

VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

3D Relative Risk Profile Comparison
Potential Grounding Oil Loss

CASE T – GW – KM – DP & 6 RMM's

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November 2013



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%

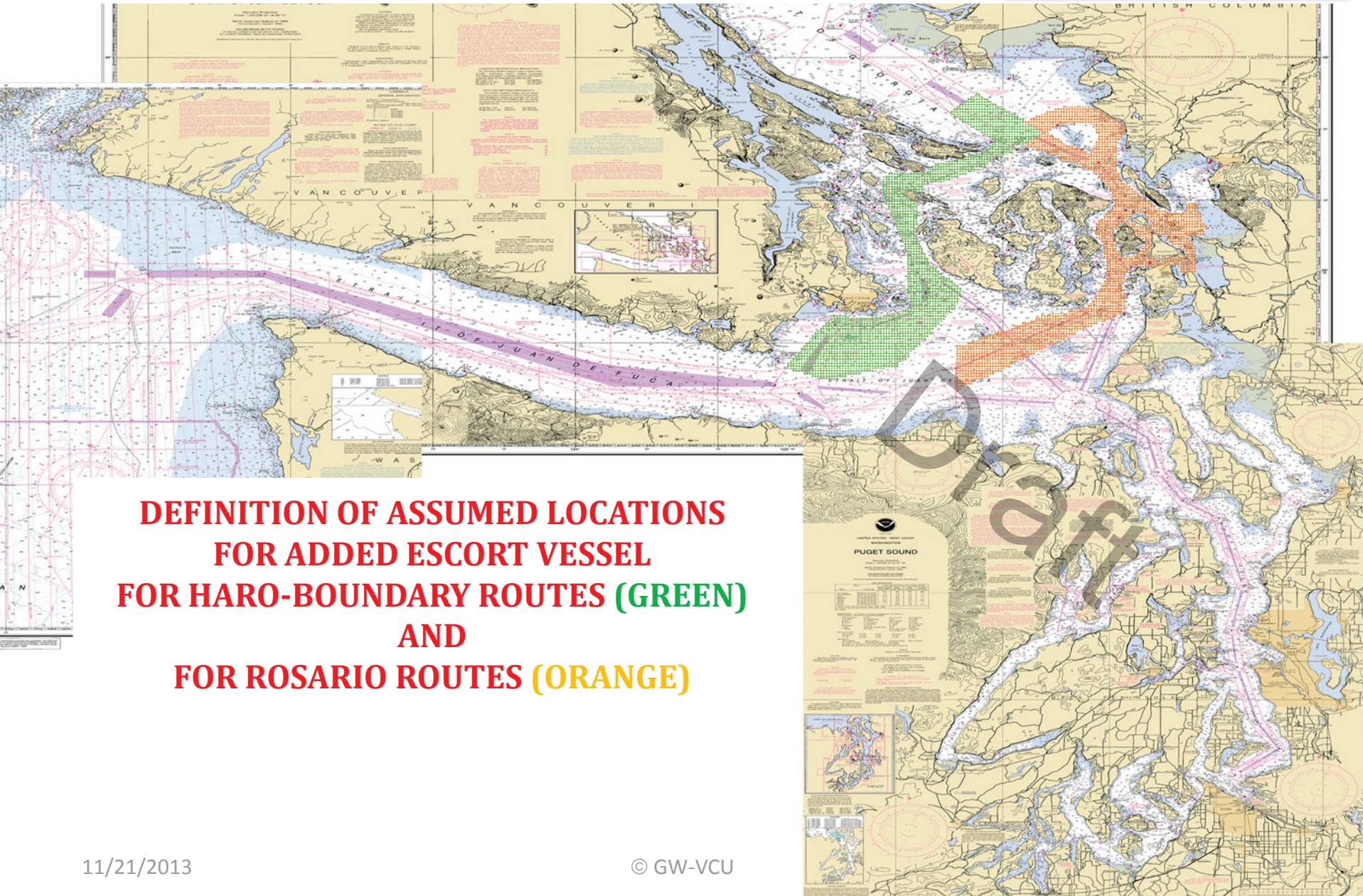
RMM 3: No Bunkering for Gateway Vessels

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)

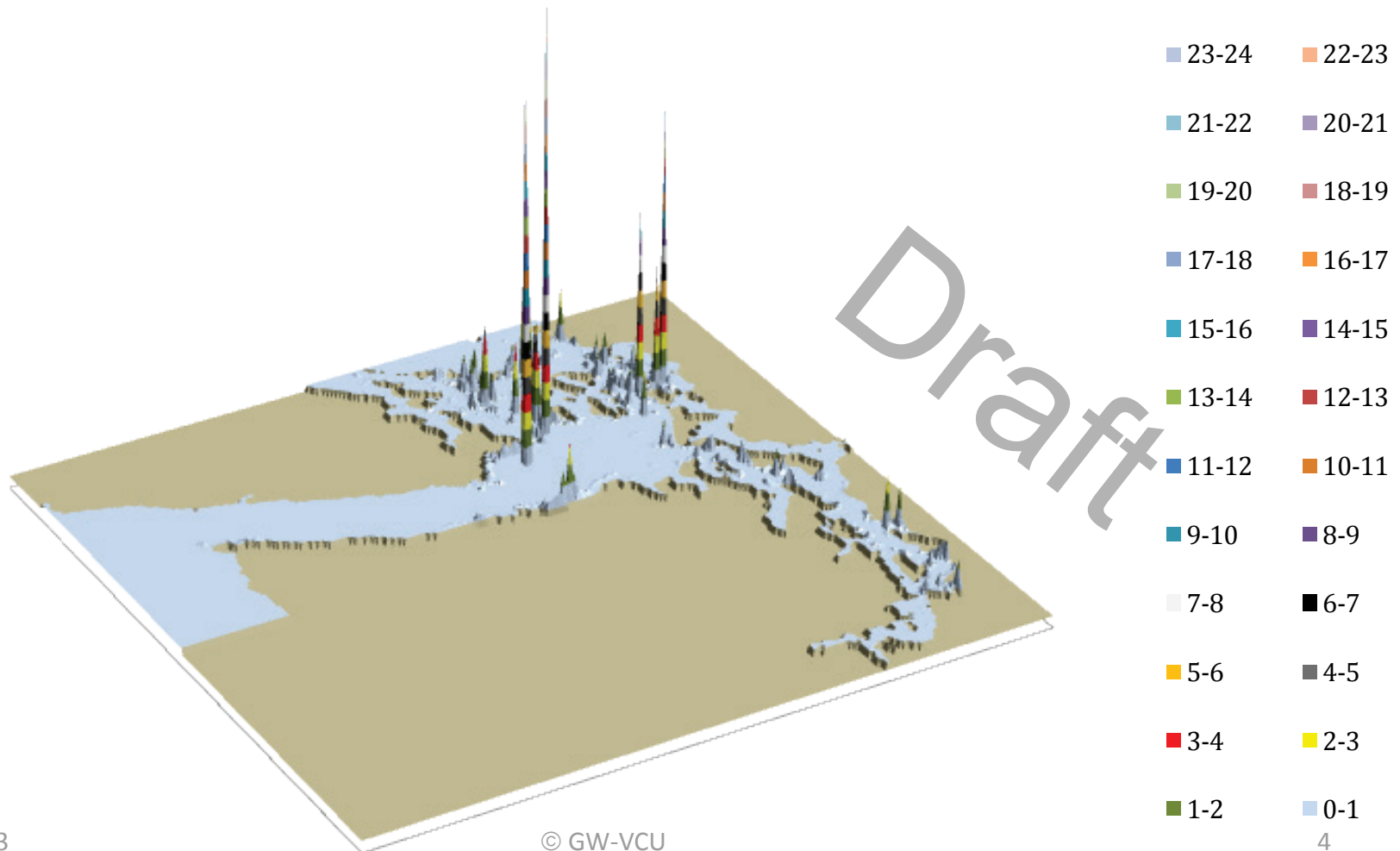
VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010



