

Inverloch Coastal Resilience Project

Mapping of Coastal Recession from Pt Norman to Flat Rocks, Inverloch

1. Introduction:

As an adjunct to the Drone and Laser Monitoring being undertaken as part of the Inverloch Coastal Resilience Project, mapping of the coastal recession between Pt Norman and Flat Rocks was undertaken using Google Earth historical imagery that provides an aerial insight into recession that has occurred from March 2010 to September 2020.

2. Methodology:

Using the Google Earth 'Add Path' feature which provides measuring tools that draw:

- a. Lines from point to point on the aerial map that measure distance;
- b. Polygons on the map that measure the surface area within the polygon.

The mapping was split into 3 sets to allow higher detail when projecting or printing the maps:

- Pt Norman, west to the western end of the Surf Life Saving Club;
- The western end of the Surf Life Saving Club (SLC), west to the eastern end of the rock wall at Toorak Rd;
- The eastern end of the rock wall at Toorak Rd, west to Flat Rocks.
- Google Earth historical imagery years plotted were:

- 14/3/2010
- 12/7/2018
- 4/4/2017
- 17/12/2015
- 28/1/2014
- 19/9/2020



- Coastal Recession was plotted as accurately as possible along the vegetation line of each of the 6 years of historical imagery. The distance between each vegetation plot represents the coastal recession. The total coastal recession is the difference between 14/3/2010 and 19/9/2020 lines as shown on the mapping (Year colours on mapping shown in table above).
- Vegetation loss was measured using polygons plotted around individual vegetation stands that did not include open areas (tracks, blowouts). This provided a more accurate overall total area of remnant vegetation. Total vegetation loss between 14/3/2010 and 19/9/2020 was measured by subtracting the 2010 vegetation extent minus the 2020 vegetation extent across the 3 mapping sets.
- Average recession was calculated using a number of measured distances between the 2010 and 2020 maps.

3. Measurement Accuracy:

Despite efforts to minimise errors when plotting lines and polygons there will be introduced errors. The accuracy of measurements is difficult to ascertain due to:

- a. Unknown accuracy of Google Earth measuring tools/algorithms ;
- b. Some of the aerial imagery has shadows (sun) along the edge of the vegetation. This leads to interpretation of the vegetation edge in places.

Given the scale of the area mapped it is expected that errors are at a minimum.

4. Summary of Mapping:

a. *Rock Wall (SP #2) west to Flat Rocks(SP #1) over the period between 14/3/2010 to 19/9/2020:*

- Coastal recession was noticeable in the period from 2010 to 2014.
- Overall average dune recession was approximately 22 metres. Recent Laser monitoring on 31/07/2021 has highlighted significant dune recession compared with the 2020 Image.
- Vegetation Loss was approximately 2.9 ha.
- Maximum rate of recession occurred in the period from 2017 to 2018. Recession slowed in the period from 2018 to 2020. Peak recession of 44 metres has occurred at the western end of the rock wall. (M1 on Dune Recession Map)
- The wet-sand fence was installed (SP2) in October 2019 and augmented by the rock wall in April/June 2020

b. *SLC to Eastern end of Rock Wall over the period between 14/3/2010 to 19/9/2020:*

- Coastal recession was noticeable in the period from 2010 to 2014 and actively eroding the dunes west of the SLC.
- Overall average dune recession was approximately 53 metres.
- Vegetation Loss was approximately 2.7 ha.
- Significant recession occurred in the period from 2017 to 2020. Maximum recession of 69 metres has occurred in the newly formed opening(s) to Wreck Creek.
- Between the 2018 and 2020 images, the original opening of Wreck Creek closed off after storm activity in May 2020 created a new opening approximately 170 metres to the west.
- The wet-sand fence was installed (SP2) in October 2019

c. *SLC (SP 5) East to Pt. Norman (SP#7) over the period between 14/3/2010 to 19/9/2020:*

- Coastal recession was active in the period from 2010 to 2014 and significant erosion of the dunes starting at the SLC and west to just west of Ozone St.
- Overall average dune recession was approximately 33 metres.
- Vegetation Loss was approximately 2.6 ha.
- Recession slowed in the period from 2018 to 2020. Peak recession was approximately 54 metres just east of the SLC. (M2 on the Map)
- The section of dunes east of Ozone St up to SP7 remain intact in the 2020 image but, as has always occurred at Pt Norman, the dynamic nature of the beach receded and accreted significantly over the time periods measured.
- Since the 2020 image the beach and dunes from Ozone St to SP7 have significantly receded, accreted, receded and are currently accreting.

5. Conclusion:

- The mapping produced for this section of dynamic coastline provides an overall picture of significant coastal recession along this section of the Inverloch surf beach. Unlike past recession events along this section of coast, where recession was followed by accretion, there is little evidence of recovery occurring, apart from the dynamic nature at Pt Hughes.
- There are several sections, notably at the SLC, Wreck Creek and west to Flat Rocks, where coastal recession has accelerated over the past 3 years.

- Since undertaking the mapping earlier this year, coastal recession continues, notably along the beach west of the Surf Life Saving Club.

Notes:

- *To date, Google Earth has no useable updated image of the area.*
- *Mapping of each section of the coast is below and is also available for viewing on the SGCS website: sgcs.org.au*
- Reference points discussed in this document and shown on the mapping are fixed, known Australian Height Datum (AHD) reference points that are used for measuring beach profile at regular intervals or after a storm event. This allows ongoing, repeatable accuracy for documenting the beach profile measurements.
- The Reference points shown on the mapping are labelled SP #x (Survey Point #x) where x = the Survey Point number.



Rock Wall (SP #2) West to Flat Rocks(SP #1)



Image - Google Earth - 14/3/2010

Rock Wall (SP #2) West to Flat Rocks (SP #1)



Image – Google Earth - 28/1/2014

Rock Wall (SP #2) West to Flat Rocks(SP #1)

