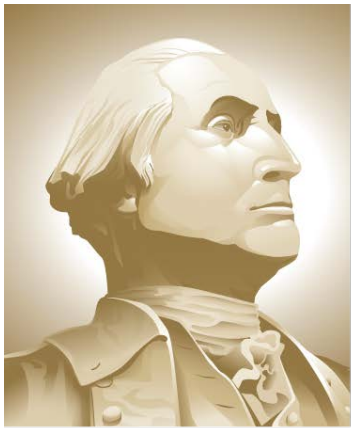
VTRA SUMMARY DENSITY ANALYSIS

A Closer look by Vessel Type and Location

Presentation by: J. Rene van Dorp



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VCU Personnel: Dr. Jason R. W. Merrick

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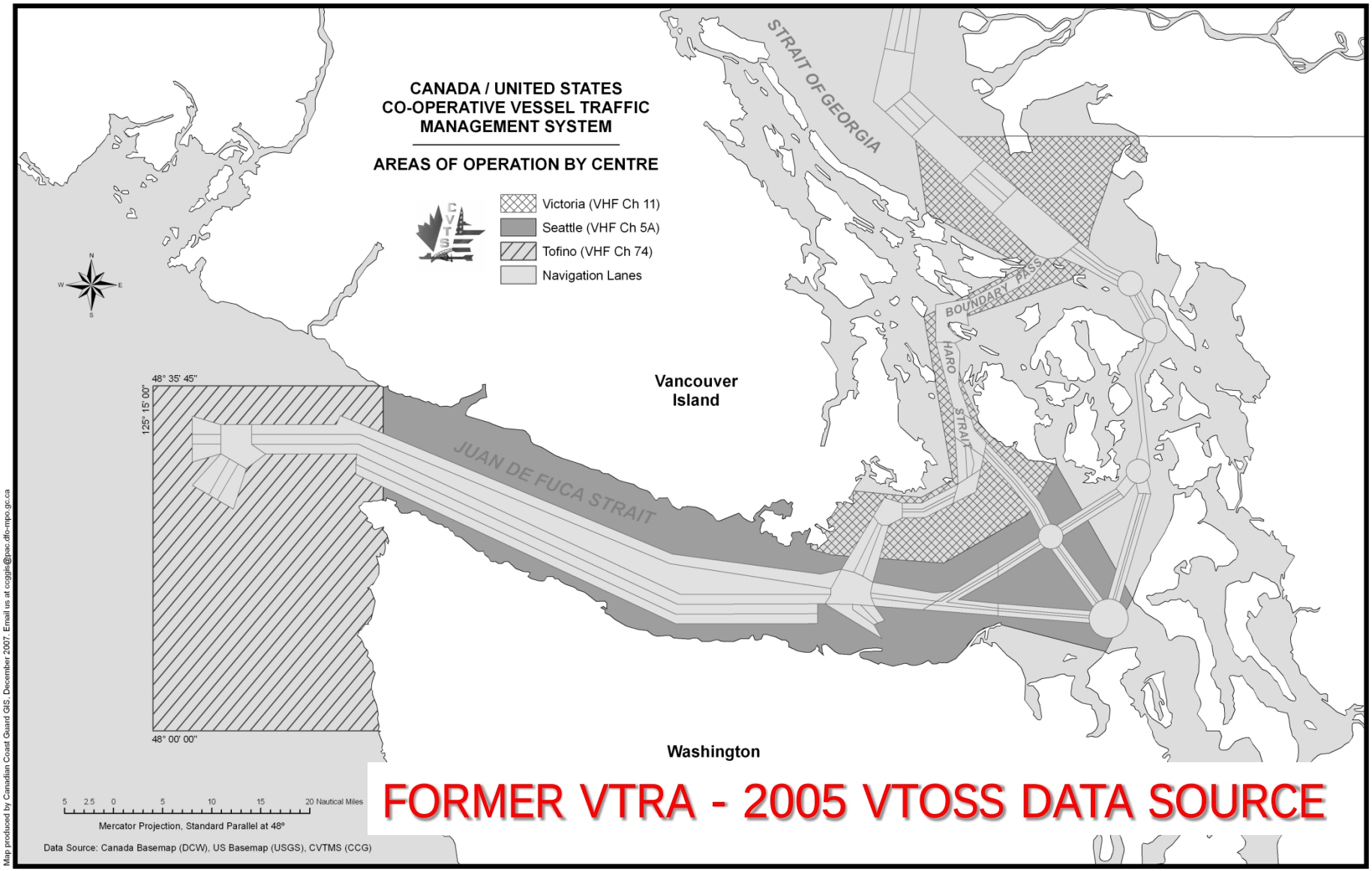
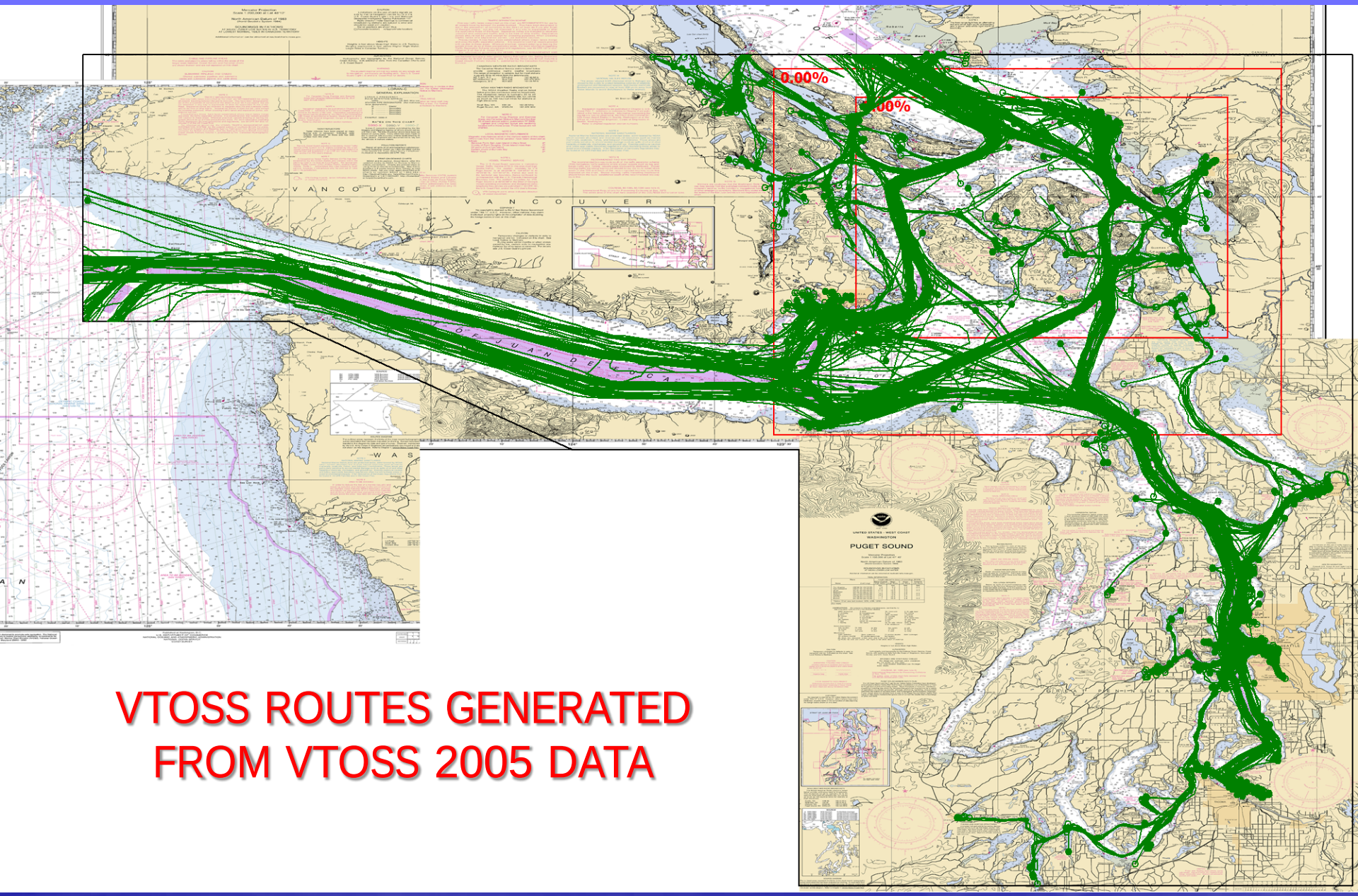
The Vessel Traffic Operation Support System (VTOSS)



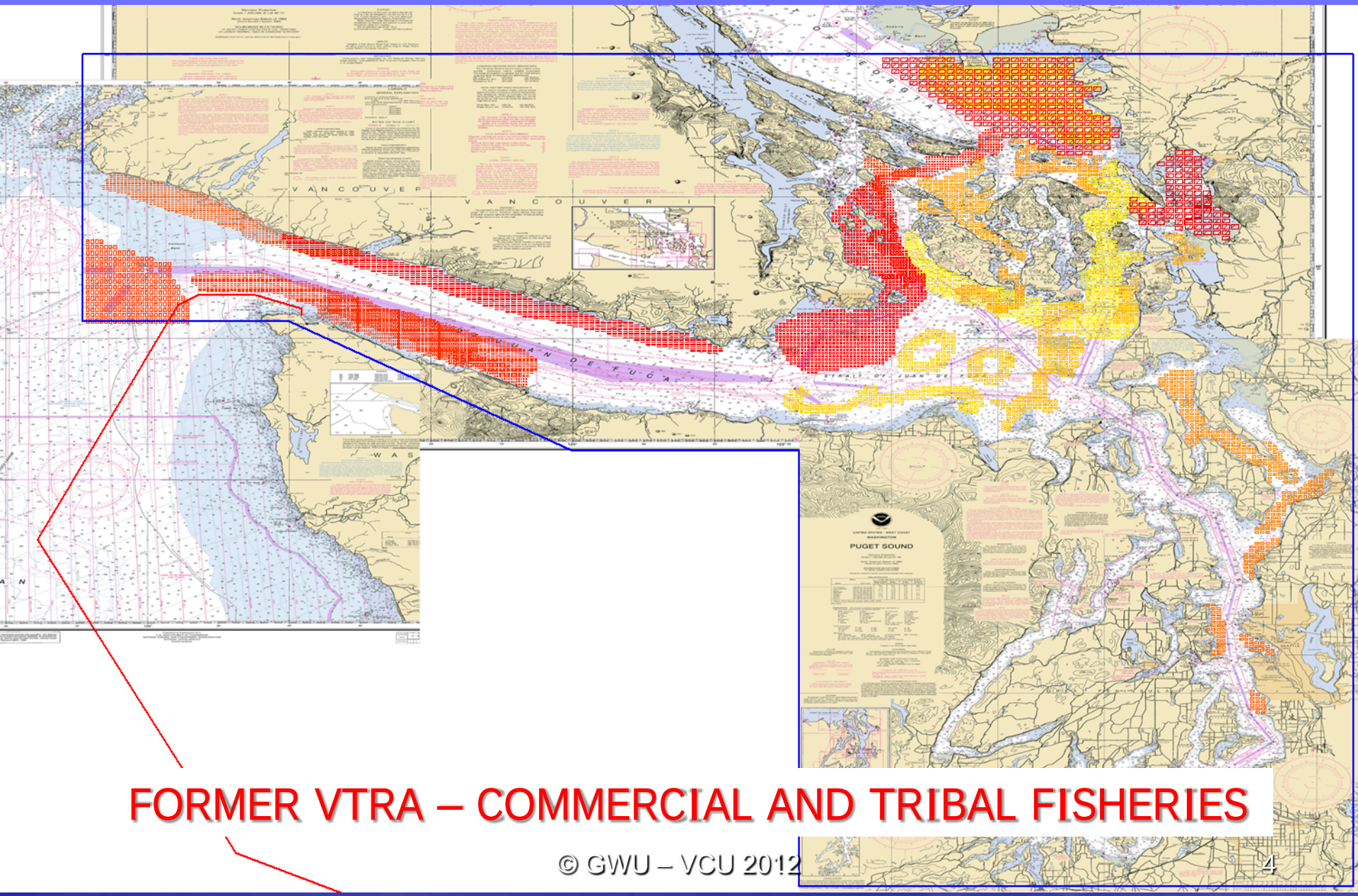
FORMER VTRA - 2005 VTOSS DATA SOURCE

FORMER VTRA STUDY – VTOSS ROUTES



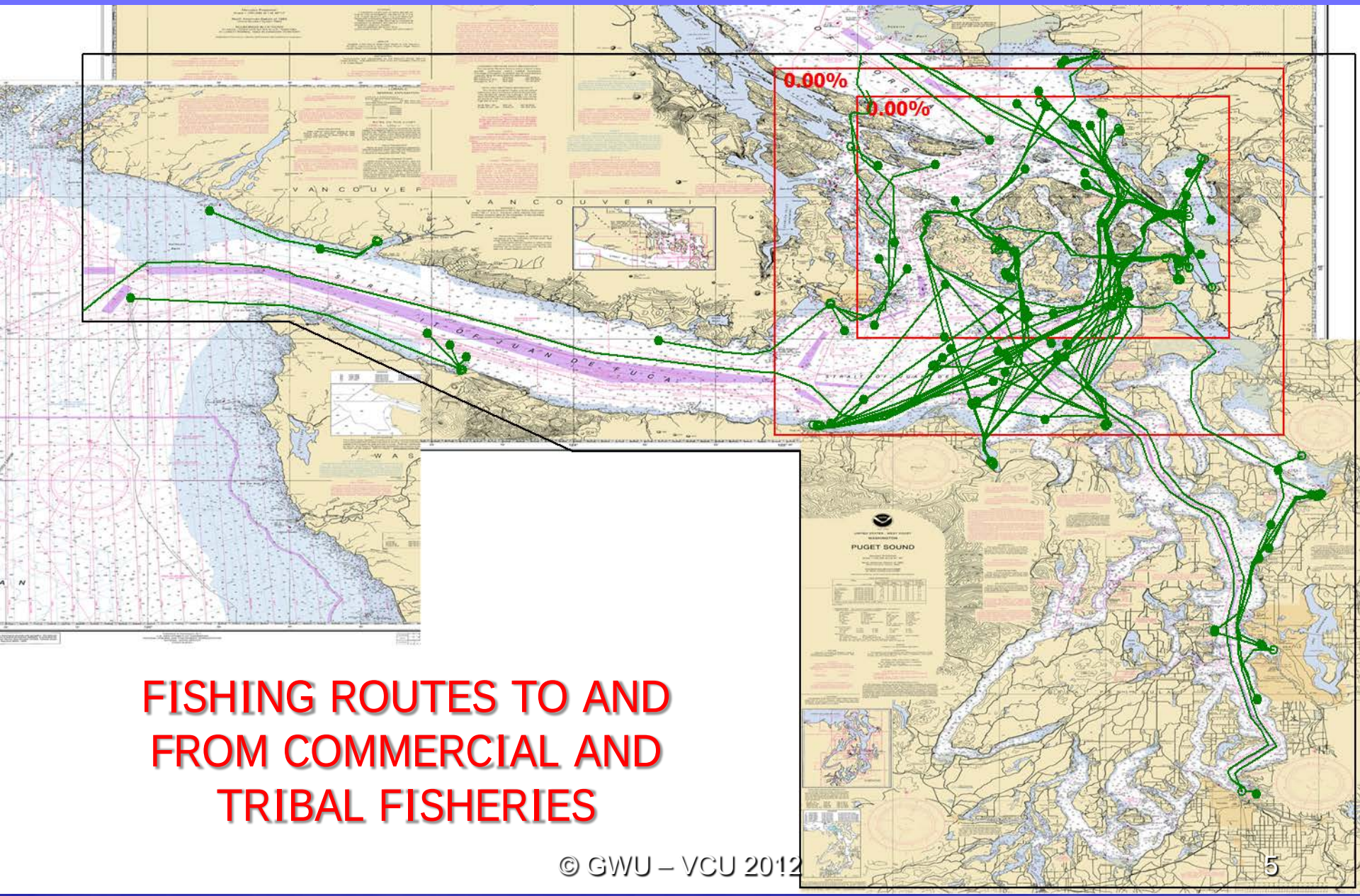
VTOSS ROUTES GENERATED
FROM VTOSS 2005 DATA

FORMER VTRA STUDY – AREAS OF FISHING



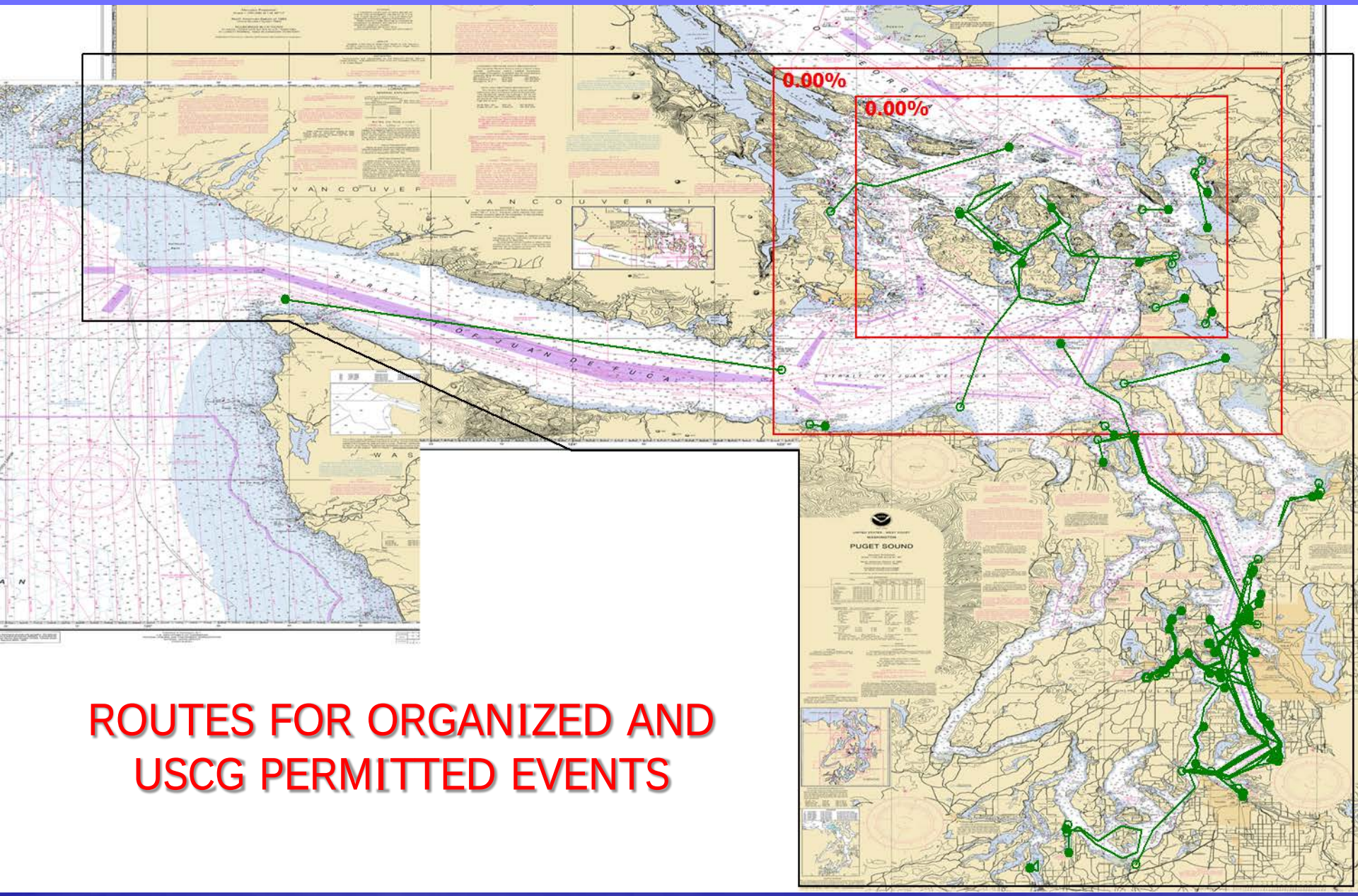
FORMER VTRA – COMMERCIAL AND TRIBAL FISHERIES

FORMER VTRA STUDY – ROUTES TO AND FROM FISHING



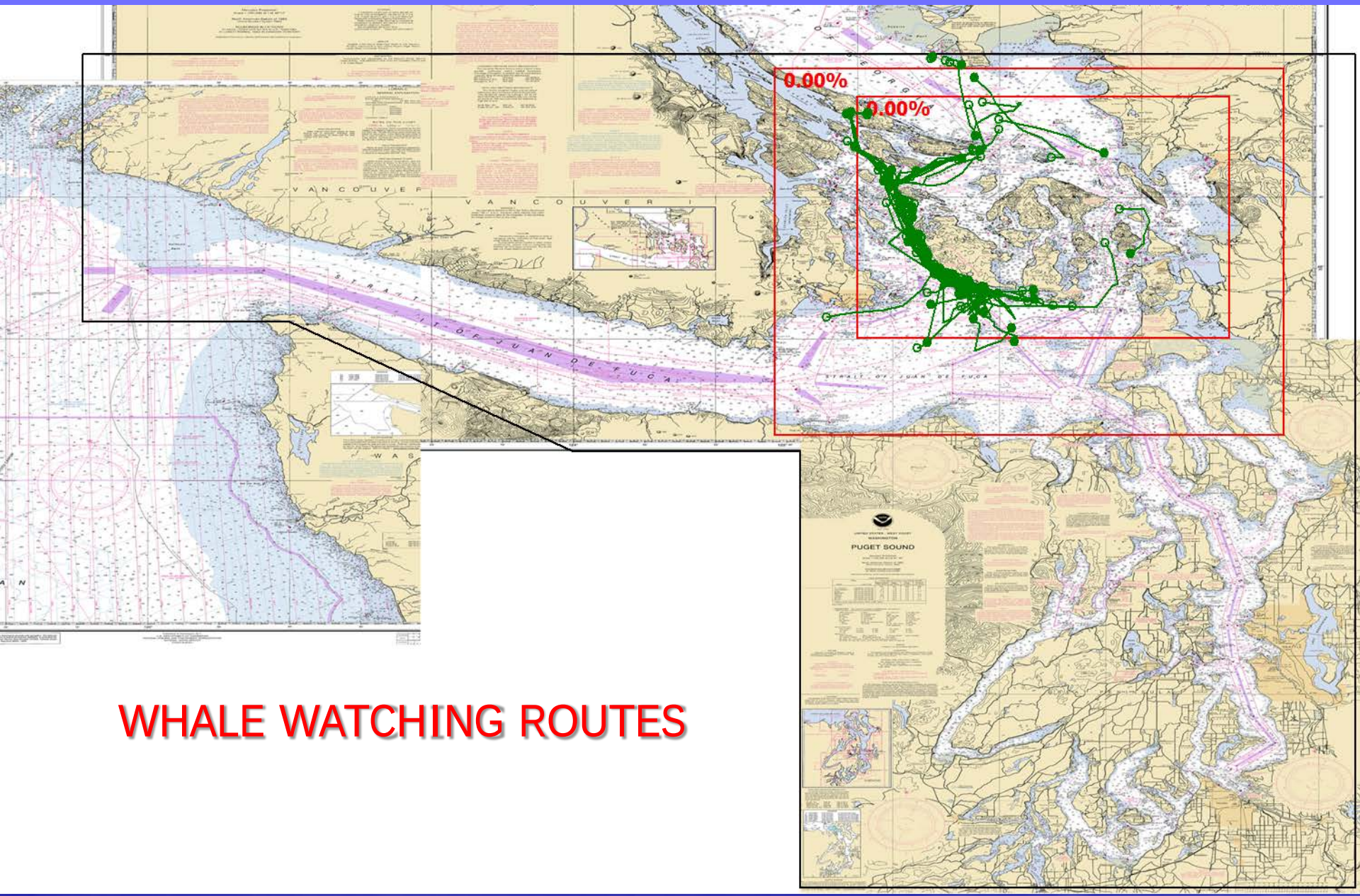
FISHING ROUTES TO AND FROM COMMERCIAL AND TRIBAL FISHERIES

FORMER VTRA STUDY – USCG PERMITTED REGATTAS, ETC.



