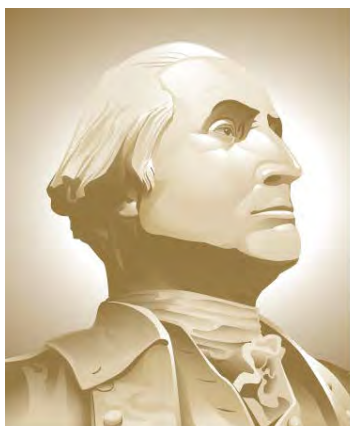


# VTRA 2010 POTENTIAL GROUNDING FREQUENCY BY ALL FV, CARGO – FV, TANK- FV and WHAT-IF FV

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**CASE S: Delta Port 415 + Bunkering Operations**

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**AUGUST 31, 2013**

PRELIMINARY

# Table. Focus Vessel (FV) Classification for the 26 VTOSS vessel type classification used in the GW/VCU MTS simulation model.

- NON – FV** : Those vessels that Interacting Vessels (IV) with Focus Vessels (FV)
- BASE CASE CARGO – FV** : Bulk Carriers, Container Vessels, Other Cargo Vessels that travel in VTRA 2010 Base Case
- BASE CASE TANK – FV** : Oil Barge, Oil Tankers, Chemical Carrier, ATB 's that travel in VTRA 2010 Base Case
- WHAT IF – FV** : CARGO AND TANK FV'S added to VTRA 2010 Base Case to model What-If Scenario

**Note:** Focus Vessels (FV's) are also considered as Interacting Vessels (IV's) when interacting with another Focus Vessel.

#	VESSEL TYPE	FOCUS VESSEL?	#	VESSEL TYPE	FOCUS VESSEL?
1	BULKCARRIER	CARGO - FV	14	PASSENGERSHIP	NO
2	CHEMICALCARRIER	TANK - FV	15	REFRIGERATEDCARGO	CARGO-FV
3	CONTAINERSHIP	CARGO - FV	16	RESEARCHSHIP	NO
4	DECKSHIPCARGO	CARGO - FV	17	ROROCARGOSHIP	CARGO-FV
5	FERRY	NO	18	ROROCARGOCONTSHIP	CARGO-FV
6	FERRYNONLOCAL	NO	19	SUPPLYOFFSHORE	NO
7	FISHINGFACTORY	NO	20	TUGTOWBARGE	NO
8	FISHINGVESSEL	NO	21	UNKNOWN	NO
9	LIQGASCARRIER	TANK - FV	22	USCOASTGUARD	NO
10	NAVYVESSEL	NO	23	VEHICLECARRIER	CARGO-FV
11	OILTANKER	TANK - FV	24	YACHT	NO
12	OTHERSPECIALCARGO	CARGO - FV	25	ATB	TANK - FV
13	OTHERSPECIFCSERV	NO	26	OIL BARGE	TANK - FV

# IMPORTANT:

THE OPERATIVE WORD IN PRESENTING THESE ANALYSIS RESULTS IS THE USE OF THE WORD

# POTENTIAL

TO INDICATE THAT THESE ANALYSIS RESULTS DO NOT FOLLOW FROM AN HISTORICAL DATA ANALYSIS, BUT THROUGH THE USE OF AN ANALYSIS TOOL THAT EVALUATES SUCH **POTENTIAL**.

THE 2010 YEAR IS CONSIDERED **THE BASE CASE YEAR** AND A BASE CASE YEAR POTENTIAL IS EVALUATED.

NEXT, **WHAT-IF SCENARIOS** ARE DEVELOPED FROM THE BASE CASE BY ADDING ADDITIONAL HYPOTHETICAL TRAFFIC AND A WHAT-IF POTENTIAL IS EVALUATED AND COMPARED **RELATIVE TO THE BASE CASE** TO INFORM **RISK MANAGEMENT**.



# CASE S: DP 415 + Bunkering Operations:

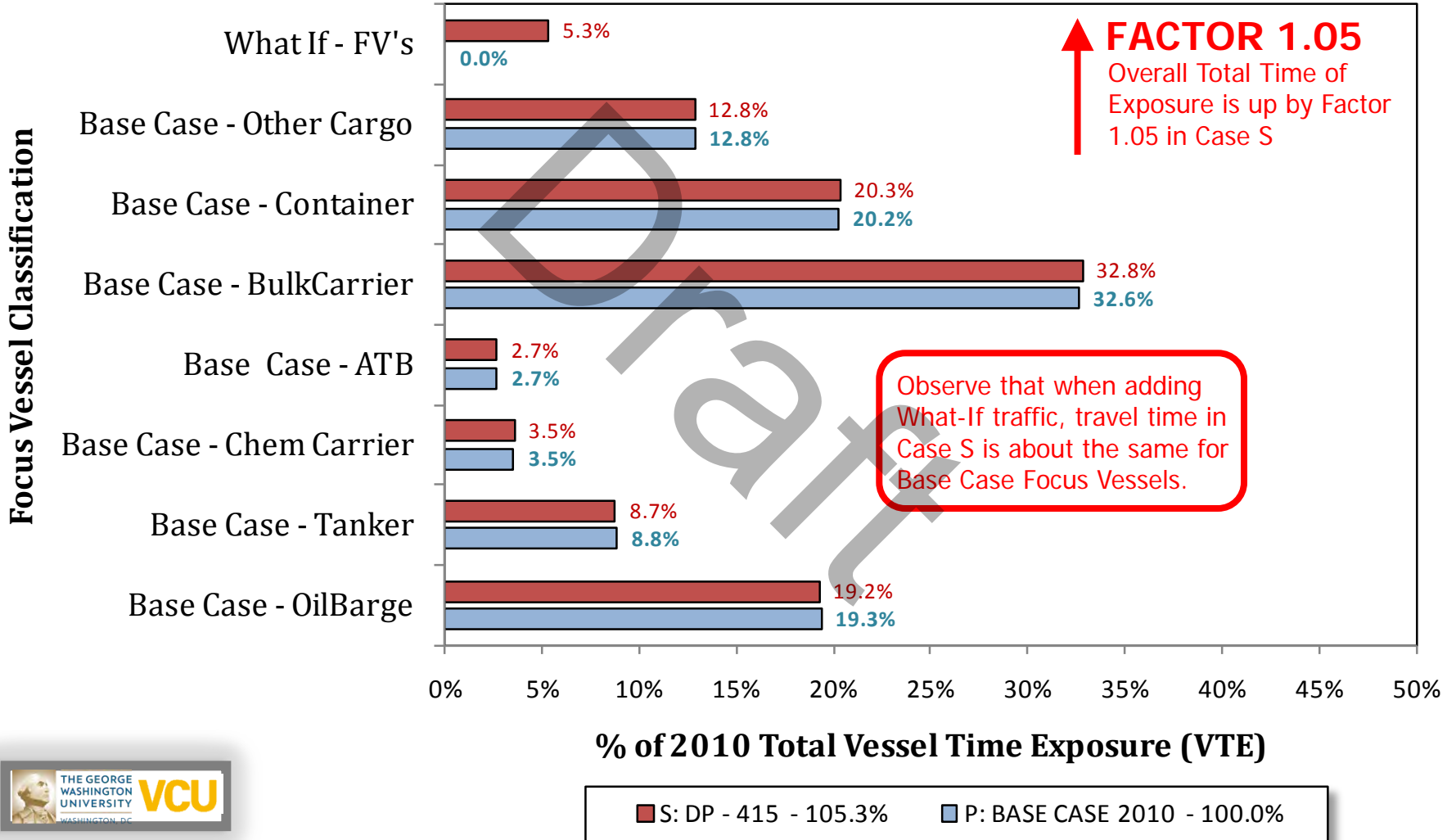
## BASE CASE 2010 TRAFFIC WITH FOLLOWING WHAT-IF FOCUS VESSELS

