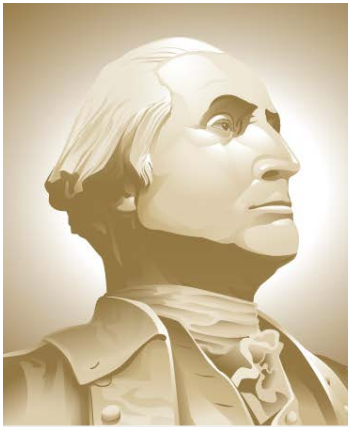


VTRA SUMMARY DENSITY ANALYSIS

A Closer look by Vessel Type and Location

Presentation by: J. Rene van Dorp



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WASHINGTON
UNIVERSITY**

WASHINGTON, DC

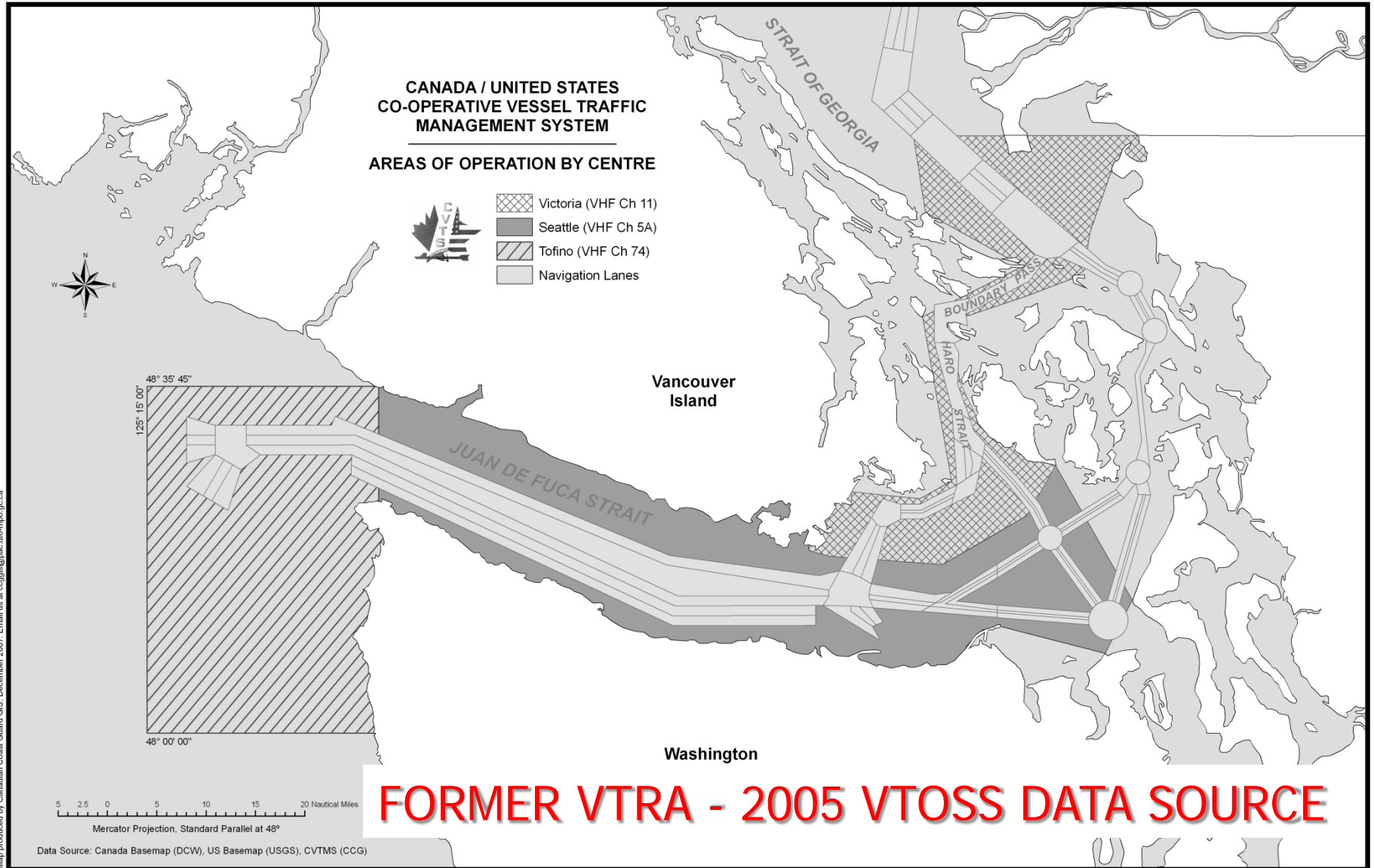
**V
C
U**

GWU Personnel: Dr. J. Rene van Dorp

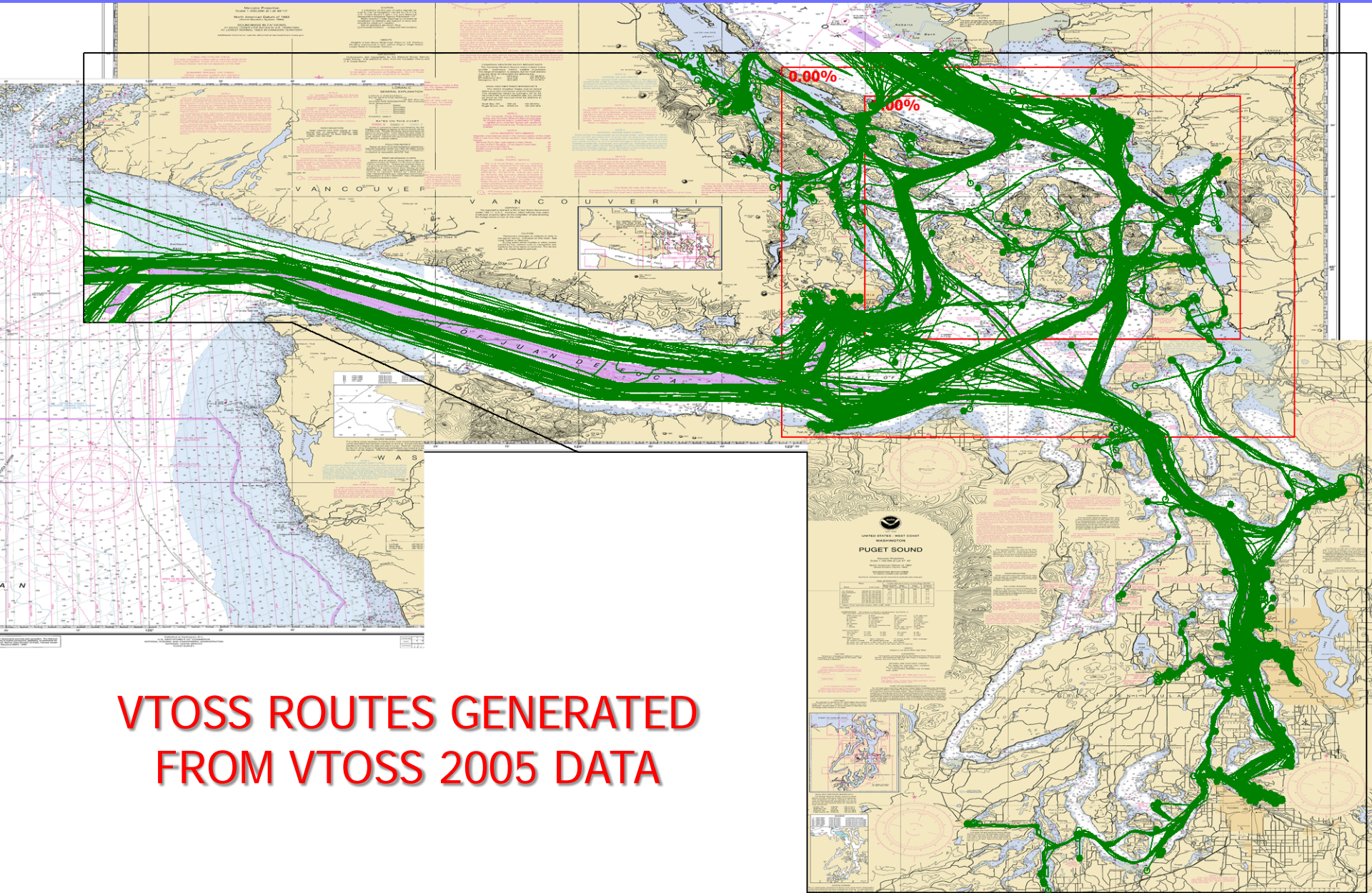
VCU Personnel: Dr. Jason R. W. Merrick

Puget Sound Harbor Safety Committee Presentation October 2012

The Vessel Traffic Operation Support System (VTOSS)

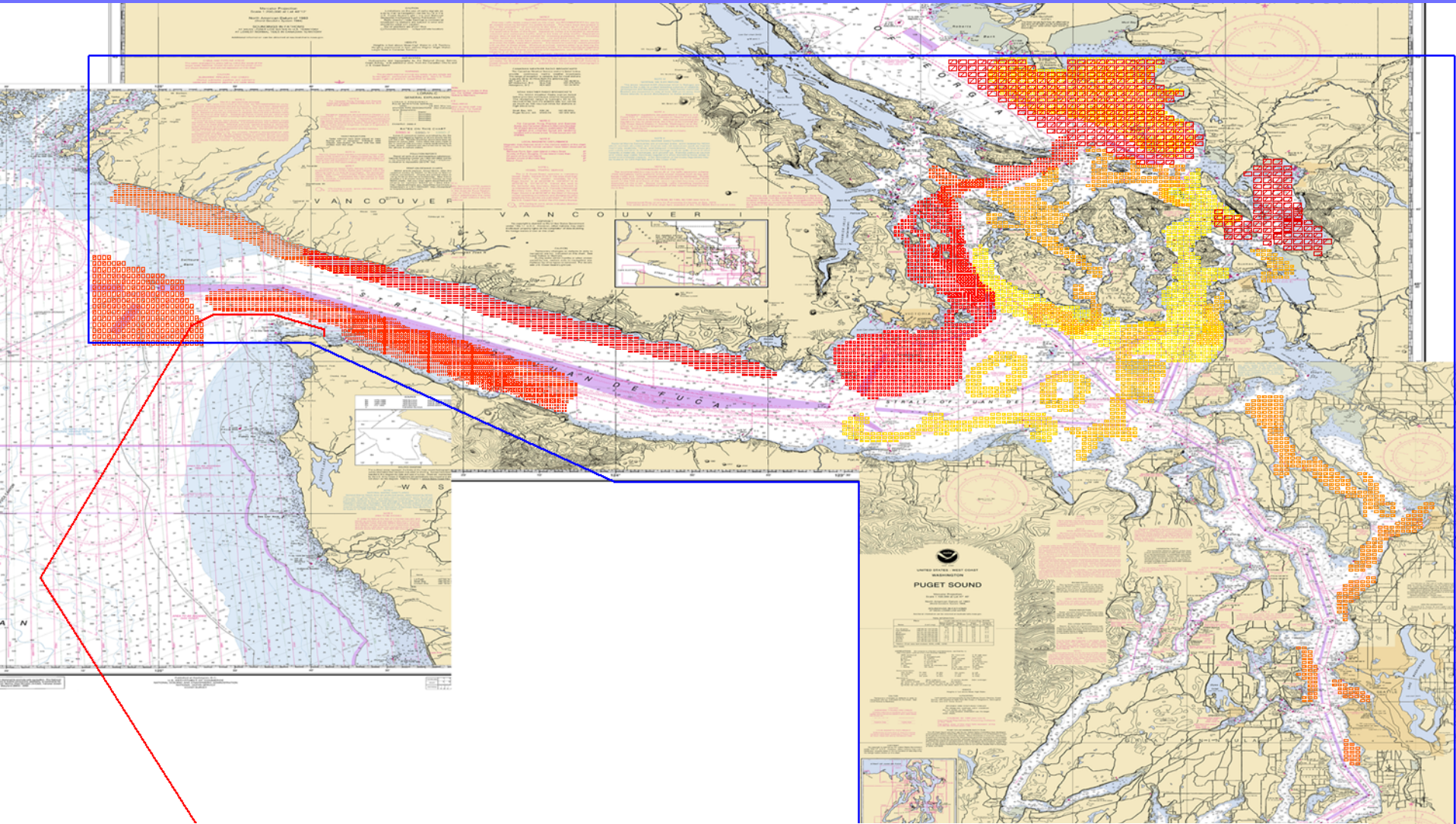


FORMER VTRA STUDY – VTOSS ROUTES



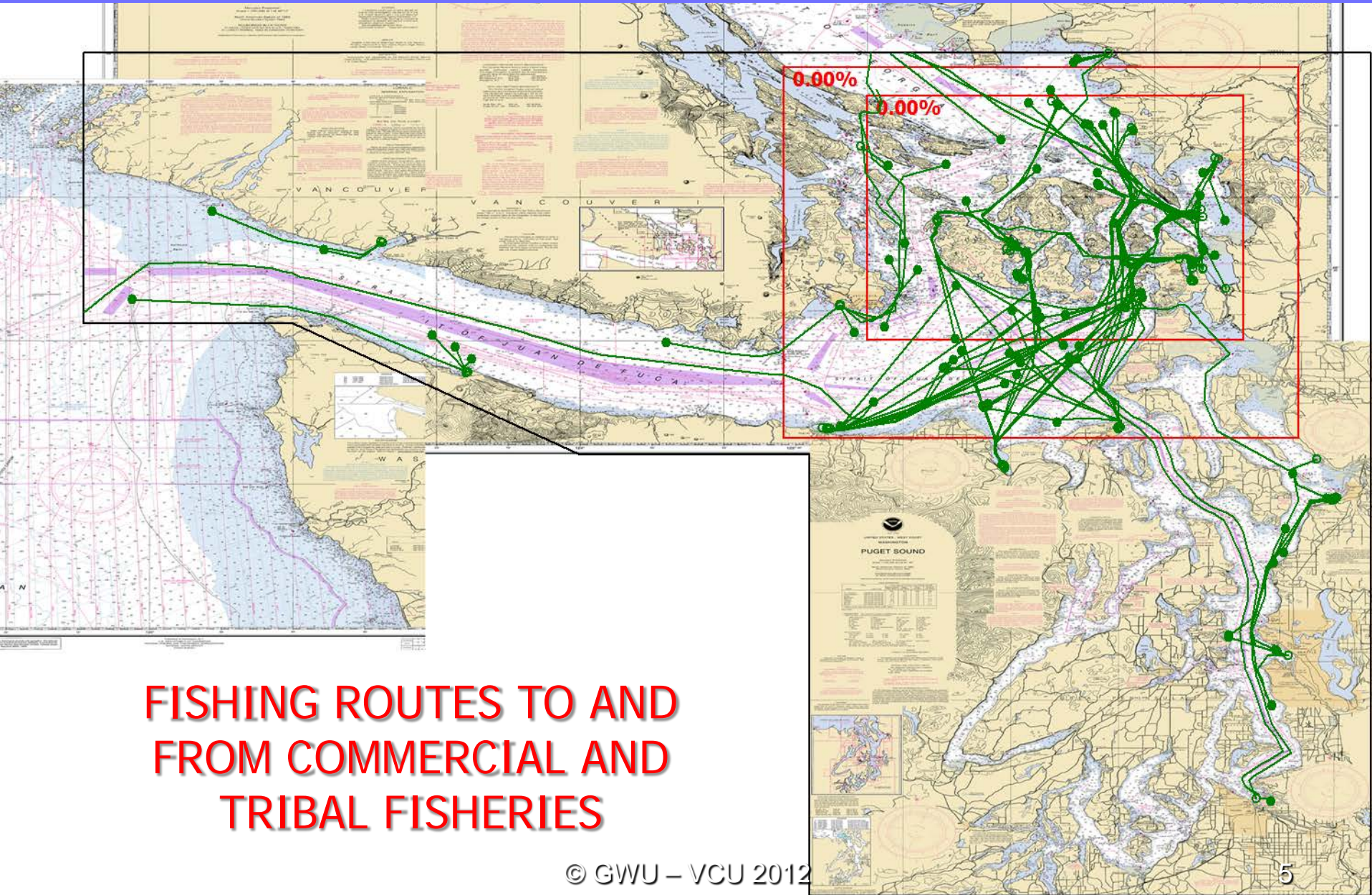
**VTOSS ROUTES GENERATED
FROM VTOSS 2005 DATA**

FORMER VTRA STUDY – AREAS OF FISHING

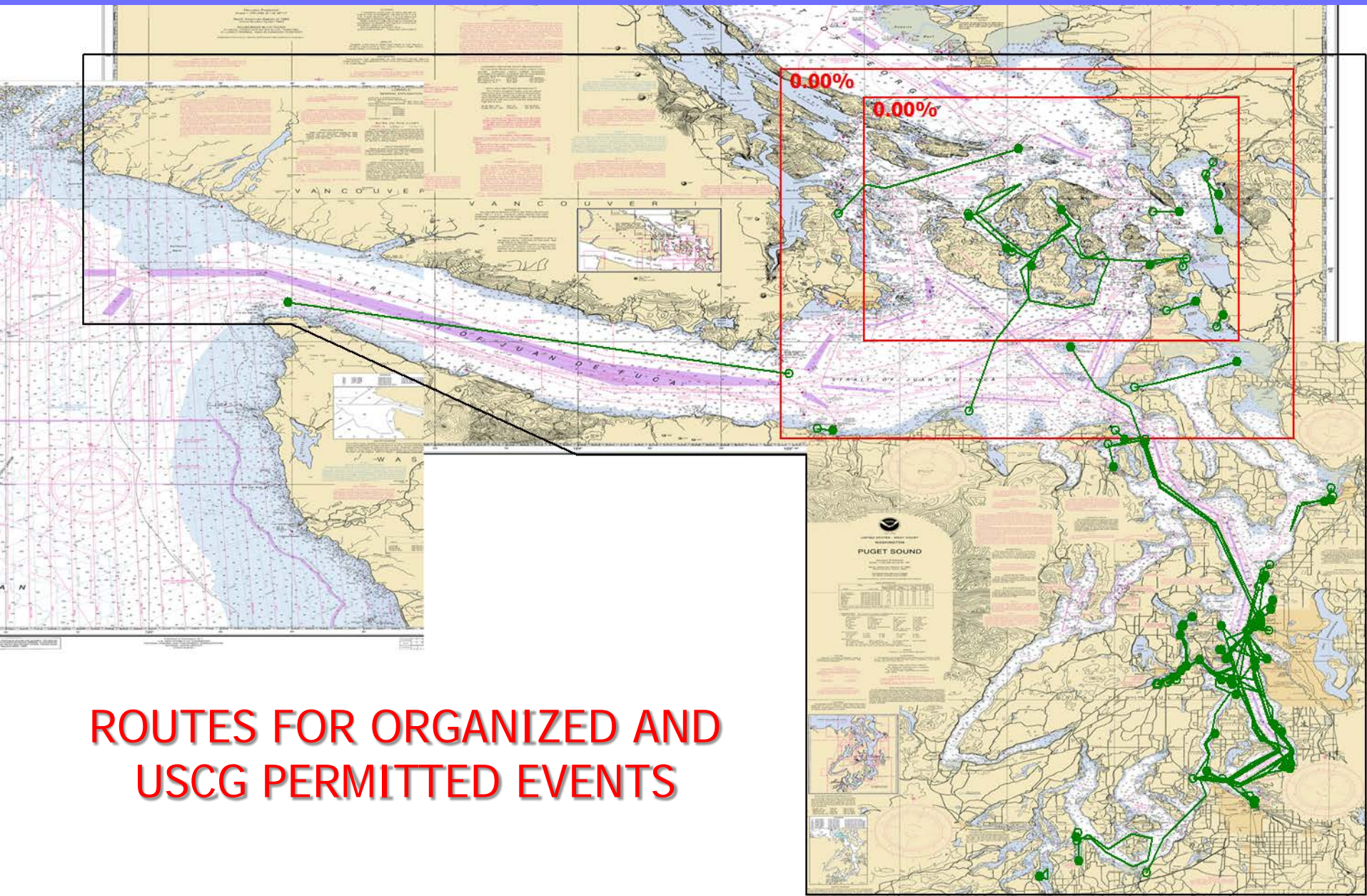


FORMER VTRA – COMMERCIAL AND TRIBAL FISHERIES

FORMER VTRA STUDY – ROUTES TO AND FROM FISHING

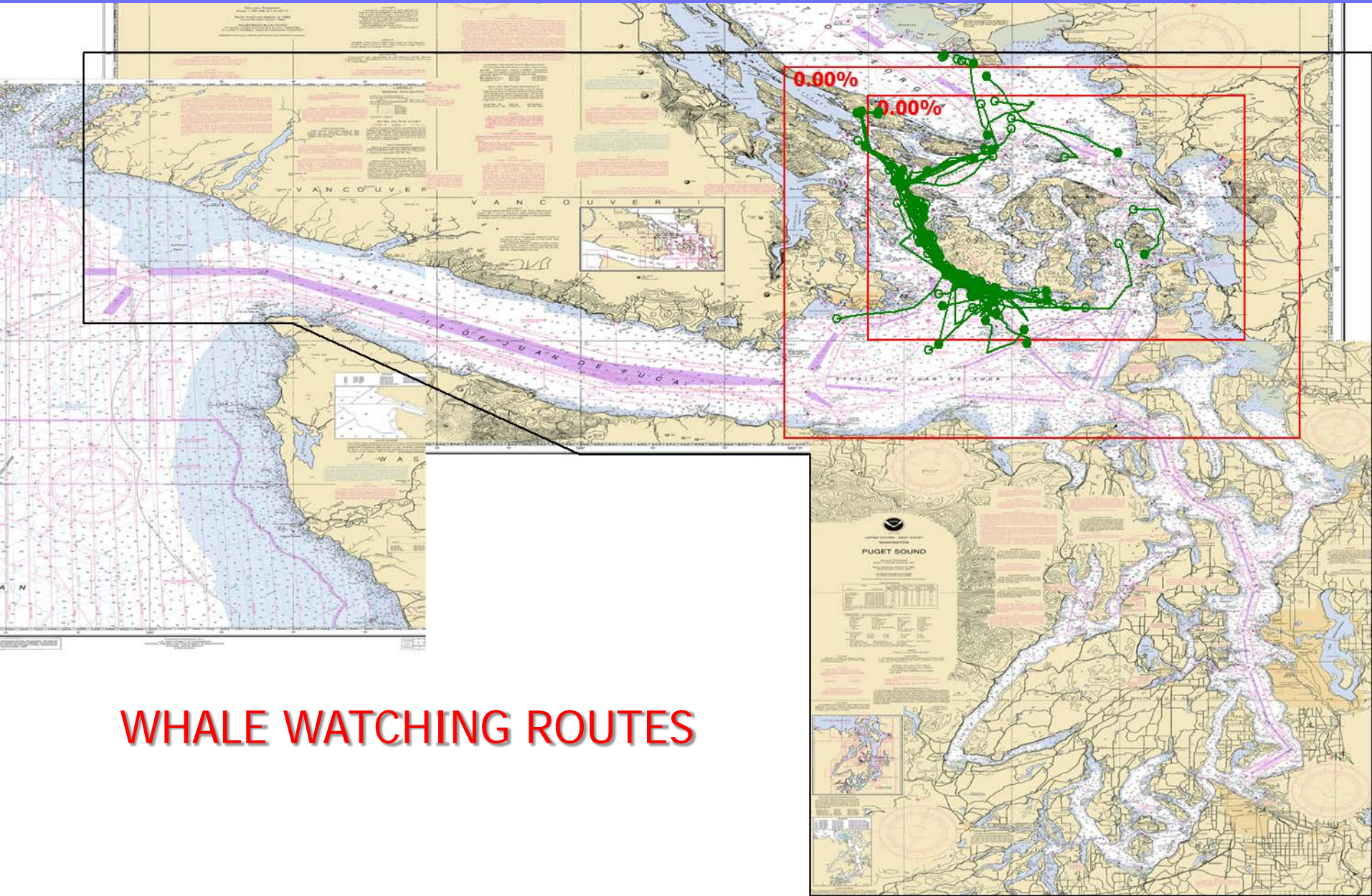


FORMER VTRA STUDY – USCG PERMITTED REGATTAS, ETC.



