On the past experiences on oil removal operations in Finland and the new national wreck progamme for the next three years

27th February, 2019 in Warsaw, Poland

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- Some Salvage cases
- BONUS Swera
- Vraka tool
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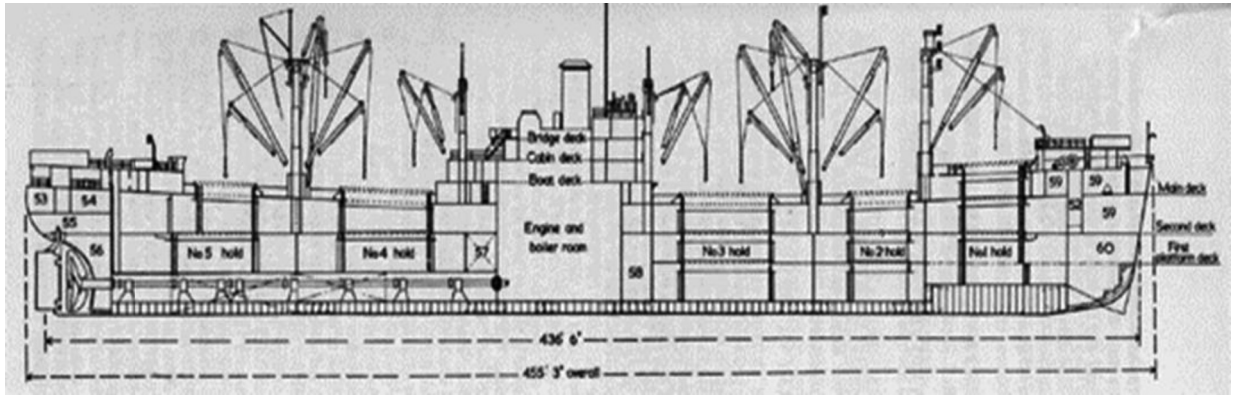
Case; SS Park Victory

Oil Recovery Operation's working hours 1994-2000;
Oil recovery vessels Halli and Hylje total 5000 h.
Finnish Navy Divers, total 1400 dives and 1200 working hours.
Observation class ROV, 1700 working hours.



