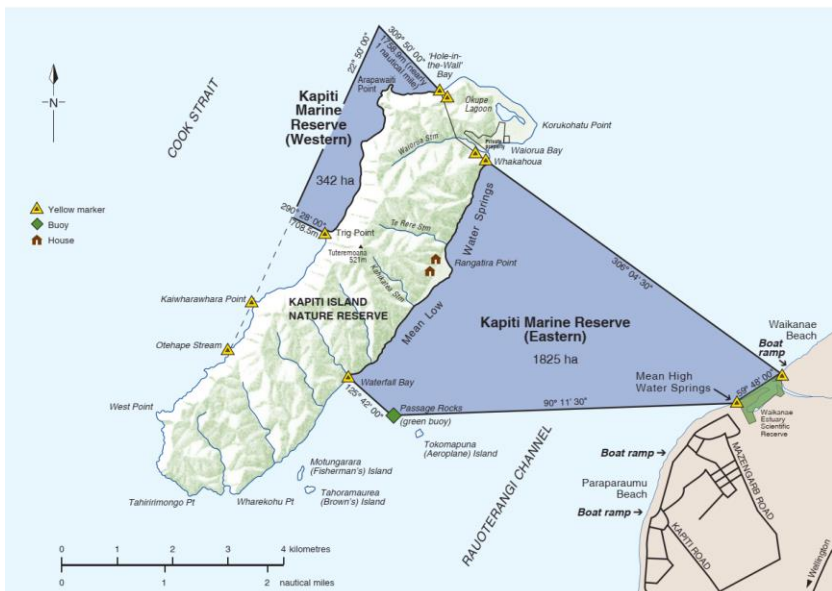
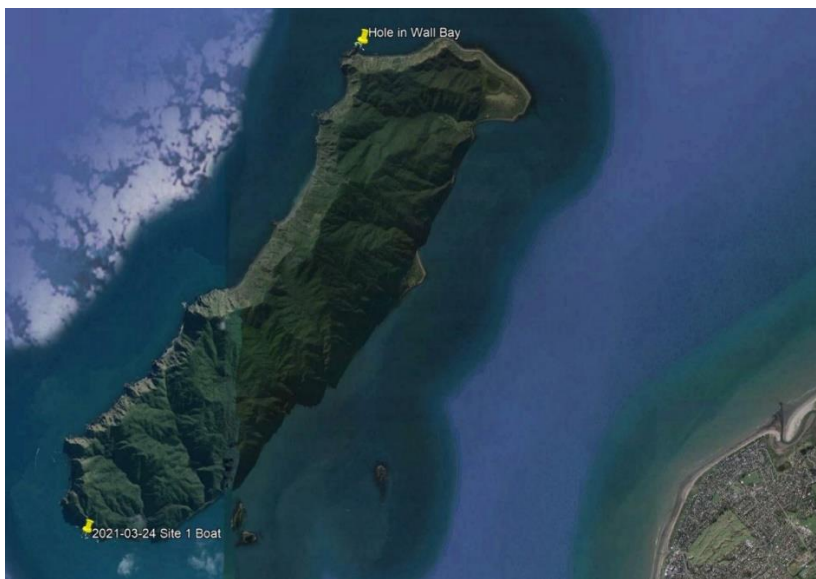