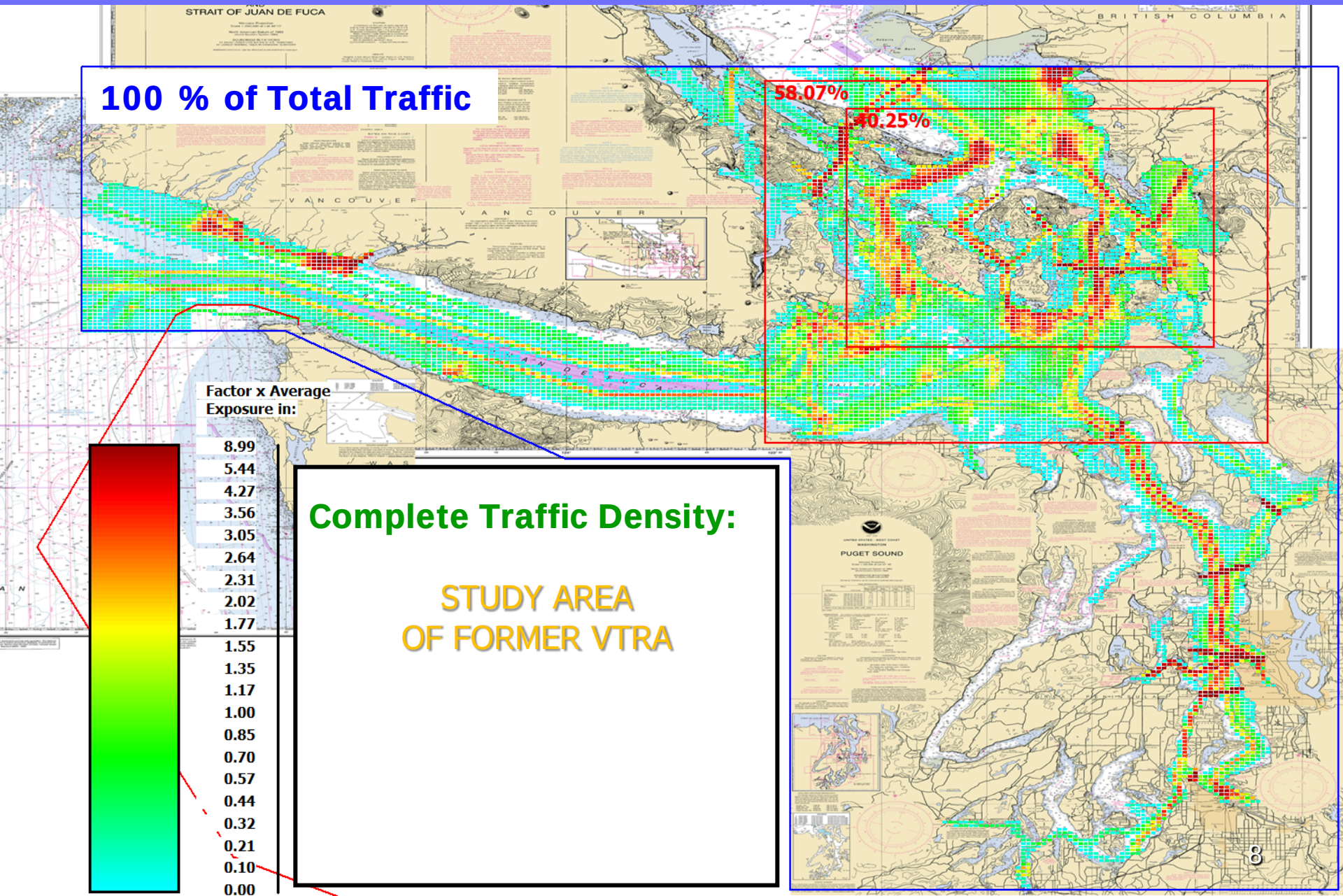
ROUTES FOR ORGANIZED AND USCG PERMITTED EVENTS

FORMER VTRA STUDY – WHALE WATCHING ROUTES



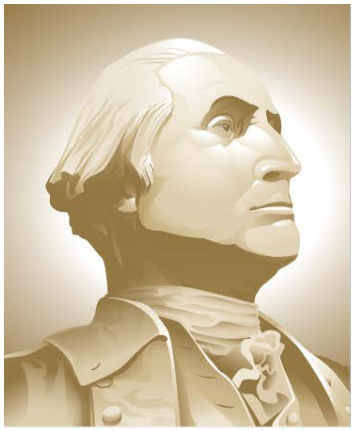
WHALE WATCHING ROUTES

FORMER VTRA STUDY – COMPLETE TRAFFIC DENSITY



UPDATING THE TRAFFIC DATA- UPDATE TO VTOSS 2010 DATA

Presentation by: J. Rene van Dorp



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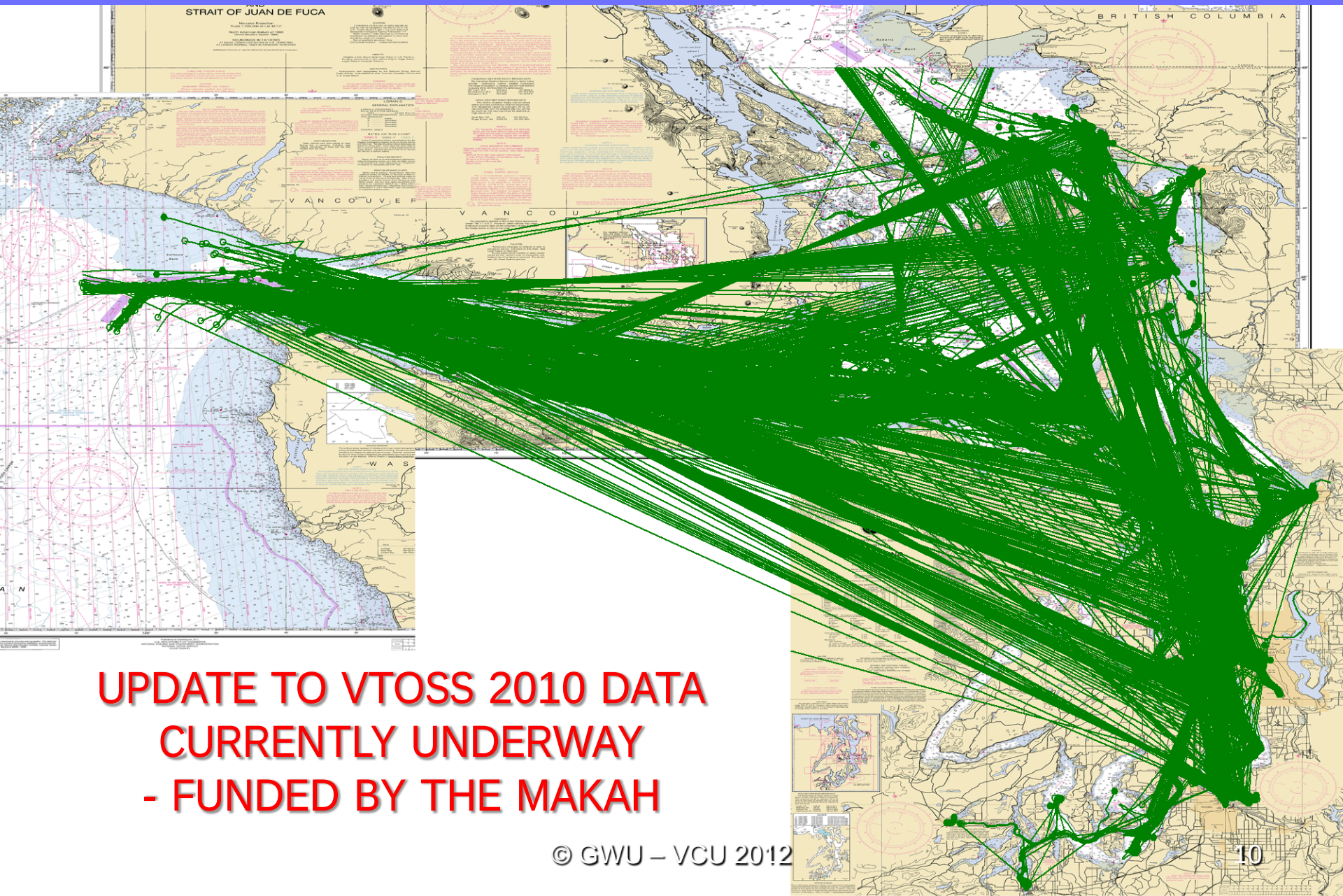
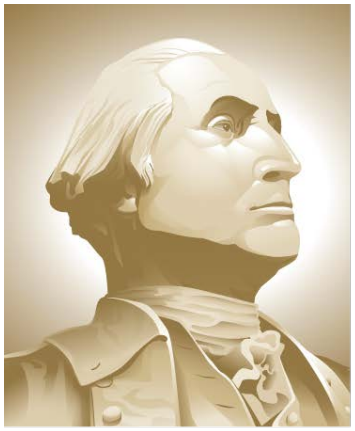
UPDATED OF VTRA STUDY – USE VTOSS 2010 DATA



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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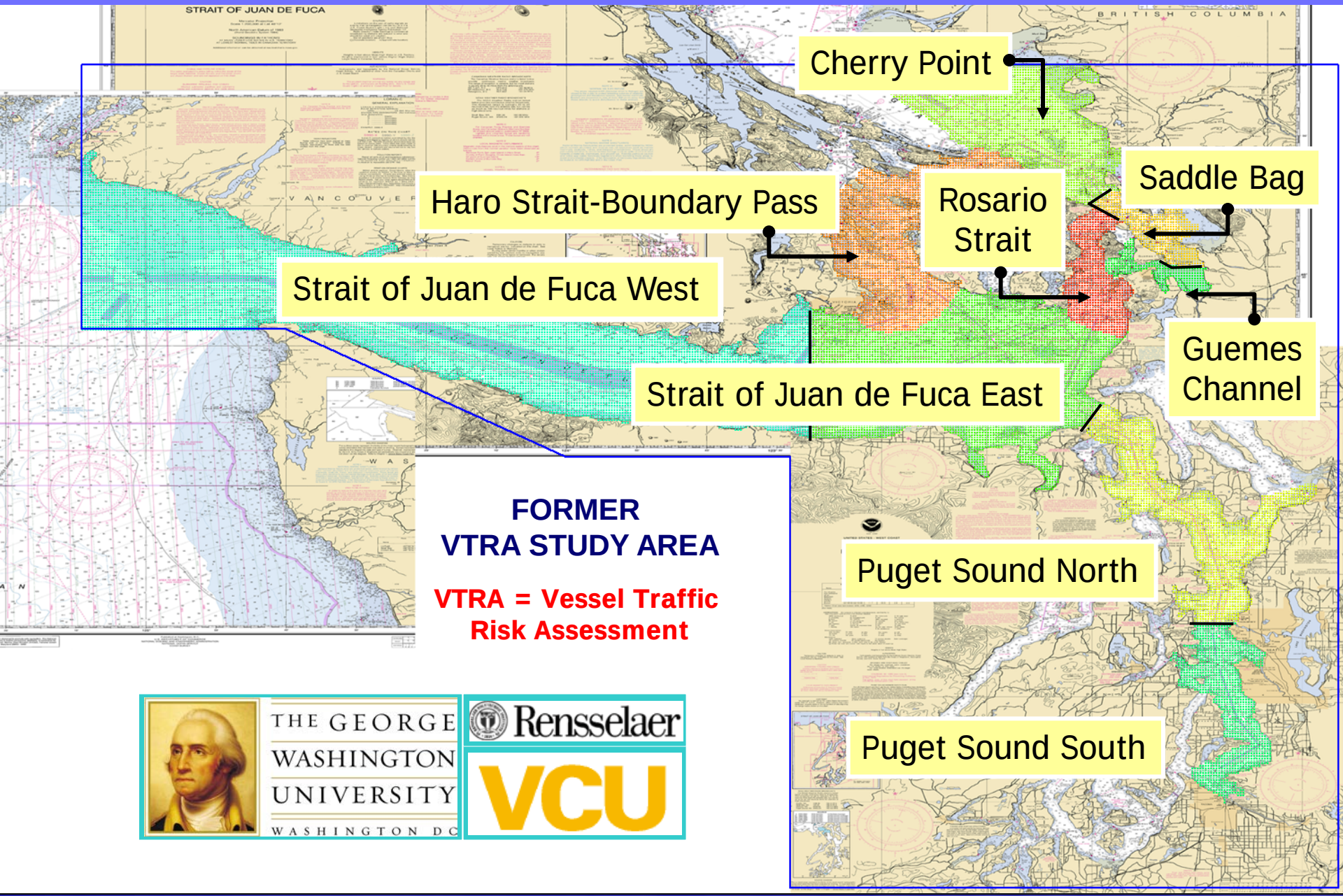
FORMER VTRA STUDY – 9 DEFINED LOCATIONS



FORMER VTRA STUDY AREA

VTRA = Vessel Traffic Risk Assessment

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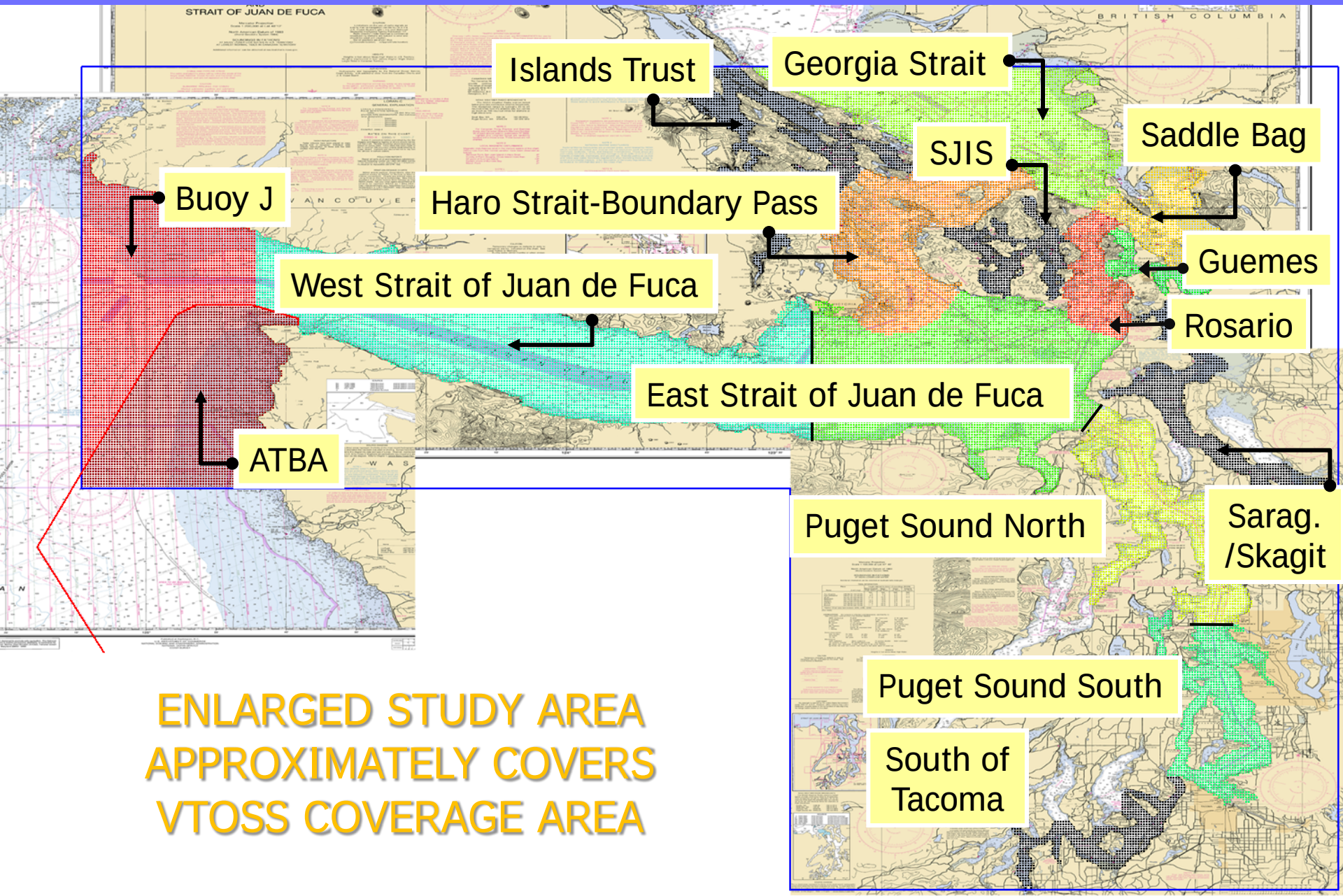
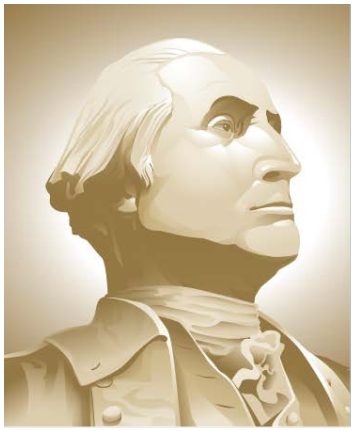
FOR UPDATED VTRA STUDY - 15 DEFINED LOCATIONS



ENLARGED STUDY AREA APPROXIMATELY COVERS VTOSS COVERAGE AREA

UPDATING THE VTRA STUDY – SELECTION OF FOCUS VESSELS

Presentation by: J. Rene van Dorp



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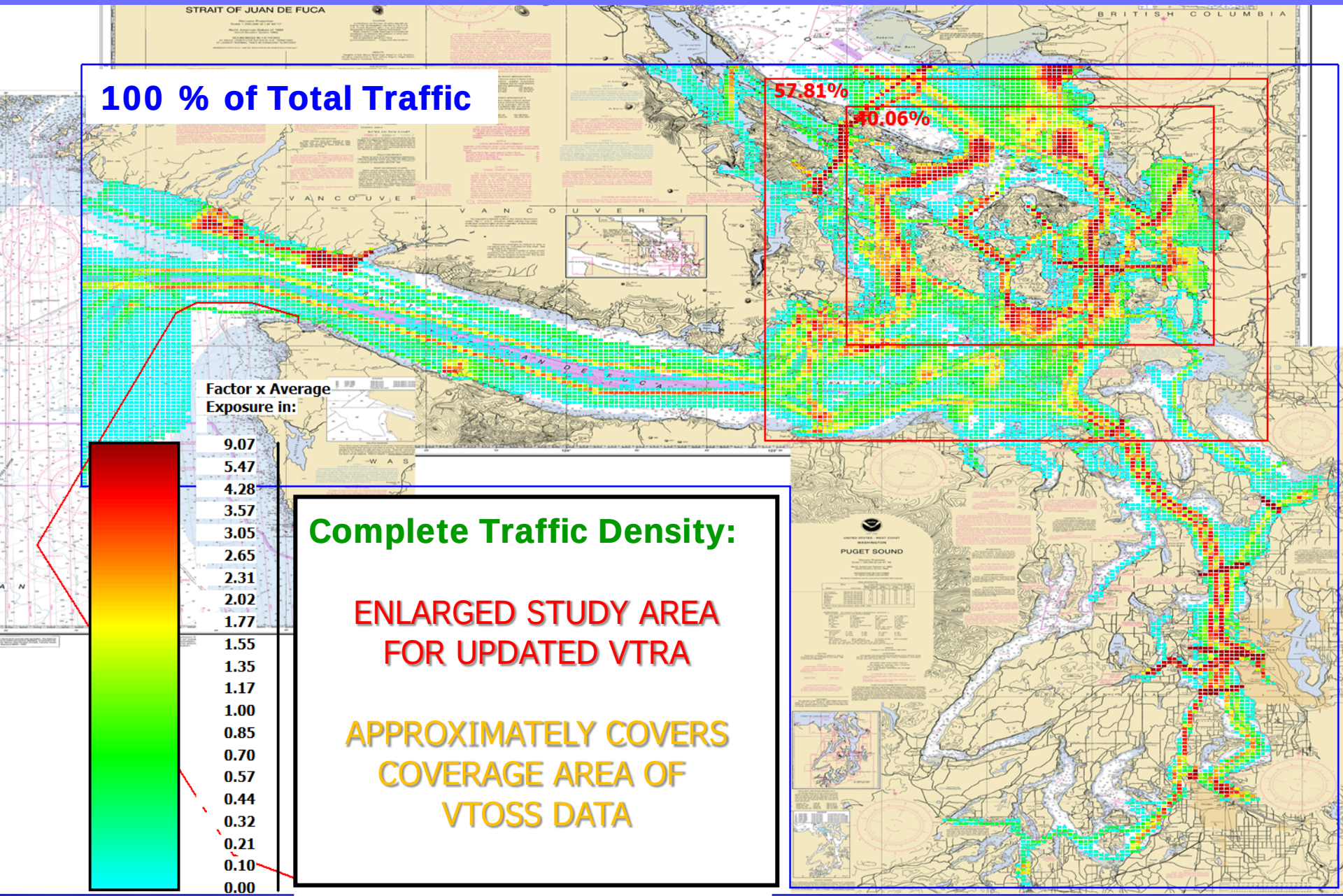
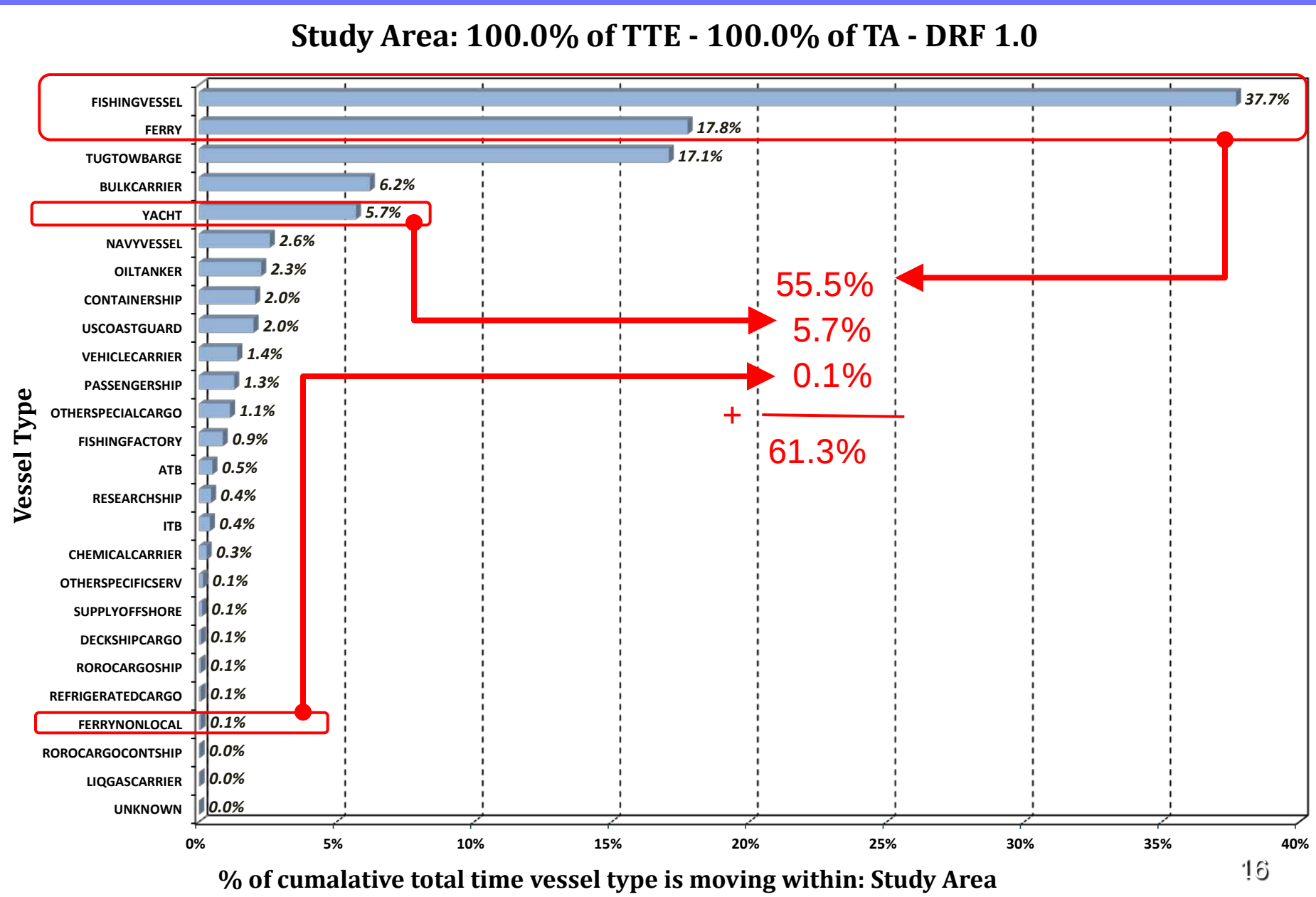
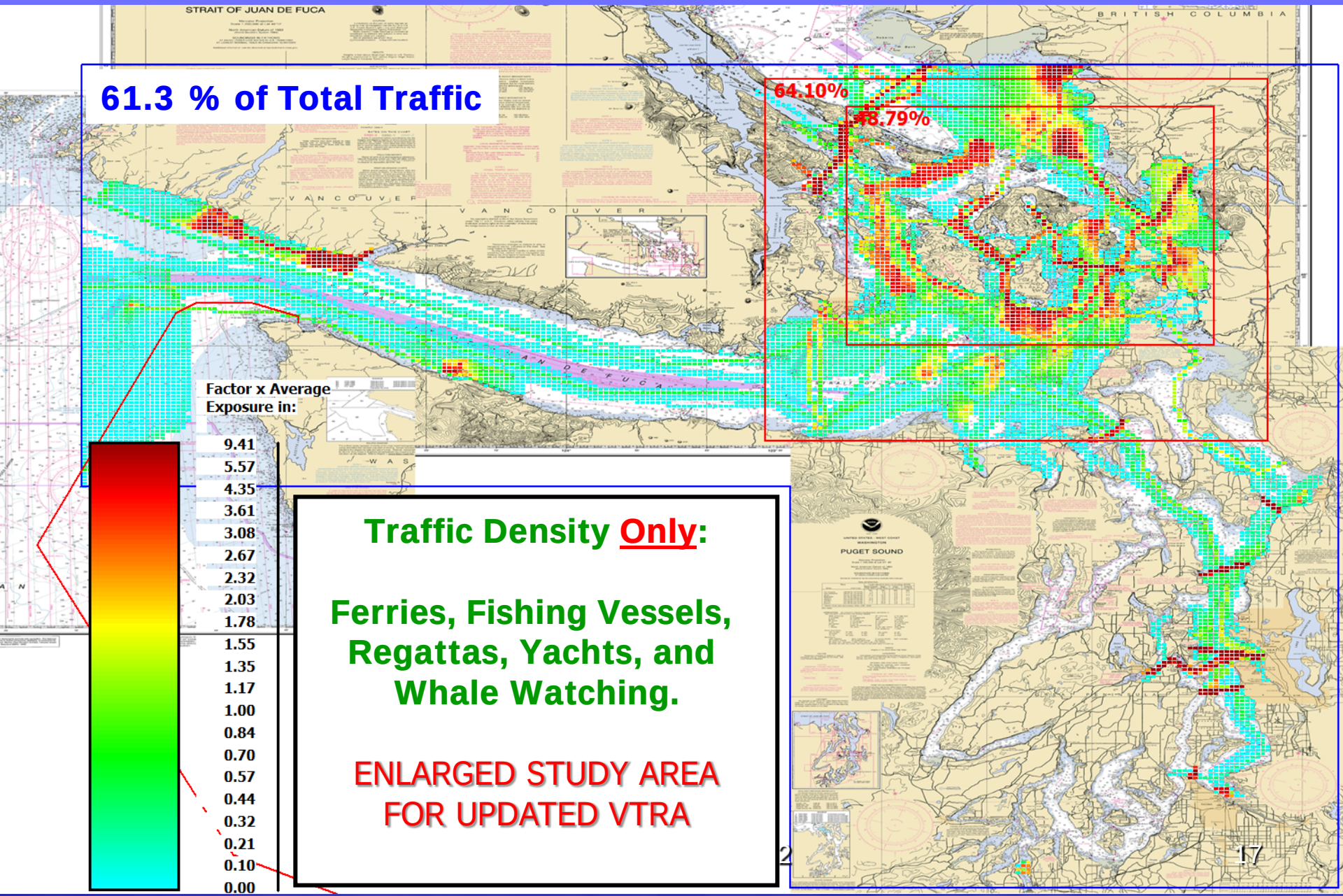
FORMER VTRA STUDY – COMPLETE TRAFFIC DENSITY



