

Paua Industry Council

Fine Scale data

Paua are different:

- Paua are sessile *“those which are not able to move about”* = there is no export / import off their home reef.
- Their larvae only settles in the immediate local area.
- Growth rates are determined by the local conditions (which can change within 10's metres – food availability, water temp extremes, oxygenation etc.
- **Therefore – Scientists around the world agree that abalone stocks are best managed at a local scale.**

Buts that's not how we do it in NZ.

The system is set up so that:

- Daily Catch & Effort is reported by Statistical Zones (10's of km long – 40 to 90 per QMA).
- These statistical zones are amalgamated for the stock assessment process (4 to 6 per stratum QMA).
- Regulations are on a QMA scale (e.g. TACC)
- Legislation is on a NZ wide scale (e.g. minimum legal size / the use of Under Water Breathing Apparatus etc).

–THIS IS NOT FINE SCALE.....

We have no option other than to change from broad-scale to fine-scale:

- **Rather than wait for Mfish to follow the direction that all other managers of abalone fisheries around the world are heading - we have started the process.....**
- **The first step to managing at a local scale is to collect data at the scale of the fishing effort.**
- **It has taken 3 years and we now have what we consider a viable system.....**

A percentage of the harvesting sector will become "e-divers" & they will collect:

1. Depth & Water Temperature
2. Catch & effort / location
3. A catch sample (shell-length)

How.....



1. Depth / Temperature.



SENSUS

BY REEFNET

ULTRA

U-05482

Data collected by Depth Logger:

- date,
 - time,
 - the depth profile,
 - water temperature.
-
- The unit turns on/off at preset depths.
 - The unit stores data for each dive (breath) individually.

2 second(s)

Time

00:00:38 B.T.

00:00:38 B.T. ←

00:00:48 S.I. ←

Depth

Avg 2.20 m 2.20 m

Max 3.43 m 3.43 m

Temperature

Avg 11.51 °C 11.51 °C

Min 11.42 °C 11.42 °C

Ascent Rate

35.21 m/min 35.21 m/min

(max) (max)

Tank Pressure

IN:

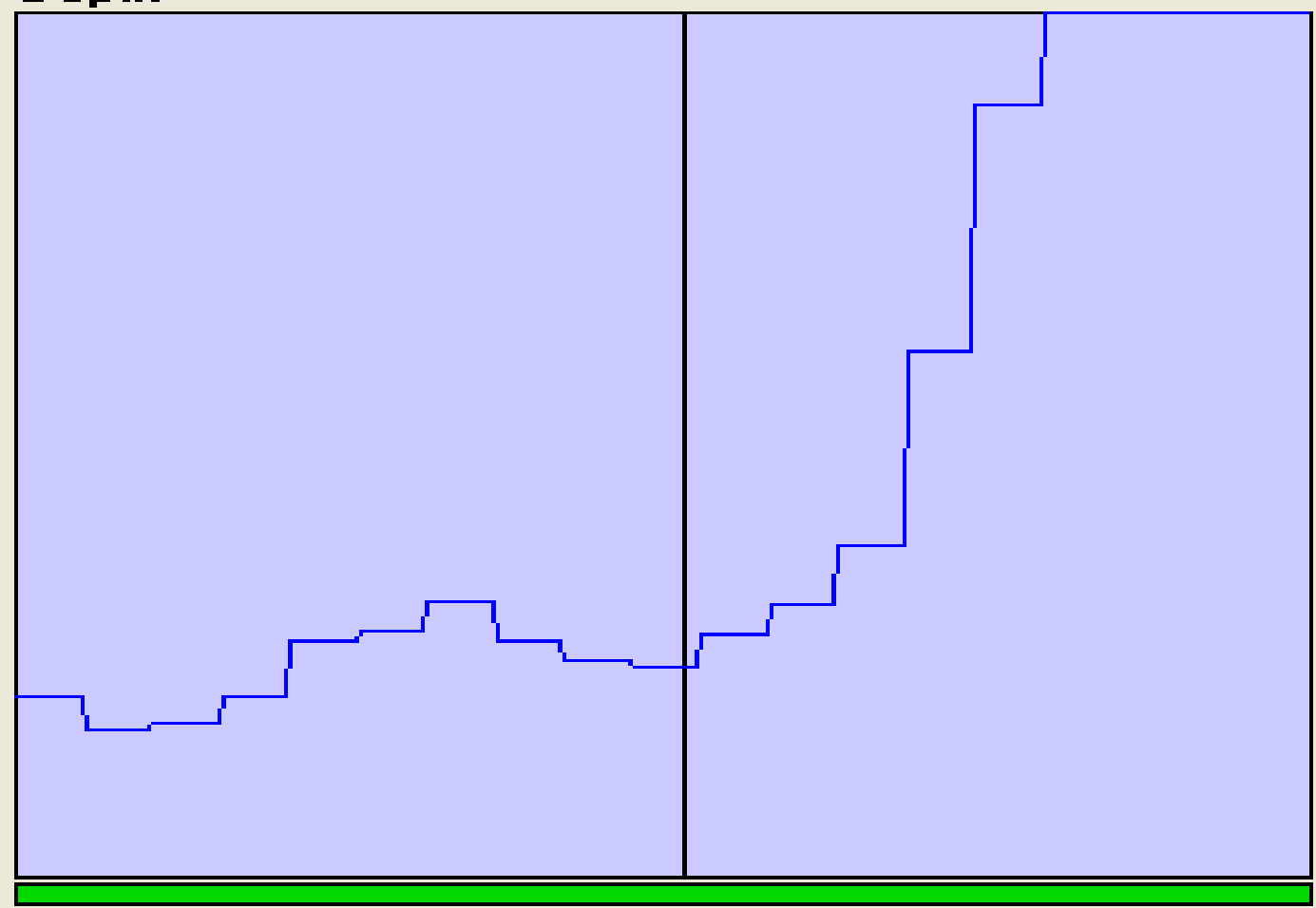
OUT:

PSI

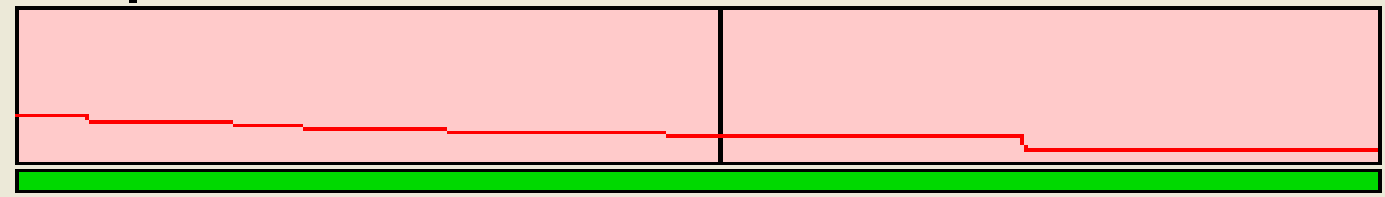
SAC Rate

n/a

Depth



Temperature



Cursor

Time: 00:00:18 Temp: 11.51 °C
Depth: 3.14 m Ascent: -0.89 m/min

Actions

Show All Save Print

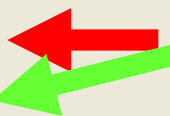
2 second(s)

Time

00:00:30 B.T.

00:00:30 B.T.

00:00:58 S.I.



