Tidal Creeks and Migrating Reefs - *Enhancing Oyster Reef Habitat in Coastal Tidal Creeks*

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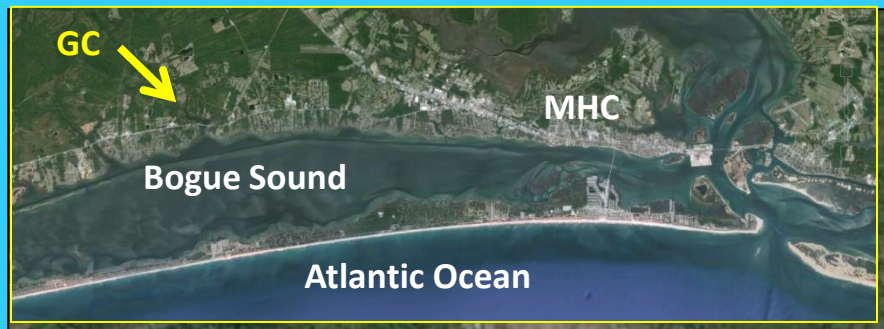
UNC INSTITUTE of MARINE SCIENCES

Sea Grant North Carolina

Albemarle - Pamlico National Estuary Partnership

Gales Creek

Bogue Sound



Gales Creek

Sea Grant
North Carolina

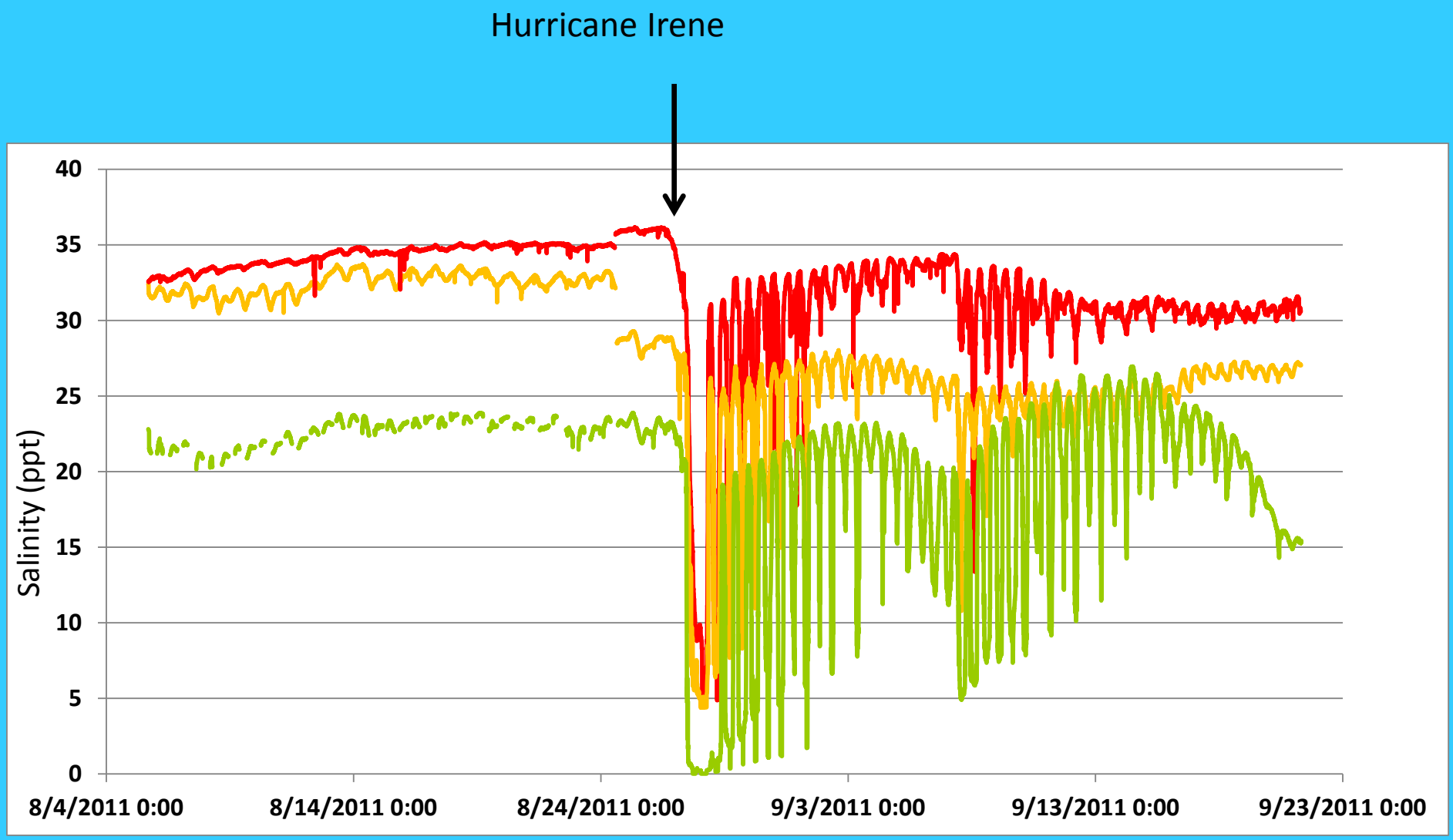
Bogue Sound


PC
MHC
Bogue Sound
Atlantic Ocean
Pelletier Creek


PC
MHC
Bogue Sound
Atlantic Ocean

Pelletier Creek
Morehead City

Gales Creek


Hurricane Irene
Salinity (ppt)
40
35
30
25
20
15
10
5
0
8/4/2011 0:00
8/14/2011 0:00
8/24/2011 0:00
9/3/2011 0:00
9/13/2011 0:00
9/23/2011 0:00

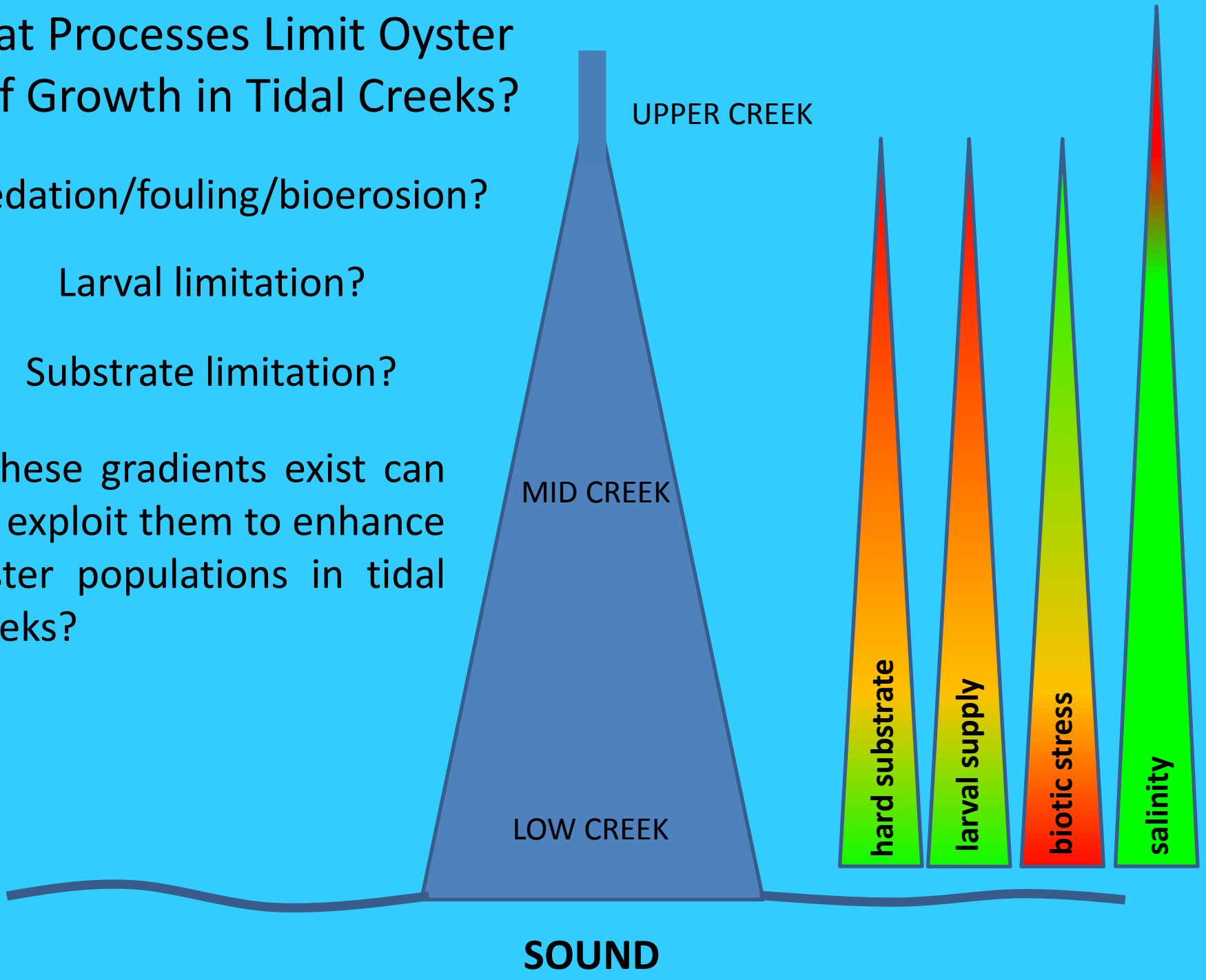
What Processes Limit Oyster Reef Growth in Tidal Creeks?

Predation/fouling/bioerosion?

Larval limitation?

Substrate limitation?

