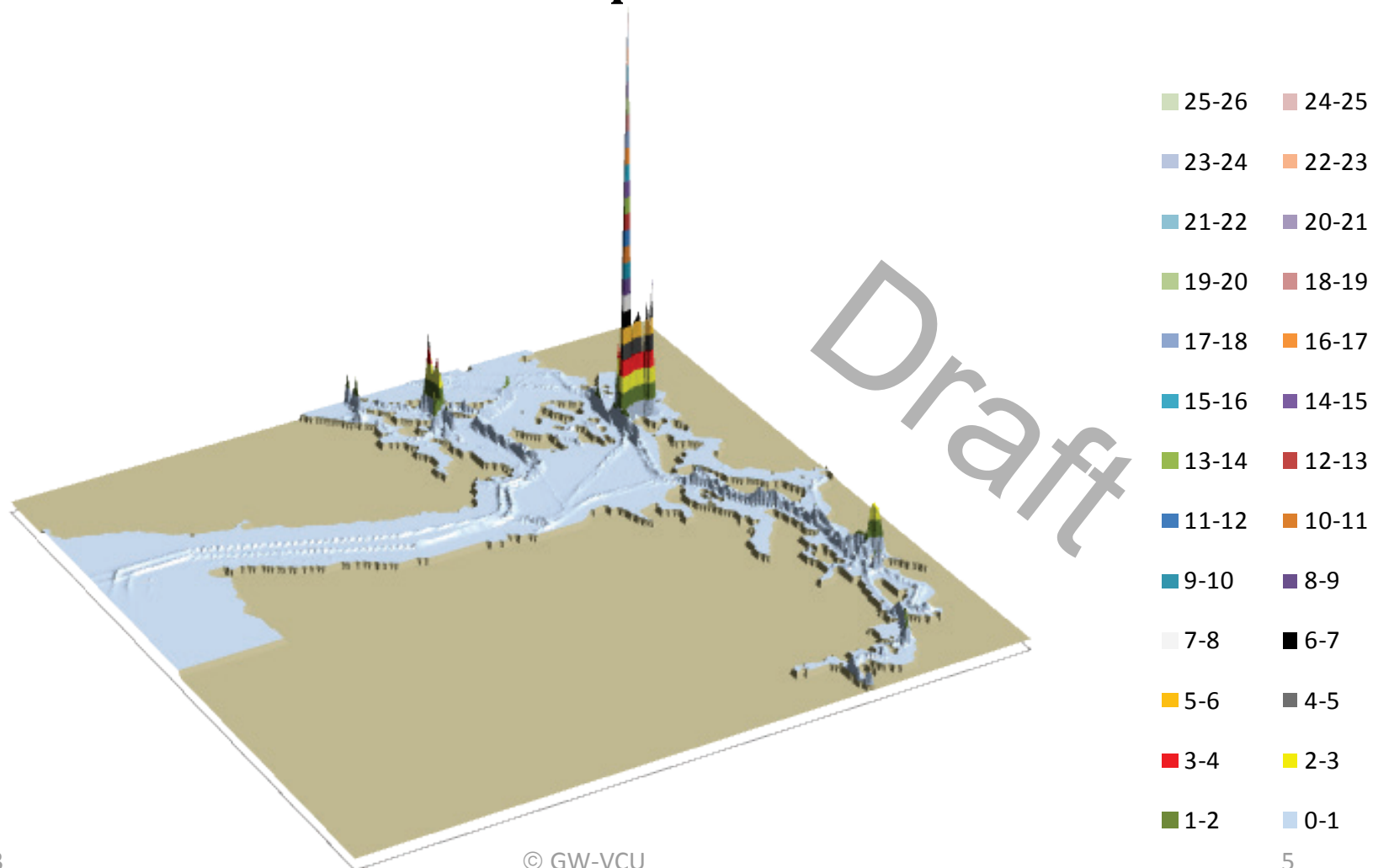
VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

T: GW - KM - DP 3D Risk Profile All FV - Pot. Coll. Acc. Freq.: 121% of Base Case PCF