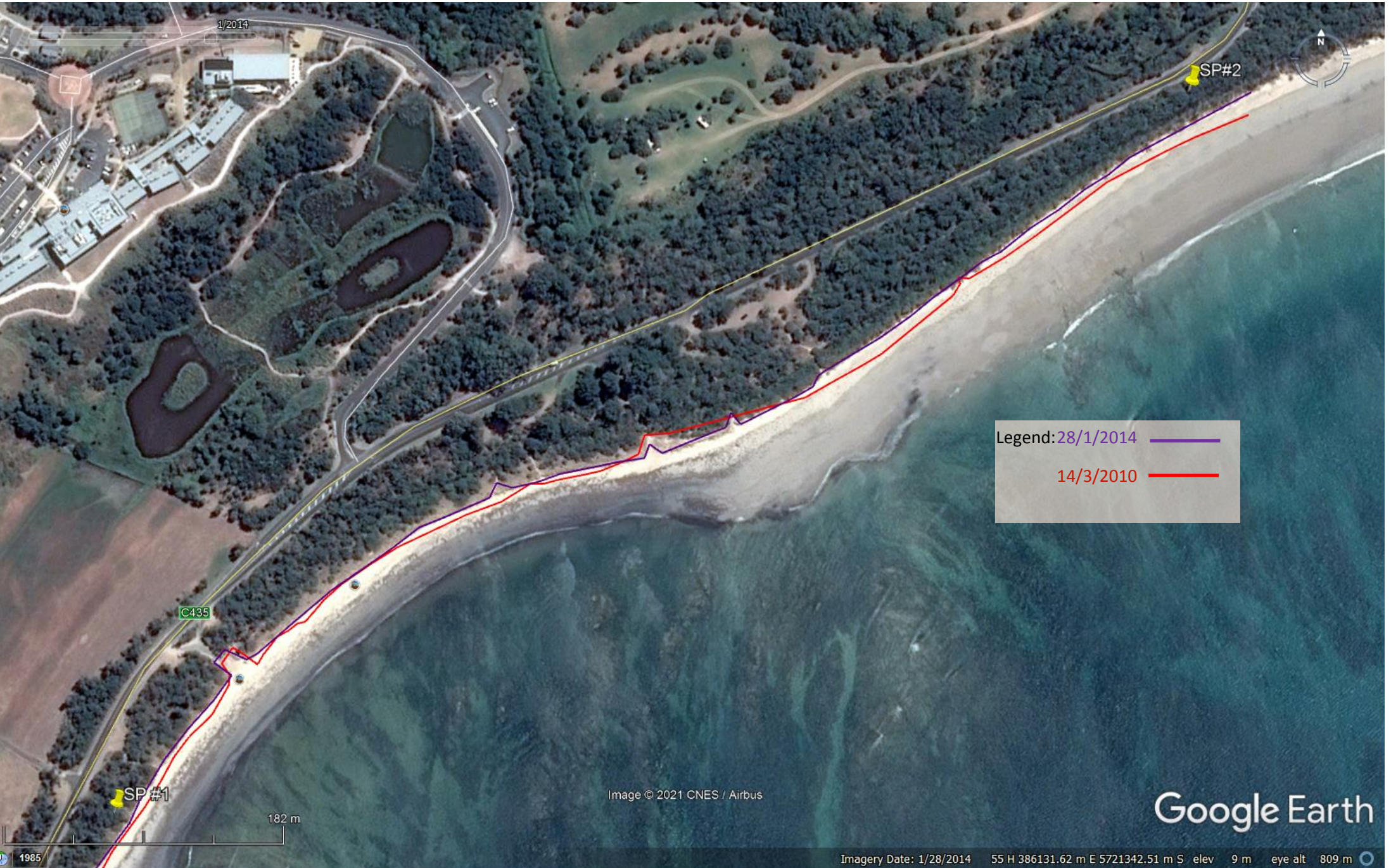
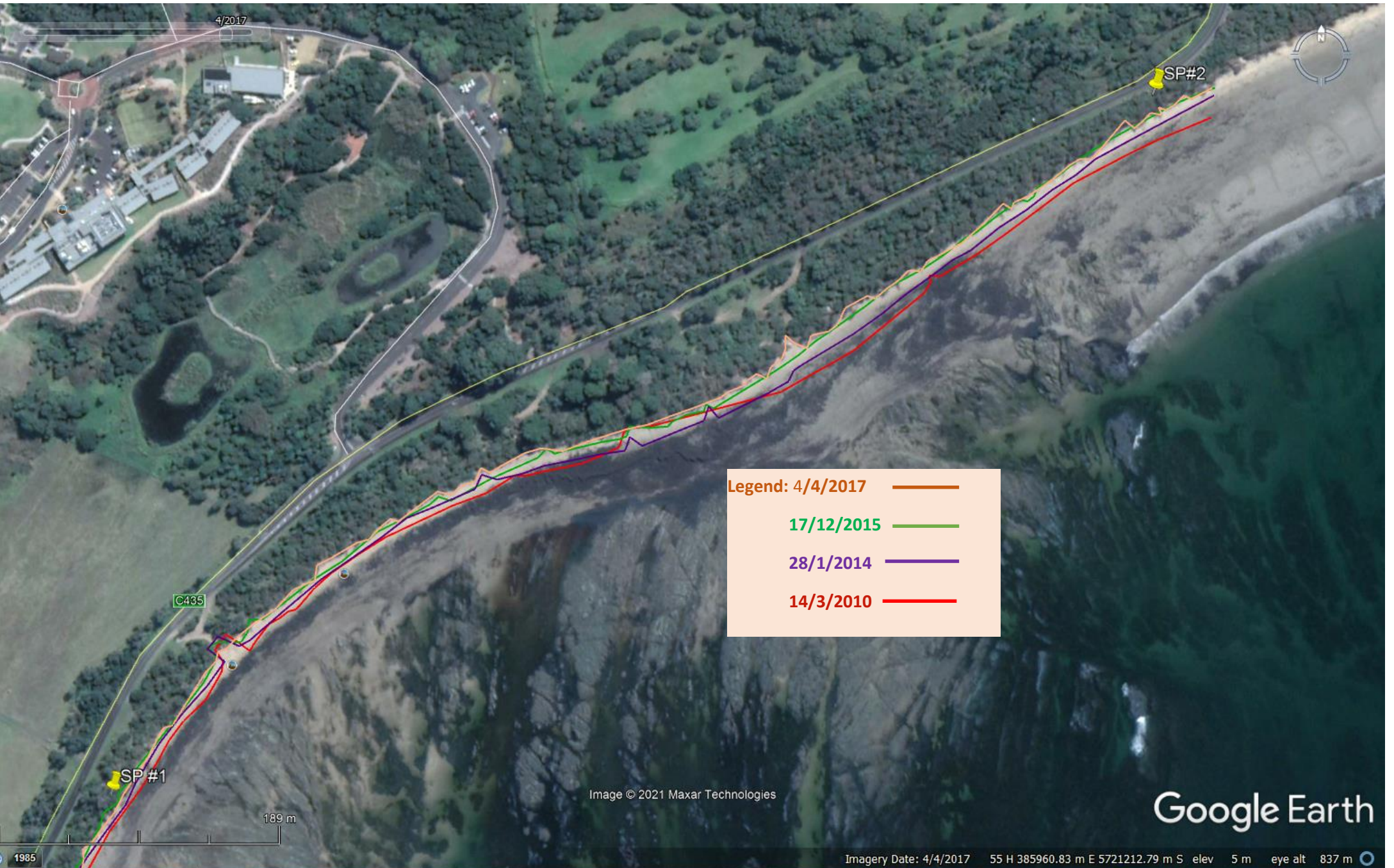


Image – Google Earth - 17/12/2015

Rock Wall (SP #2) West to Flat Rocks (SP #1)



Rock Wall (SP #2) West to Flat Rocks(SP #1)



Rock Wall (SP #2) West to Flat Rocks(SP #1)



Rock Wall (SP #2) West to Flat Rocks(SP #1)



Rock Wall (SP #2) West to Flat Rocks(SP #1)



