

SEA LICE 101

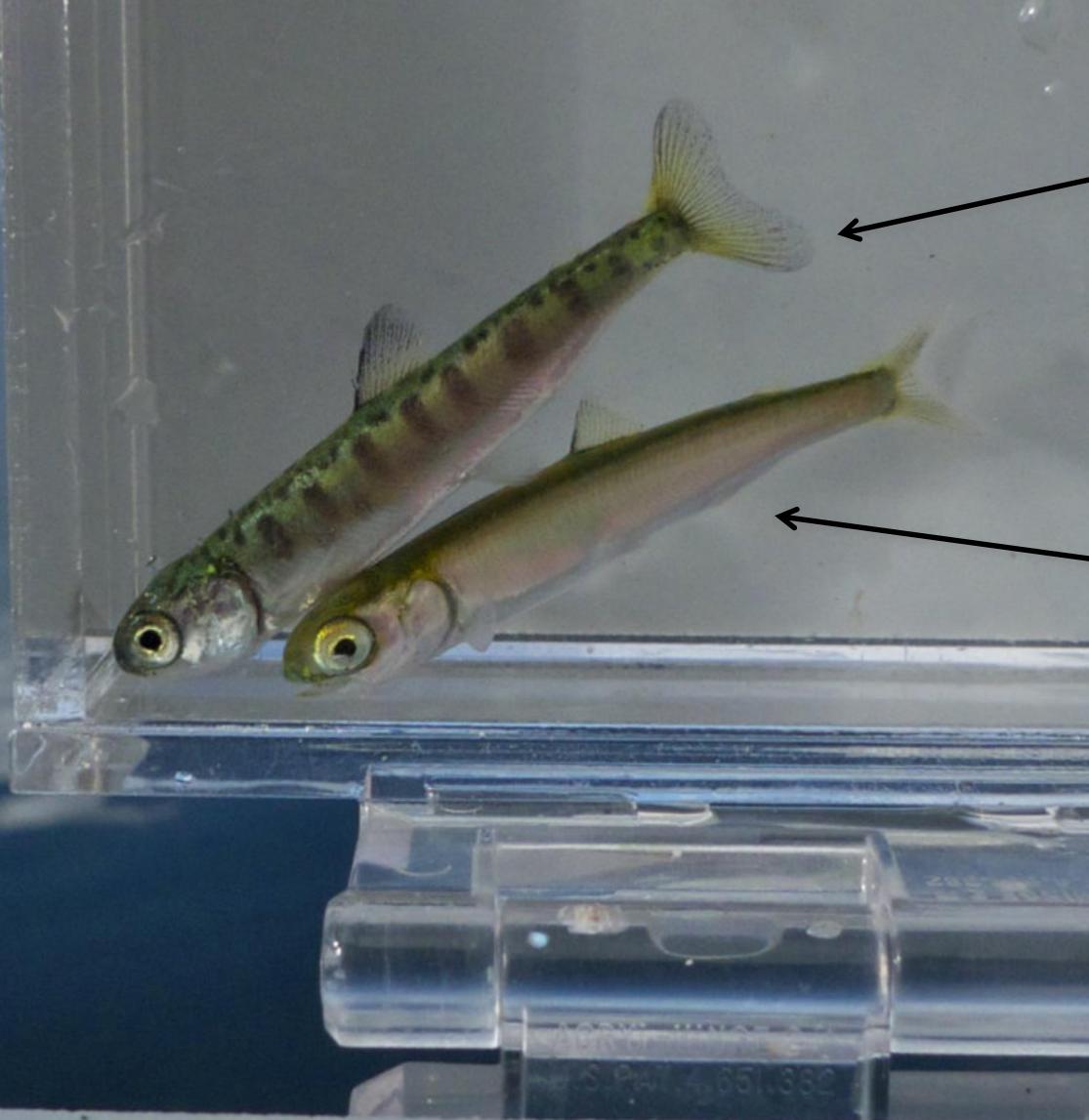


Cyrus Rocks - Ju
Quadra Island

How to catch sea lice
salmon



We catch sea lice by
catching their hosts!

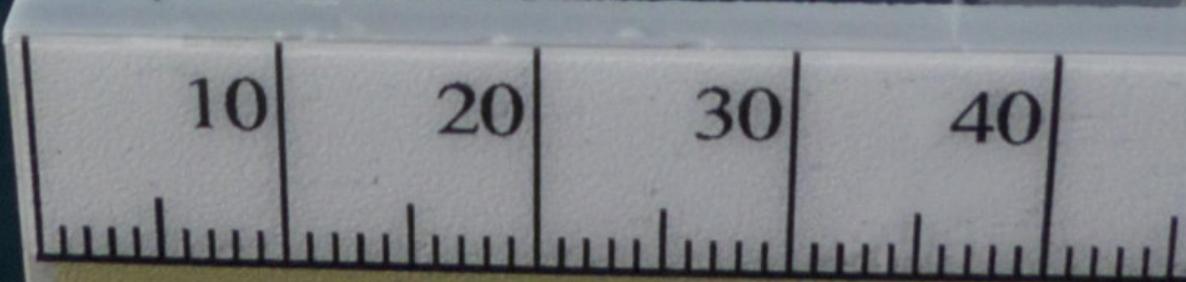


Chum salmon

- parr marks, spotted back
- caudal fin lined with black
- larger scales

Pink salmon

- silver sides, no parr marks
- peppery caudal fin, but no black rim at the fork
- smaller shimmery scales
- sometimes spotty on their backs



millimeters













Things to think about

- Minimize stress to the fish by:
 - Leaving out a larger bunt when it's rough,
 - pulling in the bunt near a steep drop-off/boulder so waves don't wash fish on shore,
 - accounting for changes in the bunt due to tide and waves,
 - pulling in the bunt **slowly** and **carefully** and avoid folds!
- Minimize rubbing in the net.
 - Don't want to knock the lice off!



Things to think about

- We want a **random** sample from the bucket.
 - It won't be completely random, but we can aim for haphazard.
- Don't just dip easy-to-catch sick fish covered in lice.
- Don't avoid them either...
- Just...don't think about it.
Be random.







What are sea lice?

