

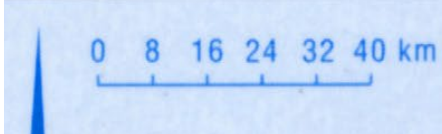


SEA LEVEL RISE

SANDY SOLUTIONS - SOLID AS A ROCK?

This presentation

- The area
- Inventory
- Climate change
- New coastal management strategies
- Public opinions
- The future



The international Waddensea

Terschelling:
30 km long
3 - 4 km wide
4500 inhabitants
450.000 tourists / year
€ 90.000.000

.....
80% N2000 area (9400 ha.)
20% private owned (1400 ha.)



The Boschplaat, Terschelling, NL

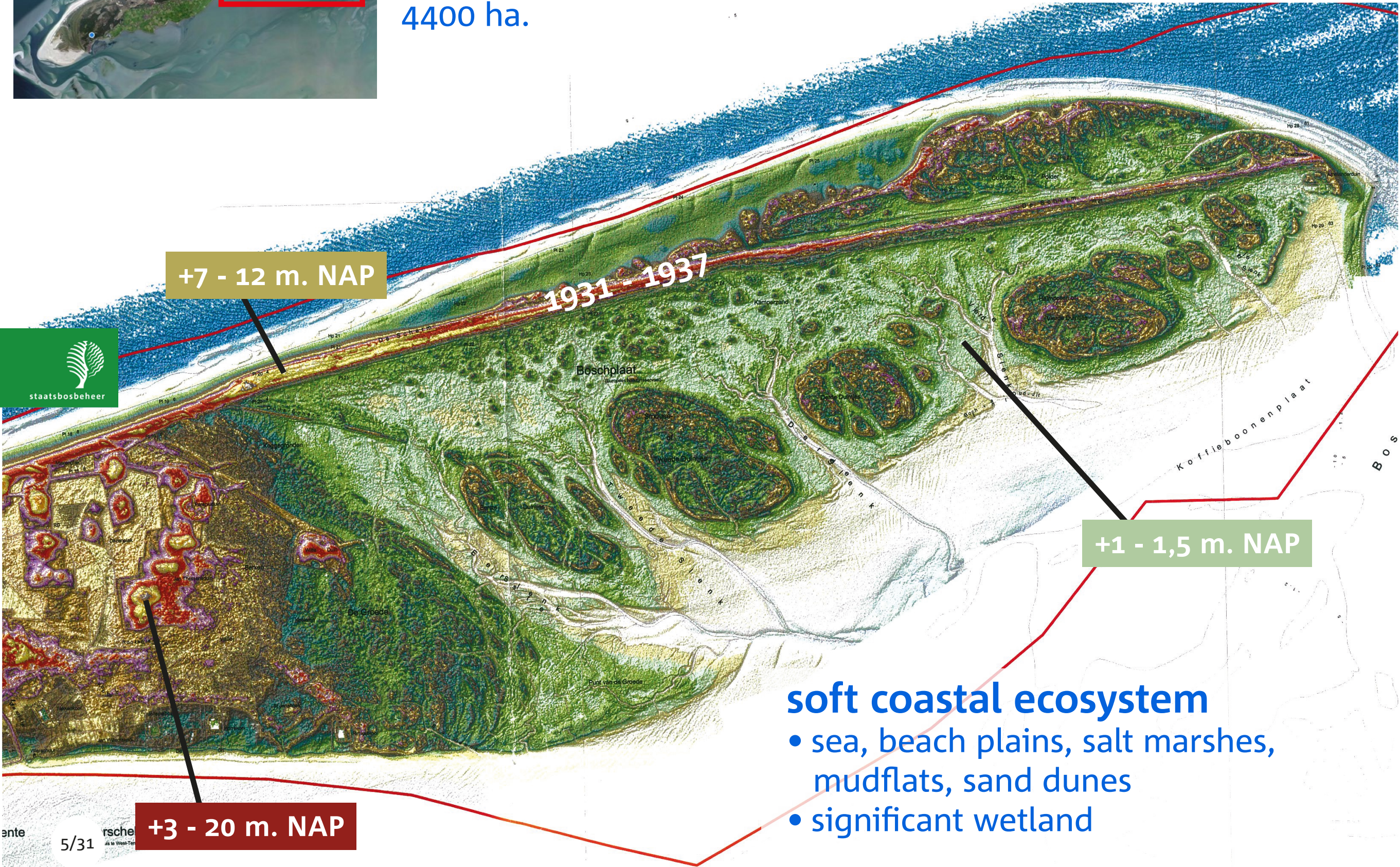


- 1910 Staatsbosbeheer
- 1924 Protected nature reserve; 1934 4400 ha.
- 1970 European Diploma
- 1980 Ramsar site
- 1979 Bird Directive (N 2000)
- 1992 Habitat Directive (N 2000)
- 2009 UNESCO World Heritage Waddensea



The Boschplaat - Characteristics

4400 ha.



+7 - 12 m. NAP

1931 - 1937

+1 - 1,5 m. NAP

+3 - 20 m. NAP

soft coastal ecosystem

- sea, beach plains, salt marshes, mudflats, sand dunes
- significant wetland

Breeding birds 65 – 70 species/year



Lesser Black-backed Gull <i>Larus fuscus</i>	10.000 - 12.000
Herring gull <i>Larus argentatus</i>	4000 - 4500
Eider <i>Somateria mollissima</i>	1500 - 2000
Spoonbill <i>Platalea leucorodia</i>	150 - 200
Great cormorant <i>Phalacrocorax carbo</i>	200
Marsh Harrier <i>Circus aeruginosus</i>	20 - 25
Short eared owl <i>Asio flamea</i>	1-5
Oystercatcher <i>Haematopus ostralegus</i>	200
Redshank <i>Tringa totanus</i>	75 - 80
Curlew <i>Numenius arquata</i>	35