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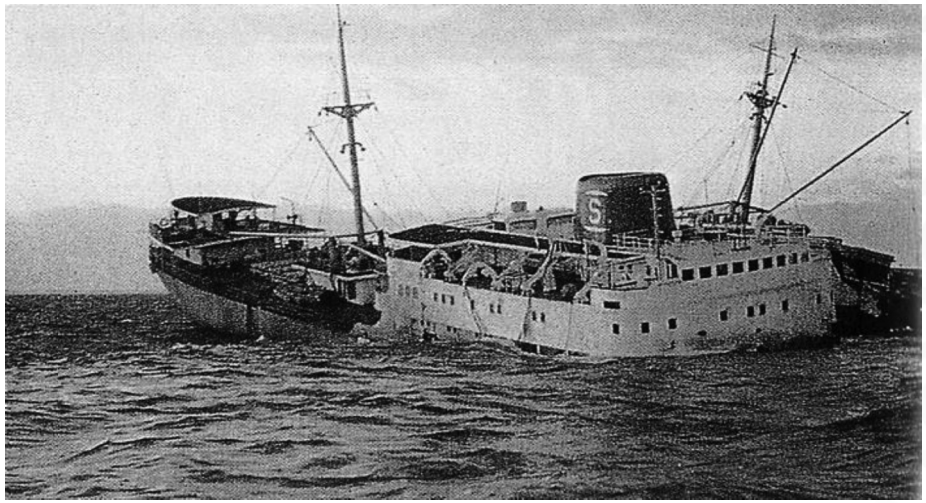
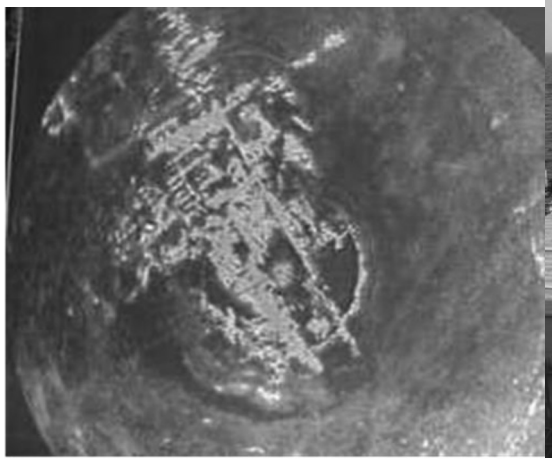
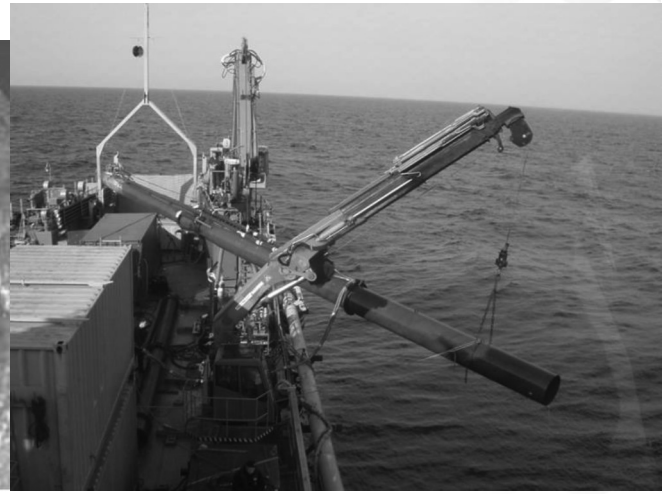
Coolaroo

- Reefer over 100 m
- 5650 DWT
- Grounded 1961
- Assumed amount of oil 100 ton HFO
- Salvage works 2001 – 2006
- No oil detected







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Brita Dan

- close to 100 m of ship, 3065 BRT
- Sunk down close to the port of Rauma in
- Detected oil leakages
- Preparatory investigations in 2001 & 2002
- SYKE removed oil in two weeks in 2003
- 20 tons of HFO

