



DNV

OCC
Owens Coastal Consultants

WHEN TRUST MATTERS

S-COSRVA

The Svalbard Pilot study

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6. september 2023

S-COSRVA - Svalbard Pilotstudie

Finansiert av Kystverket som forstudie for EPPR Cirkumpolar S-COSRVA prosjektet

Studie utført av OCC og DNV med metocean data fra Met.no

Mål:

1. Hva er mulige STRANDRENSETEKNIKKER for forskjellige strandtyper og oljetyper? Tilpasning av mulighetsanalyse for strandrenseteknikker (FAST-appen – tilgjengelig på nettet)
2. Hva er MULIGHETSROMMET med de ulike OPERASJONELLE SYSTEMENE for hver måned på et gitt sted?
3. Hva er mulige ADKOMSTALTERNATIVER (luft-land-vann-tilgang) for hver måned til et sted?



Inngangsdata til analysen

Svalbard kystdata

Value description for database field for geomorphology: FORM

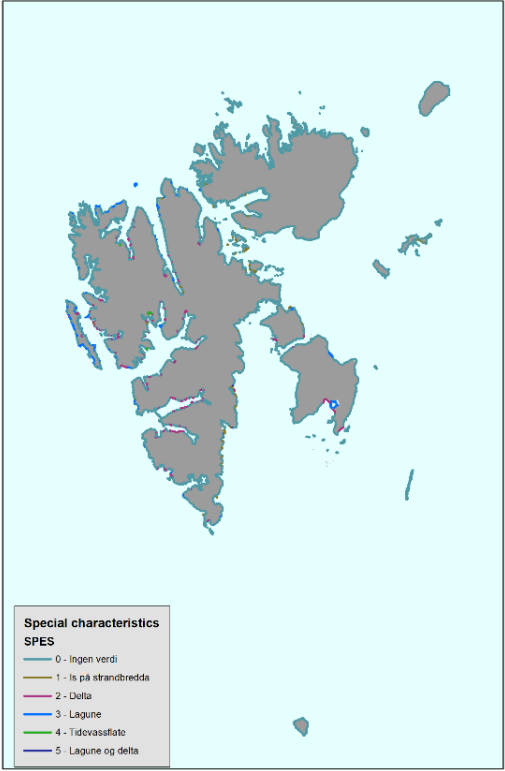
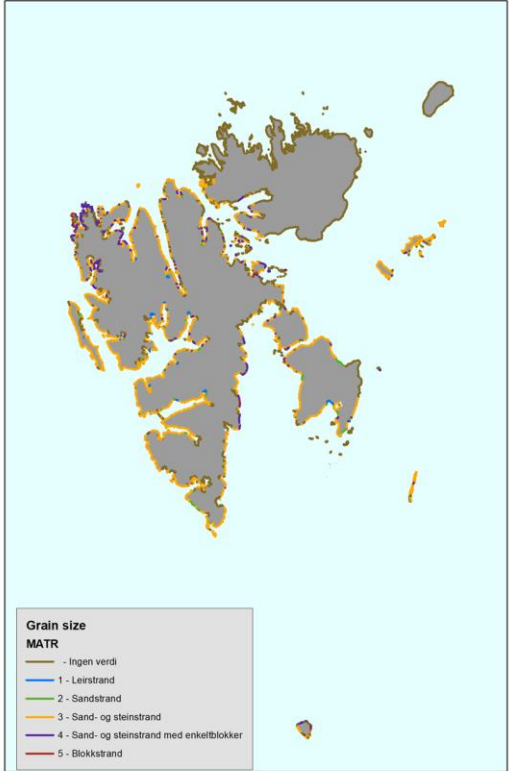
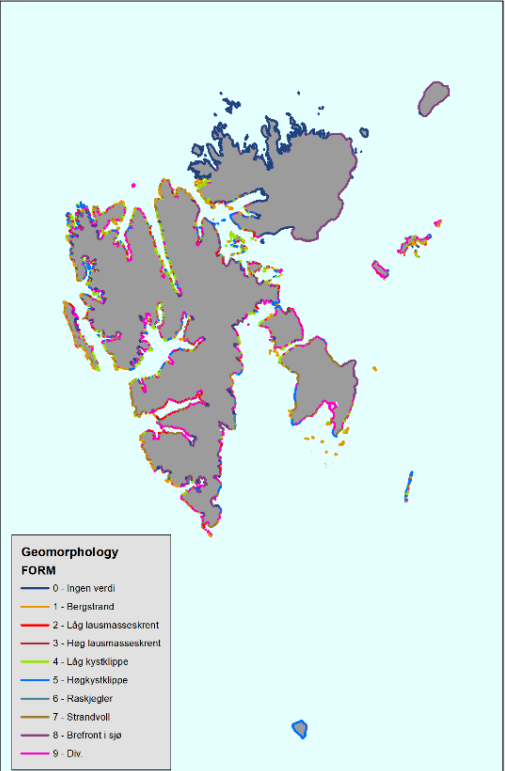
CODE	DESCRIPTION IN ENGLISH	DESCRIPTION IN NORWEGIAN
0	No value	Ingen verdi
1	Rocky shore	Bergstrand
2	Low cliff of unconsolidated material	Låg lausmasseskrent
3	High cliff of unconsolidated material	Høg lausmasseskrent
4	Low cliff of bedrock	Låg kystklippe
5	High cliff of bedrock	Høg kystklippe
6	Talus cones	Raskjegler
7	Barrier (Beach ridge)	Strandvoll
8	Glacier front terminating in the sea	Brefront i sjø
9	Misc.	Div.