**ROUTES FOR ORGANIZED AND
USCG PERMITTED EVENTS**

FORMER VTRA STUDY – WHALE WATCHING ROUTES



WHALE WATCHING ROUTES

FORMER VTRA STUDY – COMPLETE TRAFFIC DENSITY

100 % of Total Traffic

58.07%

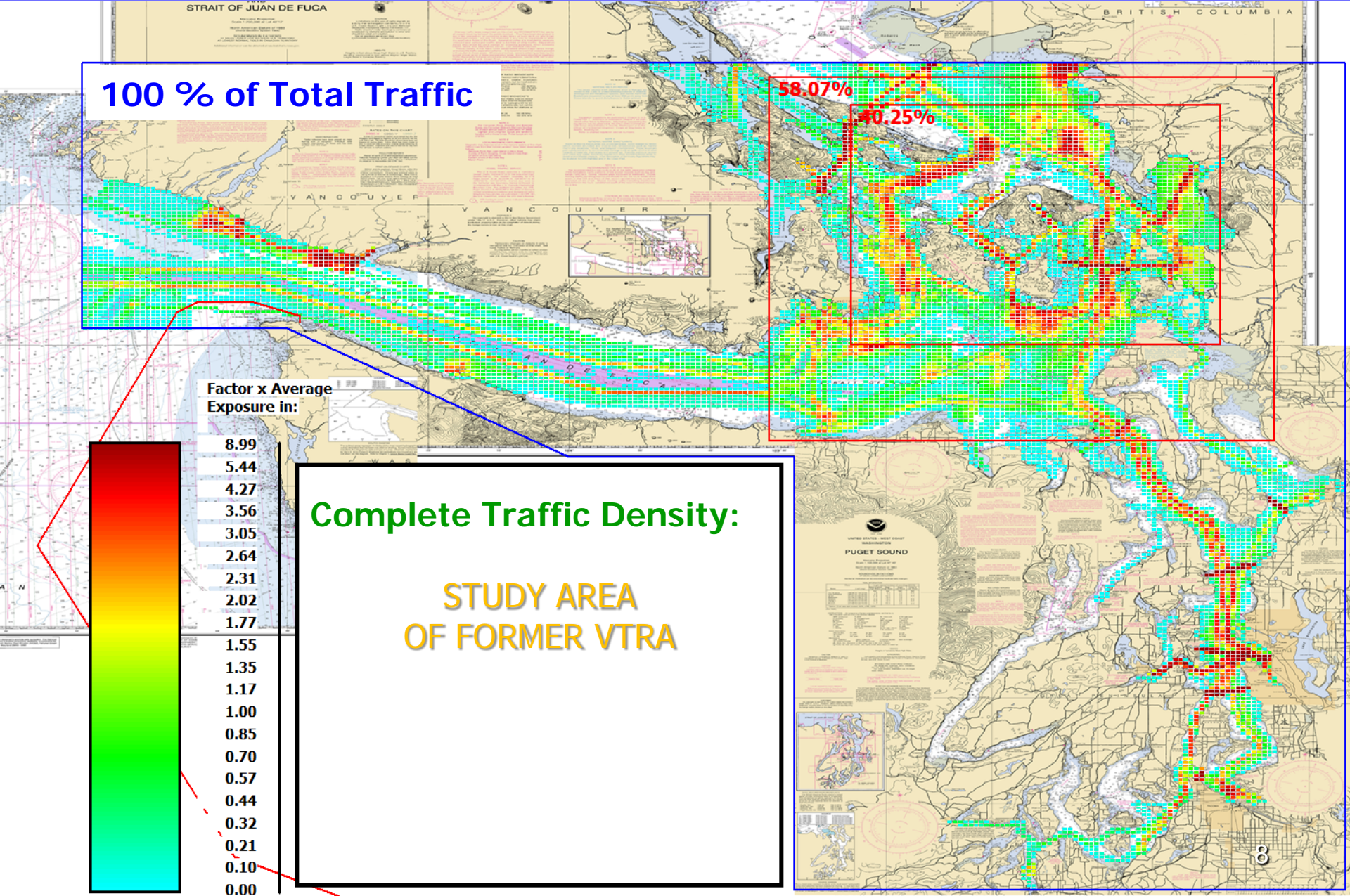
40.25%

Factor x Average Exposure in:

- 8.99
- 5.44
- 4.27
- 3.56
- 3.05
- 2.64
- 2.31
- 2.02
- 1.77
- 1.55
- 1.35
- 1.17
- 1.00
- 0.85
- 0.70
- 0.57
- 0.44
- 0.32
- 0.21
- 0.10
- 0.00

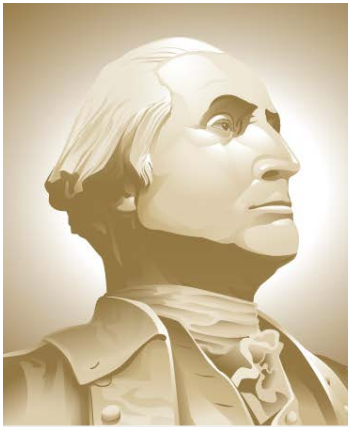
Complete Traffic Density:

STUDY AREA
OF FORMER VTRA



UPDATING THE TRAFFIC DATA- UPDATE TO VTOSS 2010 DATA

Presentation by: J. Rene van Dorp



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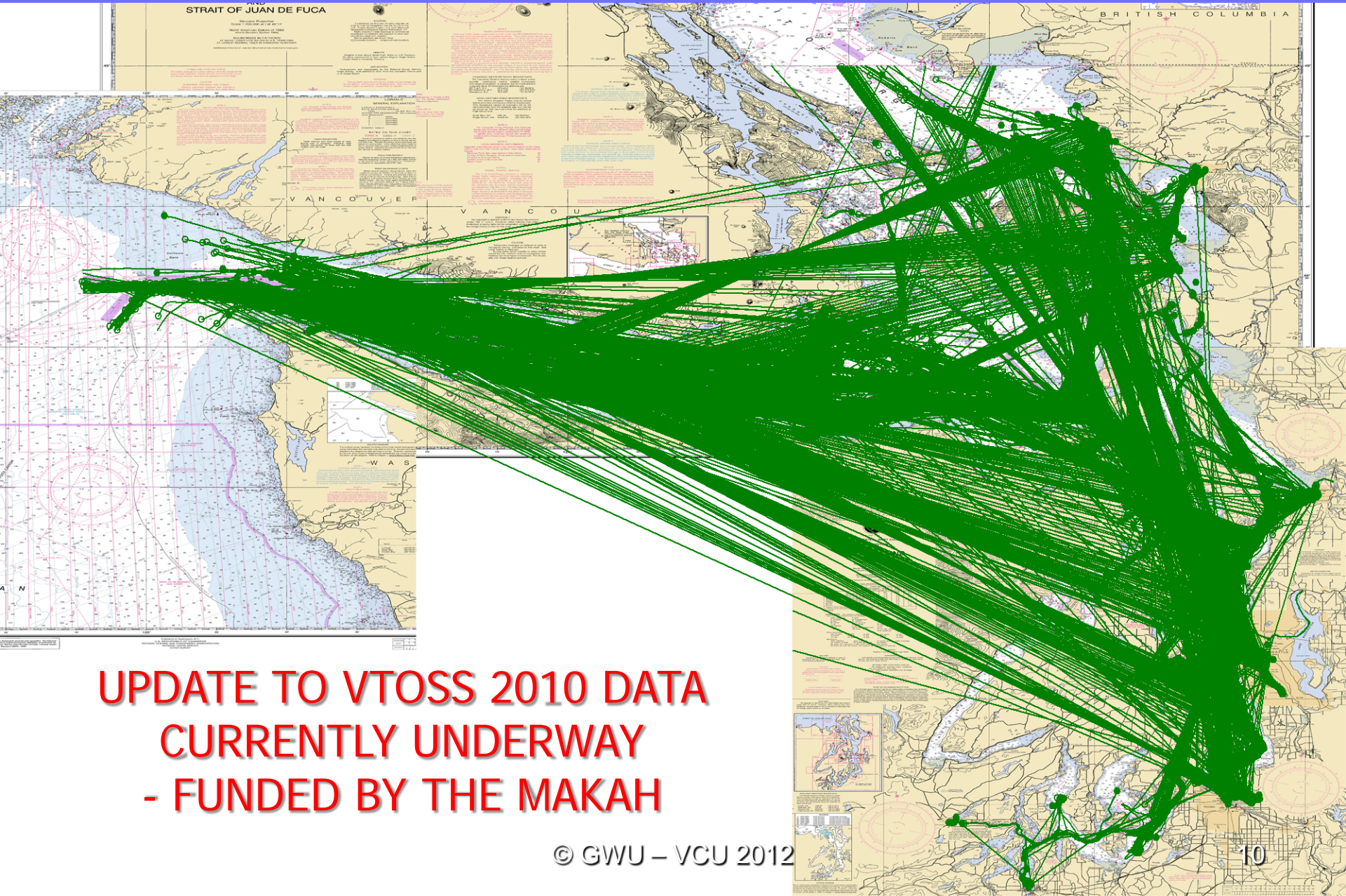
VCU

GWU Personnel: Dr. J. Rene van Dorp

VCU Personnel: Dr. Jason R. W. Merrick

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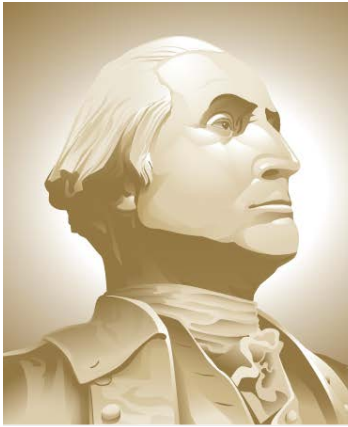
UPDATED OF VTRA STUDY – USE VTOSS 2010 DATA



**UPDATE TO VTOSS 2010 DATA
CURRENTLY UNDERWAY
- FUNDED BY THE MAKAH**

UPDATING THE VTRA STUDY - LOCATIONS

Presentation by: J. Rene van Dorp



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WASHINGTON, DC

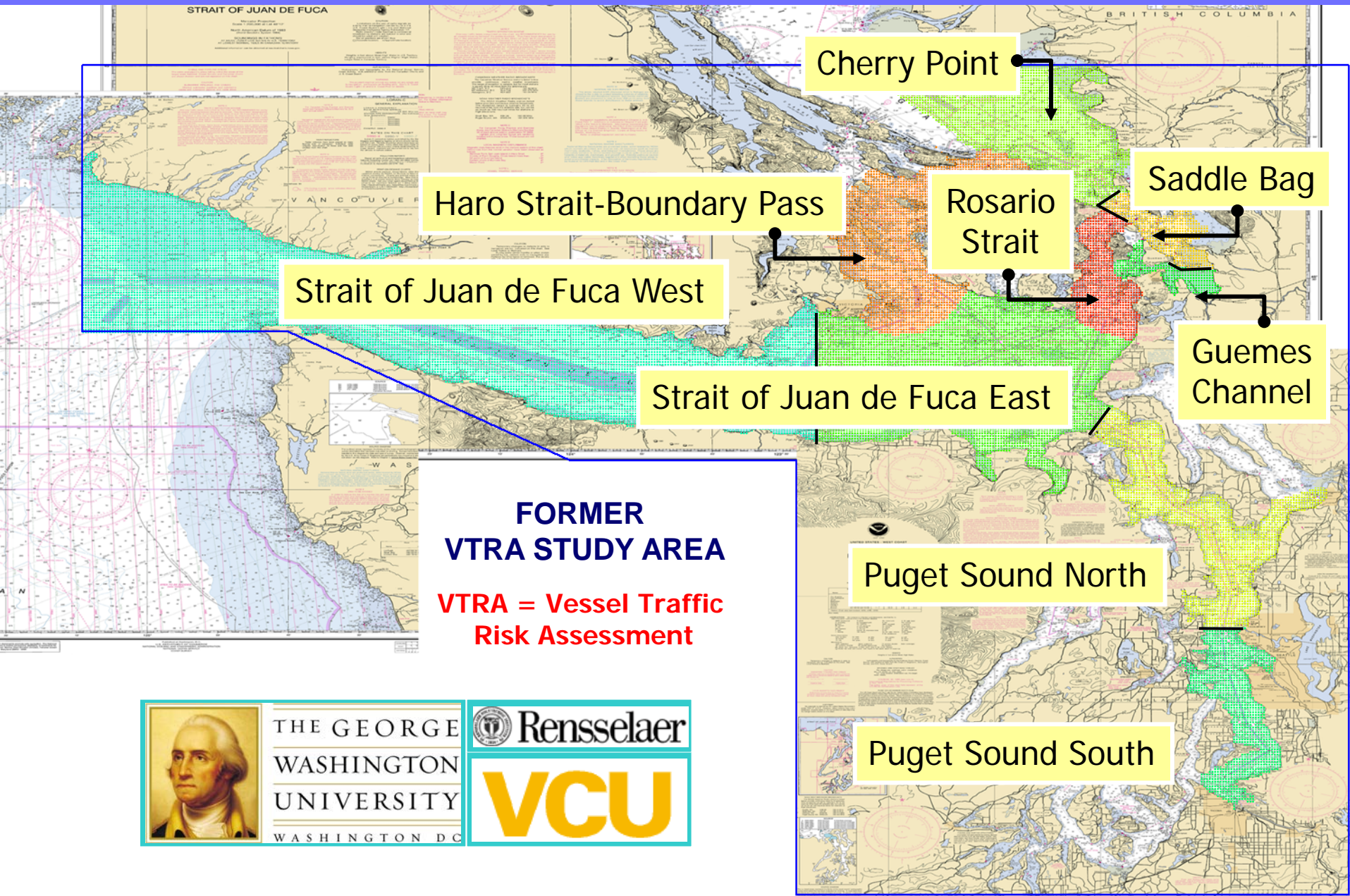
VCU

GWU Personnel: Dr. J. Rene van Dorp

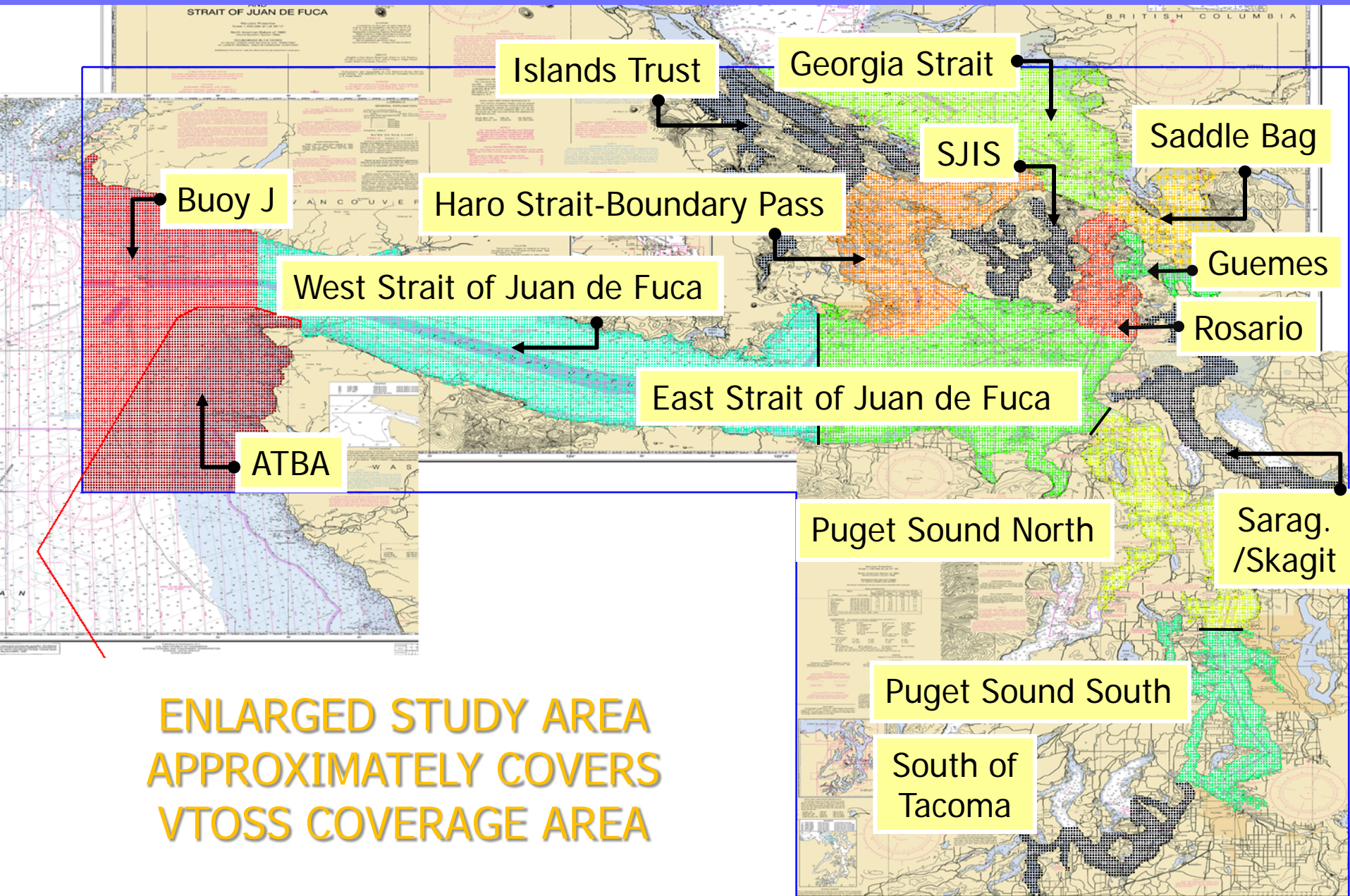
VCU Personnel: Dr. Jason R. W. Merrick

Puget Sound Harbor Safety Committee Presentation October 2012

FORMER VTRA STUDY – 9 DEFINED LOCATIONS

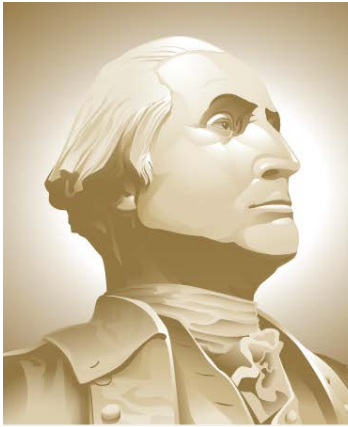


FOR UPDATED VTRA STUDY - 15 DEFINED LOCATIONS



UPDATING THE VTRA STUDY – SELECTION OF FOCUS VESSELS

Presentation by: J. Rene van Dorp



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WASHINGTON, DC

VCU

GWU Personnel: Dr. J. Rene van Dorp

VCU Personnel: Dr. Jason R. W. Merrick

Puget Sound Harbor Safety Committee Presentation October 2012

FORMER VTRA STUDY – COMPLETE TRAFFIC DENSITY

100 % of Total Traffic

57.81%

40.06%

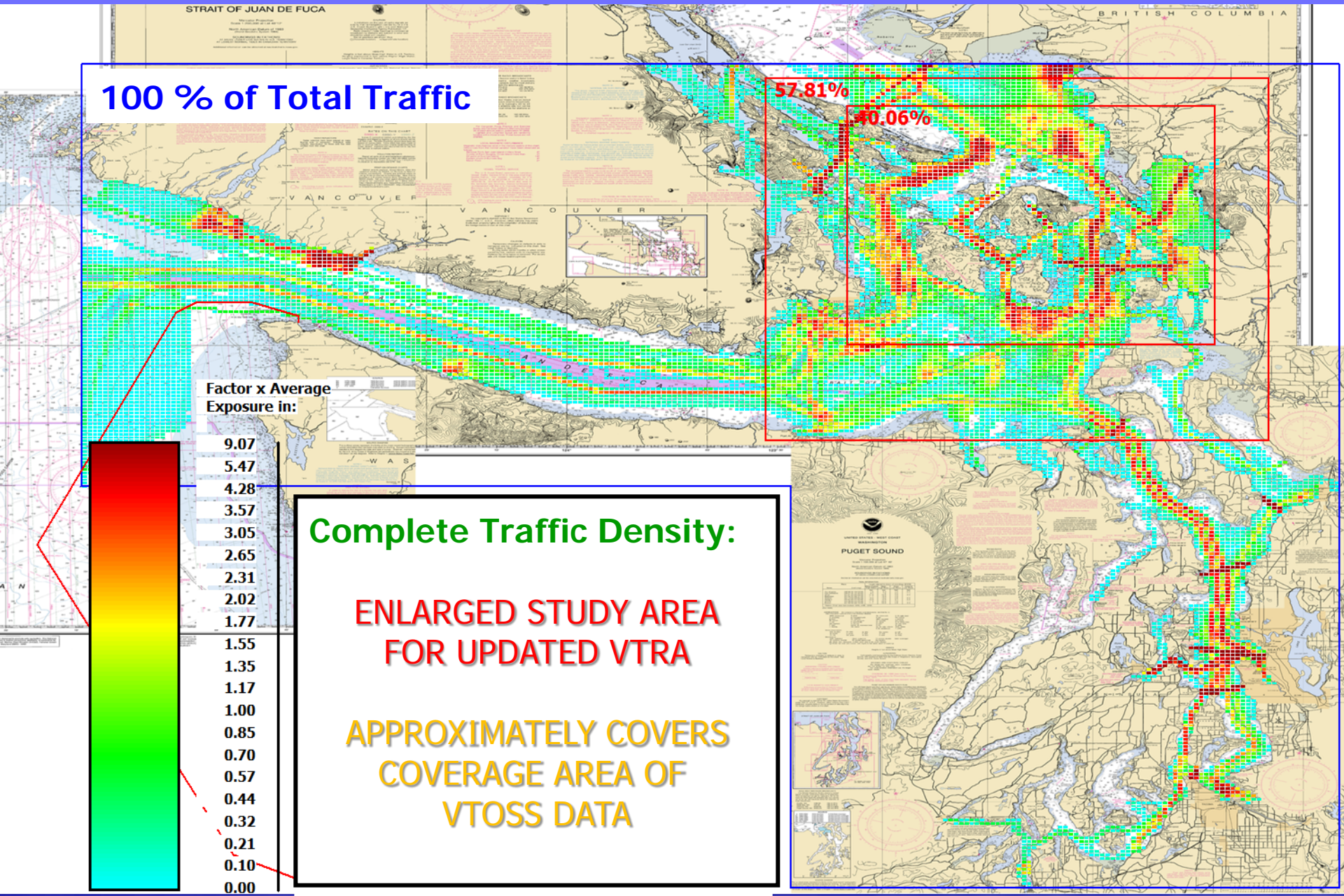
Factor x Average Exposure in:

- 9.07
- 5.47
- 4.28
- 3.57
- 3.05
- 2.65
- 2.31
- 2.02
- 1.77
- 1.55
- 1.35
- 1.17
- 1.00
- 0.85
- 0.70
- 0.57
- 0.44
- 0.32
- 0.21
- 0.10
- 0.00

Complete Traffic Density:

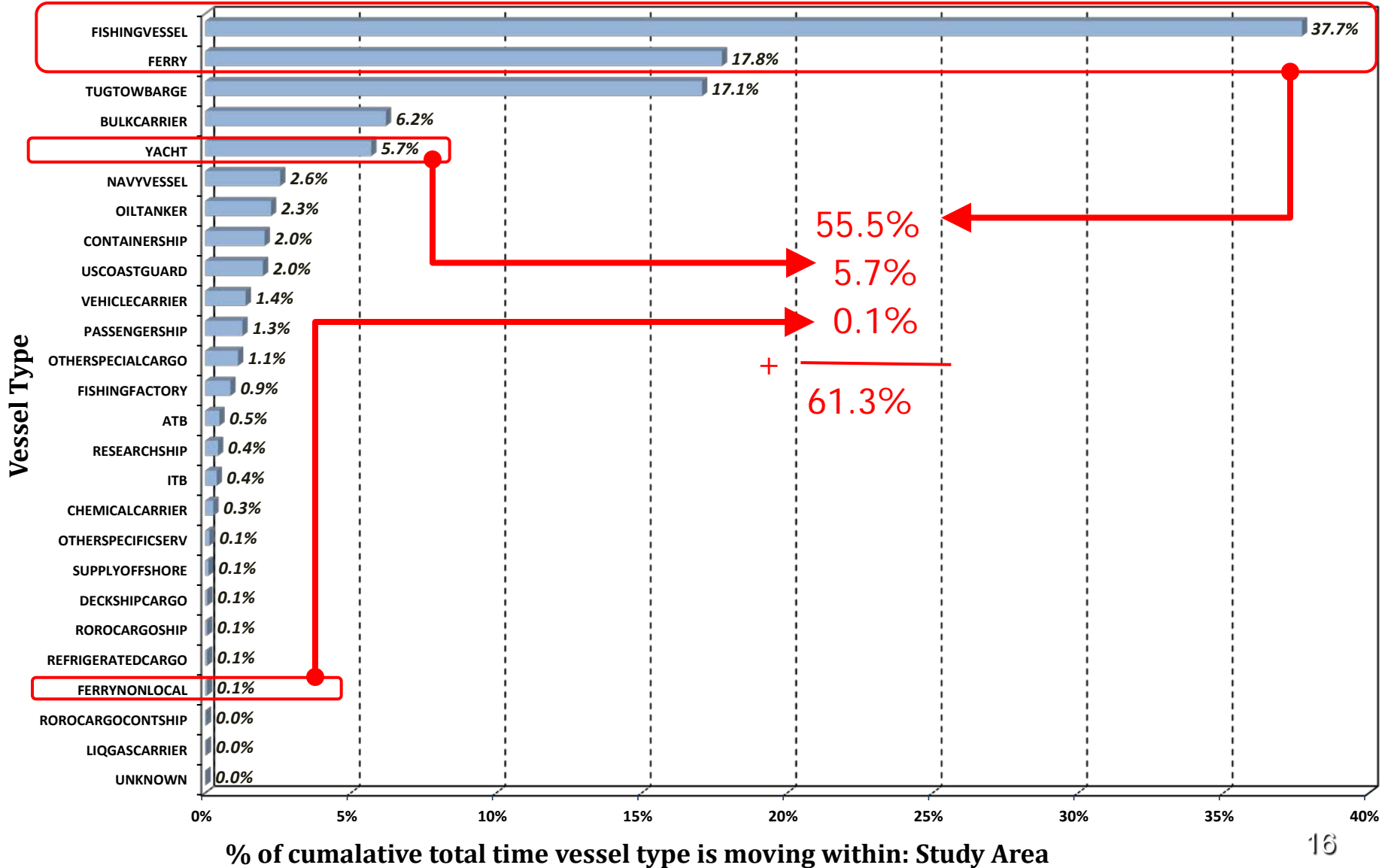
ENLARGED STUDY AREA
FOR UPDATED VTRA

APPROXIMATELY COVERS
COVERAGE AREA OF
VTOSS DATA



FORMER VTRA STUDY – COMPLETE TRAFFIC DENSITY

Study Area: 100.0% of TTE - 100.0% of TA - DRF 1.0



FORMER VTRA STUDY – 61.3% OF TOTAL TRAFFIC DENSITY

61.3 % of Total Traffic

64.10%

48.79%

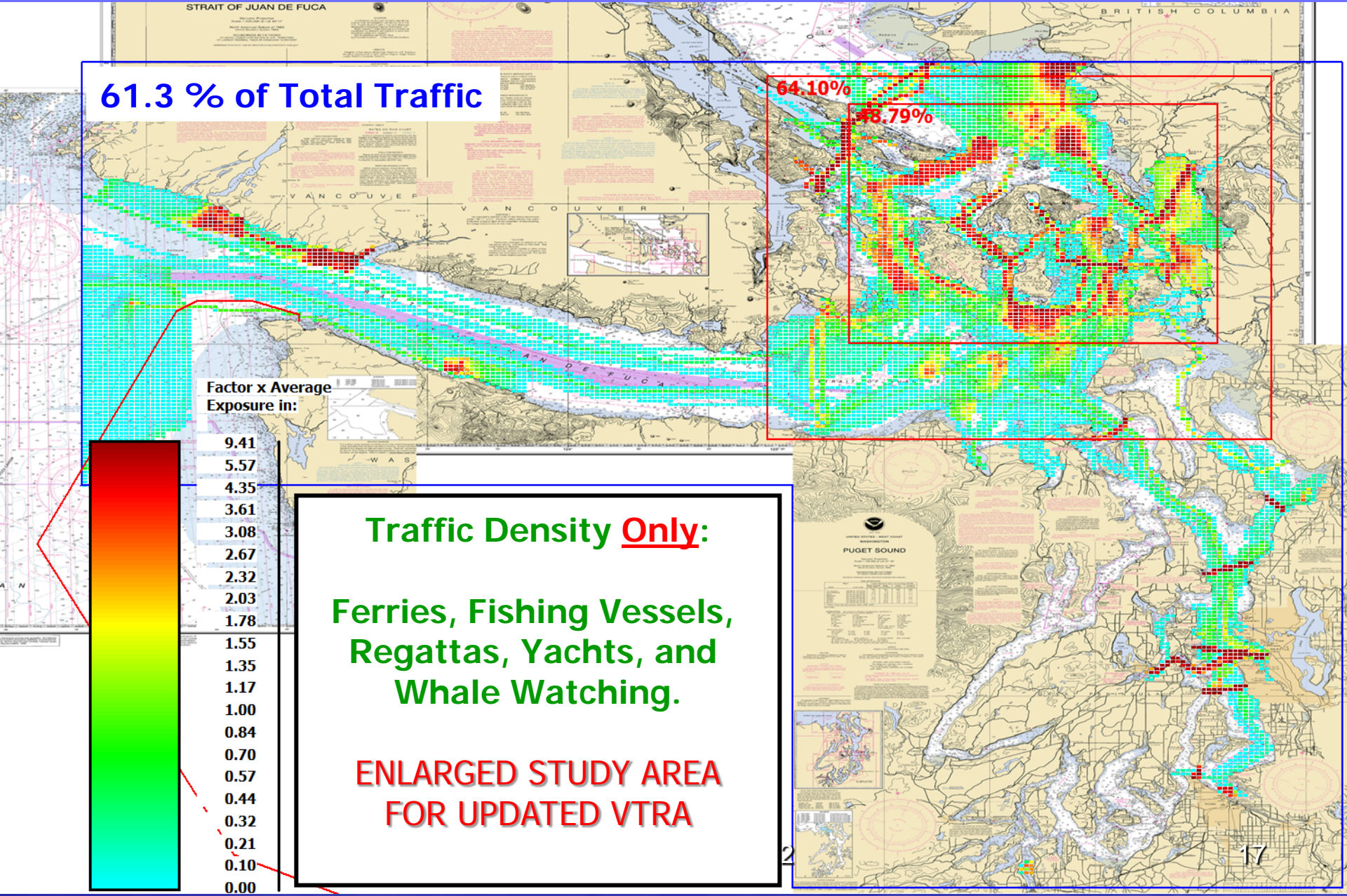
Factor x Average Exposure in:

- 9.41
- 5.57
- 4.35
- 3.61
- 3.08
- 2.67
- 2.32
- 2.03
- 1.78
- 1.55
- 1.35
- 1.17
- 1.00
- 0.84
- 0.70
- 0.57
- 0.44
- 0.32
- 0.21
- 0.10
- 0.00

Traffic Density Only:

Ferries, Fishing Vessels, Regattas, Yachts, and Whale Watching.

