

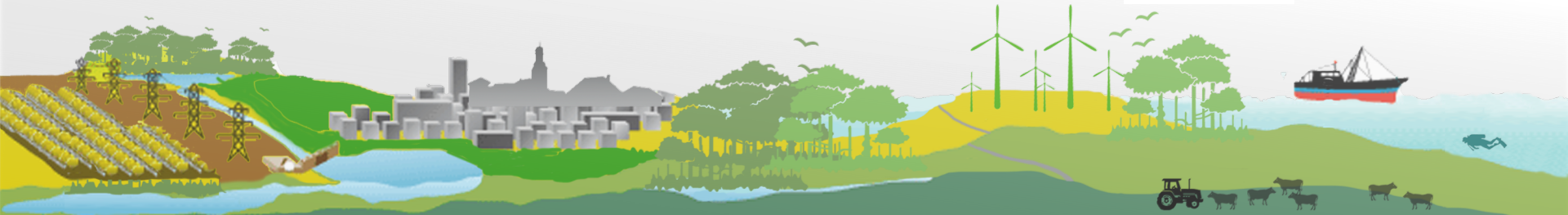
Surveying Seabirds Digitally

Digital aerial bird and marine mammal surveys
in Borssele



Bureau Waardenburg
Ecologie & Landschap

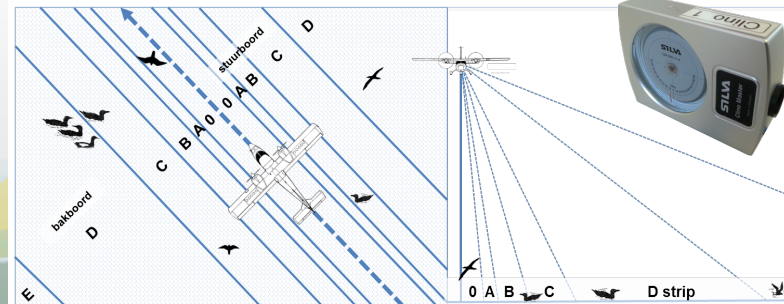
HiDef
AERIAL SURVEYING





Seabirds at sea

- Ship-based
 - Relatively slow (small area)
 - Flushed spp (divers, auks)
- Aerial surveys
 - Visual surveys (e.g. MWTL since 1989)
 - Two observers (1 each side)
 - Height 75m
 - Distance analysis





Seabirds at sea

- Ship-based

- Relatively slow (small area)
- Flushed spp (divers, auks)

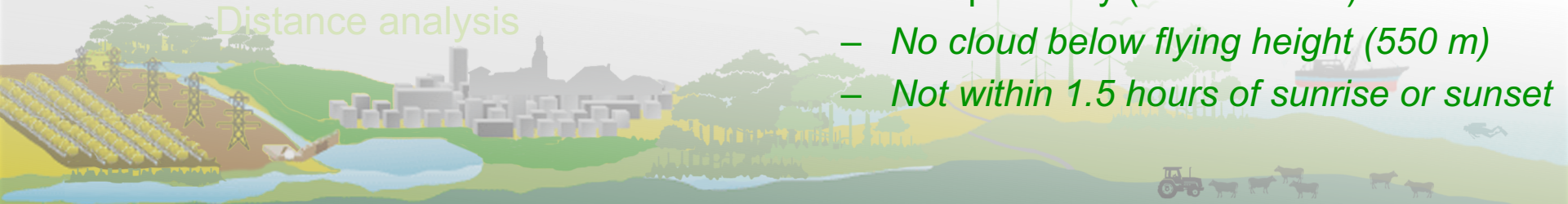
- Aerial surveys

- Visual surveys (e.g. MWTL since 1989)
- Two observers (1 each side)
- Height 75m

Distance analysis

- Digital aerial surveys

- + Cover large areas
- + Less flushing (height 550m)
- + Less observer bias
- + Review images
- + Safety
- Time / cost
- Comparability (identification)
- *No cloud below flying height (550 m)*
- *Not within 1.5 hours of sunrise or sunset*

