Distinguishing southern and western Korean kishi velvet shrimp (*Metapenaeopsis dalei*) stocks

Jung Hwa Choi[1], Sung Yun Hong[2], Hyung Kee Cha[3] and Glen Jamieson[1]

[1]Pacific Biological Station, Canada

[2]Pukyong National University, Korea

[3]National Fisheries Research and Development Institute, Korea

Taxonomical position

- In Korean waters: 19 species (Kim et al., 2003), five commercial
- Class Crusatcea

  Order Decapoda

  Family Penaeidae

  Subfamily Penaeoidae

  Penaeus chinensis

  Penaeus japonicus

  Metapenaeus joyneri

  Trachypenaeus curvirostris

  Metapenaeopsis dalei (Kishi velvet shrimp)

Penaeid shrimp fishing in Korea

Landings:

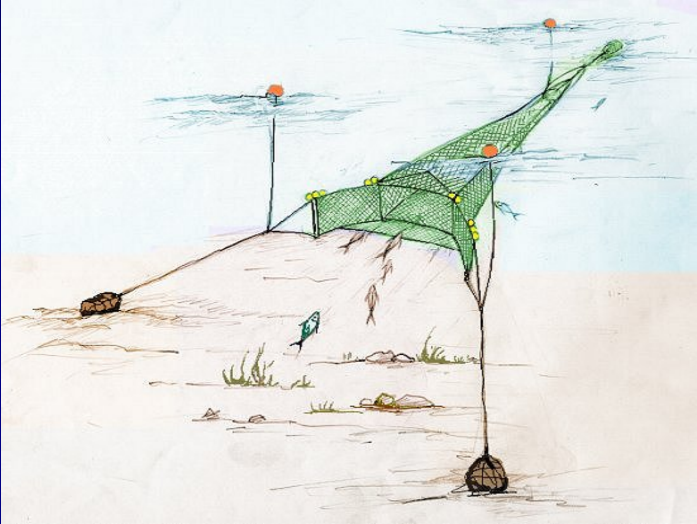
- Decreased from 1993 to 2001 (19,616 to 6,625 t)

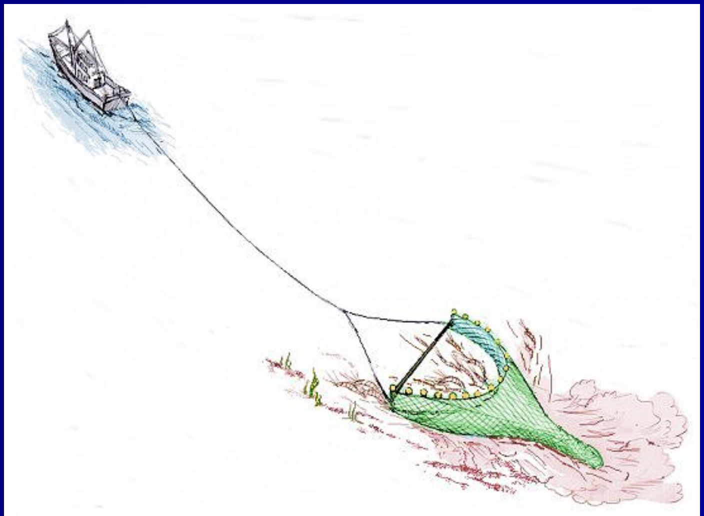
Fishing areas

- South and west Korean coasts

Fishing gear

- Stow nets and anchors
- Shrimp trawl





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Previous Korean penaeid shrimp studies