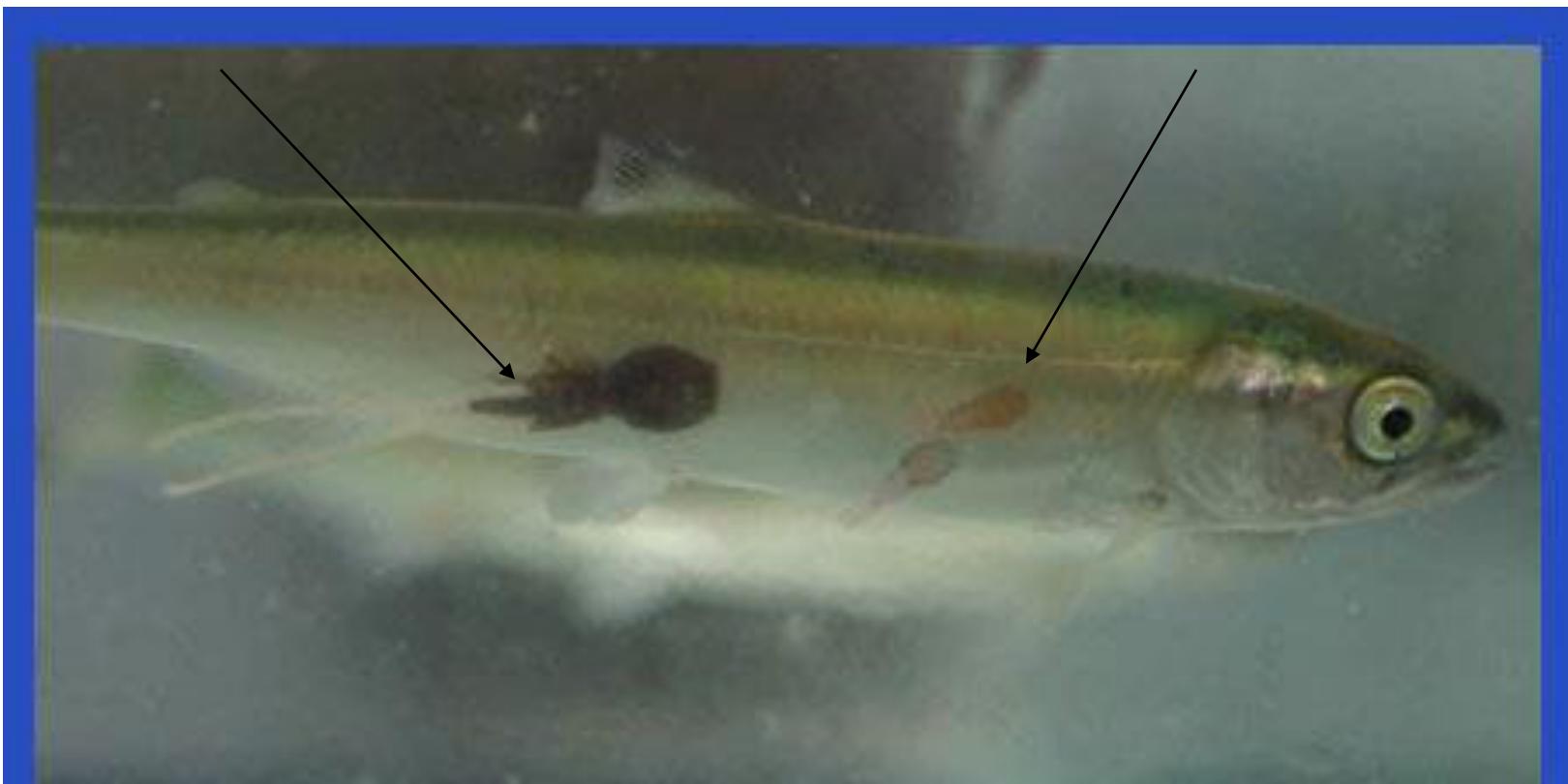
- Marine ecto(surface) parasites that occur naturally on many different species of wild fish.
- Feed on fish by attaching to the outside, usually on the skin, fins and or gills.
- They are a type of copepod, and moult through several stages.



Two (main) species of sea lice in British Columbia

*Lepeophtheirus
salmonis*

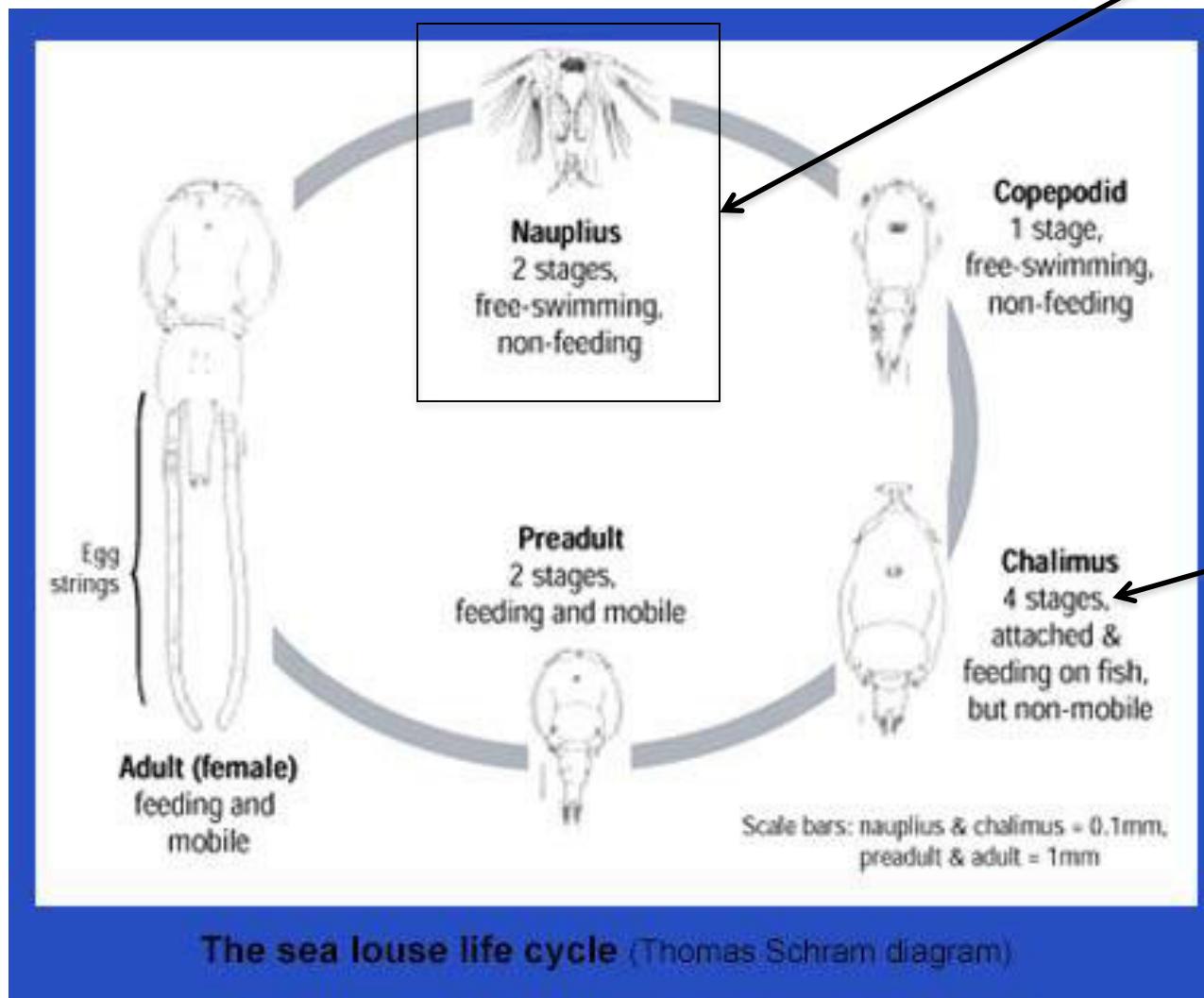
Caligus clemensi



Lepeophtheirus salmonis (left) and *Caligus clemensi* (right) on
a pink salmon smolt (Alexandra Morton photo)

Lifecycle

We don't observe these on fish.

