

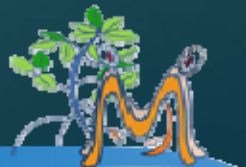


# Do native intertidal burrowing crabs benefit from non-native *Spartina alterniflora*?

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2016/07/18



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# Introduction

**Invasive alien species** can have serious ecological and economic impacts across the globe (Vilà et al. 2011).

During the establishment and further spread of invasive species in native ecosystem, the **interactions** between invasive species and native species will occur (Wan et al. 2011).

## **Invasive plants - Native animals**



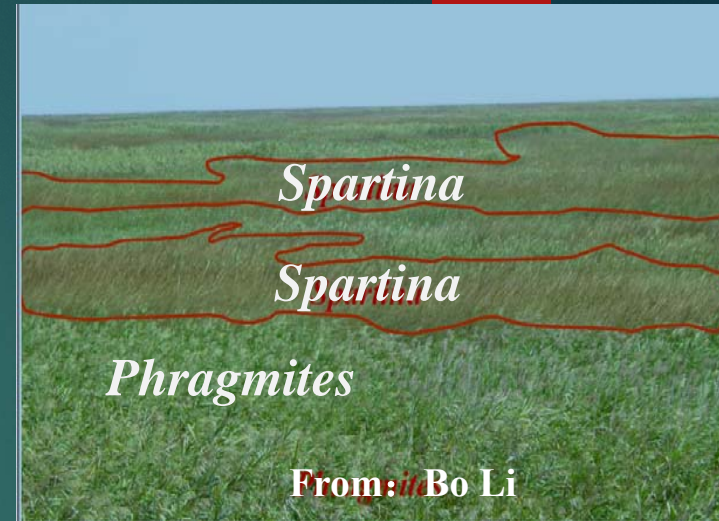
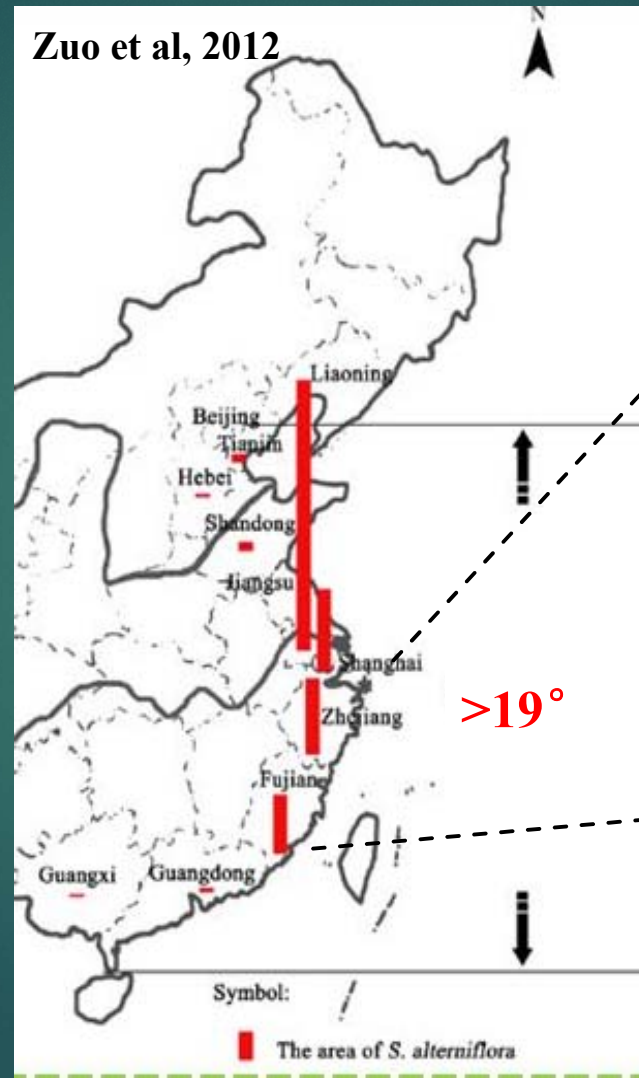
*Spartina alterniflora*

