

Shallow Water Shipwrecks Environmental Impact: MS VOLARE case study

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WRECKS OF THE WORLD III
October 12-13 2015, Gothenburg, Sweden



Estonian Shipwreck Register SHIPWHER



<http://register.muinas.ee/public.php?menuID=wreckregistry>

Wrecks in the archive

-total 1185

-found 85

- risk of oil pollution 14

NATIONAL REGISTRY OF CULTURAL MONUMENTS

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Stolen National Monuments

Wreck register

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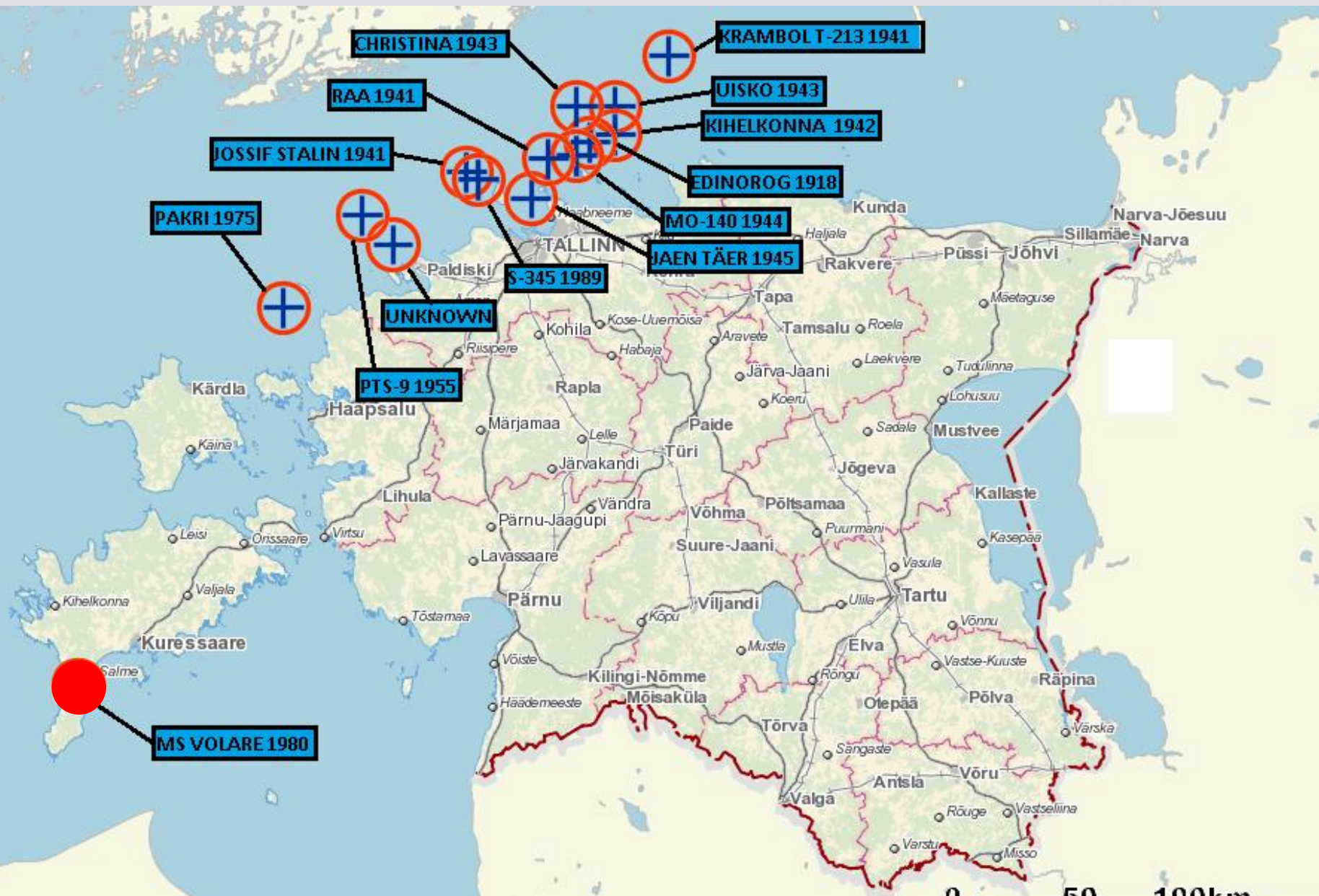
Filtering ▲

