Small RPAS as a Tool for Underwater Habitat Mapping

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Background

VELMU programme: 2004-2014

- Underwater inventory of habitats and species along the Finnish coastline

- The data collected is made into habitat maps and models using ArcGIS – VELMU atlas (www.paikkatieto.ymparisto.fi)
- HELCOM – database update (e.g. habitats)
- Natura – database update (habitas and species information)

- Future applications:

- Assessment of Natura sites (NATA)
- Plan for the use and maintenace of the marine national parks


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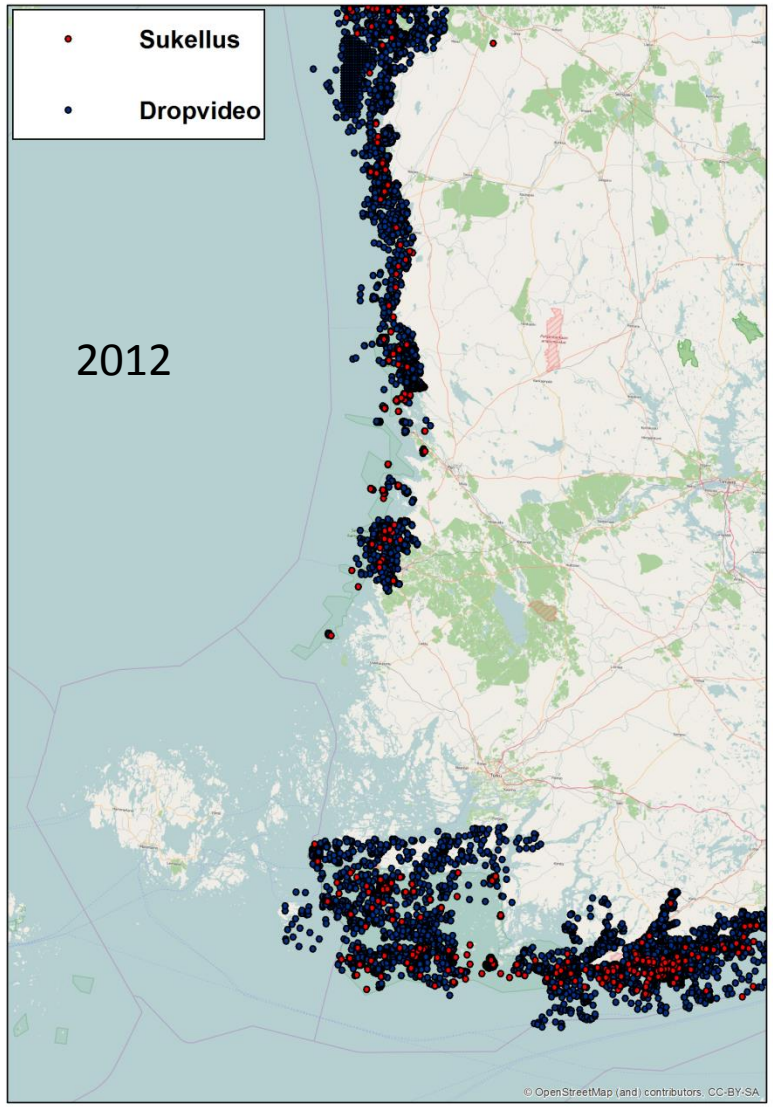
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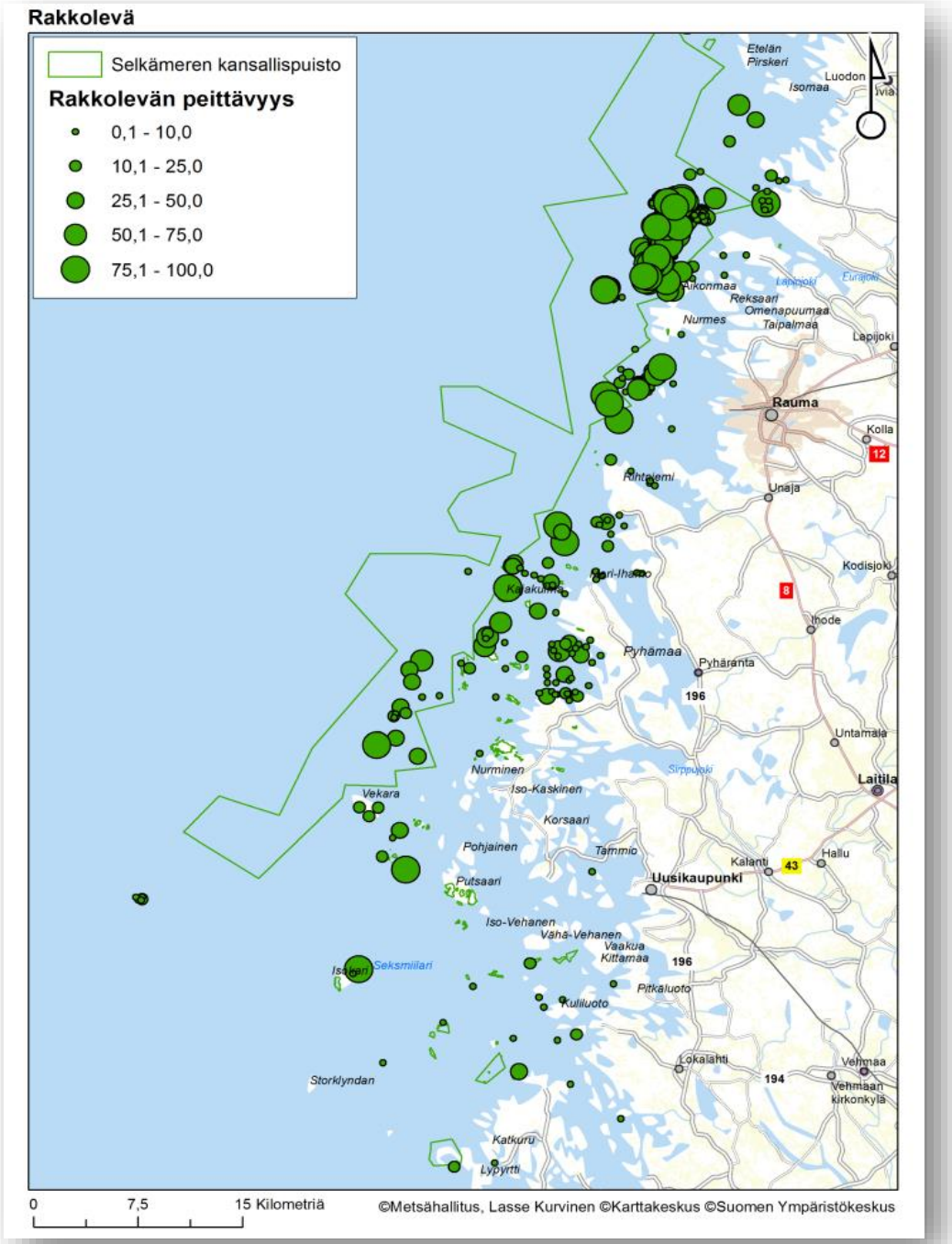
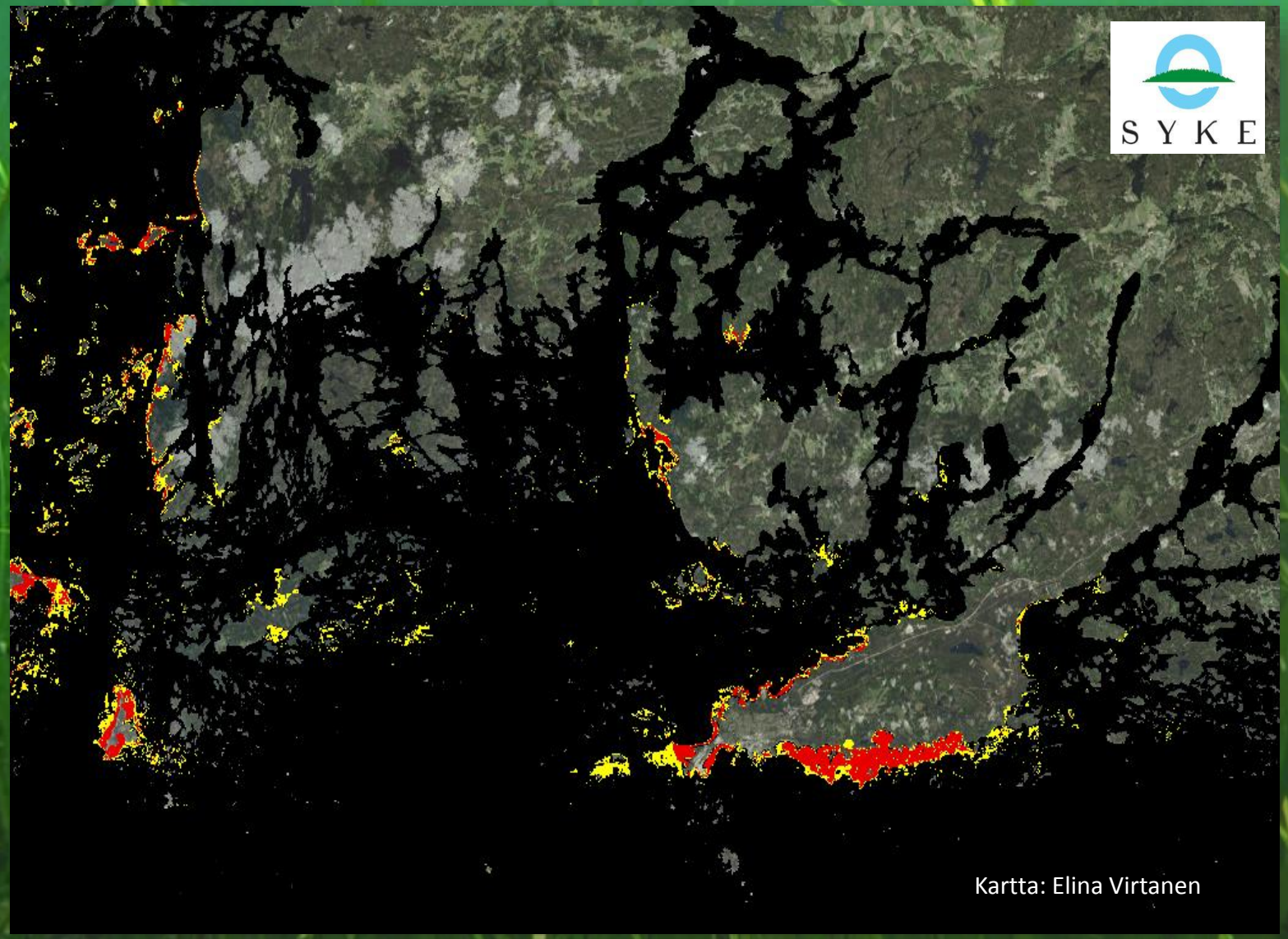
Bladderwrack - *Fucus vesiculosus*