Migratory birds

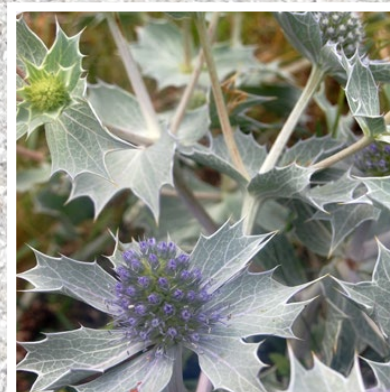
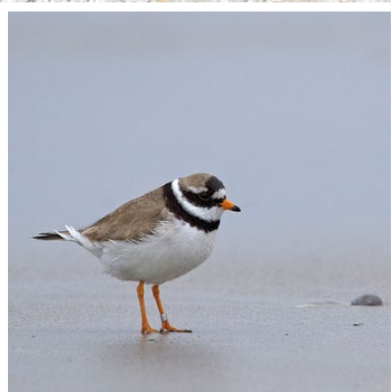
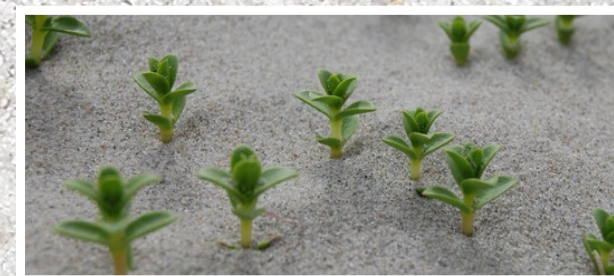
Approximately 70 species,
max. 80.000 – 100.000 @ one moment



	Maximum	Ramsar 1% criterium
Herring gull <i>Larus argentatus</i>	37.000	6x
Dunlin <i>Calidris alpina</i>	24.000	2x
Wigeon <i>Anas Penelope</i>	17.700	1x
Red Knot <i>Calidris canutus</i>	17.500	4x
Mew Gull <i>Larus canus</i>	16.500	1x
Bar-tailed Godwit <i>Limosa lapponica</i>	15.500	2x
Oystercatcher <i>Haematopus ostralegus</i>	13.000	1x
Curlew <i>Numenius arquata</i>	11.400	1x
Shelduck <i>Tadorna tadorna</i>	8800	3x
Brent Goose <i>Branta bernicla</i>	8700	5x



