

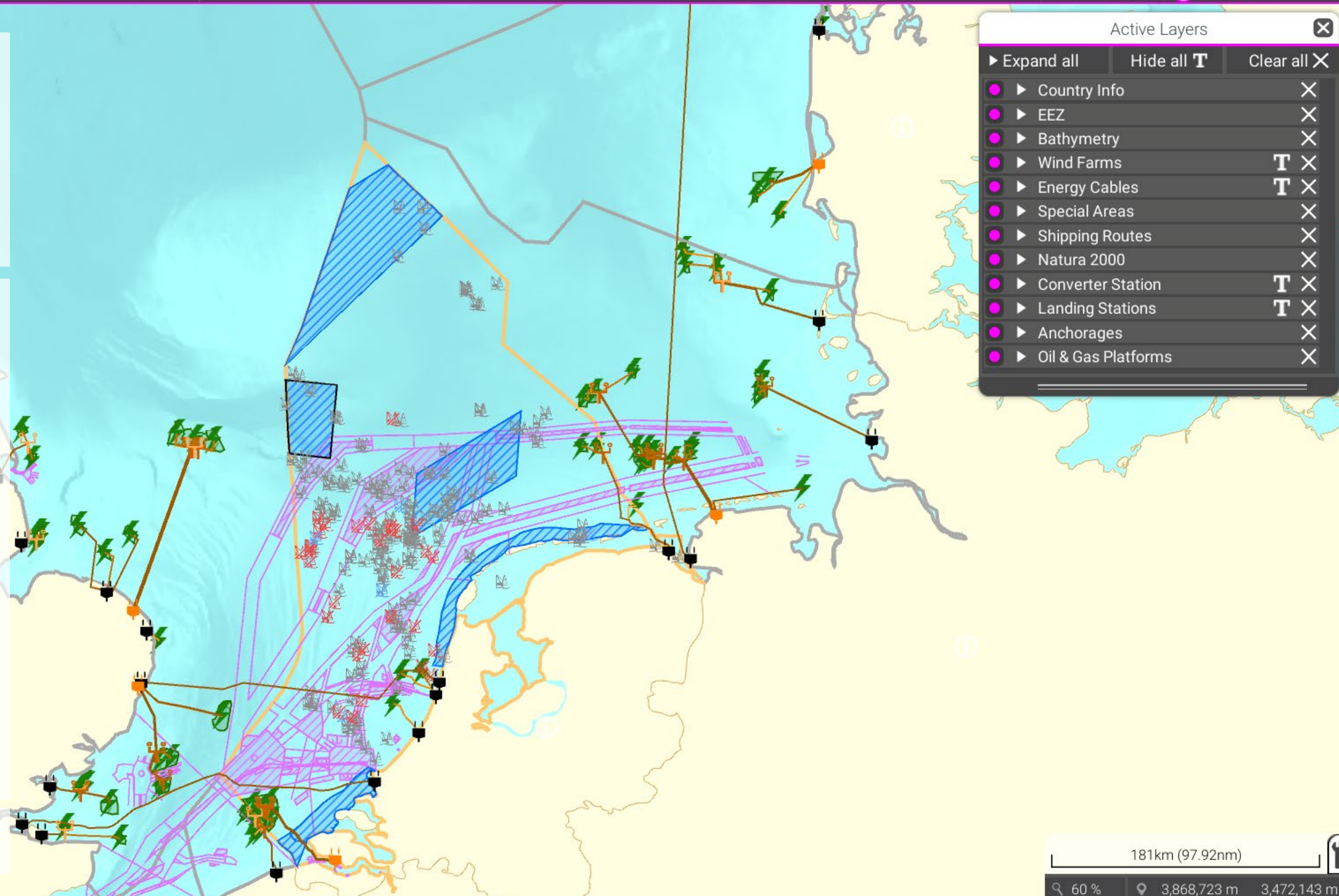
Before

Starting situation

- Developed wind farms in the North Sea region
- Shipping routing measures in the North Sea region
- Marine protected areas in the Dutch EEZ
- Oil and gas platforms in the Dutch EEZ