Species-modelling: Seagrass – *Zostera marina* (Finnish Environmental Agency)



Our Rig

- DJI Phantom 2 V2
- Zenmuse 3-axis gimbal
- Gopro 3 Black+ ND/CP filters
- 10mW radio transmitter/mushroom antenna
- 32-channel diversity receiver/monitor with mushroom, helical and patch antennas
- iOSD sends live telemetry to monitor
- Position, altitude and speed recorded to an onboard data logger

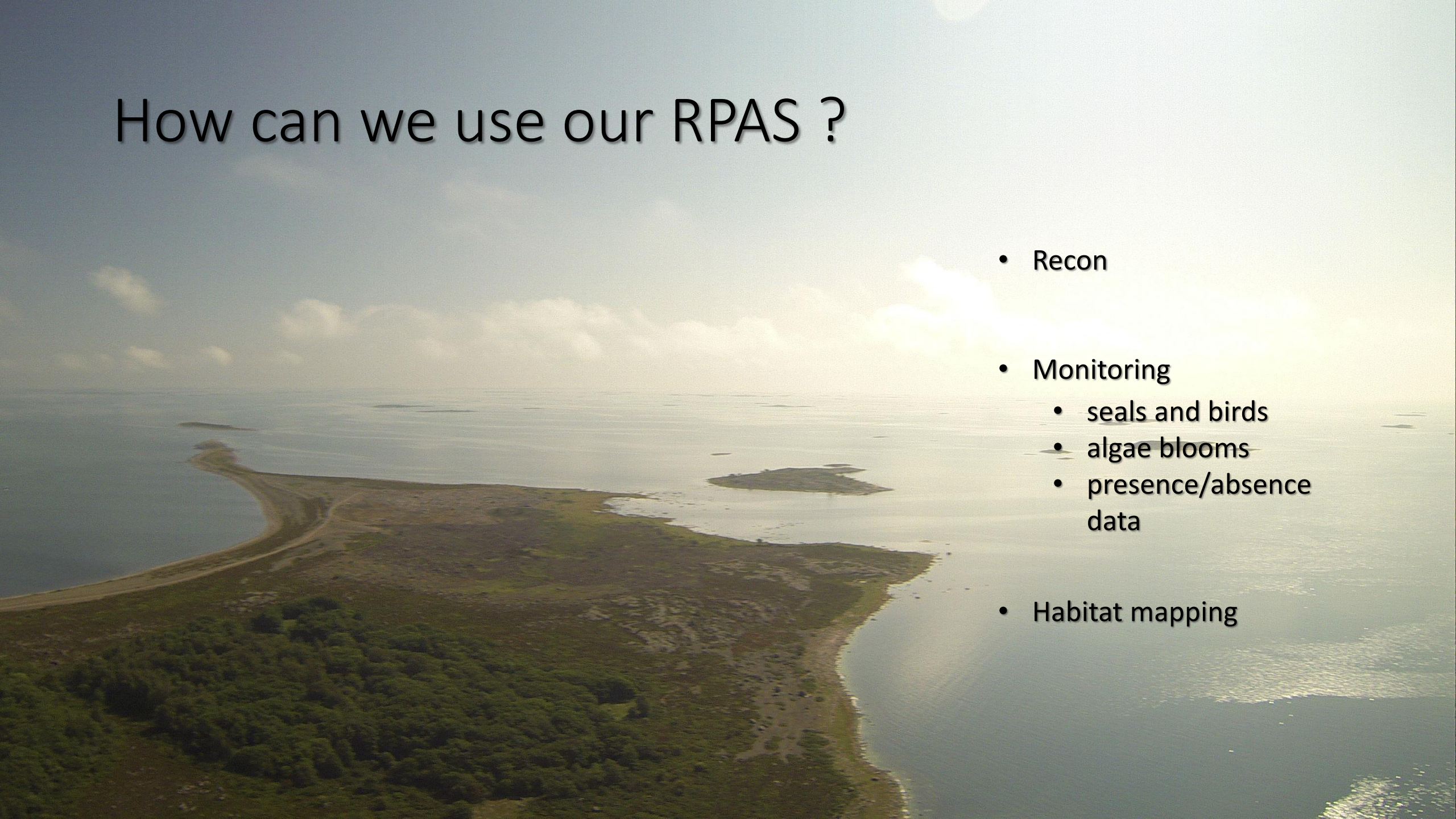
Advantages

- Small, light and easy to transport
- Easy to hand-launch/land even from a boat
- Stable video footage
- 15 mins flight time – good range
- Monitor allows shot framing
- Access difficult to reach areas - rapid ’quick and dirty’ coverage of relatively large areas
- Faster and less expensive than diving or drop-video

Disadvantages

- Not waterproof !!!
- Weather dependent- sun, waves/ripples, rain
- Risky flying in winds over 8 m/s
- Water clarity limits usefulness

How can we use our RPAS ?



- Recon
- Monitoring
  - seals and birds
  - algae blooms
  - presence/absence data
- Habitat mapping

Reconnaissance

- Difficult to access shallow muddy/rocky areas – bays, lagoons and flads
- Find a suitable entry/anchor point with boat
- See if area is worth further investigation using more coventional inventory methods

Monitoring seals and birds

Seals

- Estimate numbers at haul-out rocks (grey seal)
- Estimate numbers on fast ice during pupping/moulting areas (ringed seal)