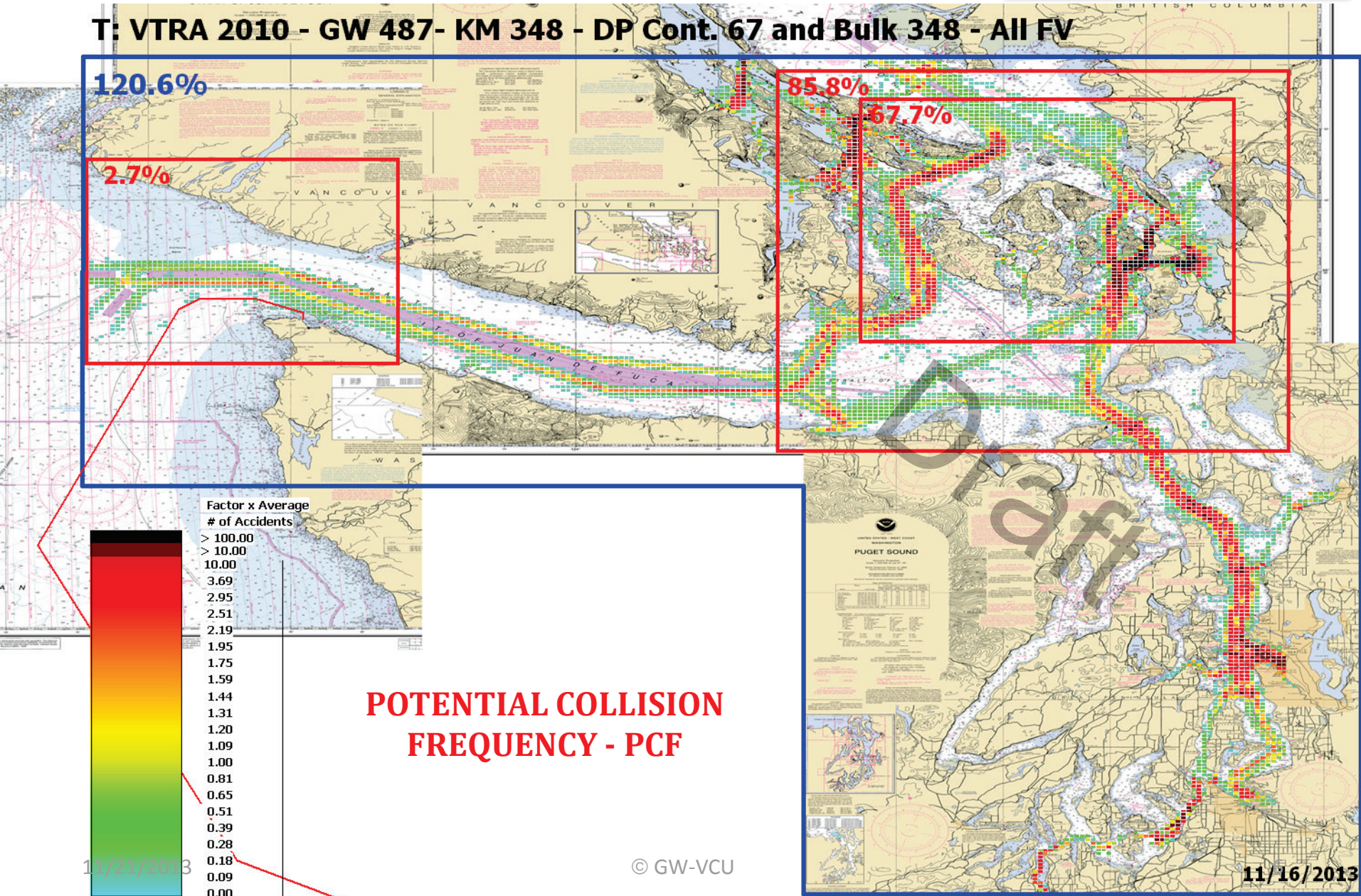
VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

T: GW - KM - DP & 6 RMM 3D Risk Profile
All FV - Pot. Coll. Acc. Freq.: 90% of Base Case PCF