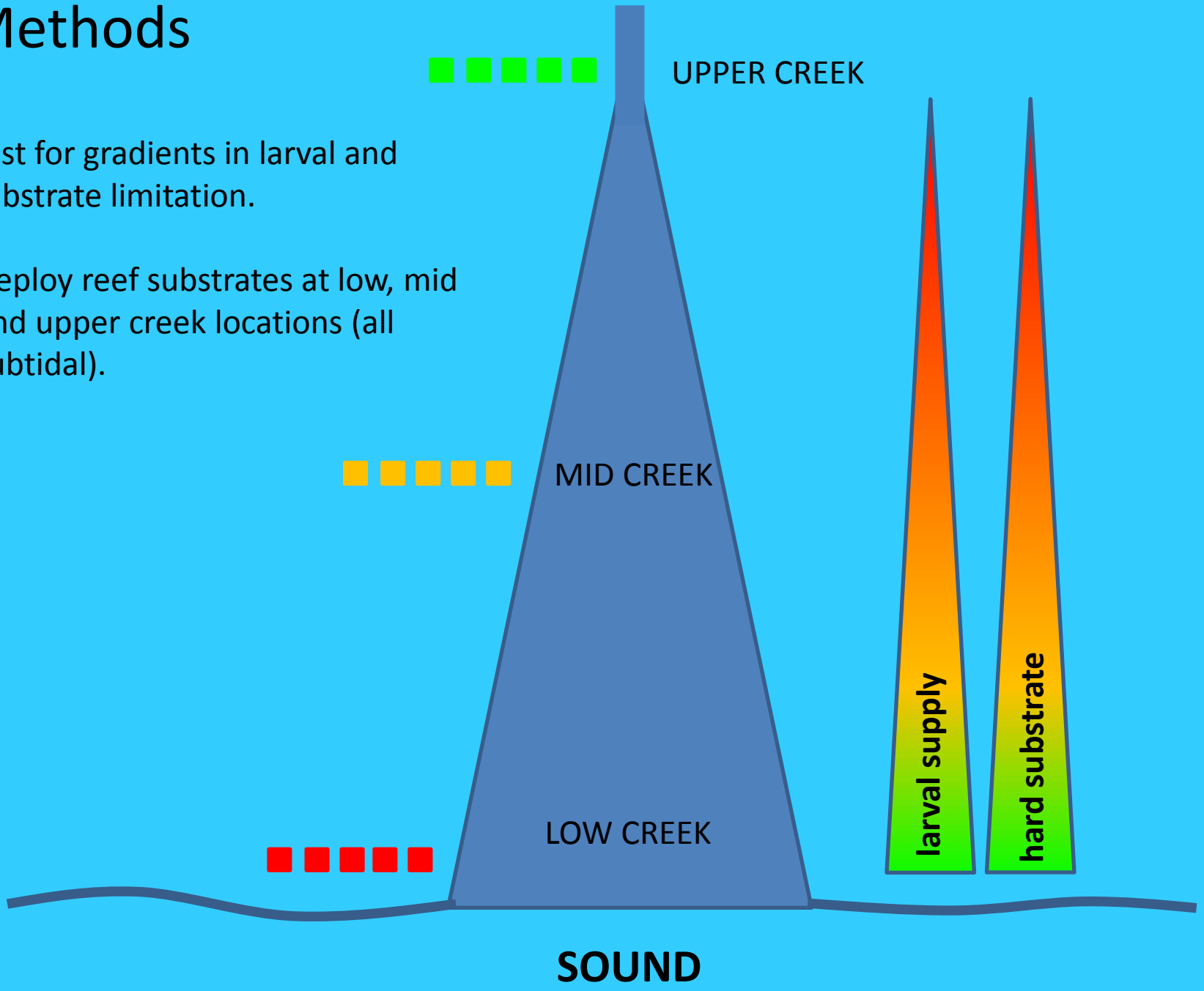
If these gradients exist can we exploit them to enhance oyster populations in tidal creeks?



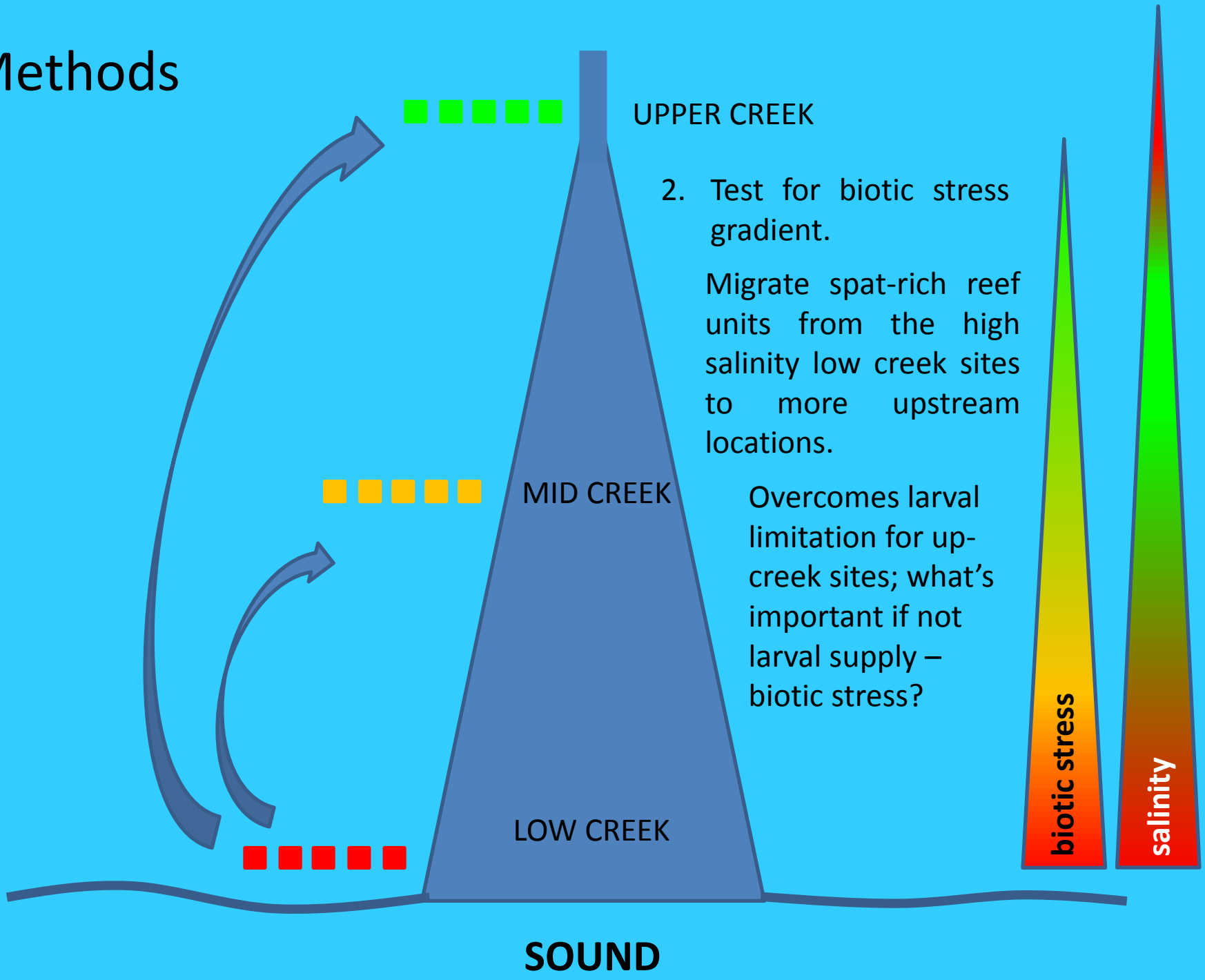
Methods

1. Test for gradients in larval and substrate limitation.

   Deploy reef substrates at low, mid and upper creek locations (all subtidal).



Methods

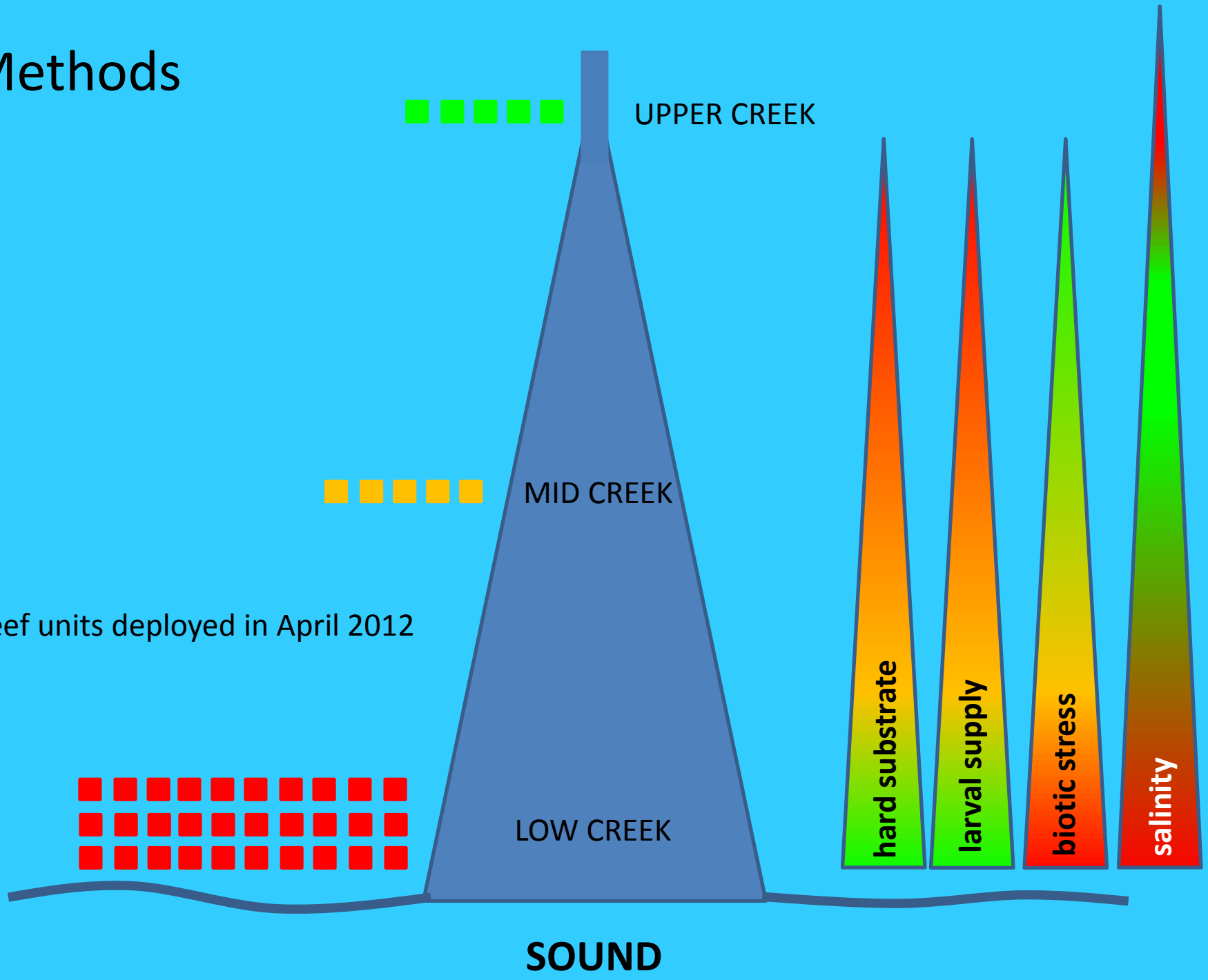


2. Test for biotic stress gradient.

Migrate spat-rich reef units from the high salinity low creek sites to more upstream locations.