Population studies

Penaeus chinensis: Cha et al., 2002

Metapenaeus joyneri: Cha et al., 2003

Trachypeaneus curvirostris: Cha et al., 2003

Metapenaeopsis dalei: Choi et al., 2003

Species distribution studies

P. chinensis: Kim, 1973

M. joyneri and *T. curvirostris*: Cha, 1997

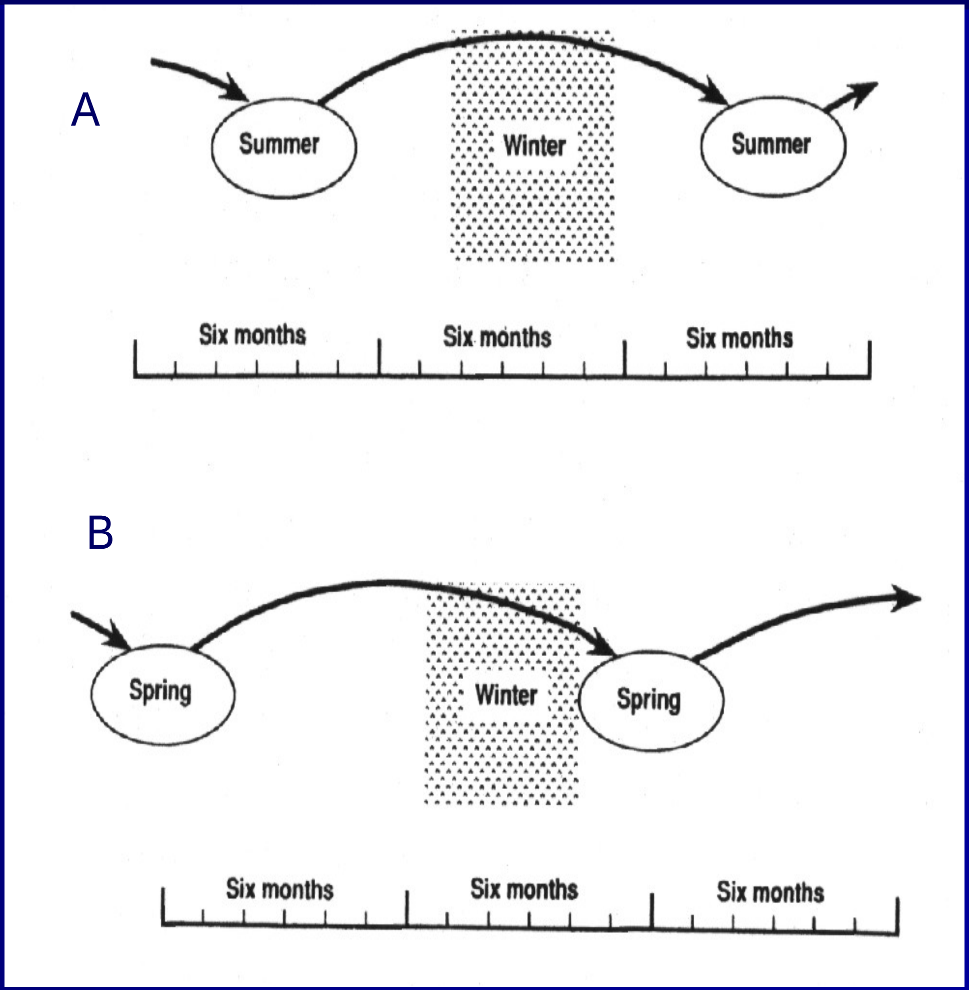
Fisheries management and stock assessment studies

