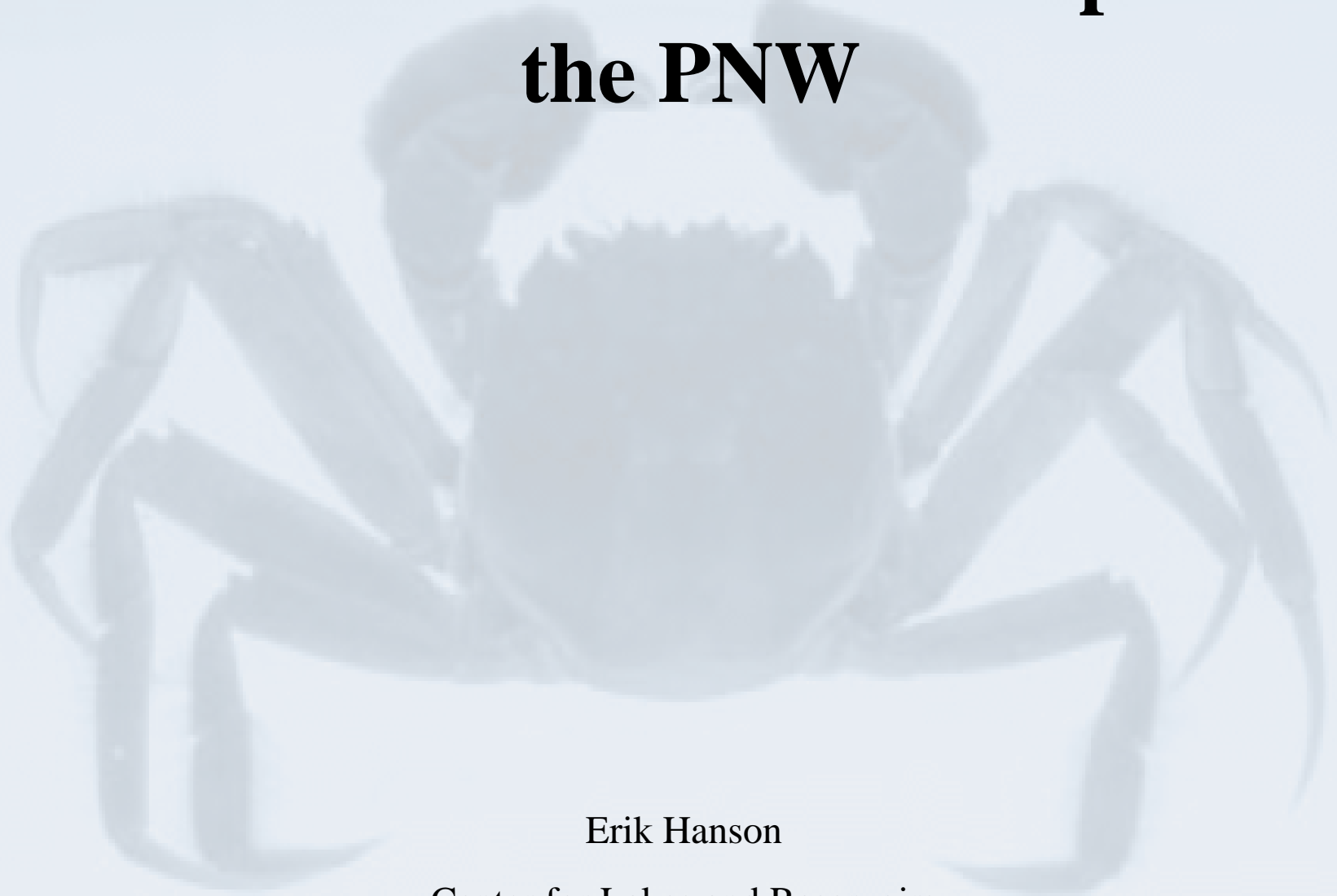


# Potential for Mitten Crab Dispersal in the PNW



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# Mitten Crab (*Eriocheir* spp.)



