Habitat use of juvenile rockfish *Sebastiscus marmoratus* in mussel farming area: possible essential fish habitat for reef fishes

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Background

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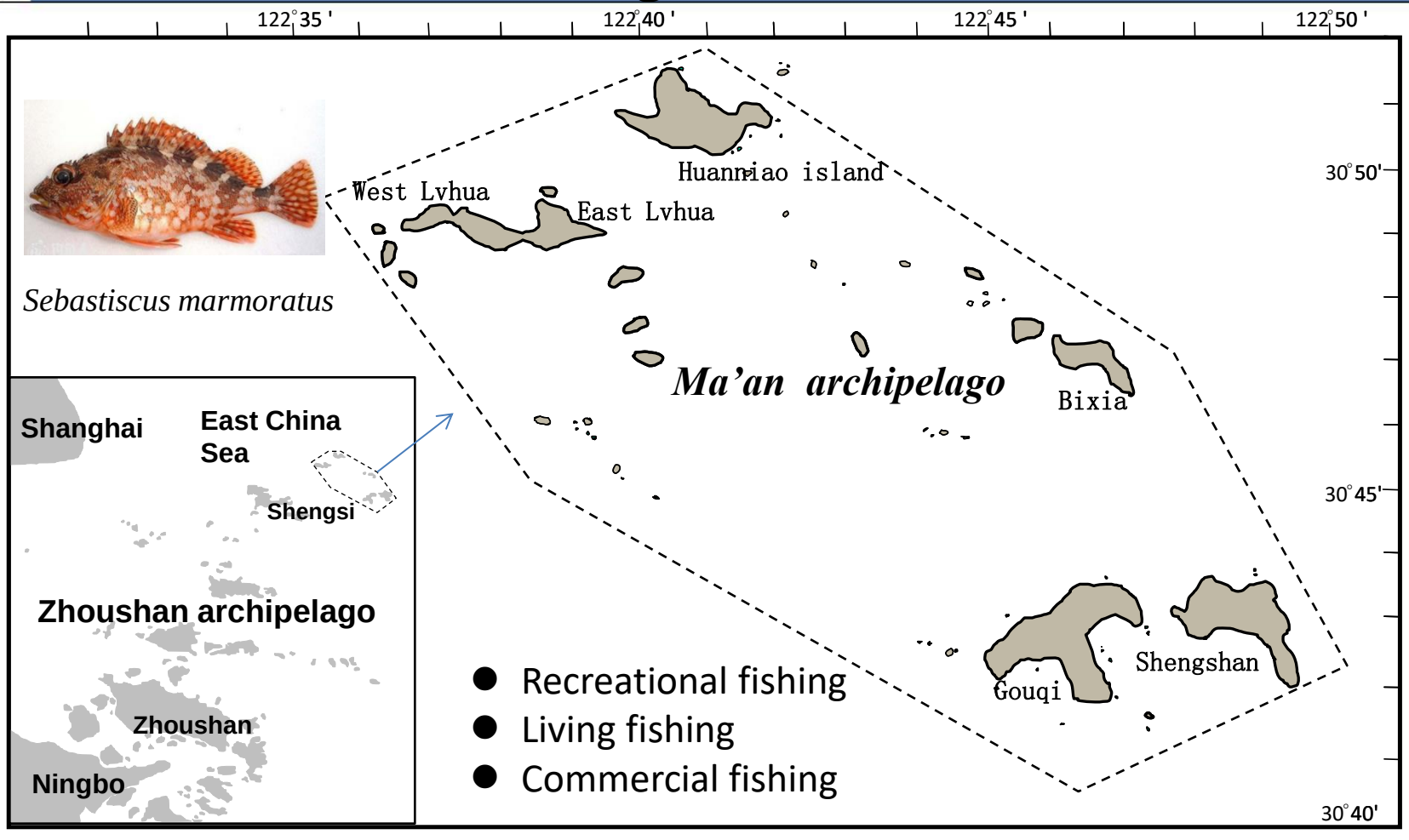
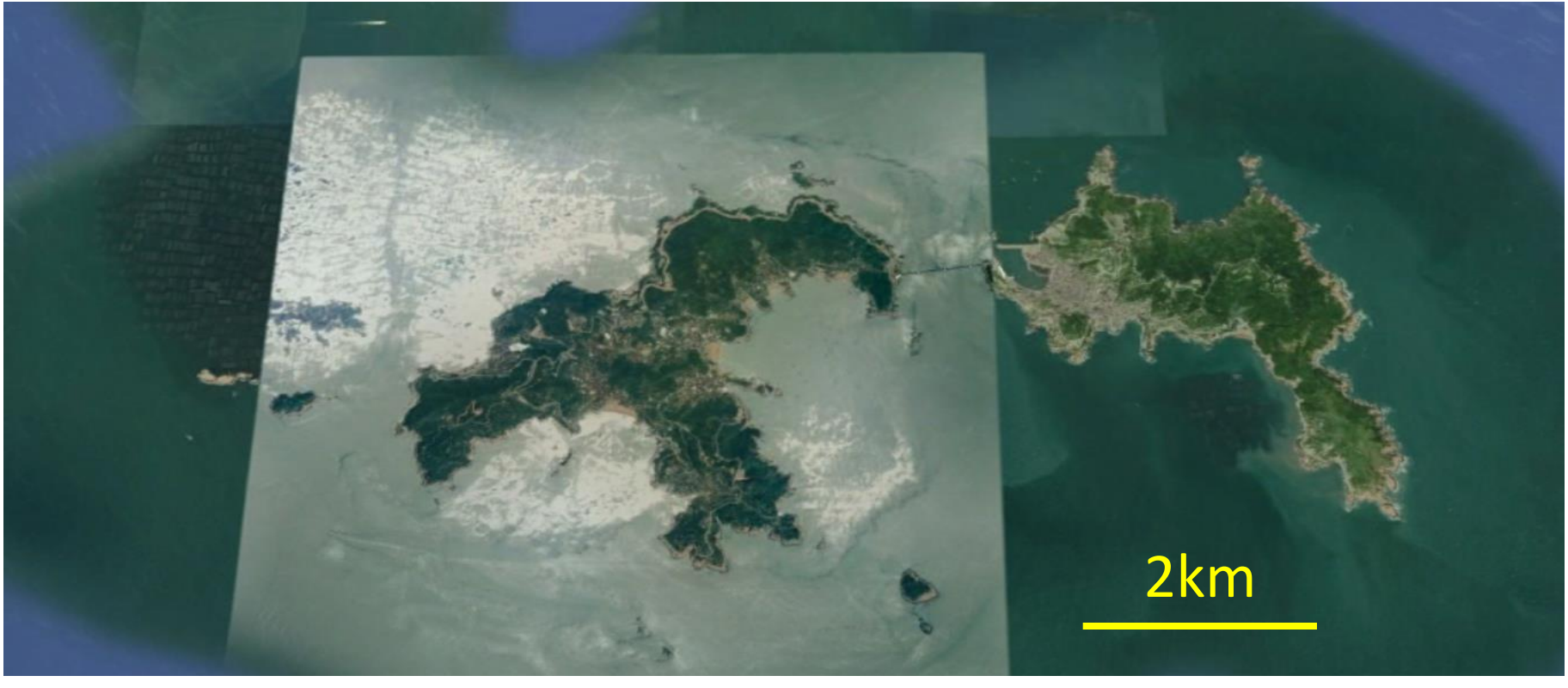
Sebastiscus marmoratus