Items from 1 kuni 100. Kokku: 705

« Eelmised 1 2 3 4 5 6 7 8 Järgmised » Näita kõiki

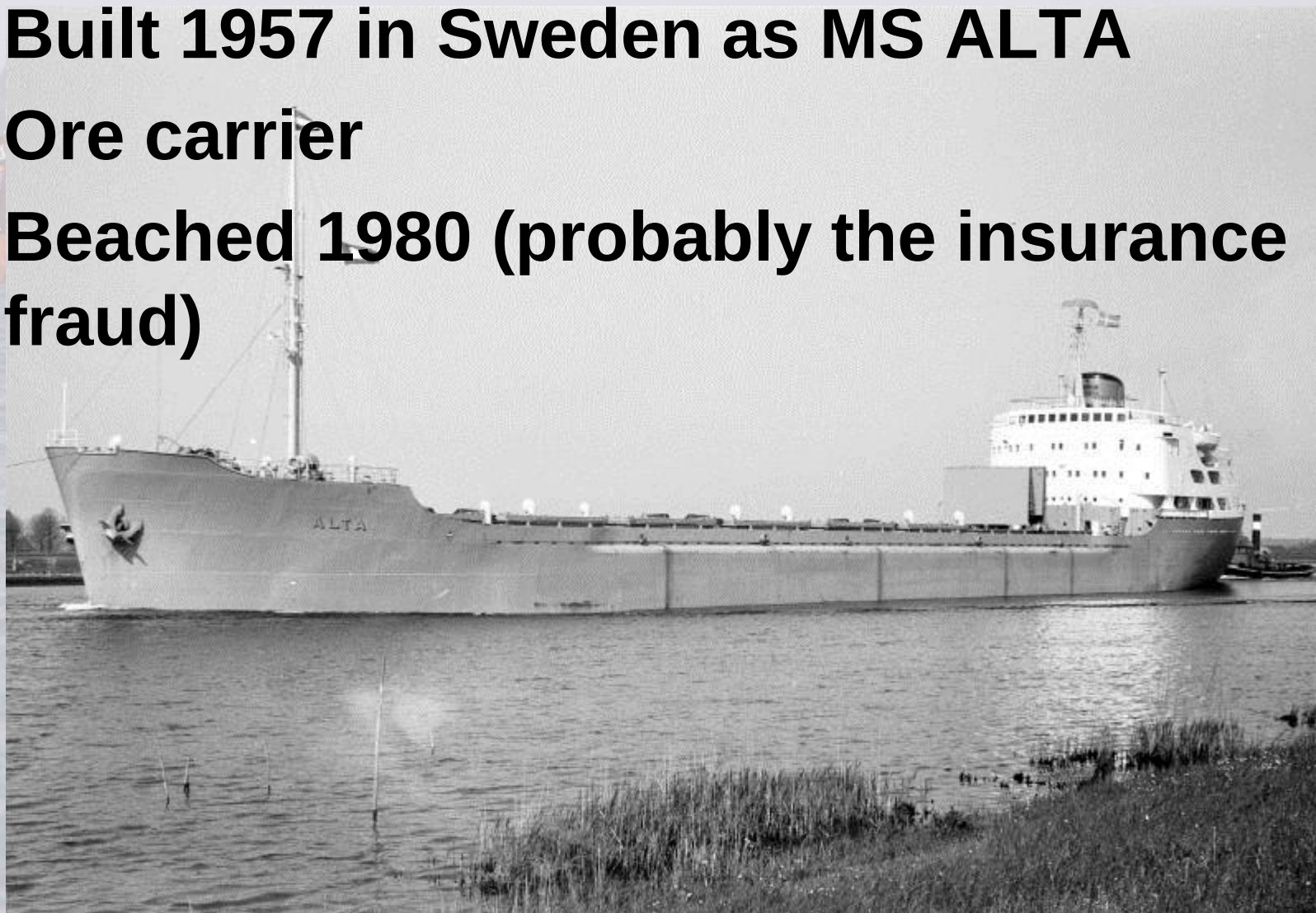
ID ▼	Name	Dating	Address	Monument	Purpose	Found
710	Helena	19th century	Inland sea, Soome laht, Hara laht		merchant ship	No
709	Lady Scott	19th century	Territorial sea, Gulf of Finland		merchant ship	No
708	unknown	19th century	Inland sea, Soome laht, Narva laht		merchant ship	No
706	Lootsi tänava vrakk	19th century	Harju maakond, Tallinn, Lootsi 8	30188	merchant ship	Yes
704	Maria	19th century	Inland sea, Soome laht		merchant ship	No
701	Success	19th century	Territorial sea, Soome laht		merchant ship	No
700	Marie Anette	19th century	Territorial sea, Soome laht		merchant ship	No
698	Dissington	19th century	Territorial sea, Läänemeri, Hiiu madal		merchant ship	No
697	Aina	19th century	Inland sea, Soome laht, Tallinna laht		merchant ship	No
696	Catrina/Catharina	19th century	Inland sea, Soome laht, Eru laht		merchant ship	No
695	Gefina	19th century	Inland sea, Soome laht		merchant ship	No
694	Fritz von Arenstorff	19th century	Inland sea, Soome laht		merchant ship	No
693	Aurora	19th century	Inland sea, Soome laht		merchant ship	No