348 Delta Port Bulk Carriers + Bunkering Barges

67 Delta Port Container Ships+ Bunkering Barges

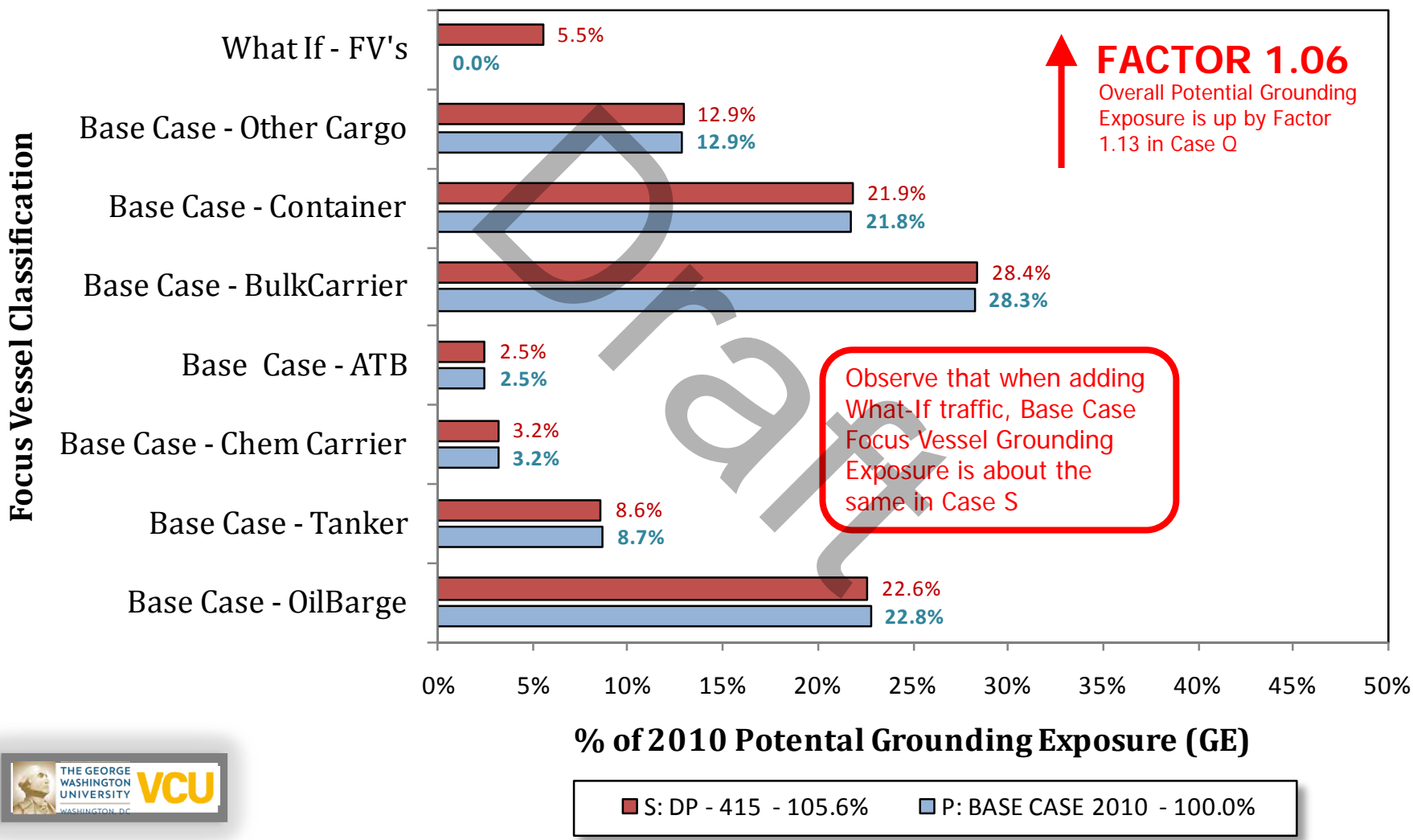
# CASE S: DP 415 + BUNKERING

## VTRA 2010 - Total Vessel Time of Exposure (VTE)



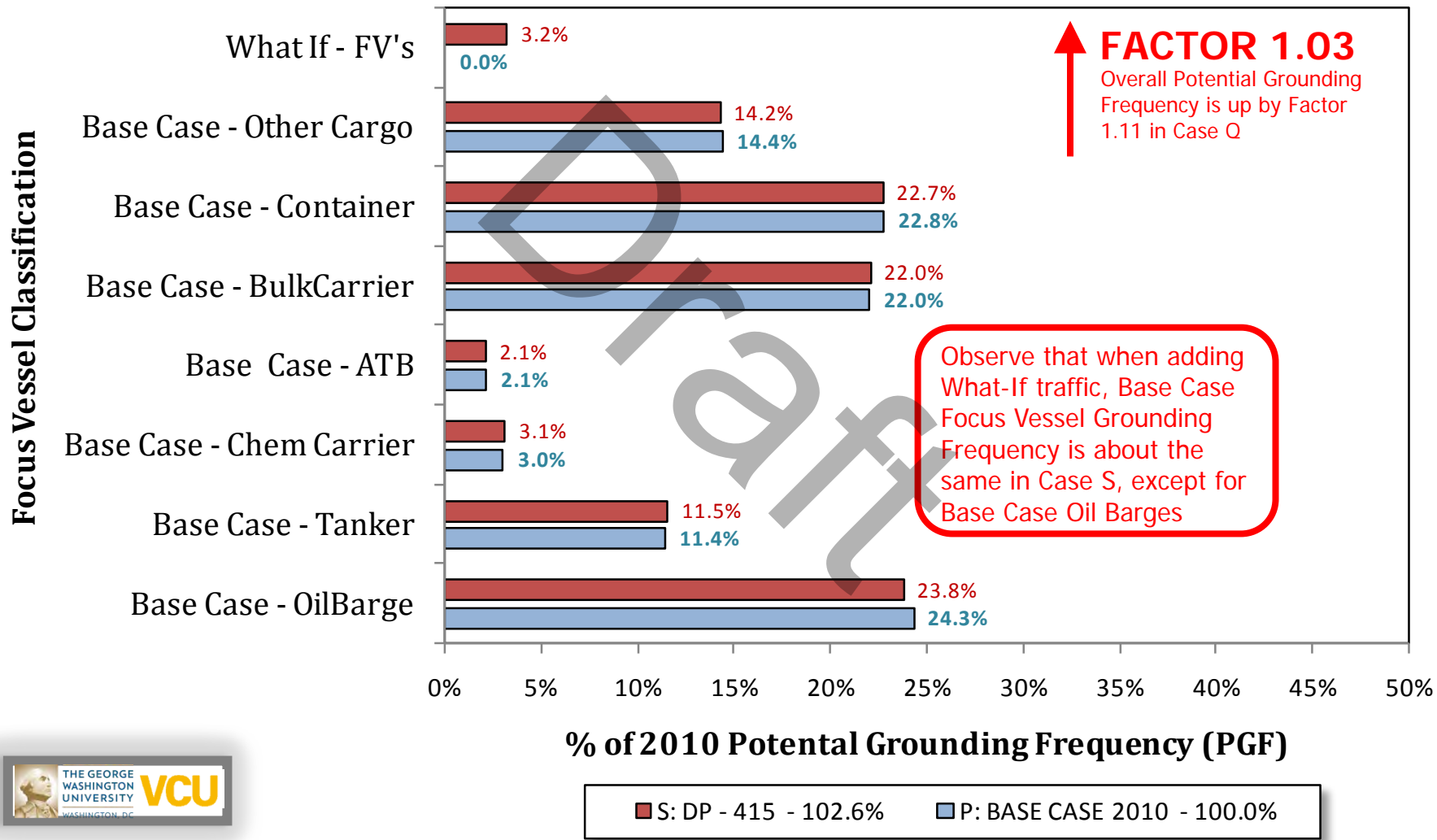
# CASE S: DP 415 + BUNKERING

## VTRA 2010 - GROUNDING EXPOSURE



# CASE S: DP 415 + BUNKERING

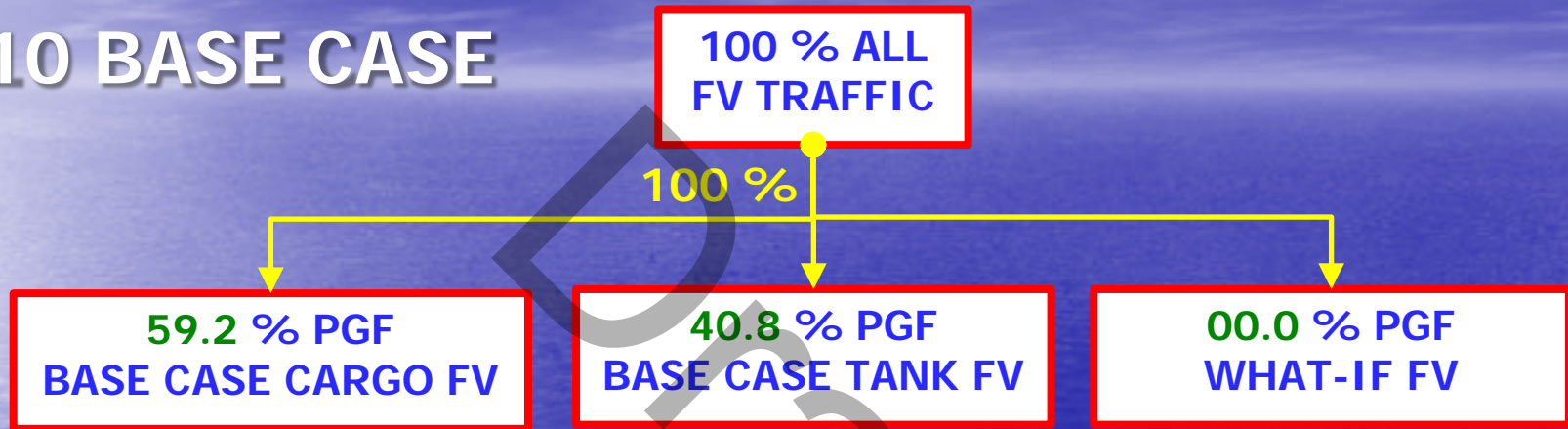