Value description for database field for grain size: MATR

CODE	DESCRIPTION IN ENGLISH	DESCRIPTION IN NORWEGIAN
0	No value	Ingen verdi
1	Clayey beach	Leirstrand
2	Sandy beach	Sandstrand
3	Sandy and stony beach	Sand- og steinstrand
4	Sandy and stony beach with single boulders	Sand- og steinstrand med enkeltblokker
5	Boulder beach	Bløkkstrand
7	???	???

Value description for database field special characteristics: SPES

CODE	DESCRIPTION IN ENGLISH	DESCRIPTION IN NORWEGIAN
0	No value	Ingen verdi
1	Ice on the beach	Is på strandbredda
2	Delta	Delta
3	Lagoon	Lagune
4	Tidal flat	Tidevassflate
5	Lagoon and Delta	Lagune og delta



Eksempel på FAST resultater – Svalbard pilot

sammenheng mellom strandrenseteknikk, substrat, oljetype og lokasjon

3A Medium Surface	IMPERMEABLE/SOLID		PERMEABLE					
	Bedrock	Ice	Sand Beach	Mixed Sed Beach	Bld Beach	Mud Flat	Sand Flat	Snow
Natural Attenuation	✓	o	✓	✓	✓	o	o	o
Flush/Flood	✓	o	✓	✓	✓	✓	✓	✓
LP Wash	✓	✓	o	✓	✓	✓	O	✓
LP Heated Wash	✓	✓	O	O	O	O	O	O
HP Wash	✓	O	O	O	O	E	O	O
HP Heated Wash	E	O	O	O	O	E	O	O
Steam Cleaning	E	O	I	I	O	I	I	I
Sand Blasting	E	I	I	I	O	I	I	I
Manual Removal	o	o	o	o	o	o	o	o
Vacuum	✓	✓	✓	✓	I	✓	✓	✓
Mech Removal	I	✓	✓	✓	o	E	✓	✓
Veg Cutting	o	I	I	I	I	I	I	I
Passive Sorbents	o	o	o	o	o	o	o	o
Dry Mixing	I	I	✓	✓	I	O	✓	O
Wet Mixing	I	I	✓	✓	O	E	✓	✓
Relocation	I	I	✓	✓	I	O	O	✓
Incineration	I	I	o	o	I	I	o	o
Burning	I	I	I	I	I	I	I	I
Dispersants	✓	O	O	O	E	E	E	I
SWAs	✓	O	O	O	o	E	E	I
Solidifiers	I	I	O	O	I	I	I	I
Bioremediation	o	I	o	o	o	o	o	I

Safety can be an operational concern for unweathered Medium oils

FEASIBILITY ANALYSIS

FEASIBLE OPTION

NOT APPLICABLE

FEASIBLE SMALL AMOUNTS

Primary "NOT APPLICABLE" Reason *

environmentally inappropriate	E
operationally incompatible	I
operationally impractical	O
safety	S

Operasjonelle Systemer

- 22 strandrenseteknikker
- 4 operasjonelle systemer

Shoreline Treatment Operations Systems for S-COSVRA Phase II			
Treatment Options	1. Natural Attenuation	9. Manual Removal	16. Sediment Relocation
	2. Flooding or Flushing	10. Vacuum	17. Incineration
	3. Low Pressure Ambient Wash	11. Mechanical Removal	18. Controlled Burning
	4. Low Pressure Heated Wash	12. Vegetation Cutting	19. Dispersant Washing
	5. High Pressure Ambient Wash	13. Passive Sorbents	20. Surface Washing Agents
	6. High Pressure Heated Wash	14. Dry Mixing	21. Solidifiers
	7. Steam Cleaning	15. Wet Mixing	22. Bioremediation
	8. Sand Blasting		