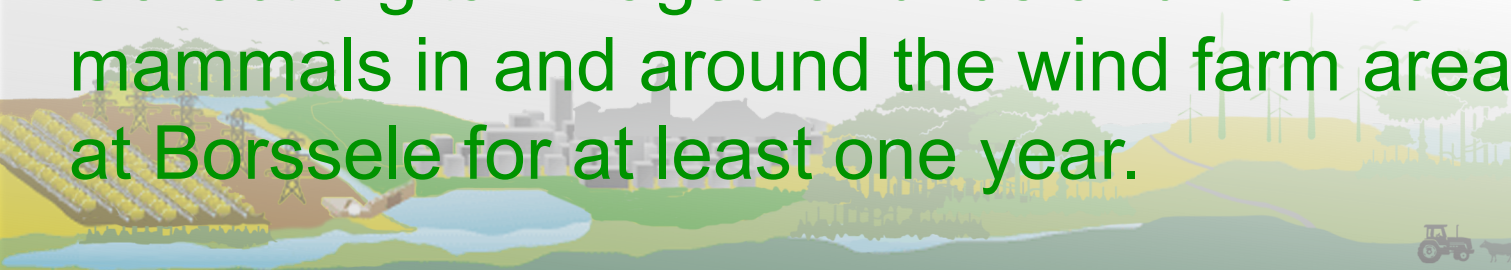




Research aims / methods

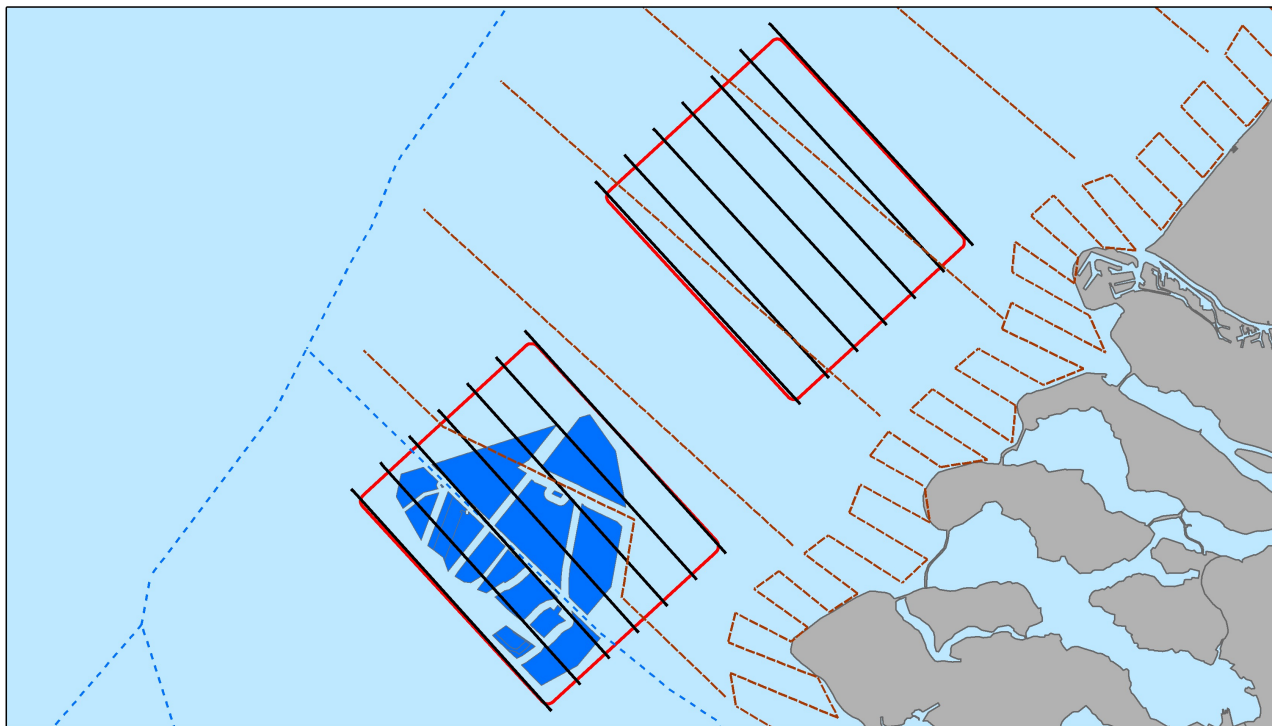
- Collect images for development of software to filter, count and identify birds and marine mammals.
- Determine numbers and distribution in and around wind farms throughout the year.
- Gain insight into how digital aerial surveys can assess displacement and habituation of seabirds and marine mammals from and to wind farms respectively.

Collect digital images of birds and marine mammals in and around the wind farm area at Borssele for at least one year.





Survey area



2 surveys
per month



Bureau Waardenburg
Ecologie & Landschap

0 20 km

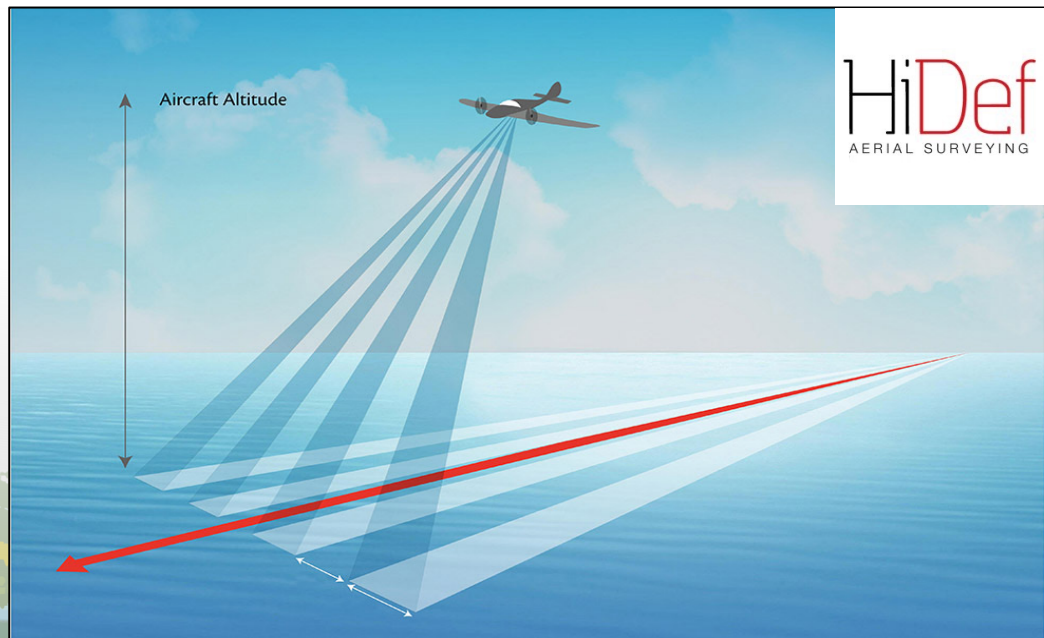


- border national EEZ
- MWTL transects
- HiDef transects
- survey areas
- OWF Borssele