Depth

Avg	1.22 m	1.22 m
Max	2.08 m	2.08 m

Temperature

Avg	10.77 °C	10.77 °C
Min	10.71 °C	10.71 °C

Ascent Rate

26.93 m/min	26.93 m/min
(max)	(max)

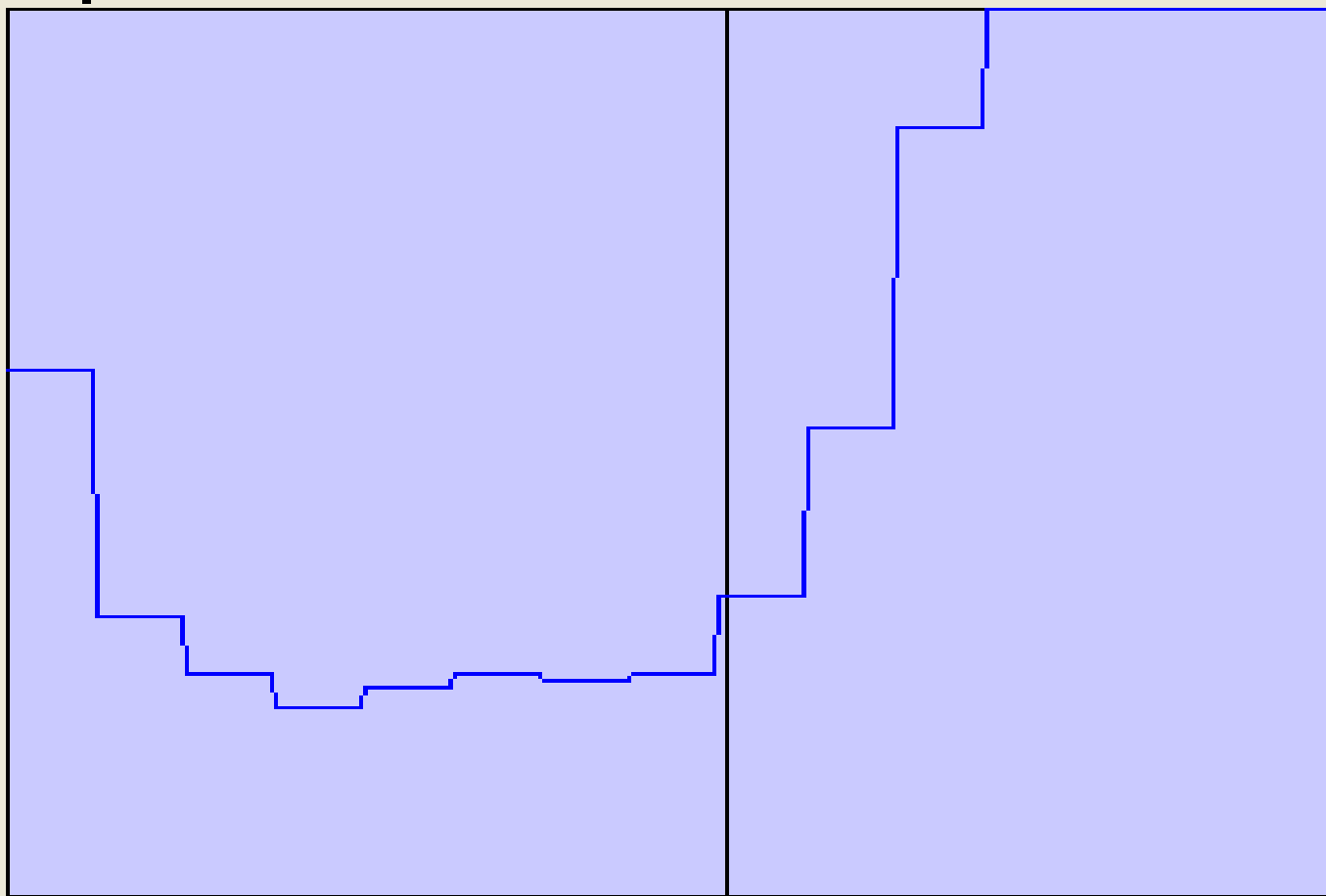
Tank Pressure

IN: PSI
OUT: PSI

SAC Rate

n/a

Depth



Temperature



Cursor

Time: 00:00:16 **Temp:** 10.79 °C
Depth: 1.75 m **Ascent:** 6.81 m/min

Actions

Show All Save
Print

2 second(s)

Time

00:00:34 B.T.
00:00:34 B.T. ←
00:00:28 S.I. ←

Depth

Avg	1.45 m	1.45 m
Max	2.30 m	2.30 m

Temperature

Avg	10.70 °C	10.70 °C
Min	10.63 °C	10.63 °C

Ascent Rate

32.81 m/min	32.81 m/min
(max)	(max)

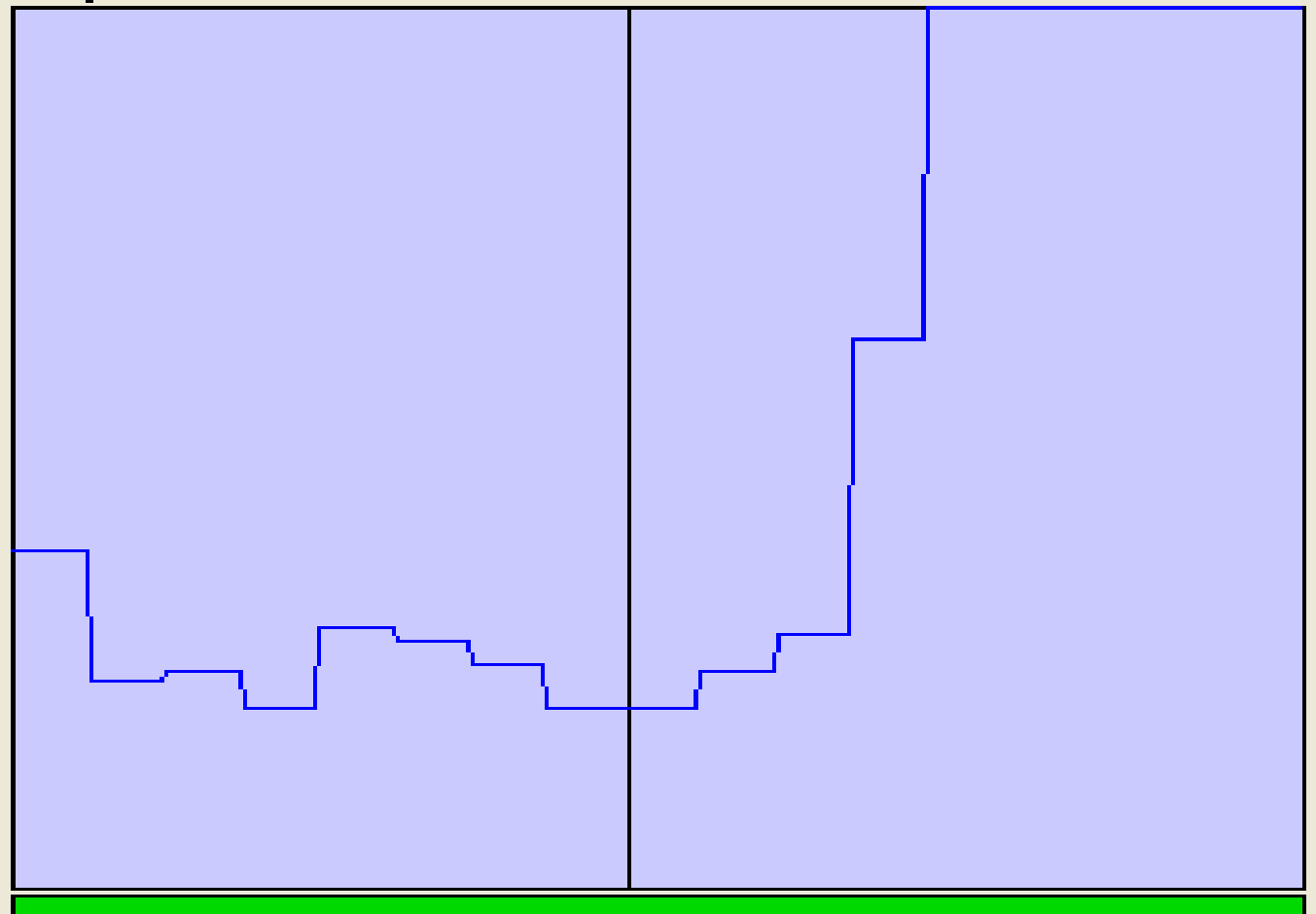
Tank Pressure

IN: PSI
OUT: PSI

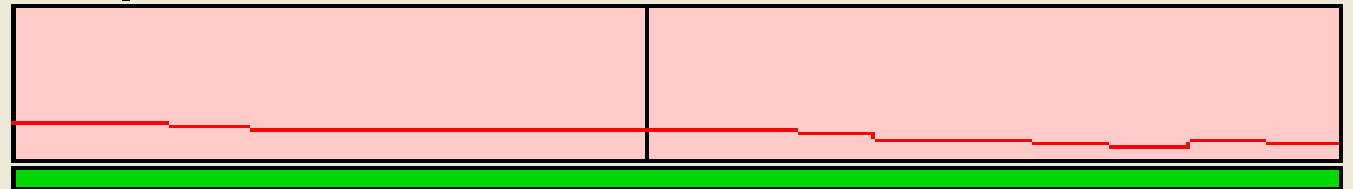
SAC Rate

n/a

Depth



Temperature



Cursor

Time: 00:00:16 Temp: 10.72 °C
Depth: 2.30 m Ascent: 0.00 m/min

Actions

Show All Save
Print

File ID: 0008526563

Select All

Copy

Datapoints: 17

Time (s)	Depth (ft)	Depth (m)	Temp (F)	Temp (C)
0	5.85	1.78	51.35	10.75
2	7.24	2.21	51.35	10.75
4	7.15	2.18	51.33	10.74
6	7.53	2.3	51.3	10.72
8	6.66	2.03	51.3	10.72
10	6.82	2.08	51.3	10.72
12	7.05	2.15	51.3	10.72
14	7.53	2.3	51.3	10.72
16	7.53	2.3	51.3	10.72
18	7.15	2.18	51.3	10.72
20	6.73	2.05	51.28	10.71
22	3.59	1.09	51.19	10.66