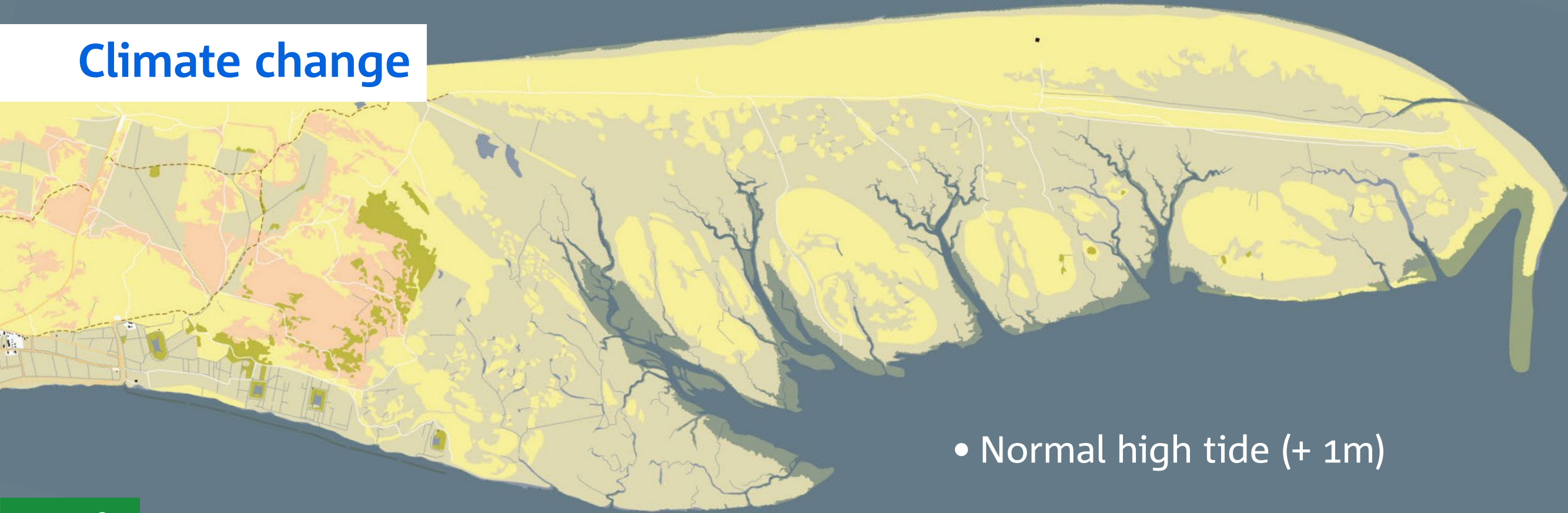
AND MANY OTHER THINGS



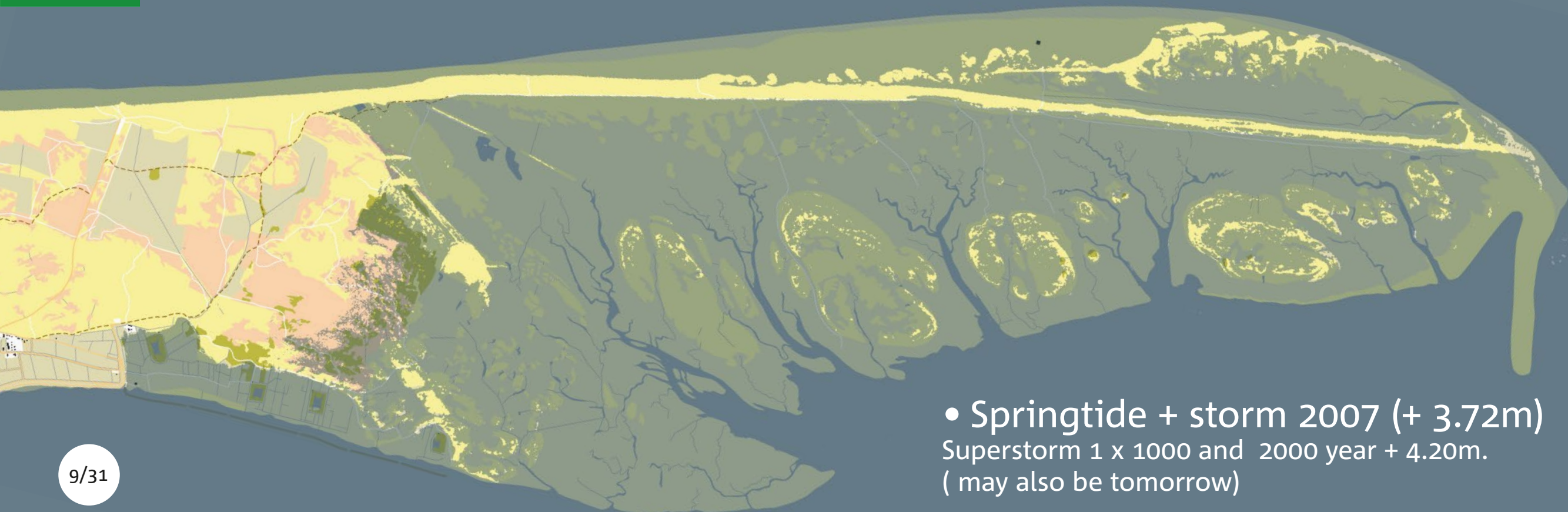
8/31



Climate change



- Normal high tide (+ 1m)



- Springtide + storm 2007 (+ 3.72m)
Superstorm 1 x 1000 and 2000 year + 4.20m.
(may also be tomorrow)

Climate change

Sea level rise long term

Most recently scenario (KNMI 2014)

- 35 year + 25 cm
- 50 year + 50 cm
- 100 year + 100 cm.