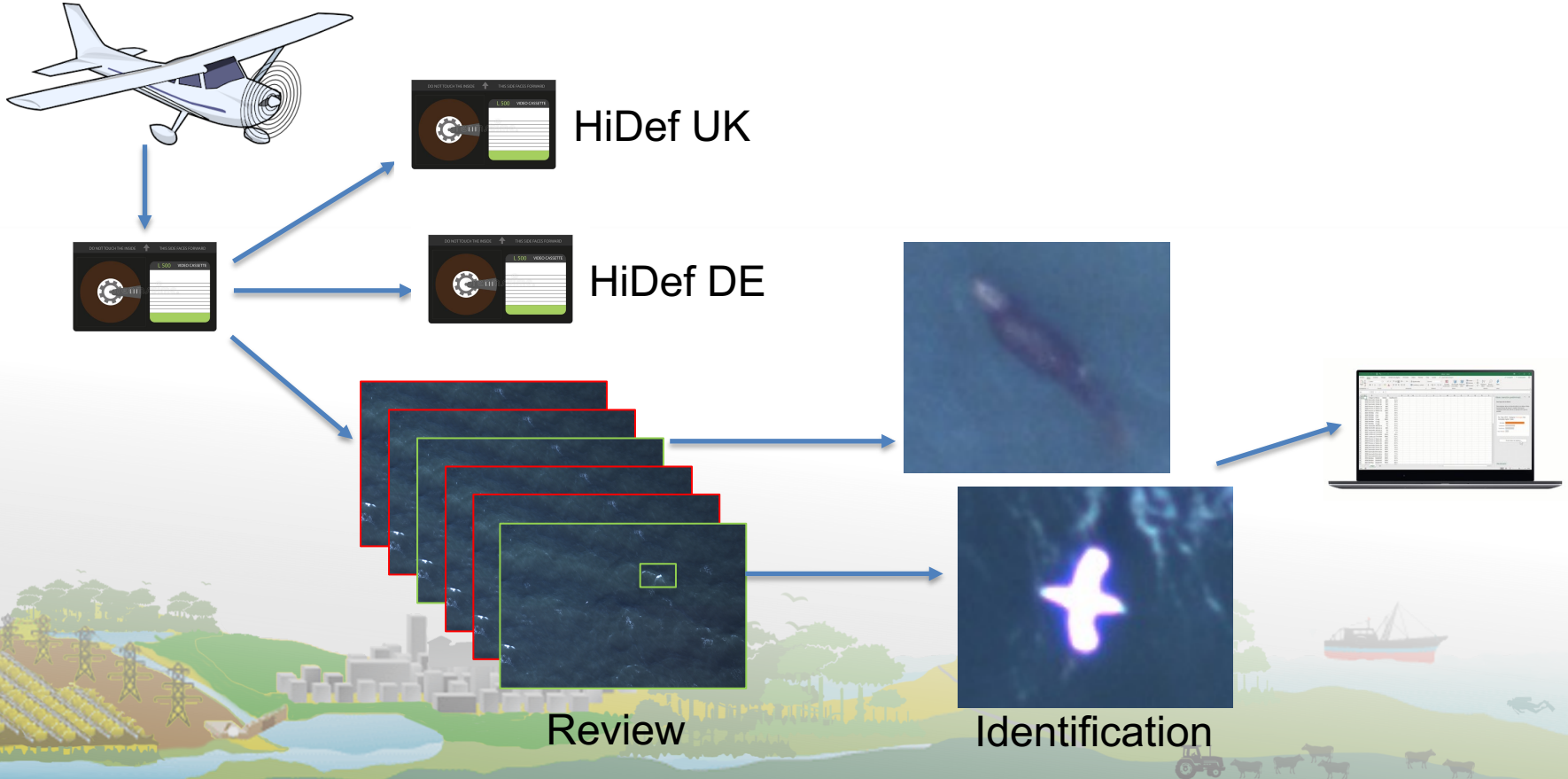
HiDef digital aerial surveys

- Survey transects flown at 550m and 220 km/h.
- Video
- Four cameras
- Strip width 544m
- Resolution 2x2cm





Data analysis





Observations

Feb – Jun almost 21,000 birds recorded, 950 mammals.

1 survey in April 5,500 birds recorded.