## Monitoring Kina at Kapiti Island

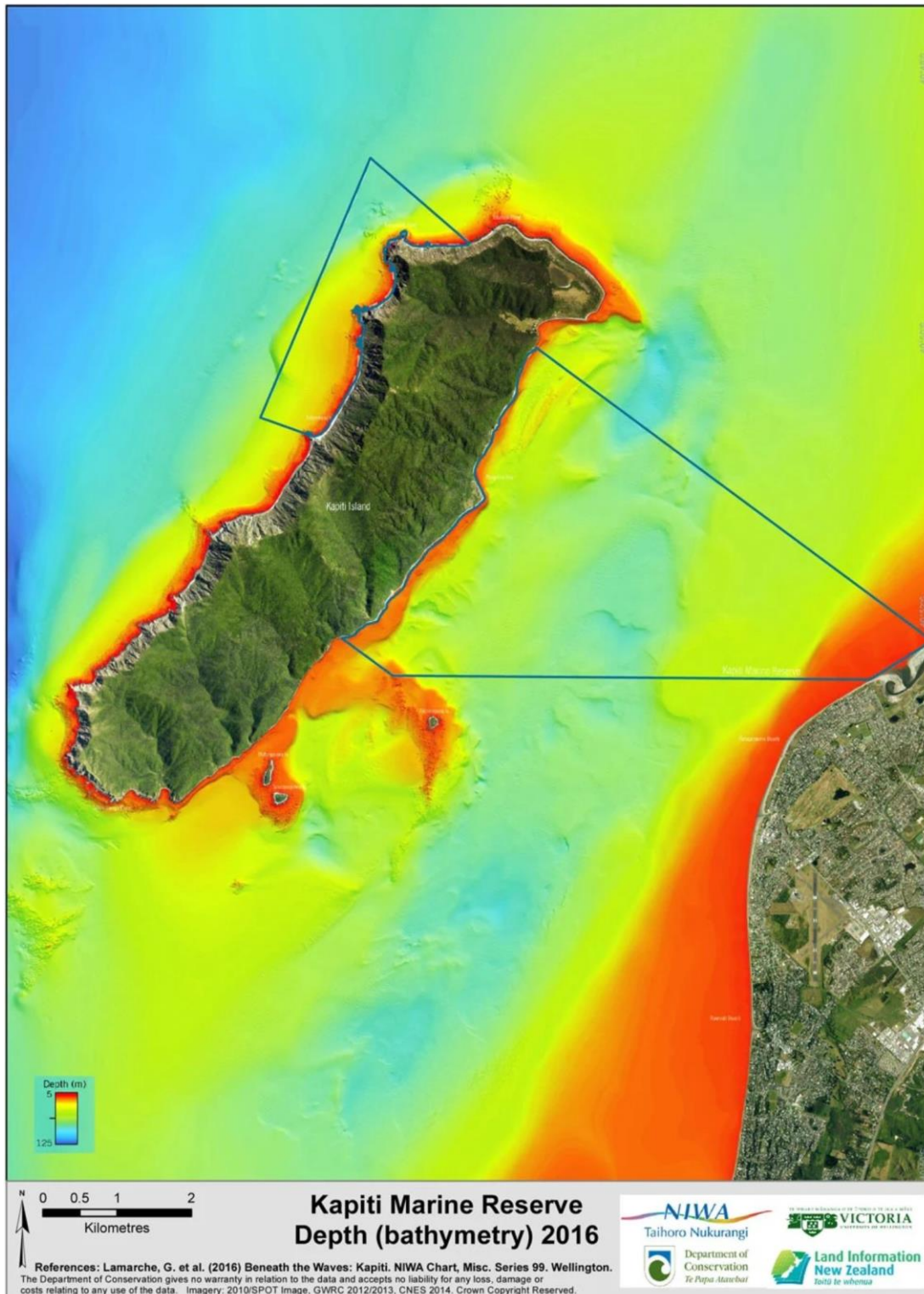
### Introduction / Background

Kapiti Island with its many habitats and two marine reserves is a popular destination for a wide range of marine users. Below is the satellite image with the two monitoring sites, a map with the marine reserves (DOC brochure) and the bathymetry map (NIWA) (Figure 1-3).



**Figure 1:** Overview of Kapiti Island and March 2021 dive sites.

<sup>1</sup> <https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-protected-areas/kapiti-marine-reserve-brochure.pdf> (retrieved 22 Dec 2021)



**Figure 2:** Kapiti Island Bathymetry.<sup>2</sup>

<sup>2</sup> Image retrieved 22 Dec 2021 from *Habitat Diversity in Kapiti Marine Reserve* page:  
<https://www.doc.govt.nz/nature/habitats/marine/type-1-marine-protected-areas-marine-reserves/marine-reserve-report-cards/kapiti-marine-reserve/habitat/>





Wellington Underwater Club divers noted a significant change in kelp coverage and kina numbers on a dive at the Hole in the Wall Bay on 20 March. Dense aggregation, with areas of turf or only stubs of kelp were observed in the channel on the northwest side of the swim through and around the point at Hole in the Wall dive site.

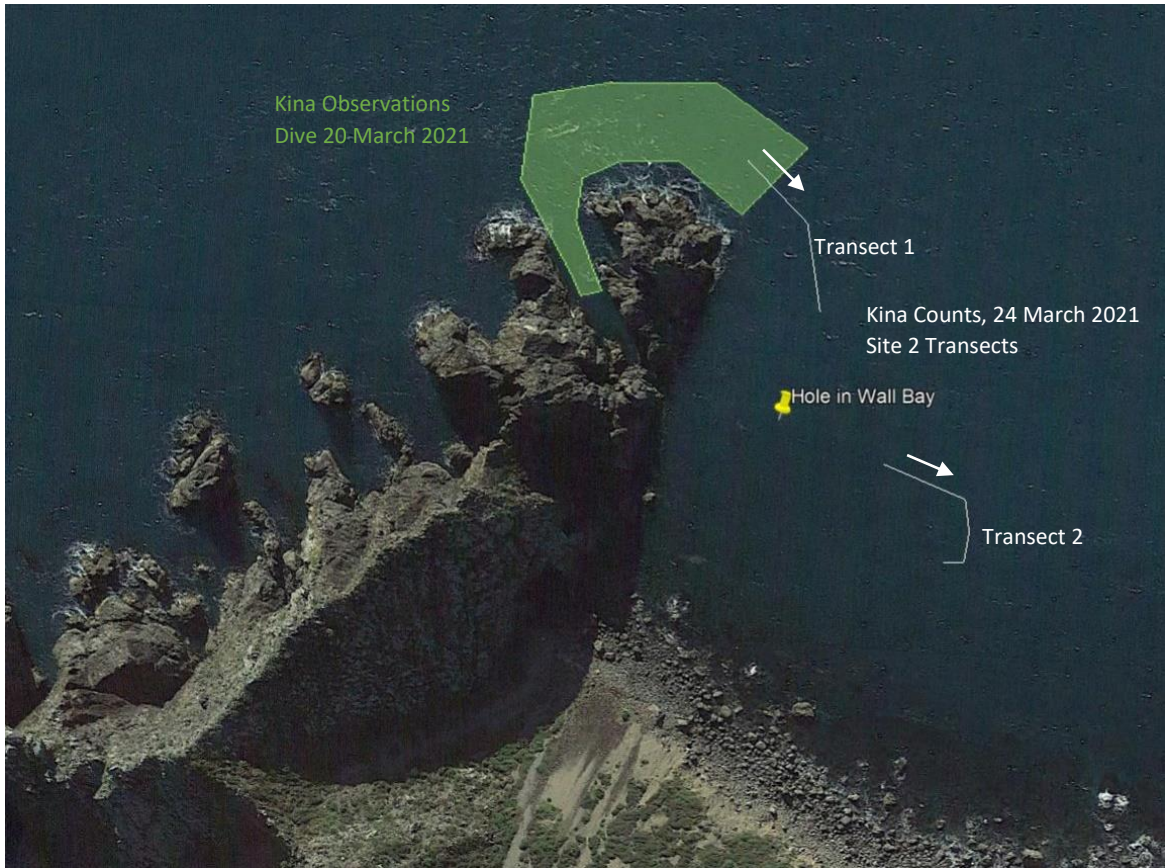


**Figure 3:** Impact of kina grazing on the kelp coverage at the Hole in the Wall dive site, March 2021.

Volunteer divers returned on the 24 March 2021 to start monitoring kina numbers at the Hole in the Wall and at the South End (Figure 4 & Figure 5).

Building on our seaweed & kina monitoring project in Wellington Harbour a monitoring method for experienced divers was trialled at Kapiti Island using 25m and 50m transects respectively and counting kina 1m either side (details below in Data Collection – Method Details).





**Figure 4:** Hole in the Wall Bay Site 2, Kapiti Island, March 2021 (approx. observation locations).



**Figure 5:** South End Site 1, Kapiti Island, March 2021 (approx. observation locations).

Divers also had favourable conditions for a dive at Pukerua Bay on 21 March 2021. Video footage was assembled to a photomosaic in the approx. location shown in Figure 6.



**Figure 6:** Pukerua Bay Observation (approx. location), 21 March 2021.

## Data Collection – Method Details

### Counting method

Scuba buddy pairs deploy 50m (2x25m) transect lines and count all kina within 1m either side of transect.