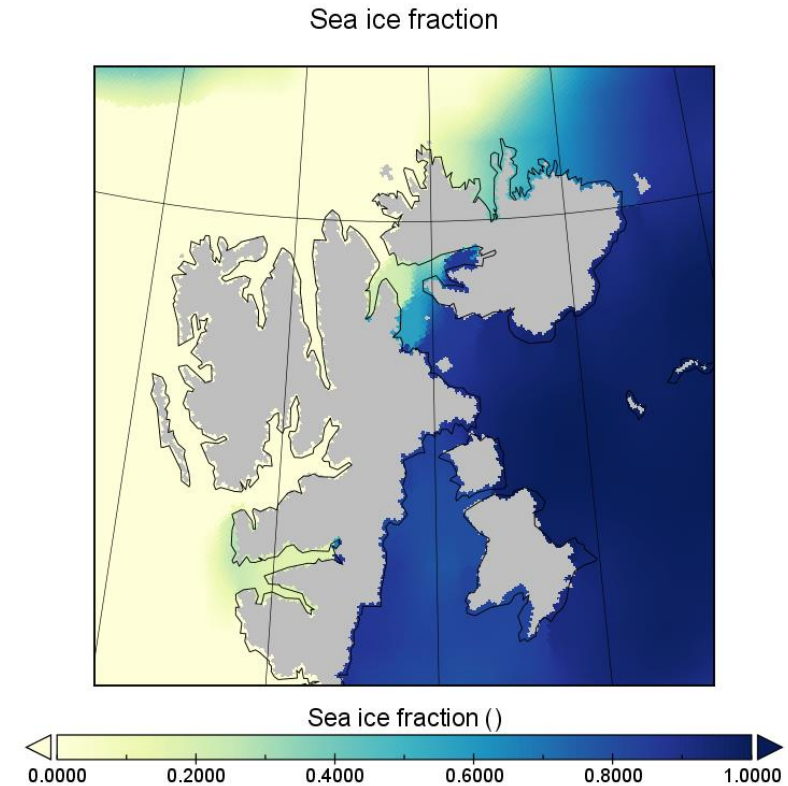


OPERATIONAL SYSTEM	CODE	TREATMENT METHOD
PHYSICAL TREATMENT: MANUAL (P-MAN)	9	Manual Removal
	10	Vacuum Recovery
	12	Vegetation Cutting
	13	Passive Sorbent
	17	Incineration
	18	Controlled Burn
	21	Solidifiers/Stabilization
	22	Bioremediation (Bioenhancement)
PHYSICAL TREATMENT: MECHANICAL REMOVAL & IN SITU TREATMENT (P-MEC)	11	Mechanical Removal
	10	Mobile Vacuum Trucks
	14	Dry Mixing
	15	Wet Mixing
	16	Sediment Relocation
WASHING: MANUAL, SHORE-BASED (W-MAN)	2	Flooding or Flushing ("Deluge")
	3	Low Pressure Ambient Wash
	4	Low Pressure Heated Wash
	5	High Pressure Ambient Wash
	6	High Pressure Heated Wash
	7	Steam Cleaning
	8	Sand Blasting
	19	Dispersant Washing
	20	Surface Washing Agents (SWAs)
WASHING: MECHANICAL, WATER- BASED PLATFORM (W-MEC)	2	Flooding Of Flushing ("Deluge")
	3	Low Pressure Ambient Wash
	4	Low Pressure Heated Wash
	5	High Pressure Ambient Wash
	6	High Pressure Heated Wash
	7	Steam Cleaning
	8	Sand Blasting
	19	Dispersants
	20	Surface Washing Agents (SWAs)

Datasett for operasjonelle begrensninger

Dekning på kyst, 10 år hindcast datasett 2012-2021 (hver time)

- NORA3km <https://thredds.met.no/thredds/projects/nora3.html>
 - wind speed 10 m (m/s)
 - air temperature 2m (K), sea surface temperature (K)
 - sea ice concentration (fraction)
 - horizontal visibility (m) (based on temp and dew point)
- MyWaveWAM3km https://thredds.met.no/thredds/catalog/windsurfer/mywavewam3km_files/catalog.html
 - sign. wave height H_s (m), period T_z (s), wave direction (degree)
- Other
 - cloud ceiling (m)
 - shore-zone ice (based on temp)
 - wave exposure
- DNV: tidal range, daylight, superstructure icing (cm/h), wind chill (°C)



Operasjonelle grenseverdier

OPERATIONAL SYSTEM
PHYSICAL TREATMENT: MANUAL (P-MAN)
PHYSICAL TREATMENT: MECHANICAL REMOVAL & IN SITU TREATMENT (P-MEC)
WASHING: MANUAL, SHORE-BASED (W-MAN)
WASHING: MECHANICAL, WATER-BASED PLATFORM (W-MEC)

SYSTEM LIMITS - Metric	FAVOURABLE	MARGINAL		NOT FAVOURABLE
Boundary	Upper	Lower	Upper	Lower
Shore Zone Ice (°C)	> 0	0	-5	< -5
Air Temperature (°C)	> -10	-10	-34	< -34
Wind Chill (°C)	> -10	-10	-34	< -34
Wind Speed (m/s)	< 13	13	18	> 18
Light Conditions (daylight hours)	> 6	6	4	< 4

SYSTEM LIMITS - Metric	FAVOURABLE	MARGINAL		NOT FAVOURABLE
Boundary	Upper	Lower	Upper	Lower
Shore Zone Ice (°C)	>0	0	-5	<-5
Air Temperature (°C)	>-10	-10	-20	<-20
Wind Chill (°C)	>-10	-10	-20	<-20
Wind Speed (m/s)	<13	13	18	>18
Light Conditions (daylight hours)	>6	6	4	<4

SYSTEM LIMITS - Metric	FAVOURABLE	MARGINAL		NOT FAVOURABLE
Boundary	Upper	Lower	Upper	Lower
Shore Zone Ice (°C)	>0	0	-5	<-5
Air Temperature (°C)	>0	0	-5	<-5
Wind Chill (°C)	>0	0	-5	<-5
Wind Speed (m/s)	<2.5	2.5	5	>5
Light Conditions (daylight hours)	>6	6	4	<4