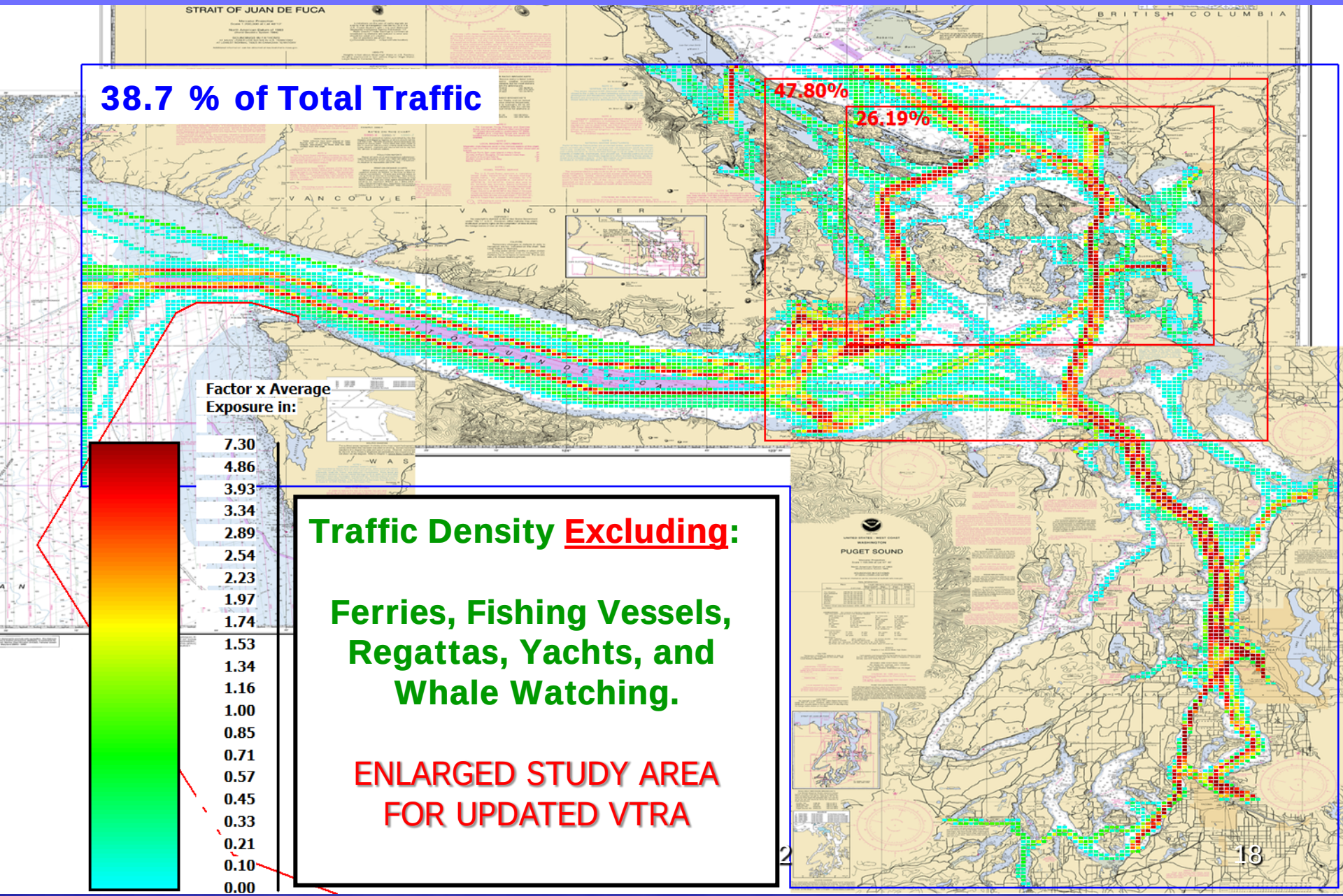
FORMER VTRA STUDY – COMPLETE TRAFFIC DENSITY



FORMER VTRA STUDY – 61.3% OF TOTAL TRAFFIC DENSITY



FORMER VTRA STUDY – 38.7 % OF TOTAL TRAFFIC DENSITY



FORMER VTRA STUDY – SELECTION OF FOCUS VESSELS

VESSELS CERTAINLY NOT CONSIDERED FOR FOCUS VESSELS:
Ferries, Fishing Vessels, Regattas, Yachts, and Whale Watchers.

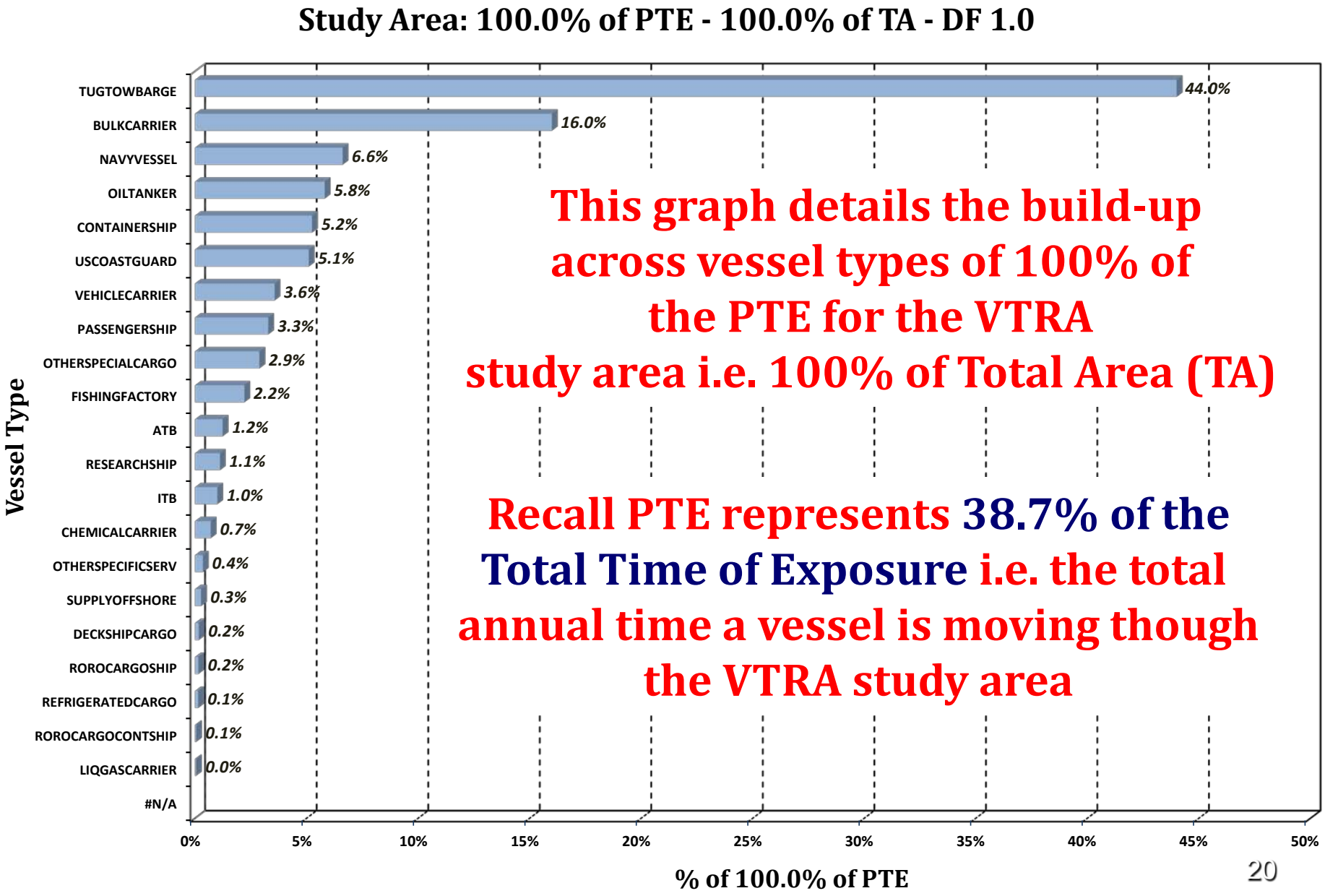
FOR VTRA STUDY AREA WE MAY DEFINE:

VESSEL TYPE EXPOSURE (VTE): The annual amount of time a vessel of a particular type is traversing though 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.

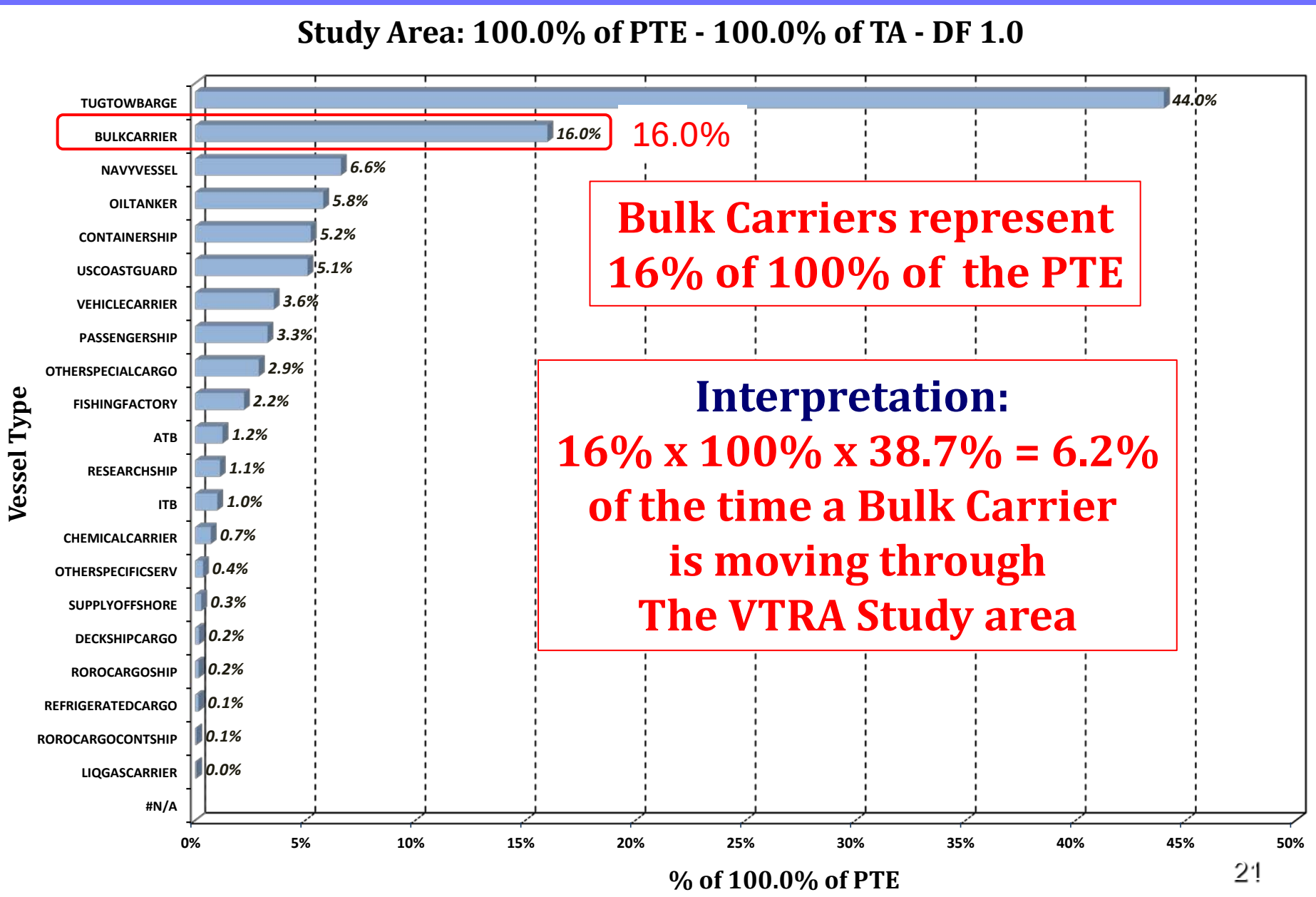
FORMER VTRA STUDY – PTE = 38.7 % TOTAL TIME EXPOSURE



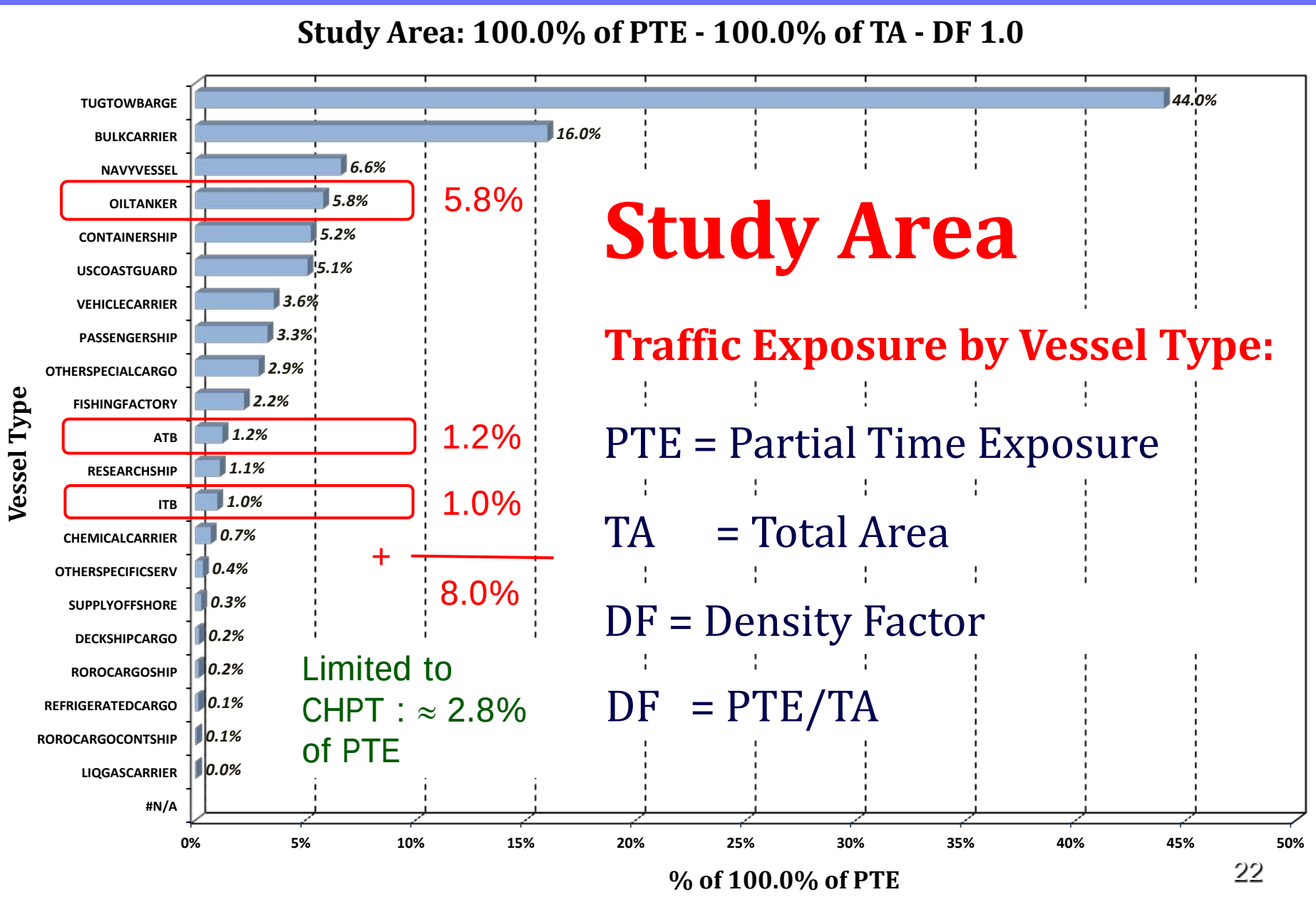
This graph details the build-up across vessel types of 100% of the PTE for the VTRA study area i.e. 100% of Total Area (TA)

Recall PTE represents 38.7% of the Total Time of Exposure i.e. the total annual time a vessel is moving though the VTRA study area

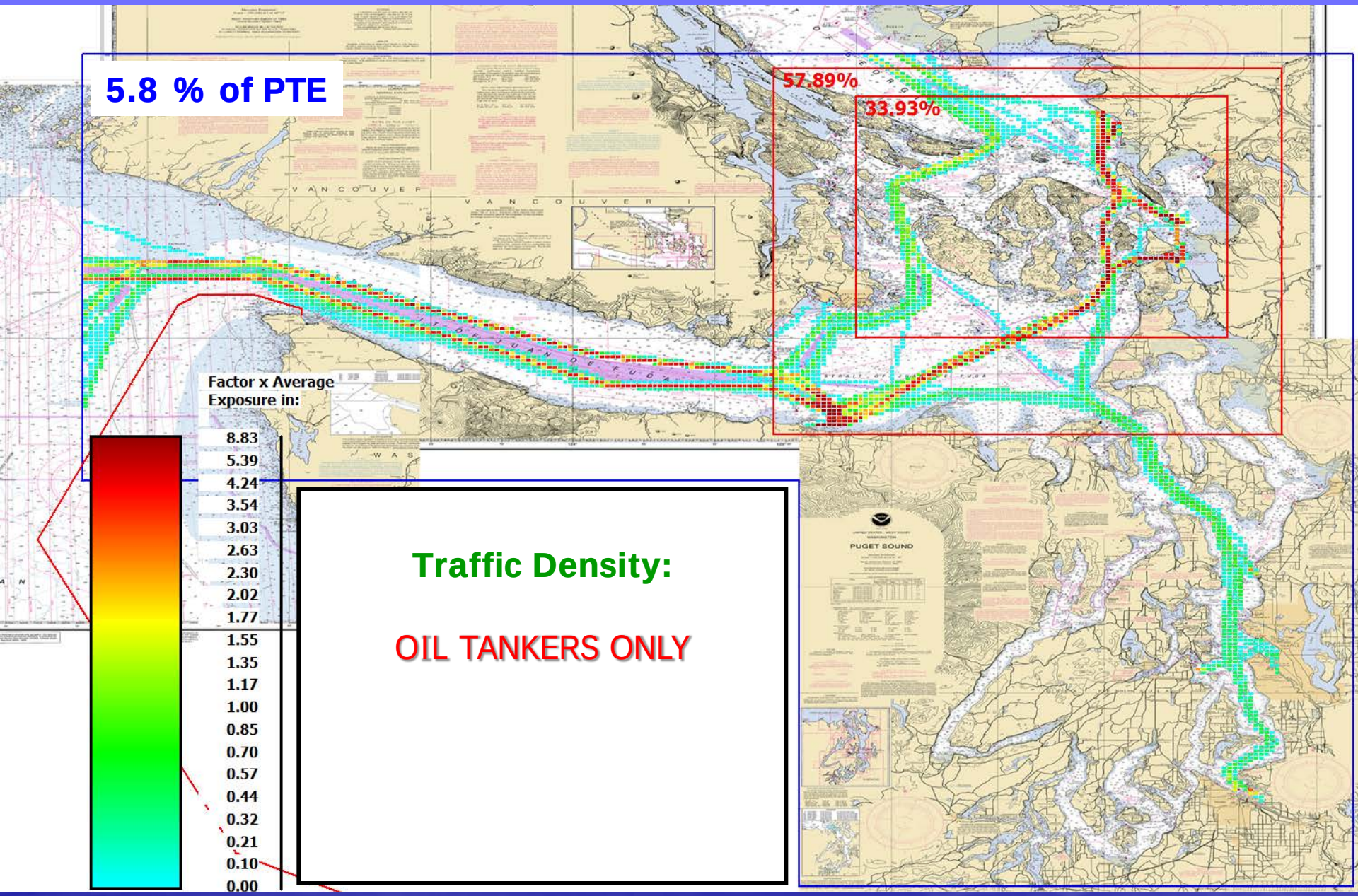
FORMER VTRA STUDY – PTE = 38.7 % TOTAL TIME EXPOSURE



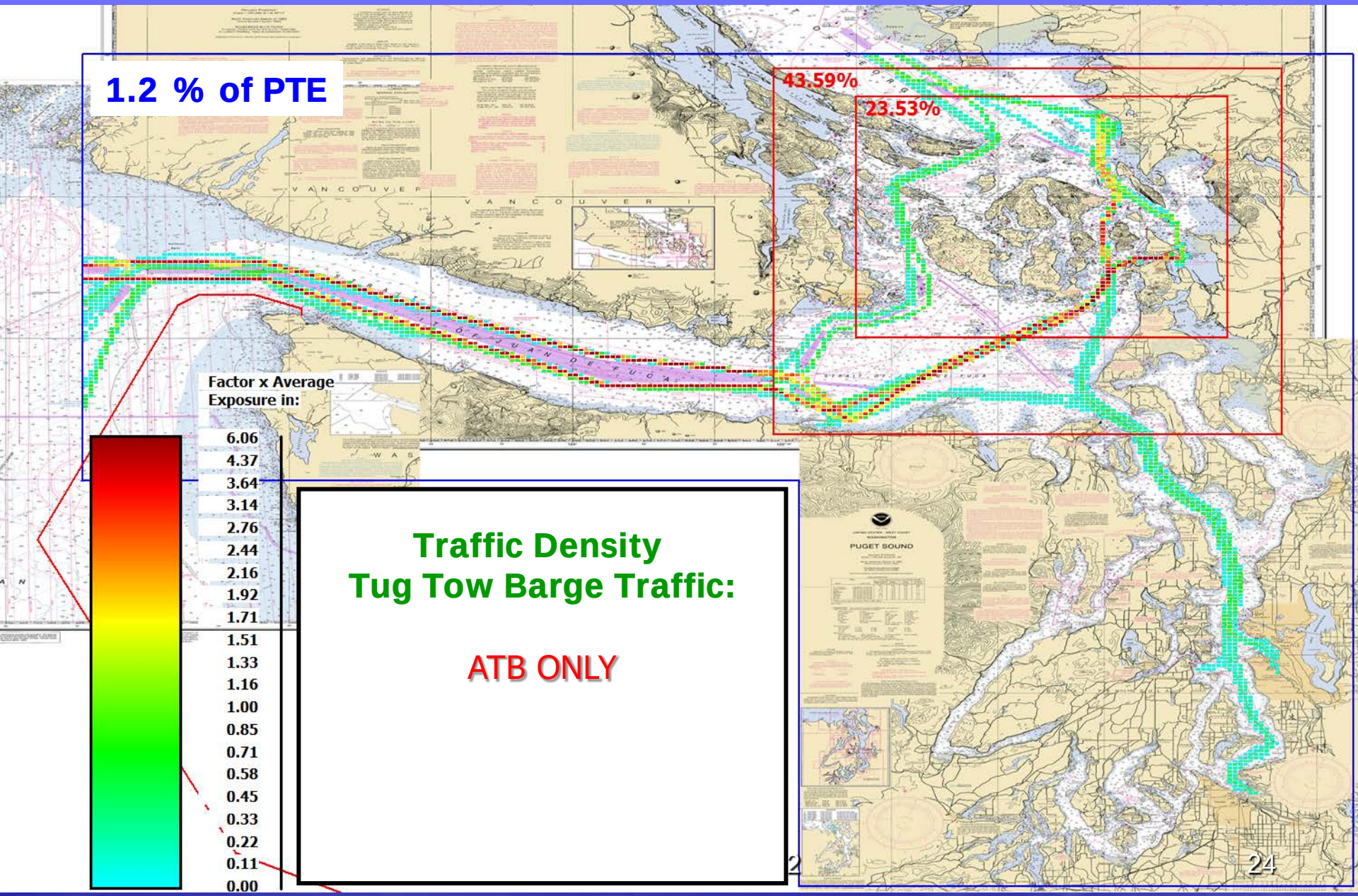
FORMER VTRA STUDY – PTE = 38.7 % TOTAL TIME EXPOSURE



