THE APPLICATION OF AN ACTIVE SEDIMENT TRACING TECHNIQUE TO ASSESS THE EFFICACY OF NEARSHORE PLACEMENT OF DREDGED MATERIAL FOR BEACH NOURISHMENT PURPOSES

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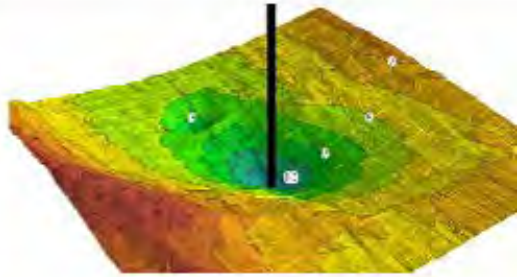

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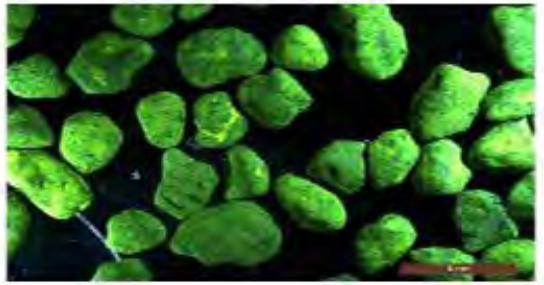

Particle Tracking

Sediment (or particle) tracking / tracing is a method used to determine the pathways and rates of sediment transport through the environment.

Technology

Sediment Tracers, benthic flumes, cohesive strength mete and online systems.

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Beneficial Re-use of Dredge Material for Nourishment Purposes –Montrose, NE Scotland, UK

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A Best Practicable Environmental Option? A trial proposed.

‘Trickle Recharge’

- Will the dredged material nourish the system?
- Will the material be redeposited in the South Esk Channel?

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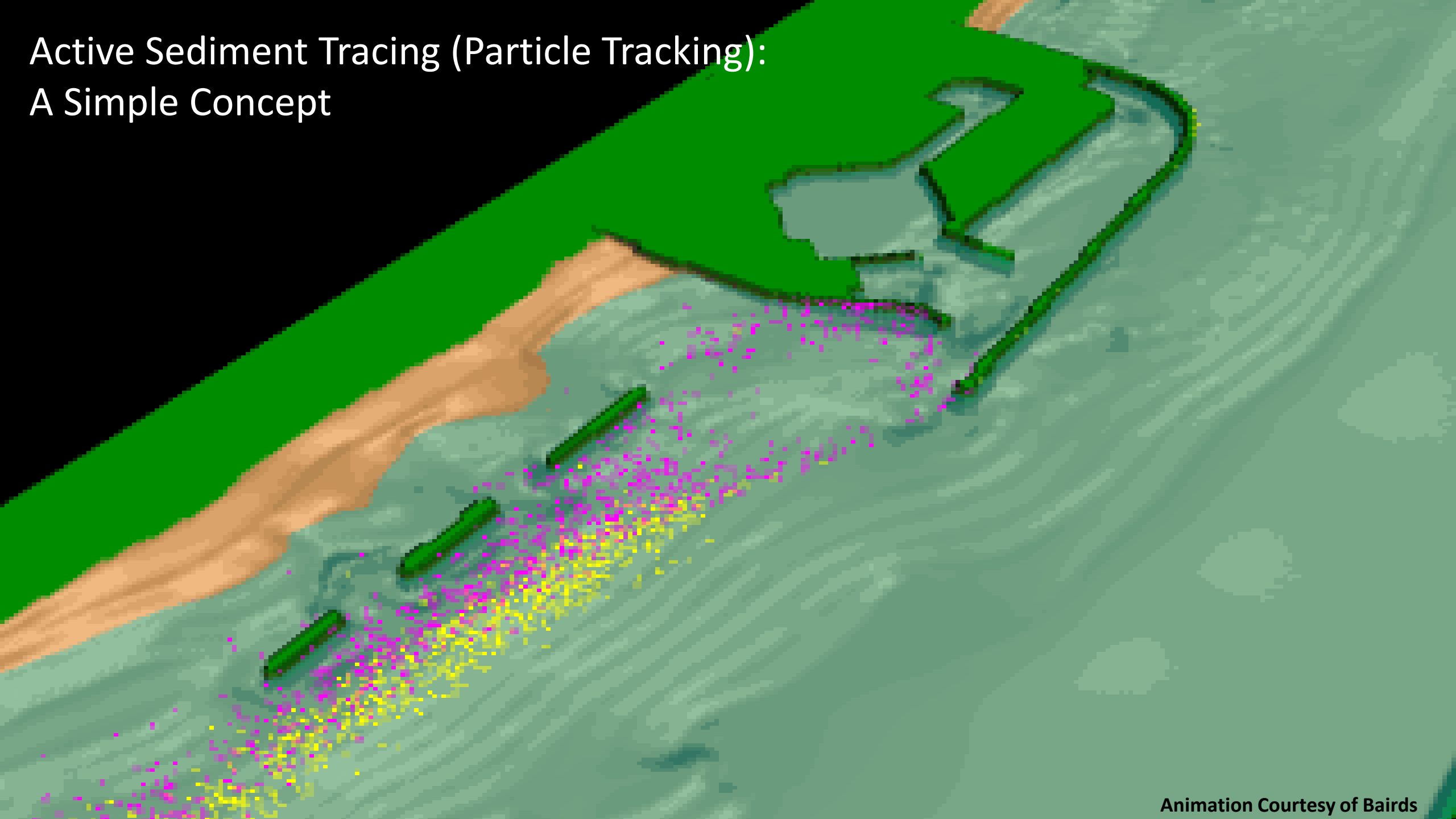
Active Sediment Tracing (Particle Tracking): A Simple Concept



Animation Courtesy of Bairds

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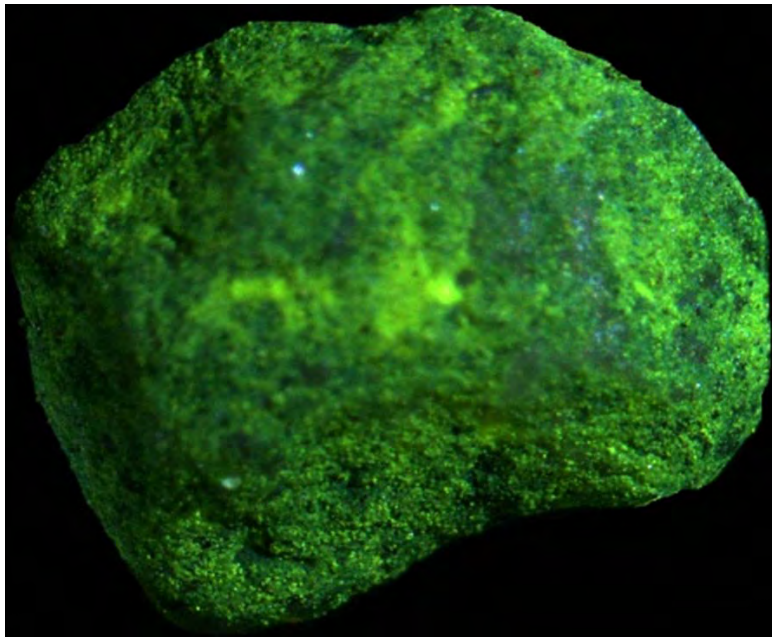
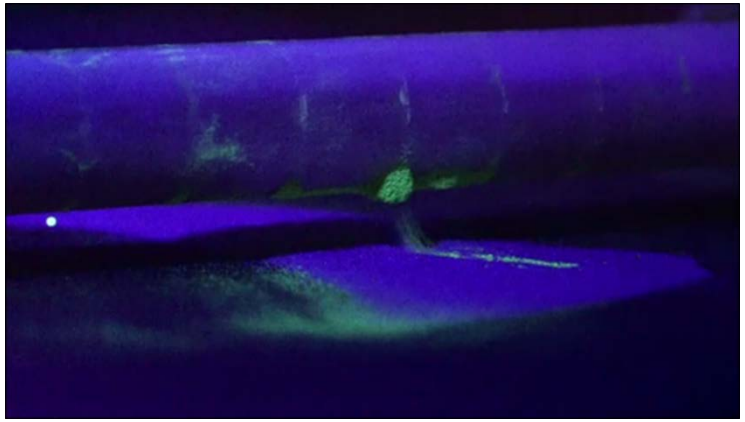
Dual Signature Tracers