## VTRA 2010 - GROUNDING FREQUENCY



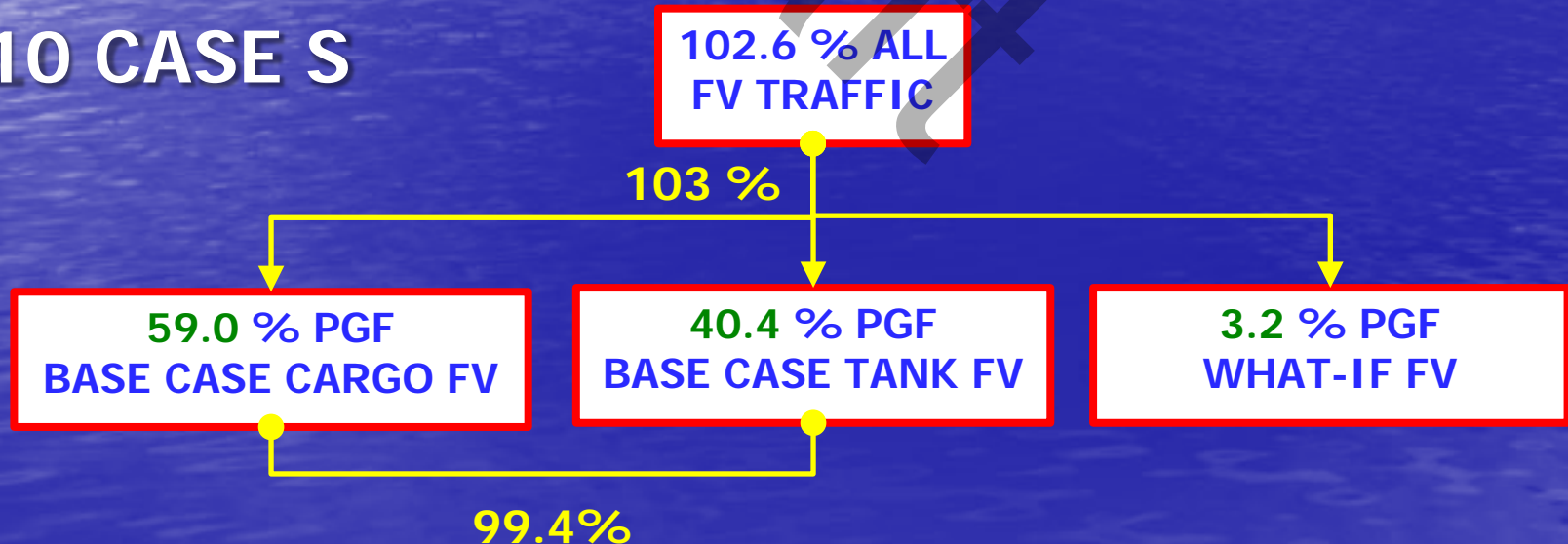
# A TAXONOMY OF 2010 FOCUS VESSEL POTENTIAL ANNUAL GROUNDING FREQUENCY

PCF : POTENTIAL GROUNDING FREQUENCY - PER YEAR

## 2010 BASE CASE



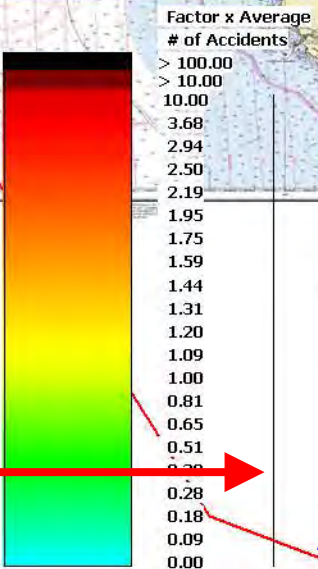
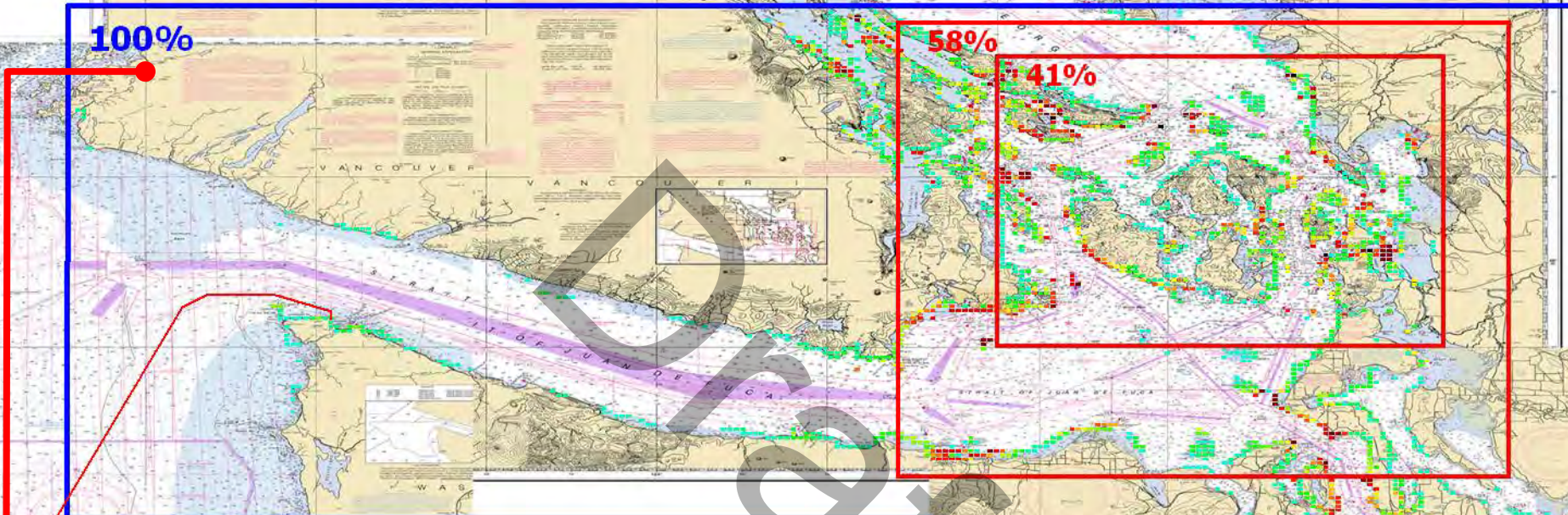
## 2010 CASE S