### Steps:

- 1) Run 25m transect
- 2) Return to start with photomosaic video, record depth & visibility
- 3) Count 1m either side of transect, record patches of barrens / densities, kina numbers, record depth [*Note: divers could also both use a slate and record kina counts in 5m blocks*]
- 4) Video footage on way back
- 5) Pop GPS unit to surface, untie tape, return to diver who spools in
- 6) Run 2<sup>nd</sup> 25m transect (with GPS at surface) (start where last transect finished)
- 7) Pull down GPS
- 8) Return to start with photomosaic video
- 9) Count 1m either side of transect, record, note depth
- 10) Video footage on way back
- 11) Untie tape, return to diver who spools in

GPS tracking: Garmin etrex 20x in waterproof housing or mobile phone/tracking app on surface float  
General Information

- Date / Time
- Site (Boat GPS location, anchor depth)
- Tide / wind
- Visibility
- Water Temp

## Data Collection – Kapiti Island South End

### Monitoring Kina at Kapiti Island, 24 March 2021, Site 1 (South End, West of Tahiririmongo Point)

#### General Information

Date / Time: 24 March 2021, 10.40pm

Site name: South End

GPS Location: GPS S 40°53.367'; E 174°52.353' (40°53'22.0"S 174°52'21.2"E; -40.889450, 174.872550)

Dive log: 15m max, 60min, 11m average

Method: As described above (GPS batteries flat)

Visibility: 8m

Water Temp: Shearwater Perdix, 17 °C average

No GPS data was obtained from the Garmin GPS (flat batteries)



**Figure 7:** South End Site 1, Kapiti Island, March 2021 (approx. observation locations).



### Monitoring Data

Transects	Depth	Diver 1	Diver 2	Kina D1+D2	substrate type / distribution comments	approx length of rocky reef	
T1	1m to 25m	10.2- 12.2m	42	60	102	Kina in 2 discrete patches from 0-5m and 10-24m	25m/ 50m <sup>2</sup>
	25m to 50m	12.2- 14.0m	30	22	55	Kina mostly in 18.5- 24m patch	25
				<b>174</b>			
T2	1m to 25m	11.6- 14.6m	50	37	87	Kina in 3 discrete patches from 0-3m, 5- 8m and 15-16.5	25
	N/A	N/A	N/A	N/A			
				<b>87</b>	(25m transect only)		

261 kina in 150m<sup>2</sup> (87 kina per 50m<sup>2</sup>)

### Data Collection – Kapiti Island North End

#### Monitoring Kina at Kapiti Island, 24 March 2021, Site 2 (North End, Hole in the Wall Bay, Arapawaiti Point)

##### General Information

Date / Time: 24 March 2021, 1pm

Site name: Hole in the Wall

GPS Location: GPS S 40°49.296'; E 174°55.407' (40°49'17.8"S 174°55'24.4"E; -40.821600, 174.923450)

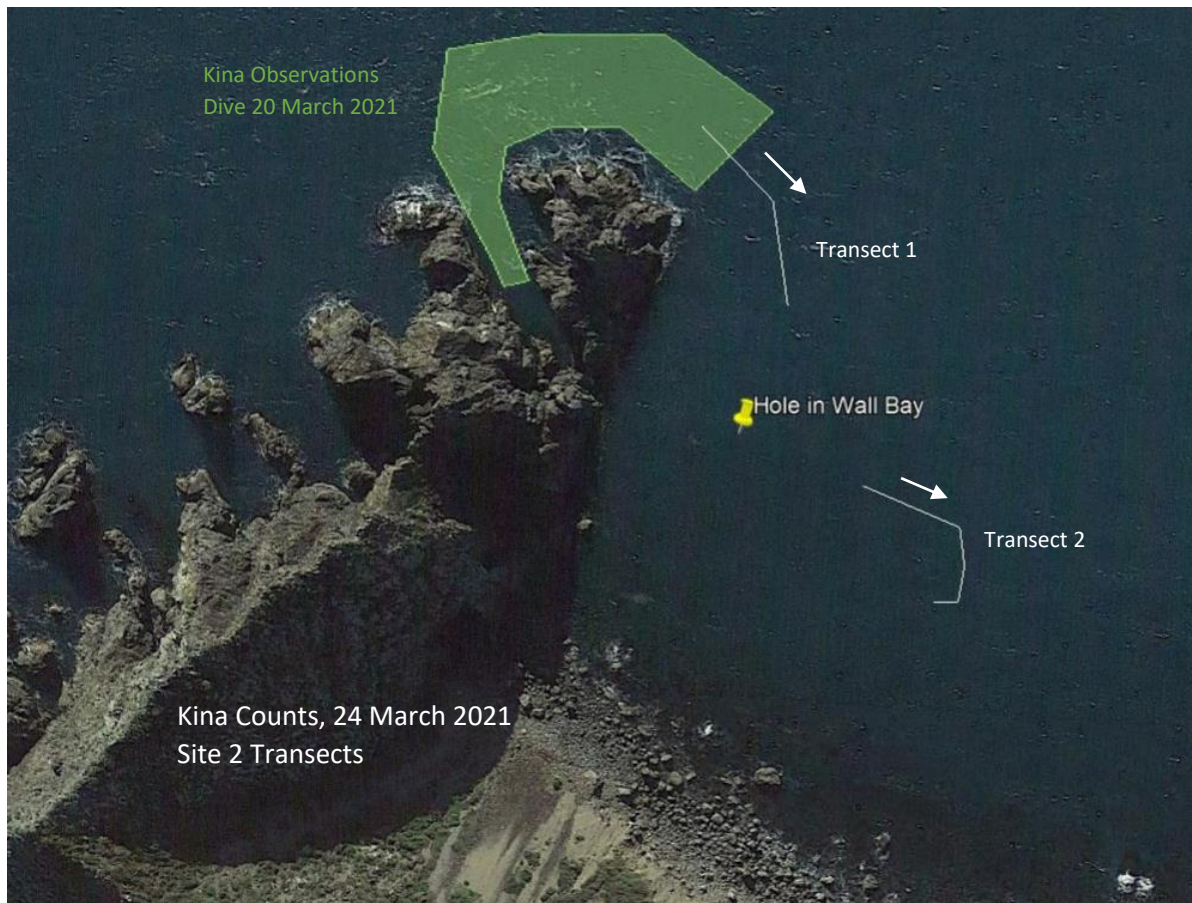
Dive log: 15m max, 62min, 9.8m average

Method: As described above (GPS batteries flat)