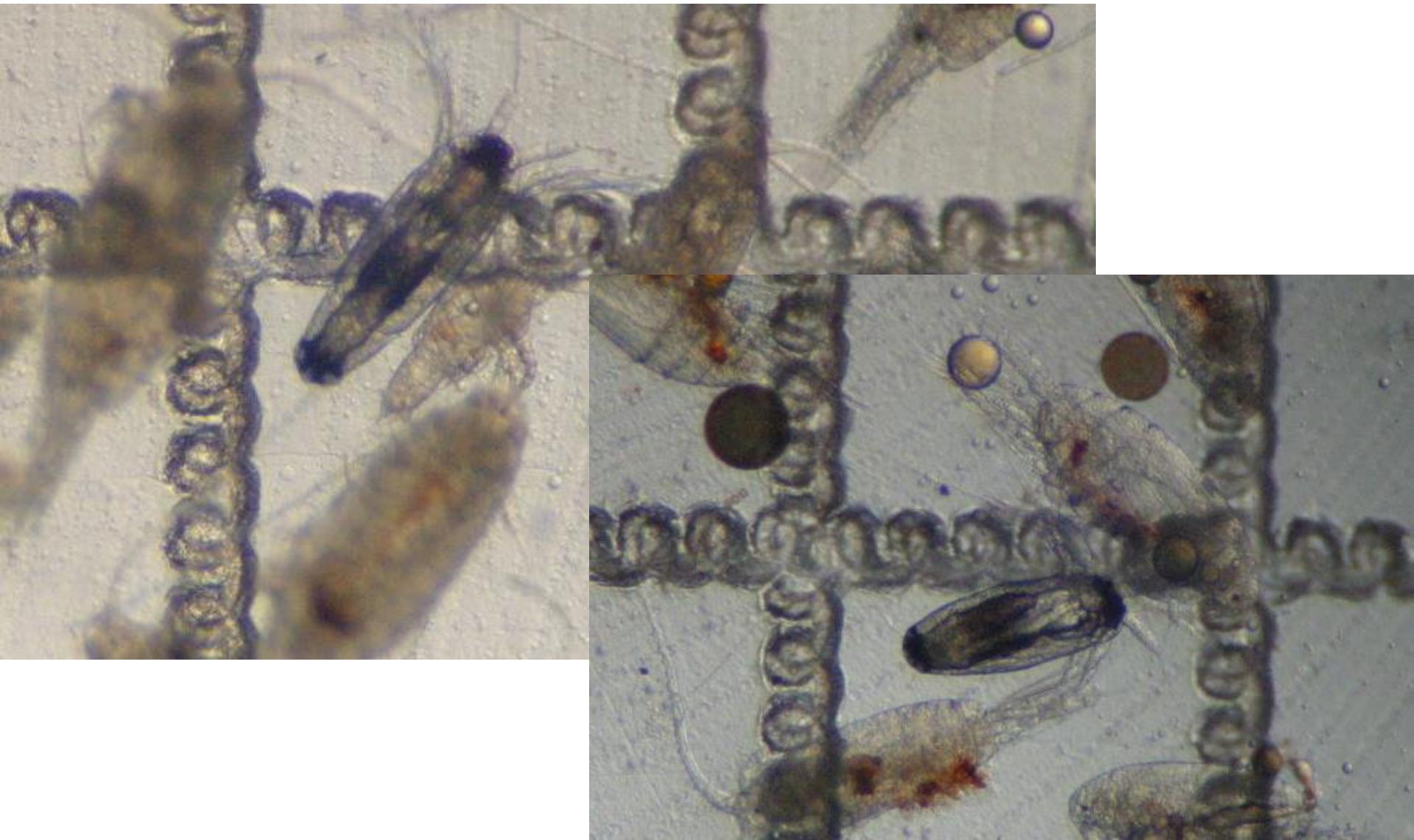


Hamre LA, et al. (2013) The Salmon Louse *Lepeophtheirus salmonis* (Copepoda: Caligidae) Life Cycle Has Only Two Chalimus Stages. PLoS One 8(9):e73539.

STAGES IN THE LIFE CYCLE

- Nauplii
 - planktonic. DO NOT SEE ON FISH.
- Cop (Copepodite)
 - Differentiate *Lep* or *Caligus*
- Chal A & Chal B (Chalimus)
 - attached by a tether
 - cannot tell species apart
- Mot (Motile: Pre-adult and Adult)
 - mobile on fish
 - Differentiate *Lep* or *Caligus* spp., male or female.

Live *L. salmonis* nauplii

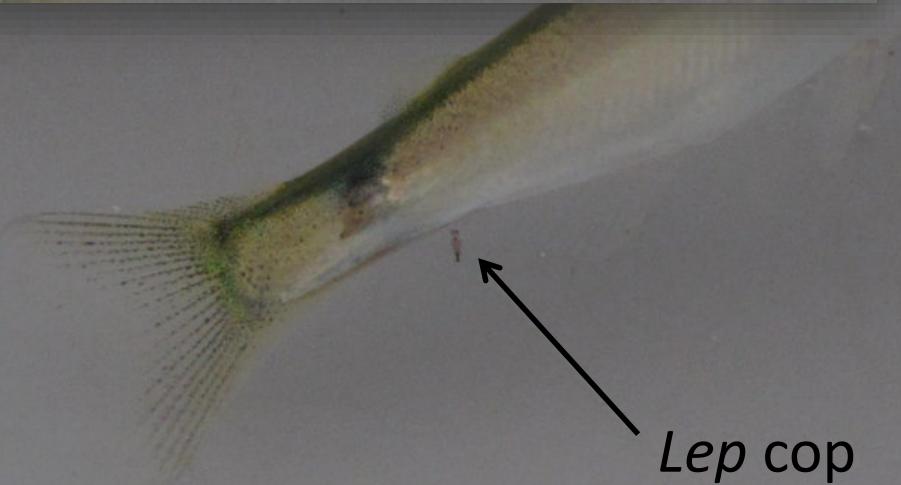
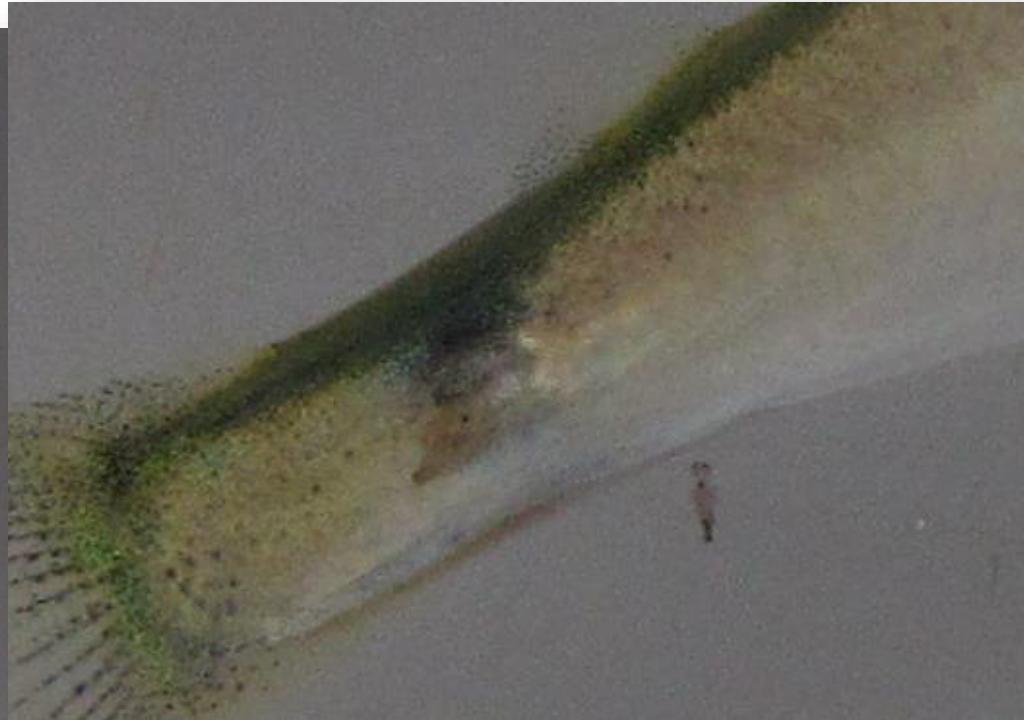