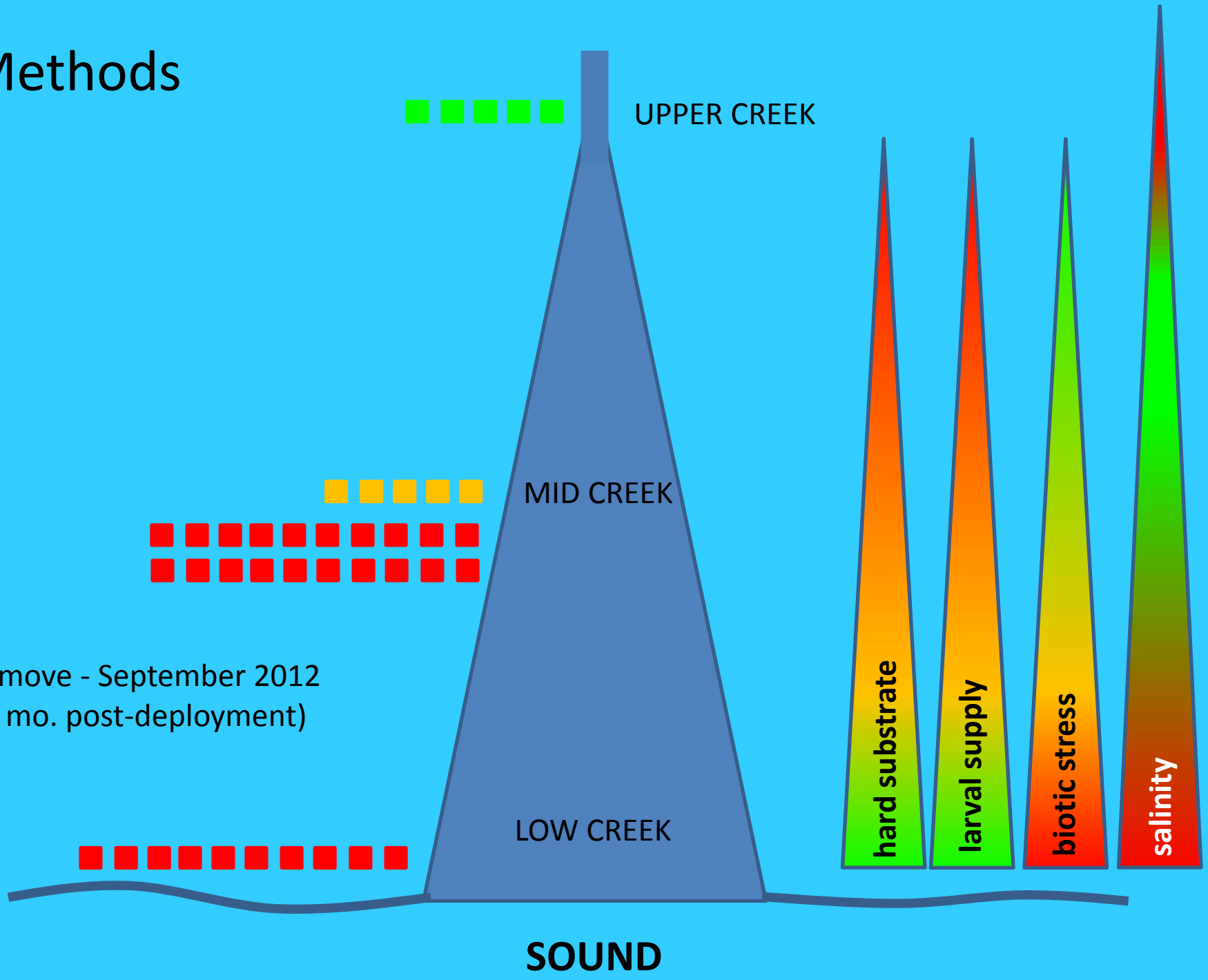
Overcomes larval limitation for up-creek sites; what's important if not larval supply – biotic stress?

Methods



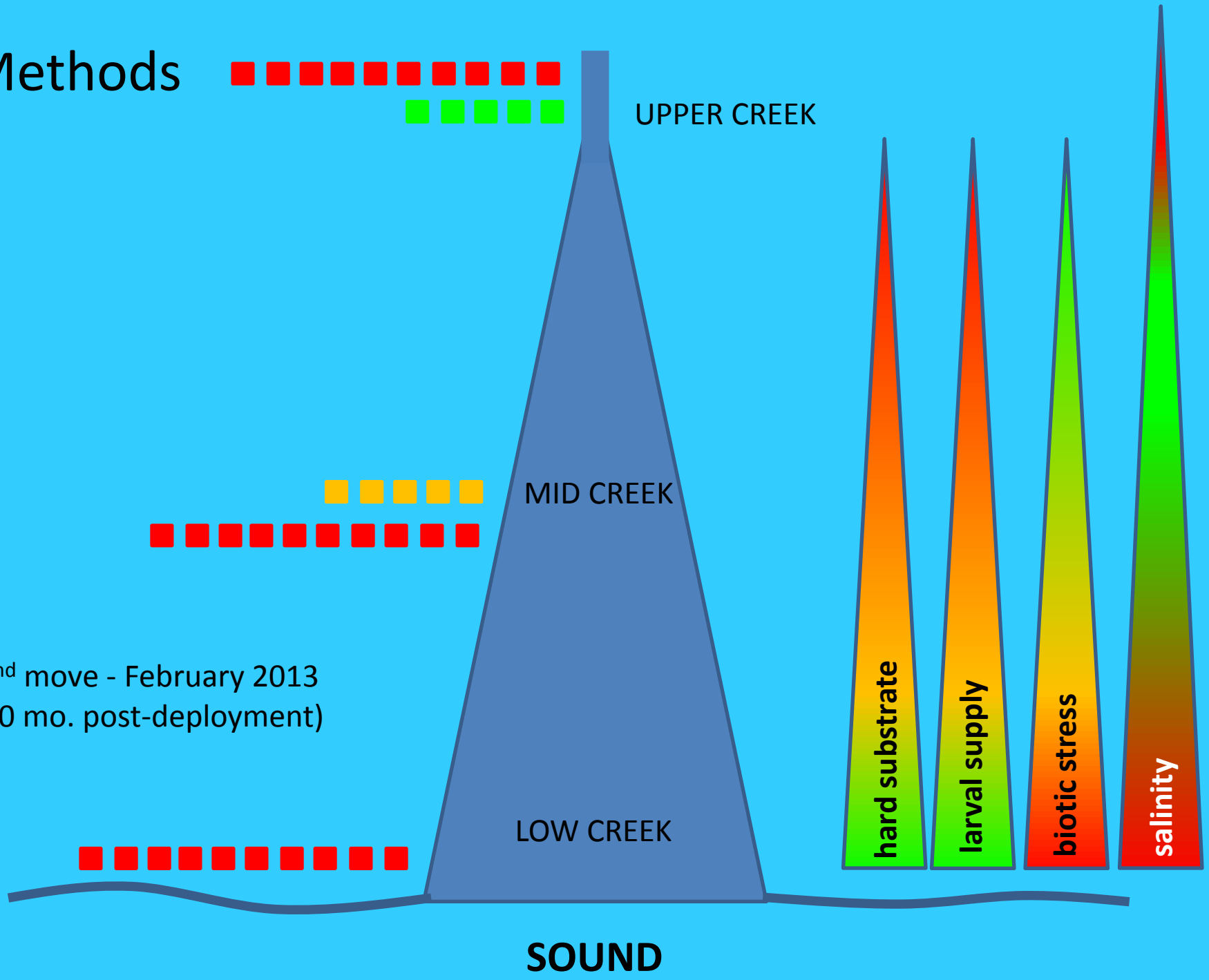
Reef units deployed in April 2012

Methods



1st move - September 2012
(6 mo. post-deployment)

Methods



2nd move - February 2013
(10 mo. post-deployment)