Burrowing crabs



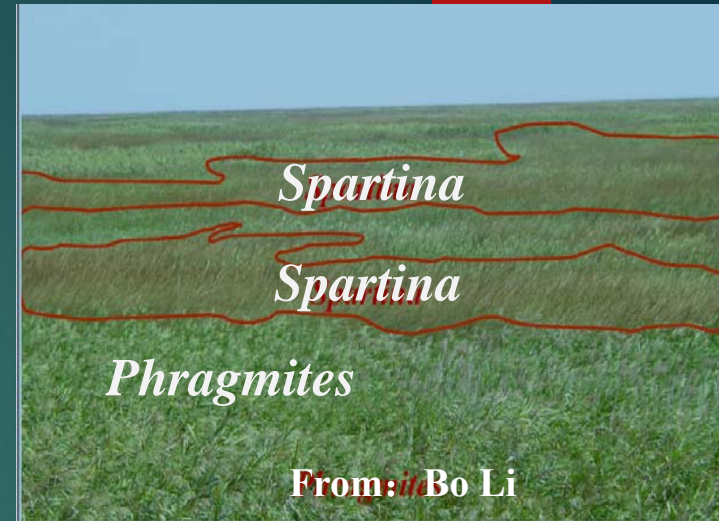
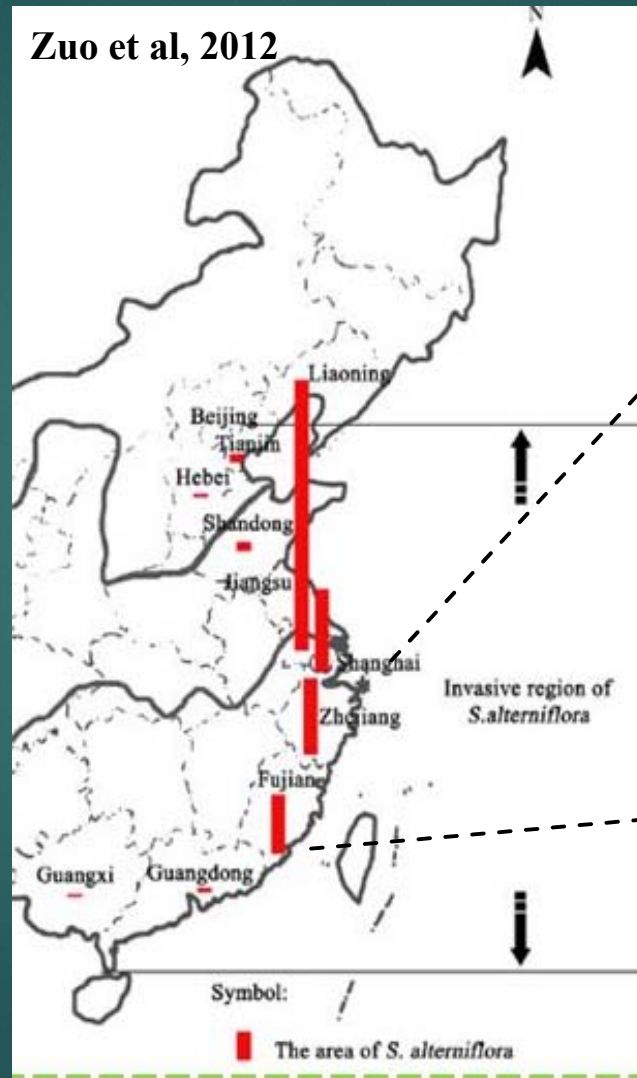
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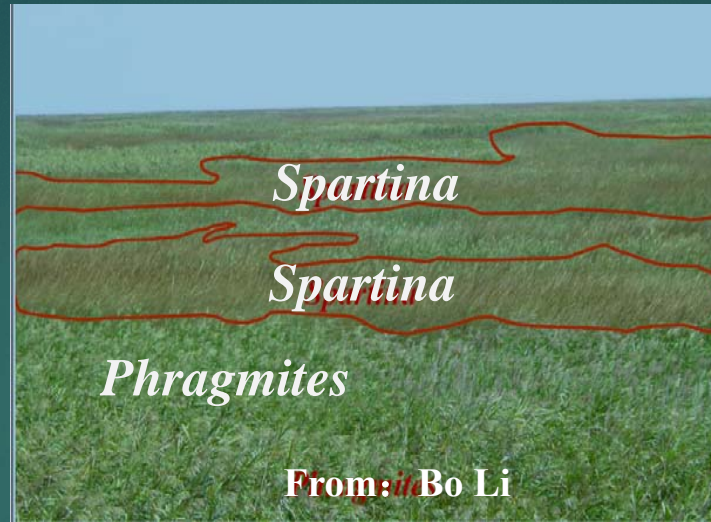
*S. alterniflora* transforms open mudflats to tall, dense vegetation (Li et al. 2009, He et al. 2012), suppresses native marsh vegetation and associated animals (Li et al. 2009, Ma et al. 2011), and at low latitudes, invades **mangrove habitat** at higher in the intertidal zone (Zhang et al. 2012).