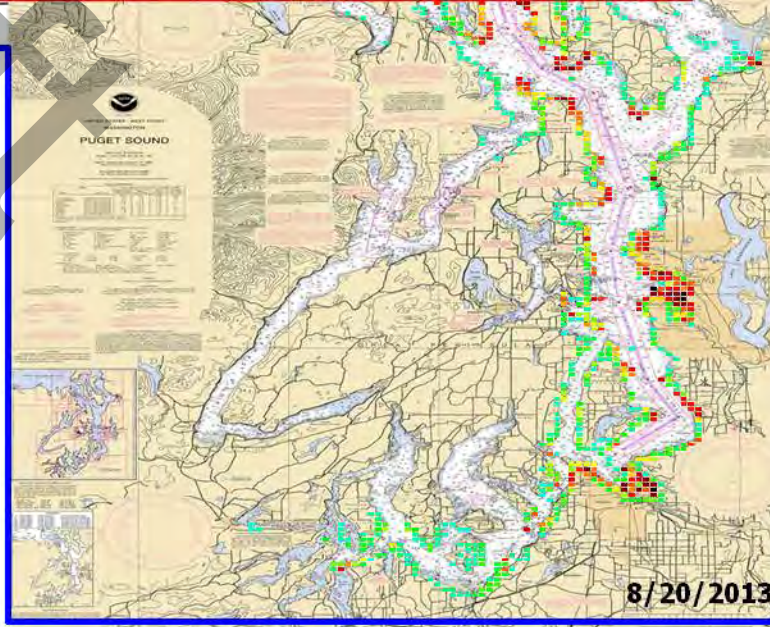
**P: ALL FV POTENTIAL  
GROUNDING FREQUENCY (PGF)**

**P: VTRA 2010 - BASE CASE**



- P: POTENTIAL GROUND. FREQ. (PGF)**
- 22.0% - BULK CARGO
  - 22.8% - CONTAINERSHIP
  - 14.4% - OTHERCARGO
  - 24.3% - OIL BARGE
  - 11.4% - TANKER
  - 03.0% - CHEMICAL CARRIER
  - 02.1% - ATB
  - 00.0% - WHAT-IF FV

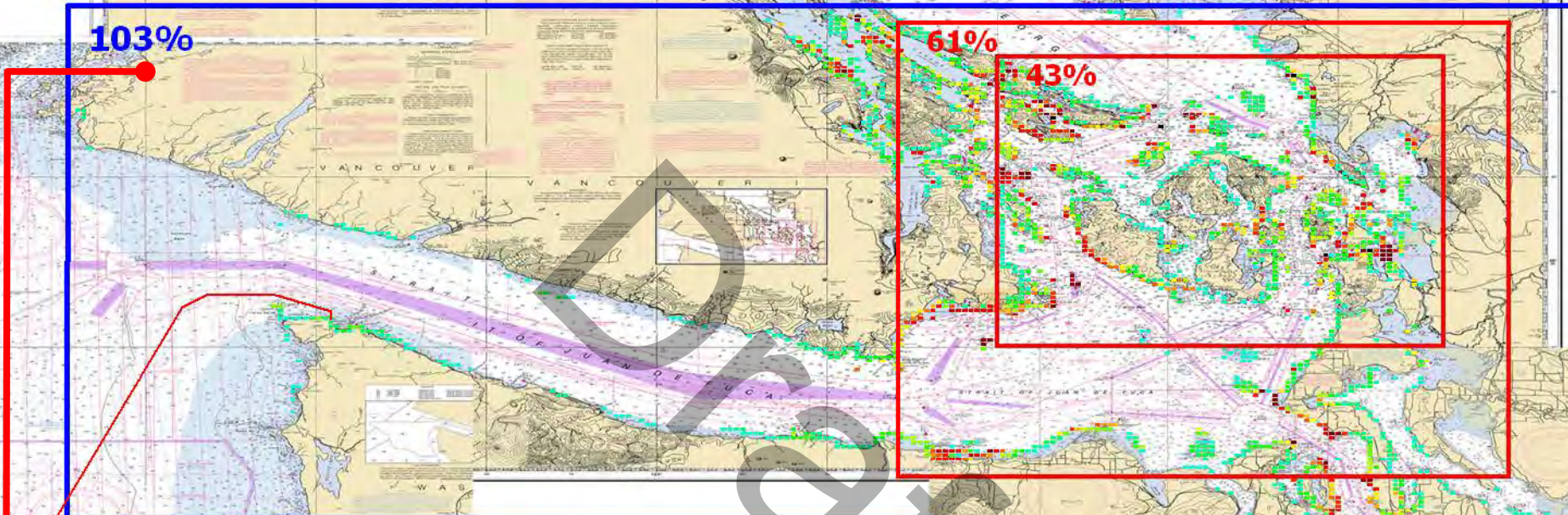
**100.0% of 2010 Base Case  
ALL FV - PGF**





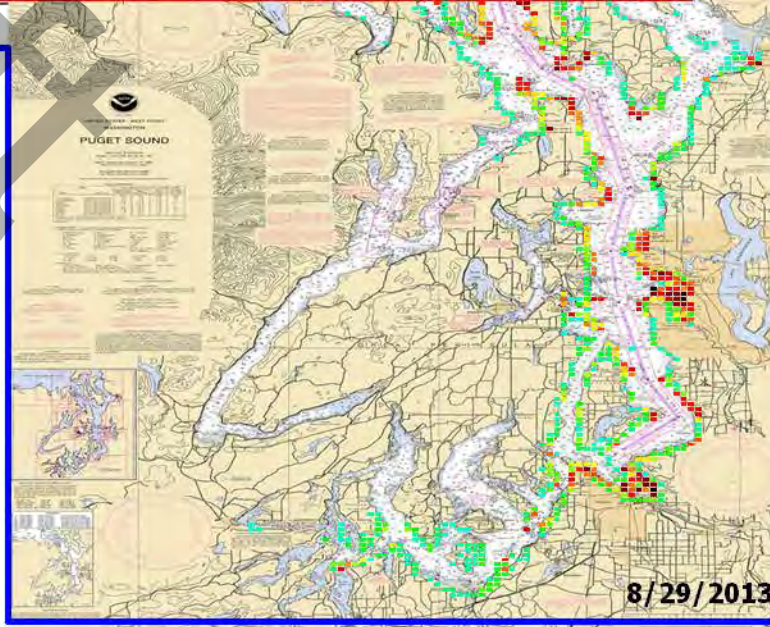
**S: ALL FV POTENTIAL  
GROUNDING FREQUENCY (PGF)**