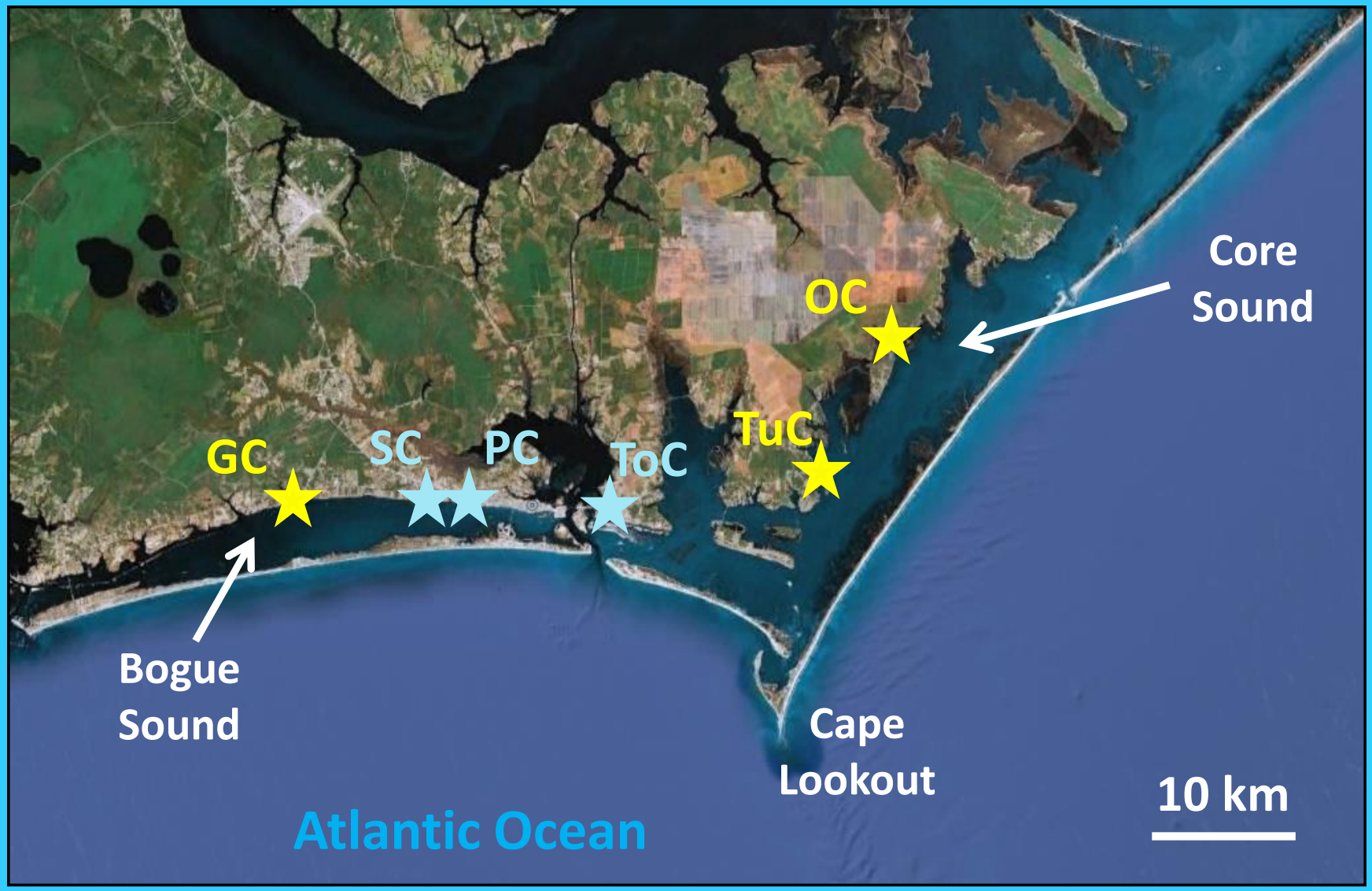
Reef Substrate

cement-coated crab pots

Adam Tyler

David “Clammerhead” Cessna

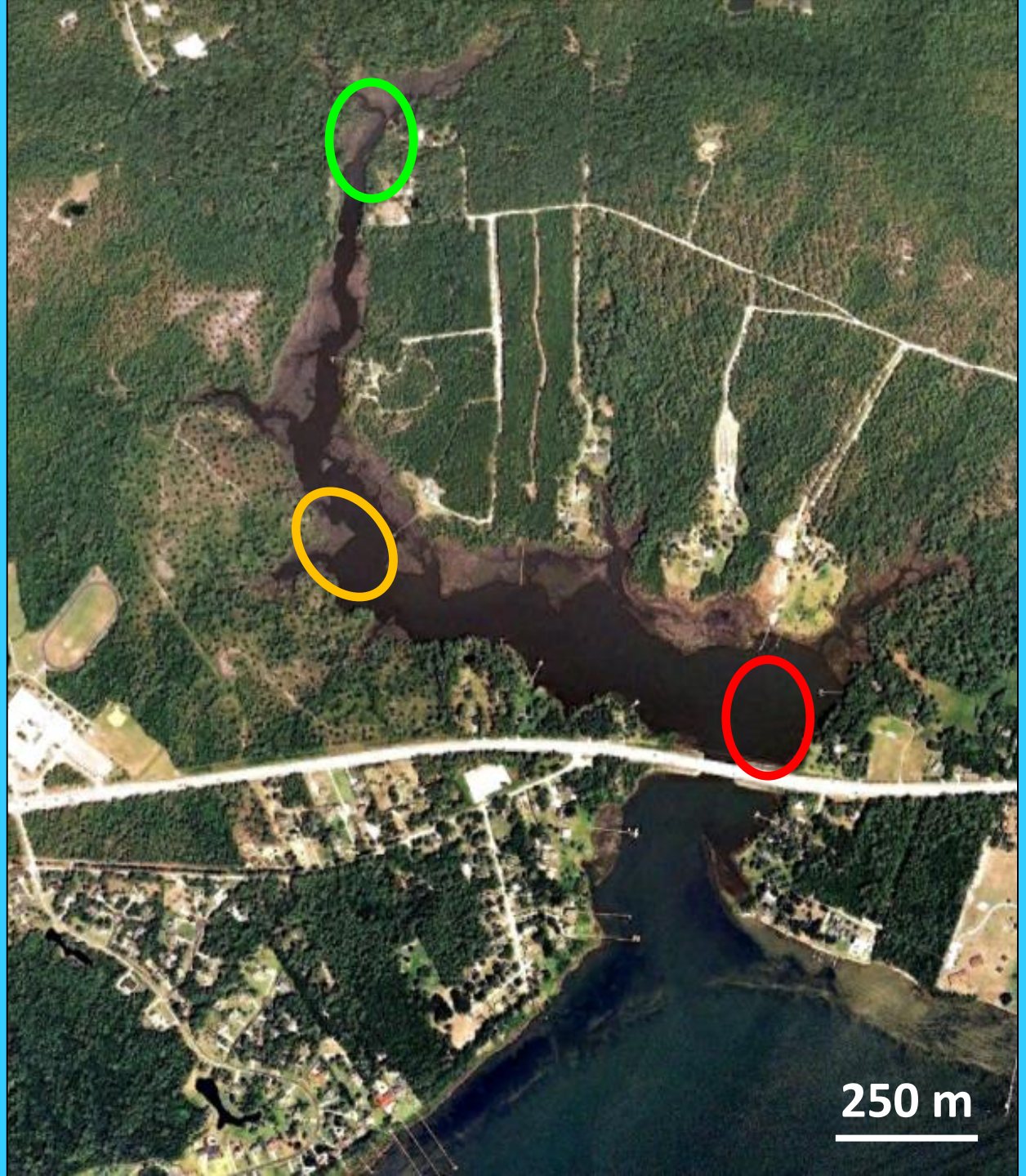
Study Creeks



= rural creeks

= urban creeks

Gales Creek



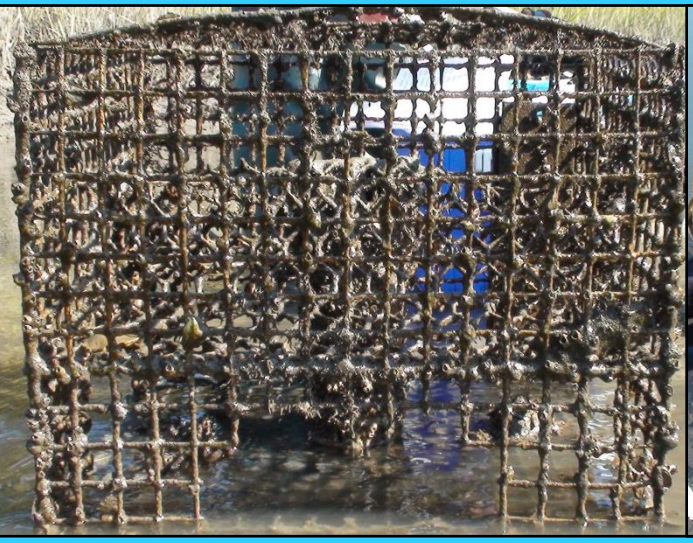
Upper-Creek Stations (6 mo. post-deployment)

Gales

Spooners

Pelletier

Town



Tusk

Oyster

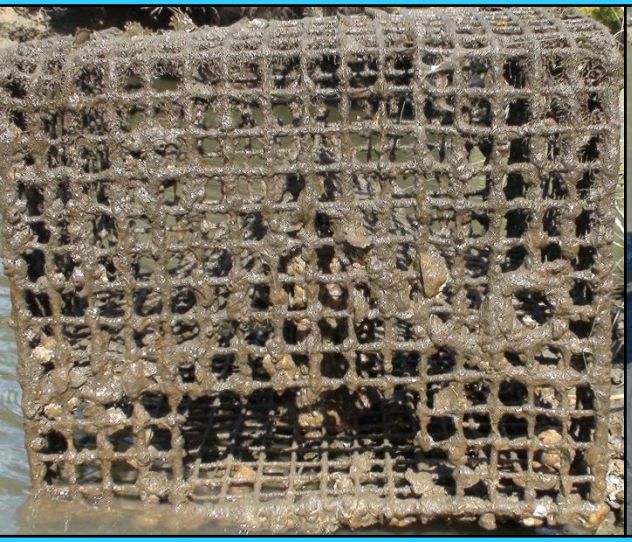
Mid-Creek Stations (6 mo. post-deployment)

Gales

Spooners

Pelletier

Town

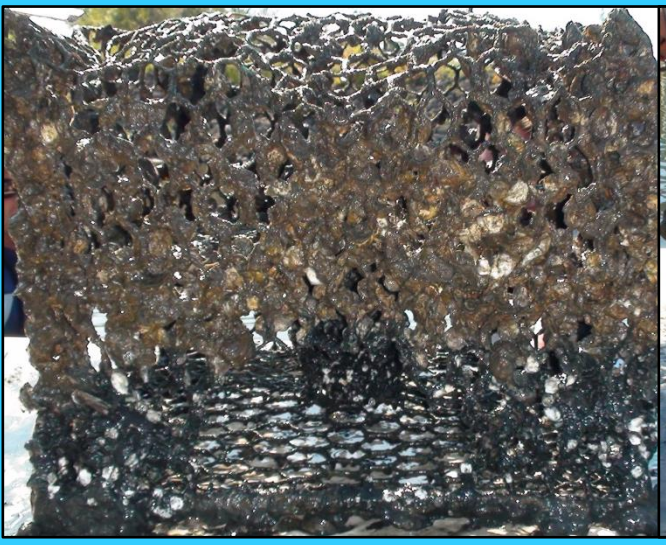


Tusk

Oyster

Low-Creek Stations (6 mo. post-deployment)

