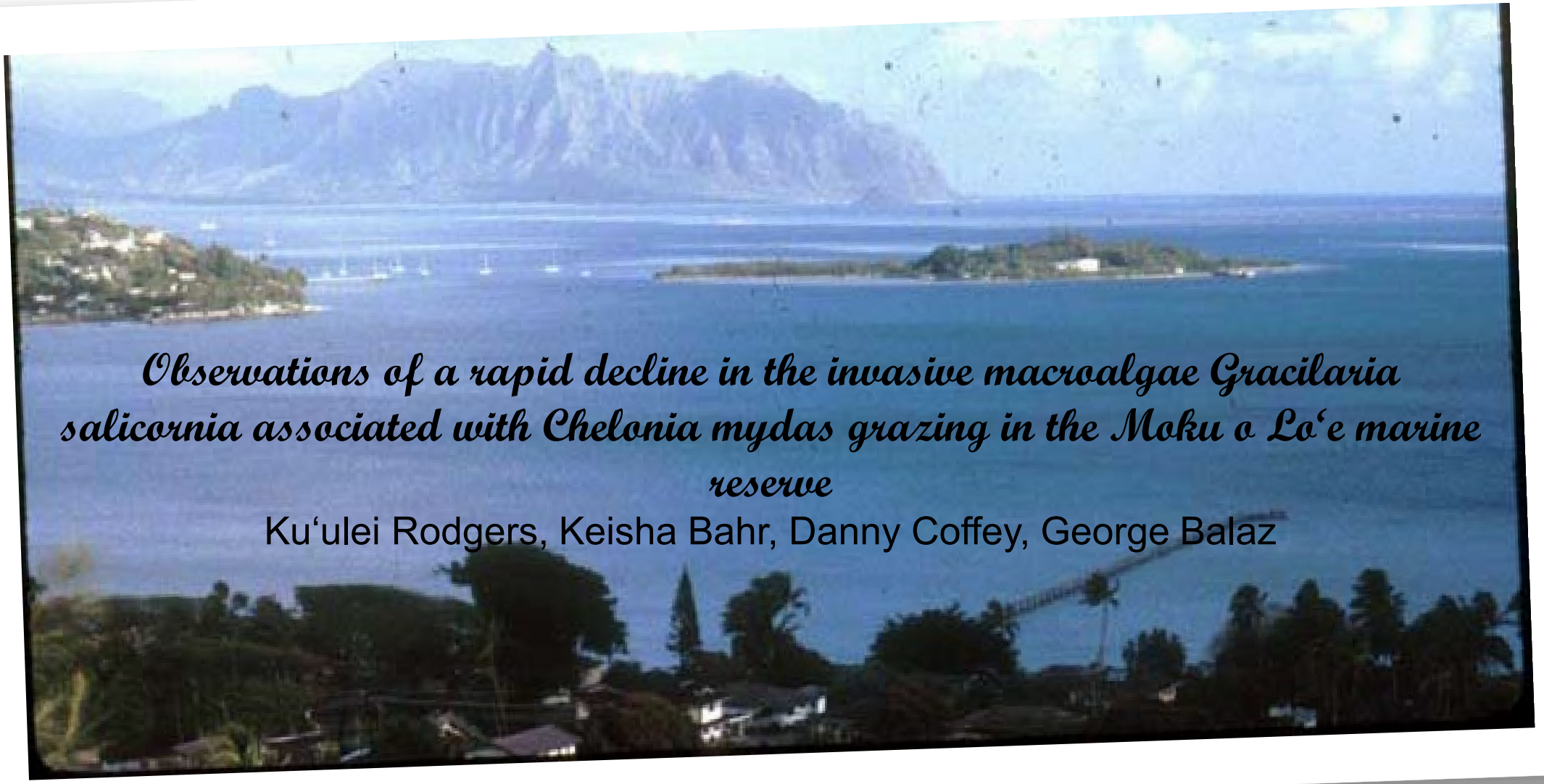