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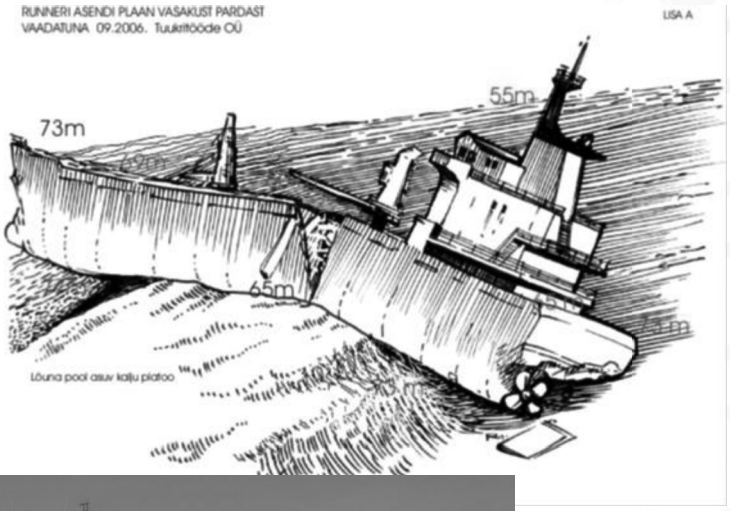
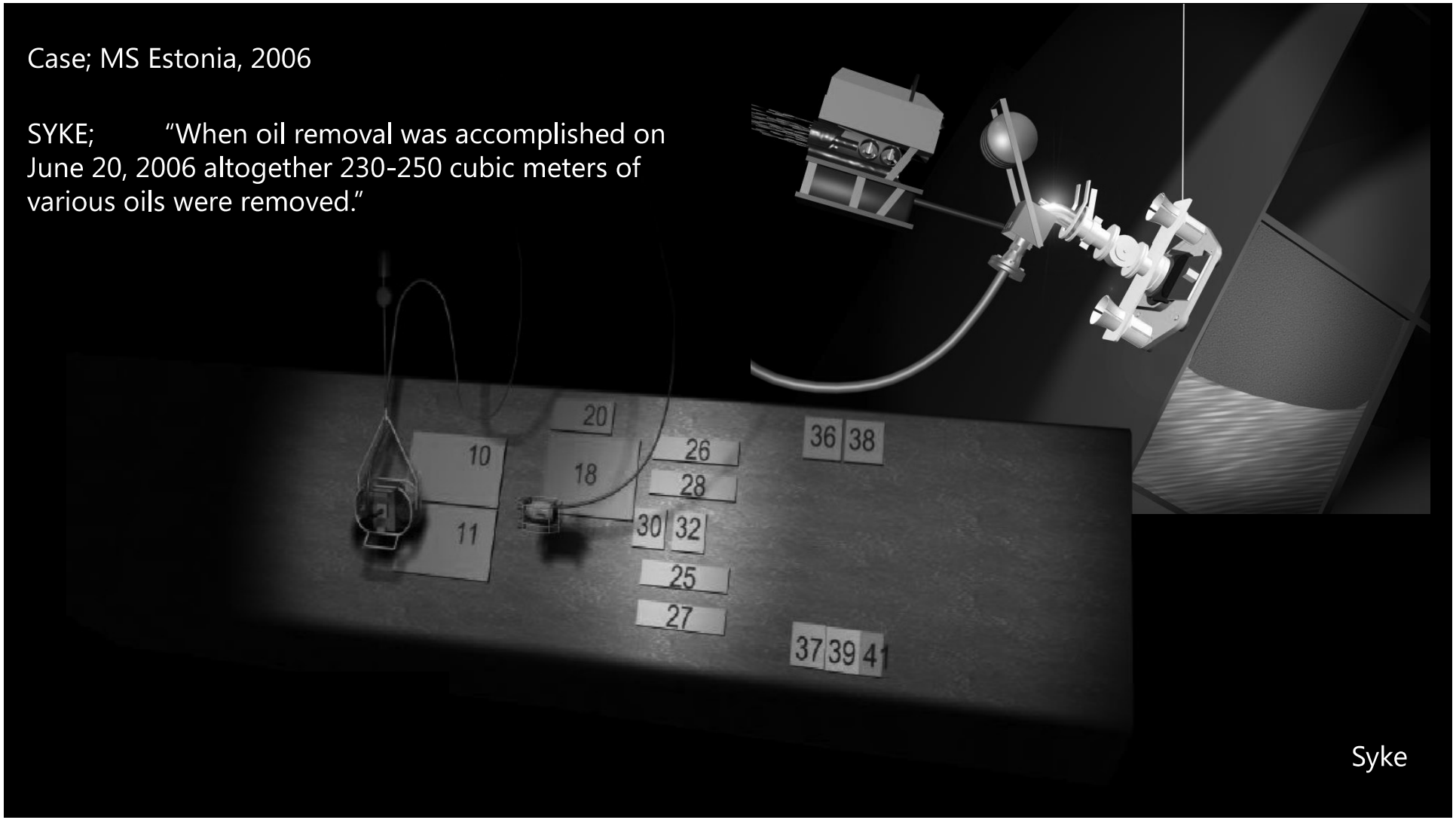
Runner 4

- Sunk down 5.3.2006
- 102 ton heavy fuel oil
- 35 light fuel oil & lubrication oil
- Aluminium cargo
- Two oil combating eforts by SYKE
- Aluminium and oil removed later
- November 2009 onboard Geosund(100m3 oil/water mixture)



Case; MS Estonia, 2006

SYKE; "When oil removal was accomplished on June 20, 2006 altogether 230-250 cubic meters of various oils were removed."