Vegetation Loss: From 14/3/2010 to 19/9/2020 is approximately 2.9 Ha between the Rock Wall (SP #2) West to Flat Rocks(SP #1)

Image - Google Earth – Dune Recession – 14/3/2010 to 19/9/2020

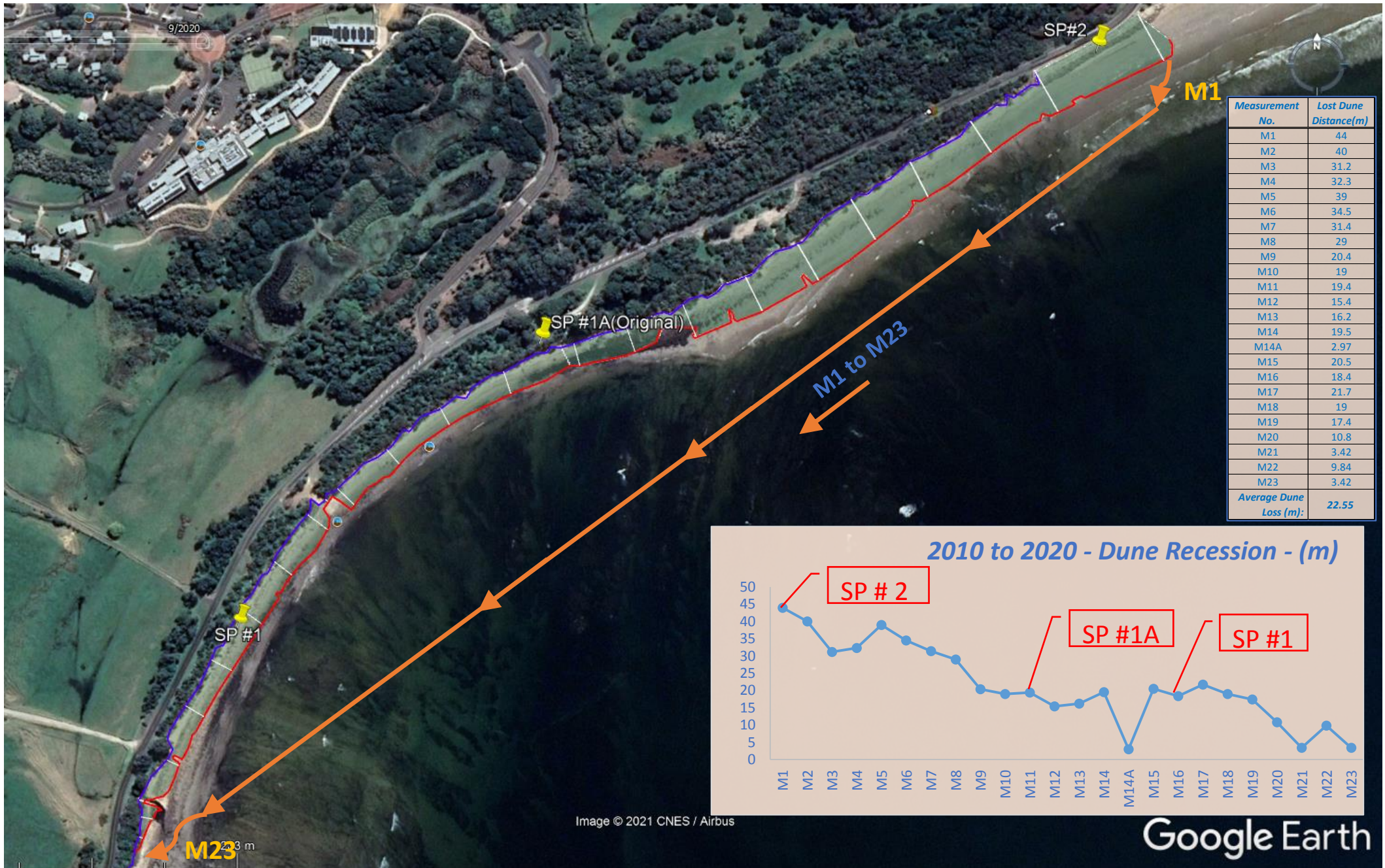
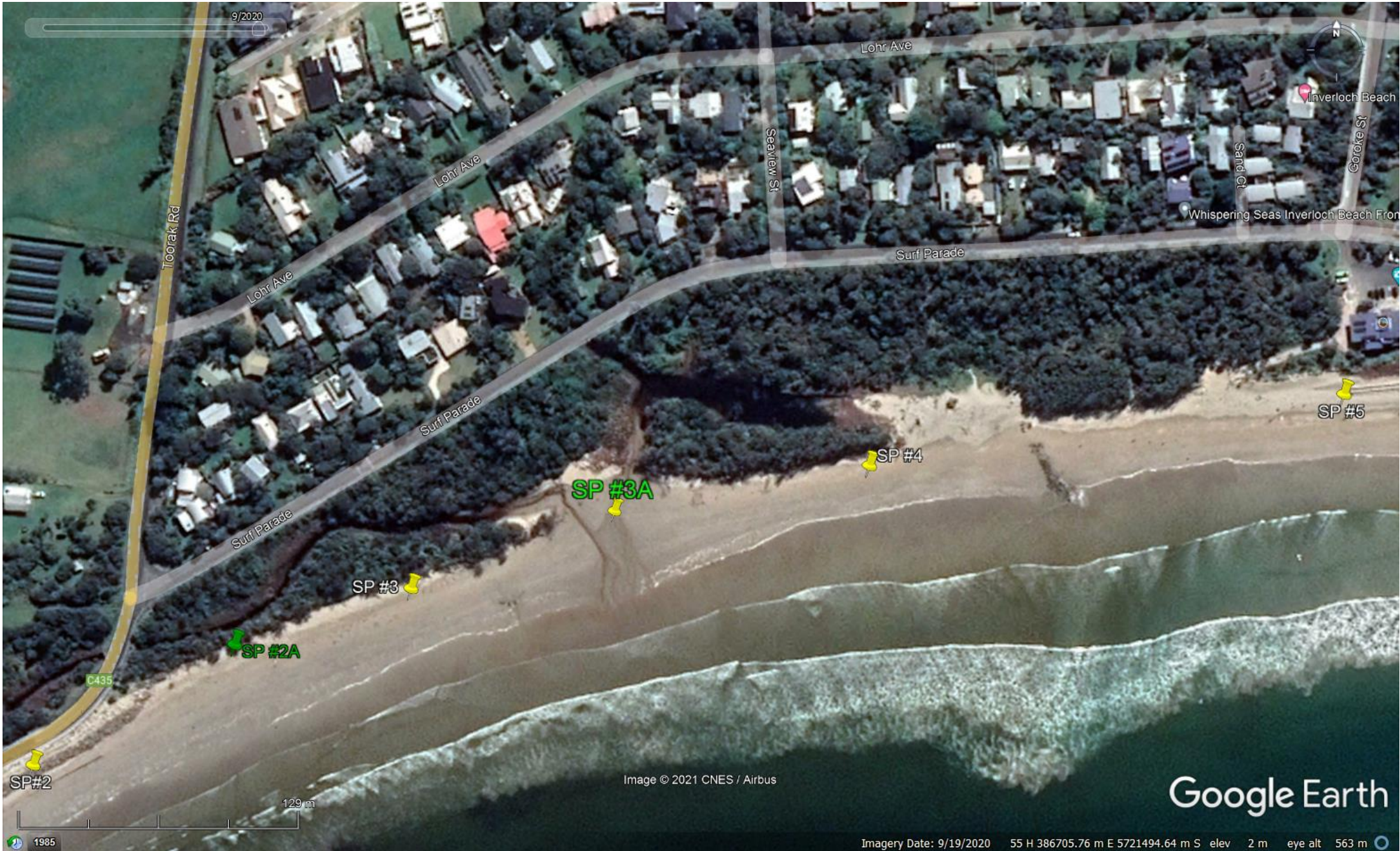