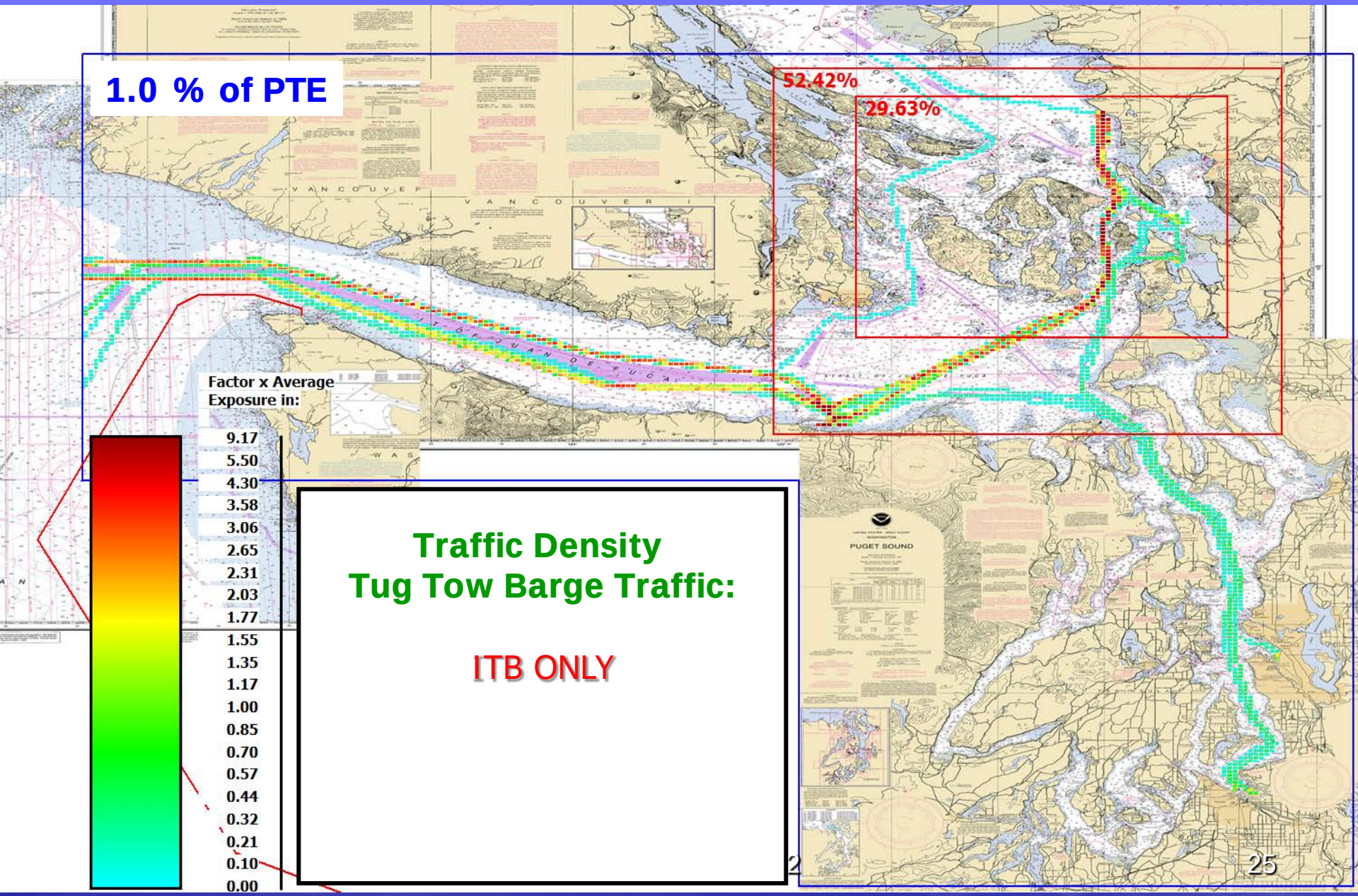
FORMER VTRA STUDY – OIL TANKER TRAFFIC DENSITY



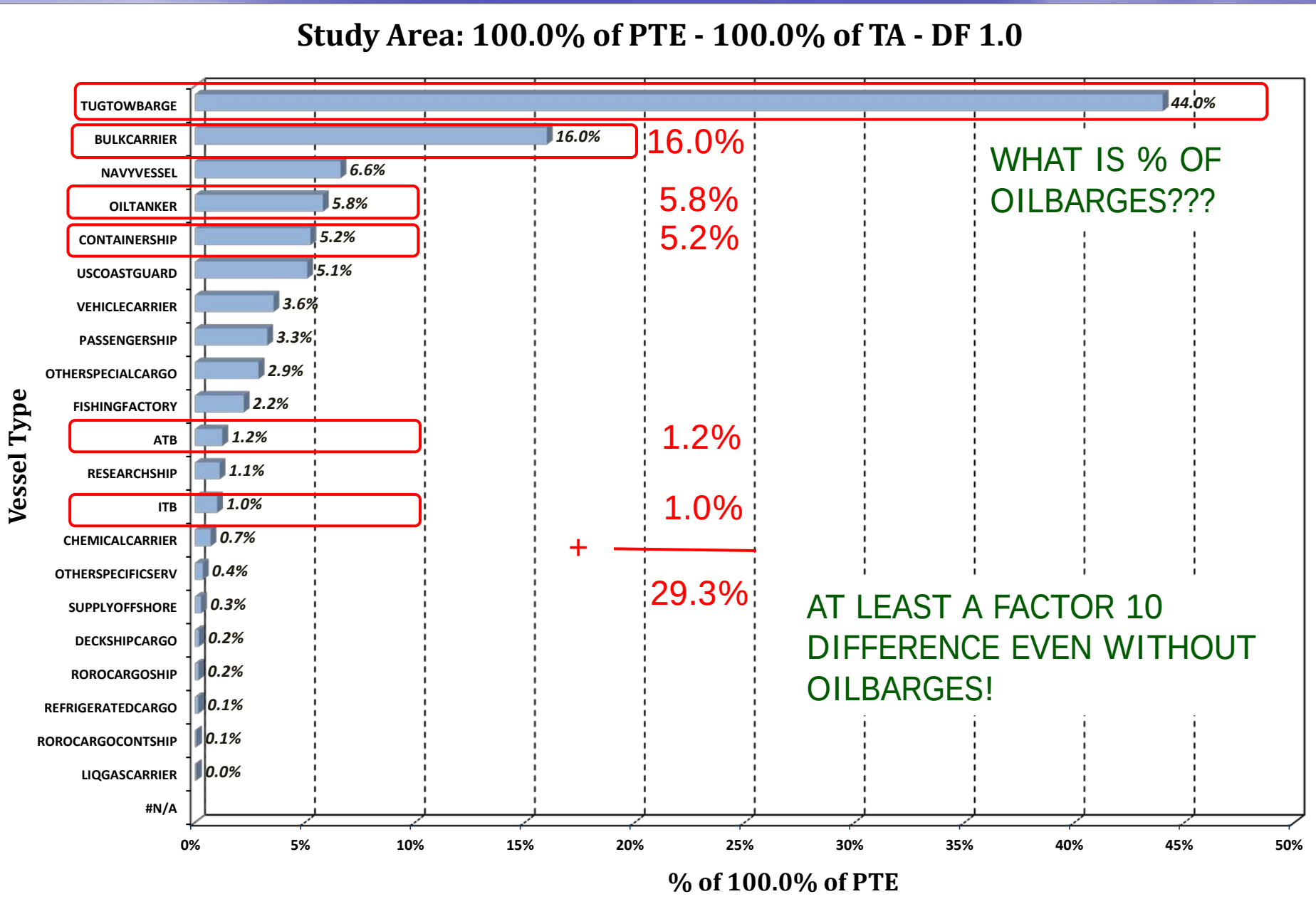
FORMER VTRA STUDY – ATB TRAFFIC DENSITY



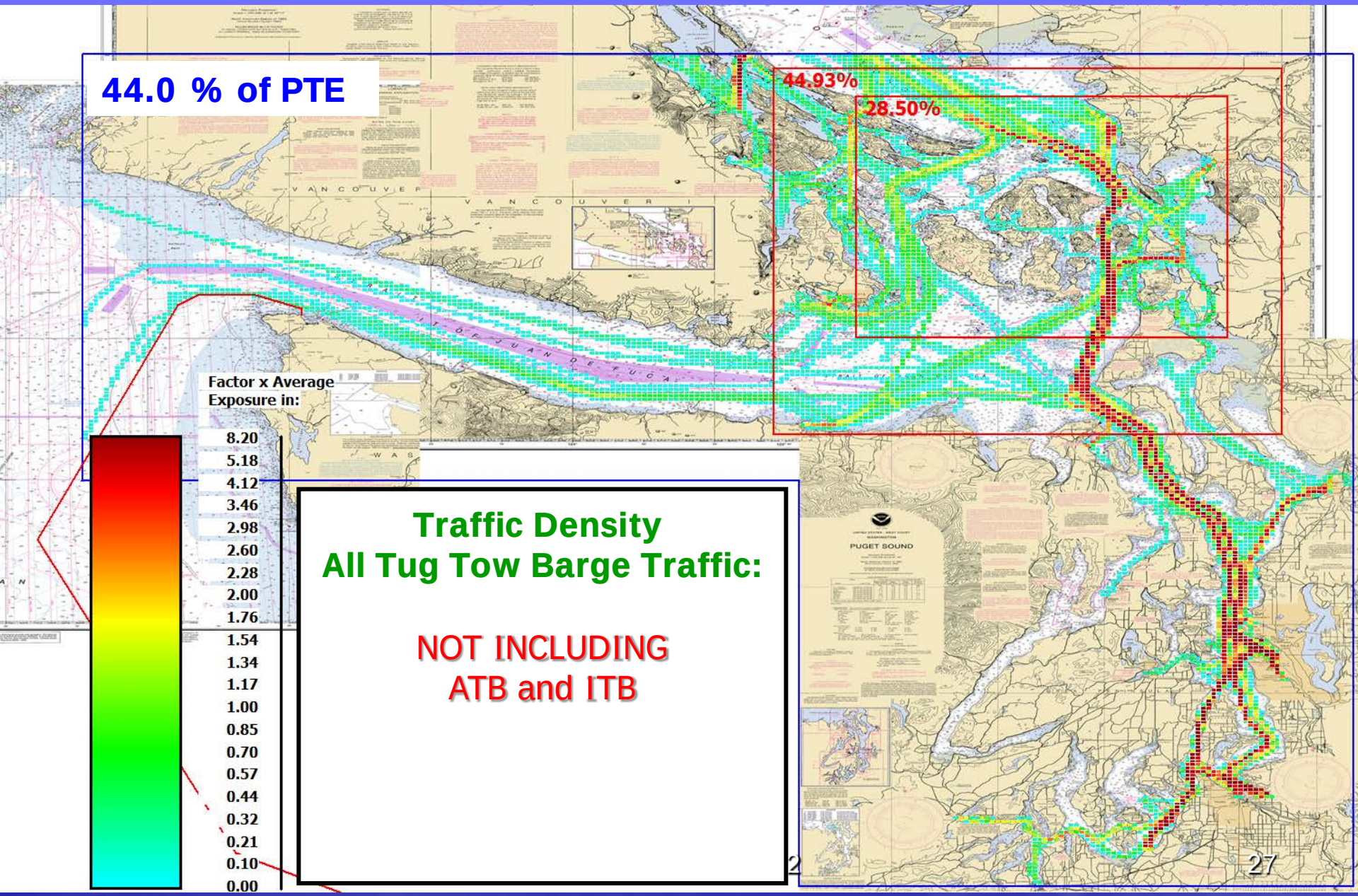
FORMER VTRA STUDY – ITB TRAFFIC DENSITY



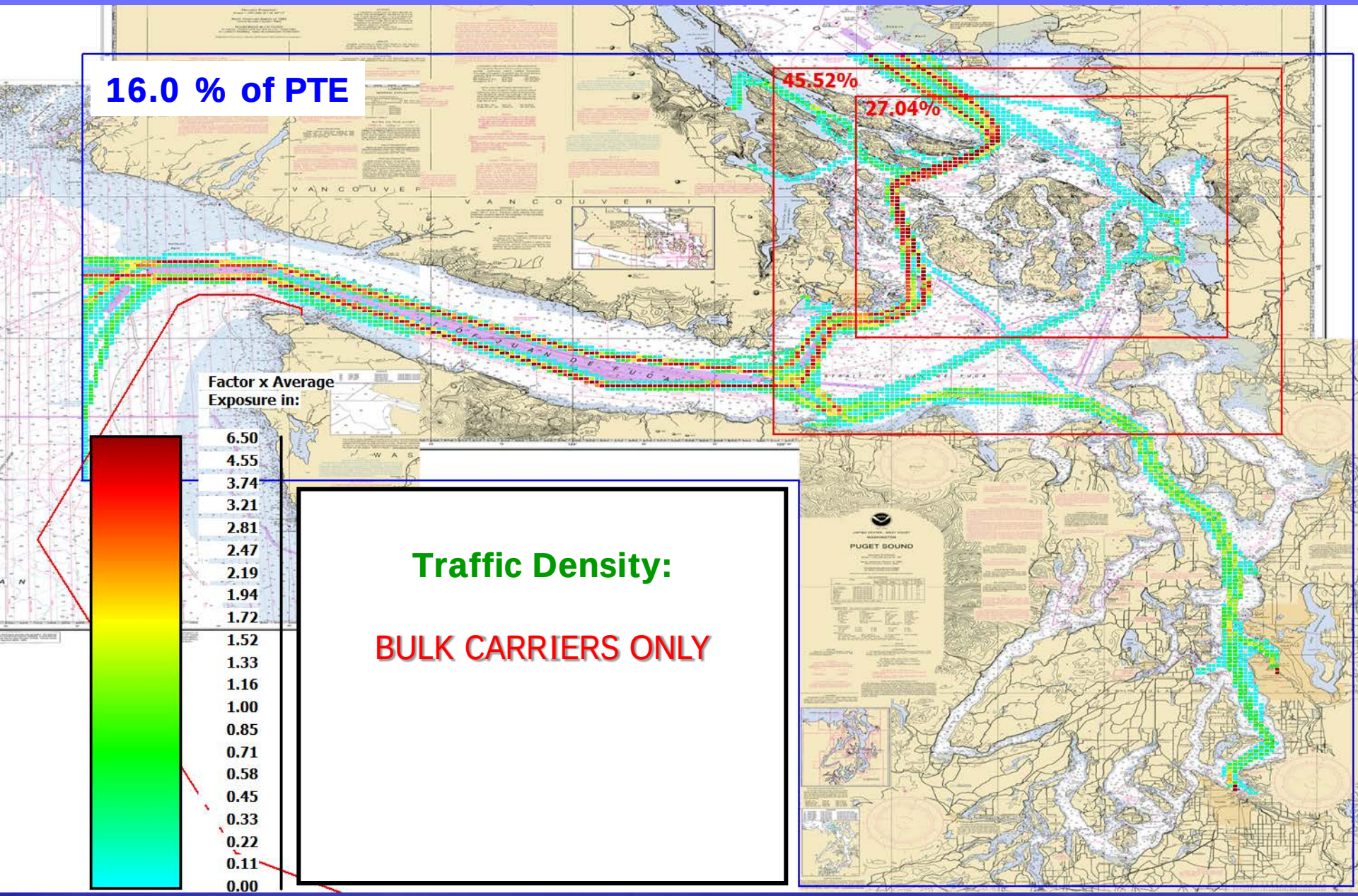
FORMER VTRA DATA – FOCUS VESSELS FOR UPDATED VTRA ???



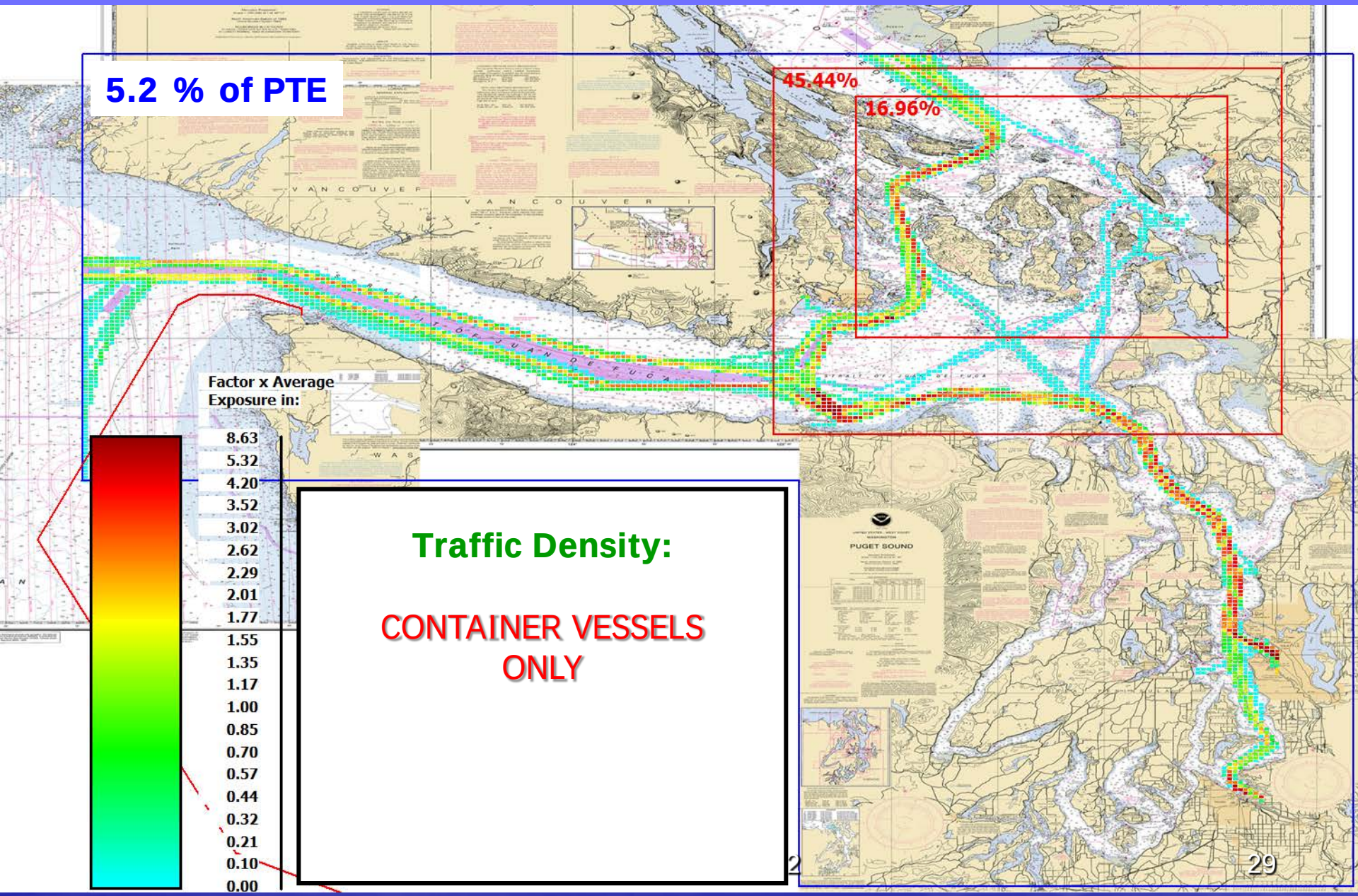
FORMER VTRA STUDY – TUG TOW BARGE TRAFFIC DENSITY



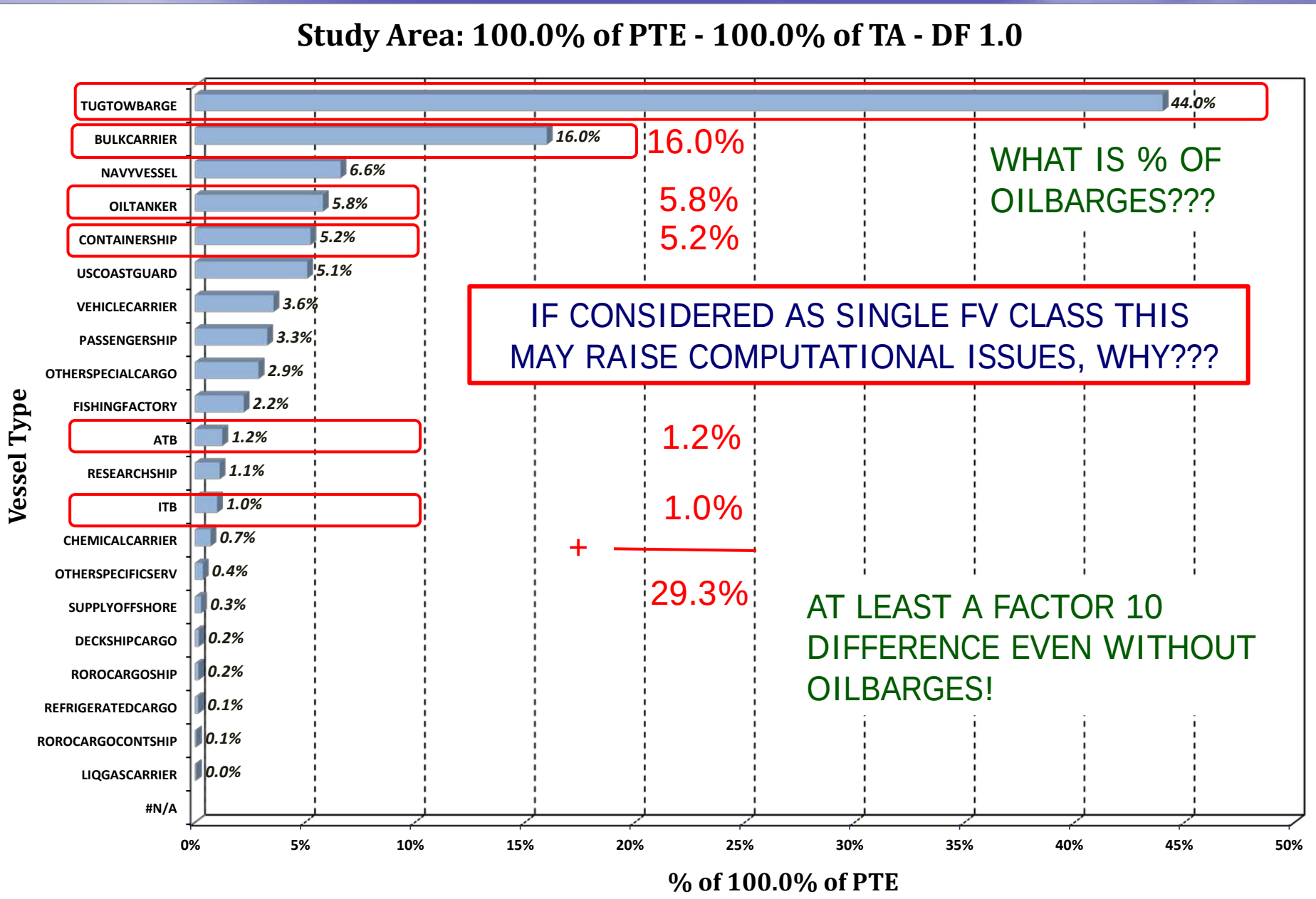
FORMER VTRA STUDY – BULK CARRIER TRAFFIC DENSITY



FORMER VTRA STUDY – CONTAINER VESSELS TRAFFIC DENSITY



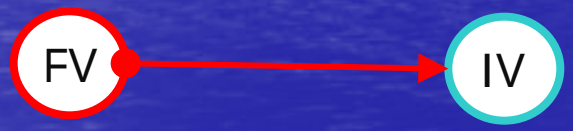
FORMER VTRA DATA – FOCUS VESSELS FOR UPDATED VTRA ???



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

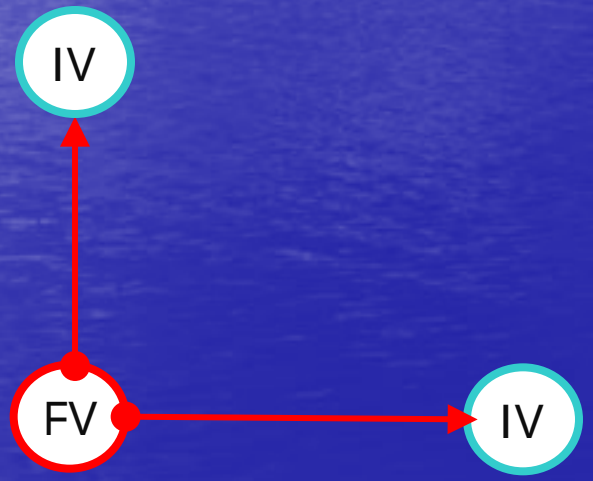


One FV-IV Interaction

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?

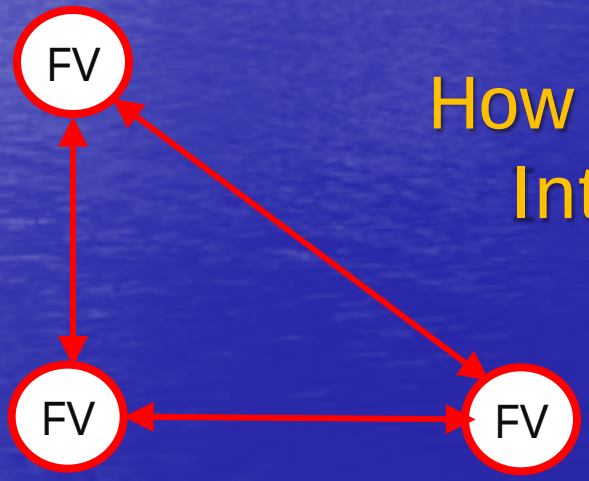
- First One

- Second One

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



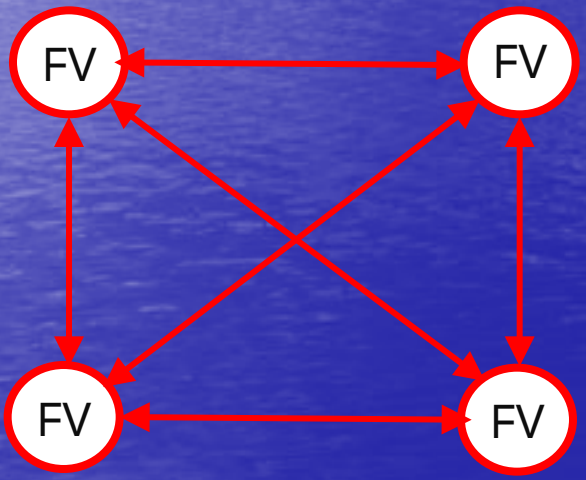
How many FV-IV Interactions?