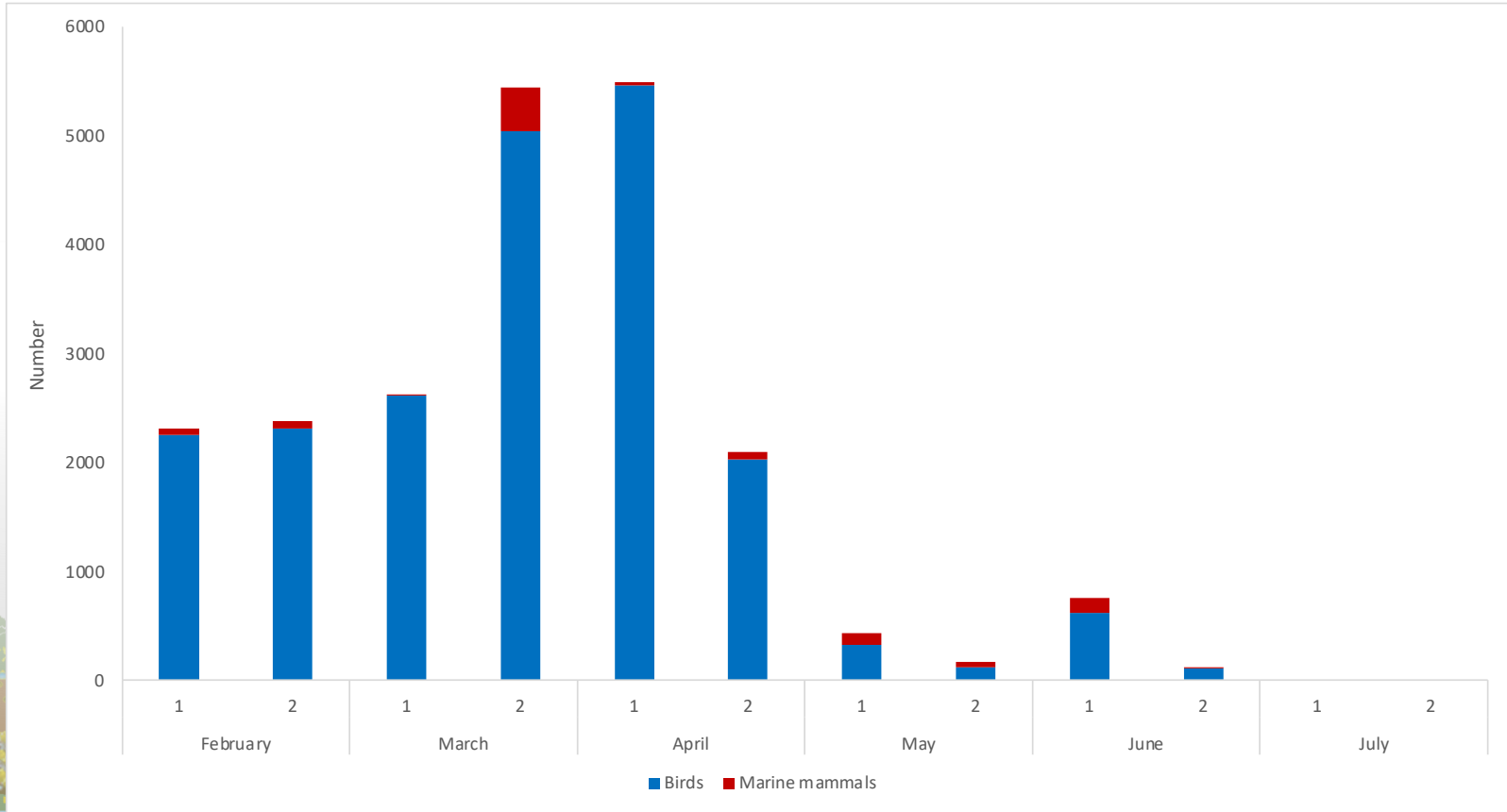
26 birds identified to species.

Little Gull	4,035
Common Guillemot	3,600
Razorbill	2,628
Black-legged Kittiwake	2,382
Lesser Black-backed Gull	1,962



