Adaptation by wide green dikes: Opportunity to improve biodiversity along the coast?

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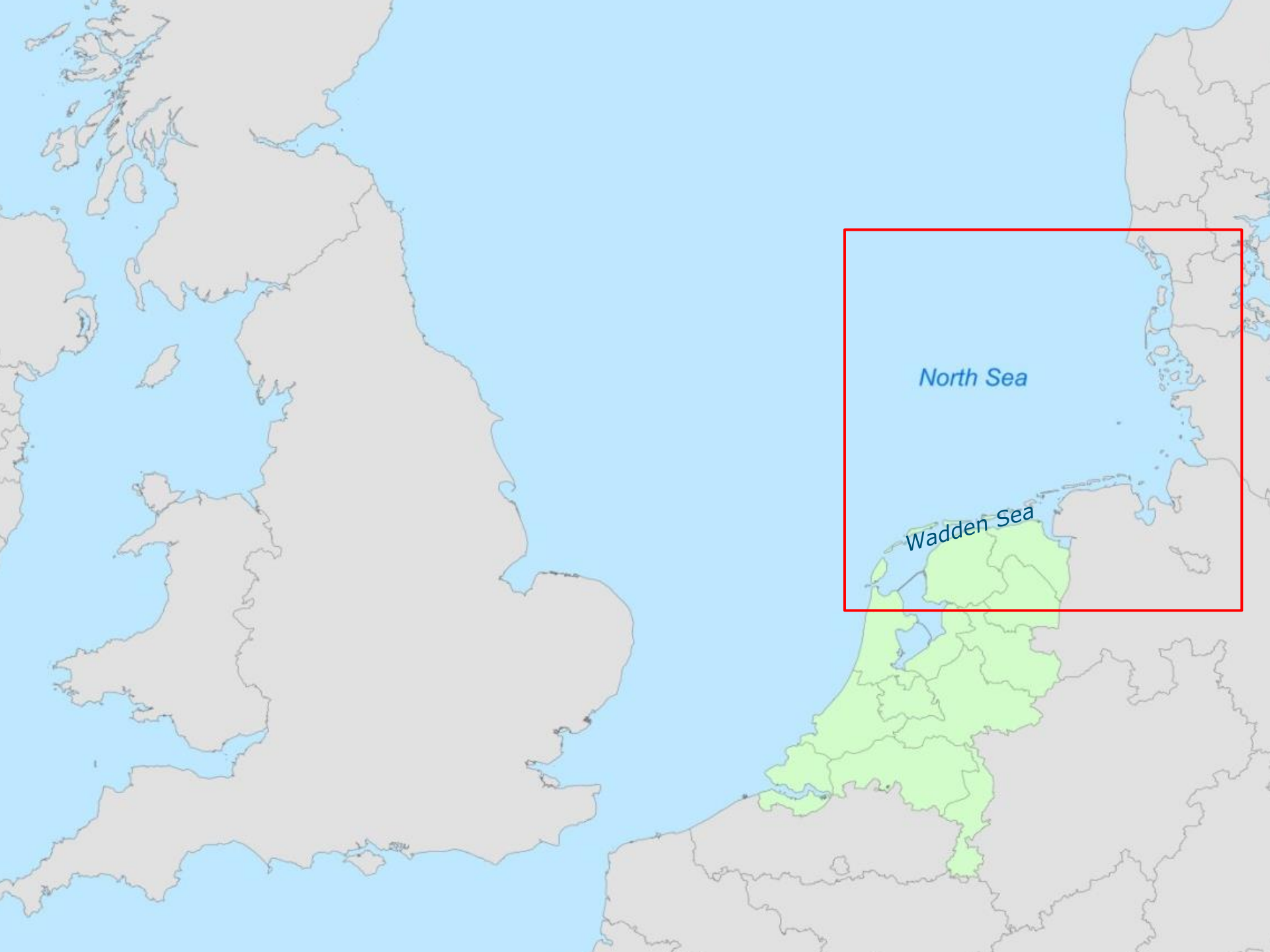