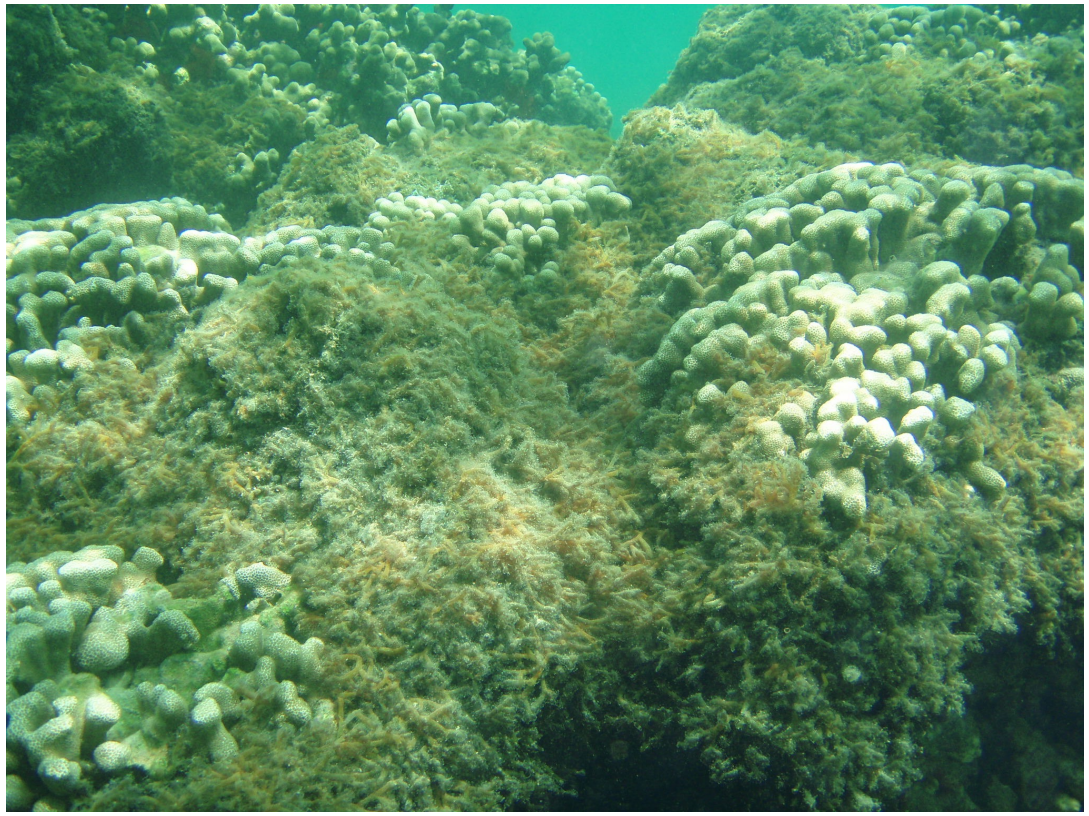