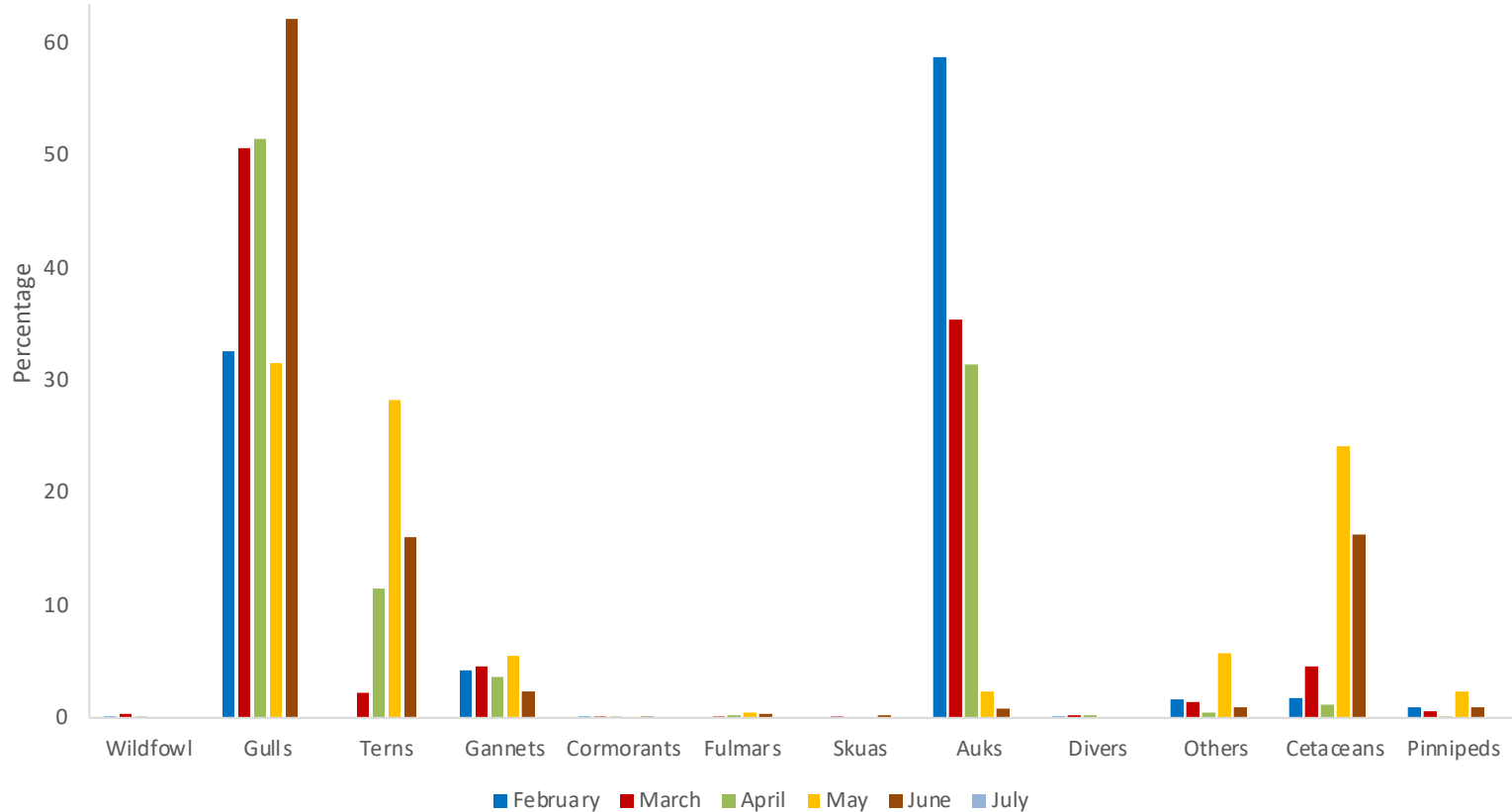


Observations per month





Relative abundance per month

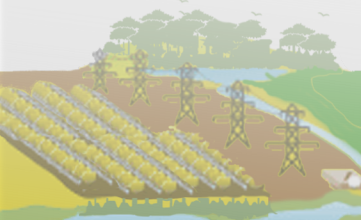
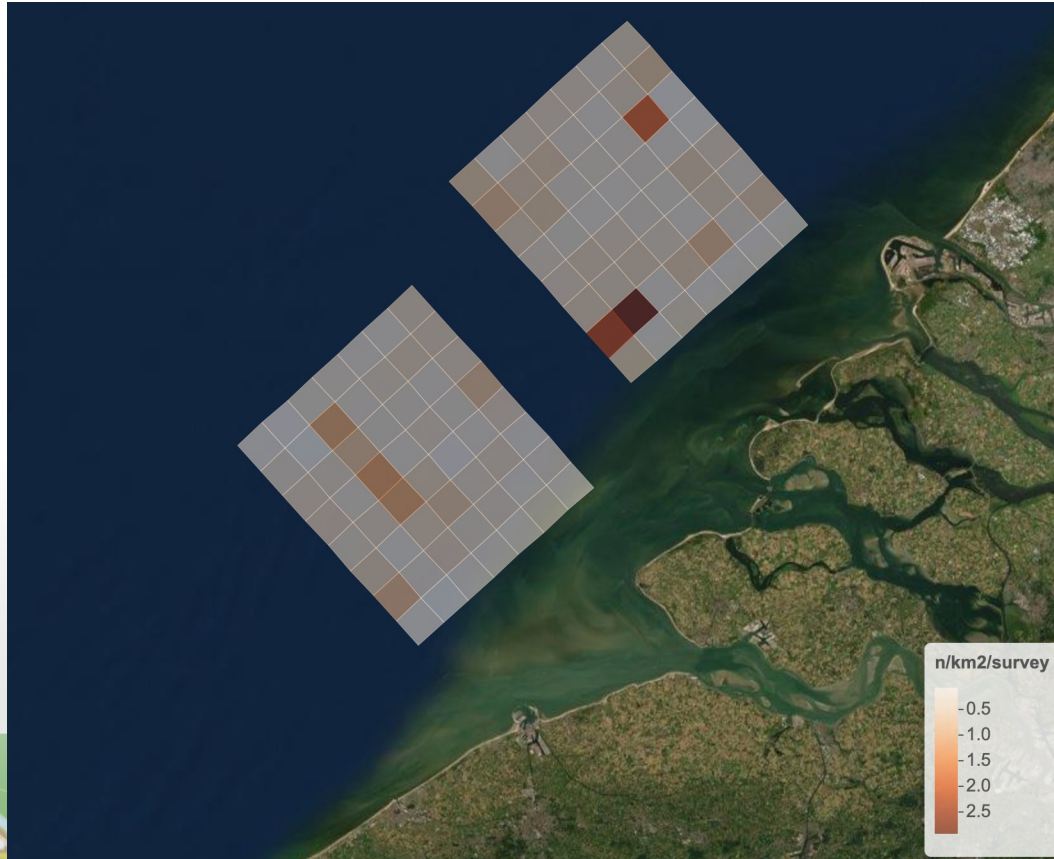