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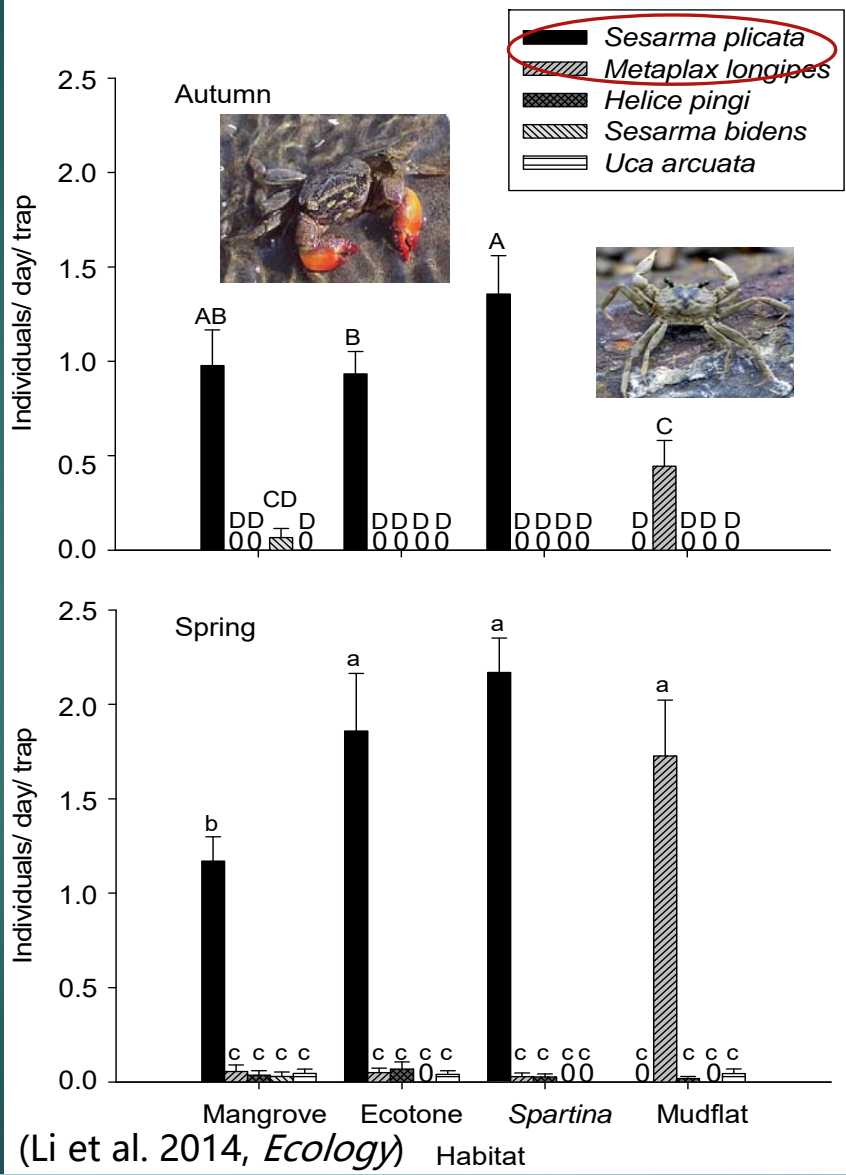