Cannibalism

Metapopulation dynamics?
Links between Aquaculture activities and rock fish recruitment?


2km

- Area=8.27km^2(northern part)+1.0km^2(southern part)= 9.27km^2

- Species:

1.*Mytilus coruscus*(67%)

2.*Mytilus edulis*(33%)

- Amount（2018）:

1.85×10^{6}strings(species 1)
9.26×10^{5}strings(species 2)

6.5×10^4 t/year

Sampling

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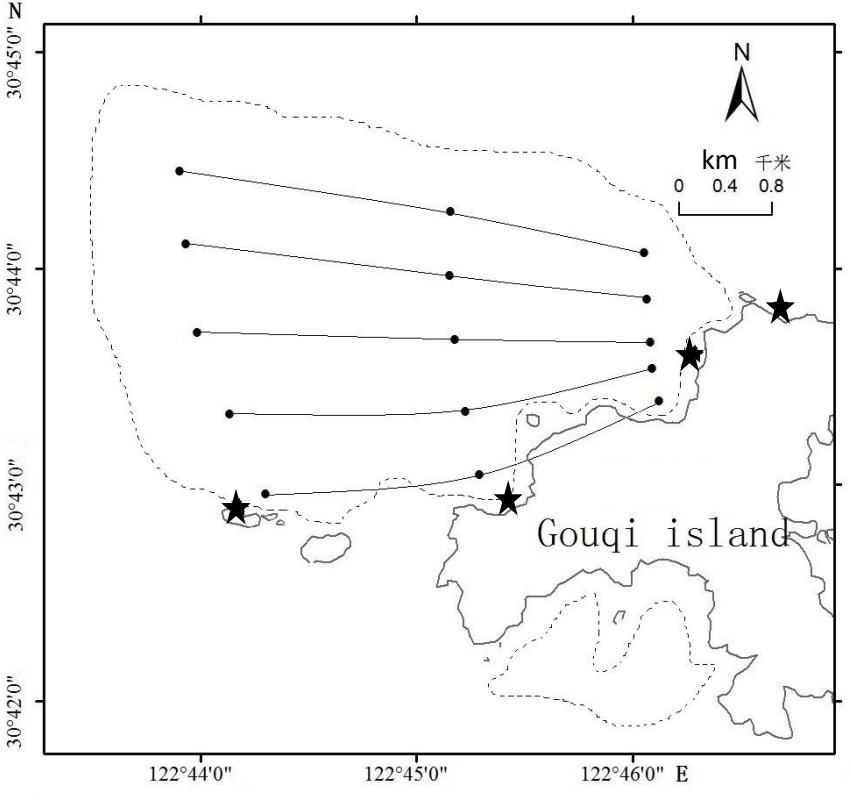
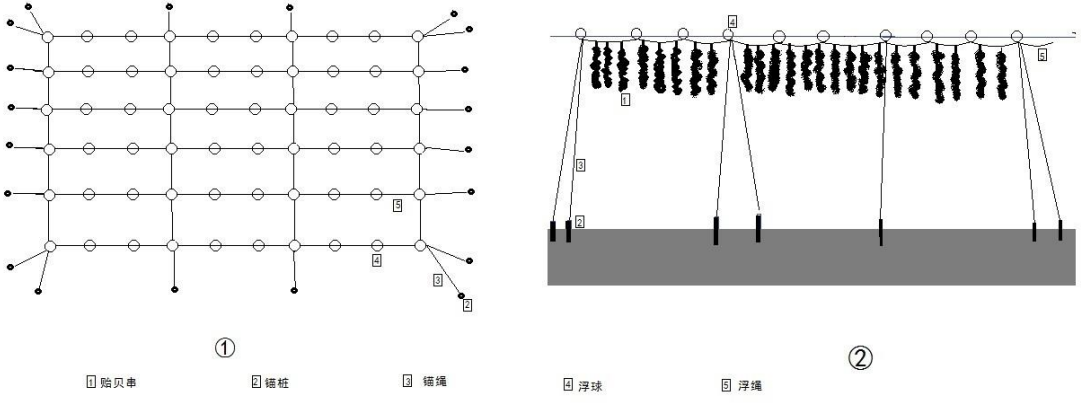
- 5 transects
- 15 sites in mussel farming area, 4 control sites
- Monthly sampling (May-July)



Sampling



Schematic diagram of mussel farming structure & underwater sampling

Juvenile fish collection

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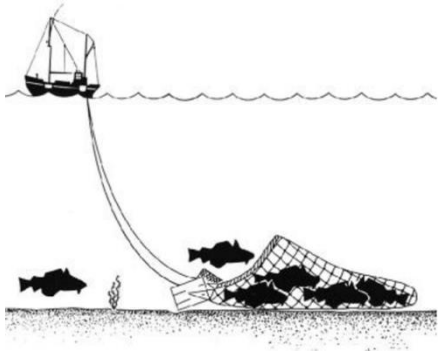