North Sea
Wadden Sea

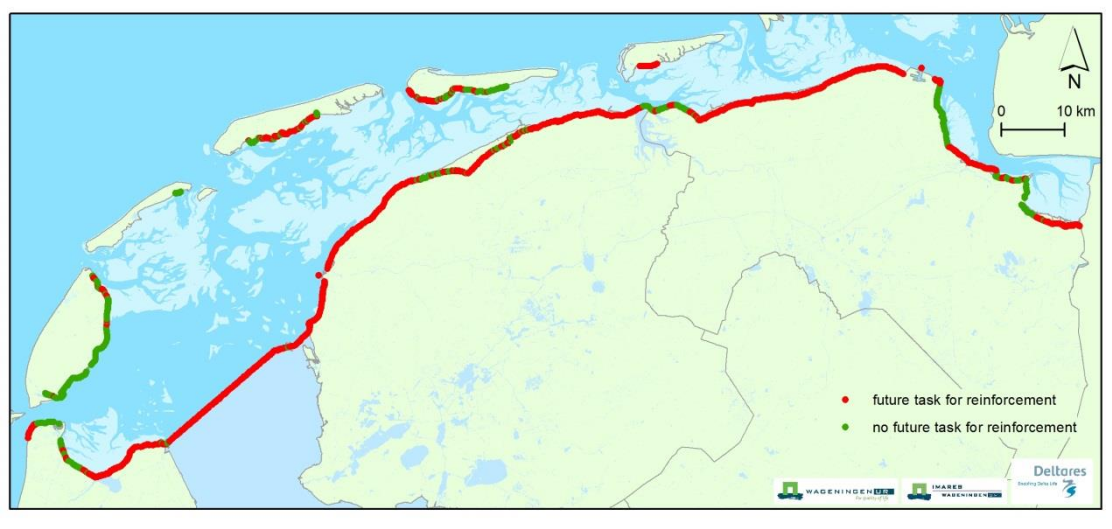
North Sea

Wadden Sea

Task to improve flood protection

Flood defences along Wadden Sea coast: several stretches do not meet current standards → task to improve flood protection

Future task (under sea level rise)



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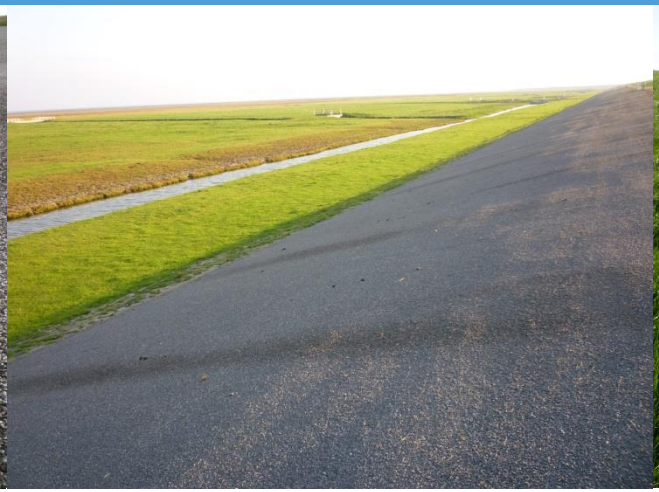
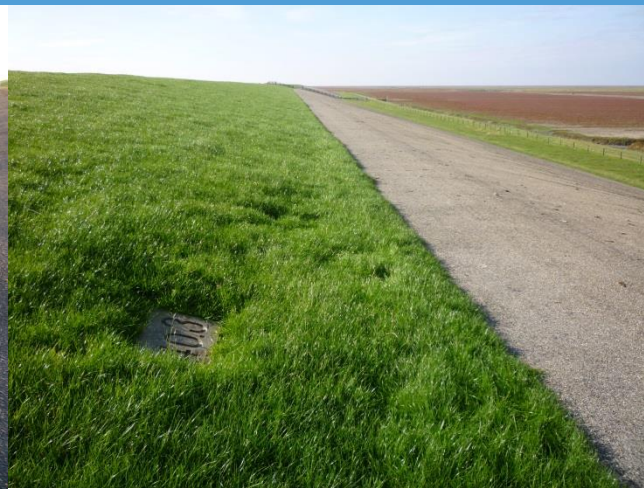
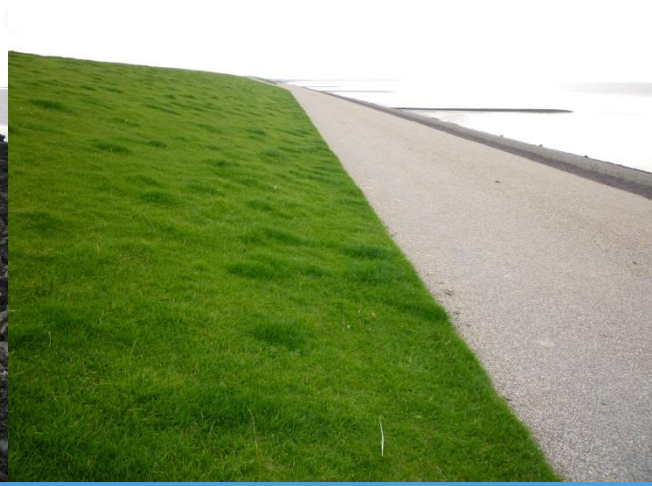
Current dikes along Dutch Wadden Sea coast