\*Photo from CDFG

- Native to rivers and estuaries of the Yellow Sea in Asia
- Introduced in Europe and California
- Juveniles migrate up to 850 miles (1400 km) upstream
- Grand Coulee (596.6 m)
- Adults 30 to 90 mm

# Two Phase Life cycle

## Adult

- Omnivorous
- Benthic
- Occurs in brackish to freshwater
- Highly migratory
- Tolerant of desiccation and low temperatures

## Larval

- 5 zoea and 1 megalopae
- Planktonic
- Occurs in lower estuaries and coastal waters
- Limited swimming ability
- Intolerant of low salinities and temperatures

# Dispersal pathways

- Human introduction
- Dredging
- Ballast Water
- Natural dispersal



# Recruitment cycle

Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July		
Maturation																											
	Downstream Migration																										
		Mating																									
		Embryonic Development																									
		<b>Larval Development</b>																									
		Settlement																									
																			Upstream Migration								

# Larval stage

Primarily seen March to June

Temperatures above 12 degrees Celsius

Salinities from 20 to 35 parts per thousand

Development is temperature dependant: 100 days at 12 degrees Celsius, 60 days at 15 degrees and 45 days at 18 degrees



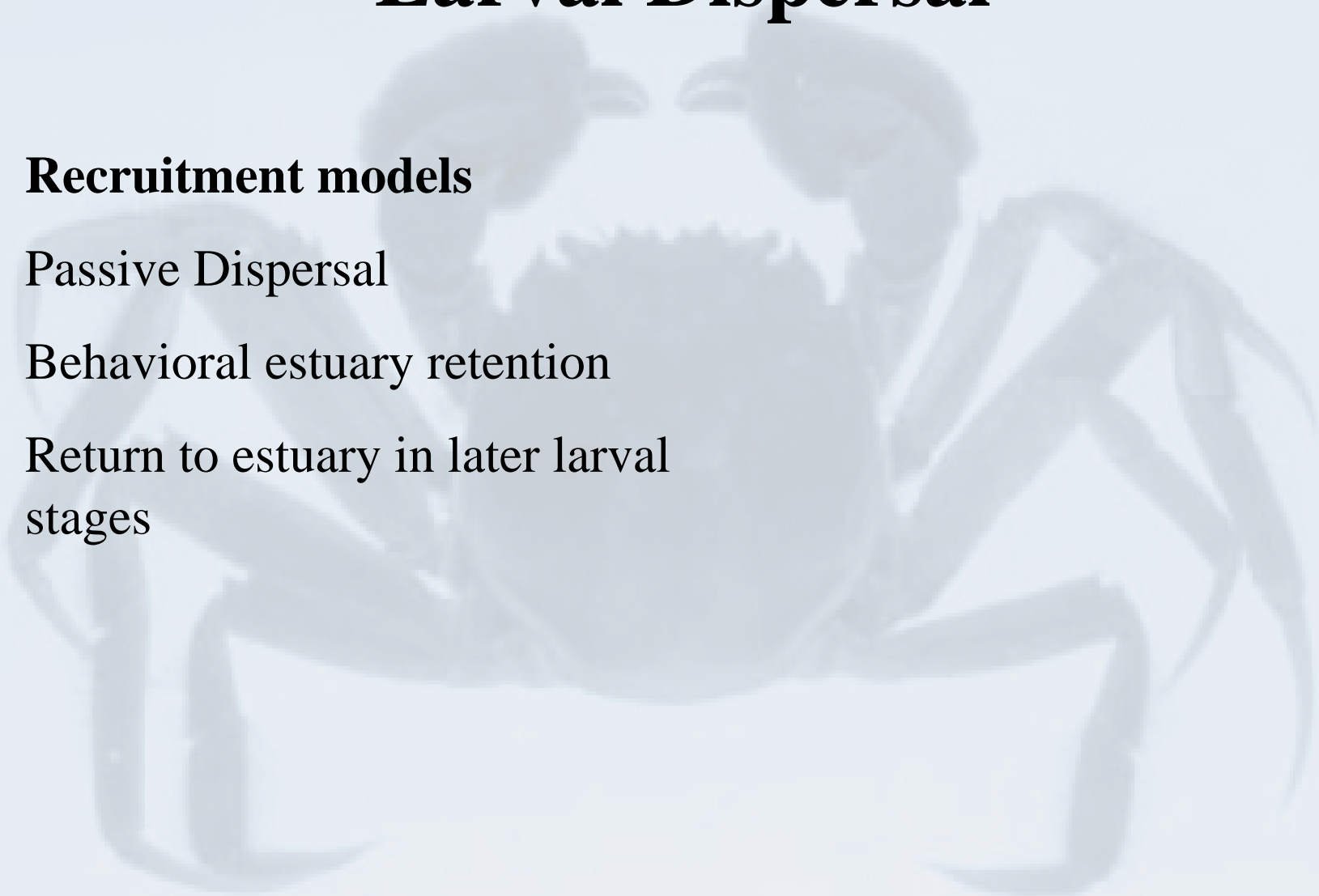
# Larval Dispersal

## **Recruitment models**

Passive Dispersal

Behavioral estuary retention

Return to estuary in later larval stages



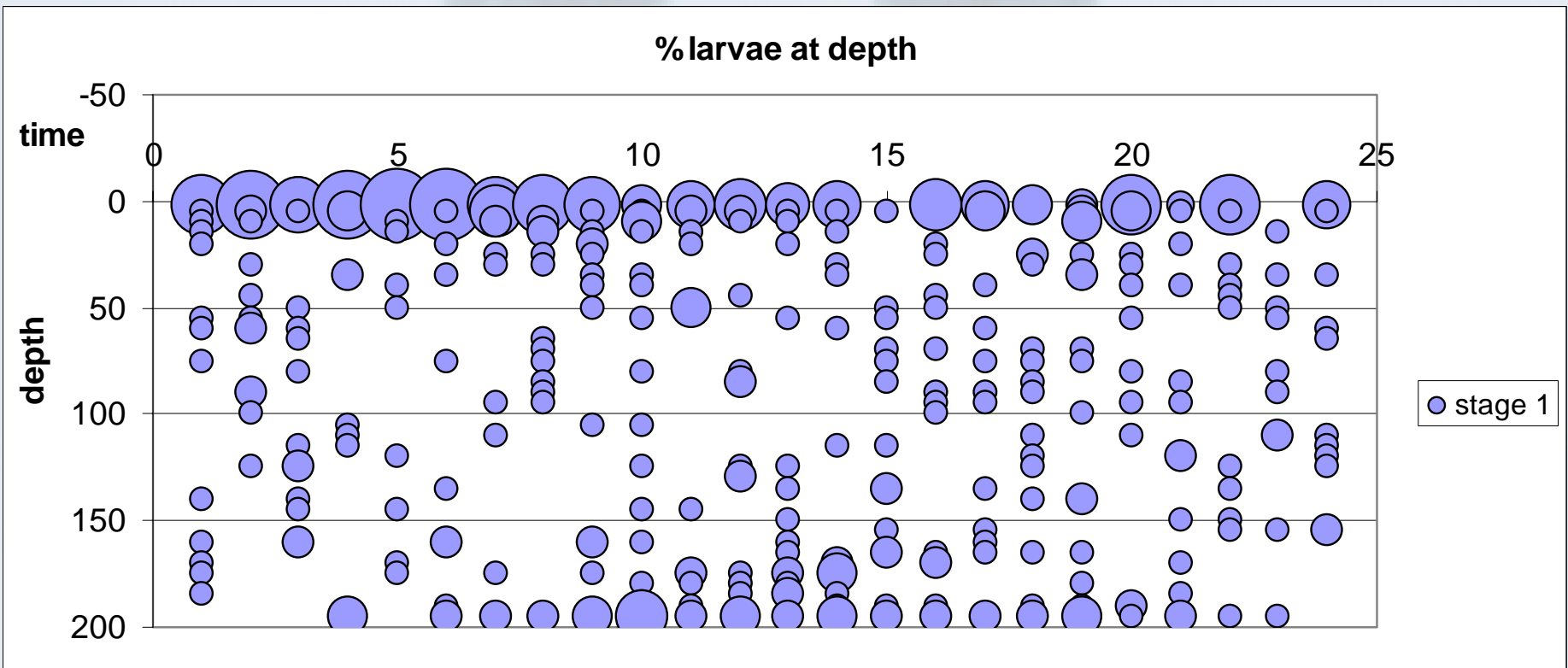
# Larval Dispersal

## Vertical Migration

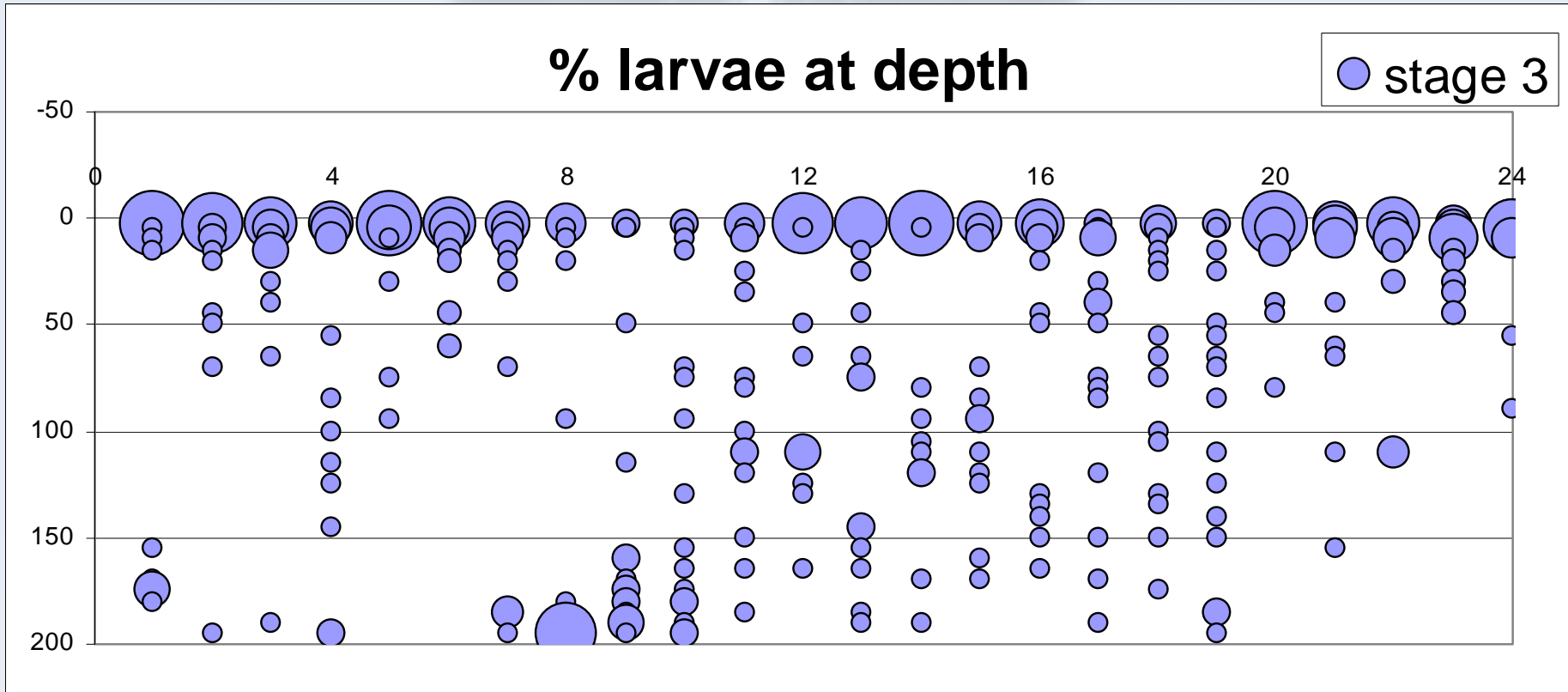
- Means by which larvae can be dispersed or retained.
- Solar or lunar cycles
- Affected by predators, food, salinity and temperature.