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

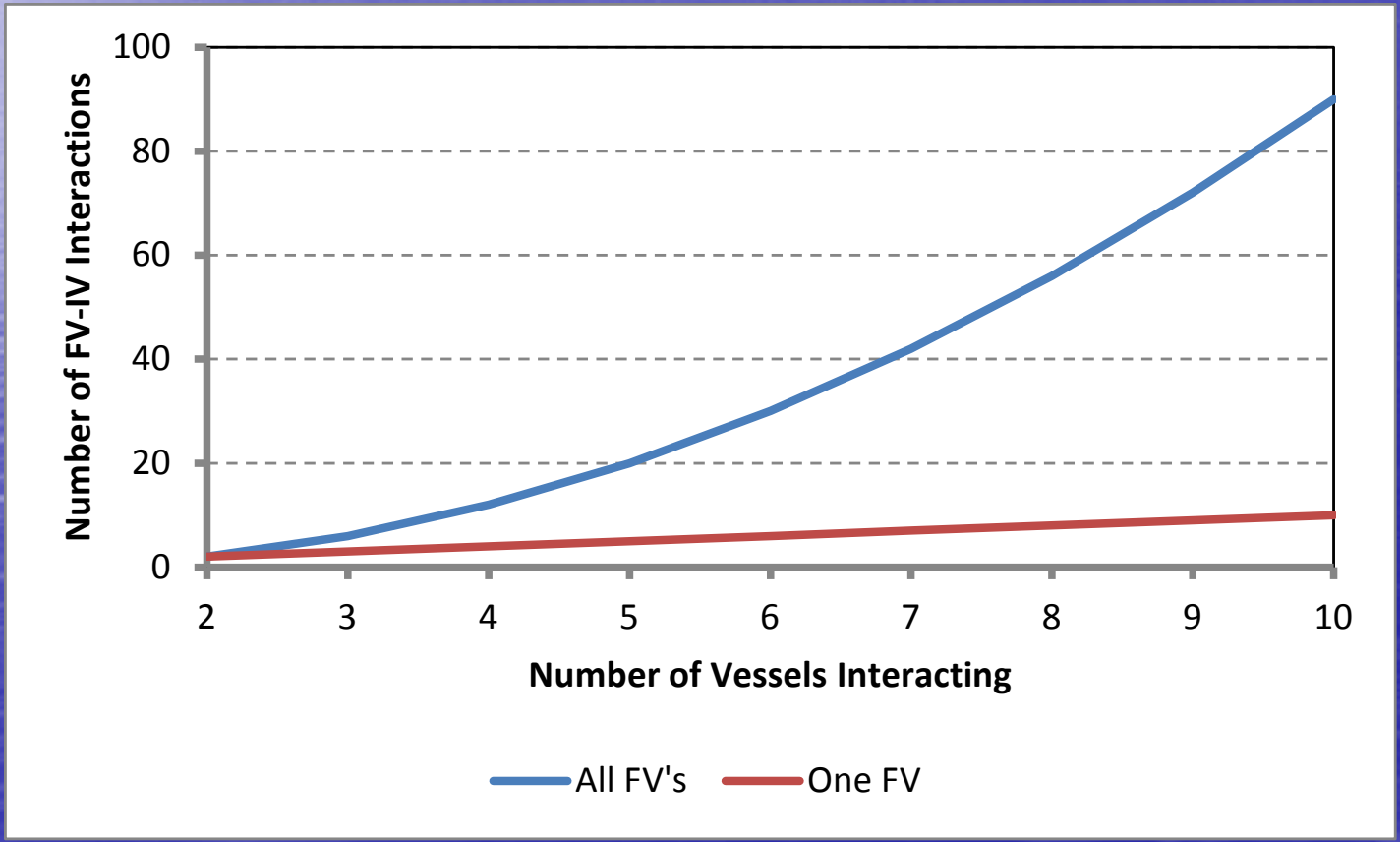


How many FV-IV Interactions?

Twelve FV-IV Interactions

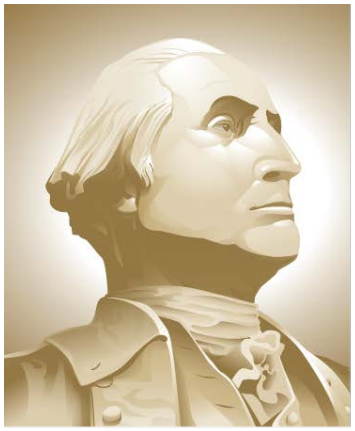
FORMER VTRA STUDY – COUNTING COLLISION INTERACTIONS

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



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FORMER VTRA STUDY – 26 DIFFERENT VESSEL TYPES

FORMER VTRA STUDY

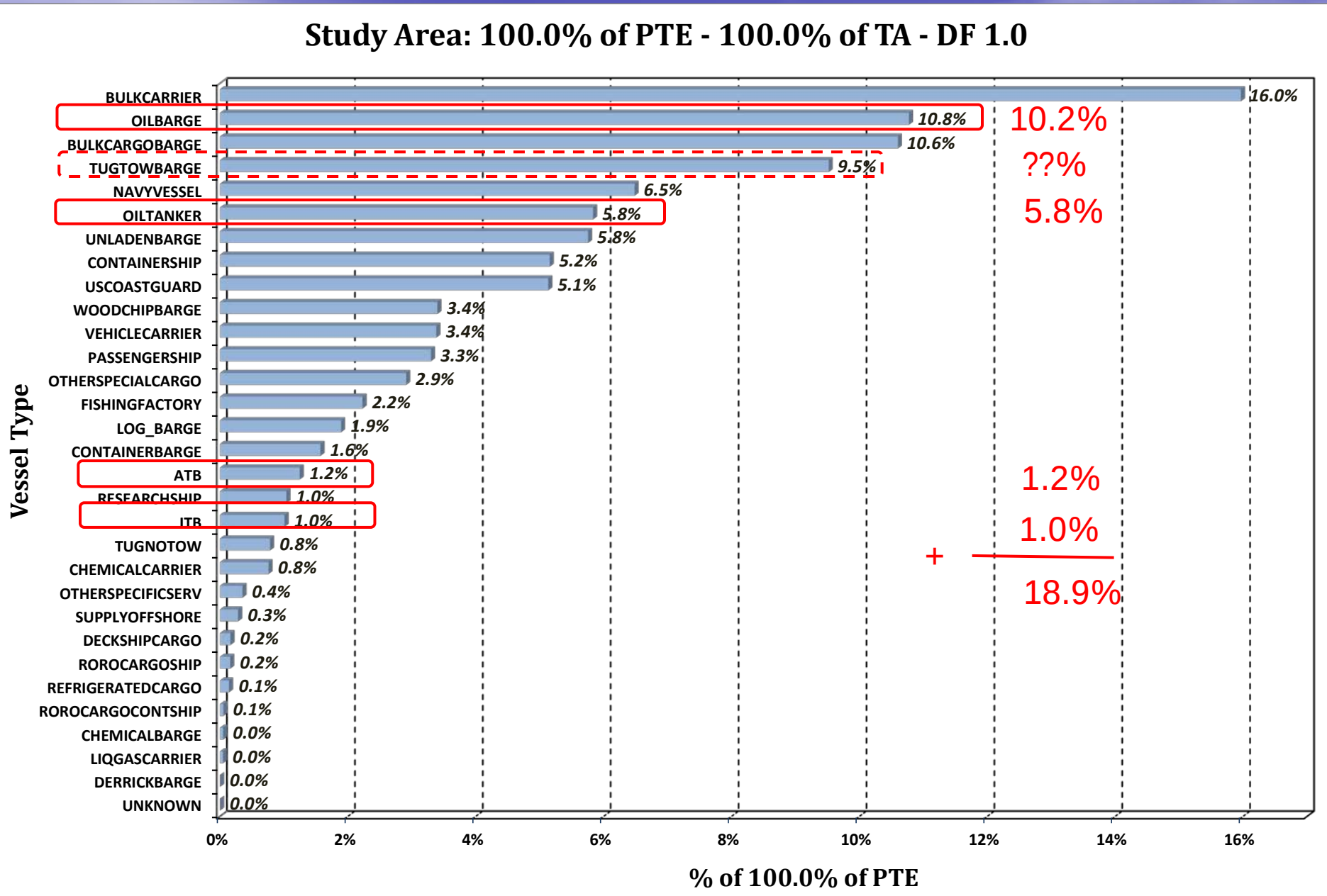
VESSEL TYPE
TUGTOWBARGE
ATB
ITB

BARGE TYPE
OILBARGE
TUGNOTOW
BULKCARGOBARGE
CHEMICALBARGE
CONTAINERBARGE
DERRICKBARGE
UNLADENBARGE
LOG_BARGE
WOODCHIPBARGE

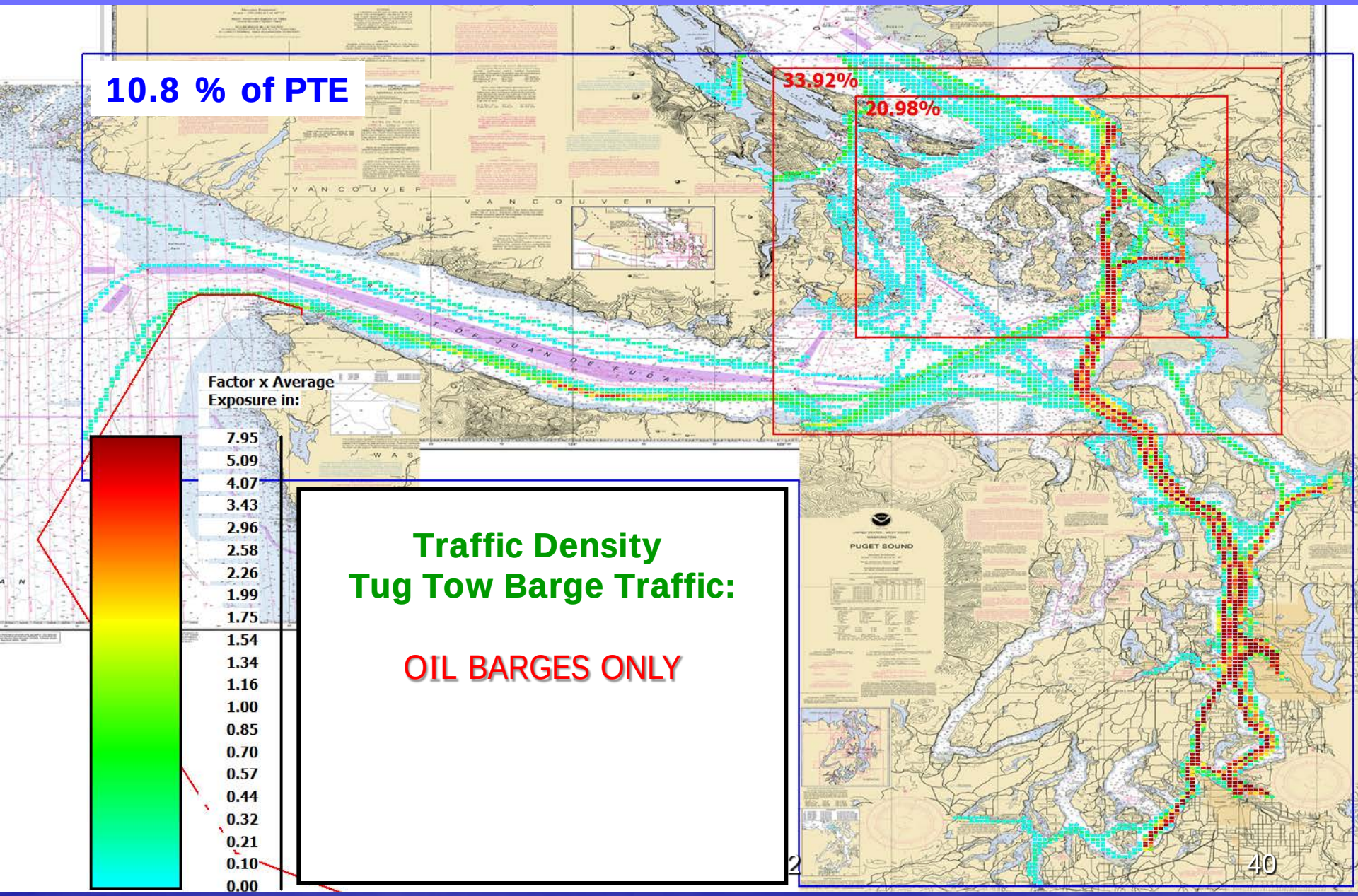
UPDATED VTRA STUDY

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

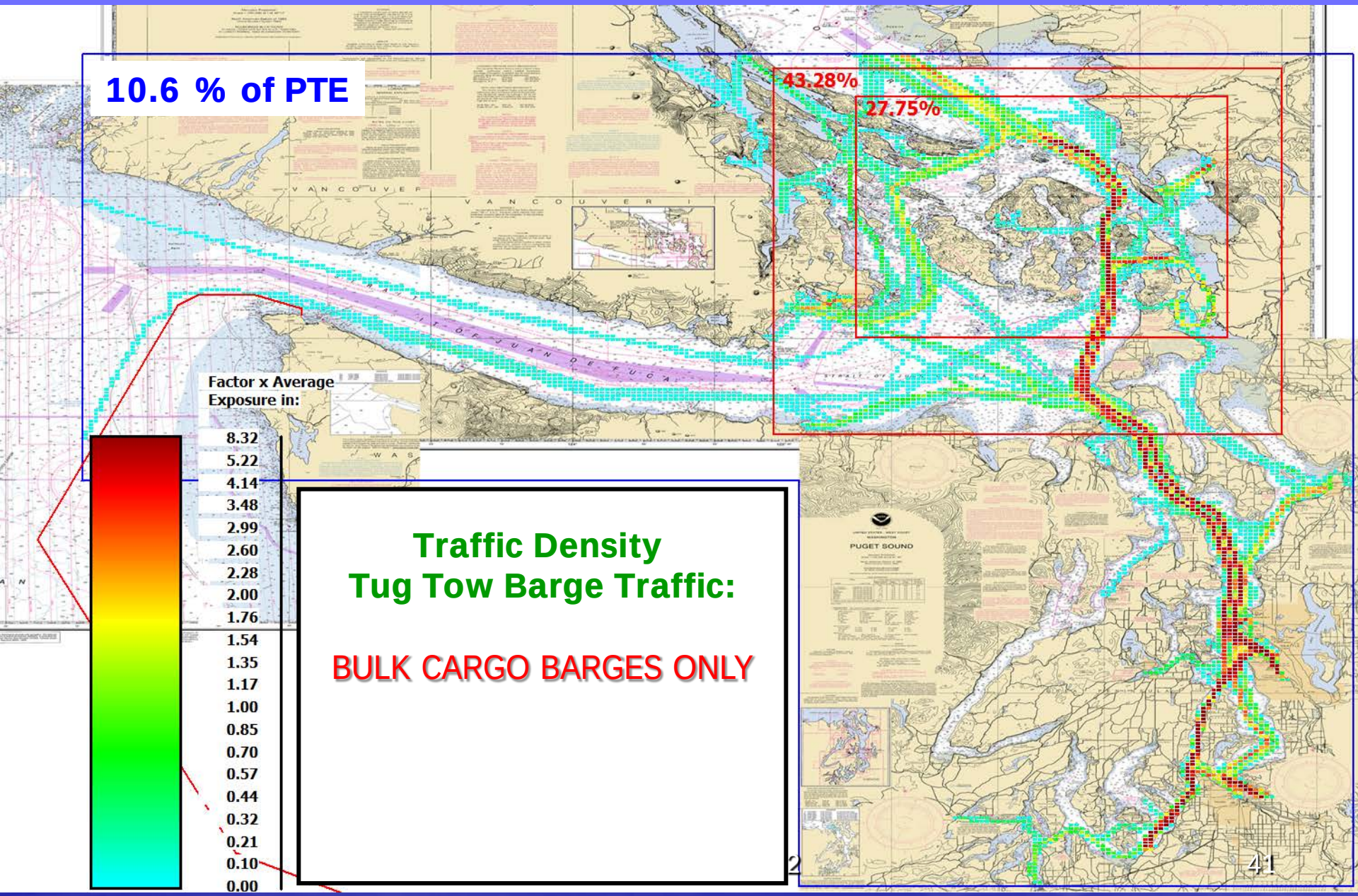
2005 VTOSS DATA – WITH BREAK DOWN OF TUG WITH TOW



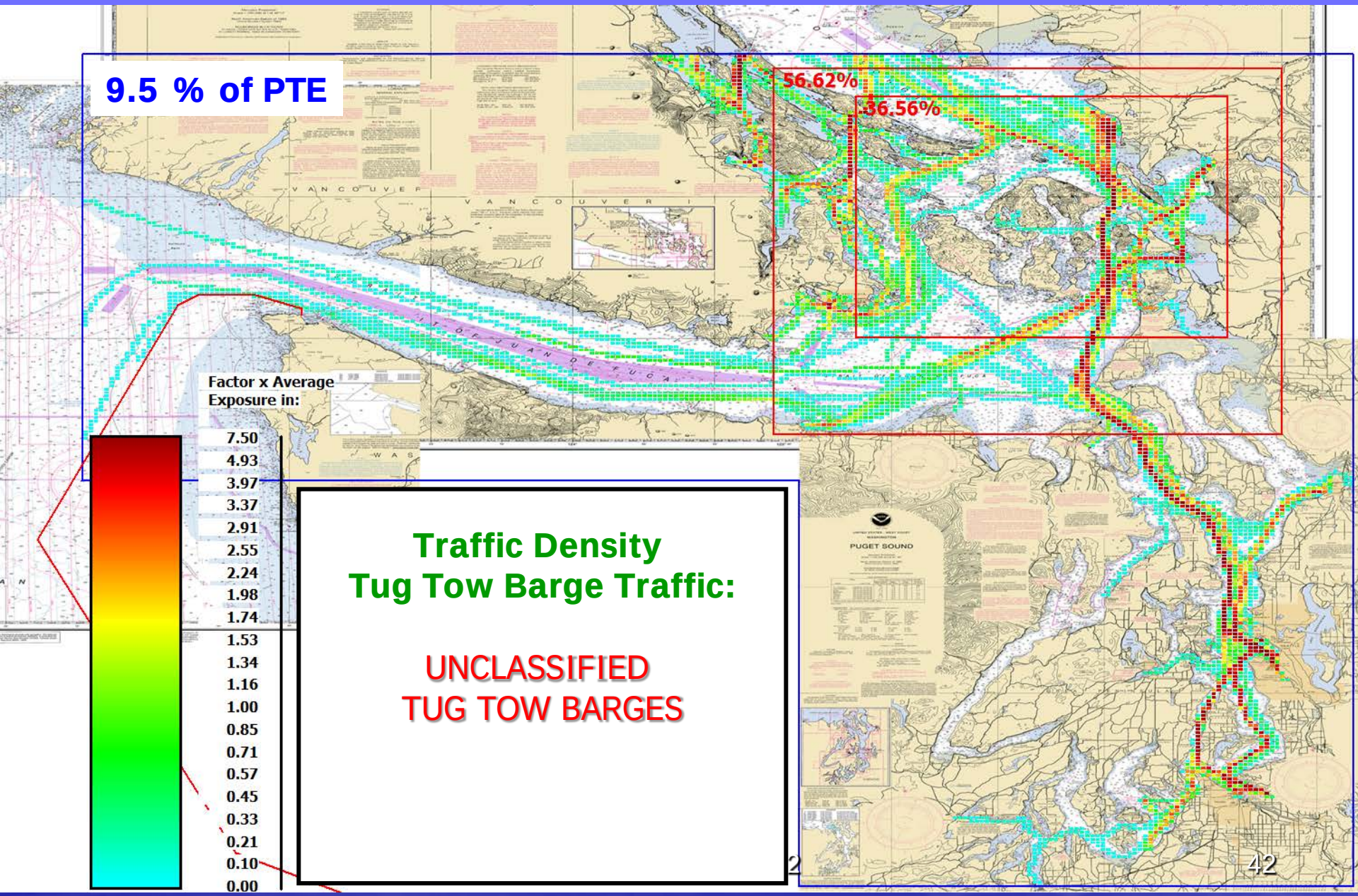
FORMER VTRA STUDY – OIL BARGE TRAFFIC DENSITY



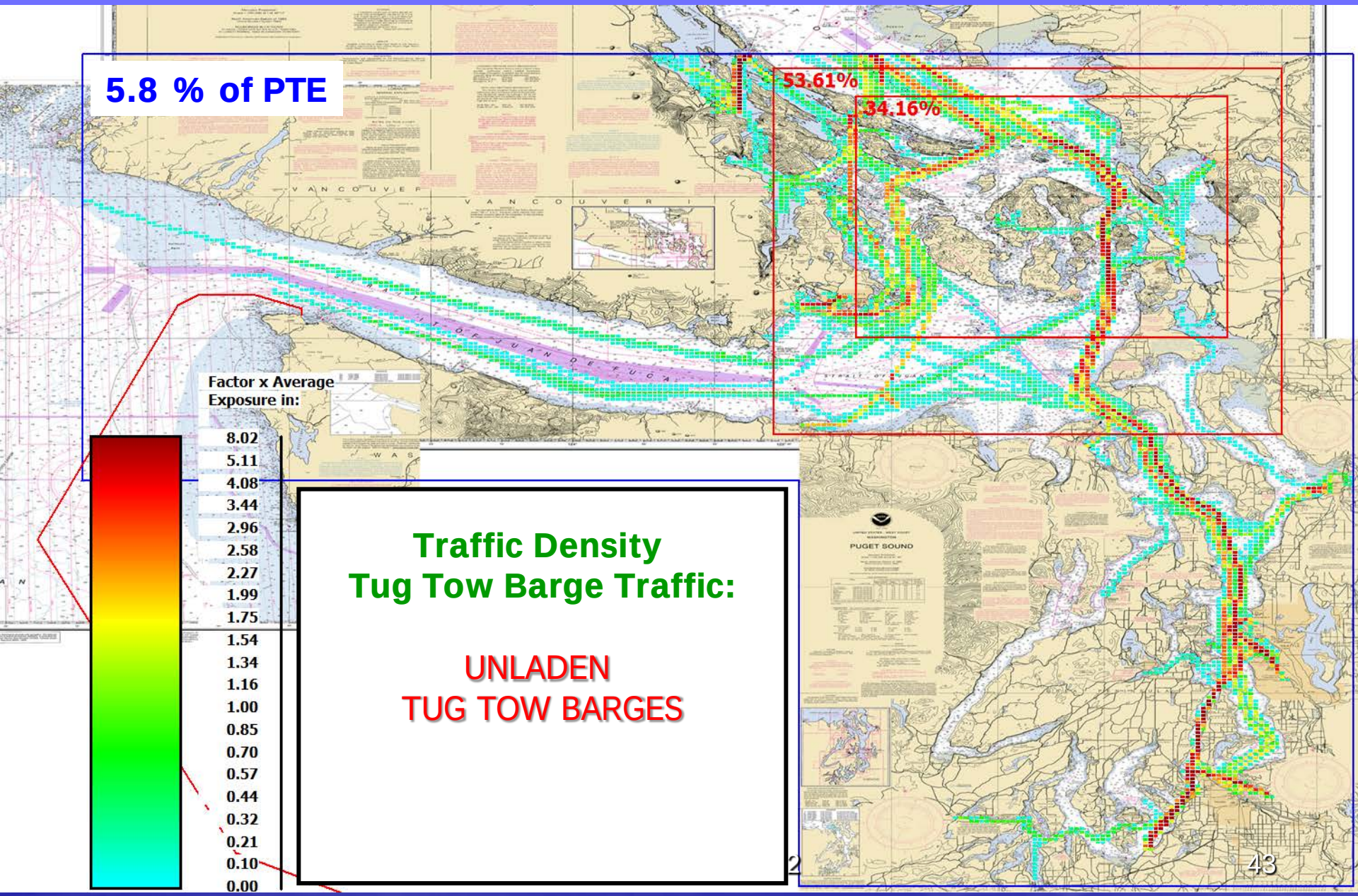
FORMER VTRA STUDY – BULK CARGO BARGE TRAFFIC DENSITY



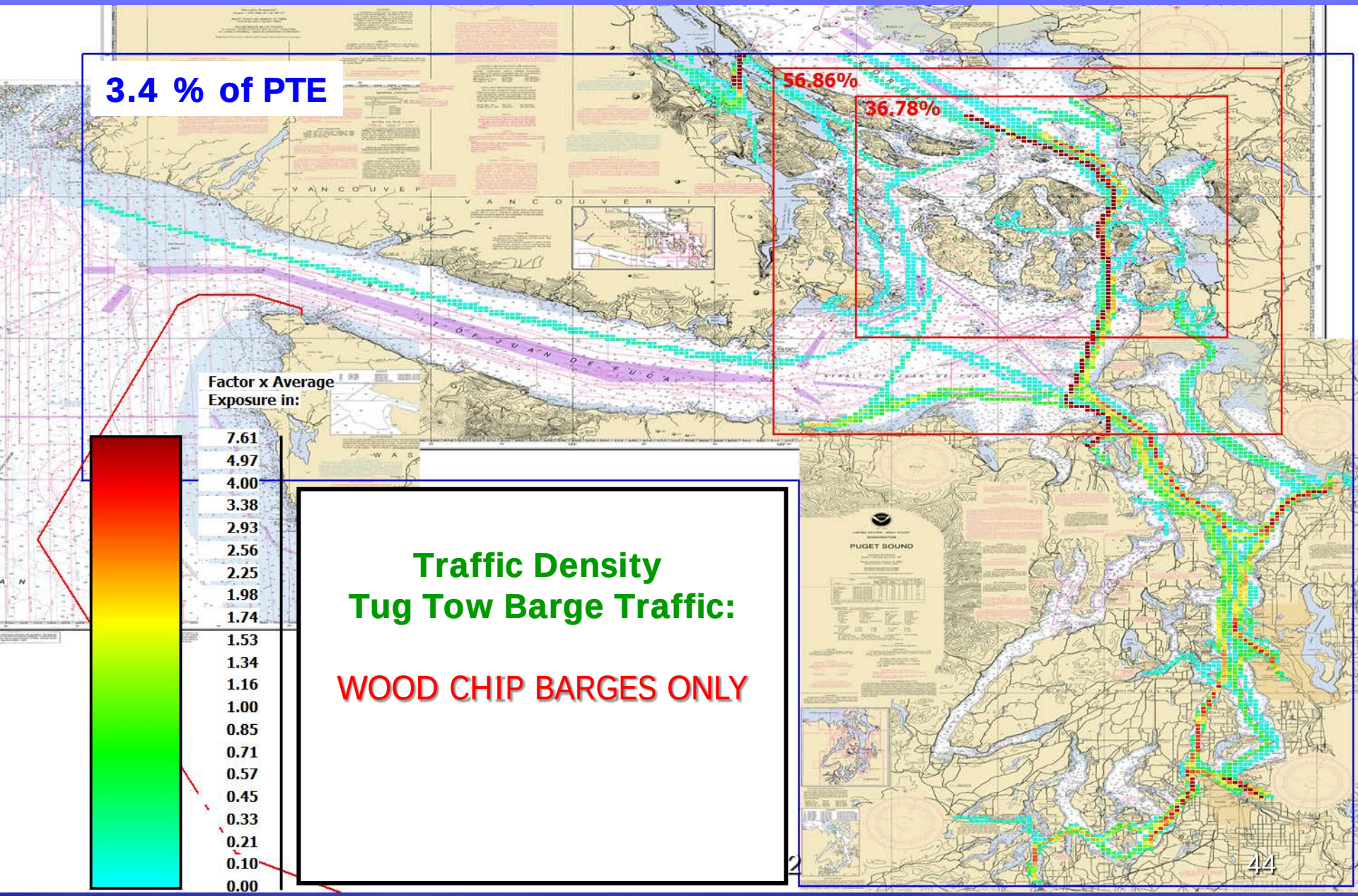
FORMER VTRA STUDY – UNCLASS TUGS TRAFFIC DENSITY