Depth logger example:

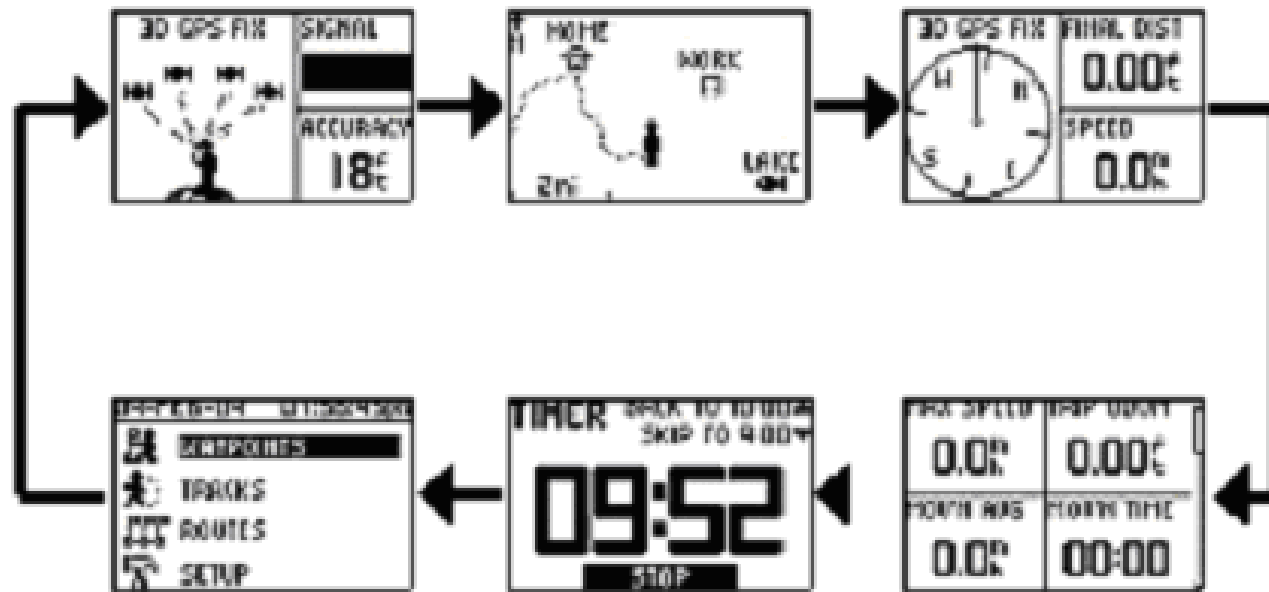
Date	Num dives	Avg depth	Avg BOT time	Avg SUR time	Total Dive (mins)	Total Bottom time (mins)	Total Surface time (mins)
20/08/2006	325	3.2	20	58	422	108	314
21/08/2006	334	3.4	21	51	400	118	282
30/08/2006	271	5.0	26	38	287	117	170

PCELR = 500 min in water / 422 min in water / 108 min fishing

The background of the slide features a grid of 18 spheres arranged in 3 rows and 6 columns. The spheres are colored in a gradient from dark blue on the left to bright green on the right. The text is centered over this grid.

2. Catch & effort plus location





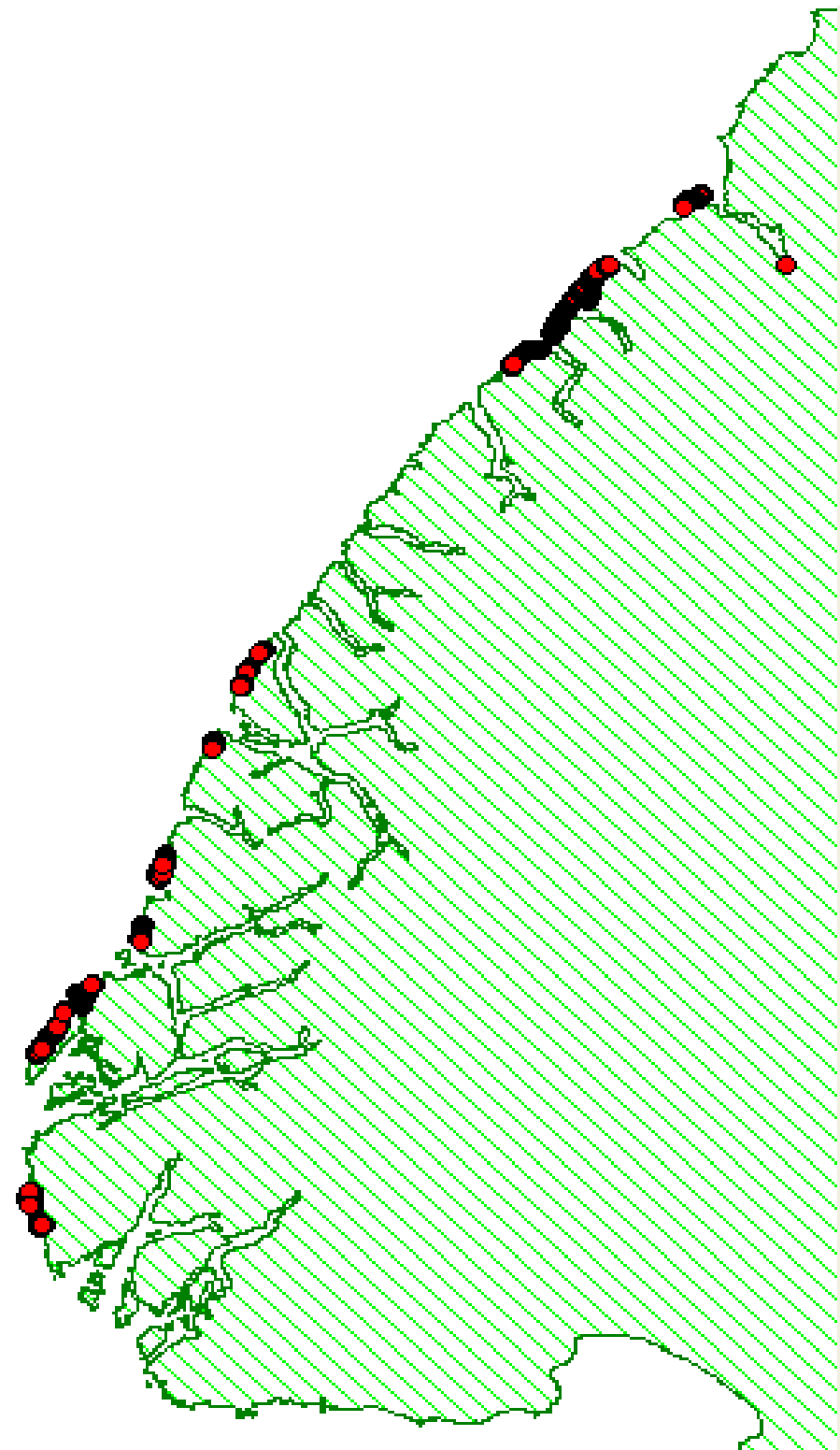
Data collected by GPS Logger:

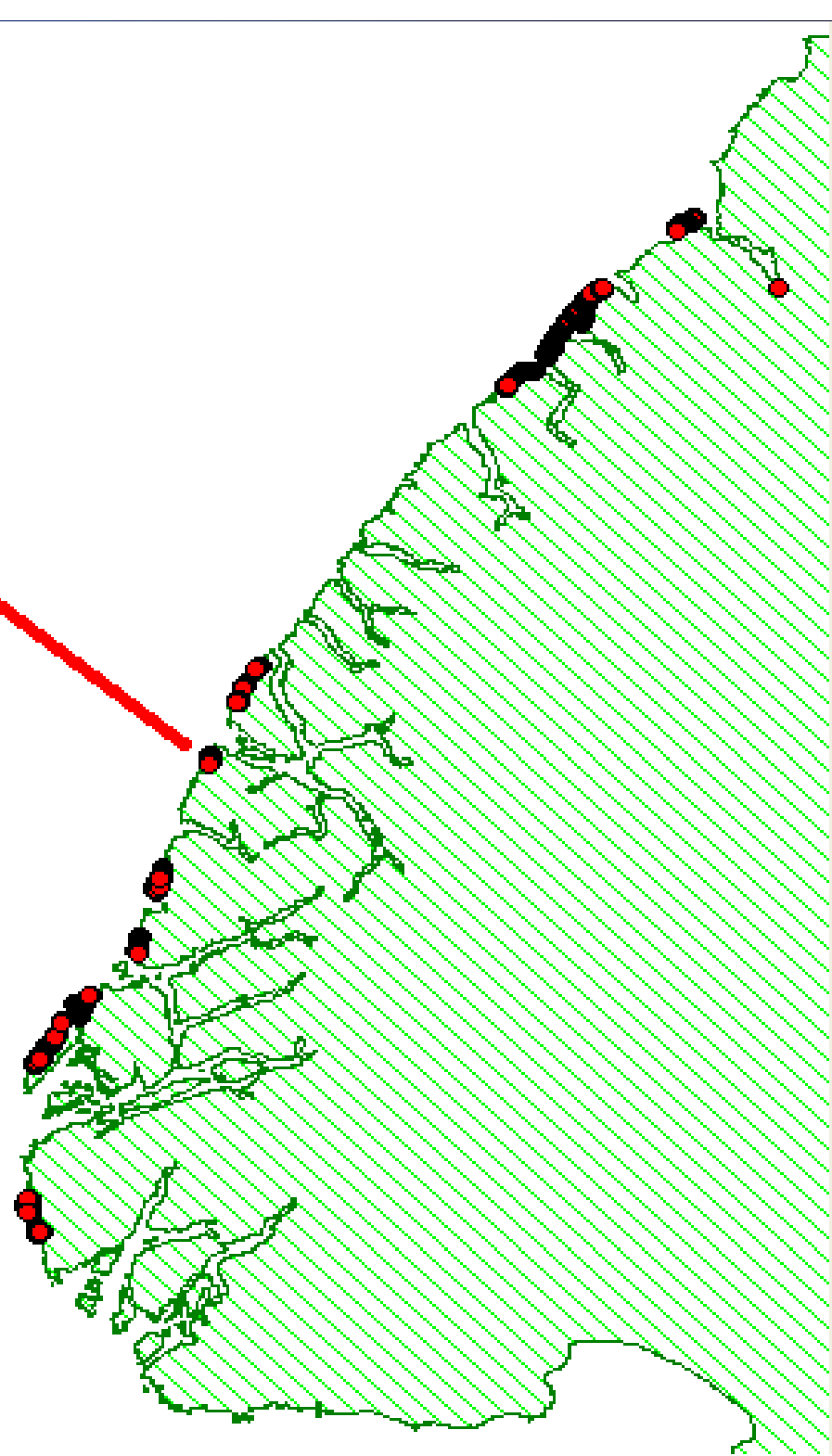
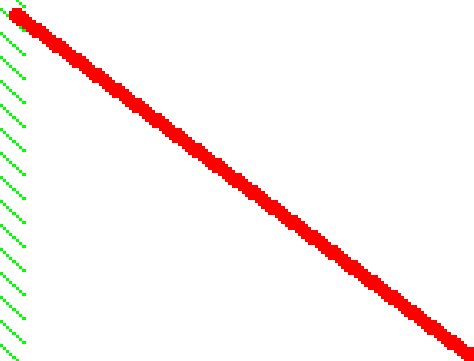
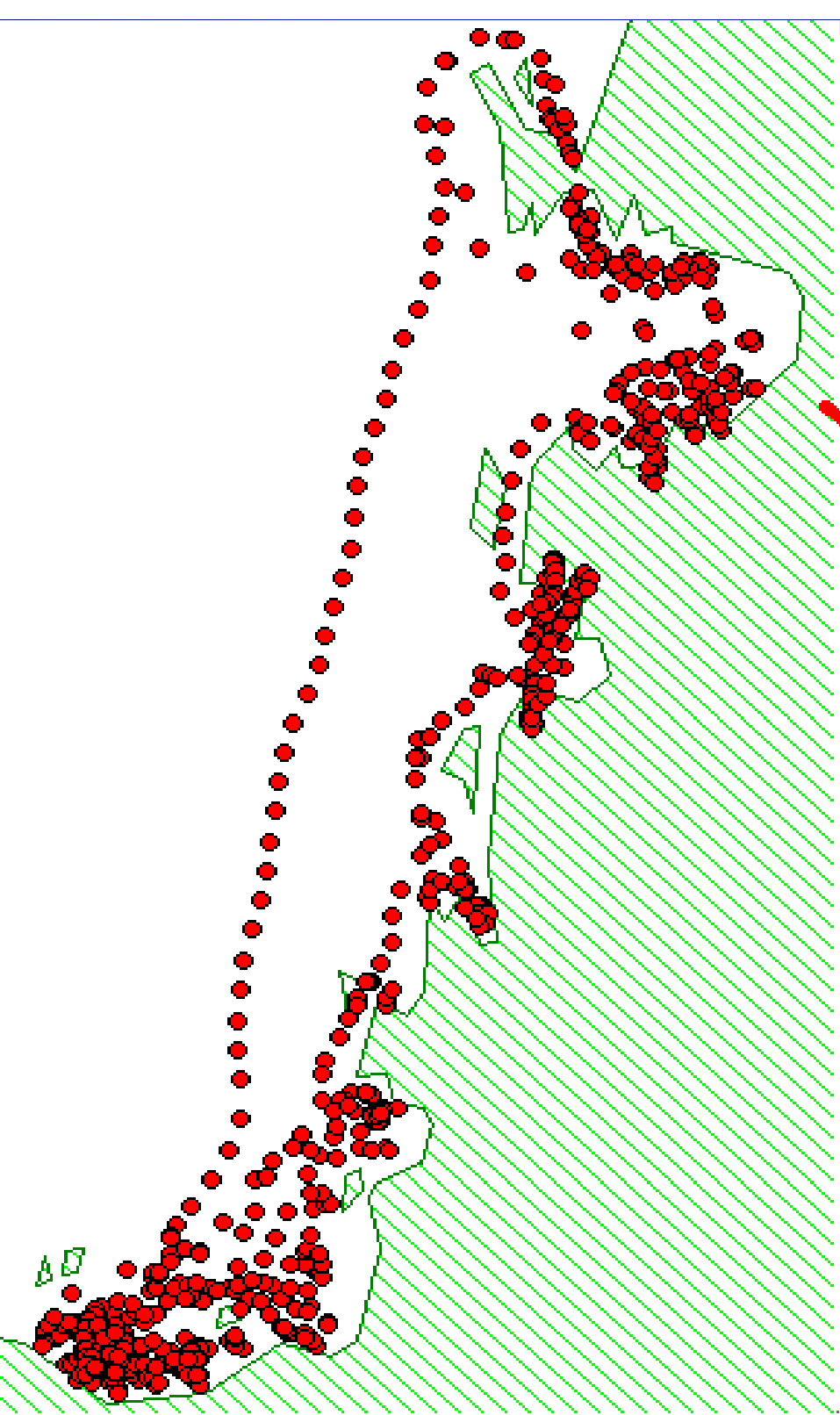
- Date,
- Time,
- Lat / Long
- Set sampling rate by time / metres
 - if sampling is set at 20 metres then the unit will store 20 days of sampling or $\frac{1}{2}$ season











Cost per e-diver:

- GPS data logger
- Water proof case
- Depth / temp data logger
- Rechargeable batteries & charger
- Download cables
- Software
- Diver back pack

= NZ \$480

3. Catch sampling

Catch Sampling:

- **The e-diver randomly selects 2 bins (150 shells) from his catch and tags them.**
- **At the LFR the shells from these bins are isolated.**
- **We have technicians stationed around NZ that measure these shells.**

How fine is the scale:

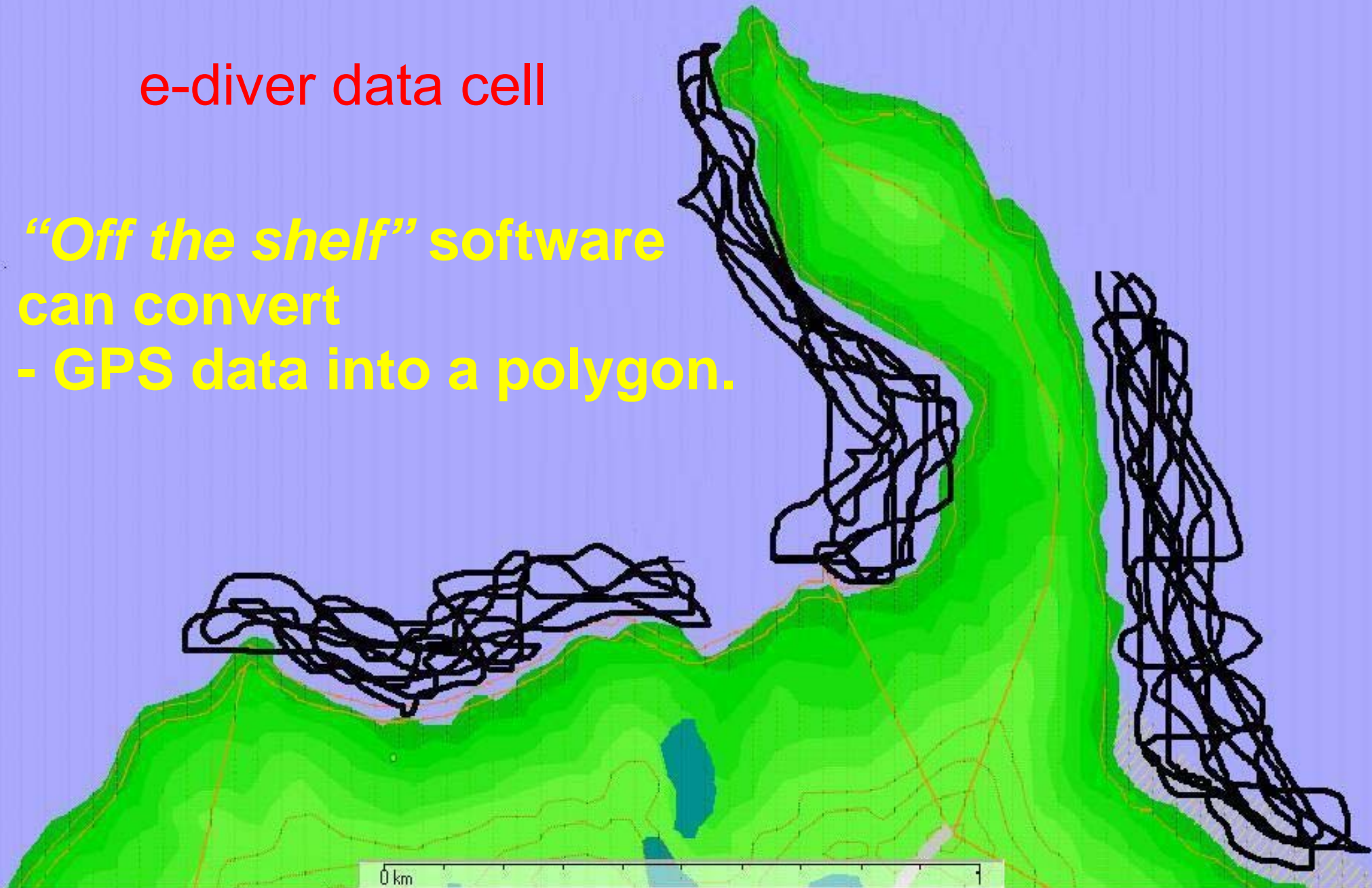
- The fishing effort data is being recorded on a **per breath / 2 second sampling interval** & the catch data is on a **per metre² of area fished** and the catch sampling is for **each dive event**.
- That's fine scale data.....
- Not bad for \$480 per e-diver eh.....



Putting it all
together

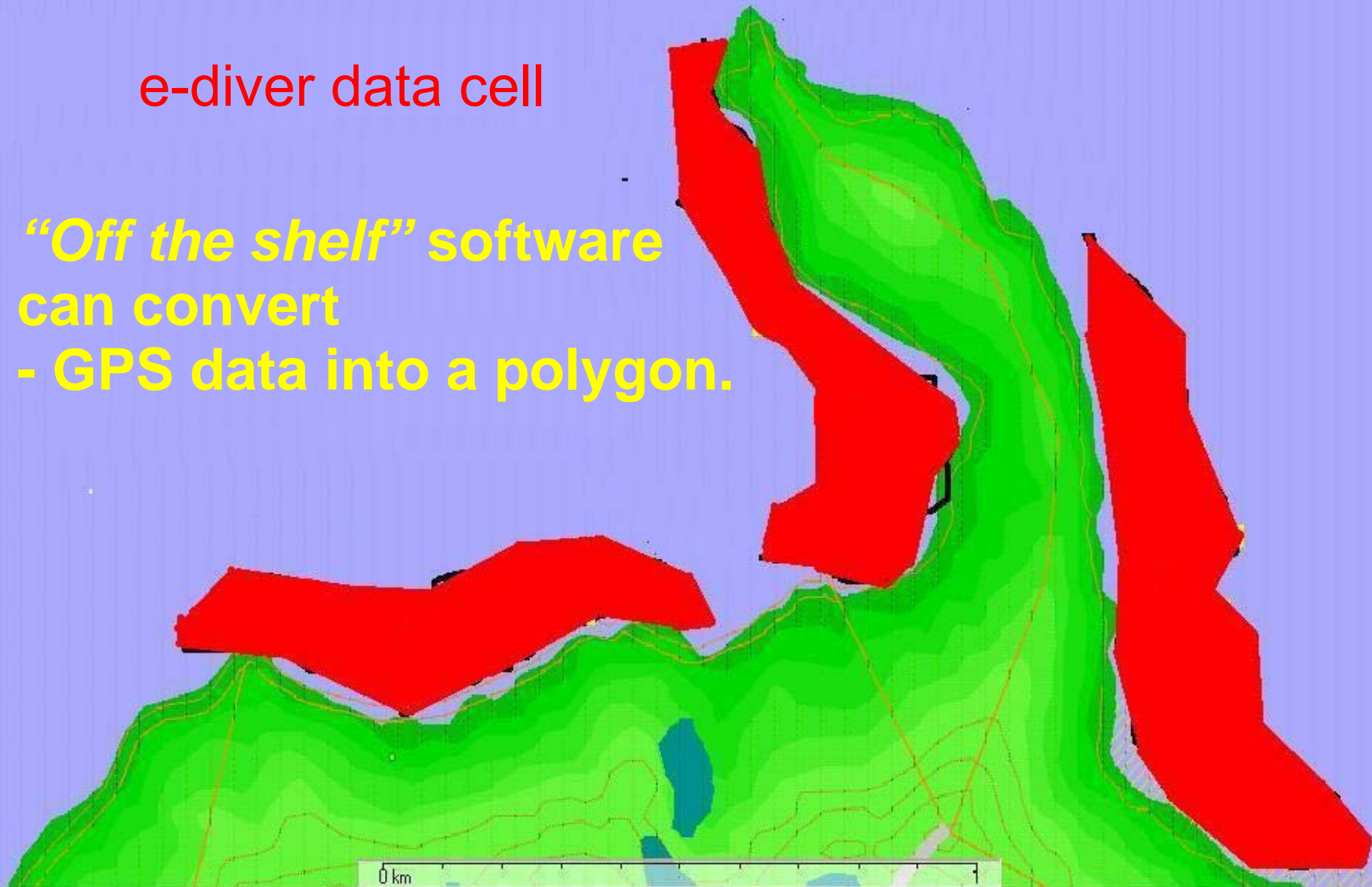
e-diver data cell

“Off the shelf” software
can convert
- GPS data into a polygon.