Shipwrecks with oil pollution risk in Estonian waters

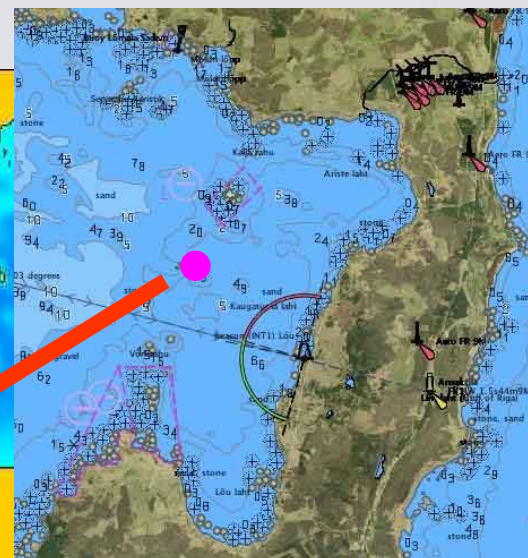
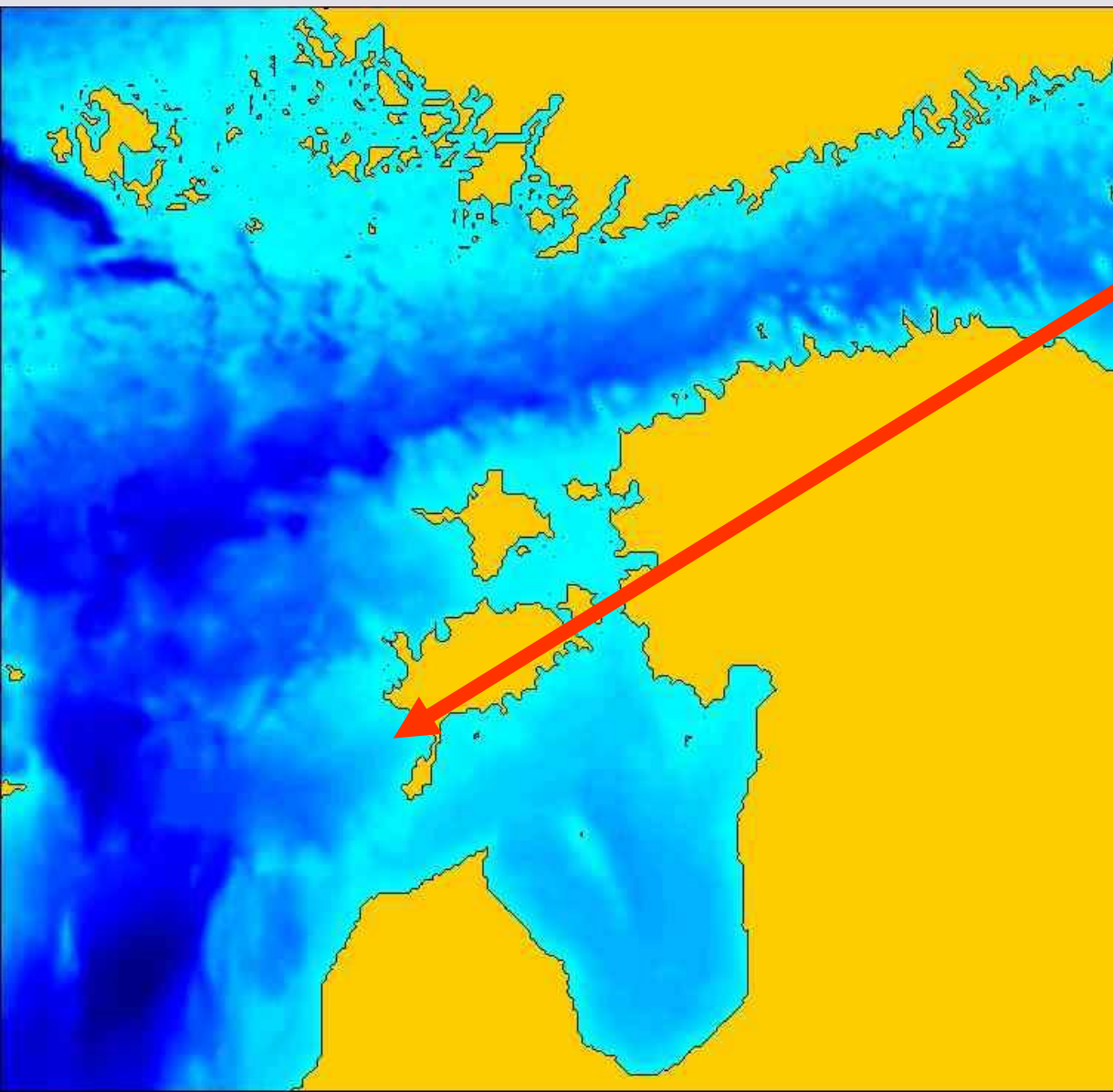


MS VOLARE

- Built 1957 in Sweden as MS ALTA
- Ore carrier
- Beached 1980 (probably the insurance fraud)



MS VOLARE recksite



MS VOLARE wreck

MS VOLARE today

Stern

Main engine

Bow

Depth 4-5m





- No owner
- Burned many times
- Wild metal scrappers

- Inspection of the wreck, it's condition, damages, corrosion etc
- Identification of environmental concerns at the wreck site
- General mapping of the sea bottom around the shipwreck
- Characterisation of hydrodynamic conditons at wrecksite (time seies)
- Identification of possible pollution transport pattern, local flow scheme and wave regime
- Analysis of local ice regime affecting the wreck
- Sampling of sea bottom sediments, lab analysis for oil and heavy metals contamination in order to identify pollution pattern around the wreck
- Estimation of environmental harm caused by shipwreck on surrounding marine environment and coastline.