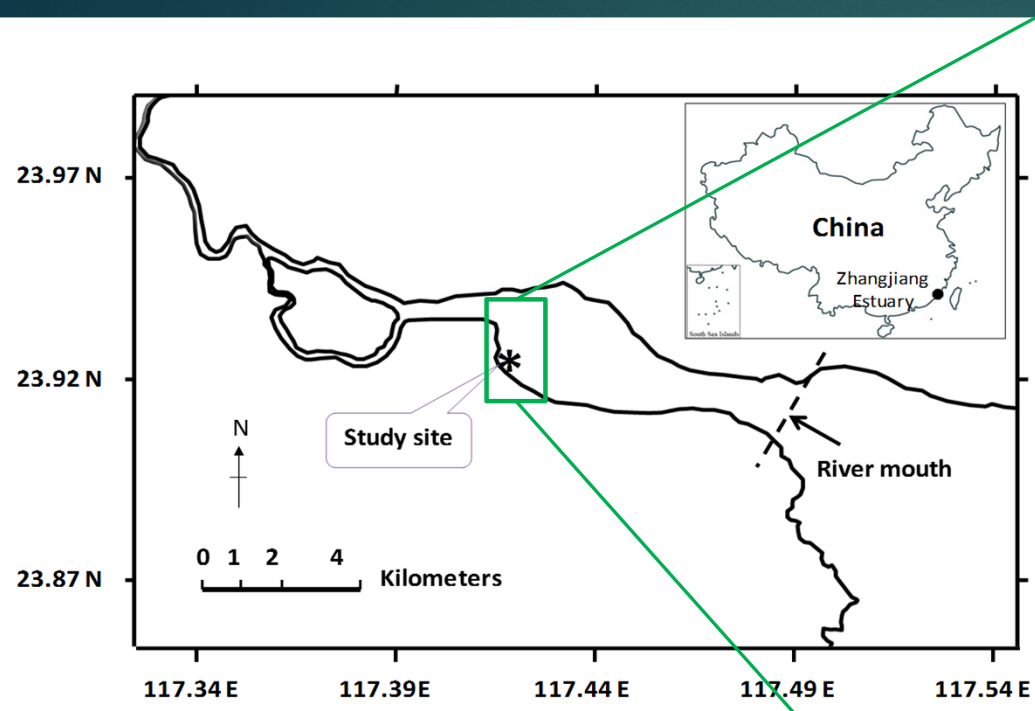
In salt marsh, *Spartina* could affect native **crab distribution** and diets, as well as provide compatible habitats for native crab (Wang et al, 2008; Qin et al, 2011).

**Mangrove ?**



- ▶ In mangrove area, what's the native crabs' distribution with the invasion of exotic plant *Spartina alterniflora*?
- ▶ Is there any difference of crab abundance between invasive *Spartina* and native mangrove?