Table and graph highlight dune recession between Laser monitoring points east (SP #2 (Rock wall)) to west SP1 (and beyond). Overall average dune recession is approximately 22 metres between 14/3/2010 to 19/9/2020. Recent Laser monitoring on 31/07/2021 has seen an acceleration of dune recession.

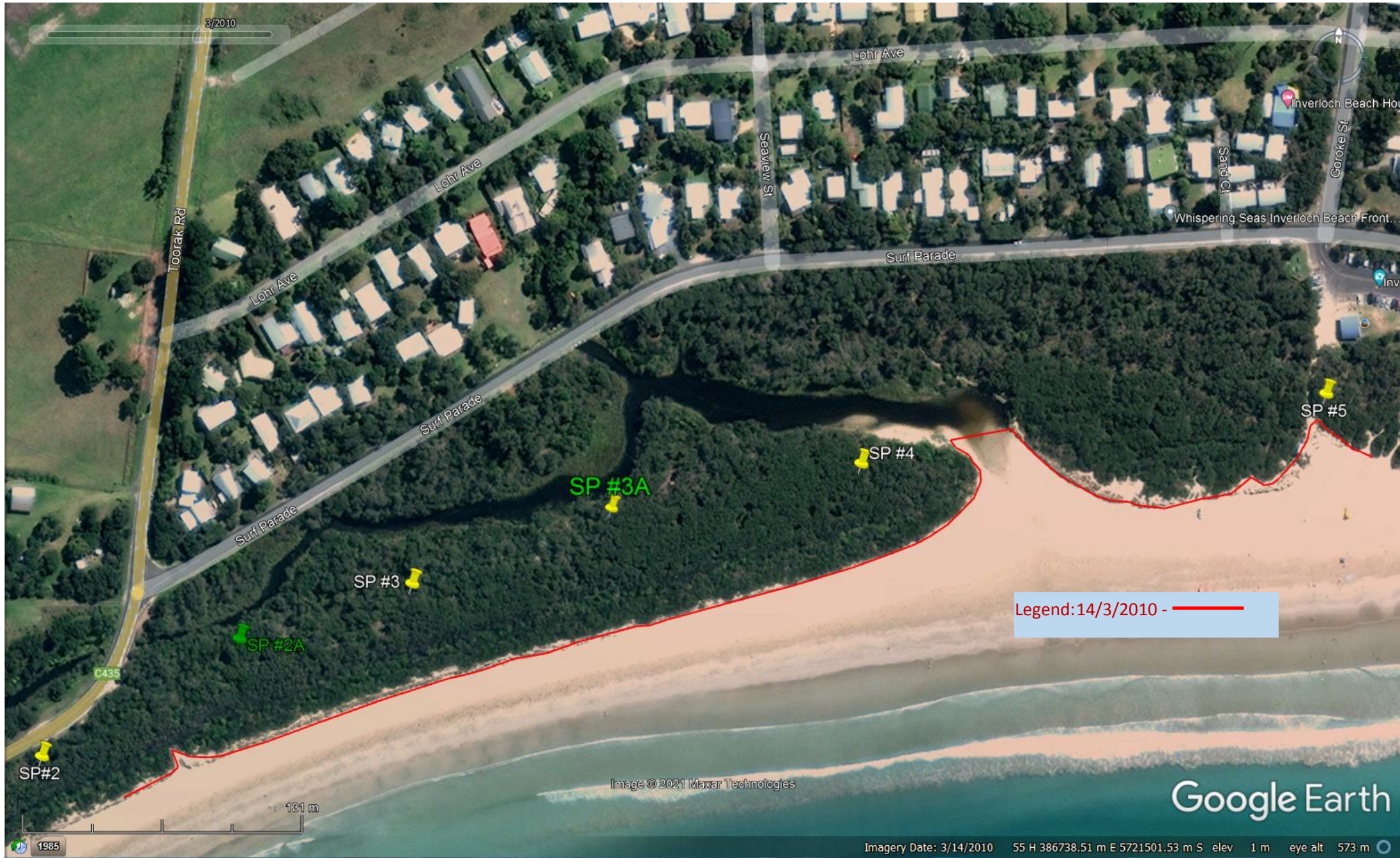
Mapping Set 2.

-- Image - Google Earth – Inverloch Foreshore Beach Recession – 19/9/2020 --

SLC (SP5) to Eastern end of Rock Wall (SP2)



SLC (SP5) to Eastern end of Rock Wall (SP2)



Legend: 14/3/2010 -

Image © 2021 Maxar Technologies

Google Earth

SLC (SP5) to Eastern end of Rock Wall (SP2)



SLC (SP5) to Eastern end of Rock Wall (SP2)



SLC (SP5) to Eastern end of Rock Wall (SP2)



SLC (SP5) to Eastern end of Rock Wall (SP2)



SLC (SP5) to Eastern end of Rock Wall (SP2)