Unknown amount of oil onboard



Surrounded by permanent oil slick

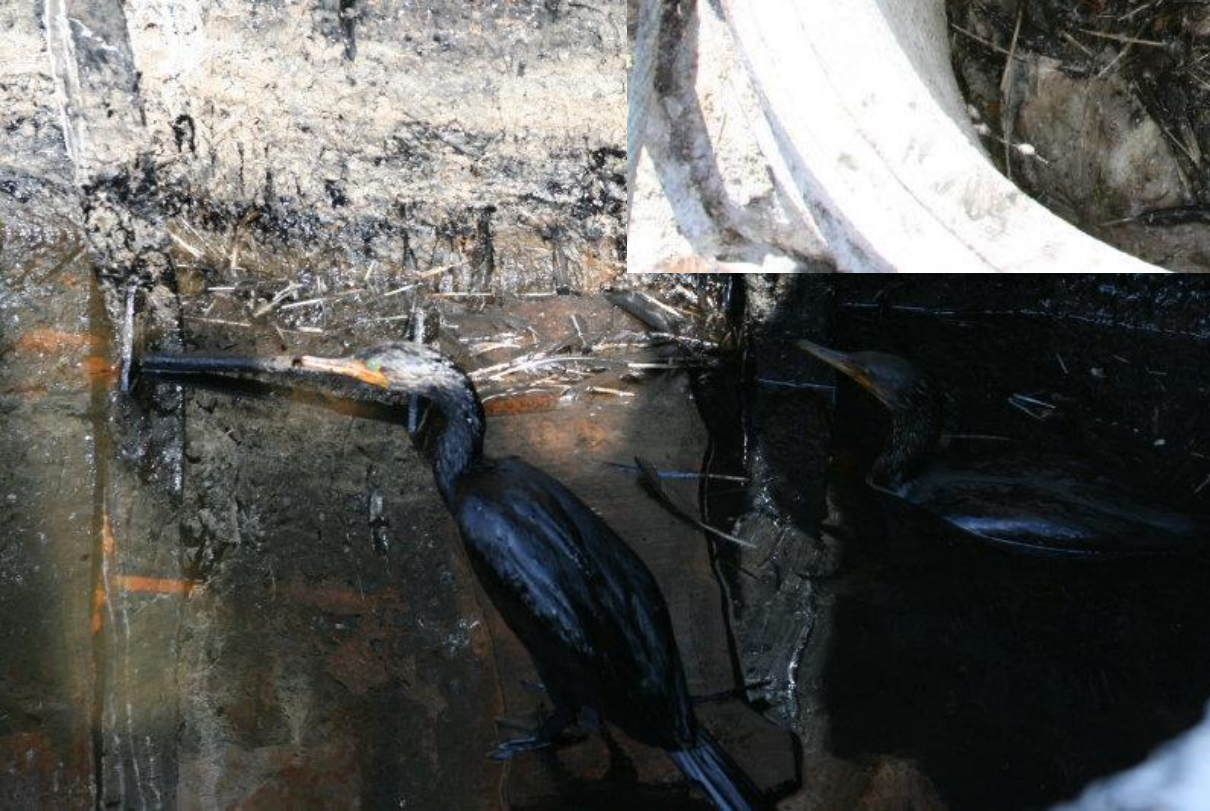


Nearby is Nature
Conservation Area!!!!!!