Distributions

Guillemot,
Razorbill

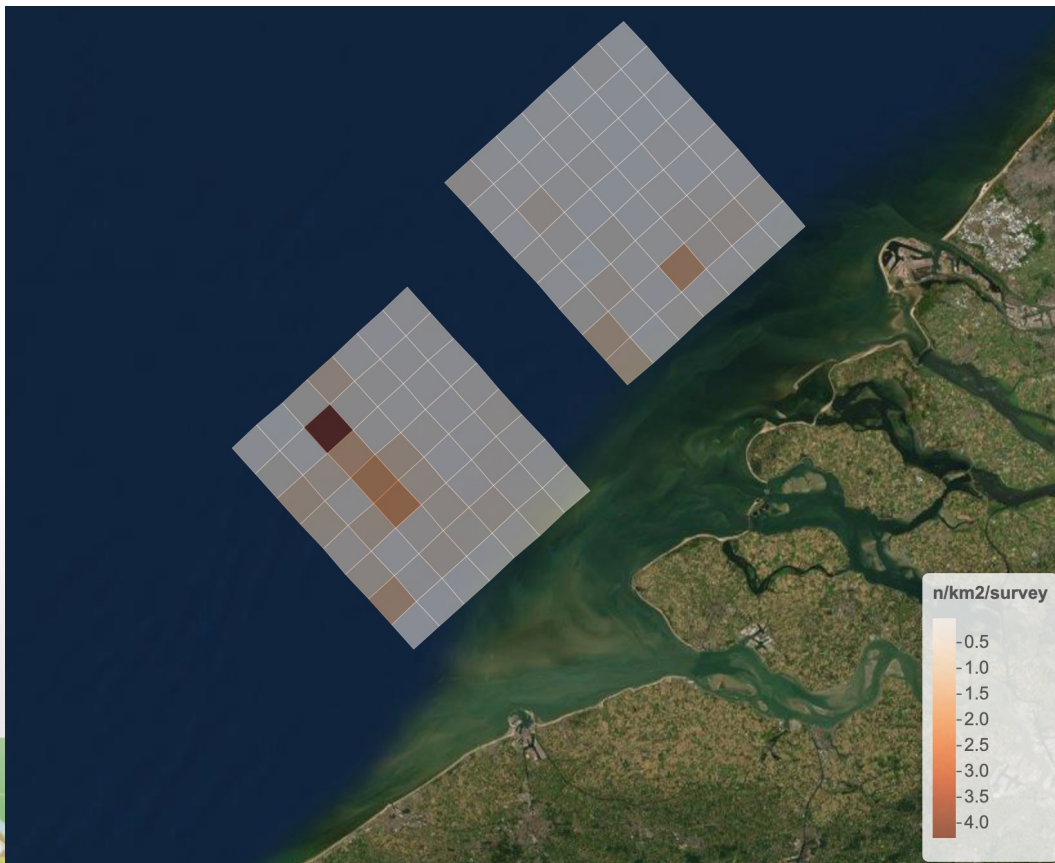
February
/ March



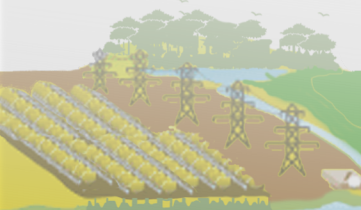


Distributions

Guillemot,
Razorbill



April /