staatsbosbeheer



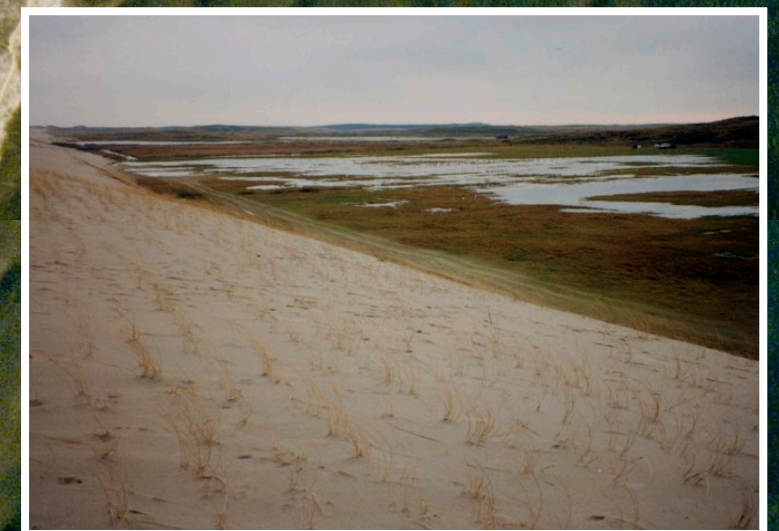
Climate change

- More frequent summer storms



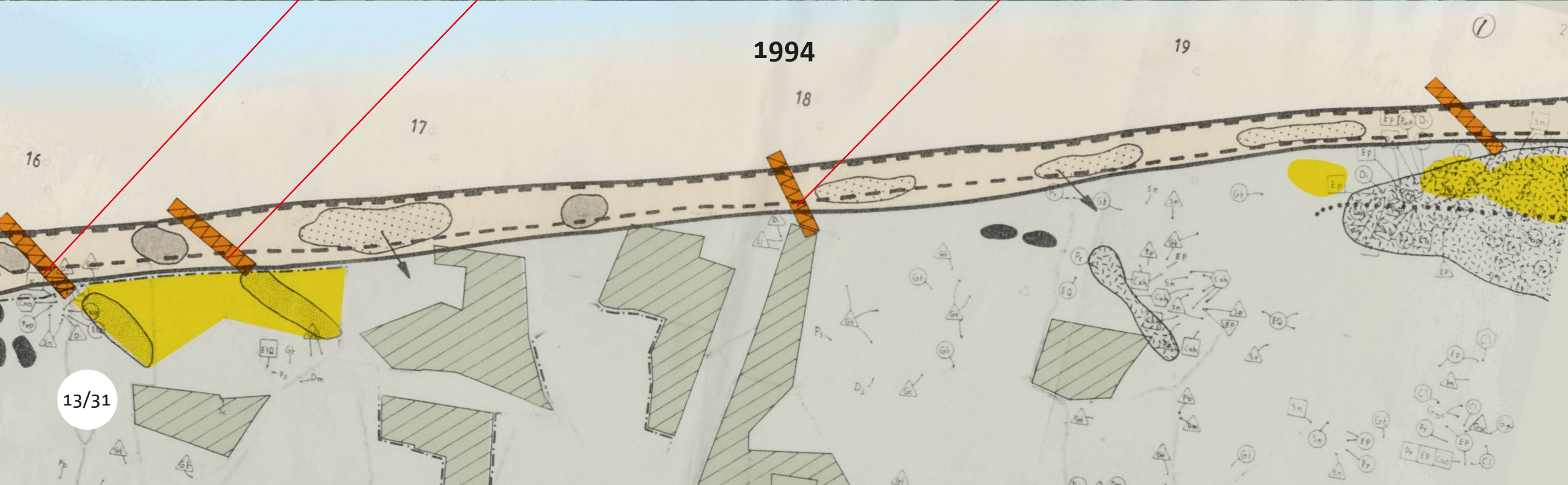
New coastal management strategies

- Traditional coastal protection up to 1990

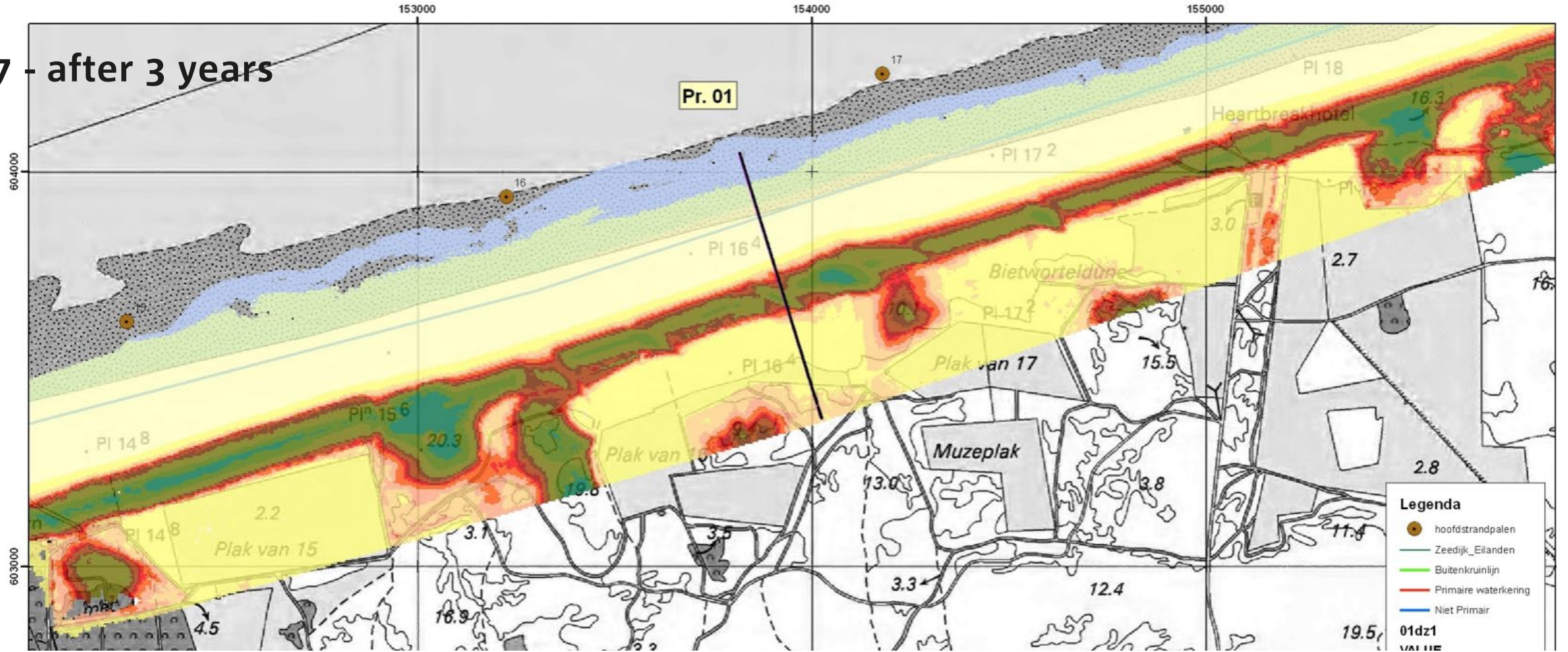


New coastal management strategies

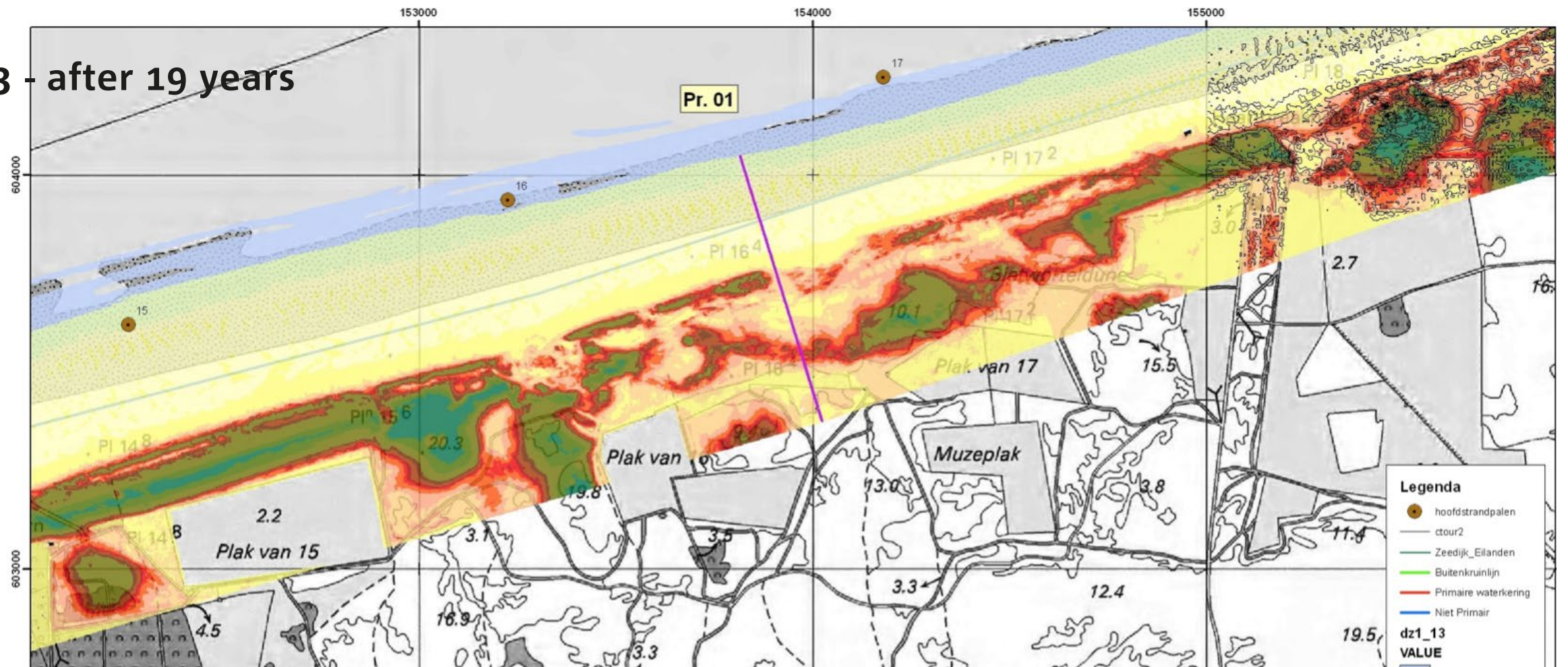