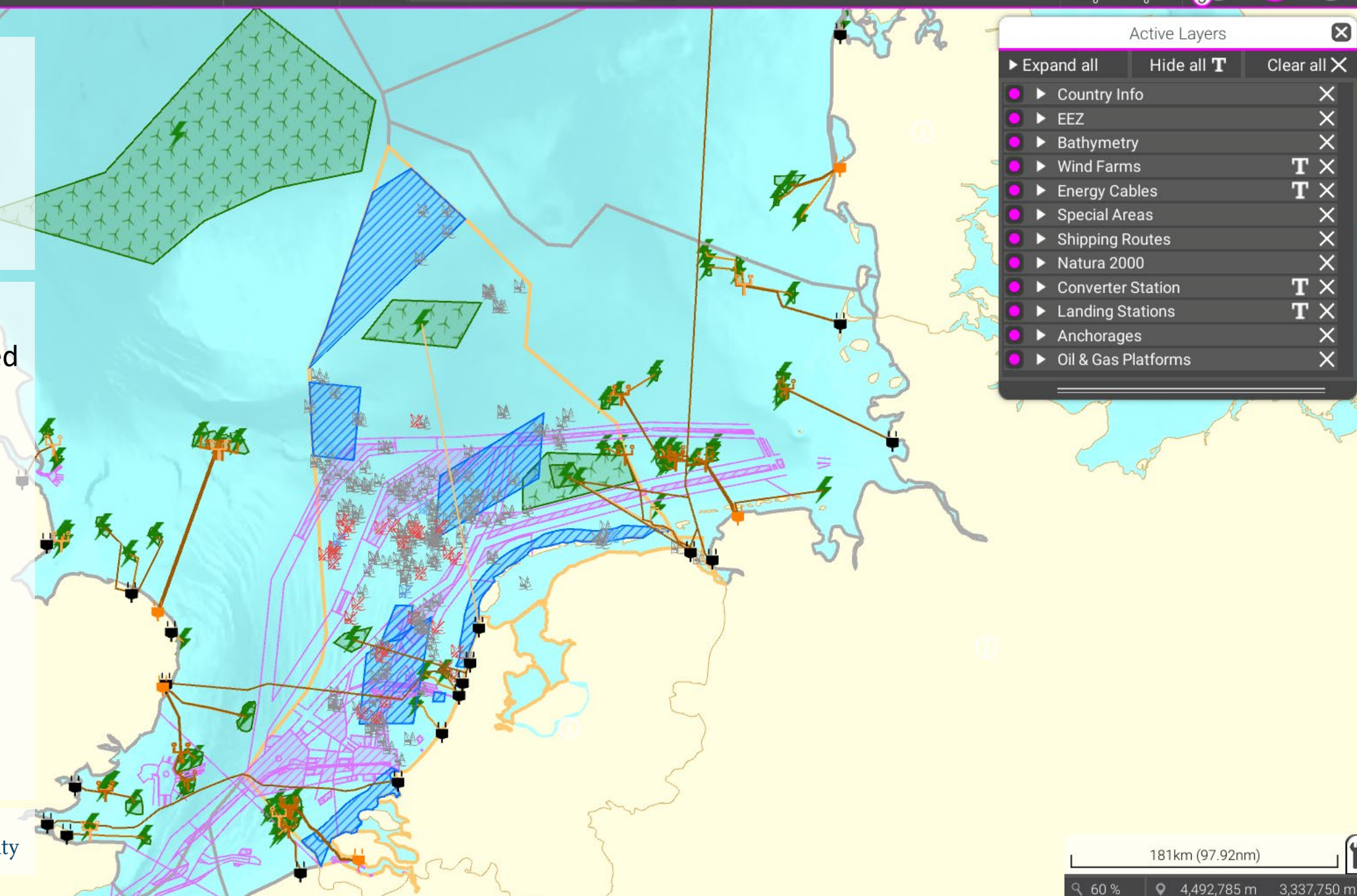
Active Layers

	Expand all	Hide all T	Clear all X
Country Info			X
EEZ			X
Bathymetry			X
Wind Farms		T	X
Energy Cables		T	X
Special Areas			X
Shipping Routes			X
Natura 2000			X
Converter Station		T	X
Landing Stations		T	X
Anchorage			X
Oil & Gas Platforms			X



After New plans

- 12 plans implemented
- Mostly concerning wind farms
- Some also including marine protected areas & shipping routes
- Additional energy production capacity: around 25 GW



Active Layers

▶ Expand all	Hide all T	Clear all X
▶ Country Info		X
▶ EEZ		X
▶ Bathymetry		X
▶ Wind Farms	T	X
▶ Energy Cables	T	X
▶ Special Areas		X
▶ Shipping Routes		X
▶ Natura 2000		X
▶ Converter Station	T	X
▶ Landing Stations	T	X
▶ Anchorages		X
▶ Oil & Gas Platforms		X