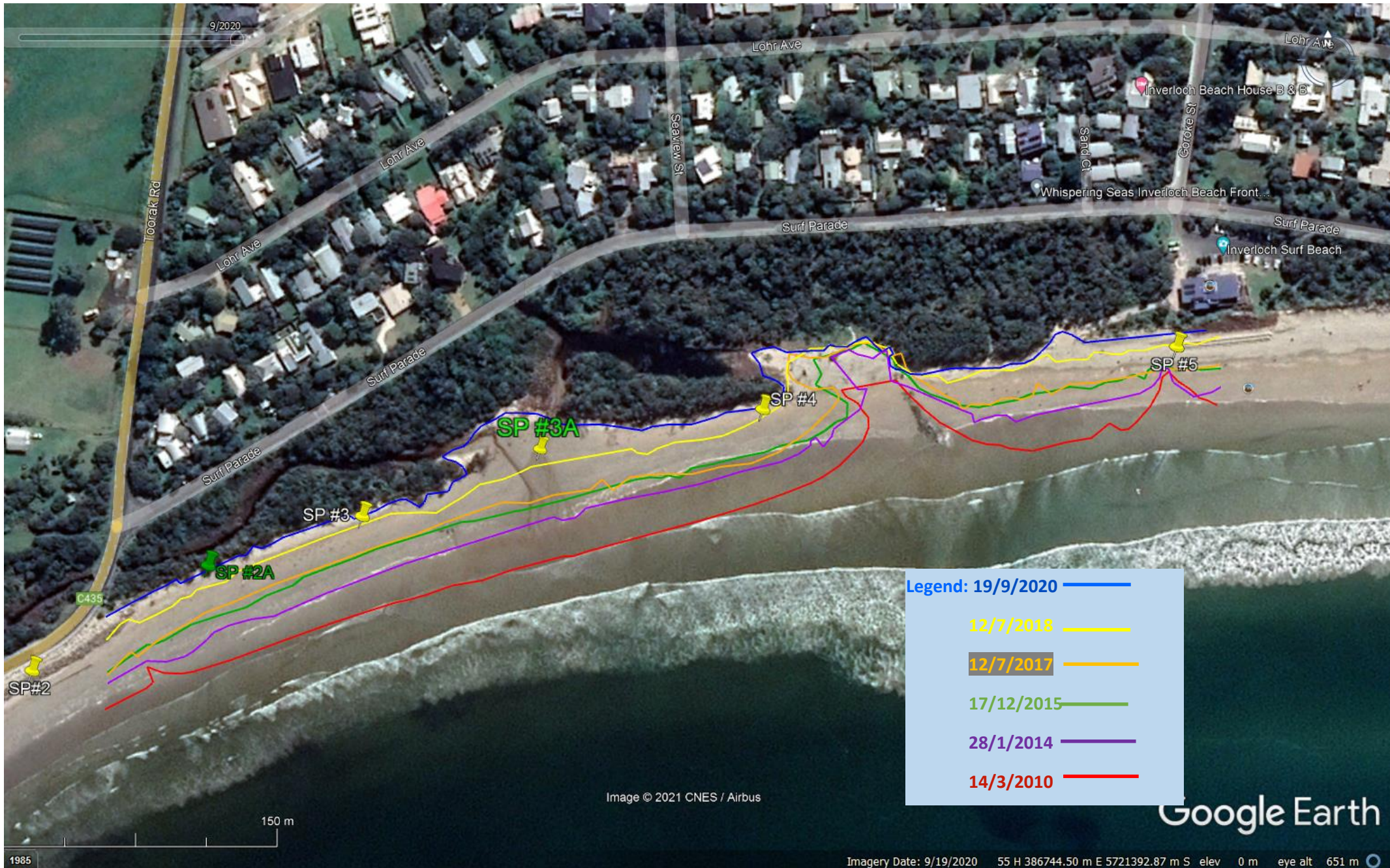


Image - Google Earth - Vegetation Loss – 14/3/2010 to 19/9/2020



Vegetation Loss: From 14/3/2010 to 19/9/2020 is approximately 2.8 Ha between the SLC and eastern end of the rock wall to the west.

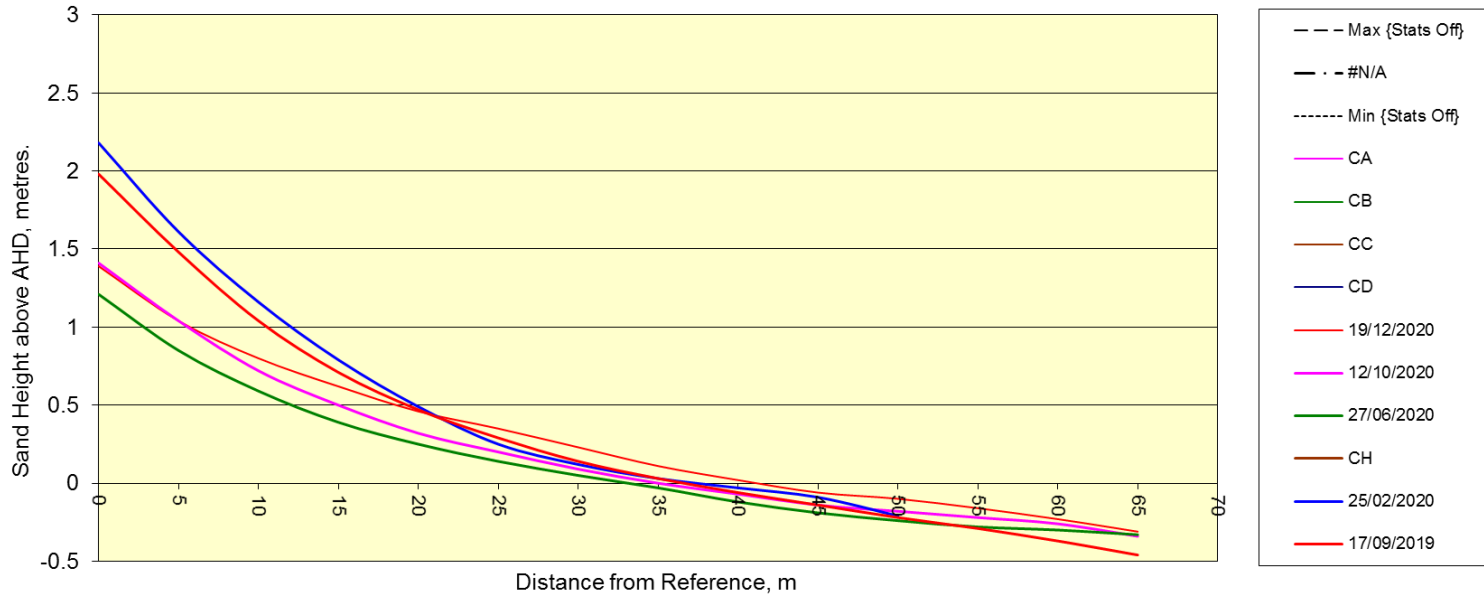
Image - Google Earth – Dune Loss – 14/3/2010 to 19/9/2020



- SP# x) are AHD referenced Beach Profile datum lines. Profile surveys are undertaken on a regular basis and, when practical after a storm/surge event. See Graphed profiles below for SP3 and SP 4.