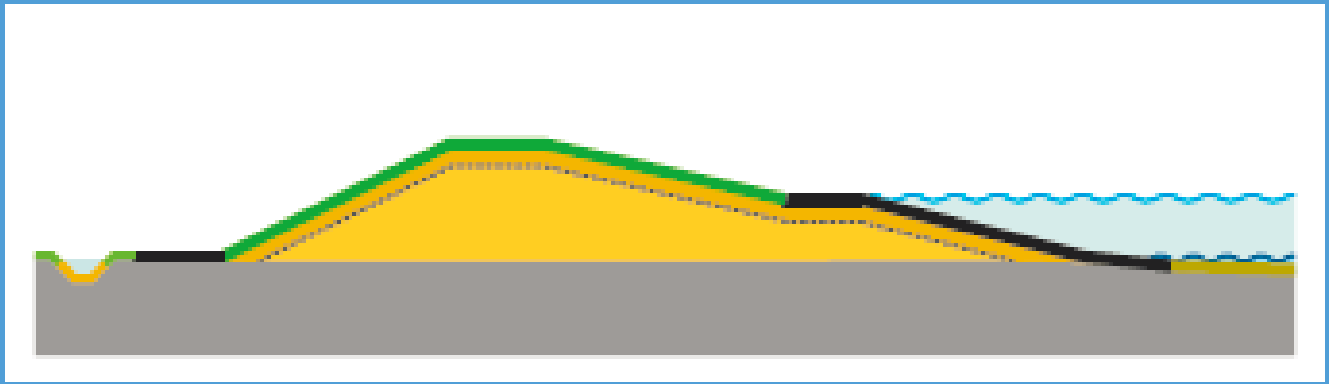

Anlieger frei
Anlieger frei
Jungviehweide
Schafbeweidung
Das Mitführen von Hunden ist verboten!
Benutzung der Anlagen auf eigene Gefahr!
Betriebshof Kanalpolder
NLWKN

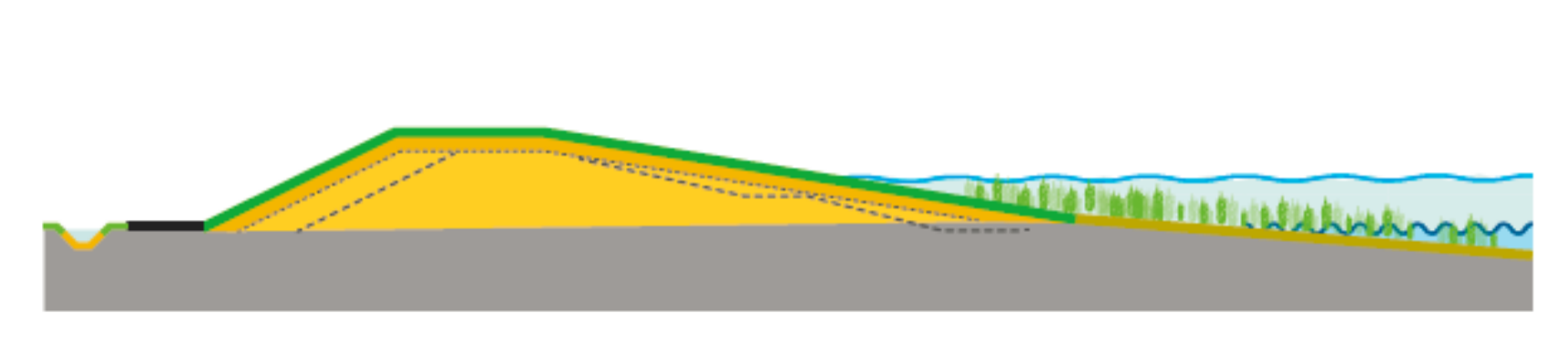
Wide green dike along German part of the Wadden Sea.....