None

Spawning patterns of Korean penaeid shrimps

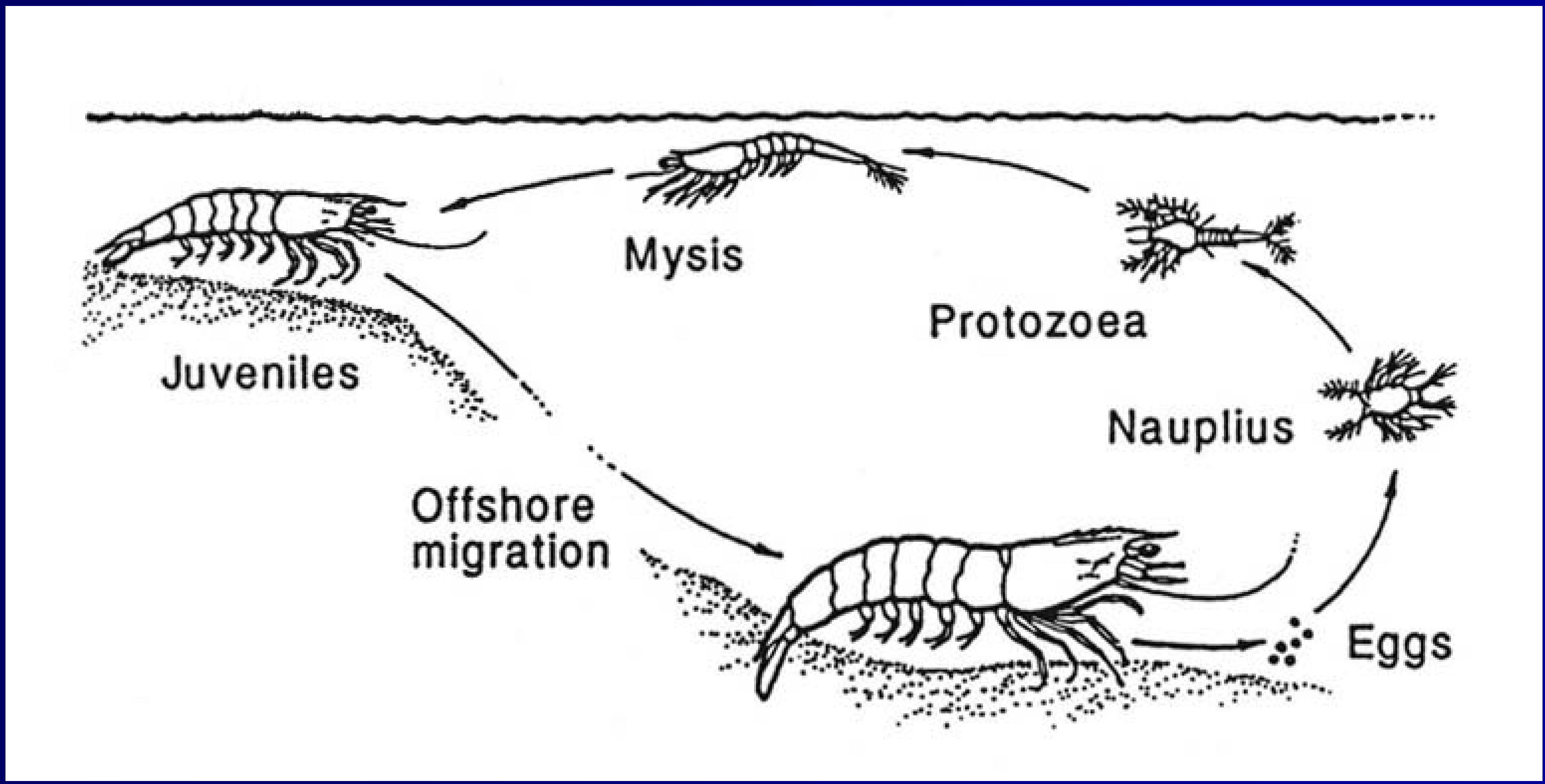
A. Summer spawning pattern:
M. joyneri
M. dalei
T. curvirostris