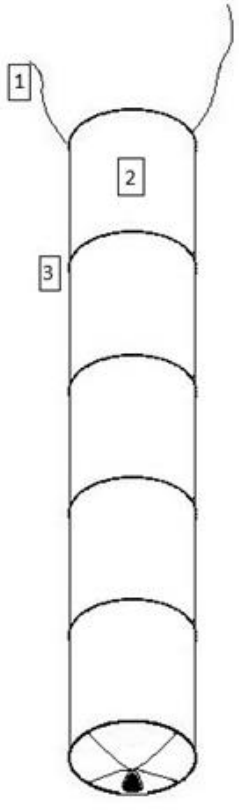

Modified hand net

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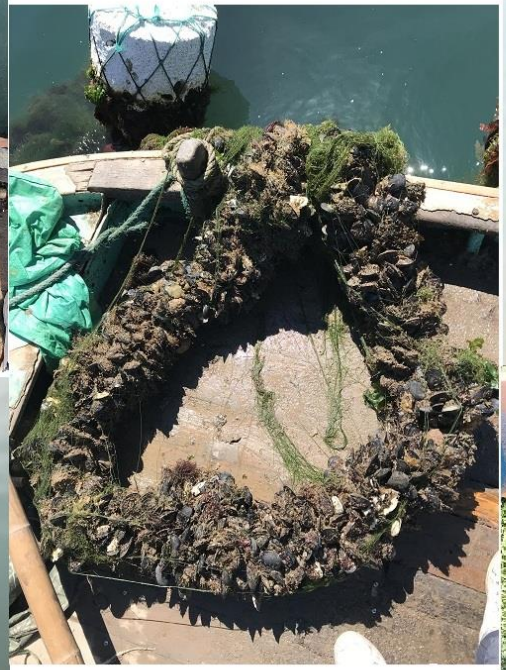
Hand net with two ropes on both sides of top

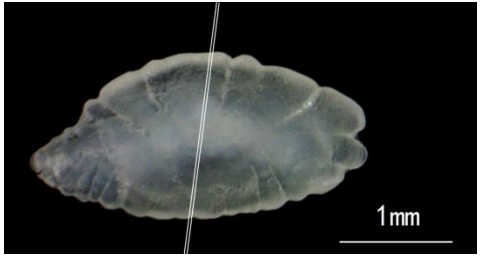


Juvenile individuals from mussel strings

Indicators

- Biological indicators
- Otolith growth traits

—— temporal niche



- Feeding traits——trophic niche
- Inhabiting traits——spatial niche

Questions

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Mussel farming habitat play roles as essential fish habitat?

- **How many?**
  Relative density(ind/string), metapopulation abundance (estimated inds)
- **Where to stay?**
  Horizontal distribution, interspace traits(volume, area)
- **How long?**
  Otolith rings
- **Why?**
  Physical environment(for shelter), trophic environment (feeding and growth) , life history need(life will find a way)

Results(incomplete)

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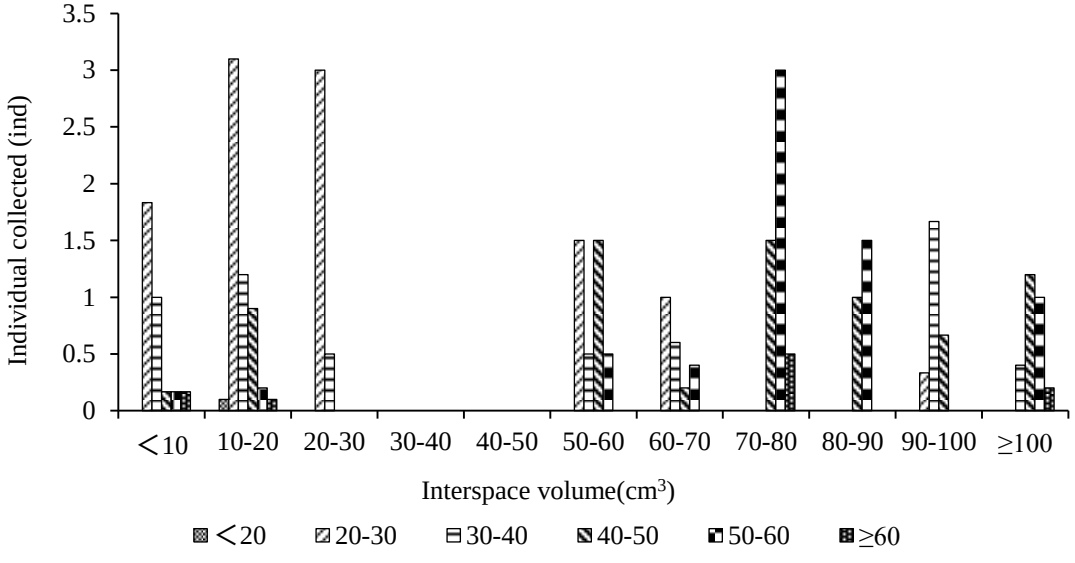
Quantitative estimation