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

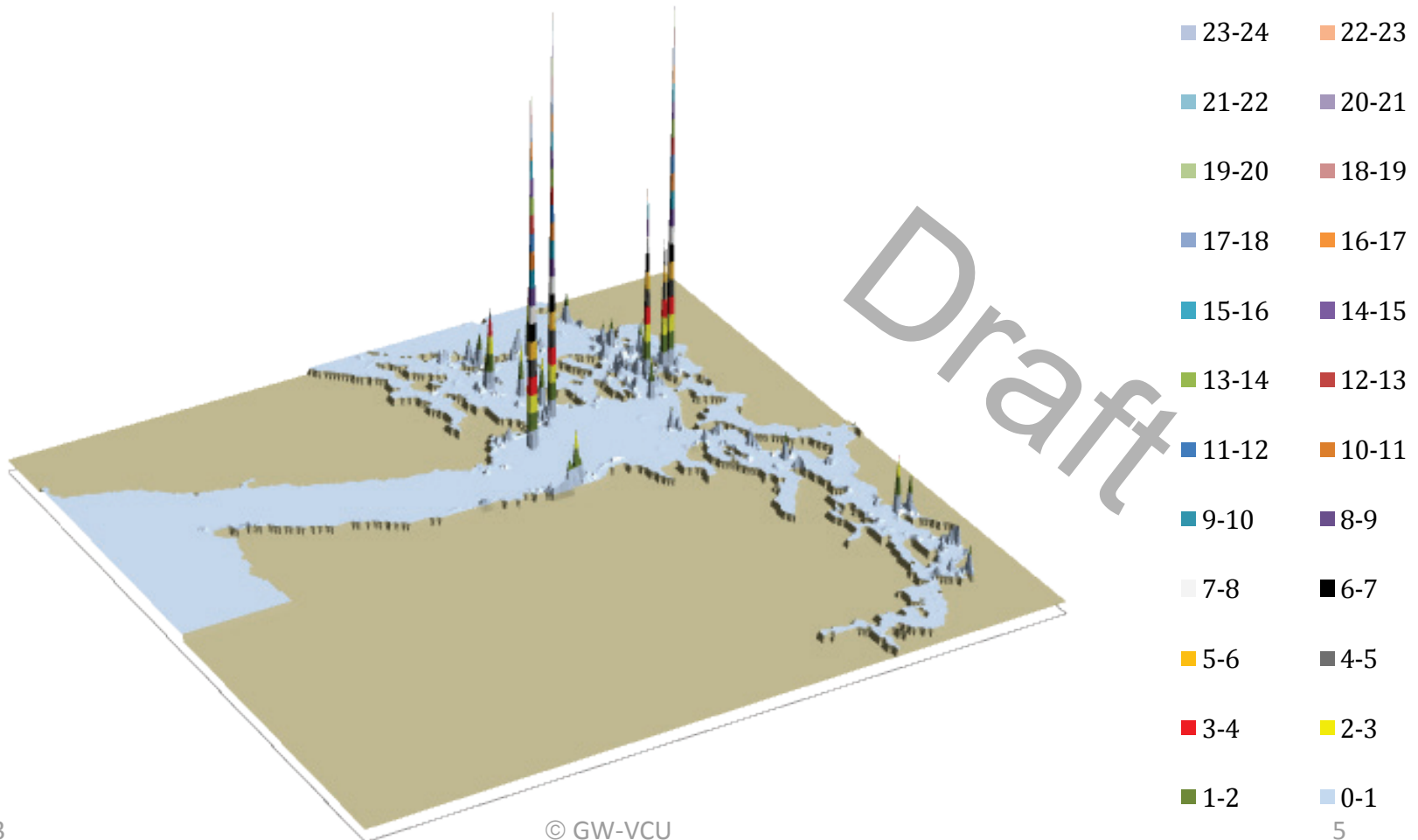
VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

T: GW - KM - DP 3D Risk Profile All FV - Pot. Ground. Oil Loss: 159% of Base Case PGO