B. Spring spawning pattern:
P. chinensis

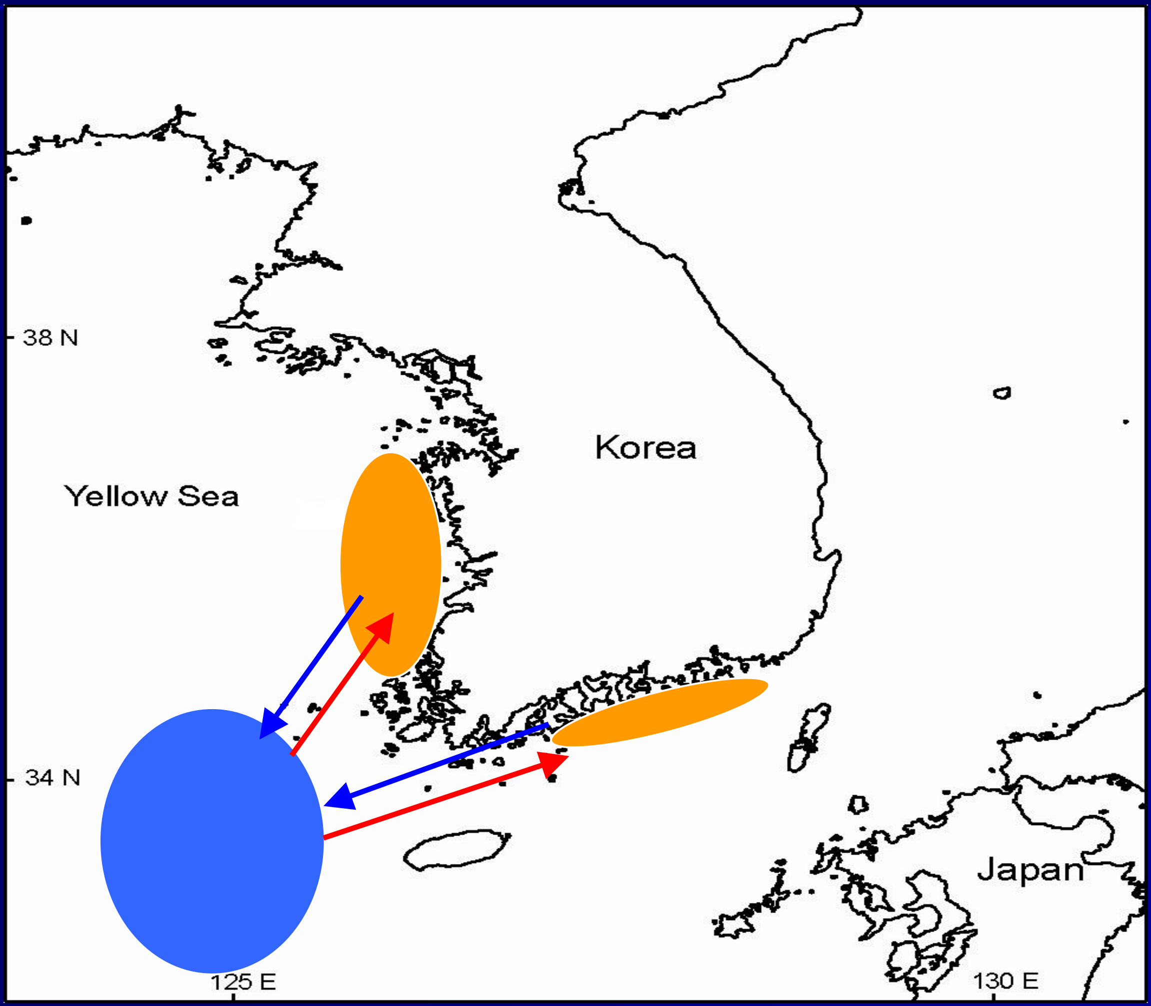


Dall et al. (1990)