**S: VTRA 2010 - Delta Port - Cont. 67 and Bulk 348**



- S: POTENTIAL GROUND. FREQ. (PGF)**
- 22.0% - BULK CARGO
  - 22.7% - CONTAINERSHIP
  - 14.2% - OTHERCARGO
  - 23.8% - OIL BARGE
  - 11.5% - TANKER
  - 03.1% - CHEMICAL CARRIER
  - 02.1% - ATB
  - 03.2% - WHAT-IF FV

**102.6% of 2010 Base Case  
ALL FV - PGF**

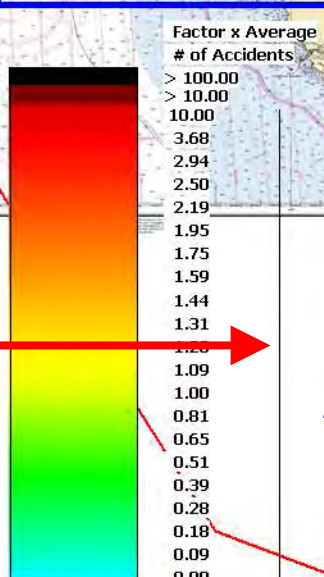
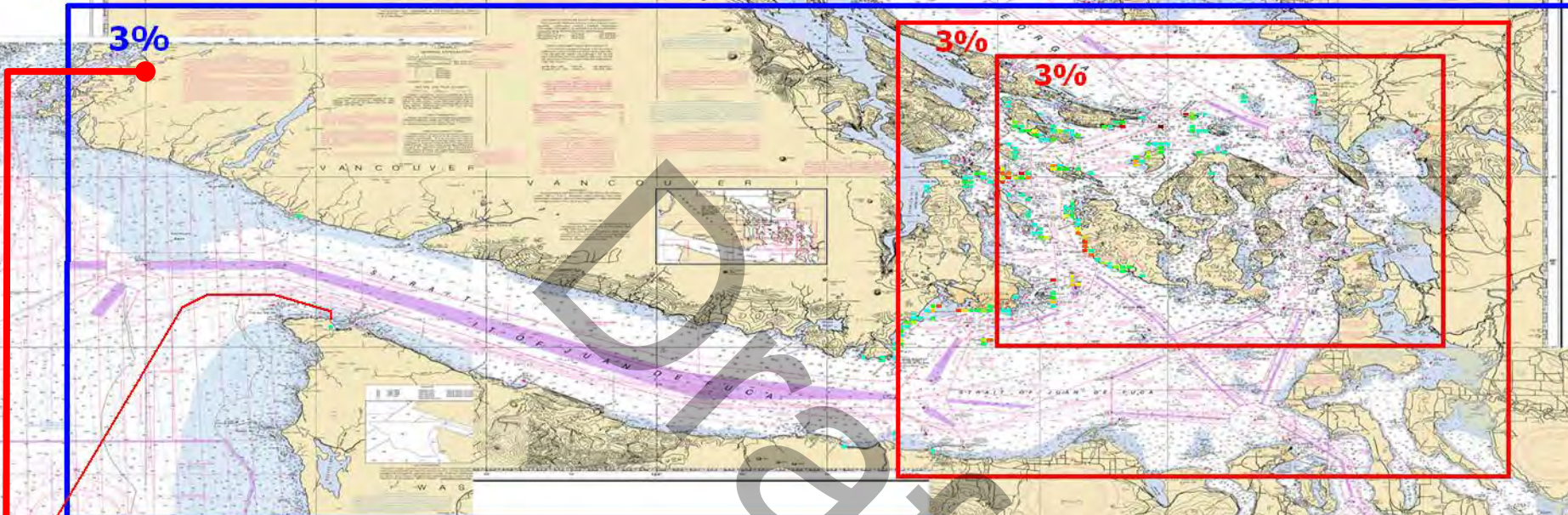




# S: WHAT-IF FV POTENTIAL GROUNDING FREQUENCY (PGF)



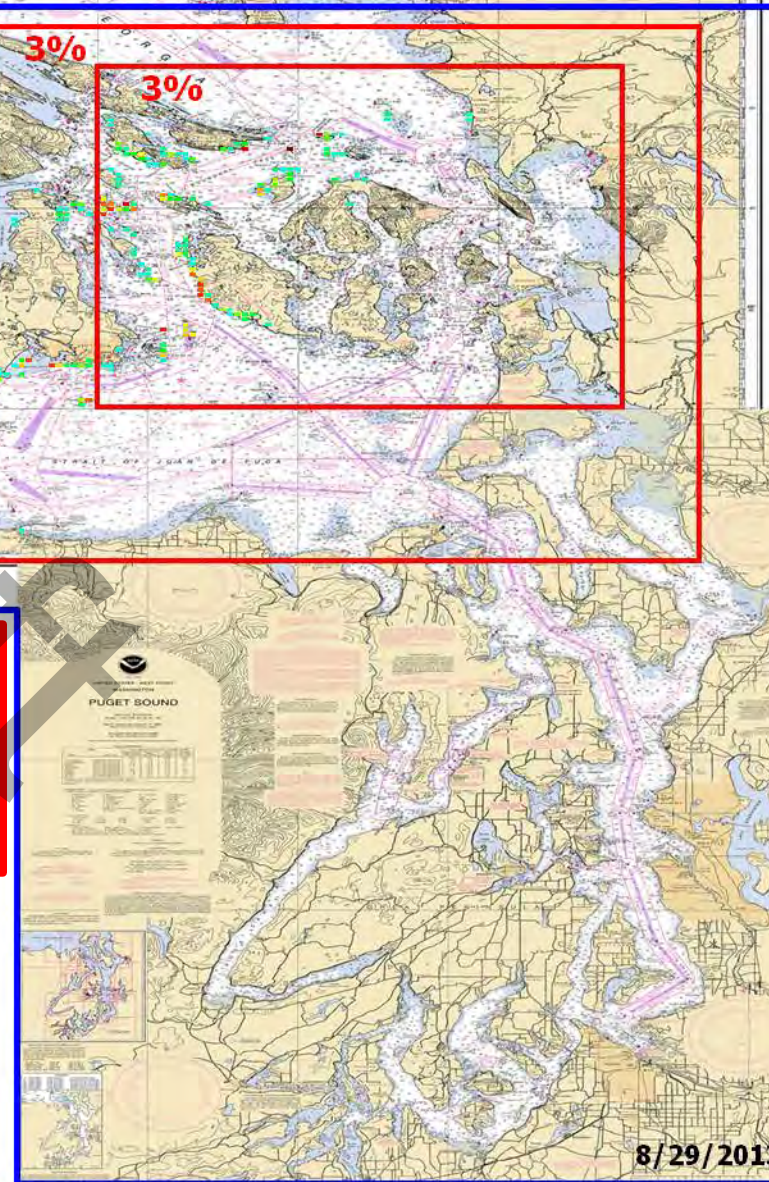
## S: VTRA 2010 - Delta Port - Cont. 67 and Bulk 348