Visibility: 8m

Surface Temp: Shearwater Perdix, 18 °C average

No GPS data was obtained from the Garmin GPS (flat batteries)



**Figure 8:** Hole in the Wall Bay Site 2, Kapiti Island, March 2021 (approx. observation locations).

### Monitoring Data

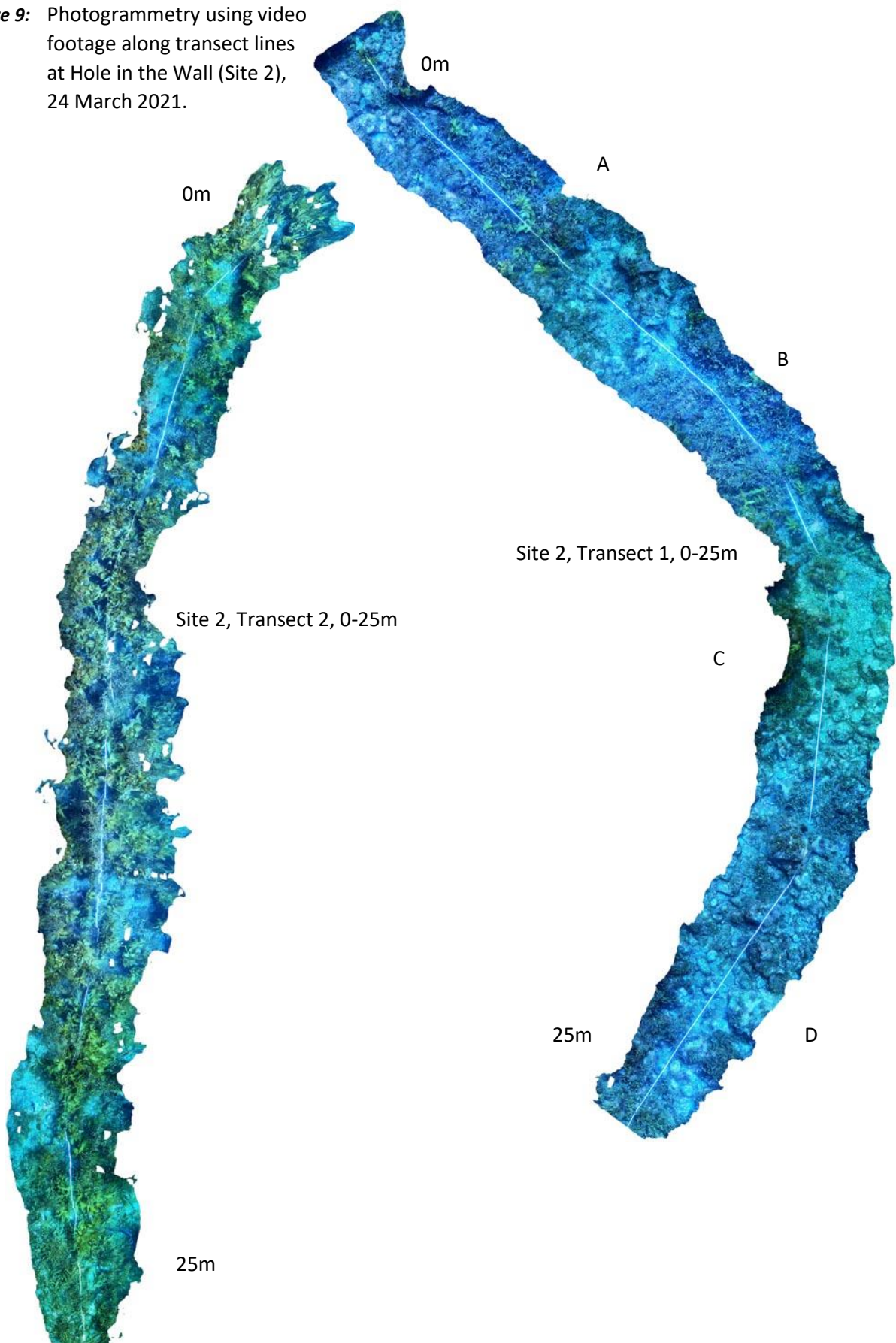
Transects	Depth	Diver 1	Diver 2	Kina D1+D2	substrate type / distribution comments	approx length of rocky reef
<b>T1</b>	1m to 25m	13.5-13.8m	56	109	165	Kina distributed along 25m/ 50m <sup>2</sup> transect
	25m to 50m	13.8-13.2m	87	78	165	Kina distributed along 25m transect
				<b>330</b>		
<b>T2</b>	1m to 25m	9.6-9.3m	32	42	75	Kina distributed along 25 transect
	25m to 50m	9.3-6.4m	72	124	196	Kina distributed along 25 transect
				<b>271</b>		

601 kina in 200m<sup>2</sup> (150 kina per 50m<sup>2</sup>)