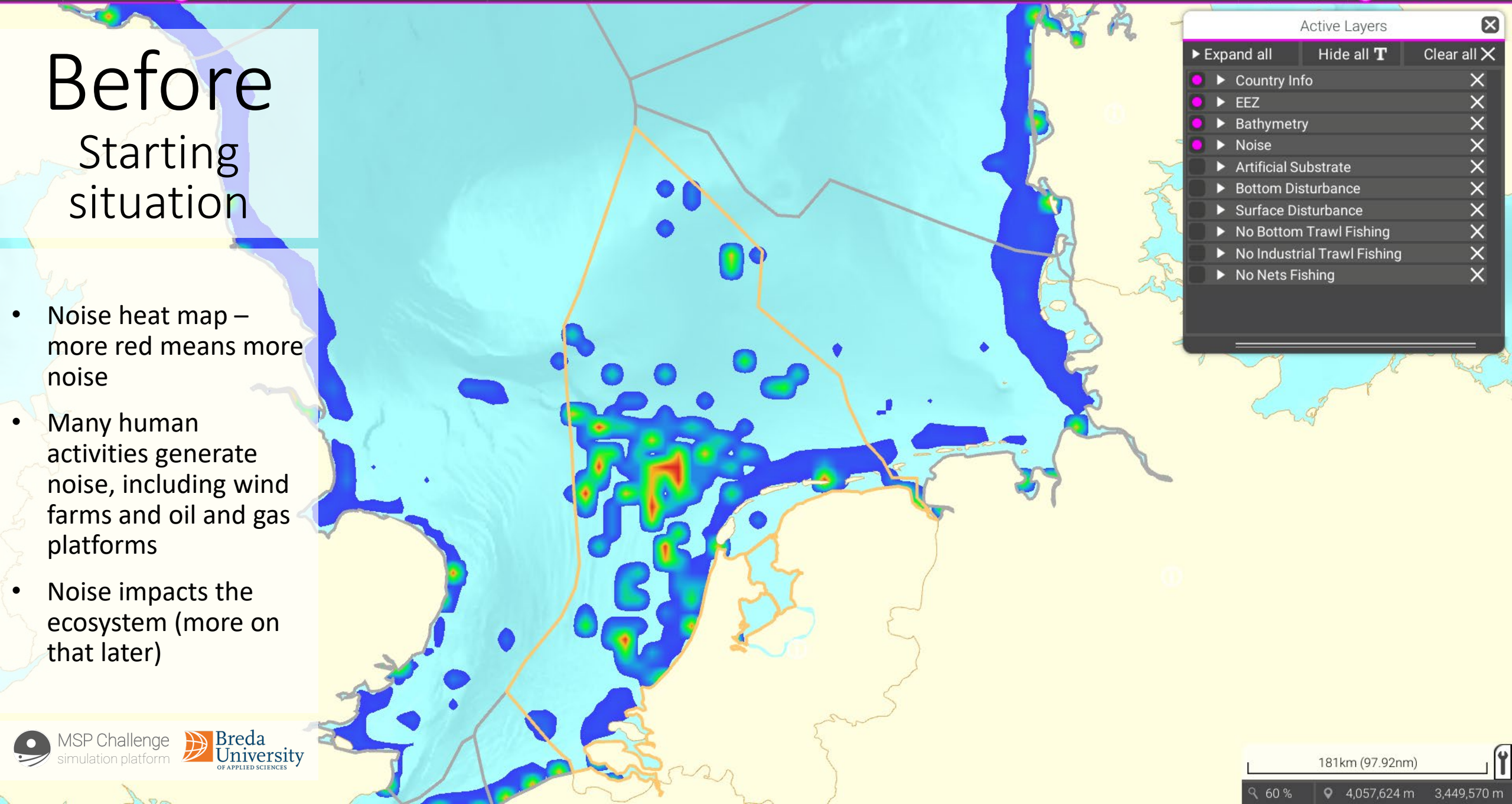
Before

Starting situation

- Noise heat map – more red means more noise
- Many human activities generate noise, including wind farms and oil and gas platforms
- Noise impacts the ecosystem (more on that later)

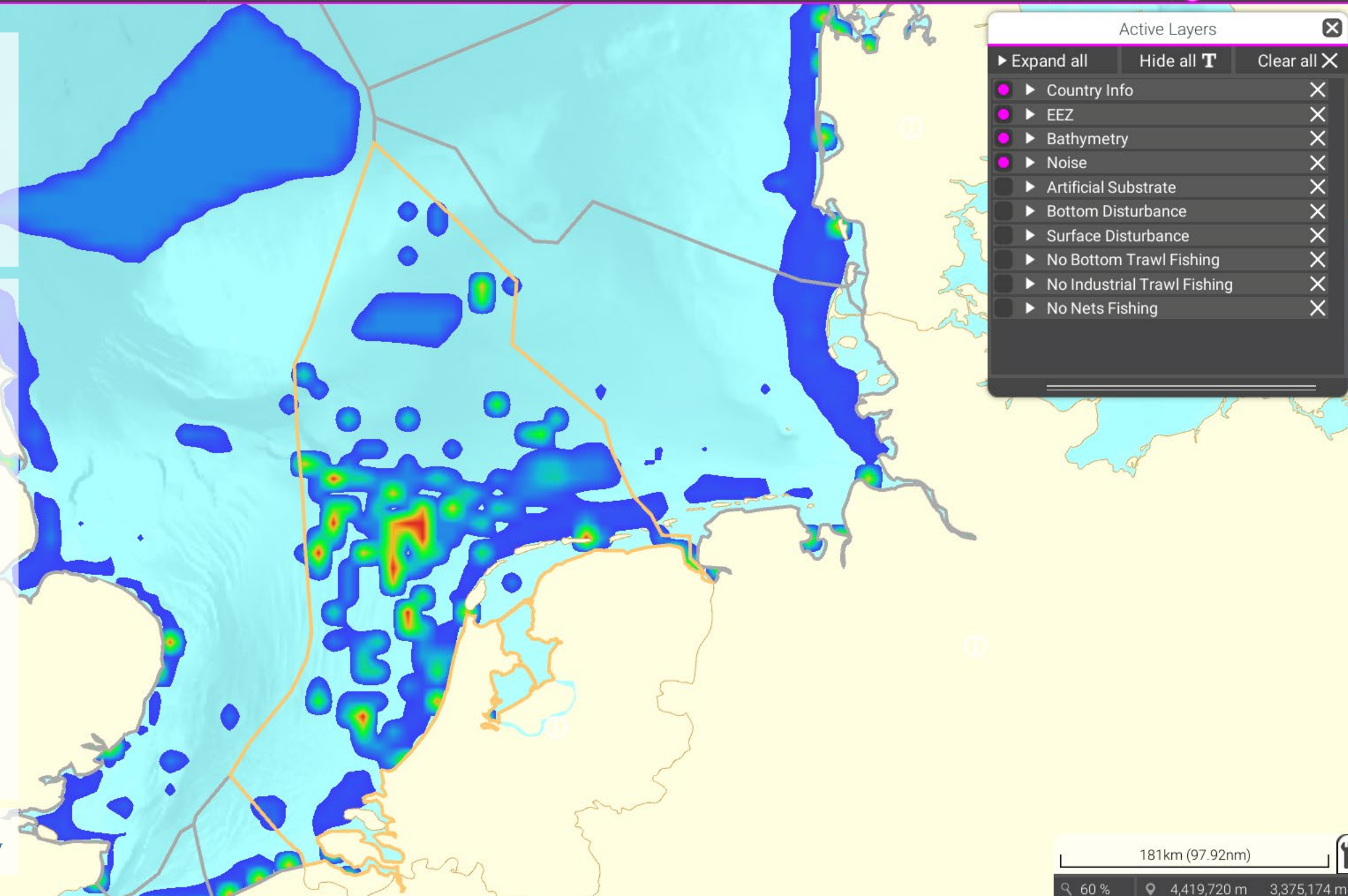
Active Layers

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▶ Country Info		X
▶ EEZ		X
▶ Bathymetry		X
▶ Noise		X
▶ Artificial Substrate		X
▶ Bottom Disturbance		X
▶ Surface Disturbance		X
▶ No Bottom Trawl Fishing		X
▶ No Industrial Trawl Fishing		X
▶ No Nets Fishing		X



