

VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

3D Relative Risk Profile Comparison
Potential Collision Accident Frequency

**CASE P: BASE CASE & 100% Double Hull Fuel Tank
Protection for All Deep Draft Vessels**

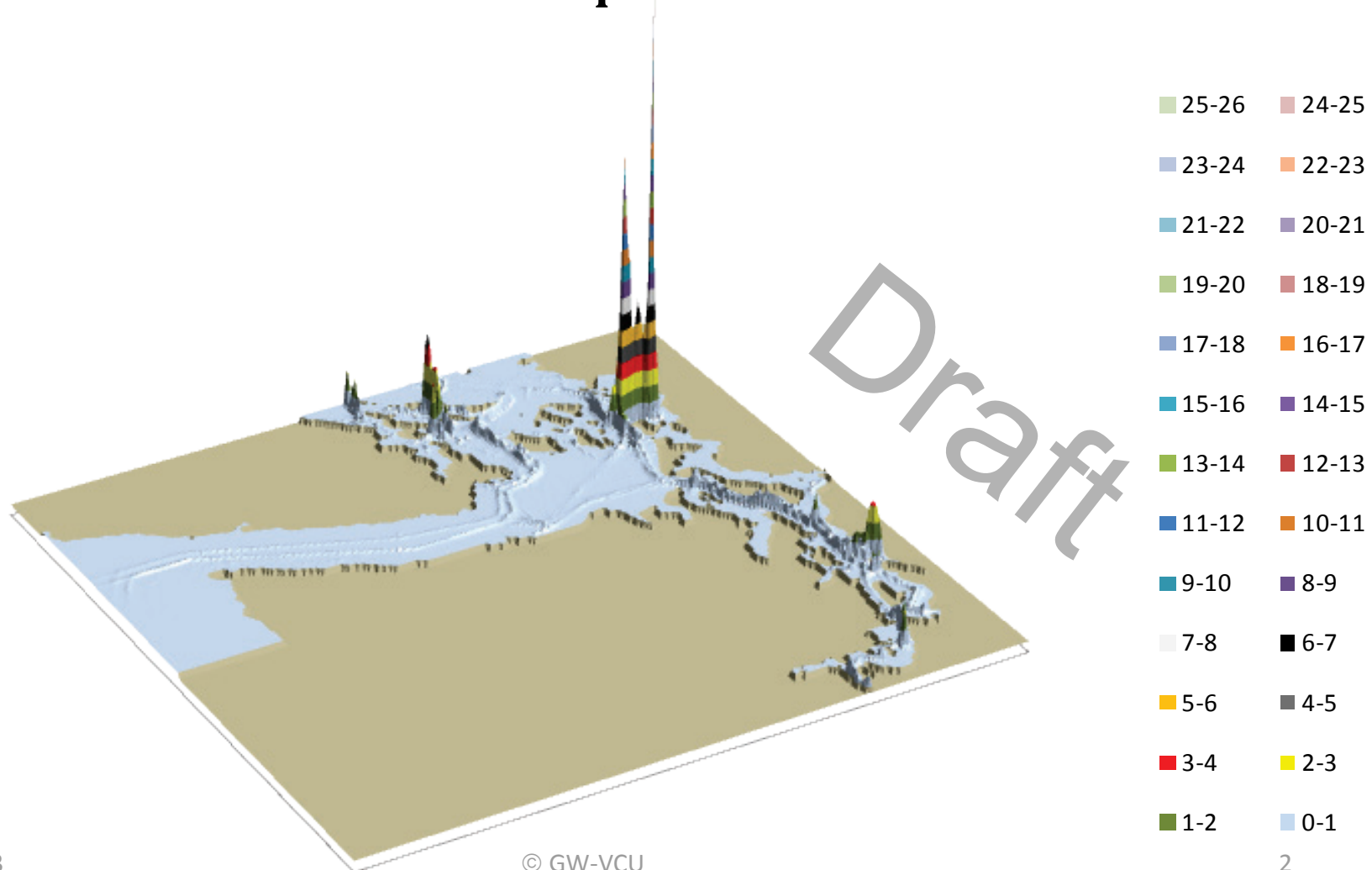
Dr. J. Rene van Dorp and Dr. Jason R.W Merrick