May





1

2

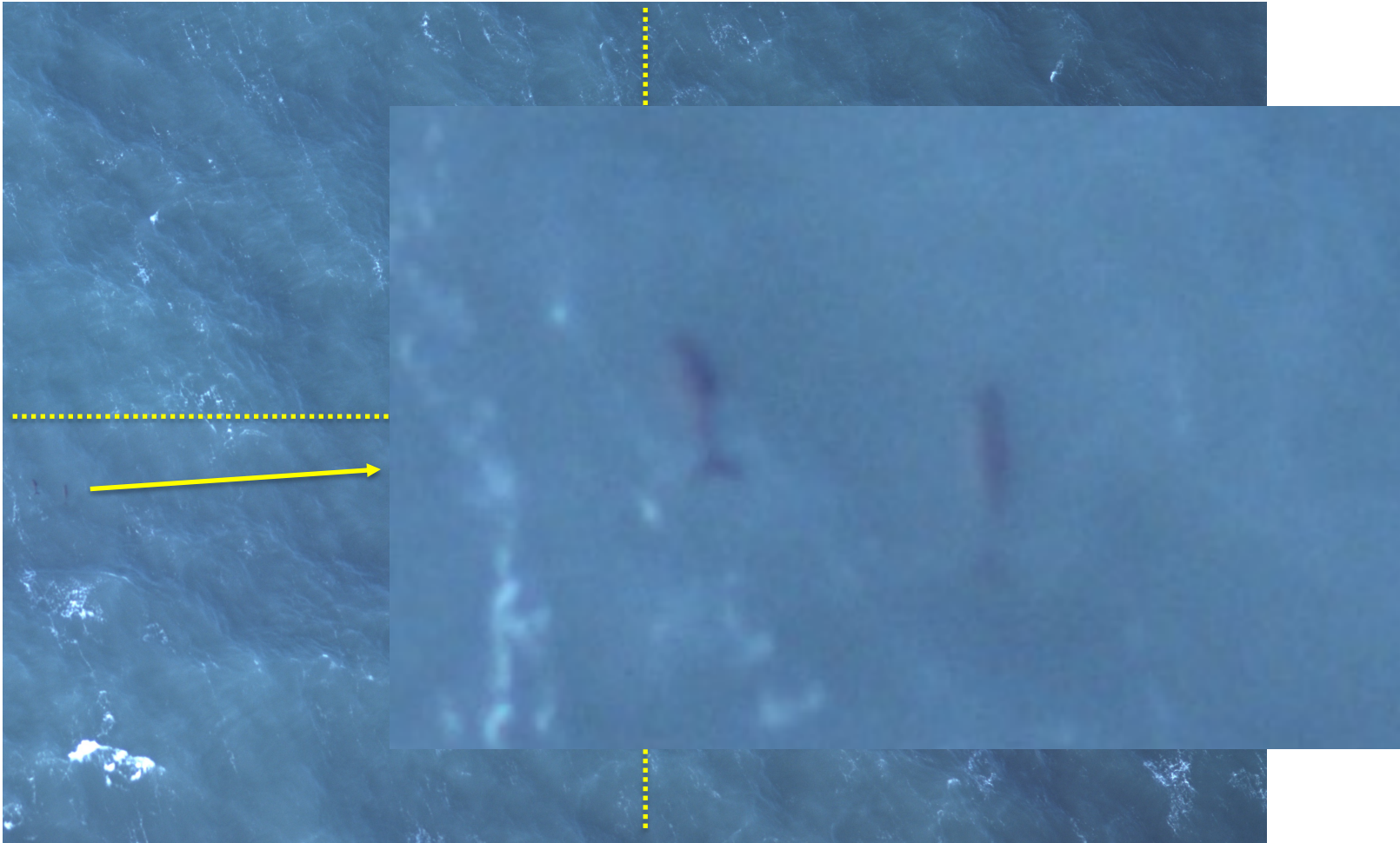
3

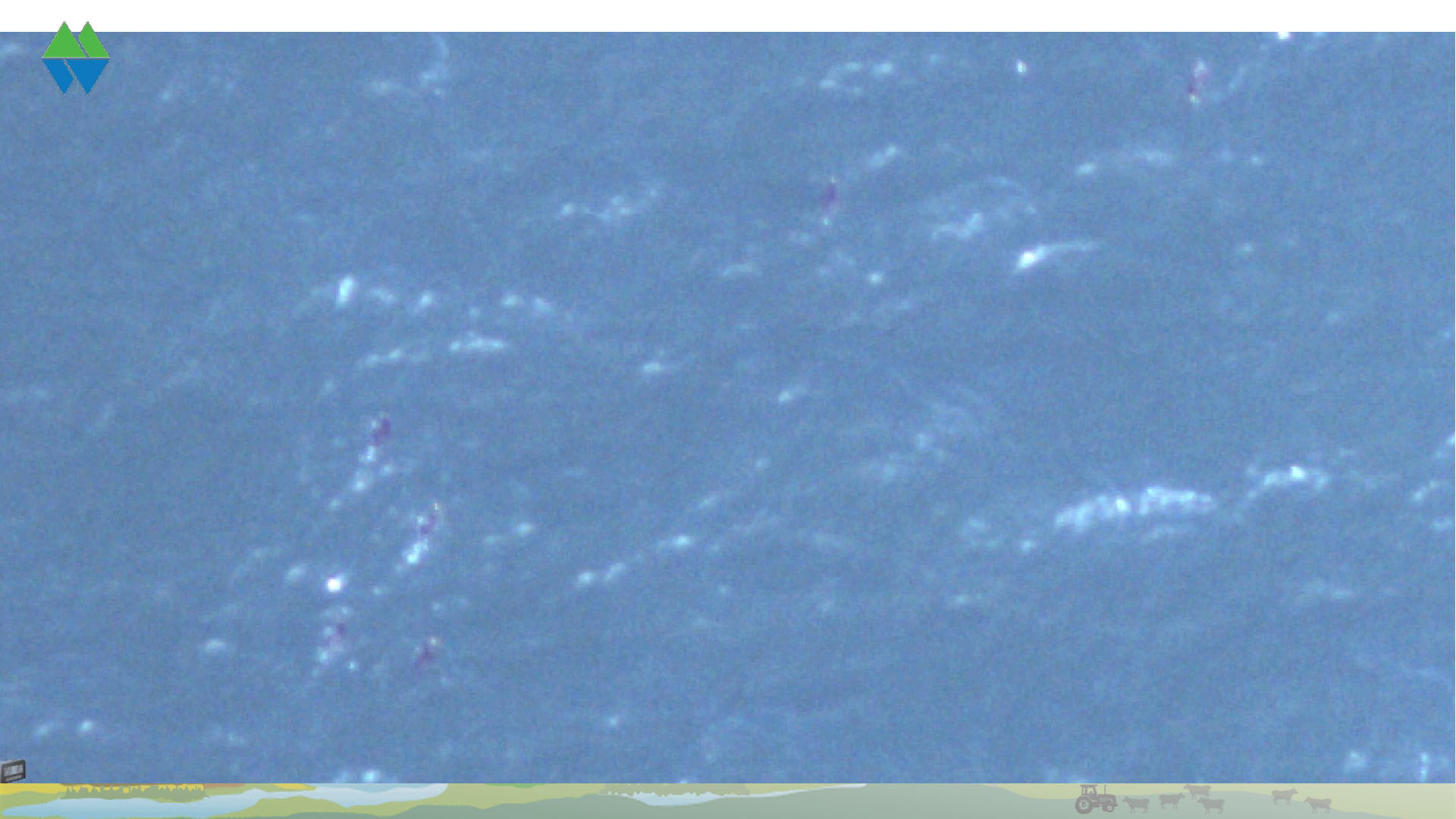
4



1

3

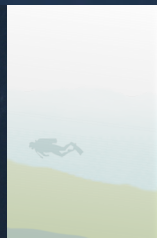
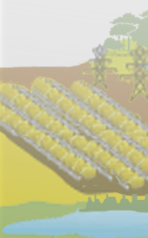