SYSTEM LIMITS - Metric	FAVOURABLE	MARGINAL		NOT FAVOURABLE
Boundary	Upper	Lower	Upper	Lower
Shore Zone Ice (°C)	>0	0	-5	<-5
Air Temperature (°C)	>0	0	-5	<-5
Wind Chill (°C)	>0	0	-5	<-5
Wind Speed (m/s)	<2.5	2.5	5	>5
Wind Wave Height (m)	<0.3	0.3	0.9	>0.9
Nearshore Ice (%)	<5	5	20	>20
Light Conditions (daylight hours)	>6	6	4	<4

- Wind Wave Height is not applicable
- Nearshore Ice is not a factor
- Tidal Range is not a factor

- Wind Wave Height is not applicable
- Nearshore Ice is not a factor
- Tidal Range could limit the width of the operating zone

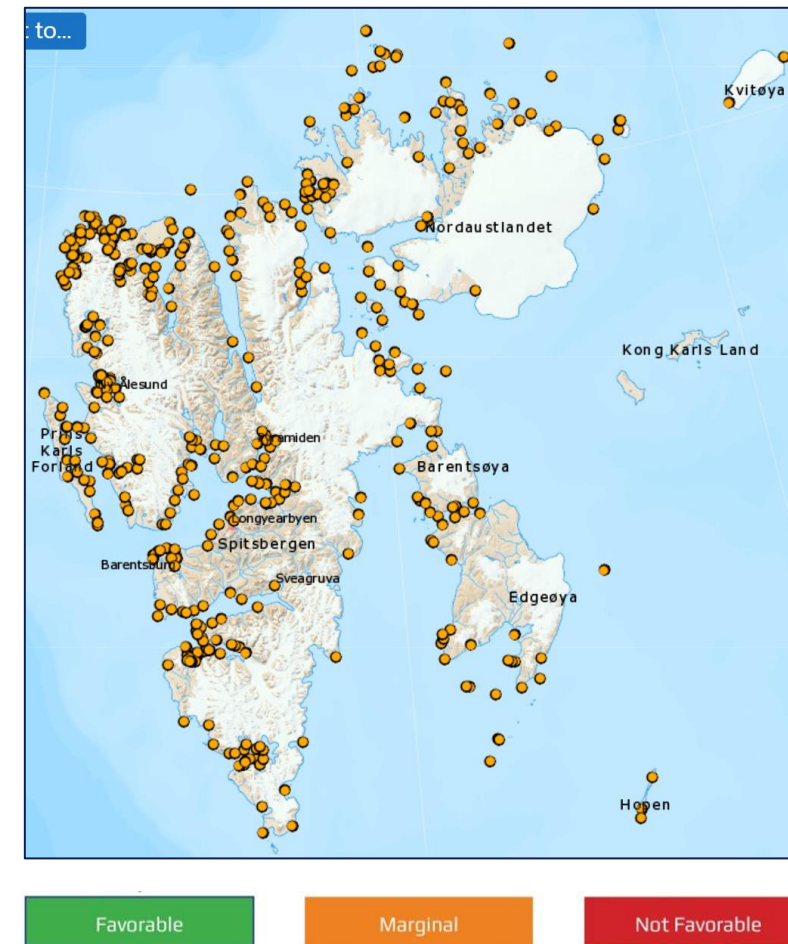
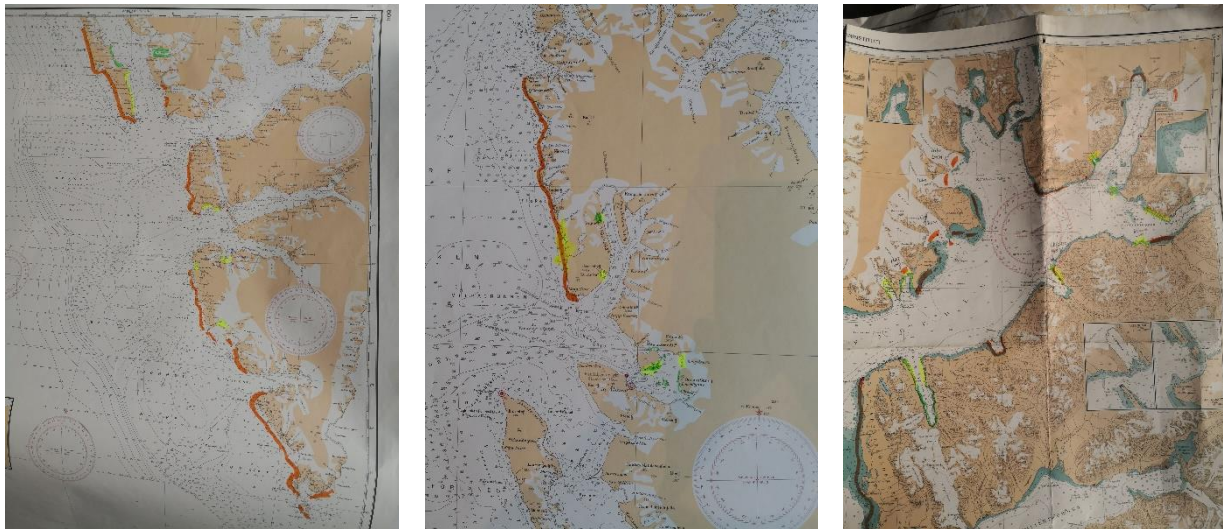
- Air Temperature assumes unheated water
- Wind speed included for excessive deflection of water from nozzle
- Wind Wave Height - not applicable
- Tidal range not a factor