Wreck's condition deteriorates



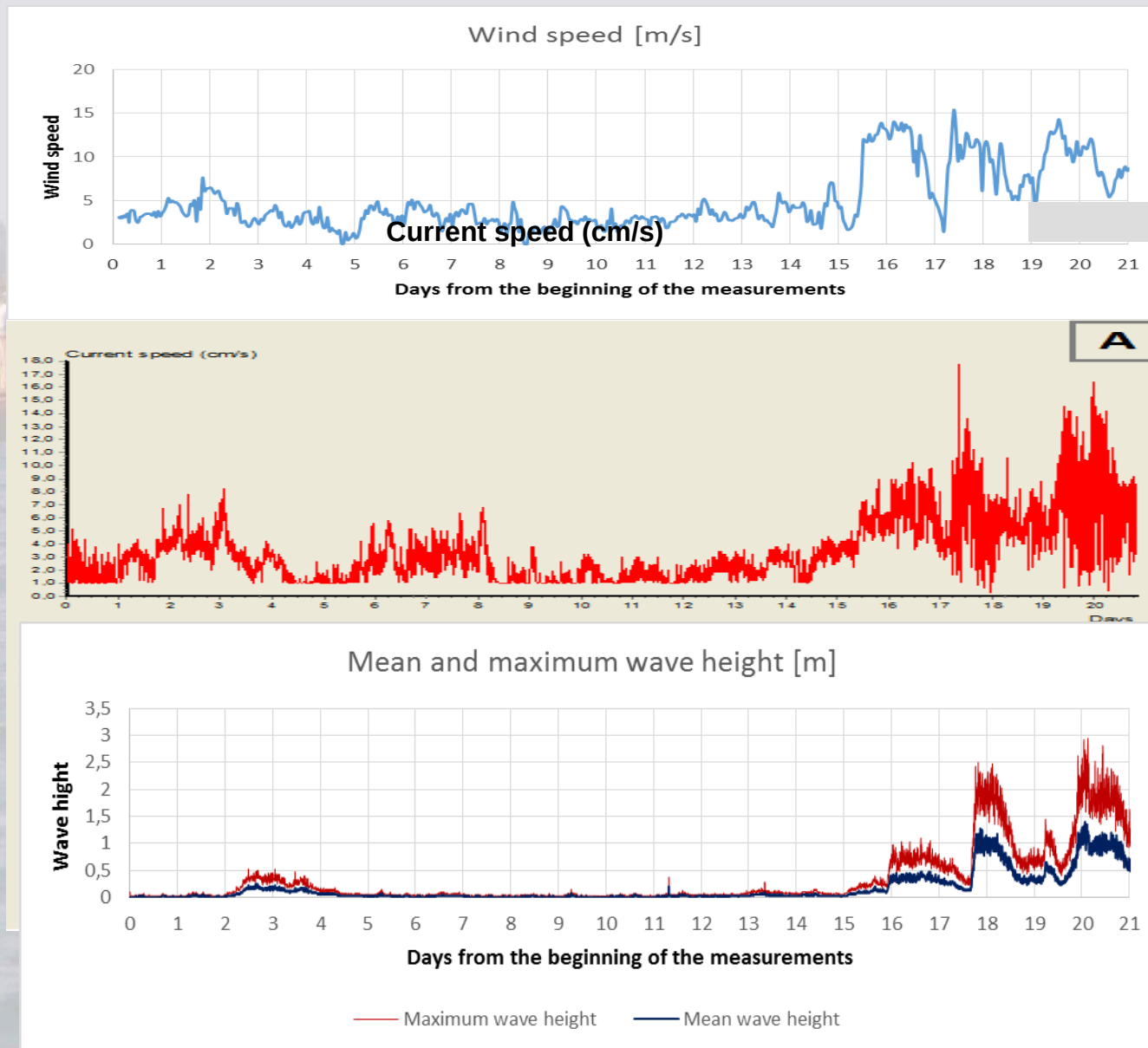


**Trap
for birds
(cormorant),
fishes,
marine mammals?**

Measurements of local hydrodynamics at wrecksite

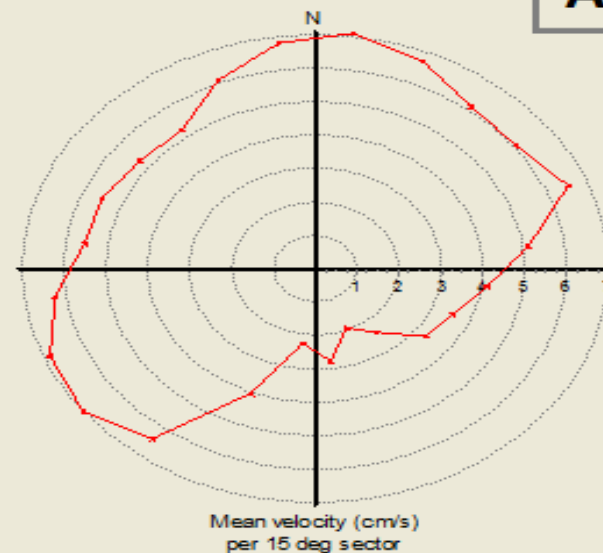
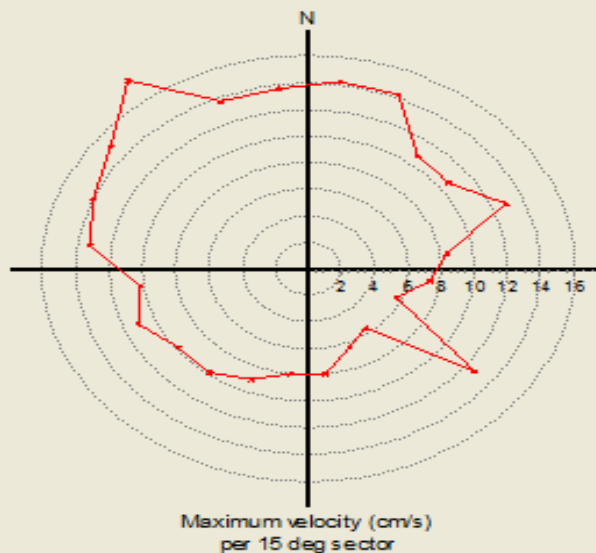
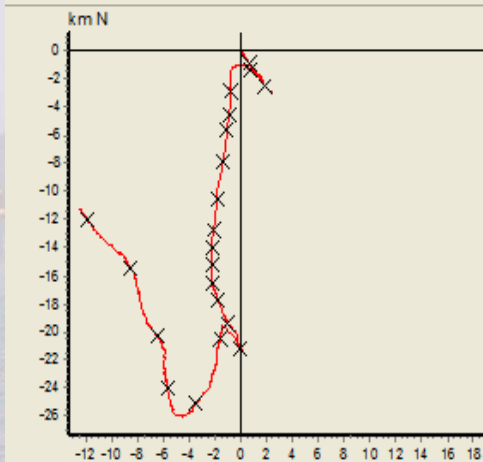