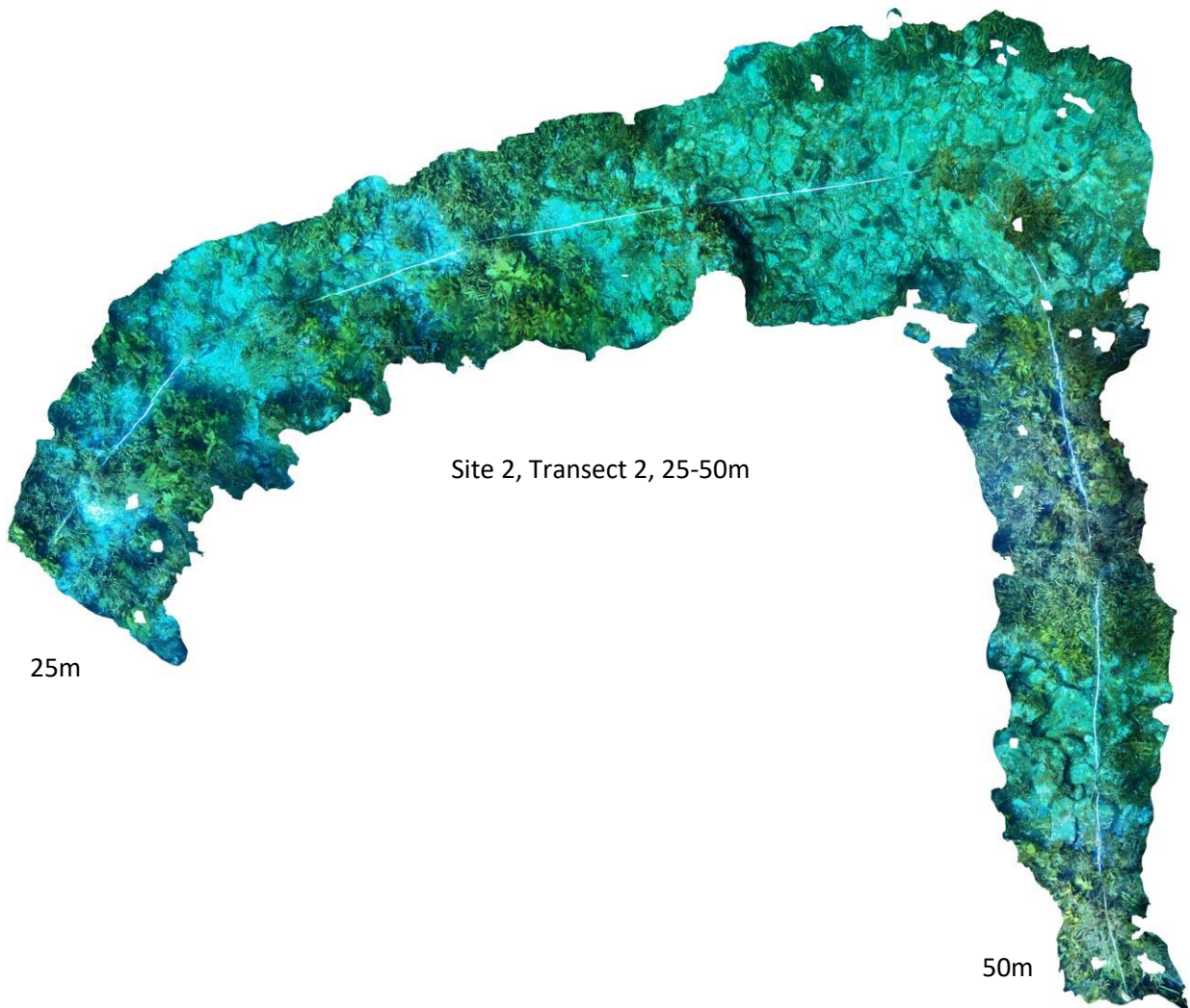




**Figure 9:** Photogrammetry using video footage along transect lines at Hole in the Wall (Site 2), 24 March 2021.



**Figure 10:** Photogrammetry using video footage along transect lines at Hole in the Wall (Site 2), Transect 2, 25-50m, 24 March 2021.

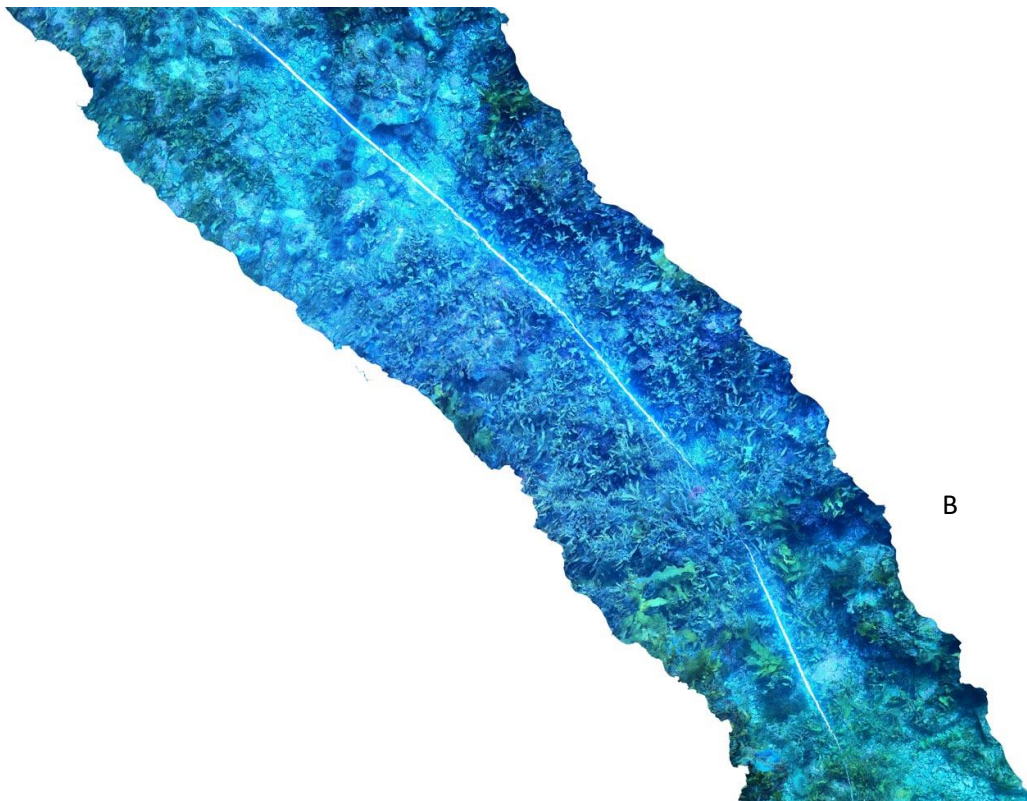
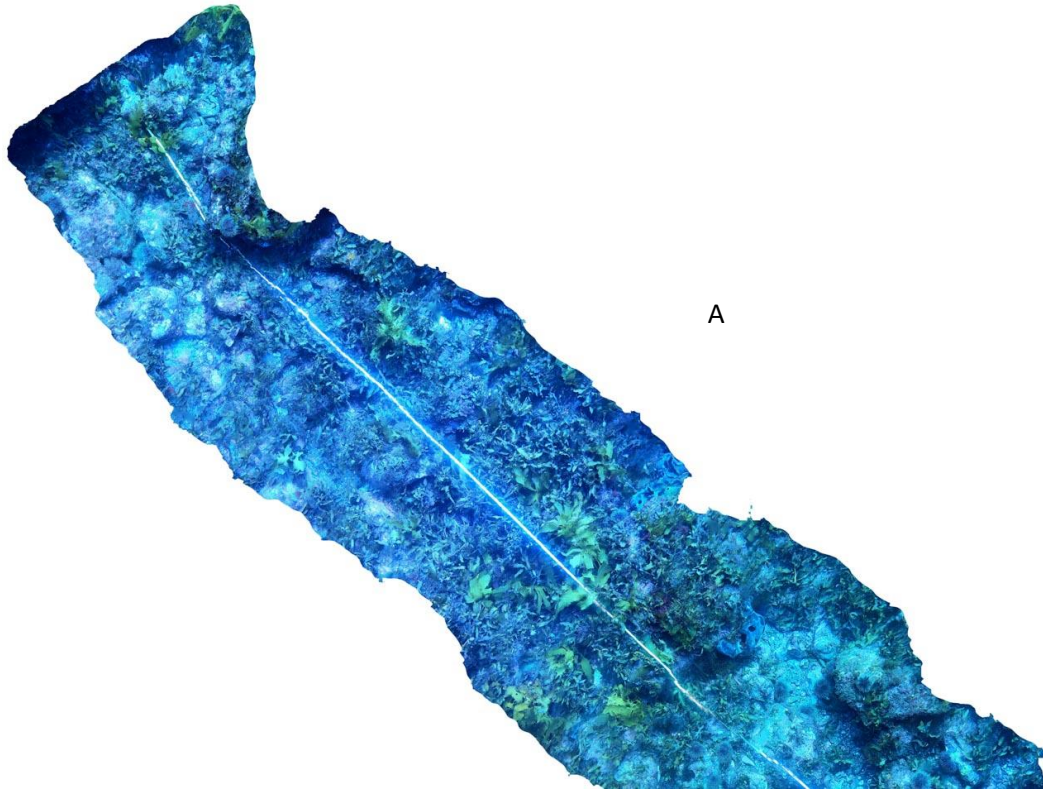