Operations Note: Assume close to shore (within 25m), nearshore containment boom, small boat (<10m length) support

- Air Temperature assumes unheated water
- Wave height based on small boat and ASTM protected water boom operating limits
- Wind speed included for excessive deflection of water from nozzle
- Tidal range not a factor (was >5 m in PWS in 1989)

Adkomst

- Lokal konsultasjon med Norsk Polarinstitutt og Miljødirektoratet
- Adkomst til strandlinjen fra mindre fartøy og båter som kan landsettes
- Svalbardkartet fra NP
 - <https://geokart.npolar.no/Html5Viewer/index.html?viewer=Svalbardkartet>
 - Landingsplasser for cruise trafikk
 - Brefronter etc



The web-map solution

Viability analysis for shoreline

Filter viability results displayed in maps based on month and operational system.

Month
July

Operational system
Physical: Mechanical (P-MEC)

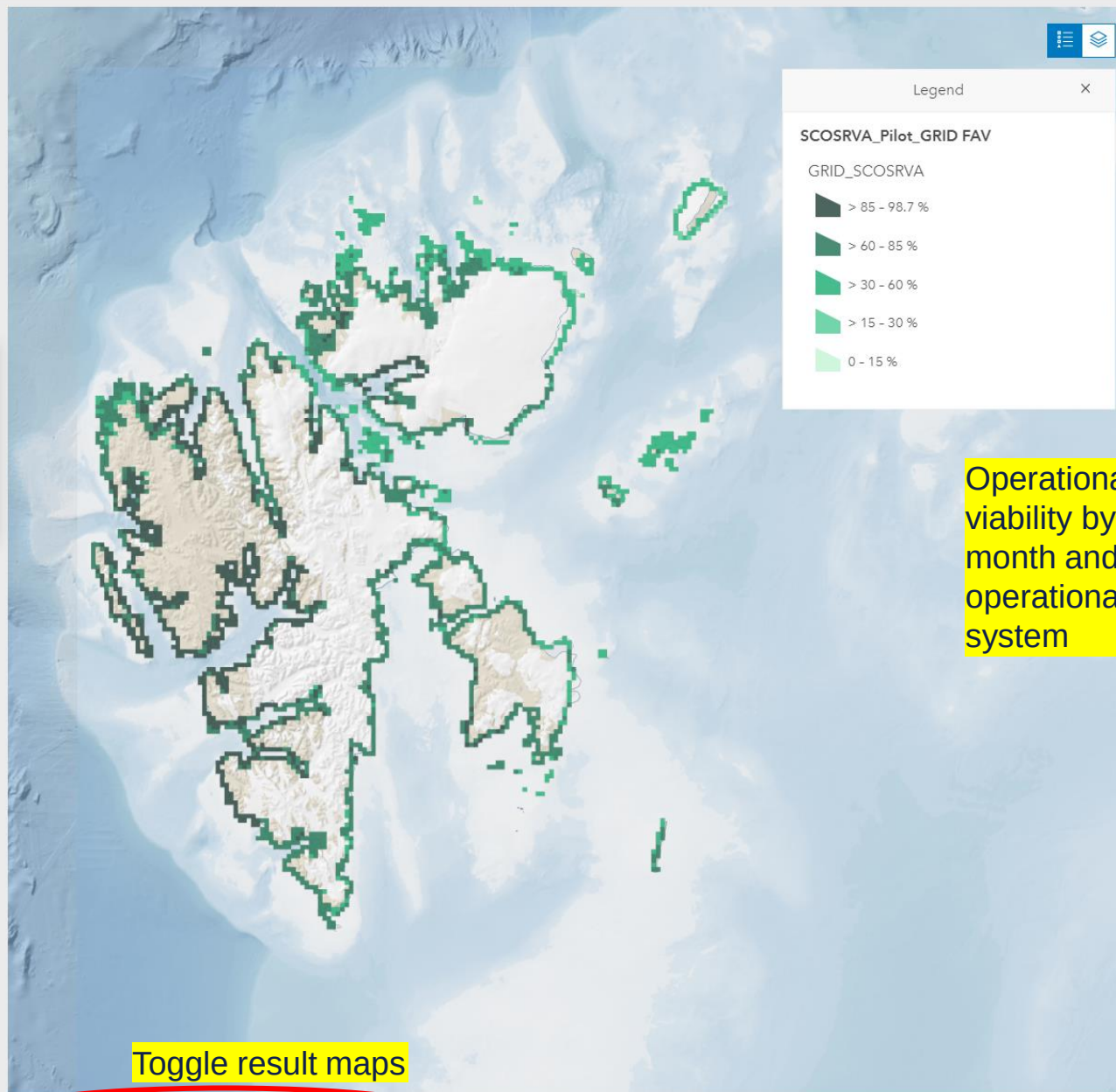
Physical: Manual (P-MAN)

• Physical: Mechanical (P-MEC)

Washing: Manual (W-MAN)