Copepodite - *Lepeophtheirus salmonis*



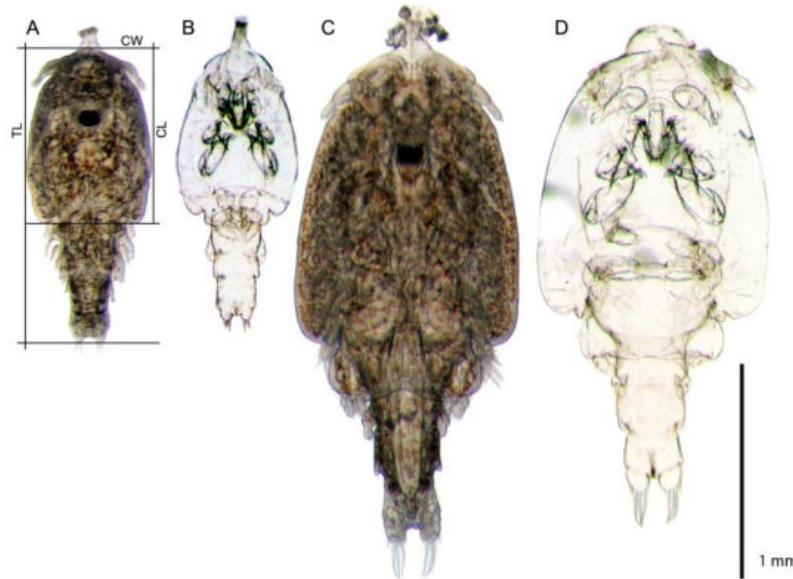


Lep cop



Lep cop

chalinus stages



chal A

chal B

OPEN ACCESS Freely available online

PLOS ONE

The Salmon Louse *Lepeophtheirus salmonis* (Copepoda: Caligidae) Life Cycle Has Only Two Chalinus Stages

Lars A. Hamre^{1*}, Christiane Eichner^{1*}, Christopher Marlowe A. Caipang², Sussie T. Dalvin^{1,2}, James E. Bron³, Frank Nilsen¹, Geoff Boxshall⁴, Rasmus Skern-Mauritzen²

¹ Sea Lice Research Centre, University of Bergen, Bergen, Norway, ² Aquatic pathogens and diseases, Institute of Marine Research, Bergen, Norway,

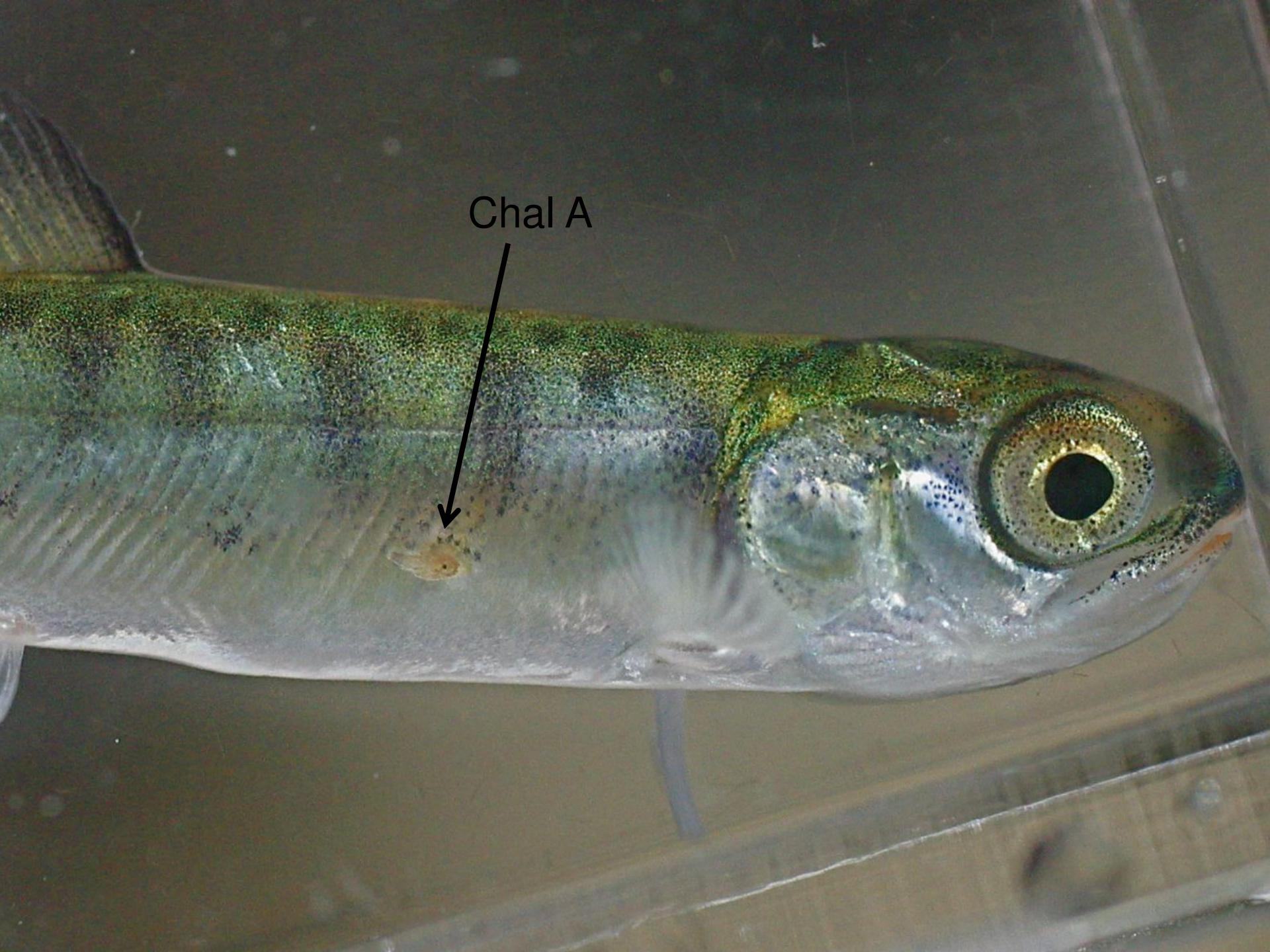
³ Institute of Aquaculture, University of Stirling, Stirling, Scotland, United Kingdom, ⁴ Natural History Museum, London, United Kingdom

Abstract

Each year the salmon louse (*Lepeophtheirus salmonis* Krøyer, 1838) causes multi-million dollar commercial losses to the salmon farming industry world-wide, and strict lice control regimes have been put in place to reduce the release of salmon louse larvae from aquaculture facilities into the environment. For half a century, the *Lepeophtheirus* life cycle has been regarded as the only copepod life cycle including 8 post-nauplius instars as confirmed in four different species, including *L. salmonis*. Here we prove that the accepted life cycle of the salmon louse is wrong. By observations of chalinus larvae molting in incubators and by morphometric cluster analysis, we show that there are only two chalinus instars: chalinus 1 (comprising the former chalinus I and II stages which are not separated by a molt) and chalinus 2 (the former chalinus III and IV stages which are not separated by a molt). Consequently the salmon louse life cycle has only six post-nauplius instars, as in other genera of caligid sea lice and copepods in general. These findings are of fundamental importance in experimental studies as well as for interpretation of salmon louse biology and for control and management of this economically important parasite.