Beach Profiles - SP 3 and SP 4 –Time Span 19/9/2019 to 19/12/2020

Chart code SP 3 Amazon Shipwreck Site
(Legend date formats: dd/mm/yyyy = laser, yyyy mm dd = Propeller Aero, dd mmm yy = GPS)



Wreck Creek Outlet - East of SP #4 -
10/8/2019

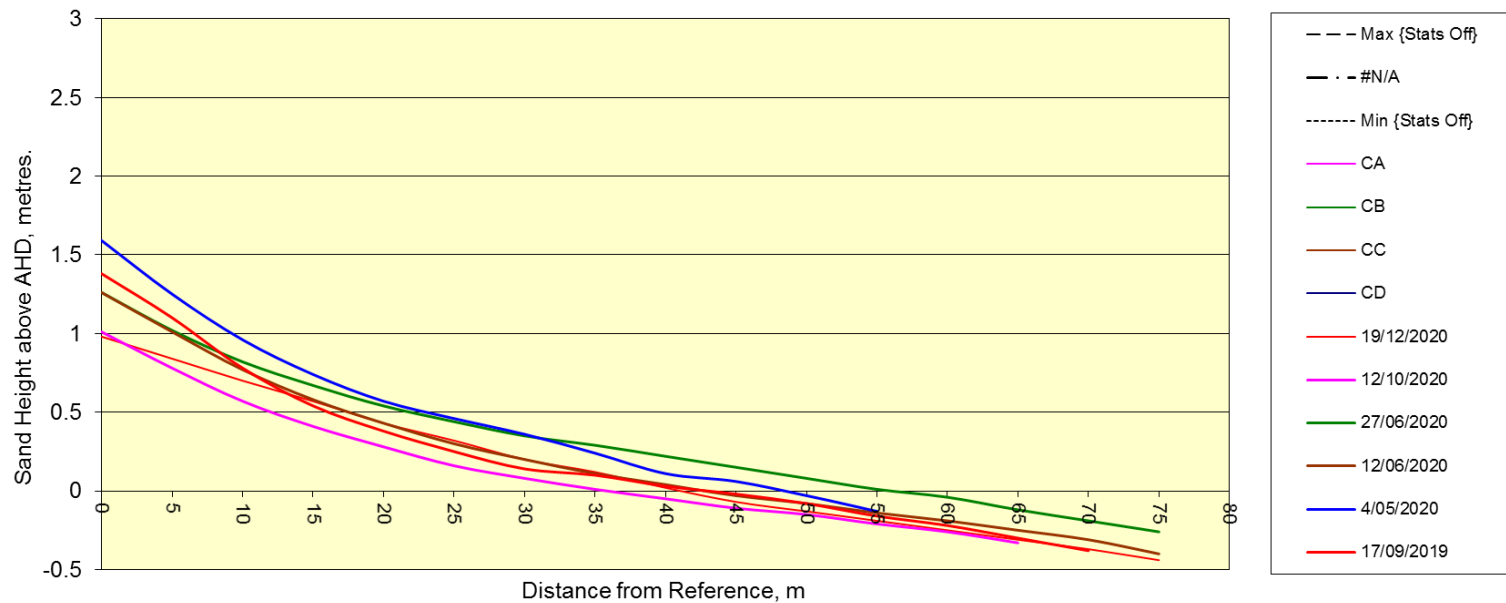


Wreck Creek Outlet has moved to SP #3A
AHD Reference - 19/5/2020



Wreck Creek Outlet –SP #3A AHD
Reference – 27/1/2021

Chart code SP 4 Wreck Creek
(Legend date formats: dd/mm/yyyy = laser, yyyy mm dd = Propeller Aero, dd mmm yy = GPS)



SLC (SP #5) East to Pt. Norman (SP #7)



Image © 2021 CNES / Airbus

Google Earth

SLC (SP #5) East to Pt. Norman (SP #7)

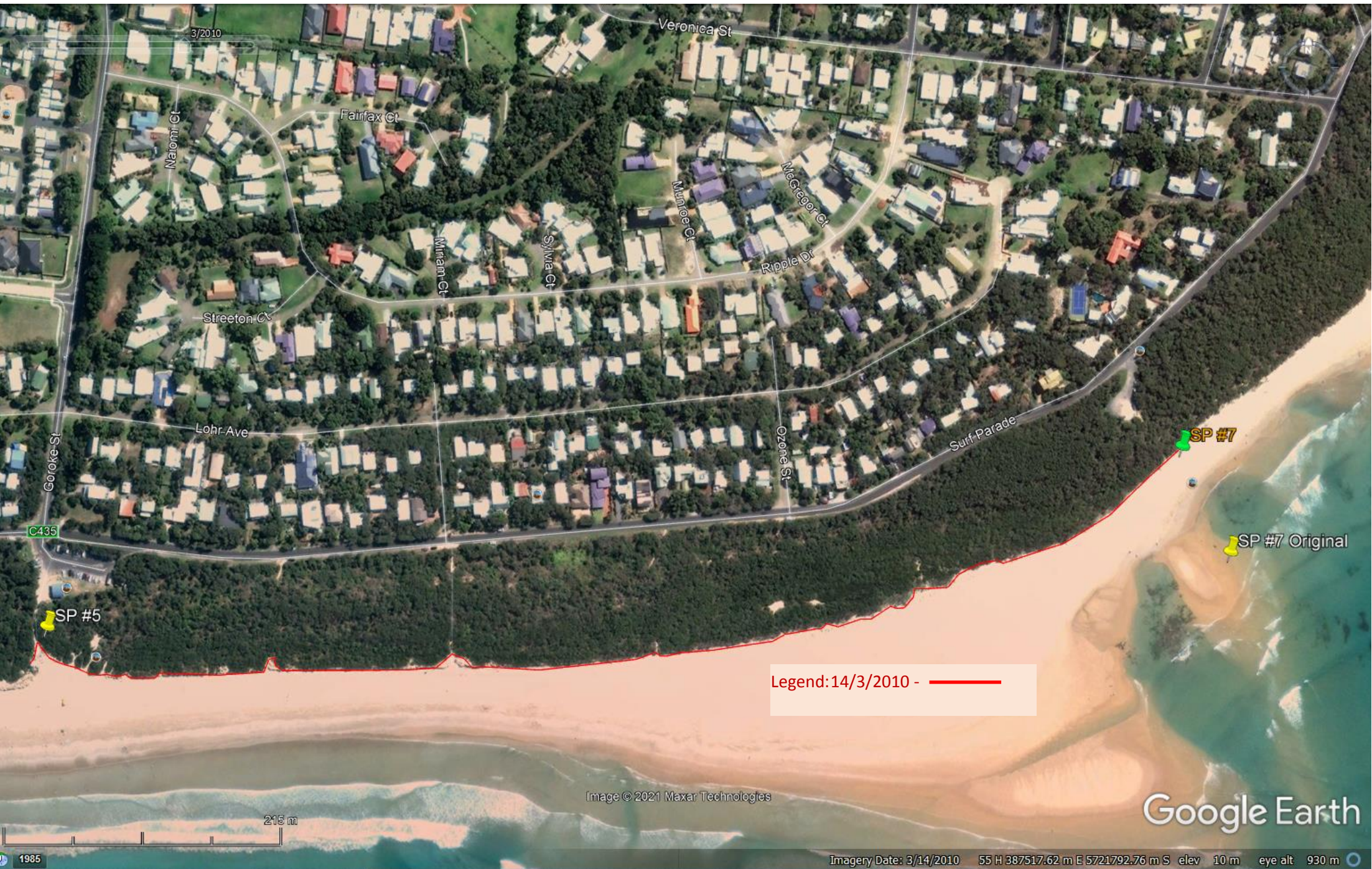


Image – Google Earth - 28/1/2014

SLC (SP #5) East to Pt. Norman (SP #7)



