Ecosystem trends in Mosquito Lagoon: Are oyster reefs being replaced by mangrove islands?

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Mangrove shifts

Salt marsh ←→ mangrove

- Driven by temperature

Oyster reef ←→ Mangrove ?

Researchers in Tampa Bay have seen mangroves colonizing oyster reefs

Could same be happening in Mosquito Lagoon – different hydrology, further north in transition zone

Oyster reef ←→ Mangrove ?

Assess long term trend from aerial and satellite imagery

Are mangroves colonizing oyster reefs?

Is it an abrupt (shift) or slow colonization (transition)?

Are there spatial patterns to colonization?

GIS analysis

Calculate area change of mangroves on 1943 oyster reefs to present

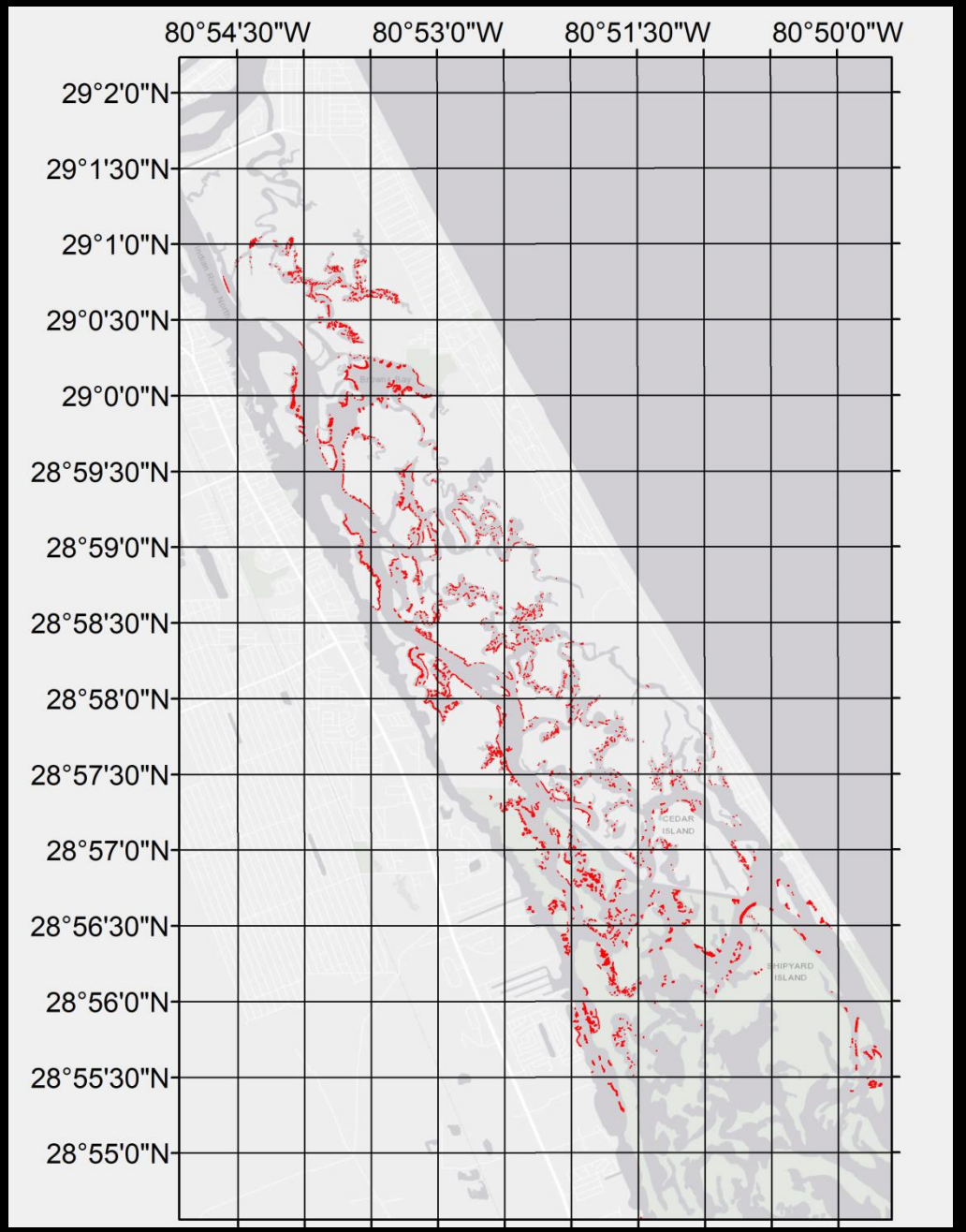
St. John's River Water Management District