Local hydrodynamics at MS VOLARE wrecksite



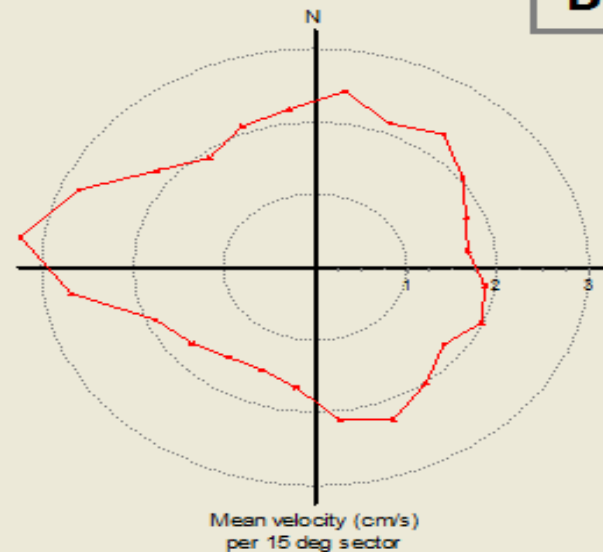
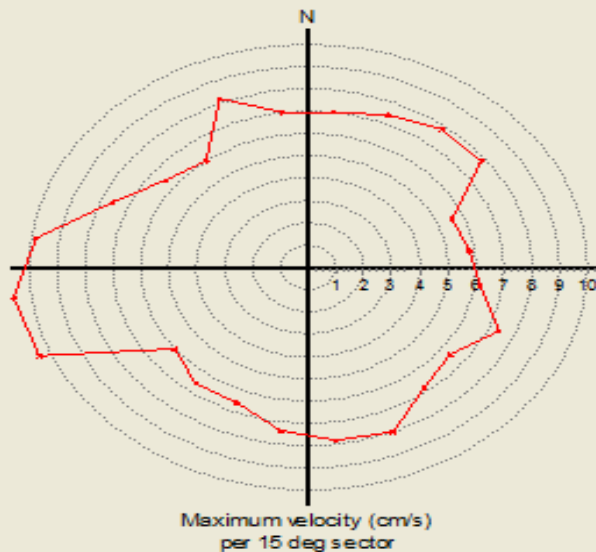
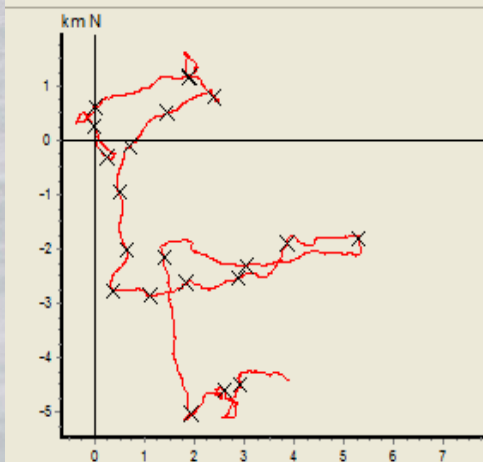
Summary flow local characteristics around wreck

Neumann parameter: 0.273
Average speed: 3.4 cm/s
Rest speed: 0.9 cm/s
Rest direction: 228 deg



A

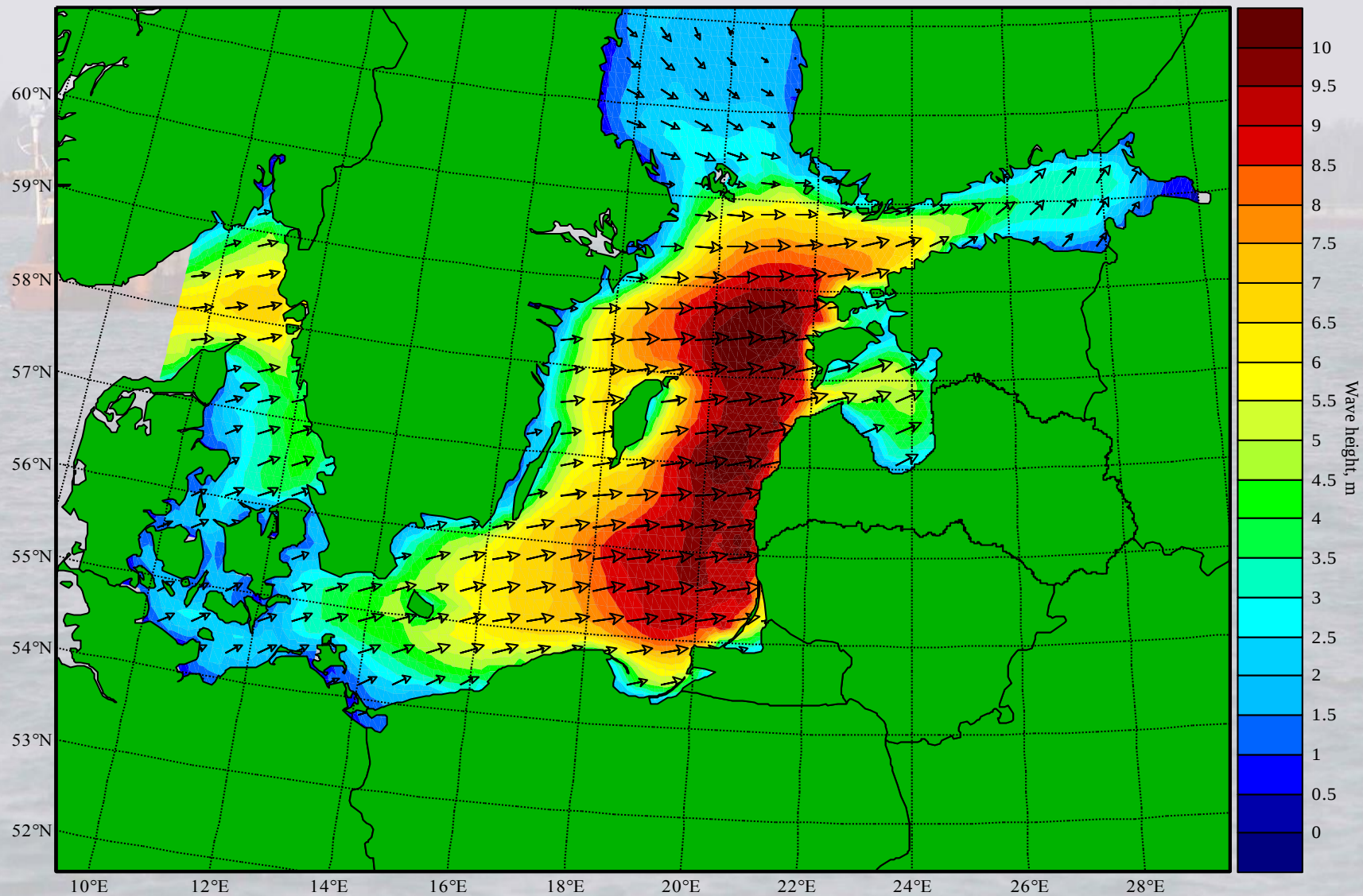
Neumann parameter: 0.166
Average speed: 2.0 cm/s
Rest speed: 0.3 cm/s
Rest direction: 139 deg