- Coated natural mineral kernel
- Two applied signatures:
  - Fluorescence
  - Ferrimagnetism
- US Environment Protection Agency (EPA) approved





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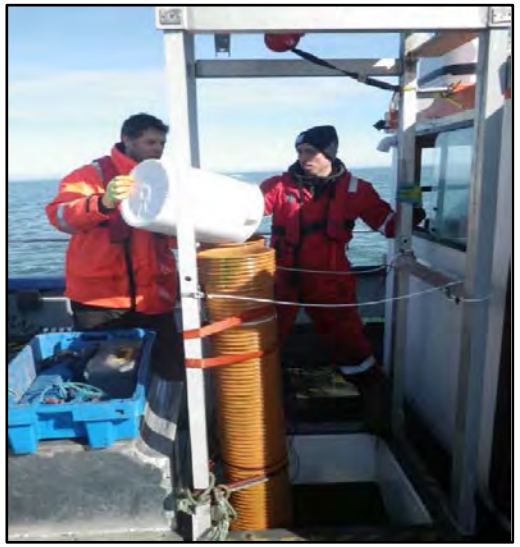
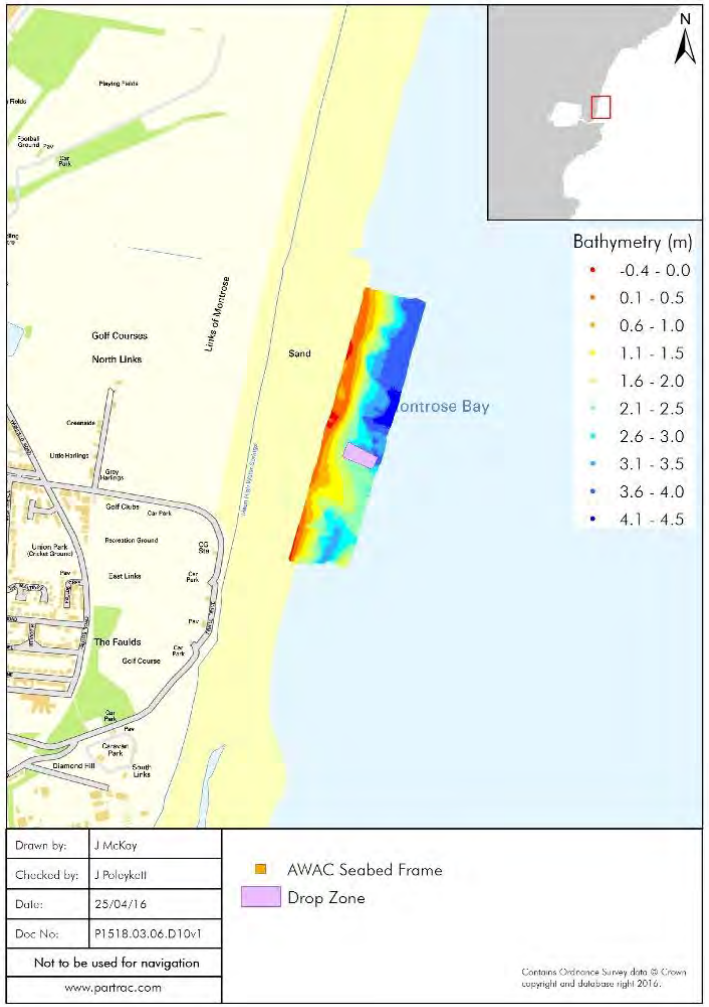
Tracer Deployment:

- 2000 kg dual signature tracer material deployed
- Hydraulically matched to the dredge material





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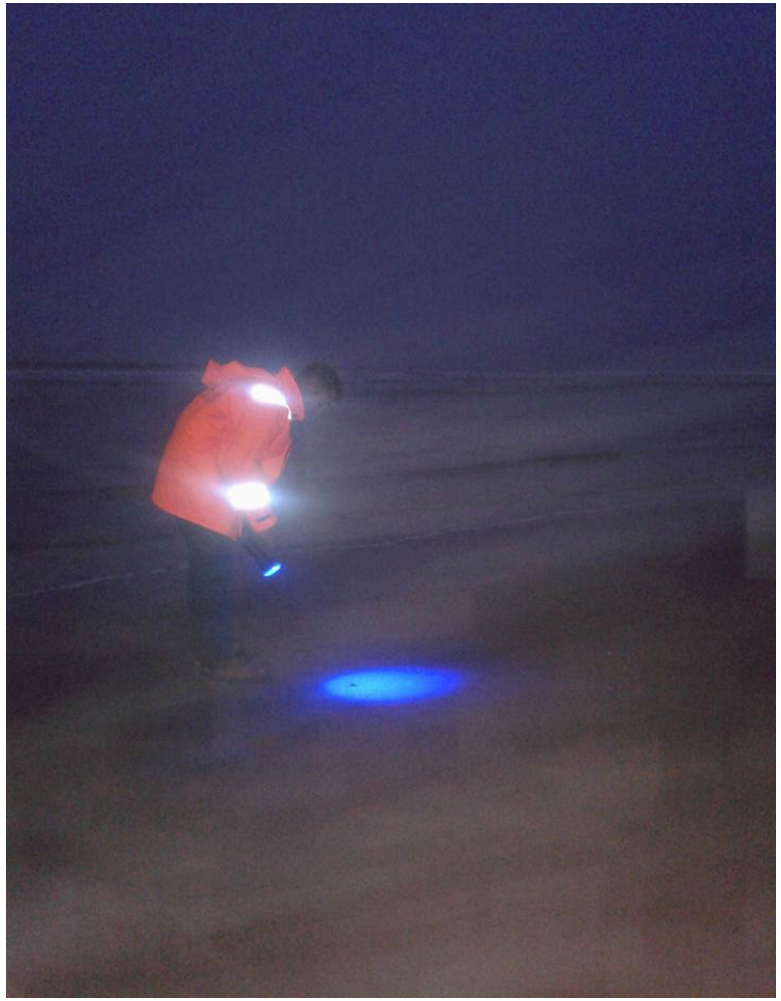
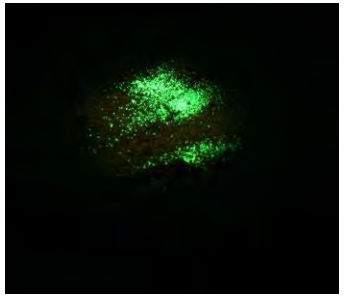
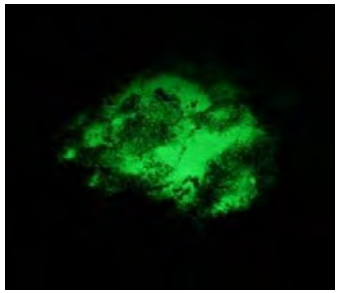
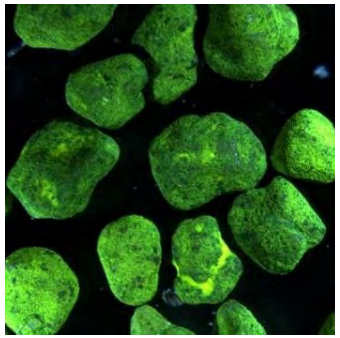
Post Deployment Sampling:

- 9 sampling campaigns conducted over a 12 month period - 560 samples collected
- Sampling resources focused via qualitative *in situ* inspection using blue light torches
- All samples collected analyzed in the laboratory to determine tracer content.