ENLARGED STUDY AREA FOR UPDATED VTRA



FORMER VTRA STUDY – 38.7 % OF TOTAL TRAFFIC DENSITY

38.7 % of Total Traffic

47.80%

26.19%

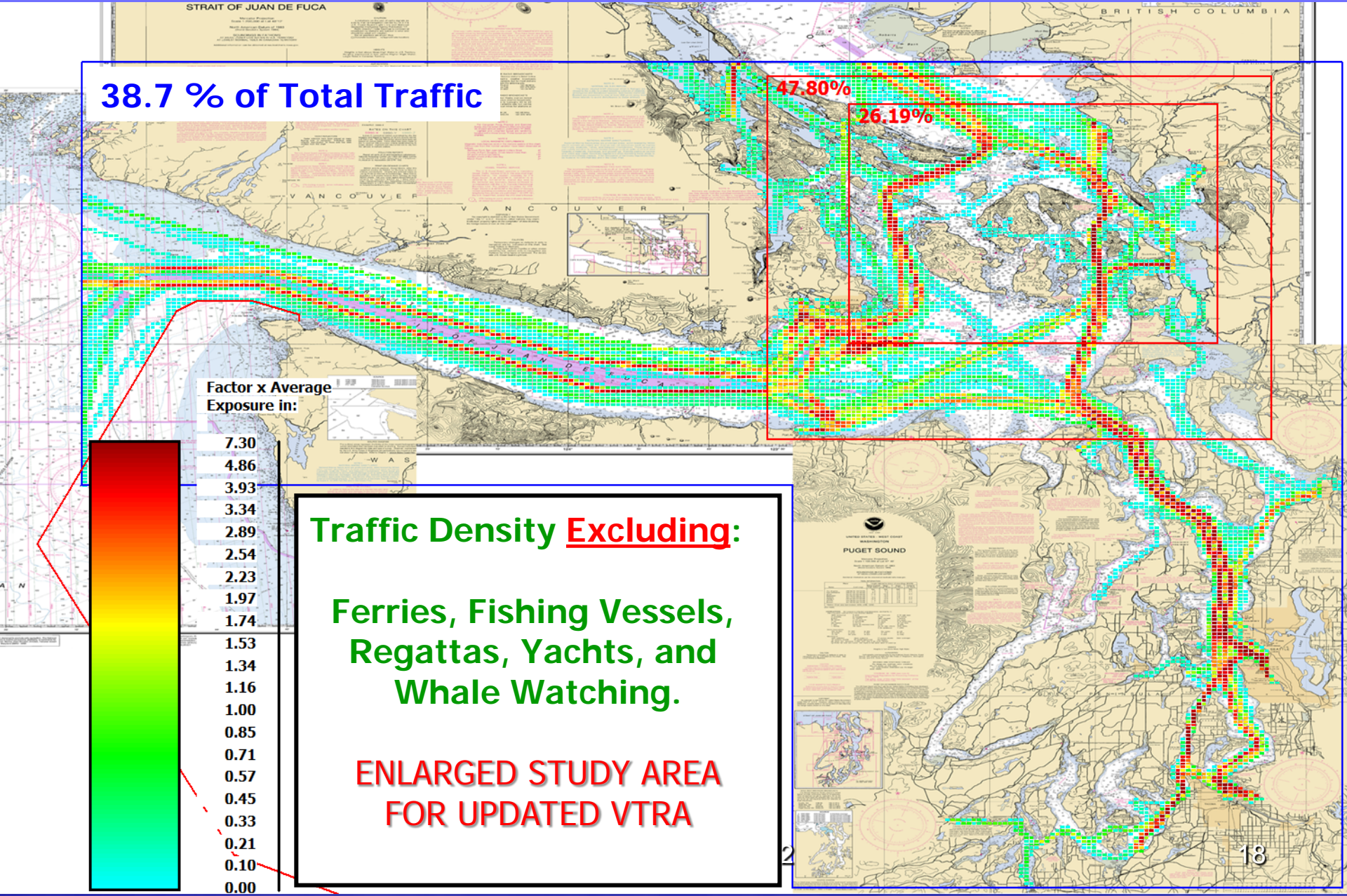
Factor x Average Exposure in:

- 7.30
- 4.86
- 3.93
- 3.34
- 2.89
- 2.54
- 2.23
- 1.97
- 1.74
- 1.53
- 1.34
- 1.16
- 1.00
- 0.85
- 0.71
- 0.57
- 0.45
- 0.33
- 0.21
- 0.10
- 0.00

Traffic Density Excluding:

Ferries, Fishing Vessels,
Regattas, Yachts, and
Whale Watching.

ENLARGED STUDY AREA
FOR UPDATED VTRA



FORMER VTRA STUDY – SELECTION OF FOCUS VESSELS

VESSELS CERTAINLY NOT CONSIDERED

FOR FOCUS VESSELS:

Ferries, Fishing Vessels, Regattas,
Yachts, and Whale Watchers.

FOR VTRA STUDY AREA WE MAY DEFINE:

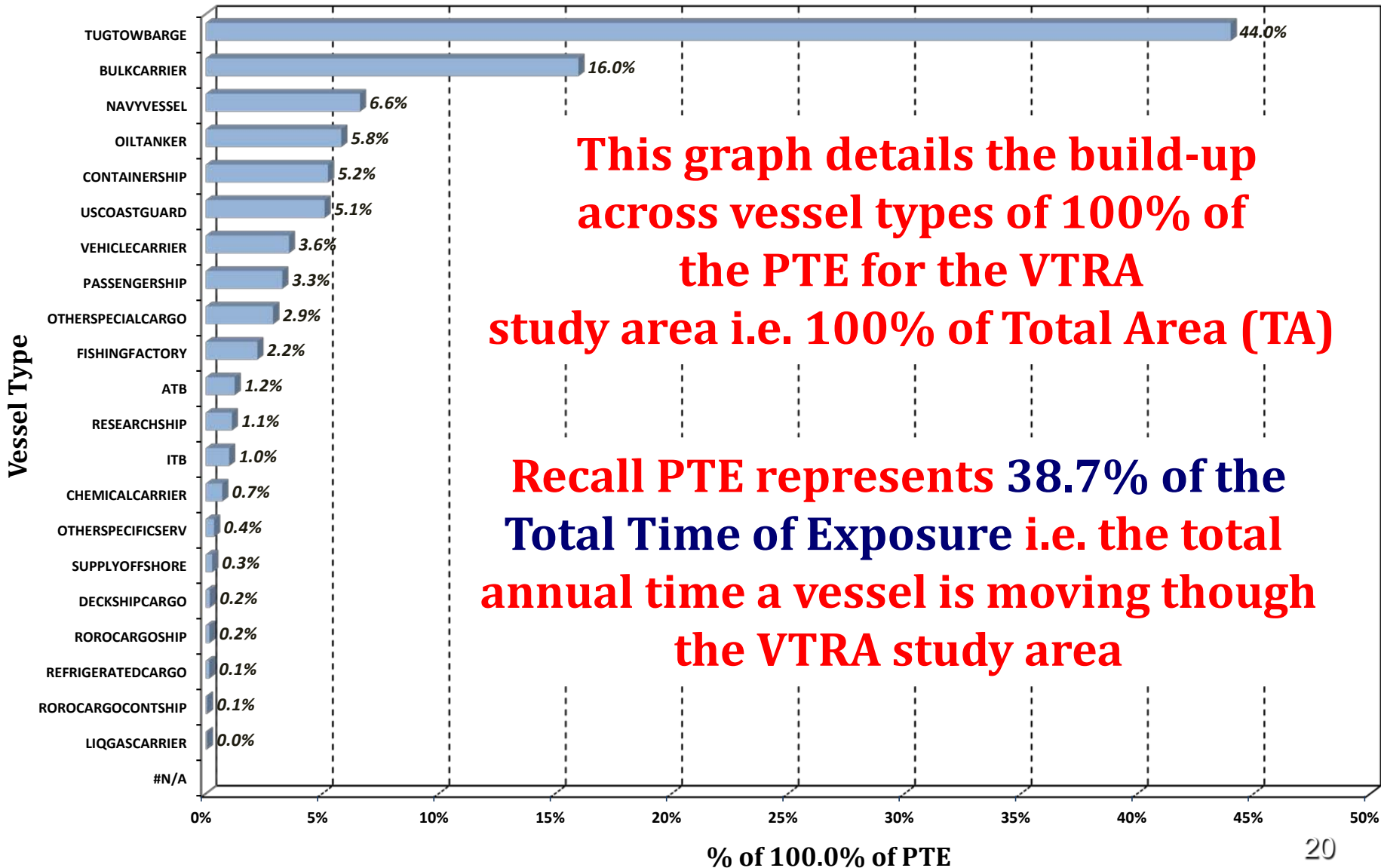
VESSEL TYPE EXPOSURE (VTE): The annual amount of time a vessel of a particular type is traversing through the VTRA study area.

TOTAL TIME EXPOSURE (TTE): Sum of vessel type exposures across all vessel types.

PARTIAL TIME EXPOSURE (PTE): Sum of vessel type exposures across all vessel types excluding the vessel types above.

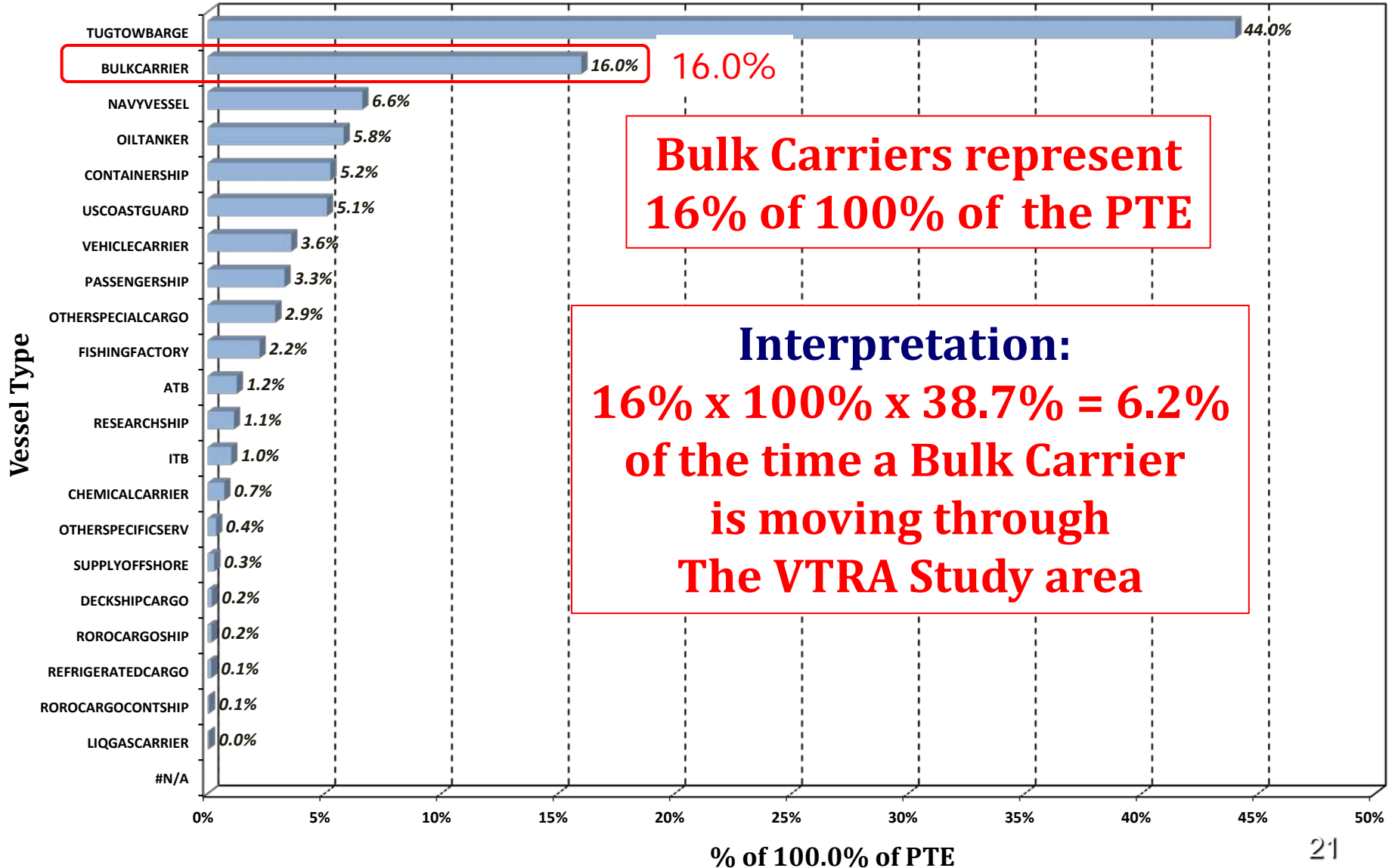
FORMER VTRA STUDY – PTE = 38.7 % TOTAL TIME EXPOSURE

Study Area: 100.0% of PTE - 100.0% of TA - DF 1.0



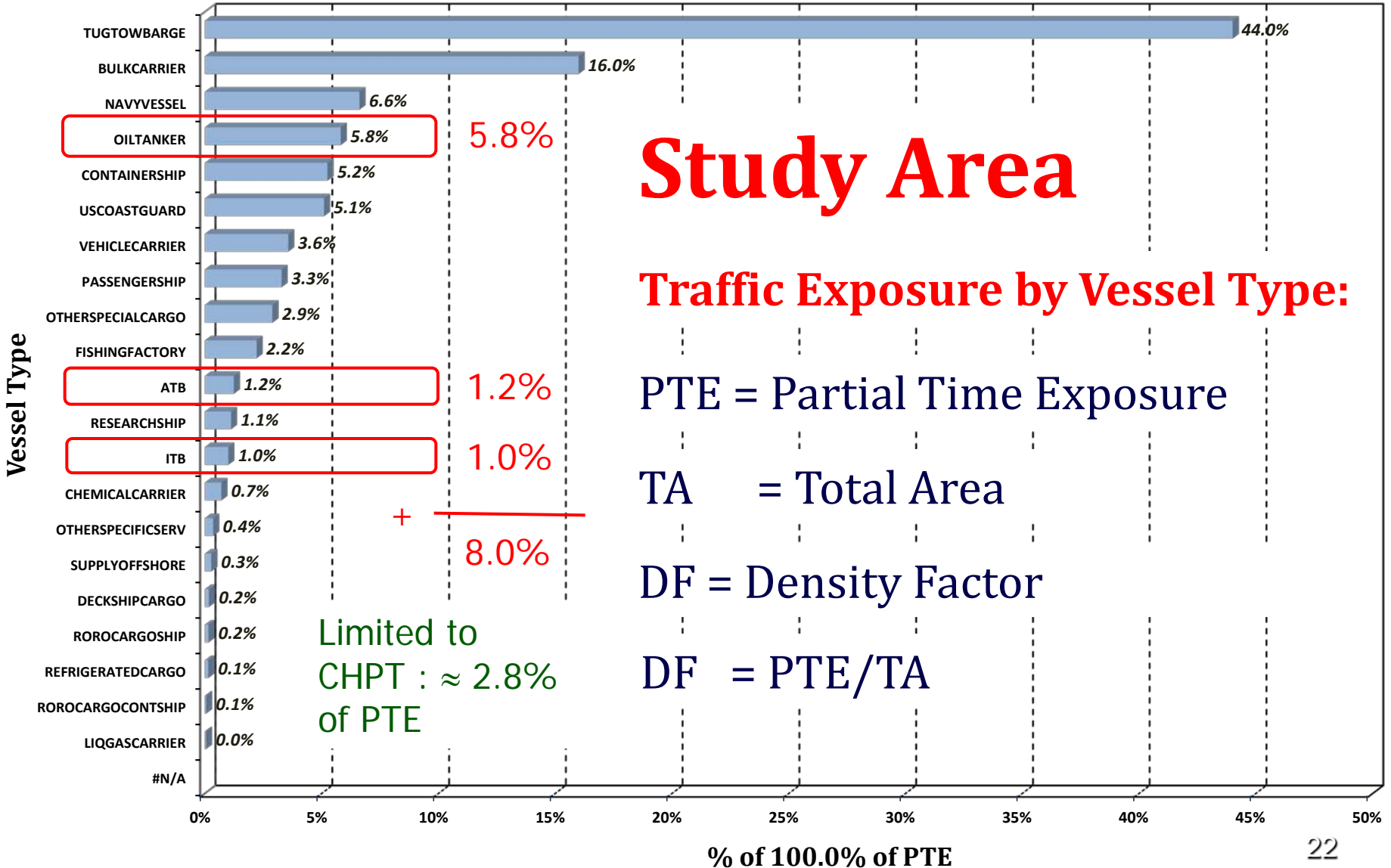
FORMER VTRA STUDY – PTE = 38.7 % TOTAL TIME EXPOSURE

Study Area: 100.0% of PTE - 100.0% of TA - DF 1.0



FORMER VTRA STUDY – PTE = 38.7 % TOTAL TIME EXPOSURE

Study Area: 100.0% of PTE - 100.0% of TA - DF 1.0



FORMER VTRA STUDY – OIL TANKER TRAFFIC DENSITY

5.8 % of PTE

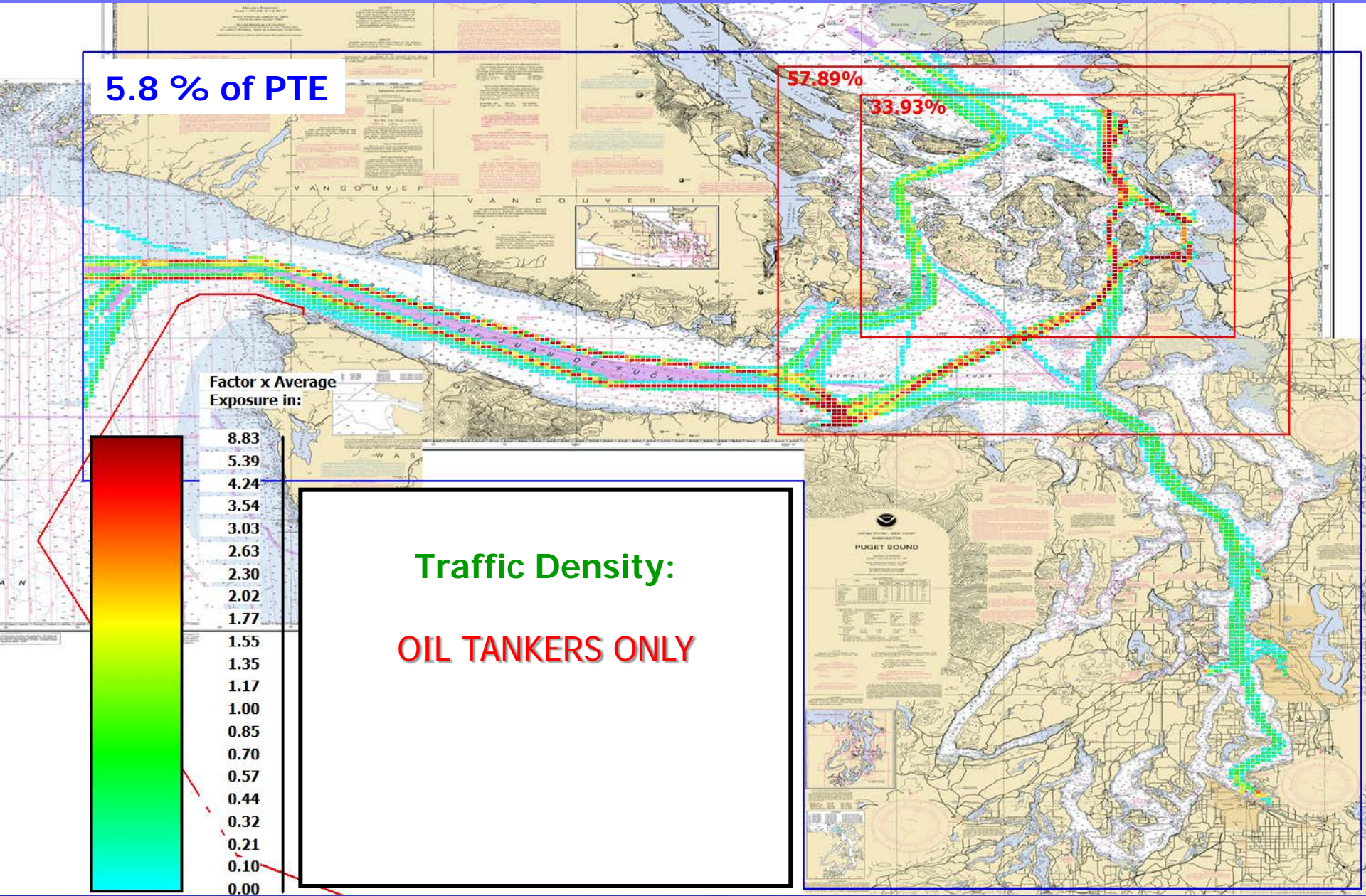
57.89%

33.93%

Factor x Average
Exposure in:

- 8.83
- 5.39
- 4.24
- 3.54
- 3.03
- 2.63
- 2.30
- 2.02
- 1.77
- 1.55
- 1.35
- 1.17
- 1.00
- 0.85
- 0.70
- 0.57
- 0.44
- 0.32
- 0.21
- 0.10
- 0.00

Traffic Density:
OIL TANKERS ONLY



FORMER VTRA STUDY – ATB TRAFFIC DENSITY

1.2 % of PTE

43.59%

23.53%

Factor x Average
Exposure in:

- 6.06
- 4.37
- 3.64
- 3.14
- 2.76
- 2.44
- 2.16
- 1.92
- 1.71
- 1.51
- 1.33
- 1.16
- 1.00
- 0.85
- 0.71
- 0.58
- 0.45
- 0.33
- 0.22
- 0.11
- 0.00

Traffic Density
Tug Tow Barge Traffic:

ATB ONLY

FORMER VTRA STUDY – ITB TRAFFIC DENSITY

1.0 % of PTE

52.42%

29.63%

Factor x Average
Exposure in:

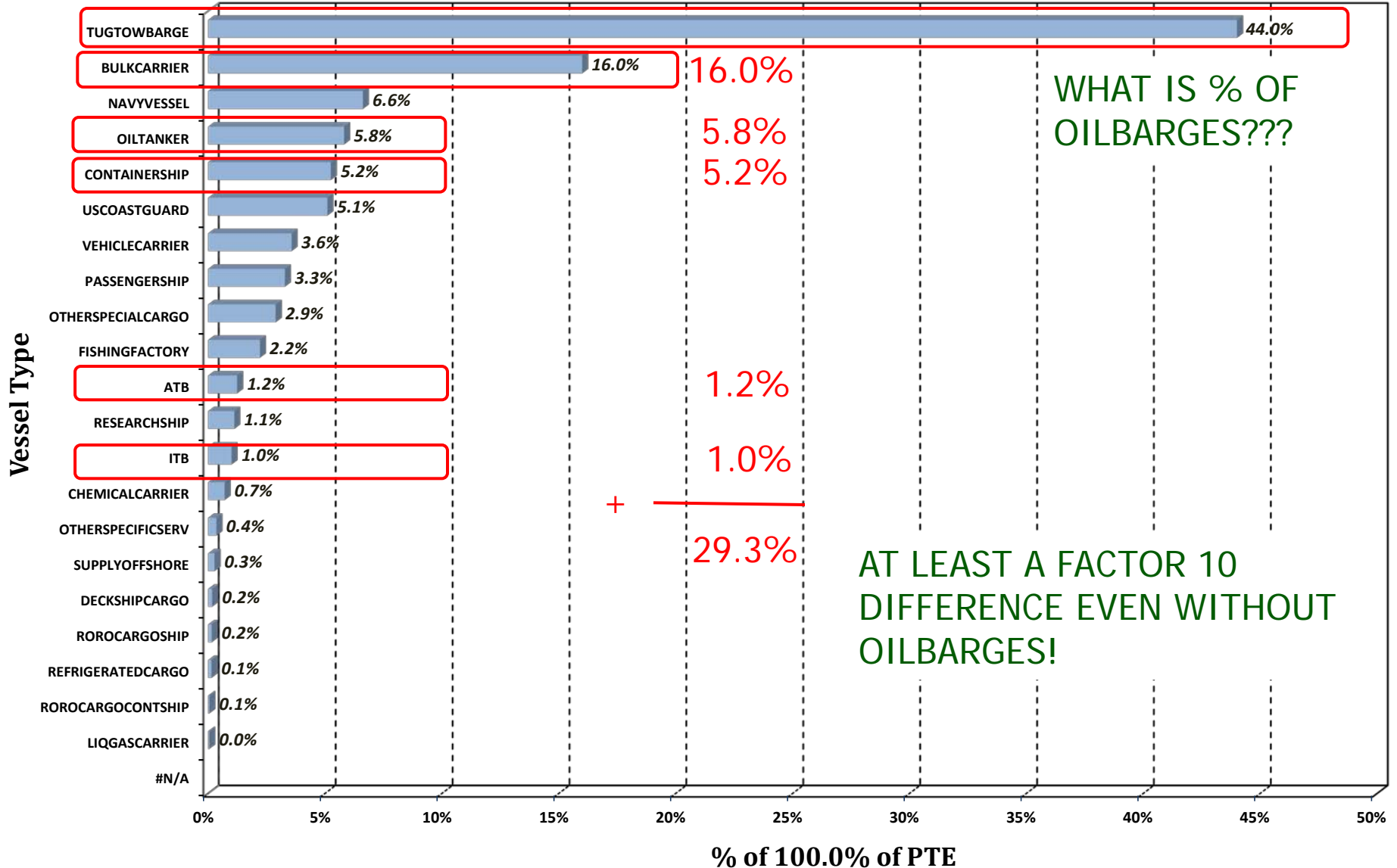
- 9.17
- 5.50
- 4.30
- 3.58
- 3.06
- 2.65
- 2.31
- 2.03
- 1.77
- 1.55
- 1.35
- 1.17
- 1.00
- 0.85
- 0.70
- 0.57
- 0.44
- 0.32
- 0.21
- 0.10
- 0.00

Traffic Density
Tug Tow Barge Traffic:

ITB ONLY

FORMER VTRA DATA – FOCUS VESSELS FOR UPDATED VTRA ???