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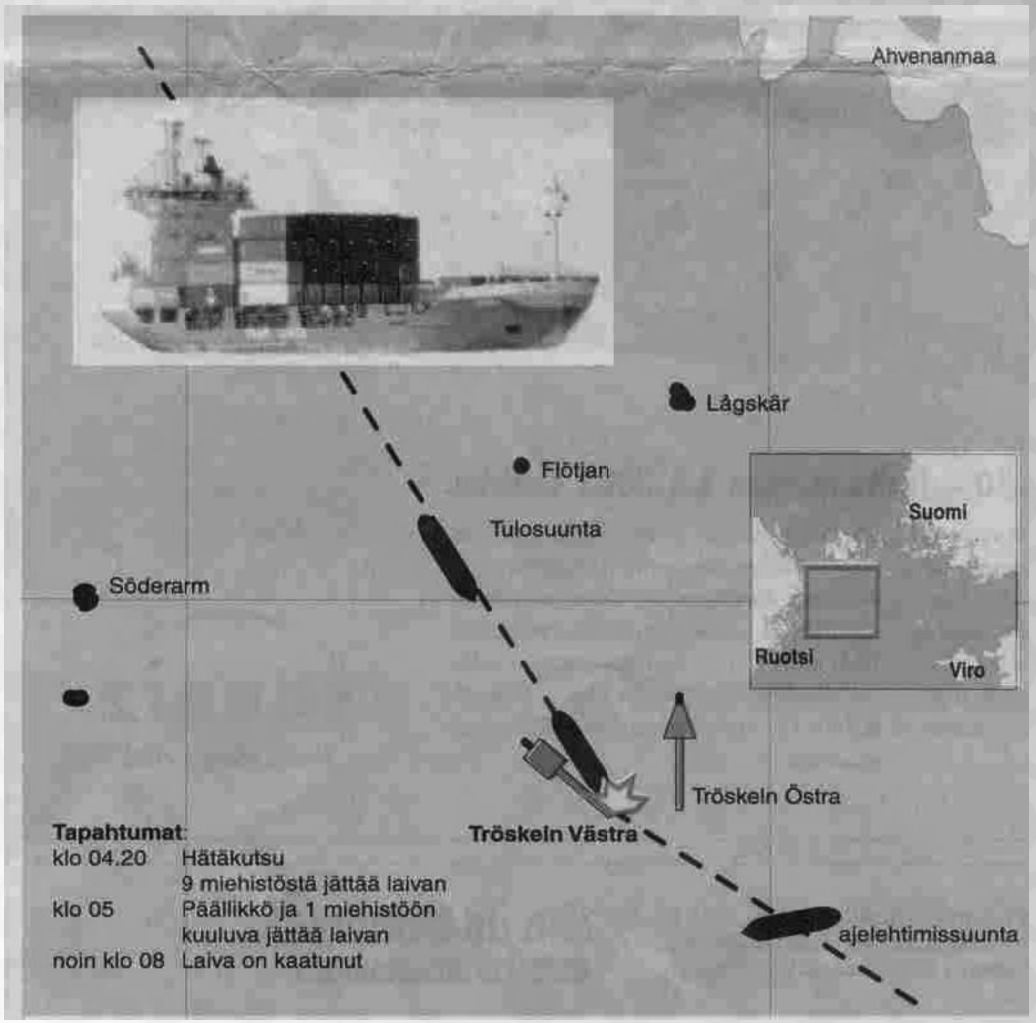

MT Janra capsize
22.12.2000

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Turun vartiolentue

M/S Janra ajelehtii Itämerellä laajenevan öljykentän ympäröimänä. Paikalla olevat öljyntorjunta-alukset pyrkivät saamaan öljyn saarrettua, jos merenkäynti sen sallii.