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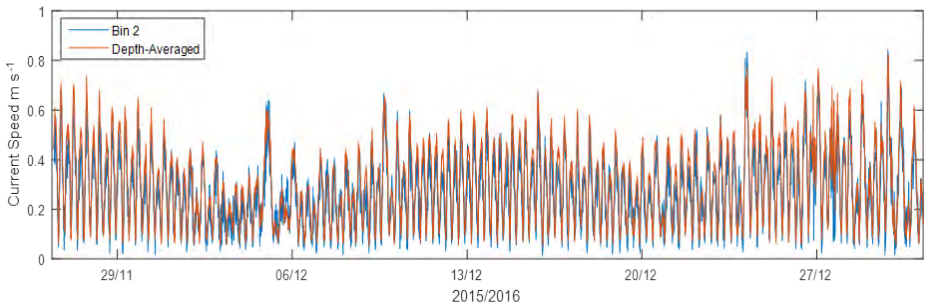
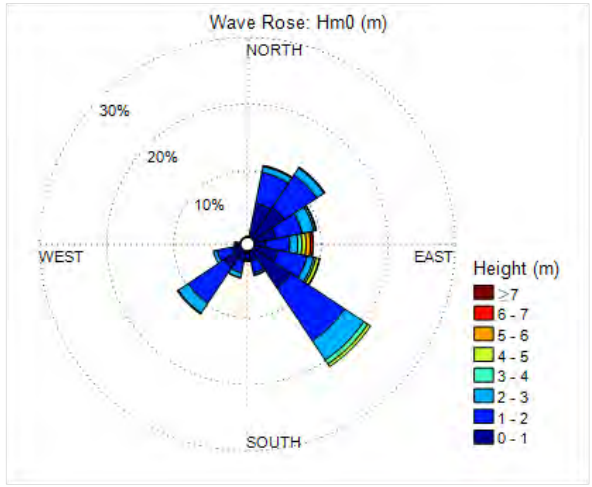
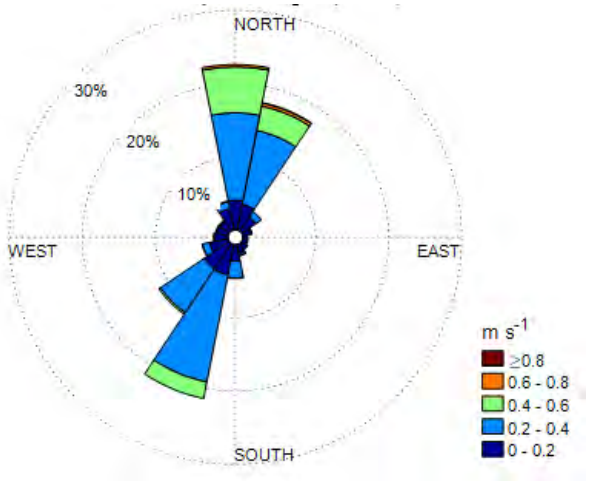
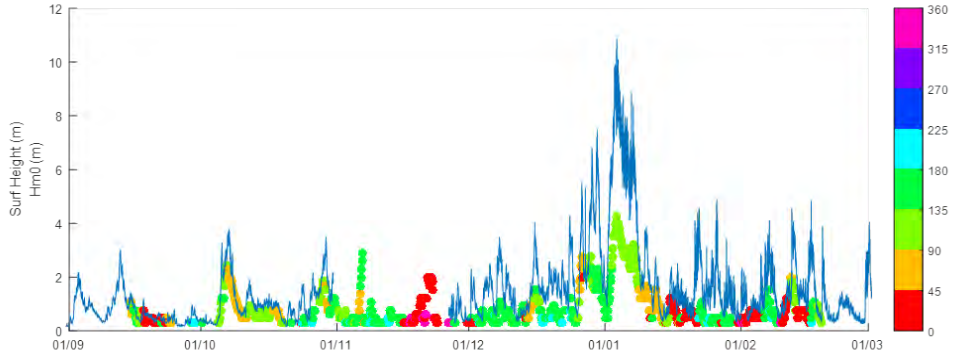
Collection of supporting oceanographic data: Critical to contextualize the study findings









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Sand Tracking Study

The following plots show the location of samples which were taken during the study from April 2015 to March 2016.

The size of the symbol indicates the mass per unit area of tracer particles found in the sample.

The ‘drop zone’ shows the location where dredged sediments were disposed as part of the trial study, in turn developing a ‘berm type feature’.

Note that sampling locations varied throughout the study.

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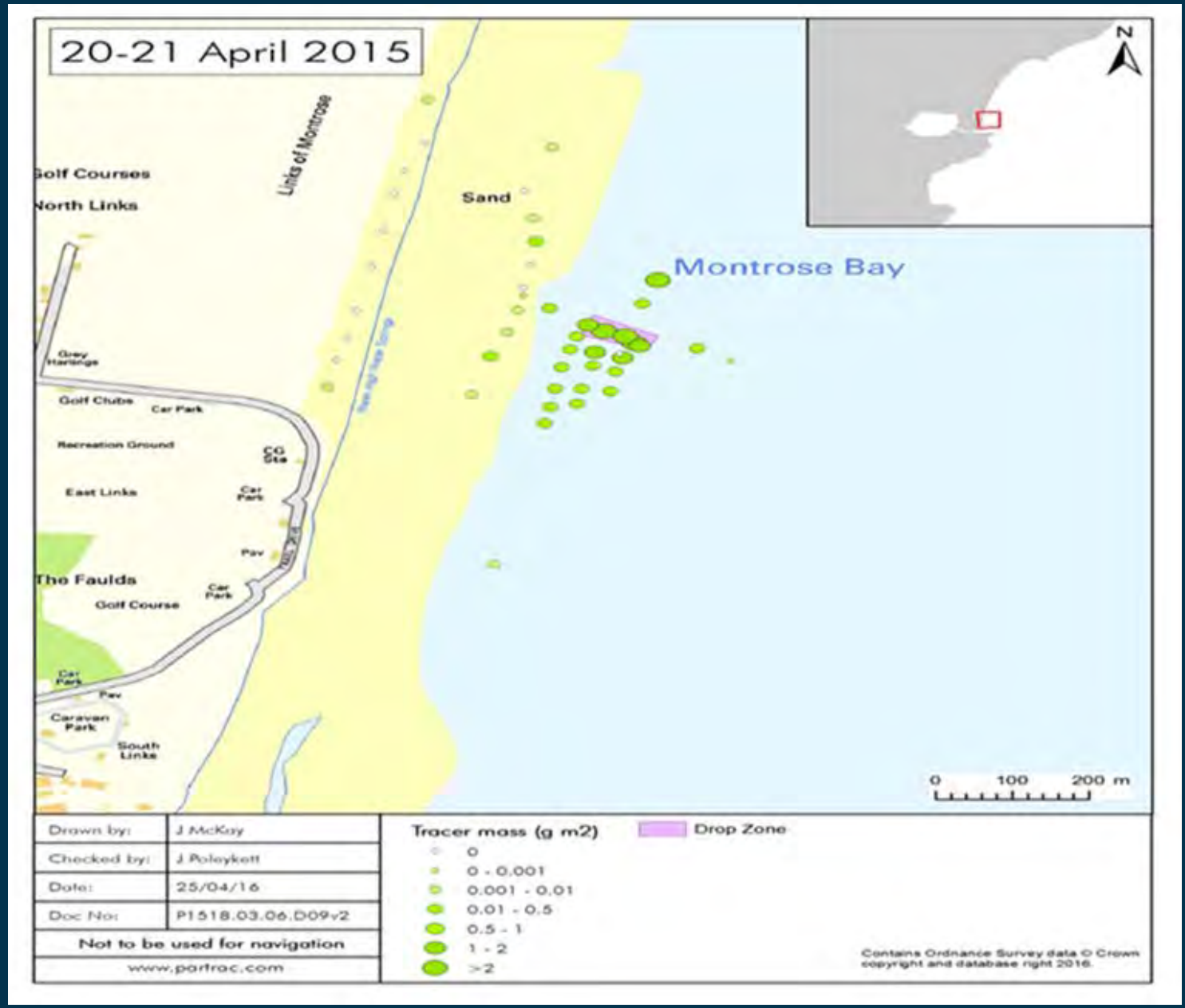
2 weeks after tracer deployment