After New plans

- New wind farms, means new noise
- Different amounts of noise for construction and operation
- Any decommissioned wind farms or oil and gas platforms would of course remove noise



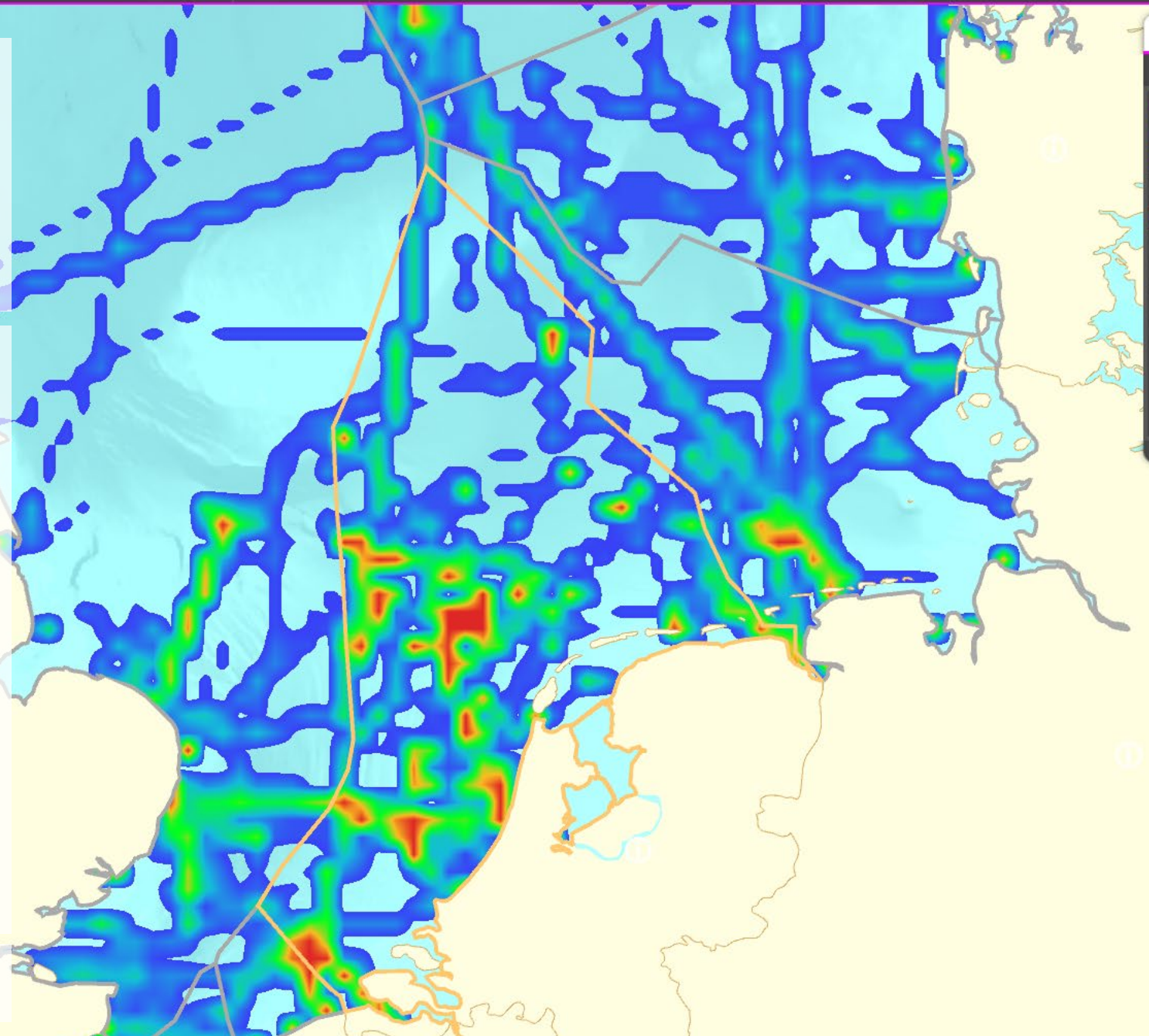
Active Layers

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<input type="checkbox"/>	▶ Bottom Disturbance		X
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<input type="checkbox"/>	▶ No Bottom Trawl Fishing		X
<input type="checkbox"/>	▶ No Industrial Trawl Fishing		X
<input type="checkbox"/>	▶ No Nets Fishing		X

Before

Starting situation

- Artificial substrate is created when we introduce new structures into the sea
- This is again a heat map - more red means more artificial substrate
- Think of wind turbine foundations, cables, or the oil and gas platforms