### Observations on the photogrammetry work

Below are sections A-D of Site 2 Transect 1 – original as well as kina marked up by yellow dots on the following page.

- 88 kina were identified on the photomosaic. In comparison divers counted 165. It is really important to look under the kelp and seaweed coverage when counting kina. There are limitations to automation and looking at photo and video footage of tow or drop cameras.
- Photogrammetry itself is difficult in areas with dense seaweed coverage as software doesn't find reference points.

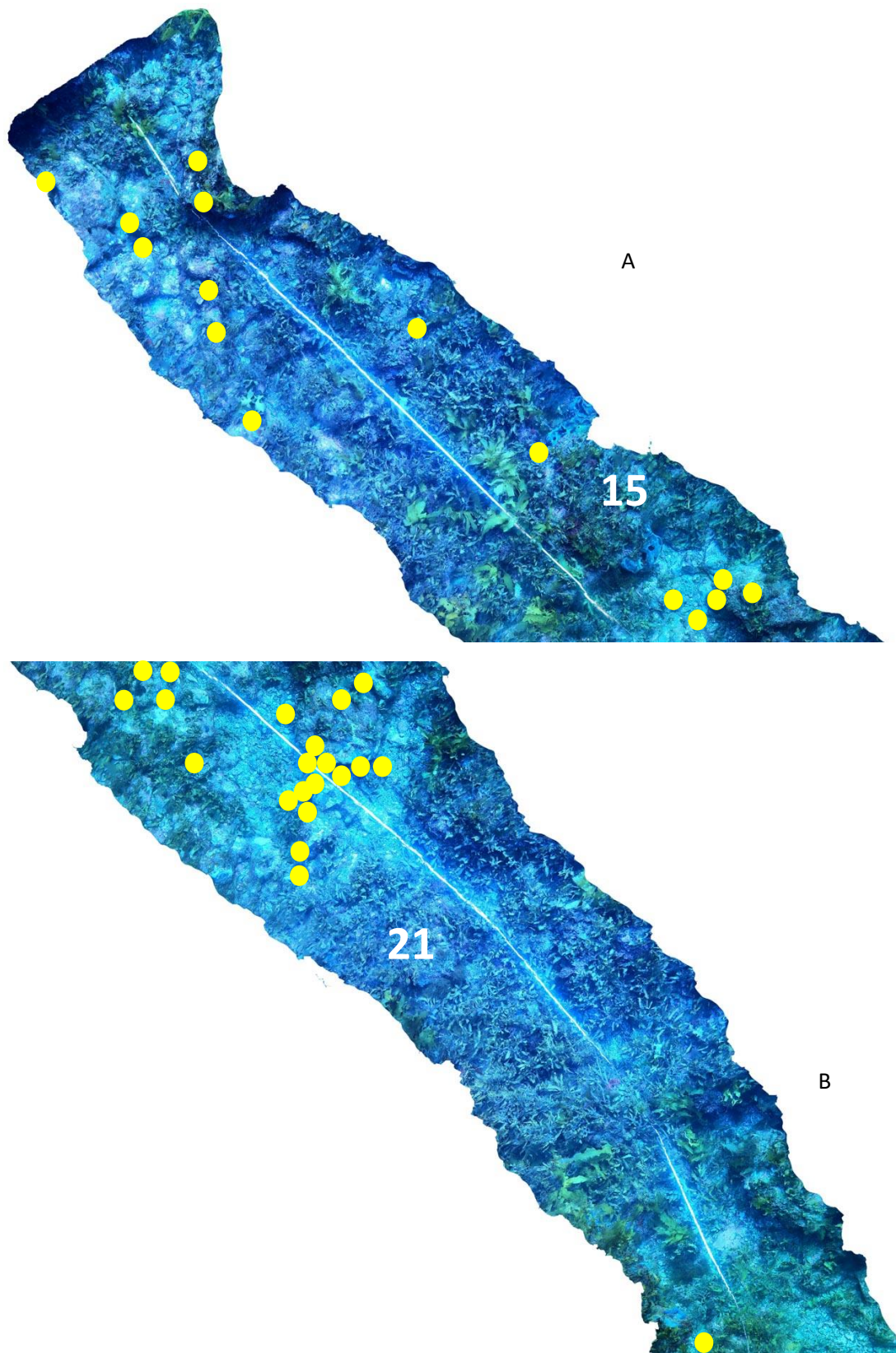
Site 2, Transect 1 – 0-25m (sections A, B)