Study Area: 100.0% of PTE - 100.0% of TA - DF 1.0



FORMER VTRA STUDY – TUG TOW BARGE TRAFFIC DENSITY

44.0 % of PTE

44.93%

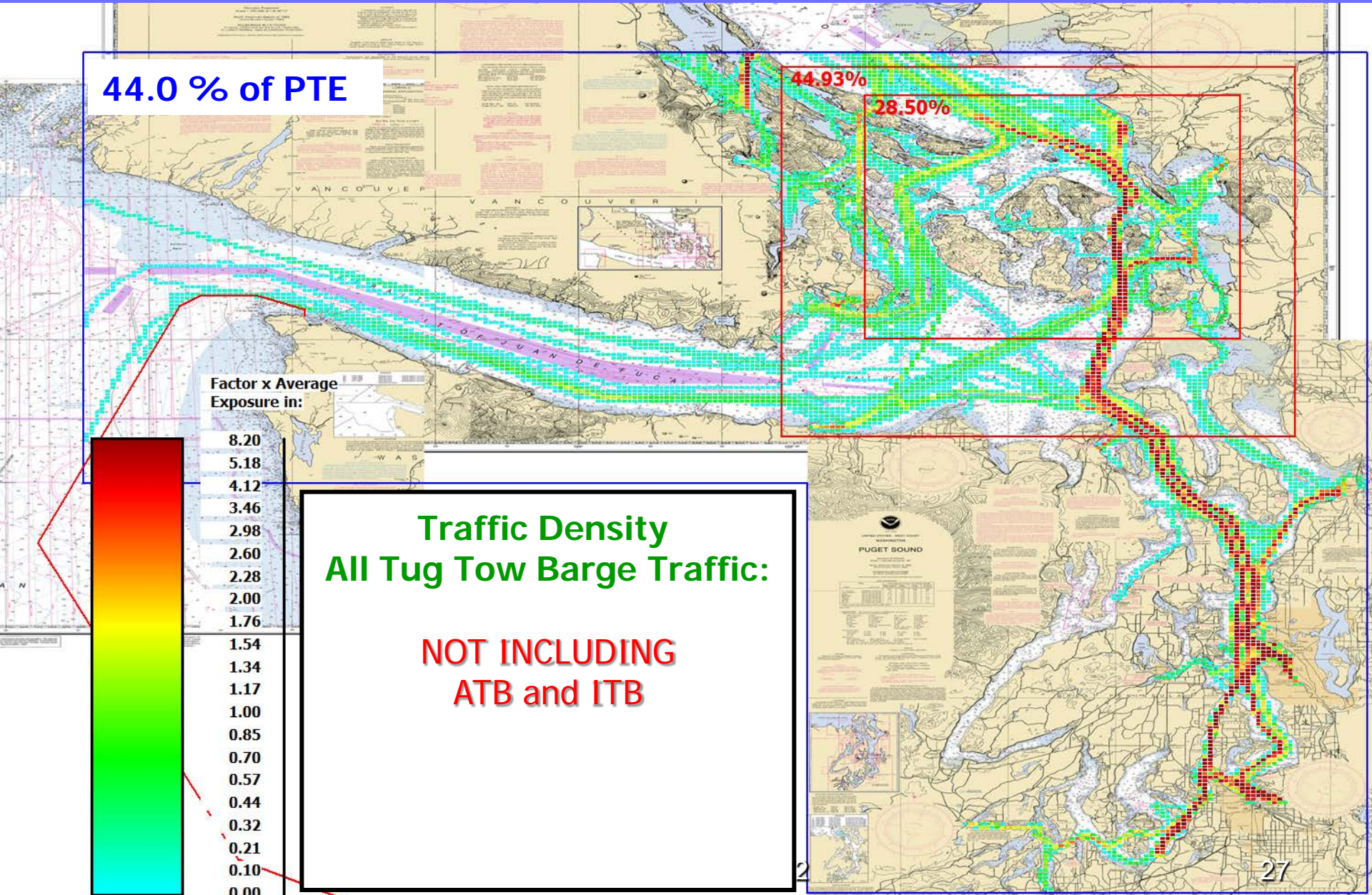
28.50%

Factor x Average Exposure in:

- 8.20
- 5.18
- 4.12
- 3.46
- 2.98
- 2.60
- 2.28
- 2.00
- 1.76
- 1.54
- 1.34
- 1.17
- 1.00
- 0.85
- 0.70
- 0.57
- 0.44
- 0.32
- 0.21
- 0.10
- 0.00

Traffic Density
All Tug Tow Barge Traffic:

NOT INCLUDING
ATB and ITB



FORMER VTRA STUDY – BULK CARRIER TRAFFIC DENSITY

16.0 % of PTE

45.52%

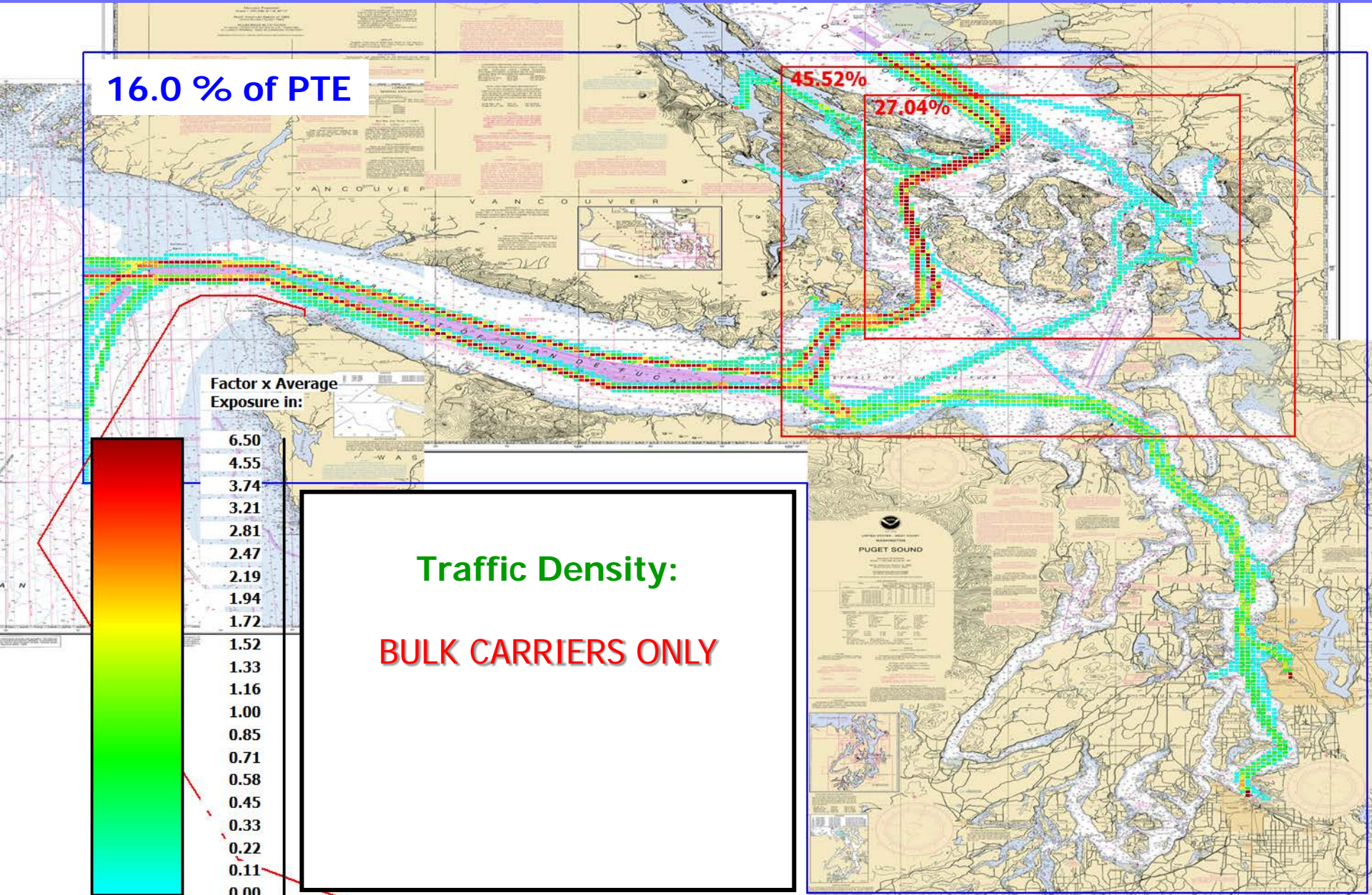
27.04%

Factor x Average
Exposure in:

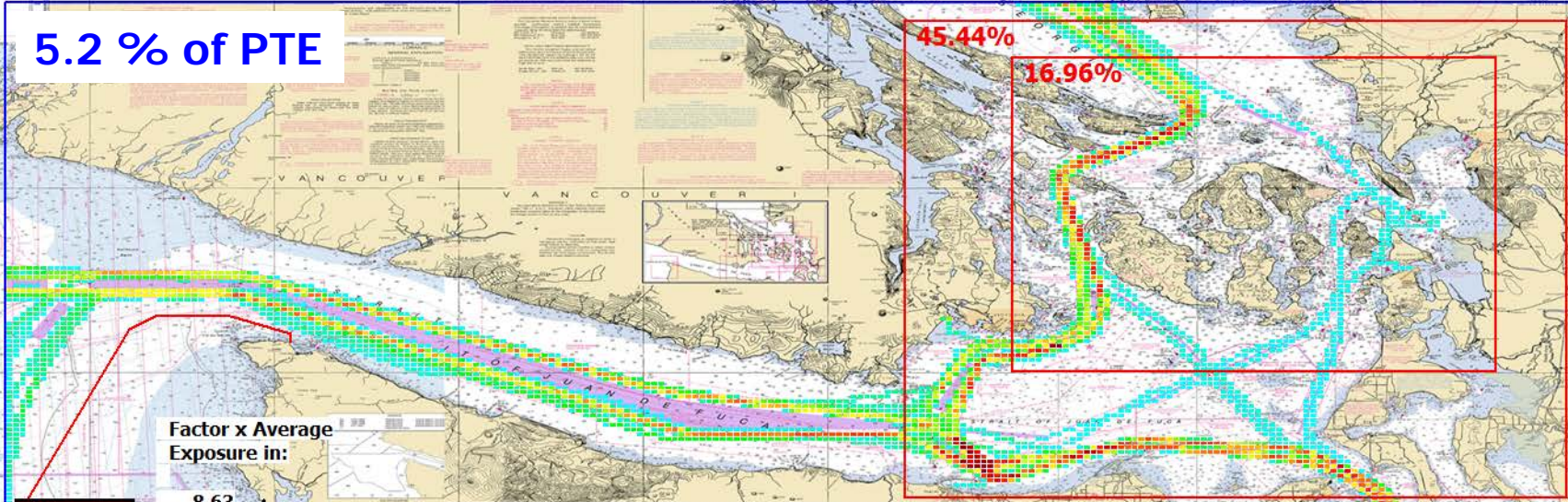
- 6.50
- 4.55
- 3.74
- 3.21
- 2.81
- 2.47
- 2.19
- 1.94
- 1.72
- 1.52
- 1.33
- 1.16
- 1.00
- 0.85
- 0.71
- 0.58
- 0.45
- 0.33
- 0.22
- 0.11
- 0.00

Traffic Density:

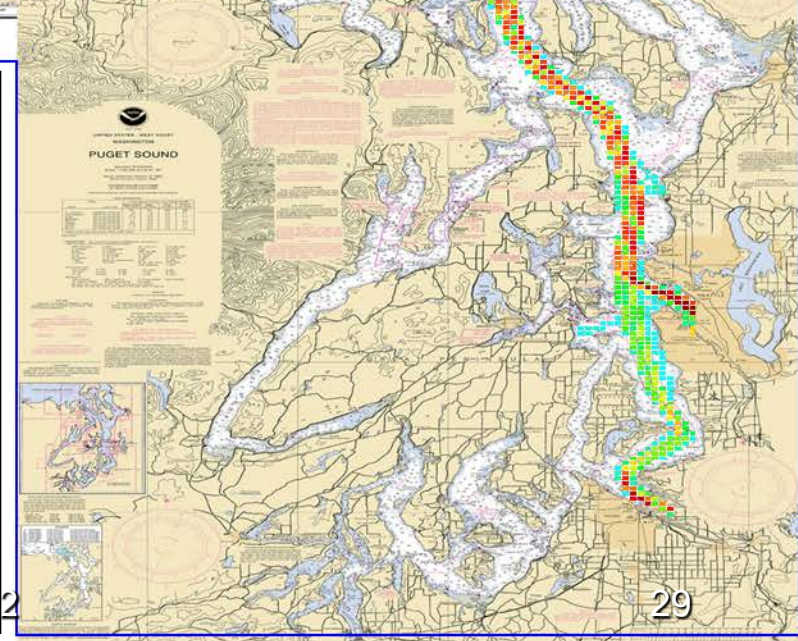
BULK CARRIERS ONLY



FORMER VTRA STUDY – CONTAINER VESSELS TRAFFIC DENSITY

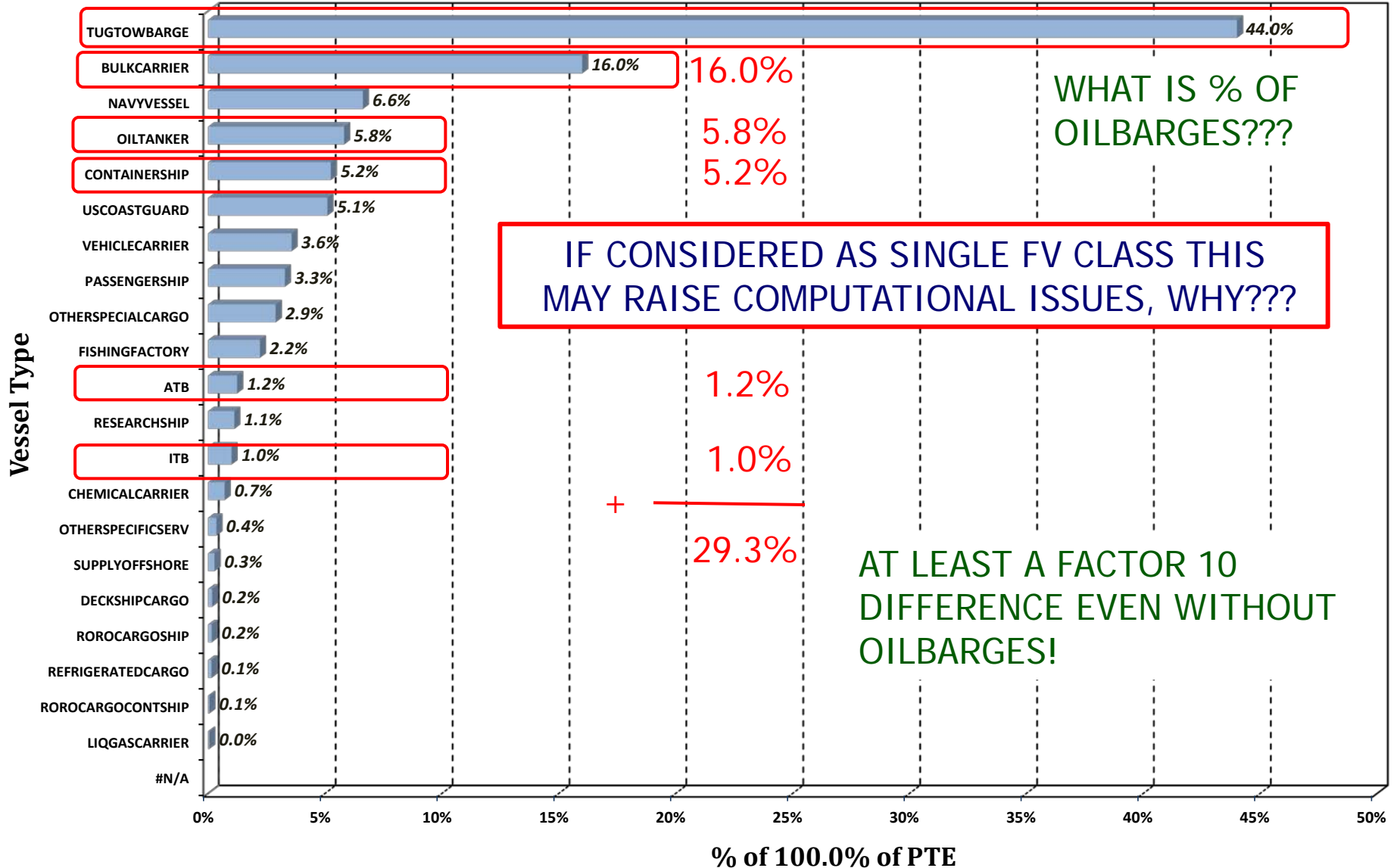


Traffic Density:
CONTAINER VESSELS ONLY



FORMER VTRA DATA – FOCUS VESSELS FOR UPDATED VTRA ???

Study Area: 100.0% of PTE - 100.0% of TA - DF 1.0



FORMER VTRA STUDY – COUNTING COLLISION INTERACTIONS

Two vessel classification for counting purposes

1: Focus Vessels (FV): CHPT OIL TANKERS, ATB, ITB

2: Interacting Vessels (IV): All other Traffic

SUPPOSE TWO VESSELS ARE INTERACTING



One FV-IV Interaction

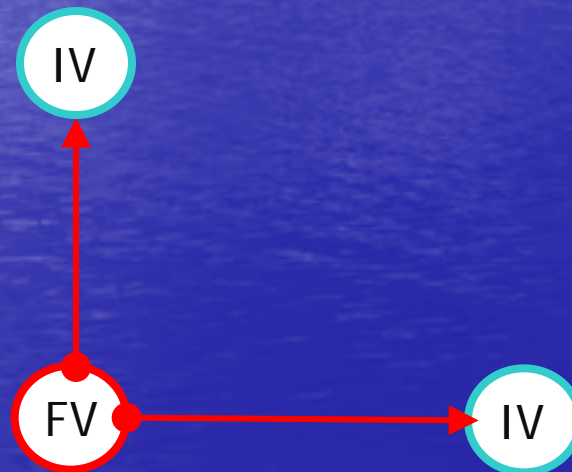
FORMER VTRA STUDY – COUNTING COLLISION INTERACTIONS

Two vessel classification for counting purposes

1: Focus Vessels (FV): CHPT OIL TANKERS, ATB, ITB

2: Interacting Vessels (IV): All other Traffic

SUPPOSE THREE VESSELS ARE INTERACTING



Two FV-IV Interactions

FORMER VTRA STUDY – COUNTING COLLISION INTERACTIONS

Two vessel classification for counting purposes

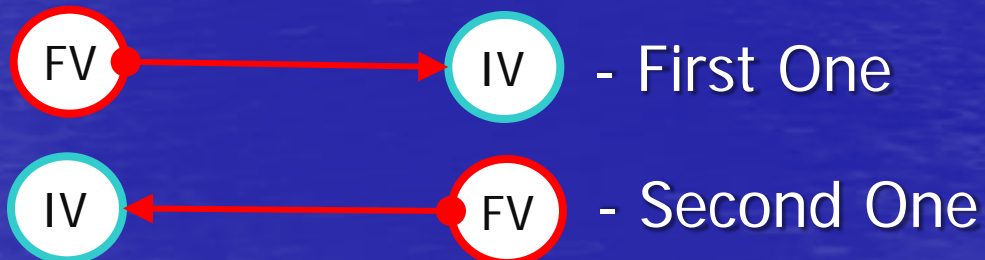
1: Focus Vessels (FV): CHPT OIL TANKERS, ATB, ITB

2: Interacting Vessels (IV): All other Traffic

SUPPOSE TWO VESSELS ARE INTERACTING



How many FV-IV Interactions?



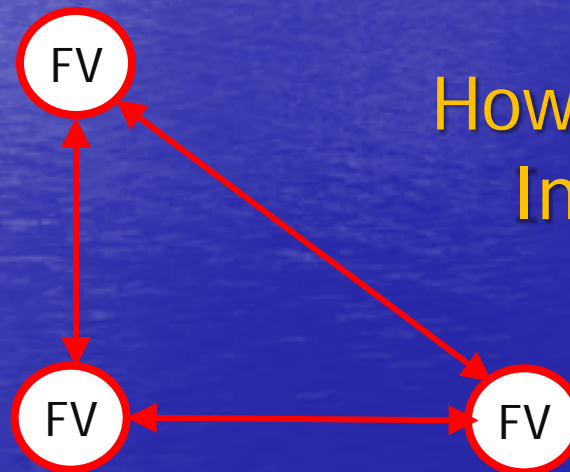
FORMER VTRA STUDY – COUNTING COLLISION INTERACTIONS

Two vessel classification for counting purposes

1: Focus Vessels (FV): CHPT OIL TANKERS, ATB, ITB

2: Interacting Vessels (IV): All other Traffic

SUPPOSE THREE VESSELS ARE INTERACTING



How many FV-IV Interactions?

Six FV-IV Interactions

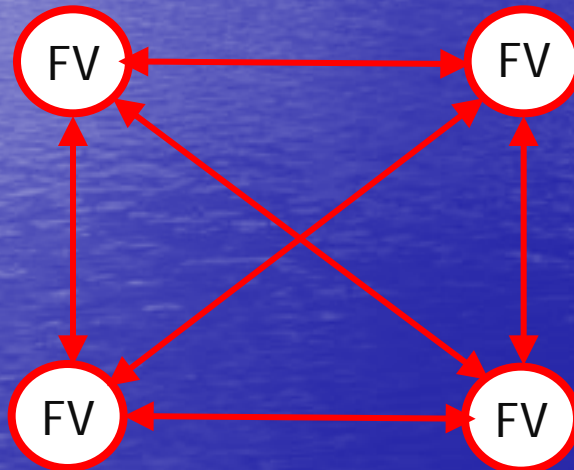
FORMER VTRA STUDY – COUNTING COLLISION INTERACTIONS

Two vessel classification for counting purposes

1: Focus Vessels (FV): CHPT OIL TANKERS, ATB, ITB

2: Interacting Vessels (IV): All other Traffic

SUPPOSE FOUR VESSELS ARE INTERACTING



How many FV-IV Interactions?

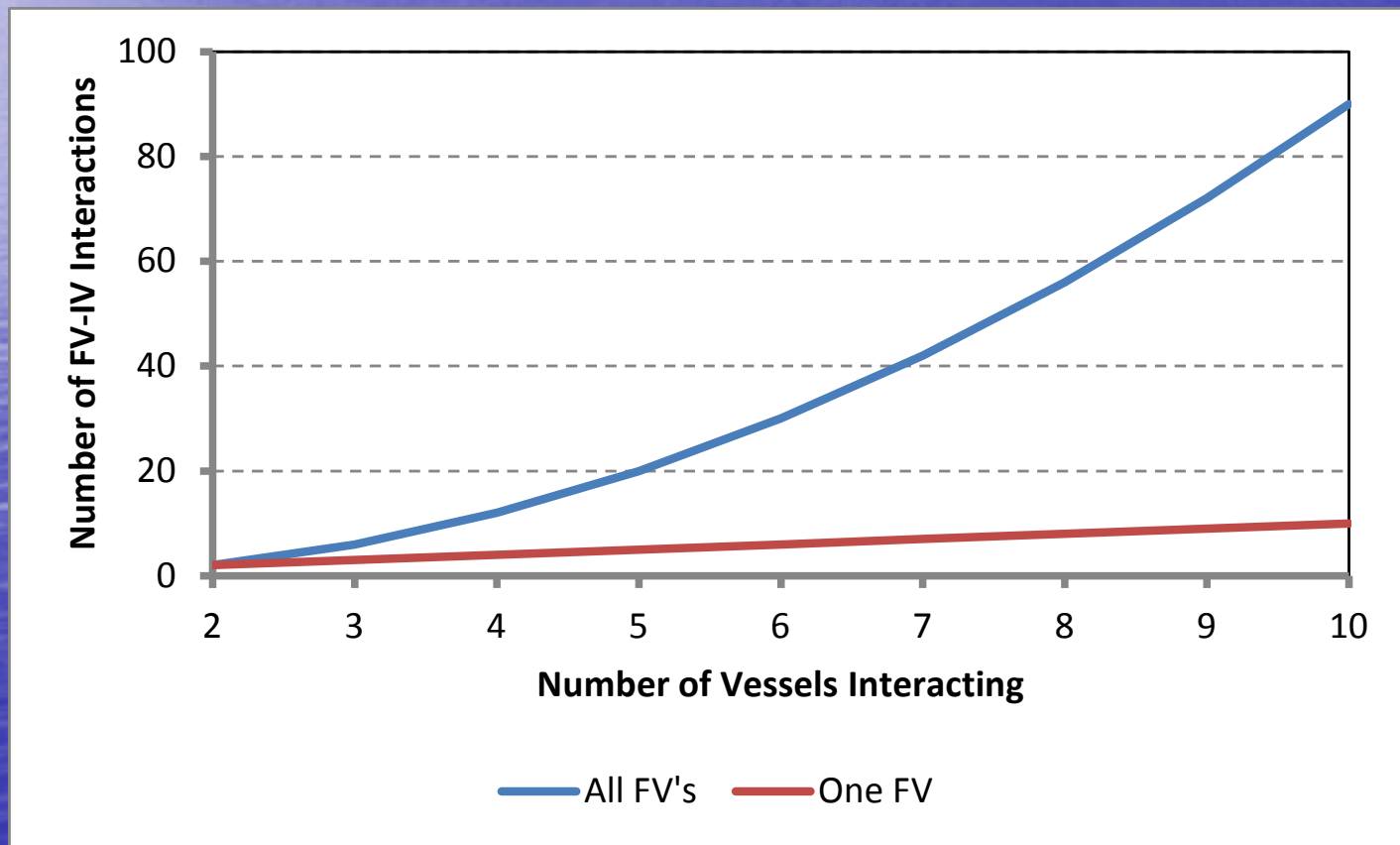
Twelve FV-IV Interactions

FORMER VTRA STUDY – COUNTING COLLISION INTERACTIONS

Two vessel classification for counting purposes

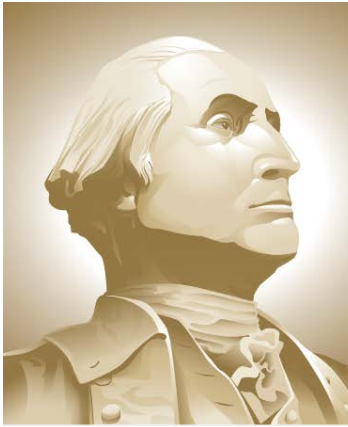
1: Focus Vessels (FV): CHPT OIL TANKERS, ATB, ITB