- 1943
- 1951
- 1967
- 1984
- 1999
- 2009
- 2017

Oyster reefs from Garvis *et al* 2015 for all years except 2017

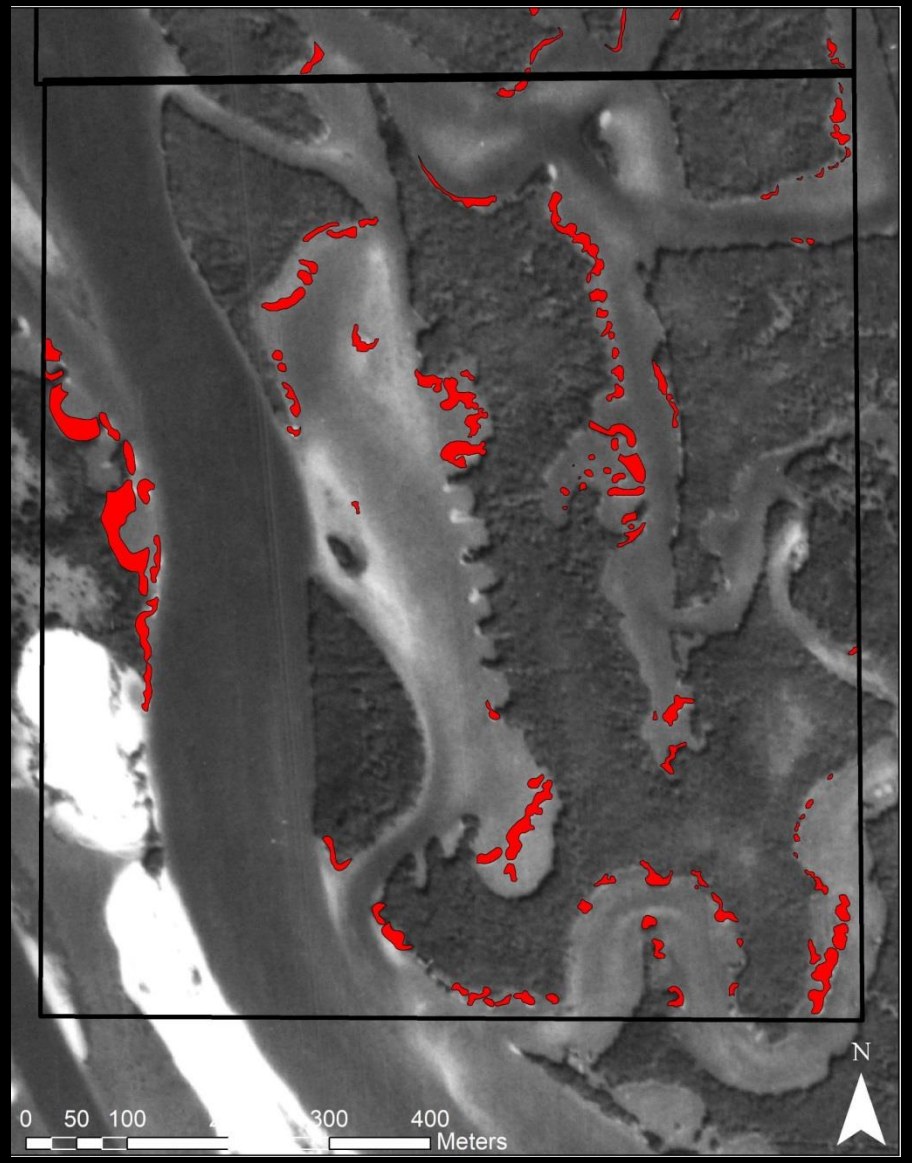
Mangrove patches on oyster reefs hand digitized for each year

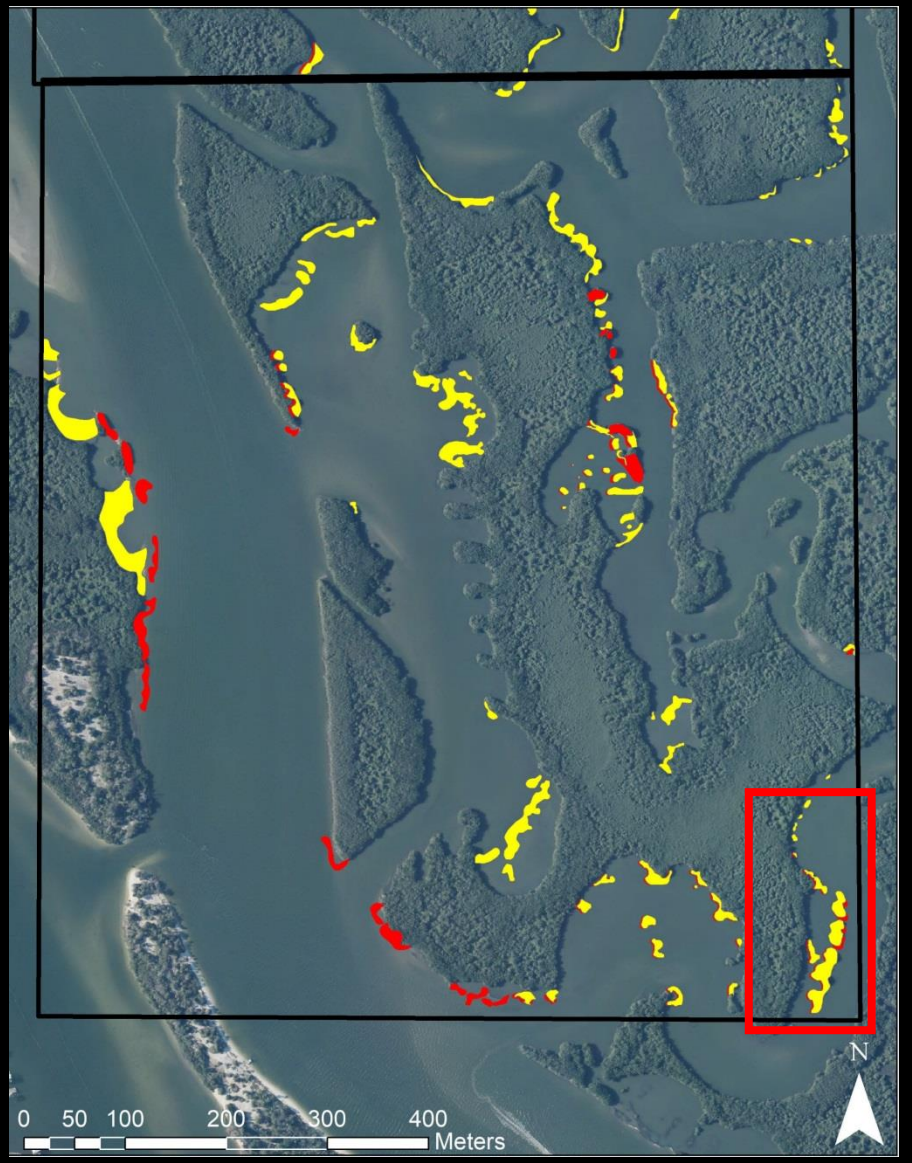

N
0 0.5 1 2 3 4
km


80°54'30"W
80°53'0"W
80°51'30"W
80°50'0"W
29°2'0"N
29°1'30"N
29°1'0"N
29°0'30"N
29°0'0"N
28°59'30"N
28°59'0"N
28°58'30"N
28°58'0"N
28°57'30"N
28°57'0"N
28°56'30"N
28°56'0"N
28°55'30"N
28°55'0"N