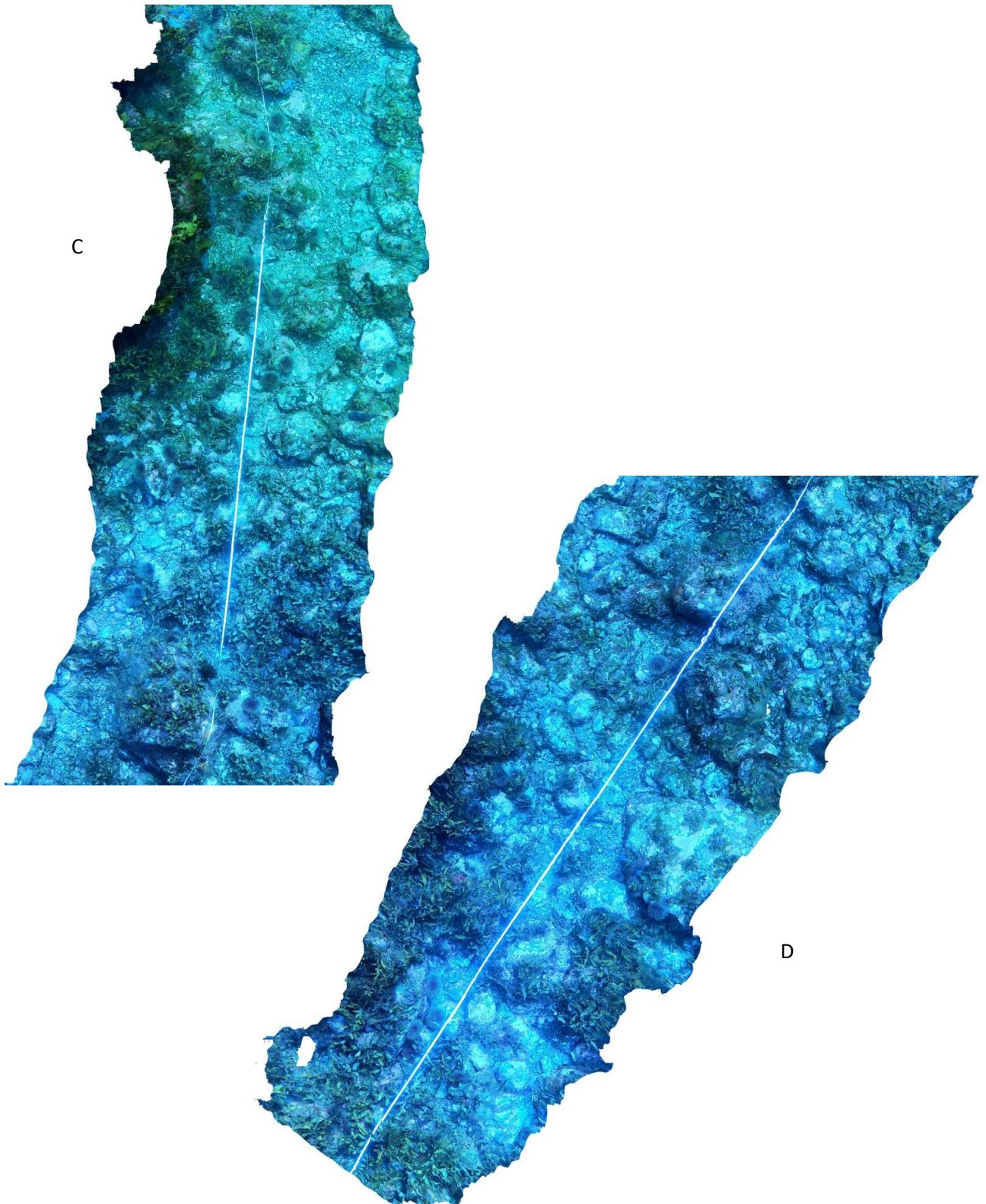




Site 2, Transect 1 – 0-25m (sections A, B) – Kina marked up



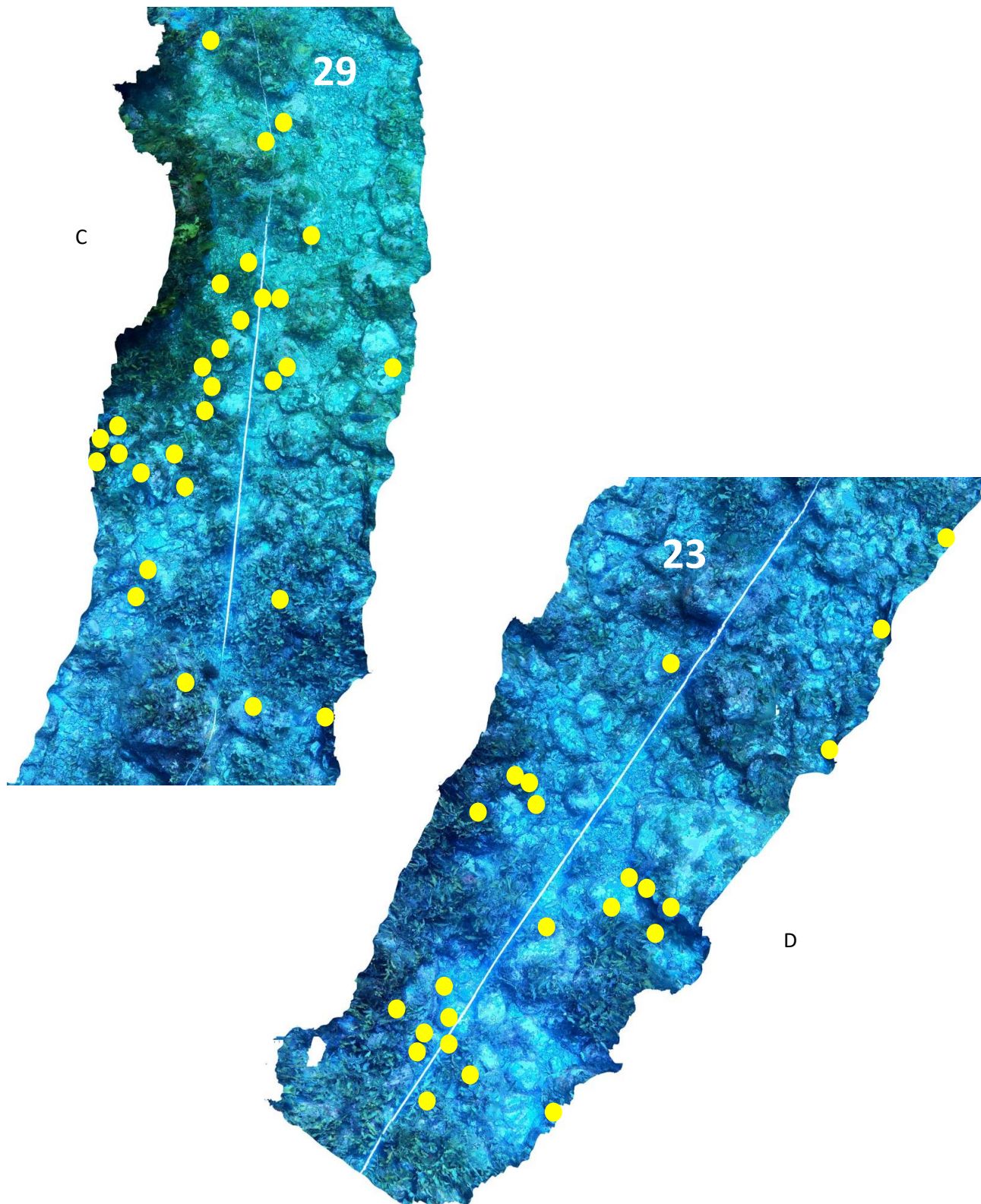
Site 2, Transect 1 – 0-25m (sections C, D)