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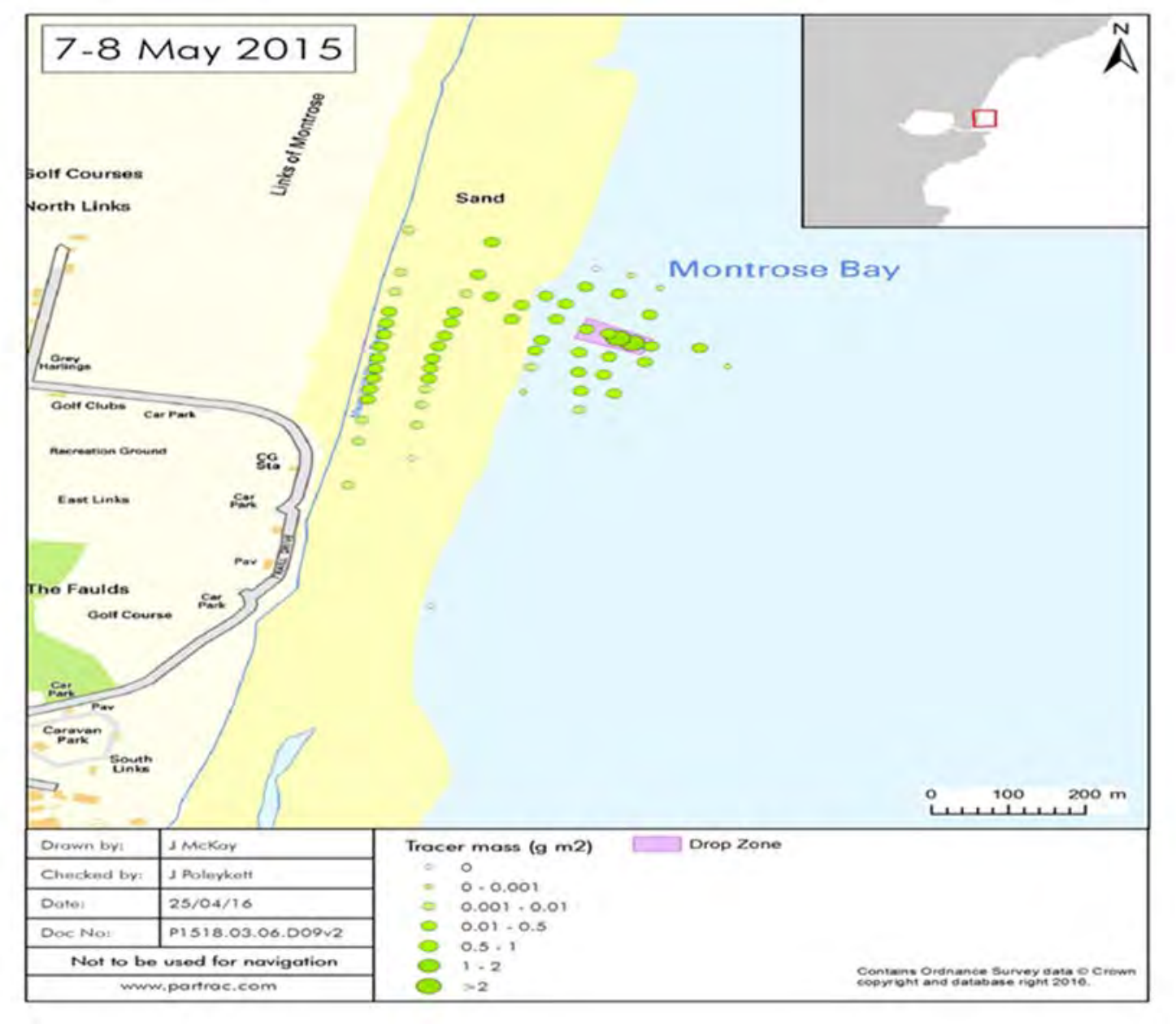
4 weeks after tracer deployment