- Landscape experiment 1994



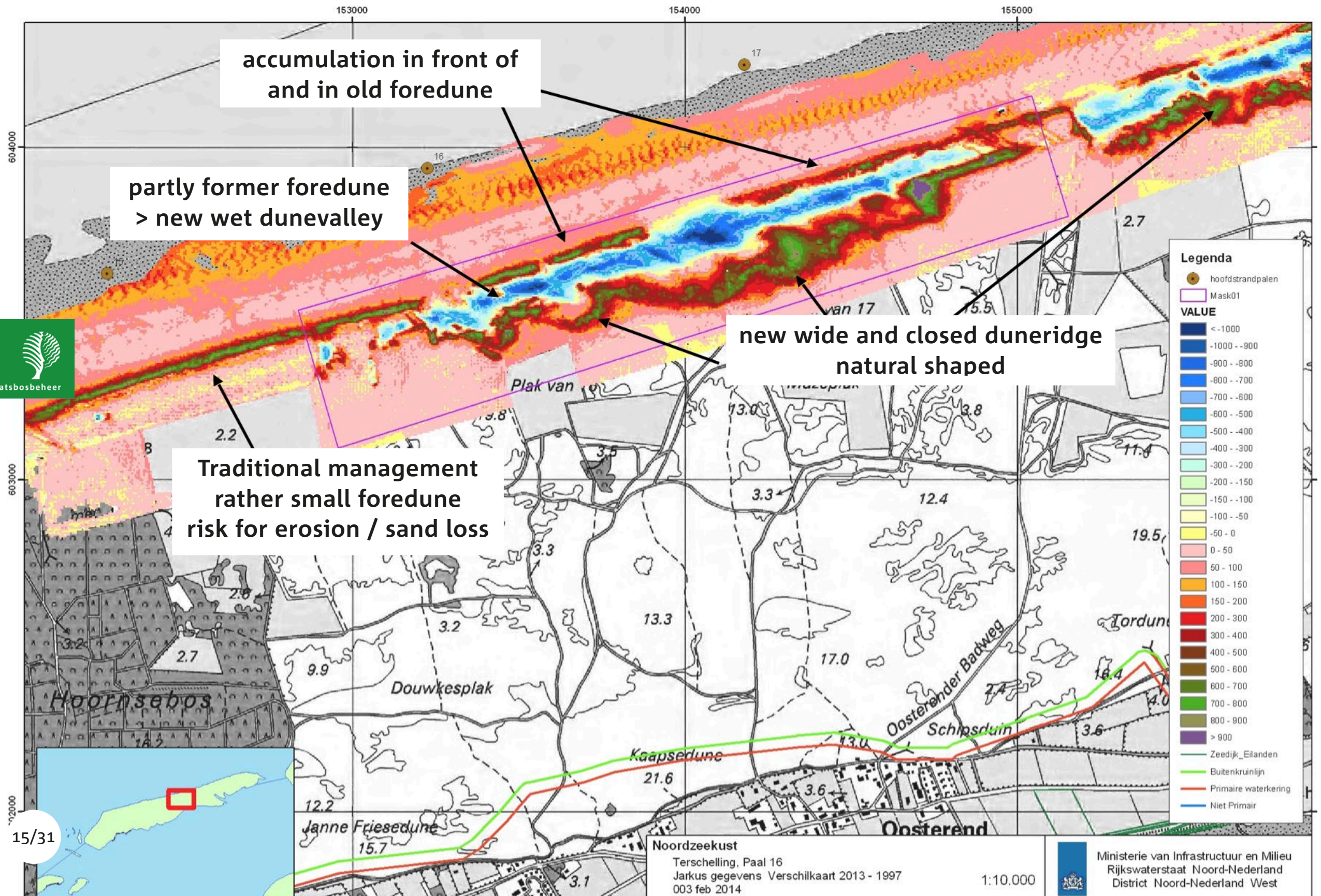
1997 - after 3 years



2013 - after 19 years



Changes altitude 1997 - 2013



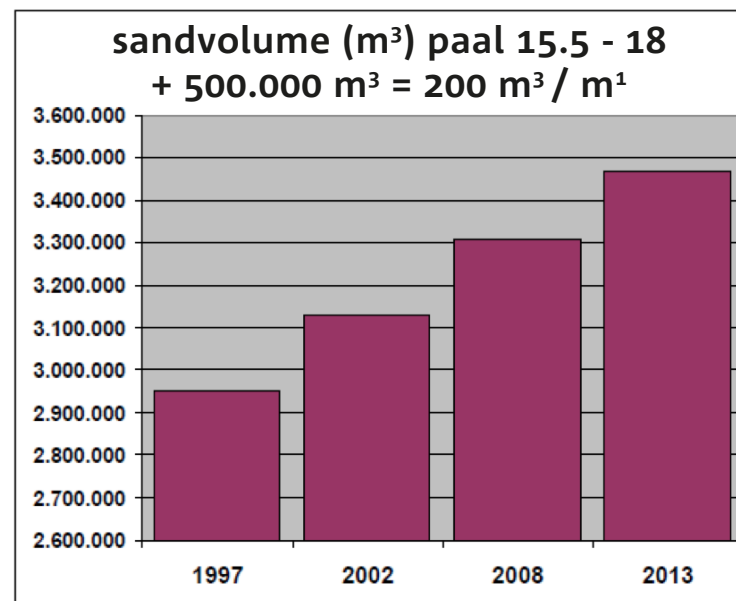
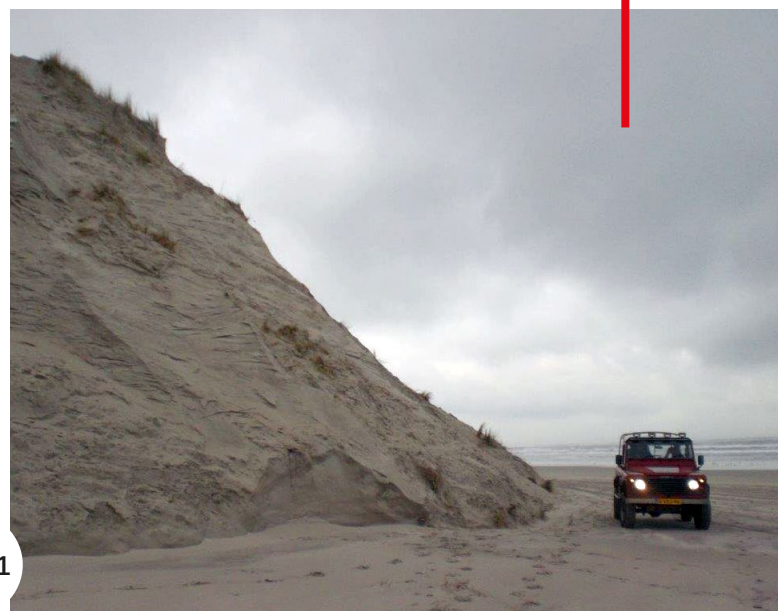
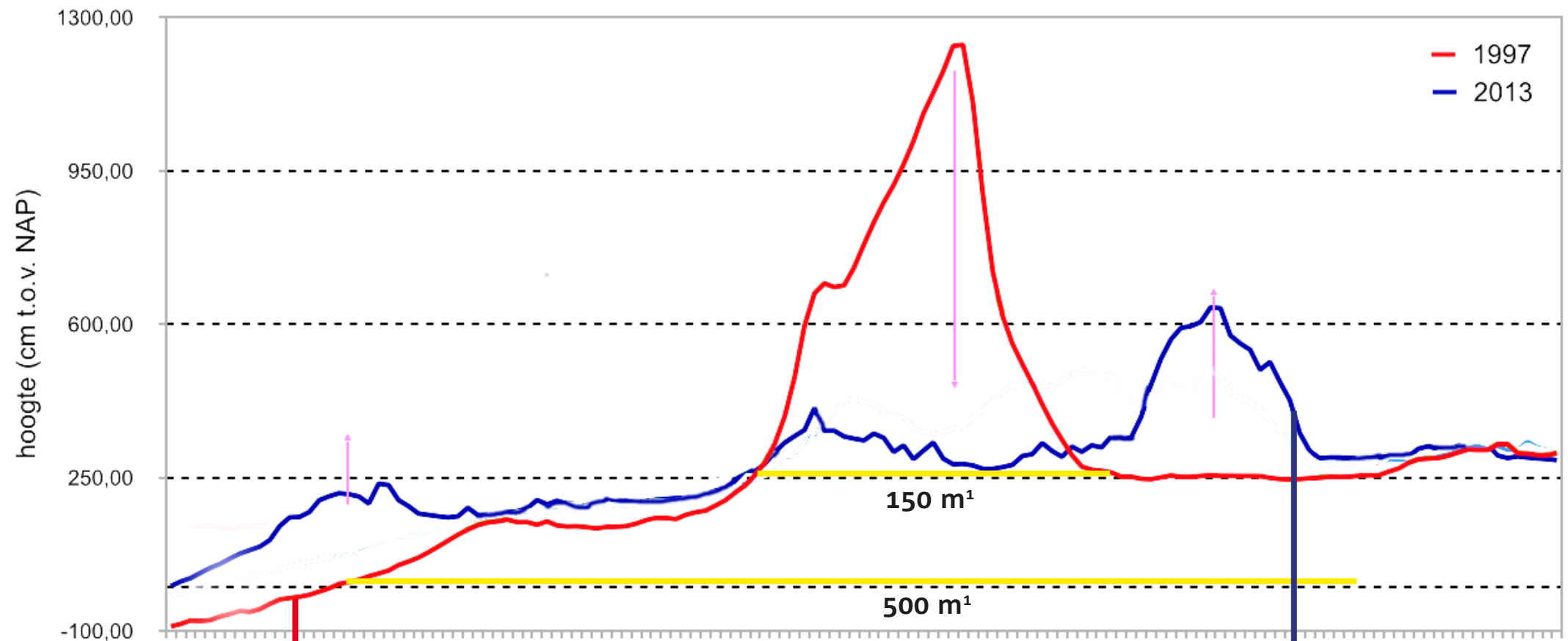
New coastal management strategies

Result



Rijkswaterstaat