Gales



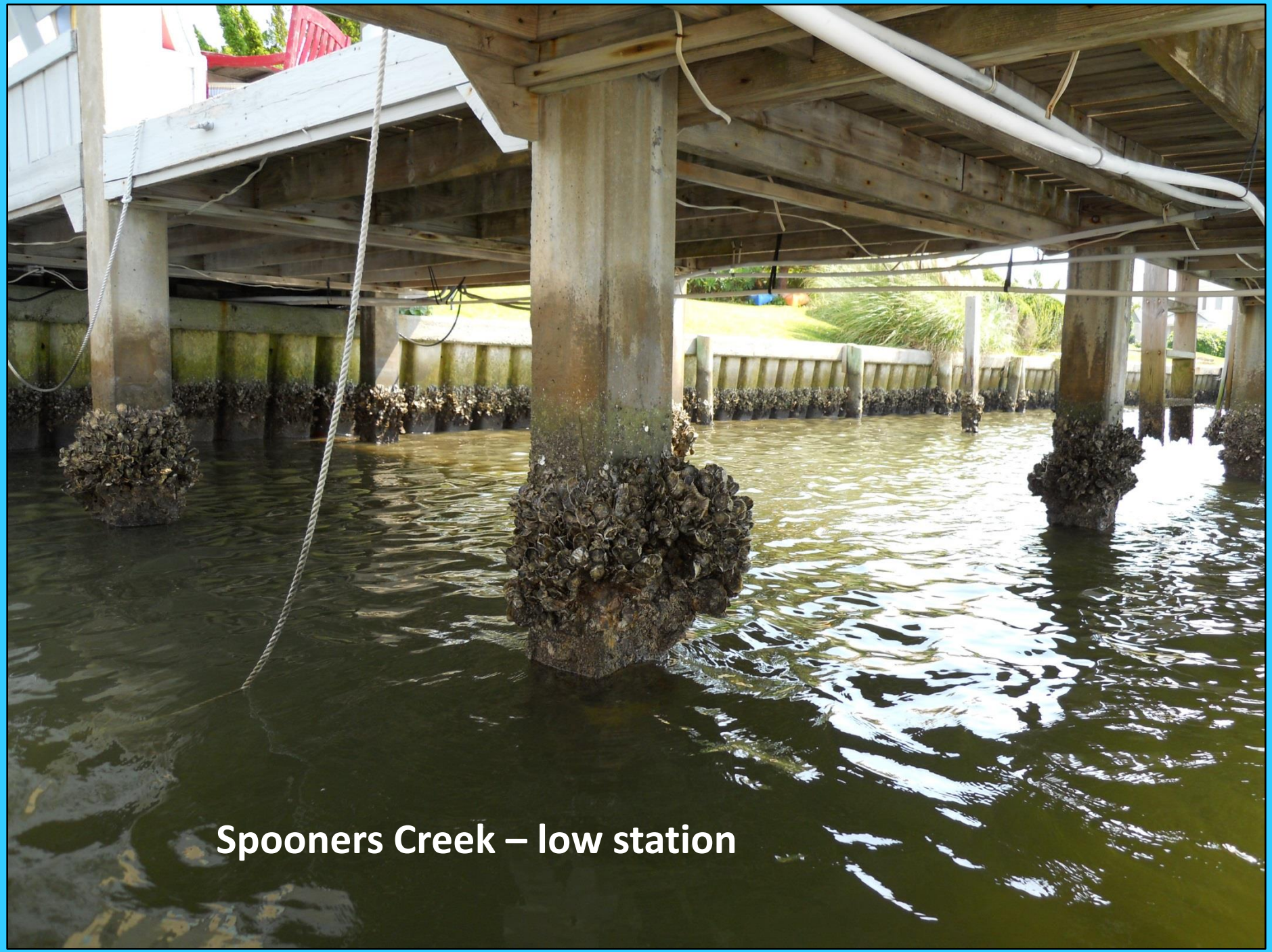
Spooners

Pelletier

Town

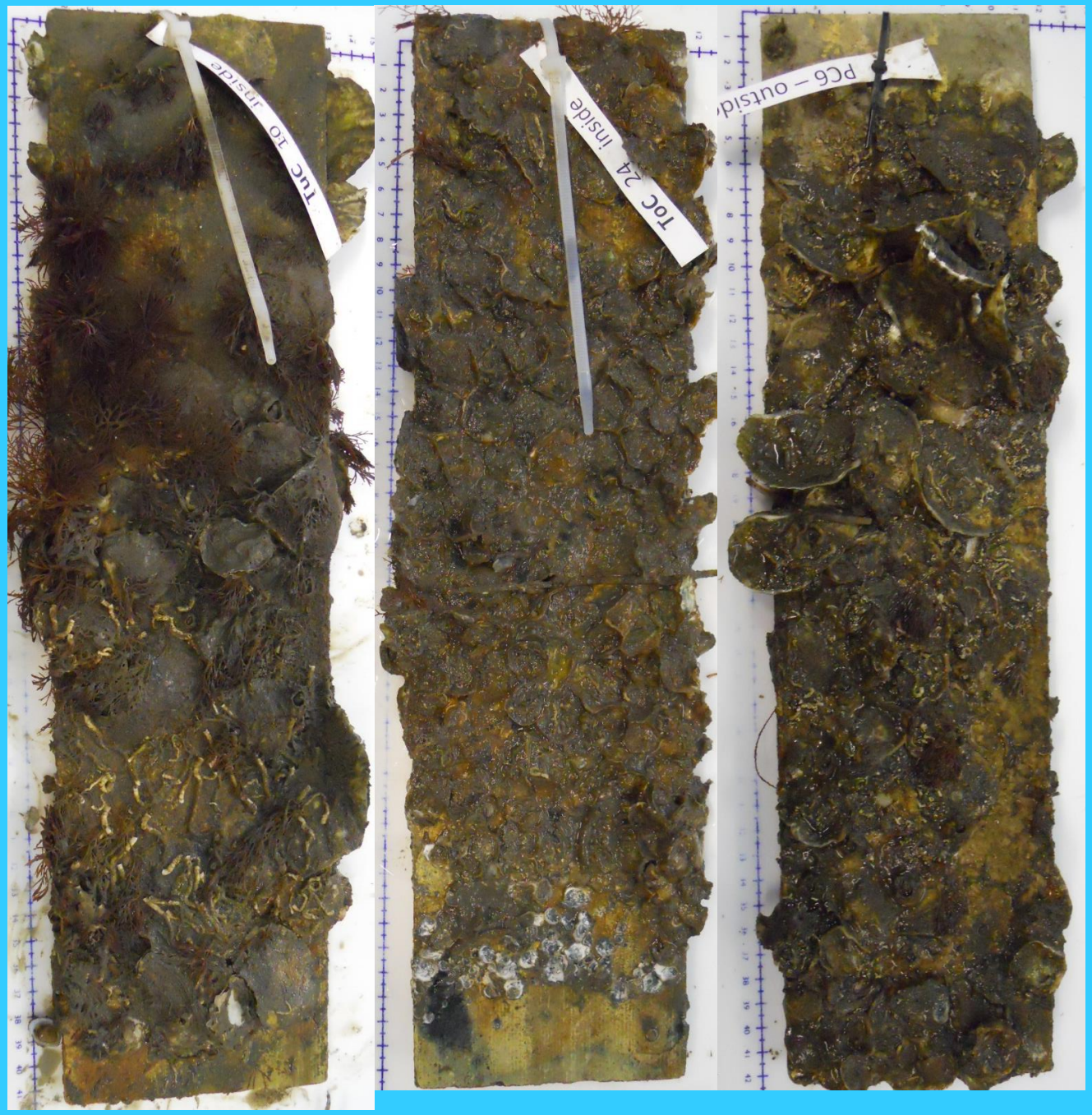
Tusk

Oyster


Spooners Creek – low station

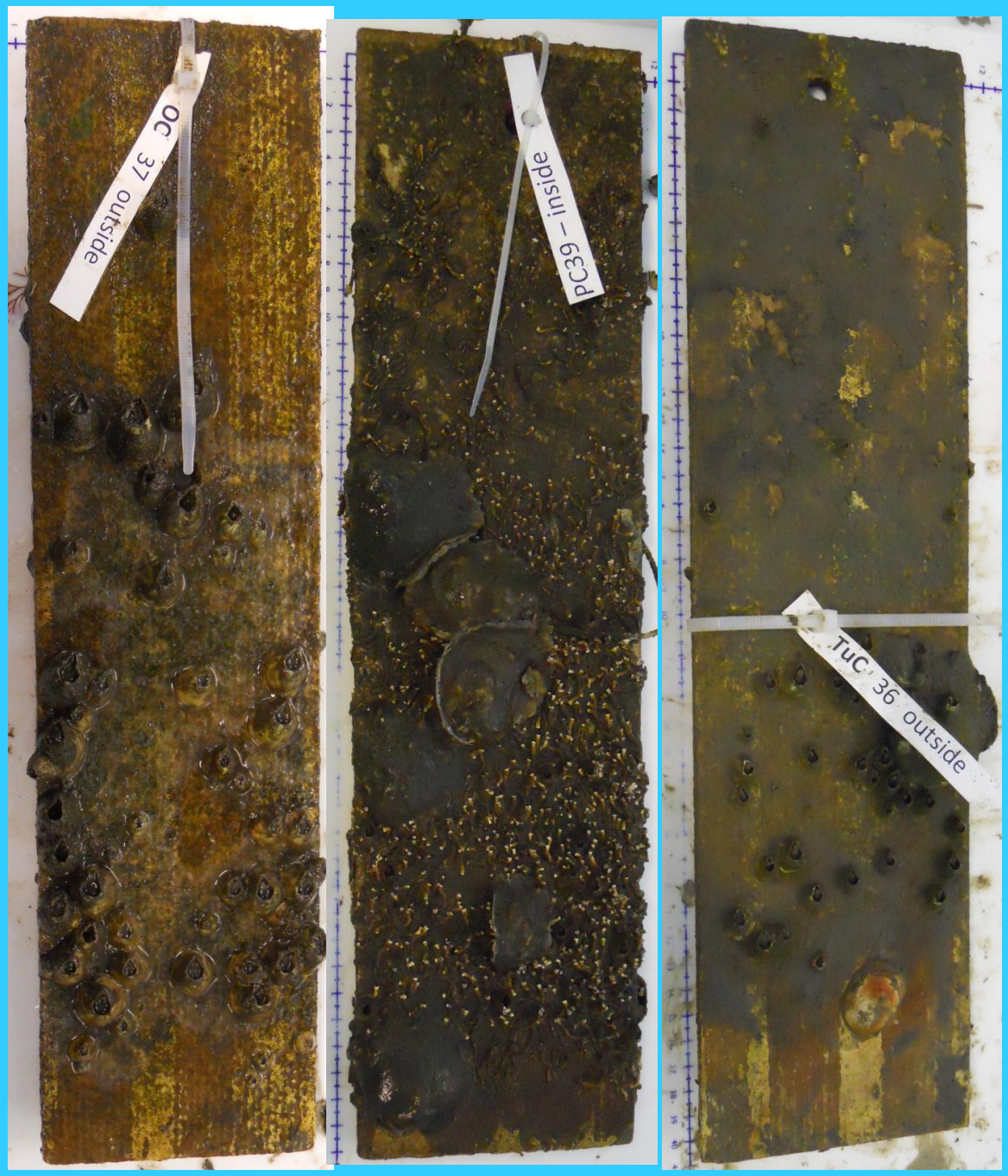
low-creek stations

6 mo. post-deployment



upper-creek stations

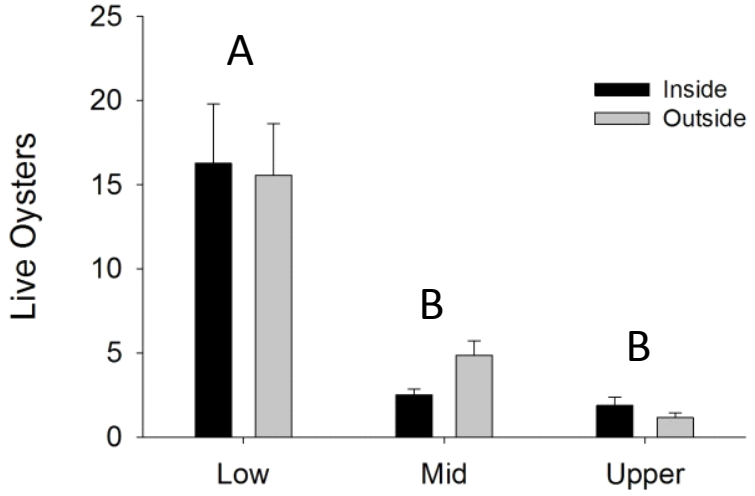
6 mo. post-deployment



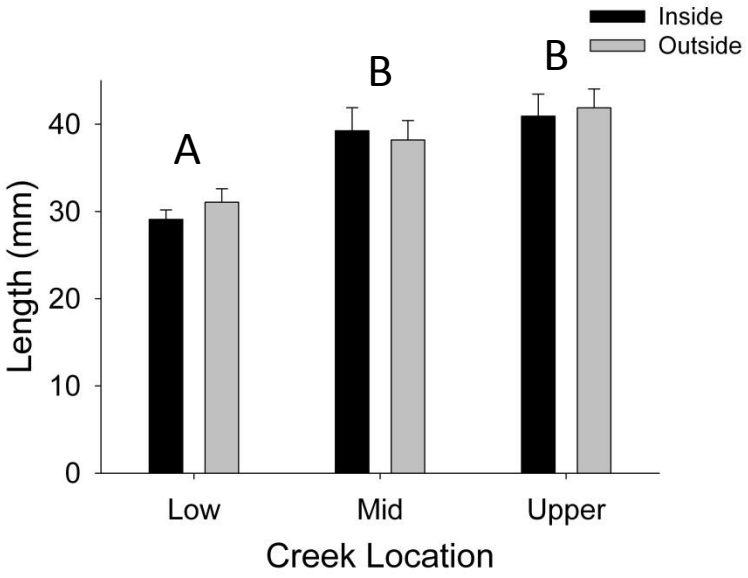
settlement plate