November 2013



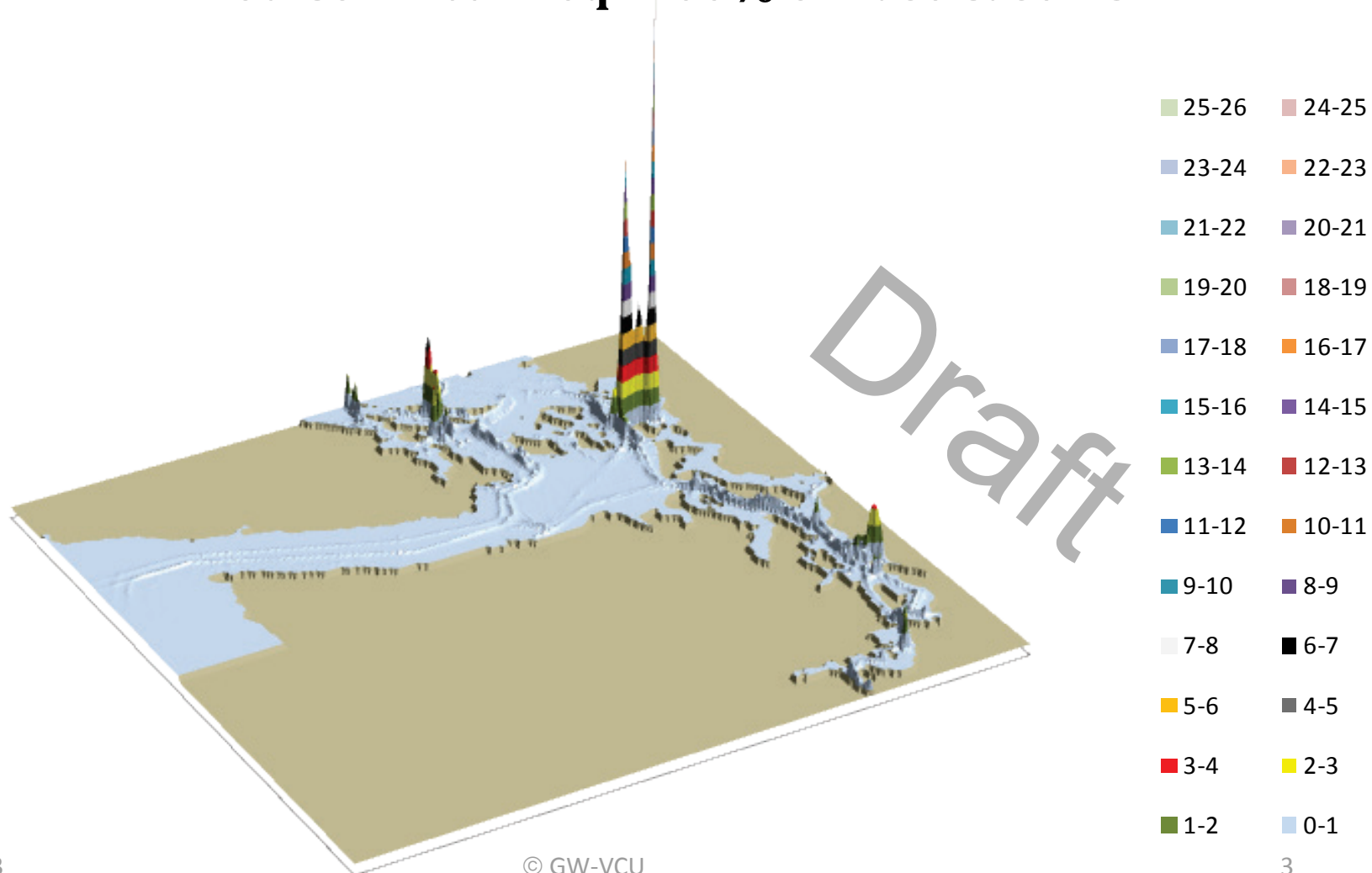
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P: Base Case 3D Risk Profile All FV - Pot. Coll. Acc. Freq.: 100% of Base Case PCF