2: Interacting Vessels (IV): All other Traffic



UPDATING THE VTRA STUDY – REFINING TUGTOW BARGE TYPES

Presentation by: J. Rene van Dorp



THE GEORGE
WASHINGTON
UNIVERSITY

WASHINGTON, DC

VCU

GWU Personnel: Dr. J. Rene van Dorp

VCU Personnel: Dr. Jason R. W. Merrick

Puget Sound Harbor Safety Committee Presentation October 2012

FORMER VTRA STUDY – 26 DIFFERENT VESSEL TYPES

FORMER VTRA STUDY

VESSEL TYPE
TUGTOWBARGE
ATB
ITB

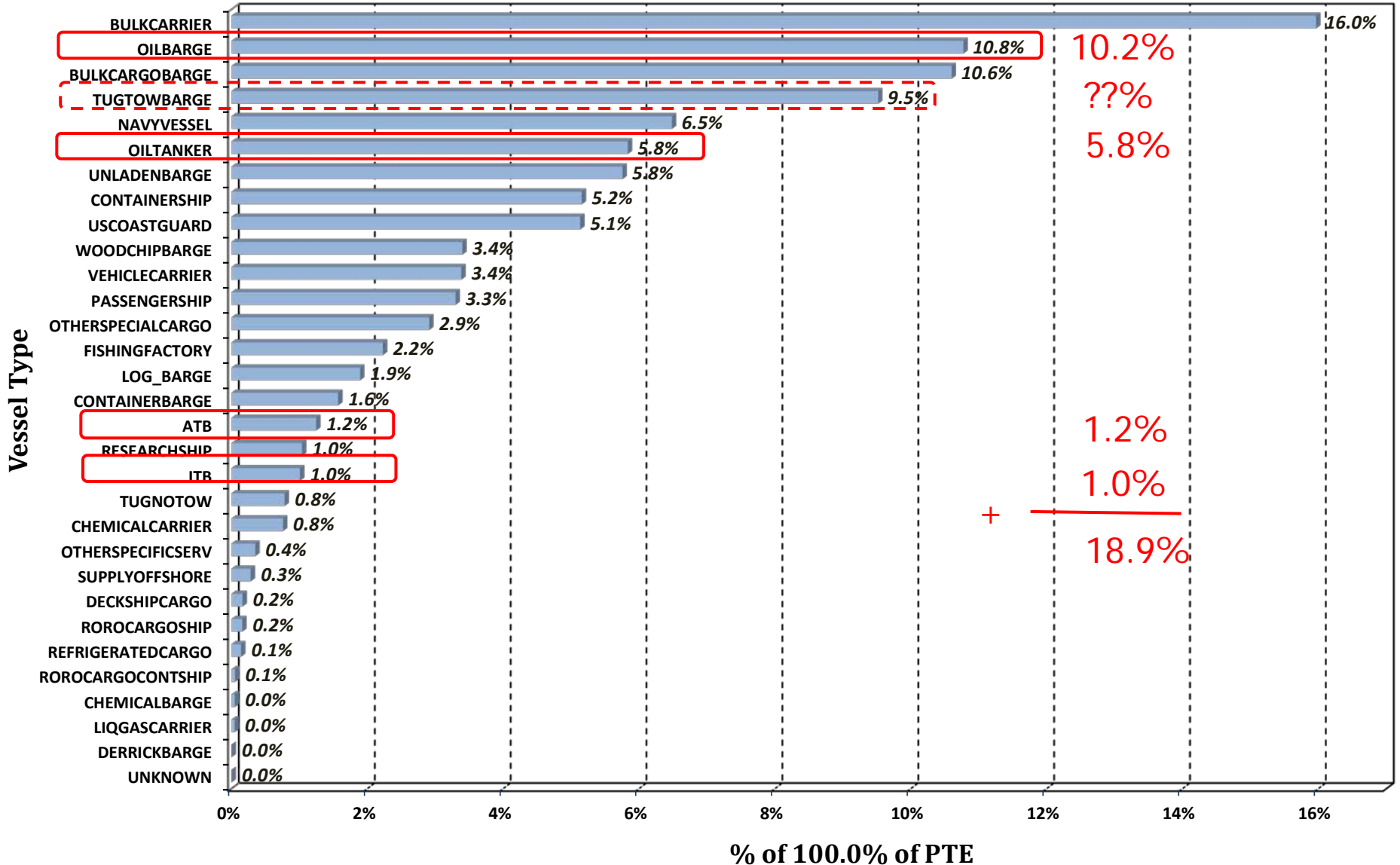
BARGE TYPE
OILBARGE
TUGNOTOW
BULKCARGOBARGE
CHEMICALBARGE
CONTAINERBARGE
DERRICKBARGE
UNLADENBARGE
LOG_BARGE
WOODCHIPBARGE

UPDATED VTRA STUDY

VESSEL TYPE
TUGTOWBARGE
ATB
ITB
OILBARGE
TUGNOTOW
BULKCARGOBARGE
CHEMICALBARGE
CONTAINERBARGE
DERRICKBARGE
UNLADENBARGE
LOG_BARGE
WOODCHIPBARGE

2005 VTOSS DATA – WITH BREAK DOWN OF TUG WITH TOW

Study Area: 100.0% of PTE - 100.0% of TA - DF 1.0



FORMER VTRA STUDY – OIL BARGE TRAFFIC DENSITY

10.8 % of PTE

33.92%

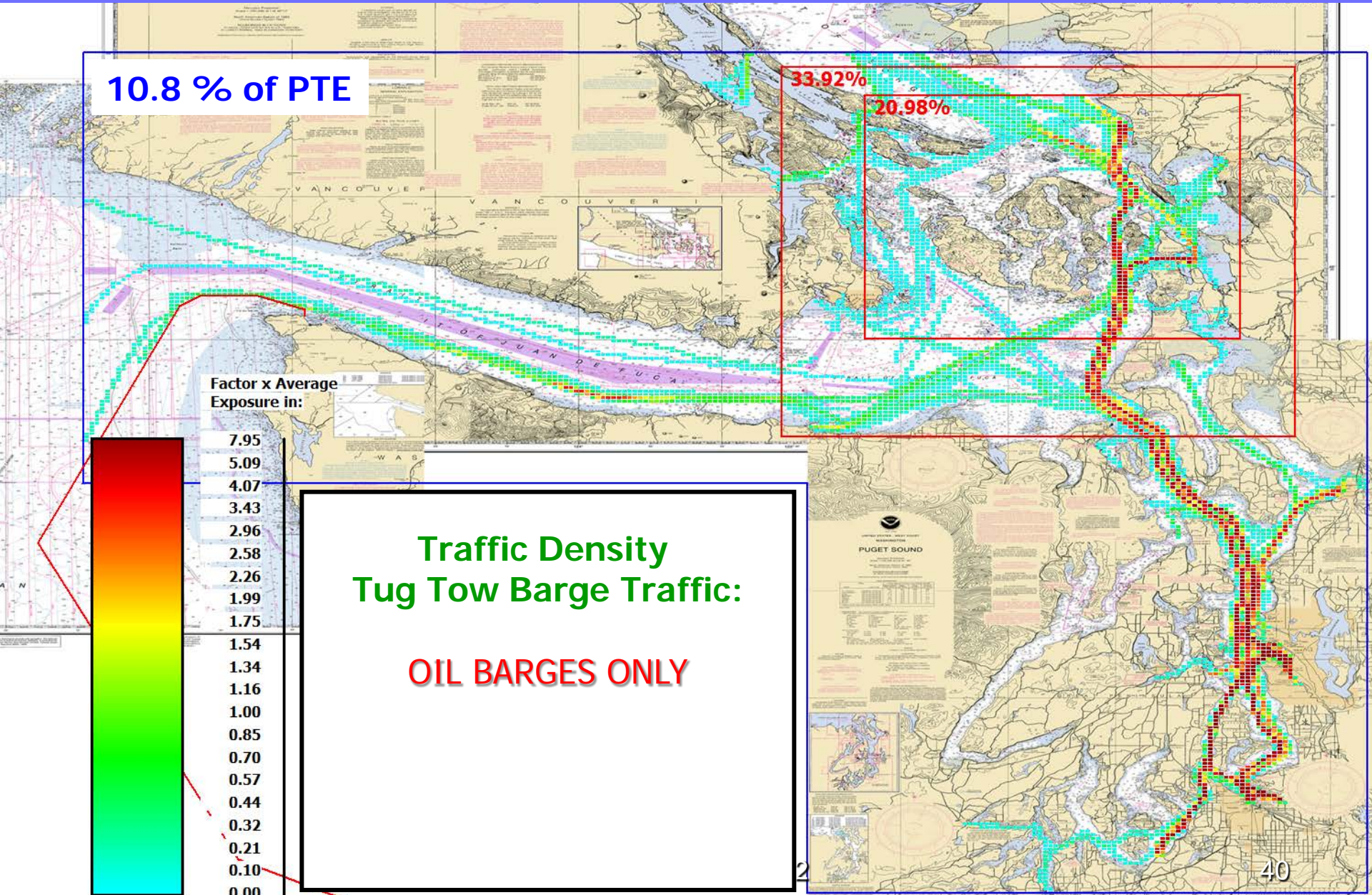
20.98%

Factor x Average Exposure in:

- 7.95
- 5.09
- 4.07
- 3.43
- 2.96
- 2.58
- 2.26
- 1.99
- 1.75
- 1.54
- 1.34
- 1.16
- 1.00
- 0.85
- 0.70
- 0.57
- 0.44
- 0.32
- 0.21
- 0.10
- 0.00

Traffic Density
Tug Tow Barge Traffic:

OIL BARGES ONLY



FORMER VTRA STUDY – BULK CARGO BARGE TRAFFIC DENSITY

10.6 % of PTE

43.28%

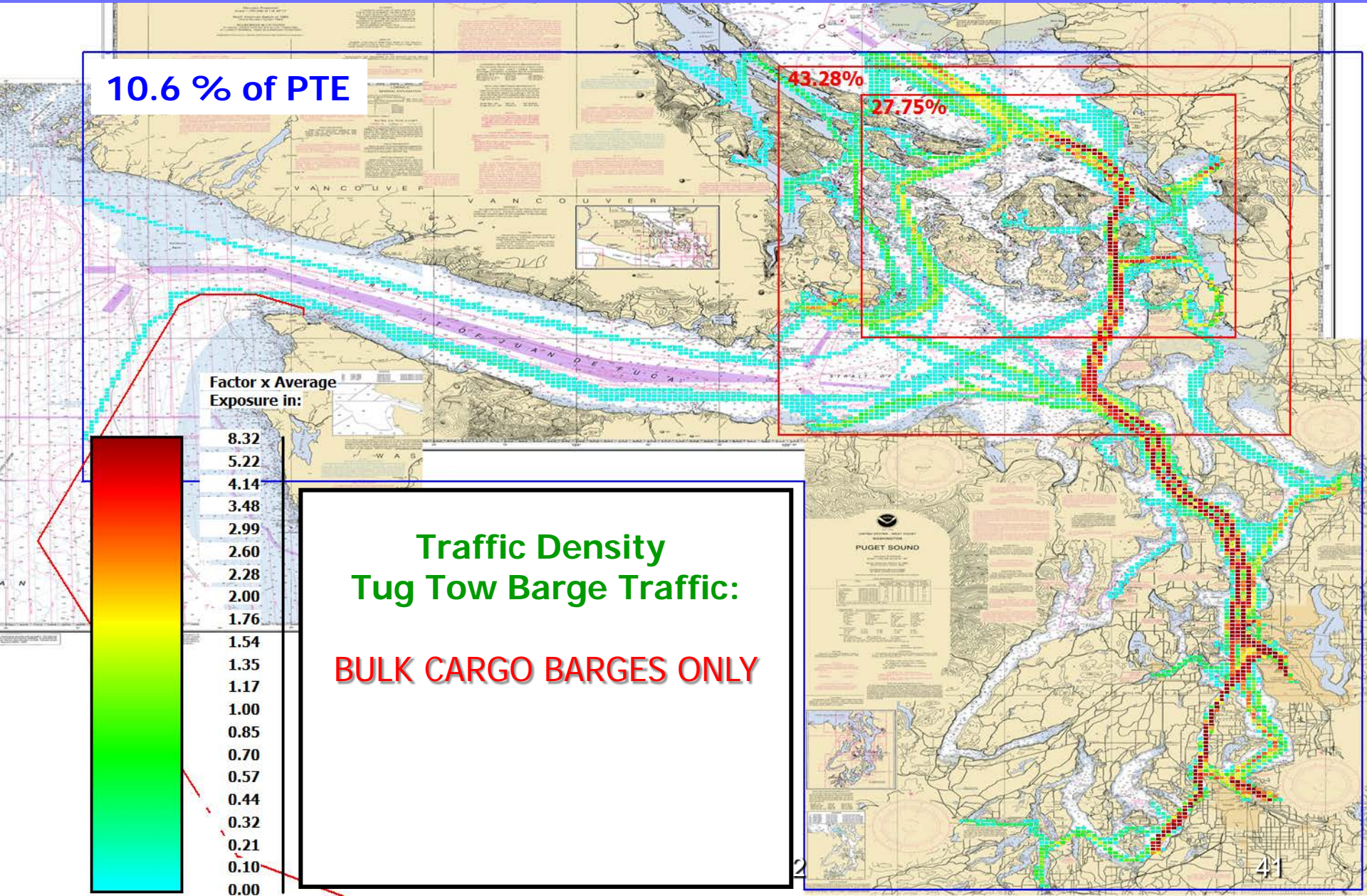
27.75%

Factor x Average Exposure in:

- 8.32
- 5.22
- 4.14
- 3.48
- 2.99
- 2.60
- 2.28
- 2.00
- 1.76
- 1.54
- 1.35
- 1.17
- 1.00
- 0.85
- 0.70
- 0.57
- 0.44
- 0.32
- 0.21
- 0.10
- 0.00

Traffic Density
Tug Tow Barge Traffic:

BULK CARGO BARGES ONLY



FORMER VTRA STUDY – UNCLASS TUGS TRAFFIC DENSITY

9.5 % of PTE

56.62%

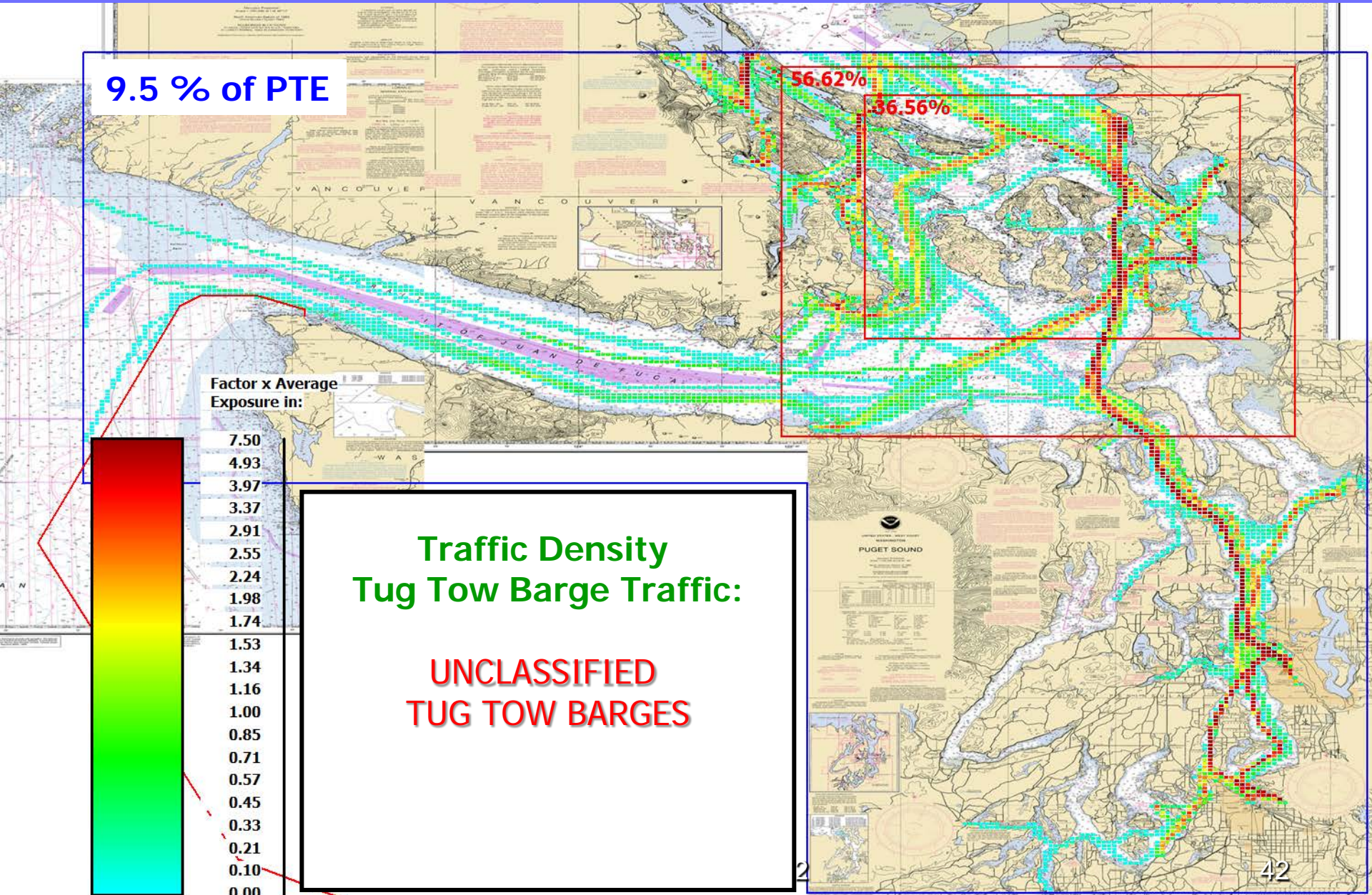
36.56%

Factor x Average Exposure in:

- 7.50
- 4.93
- 3.97
- 3.37
- 2.91
- 2.55
- 2.24
- 1.98
- 1.74
- 1.53
- 1.34
- 1.16
- 1.00
- 0.85
- 0.71
- 0.57
- 0.45
- 0.33
- 0.21
- 0.10
- 0.00

Traffic Density
Tug Tow Barge Traffic:

UNCLASSIFIED
TUG TOW BARGES



FORMER VTRA STUDY – UNLADEN BARGE TRAFFIC DENSITY

5.8 % of PTE

53.61%

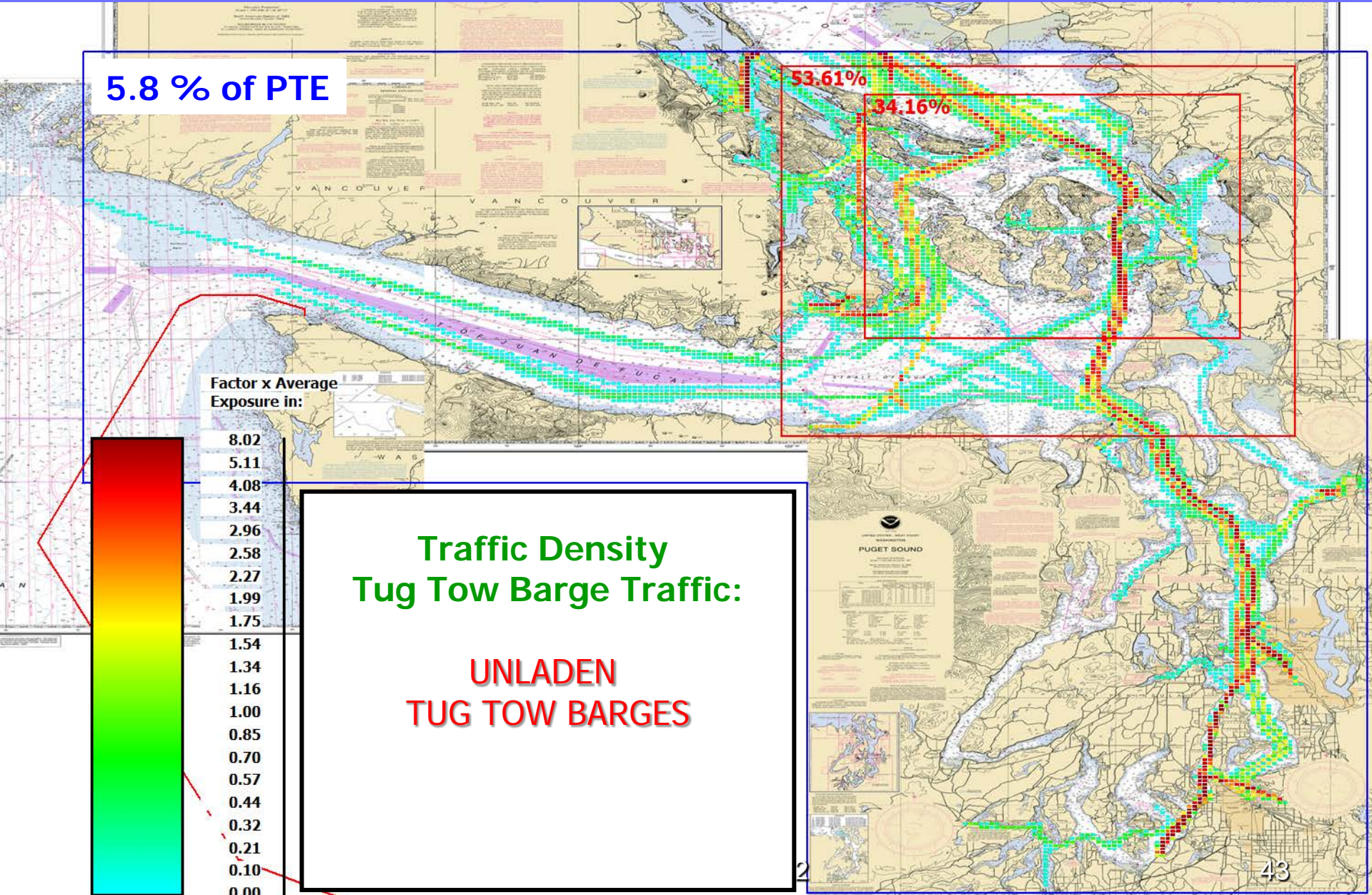
34.16%

Factor x Average
Exposure in:

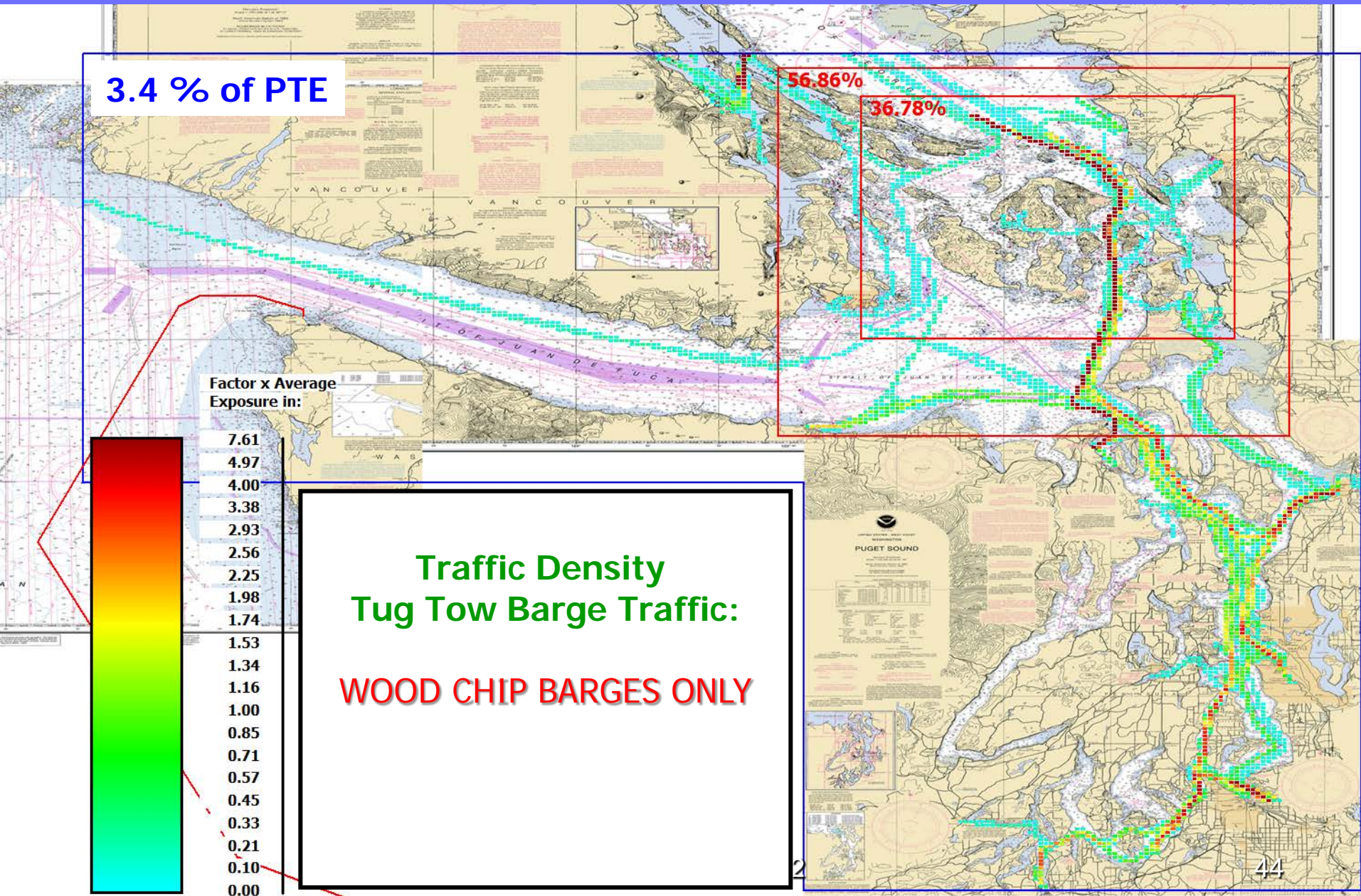
- 8.02
- 5.11
- 4.08
- 3.44
- 2.96
- 2.58
- 2.27
- 1.99
- 1.75
- 1.54
- 1.34
- 1.16
- 1.00
- 0.85
- 0.70
- 0.57
- 0.44
- 0.32
- 0.21
- 0.10
- 0.00

Traffic Density
Tug Tow Barge Traffic:

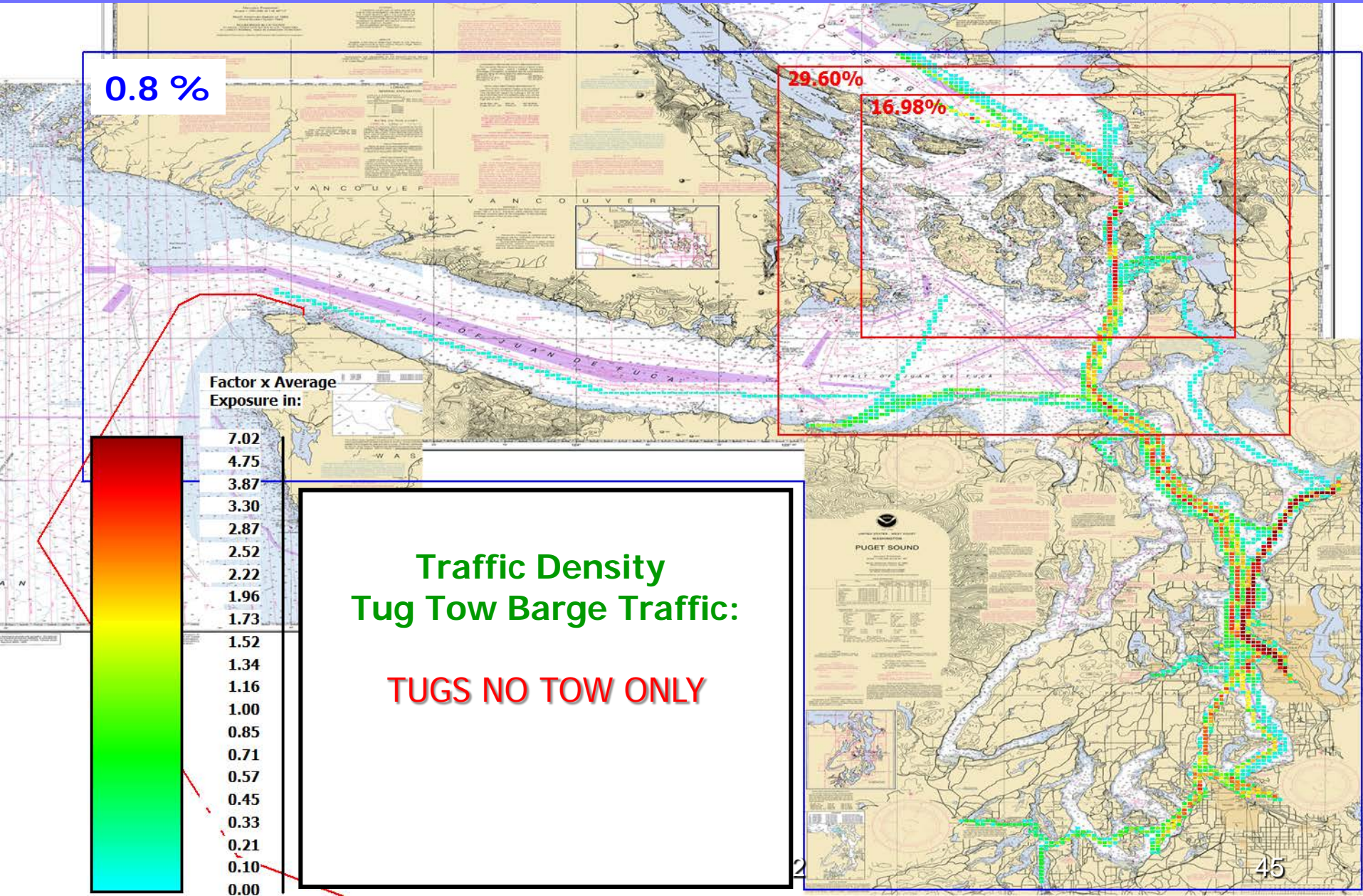
UNLADEN
TUG TOW BARGES



FORMER VTRA STUDY – WOOD CHIP BARGE TRAFFIC DENSITY

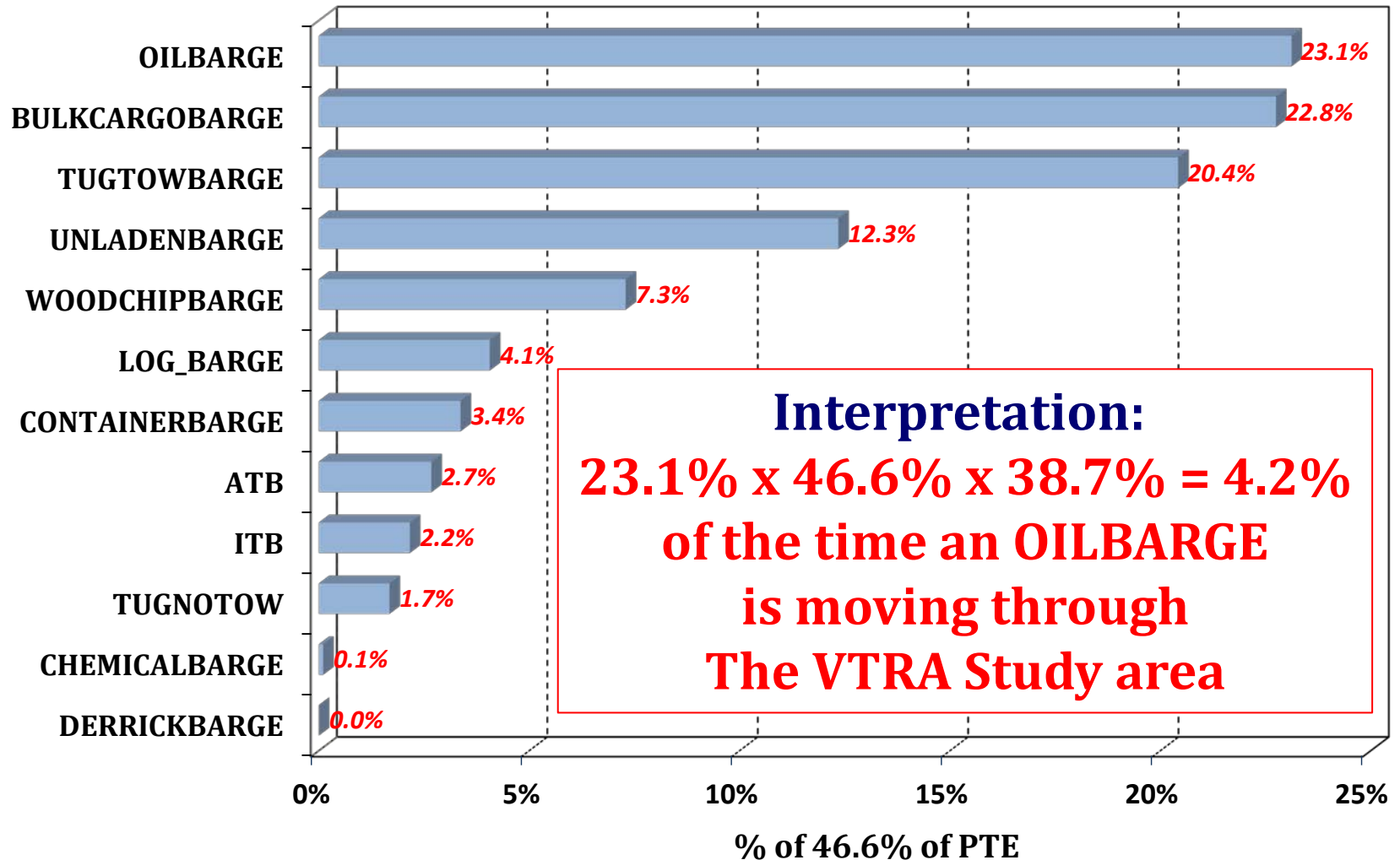


FORMER VTRA STUDY – TUGS NO TOW TRAFFIC DENSITY



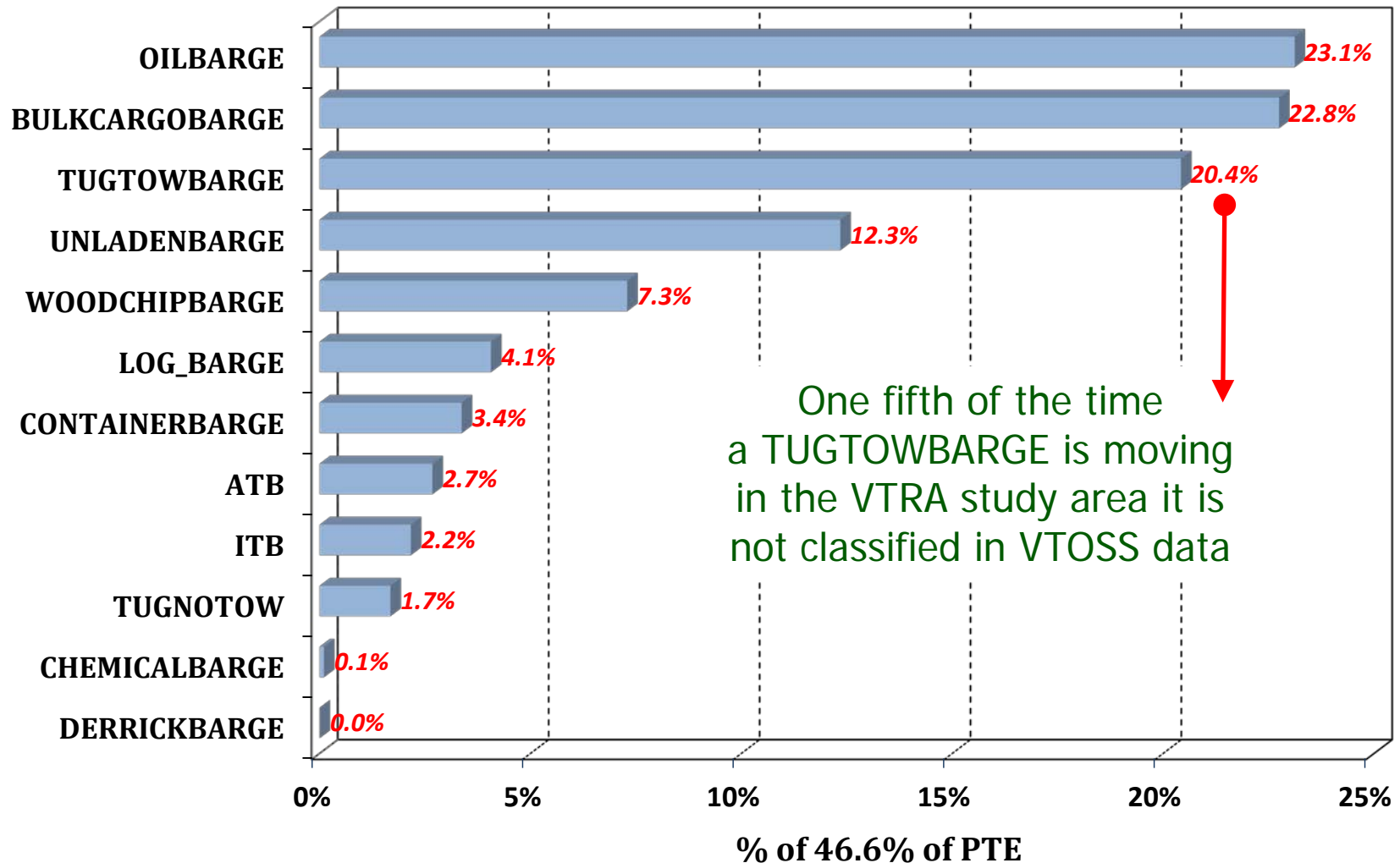
2005 VTOSS DATA – PRE = 38.7% of Total Time Exposure

Study Area: 46.6% of PTE - 100.0% of TA - DF 0.47



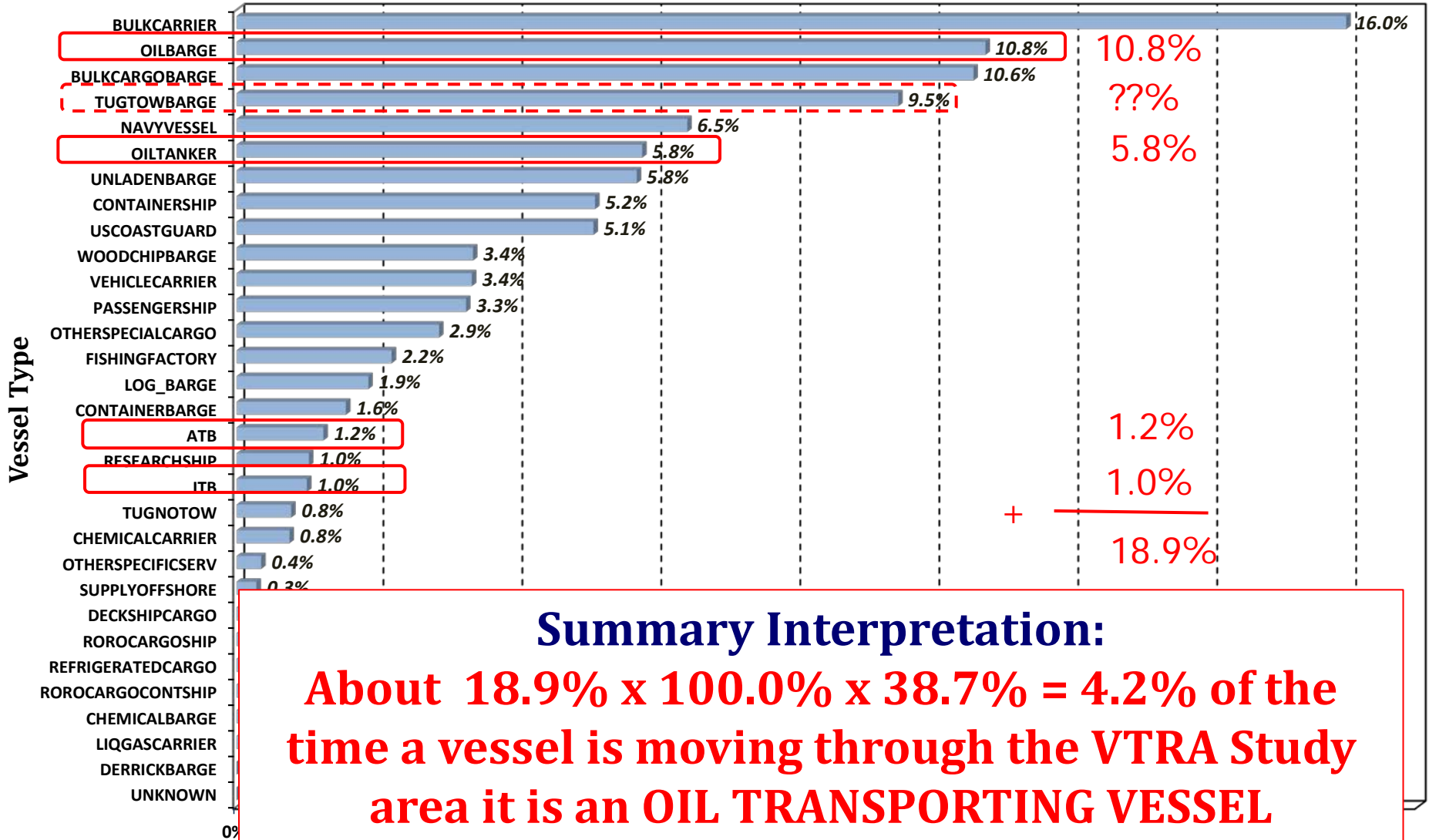
2005 VTOSS DATA – PRE = 38.7% of Total Time Exposure

Study Area: 46.6% of PTE - 100.0% of TA - DF 0.47



2005 VTOSS DATA – PTE = 38.7% of Total Time Exposure

Study Area: 100.0% of PTE - 100.0% of TA - DF 1.0

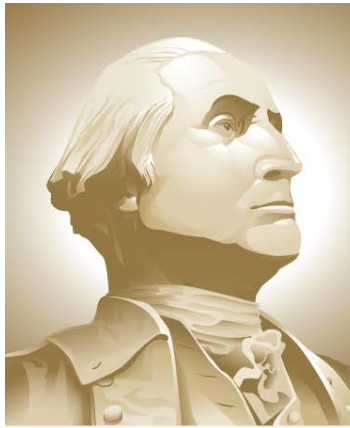


Summary Interpretation:
About 18.9% x 100.0% x 38.7% = 4.2% of the time a vessel is moving through the VTRA Study area it is an OIL TRANSPORTING VESSEL

% of 100.0% of PTE

FORMER VTRA - TRAFFIC DENSITY BY VESSEL TYPE AND LOCATION

Presentation by: J. Rene van Dorp



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GWU Personnel: Dr. J. Rene van Dorp

VCU Personnel: Dr. Jason R. W. Merrick

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FORMER VTRA STUDY – COMPLETE TRAFFIC DENSITY

100% of Total Traffic Density

57.81%

40.06%

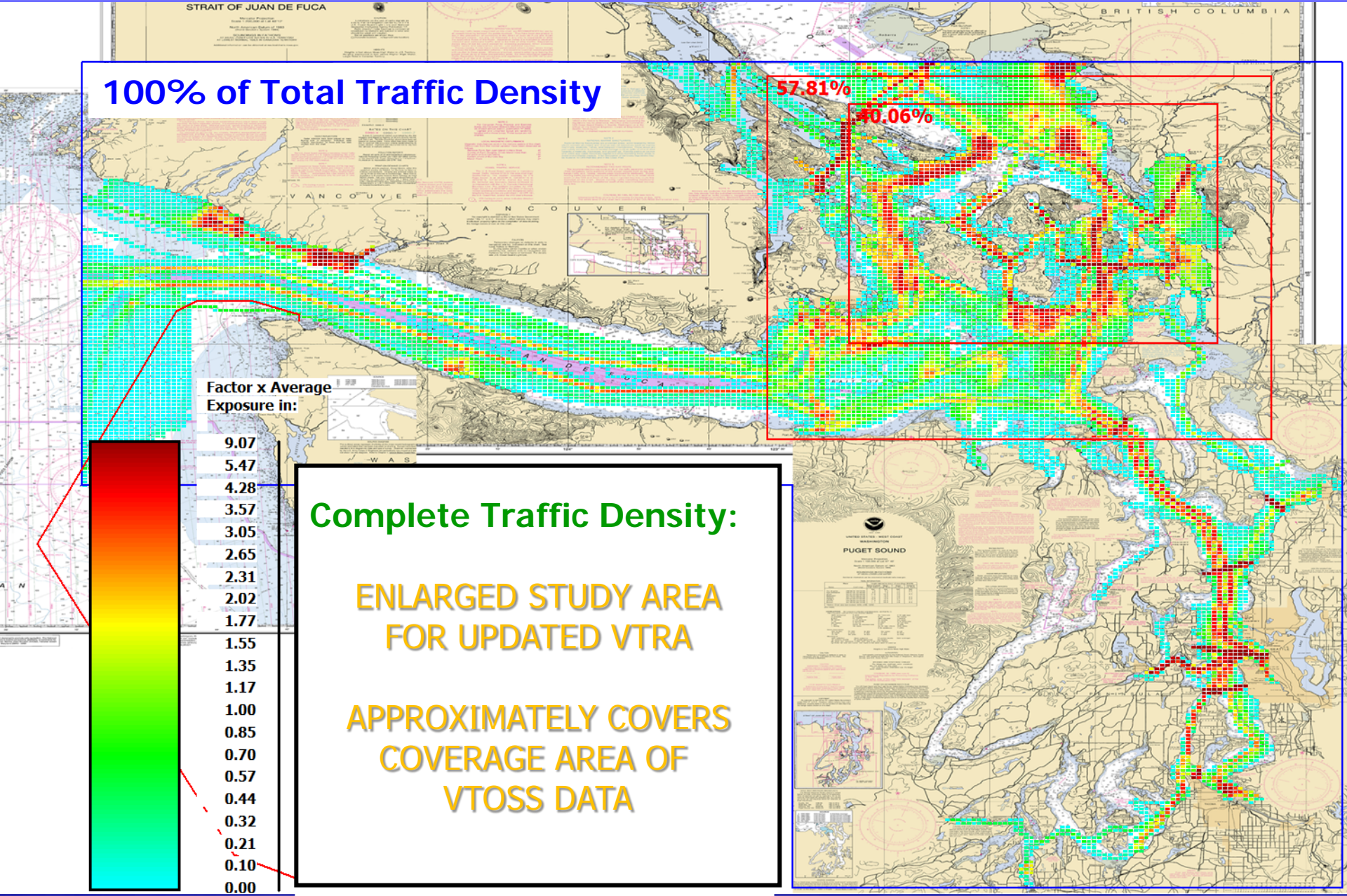
Factor x Average Exposure in:

- 9.07
- 5.47
- 4.28
- 3.57
- 3.05
- 2.65
- 2.31
- 2.02
- 1.77
- 1.55
- 1.35
- 1.17
- 1.00
- 0.85
- 0.70
- 0.57
- 0.44
- 0.32
- 0.21
- 0.10
- 0.00

Complete Traffic Density:

ENLARGED STUDY AREA
FOR UPDATED VTRA

APPROXIMATELY COVERS
COVERAGE AREA OF
VTOSS DATA



FORMER VTRA STUDY – 38.7 % OF TOTAL TRAFFIC DENSITY

38.7 % of Total Traffic

47.80%

26.19%

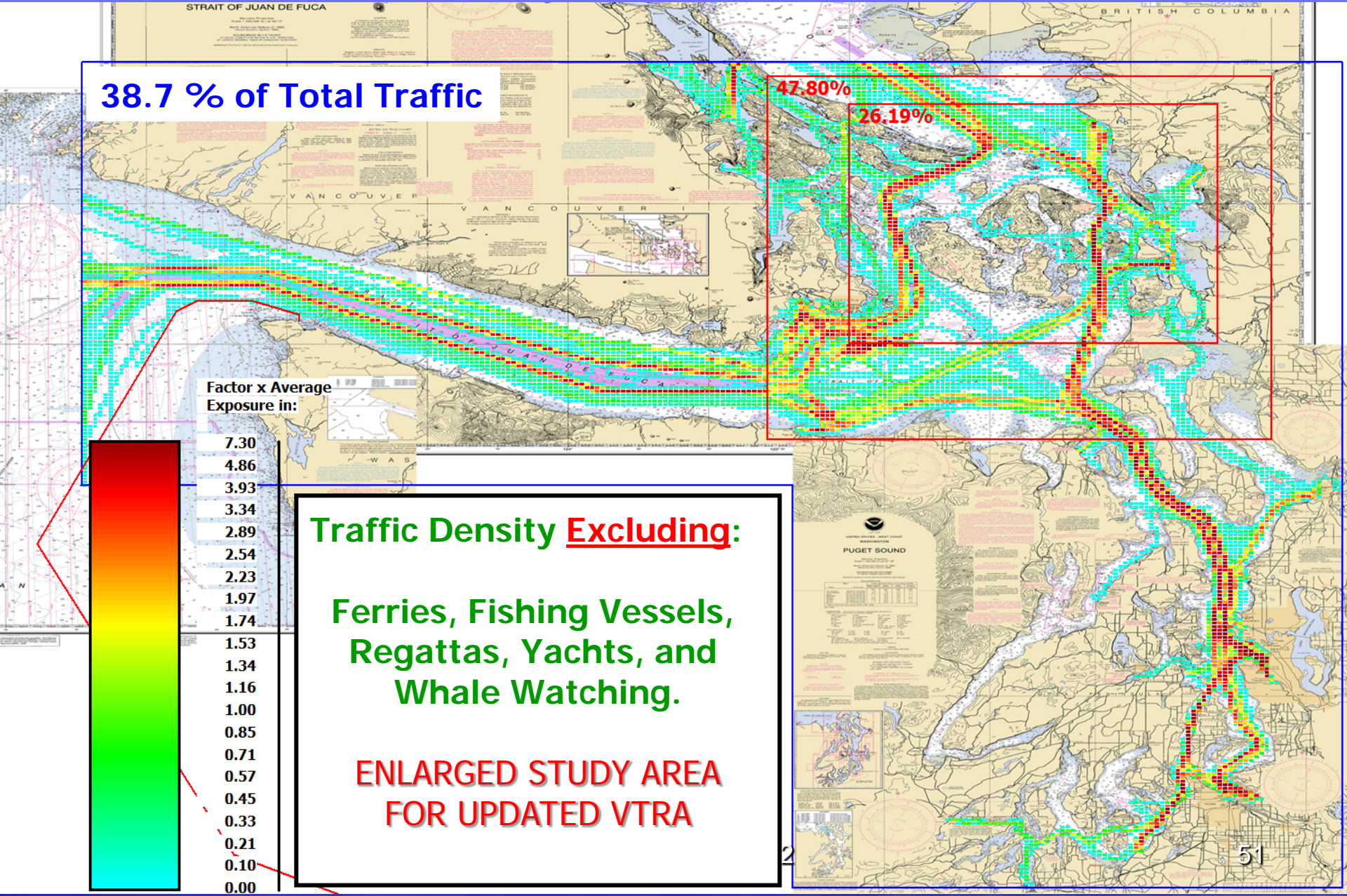
Factor x Average Exposure in:

- 7.30
- 4.86
- 3.93
- 3.34
- 2.89
- 2.54
- 2.23
- 1.97
- 1.74
- 1.53
- 1.34
- 1.16
- 1.00
- 0.85
- 0.71
- 0.57
- 0.45
- 0.33
- 0.21
- 0.10
- 0.00

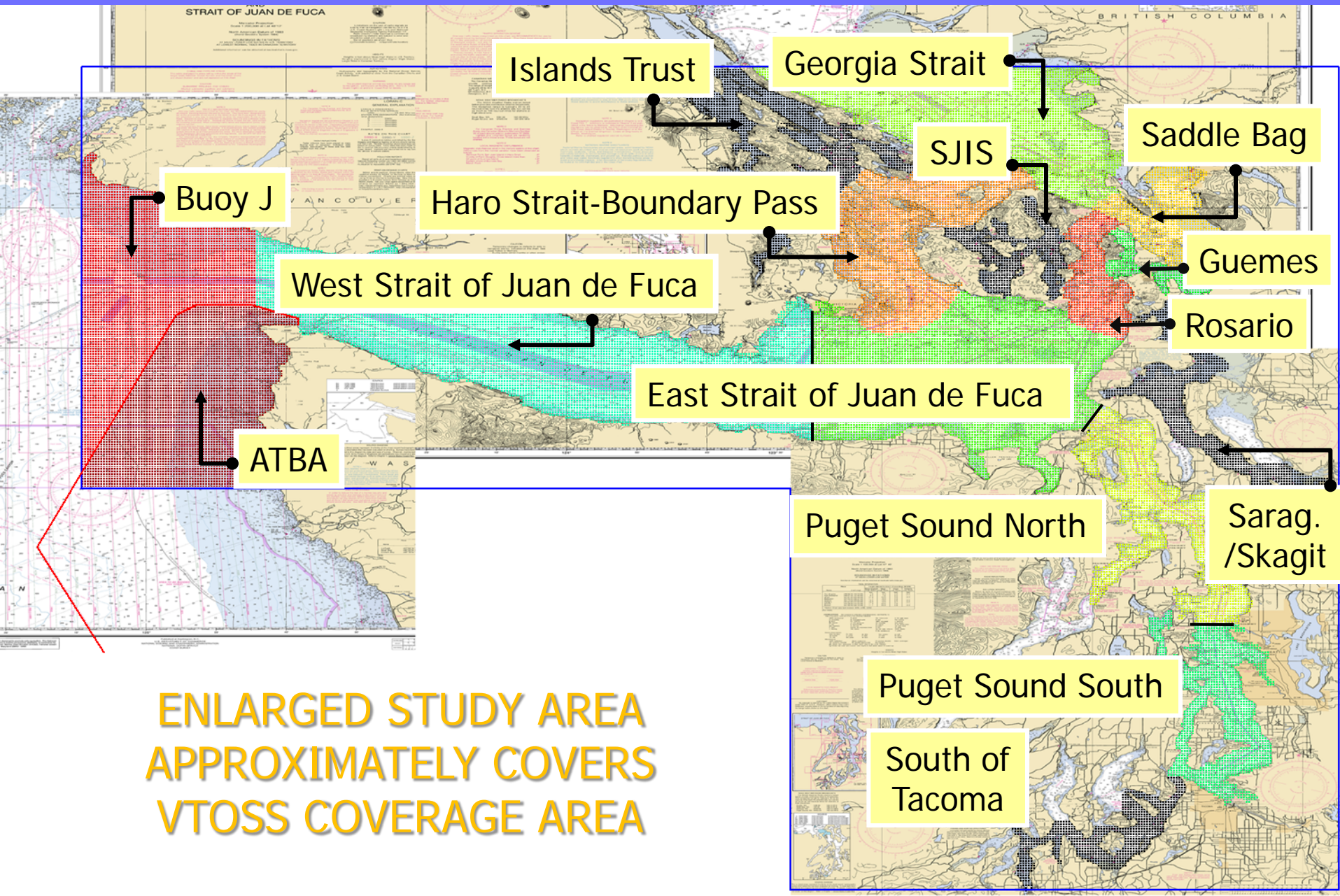
Traffic Density Excluding:

Ferries, Fishing Vessels,
Regattas, Yachts, and
Whale Watching.