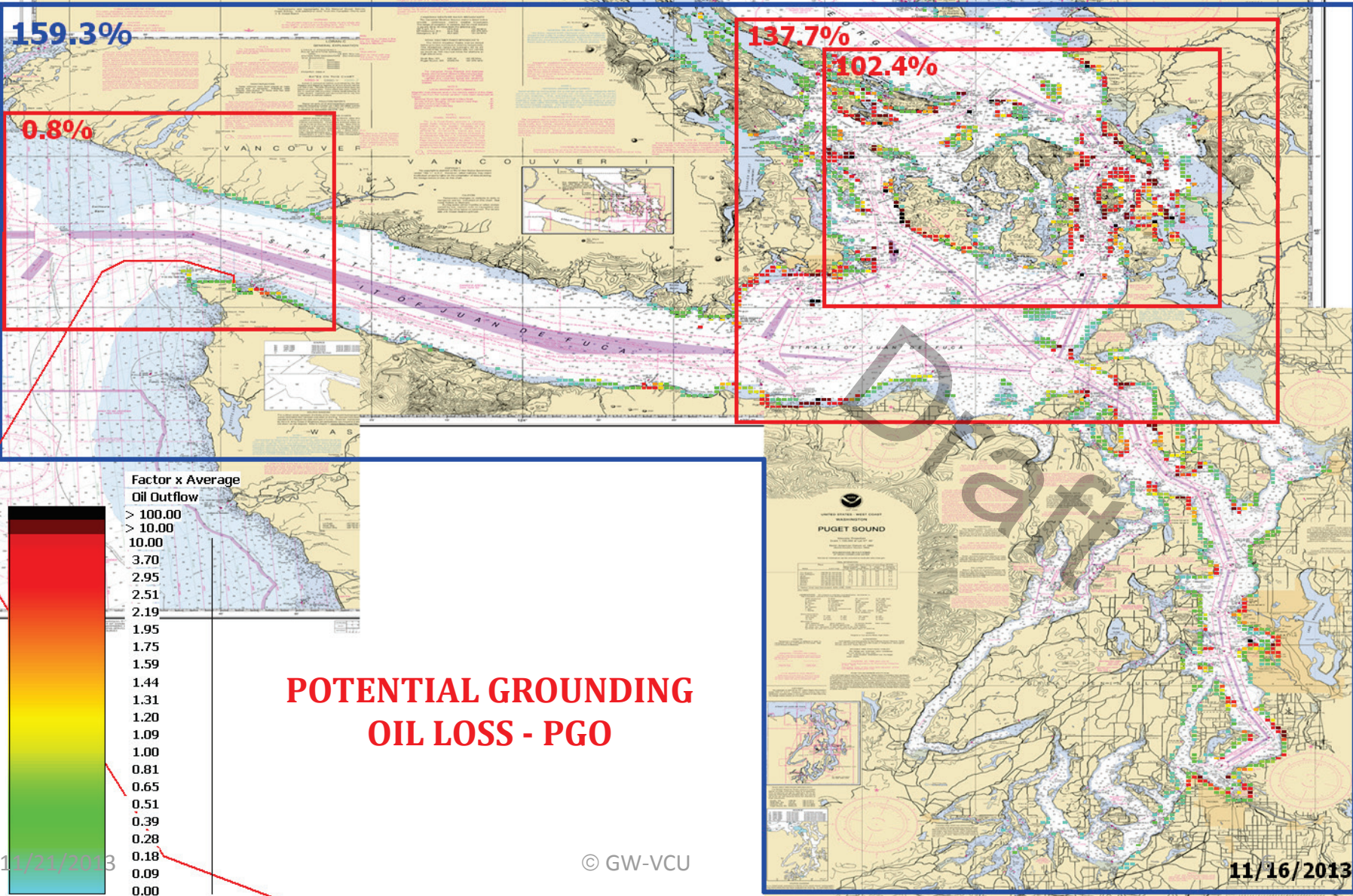
VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

T: GW - KM - DP & 6 RMM 3D Risk Profile All FV - Pot. Ground. Oil Loss: 125% of Base Case PGO



VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

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



POTENTIAL GROUNDING OIL LOSS - PGO

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VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

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

124.9%

0.8%

107.0%

77.0%

Factor x Average
Oil Outflow

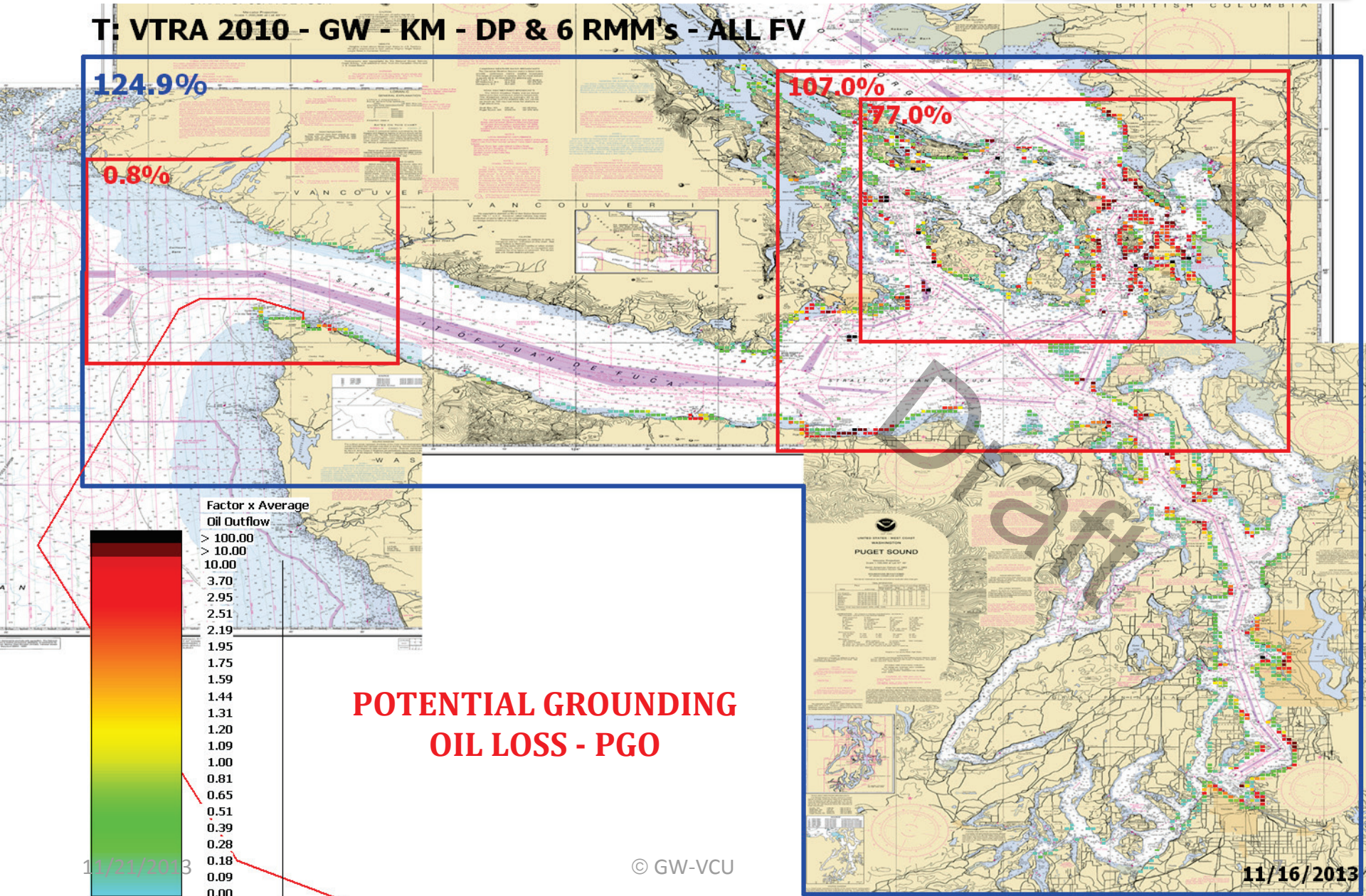
- > 100.00
- > 10.00
- 10.00
- 3.70
- 2.95
- 2.51
- 2.19
- 1.95
- 1.75
- 1.59
- 1.44
- 1.31
- 1.20
- 1.09
- 1.00
- 0.81
- 0.65
- 0.51
- 0.39
- 0.28
- 0.18
- 0.09
- 0.00