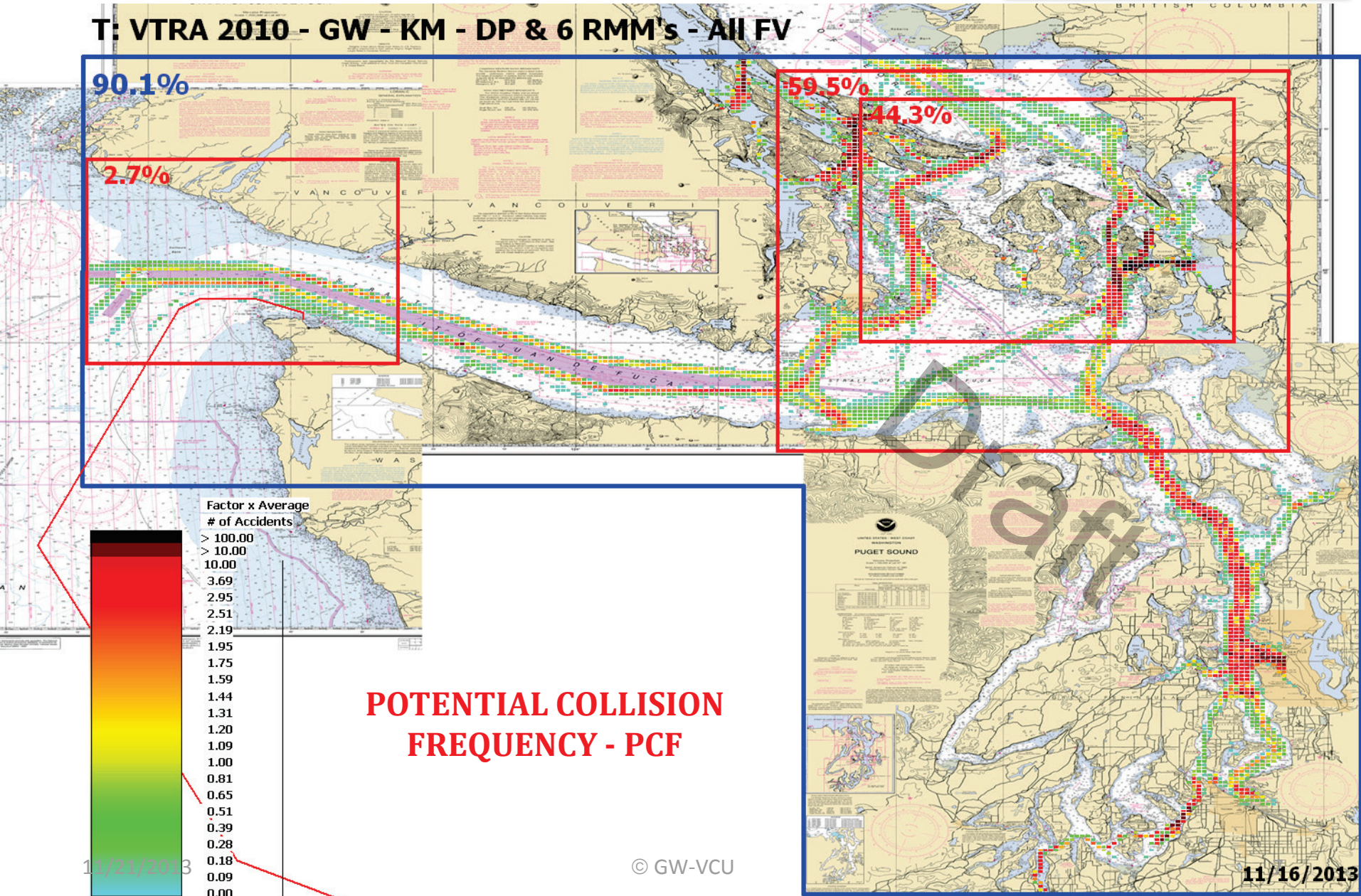
VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

T: VTRA 2010 - GW 487- KM 348 - DP Cont. 67 and Bulk 348 - All FV



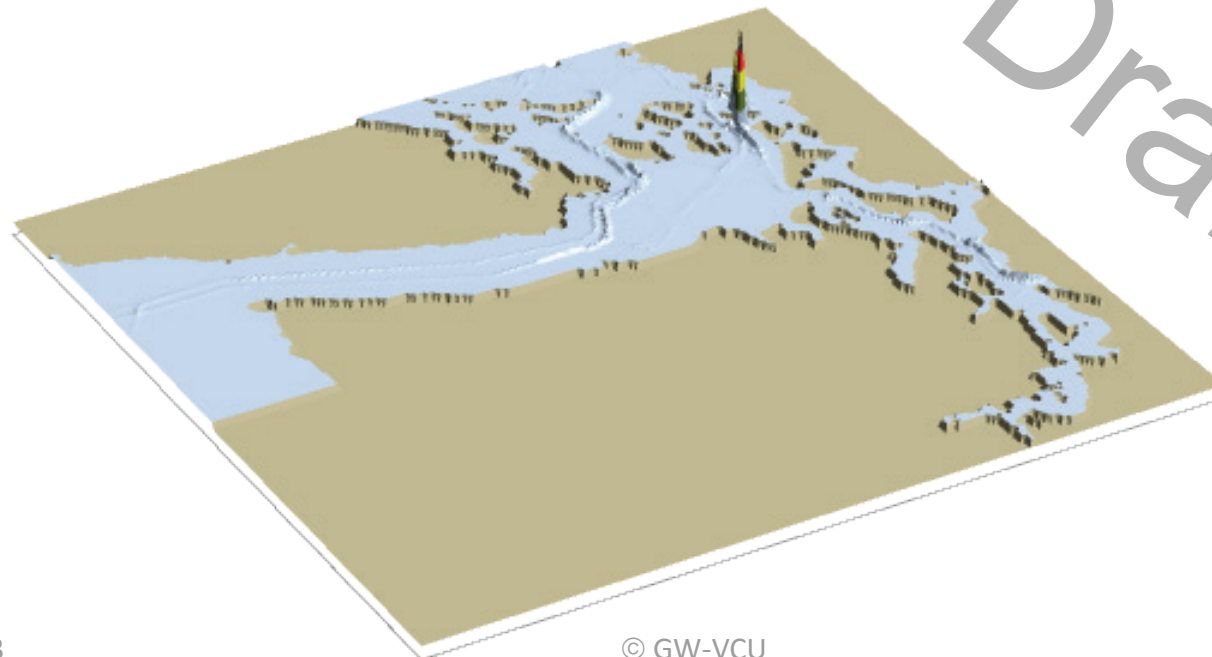
VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