Chal A (chalimus
A stage) - no
species



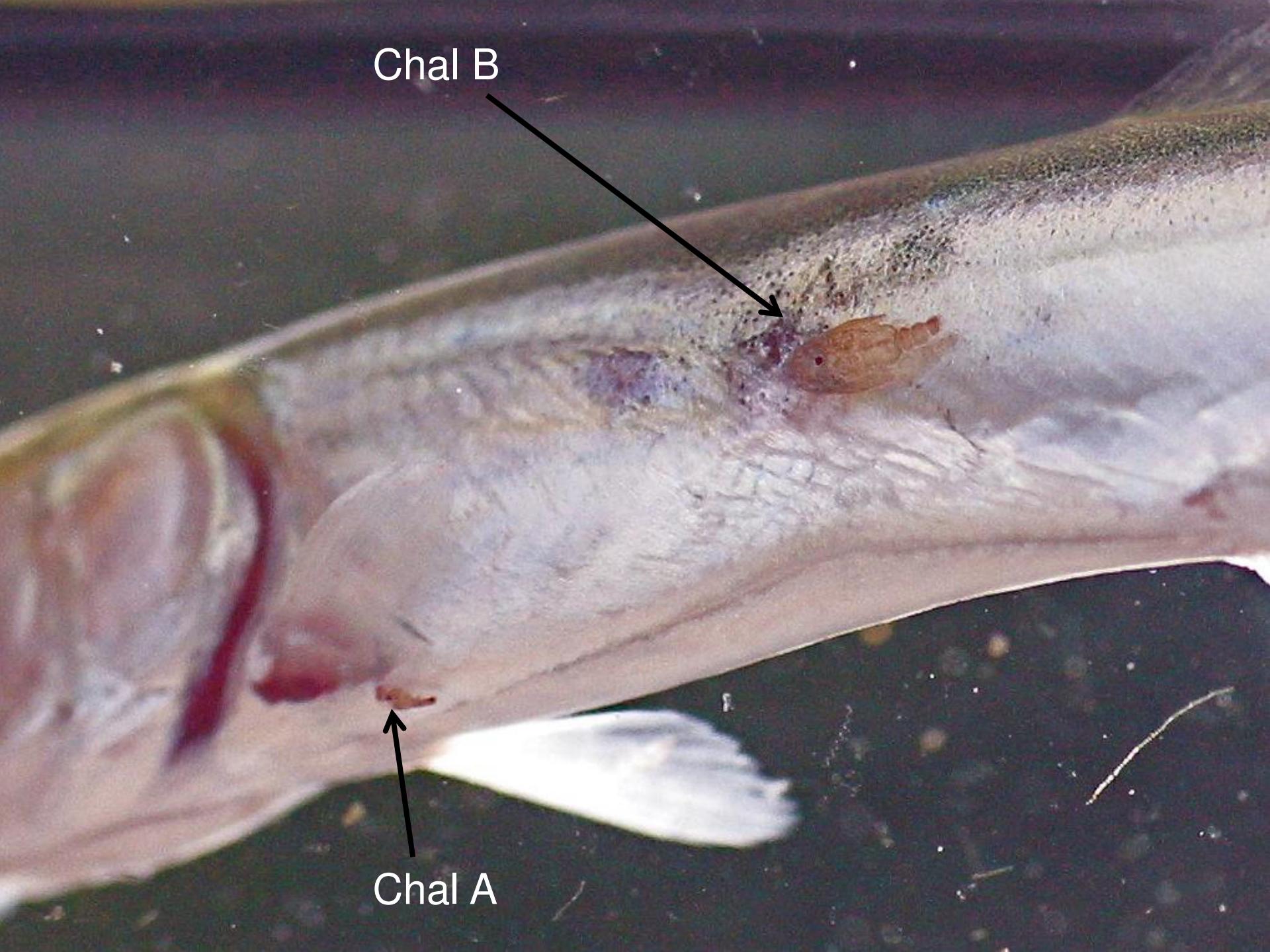


Chal A





Chal B (chalimus B)