**S: POTENTIAL GROUND. FREQ. (PGF)**

- 01.2% - BULK CARGO
- 02.0% - CONTAINERSHIP
- 00.0% - TANKER
- 00.0% - OILBARGE

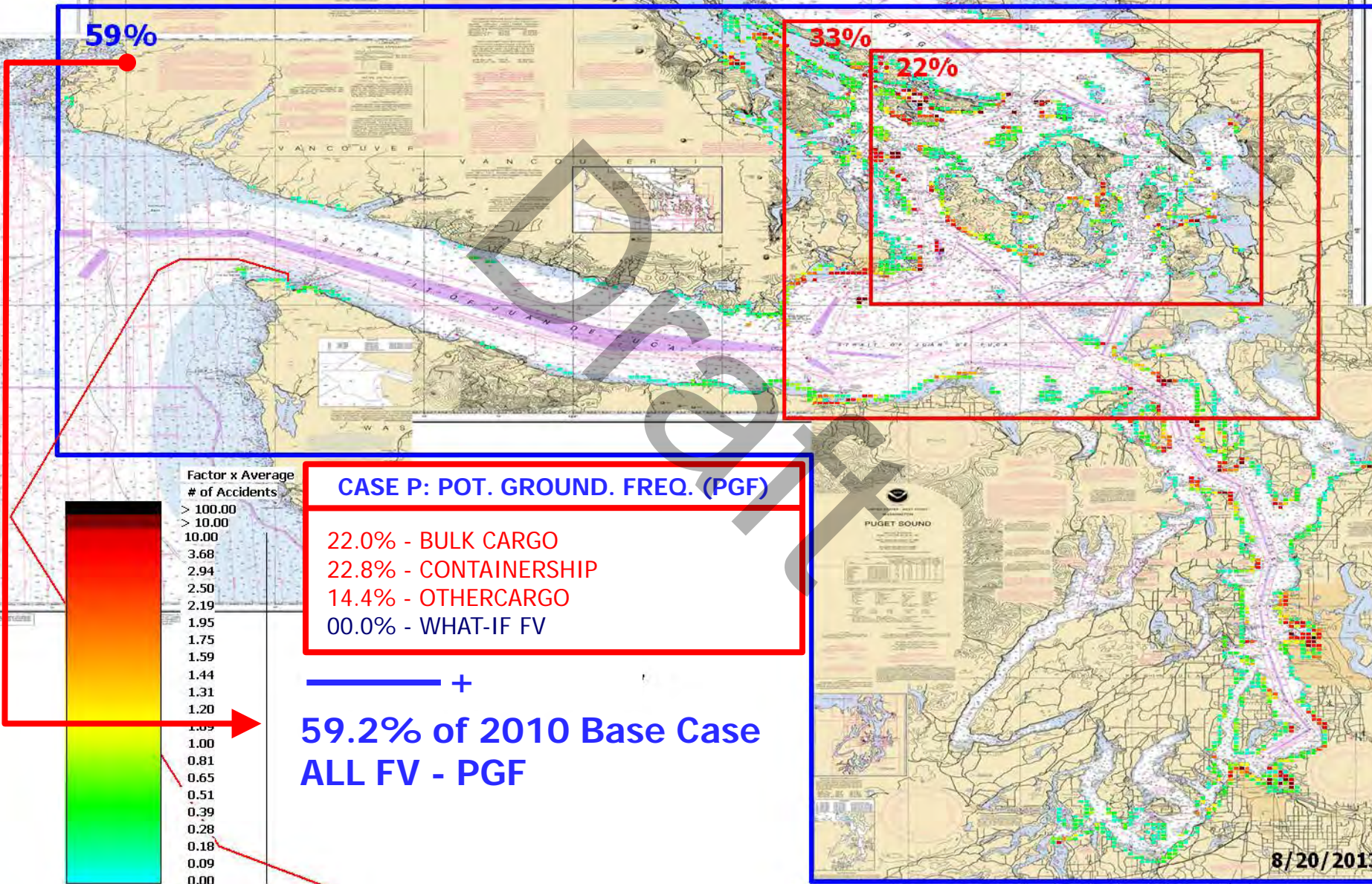
**+  
3.2% of 2010 Base Case  
ALL FV - PGF**





**P: BASE CASE CARGO FV POTENTIAL GROUNDING FREQUENCY (PGF)**

**P: VTRA 2010 - BASE CASE**



**CASE P: POT. GROUND. FREQ. (PGF)**

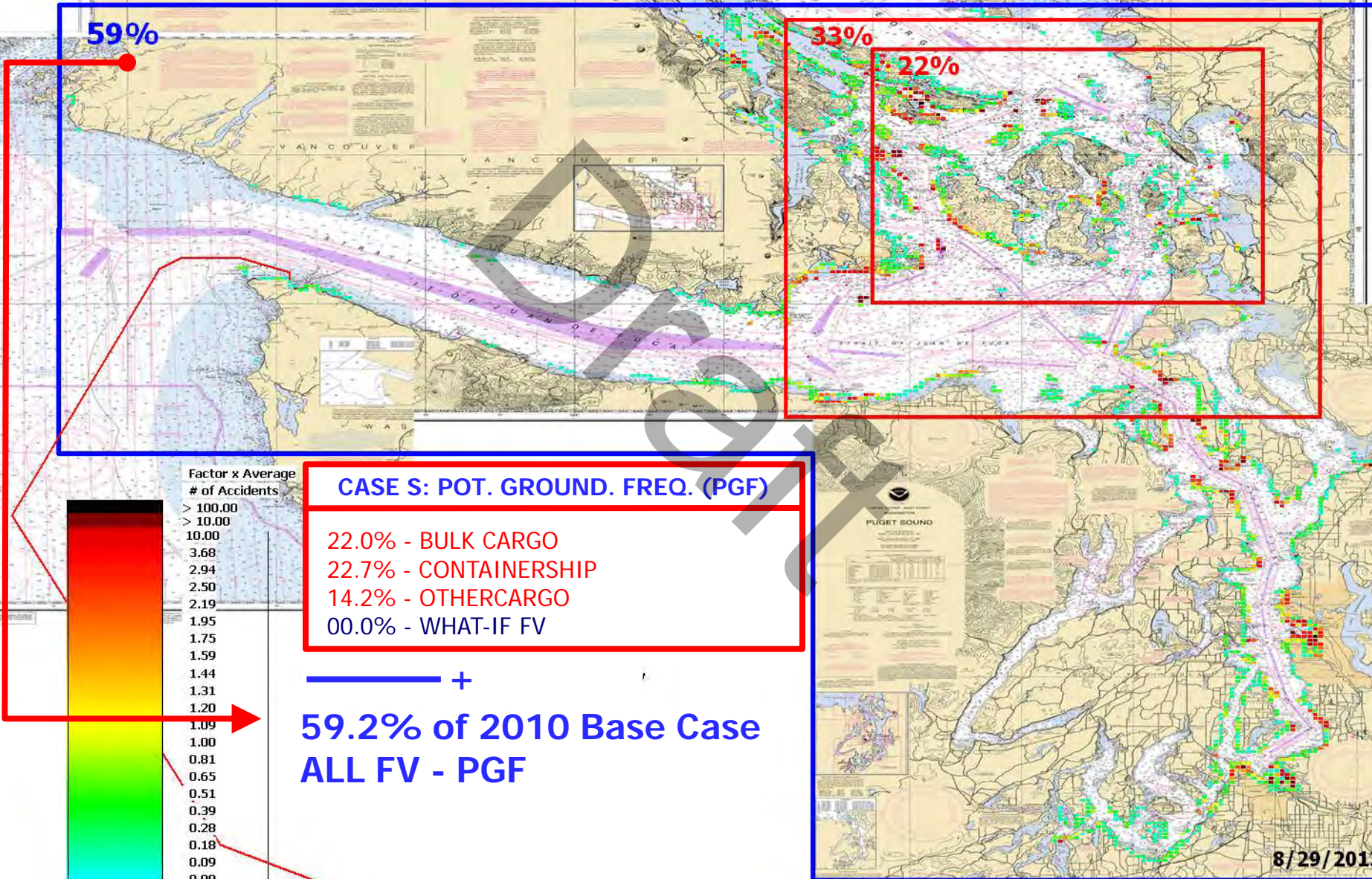
- 22.0% - BULK CARGO
- 22.8% - CONTAINERSHIP
- 14.4% - OTHERCARGO
- 00.0% - WHAT-IF FV

**59.2% of 2010 Base Case ALL FV - PGF**



**S: BASE CASE CARGO FV POTENTIAL GROUNDING FREQUENCY (PGF)**

**S: VTRA 2010 - Delta Port - Cont. 67 and Bulk 348**

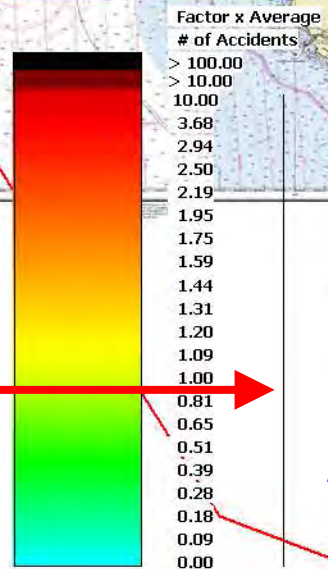
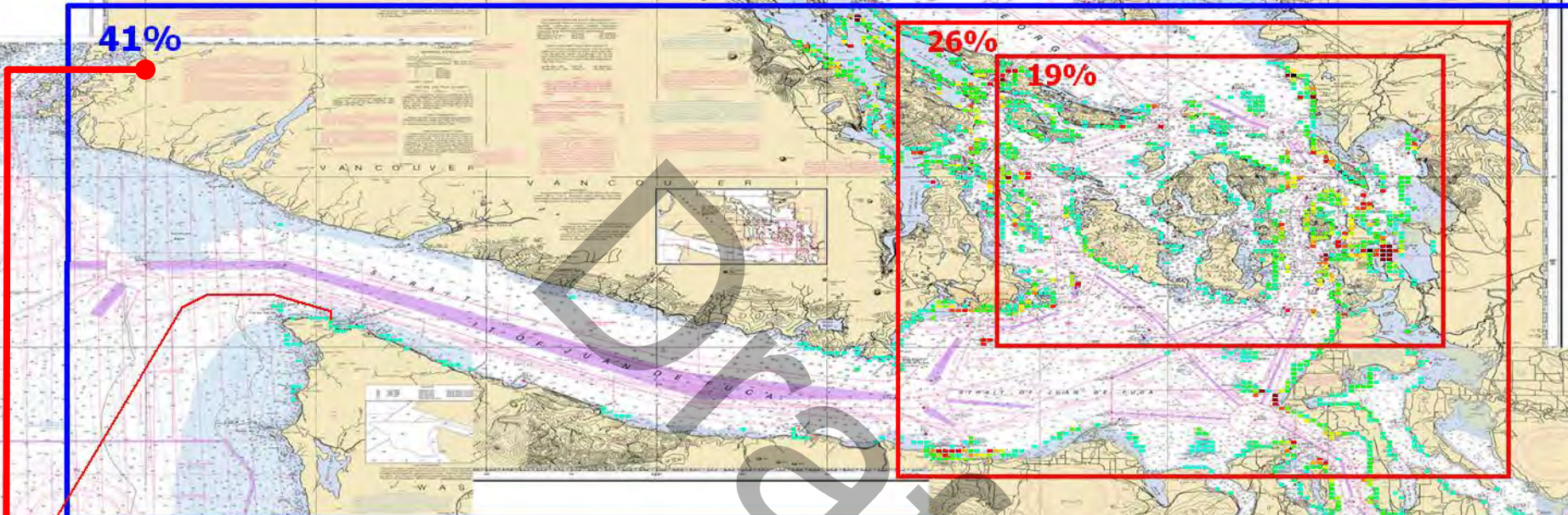




# P: BASE CASE TANK FV POTENTIAL GROUNDING FREQUENCY (PGF)



## P: VTRA 2010 - BASE CASE



**CASE P: POT. GROUND. FREQ. (PGF)**

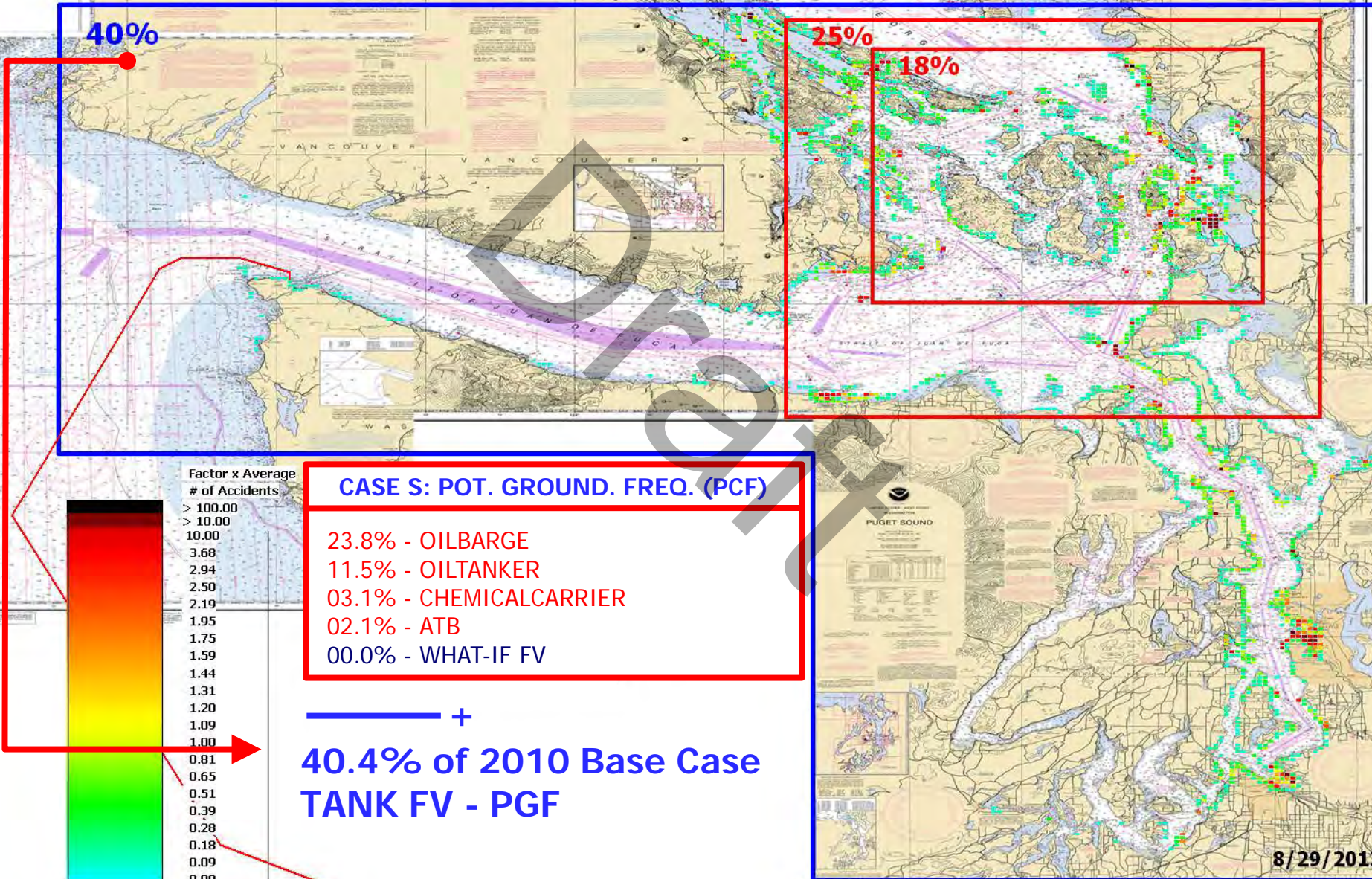
- 24.3% - OILBARGE
- 11.4% - OILTANKER
- 03.0% - CHEMICALCARRIER
- 02.1% - ATB
- 00.0% - WHAT-IF FV

— +  
**40.8% of 2010 Base Case  
 ALL FV - PGF**



# S: BASE CASE TANK FV POTENTIAL GROUNDING FREQUENCY (PGF)

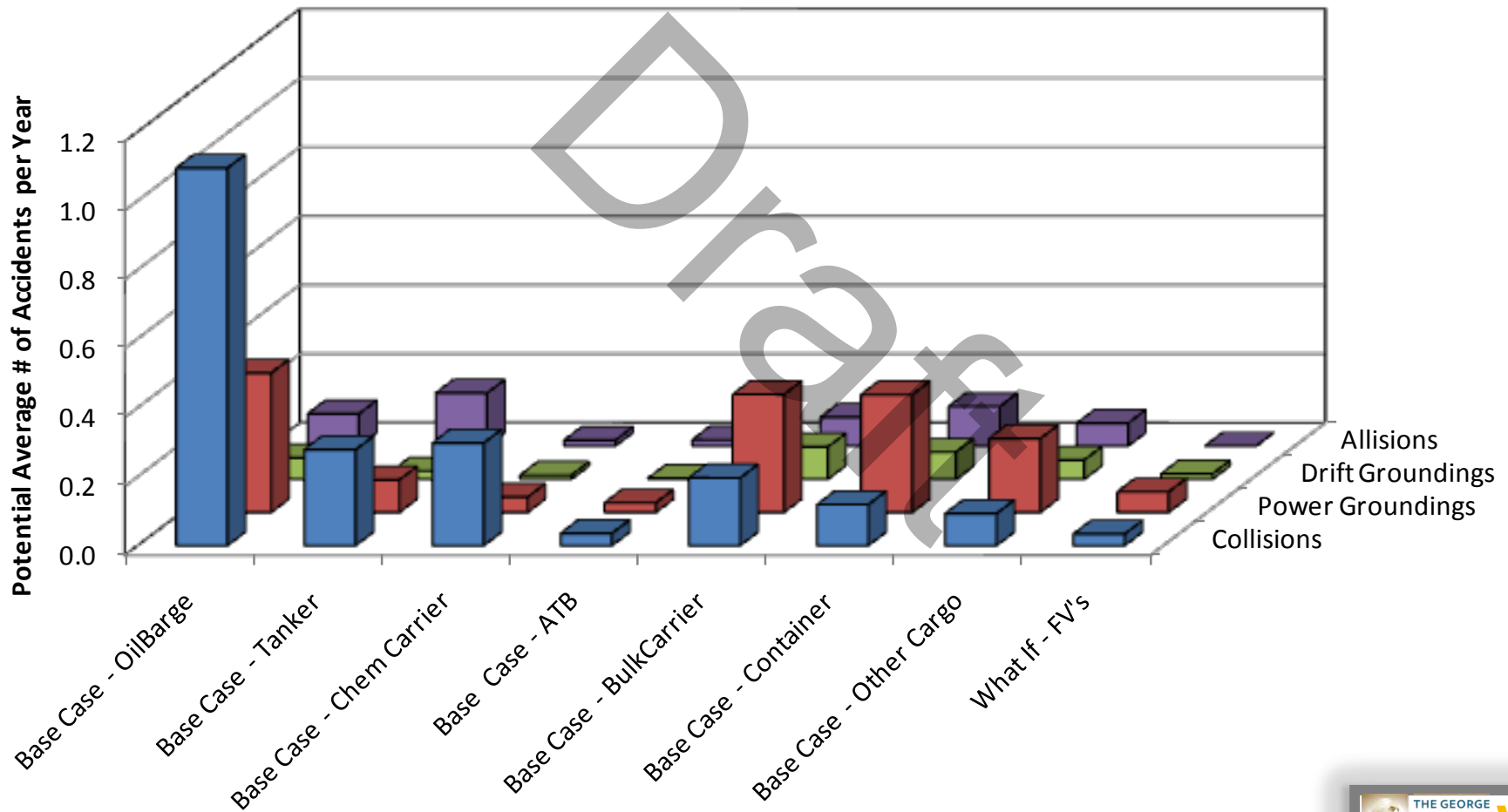
S: VTRA 2010 - Delta Port - Cont. 67 and Bulk 348



# A TAXONOMY OF 2010 FOCUS VESSEL POTENTIAL ACCIDENT FREQUENCY AND ACCIDENT TYPE

## CASE S: DP 415 + BUNKERING

S - VTRA 2010 : Potential Average # of Accidents per Year





# CASE S: DP 415 + BUNKERING

## S - VTRA 2010 : Potential Average # of Accidents per Year

Focus Vessel	Collisions	Power Groundings	Drift Groundings	Allisions	Total
Base Case - OilBarge	55.8%	27.3%	18.9%	17.0%	38.3%
Base Case - Tanker	14.2%	6.4%	7.3%	28.1%	12.7%
Base Case - Chem Carrier	15.2%	3.0%	3.6%	3.0%	8.6%
Base Case - ATB	1.8%	1.9%	1.0%	3.3%	2.0%
Base Case - All Tank FV's	87.0%	38.5%	30.8%	51.5%	61.6%
Base Case - BulkCarrier	10.0%	23.1%	28.5%	15.3%	16.6%
Base Case - Container	6.1%	23.0%	23.9%	21.0%	15.1%
Base Case - Other Cargo	4.7%	14.4%	16.9%	12.1%	9.9%
Base Case - All Cargo FV's	20.8%	60.6%	69.3%	48.4%	41.6%
Base Case - All FV's	107.8%	99.1%	100.1%	99.8%	103.2%
What If - FV's	1.7%	4.0%	4.7%	0.0%	2.5%
Total - Base Case + What- IF	109.5%	103.1%	104.8%	99.8%	105.7%

## S - VTRA 2010 : Potential Average # of Accidents per Year

Focus Vessel	Collisions	Power Groundings	Drift Groundings	Allisions	Total
Base Case - OilBarge	1.09	0.40	0.06	0.09	1.65
Base Case - Tanker	0.28	0.09	0.02	0.15	0.55
Base Case - Chem Carrier	0.30	0.04	0.01	0.02	0.37
Base Case - ATB	0.04	0.03	0.00	0.02	0.08
Base Case - All Tank FV's	1.71	0.57	0.10	0.28	2.66
Base Case - BulkCarrier	0.20	0.34	0.09	0.08	0.72
Base Case - Container	0.12	0.34	0.08	0.11	0.65
Base Case - Other Cargo	0.09	0.21	0.06	0.07	0.43
Base Case - All Cargo FV's	0.41	0.90	0.23	0.26	1.80
Base Case - All FV's	2.11	1.47	0.33	0.55	4.46
What If - FV's	0.03	0.06	0.02	0.00	0.11
Total - Base Case + What- IF	2.15	1.53	0.34	0.55	4.56