SLC (SP #5) East to Pt. Norman (SP #7)



SLC (SP #5) East to Pt. Norman (SP #7)



SLC (SP #5) East to Pt. Norman (SP #7)



SLC (SP #5) East to Pt. Norman (SP #7)



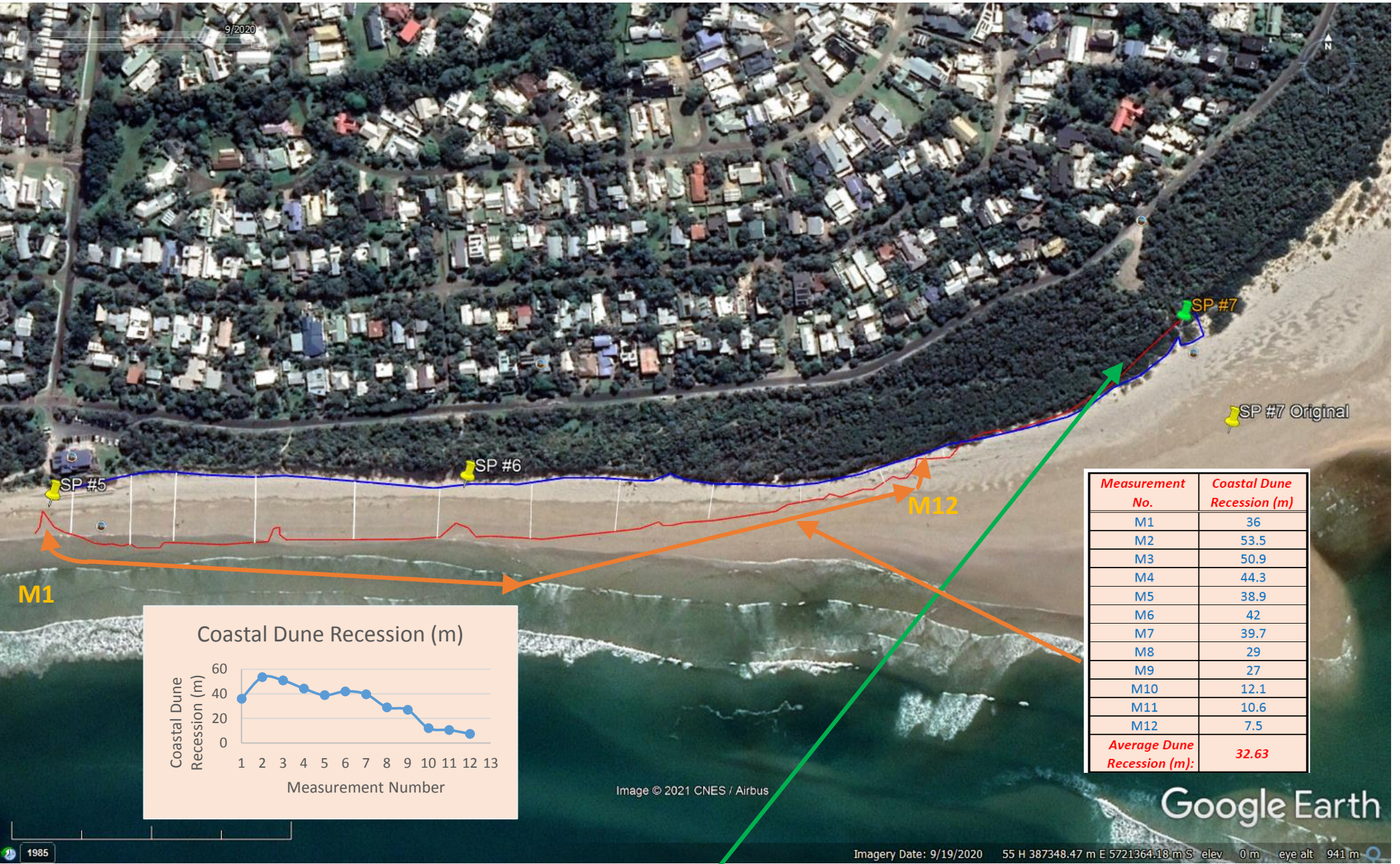
Image - Google Earth Image - Google Earth - Vegetation Loss – 14/3/2010 to 19/9/2020



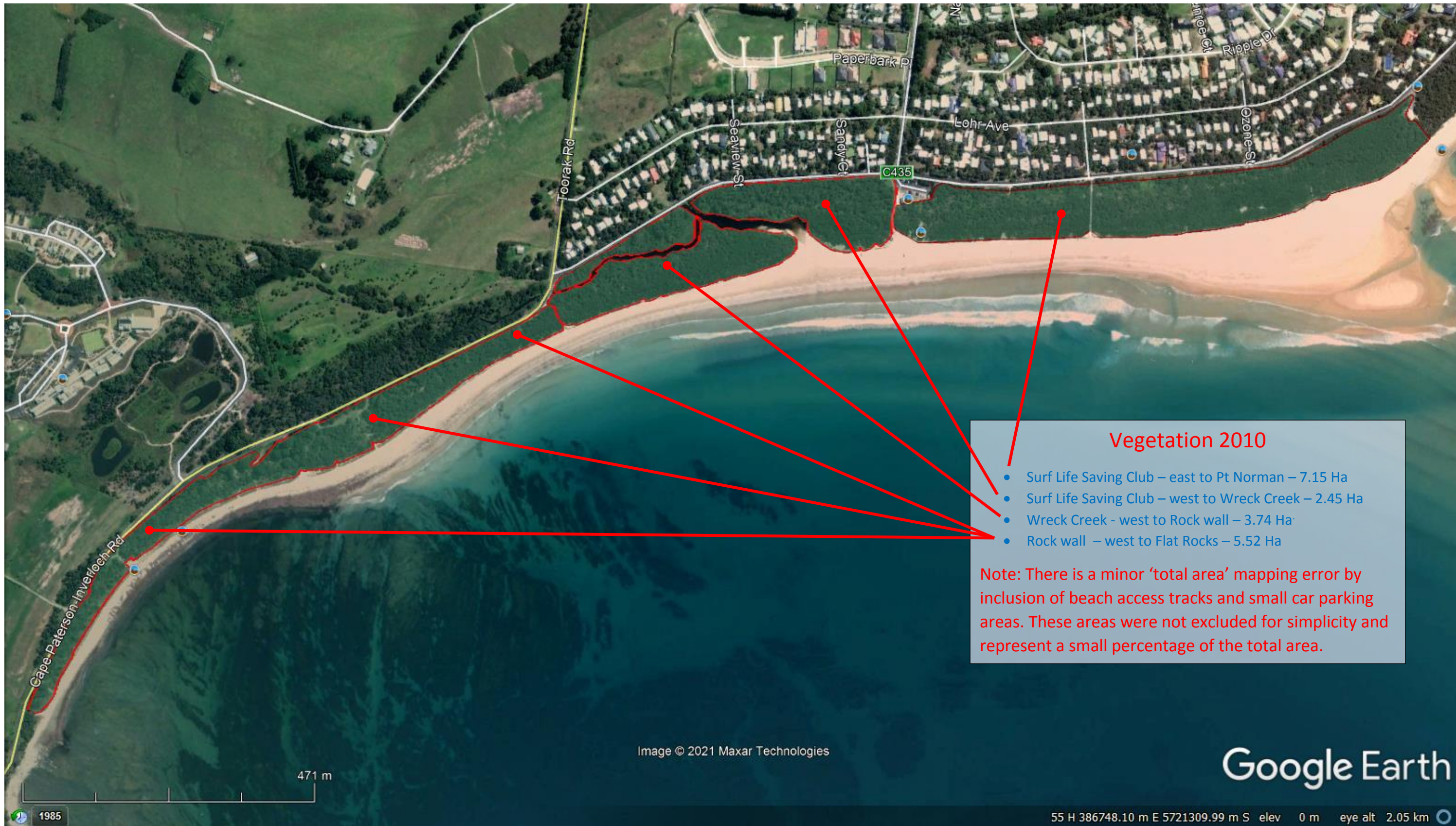
Vegetation Loss: From 14/3/2010 to 19/9/2020 is approximately 2.6 Ha between the SLC and east to Pt. Norman (SP7).