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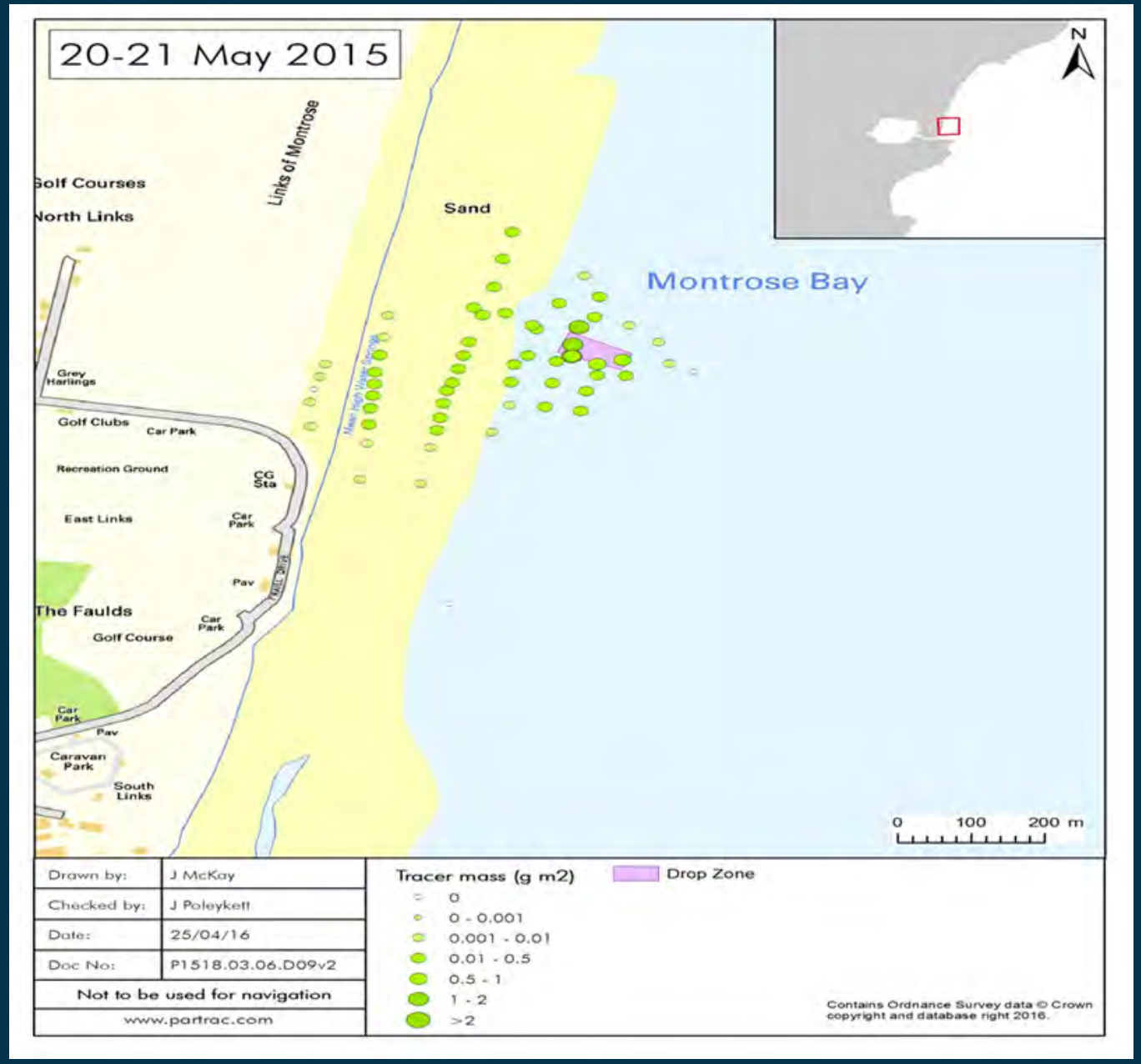
6 weeks after tracer deployment



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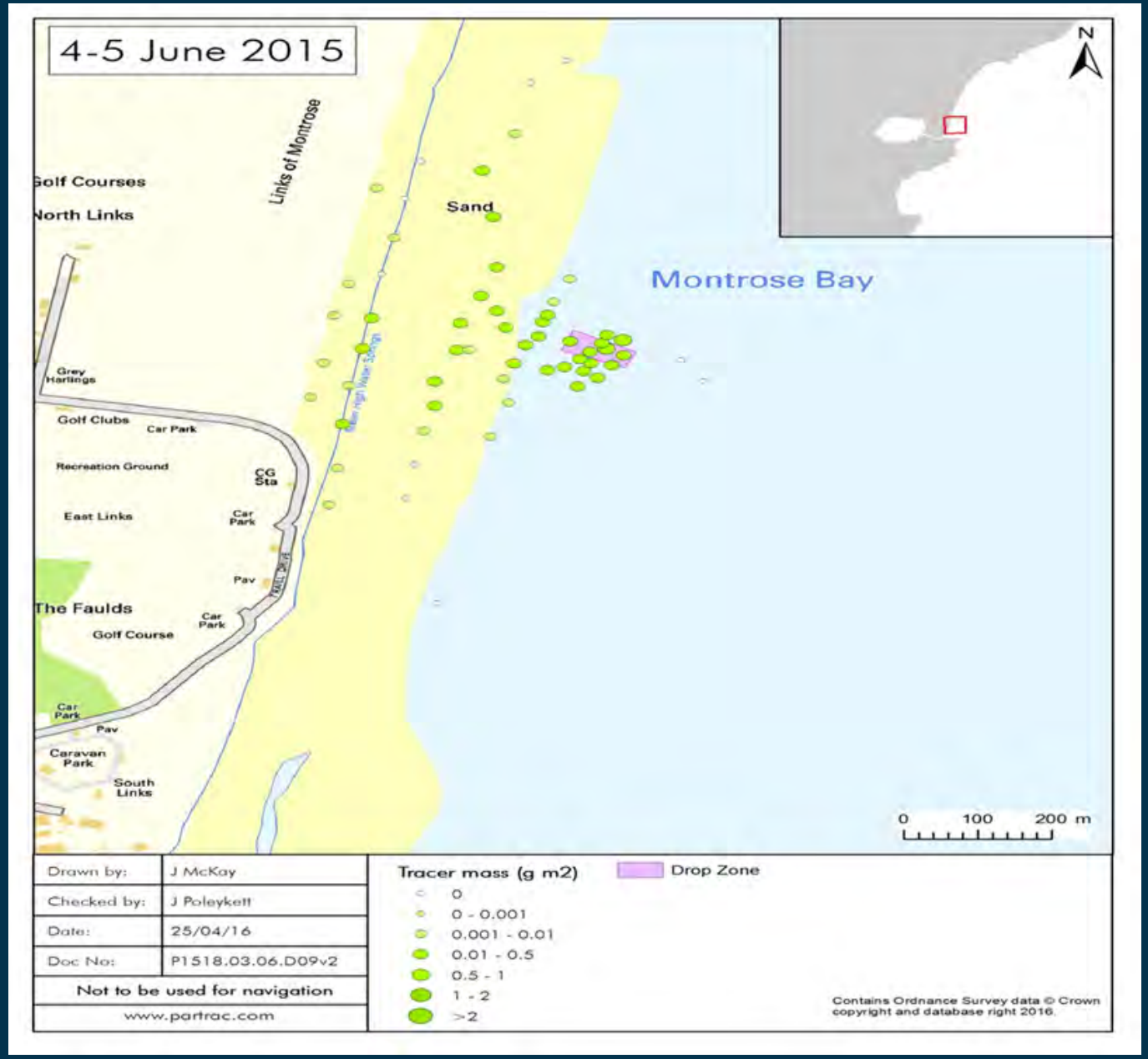
8 weeks after tracer deployment