Indian River North
Massey Ranch Airport
CEDAR ISLAND
SHIPYARD ISLAND
N
0 0.5 1 2 3 4
km


Indian River North
Massey Ranch Airport
Brevins Bay
CEDAR ISLAND
SHIPYARD ISLAND
N
0 0.5 1 2 3 4
km


0 50 100 300 400
Meters
N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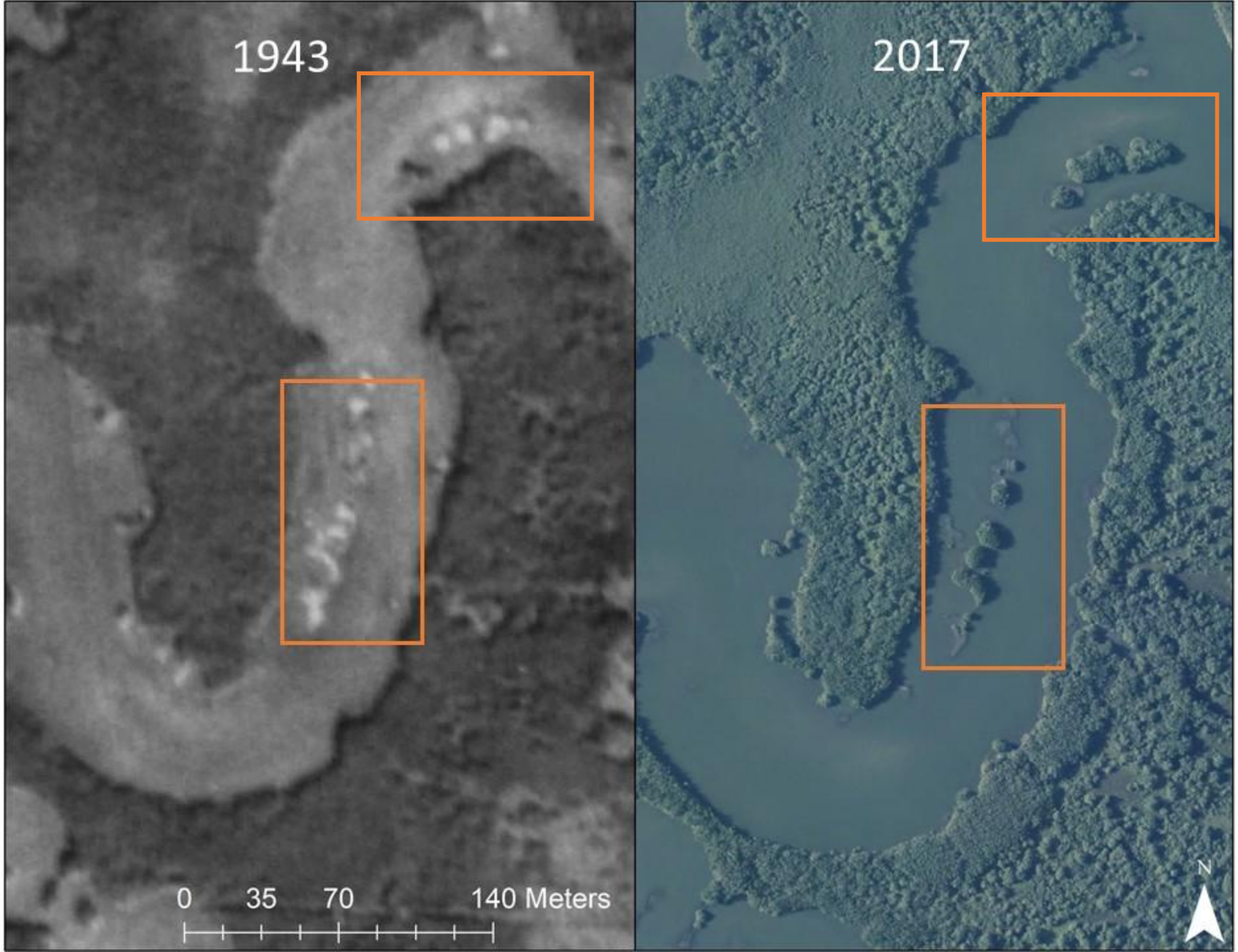
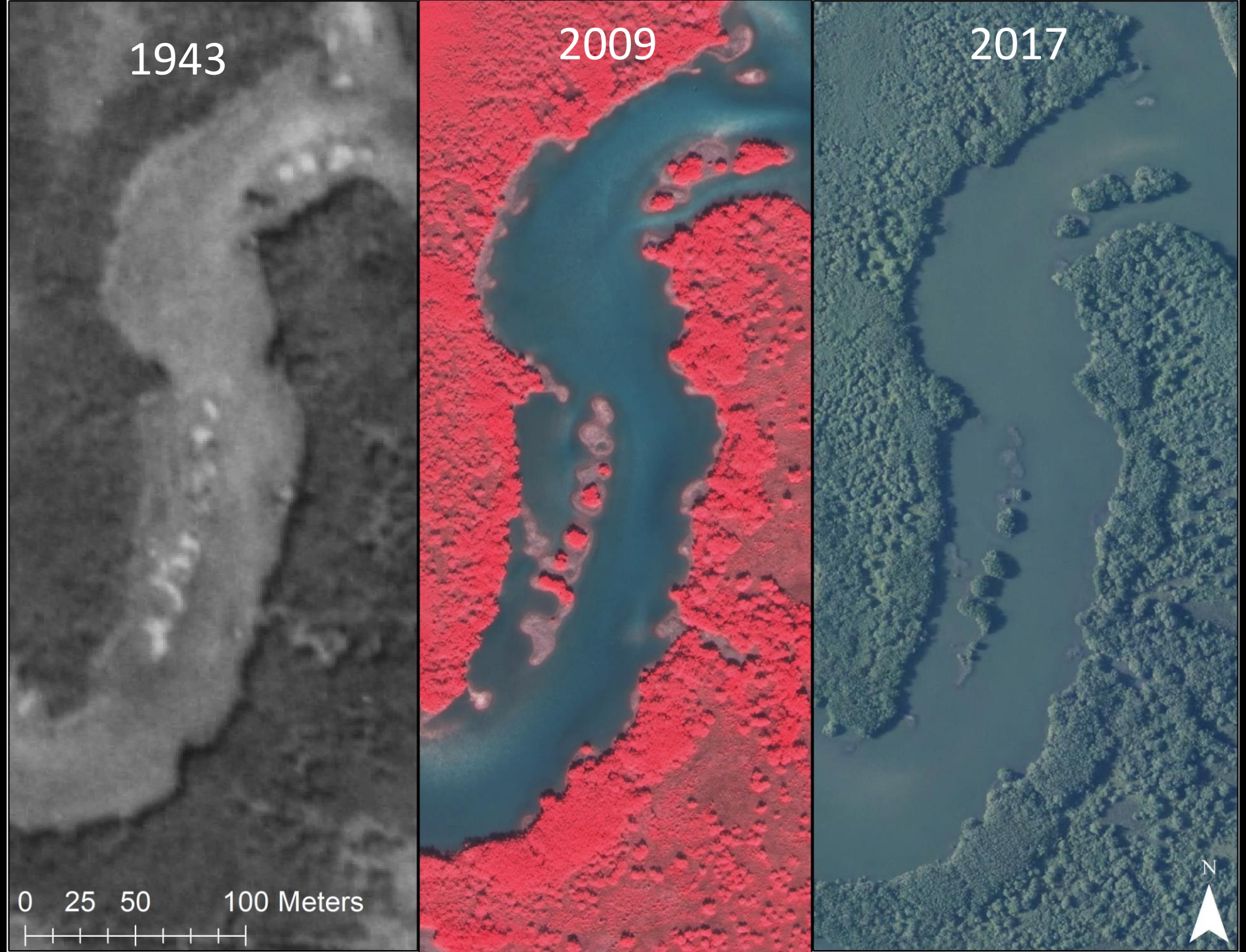
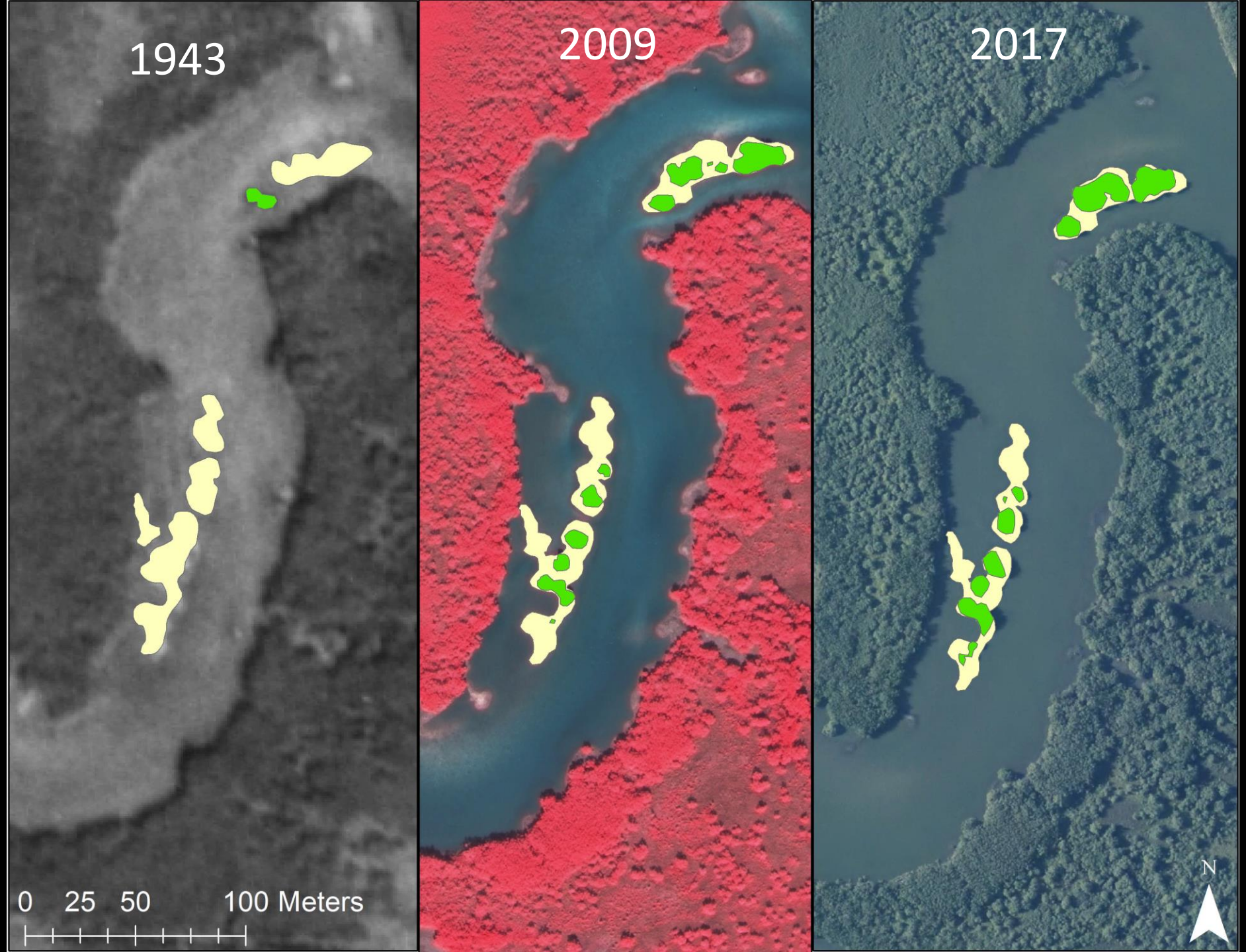
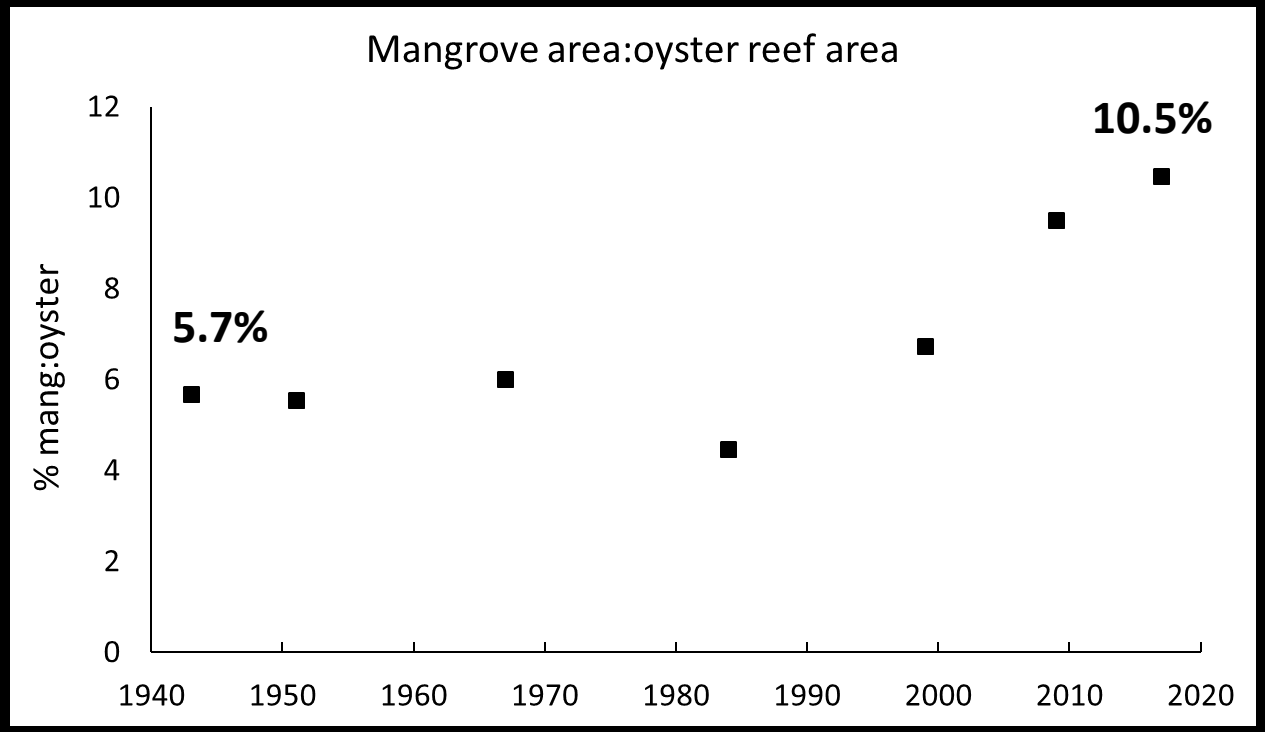
Meters
N