Observations of a rapid decline in the invasive macroalgae Gracilaria salicornia associated with Chelonia mydas grazing in the Moku o Loʻe marine reserve

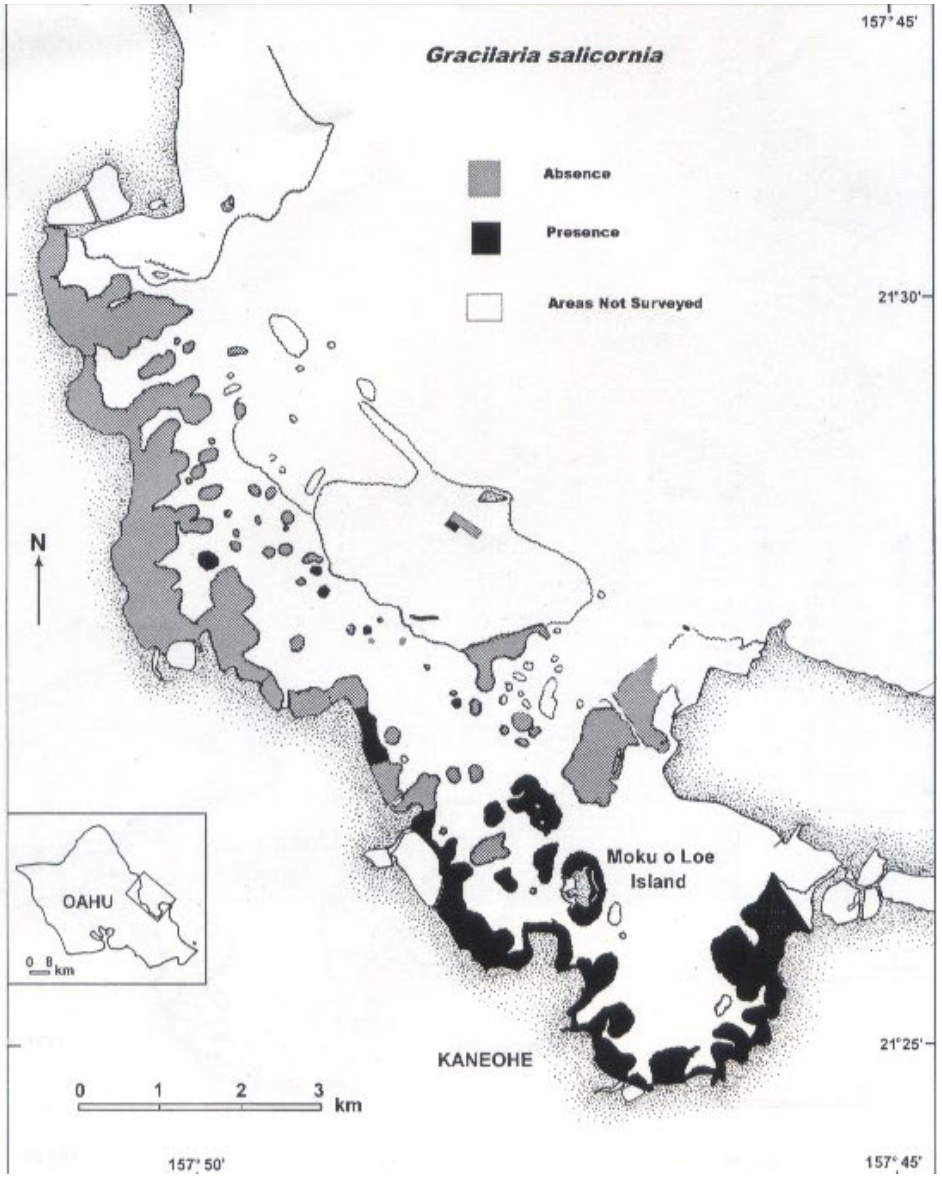
Kuʻulei Rodgers, Keisha Bahr, Danny Coffey, George Balaz