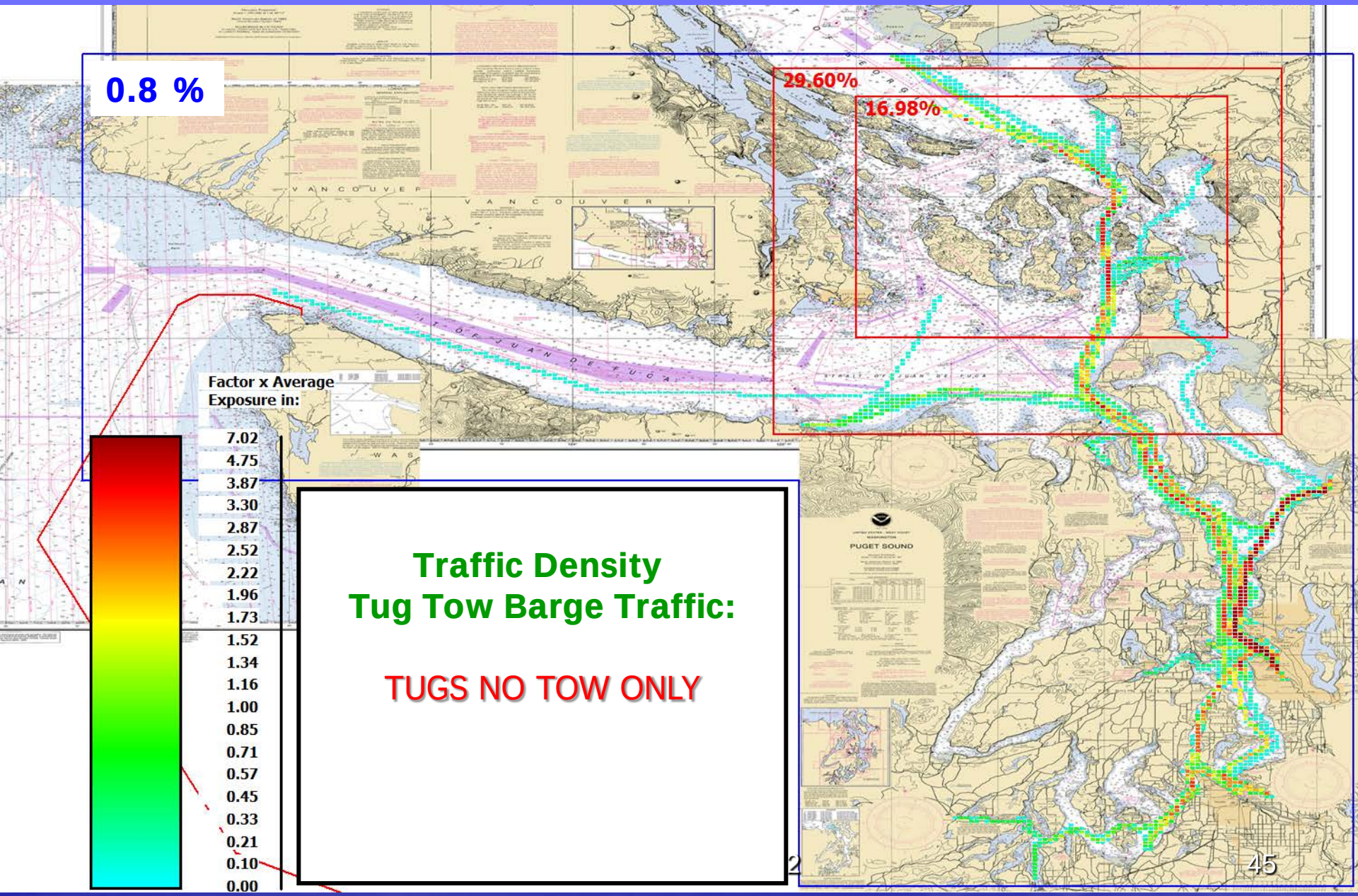
FORMER VTRA STUDY – UNLADEN BARGE TRAFFIC DENSITY



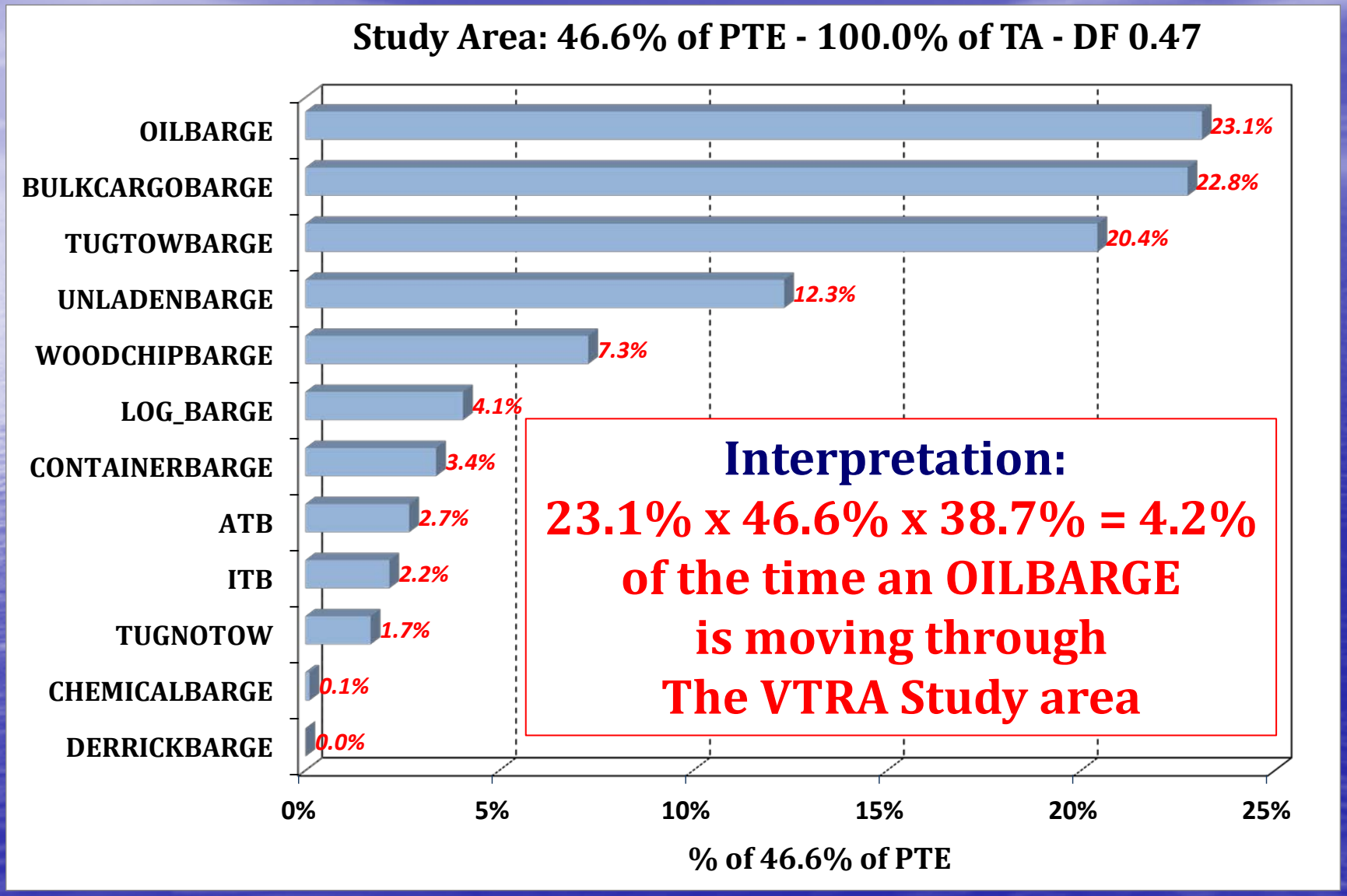
FORMER VTRA STUDY – WOOD CHIP BARGE TRAFFIC DENSITY



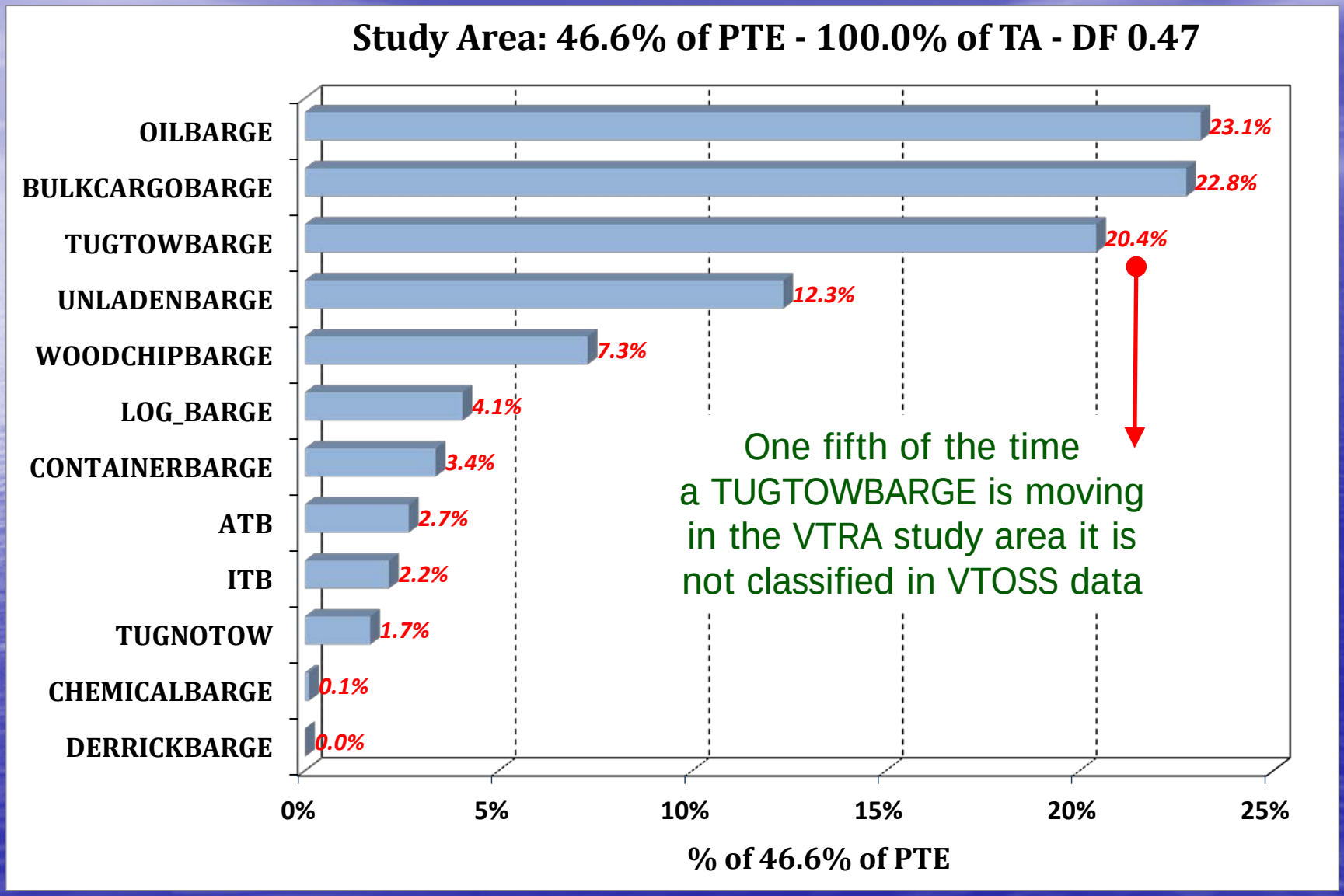
FORMER VTRA STUDY – TUGS NO TOW TRAFFIC DENSITY



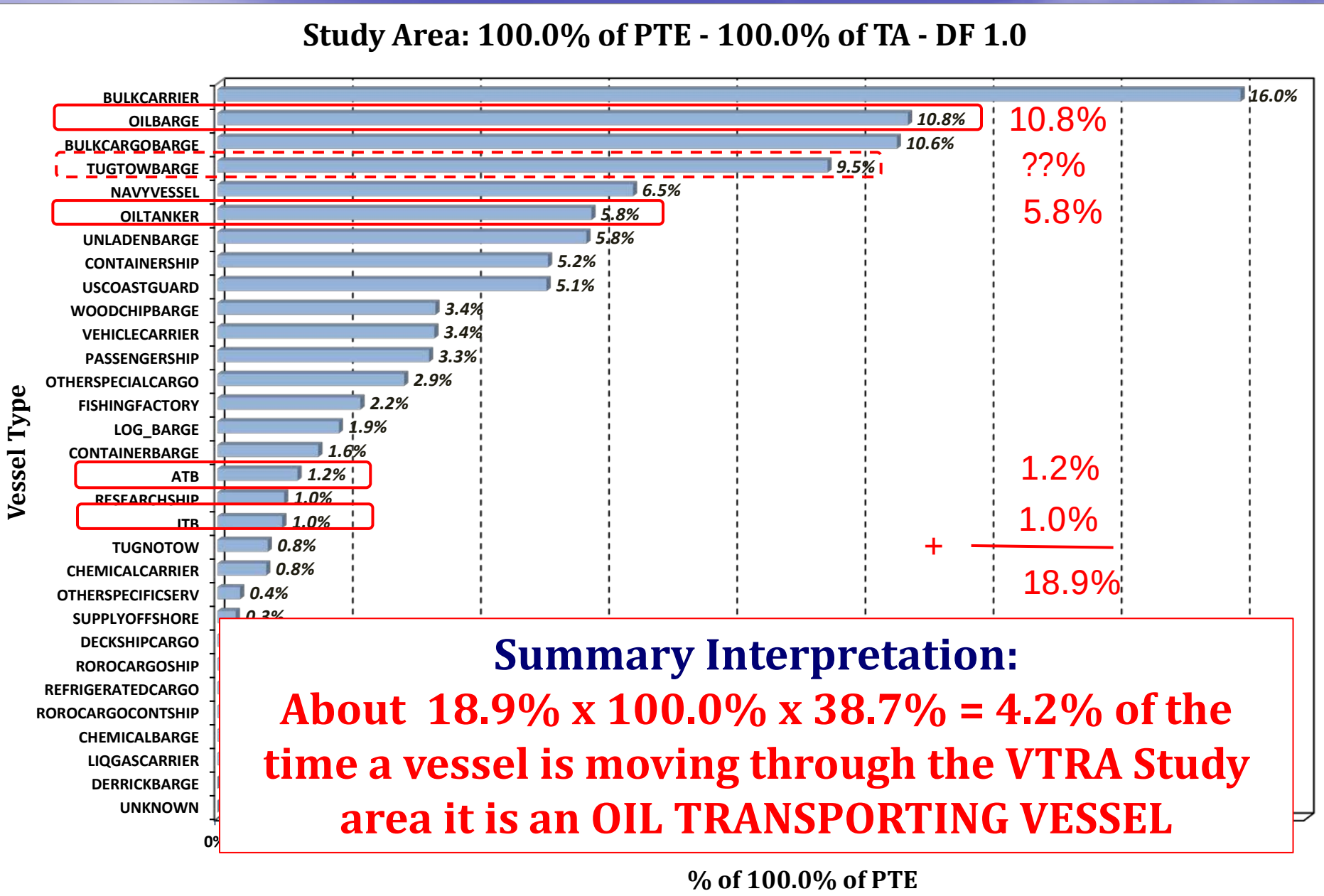
2005 VTOSS DATA – PRE = 38.7% of Total Time Exposure



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



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

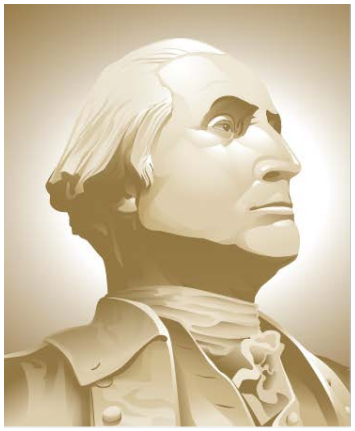


Summary Interpretation:

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

FORMER VTRA - TRAFFIC DENSITY BY VESSEL TYPE AND LOCATION

Presentation by: J. Rene van Dorp



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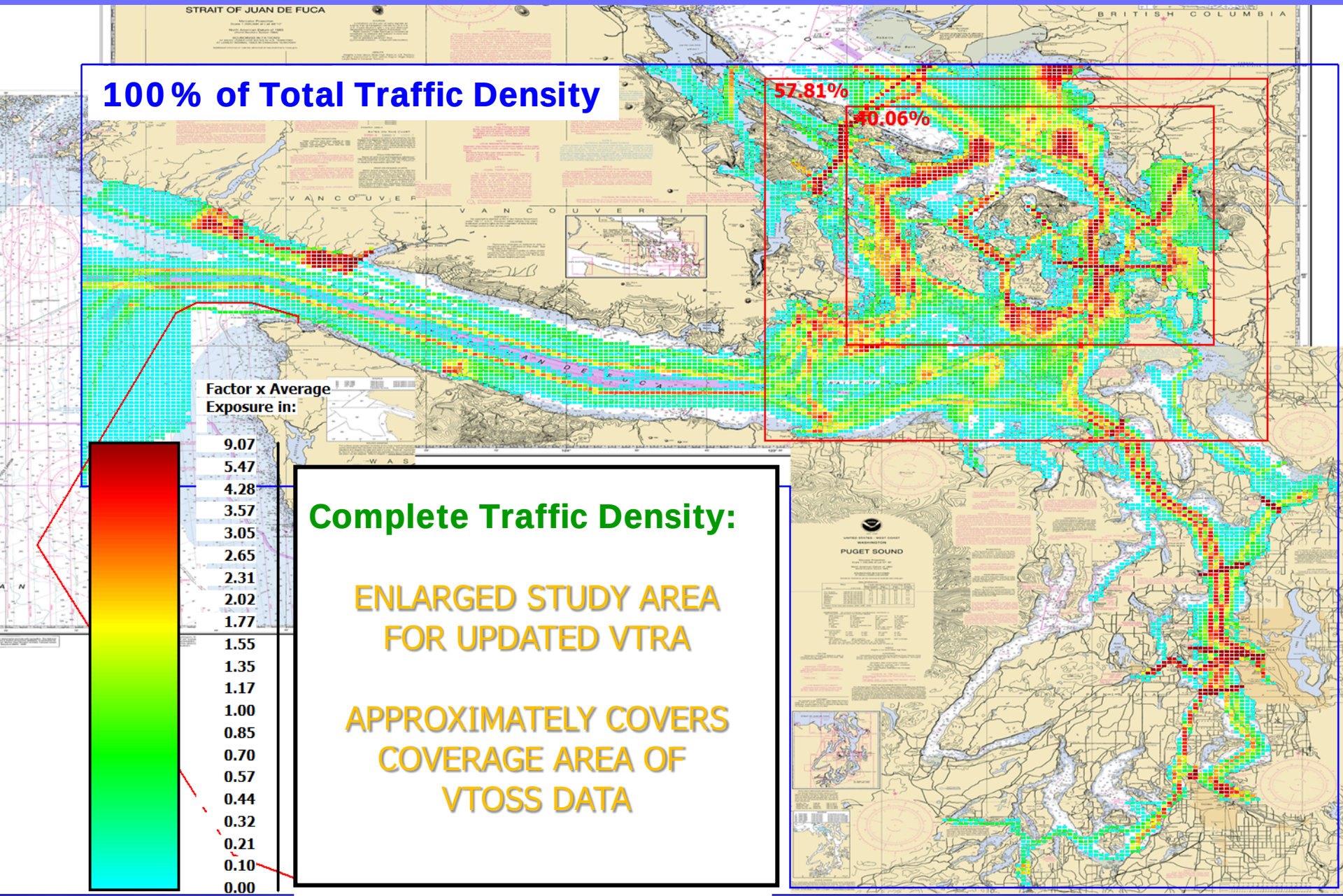
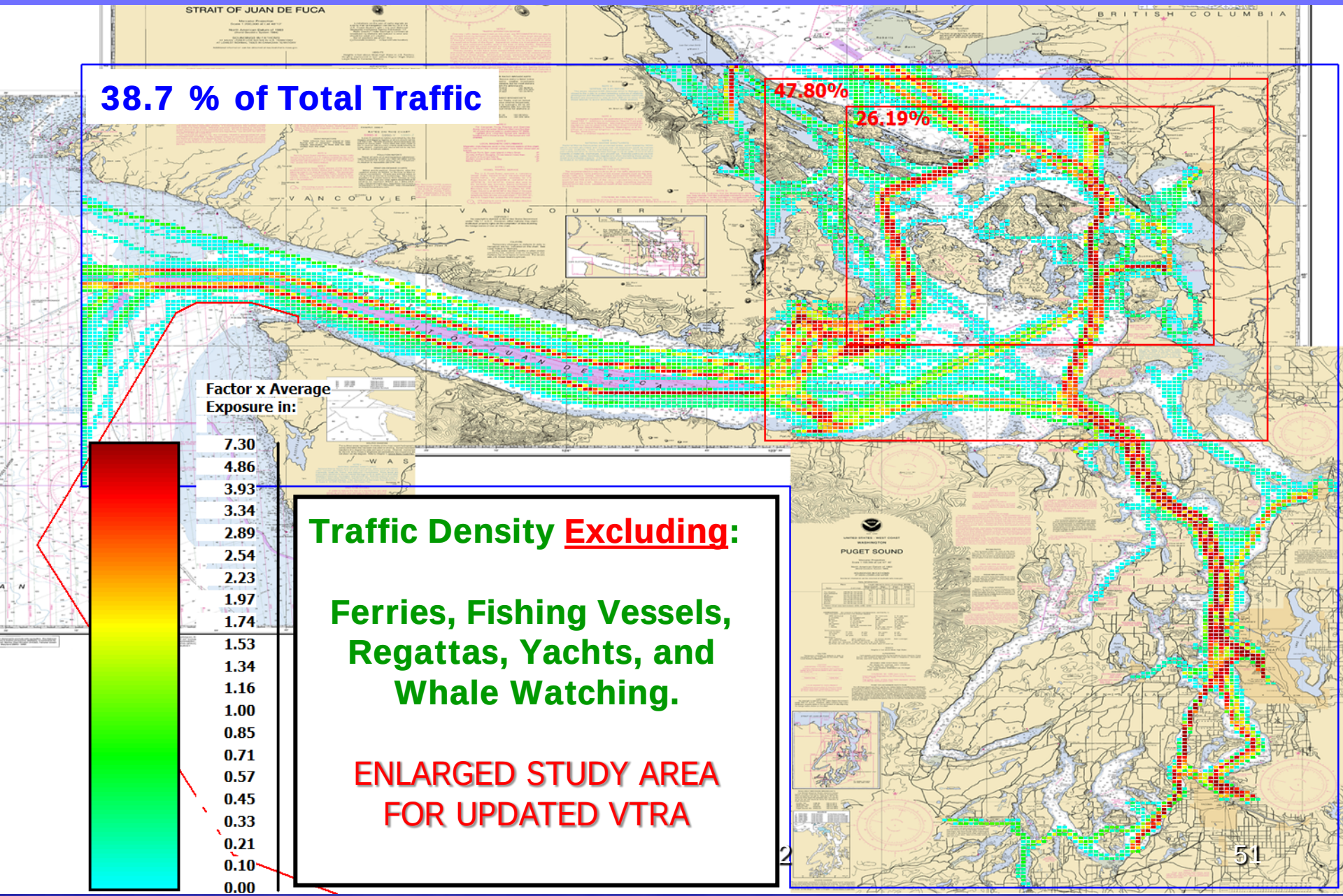
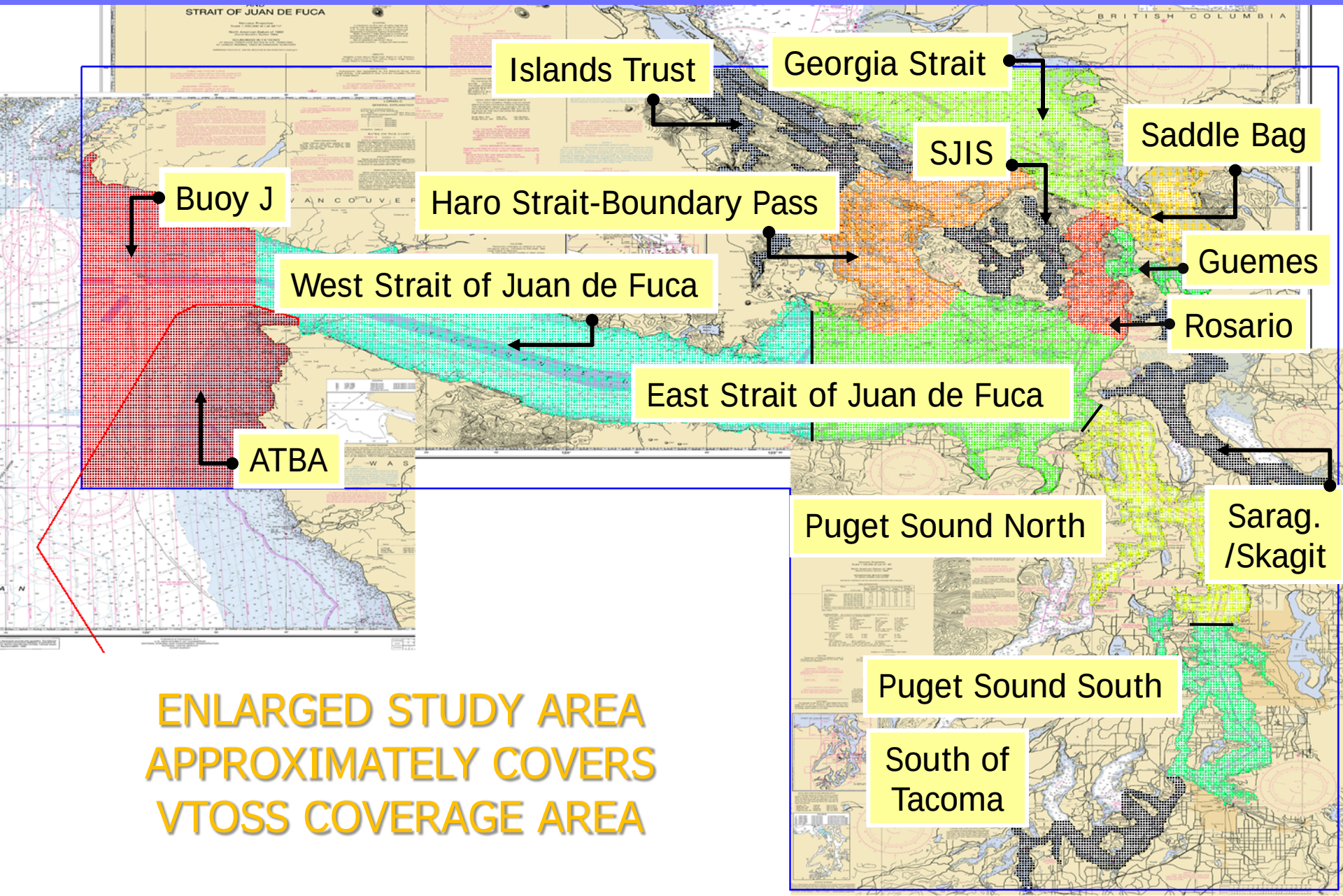
FORMER VTRA STUDY – COMPLETE TRAFFIC DENSITY