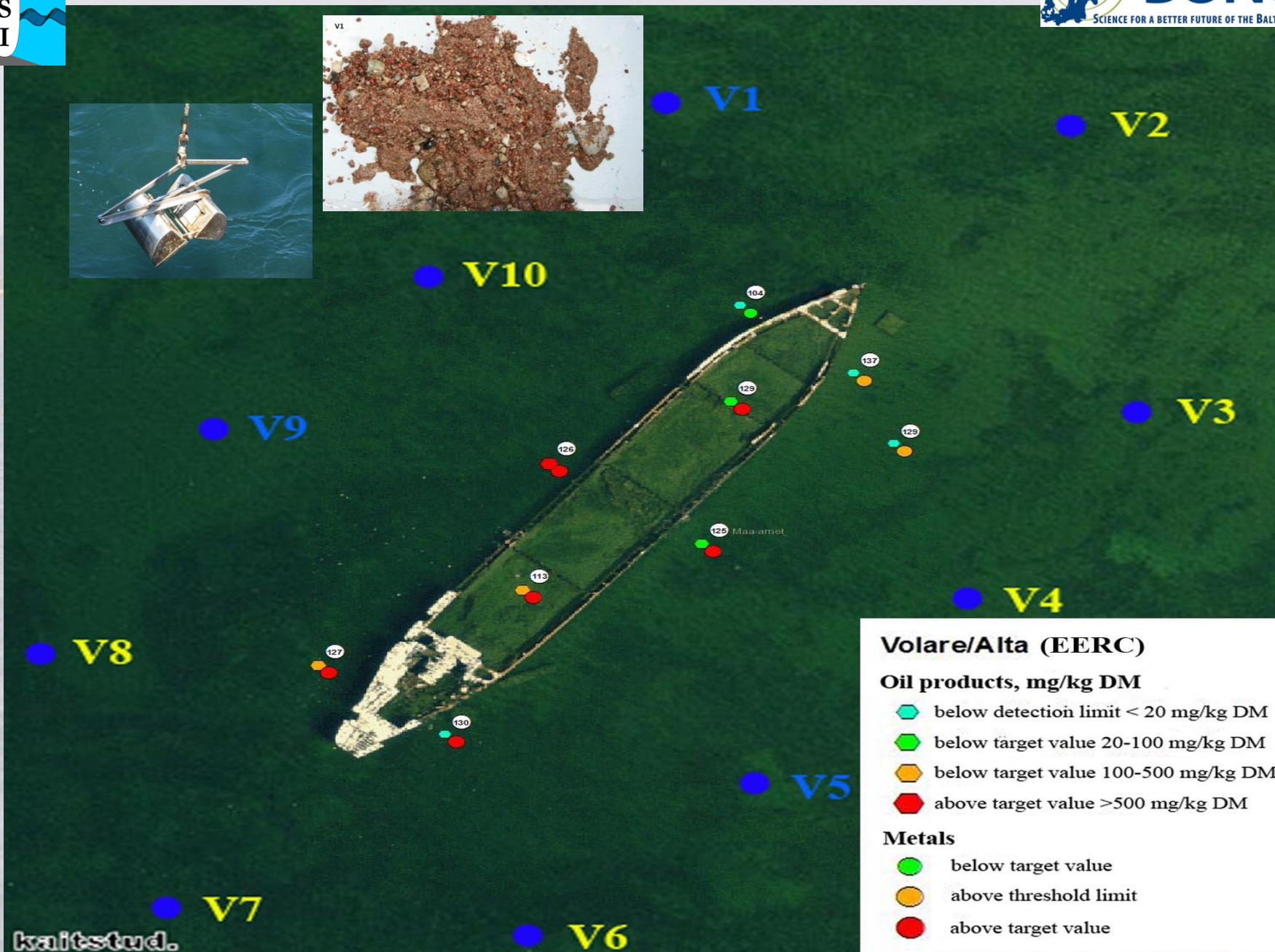


B

Role of extreme storm events???