Active Layers

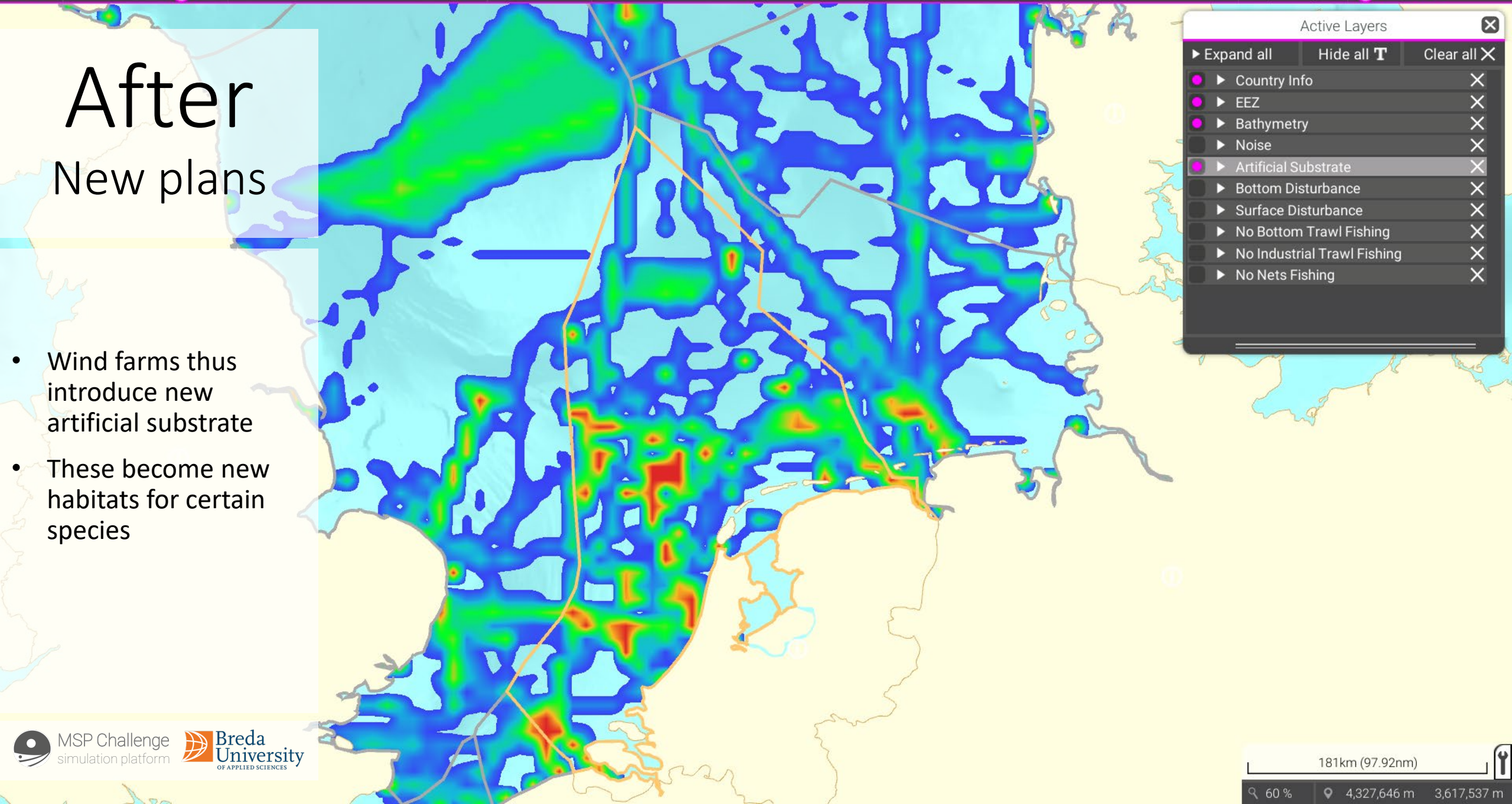
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Country Info			X
EEZ			X
Bathymetry			X
Noise			X
Artificial Substrate			X
Bottom Disturbance			X
Surface Disturbance			X
No Bottom Trawl Fishing			X
No Industrial Trawl Fishing			X
No Nets Fishing			X

After New plans

- Wind farms thus introduce new artificial substrate
- These become new habitats for certain species

Active Layers

	Expand all	Hide all T	Clear all X
Country Info	▶		X
EEZ	▶		X
Bathymetry	▶		X
Noise	▶		X
Artificial Substrate	▶		X
Bottom Disturbance	▶		X
Surface Disturbance	▶		X
No Bottom Trawl Fishing	▶		X
No Industrial Trawl Fishing	▶		X
No Nets Fishing	▶		X