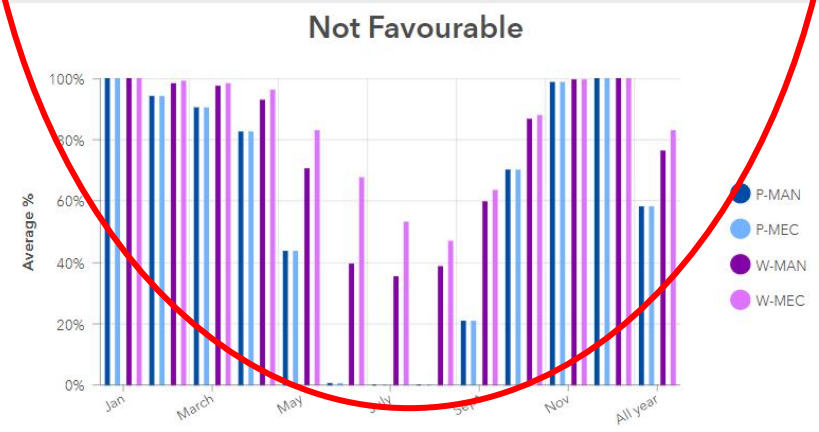
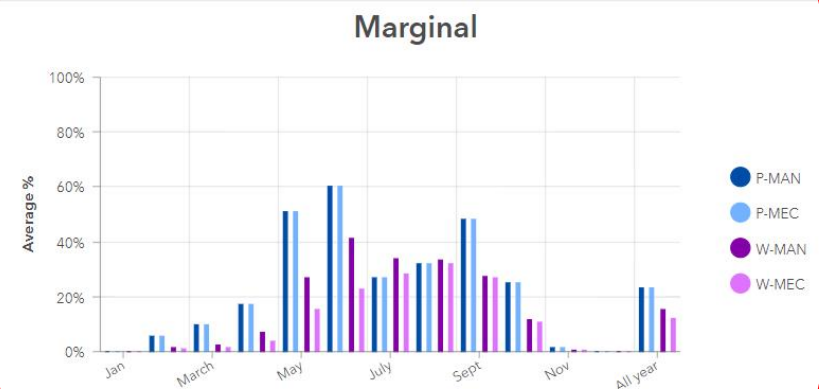
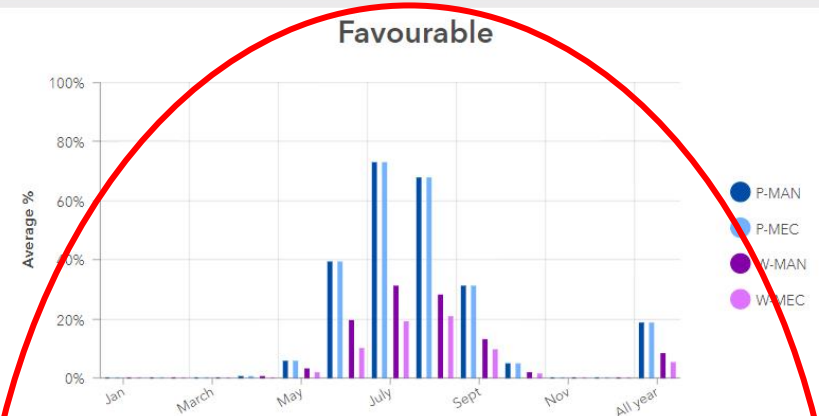
Washing: Mechanical (W-MEC)

User selections



Toggle result maps

Favourable Marginal Not favourable Coast Type



Viability analysis for shoreline

Filter viability results displayed in maps based on month and operational system.