Ministerie van Infrastructuur en Milieu

development surface profile near paal 16

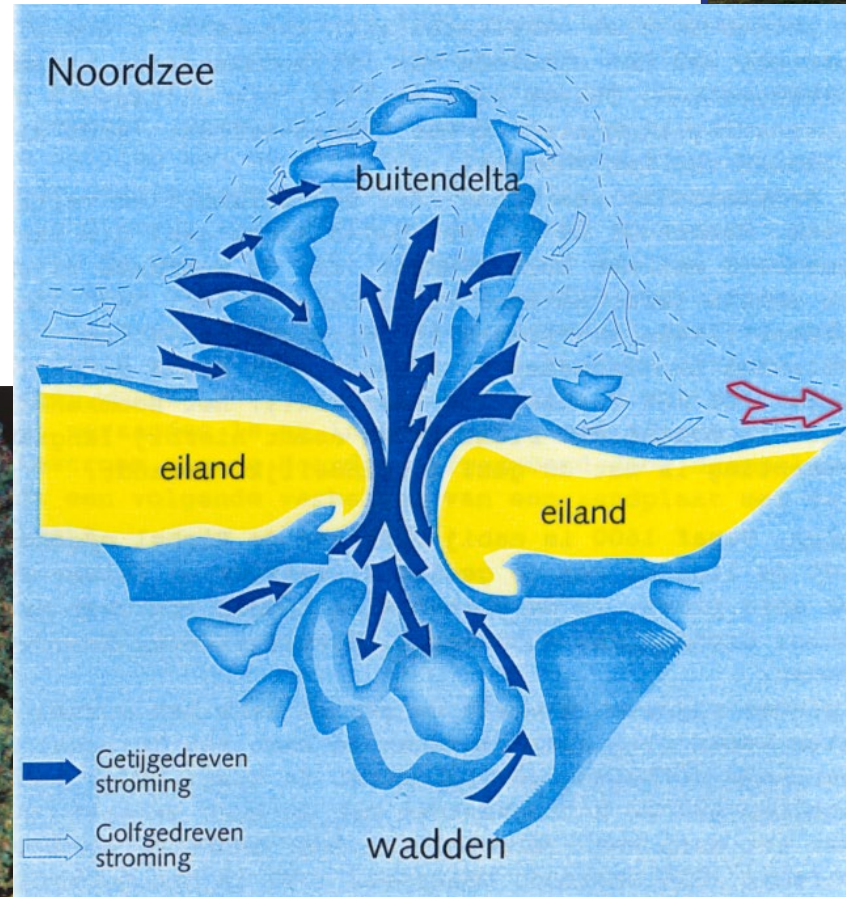


New coastal management strategies

The Sand Motor
and sandwaves
long term perspective



Landed sandbank moving eastwards along the coast
foto: Jan Huneman



New coastal management strategies

- Map monitoring coastline (data 2013)