ENLARGED STUDY AREA
FOR UPDATED VTRA



FOR UPDATED VTRA - 15 DEFINED LOCATIONS



ENLARGED STUDY AREA
APPROXIMATELY COVERS
VTOSS COVERAGE AREA

2005 VTOSS DATA – TRAFFIC DENSITY BY LOCATION

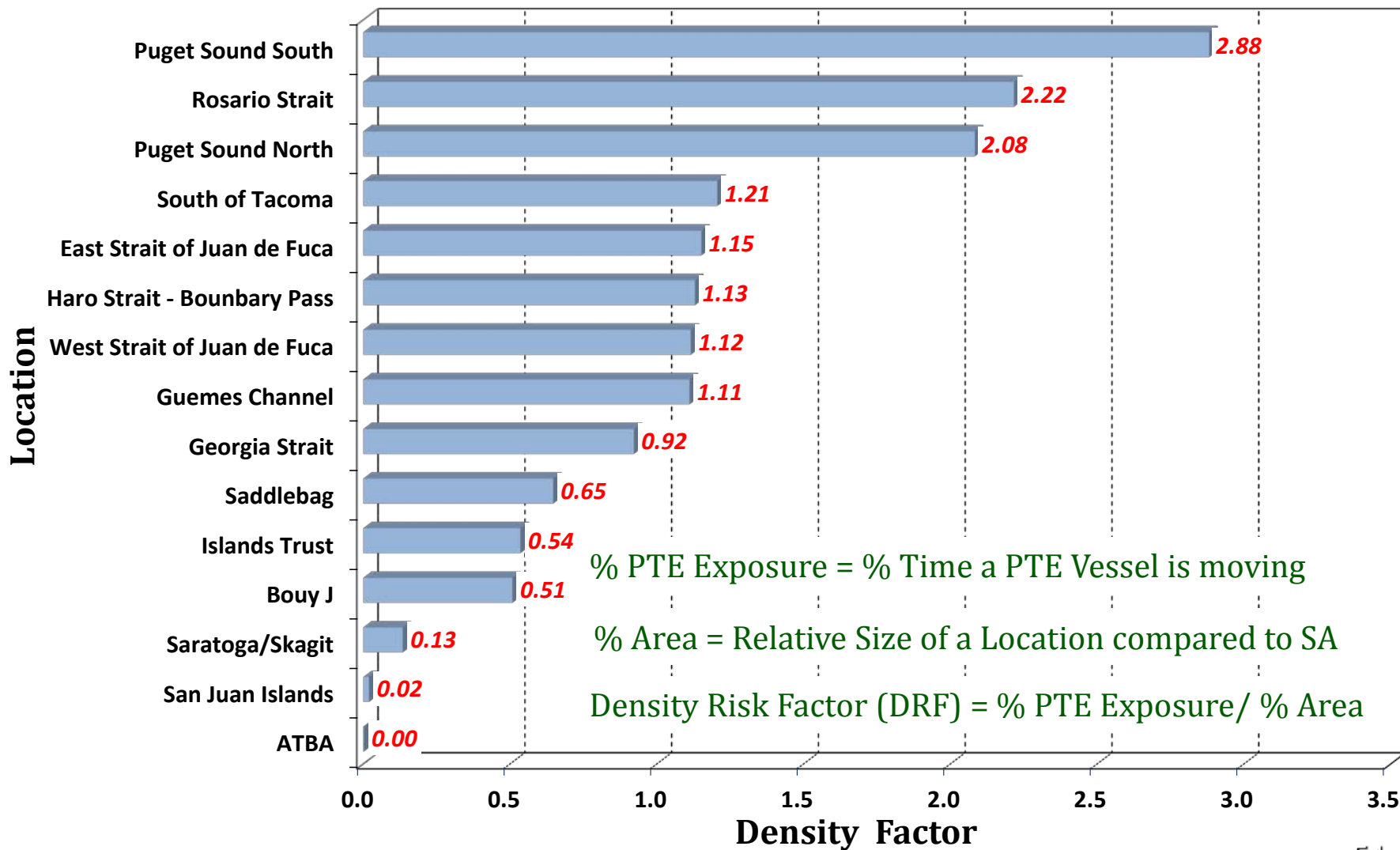
% of PTE Exposure = % of Time a PTE Vessel Travels within an Area

% Area = Relative Size of a Location compared to Study Area

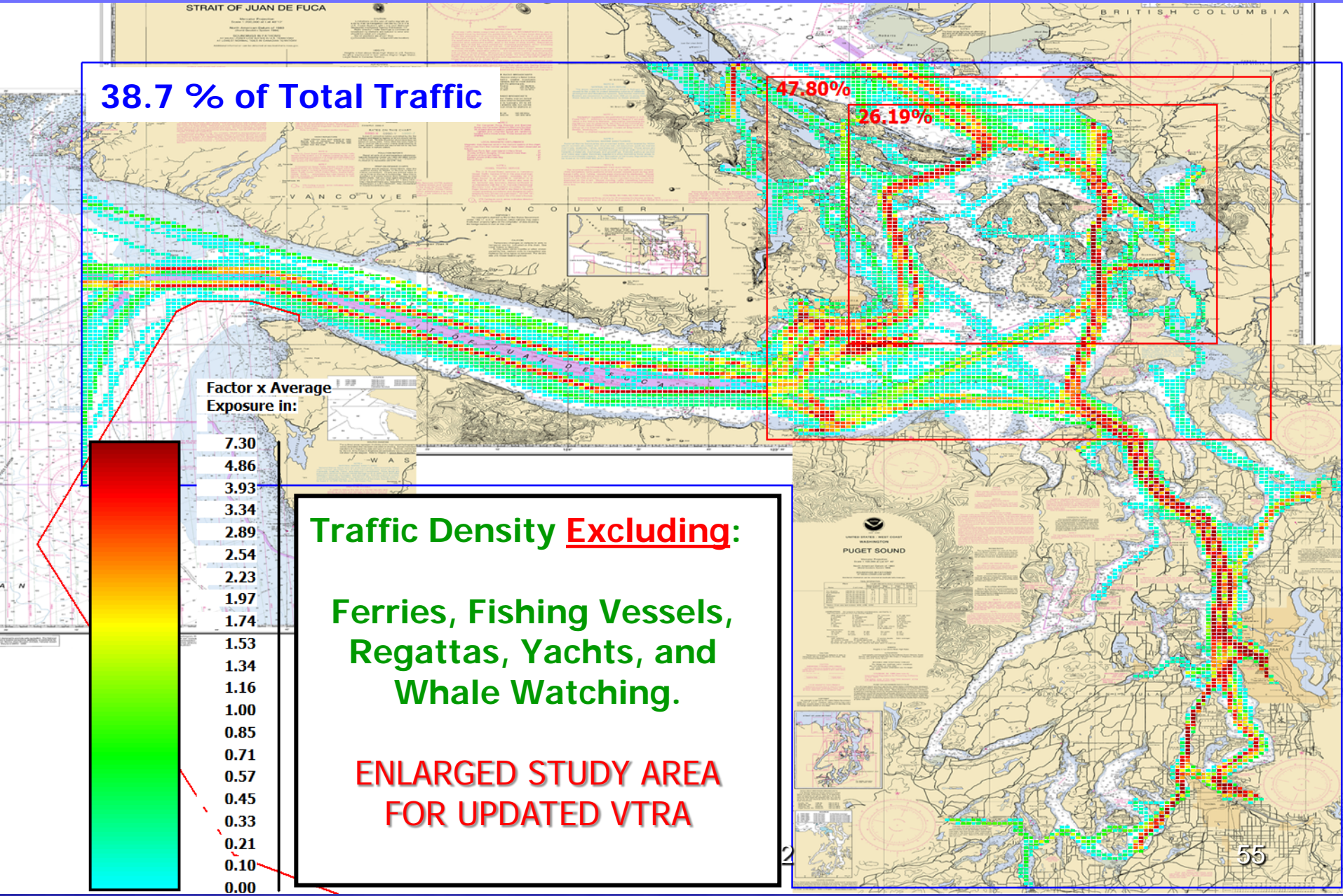
Density Risk Factor (DF) = % PTE Exposure / %Area

LOCATION ID	LOCATION	# GRID CELLS	% AREA	% PTE EXPOSURE	DENSITY FACTOR (DF)
1	West Strait of Juan de Fuca	2857	19.6%	21.9%	1.12
2	Puget Sound South	619	4.3%	12.3%	2.88
3	Guemes Channel	127	0.9%	1.0%	1.11
4	East Strait of Juan de Fuca	2049	14.1%	16.2%	1.15
5	Georgia Strait	1424	9.8%	9.0%	0.92
6	Puget Sound North	983	6.8%	14.1%	2.08
7	Saddlebag	375	2.6%	1.7%	0.65
8	Haro Strait - Bounbary Pass	1066	7.3%	8.3%	1.13
9	Rosario Strait	307	2.1%	4.7%	2.22
10	Bouy J	1478	10.2%	5.2%	0.51
11	ATBA	1520	10.5%	0.0%	0.00
12	South of Tacoma	326	2.2%	2.7%	1.21
13	San Juan Islands	259	1.8%	0.0%	0.02
14	Saratoga/Skagit	459	3.2%	0.4%	0.13
15	Islands Trust	696	4.8%	2.6%	0.54
	Total	14545	100.0%	100.0%	1.0

2005 VTOSS DATA – TRAFFIC DENSITY BY LOCATION

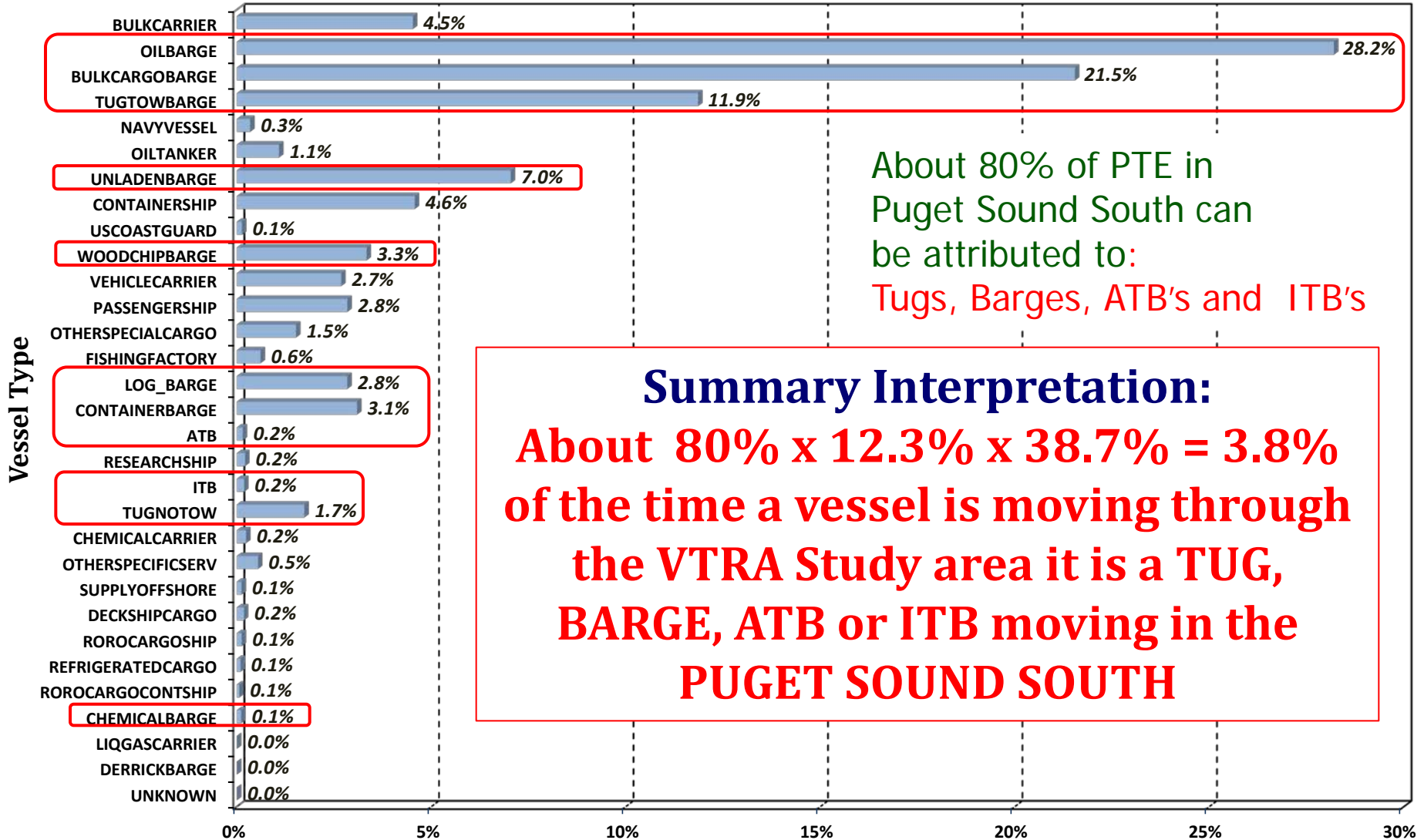


FORMER VTRA STUDY – 38.7 % OF TOTAL TRAFFIC DENSITY



FORMER VTRA STUDY – PTE = 38.7 % OF TOTAL TIME EXPOS.

Puget Sound South: 12.3% of PTE - 4.3% of TA - DF 2.88



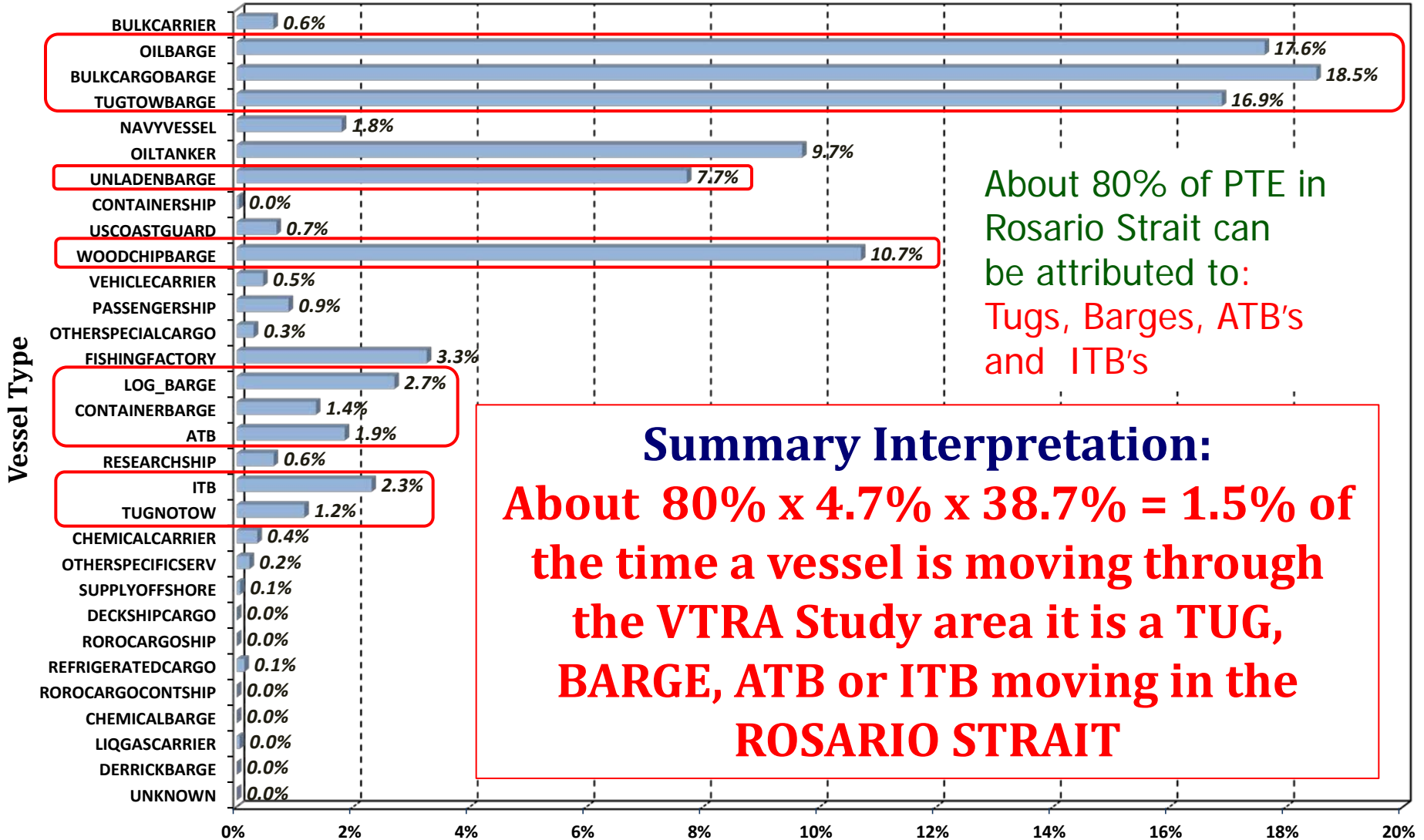
About 80% of PTE in Puget Sound South can be attributed to:
Tugs, Barges, ATB's and ITB's

Summary Interpretation:
About 80% x 12.3% x 38.7% = 3.8% of the time a vessel is moving through the VTRA Study area it is a TUG, BARGE, ATB or ITB moving in the PUGET SOUND SOUTH

% of 12.3% of PTE

FORMER VTRA STUDY – PTE = 38.7 % OF TOTAL TIME EXPOS.

Rosario Strait: 4.7% of PTE - 2.1% of TA - DF 2.22



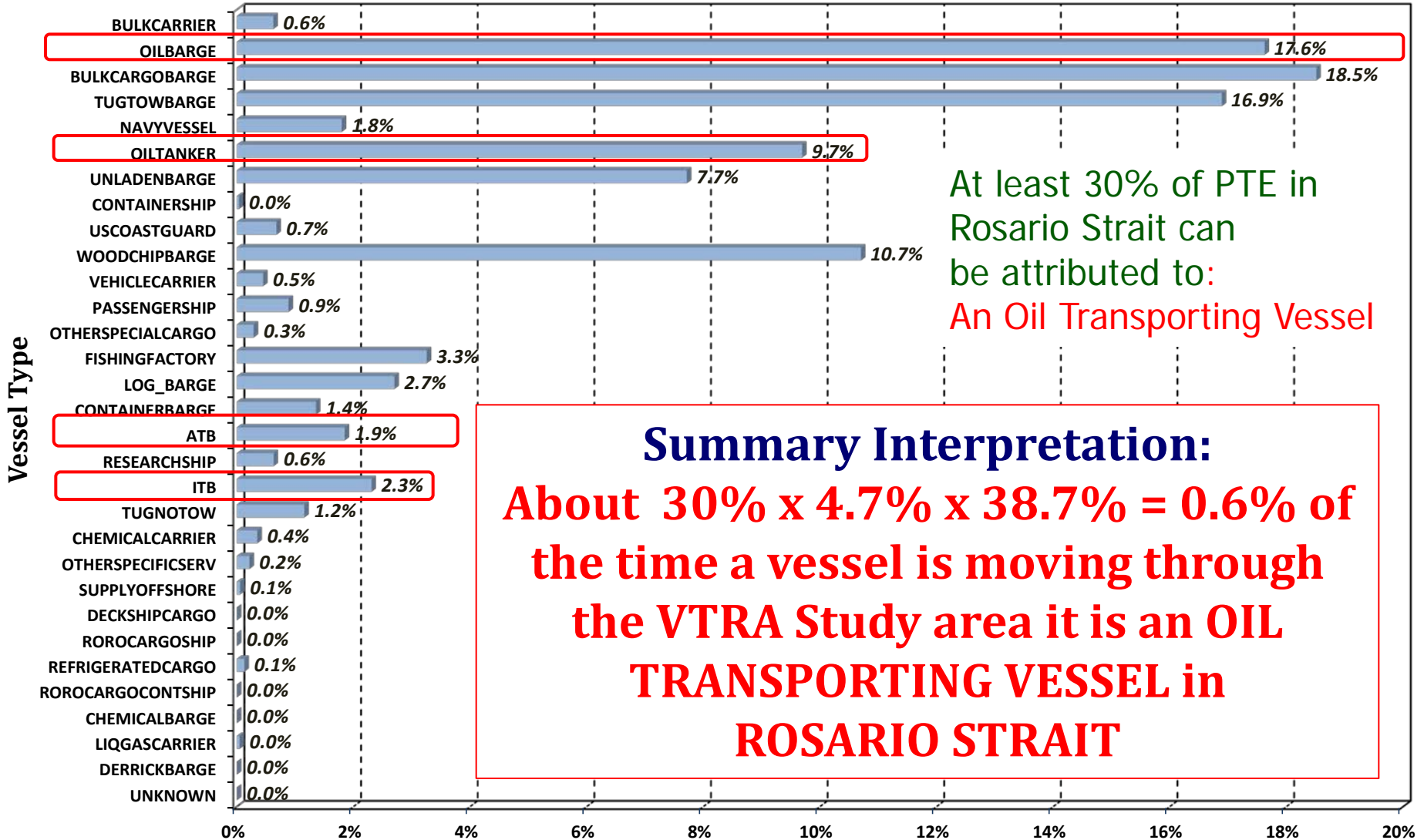
About 80% of PTE in Rosario Strait can be attributed to:
Tugs, Barges, ATB's and ITB's

Summary Interpretation:
About 80% x 4.7% x 38.7% = 1.5% of the time a vessel is moving through the VTRA Study area it is a TUG, BARGE, ATB or ITB moving in the ROSARIO STRAIT

% of 4.7% of PTE

FORMER VTRA STUDY – PTE = 38.7 % OF TOTAL TIME EXPOS.

Rosario Strait: 4.7% of PTE - 2.1% of TA - DF 2.22



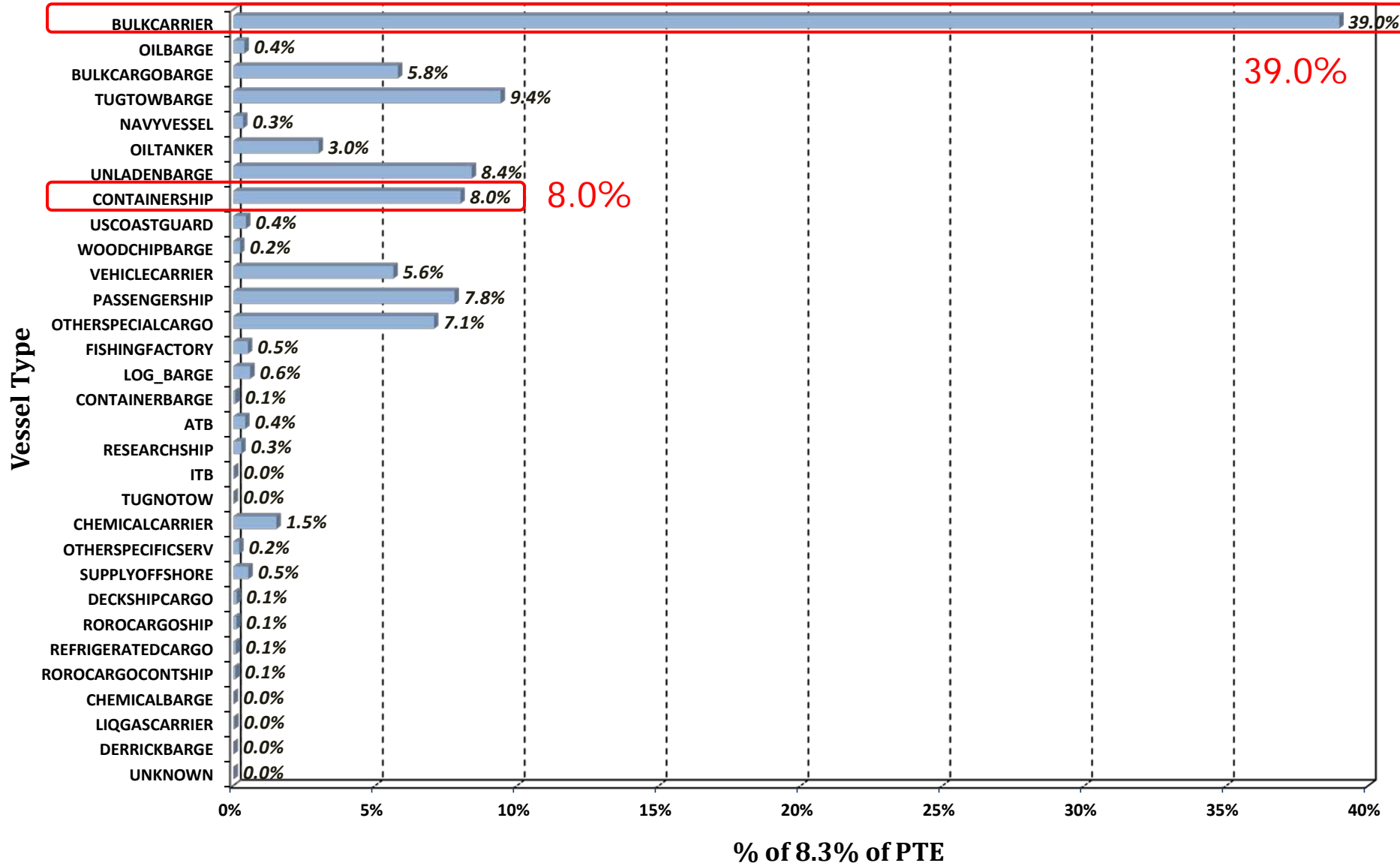
At least 30% of PTE in Rosario Strait can be attributed to:
An Oil Transporting Vessel

Summary Interpretation:
About $30\% \times 4.7\% \times 38.7\% = 0.6\%$ of the time a vessel is moving through the VTRA Study area it is an **OIL TRANSPORTING VESSEL** in **ROSARIO STRAIT**

% of 4.7% of PTE

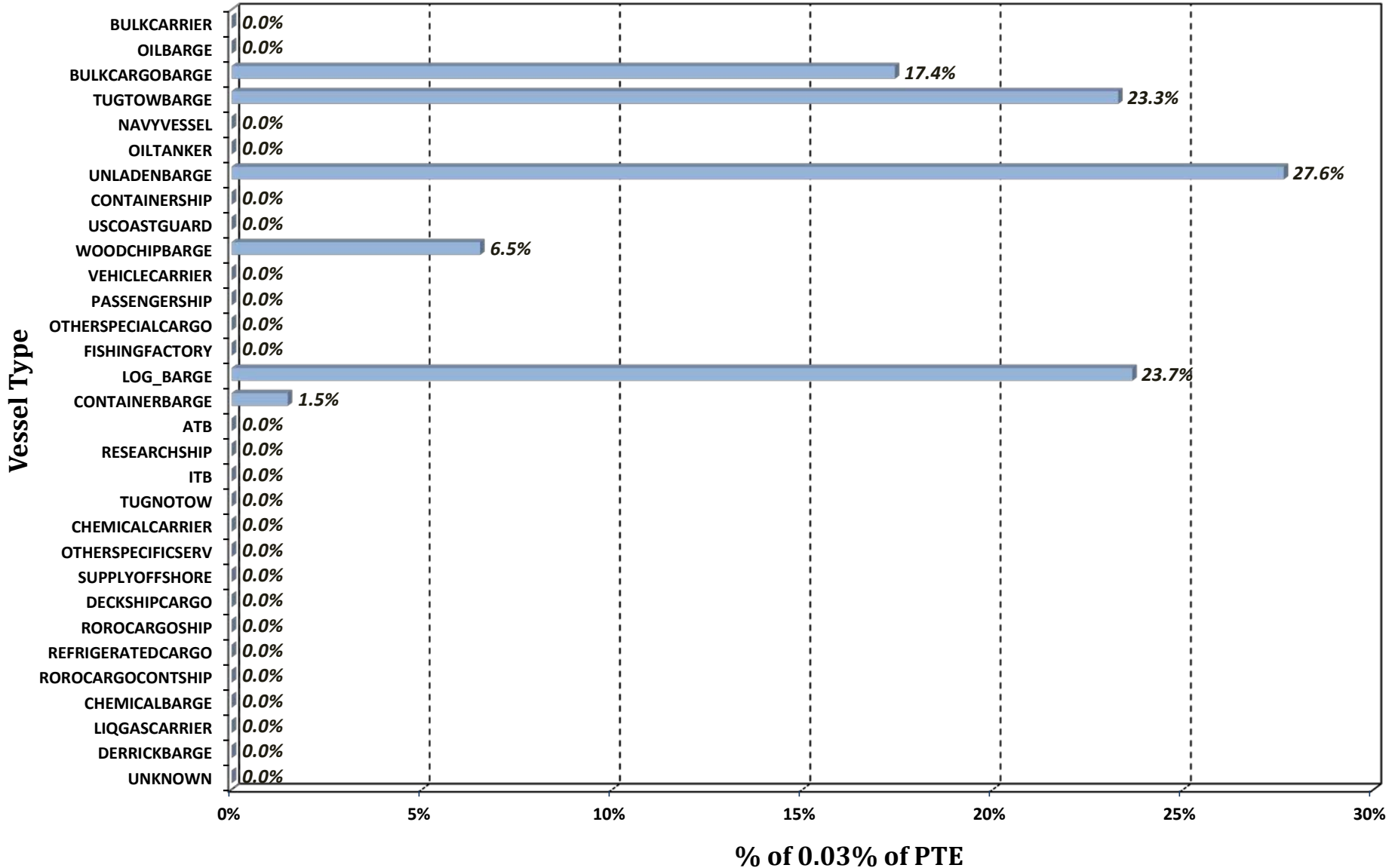
FORMER VTRA STUDY – PTE = 38.7 % OF TOTAL TIME EXPOS.