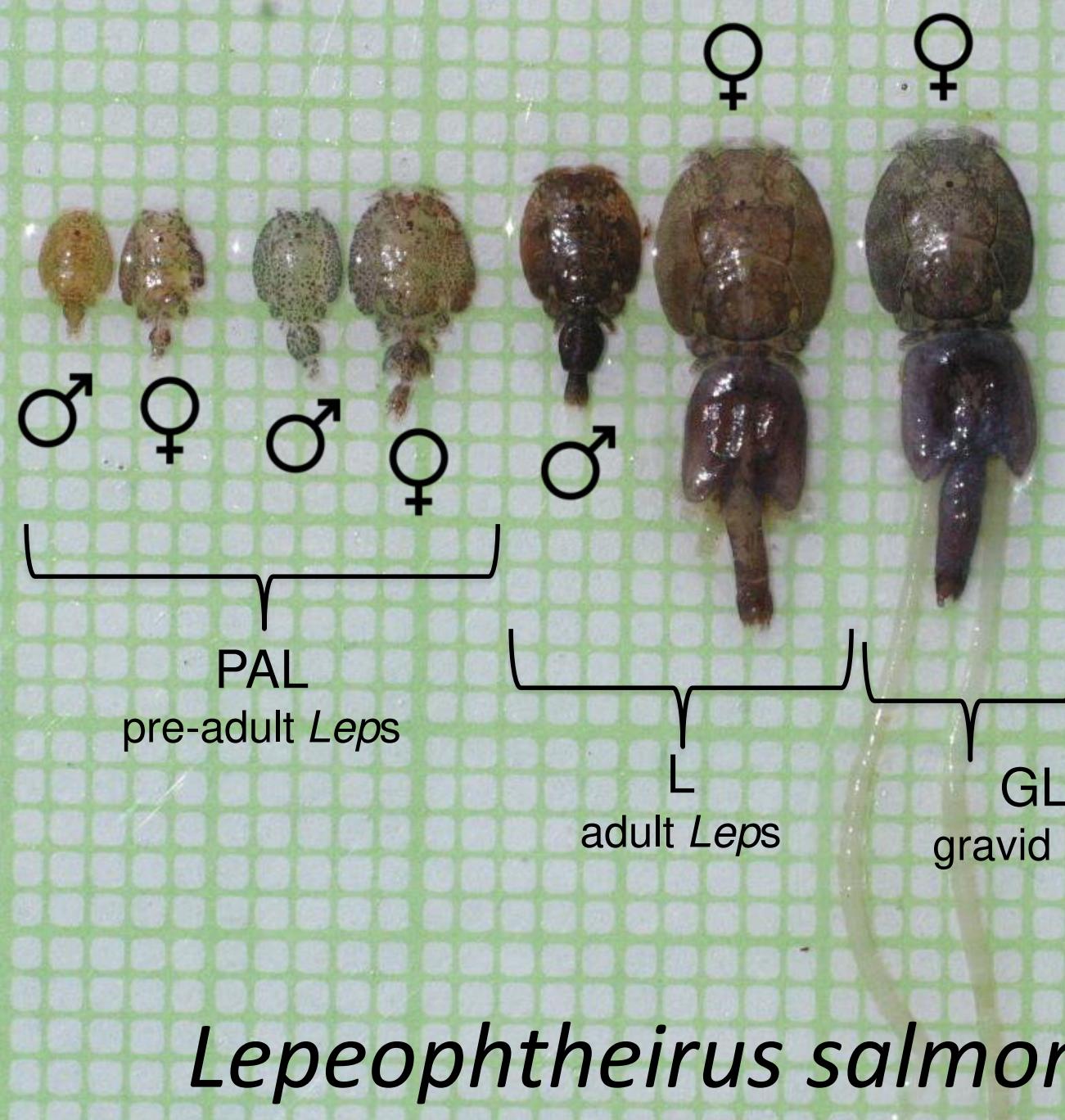
Chal B

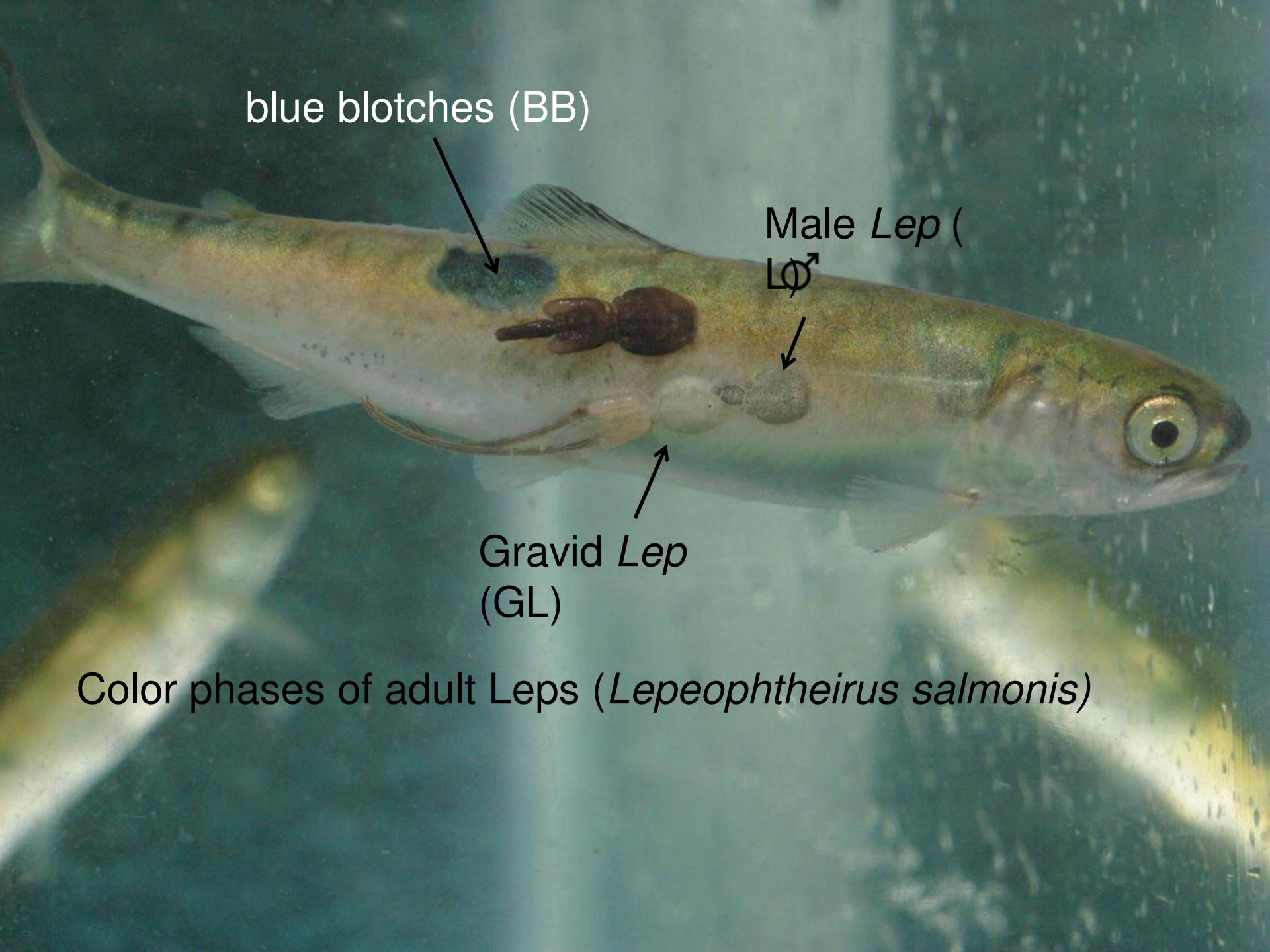
Chal A

Motiles

- Adult lice
- Easy to tell what species: L or C
 - *Lepeophtheirus salmonis* (L)
 - Male PAL or Female PAL = pre-adult Lep
 - Male L or Female L
 - GL = gravid Lep
 - *Caligus clemensi*
 - C = Caligus adult
 - GC = gravid caligus
 - Mot unid

GRAVID means
pregnant, or
having eggs





blue blotches (BB)

Male Lep (

♂

Gravid Lep
(GL)

Color phases of adult Leps (*Lepeophtheirus salmonis*)



Adult

Leps vs. Cals

	<i>L. salmonis</i>	<i>C. clemensi</i>
Feeding habits	Mucus, skin and blood. Blood can often be seen in the digestive tract of pre-adults and adults	More surface browsers, less frequently taking blood
Lunules	Smaller and more delicate	More triangular and large
Chalimus Filament	Replace every molt	Adds material to filament after every molt
Size	Larger	smaller
Colour (not always reliable!)	Brown, grey, clear. Egg string are clear or brownish	<i>Usually orange-ish.</i> Egg strings are bright pink!

Blood in intestine of GL
(gravid Lep)

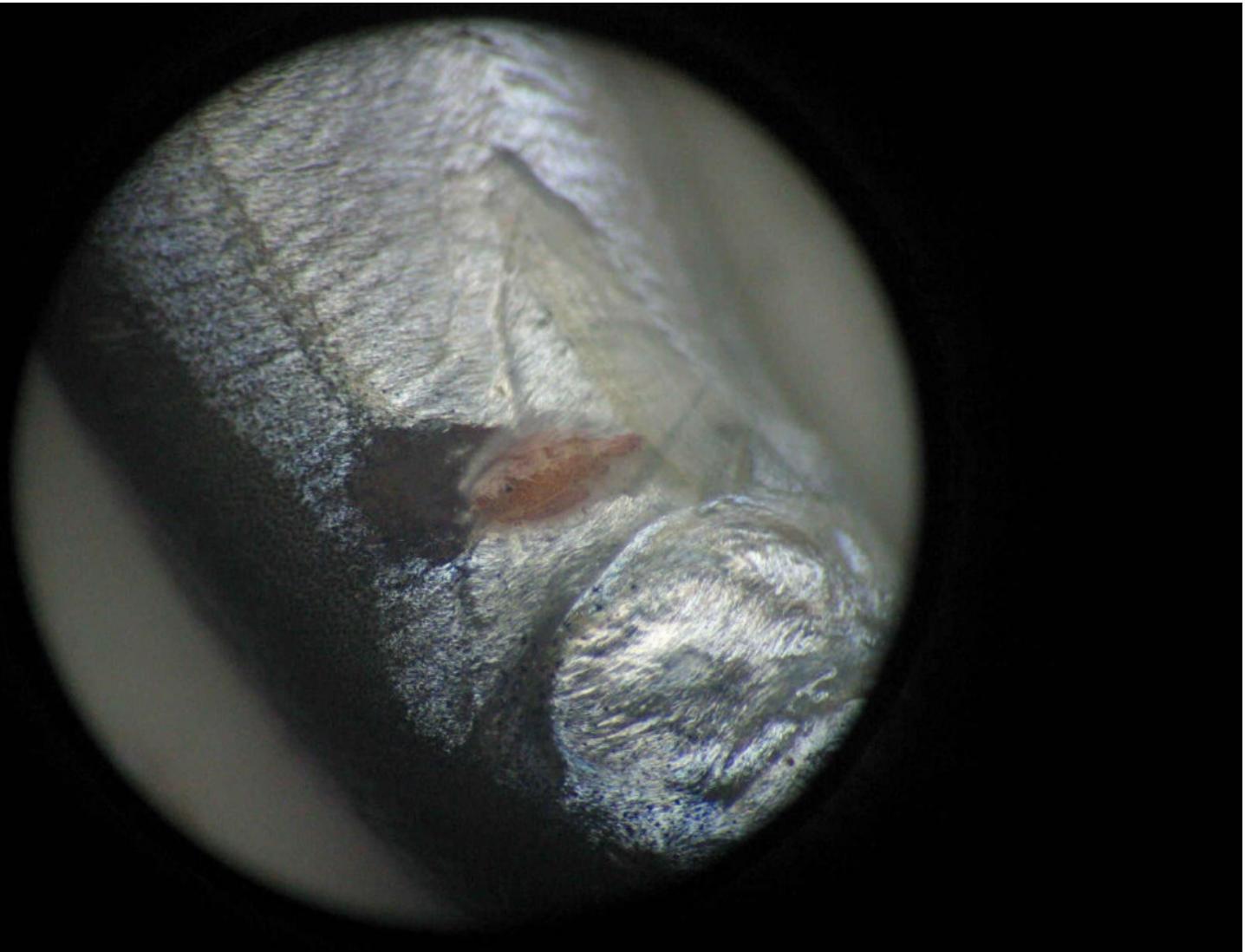


Marks you might see as a result of lice

- CS - Chalimus scar
- MS – Motile (Mot) Scars
- MG - Mate guarding
- PB - Pinched Belly
- H – Hemorrhaging