Before

Starting situation

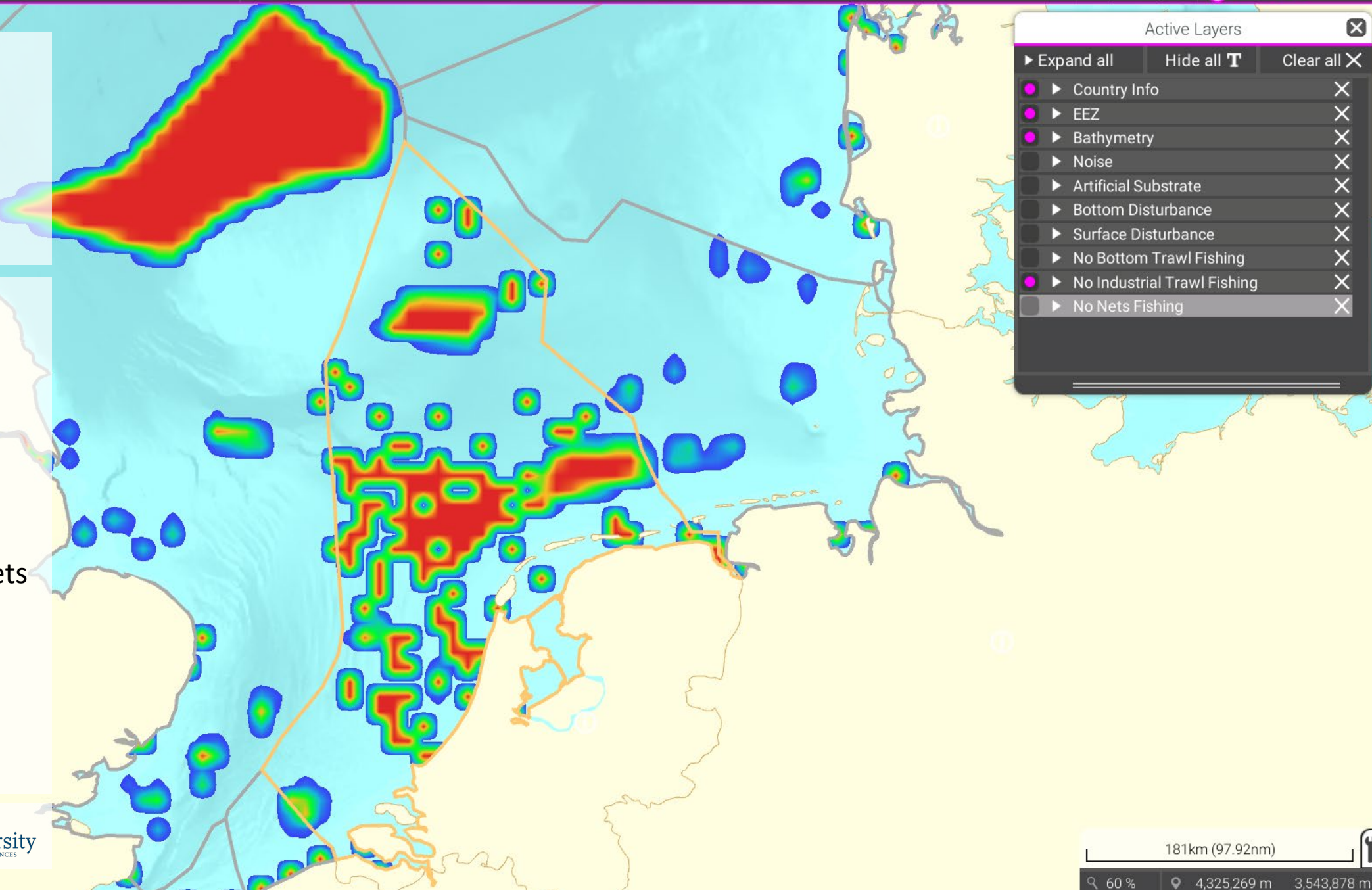
- Industrial trawlers are a fishing fleet type that use large nets that do not scrape the sea floor
- This is again a heat map - more red means more industrial trawling
- They are not allowed in wind farm areas

Active Layers

	Expand all	Hide all T	Clear all X
<input checked="" type="checkbox"/>	▶ Country Info		X
<input checked="" type="checkbox"/>	▶ EEZ		X
<input checked="" type="checkbox"/>	▶ Bathymetry		X
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<input type="checkbox"/>	▶ No Bottom Trawl Fishing		X
<input checked="" type="checkbox"/>	▶ No Industrial Trawl Fishing		X
<input type="checkbox"/>	▶ No Nets Fishing		X

After New plans

- New wind farms means new areas without industrial trawlers
- But that does not impact any fishing quota. So these fleets go fish elsewhere.



Before Starting situation

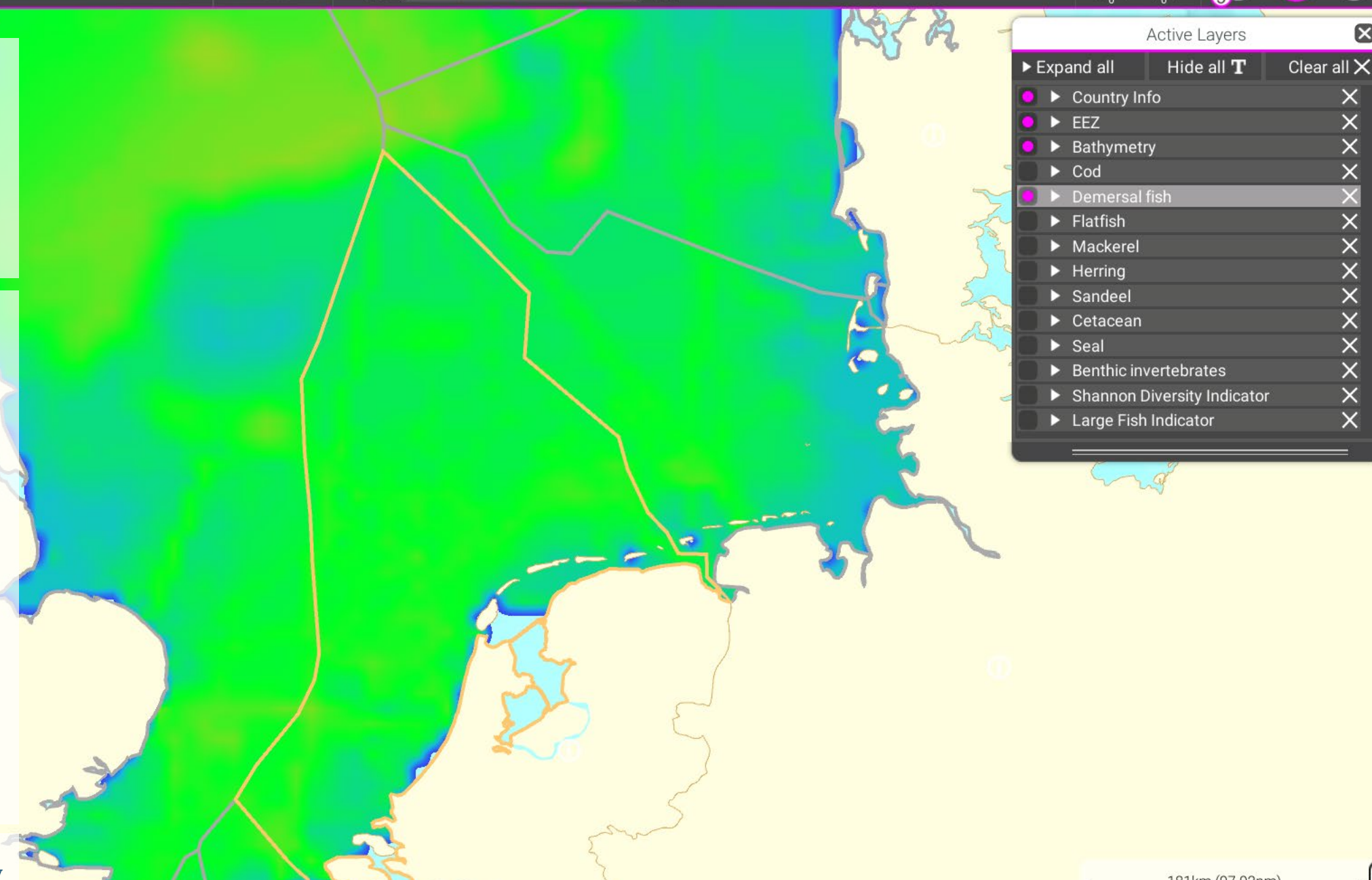
- Demersal fish is a species group. Example species are the Grey Gurnard and the Thornback Ray.
- Don't particularly like shallow waters
- This is again a heat map - more red means more demersal fish
- Demersal fish are caught by all fishing fleets, but mostly by bottom trawlers