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Pagasos 2002

Most significant marine cases in 2017 were

- CAPSIZE OF ”Kuokkapekka 5” dredging barge in 2/2017 out of Hanko
- Oil ouflow 1…2 m3 max.
- Countermeasures: oil booms and recovery vessel HYLJE
- The salvage work took around one week. Capsized barge was turned 4th February.

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Most significant marine cases in 2017 were

- CAPSIZE OF ”Esko drilling barge” in late November outside of Vaasa
- Estimated oil outflow 500 – 1000 l of diesel oil
- Barge was towed to the harbour and turned.

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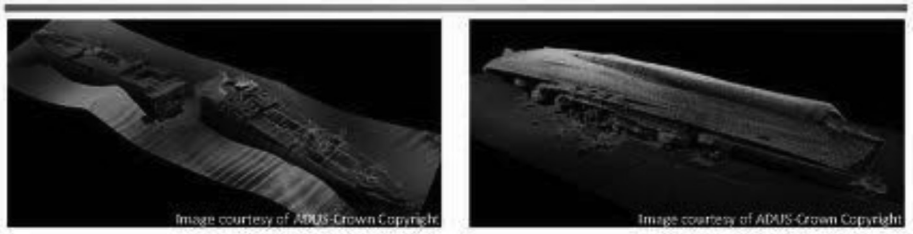
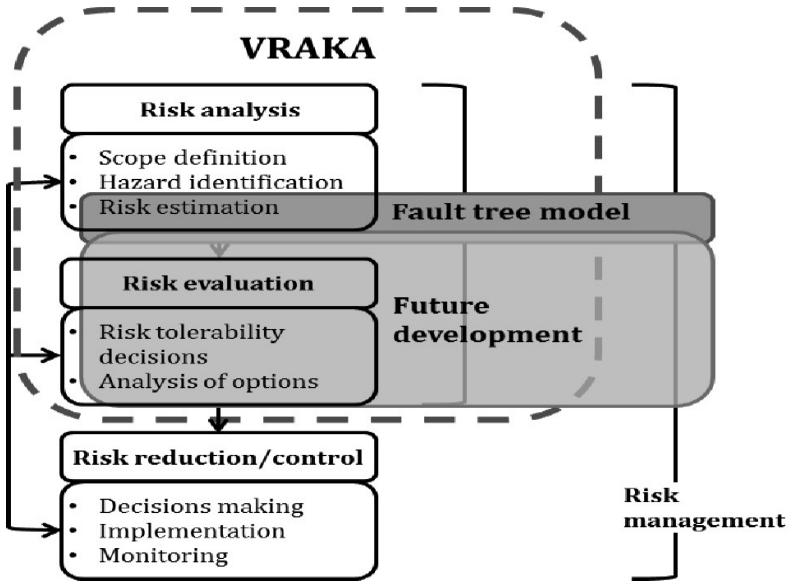
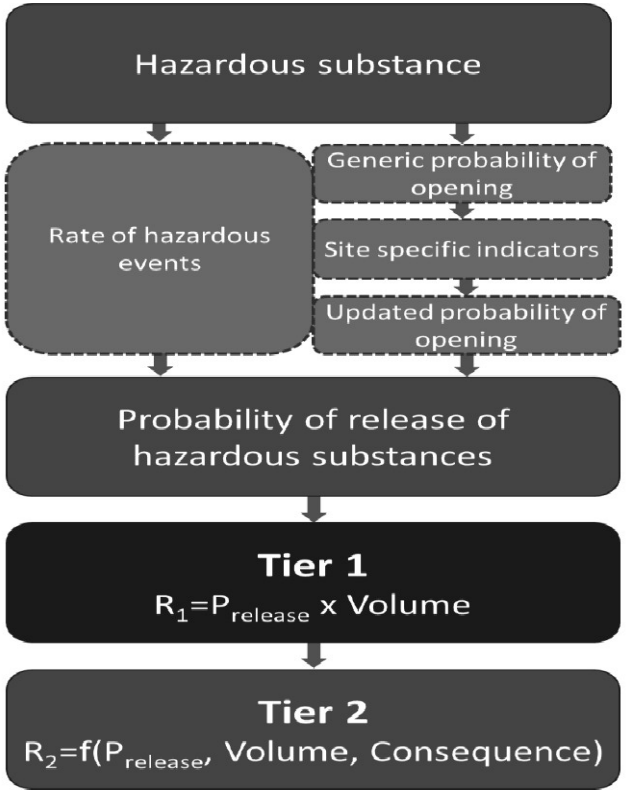
BONUS SWERA Main Objectives / Results