Month	No. of strings	Individual collected (ind)	Relative density (ind/string)	Average body length (mm)	Average body weight (g)	Estimated abundance (ind)	Estimated biomass (kg)	Control sites (ind)
May	28	155	10±5	28.57±5.12	0.87±0.40	1.85×10^{7}	16095	27
June	29	101	7±5	45.92±6.73	3.07±1.26	1.30×10^{7}	39756	22
July	27	65	5±5	51.96±5.86	4.08±1.57	9.25×10^{6}	37740	13
Average	28	107	7±6	36.77±11.68	1.78±1.75	1.36×10^{7}	31197	20

Space to live or hide

Juveniles tended to choose space fitted to their body size



Individuals collected on board were analyzed

Food selection

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zero empty stomach was found.
Amphipoda was dominant food for juvenile rock fish (Accounting 99.2% by weight)

Caprellidae sp.			*Gammaridea* sp.		
Abundance percentage	Weight percentage	Occurrence frequency	Abundance percentage	Weight percentage	Occurrence frequency
75.372%	70.881%	65.185%	24.628%	28.333%	49.630%

Stable isotope values for related samples	$\delta^{13}C$ (‰)	$\delta^{15}N$ (‰)	TL
Juveniles in mussel farming habitat	-17.77±0.63	5.44±0.49	2.16
Juveniles from rocky reef habitat	-16.14±0.86	8.02±1.16	2.92
Caprellidae sp.	-17.64±0.18	3.04±0.4	1.45
Gammaridea sp.	-17.23±0.30	2.80±0.27	1.38

Time span in their life history

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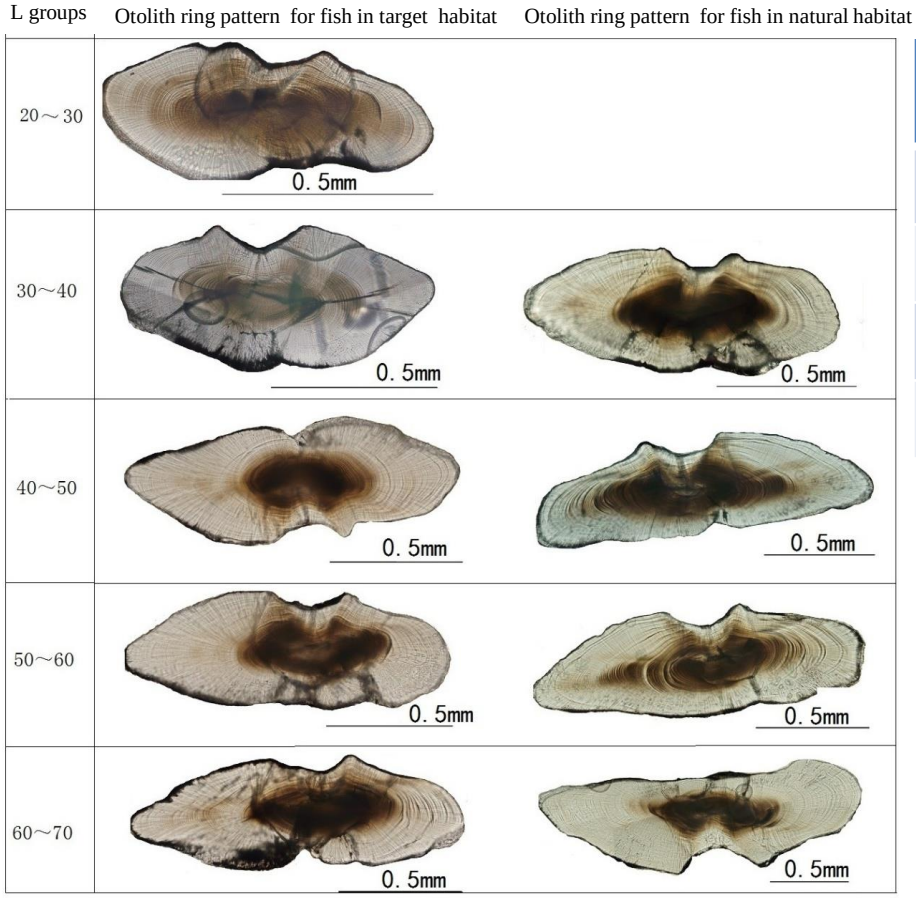

Month	Range (day)	Average No.(day)	Age(month)
May	33-88	51±14	1-3
June	48-74	58±7	1.5-2.5
July	49-79	64±8	1.5-2.5
Control	54-153	92±25	2-5

Juvenile rock fish usually stay in mussel farming habitat for 1-3months, and mostly for 2 months.