Recent Laser monitoring on 31/07/2021 has seen an acceleration of dune recession. There has also been a small amount of vegetation accretion Pt. Norman

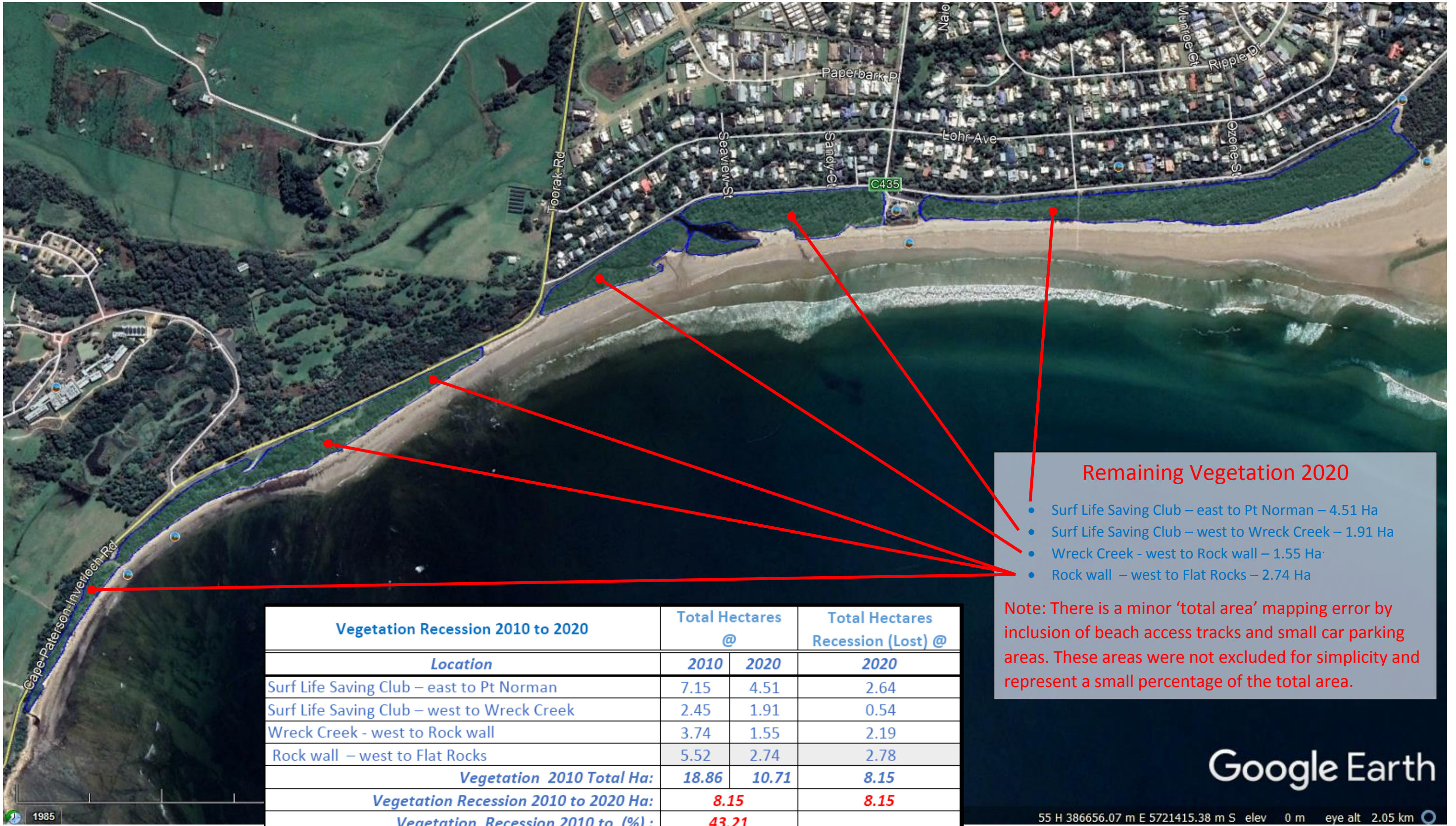
Image - Google Earth – SLC (SP #5) East to Pt. Norman (SP #7) Dune Recession – 14/3/200 to 19/9/2020



Vegetation Accretion: from 14/3/2010 to 19/9/2020 - Pt. Norman (SP7).



Vegetation Remaining at: 19/9/2020



Remaining Vegetation 2020

- Surf Life Saving Club – east to Pt Norman – 4.51 Ha
- Surf Life Saving Club – west to Wreck Creek – 1.91 Ha
- Wreck Creek - west to Rock wall – 1.55 Ha
- Rock wall – west to Flat Rocks – 2.74 Ha

Note: There is a minor 'total area' mapping error by inclusion of beach access tracks and small car parking areas. These areas were not excluded for simplicity and represent a small percentage of the total area.

Vegetation Recession 2010 to 2020 <i>Location</i>	Total Hectares @		Total Hectares Recession (Lost) @
	2010	2020	2020
Surf Life Saving Club – east to Pt Norman	7.15	4.51	2.64
Surf Life Saving Club – west to Wreck Creek	2.45	1.91	0.54
Wreck Creek - west to Rock wall	3.74	1.55	2.19
Rock wall – west to Flat Rocks	5.52	2.74	2.78
Vegetation 2010 Total Ha:	18.86	10.71	8.15
Vegetation Recession 2010 to 2020 Ha:	8.15		8.15
Vegetation Recession 2010 to (%) :	43.21		

Google Earth

55 H 386656.07 m E 5721415.38 m S elev 0 m eye alt 2.05 km

2020 Google map - Dune Recession (Lost) since 2010