January 9, 2005





Summary of bottom sediments sampling

Parameter	Method	Sample [mg/kg DM*]			
		V1	V5	V9	
hydrocarbons (C ₁₀ -C ₄₀)	EVS-EN ISO 16703	<20	<20	<20	<20
naphthalene	ISO 18287	<0,005	<0,005	<0,005	<0,005
acenaphthylene	ISO 18287	<0,005	<0,005	<0,005	<0,005
acenaphthene	ISO 18287	<0,005	<0,005	<0,005	<0,005
fluorene	ISO 18287	<0,005	<0,005	<0,005	<0,005
phenanthrene	ISO 18287	<0,005	<0,005	<0,005	<0,005
anthracene	ISO 18287	<0,005	<0,005	<0,005	<0,005
fluoranthene	ISO 18287	<0,005	<0,005	<0,005	<0,005
pyrene	ISO 18287	<0,005	<0,005	<0,005	<0,005
benz[a]anthracene	ISO 18287				
chrysene	ISO 18287				
benzo[b]fluoranthene	ISO 18287				
benzo[k]fluoranthene	ISO 18287				
benzo[a]pyrene	ISO 18287				
indeno[1,2,3-cd]pyrene	ISO 18287				
dibenz[a,h]anthracene	ISO 18287				
benzo[ghi]perylene	ISO 18287				

Salvage operations, summer 2015









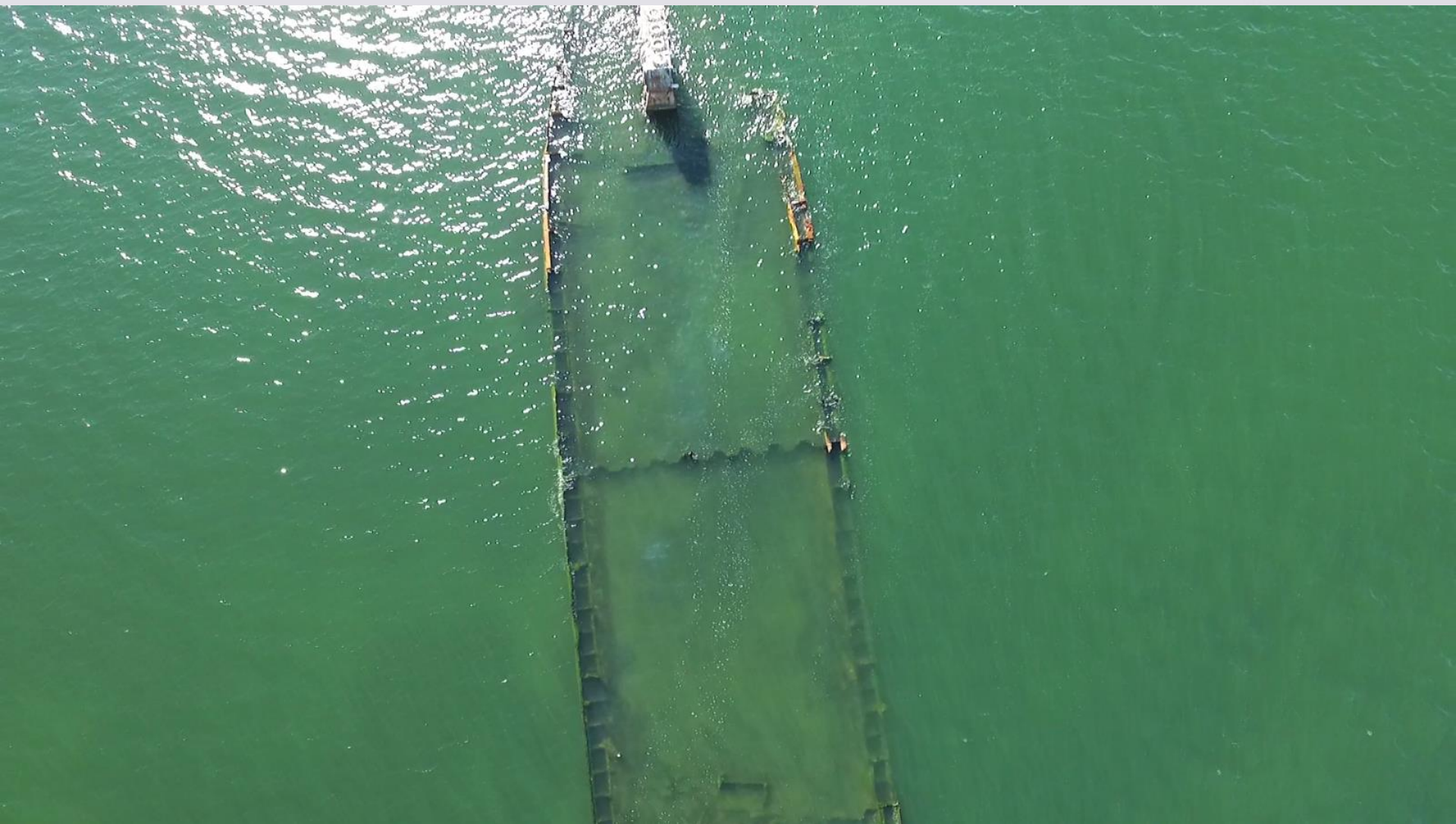
















Summary

- MS VOLARE wreck condition and basic parameters identified
- Environmental concerns identified, salvage needed!!!
- Salvage of the wreck completed (as first approach)
- Sea bottom around the shipwreck and local hydrodynamic regime characterised
- Pollution transport pattern, by local flow and wave regime generally identified
- Analysis of long term processes at wrecksite using models (HIROMB, HBM, NEMO). Forecast of general hydrodynamic pattern and its temporal variability allow net load to marine environment and forecast environmental risks development in future.

Thanks for listening!