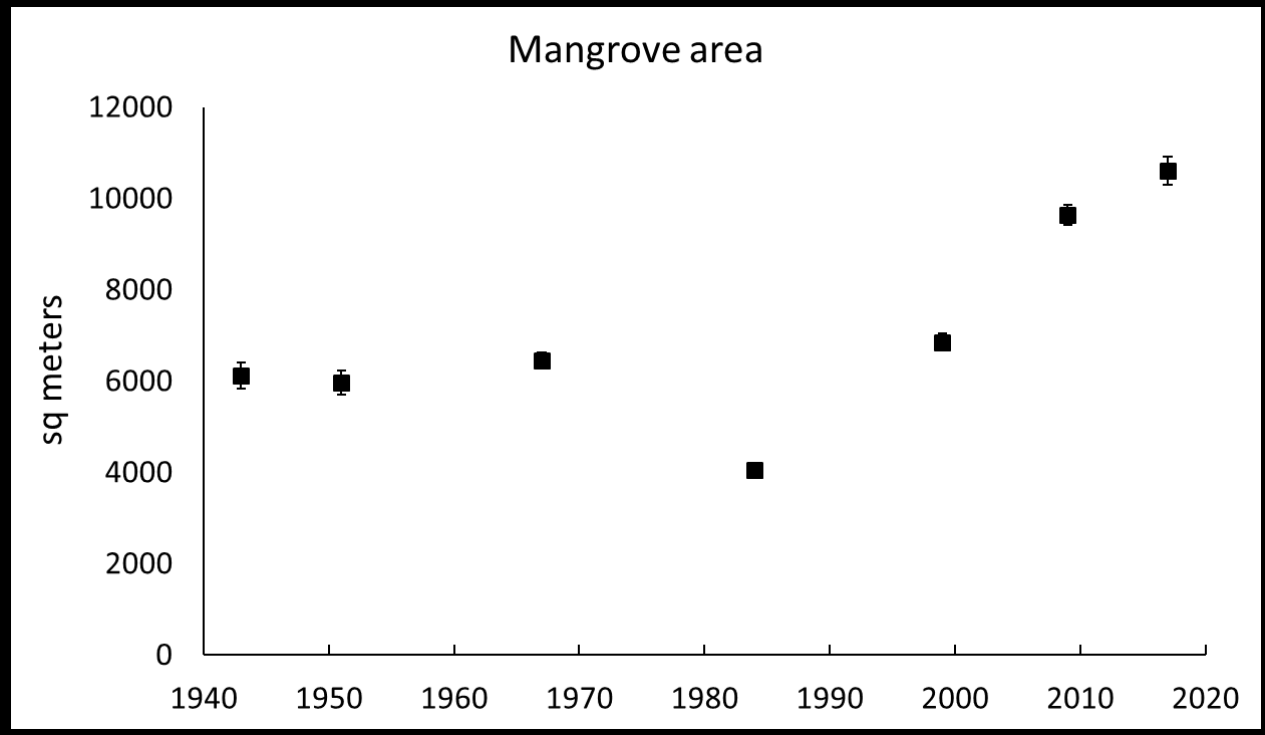

1943
2017
0 35 70 140 Meters
N


1943
2009
2017
0 25 50 100 Meters
N

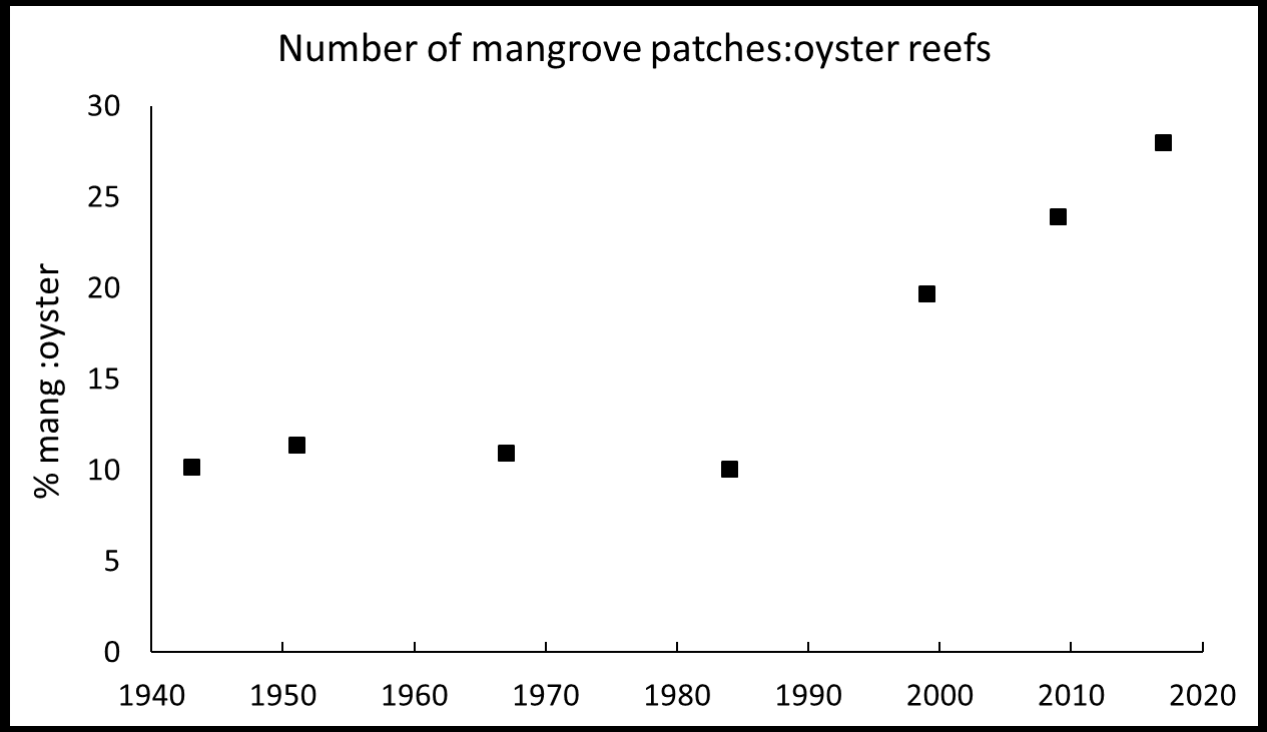

1943
2009
2017
0 25 50 100 Meters
N

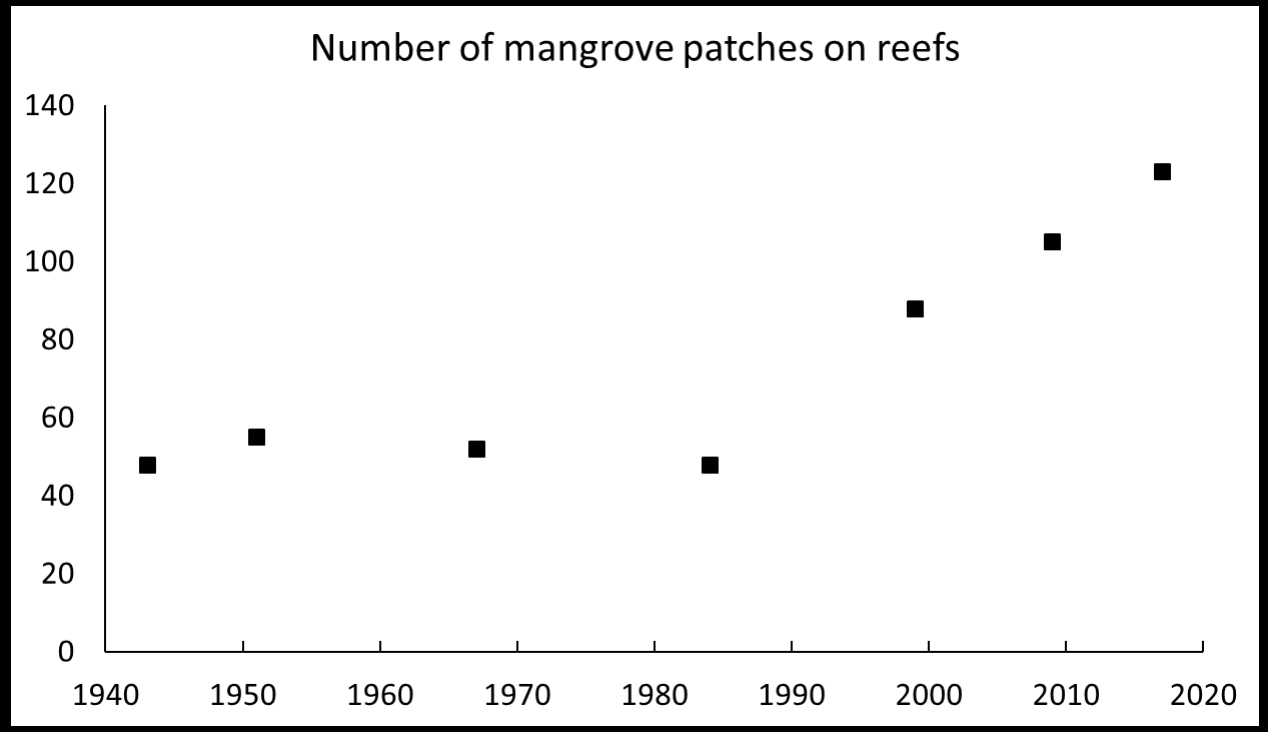