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e-diver data cell

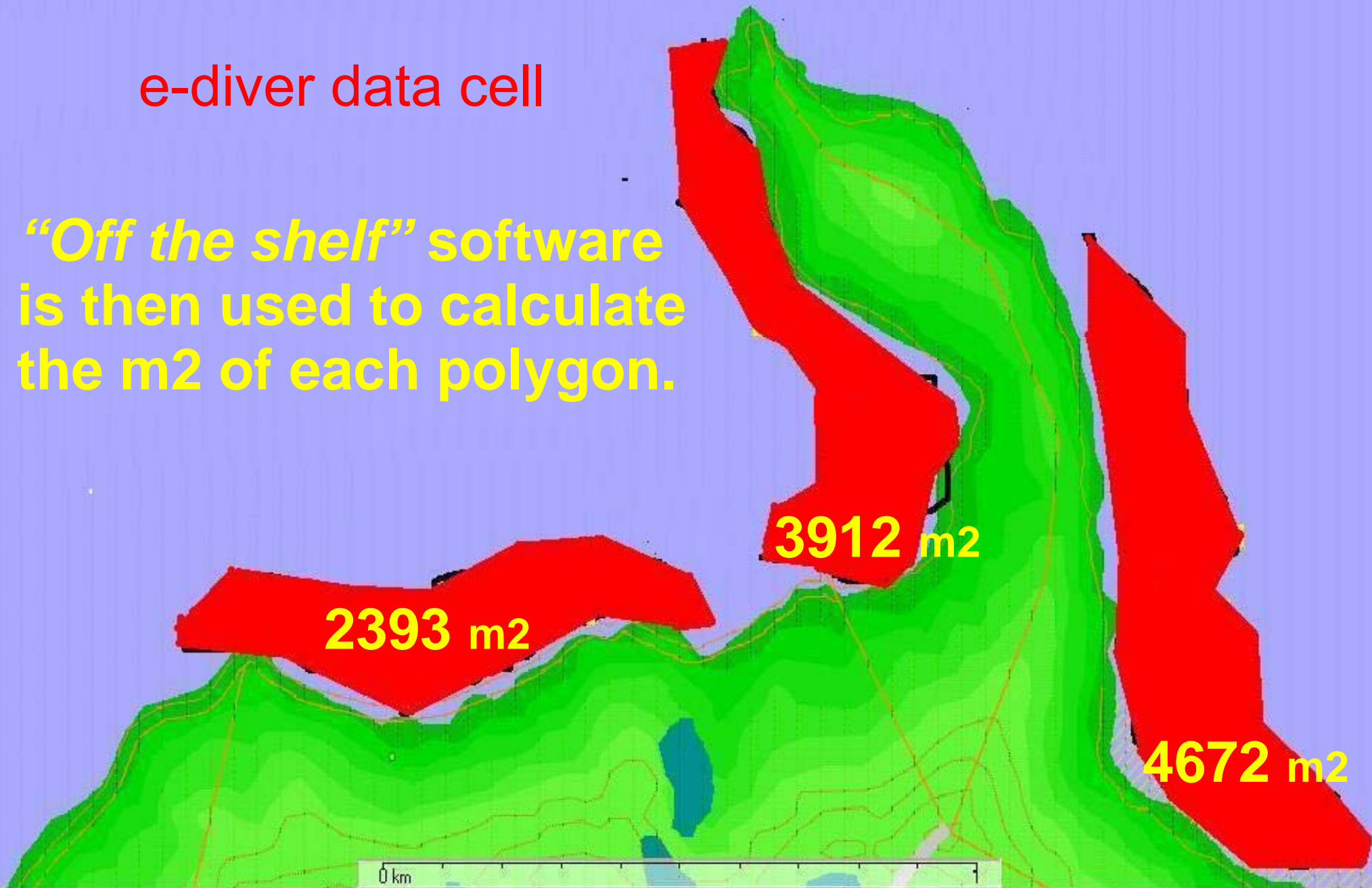
“Off the shelf” software
is then used to calculate
the m2 of each polygon.