POTENTIAL GROUNDING
OIL LOSS - PGO

11/21/2013

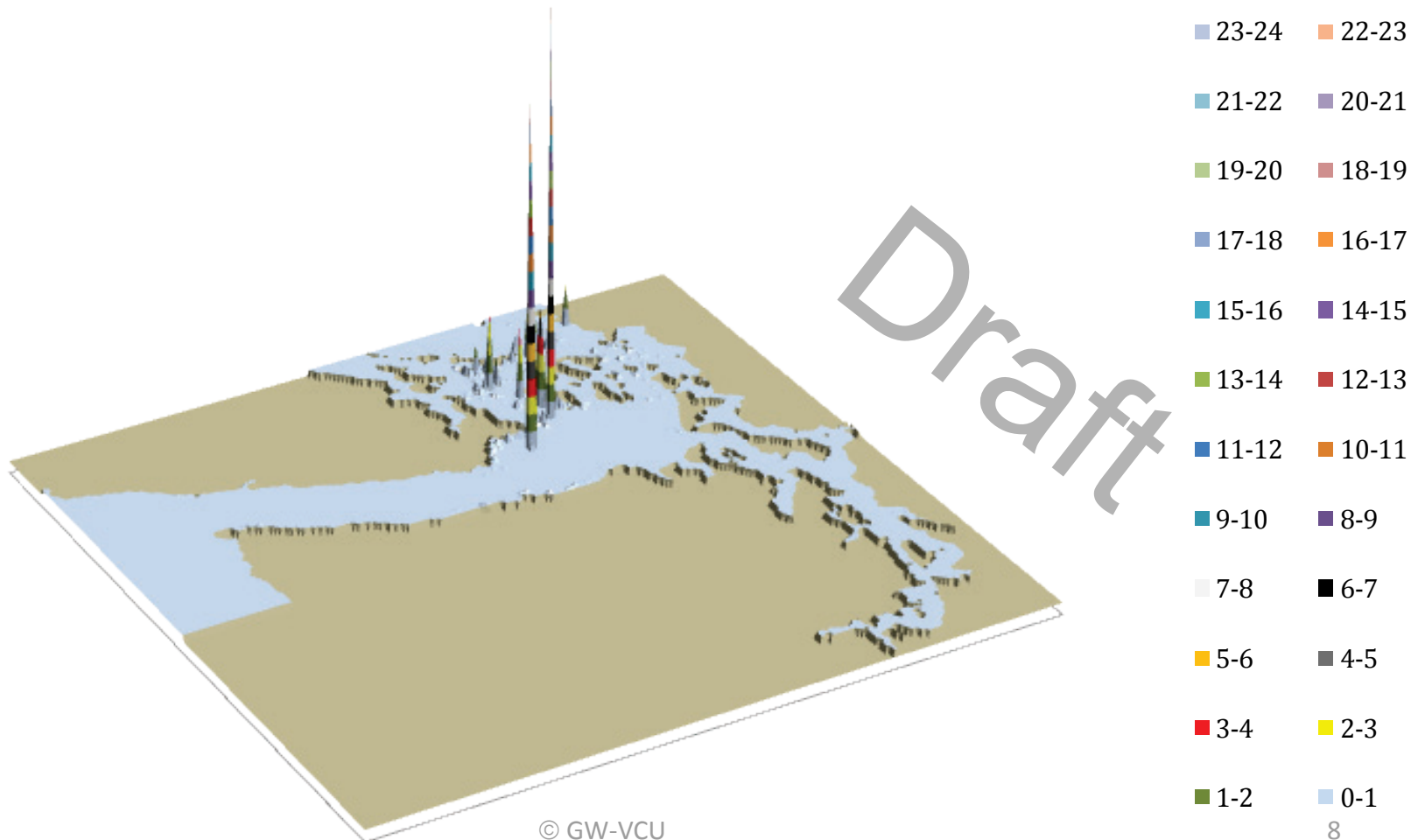
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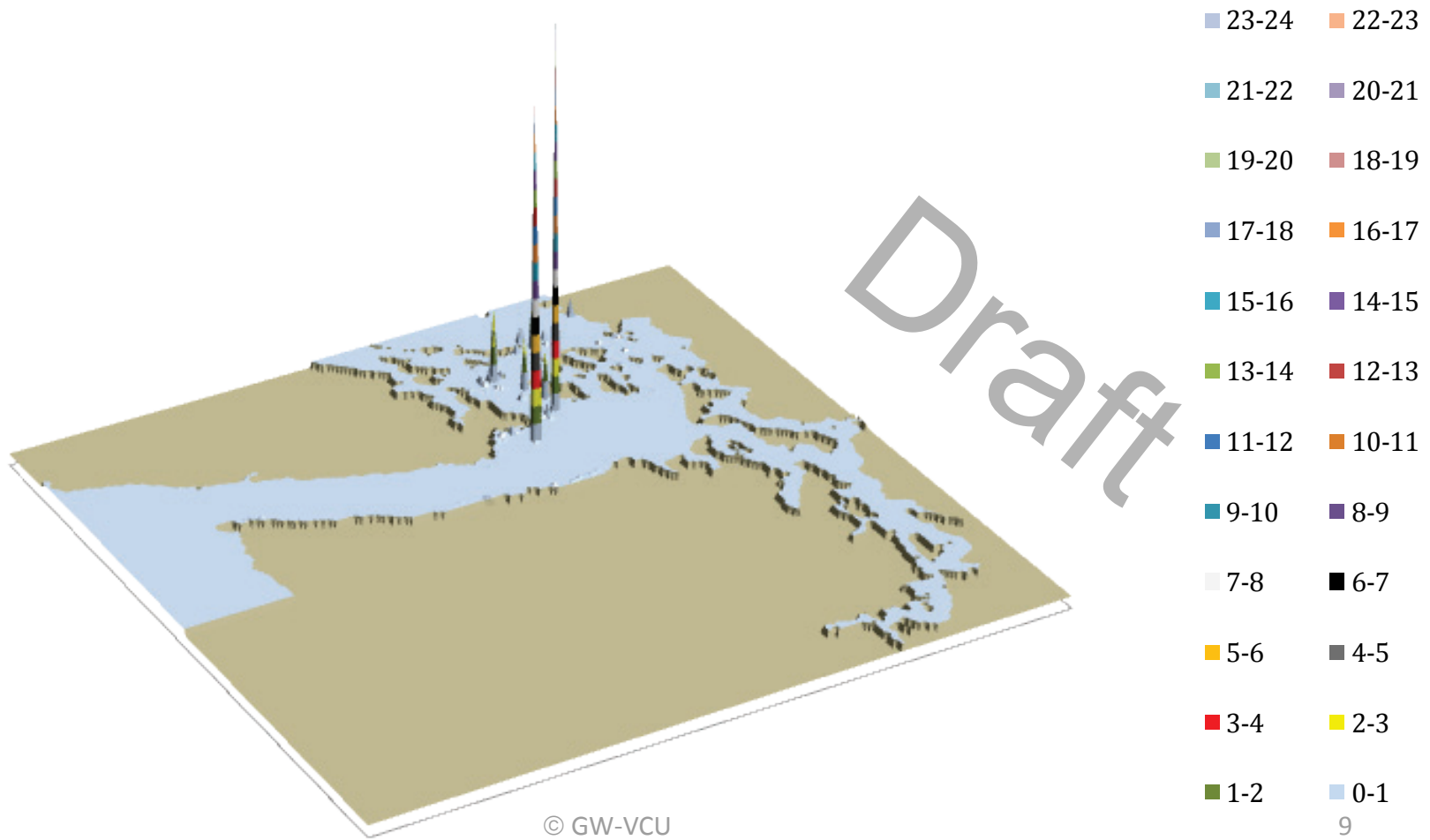
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T: GW - KM - DP 3D Risk Profile What-If FV - Pot. Grou. Oil Loss: 61% of Base Case PGO