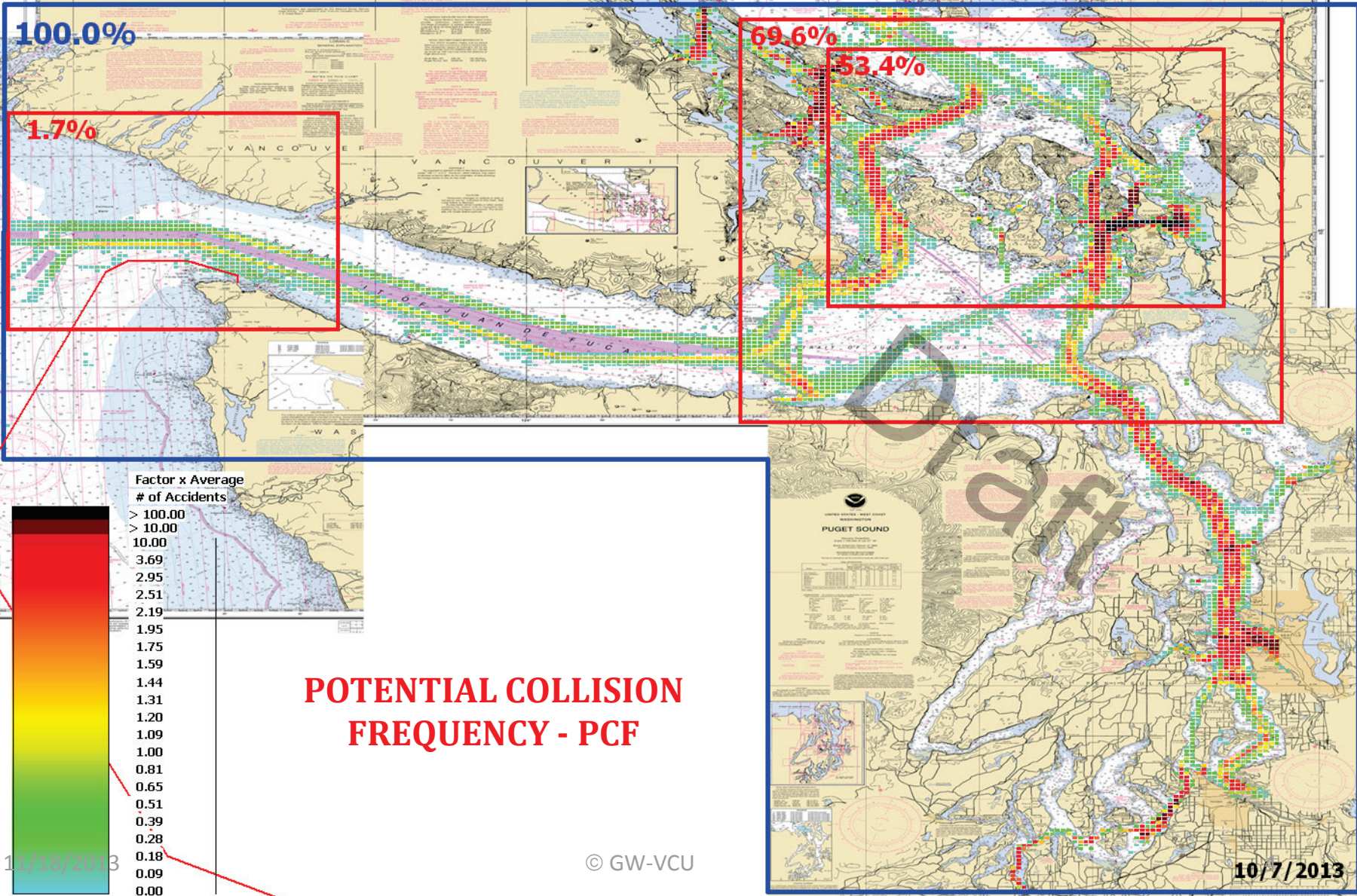
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P: BC & DH100 3D Risk Profile All FV - Pot. Coll. Acc. Freq.: 100% of Base Case PCF



VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

P: VTRA 2010 - BASE CASE - All FV



POTENTIAL COLLISION FREQUENCY - PCF

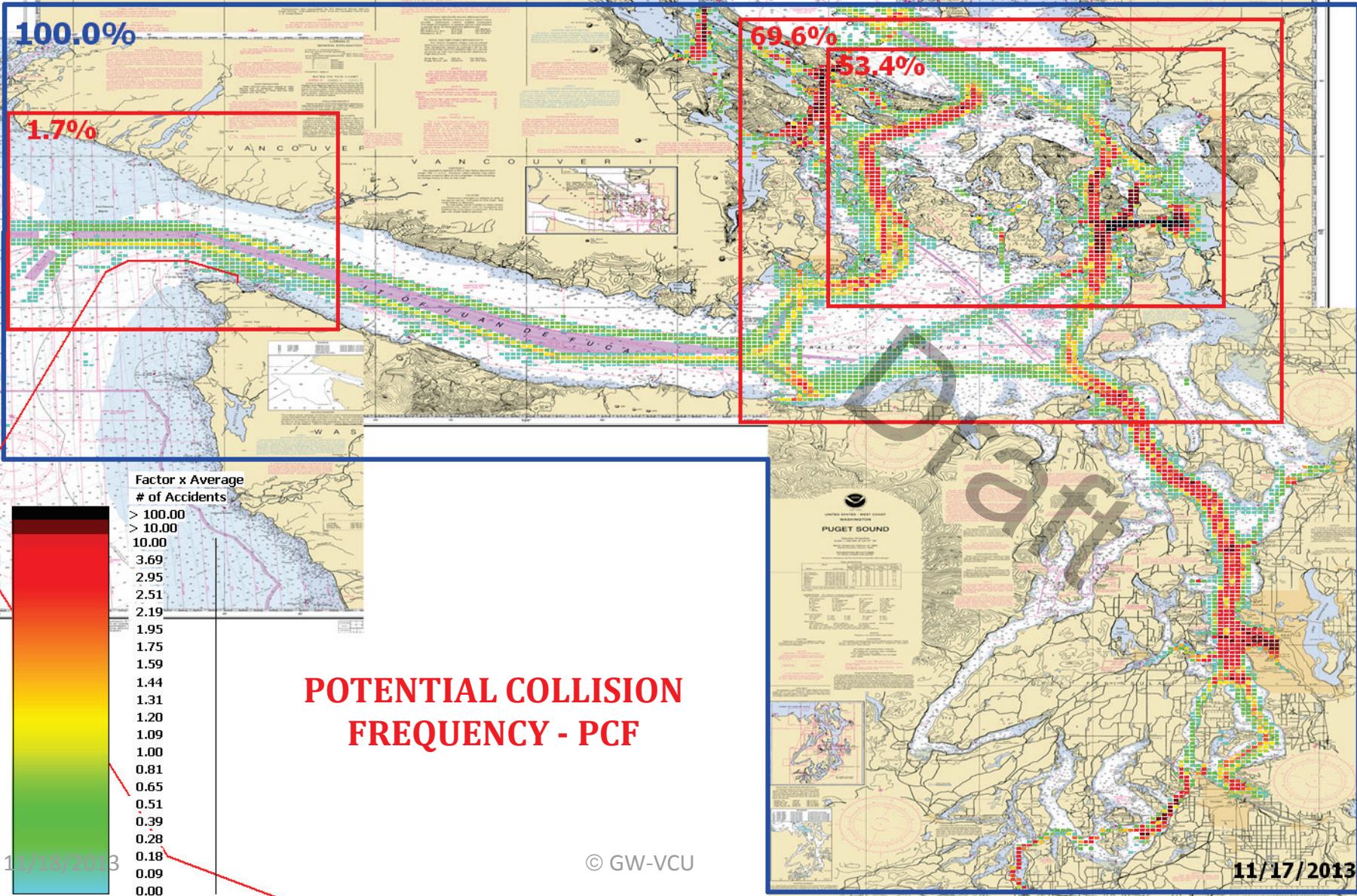
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VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