- 1.) **Wreck survey** – selecting the primary targets (high potential for oil pollution, **New Data Base**
- 2.) **Validation of the wreck model (Vraka)**
- 3.) **Modification** of the existing wreck model to also include the risk assessment of different salvage operation alternatives
- 4.) **Developing innovative technological solutions** for oil removal operations,
- **Salvage Toolbox Development**



Further development of the VRAKA model





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By Hanna Landquist /Chalmers University

Thetis (left) versus Z36 (right)

Factor				Notes
ORRA				
type/size of the structure				
wreck condition/corrosion				
water depth				
need for clearing/dredging				
amount of oil				
quality of oil				
leakages detected				no data
sensitivity of the area				
vulnerability of the area				
wreck stabilization				
explosives				
Additional salvage factors				
initial mobilization				
removal stabilization				
oil removal				
mobilization distance				
protected/unprotected waters				??
pre-studies carried out				
site-investigations carried out				

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Factor				Notes
VRAKA				
construction works				gaz pipeline is very close
deterioration				
diving				recreational groups have visited the site many times
military activity				
shipping traffic				in the middle of traffic lanes
storms				
trawling				
unstable seabed				moving sediments
VRAKA/site specific				
oxygen concentration				
water salinity				
water temperature				
current speed				sometimes too much for divers
hull thickness				corrosion rate small
seabed character				needs dredging if oil removal
ship use				explosives
time since sinking				>70 years
water depth				> 70 m
wreck position				on keel
ORRA				
type/size of the structure				
wreck condition/corrosion				
water depth				
need for clearing/dredging				
amount of oil				300 – 800 tons (?)
quality of oil				turbine oil might be lignine oil
leakages detected				oil detected on seabed !
sensitivity of the area				
vulnerability of the area				
wreck stabilization				
explosives				
Additional salvage factors				
initial mobilization				shipping lanes
removal stabilization				
oil removal				after ammo deactivation
mobilization distance				
protected/unprotected waters				open sea
pre-studies carried out				more investigations required
site-investigations carried out				more investigations required

Some selected wrecks in Finland for further studies (?)

Wreck No./Name	Oil Amount	Sank Down	Notes
Gnevnyj –Wreck A*	max 500 ton	24.6.1941	water depth ?
Ilmarinen –Wreck B*	93 ton	13.9.1941	water depth 70 m
Pravda – Wreck C*	93 ton	17.9.1941	location and water depth ?
Riegel – Wreck D	25 ton	28.11.1966	water depth 40 m
S5 – Wreck E*	max 200 ton	28.8.1941	water depth unknown
Smetlivyi – Wreck F*	max 500 ton	4.11.1941	> 70 m
Surovyi – Wreck G*	max 500 ton	14.11.1941	> 70 m
Translubeca –Wreck H	137 ton	31.12.1975	Out of Rauma
Z35 –Wreck I*	max 800 ton	12.12.1944	Totally destroyed when sinking
T-203 –Wreck J*	96 ton	24.10.1941	
Wischaven – Wreck K	?	7,1,1960	61° 10.000' N , 20° 30.000' E WGS84 – location not accurate

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VRAKA – guiding tool

Table 10. Guiding matrix for initial prioritizing ship wrecks (Vraka tool).