Month
July

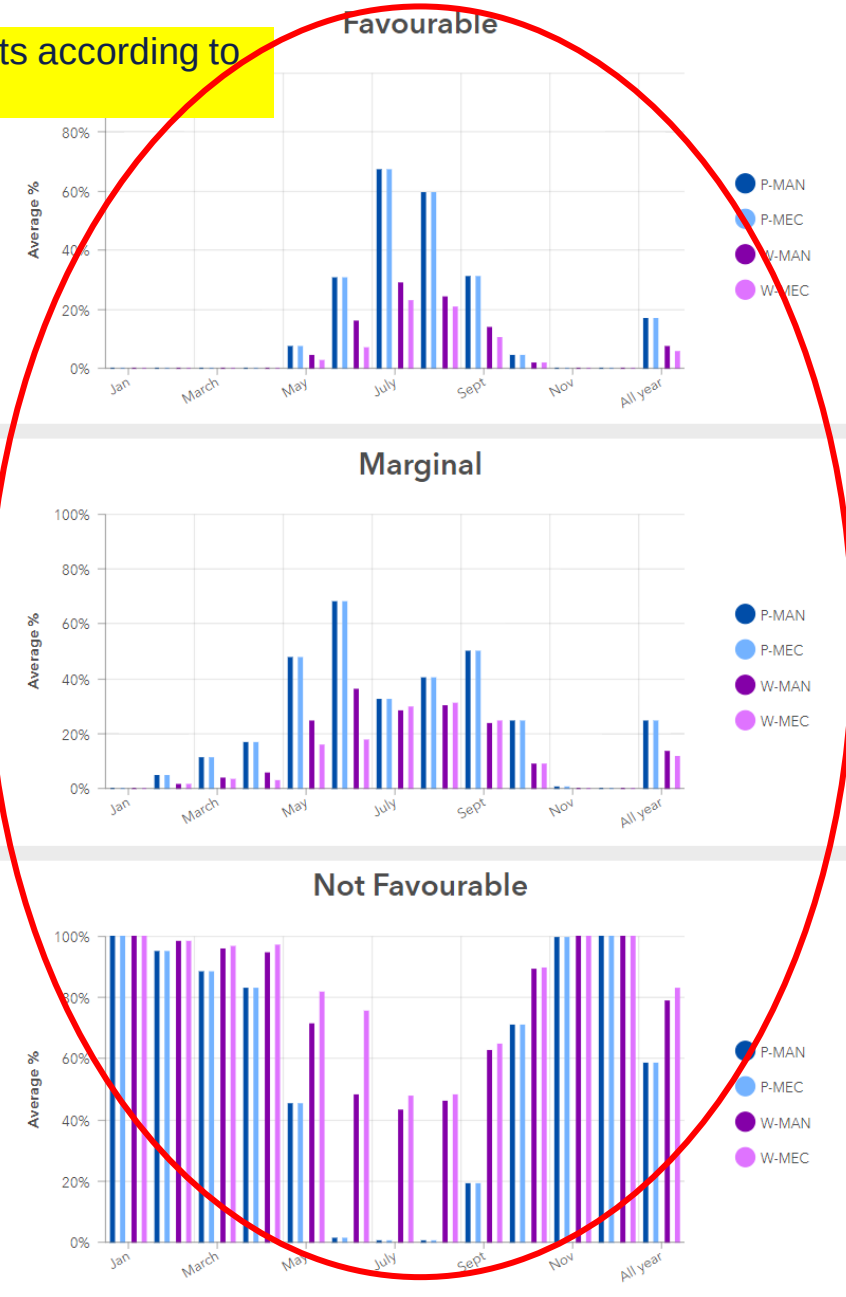
Operational system
Physical: Mechanical (P-MEC)

Zooming in updates the results according to map view

View shifts from grid cells (3x3 km) to line segments



Favourable Marginal Not favourable Coast Type



Filters

1) Viability results

Month
May

Operational system
Washing: Mechanical (W-MEC)