Active Layers

	Expand all	Hide all T	Clear all X
▶ Country Info			X
▶ EEZ			X
▶ Bathymetry			X
▶ Cod			X
▶ Demersal fish			X
▶ Flatfish			X
▶ Mackerel			X
▶ Herring			X
▶ Sandeel			X
▶ Cetacean			X
▶ Seal			X
▶ Benthic invertebrates			X
▶ Shannon Diversity Indicator			X
▶ Large Fish Indicator			X

After New plans

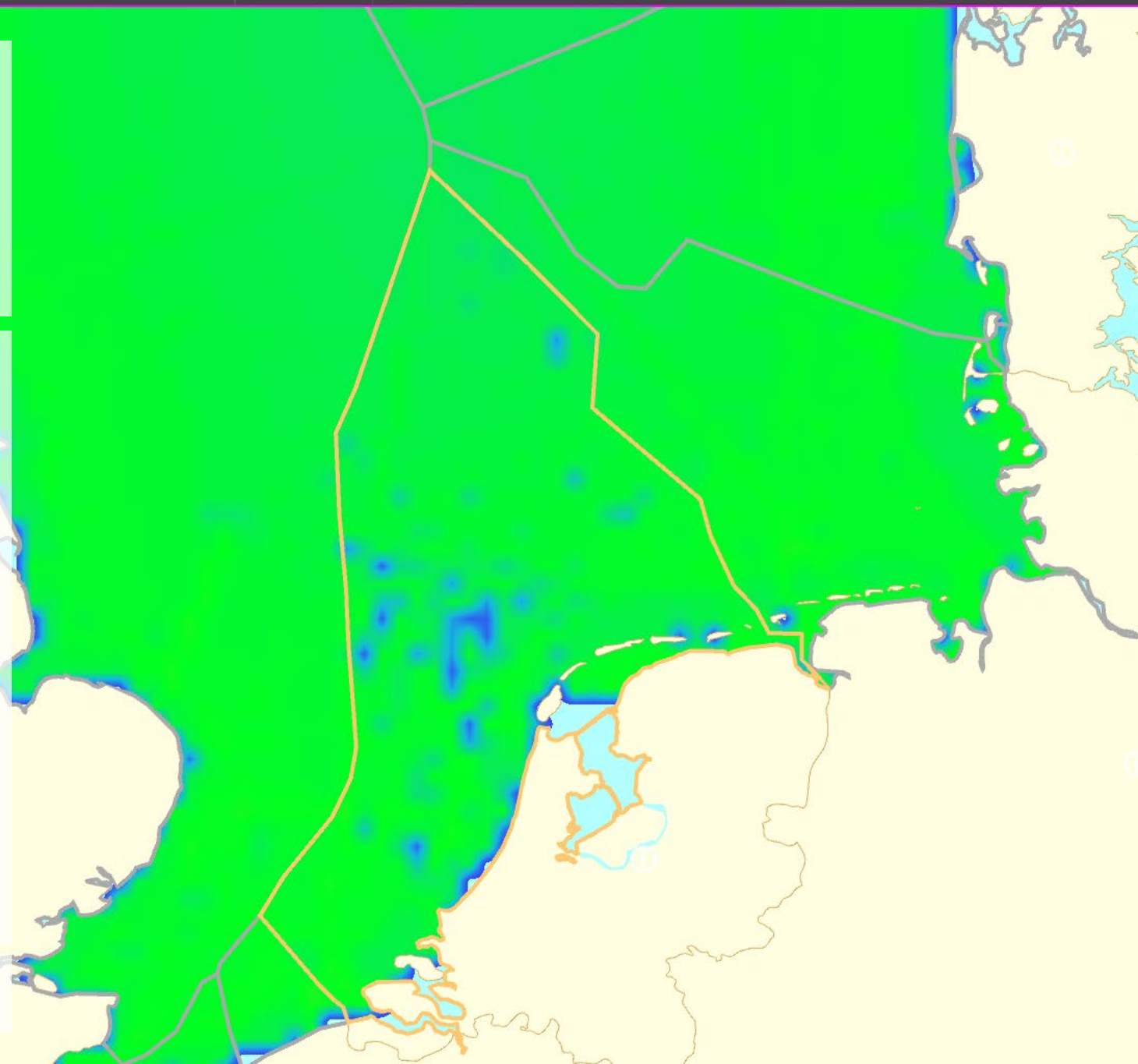
- Notice the redder new large wind farm area.
- There is no more bottom trawling in that area, and the area is large, hence the higher density.
- But also notice that this species group tends to have higher density around artificial substrate.