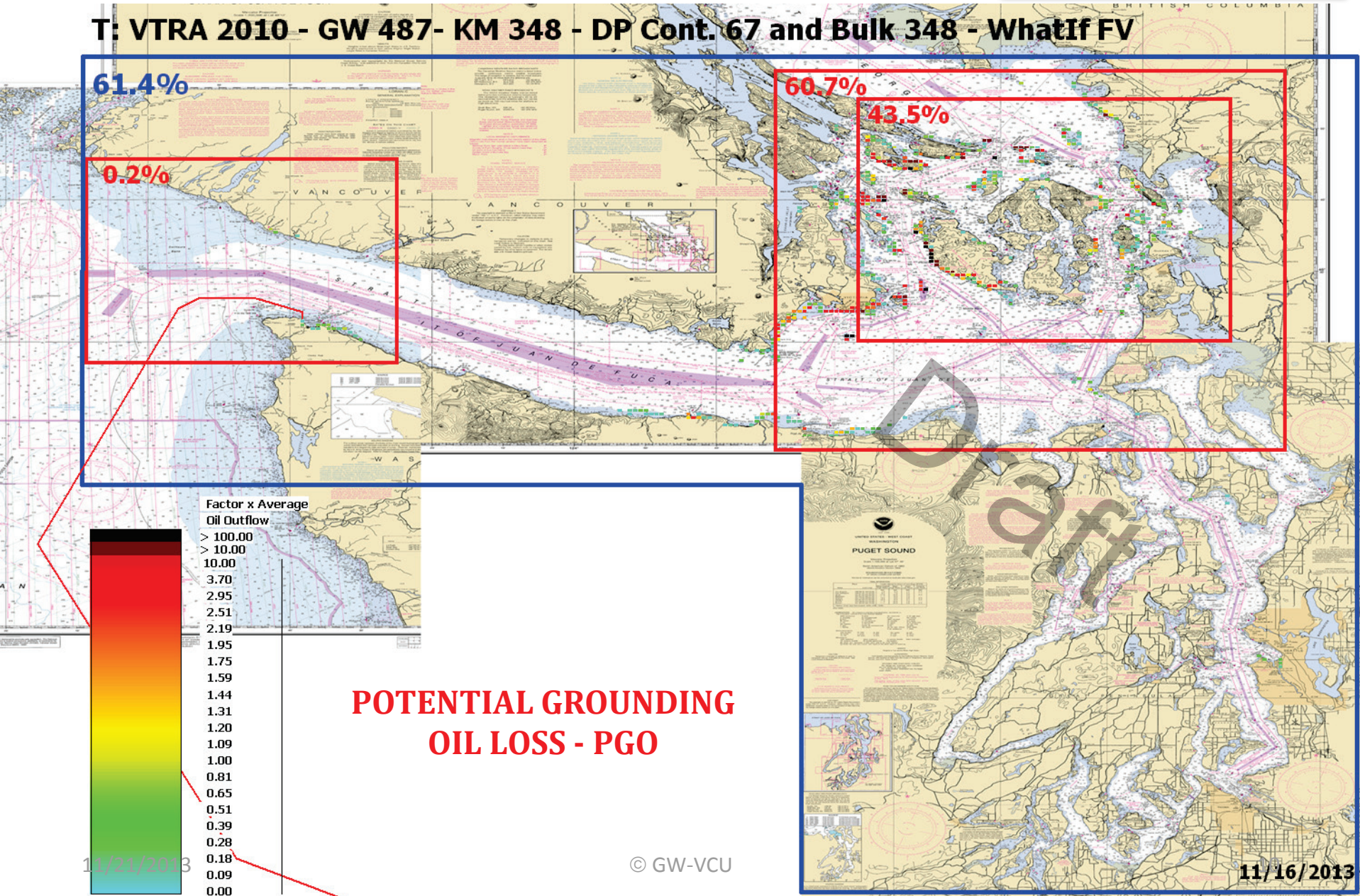
VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