oyster counts/sizes

6 mo. post deployment

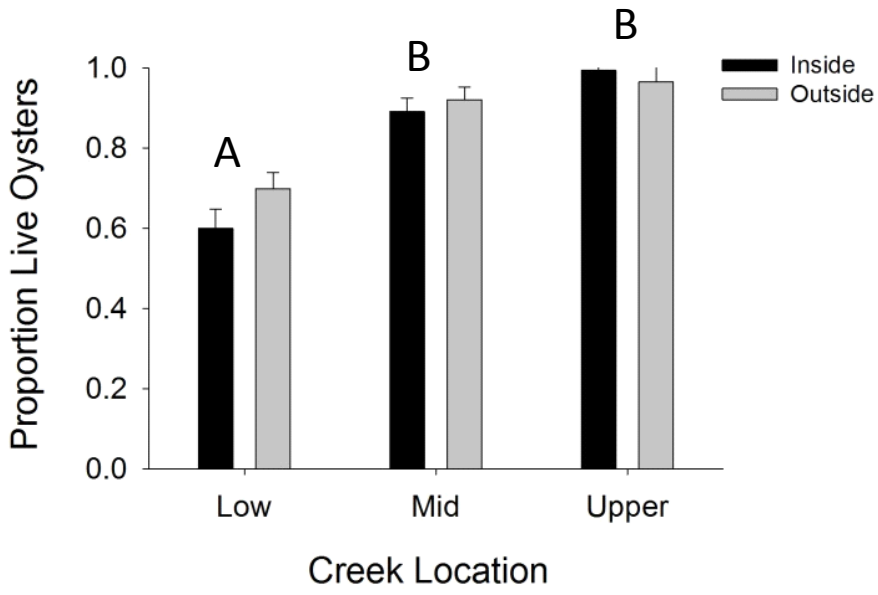
Live Oyster per Plate by Creek Location



Average Oyster Length by Creek Location



Proportion Live Oyster by Creek Location




18 months post-deployment


HYDRO FLEX
XCEL
COMPRESSION RESISTANT
XCEL

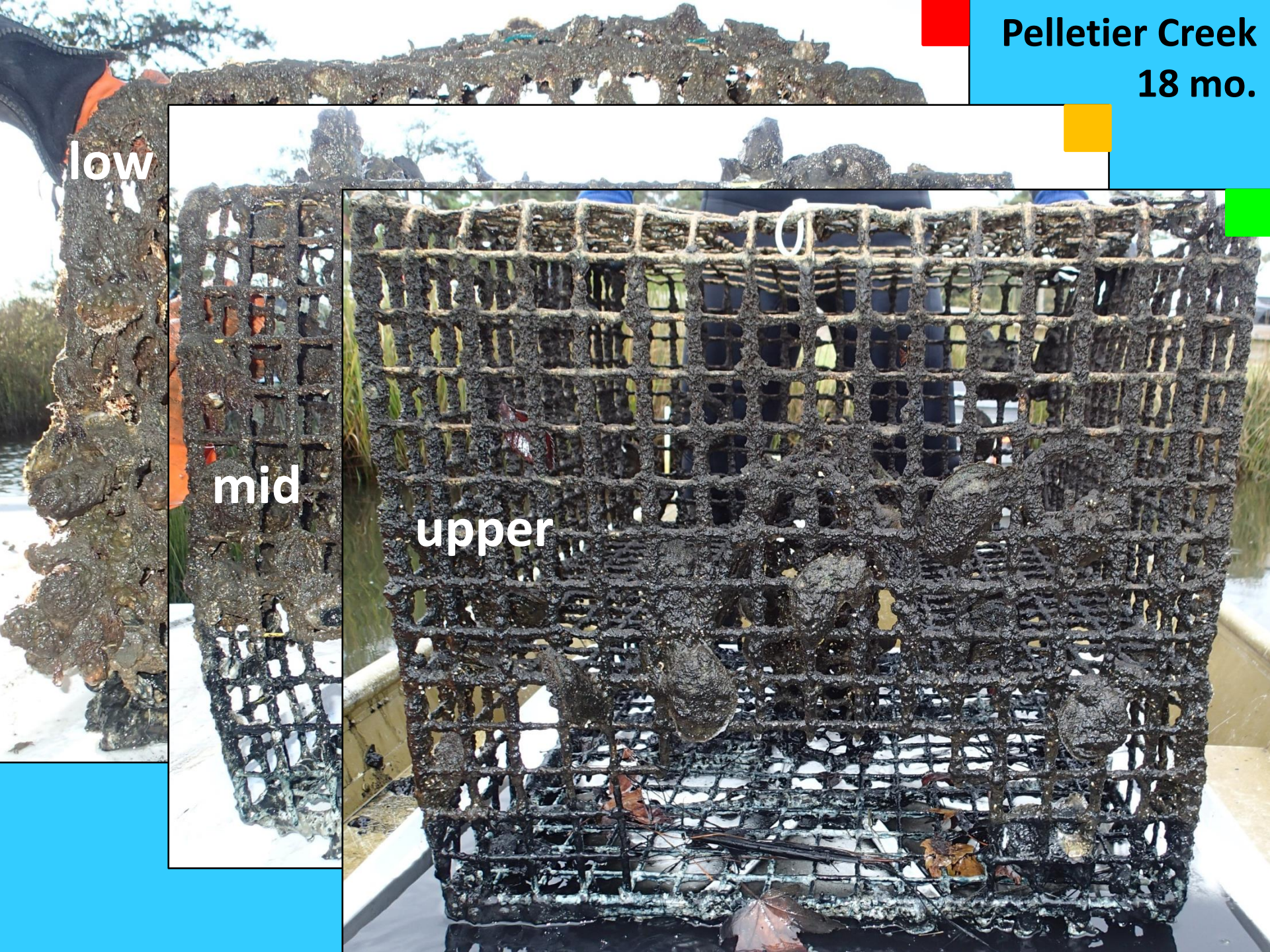
Gales Creek
18 mo.

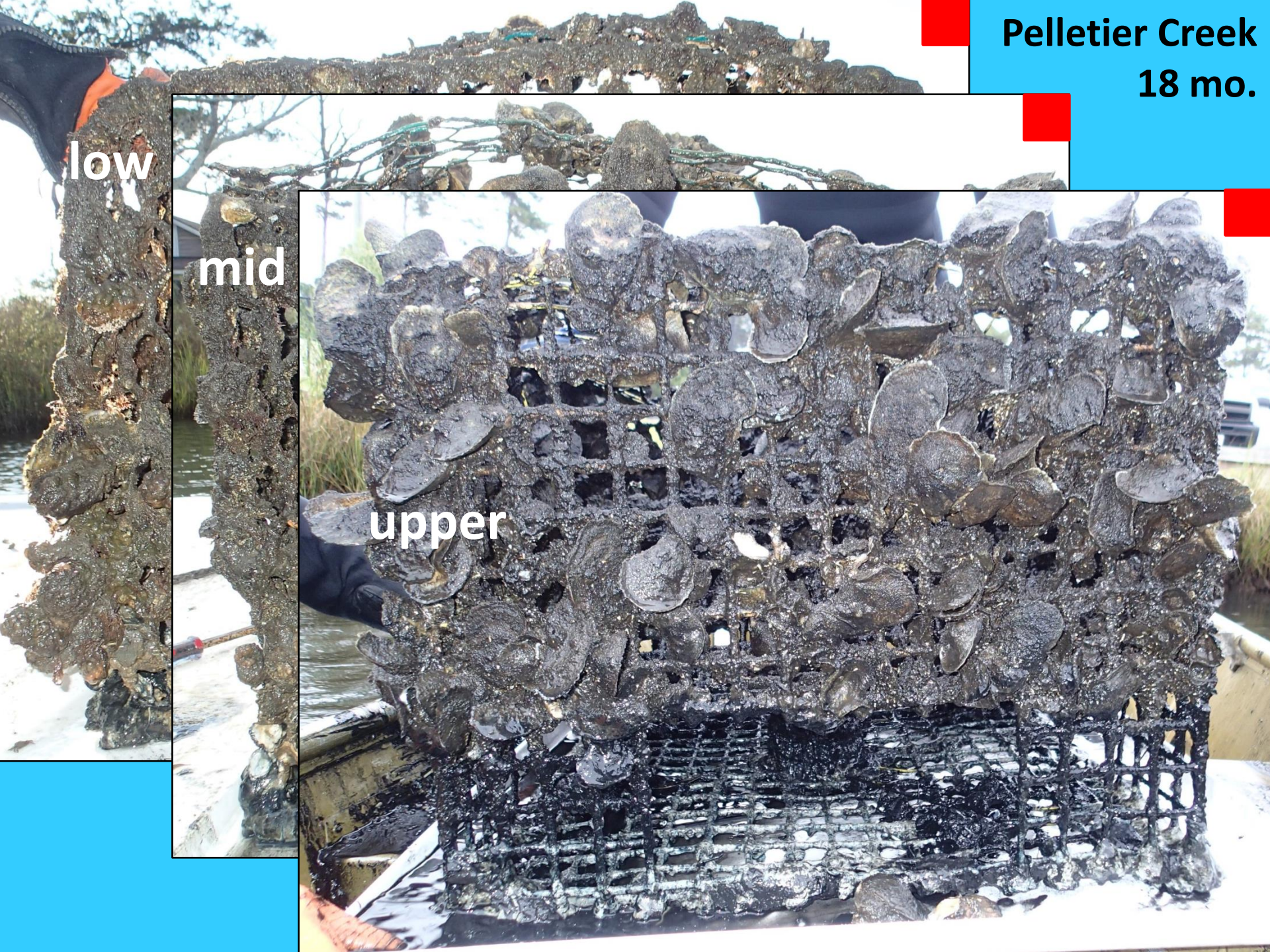
Gales Creek
18 mo.