Habitat transfer

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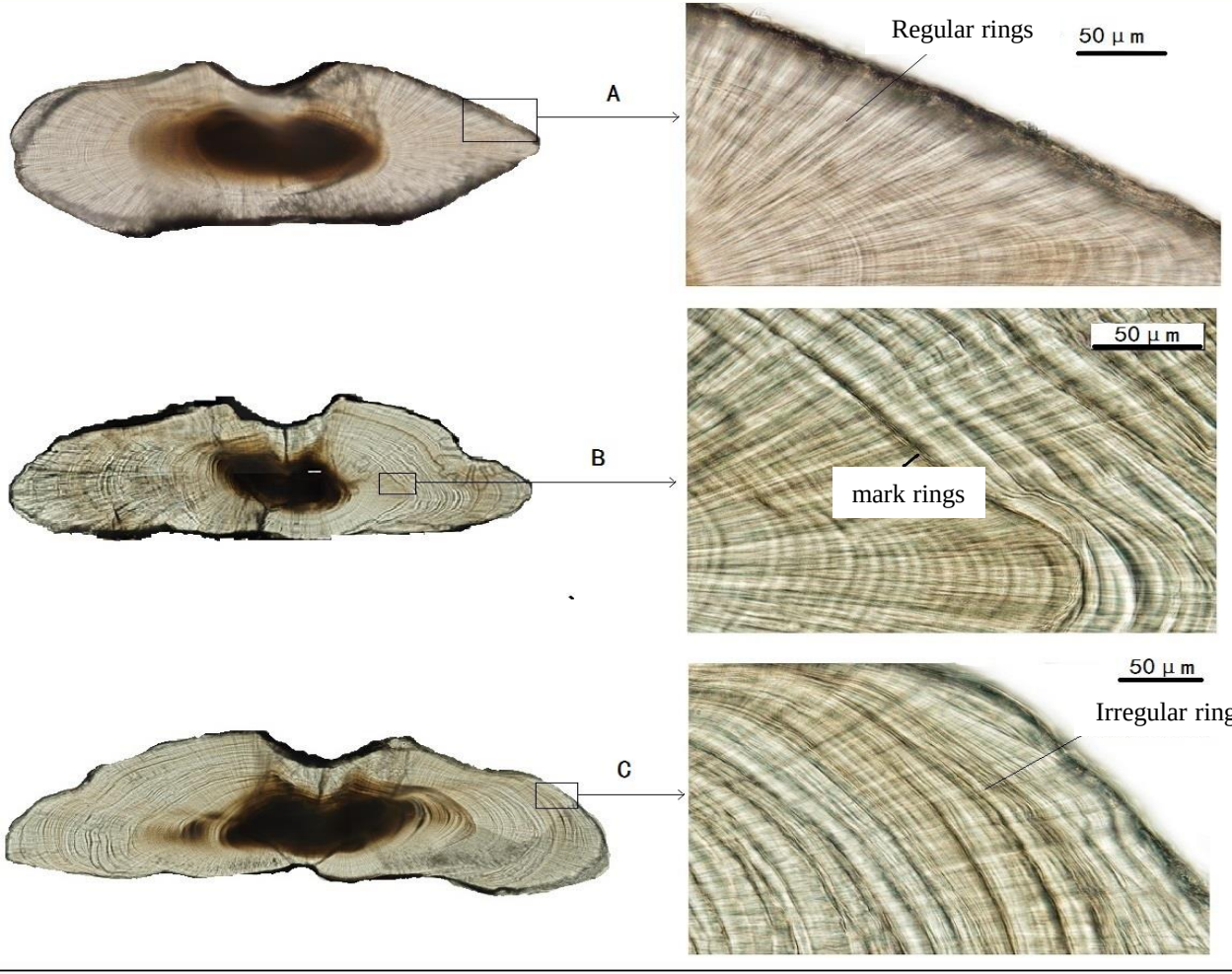

Summary

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- Juvenile rock fish appeared in large quantity in mussel farming habitat.
- They lived in a place with abundant food supply.
- And they seem to stay in a place with fitted interspace in case to hide away from hazardous situations
- They will stay in this habitat for nearly two months and then go back to where they belong.

- We are still not sure whether mussel farming habitat paly essential roles in its early life history.
- When did they move there? How? Active or passive?……
- Good for population enhancement or not?

Thanks