Rijkswaterstaat
Ministerie van Infrastructuur en Milieu



New coastal management strategies

- Landscape



New coastal management strategies

- Landscape



staatsbosbeheer

Results: Nature - Embryonic dunes N 2000 habitat 2110

Status: rare in the Netherlands and Europe



Results: Nature - White dunes N 2000 habitat 2120

Status: limited area in the Netherlands and Europe - not endangered



Public opinions

Results:

- Safety - december storms 2013

But:

- Vote of censure in local council

2 days storm > 11 bft
ht. average + 100/120 NAP
december 2013
ht. + 290/300 NAP

Public opinions

local: problems



- Local action group very critical special at election time
- Regular meetings local action / consultation

Public opinions

visitors

traditional dune management

natural dynamics since 1995



Appreciaton

- dynamic dunes 92%
- traditional dunes 3%
- both 5%

New coastal management strategies

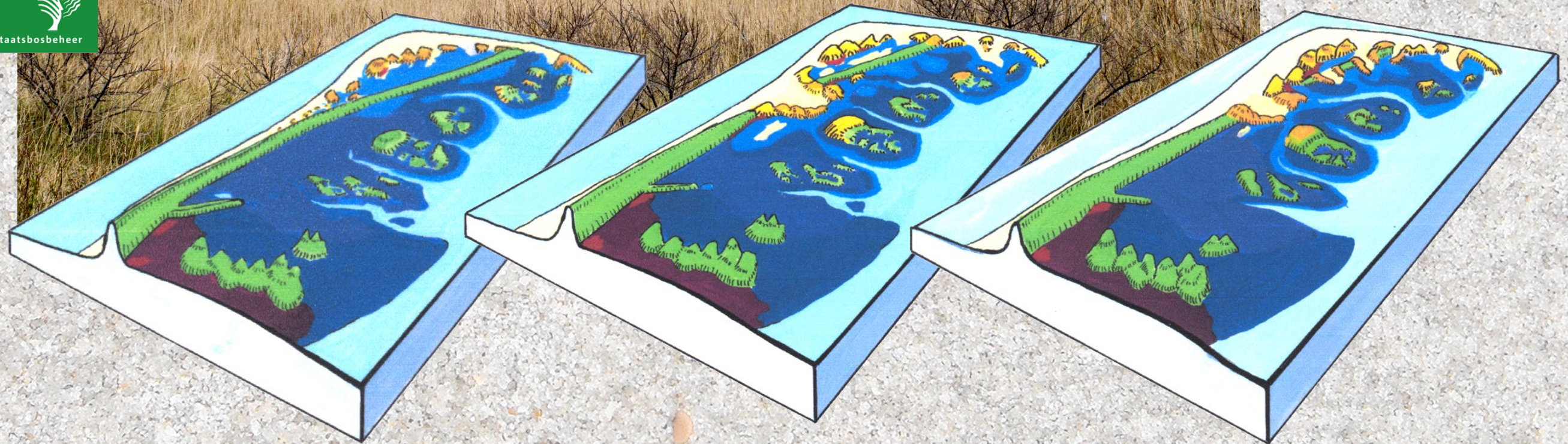
Conclusions up to now

- + coastal safety
(positive long-term sand balance)
- + landscape diversity
- + bio diversity
- + visitors appreciation
- local public support
- inadequate communication