Gales Creek
18 mo.

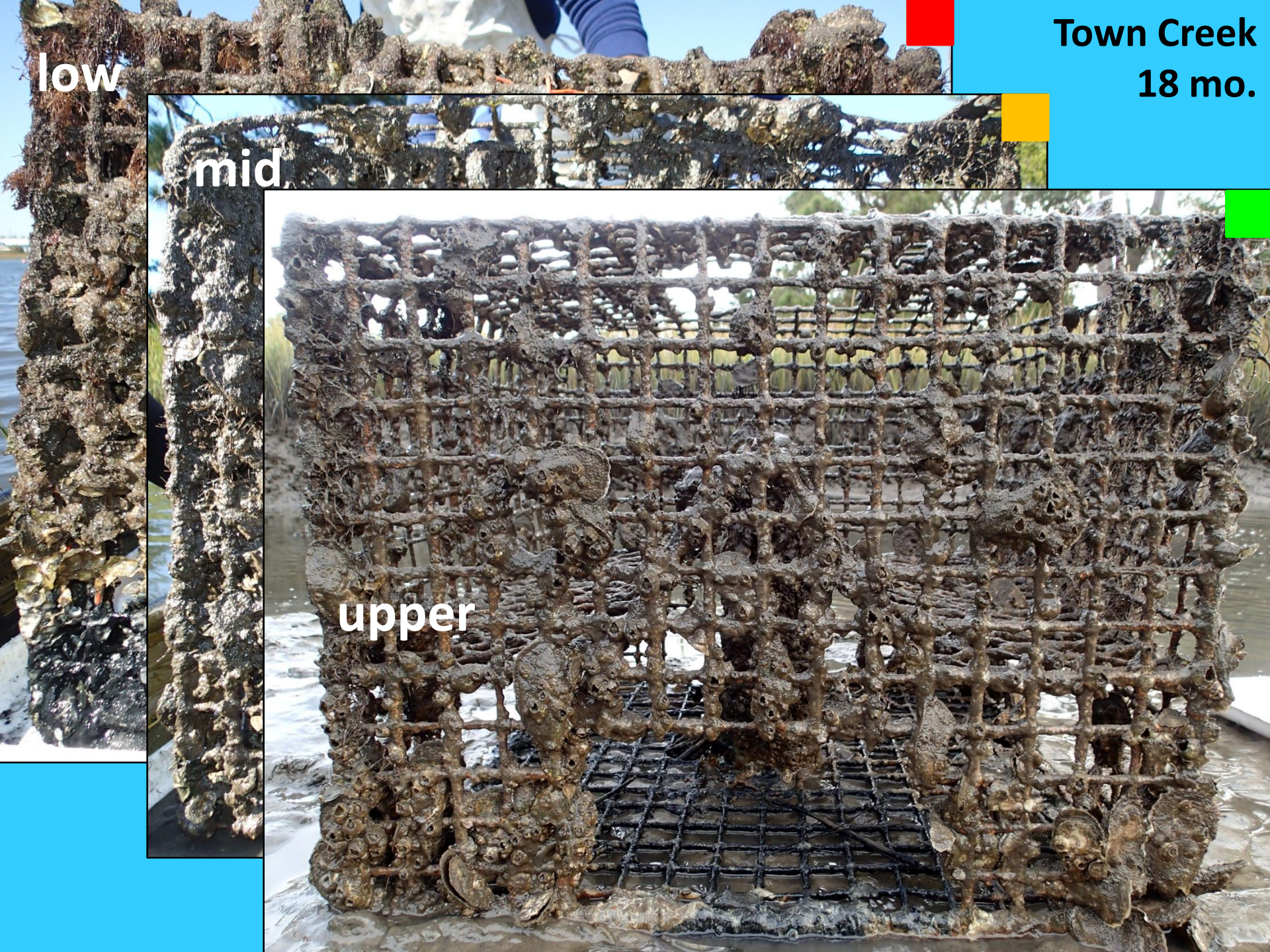

Spooners Creek
18 mo.
low
mid
upper

Pelletier Creek
18 mo.



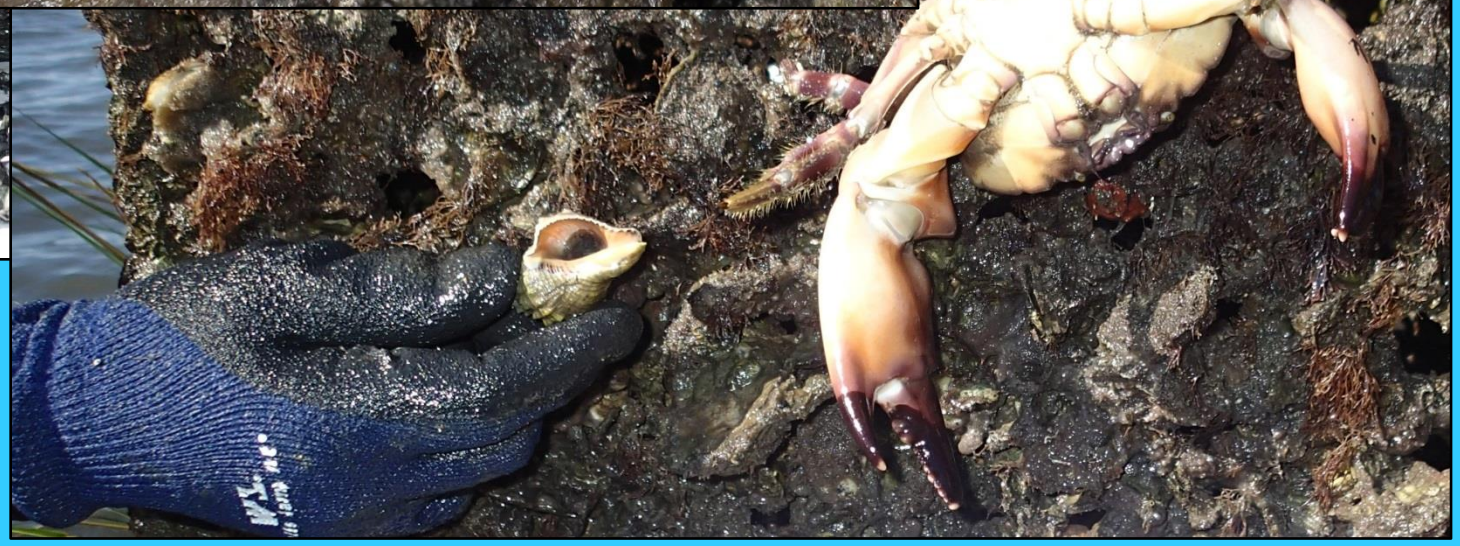

Pelletier Creek
18 mo.
low
mid
upper

Pelletier Creek
18 mo.

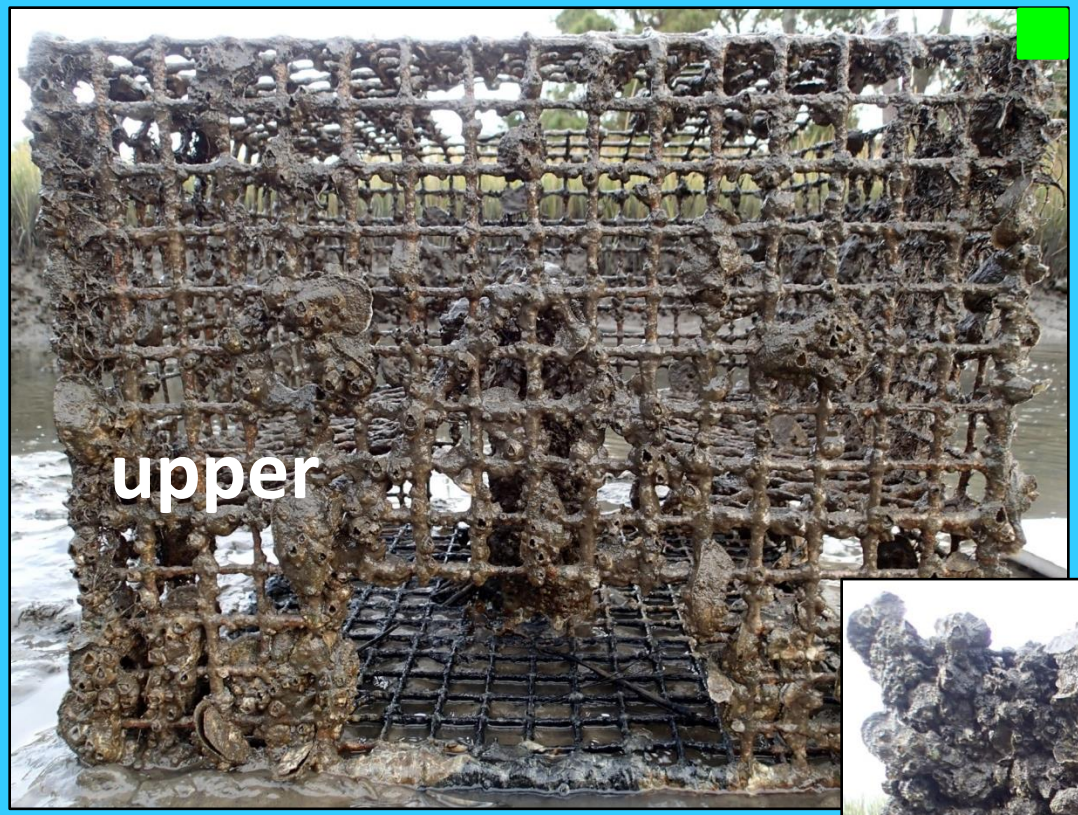

low
mid
upper
Town Creek
18 mo.

low

Town Creek
18 mo.