CS - Chalimus Scar

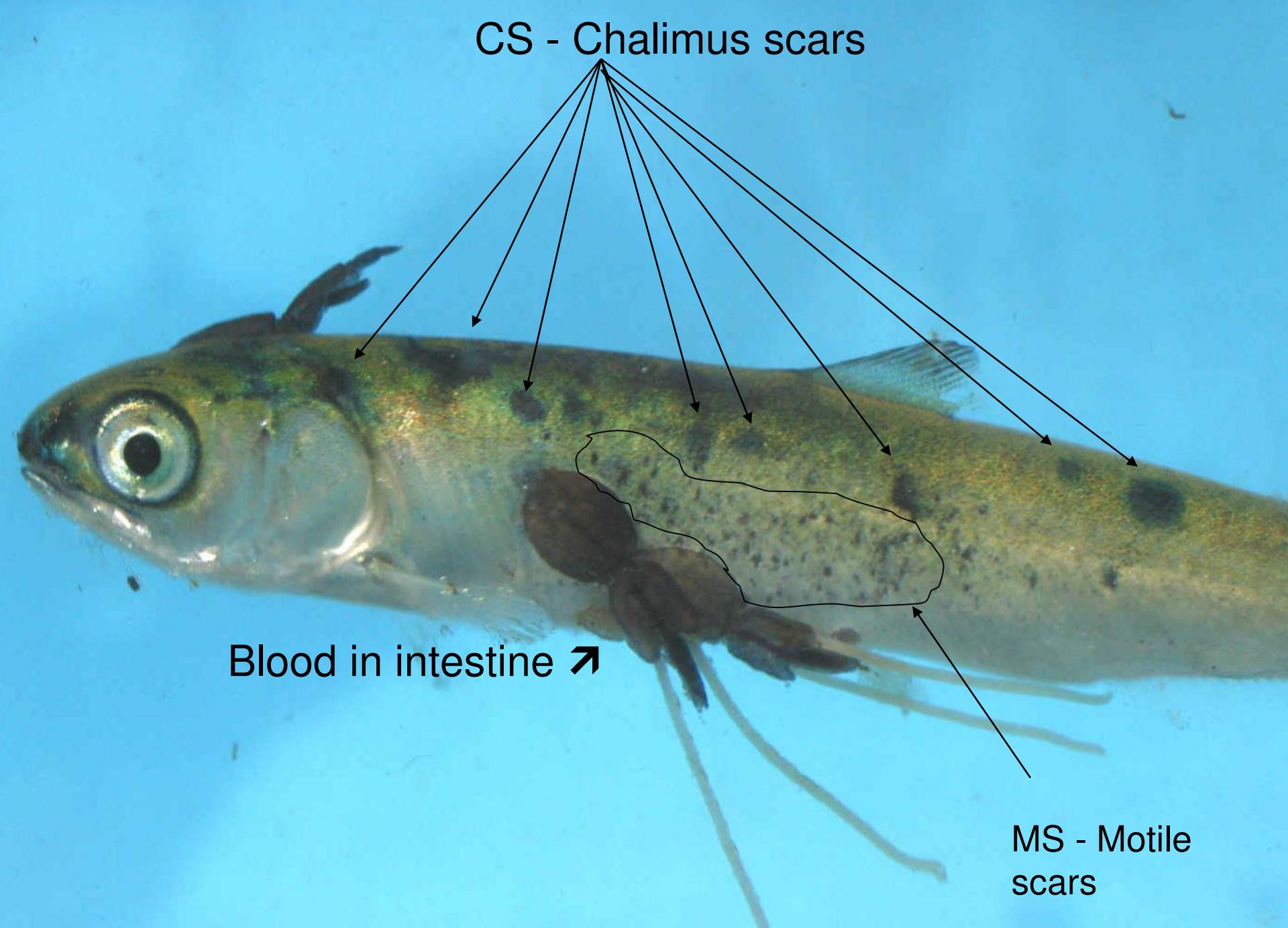
Tally by hash marks





MS - Motile/Adult Scars
note presence or absence

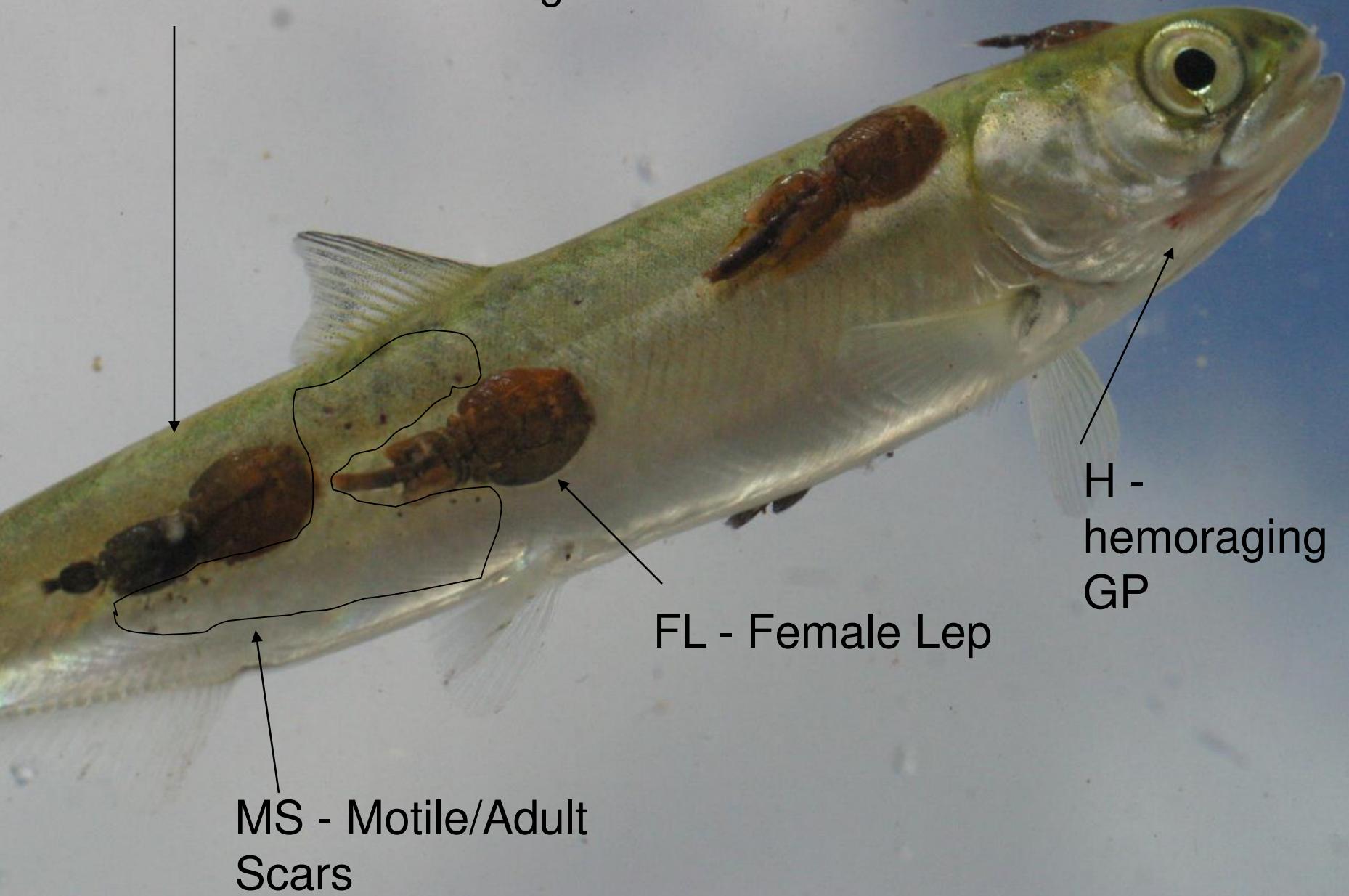
CS - Chalimus scars



Blood in intestine ↗

MS - Motile
scars

MG - Mate Guarding



MS - Motile/Adult
Scars

FL - Female Lep

H -
hemoraging
GP

GGP and chal B





PB - Pinched Belly, due
to louse

Other signs you may see on the fish

- PS - predator scar, indicate whether it is a fish or bird
- H - hemorrhaging, may be indicative of disease or other problems
- BB – blue blotches