Indicator	Low severity	Moderate severity	High severity
Volume	<100 m^3	10 – 500 m^3	> 500 m^3
Status	< 20 years since wreckage	20 – 60 years since wreckage	> 60 years since wreckage
Distance to shore	< 10 nm	1 – 10 nm	< 1 nm
Sensitivity	Nearest shore is: Sand, steep cliffs or rock walls or facilities.	Nearest shore is: Cliff beaches, pebble, boulder or gravel beaches.	Nearest shore is: Reedbeds, meadows, fine sediment beaches. or mixed beaches

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Severity of risks for oil pollution

Table 11. Results of the initial prioritization of potentially polluting ship wrecks.

	Volume	Status	Distance to shore	Sensitivity	Estimated Risk
Wreck A	High	High	Low	Moderate	Estimated Risk
Wreck B	Low	High	Moderate	High	Estimated Risk
Wreck C	Low	High	Low	Low	Estimated Risk
Wreck D	Low	Moderate	Low	Moderate	Estimated Risk
Wreck E	Moderate	High	Low	Moderate	Estimated Risk
Wreck F	High	High	Low	Moderate	Estimated Risk
Wreck G	High	High	Low	Moderate	Estimated Risk
Wreck H	Low	Moderate	Low	Moderate	Estimated Risk
Wreck I	High	High	Low	Moderate	Estimated Risk
Wreck J	Moderate	High	Low	Moderate	Estimated Risk
Wreck K	Low	Moderate	Low	Moderate	Estimated Risk

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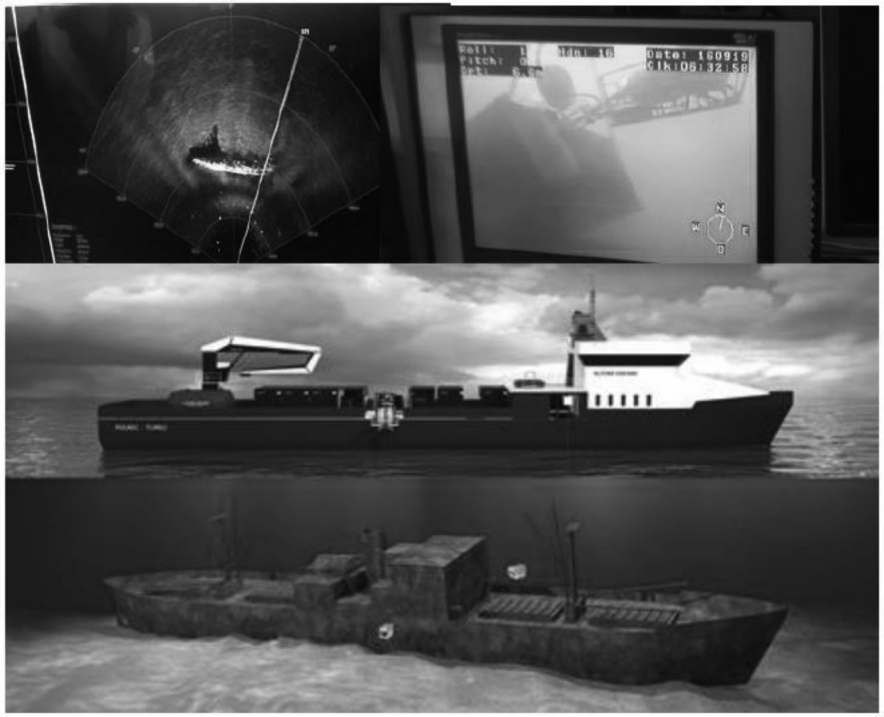
Finnish Wreck Programme 2019 - 2021