2393 m²

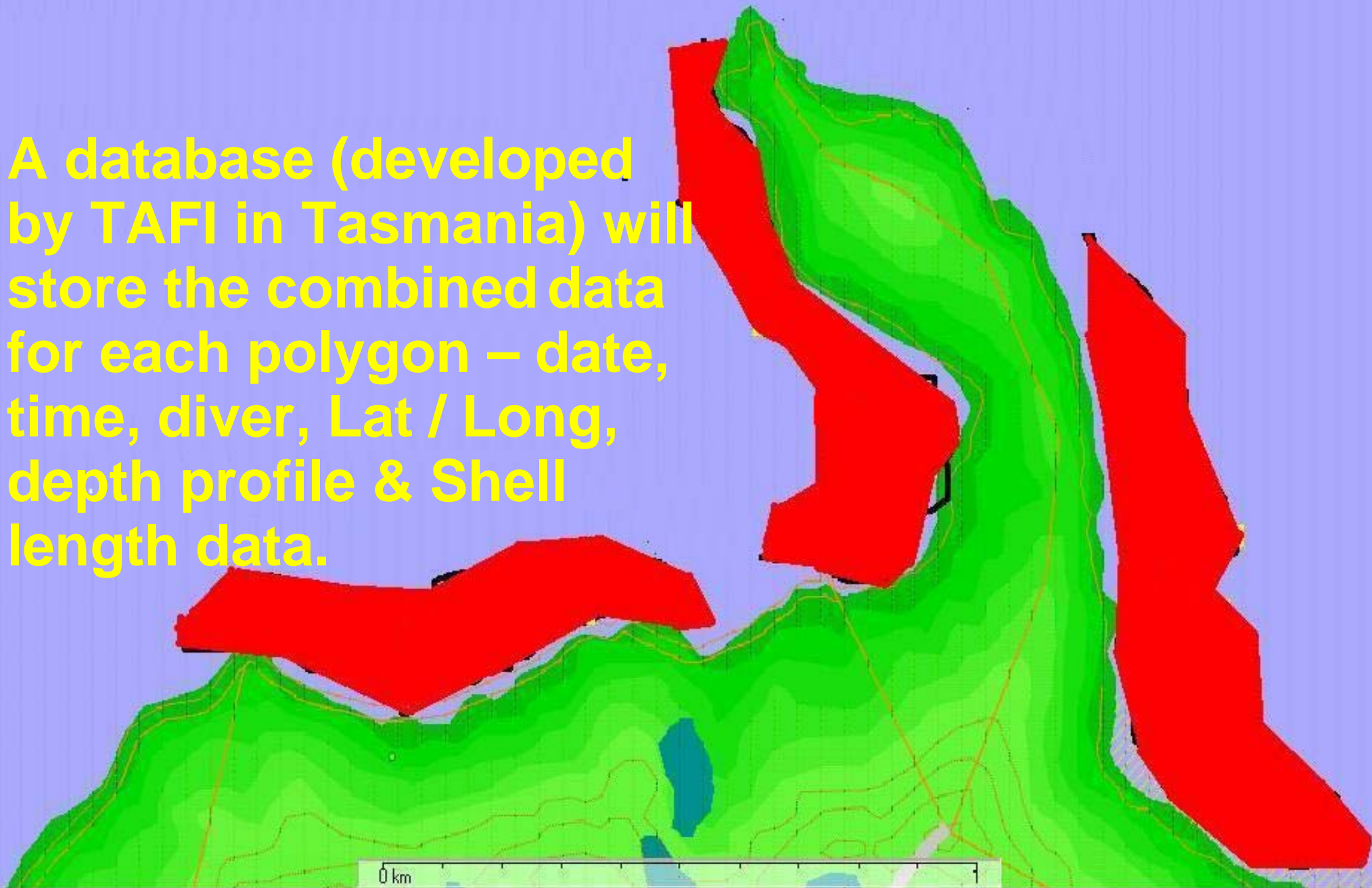
3912 m²

4672 m²

0 km

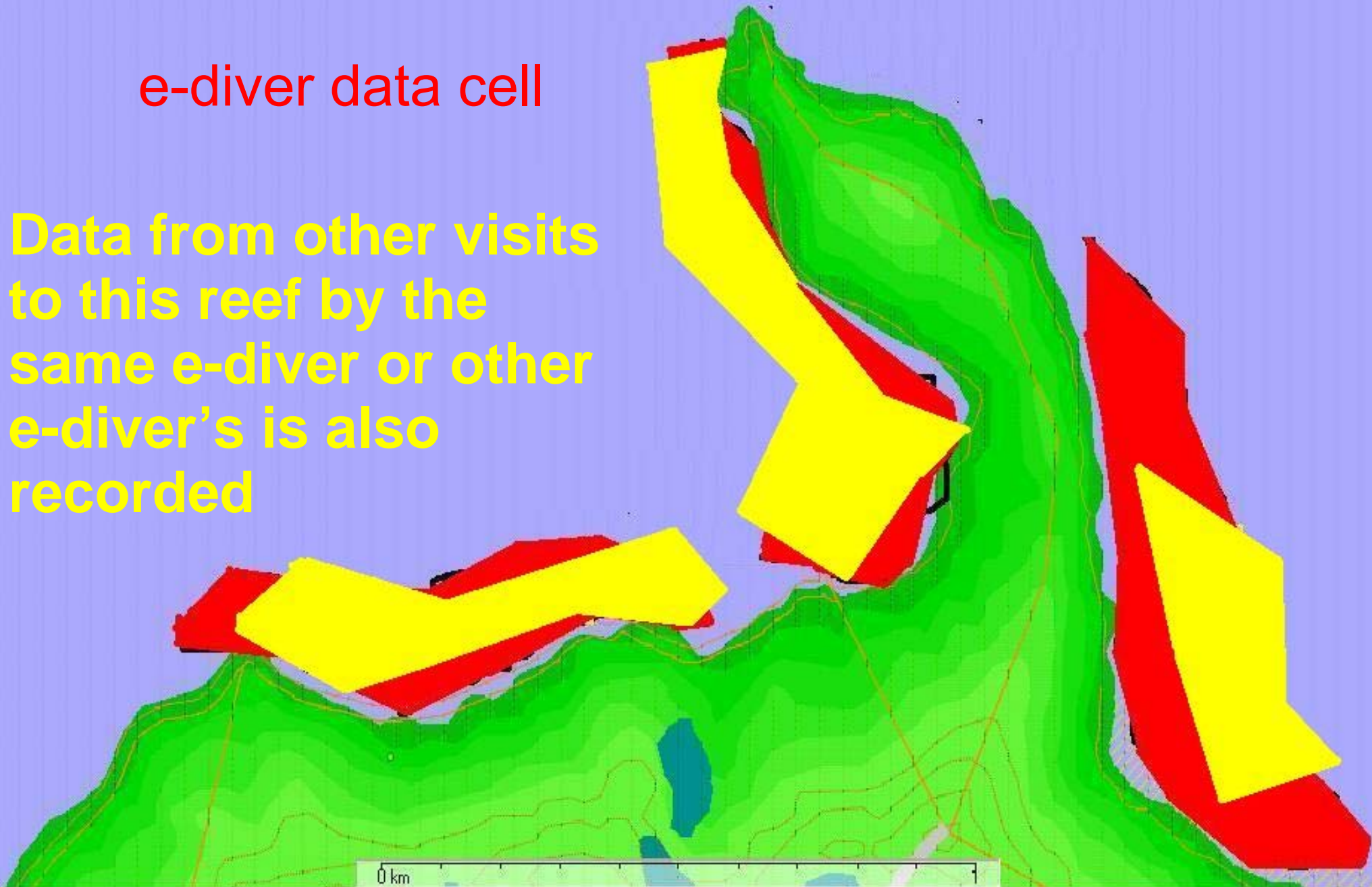


A database (developed by TAFI in Tasmania) will store the combined data for each polygon – date, time, diver, Lat / Long, depth profile & Shell length data.



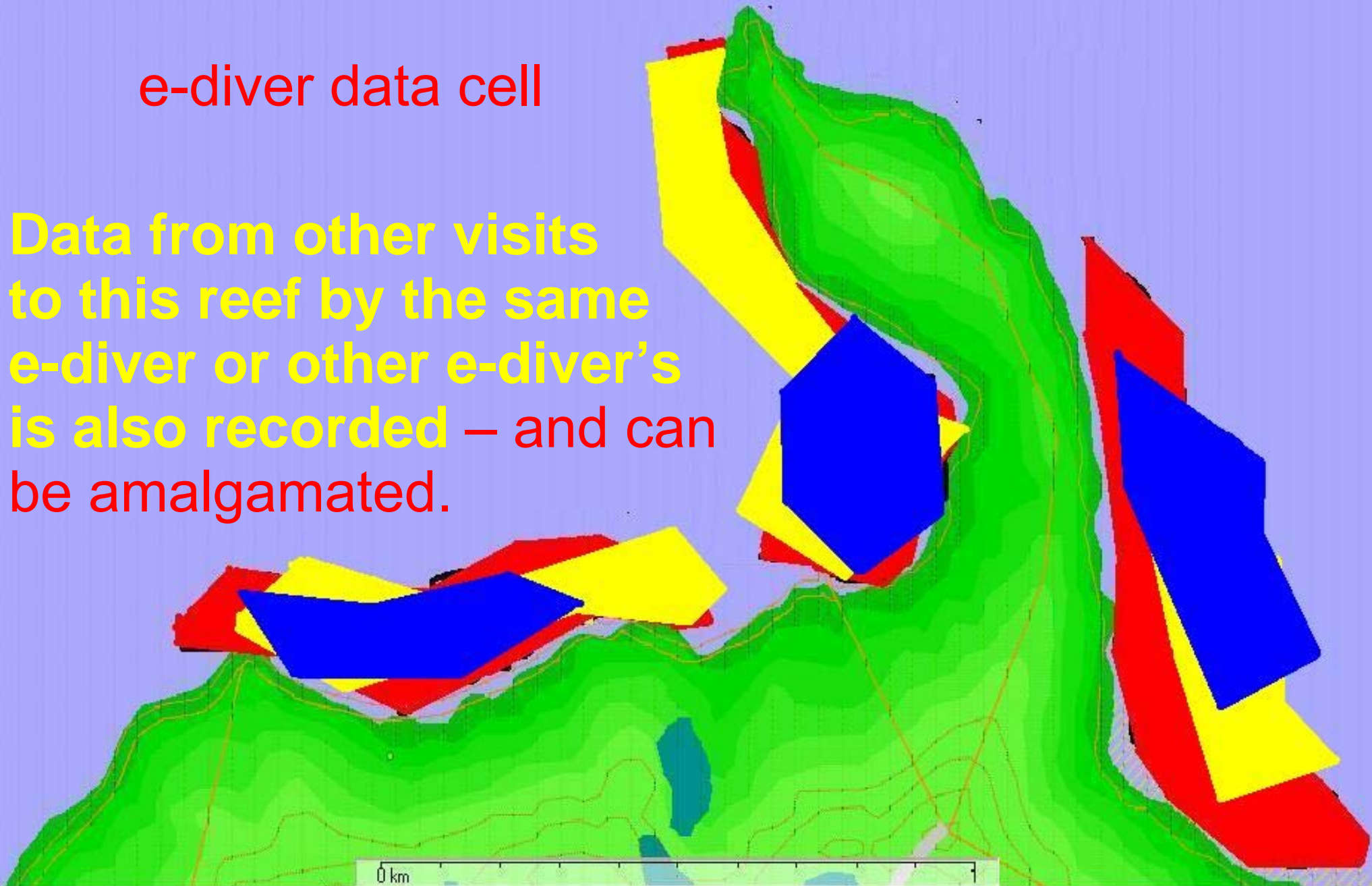
e-diver data cell

Data from other visits to this reef by the same e-diver or other e-diver's is also recorded



e-diver data cell

Data from other visits to this reef by the same e-diver or other e-diver's is also recorded – and can be amalgamated.