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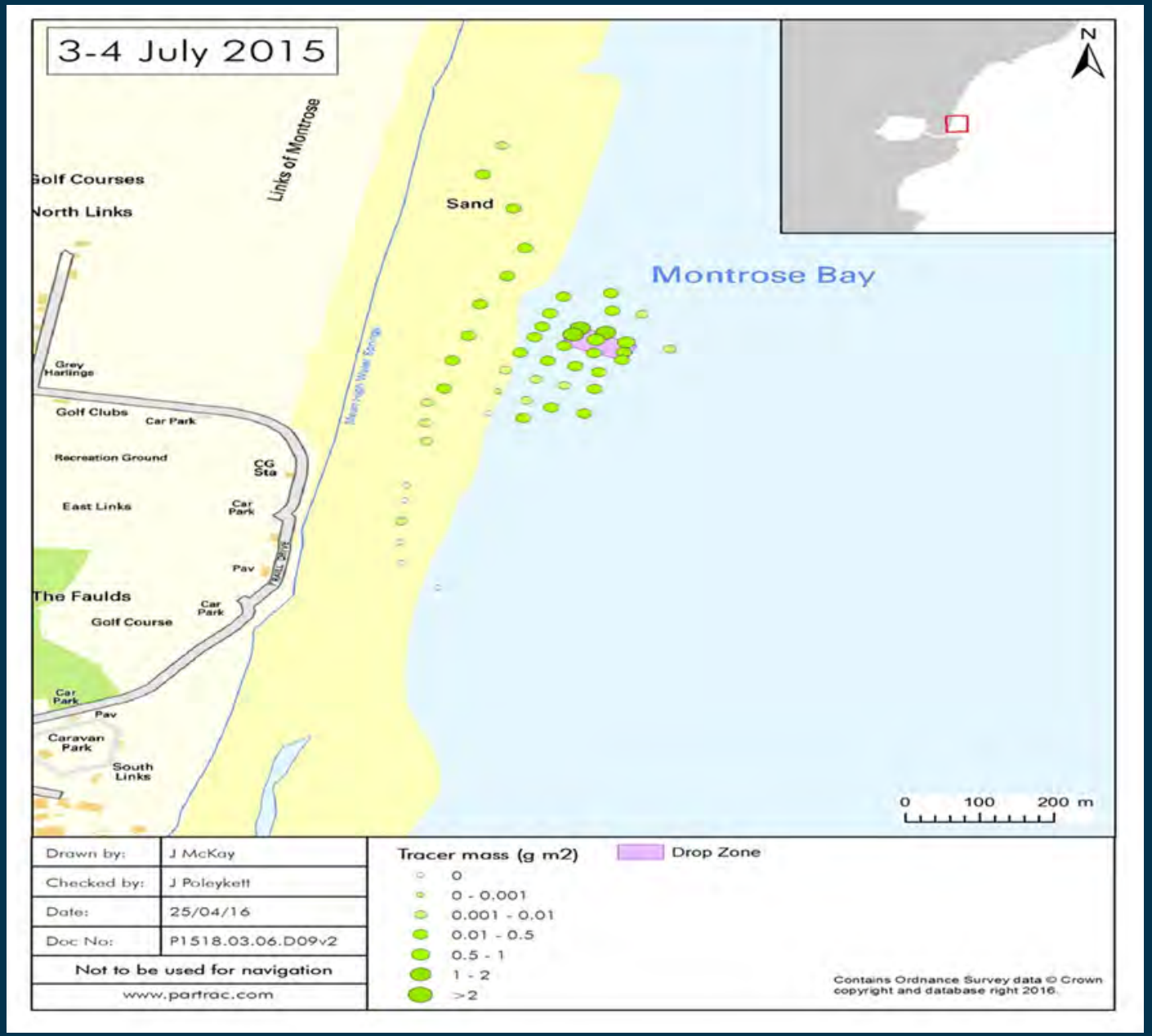
12 weeks after tracer deployment



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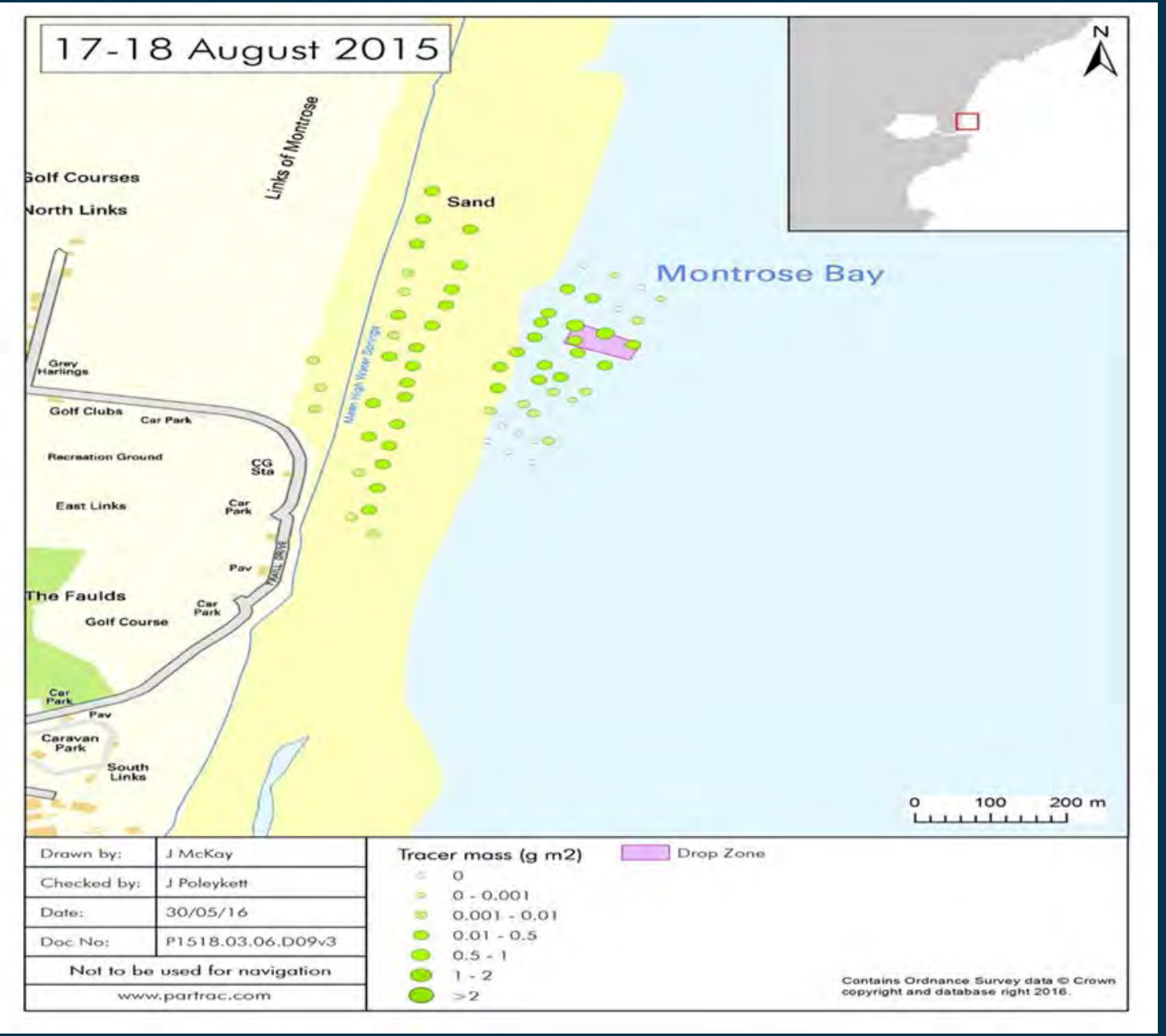
18 weeks after tracer deployment