**Fig. 1** Location of the field site in mangrove area of Zhangjiang Estuary, Fujian Province, China.



**August, 2013**



**August, 2014**



# Sampling---pitfall traps (Li et al, 2014)

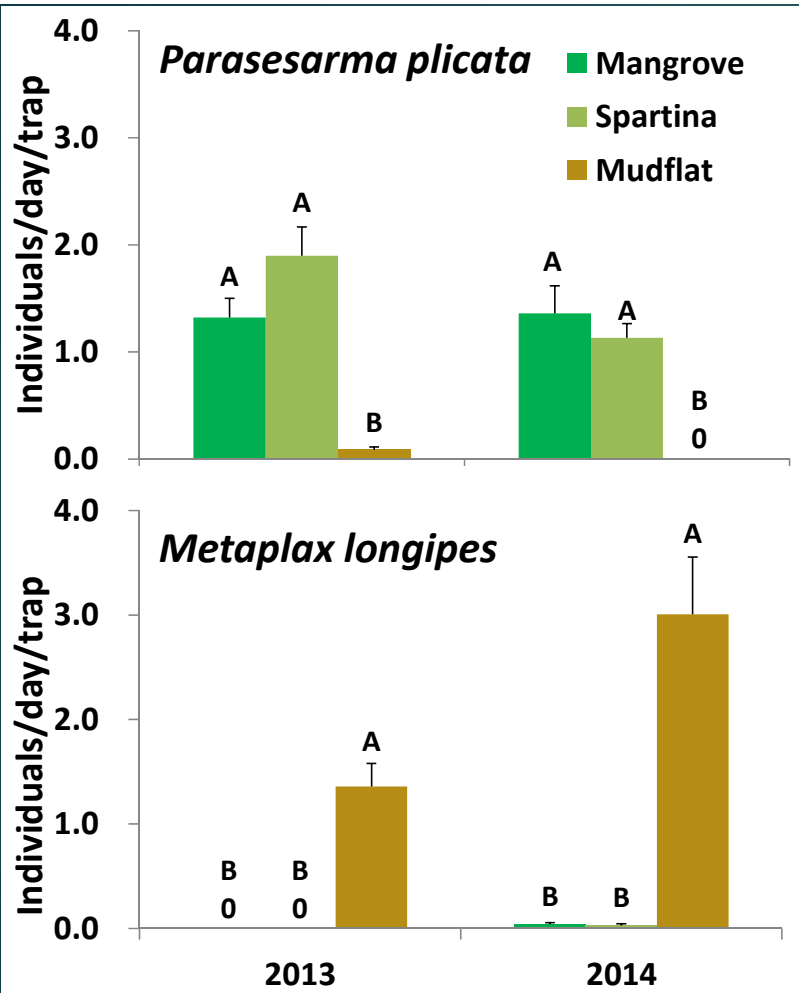
- ▶ **Time:** 2013 and 2014
- ▶ **Habitats:** Mangrove, *S.alterniflora*, Unvegetated mudflat
- ▶ **Replicate traps:**  
n=15 (16 cm diameter, 25 cm deep, > 15 m apart within habitat)
- ▶ The number of *Parasesarma plicata* and *Metaplax longipes* per trap every day for 3 consecutive days in Spring, Summer, Autumn and Winter.

Pitfall trap



Crab investigation





**Fig. 2** Density of *Parasesarma plicata* and *Metaplax longipes* in different habitats.

- *P. plicata* was abundant in mangrove and *Spartina* marsh, while *M. longipes* was abundant in unvegetated mudflat.
- There was no significant difference of crab density between mangrove forest and *Spartina* marsh.



Uninvaded  
mudflat (2013)



Invaded by  
*Spartina* (2014)

Invasive plant affects the  
distribution of native crabs.

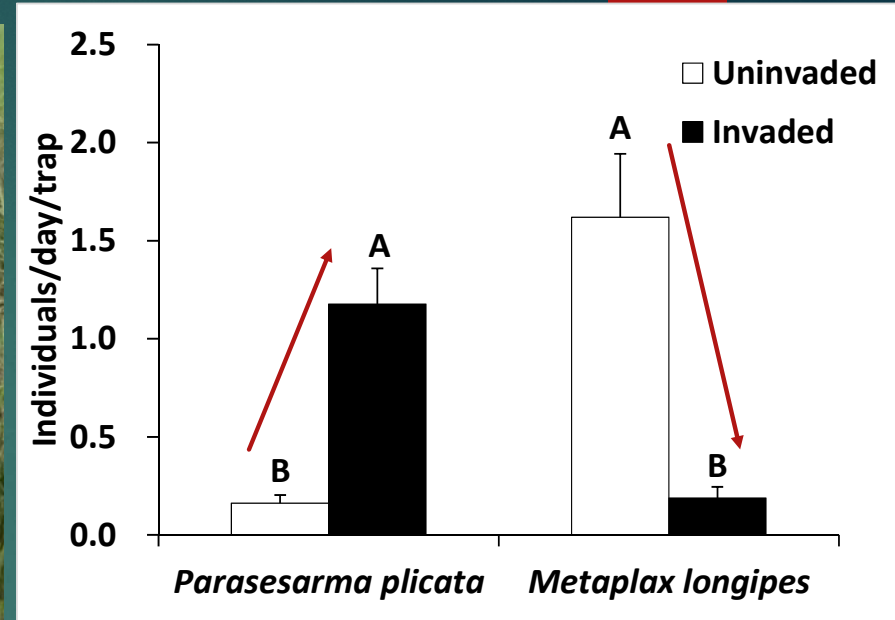


Fig. 3 Number of *Parasesarma plicata* and *Metaplox longipes* before and after *S.alterniflora* invading unvegetated mudflat within only one growing season.