T: GW - KM - DP & 6 RMM 3D Risk Profile What-If FV - Pot. Grou. Oil Loss: 38% of Base Case PGO



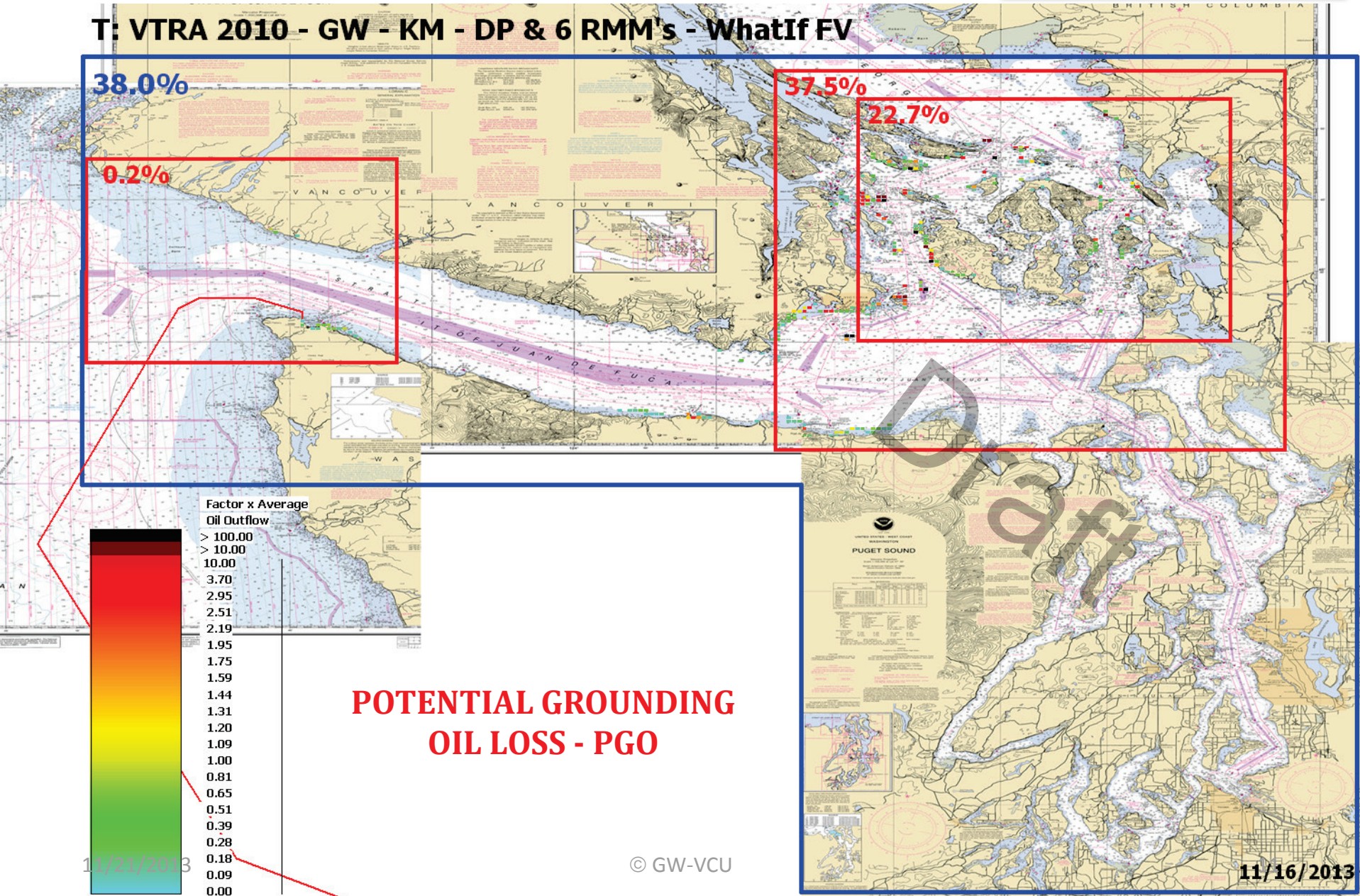
VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