Mangrove area on oyster reefs

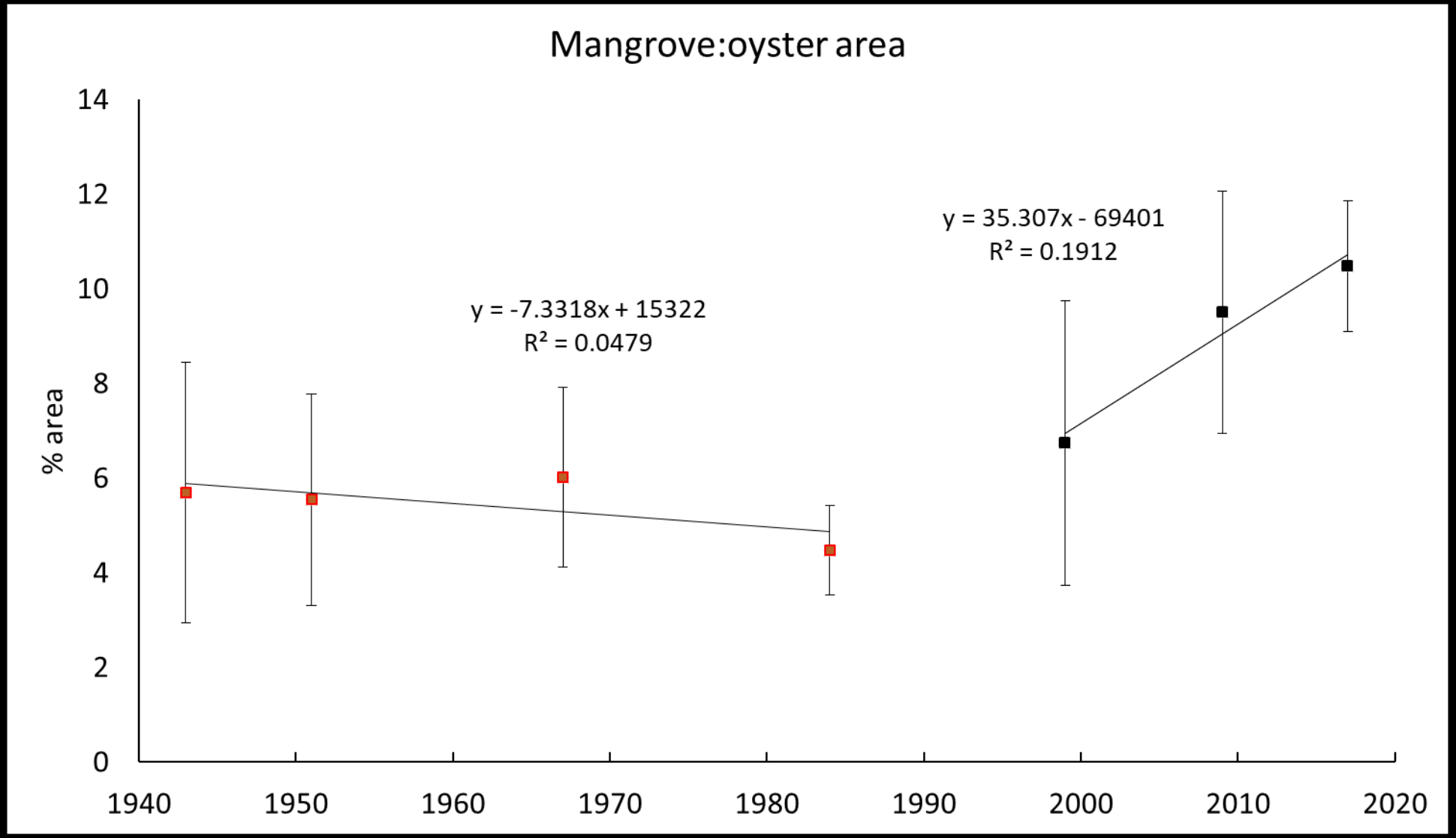




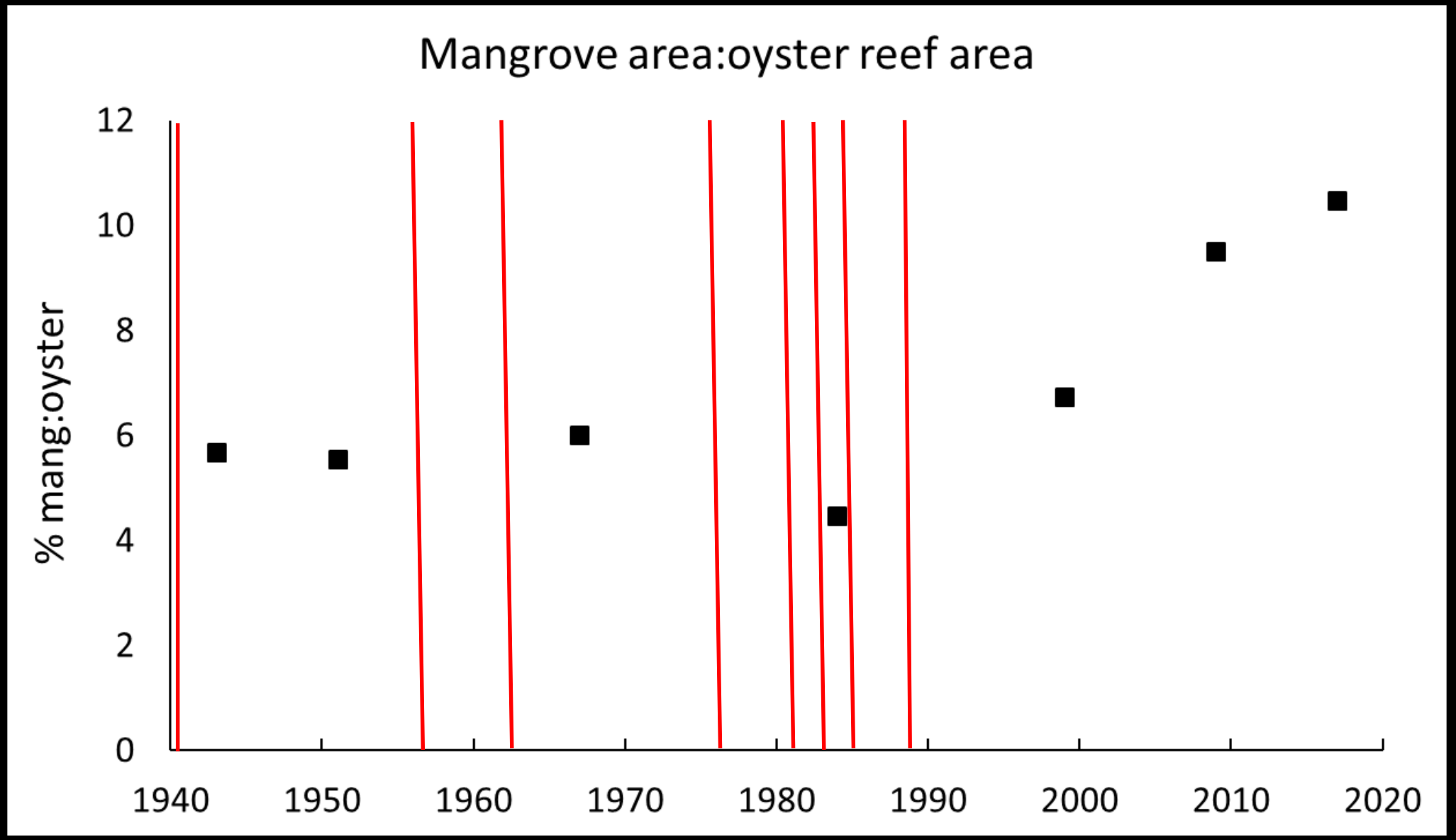
Individual mangrove stands on reefs



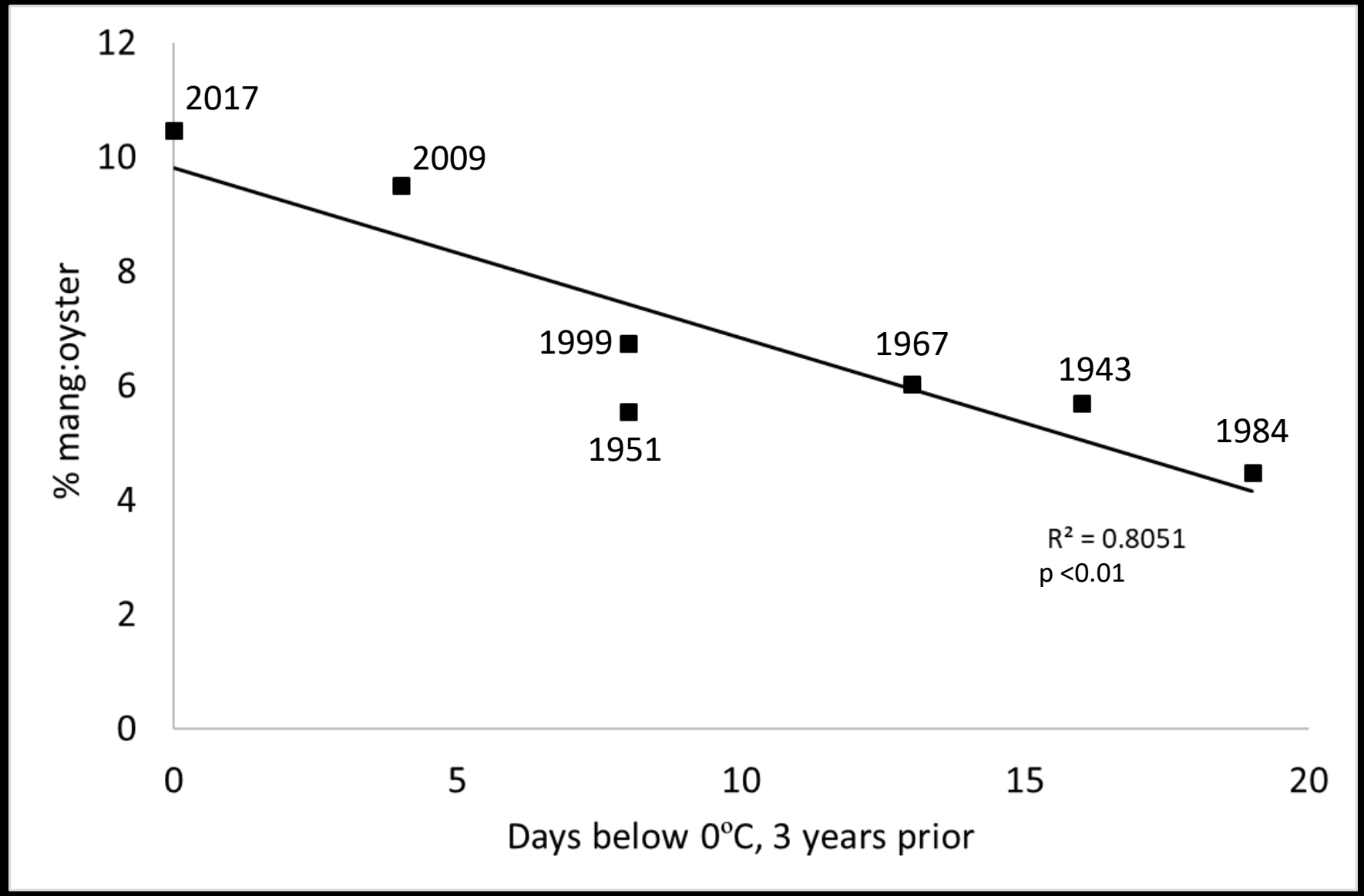



Mangrove:oyster area
% area
14
12
10
8
6
4
2
0
1940
1950
1960
1970
1980
1990
2000
2010
2020
y = -7.3318x + 15322
R² = 0.0479
y = 35.307x - 69401
R² = 0.1912

Freezes in Florida since 1940



Days below freezing prior to image



Ecosystem shift?

% mangrove area:oyster reef area doubled since 1984

Indicative of potential system wide changes?

How long can it continue?

- Not occurring on every reef, why not?

Questions?