T: VTRA 2010 - GW - KM - DP & 6 RMM's - All FV



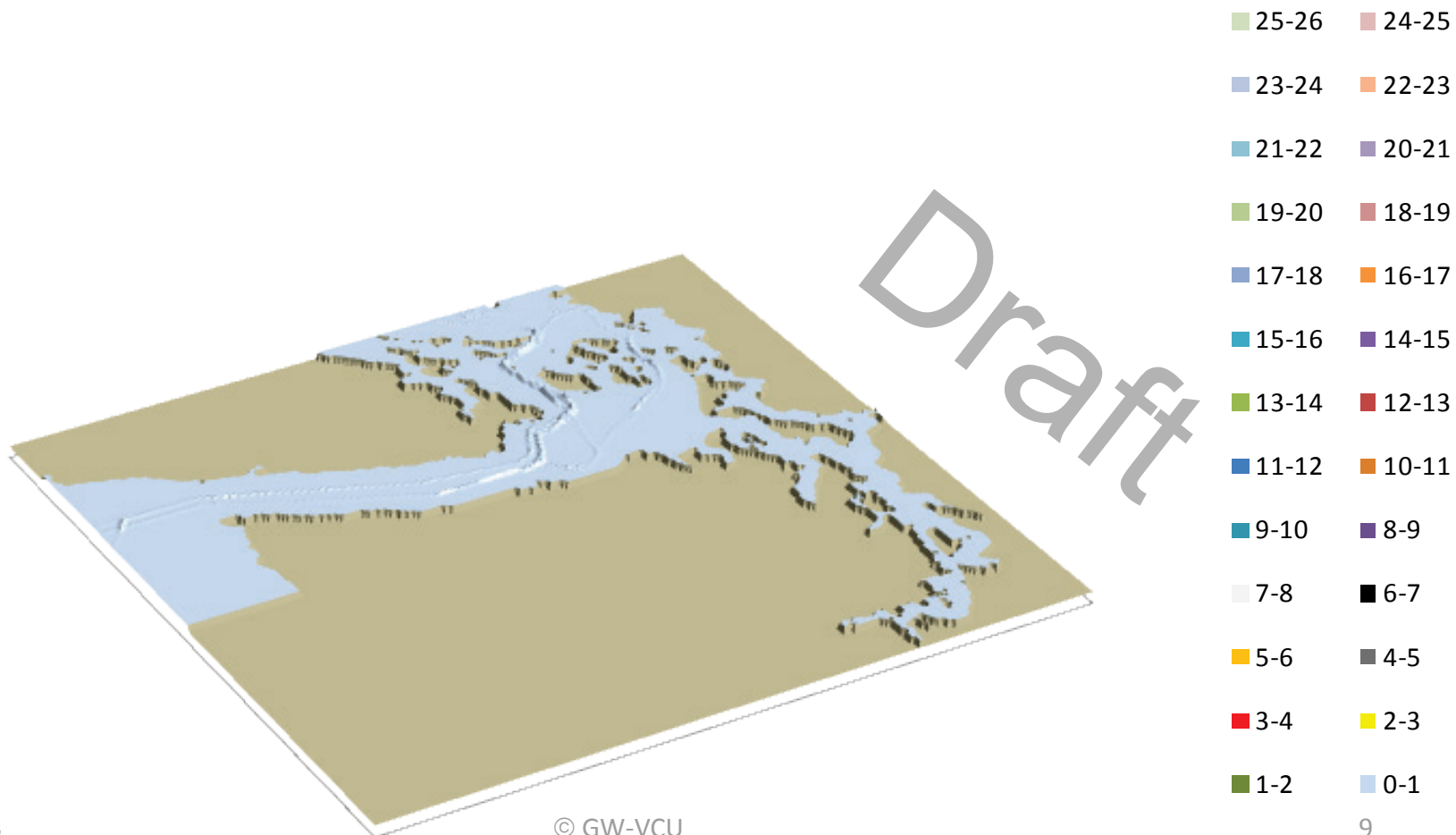
VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

T: GW - KM - DP 3D Risk Profile What If FV - Pot. Coll. Acc. Fr.: 18% of Base Case PCF