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



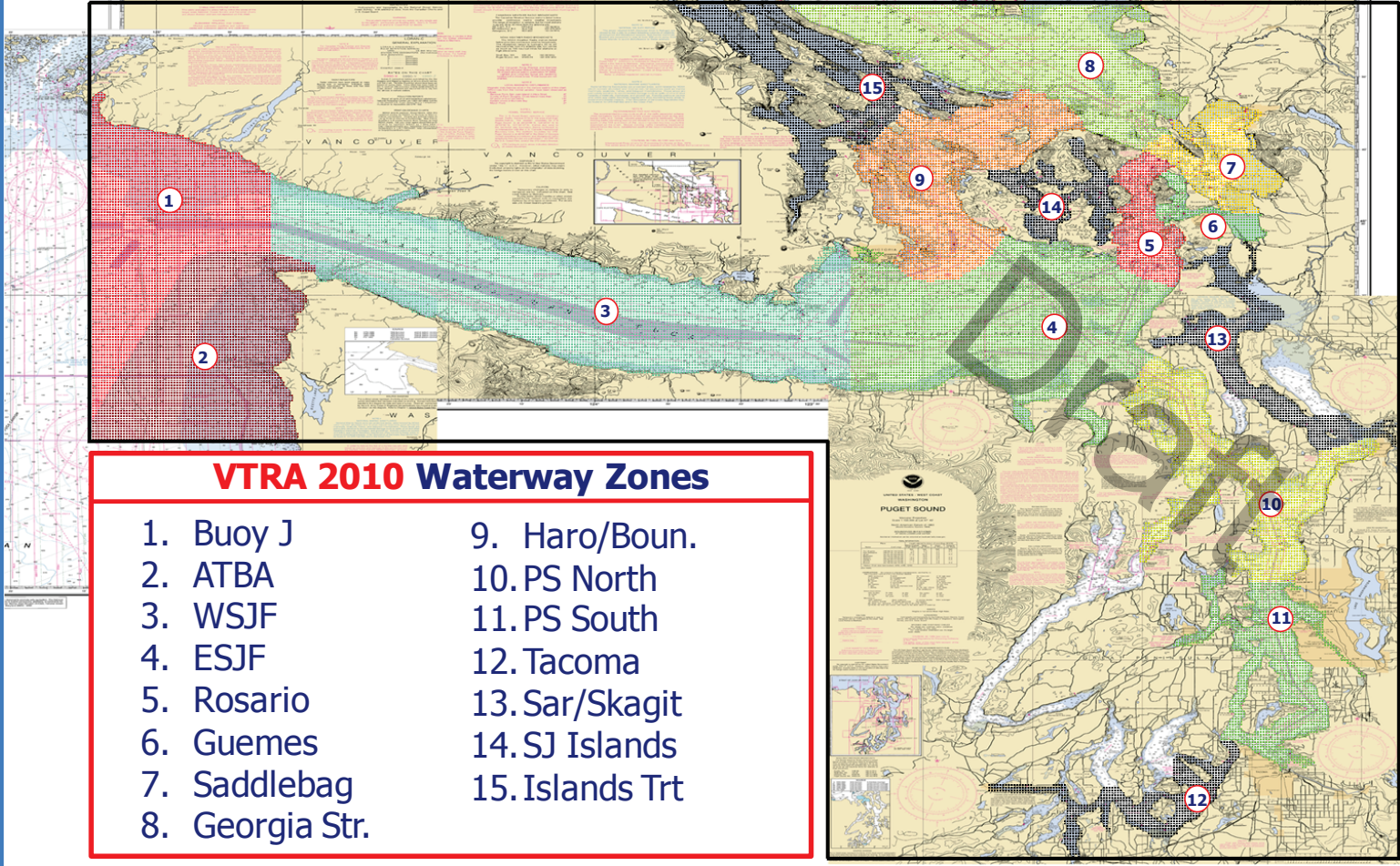
VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