Wide green dike along German part of the Wadden Sea.....

Workshop (with German experts) organised by Waterboard Hunze & Aa’s as part of Delta Programme Wadden Sea Region

Wide green dike with shallow seaward slope

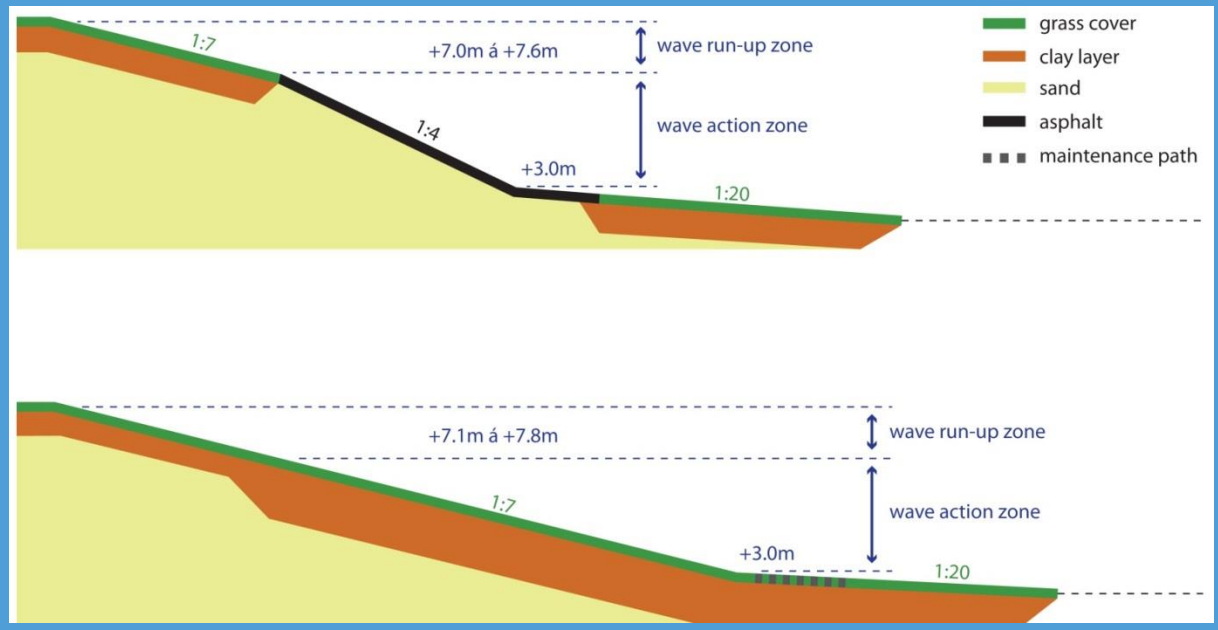




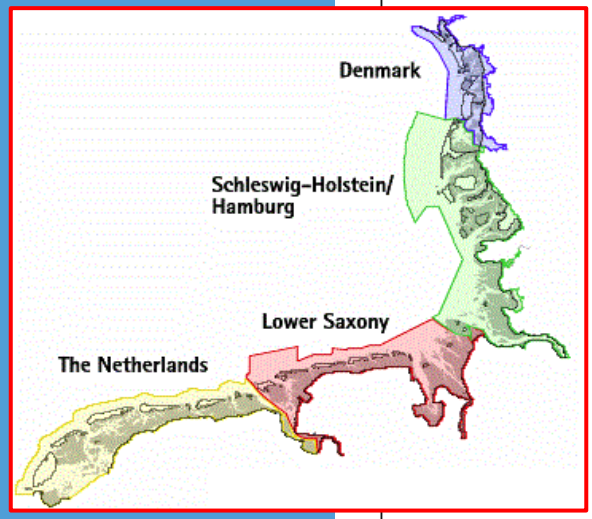
Costs-Benefits

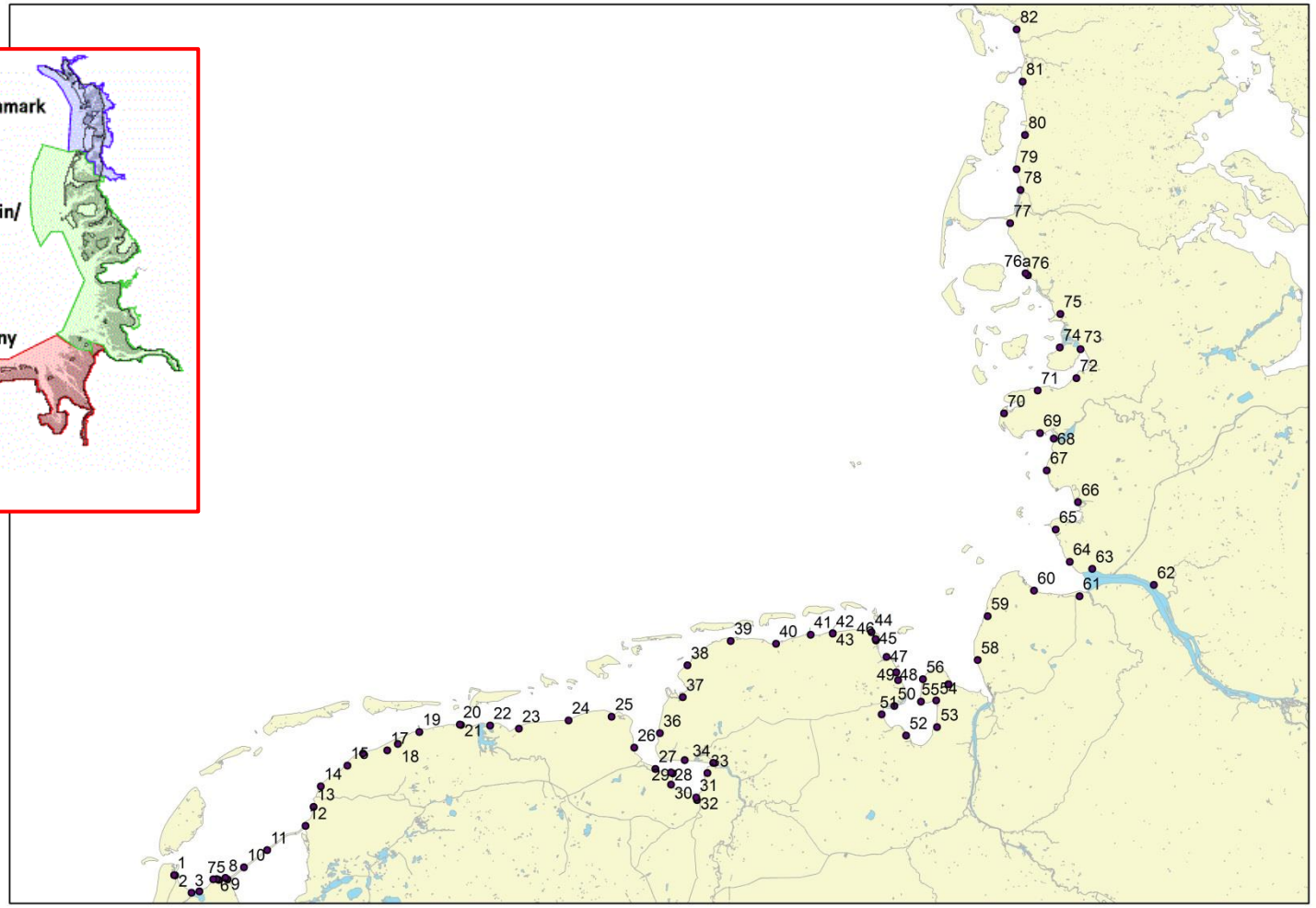
- cost-effective?
- flexible solution
- Fits better in Wadden Sea coastal landscape

But, how about nature values?