Cyrus Rocks

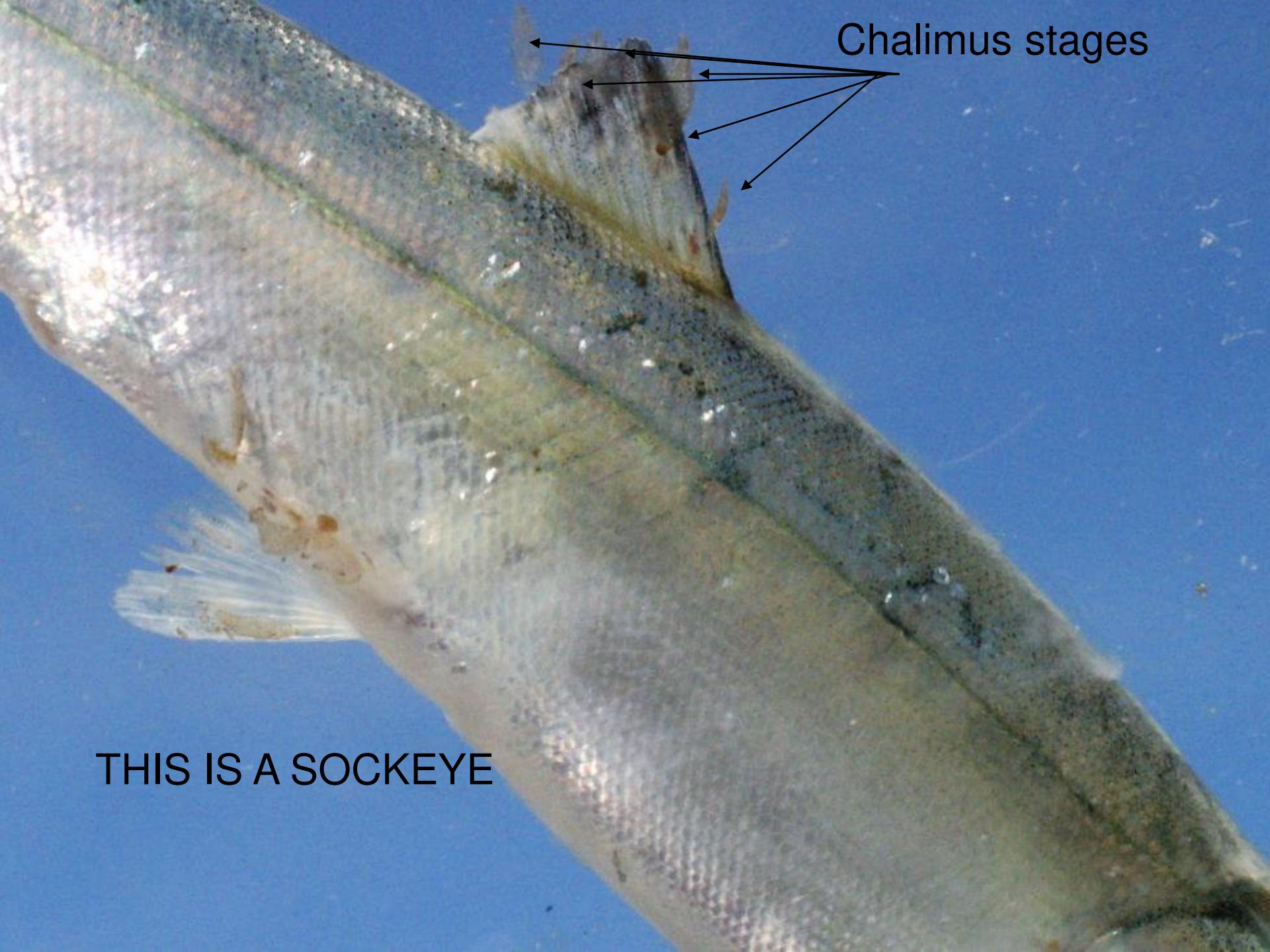


Chalimus scar

Male PAL

Hemorrhaging chalimus scar





Chalimus stages

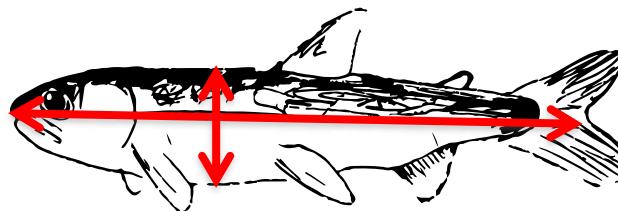
THIS IS A SOCKEYE

Writing down data

- Be **clear** and **neat**.
- Avoid erasing.
 - If you make a mistake, unless you have an awesome eraser, just put a line through the mistake (erasers make a mess on wet paper!)
- Note farm activity (number of pens, stocked?, size of fish, any unusual activity).
- Temperature, salinity measurements at each site.
- Record mortalities in net/buckets and in recovery separately.
- Note school size, ratio of pink:chum, bycatch.

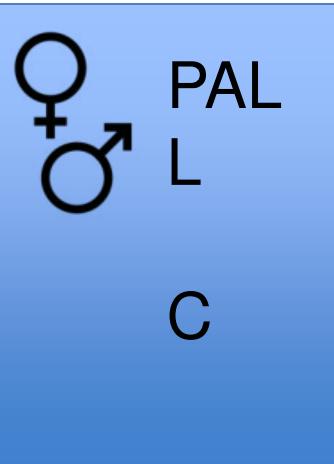
Species:
P = pink
C = chum

Forklength
Height
(widest)



Date: _____ Location: _____ Temp: _____
Salinity: _____

#	Spp	L(mm)	H(mm)	Cop	ChalA	ChalB	Mot	CS	Notes	Comments
1									MS PS H EG BB SC	
2									MS PS H EG BB SC	
3									MS PS H EG BB SC	
4									MS PS H EG BB SC	
5									MS PS H EG BB SC	
6									MS PS H EG BB SC	
7									MS PS H EG BB SC	
8									MS PS H EG BB SC	
9									MS PS H EG BB SC	
10									MS PS H EG BB SC	
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16									MS PS H EG BB SC	
17									MS PS H EG BB SC	
18									MS PS H EG BB SC	
19									MS PS H EG BB SC	
20									MS PS H EG BB SC	



L
C

hashmarks

Date:

Location:

Temp:
Salinity:

#	Spp	L(mm)	H(mm)	Cop	ChalA	ChalB	Mot	CS	Notes	Comments
1									MS PS H EG BB SC	
2									MS PS H EG BB SC	
3									MS PS H EG BB SC	
4									MS PS H EG BB SC	
5									MS PS H EG BB SC	
6									MS PS H EG BB SC	
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8									MS PS H EG BB SC	
9									MS PS H EG BB SC	
10									MS PS H EG BB SC	
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17									MS PS H EG BB SC	
18									MS PS H EG BB SC	
19									MS PS H EG BB SC	
20									MS PS H EG BB SC	

MS: mot scars

PS: pred scars – comments Fish or Bird

H: hemorrhaging – comment where

EG: eroded gill (different from GGP)

BB: blue blotches

SC: scales present

Date:		Location:							Temp:	Salinity:
#	Spp	L(mm)	H(mm)	Cop	ChalA	ChalB	Mot	CS	Notes	Comments

1									MS PS H EG BB SC	
2									MS PS H EG BB SC	
3									MS PS H EG BB SC	
4									MS PS H EG BB SC	
5									MS PS H EG BB SC	
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20									MS PS H EG BB SC	

Parts of a fry