Life cycle of kishi velvet shrimp



Previous understanding of spatial distribution and migration



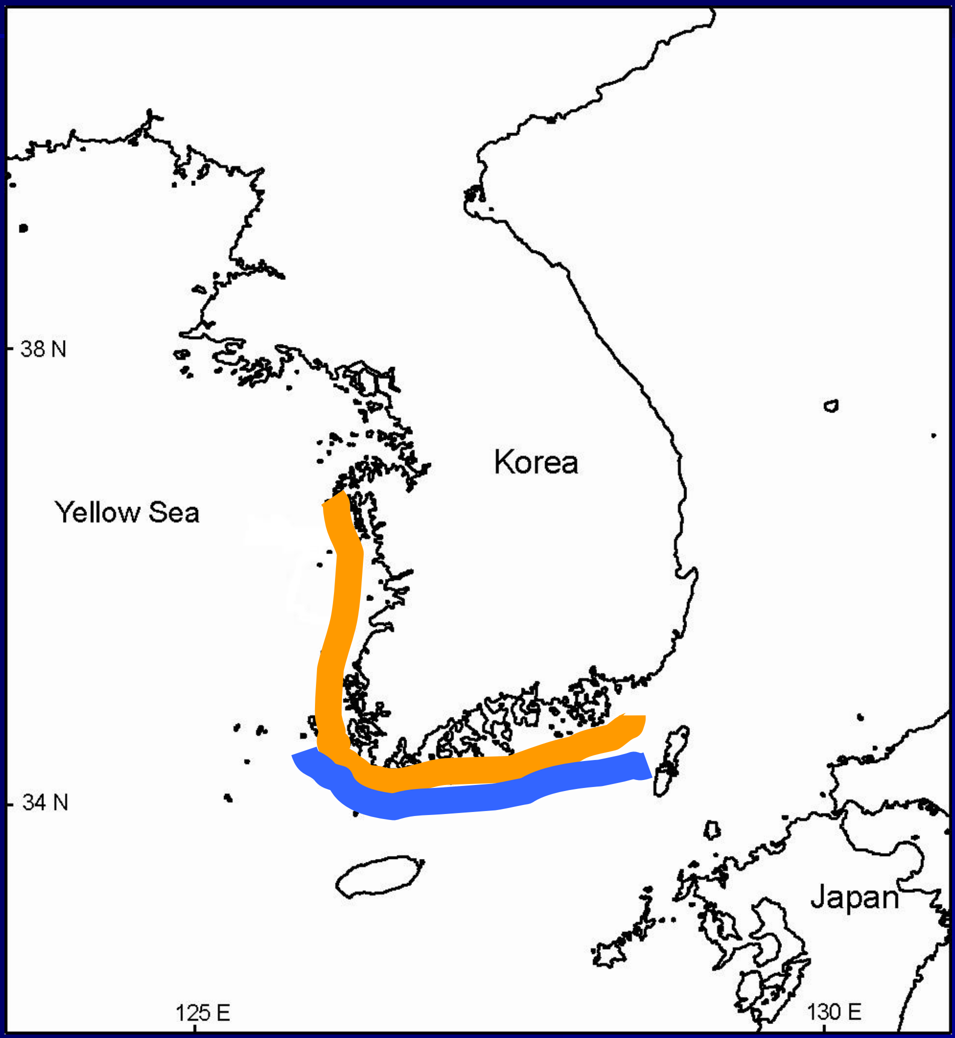
Study purpose

- To distinguish kishi velvet shrimp stocks in Korean waters through parasite presence, growth and migration patterns
- To characterise kishi velvet shrimp stock boundaries on the basis of the above parameters

Features considered to distinguish kishi velvet shrimp stocks

- Spatial distribution
- Parasite rate
- Growth pattern
- Temperature
- Current flow direction