# *Spartina* removal experiment

- ▶ **Plots set time:** May 2015
- ▶ **Treatment:** *Spartina*; *Spartina* removal; Unvegetated mudflat
- ▶ **Replicate traps:** n=12
- ▶ **Size:** 2\*2 m

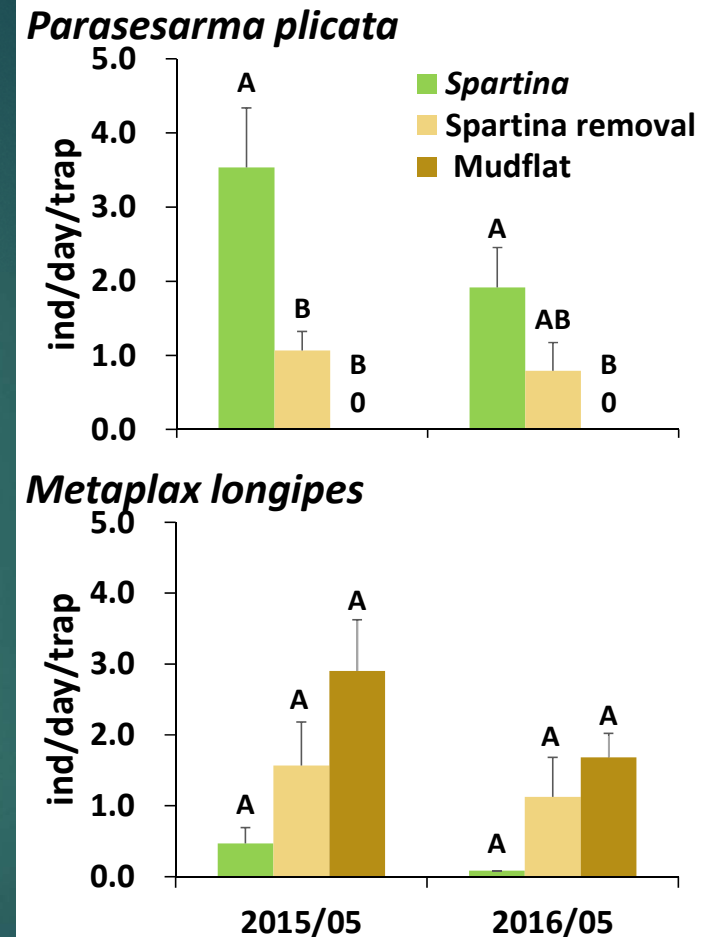


Fig. 4 Density of *Parasesarma plicata* and *Metaplax longipes* in each treatment.

# Conclusion

- ▶ *Parasesarma plicata* was abundant in mangrove and *Spartina* marsh, while *Metaplax longipes* was abundant in unvegetated mudflat.
- ▶ *Spartina alterniflora* could expand the intertidal distribution of native *P. plicata* but limit *M. longipes*' distribution with *S. alterniflora* sharply occupying mudflats and displacing mangroves in the upper intertidal of Zhangjiang Estuary.