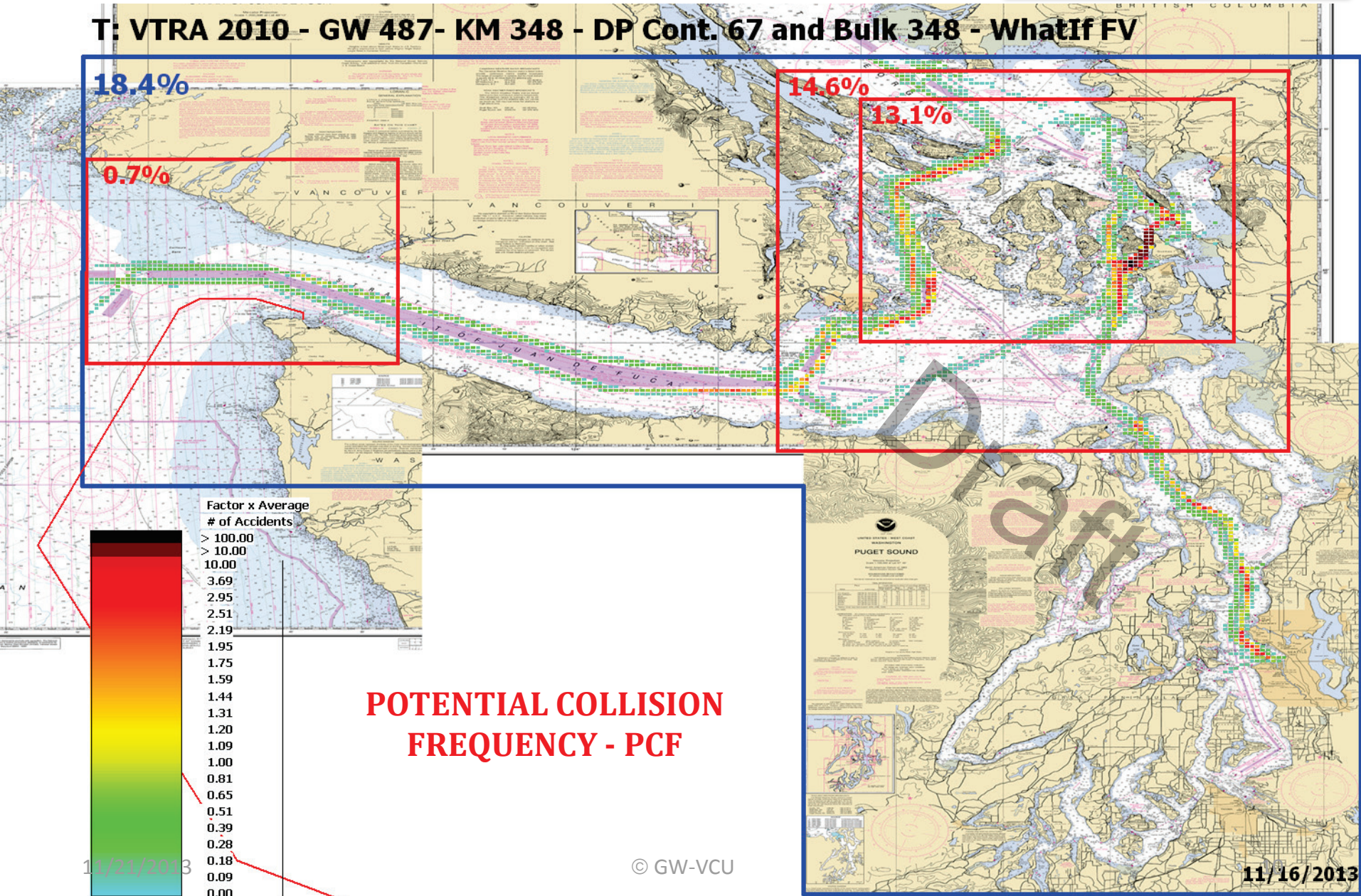
VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

T: GW - KM - DP & 6 RMM 3D Risk Profile What If FV - Pot. Coll. Acc. Fr.: 6% of Base Case PCF