Spatial distributions

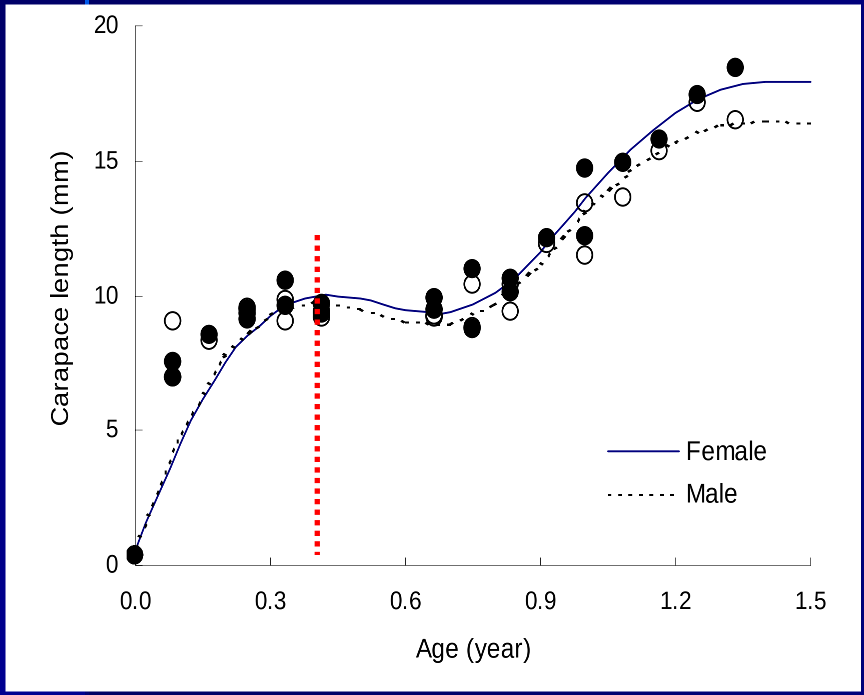


Parasite infection rate

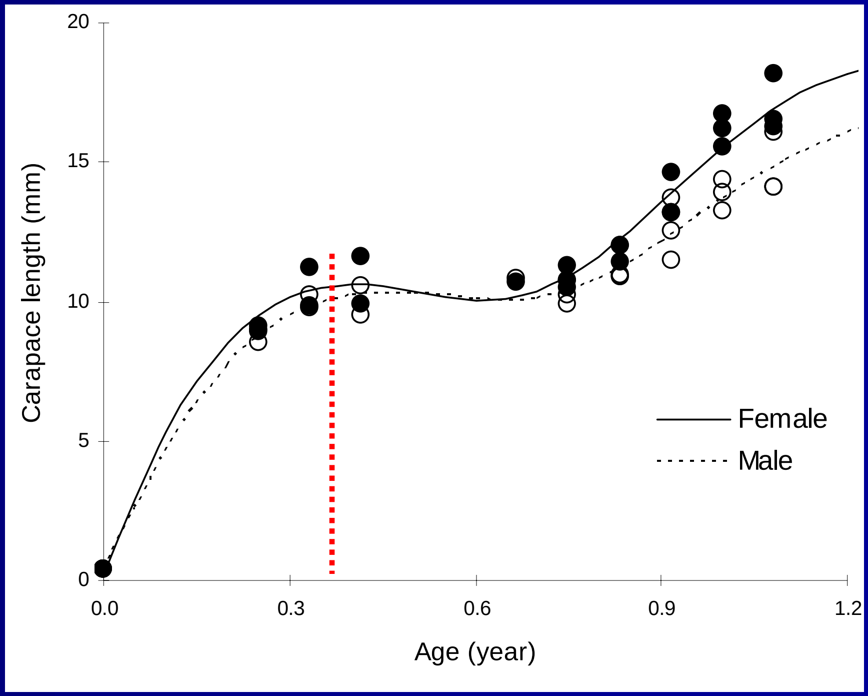
Area	Rate	Host species	Parasite
South West	48 % 0 %	*M. dalei*	*Parapenaeon consolidatum*