*Spartina alterniflora*

+

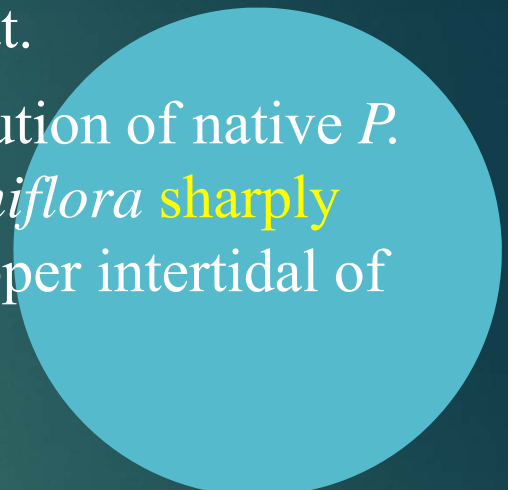


*Parasesarma plicata*

-



*Metaplax longipes*



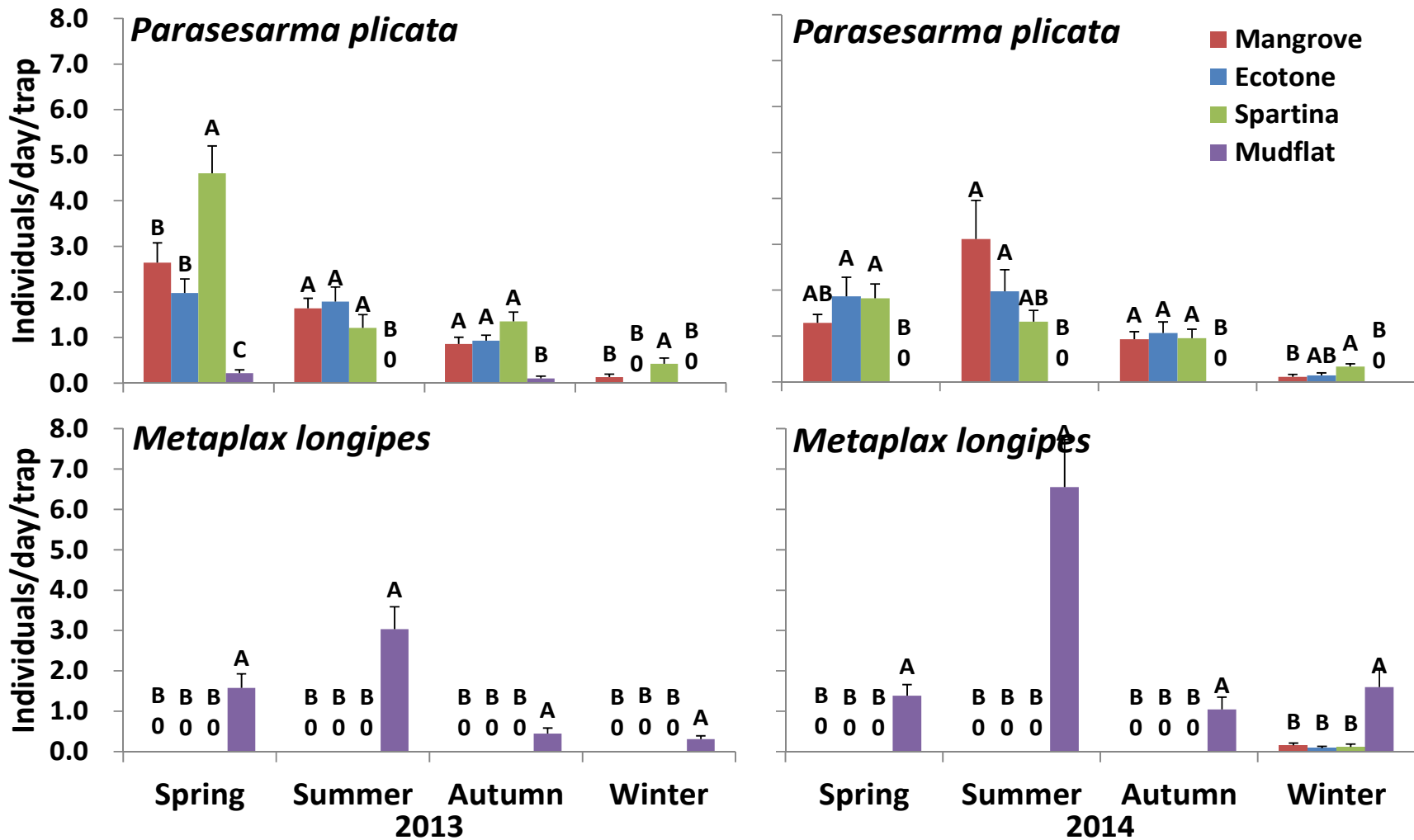
# Ongoing

- ▶ What are the **mechanisms** that shaped the patterns of crabs' distribution?
- ▶ Additional studies will be conducted to disentangle the roles of the **biotic** (vegetation, predator, food source) and **abiotic** (light, temperature, salinity, sediment) factors on the habitat selection of these two crabs (Wang, 2008; Garside & Bishop 2014; He & Cui 2014).



Thank you!





**Fig. 2** Number of *Parasesarma plicata* and *Metaplex longipes* in the four different habitats in Spring, Summer, Autumn and Winter 2013 and 2014.