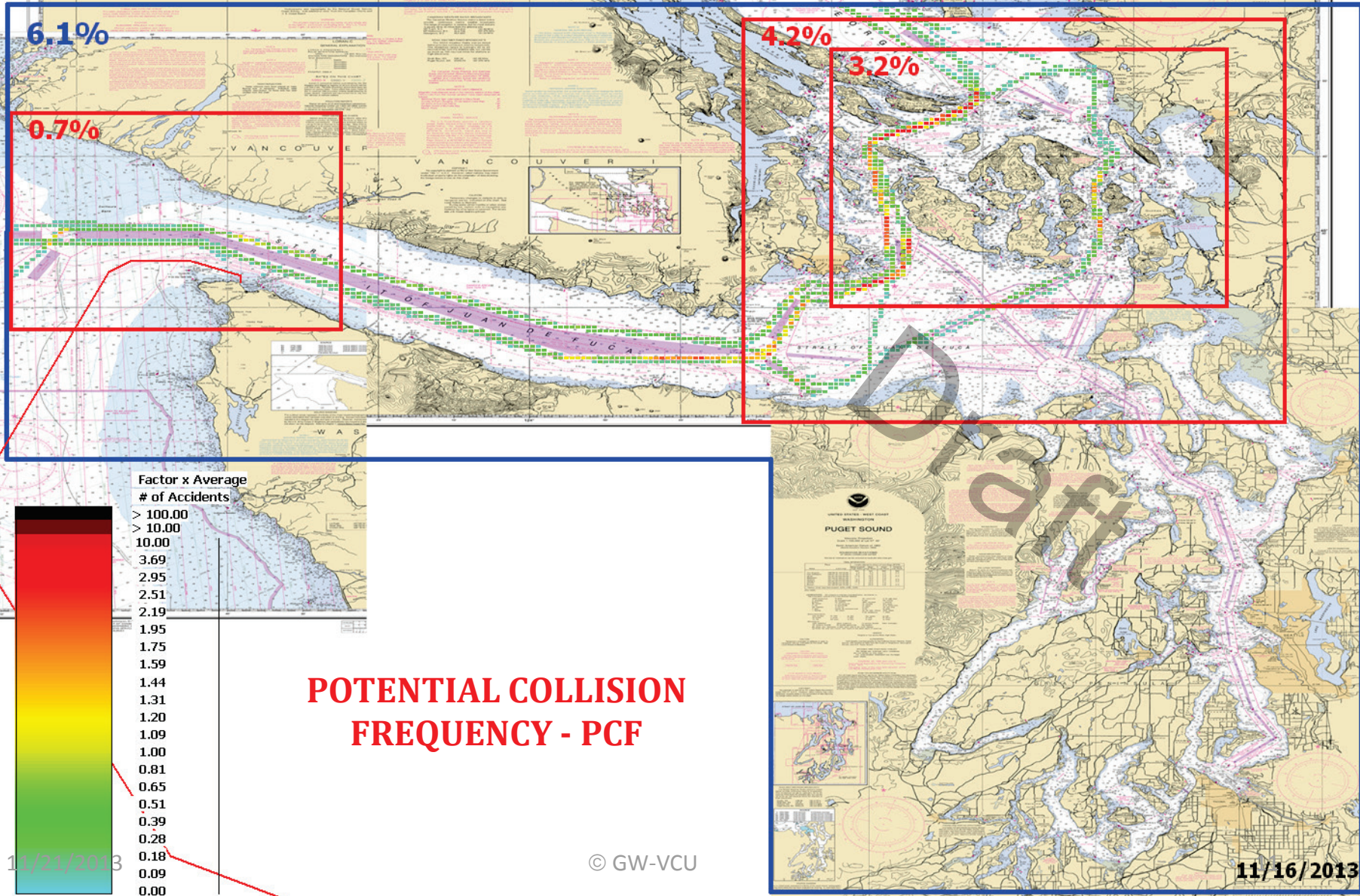
VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