Survey along entire Wadden Sea coast





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Survey (82 locations)

- Seaward slope
- Relevé of ~25 m²
- Upper, Middel and Lower zone

NL (Stroe)

type	Name Species	U
gras	Agrostis stolonifera	4
gras	Cynosurus cristatus	3
gras	Hordeum murinum	2m
gras	Hordeum secalinum	1
gras	Lolium perenne	5
	Number	5
forb	Anthriscus sylvestris	+
forb	Cerastium fontanum	+
forb	Cirsium arvense	1
forb	Geranium molle	2m
mos	Brachythecium albicans	4
	Number	5

type	Name Species	U	M	L
gras	Agrostis stolonifera		1	4
gras	Arrhenatherum elatius	2m	4	
gras	Cynosurus cristatus	1	3	1
gras	Juncus gerardii			2a
gras	Juncus tenuis			+
gras	Lolium perenne	5	5	5
gras	Phragmites australis			+
	Number	3	4	6
forb	Aster tripolium			+
forb	Atriplex prostrata			r
forb	Bellis perennis		5	1
forb	Centaurium littorale			+
forb	Cerastium fontanum	+		
forb	Cirsium arvense			1
forb	Cirsium vulgare			1
forb	Leontodon autumnalis			1
forb	Lotus glaber			+
forb	Plantago major			2a
forb	Ranunculus acris	+		
forb	Rumex crispus			+
forb	Sonchus arvensis			1
forb	Taraxacum species	1		
forb	Trifolium pratense	2b	2b	
forb	Trifolium repens	2a	2b	2a
	Number	5	3	12

Dike reinforcement (Niedersachsen)

type	Name Species	M
gras	Festuca rubra	+
gras	Lolium perenne	4
gras	Poa annua	1
	Number	3
forb	Medicago lupulina	+
forb	Rumex crispus	1
forb	Trifolium repens	3
forb	Tripleurospermum maritima	3
	Number	4

Number of species on seaward face dike (upper, middle and lower zone)

Number of Species												
	Number			Mean			Max.			STD		
Loc.	U	M	L	U	M	L	U	M	L	U	M	L
NL	27	10	13	9	6.2	10.5	15	9	16	2.5	1.9	2.6
NS	26	20	23	12.3	13.1	11.7	20	23	22	4	5.1	5
SH	14	12	11	12	10.9	10.5	19	14	14	3.9	2.2	3
Dk	4	4	4	11	13.3	14	14	21	24	2.4	7.4	6.7

Vegetation type (NL – NS)

Type	U	M	L	Total
12AA01A	2	3	4	9
12BA03A	4		3	7
12BA04B	1			1
12RG01	2	2		4
12RG03	9	4	4	17
16BB01C		1		1
16BC01A	7	1		8
16RG01	1			1
16RG11	1			1
26RG02			1	1
31BA01A			1	1
31CA01B	1			1
Total	28	11	13	52

Type	U	M	L	Total
12AA01A	1	4	2	7
12BA03A	1	1	6	8
12BA04B			1	1
12RG01	4	2	1	7
12RG03	6	2	3	11
12RG04		2	1	3
16BB01B		1		1
16BC01A	12	4		16
16BC01C	1	3	1	5
16BC02			1	1
16RG01		1		1
22AA01A			1	1
22AB01A			1	1
26AB01B			1	1
26AC06			1	1
26AC07			1	1
27AA01B			1	1
31BA01A		1		1
32BA03			1	1
Total	25	21	23	69

Findings:

- Difference in vegetation between traditional Dutch dikes and wide green dikes
- Especially the older grass covers of the wide green dikes harbour many different grasses and forbs
- Majority of dikes is maintained by sheep grazing
- At toe of wide green dikes several typical salt-marsh species
- If a wide, and high foreland is present → no halophytes at the toe of wide green dikes
- Recently reinforced dikes in Germany species poor
- Wide green dike can harbour species-rich vegetation and form at many locations a smooth transition from salt-marsh foreland vegetation into dike grasslands

Questions?

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