FORMER VTRA STUDY – 38.7 % OF TOTAL TRAFFIC DENSITY



FOR UPDATED VTRA - 15 DEFINED LOCATIONS



ENLARGED STUDY AREA APPROXIMATELY COVERS VTOSS COVERAGE AREA

2005 VTOSS DATA – TRAFFIC DENSITY BY LOCATION

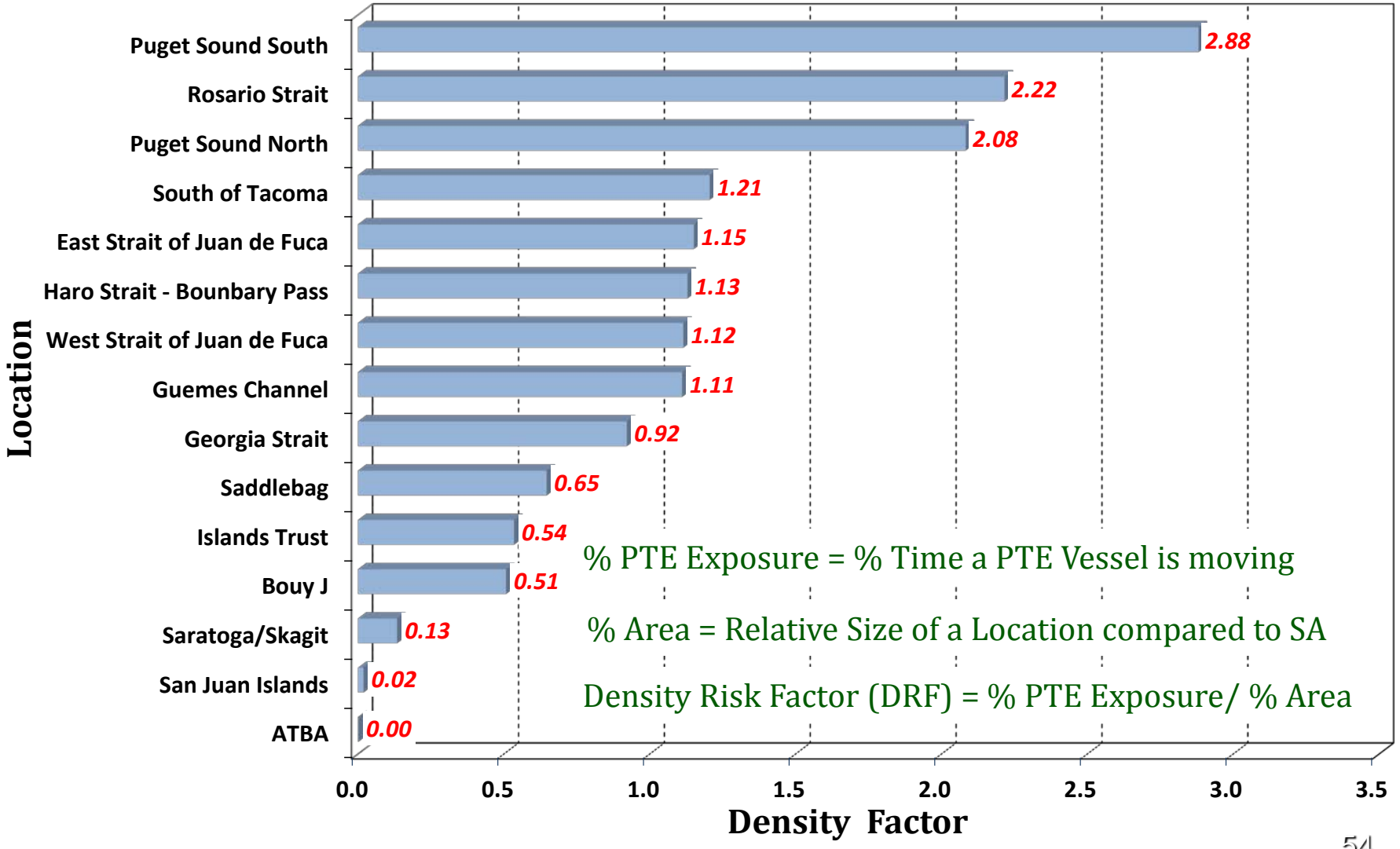
% of PTE Exposure = % of Time a PTE Vessel Travels within an Area

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

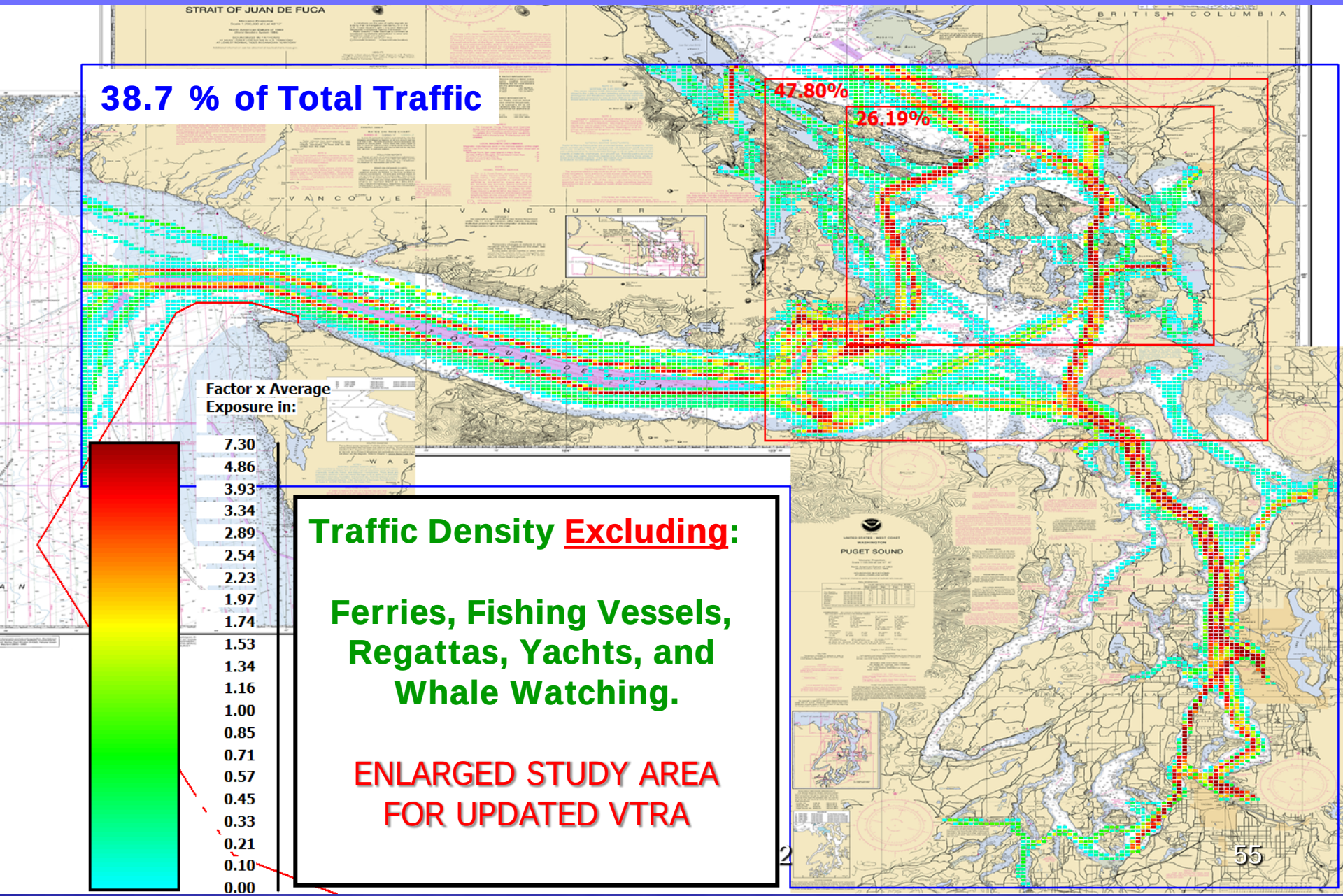
Density Risk Factor (DF) = % PTE Exposure/ %Area

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**

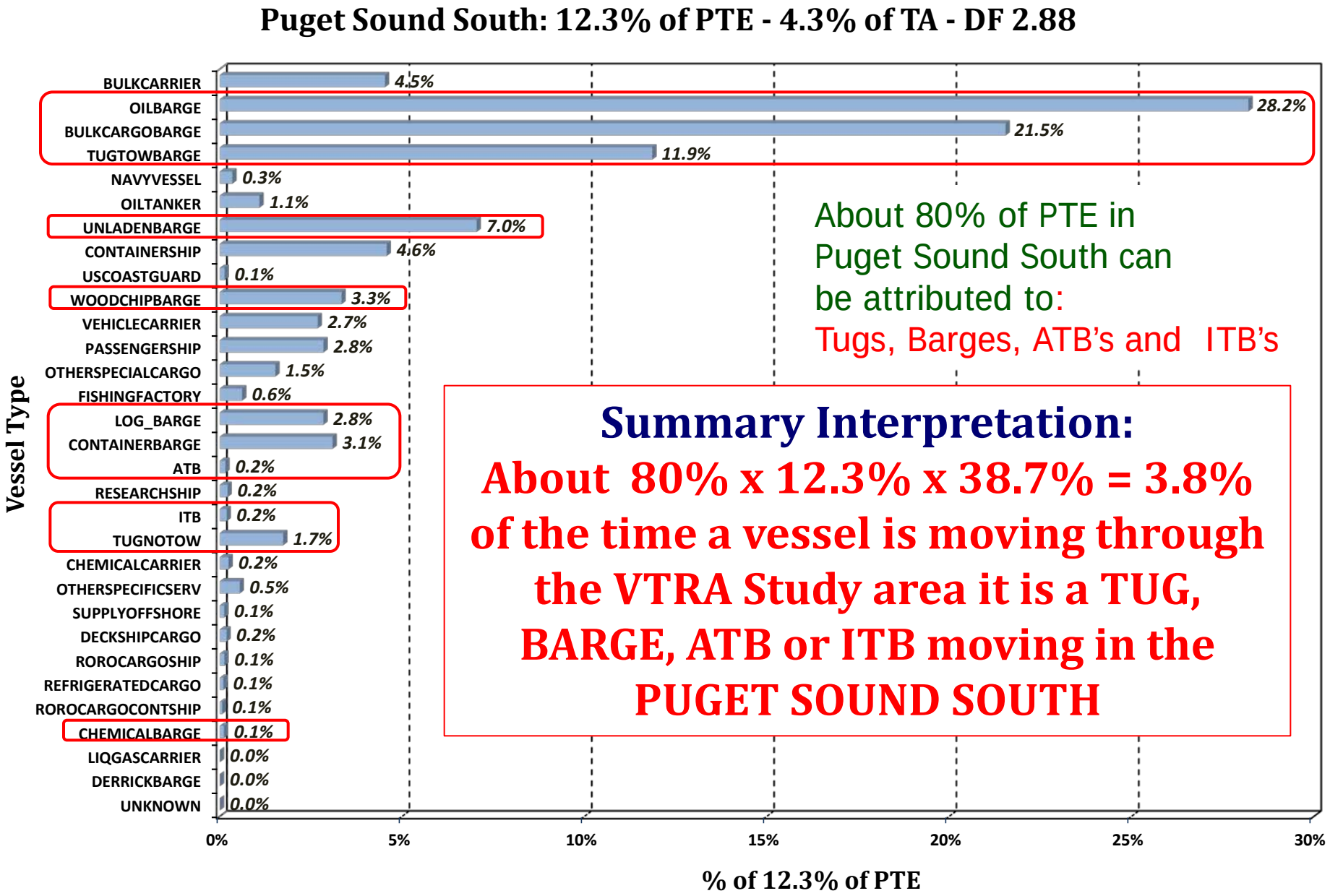
2005 VTOSS DATA – TRAFFIC DENSITY BY LOCATION



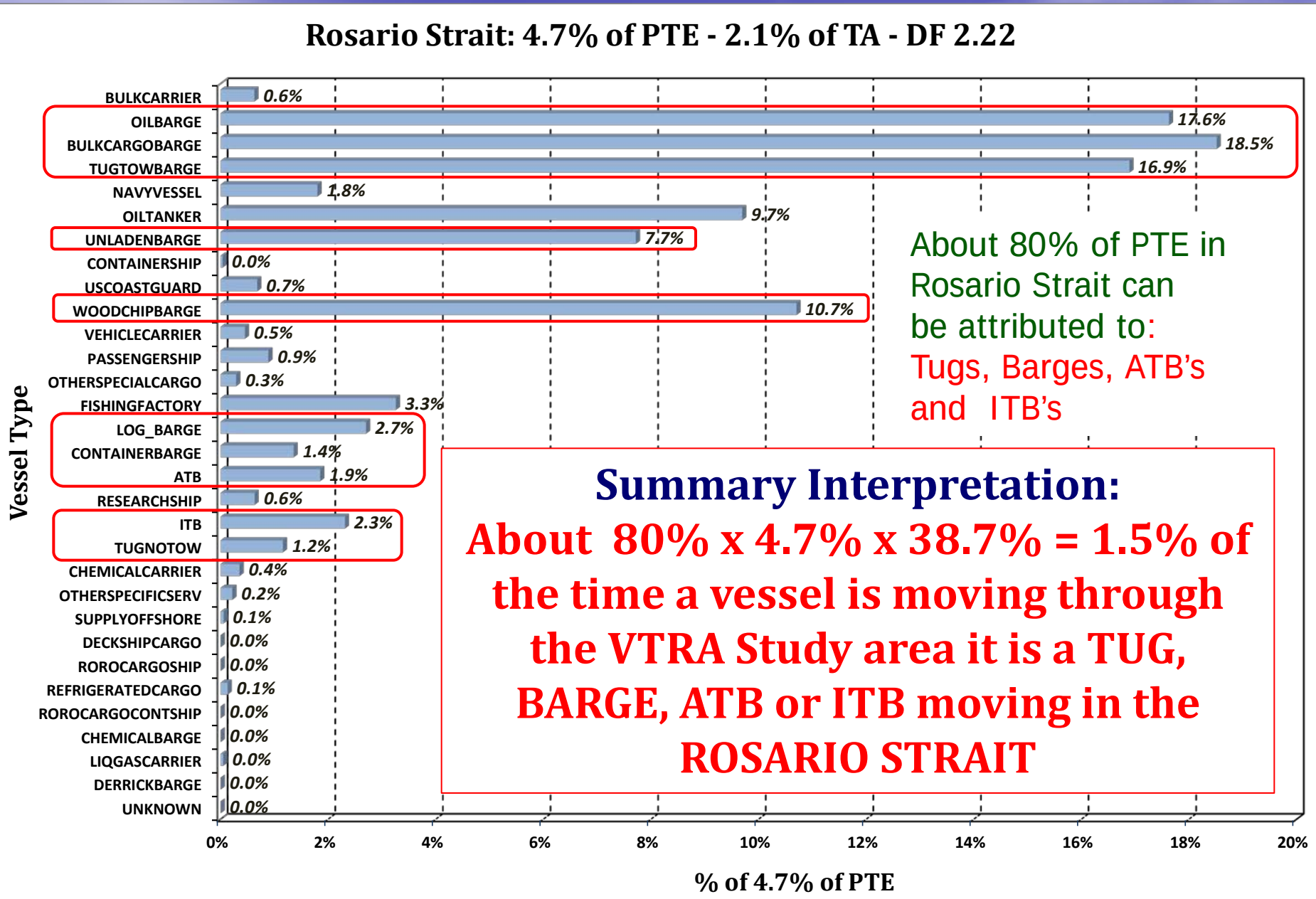
FORMER VTRA STUDY – 38.7 % OF TOTAL TRAFFIC DENSITY



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



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

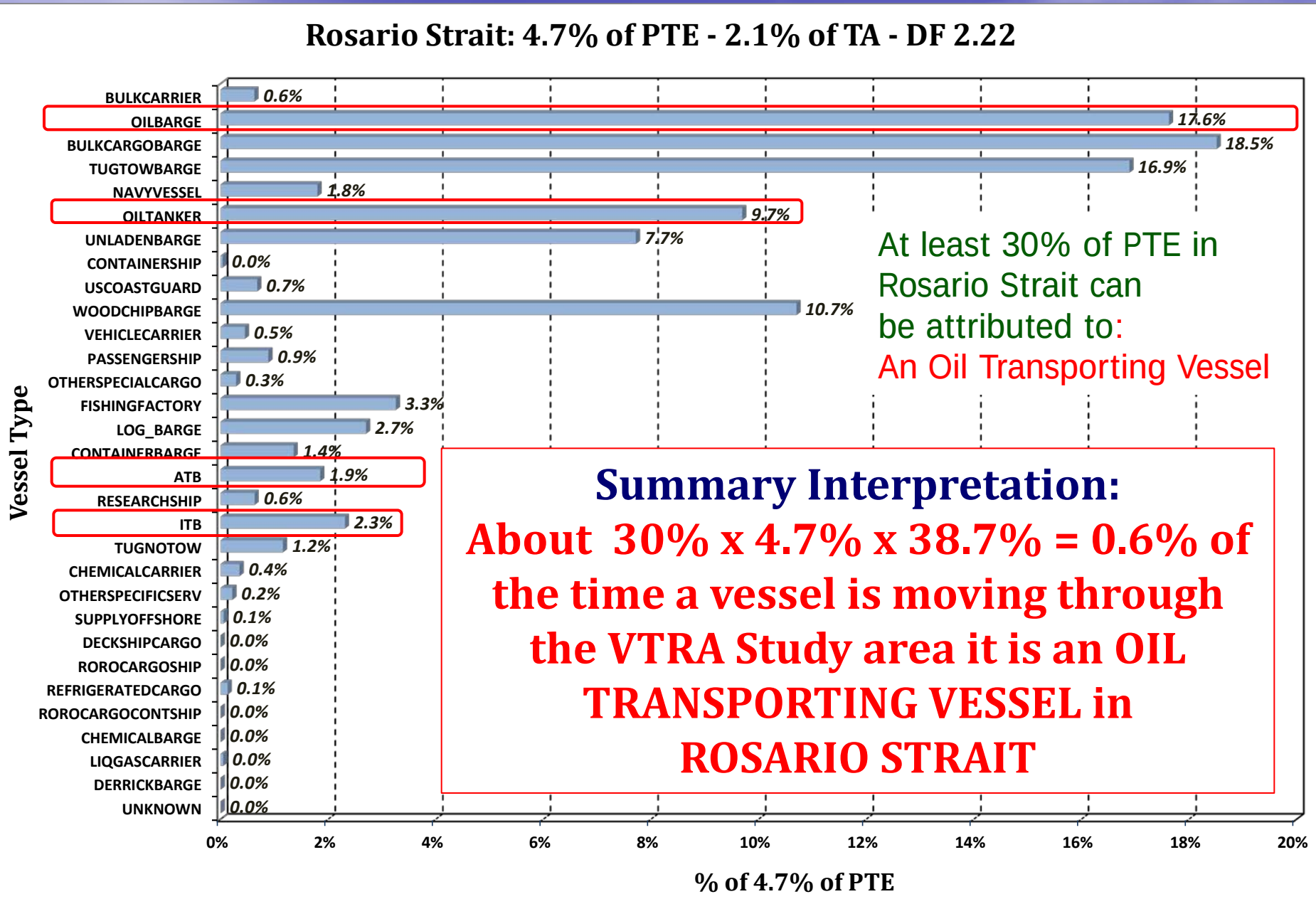


About 80% of PTE in Rosario Strait can be attributed to: Tugs, Barges, ATB's and ITB's

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

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

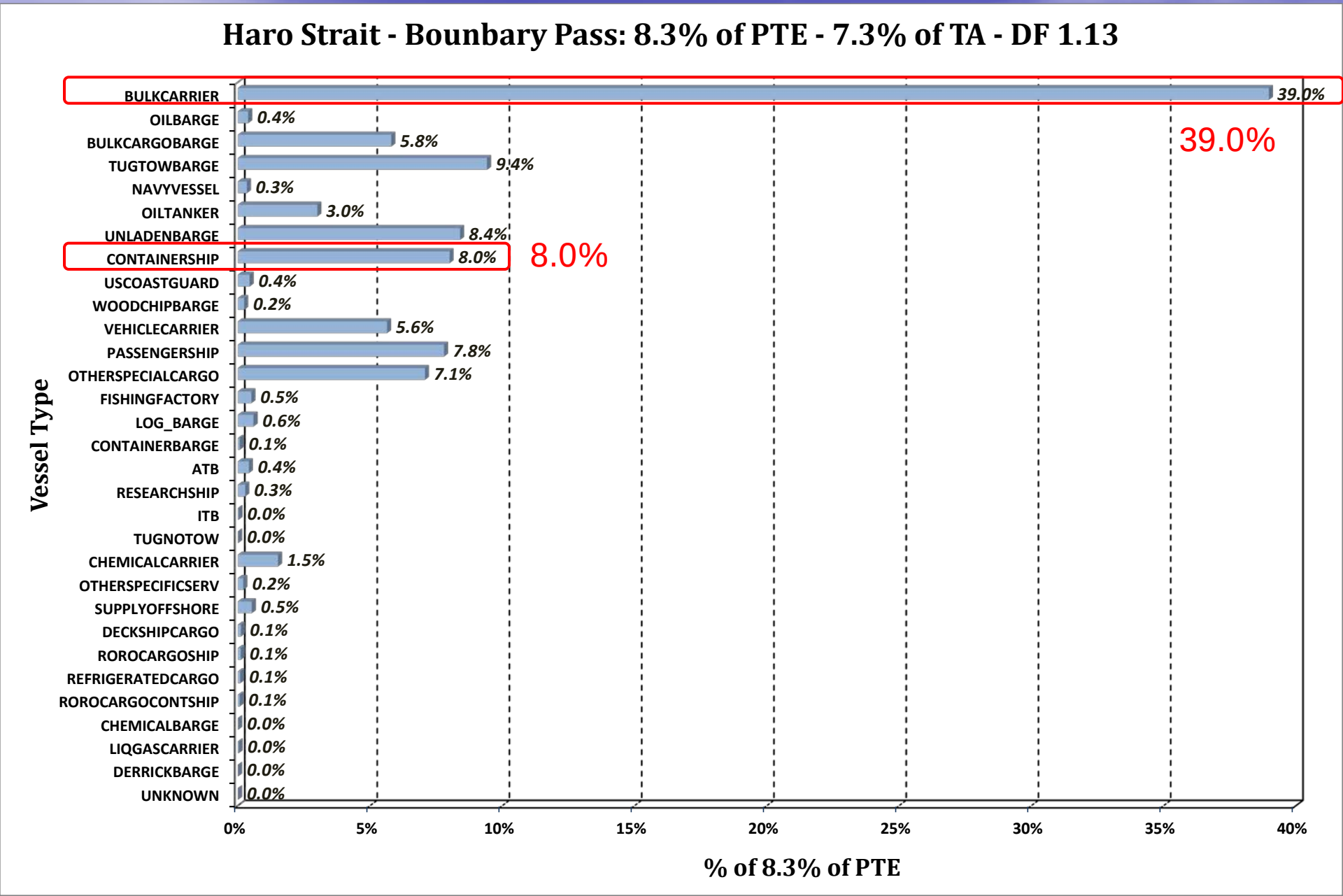


At least 30% of PTE in Rosario Strait can be attributed to:
An Oil Transporting Vessel