Kishi velvet shrimp growth patterns

South

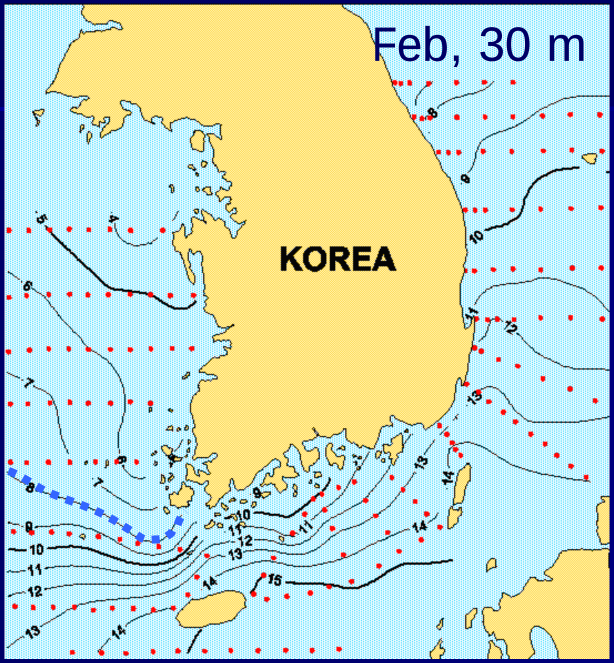


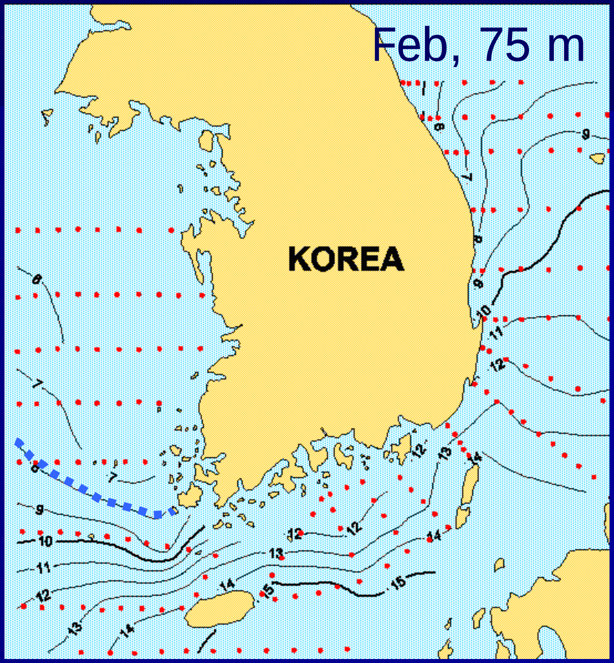
West – faster growth



$L_t = L_\infty\{1 - \exp[-K(t - t_0) - (CK/2\pi)\sin(2\pi(t - ts))]\}$

Bottom temperature





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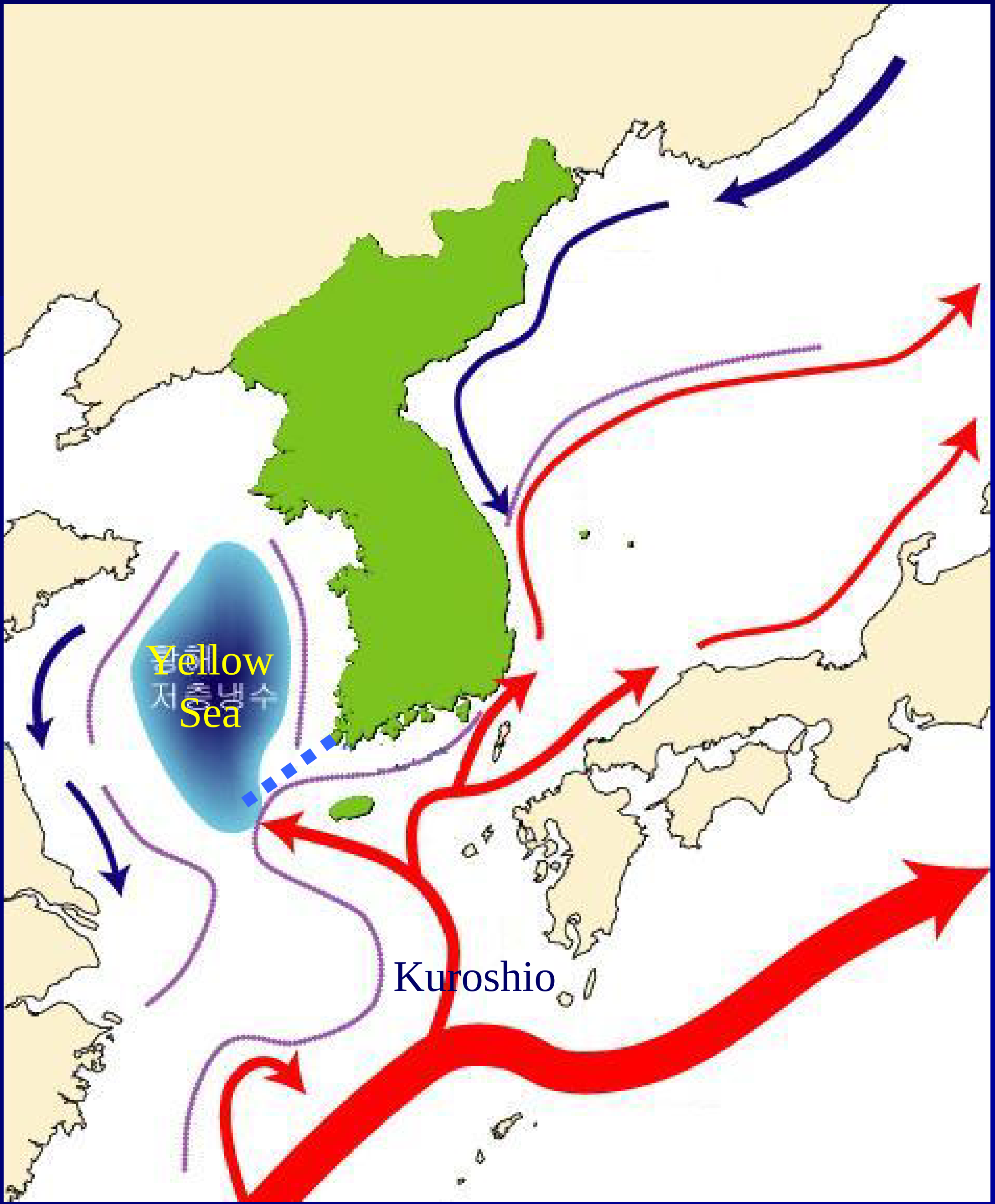
- The average estimated low temperature tolerance of penaeid shrimps in general is 8°C (Joyce, 1965).

Kuroshio Current Divergence



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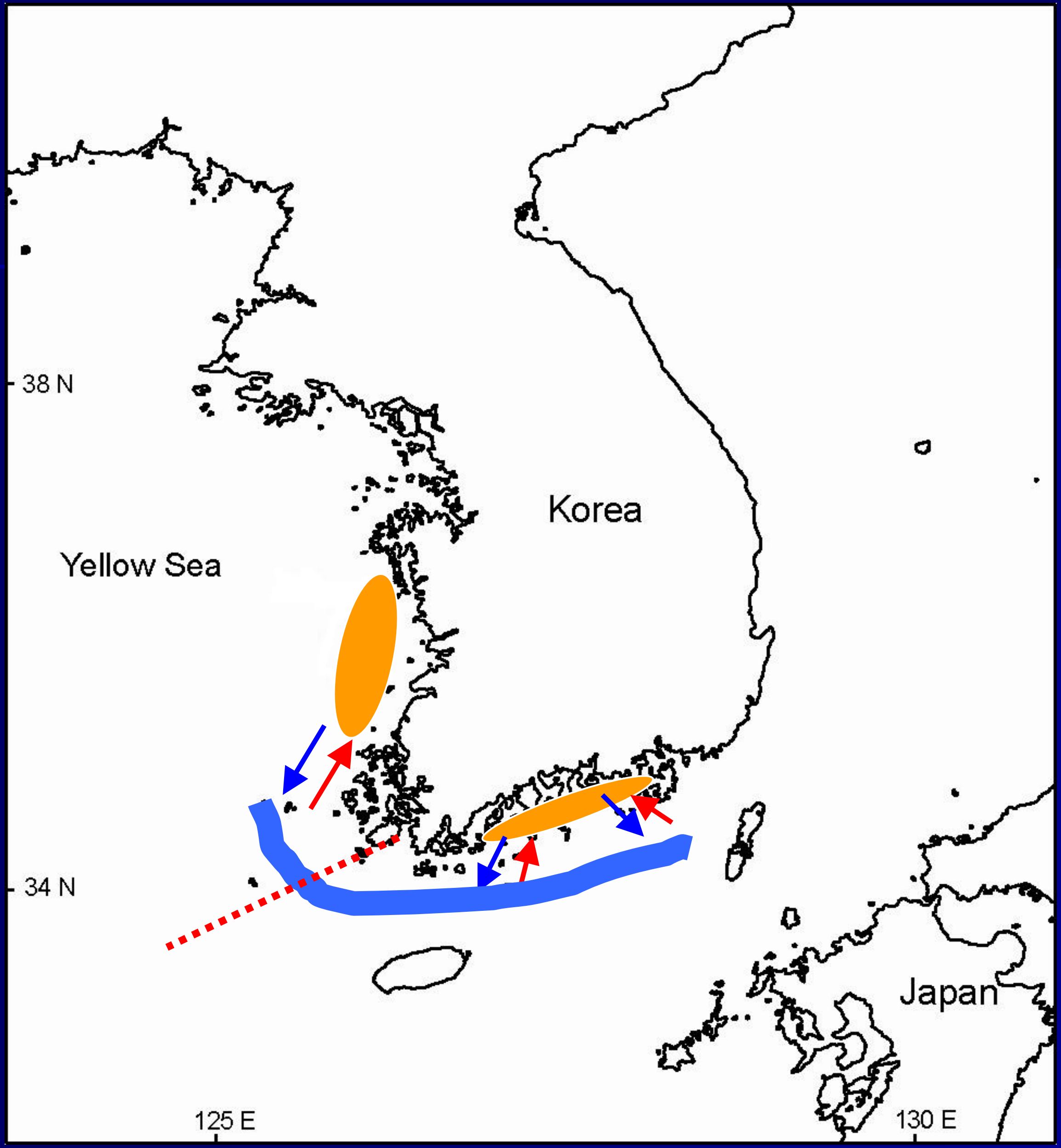

38 N
Korea
Yellow Sea
34 N
Japan
125 E
130 E

Summary

Items	South	West
Spatial distribution	All seasons	Summer
Parasite rate	48 %	0 %
Von Bertalanffy Growth parameter	L_∞ =24. 8 (female) φ'=2.67 (female)	L_∞ =22.1 (female) φ'=2.77 (female)
Migration	Inshore – Offshore	West – Northern East China Sea

$\varphi' = \log(K) + 2\log(L_\infty)$

Conclusions

- The boundary between the southern and western kishi velvet shrimp stocks is Mokpo City, and is identified by water temperature and Kuroshio current direction.
- Suggested cause of differential parasite load:

    Temperature

    Sediment type

Future studies

- To examine morphological variation and genetic study
- To examine tagging study
- To compare the commercial fish stock
- To suggest different management approaches