Birds

- Cormorant colonies
- Oiled birds during oil-spill events

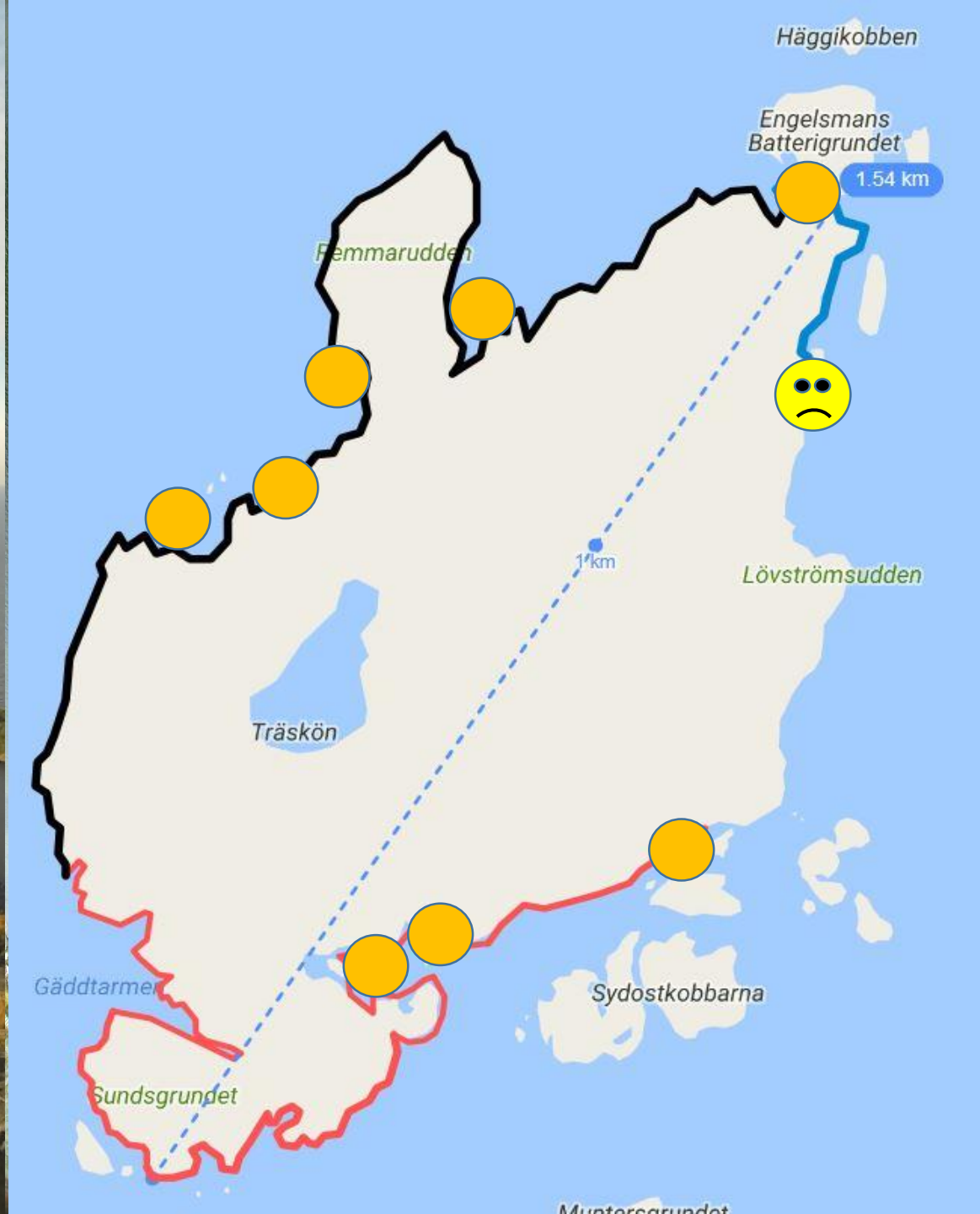
Mapping shallow water habitats

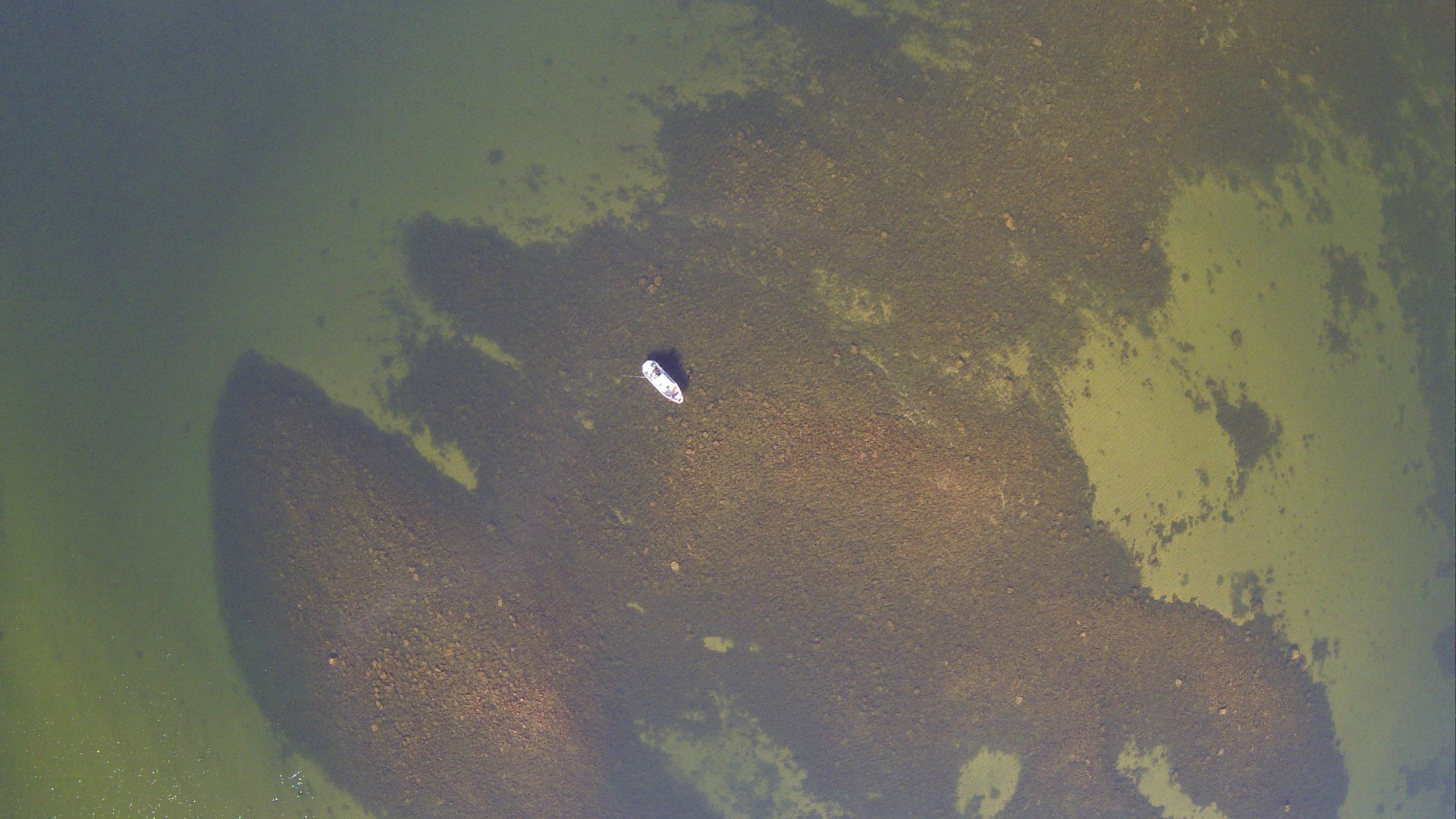
- Shallow coastline areas, including reefs, flads/gloe-lakes, lagoons reefs and bays
- Biodiverse – many/rare plant species and associated fauna
- Important as nursery grounds for fish species
- Important breeding/resting feeding grounds for birds
- Area of highest potential impact by humans
- Contain key species e.g. bladderwrack (rocky shores) or seagrass (sand-gravel shores) which play a crucial role in supporting that ecosystem

Monitoring algal blooms

Shoreline mapping – bladderwrack presence

- Träskön Island, Porkkala
- 3 days of filming (4-7 flights/day)
- Flight speed <5m/s
- Gopro 3 Black12MP photos at 5 second intervals





Habitat type 2: Flad (Riitsaranlahti, Pori)

The next step….

Phantom 4

- Pre-programmed flight path at 1m/s
- Geotagged images can be taken every second
- Images can be converted into a mosaic layer
- Layers can be added to ArcGIS to

calculate habitat area, width and biomass volume

Note! Data still needs groundtruthing with conventional methods, i.e. SCUBA.


Thank you!