# Vertical Migration



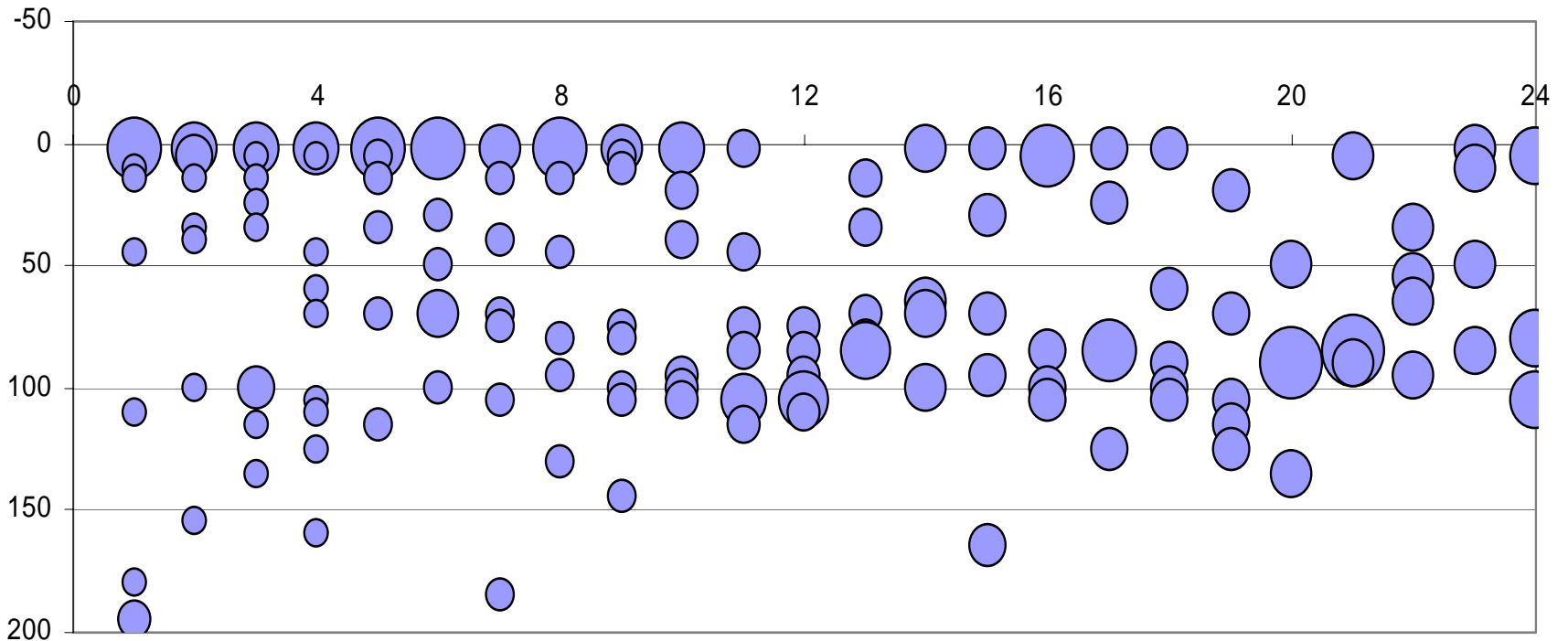
# Vertical Migration



# Vertical Migration

% larvae at depth

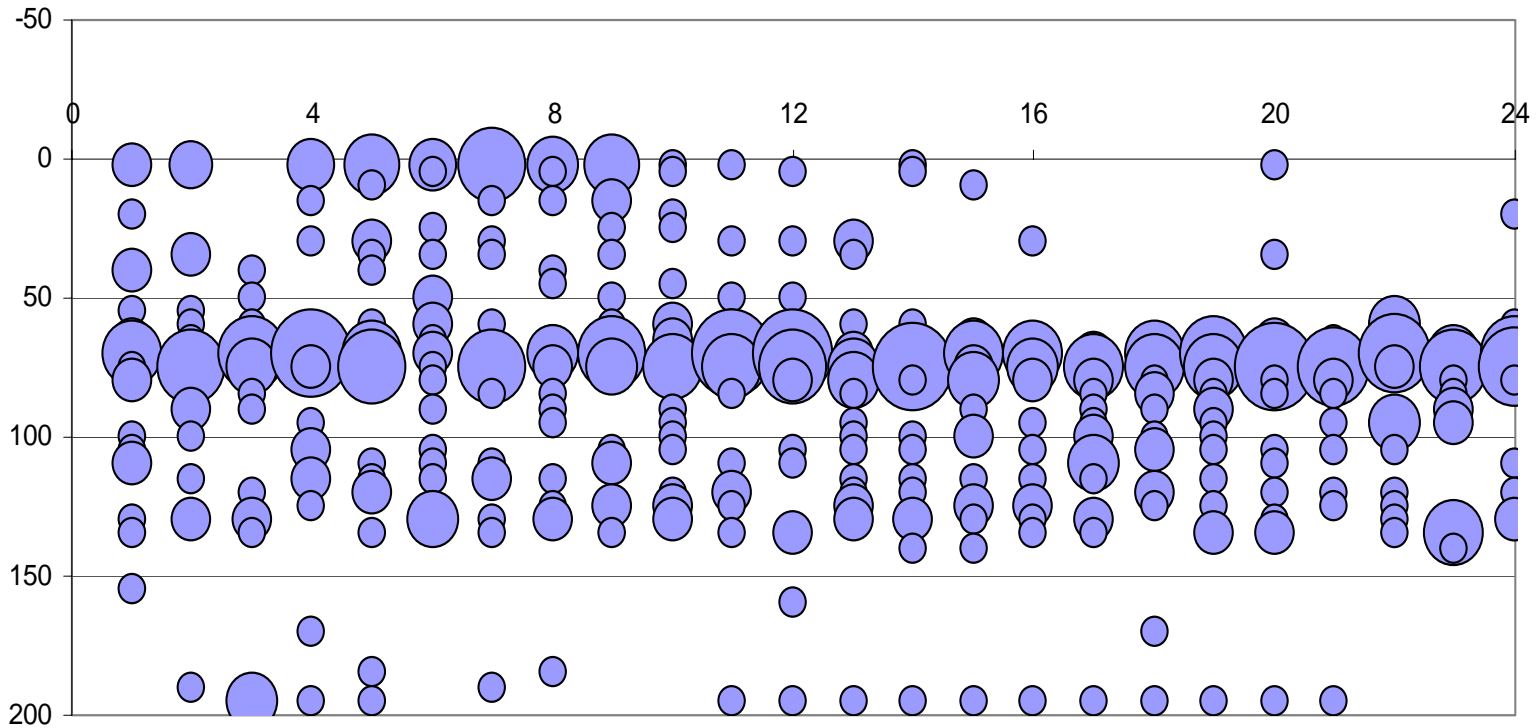
● stage 5



# Vertical Migration

%larvae at depth with Halocline

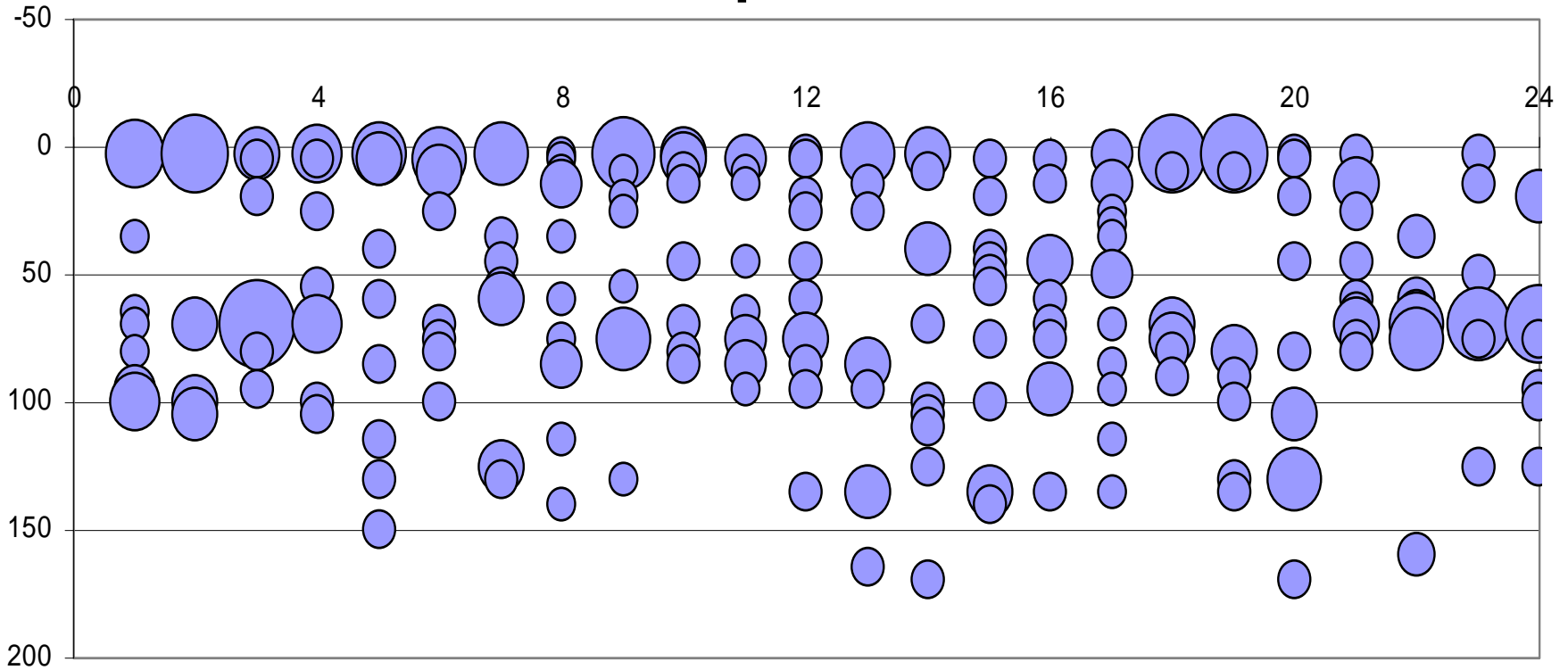
● stage1



# Vertical Migration

% larvae at depth with Halocline

stage 5



# Implications



## **Ballast Water**

Larvae available

Can survive length of voyage

Viability dependant upon receiving waters/ballast management techniques

## **Natural Dispersal**

Larvae likely in coastal waters

Distance between estuaries limits establishment

Behaviorally return to freshwater

# Research needs



Survival of newly released larvae.

Survival of larvae under ballast water management

Integration of vertical migration behavior and retention time/estuary exchange rate

Dispersion due to coastal currents