P: VTRA 2010 - BASE CASE & 100% DH FUEL TANKS - All FV



100.0%

1.7%

69.6%

53.4%

Factor x Average
of Accidents

- > 100.00
- > 10.00
- 10.00
- 3.69
- 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 COLLISION FREQUENCY - PCF

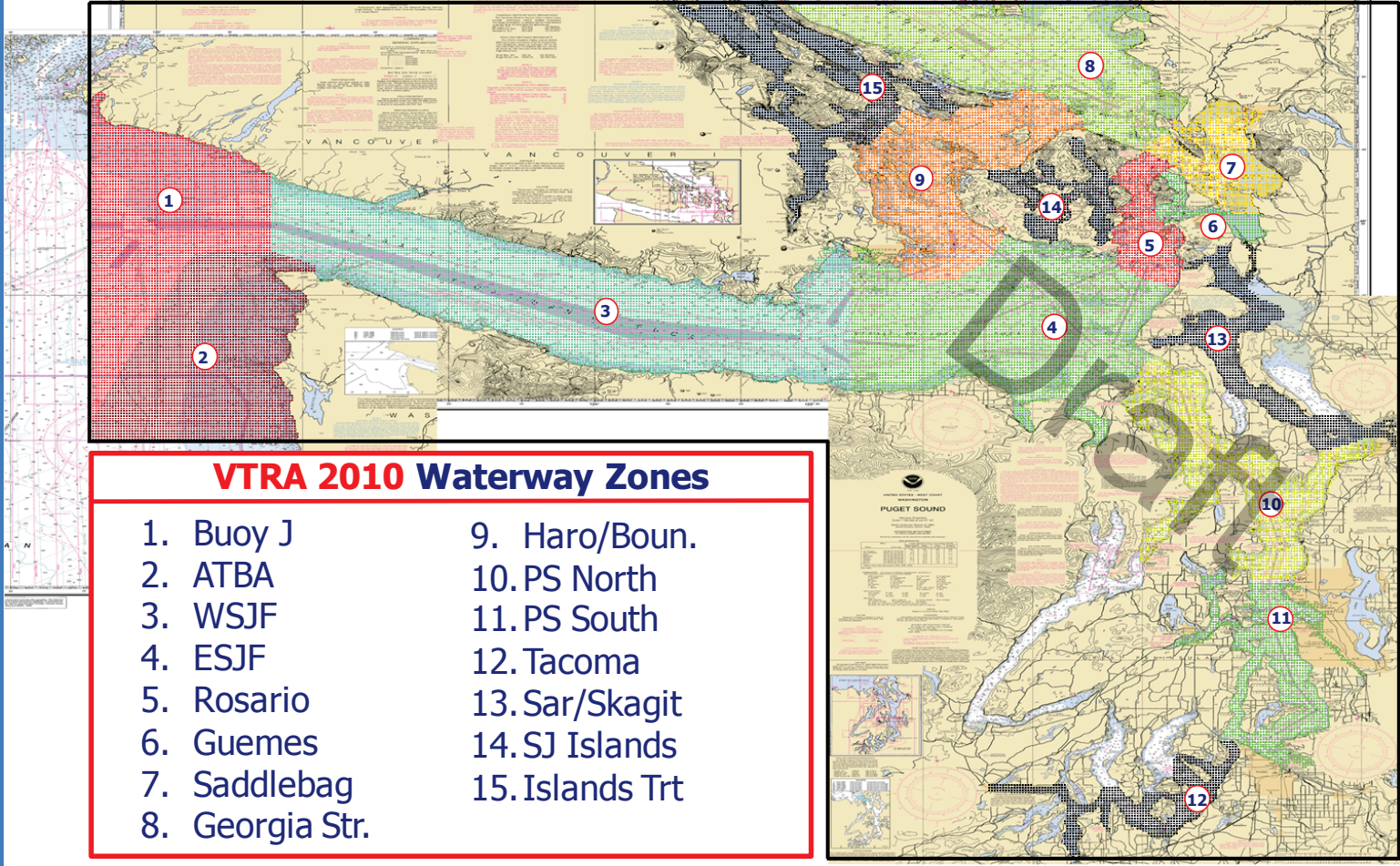
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VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2010

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. | |

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% Base Case Collision Frequency - ALL_FV

Waterway Zone:

