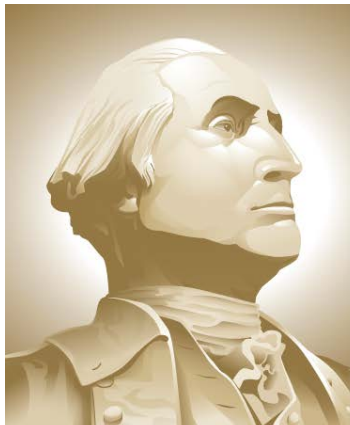


## Paired Comparison of following VTRA 2015 Cases:

1. '15 Base Case to USKCA1600 and
2. USKCA1600 to USKCA1600 - OAE



**THE GEORGE  
WASHINGTON  
UNIVERSITY**

WASHINGTON, DC

**VCU**

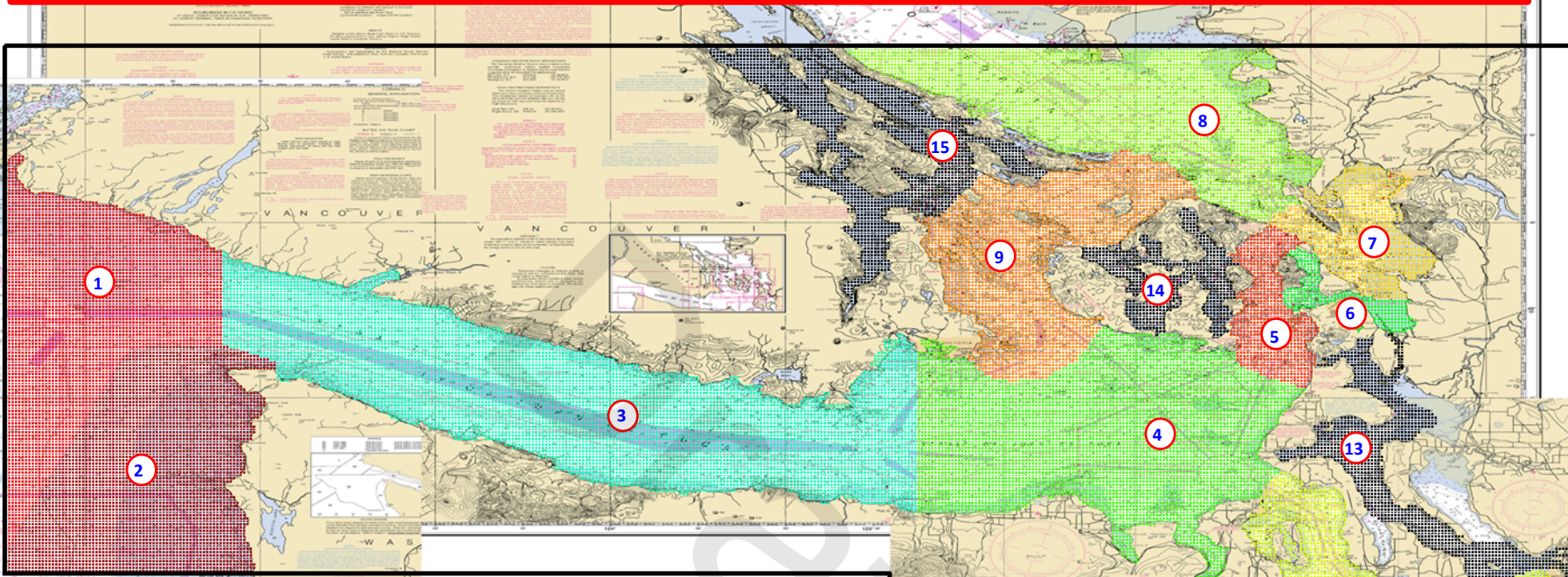
**Jason R.W. Merrick (VCU) and J. Rene van Dorp (GW)**

September, 2016

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

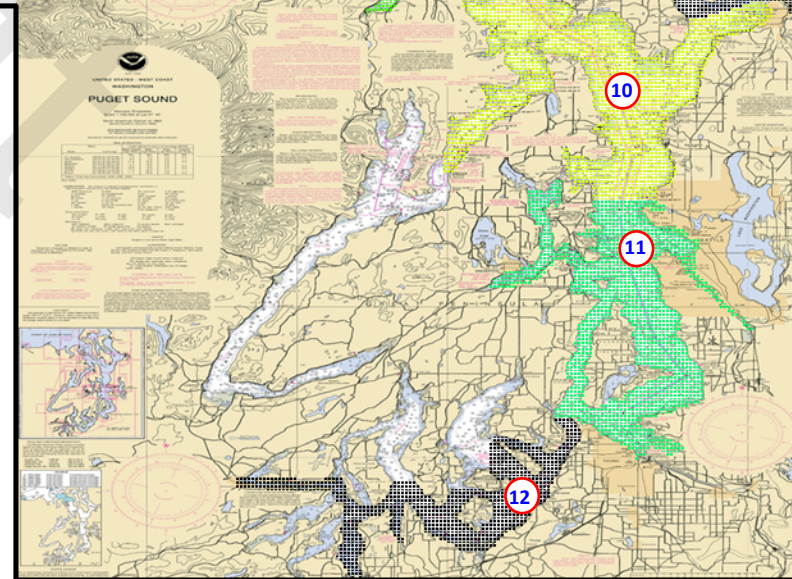


# DEFINITION OF 15 WATERWAY ZONES

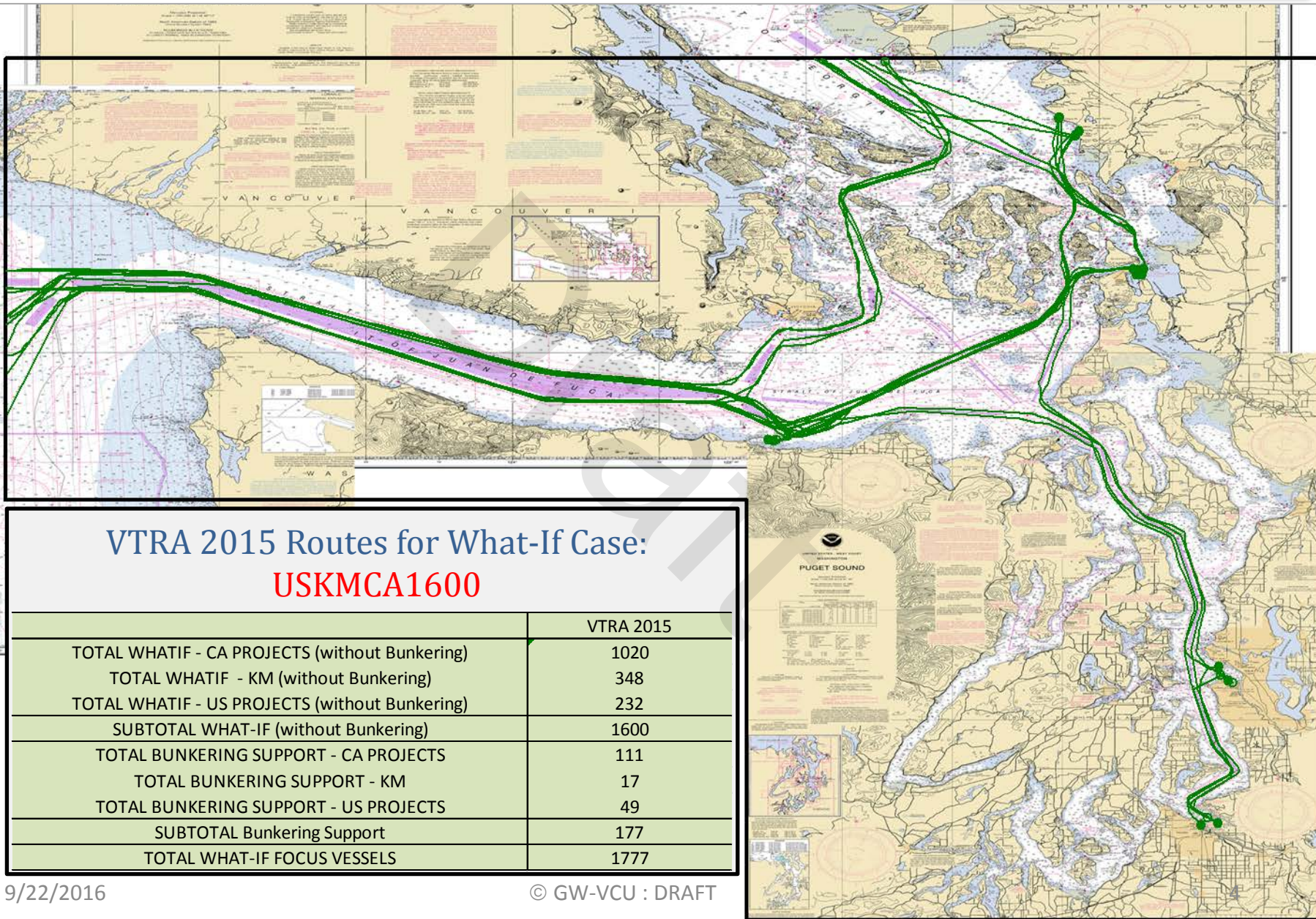


## VTRA 2015 Waterway Zones

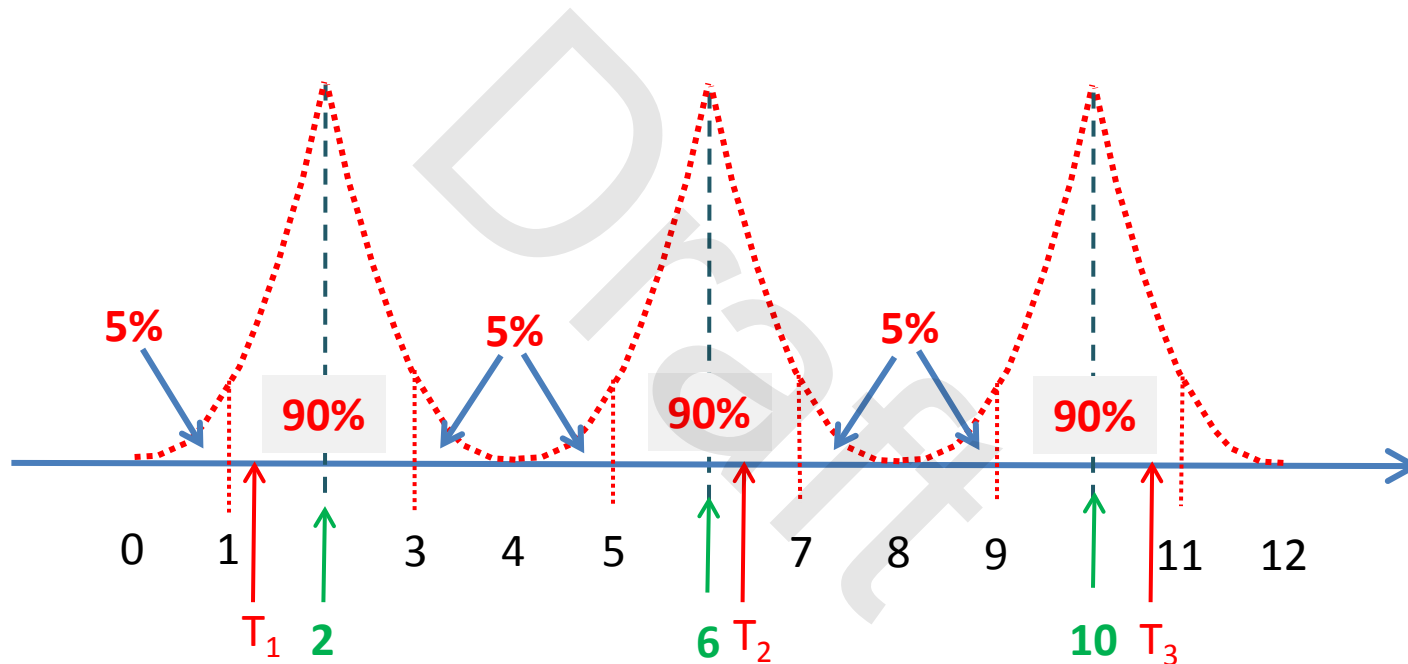
- |                 |                           |
|-----------------|---------------------------|
| 1. Buoy J       | 9. Haro/Boun.             |
| 2. ATBA         | 10. PS North              |
| 3. WSJF         | 11. PS South              |
| 4. ESJF         | 12. Tacoma                |
| 5. Rosario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



# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



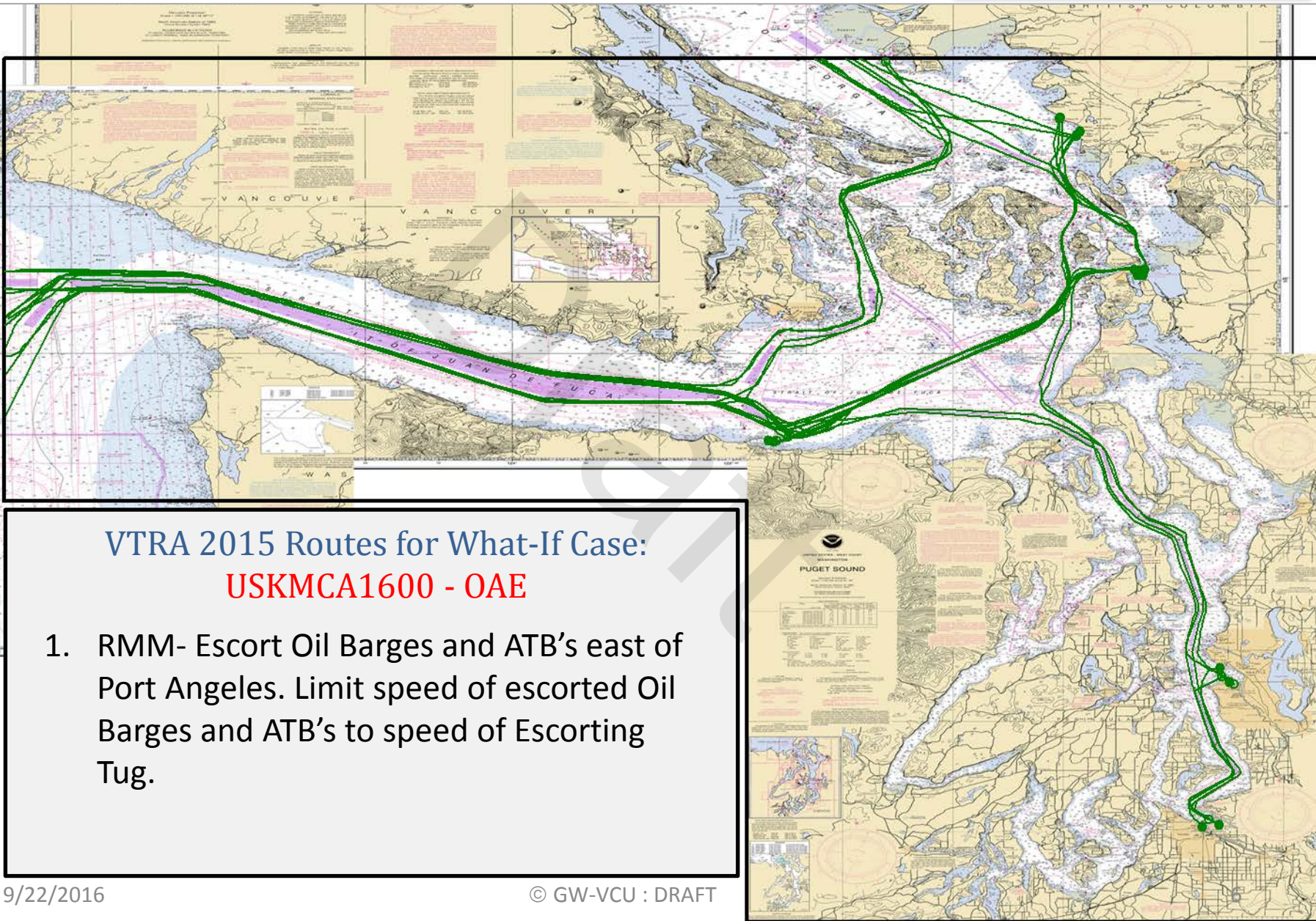
## VTRA 2015 – What If FV Scheduled Random Arrival Pattern Model (See Example Graph below)



VTRA 2010 Equidistant Fixed Arrival Pattern (one every 4 days)

VTRA 2015 Random Arrival Pattern ( 3 Random Times in 12 days)

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



## VTRA 2015 Routes for What-If Case: USKMCA1600 - OAE

1. RMM- Escort Oil Barges and ATB's east of Port Angeles. Limit speed of escorted Oil Barges and ATB's to speed of Escorting Tug.

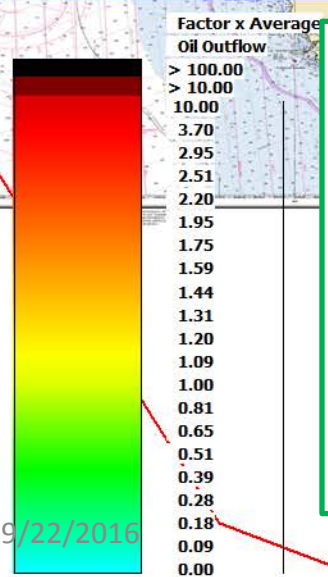
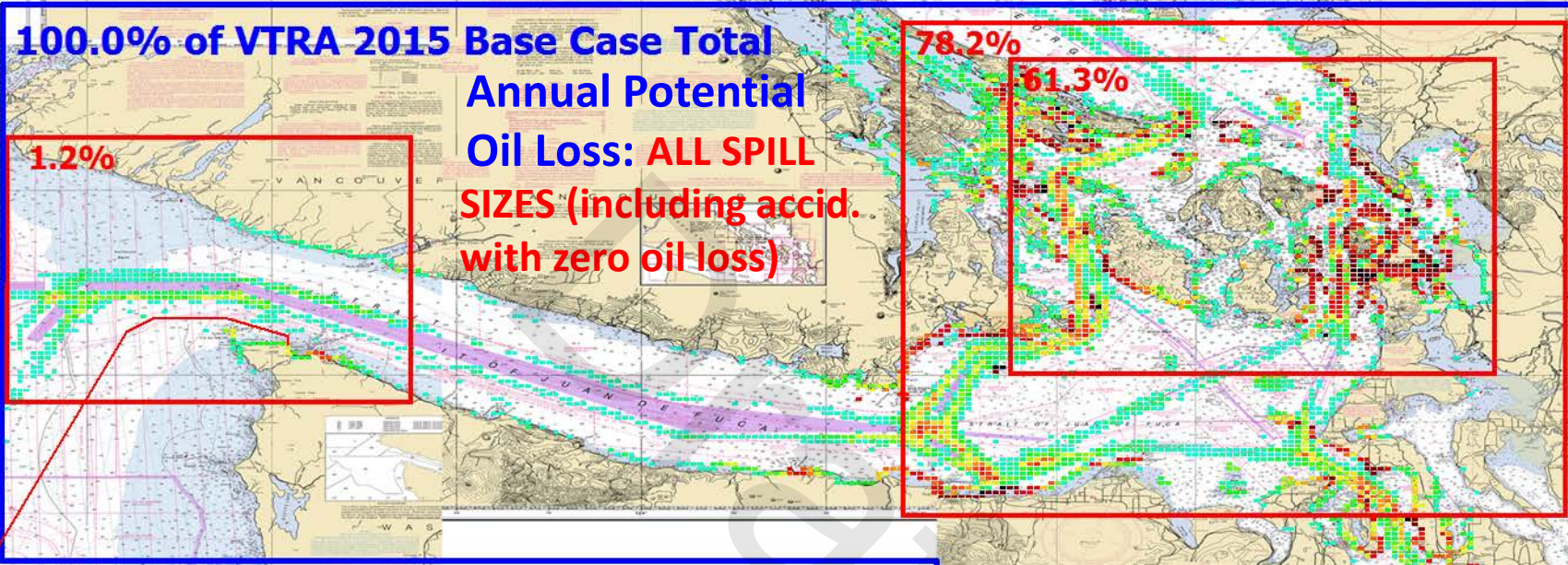
# By Waterway Zone Risk Comparison

Oil Spill Size Category:

**ALL SPILL SIZES**

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

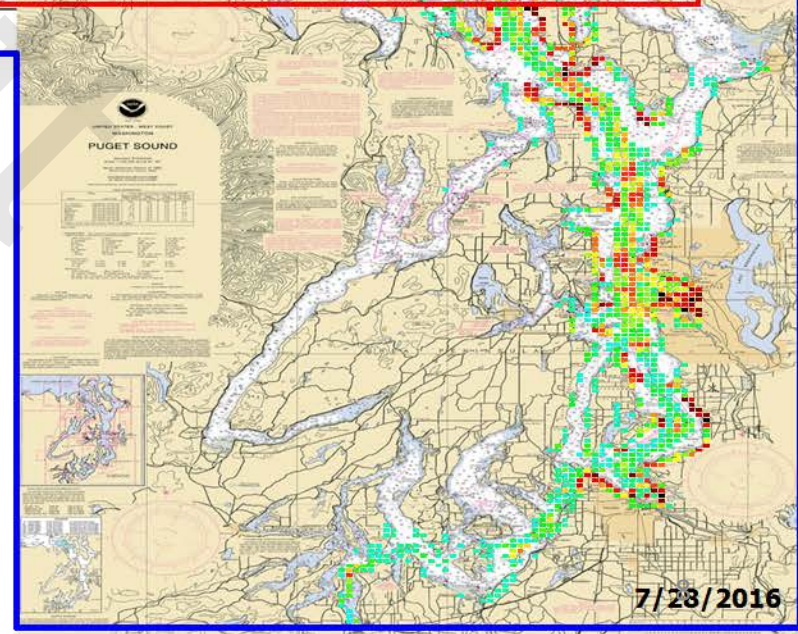
## VTRA 2015 BASE CASE - ALL FV



**VTRA '15 Case:**  
**BASE CASE**

GEOGRAPHIC PROFILE OF POTENTIAL ANNUAL OIL LOSS OF ACCIDENTS IN SPILL SIZE CATEGORY

**ALL SPILL SIZES**

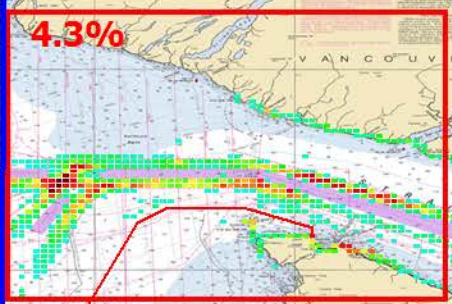




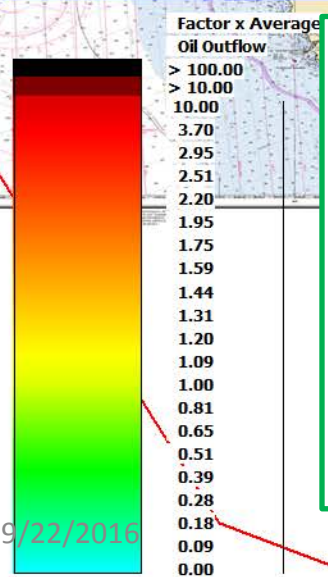
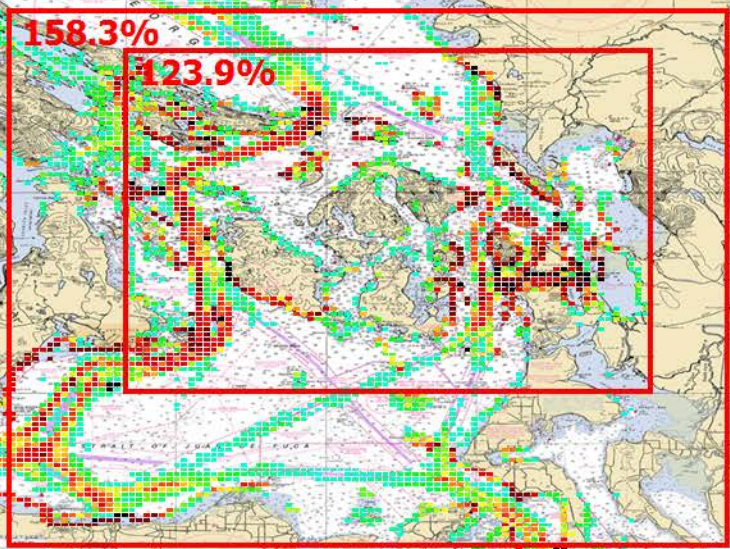
# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

**VTRA 2015 Case: USKMCA1600 - ALL FV**

**184.1% of VTRA 2015 Base Case Total Annual Potential Oil Loss: ALL SPILL SIZES (including accid. with zero oil loss)**

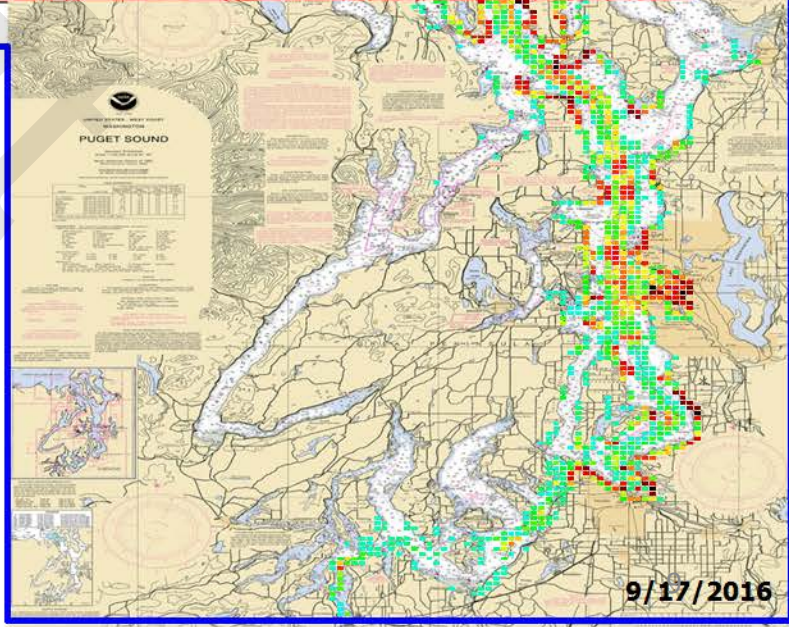


**Oil Loss: ALL SPILL SIZES (including accid. with zero oil loss)**



**VTRA '15 Case: USKMCA1600**

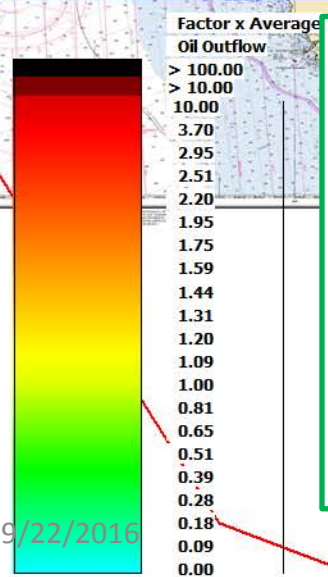
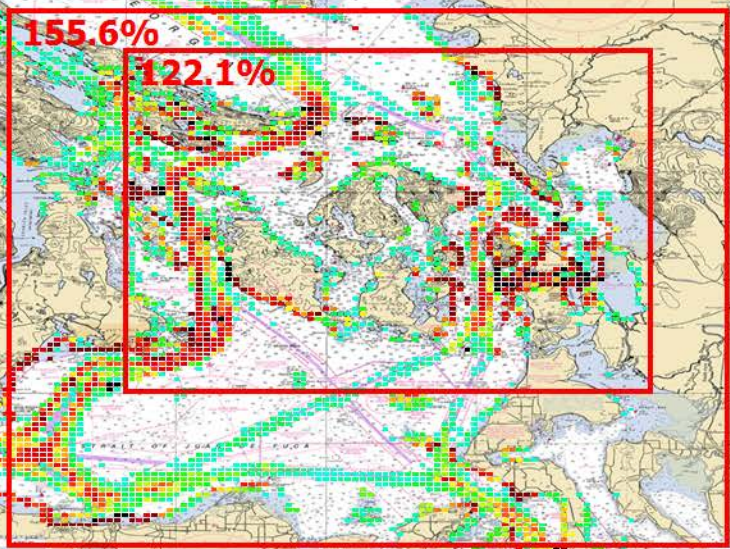
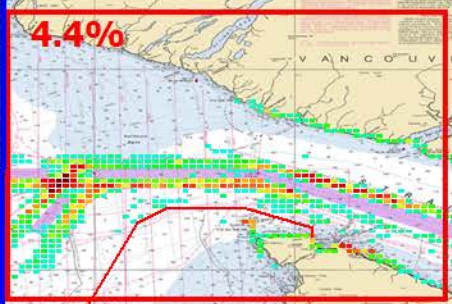
**GEOGRAPHIC PROFILE OF POTENTIAL ANNUAL OIL LOSS OF ACCIDENTS IN SPILL SIZE CATEGORY ALL SPILL SIZES**



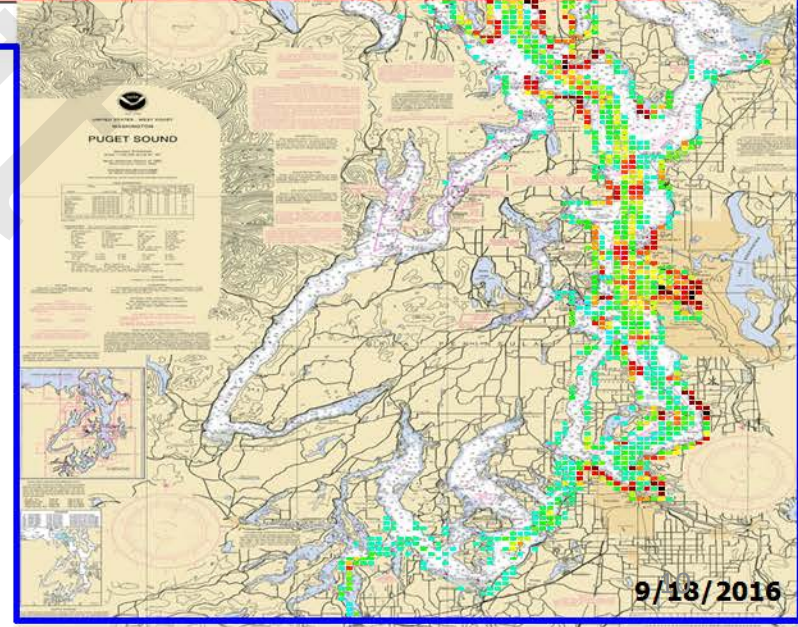
# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

## VTRA 2015 Case: USKMCA1600-OAE - ALL FV

**181.0% of VTRA 2015 Base Case Total Annual Potential Oil Loss: ALL SPILL SIZES (including accid. with zero oil loss)**



**VTRA '15 Case:**  
**USKMCA1600 - OAE**  
GEOGRAPHIC PROFILE  
OF POTENTIAL ANNUAL  
OIL LOSS OF ACCIDENTS  
IN SPILL SIZE CATEGORY  
**ALL SPILL SIZES**

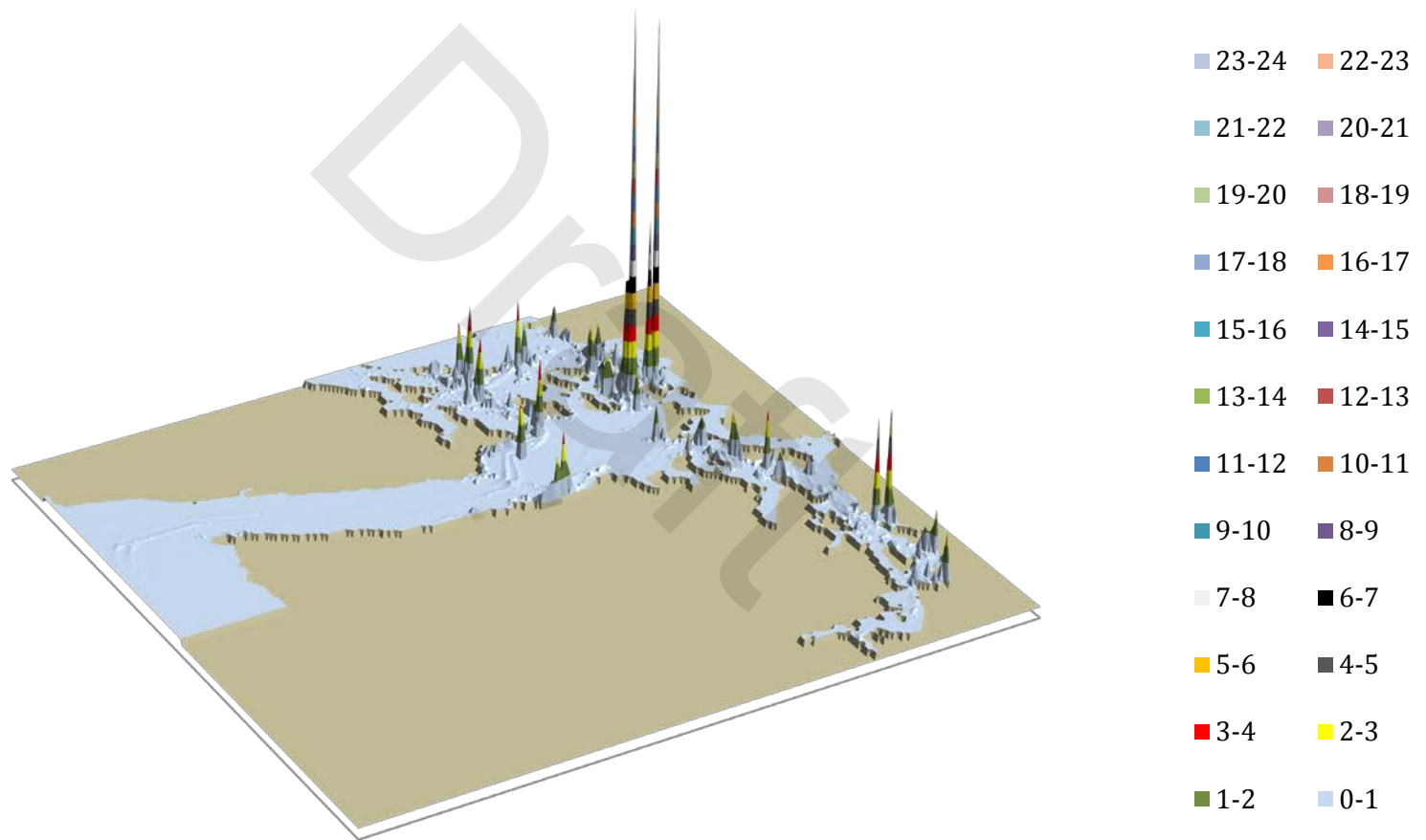


9/22/2016

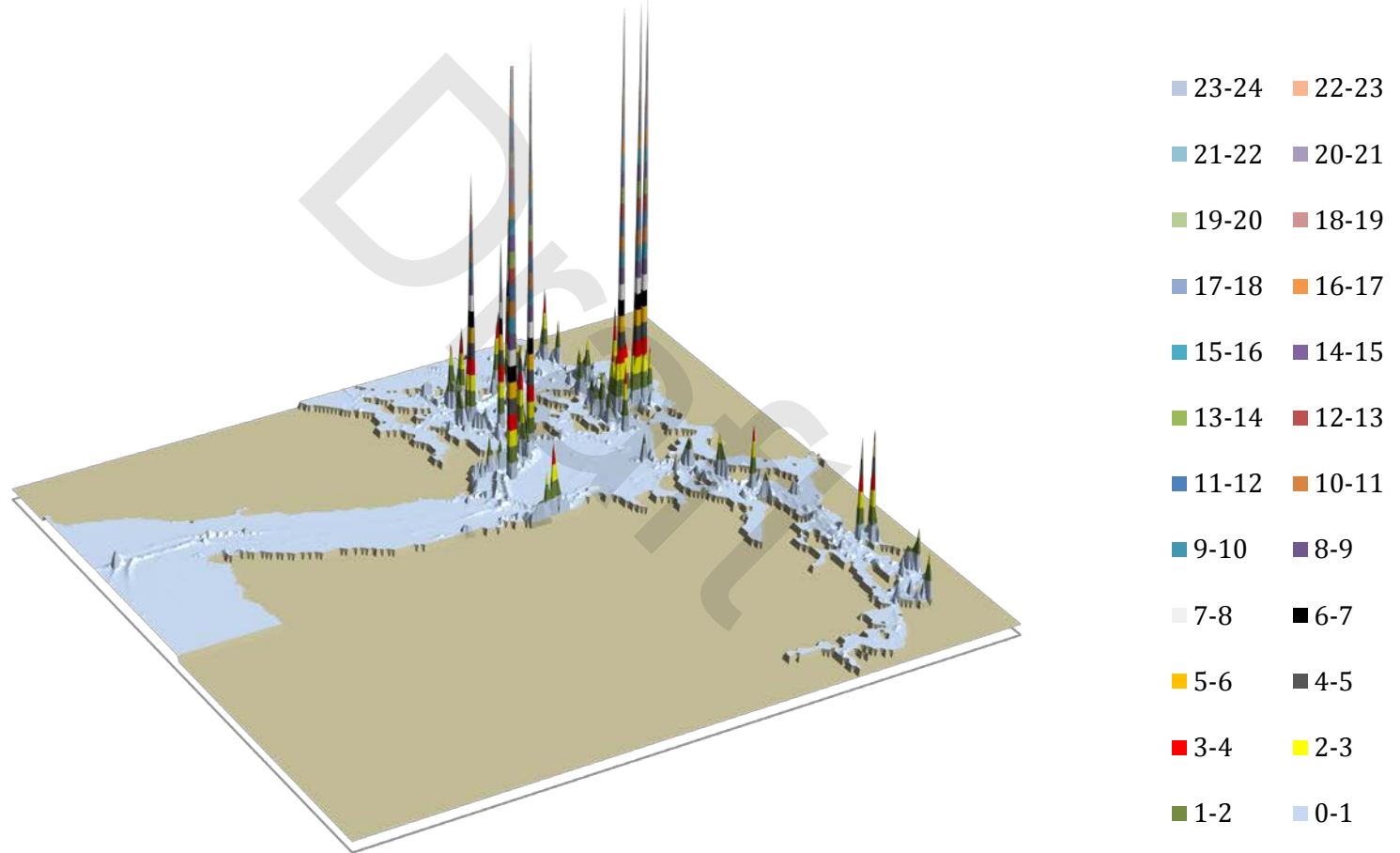
© GW-VCU : DRAFT

9/18/2016

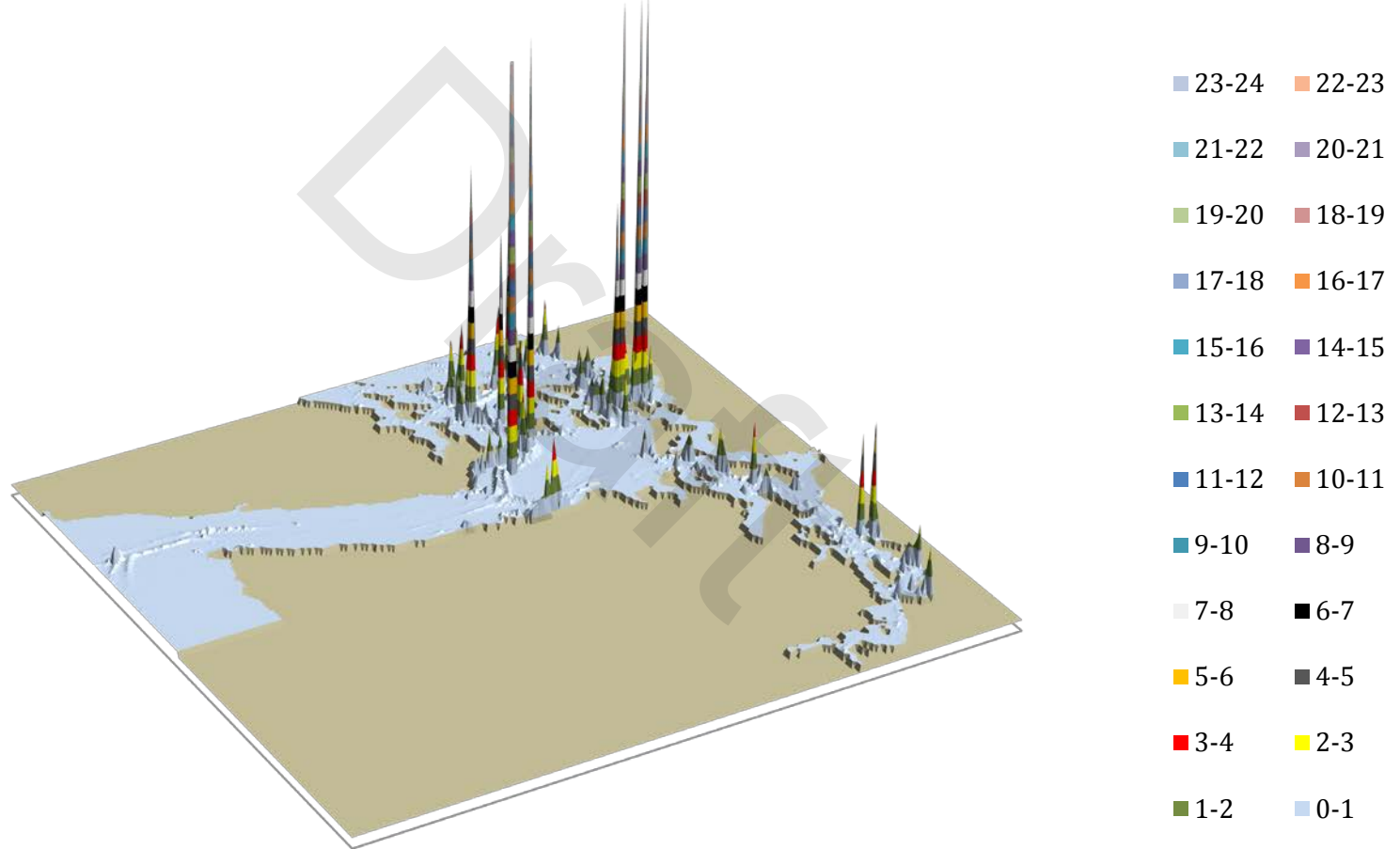
## VTRA '15: Base Case 3D Risk Profile All FV - Pot.C+G+A.Oil Loss: 100% of Base Case POL



## USKMCA1600 3D Risk Profile All FV - Pot.C+G+A.Oil Loss: 184% of Base Case POL

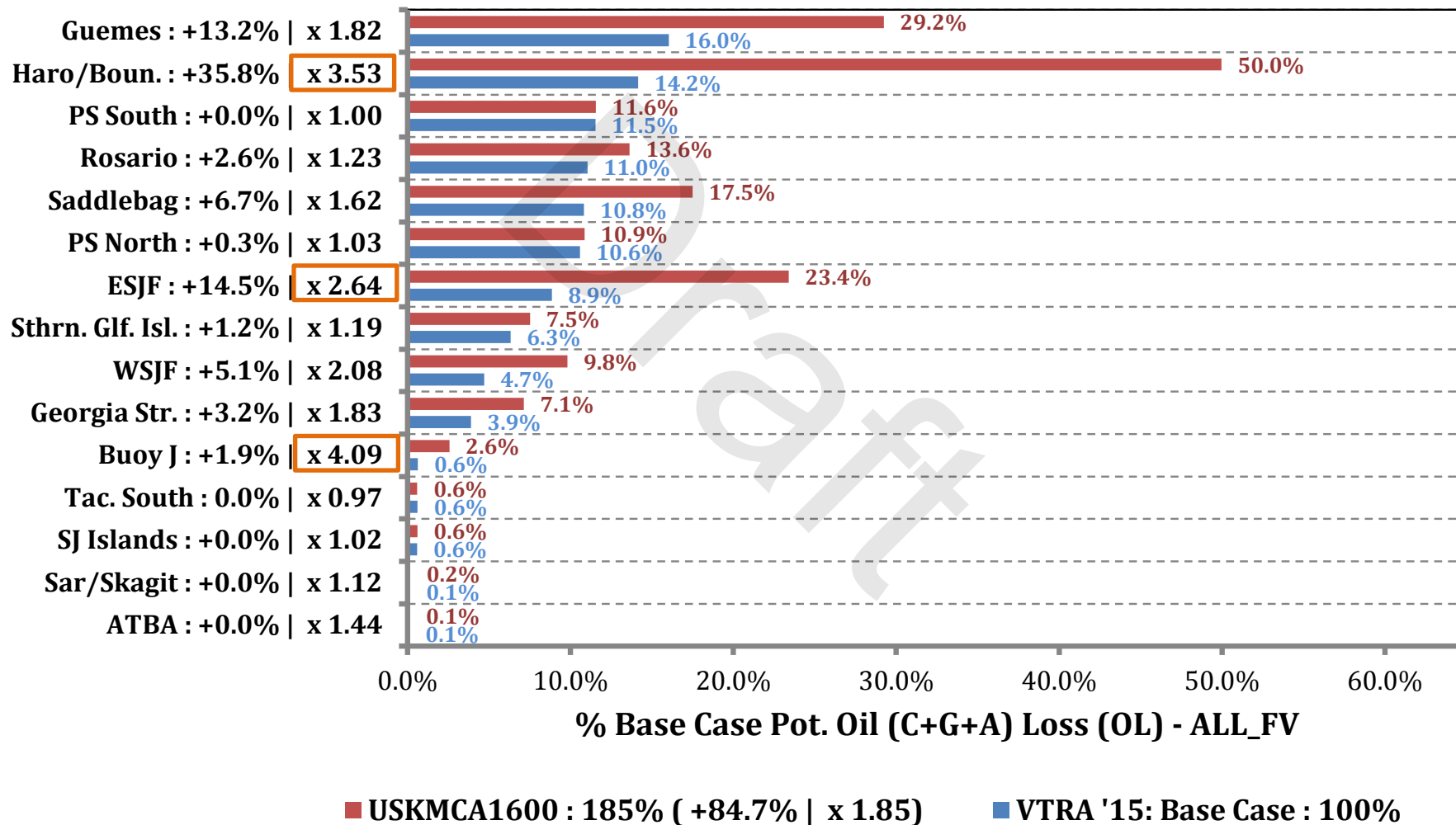


## USKMCA1600 - OAE 3D Risk Profile All FV - Pot.C+G+A.Oil Loss: 181% of Base Case POL



# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

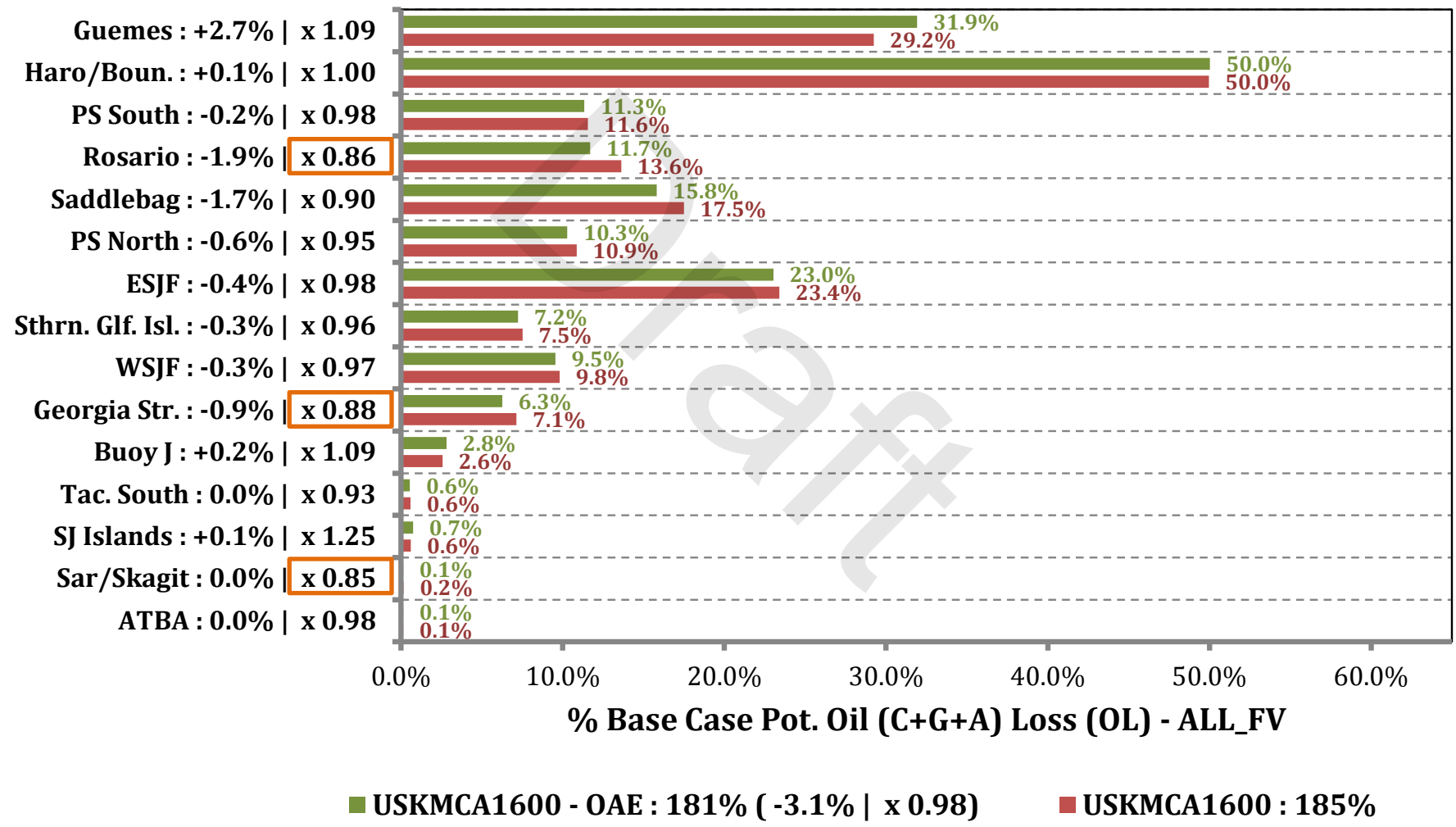
## % Base Case Pot. Oil (C + G + A) Loss - ALL\_FV



# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



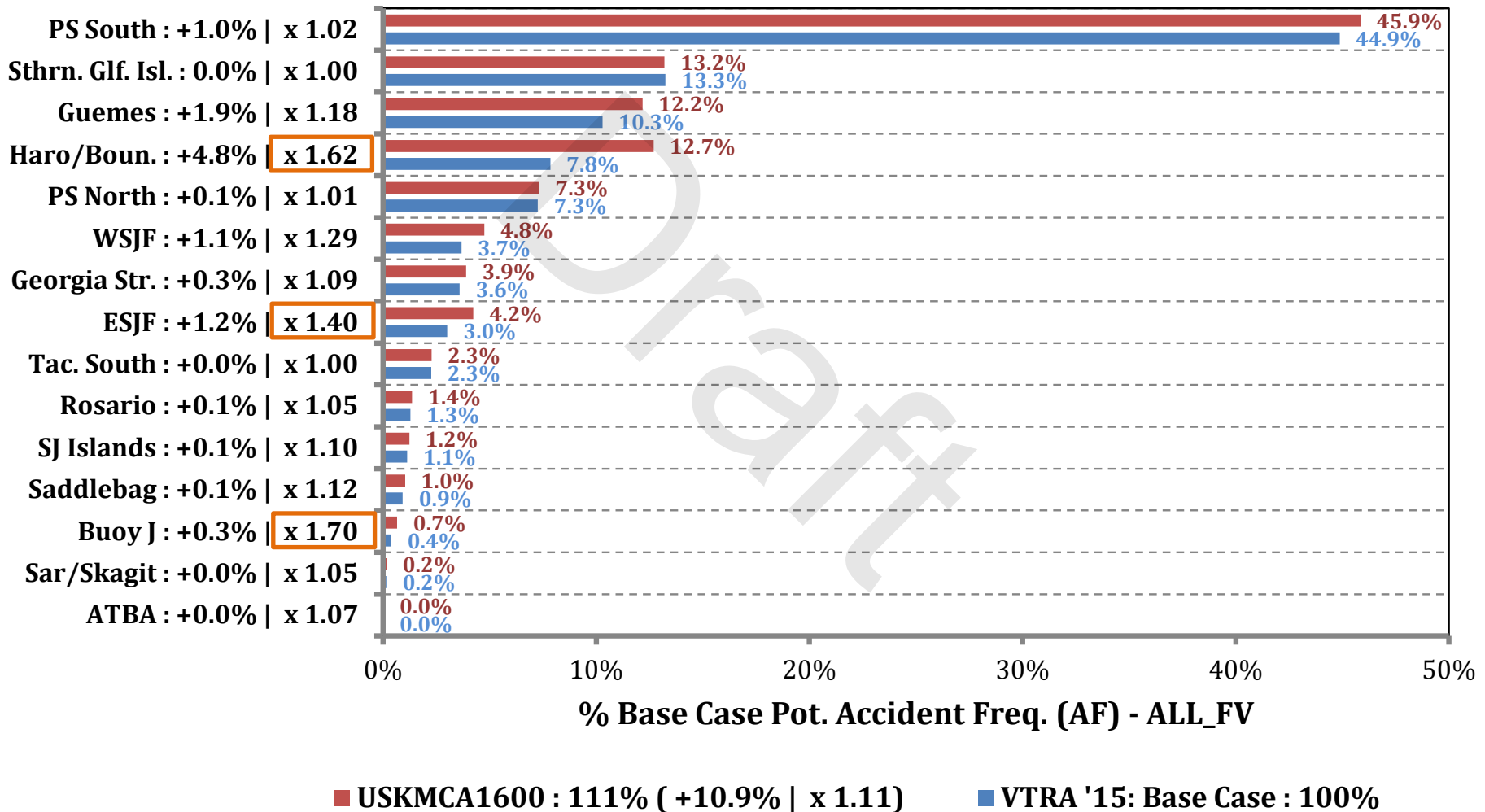
## % Base Case Pot. Oil (C + G + A) Loss - ALL\_FV



# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



## % Base Case Pot. Accident (C+G+A) Frequency - ALL\_FV

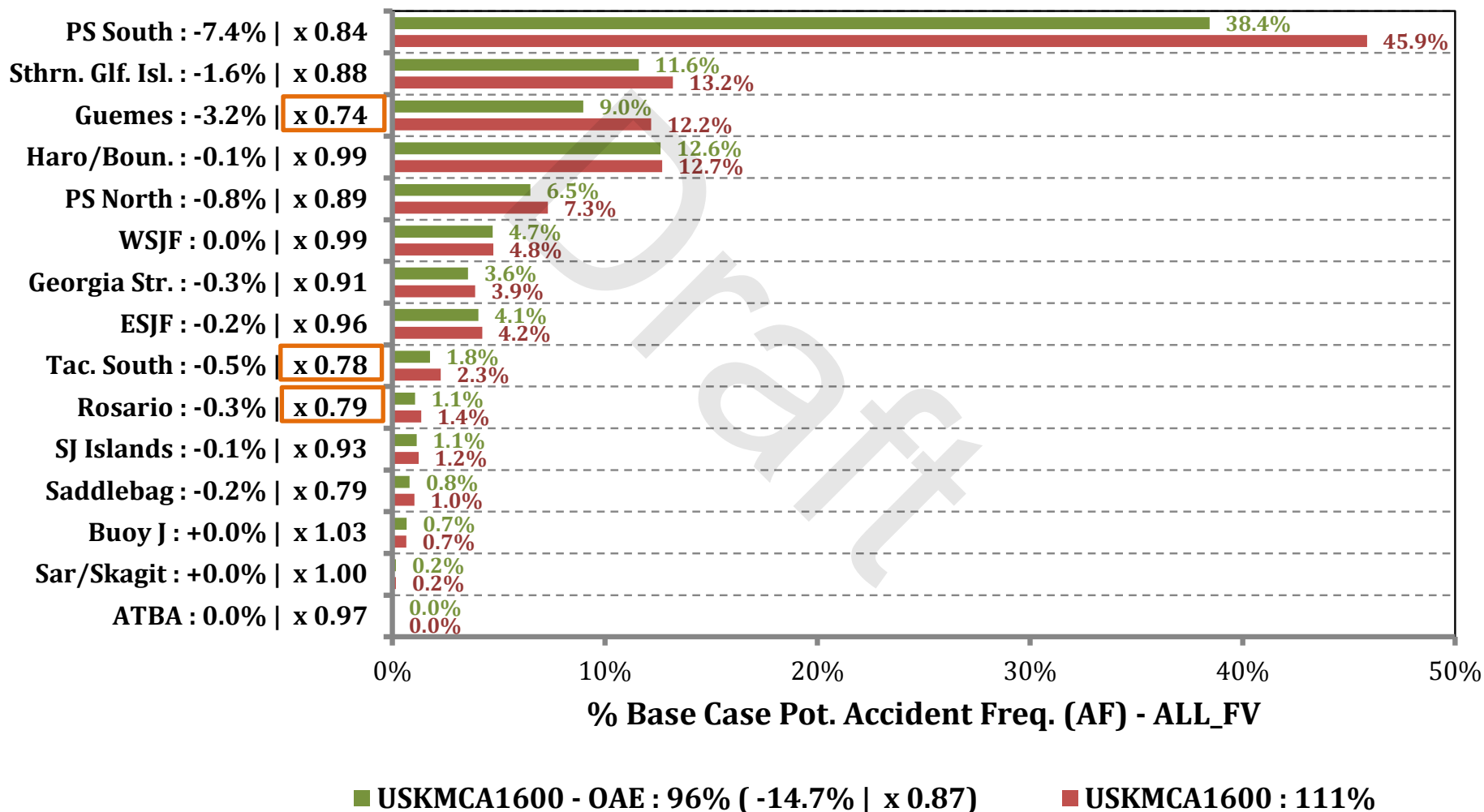




# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



## % Base Case Pot. Accident (C+G+A) Frequency - ALL\_FV



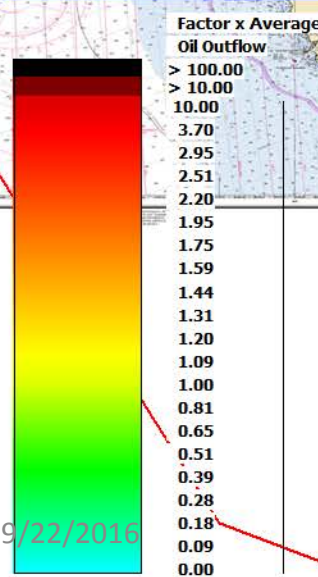
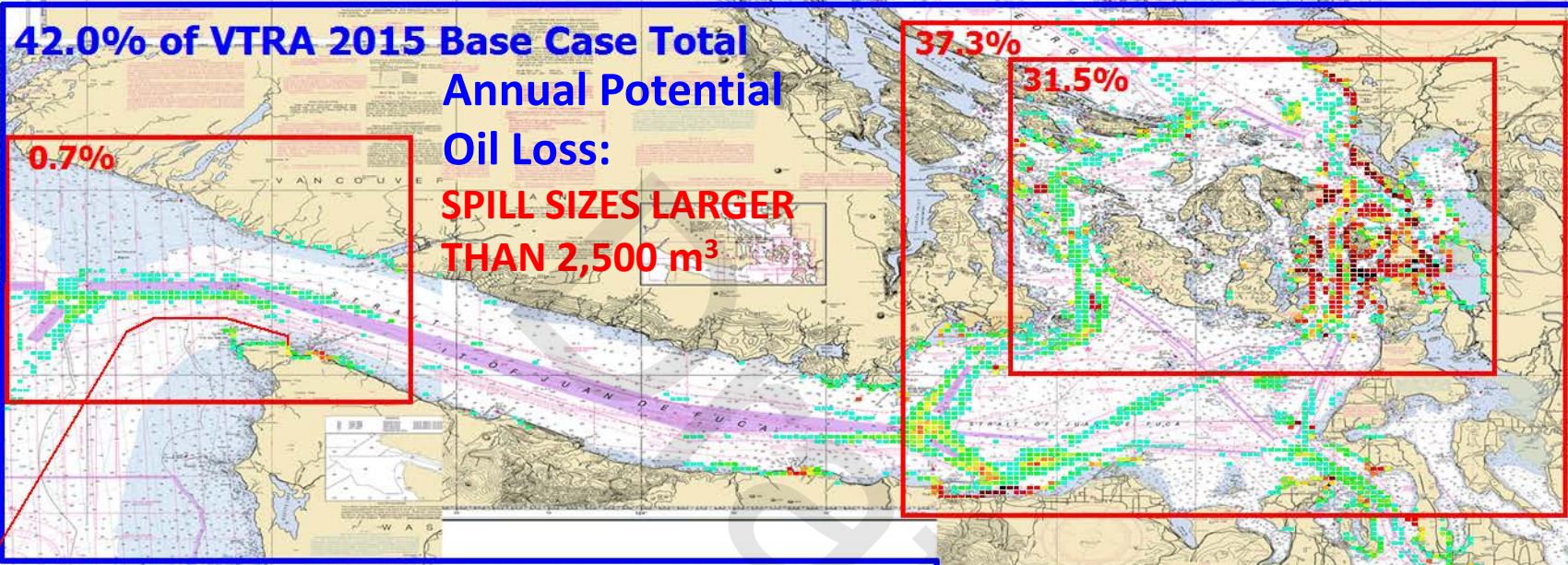
# By Waterway Zone Risk Comparison

Oil Spill Size Category:  
**2500 m<sup>3</sup> or more**

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



## VTRA 2015 BASE CASE - ALL FV



**VTRA '15:**  
**BASE CASE**  
GEOGRAPHIC PROFILE  
OF POTENTIAL  
ANNUAL OIL LOSS  
OF ACCIDENTS  
WITH SPILL SIZE  
**2,500 m<sup>3</sup> or more**

≈ 0.50% Probability  
of Spill Occurrence  
in 10 years

Average of ≈ 6,798 m<sup>3</sup>  
Per Potential Spill  
(≈ 5,846 Metric. Tons)

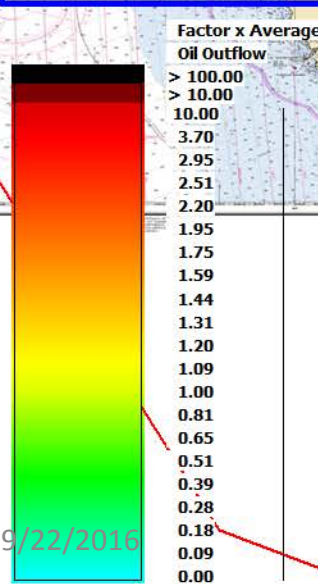
# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

## VTRA 2015 Case: USKMCA1600 - ALL FV

**91.0% of VTRA 2015 Base Case Total Annual Potential Oil Loss:**  
**SPILL SIZES LARGER THAN 2,500 m<sup>3</sup>**

**83.1%**  
**67.7%**

**3.3%**



**VTRA '15 Case: USKMCA1600**  
 GEOGRAPHIC PROFILE OF POTENTIAL ANNUAL OIL LOSS OF ACCIDENTS WITH SPILL SIZE **2,500 m<sup>3</sup> or more**

≈ 1.35% Probability of Spill Occurrence in 10 years

Average of ≈ 5,412 m<sup>3</sup> Per Potential Spill (≈ 4,654 Metric Tons)

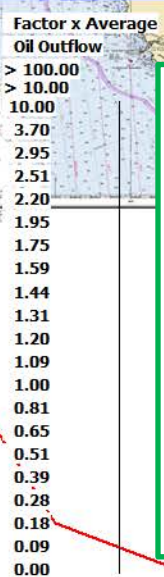
# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

## VTRA 2015 Case: USKMCA1600-OAE - ALL FV

**91.6% of VTRA 2015 Base Case Total Annual Potential Oil Loss:**  
**SPILL SIZES LARGER THAN 2,500 m<sup>3</sup>**

**83.6%**  
**68.7%**

**3.4%**



**VTRA '15 Case:**  
**USKMCA1600 - OAE**  
GEOGRAPHIC PROFILE OF POTENTIAL ANNUAL OIL LOSS OF ACCIDENTS WITH SPILL SIZE **2,500 m<sup>3</sup> or more**

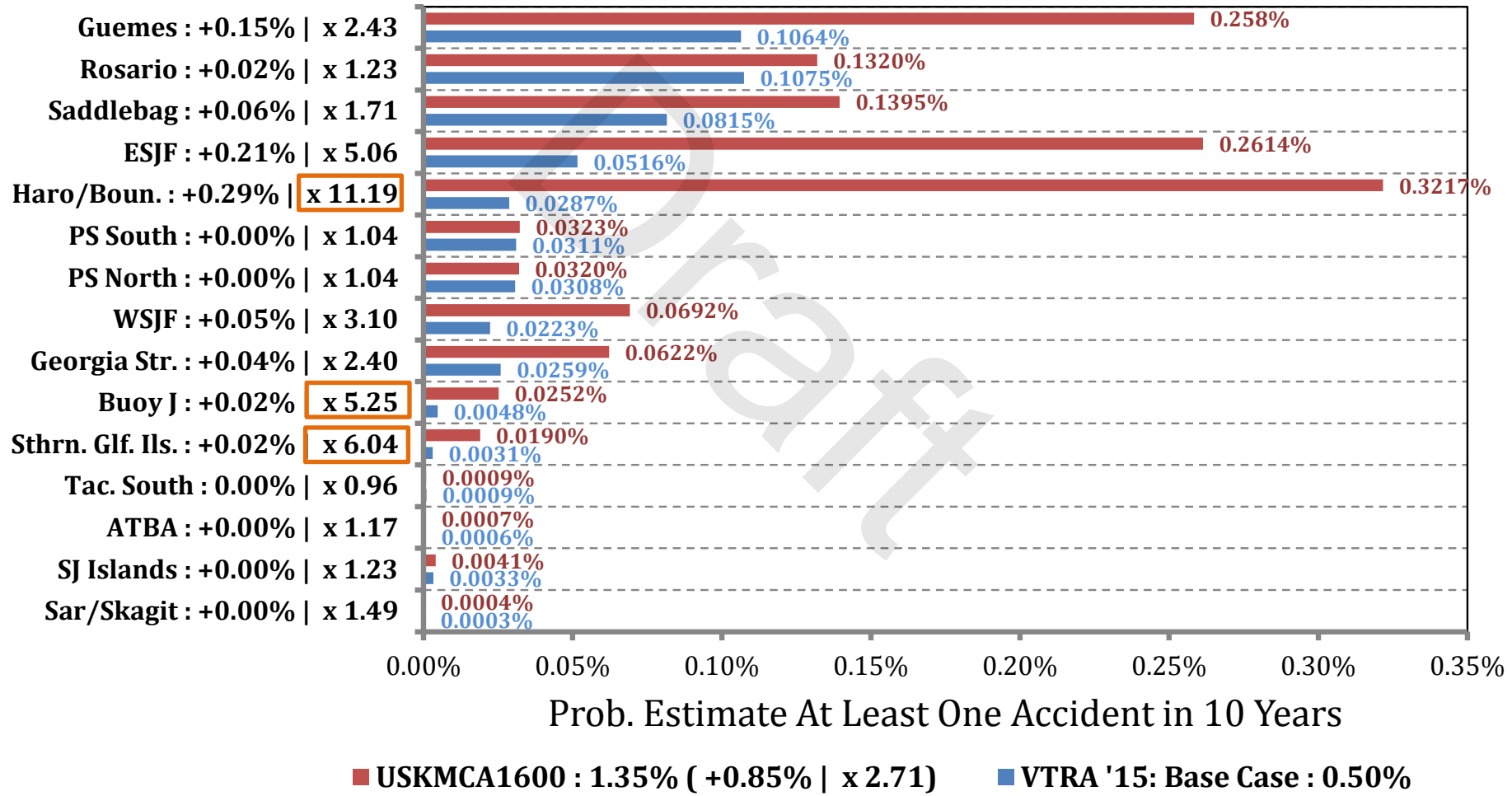
≈ 1.34% Probability of Spill Occurrence in 10 years

Average of ≈ 5,486 m<sup>3</sup> Per Potential Spill (≈ 4,718 Metric. Tons)

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



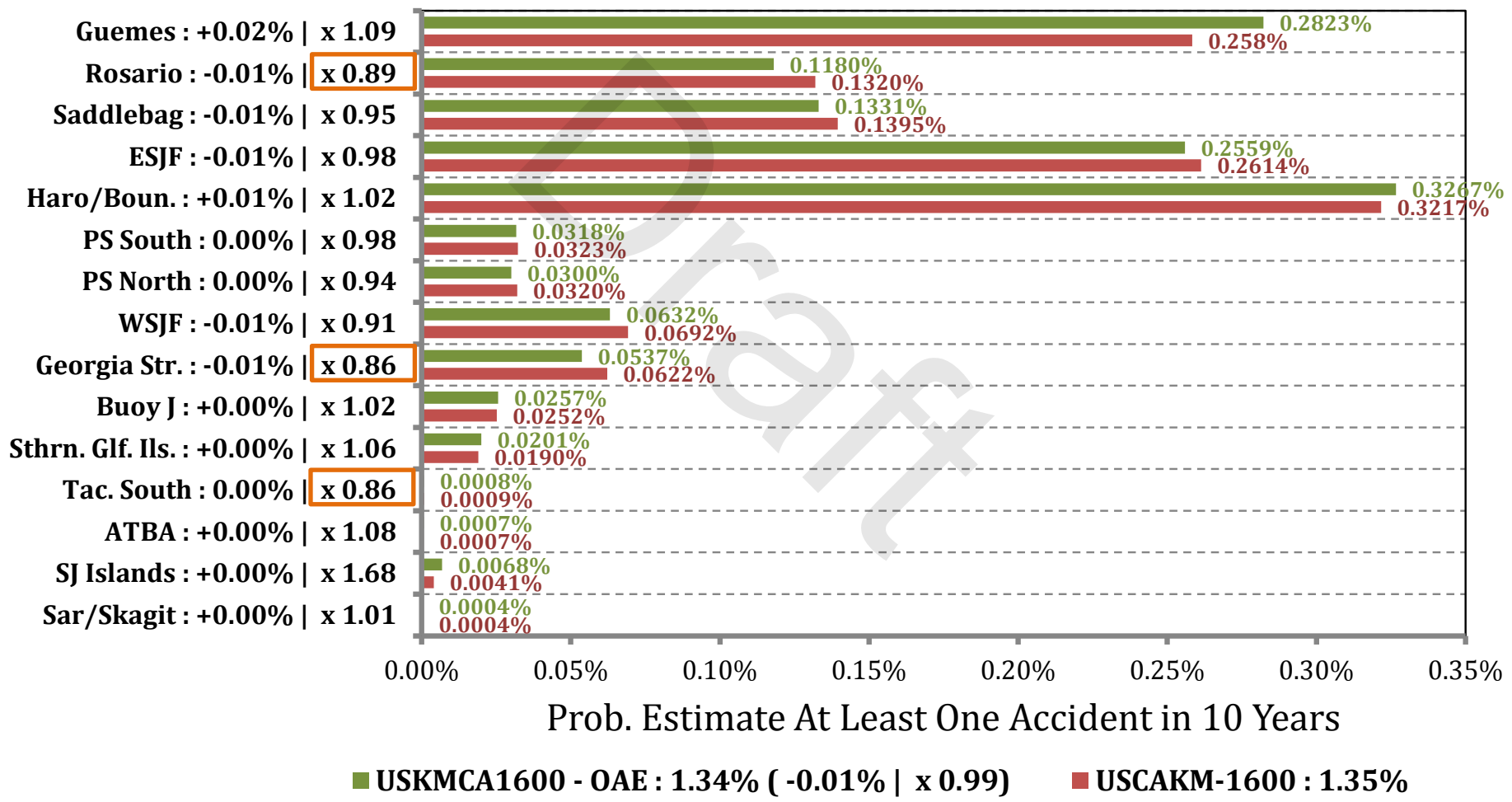
## Prob. Estimate At Least One Accident in 10 Years - ALL\_FV - Oil Spill Size Category: 2500 cubic meters or more



# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

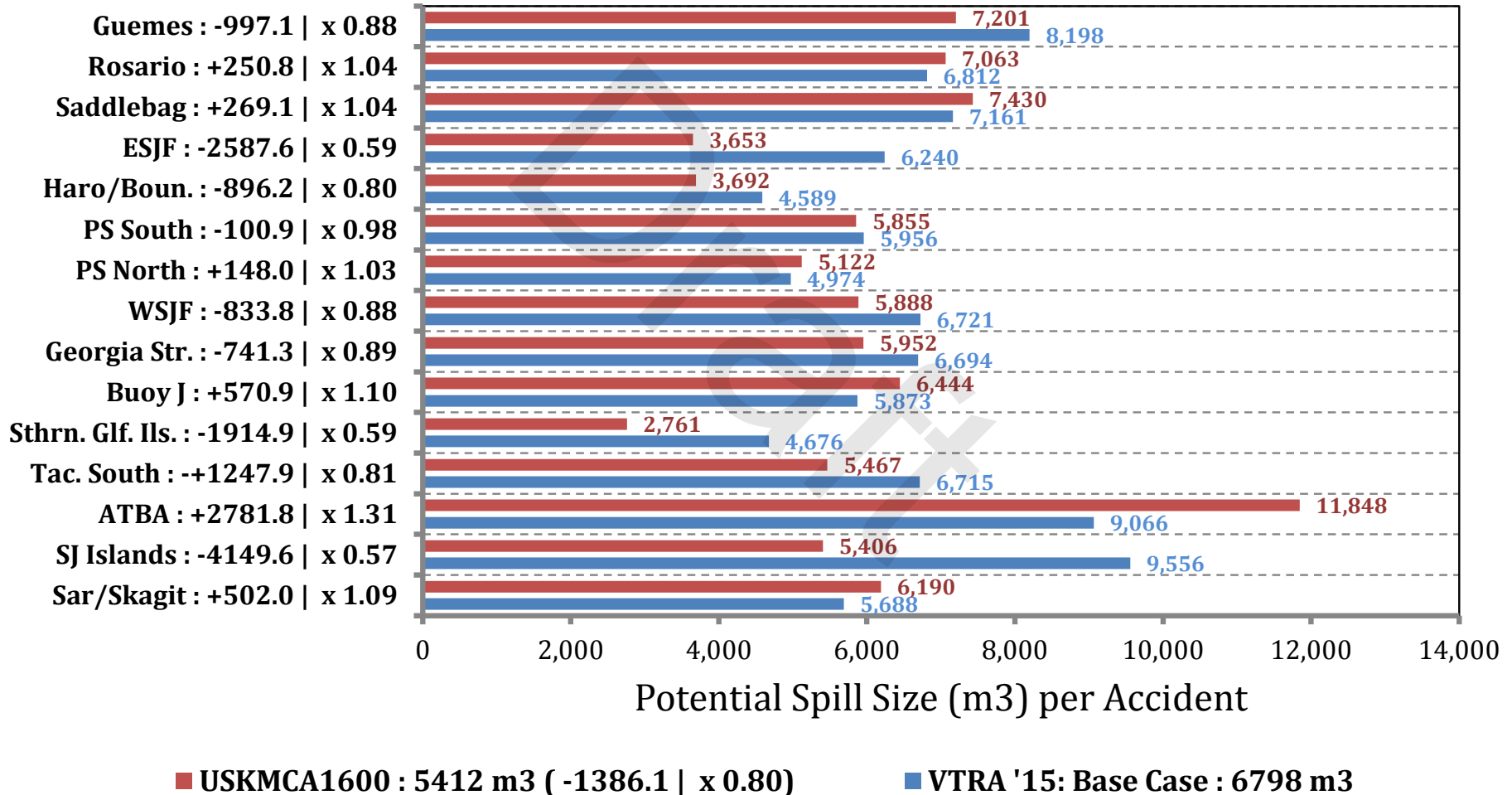


## Prob. Estimate At Least One Accident in 10 Years - ALL\_FV - Oil Spill Size Category: 2500 cubic meters or more



# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

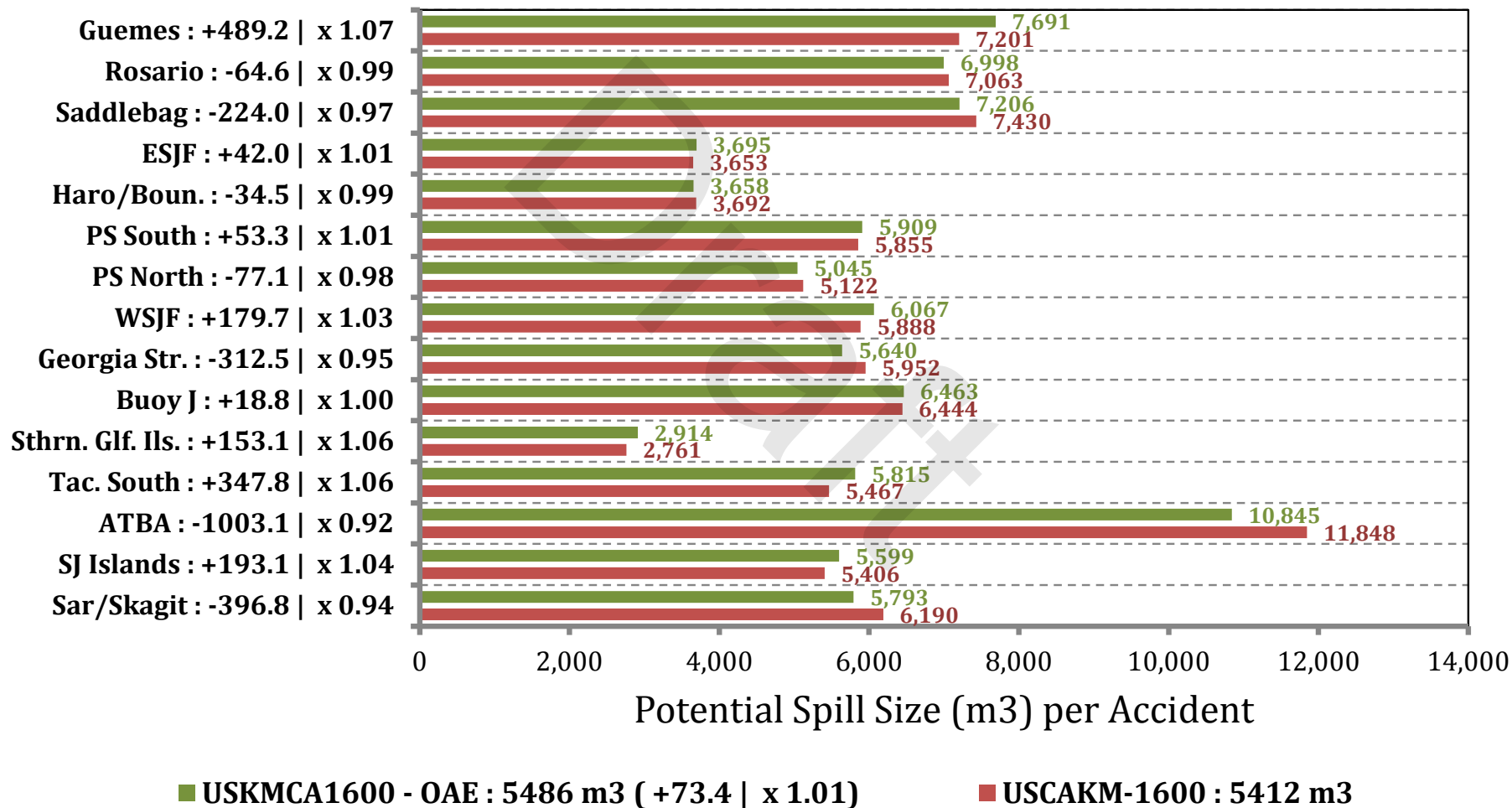
## Potential Spill Size (m<sup>3</sup>) per Accident - ALL\_FV - Oil Spill Size Category: 2500 cubic meters or more





# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

## Potential Spill Size (m<sup>3</sup>) per Accident - ALL\_FV - Oil Spill Size Category: 2500 cubic meters or more



# By Waterway Zone Risk Comparison

Oil Spill Size Category:

1000 m<sup>3</sup> - 2500 m<sup>3</sup>

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

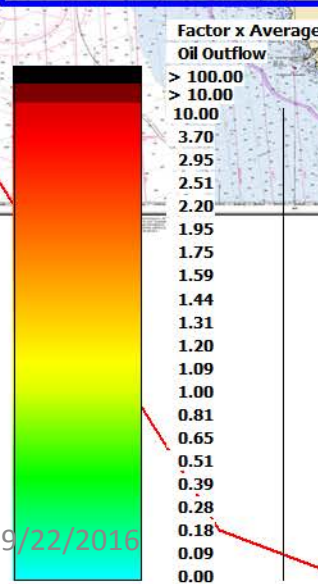


## VTRA 2015 BASE CASE - ALL FV

**12.3% of VTRA 2015 Base Case Total Annual Potential Oil Loss:**  
**SPILL SIZES BETWEEN 1,000 m<sup>3</sup> - 2,500 m<sup>3</sup>**

**10.7%**  
**9.1%**

**0.1%**



**VTRA '15:**  
**BASE CASE**  
GEOGRAPHIC PROFILE OF POTENTIAL ANNUAL OIL LOSS OF ACCIDENTS WITH SPILL SIZE **BETWEEN 1,000 m<sup>3</sup> - 2,500 m<sup>3</sup>**

≈ 0.61% Probability of Spill Occurrence in 10 years

Average of ≈ 1,619 m<sup>3</sup> Per Potential Spill (≈ 1,392 Metric Tons)

9/22/2016

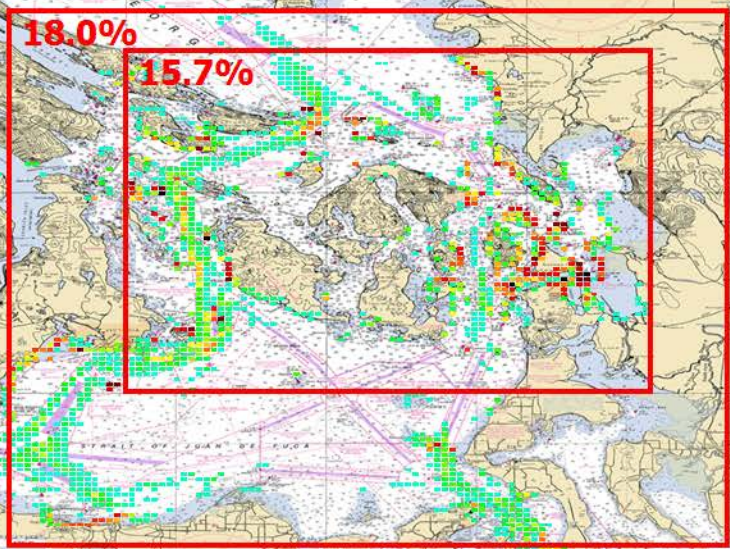
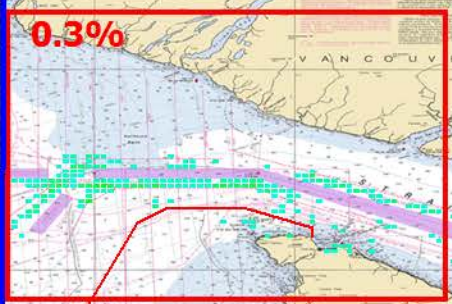
7/28/2016

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



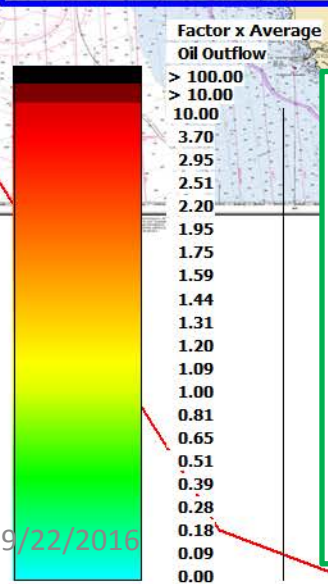
## VTRA 2015 Case: USKMCA1600 - ALL FV

**19.9% of VTRA 2015 Base Case Total Annual Potential Oil Loss:**  
**SPILL SIZES BETWEEN 1,000 m<sup>3</sup> - 2,500 m<sup>3</sup>**



18.0%

15.7%



**VTRA '15 Case: USKMCA - 1600**  
**GEOGRAPHIC PROFILE OF POTENTIAL ANNUAL OIL LOSS OF ACCIDENTS WITH SPILL SIZE BETWEEN 1,000 m<sup>3</sup> - 2,500 m<sup>3</sup>**

≈ 0.95% Probability of Spill Occurrence in 10 years

Average of ≈ 1,694 m<sup>3</sup> Per Potential Spill (≈ 1,457 Metric Tons)

9/22/2016

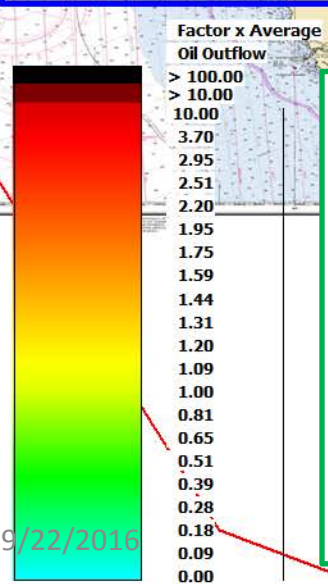
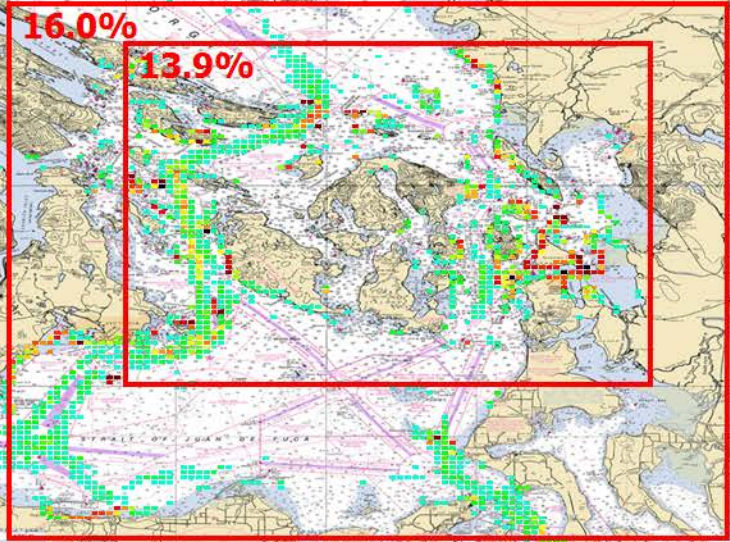
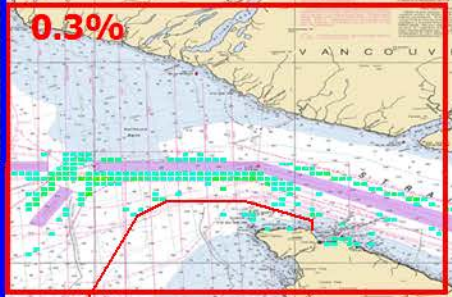
9/17/2016

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

## VTRA 2015 Case: USKMCA1600-OAE - ALL FV

17.6% of VTRA 2015 Base Case Total Annual Potential Oil Loss:

**Oil Loss: SPILL SIZES BETWEEN 1,000 m<sup>3</sup> - 2,500 m<sup>3</sup>**



**VTRA '15 Case: USKMCA1600 - OAE**  
GEOGRAPHIC PROFILE OF POTENTIAL ANNUAL OIL LOSS OF ACCIDENTS WITH SPILL SIZE **BETWEEN 1,000 m<sup>3</sup> - 2,500 m<sup>3</sup>**

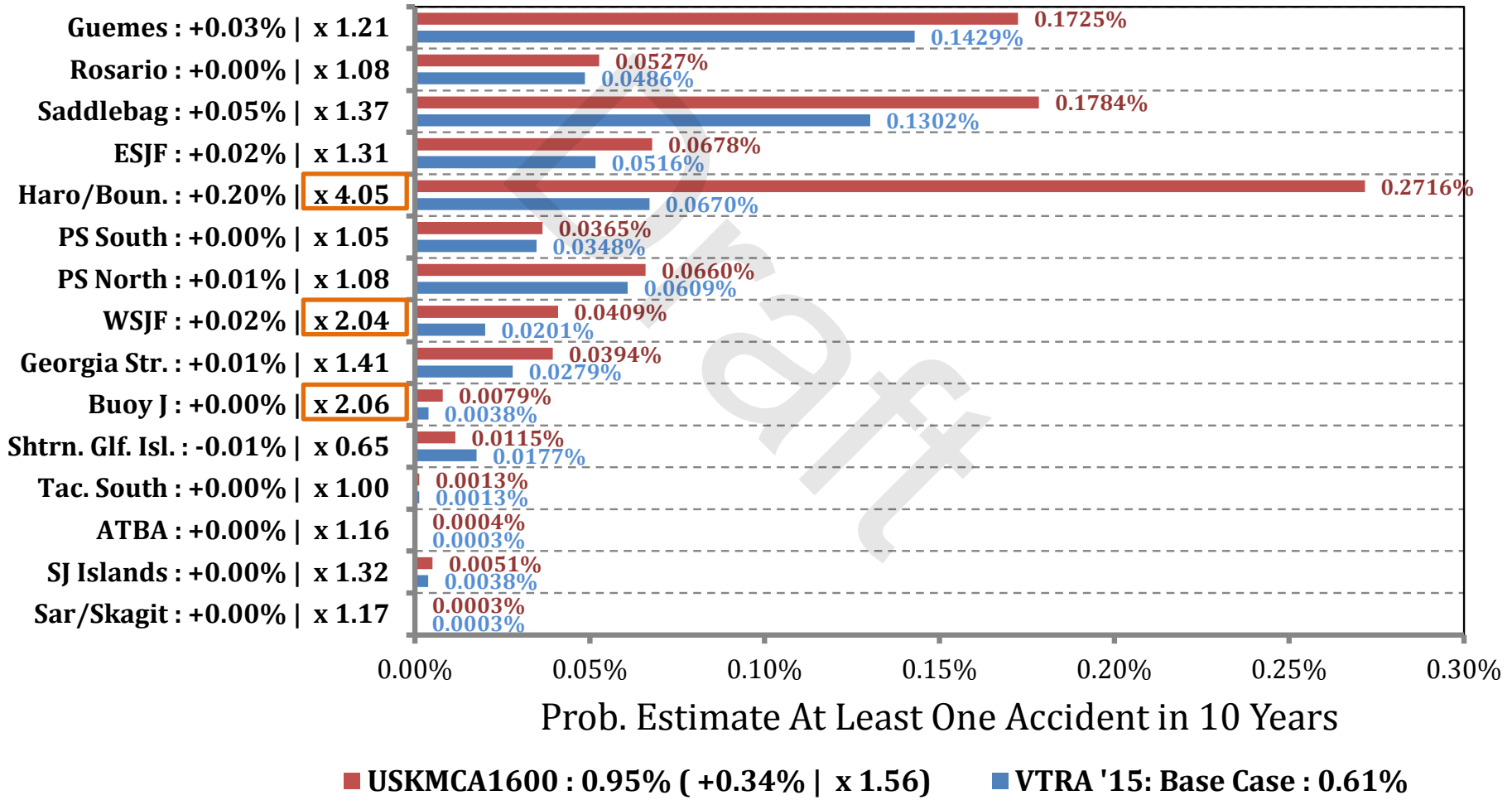
≈ 0.84% Probability of Spill Occurrence in 10 years

Average of ≈ 1,680 m<sup>3</sup> Per Potential Spill (≈ 1,444 Metric Tons)

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



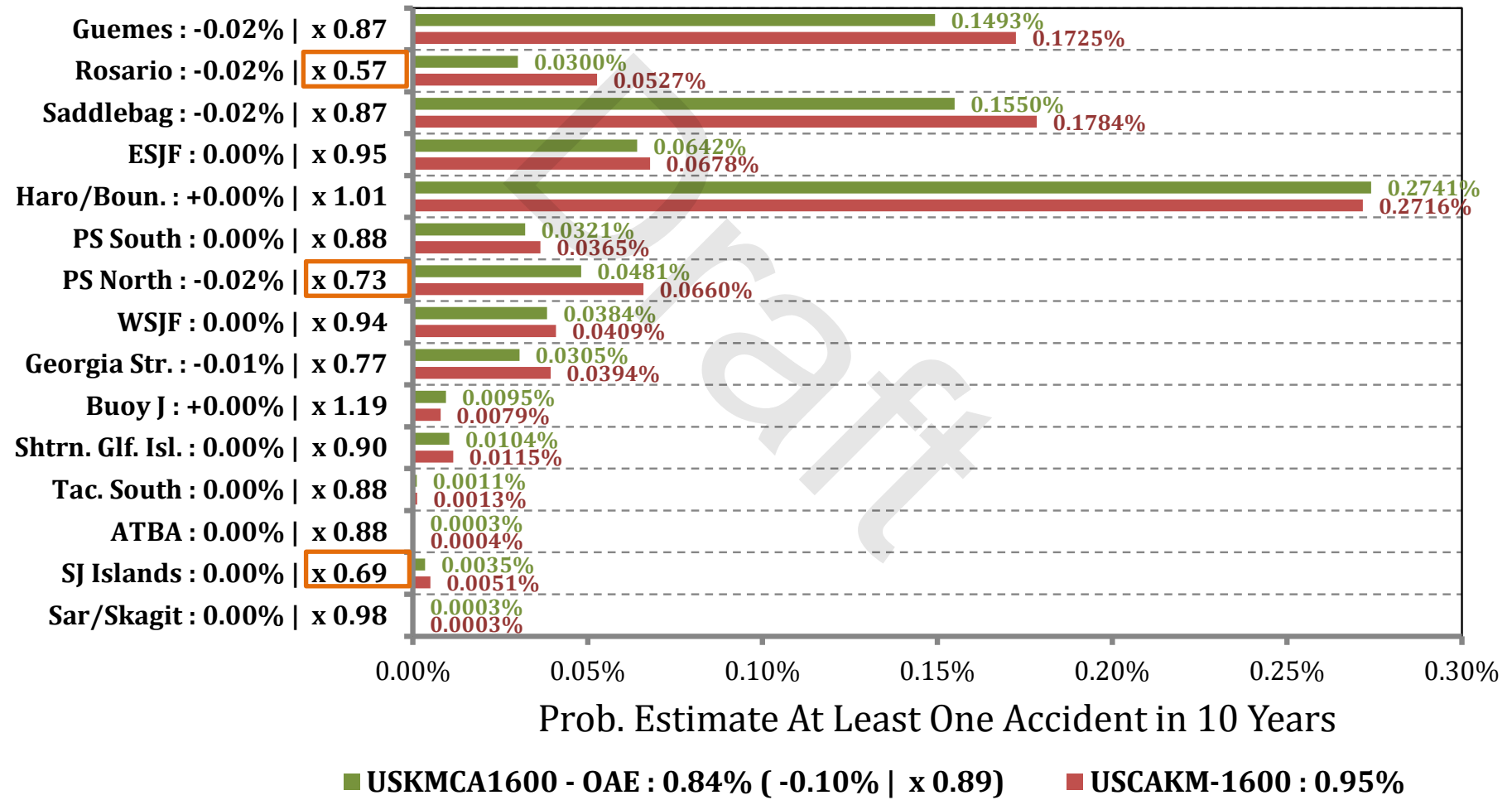
## Prob. Estimate At Least One Accident in 10 Years - ALL\_FV - Oil Spill Size Category: 1000 - 2500 m3



# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



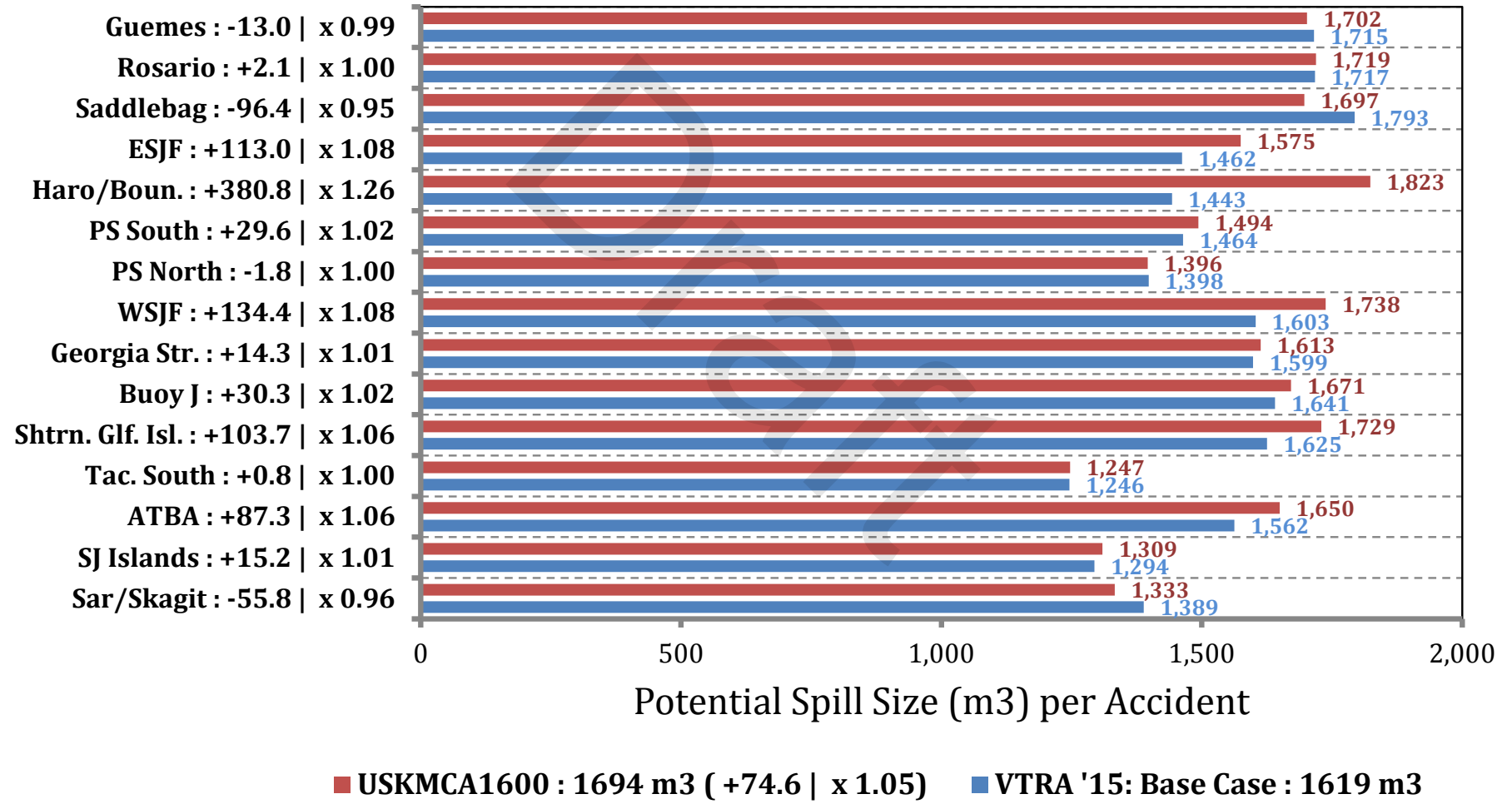
## Prob. Estimate At Least One Accident in 10 Years - ALL\_FV - Oil Spill Size Category: 1000 - 2500 m3



# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



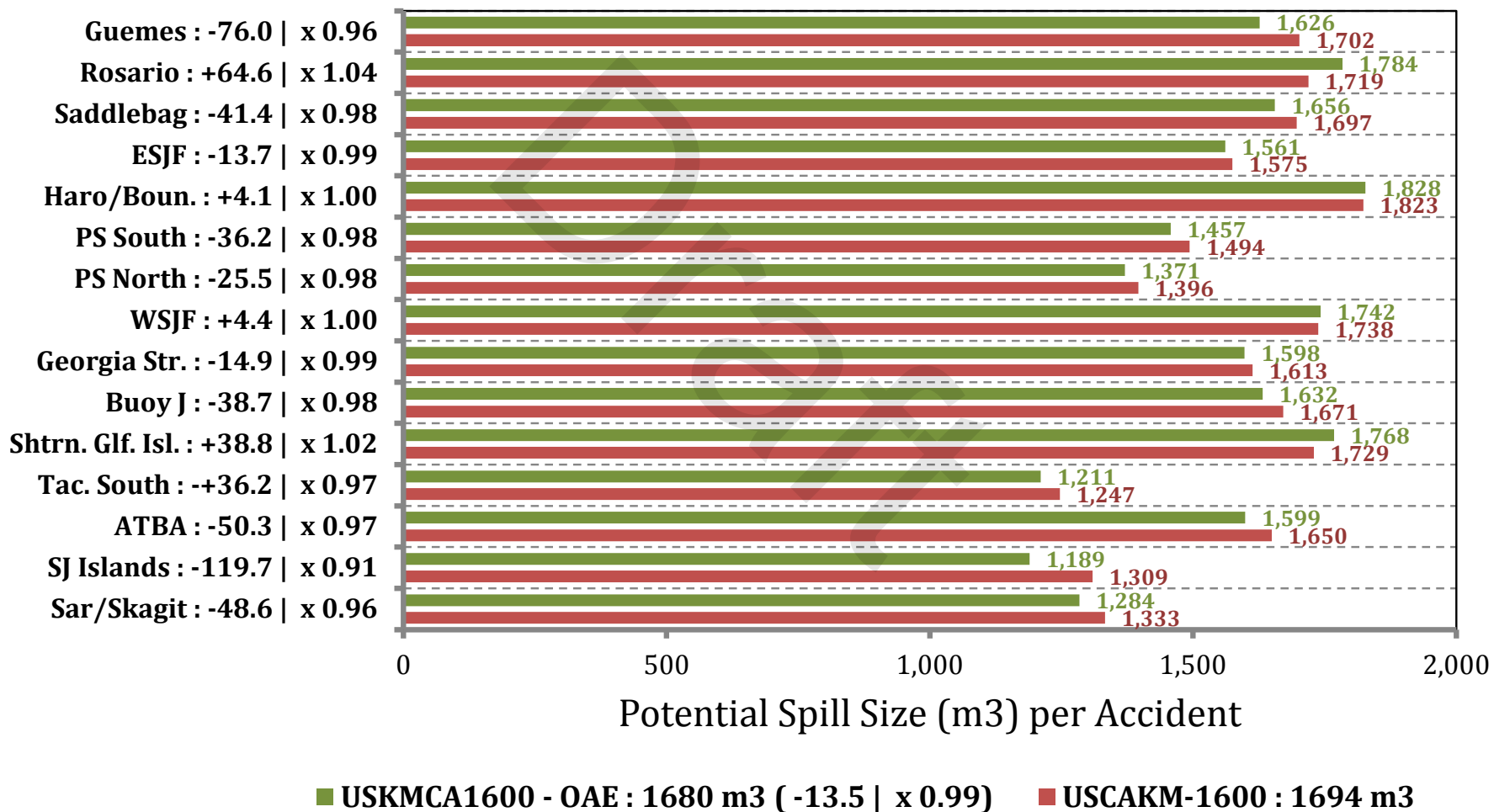
Potential Spill Size (m<sup>3</sup>) per Accident - ALL\_FV - Oil Spill Size Category: 1000 - 2500 m<sup>3</sup>





# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

## Potential Spill Size (m<sup>3</sup>) per Accident - ALL\_FV - Oil Spill Size Category: 1000 - 2500 m<sup>3</sup>



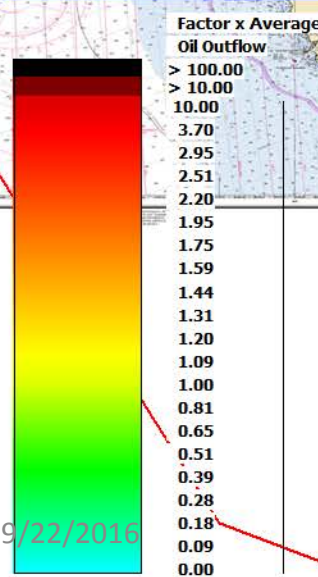
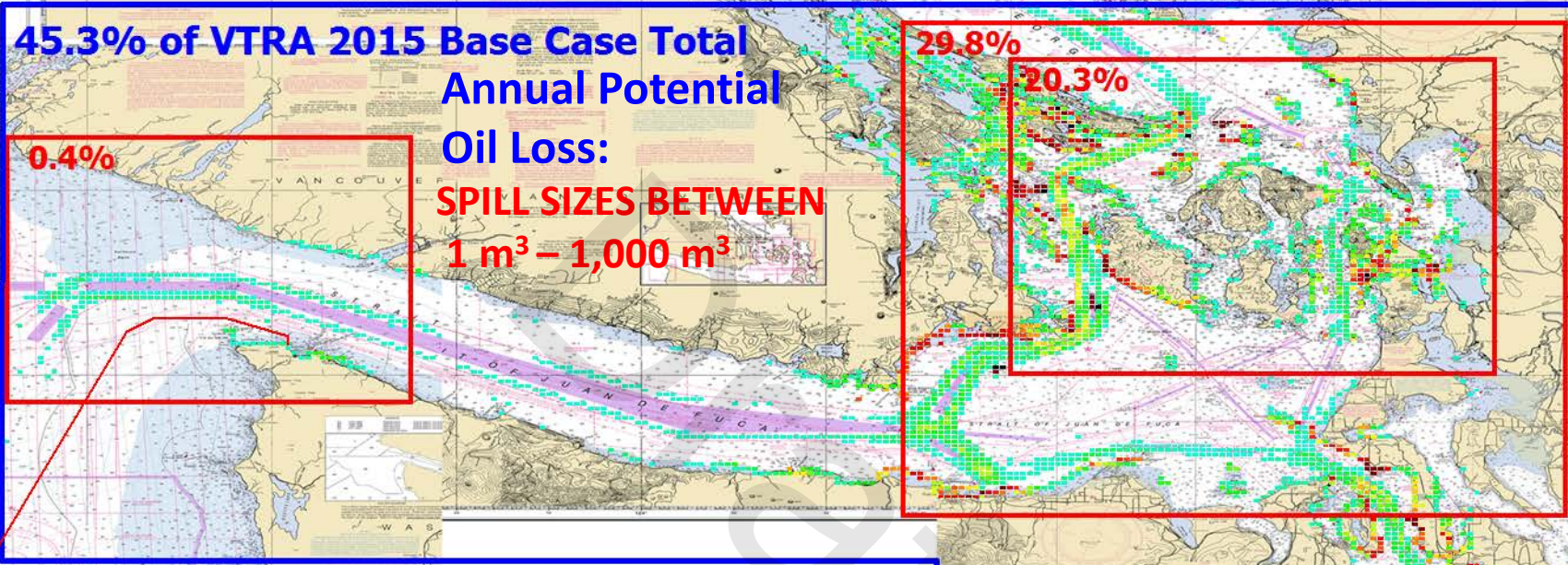
# By Waterway Zone Risk Comparison

Oil Spill Size Category:

$1 \text{ m}^3 - 1000 \text{ m}^3$

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

## VTRA 2015 BASE CASE - ALL FV



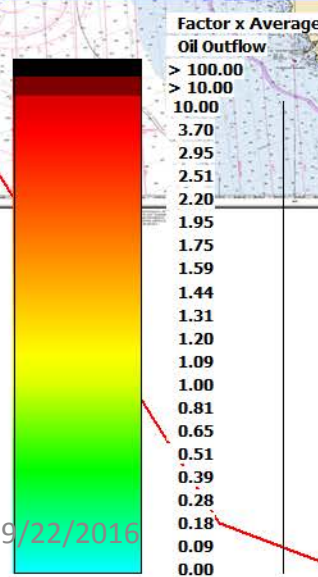
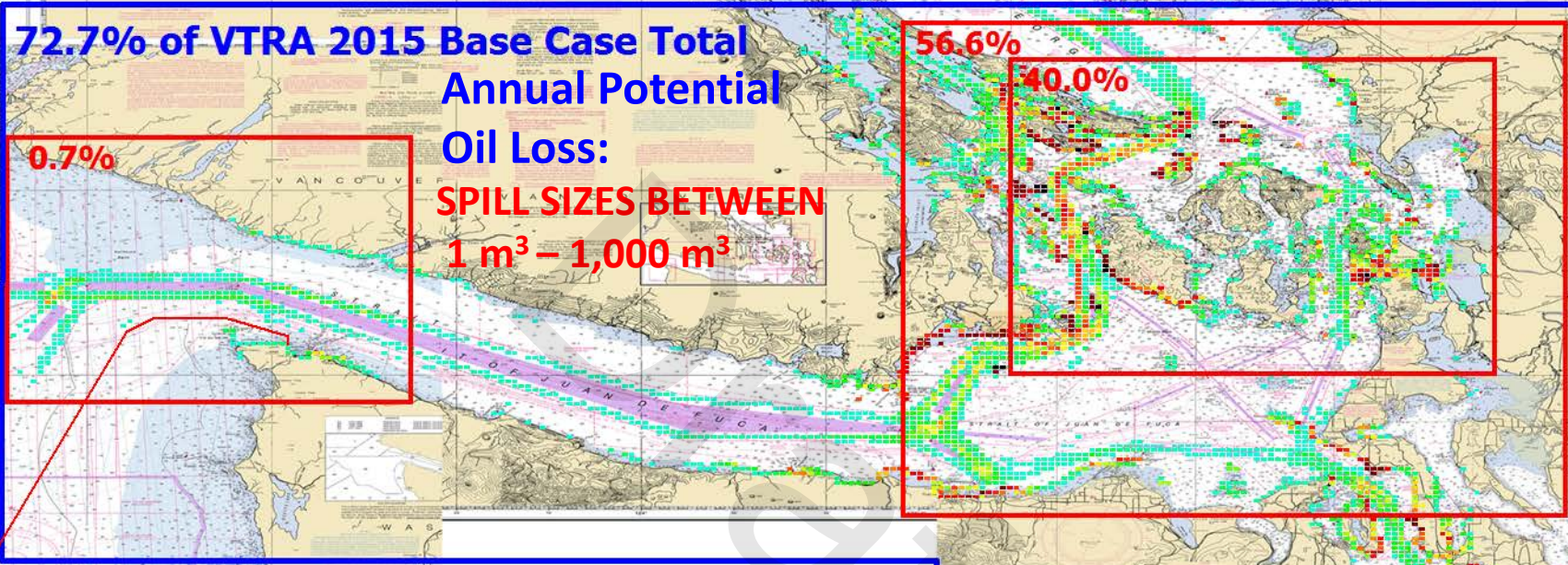
**VTRA '15:**  
**BASE CASE**  
GEOGRAPHIC PROFILE  
OF ANNUAL  
POTENTIAL OIL LOSS  
OF ACCIDENTS  
WITH SPILL SIZE  
**BETWEEN 1 m<sup>3</sup> - 1000 m<sup>3</sup>**

≈ 54.2% Probability  
of Spill Occurrence  
in 10 years

Average of ≈ 47 m<sup>3</sup>  
Per Potential Spill  
(≈ 295 Barrels)

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

## VTRA 2015 Case: USKMCA1600 - ALL FV



**VTRA '15 Case: USKMCA - 1600**  
GEOGRAPHIC PROFILE OF ANNUAL POTENTIAL OIL LOSS OF ACCIDENTS WITH SPILL SIZE **BETWEEN 1 m<sup>3</sup> - 1000 m<sup>3</sup>**

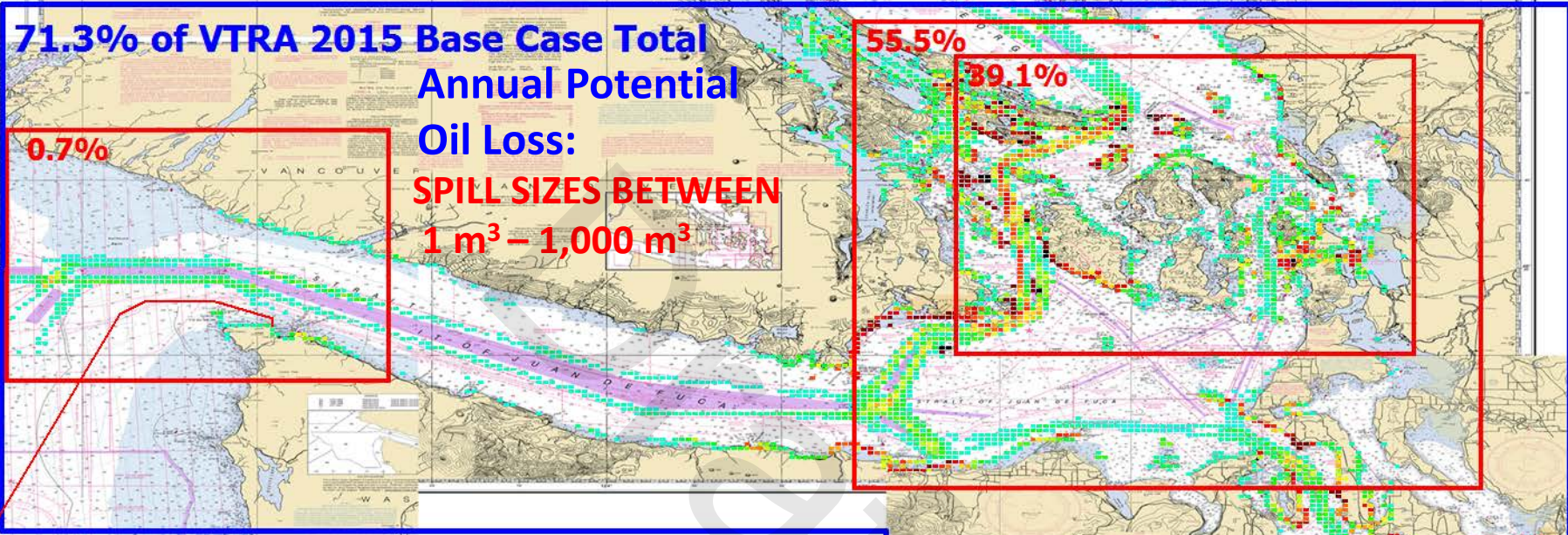
≈ 57.2% Probability of Spill Occurrence in 10 years

Average of ≈ 69 m<sup>3</sup> Per Potential Spill (≈ 436 Barrels)

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



## VTRA 2015 Case: USKMCA1600-OAE - ALL FV



**71.3% of VTRA 2015 Base Case Total Annual Potential Oil Loss:**

**0.7%**  
**SPILL SIZES BETWEEN 1 m<sup>3</sup> - 1,000 m<sup>3</sup>**

**55.5%**

**39.1%**



**VTRA '15 Case: USKMCA1600 - OAE**  
**GEOGRAPHIC PROFILE OF ANNUAL POTENTIAL OIL LOSS OF ACCIDENTS WITH SPILL SIZE BETWEEN 1 m<sup>3</sup> - 1000 m<sup>3</sup>**

≈ 55.6% Probability of Spill Occurrence in 10 years

Average of ≈ 71 m<sup>3</sup> Per Potential Spill (≈ 447 Barrels)

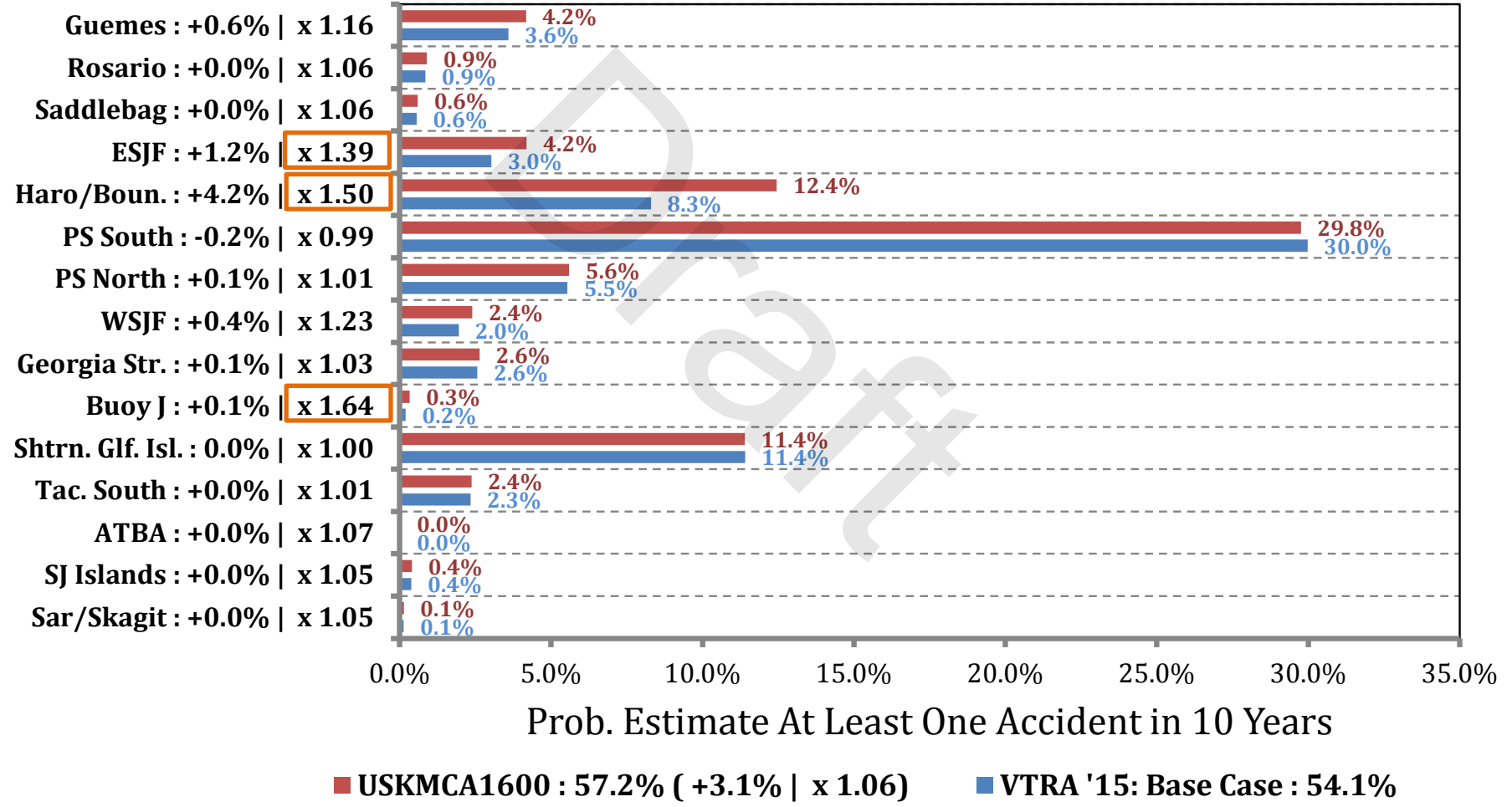
9/22/2016

9/18/2016

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



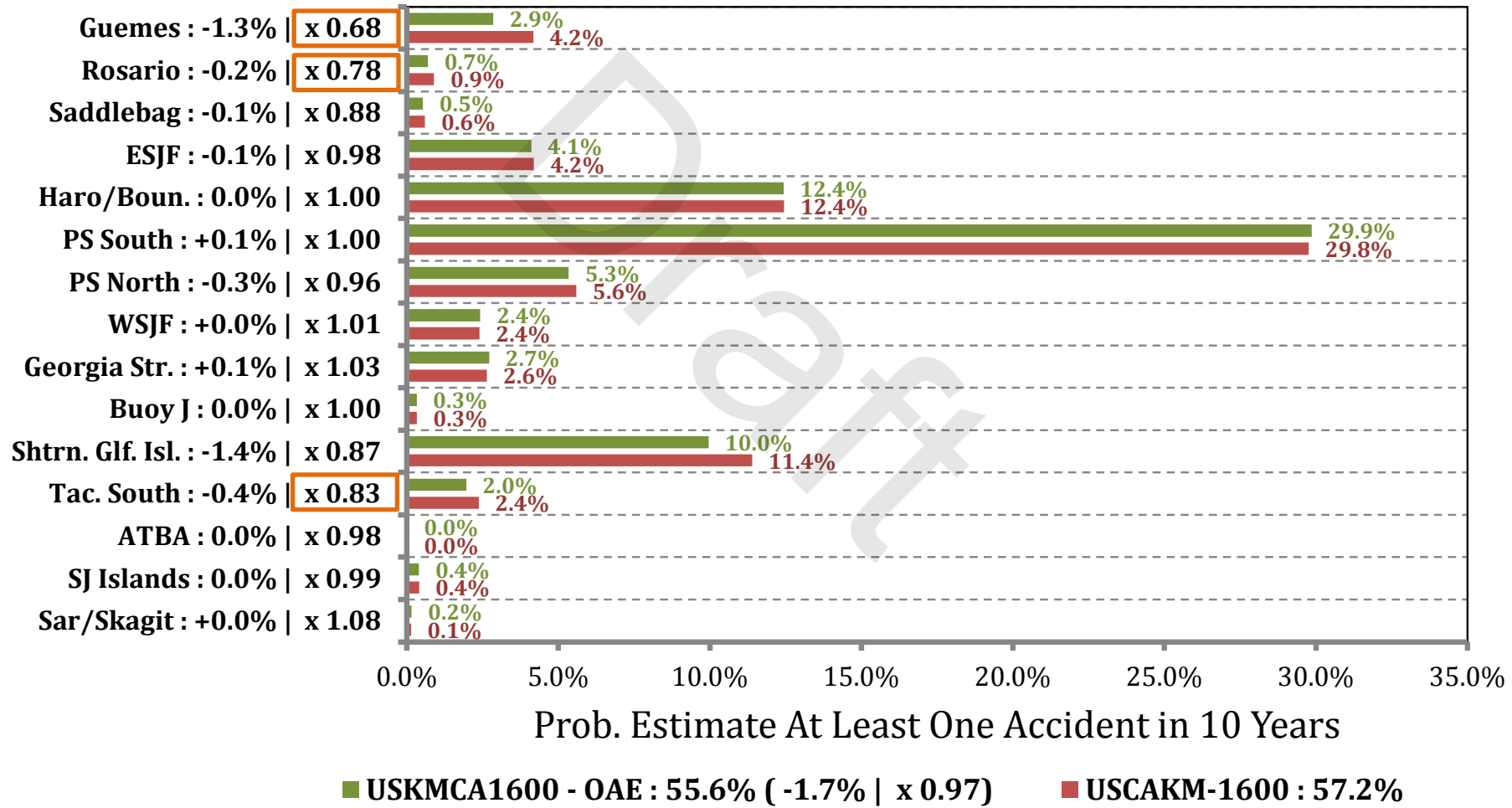
## Prob. Estimate At Least One Accident in 10 Years - ALL\_FV - Oil Spill Size Category: 1 - 1000 m3



# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

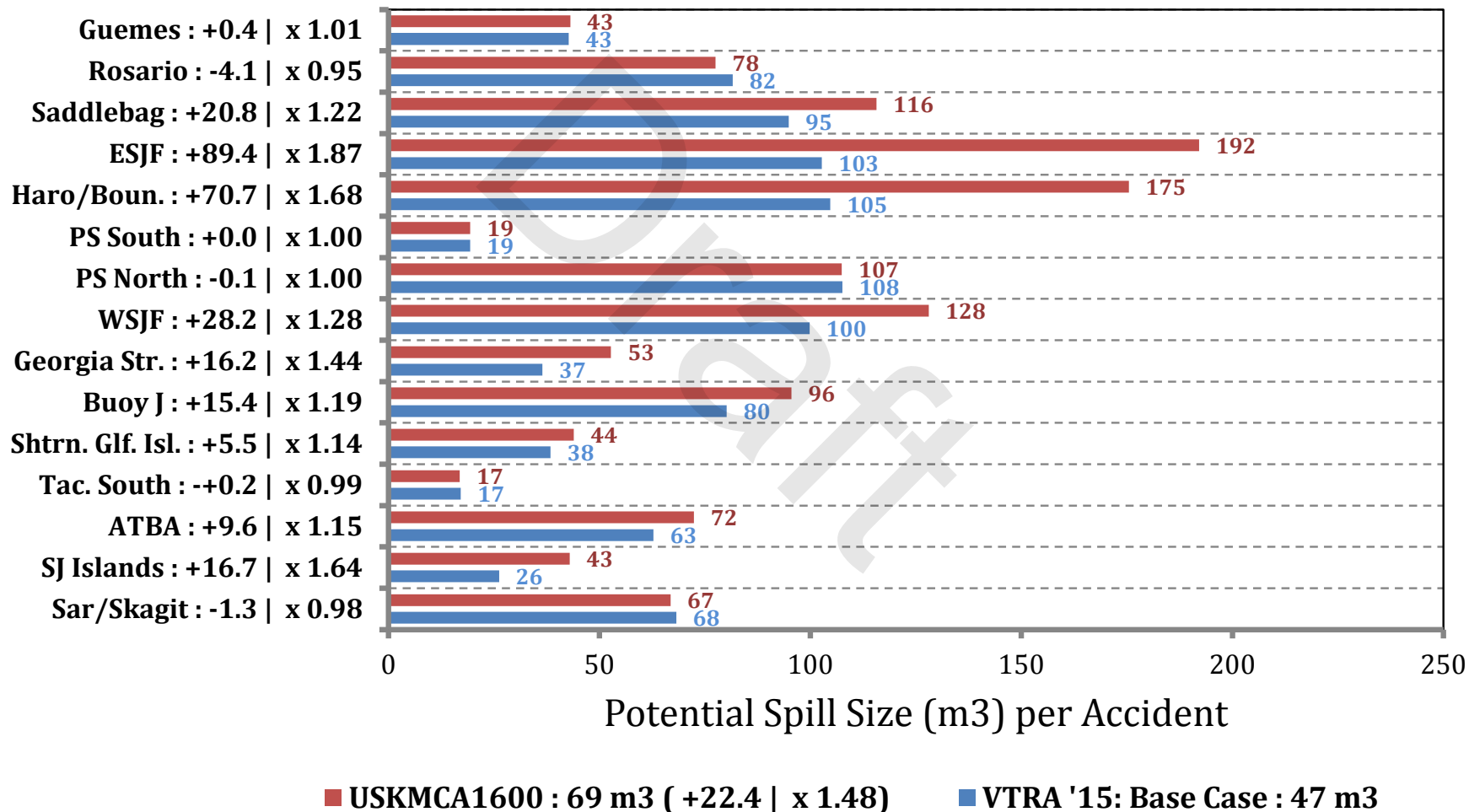


## Prob. Estimate At Least One Accident in 10 Years - ALL\_FV - Oil Spill Size Category: 1 - 1000 m3



# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

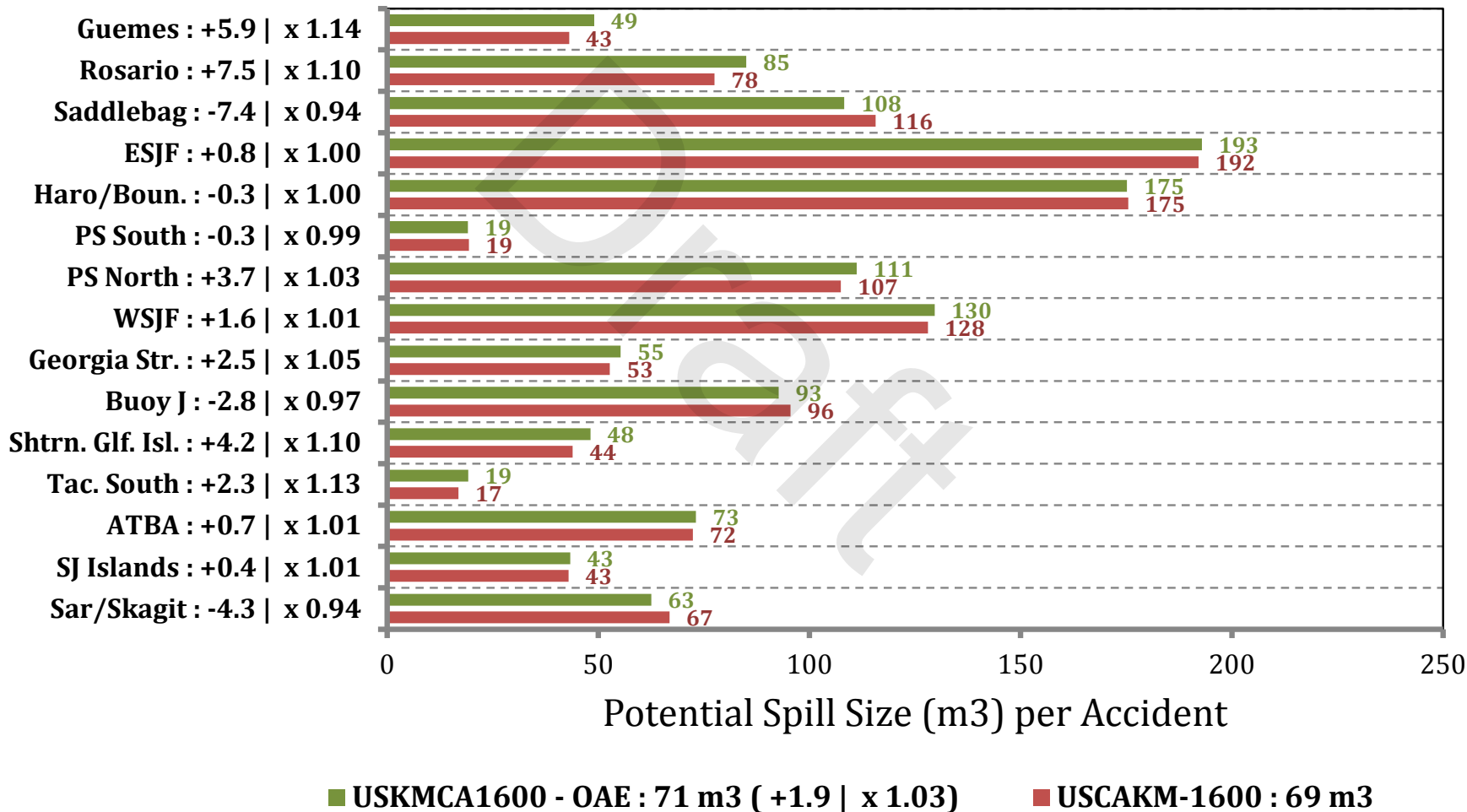
## Potential Spill Size (m<sup>3</sup>) per Accident - ALL\_FV - Oil Spill Size Category: 1 - 1000 m<sup>3</sup>





# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

## Potential Spill Size (m<sup>3</sup>) per Accident - ALL\_FV - Oil Spill Size Category: 1 - 1000 m<sup>3</sup>



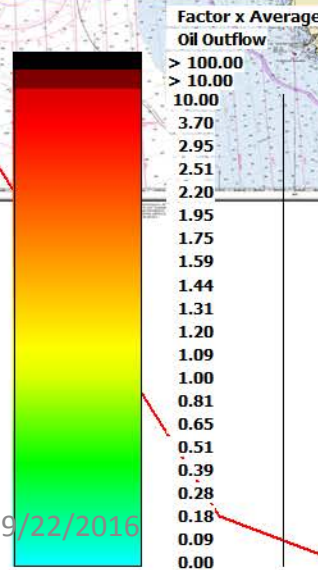
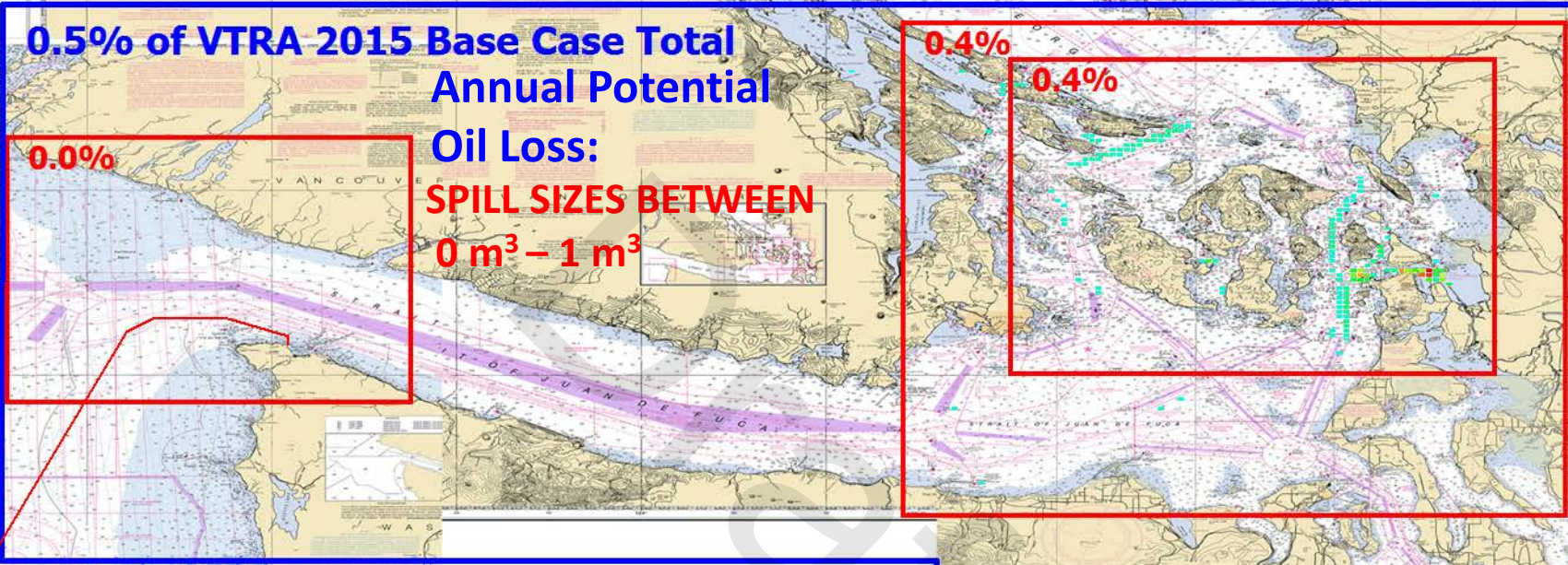
# By Waterway Zone Risk Comparison

Oil Spill Size Category:

$0 \text{ m}^3 - 1 \text{ m}^3$

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

## VTRA 2015 BASE CASE - ALL FV



**VTRA '15:**  
**BASE CASE**  
GEOGRAPHIC PROFILE  
OF ANNUAL  
POTENTIAL OIL LOSS  
OF ACCIDENTS  
WITH SPILL SIZE  
**BETWEEN 0 m<sup>3</sup> - 1 m<sup>3</sup>**

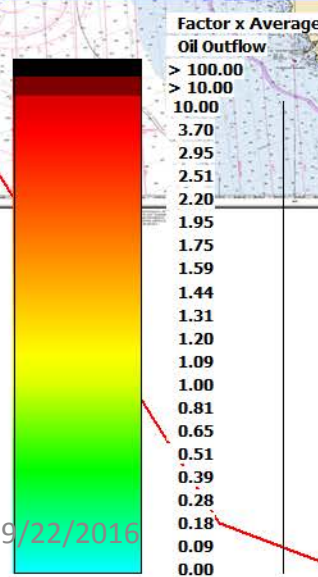
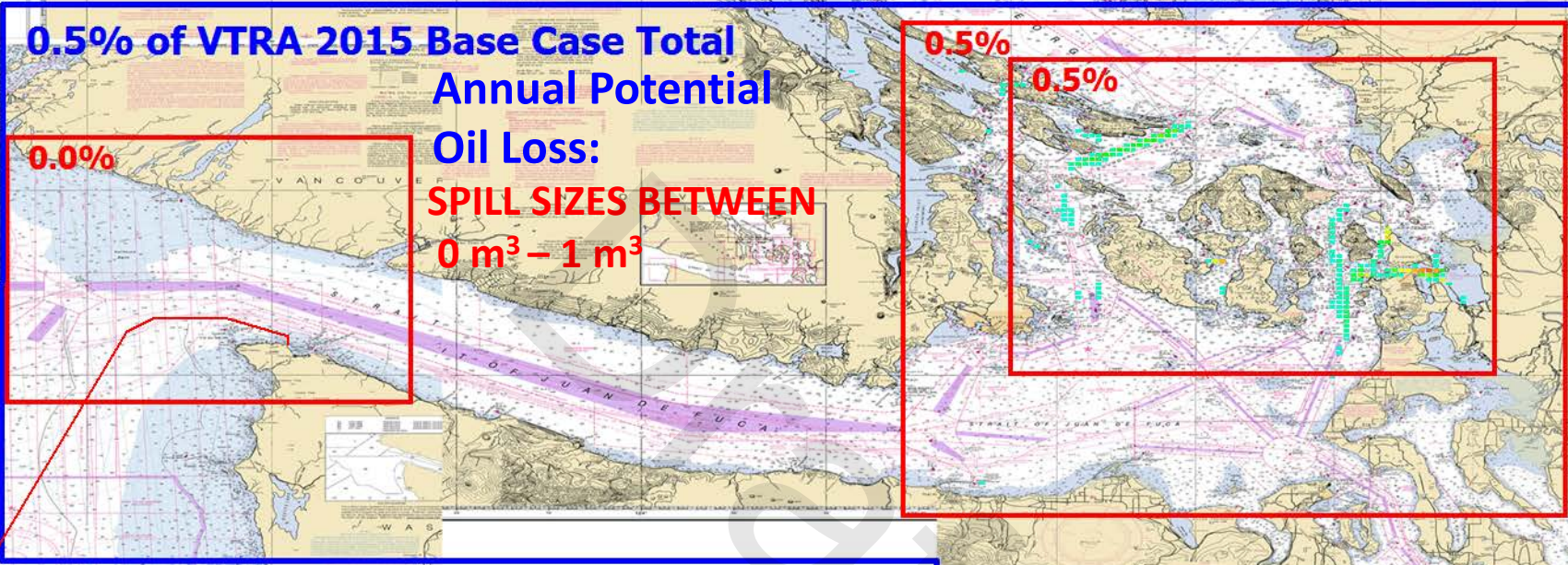
≈ 100% Probability  
of Spill Occurrence  
in 10 years

Average of ≈ 0.01 m<sup>3</sup>  
Per Potential Spill  
(≈ 2.3 gallons)

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



## VTRA 2015 Case: USKMCA1600 - ALL FV



**VTRA '15 Case:**  
**USKMCA1600**  
GEOGRAPHIC PROFILE  
OF ANNUAL  
POTENTIAL OIL LOSS  
OF ACCIDENTS  
WITH SPILL SIZE  
**BETWEEN 0 m<sup>3</sup> - 1 m<sup>3</sup>**

≈ 100% Probability  
of Spill Occurrence  
in 10 years

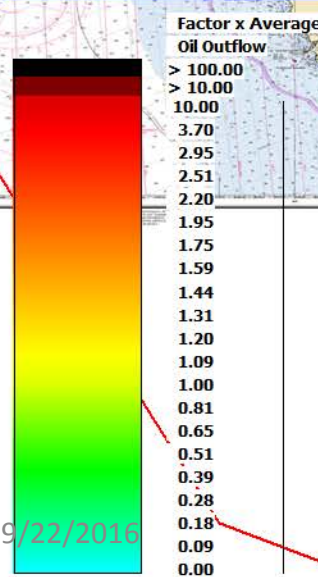
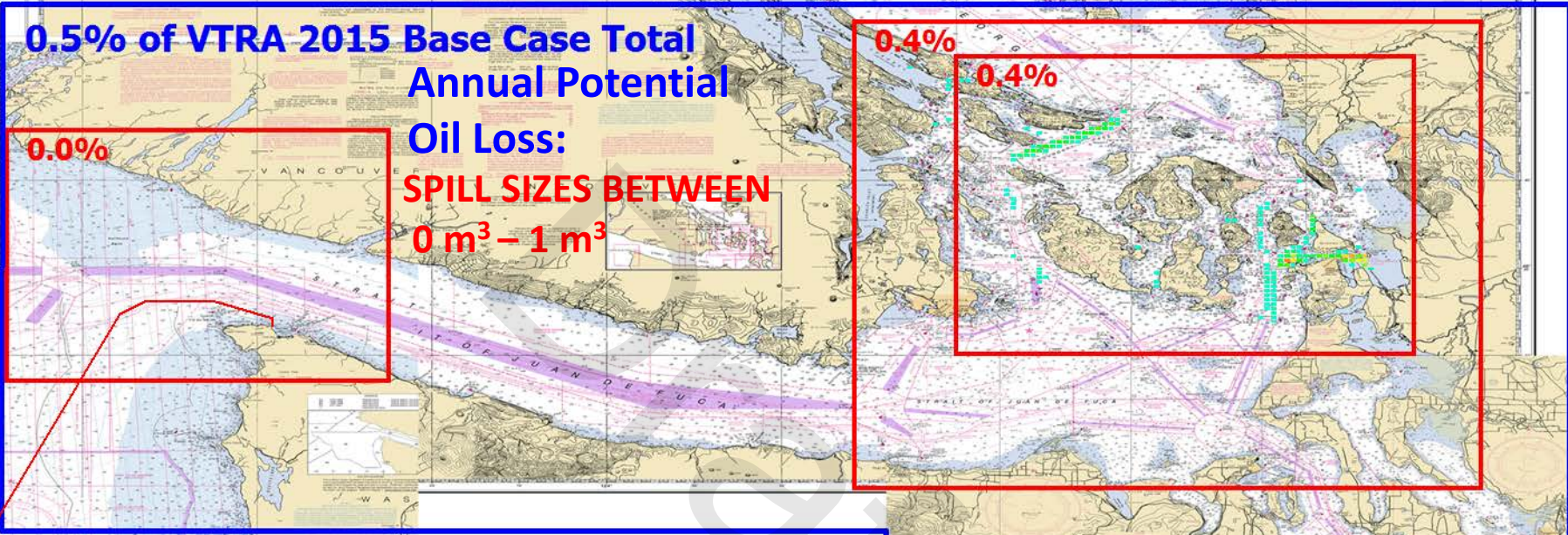
Average of ≈ 0.01 m<sup>3</sup>  
Per Potential Spill  
( ≈ 2.4 gallons)

9/22/2016

9/17/2016

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

## VTRA 2015 Case: USKMCA1600-OAE - ALL FV



**VTRA '15 Case: USKMCA1600 - OAE**  
GEOGRAPHIC PROFILE OF ANNUAL POTENTIAL OIL LOSS OF ACCIDENTS WITH SPILL SIZE **BETWEEN 0 m<sup>3</sup> - 1 m<sup>3</sup>**

≈ 100% Probability of Spill Occurrence in 10 years

Average of ≈ 0.01 m<sup>3</sup> Per Potential Spill (≈ 2.3 gallons)

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



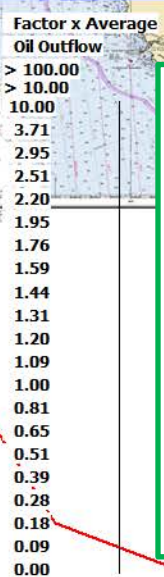
## VTRA 2015 BASE CASE - ALL FV

98.2% of VTRA 2015 Base Case Total Potential Annual # Accidents:

0.8%

SPILL SIZES BETWEEN  $0 \text{ m}^3 - 1 \text{ m}^3$

39.2%  
29.5%



VTRA '15 Case:  
**BASE CASE**  
GEOGRAPHIC PROFILE  
OF POTENTIAL ANNUAL  
# ACCIDENTS  
WITH SPILL SIZE  
**BETWEEN  $0 \text{ m}^3 - 1 \text{ m}^3$**

≈ 100% Probability  
of Spill Occurrence  
in 10 years

Average of ≈  $0.01 \text{ m}^3$   
Per Potential Spill  
(≈ 2.3 gallons)

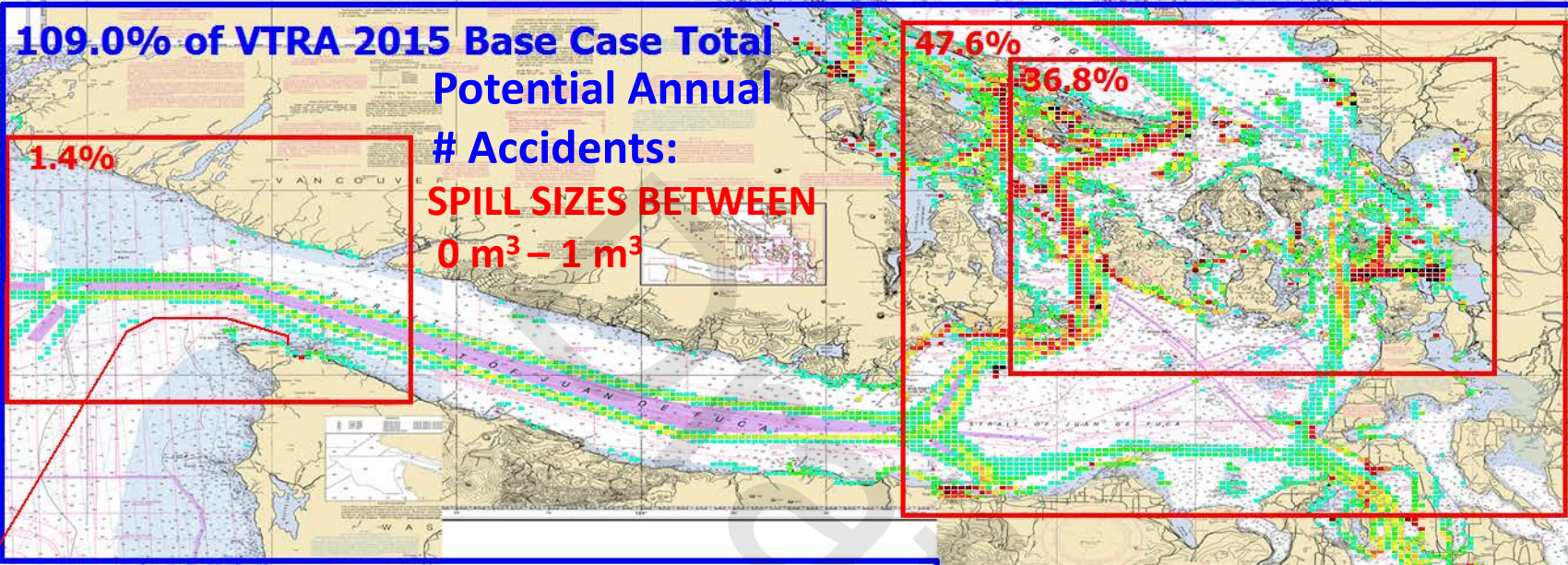
9/22/2016

7/28/2016

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



## VTRA 2015 Case: USKMCA1600 - ALL FV



**VTRA '15 Case:**  
**USKMCA1600**  
GEOGRAPHIC PROFILE  
OF POTENTIAL ANNUAL  
# ACCIDENTS  
WITH SPILL SIZE  
**BETWEEN 0 m<sup>3</sup> - 1 m<sup>3</sup>**

≈ 100% Probability  
of Spill Occurrence  
in 10 years

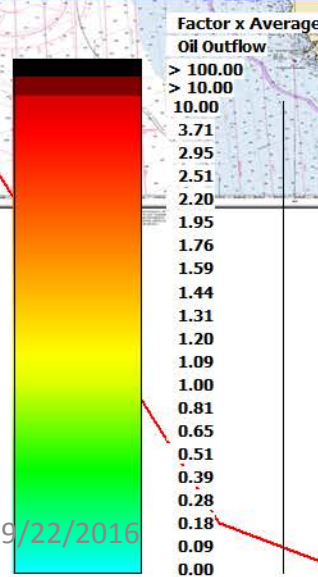
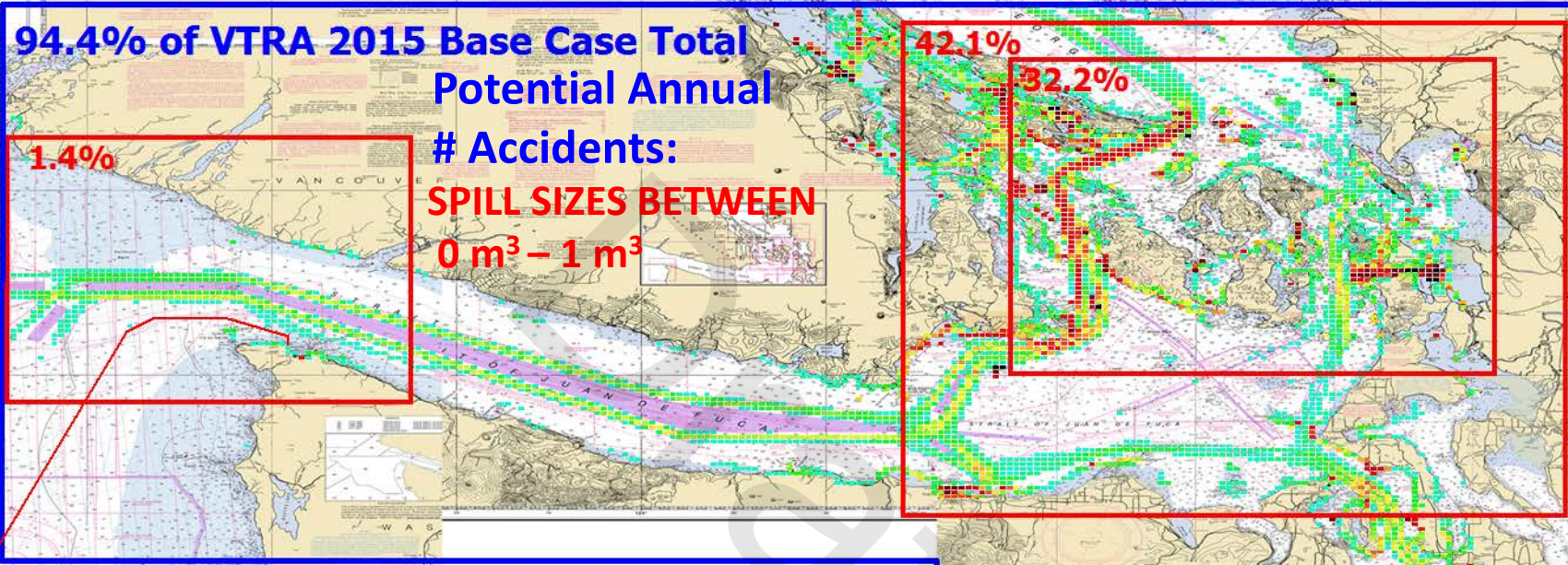
Average of ≈ 0.01 m<sup>3</sup>  
Per Potential Spill  
(= 2.4 gallons)

9/22/2016

9/17/2016

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

## VTRA 2015 Case: USKMCA1600-OAE - ALL FV



VTRA '15 Case:  
USKMCA1600 - OAE  
GEOGRAPHIC PROFILE  
OF POTENTIAL ANNUAL  
# ACCIDENTS  
WITH SPILL SIZE  
BETWEEN 0 m<sup>3</sup> - 1 m<sup>3</sup>

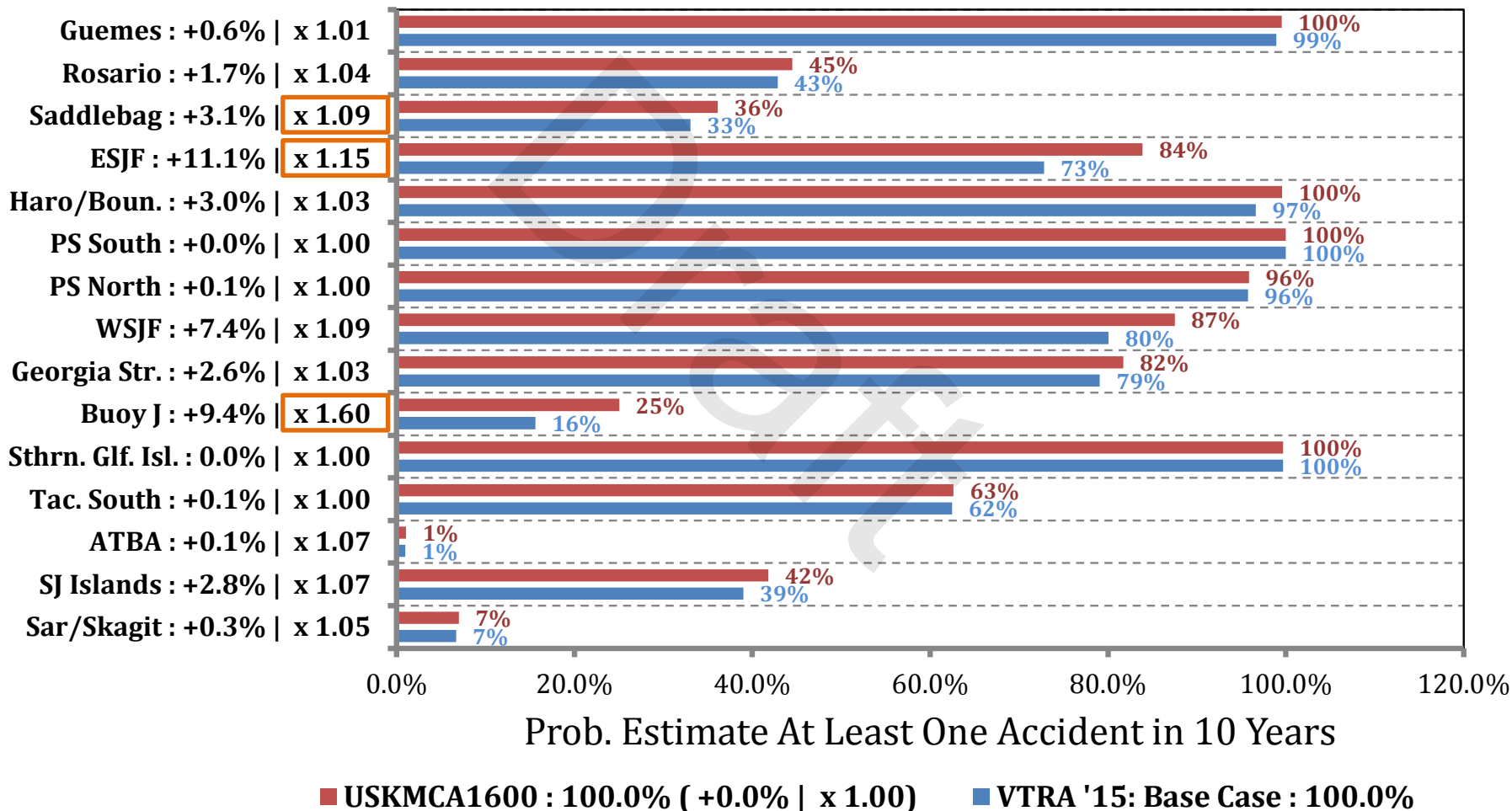
≈ 100% Probability  
of Spill Occurrence  
in 10 years

Average of ≈ 0.01 m<sup>3</sup>  
Per Potential Spill  
(≈ 2.3 gallons)



# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

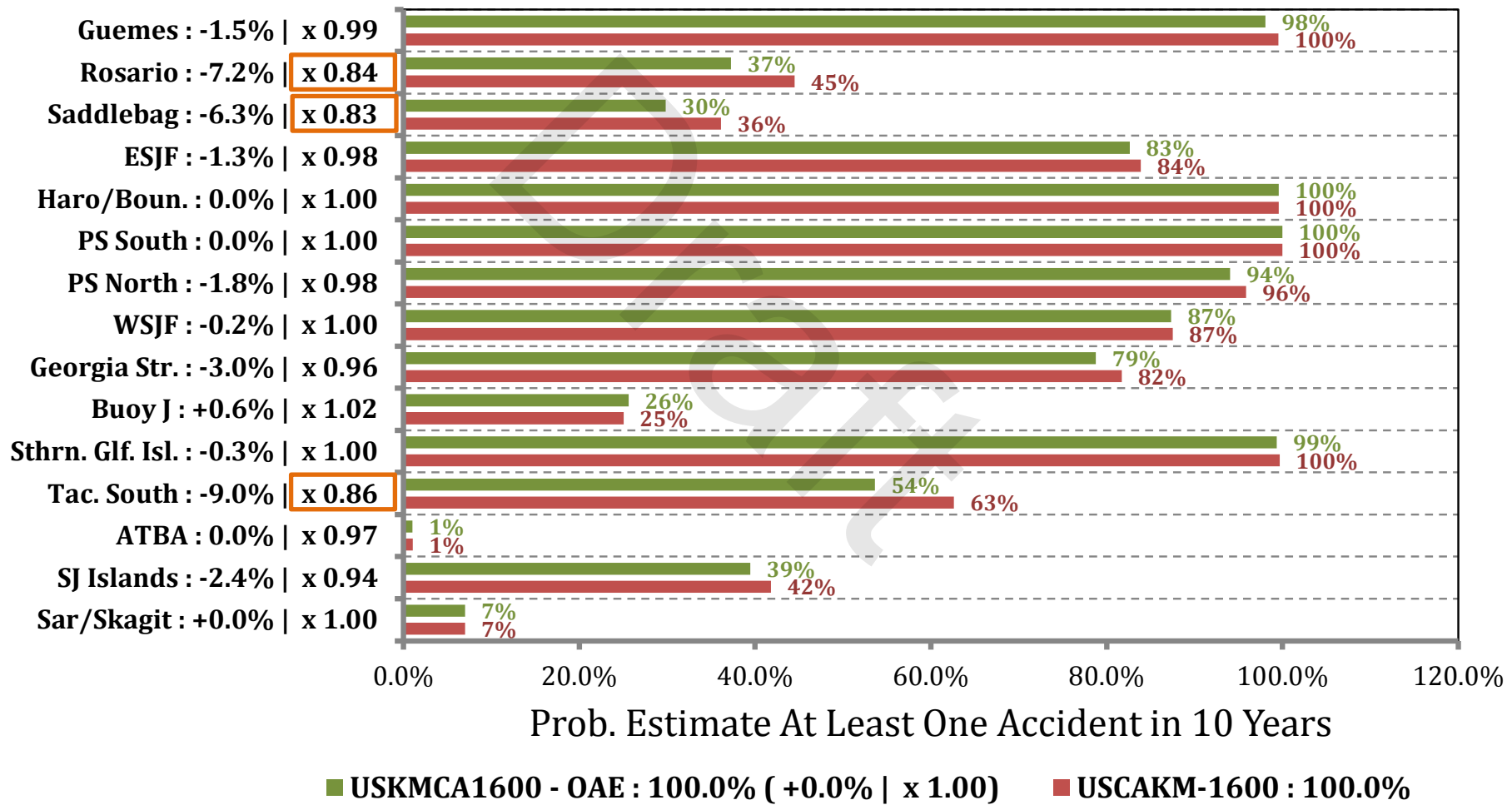
## Prob. Estimate At Least One Accident in 10 Years - ALL\_FV - Oil Spill Size Category: 0 - 264 Gallons



# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

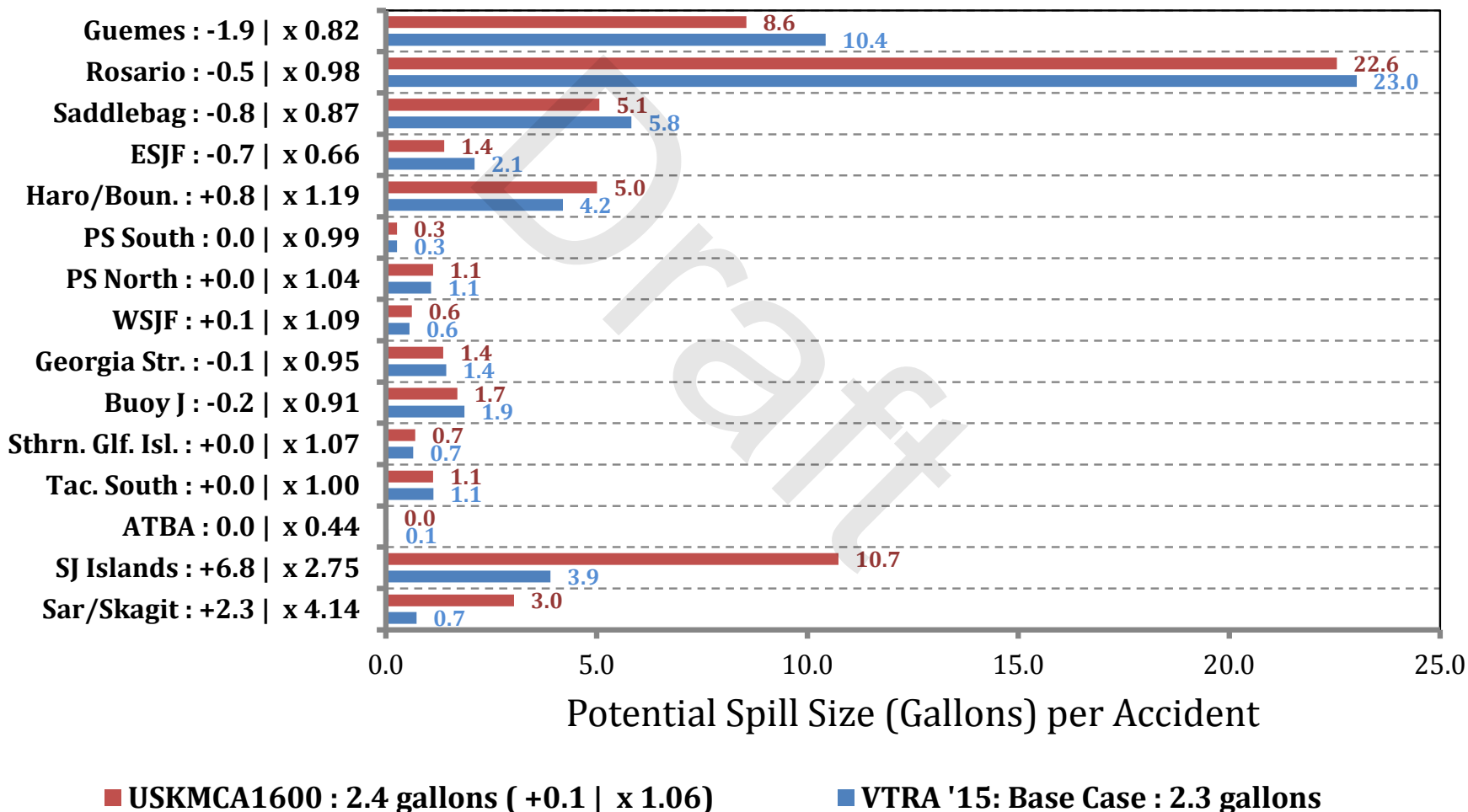


## Prob. Estimate At Least One Accident in 10 Years - ALL\_FV - Oil Spill Size Category: 0 - 264 Gallons



# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015

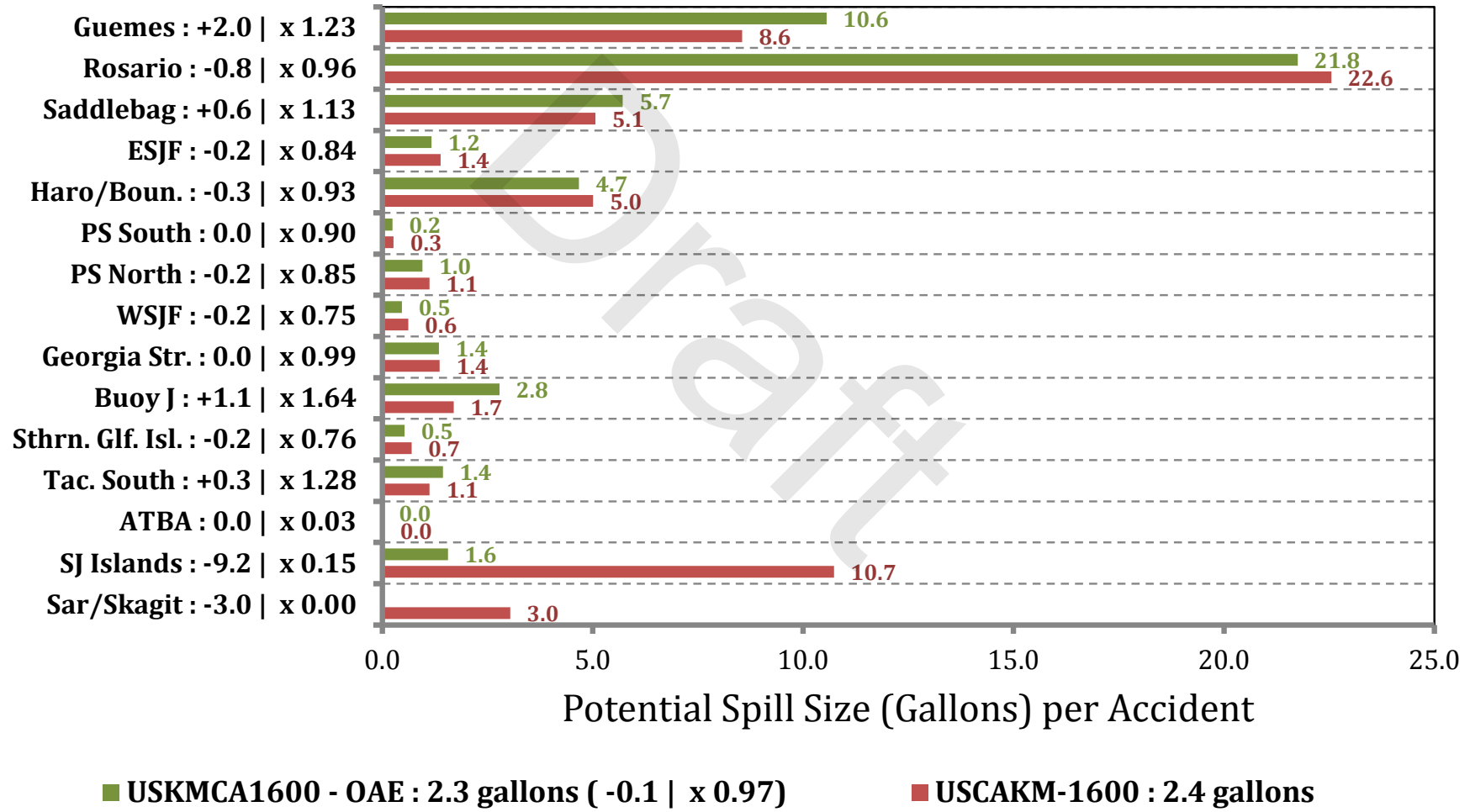
## Potential Spill Size (Gallons) per Accident - ALL\_FV - Oil Spill Size Category: 0 - 264 Gallons



# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



## Potential Spill Size (Gallons) per Accident - ALL\_FV - Oil Spill Size Category: 0 - 264 Gallons



# Summary Risk Comparison

Oil Spill Size Category:  
**All Spill Sizes**

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



## Summary Risk Comparison Base Case to USKMCA1600

		OIL_2500_MORE	OIL_1000_2500	OIL_1_1000	OIL_0_1	TOTAL_OIL
<b>VTRA '15 BASE CASE</b>	Base Case % Potential Annual Oil Loss	42.0%	12.3%	45.3%	0.5%	100.0%
	Base Case % Potential Annual Accident Frequency	0.01%	0.01%	1.8%	98.2%	100.0%
	Average potential spill size per accident (in m <sup>3</sup> )	6,798	1,619	46.9	0.01	1.8
	Probability of at least one accident in 1 year by spill size	0.05%	0.06%	7.5%	98.7%	98.8%
	Probability of at least one accident in 10 year by spill size	0.50%	0.61%	54.2%	100.0%	100.0%
	Probability of at least one accident in 25 years by spill size	1.24%	1.52%	85.8%	100.0%	100.0%
		OIL_2500_MORE	OIL_1000_2500	OIL_1_1000	OIL_0_1	TOTAL_OIL
<b>USKMCA1600</b>	Base Case % Potential Annual Oil Loss	91.1% ( +49.11%   x2.17 )	20.0% ( +7.71%   x1.63 )	72.8% ( +27.54%   x1.61 )	0.5% ( +0.08%   x1.17 )	184.4% ( +84.4%   x1.84 )
	Base Case % Potential Annual Accident Frequency	0.03% ( +0.02%   x2.72 )	0.02% ( +0.01%   x1.56 )	1.9% ( +0.16%   x1.09 )	108.9% ( +10.7%   x1.11 )	110.9% ( +10.9%   x1.11 )
	Average potential spill size per accident (in m <sup>3</sup> )	5413 ( -1385   x0.80 )	1693 ( +75   x1.05 )	69.2 ( +22.3   x1.48 )	0.01 ( +0.00   x1.06 )	3.0 ( +1.2   x1.66 )
	Probability of at least one accident in 1 year by spill size	0.14% ( +0.09%   x2.72 )	0.10% ( +0.03%   x1.56 )	8.2% ( +0.64%   x1.09 )	99.2% ( +0.48%   x1.00 )	99.3% ( +0.45%   x1.00 )
	Probability of at least one accident in 10 year by spill size	1.35% ( +0.85%   x2.71 )	0.95% ( +0.34%   x1.55 )	57.3% ( +3.09%   x1.06 )	100.0% ( 0.00%   x1.00 )	100.0% ( 0.00%   x1.00 )
	Probability of at least one accident in 25 years by spill size	3.35% ( +2.10%   x2.70 )	2.36% ( +0.84%   x1.55 )	88.1% ( +2.27%   x1.03 )	100.0% ( 0.00%   x1.00 )	100.0% ( 0.00%   x1.00 )

# VESSEL TRAFFIC RISK ASSESSMENT (VTRA) 2015



## Summary Risk Comparison USKMCA1600 to USKMCA1600-OAE

		OIL_2500_MORE	OIL_1000_2500	OIL_1_1000	OIL_0_1	TOTAL_OIL
<b>USACAKM1600</b>	Base Case % Potential Annual Oil Loss	91.0%	19.9%	72.7%	0.5%	184.1%
	Base Case % Potential Annual Accident Frequency	0.03%	0.02%	1.9%	108.9%	110.9%
	Average potential spill size per accident (in m^3)	5,413	1,693	69.2	0.01	3.0
	Probability of at least one accident in 1 year by spill size	0.14%	0.10%	8.2%	99.2%	99.3%
	Probability of at least one accident in 10 year by spill size	1.35%	0.95%	57.3%	100.0%	100.0%
	Probability of at least one accident in 25 years by spill size	3.35%	2.36%	88.1%	100.0%	100.0%
		OIL_2500_MORE	OIL_1000_2500	OIL_1_1000	OIL_0_1	TOTAL_OIL
<b>USACAKM1600 - OAE</b>	Base Case % Potential Annual Oil Loss	91.6% ( +0.7%   x1.01 )	17.6% ( -2.35%   x0.88 )	71.3% ( -1.38%   x0.98 )	0.5% ( -0.09%   x0.84 )	181.0% ( -3.1%   x0.98 )
	Base Case % Potential Annual Accident Frequency	0.03% ( 0.00%   x0.99 )	0.02% ( 0.00%   x0.89 )	1.8% ( -0.09%   x0.96 )	94.3% ( -14.6%   x0.87 )	96.2% ( -14.7%   x0.87 )
	Average potential spill size per accident (in m^3)	5486 ( +73   x1.01 )	1680 ( -13   x0.99 )	71.1 ( +1.9   x1.03 )	0.01 ( 0.00   x0.97 )	3.4 ( +0.4   x1.13 )
	Probability of at least one accident in 1 year by spill size	0.14% ( 0.00%   x0.99 )	0.08% ( -0.01%   x0.89 )	7.8% ( -0.35%   x0.96 )	98.5% ( -0.73%   x0.99 )	98.6% ( -0.67%   x0.99 )
	Probability of at least one accident in 10 year by spill size	1.34% ( -0.01%   x0.99 )	0.84% ( -0.10%   x0.89 )	55.6% ( -1.65%   x0.97 )	100.0% ( 0.00%   x1.00 )	100.0% ( 0.00%   x1.00 )
	Probability of at least one accident in 25 years by spill size	3.33% ( -0.02%   x0.99 )	2.10% ( -0.26%   x0.89 )	86.9% ( -1.19%   x0.99 )	100.0% ( 0.00%   x1.00 )	100.0% ( 0.00%   x1.00 )