Site 2, Transect 1 – 0-25m (sections C, D) – Kina marked up





Boat Dive 20 March 2021 – Hole in the Wall

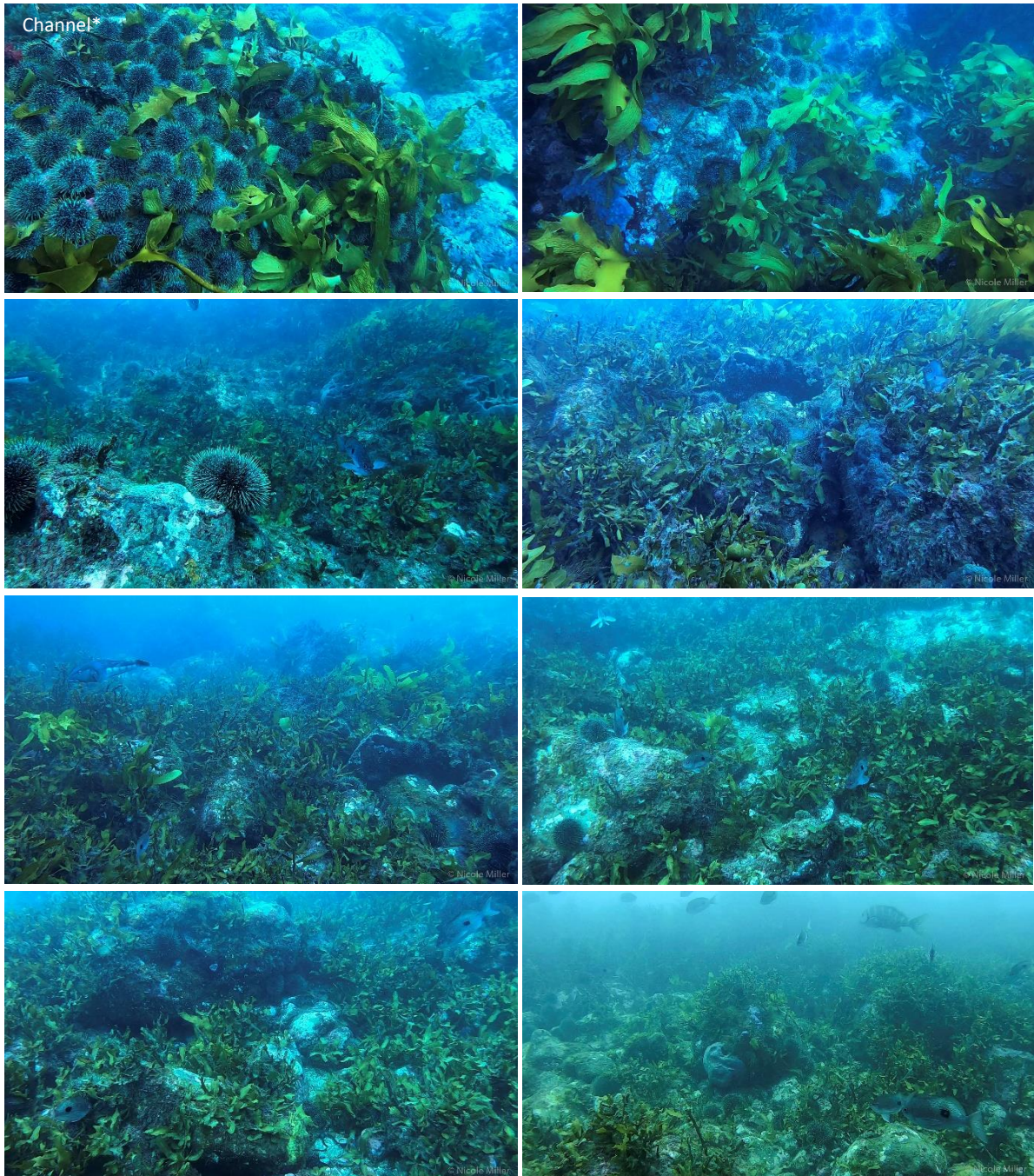


**Figure 11:** Hole in the Wall Bay, Kapiti Island, March 2021 (approx. observation location).

Below are screengrabs from video footage of the dive through the Hole in Wall on 20 March 2021.











## Pukerua Bay scooter & photogrammetry



**Figure 12:** Pukerua Bay Observation. Photogrammetry performed in the exit area (yellow, approx. location), 21 March 2021.



Divers used GoPro footage to create a photomosaic of the exit area at Pukerua Bay .

In the shallow (not shown on the photomosaic) the seaweed was denser. However, lots of kina and only spares seaweed coverage was observed deeper (see photomosaic).

Note: No counting or measuring was done in the entry or the exit area. Divers noted a significant number of small kina in the entry area

**Figure 13:** Pukerua Bay Photomosaic, 21 March 2021.