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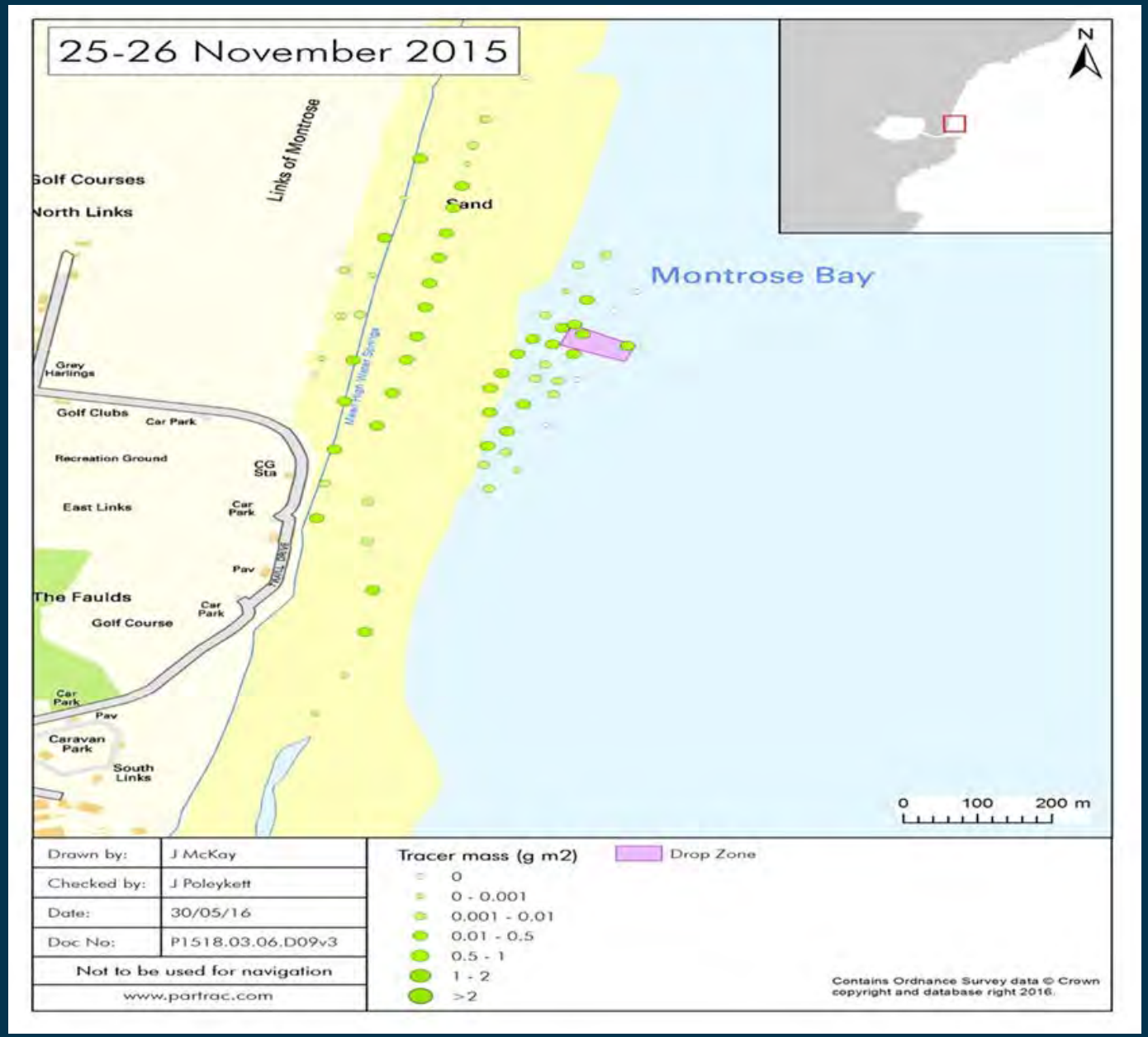
32 weeks after tracer deployment



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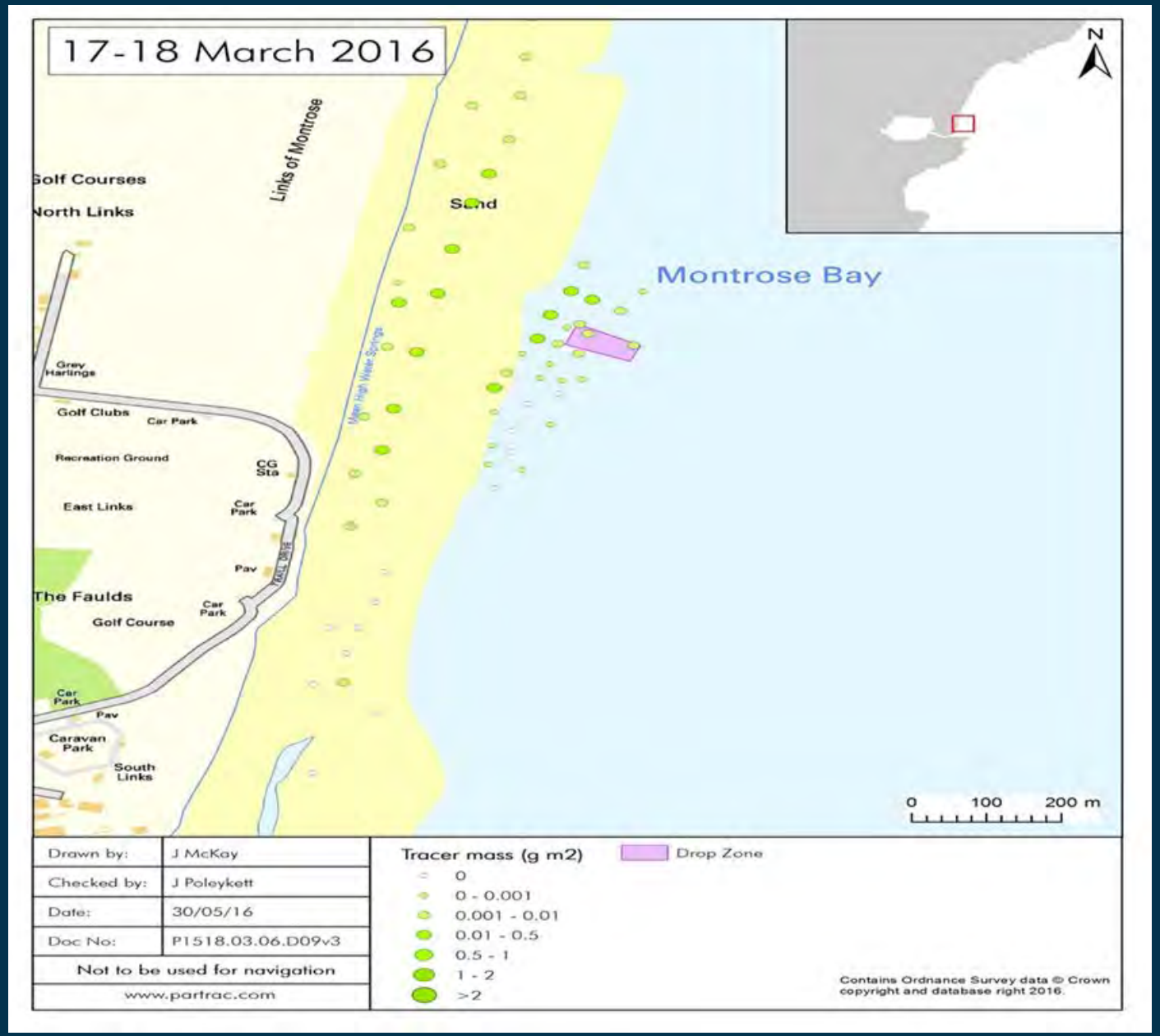
48 weeks after tracer deployment