From this base fine scale data – additional data sets can be easily calculated / produced:

- **Such as:**
 - **Length of coast-line worked**
 - **Catch profile per reef**
 - **Hectares (m²) fished**
 - **Bottom / Surface / Total Time**
 - **Kgs / hour of bottom time / m²**
 - **???????**

**NONE OF THE ABOVE ARE CURRENTLY
AVAILABLE TO SCIENTISTS**

The OPTIONS Fine scale allows :

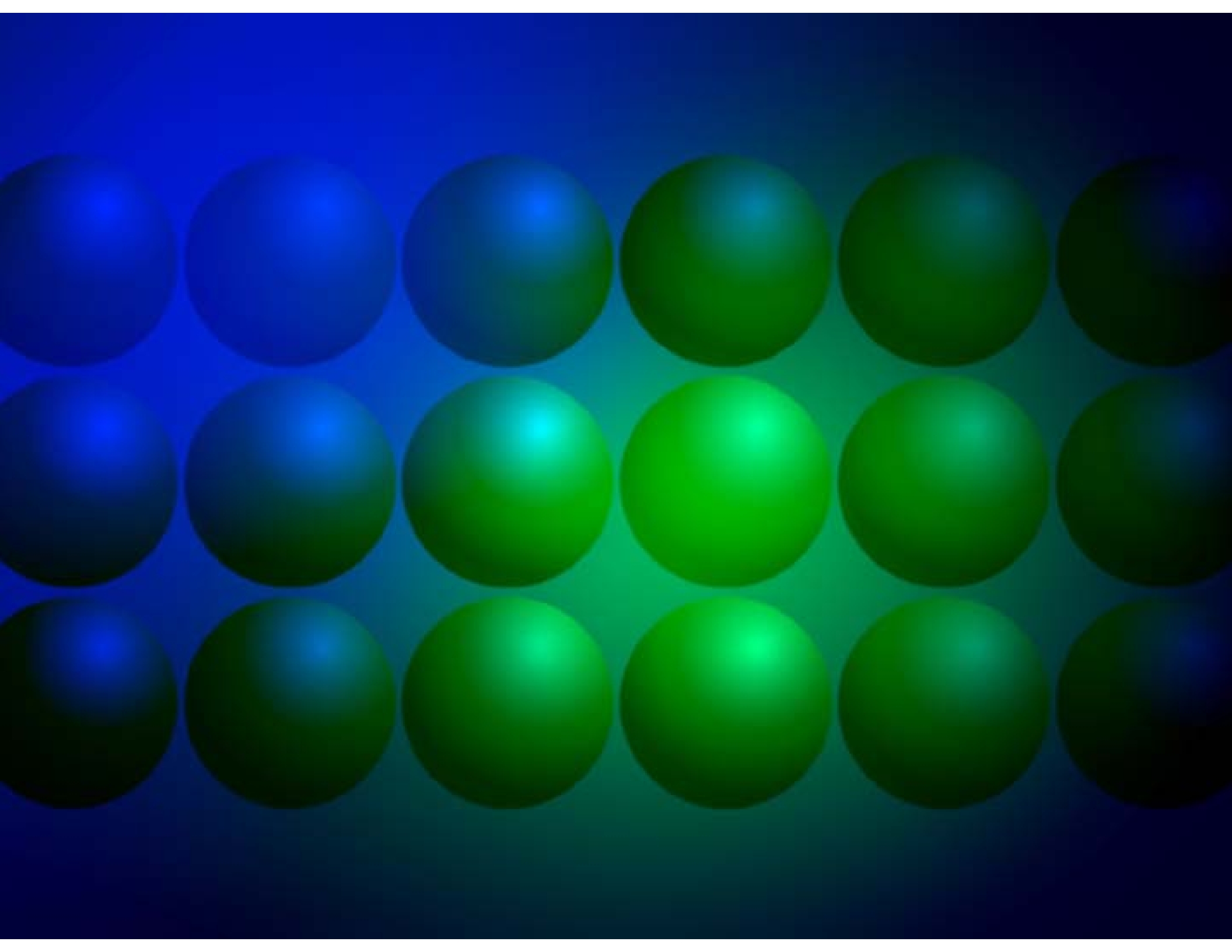
- **Data from individual reefs can be viewed and interrogated in isolation (currently = multi reefs per Statistical zone).**
- **We can amalgamate reef data into a larger scale if it is more applicable.**
- **We can aggregate individual reef data to a statistical zone scale so the current broad-scale time series can still be compared.**

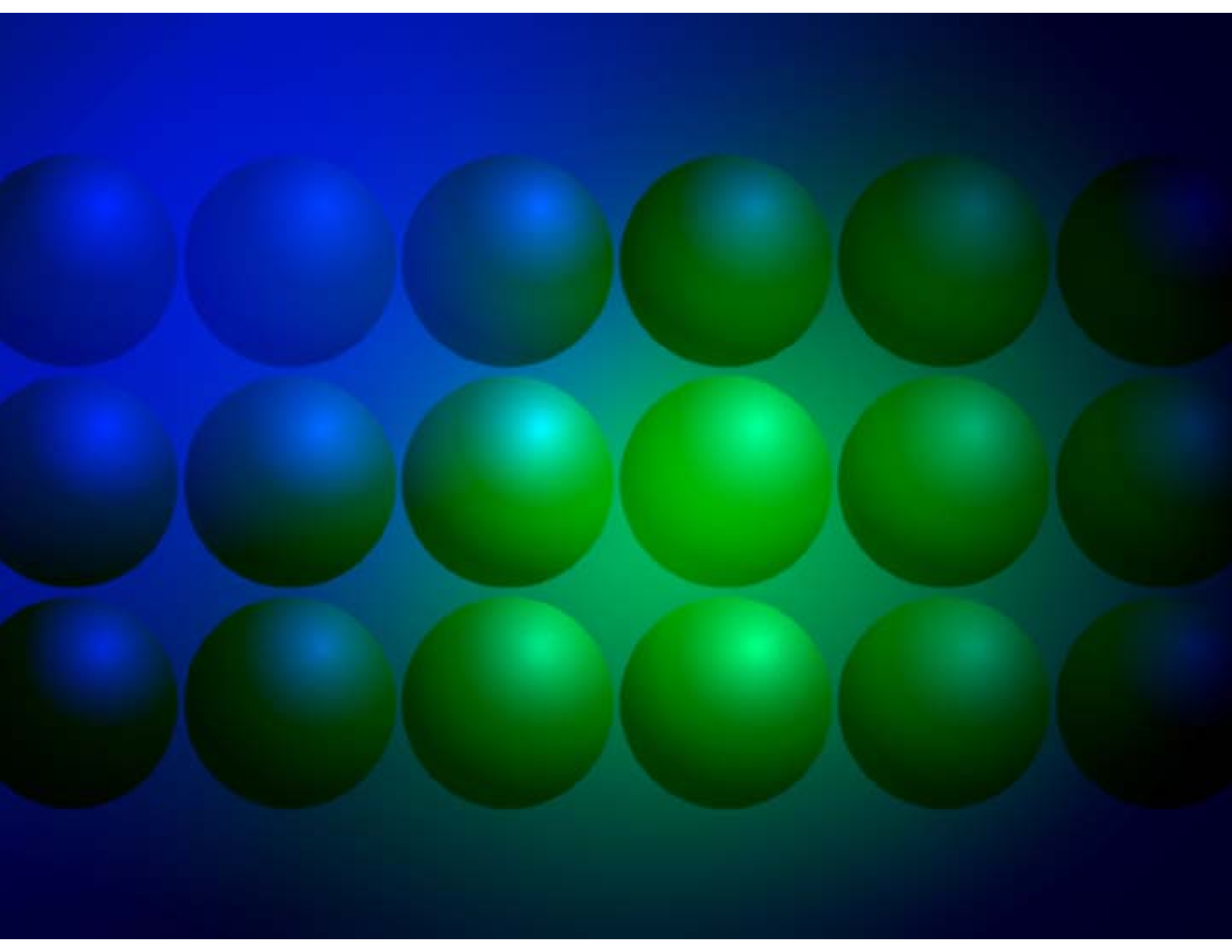
It is early days but we believe this system will prove a far more accurate, real time indicator of fisheries performance.

The result being we will have highly cost effective method by which fisheries (or individual reefs) can be better assessed & managed.

Current position:

- The industry owns **60 e-diver packs** which could potentially capture 50-70% of TACC (no scoping report / Govt funding / budget).
- The industry has purchased **3 digital shell measuring units** (can record - length / height / width / weight)..
- Paper produced by the Cawthron Institute – “Recommendations for changing Paua Stock Assessment methods” – the conclusion was that “*In time, these data could become the single most important asset in the assessment, enabling better management of paua fisheries*”.
- Project with Tasmanian (TAFI) scientists to:
 - Primary Objective: Demonstrate that the GPS & depth logger data can identify change in stock abundance.
 - Secondary Objective: Demonstrate that commercial fishers can collect meaningful data.
- Next season we are aiming to have **25% of the TACC** data logged.





The benefits of Fine scale data =

- Greater input into **collective management & self management** of the fishery with **less need for MFish intervention**.
- Ability to **fine tune management strategies** to **achieve objectives** for particular sub-areas **increasing yield overall**. (Focus on areas that need it).
- **More efficient harvesting** from increased knowledge of reef production. (Go to highest yielding reefs).
- Provide **better information for investment decisions** (such as reseedling / translocation).
- Enhances ability to **protect access to key areas** (pressure from MPA/customary reserves/share fisheries).
- **Remove the need** for costly independent dive surveys / stock assessments.