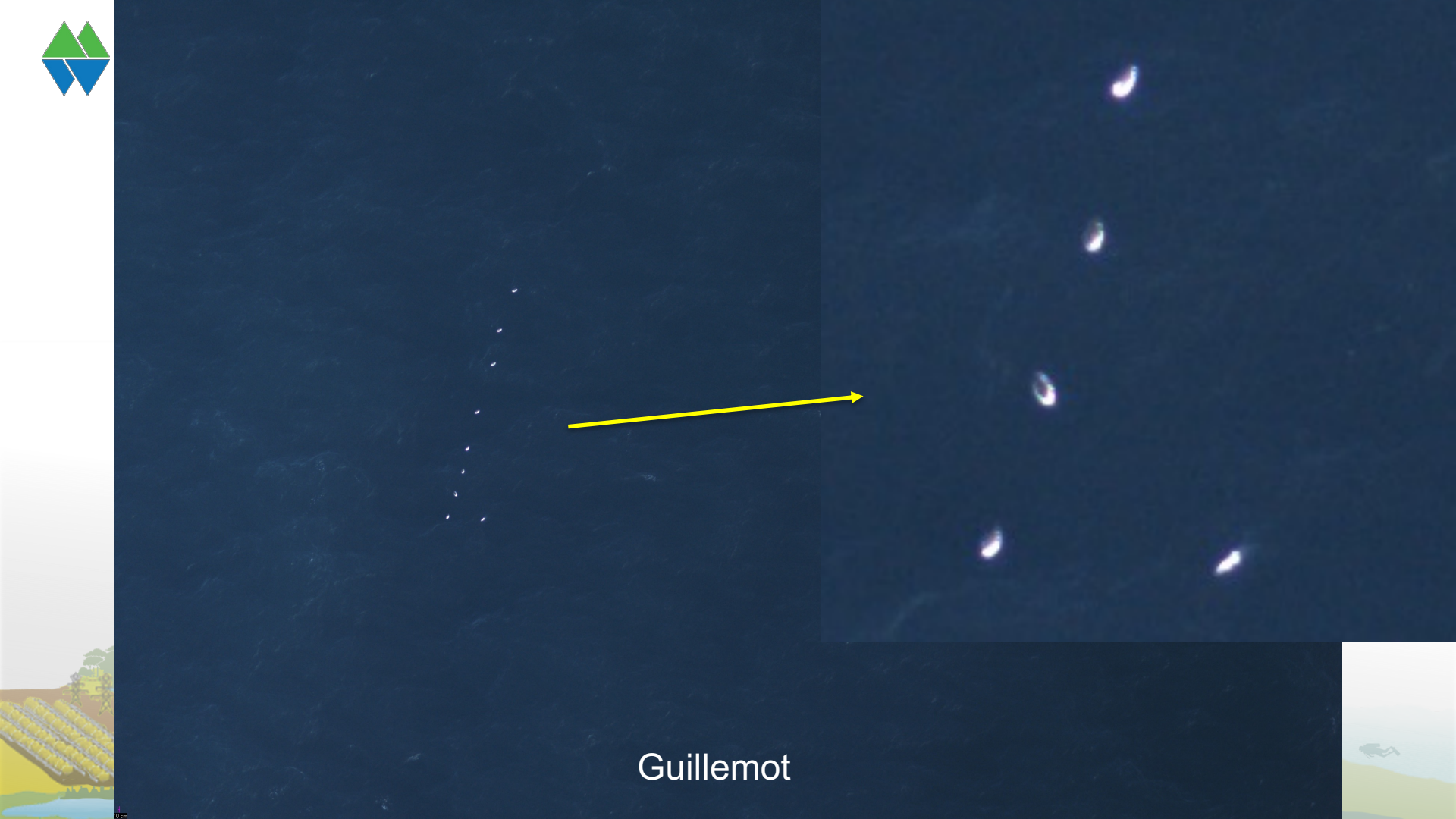




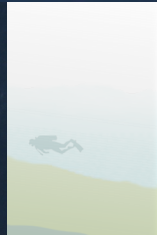
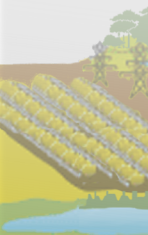
6

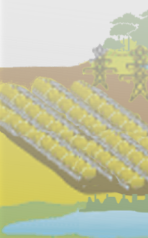
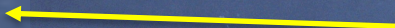






Guillemot



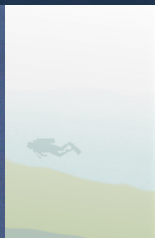
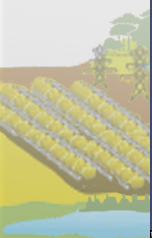


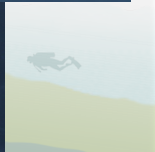
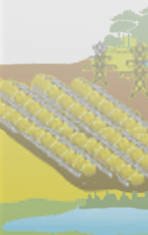


Razorbill



Guillemot







Gannet