- Draft Plan
- Goals
- Execution
- Risks
- Duties in 2019
- Duties in2020 - 2021
- More Information



Upper left: ROV's sonar detecting german war ship; upper right: drilling exercise; down middle: idea for the oil removal operation – courtesy: Alfåns Håkans LtD

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Wreck Oil Removal – authority run project to develop joint underwater missions

- Project is a part of the larger water protection programme of Finland in 2019 – 2021 and fulfill the goals of the HELCOM's Baltic Sea protection goals.
- Project execution is planned to be three years - in the condition the Parliament will confirm the annual budget every year.
- 2019 budget has been confirmed

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Main Goals

- To confirm the main authorities and governmental agencies have the capasity and competence to work with wrecks. Here the hybrid model is foreseen, where both governmental agencies (public bodies) and private sector may form successfull consortia to take care of oil removal operations ?
- The direct goal is to complete one or two oil removal operations in preselected positions, and to collect good practices and recommendations for future.
- The project execution will ensure the autorities will have better view over the wreck issue, and knowledge on the technical capability of the participating bodies.

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Execution

- Project leadership by SYKE
- Year 2019 – surveying phase, selecting the target(s) for oil removal, Sste investigations, hydrodynamic studies, diving camp(s), 3D modelling, oil removal budgeting and plans, tendering processes & budgeting for 2020 and 2021 (draft)
- Year 2020 oil removal operation(s) – if possible two targets
- Year 2021 oil removal operation, site studies, impact assessment, reporting, further operations….

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Risks of executions

- Responsible organisations ?
- Ownership ?
- Poor condition of the wreck, location, sensitive areas
- Uncertaincities when estimating amount of oil
- Required resources versus economics
- Environmental conditions - delays

MS Volare execution in Estonia
(Photo: J. Rytkönen)

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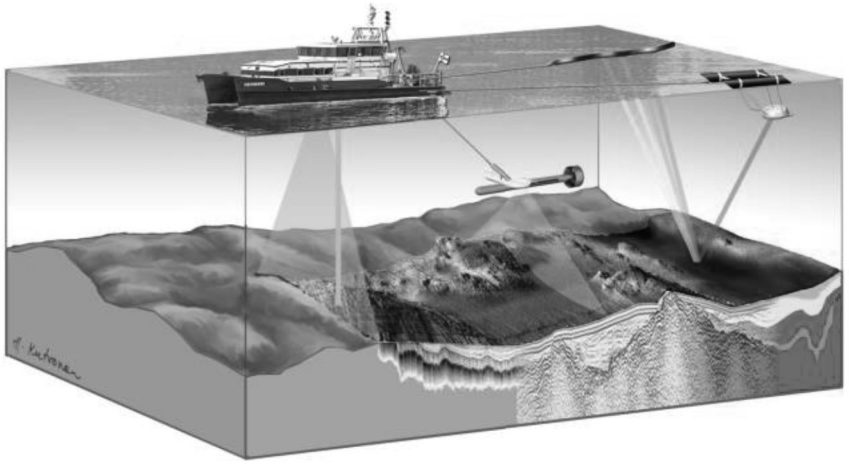
Plans for year 2019

- Additional surveying by Naval Forces, Finnish Border Guard and selected private bodies
- Use of surveying vessel ARANDA - new instrumentation !
- SYKE laboratory for sample analyses
- Diving missions



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Plans for the year 2019

- Table top/library studies to define amount of oil onboard the wrecks, vaults, registers etc
- Expert meetings, contacts with Sweden, Norway, Baltic Sea States,
- HELCOM/Submerged etc

- **<u>In the end of 2019</u>**
- Detailed information received
- Confirmed targets
- Plans for oil removal operation in progress
- Tendering process in progress
- Second target also in planning phase
- Schedule for 2020 ready
- Budget for 2020 ready
- Risk assessments made

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More Information

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