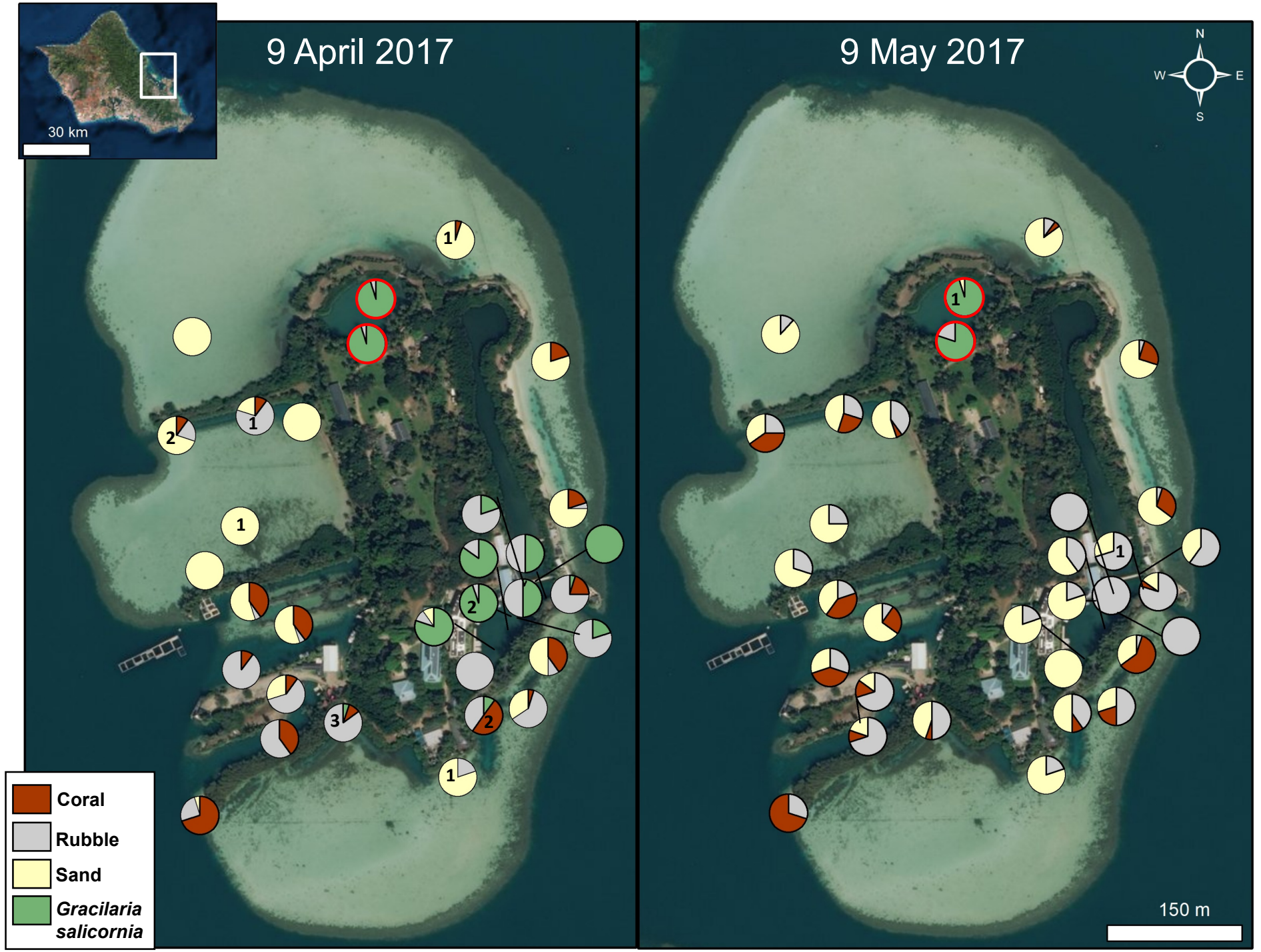


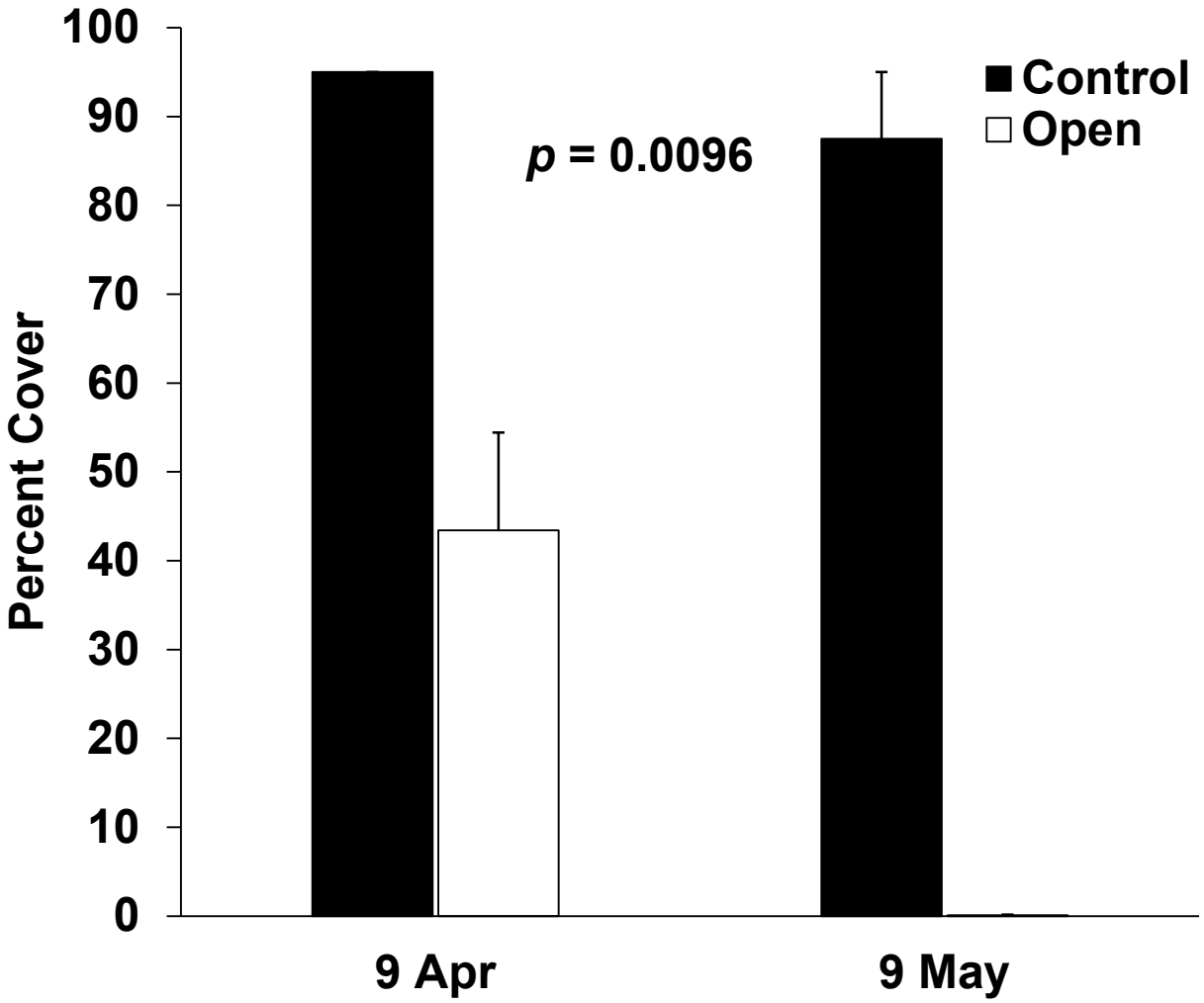
Rate of Spread

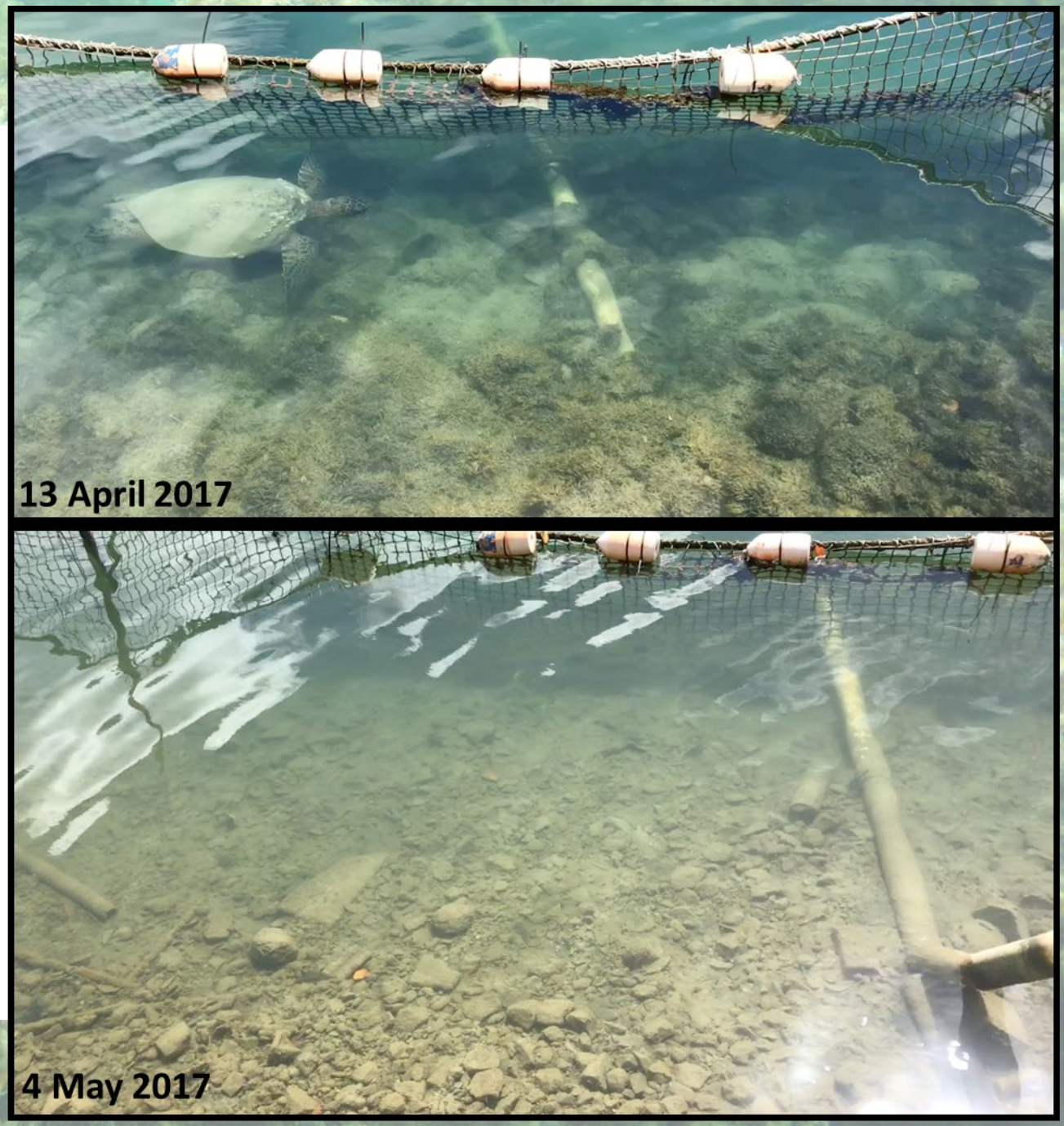
Gracilaria salicornia 280 m/yr

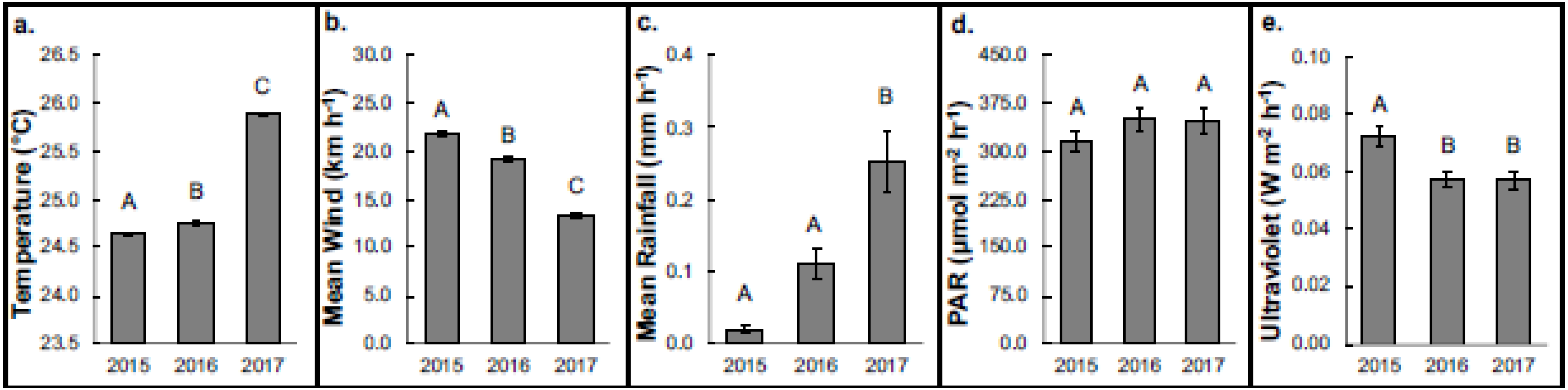
Caulerpa taxifolia 53000 m/yr

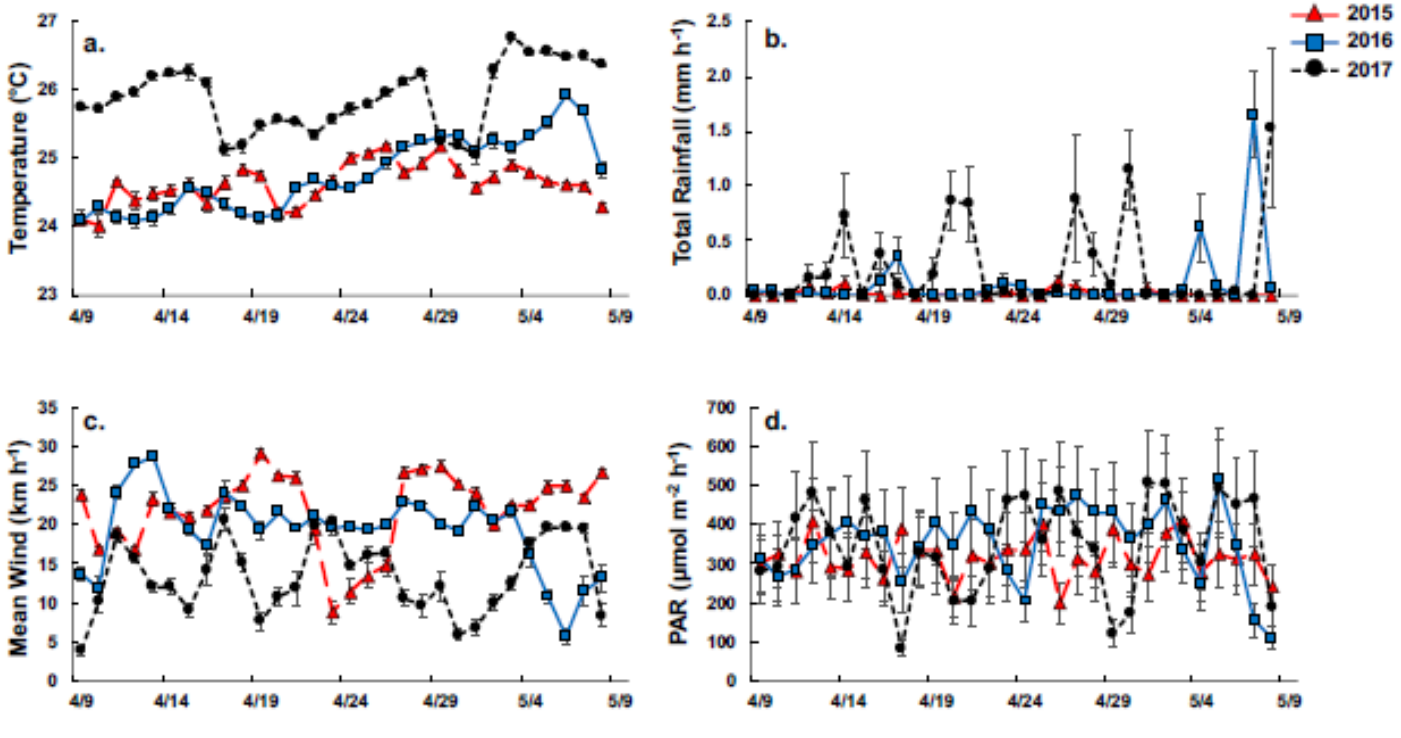


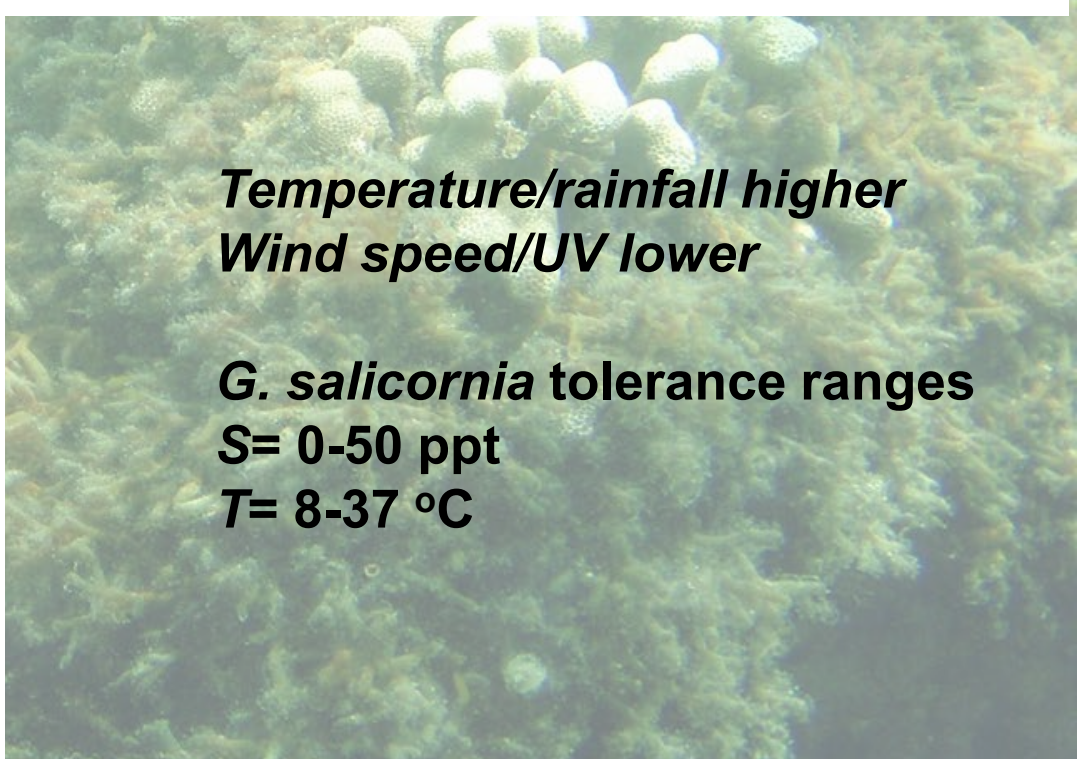

9 April 2017