T: VTRA 2010 - GW 487- KM 348 - DP Cont. 67 and Bulk 348 - WhatIf FV



VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

T: VTRA 2010 - GW - KM - DP & 6 RMM's - WhatIf FV



POTENTIAL COLLISION FREQUENCY - PCF

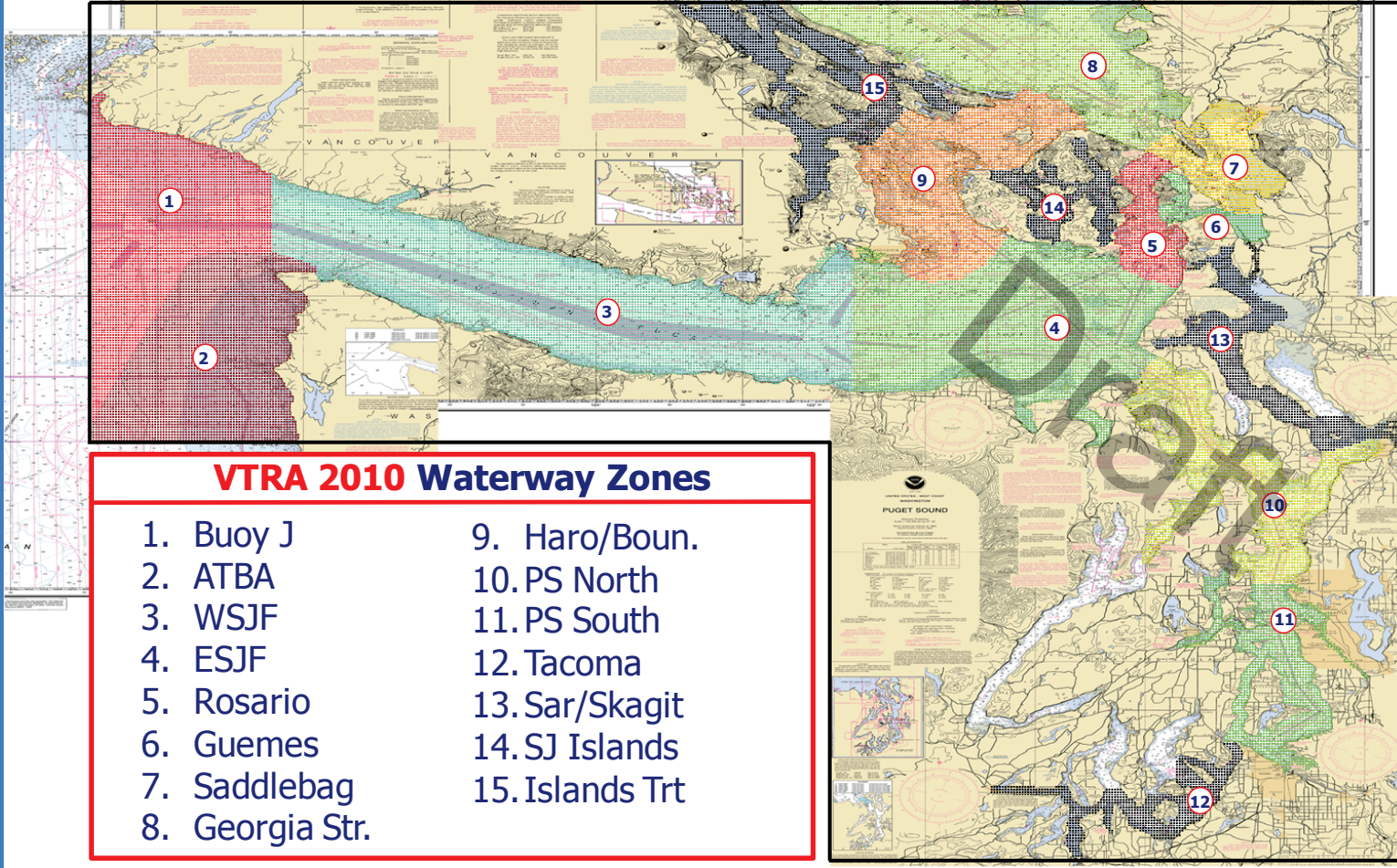
11/21/2013

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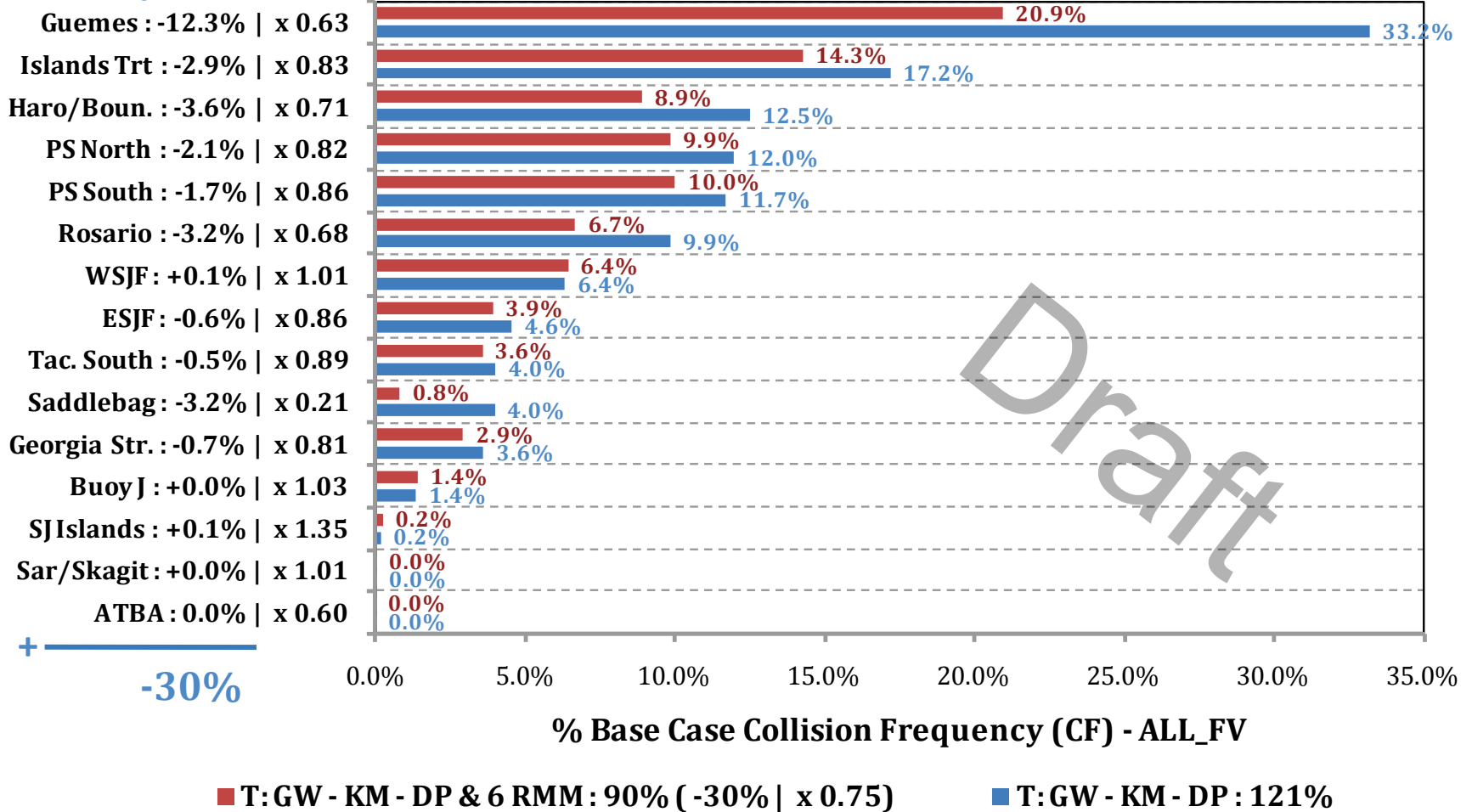
DEFINITION OF 15 WATERWAY ZONES



VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

% Base Case Collision Frequency - ALL_FV

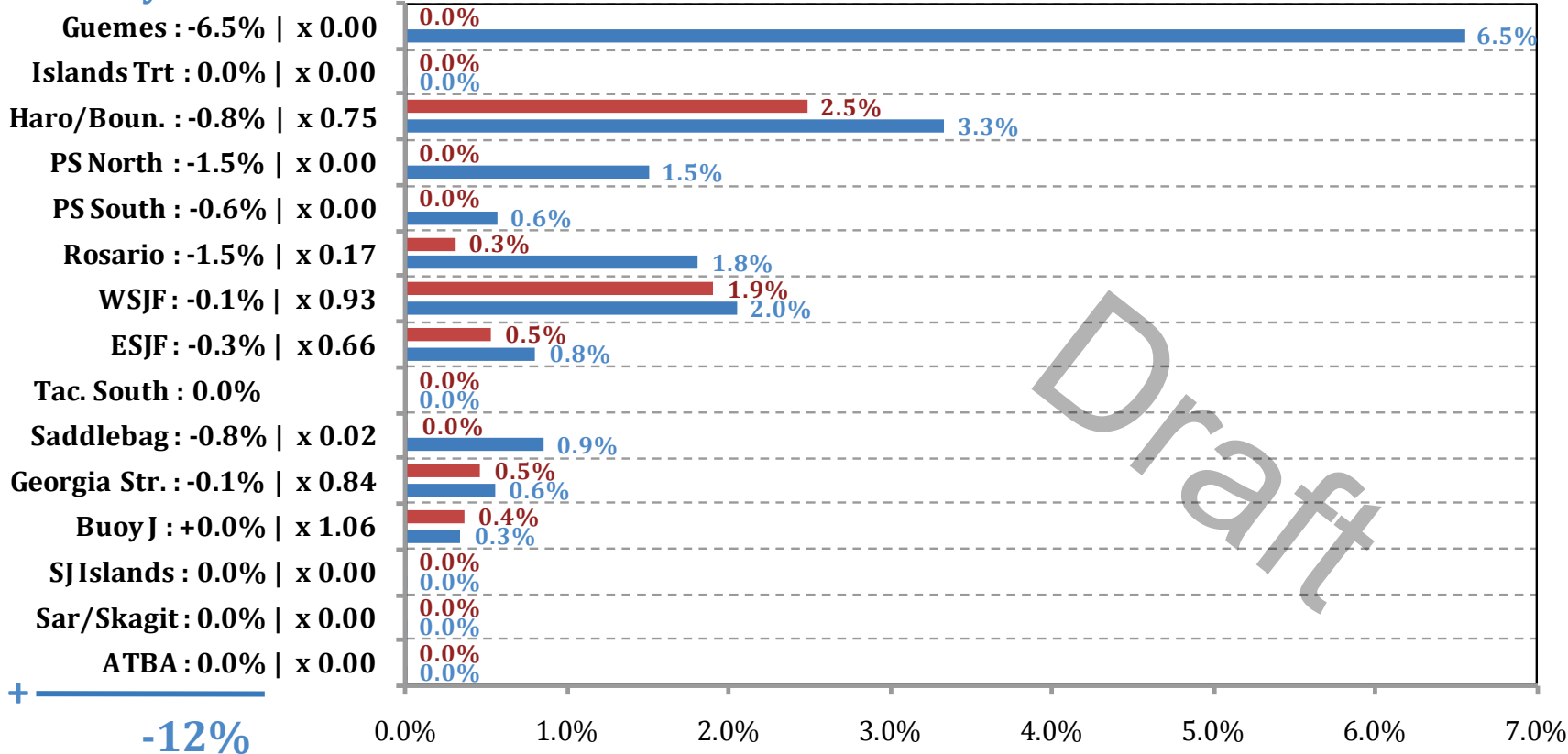
Waterway Zone:



VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

% Base Case Collision Frequency - WhatIf

Waterway Zone:



% Base Case Collision Frequency (CF) - WhatIf

■ T:GW - KM - DP & 6 RMM : 6% (-12% | x0.33) ■ T:GW - KM - DP : 18%