The Future

- possible scenarios



Most changes generate resistance
Municipal permits required for implementation

The Future

- communication essential

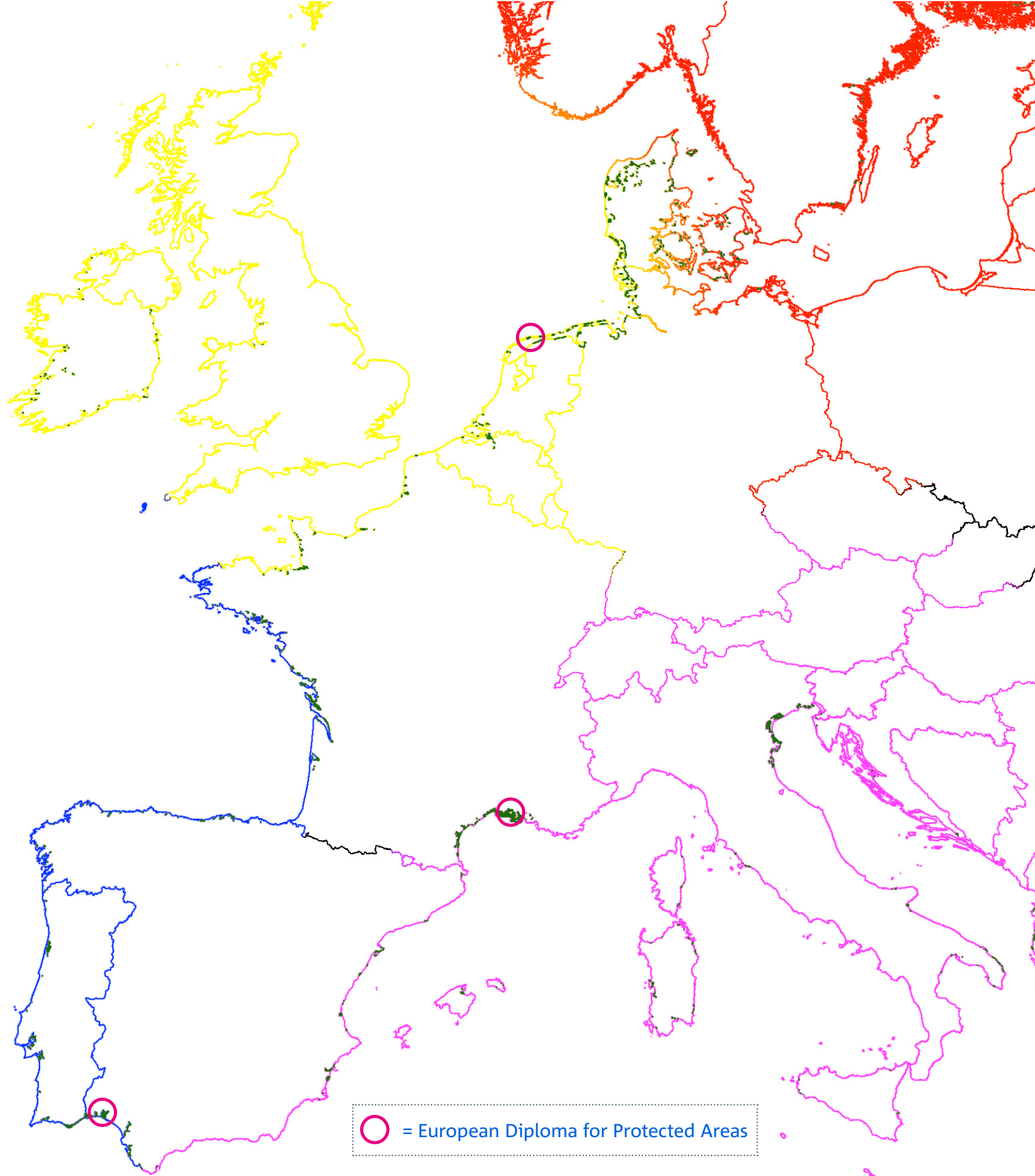
***Tell me.
What did we
do wrong?***



staatsbosbeheer

The Future

- Salt marshes across Europe

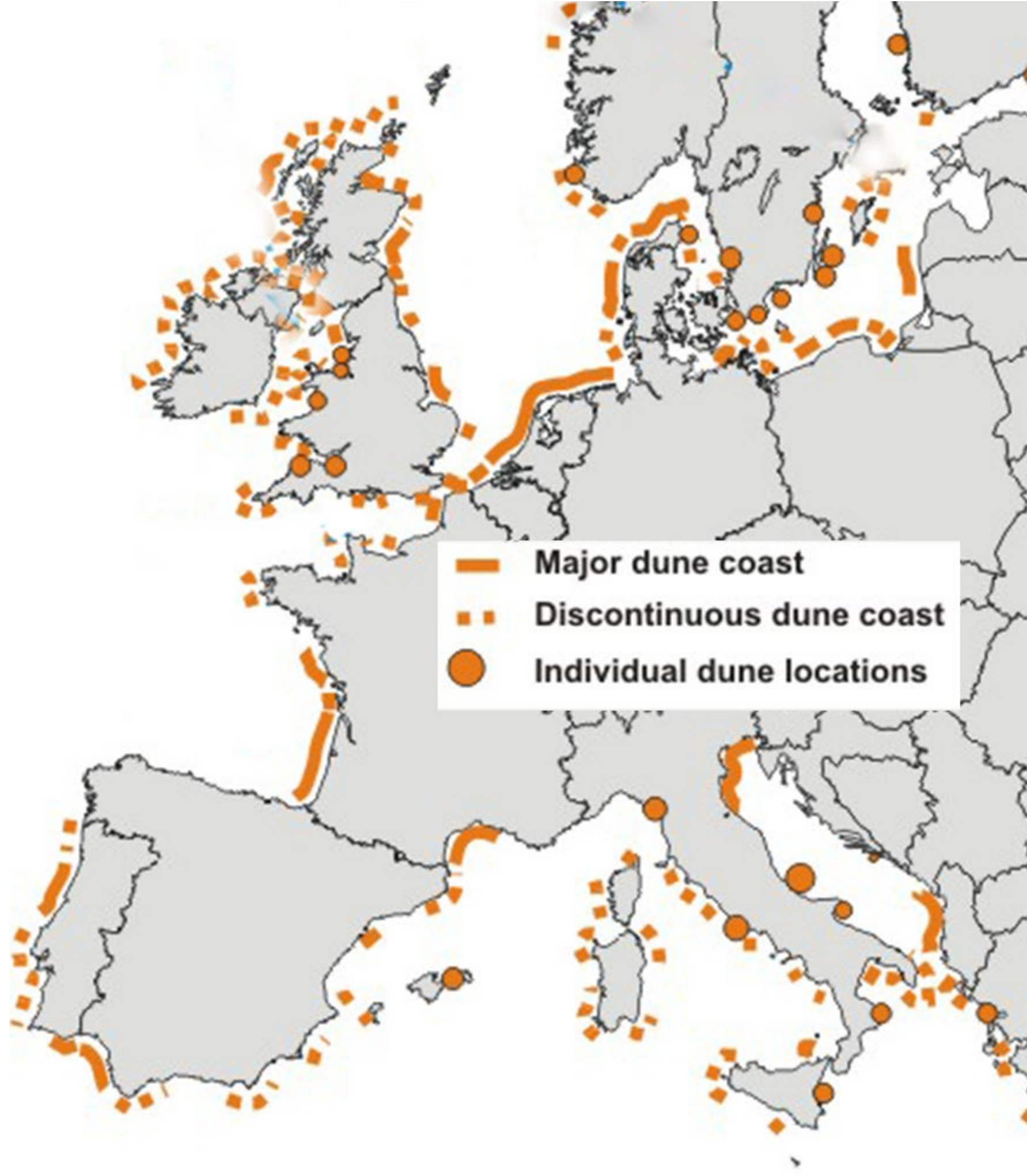


The Future

- Coastal dunes across Europe



staatsbosbeheer





A LOT TO THE THINK ABOUT



special thanks to: Ernst Lofvers,
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Frederik Zwart
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