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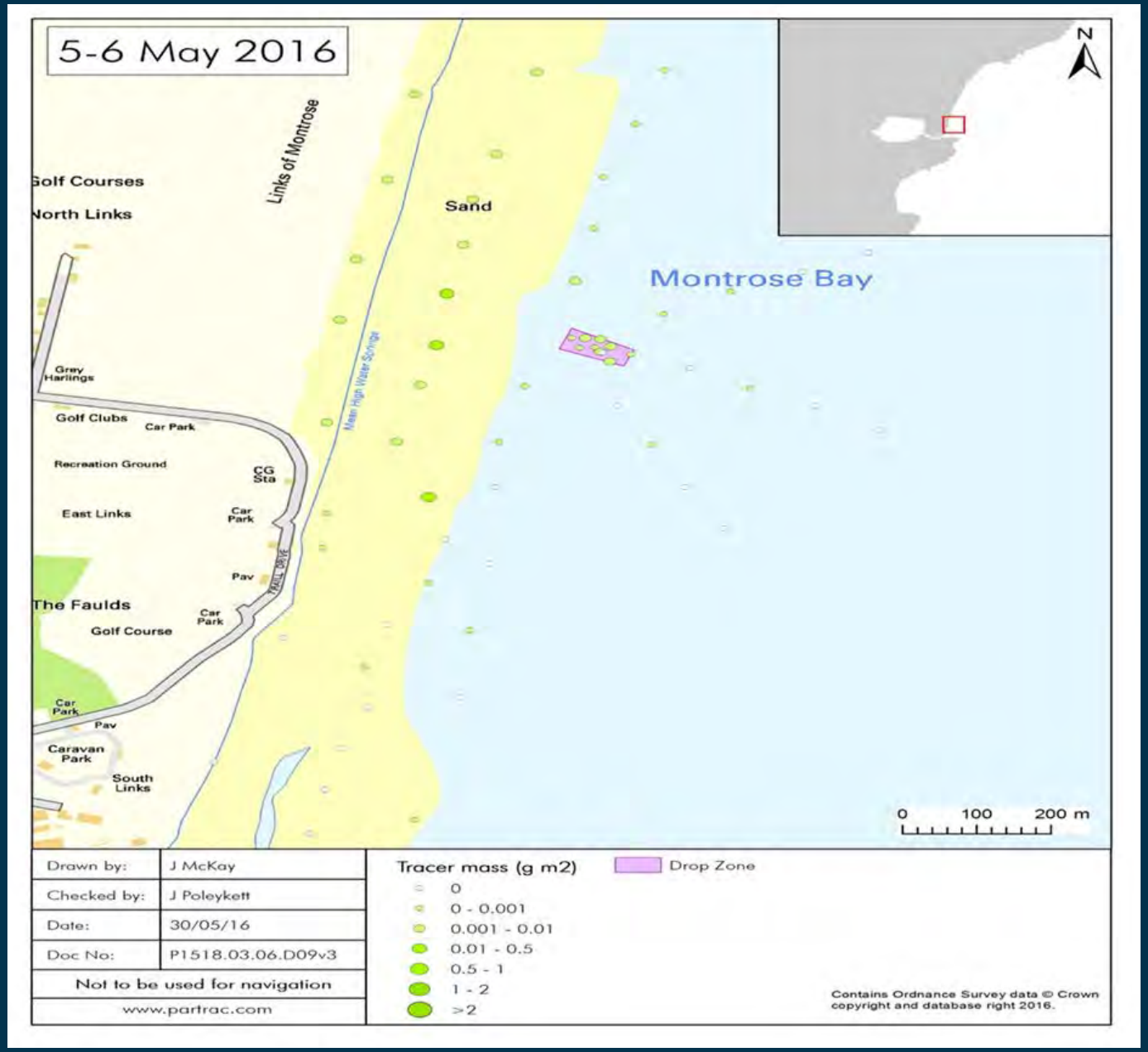
54 weeks after tracer deployment



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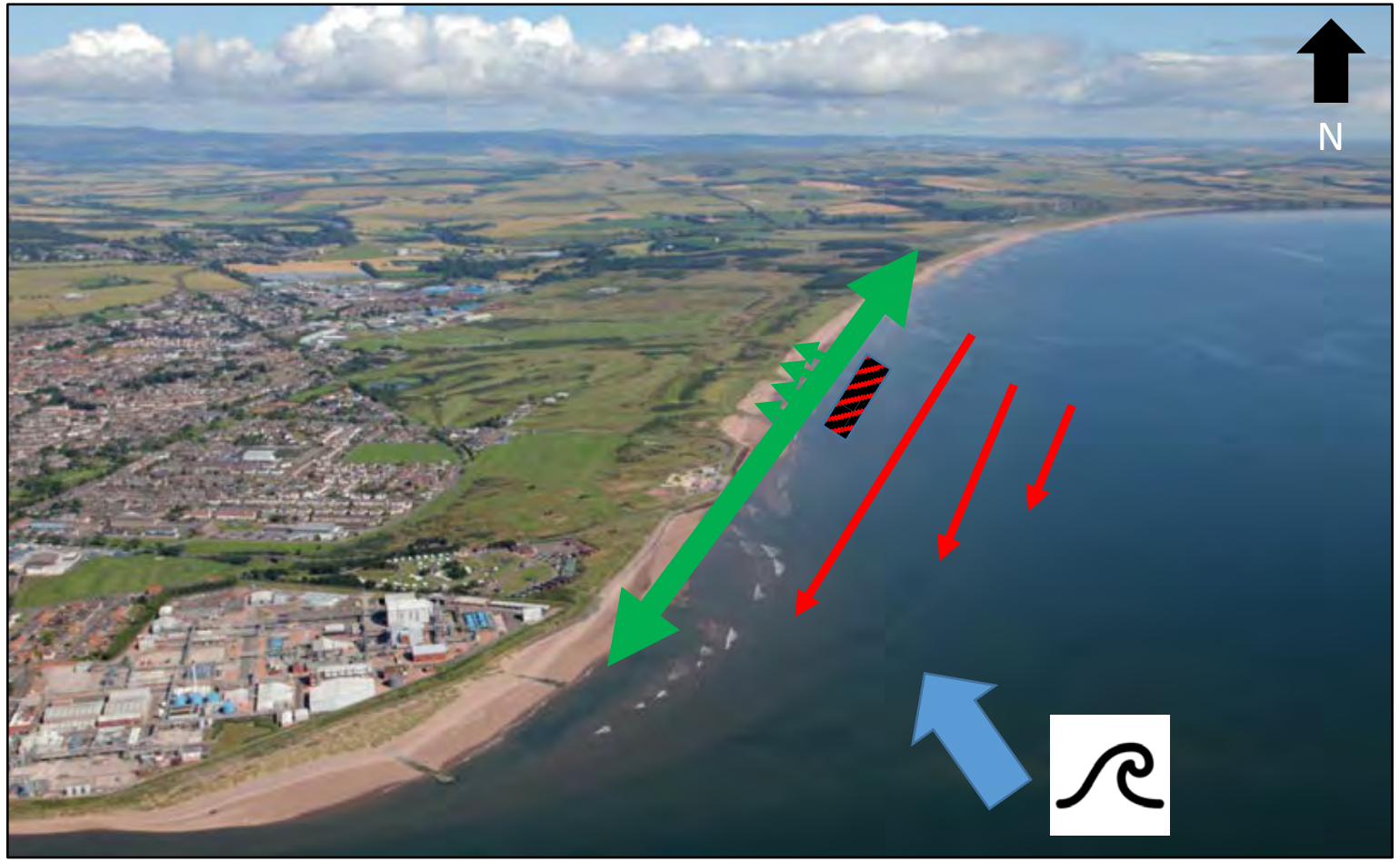
The tracer mass data confirmed that:

1. The deposit of dredge material was relatively stable

2. Dredged material was transported from the ‘drop zone’ to the beach face

3. Multidirectional transport occurs both sub tidally and on the beach face

4. A cross shore transport pathway exists



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To summarise, the study:

- Confirmed the use of dredged material to ‘trickle feed’ the foreshore
- Validated the approach as a potential “best practicable environmental option” for the disposal of dredged material
- Provided a key source of evidence for the local government authority, important to future stakeholder engagement
- Demonstrated the utility of the active sediment tracing technique for sediment transport pathway, and fate, evaluation - not a panacea but ‘A useful tool in the box’

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Thank you for listening.

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References

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