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



VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

DEFINITION OF 15 WATERWAY ZONES



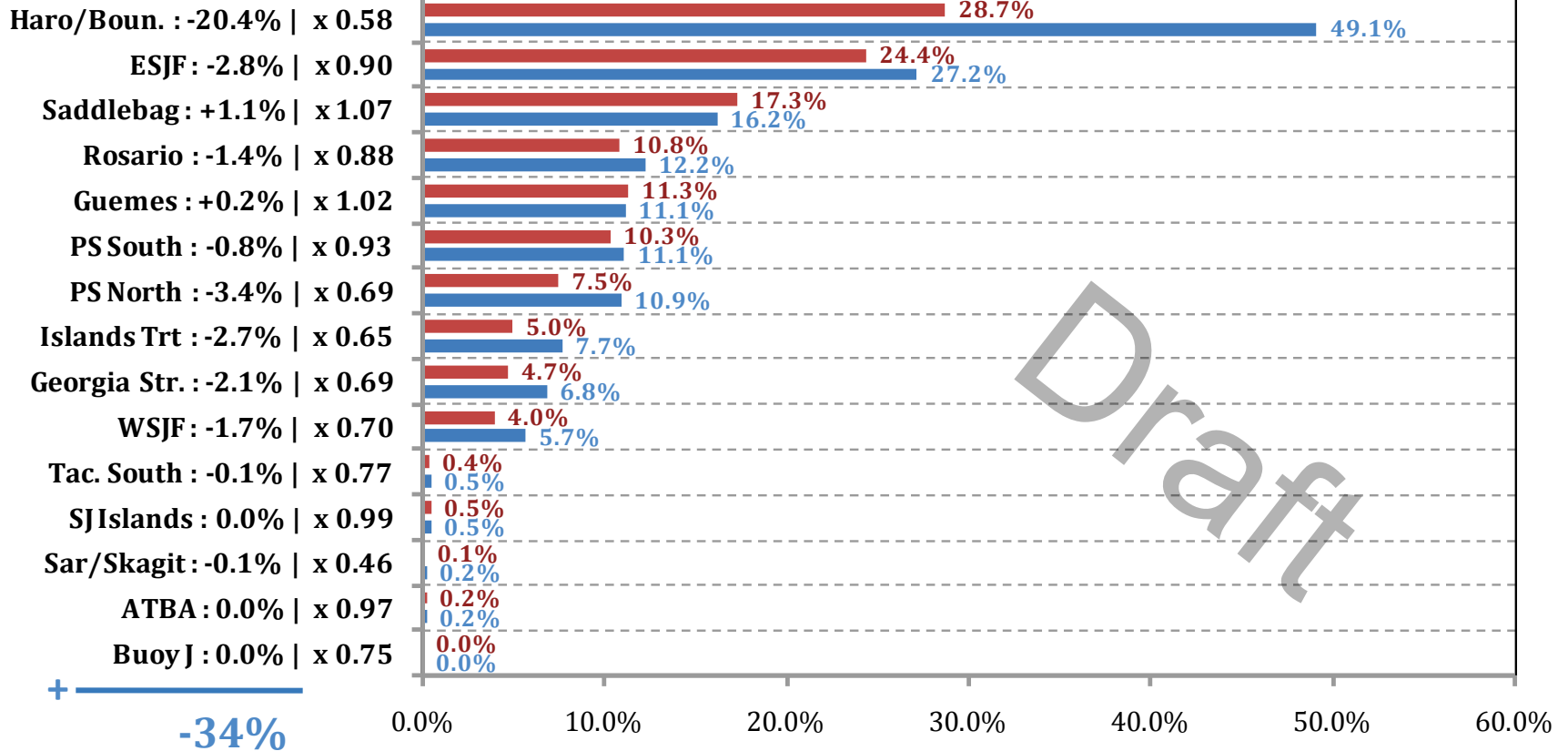
VTRA 2010 Waterway Zones

- | | |
|-----------------|-----------------|
| 1. Buoy J | 9. Haro/Boun. |
| 2. ATBA | 10. PS North |
| 3. WSJF | 11. PS South |
| 4. ESJF | 12. Tacoma |
| 5. Rosario | 13. Sar/Skagit |
| 6. Guemes | 14. SJ Islands |
| 7. Saddlebag | 15. Islands Trt |
| 8. Georgia Str. | |

VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

% Base Case Grounding Oil Loss - ALL_FV

Waterway Zone:



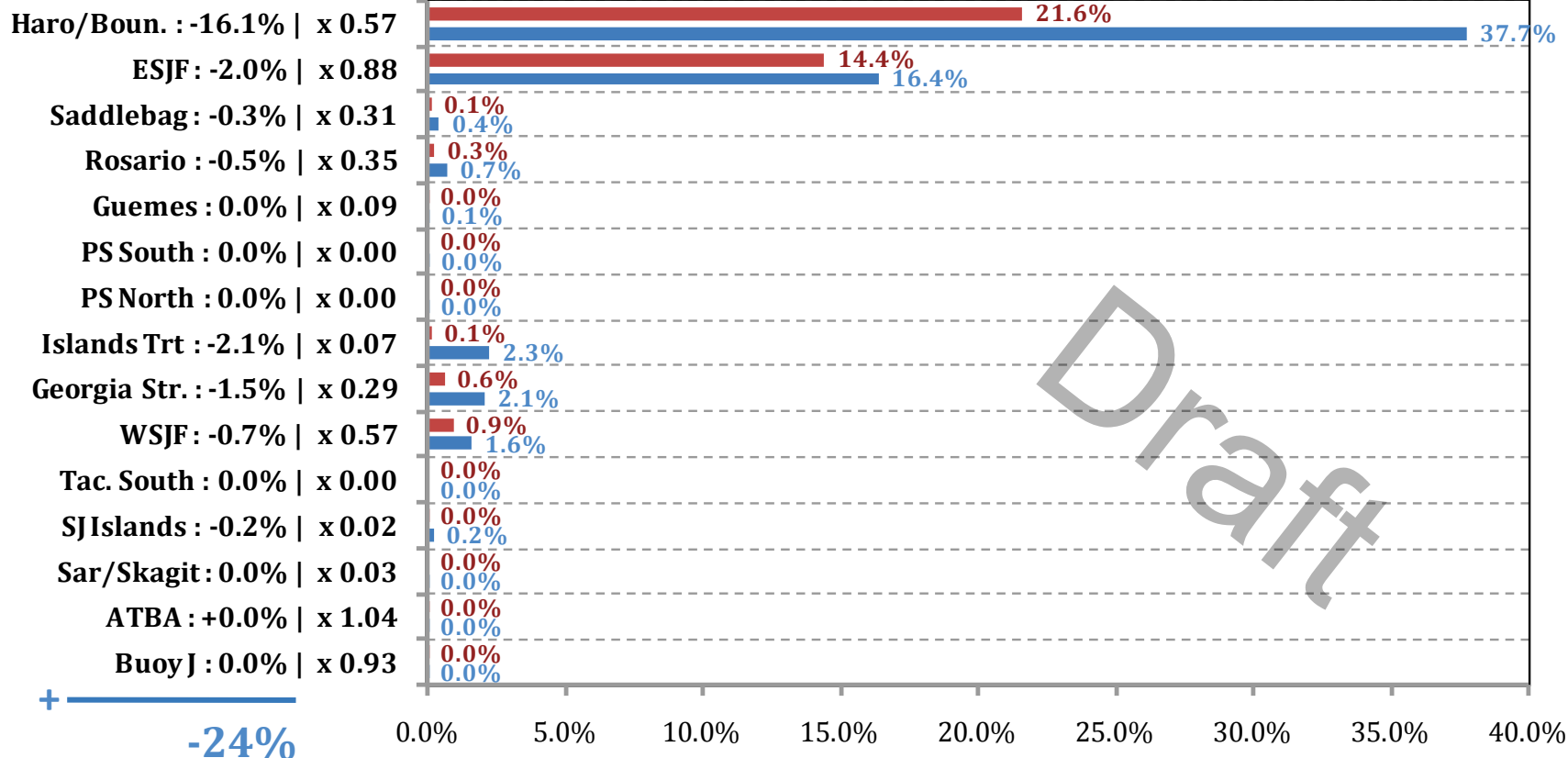
% Base Case Grounding Oil Loss (GOL) - ALL_FV

■ T:GW - KM - DP & 6 RMM: 125% (-34% | x 0.78) ■ T:GW - KM - DP: 159%

VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

% Base Case Grounding Oil Loss - WhatIf

Waterway Zone:



% Base Case Grounding Oil Loss (GOL) - WhatIf

■ T:GW - KM - DP & 6 RMM : 38% (-24% | x 0.62) ■ T:GW - KM - DP : 62%