Before

Starting situation

- Cetaceans are a species group. Example species are the Minke whale, Porpoise and White-beaked dolphin
- This is again a heat map - more red means more cetaceans
- Often sensitive to entanglement in fishing gear
- Shy away from noisy areas

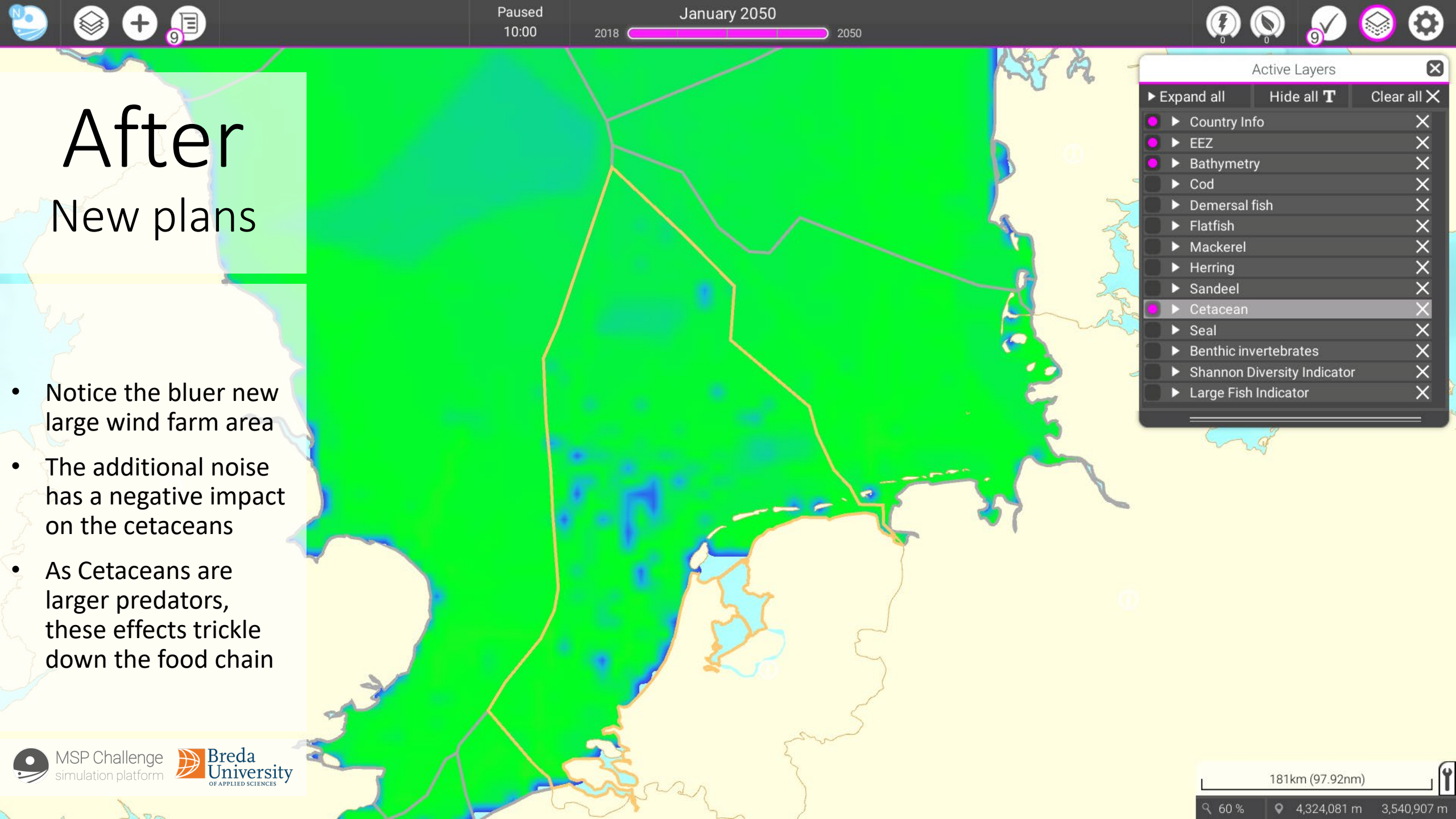


Active Layers

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<input checked="" type="checkbox"/> ▶ Country Info			X
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<input type="checkbox"/> ▶ Seal			X
<input type="checkbox"/> ▶ Benthic invertebrates			X
<input type="checkbox"/> ▶ Shannon Diversity Indicator			X
<input type="checkbox"/> ▶ Large Fish Indicator			X

After New plans

- Notice the bluer new large wind farm area
- The additional noise has a negative impact on the cetaceans
- As Cetaceans are larger predators, these effects trickle down the food chain



Thank you for your interest!

- Remember.... All maritime spatial planning should be ecosystem-based! (See [Directive 2014/89/EU](#))
- You are welcome to try out the North or Baltic Sea editions!
 - Go to www.mspchallenge.info/beta-testing
 - Log in with this password: mspbета101
 - And follow the instructions there.
- Let us know what you think: warmelink.h@buas.nl