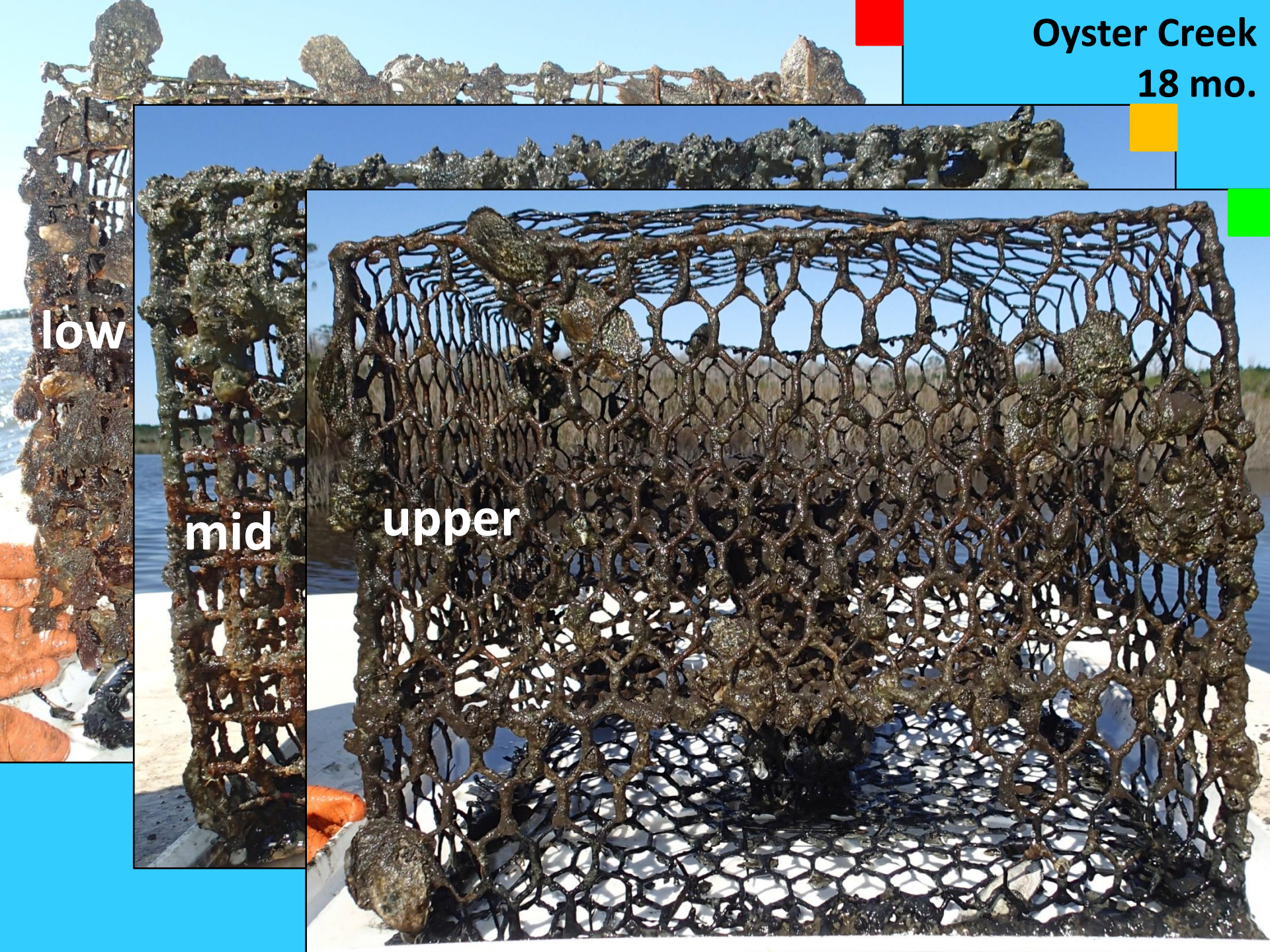



low
mid
upper
Town Creek
18 mo.

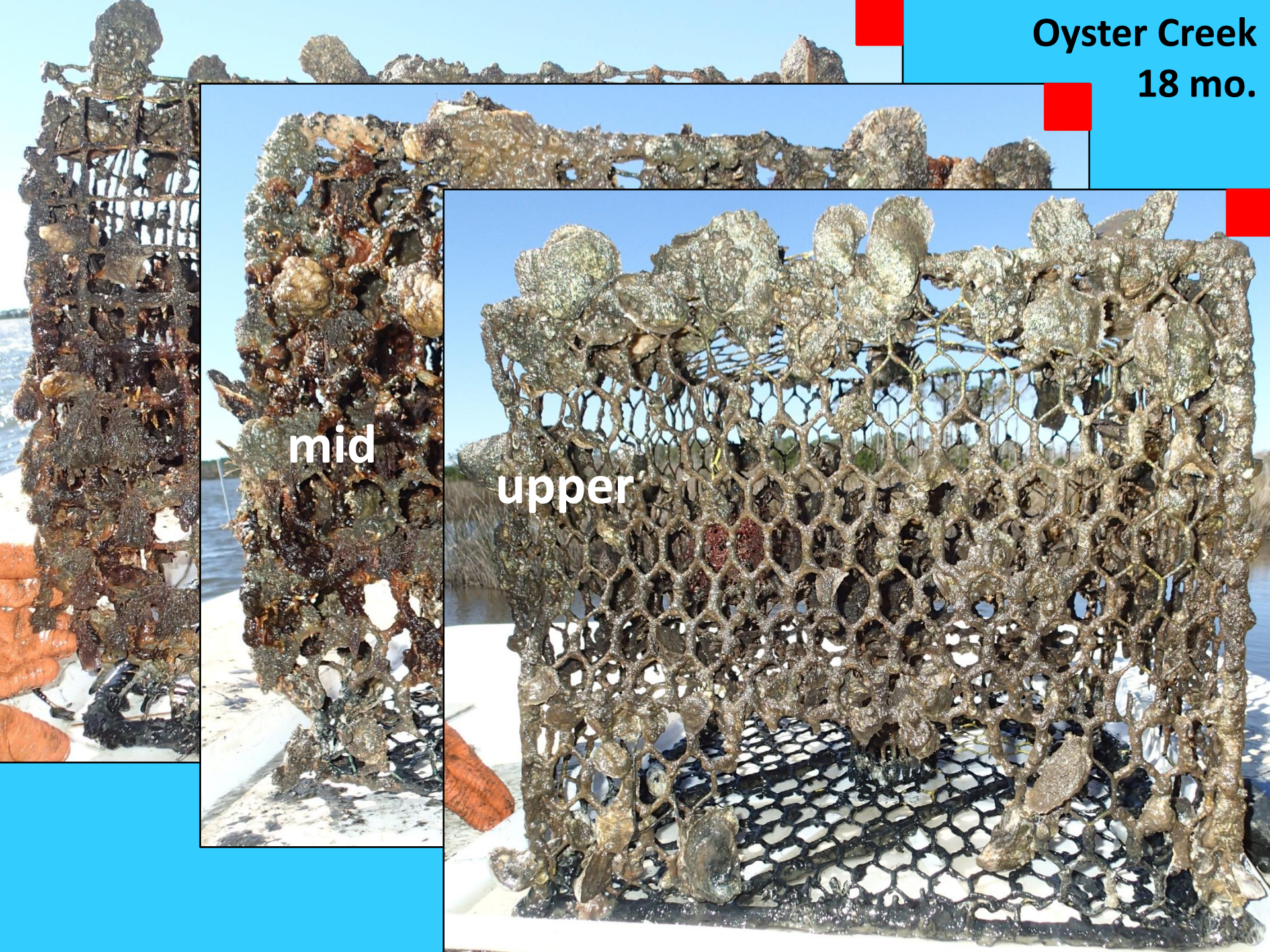


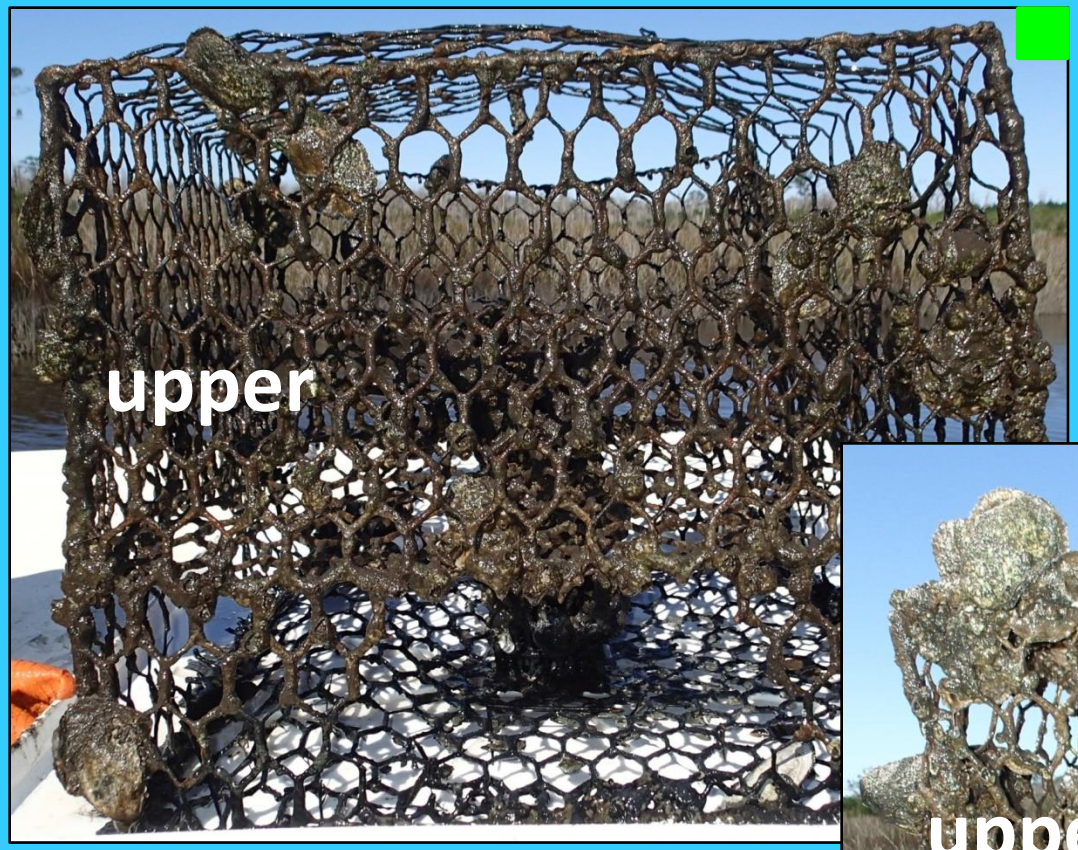
Town Creek
18 mo.

Oyster Creek
18 mo.



Oyster Creek
18 mo.





Oyster Creek
18 mo.


EVO

Lessons Learned (revisited)

1. Salinity, salinity, salinity – this appears to be, in most instances, the preeminent factor controlling subtidal oyster reef development.

2. Upper regions, and possibly mid regions, of tidal creeks appear to have salinity regimes that enhance oyster reef development by reducing levels of biotic stress, but low larval supply limits reef development.

3. Lower regions of tidal creeks are typically too salty to permit subtidal reefs to develop (a generalization know for centuries), intertidal reefs develop in the aerial refuge and oyster larvae are abundant.

4. Migrating spat-encrusted substrates from high salinity to lower salinity regions of tidal creeks offers an effective means for enhancing oyster populations and the ecosystem services oysters provide in tidal creeks – applicable to other water bodies and has been practiced for centuries.

Recent NC examples:

- DMF planted seeded cultch on AR396 (Oriental artificial reef)
- Lindquist, Cessna and Tyler APNEP restoration project (see poster)

Restoration/Management Implications