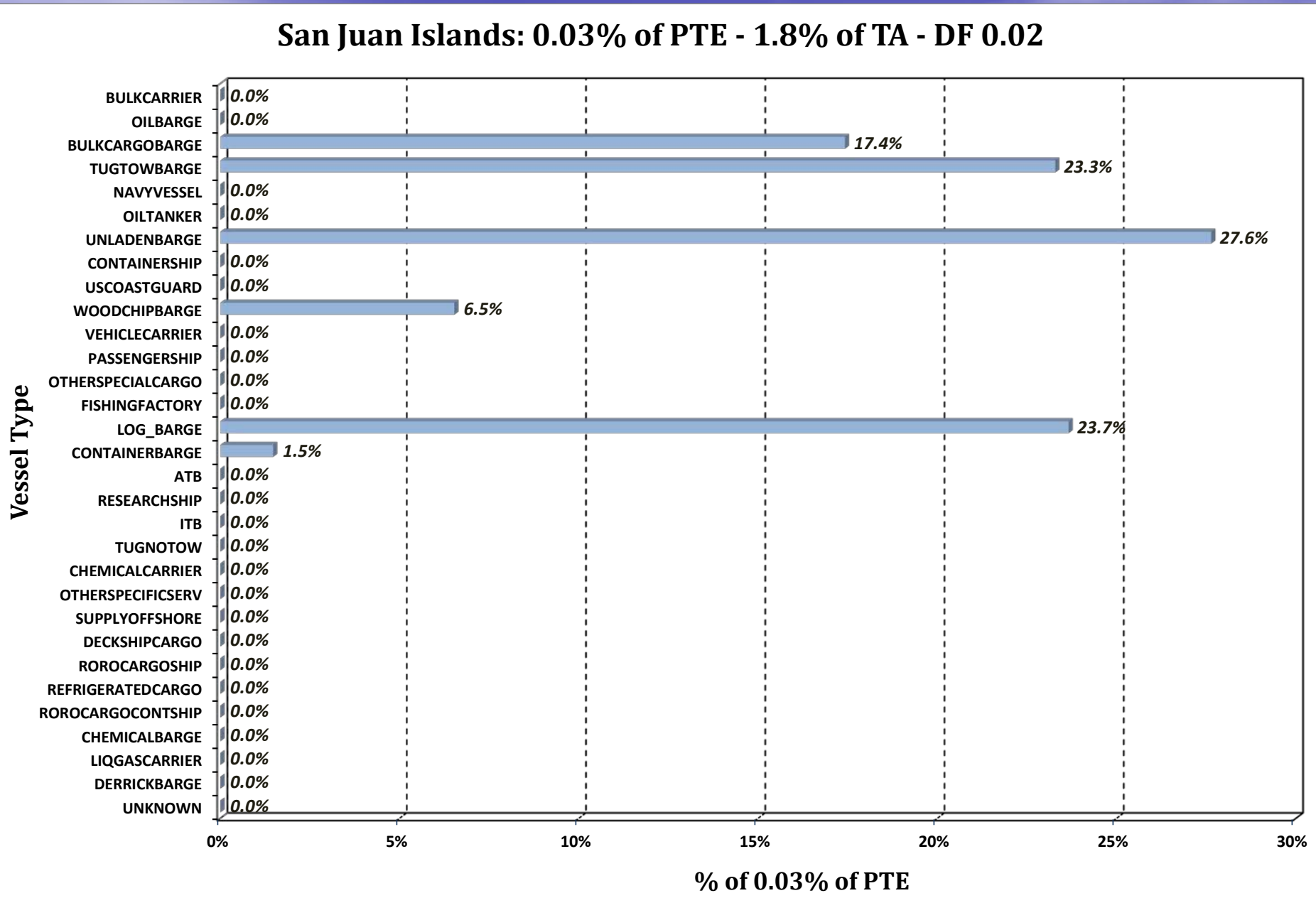
Summary Interpretation:

About 30% x 4.7% x 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

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

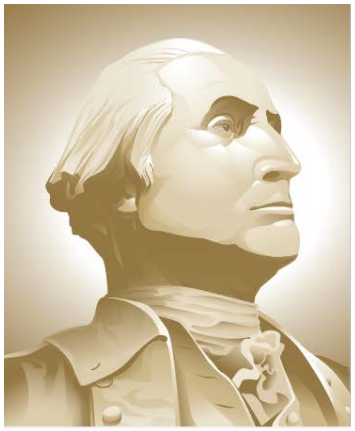


FORMER VTRA STUDY – PTE = 38.7 % OF TOTAL TIME EXPOS.



FORMER VTRA STUDY – FUTURE GATEWAY TRAFFIC

Presentation by: J. Rene van Dorp



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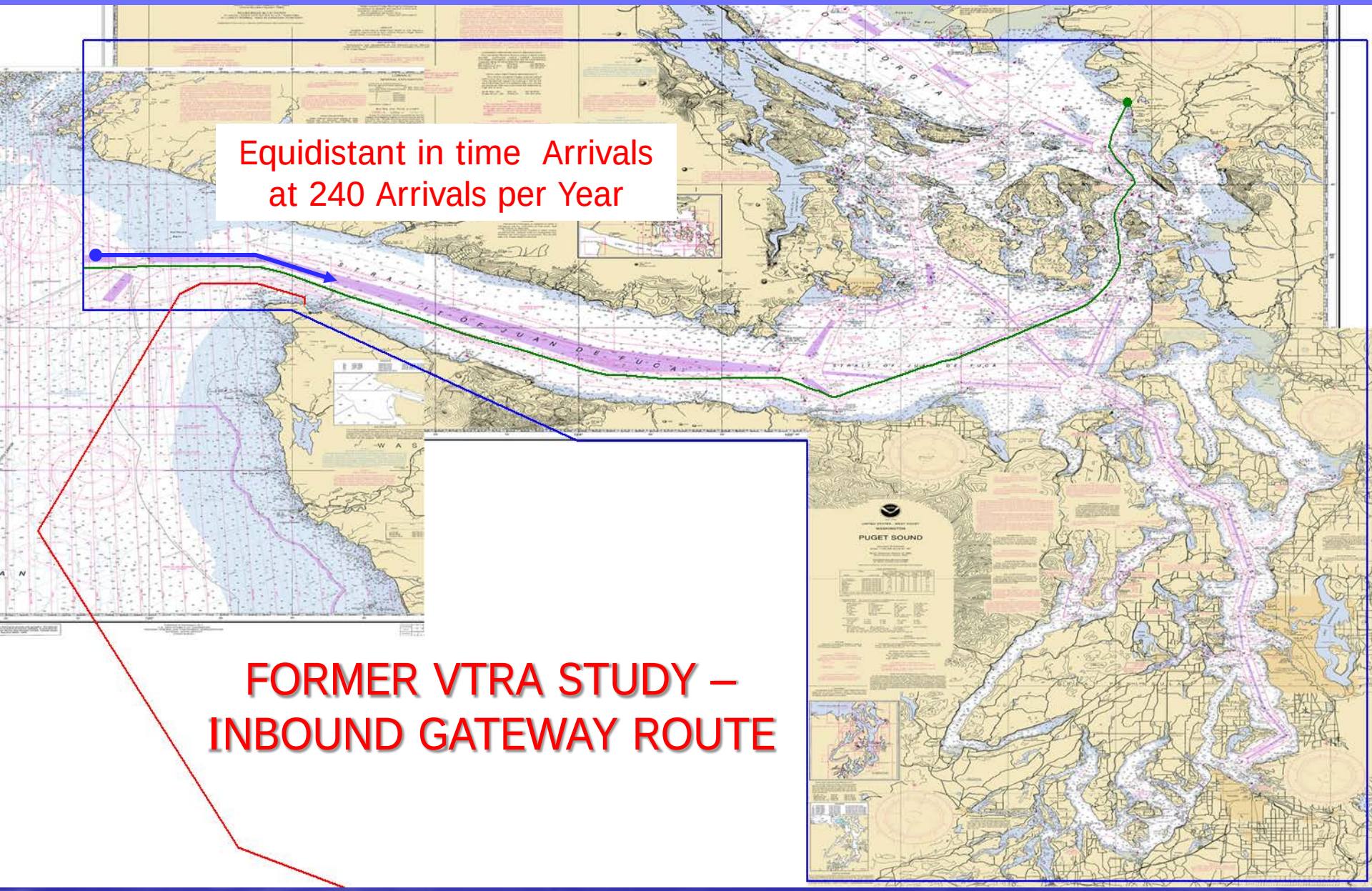
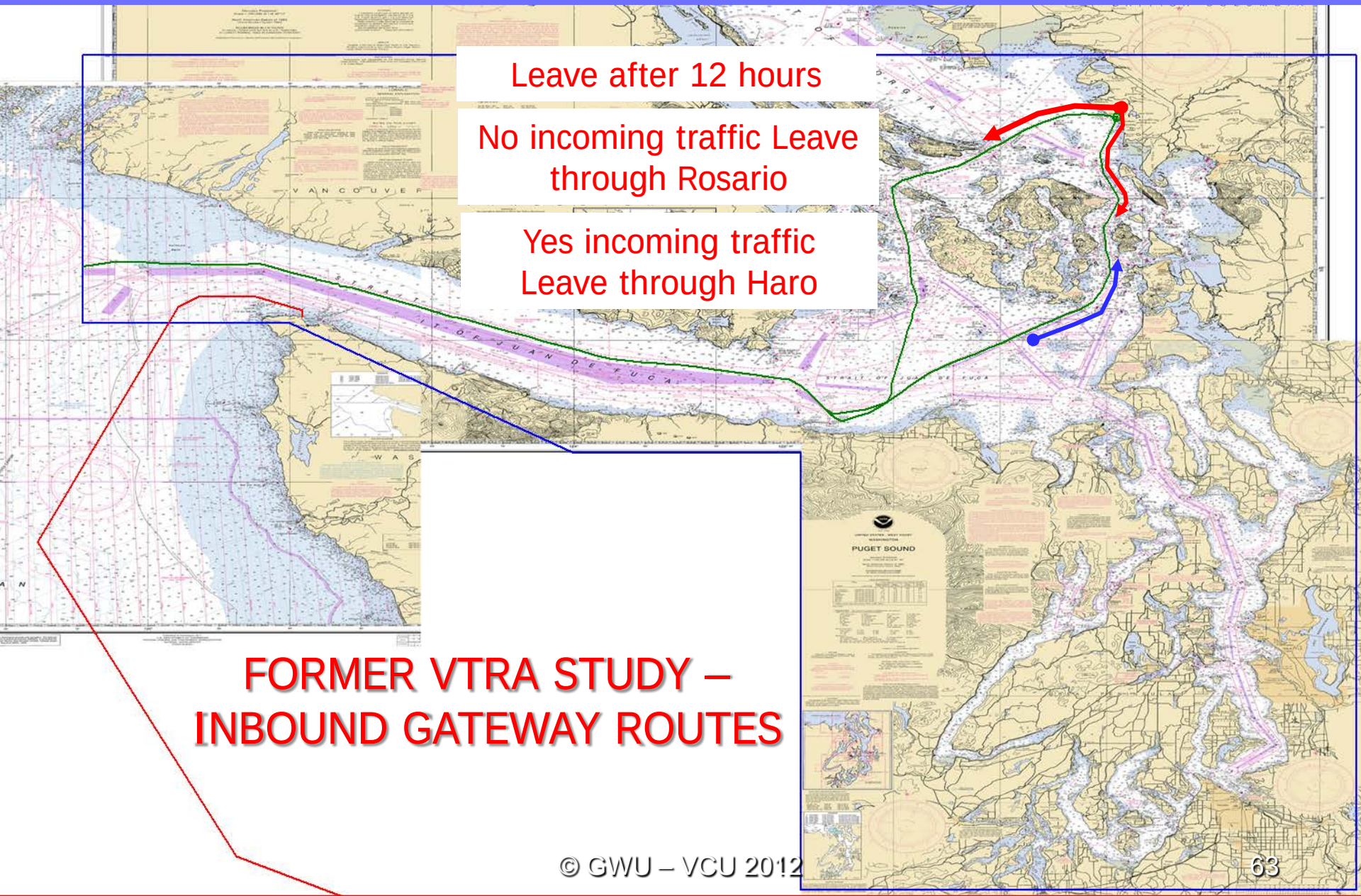
FORMER VTRA STUDY – GATEWAY TRAFFIC MODELLING

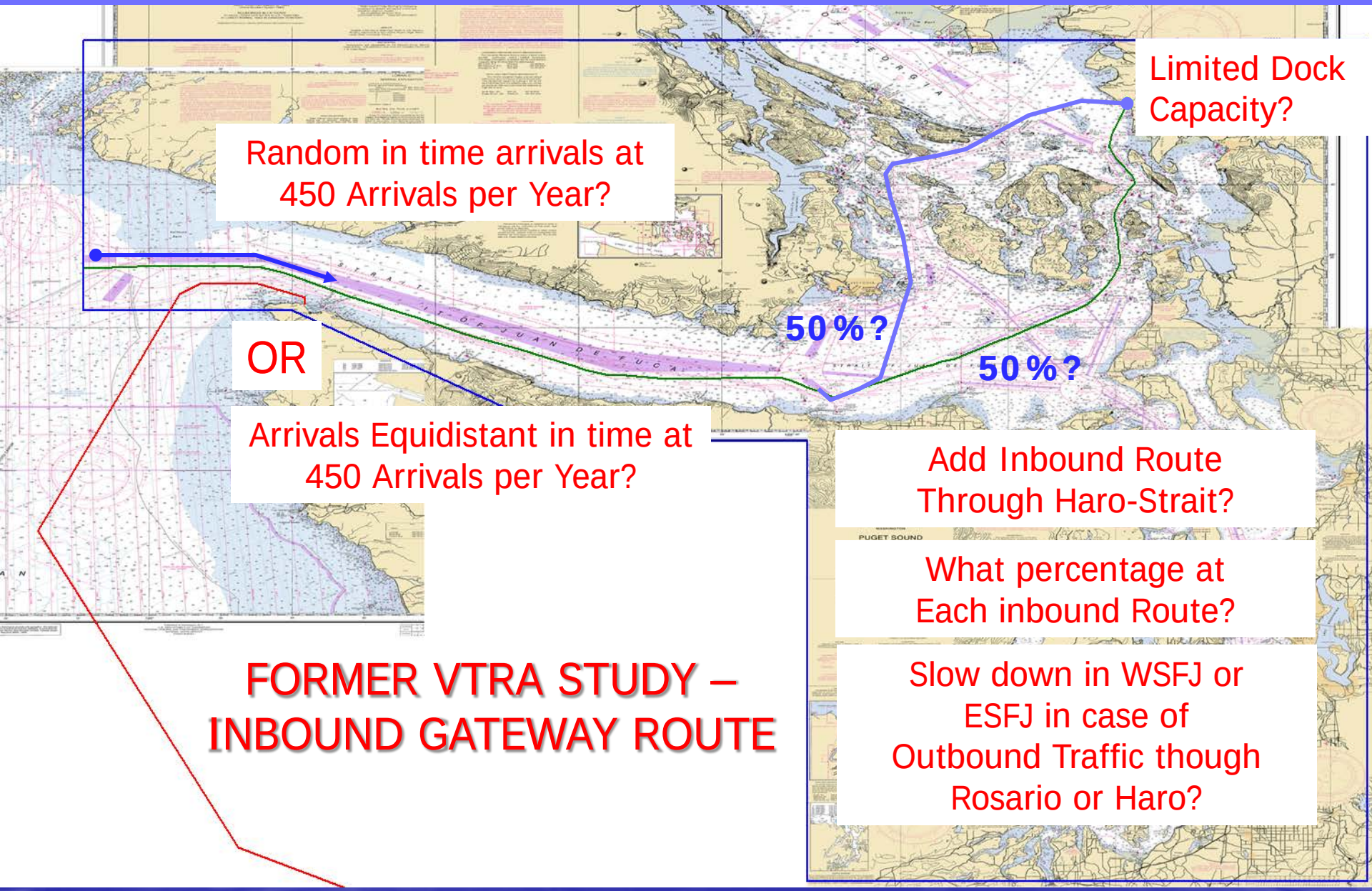


FORMER VTRA STUDY – GATEWAY TRAFFIC MODELLING



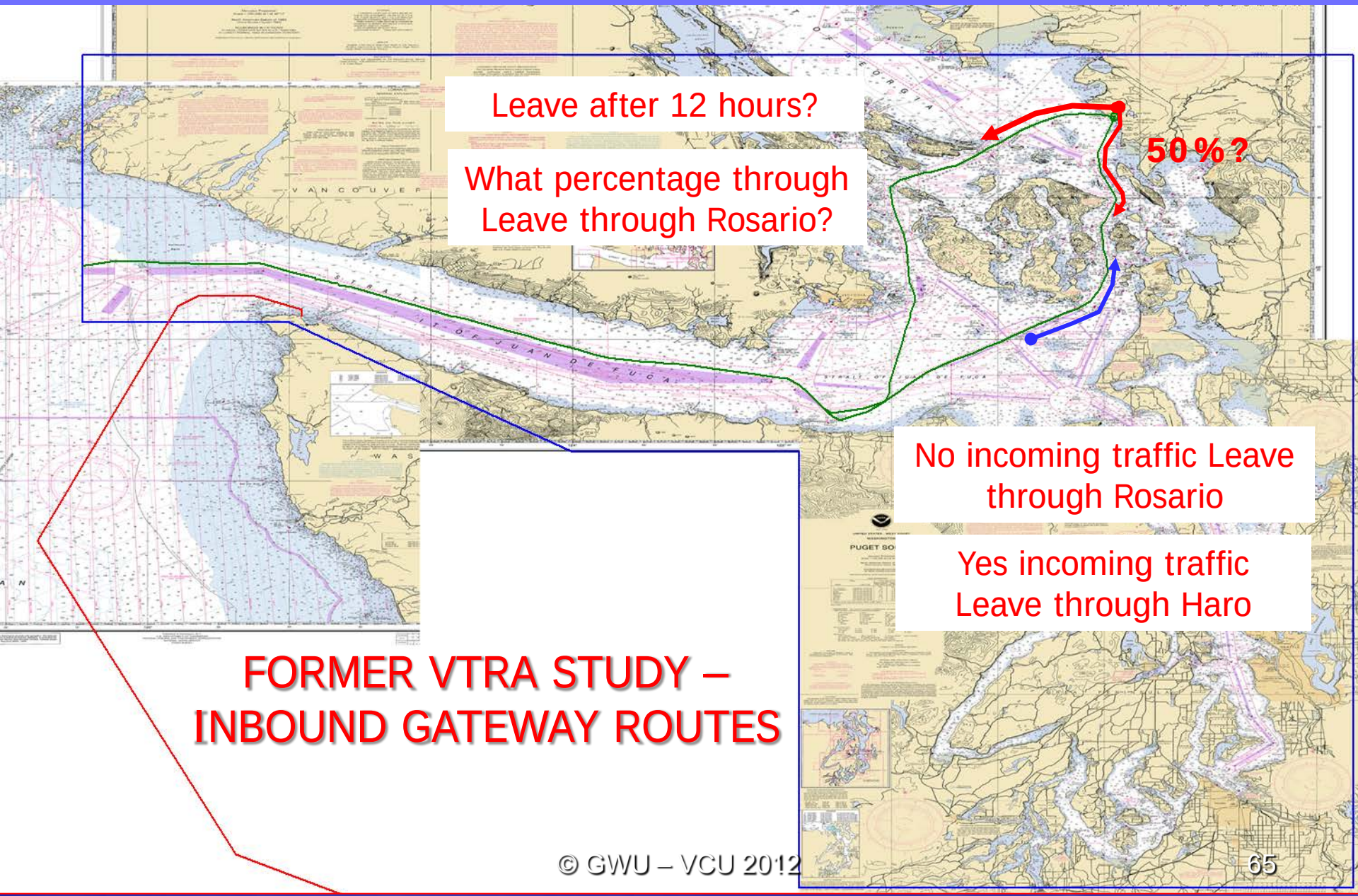
FORMER VTRA STUDY – INBOUND GATEWAY ROUTES

UPDATED VTRA STUDY – GATEWAY TRAFFIC MODELLING

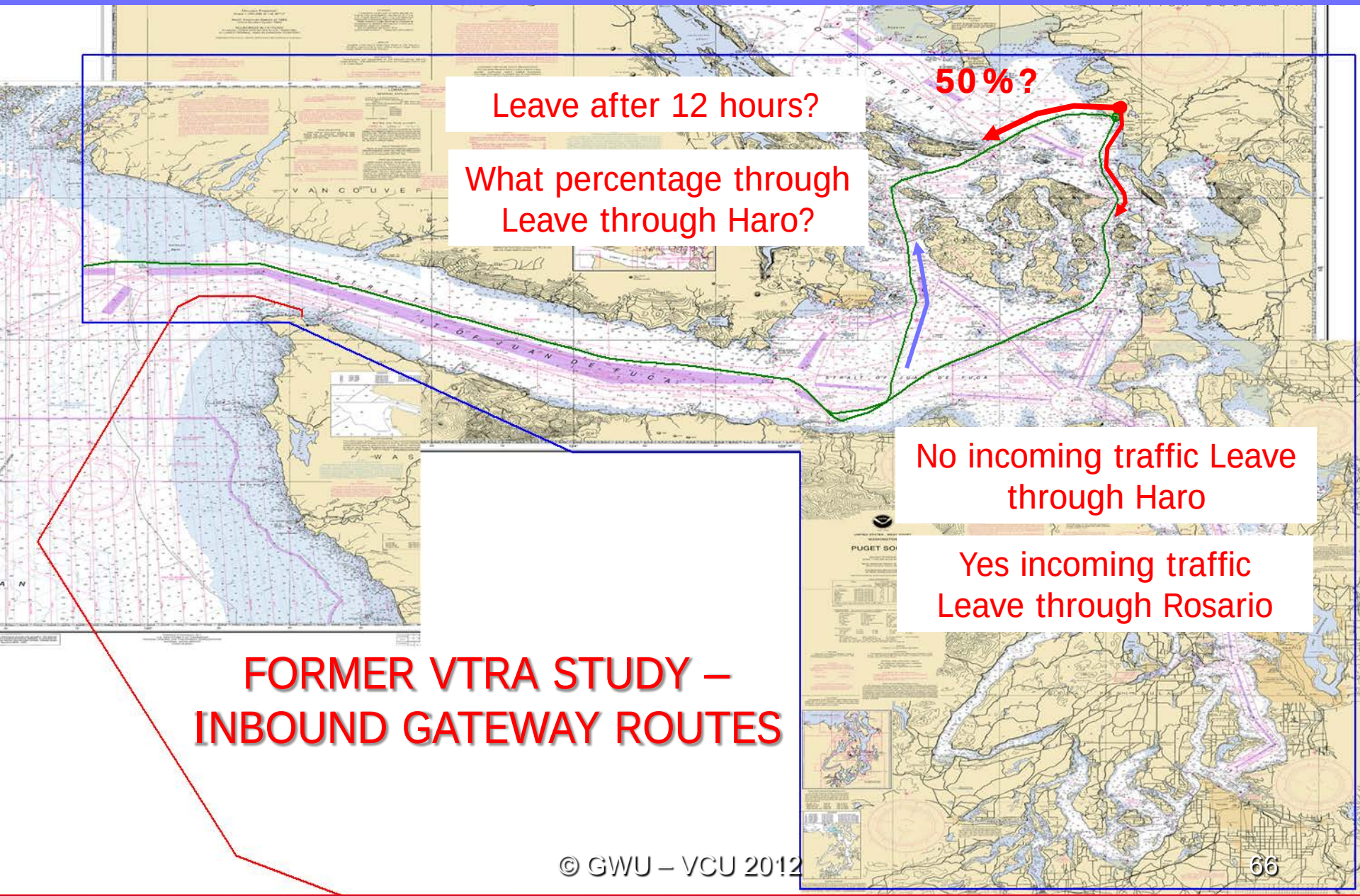


FORMER VTRA STUDY – INBOUND GATEWAY ROUTE

UPDATED VTRA STUDY – GATEWAY TRAFFIC MODELLING



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 v

- TESORO Refinery – The TESORO Refinery (and other refineries) plans to increase frequency of unit train (approximately 100 tank cars)

- T

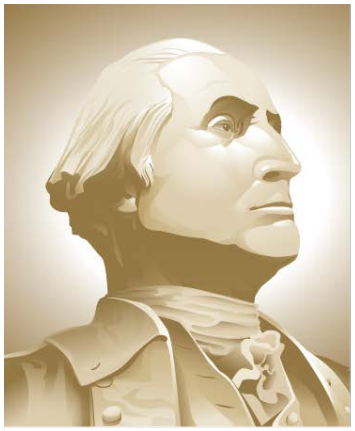
- B

AND OTHER ONES???

FOR EACH CHANGE ASSUMPTIONS ARE NEEDED FOR SIMULATION IMPLEMENTATION

DESIGNING A RISK MANAGEMENT PLAN FACED WITH TRAFFIC INCREASES

Presentation by: J. Rene van Dorp



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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?.