Haro Strait - Bounbary Pass: 8.3% of PTE - 7.3% of TA - DF 1.13



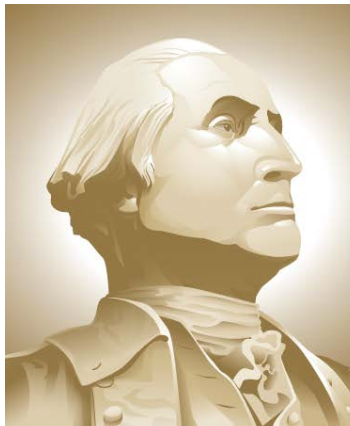
FORMER VTRA STUDY – PTE = 38.7 % OF TOTAL TIME EXPOS.

San Juan Islands: 0.03% of PTE - 1.8% of TA - DF 0.02



FORMER VTRA STUDY – FUTURE GATEWAY TRAFFIC

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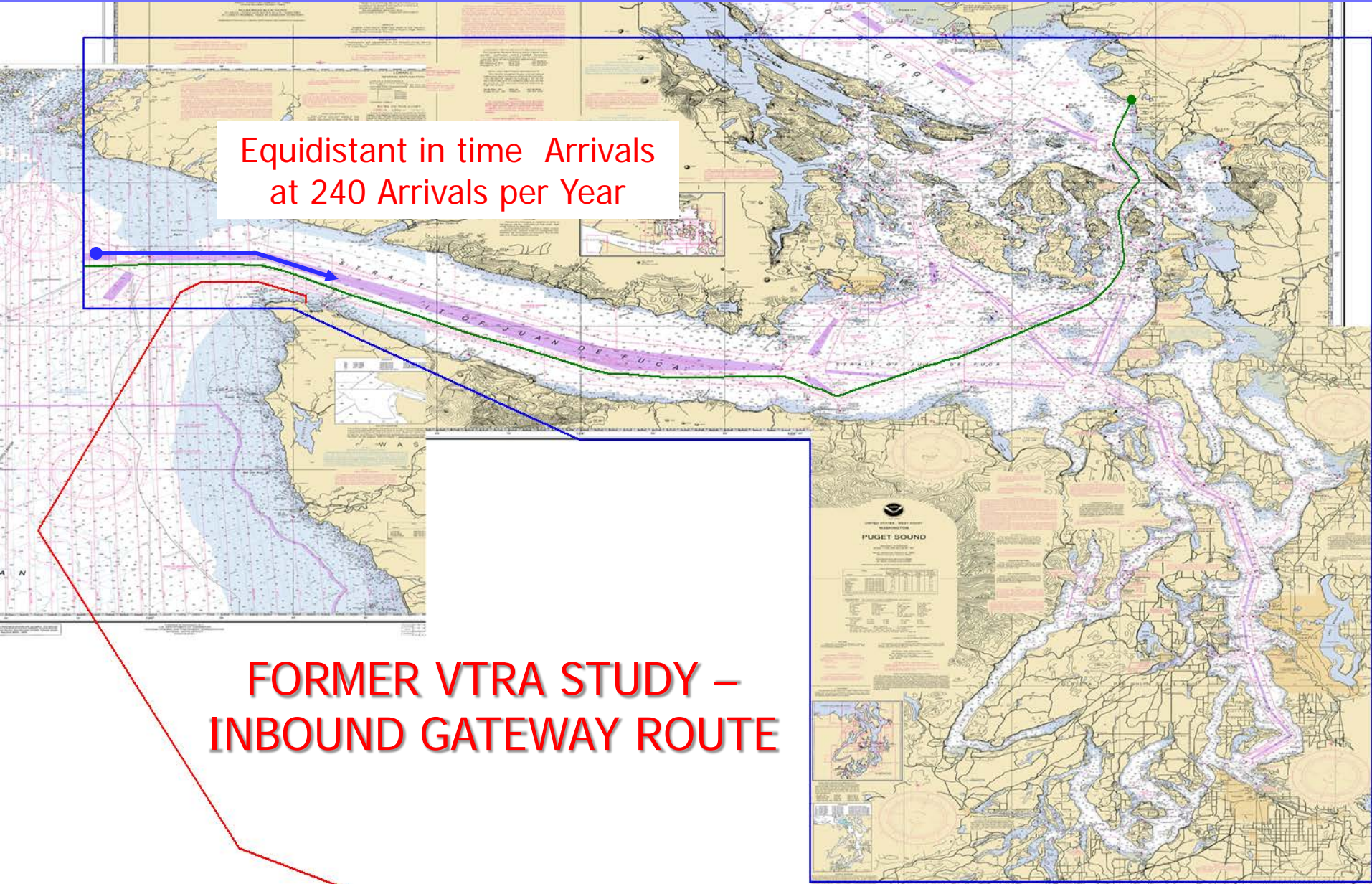
VCU Personnel: Dr. Jason R. W. Merrick

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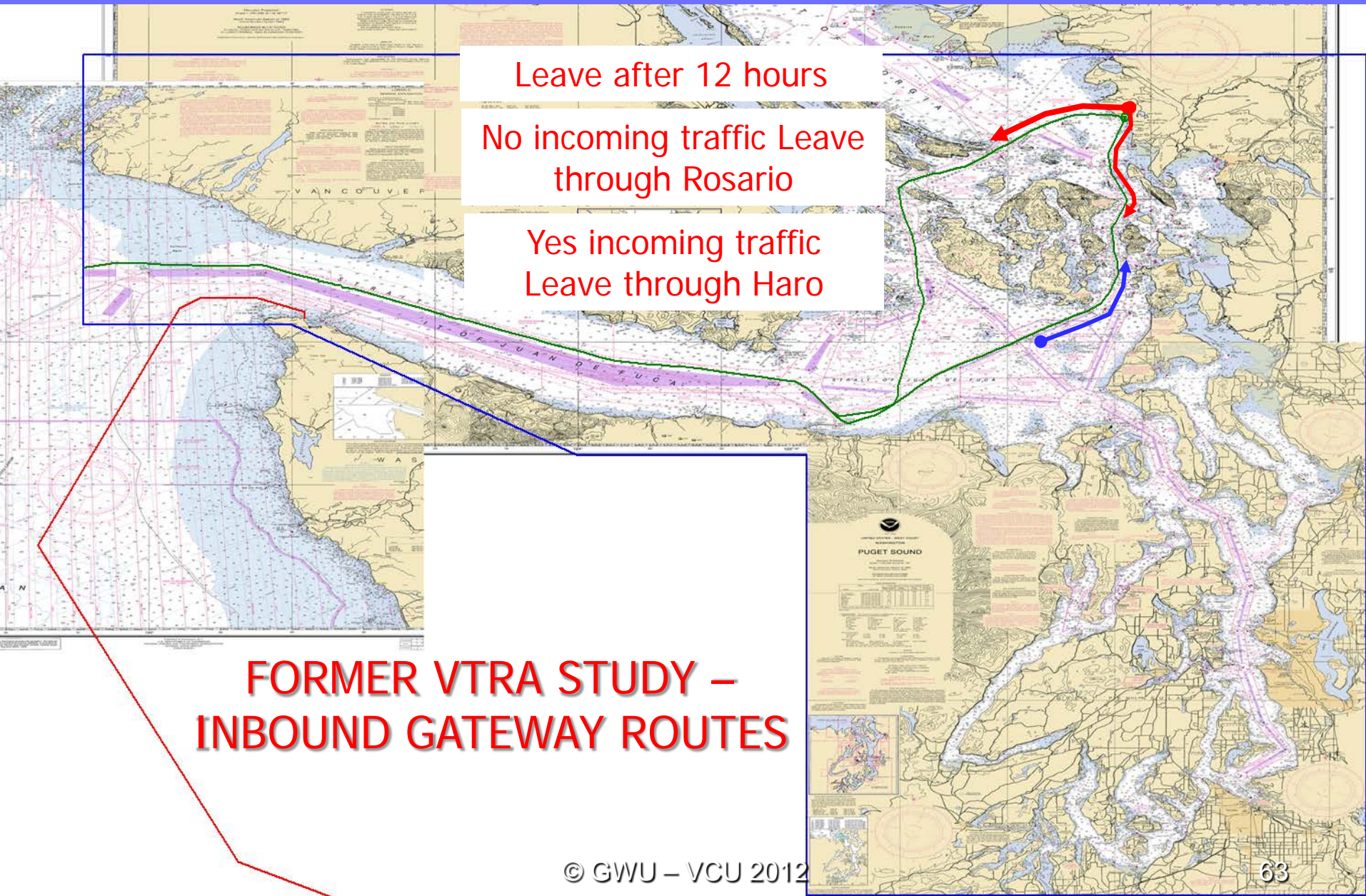
FORMER VTRA STUDY – GATEWAY TRAFFIC MODELLING

Equidistant in time Arrivals
at 240 Arrivals per Year

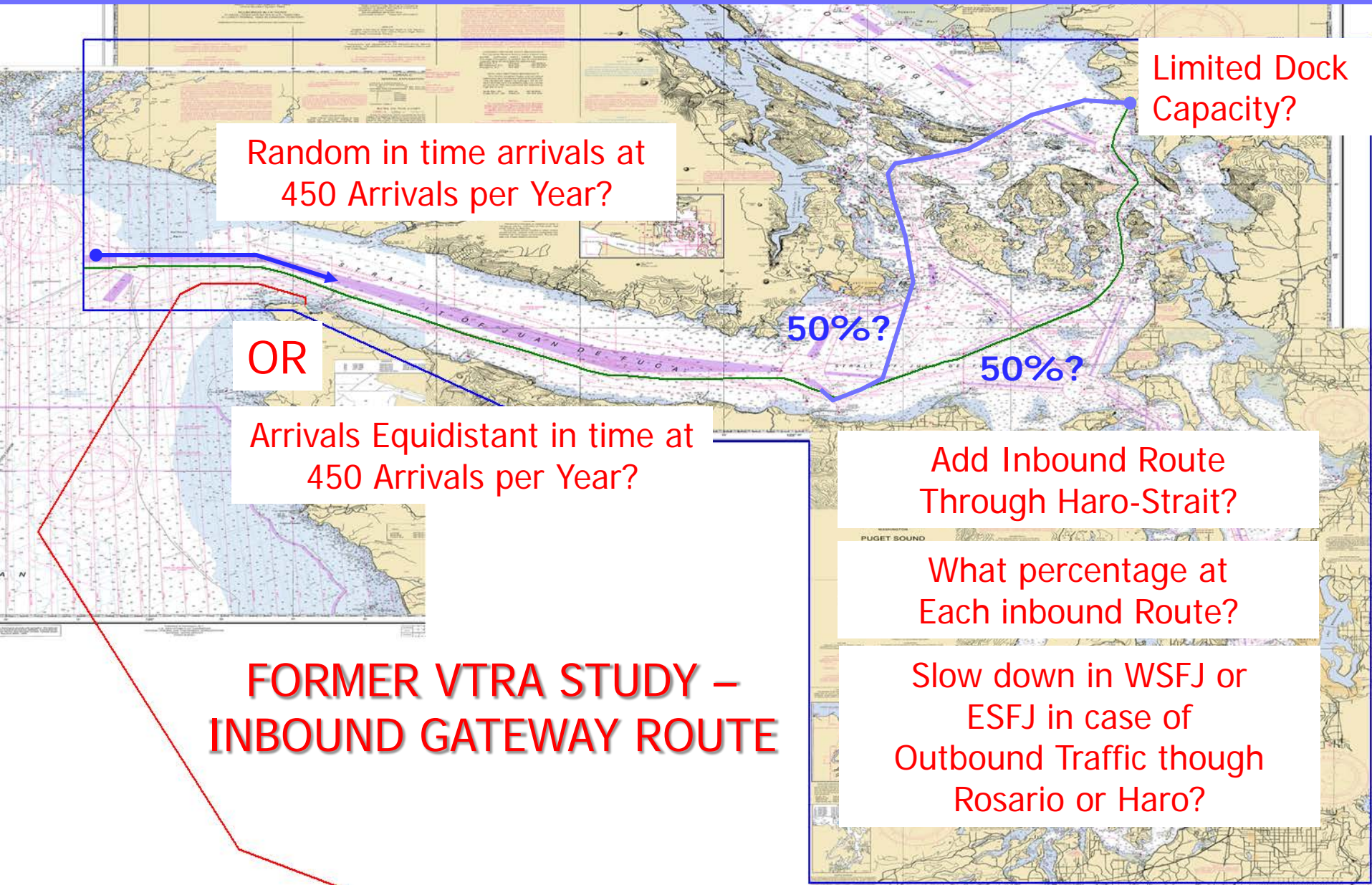
FORMER VTRA STUDY –
INBOUND GATEWAY ROUTE



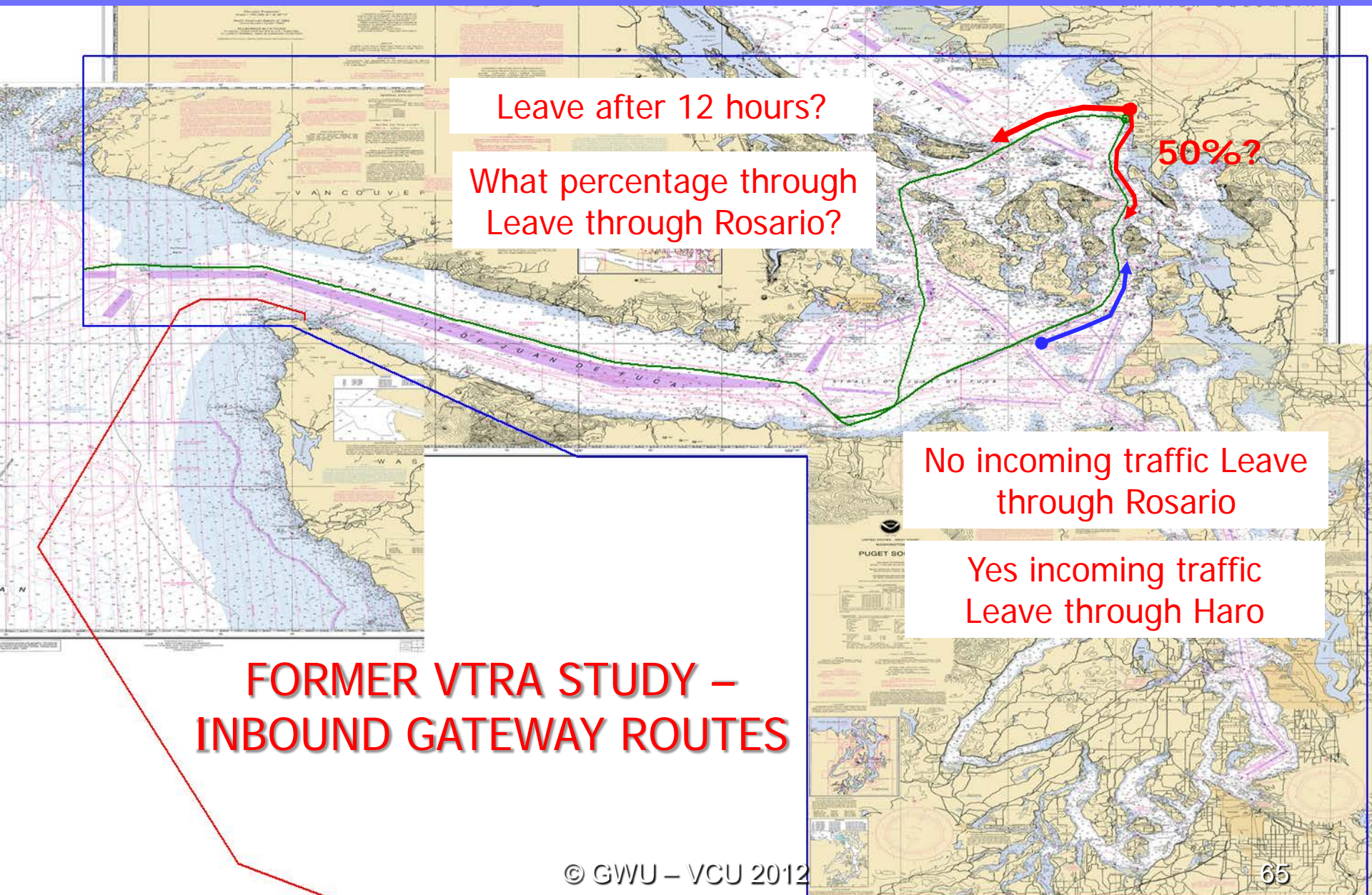
FORMER VTRA STUDY – GATEWAY TRAFFIC MODELLING



UPDATED VTRA STUDY – GATEWAY TRAFFIC MODELLING



UPDATED VTRA STUDY – GATEWAY TRAFFIC MODELLING



Leave after 12 hours?

What percentage through Leave through Rosario?

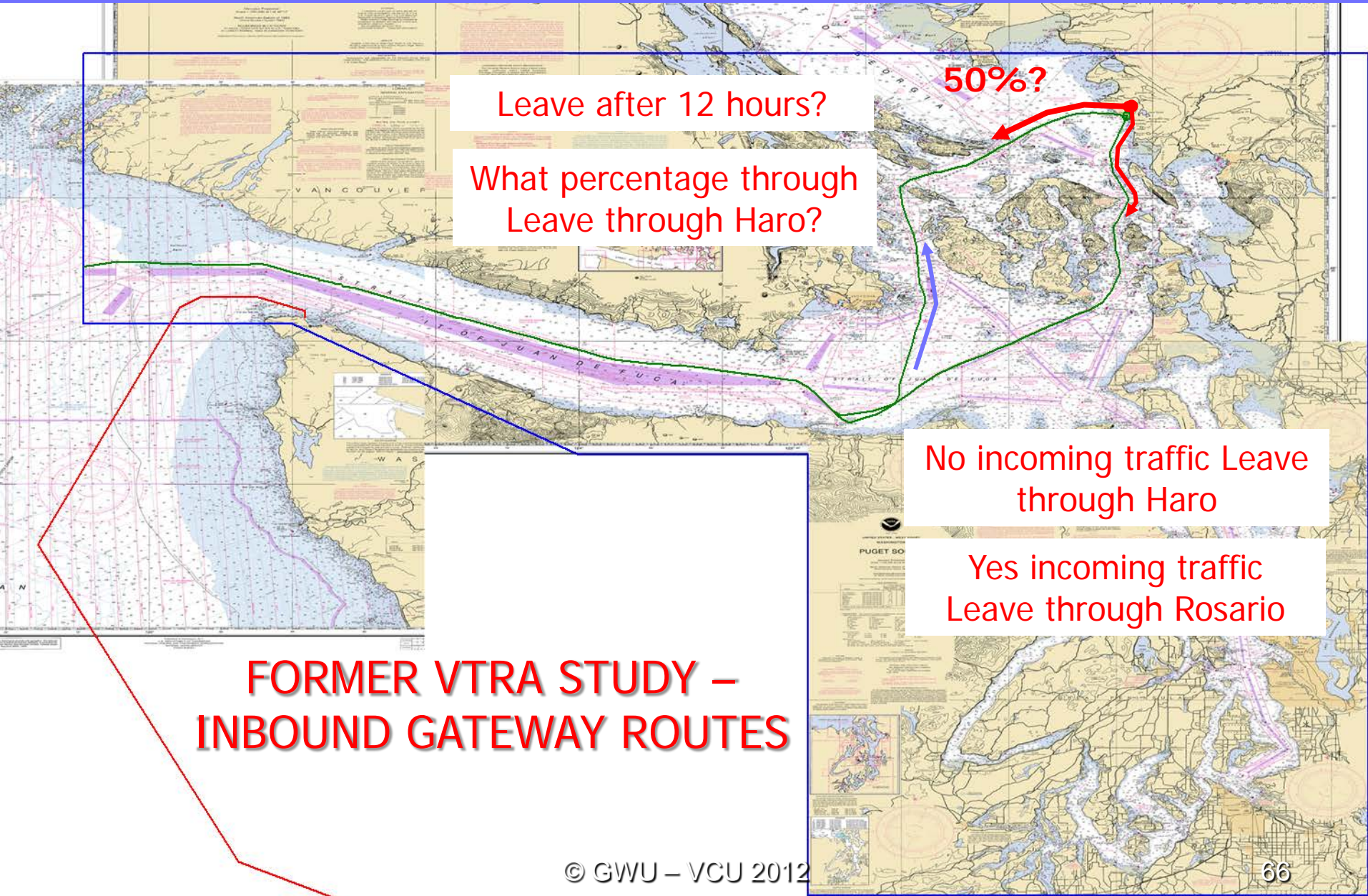
50%?

No incoming traffic Leave through Rosario

Yes incoming traffic Leave through Haro

FORMER VTRA STUDY – INBOUND GATEWAY ROUTES

UPDATED VTRA STUDY – GATEWAY TRAFFIC MODELLING



UPDATED VTRA STUDY – FUTURE SCENARIO MODELLING

Other pressures/changes on updated VTRA Study area:

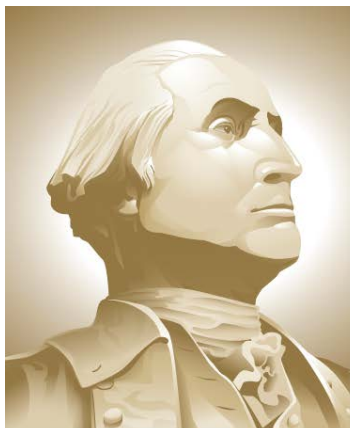
- Kindermorgan pipeline. It is currently anticipated that this traffic would consist of approximately 250 “entering” tanker transits per year of volume.
- TESORO Refinery – The TESORO Refinery (and other refineries) plans to increase frequency of unit train (approximately 100 tank cars)

AND OTHER ONES???

**FOR EACH CHANGE
ASSUMPTIONS ARE NEEDED
FOR SIMULATION
IMPLEMENTATION**

DESIGNING A RISK MANAGEMENT PLAN FACED WITH TRAFFIC INCREASES

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SOME
OBSERVATION/COMMENTS
TO KICKOFF
THE STAKEHOLDER
PROCESS/DISCUSSION

SOME OBVIOUS (?) OBSERVATIONS

**The World is not Average,
Neither is a Maritime
Transportation System (MTS).**

**Different Vessels go to
Different Locations.**

**Each Location has a
Different Traffic profile.**

SOME FOOD FOR THOUGHT

**Keeping everything the same
When Traffic Increases
Risk Increases, unless Mitigated.**

**There is no Guarantee that
Risk Increases due to Traffic
Increases can be Fully Mitigated.**

RISK MANAGEMENT CHALLENGE

**Design a Risk Management Plan
By Location.**

**Risk does not typically disappear
When mitigated locally but migrates.**

RISK MANAGEMENT CHALLENGE

**Risk Mitigation at one Location
Ought not results in an Increase
in Risk elsewhere that is larger.**

**Faced with inevitable (?) traffic
Increases how can one
Manage Risk Increases that
Cannot be mitigated?**

RISK MANAGEMENT CHALLENGE

EVENLY DISTRIBUTE FUTURE RISK?

i.e. allow for Risk Increases in Locations that currently have low risk of spills compared to those that are already higher?

EQUITABLE DISTRIBUTION OF FUTURE RISK?

Allow for each location to have a similar percentage increase in Risk?.