9 May 2017
30 km
N
W
E
S
150 m
Coral
Rubble
Sand
Gracilaria salicornia


100
90
80
70
60
50
40
30
20
10
0
Percent Cover
p = 0.0096
Control
Open
9 Apr
9 May


13 April 2017
4 May 2017


a.
Temperature (°C)
26.5
26.0
25.5
25.0
24.5
24.0
23.5
A
B
C
2015
2016
2017
b.
Mean Wind (km h-1)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
A
B
C
c.
Mean Rainfall (mm h-1)
0.4
0.3
0.2
0.1
0.0
A
A
B
d.
PAR (µmol m-2 h-1)
450.0
375.0
300.0
225.0
150.0
75.0
0.0
A
A
A
e.
Ultraviolet (W m-2 h-1)
0.10
0.08
0.06
0.04
0.02
0.00
A
B
B


a.
Temperature (°C)
27
26
25
24
23
4/9
4/14
4/19
4/24
4/29
5/4
5/9
b.
Total Rainfall (mm h-1)
2.5
2.0
1.5
1.0
0.5
0.0
2015
2016
2017
c.
Mean Wind (km h-1)
35
30
25
20
15
10
5
0
d.
PAR (µmol m-2 h-1)
700
600
500
400
300
200
100
0


Temperature/rainfall higher
Wind speed/UV lower
G. salicornia tolerance ranges
S= 0-50 ppt
T= 8-37 °C

Other Herbivores:
No association between *G. salicornia* and herbivorous fishes
Small home ranges
Areas inaccessible to *C. mydas* high abundance
Restricted habitat for herbivores
Different feeding strategies

Supporting evidence of link between decline in *G. salicornia* and increases in *C. mydas*:

Prior fish grazing

Direct grazing observations

Foraging in new habitats

Simultaneous spatial and temporal links

Reference sites not affected

No links with meteorological data