2) FAST Treatment Methods

Shoreline
Mixed Sediment

Oil Type
Medium

Location
Surface

Treatment methods

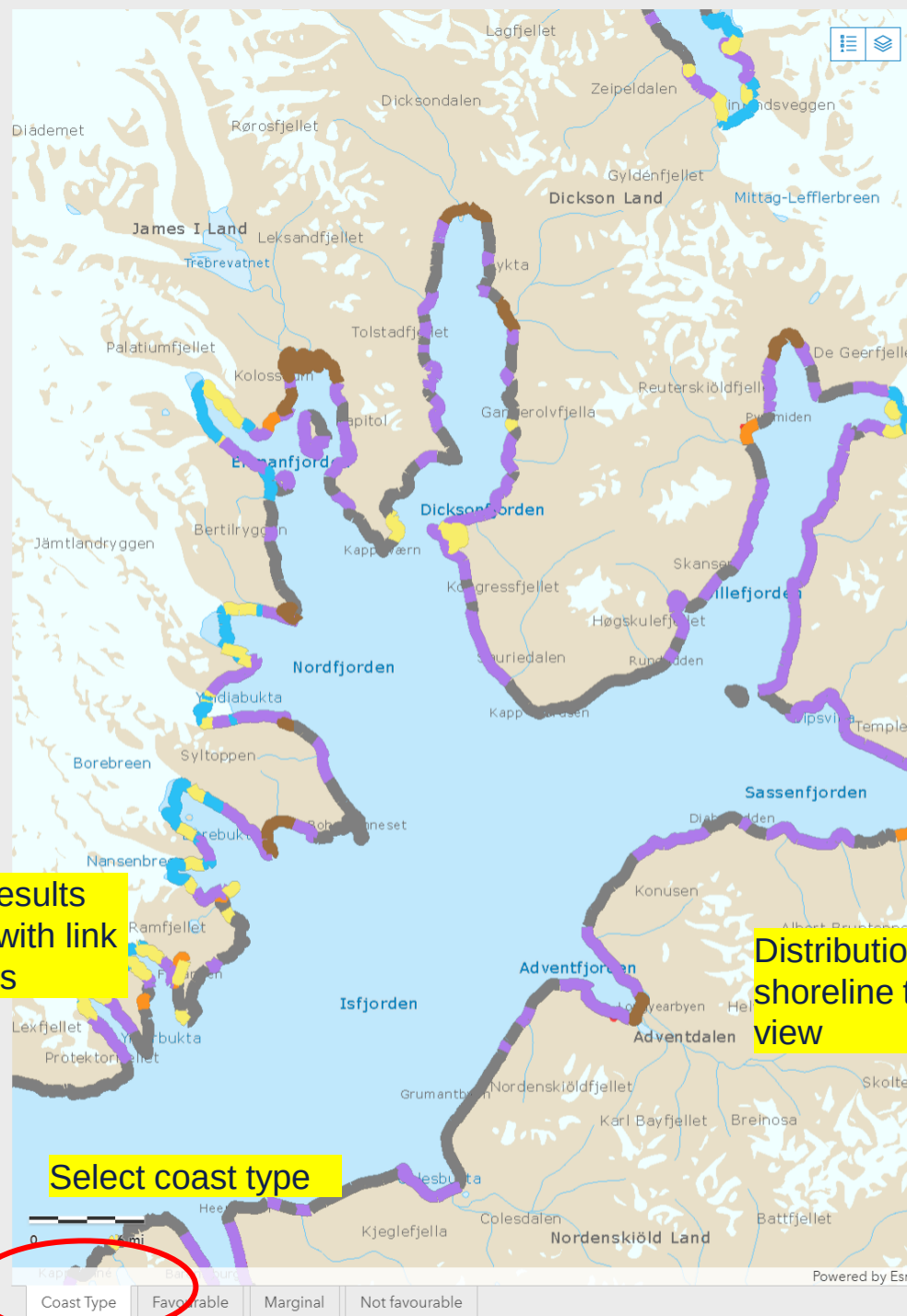
W-MEC
Mixed Sed Beach
Medium Surface

- (1) - Natural Attenuation
[Open factsheet](#)
- (2) - Flush/Flood
[Open factsheet](#)
- (3) - LP Wash
[Open factsheet](#)
- (15) - Wet Mixing
[Open factsheet](#)
- (4) - LP Heated Wash
[Open factsheet](#)
- (5) - HP Wash
[Open factsheet](#)
- (6) - HP Heated Wash
[Open factsheet](#)
- (19) - Dispersants
[Open factsheet](#)
- (20) - SWAs
[Open factsheet](#)
- (7) - Steam Cleaning
[Open factsheet](#)

Feasibility results
from FAST with link
to factsheets

Feasibility score

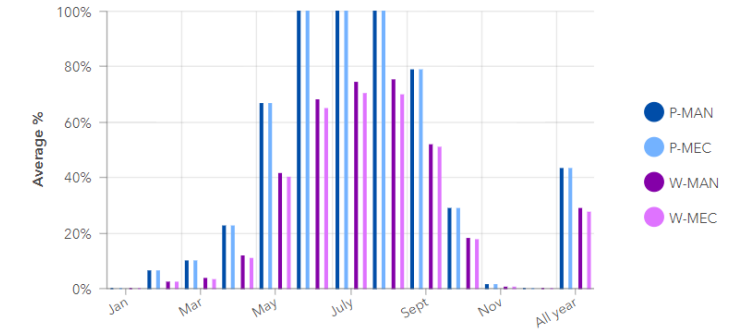
Feasible
Feasible in small amounts
Impractical
Feasible but
environmentally
inappropriate
Not applicable for safety
reasons
Incompatible



Select coast type

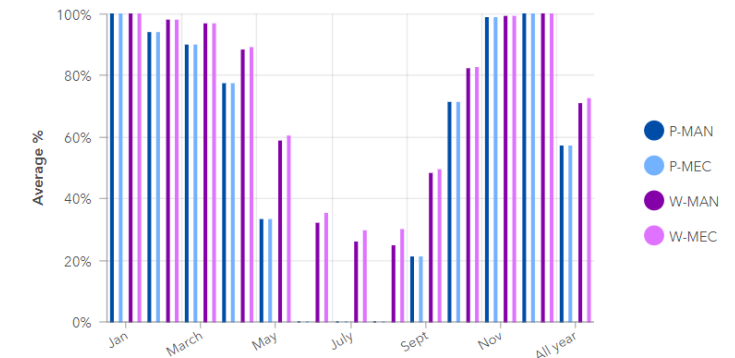
Favourable and marginal

Distribution of average favourable and marginal conditions for each month, grouped by different operational systems



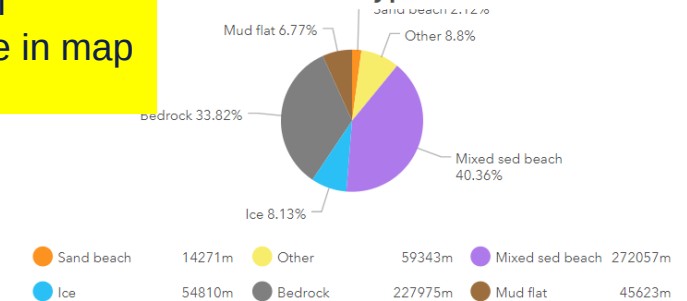
Not Favourable

Distribution of average not favourable conditions for each month, grouped by different operational systems



Distribution of
shoreline type in map
view

Coast type



Distribution of coast types in the map, based on length (m)

Dominating factor NFA
Coast type

Build as a scrollable Storymap

DNV

Forlandet

The **west side** of Prins Karls Forland is identified as a very demanding. Mostly always deep sea (swell), shallow and poorly charted. Disembarking with a small boat in this area would entail great risk.

The **eastern side** of Forlandet, where the southernmost part is often characterized by heavy seas, while further inland there will be better conditions. But this can quickly change if you get a lot of wind from the north. There is often quite a bit of wind in Forlandssundet.

The area from Pyntlaguna in the south-east to Dawespynten in north-west is considered more sheltered locations. .



Photo: Northern point of Prins Karls Forland (Source: Per Harald Olsen/Wikipedia)



Thank you for your attention

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