

# Brood Year 2018 Mark Characteristic Report



Prepared for:  
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Seattle, WA

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April 2019

- Agency: Seattle Public Utilities
- Facility: Cedar River Hatchery
- Species: Sockeye
- Brood Year: 2018
- Number of fish released by mark pattern:
  - 1,687,788 fish: H2-4n-2
  - 1,644,970 fish: H4-3n
  - 1,140,986 fish: H3-5n
- Ambient water temp: 8°C
- Marking system: Chill 4°C



$H_{2-4n-2}$

SPU

Cedar River Hatchery

Sockeye

Brood Year: 2018

Inc: K1

Mark: H2-4n-2

Ring Width: 4.4um, 2.9um,  
3.3um

6.6um

11.6um

8.8um

50  $\mu\text{m}$

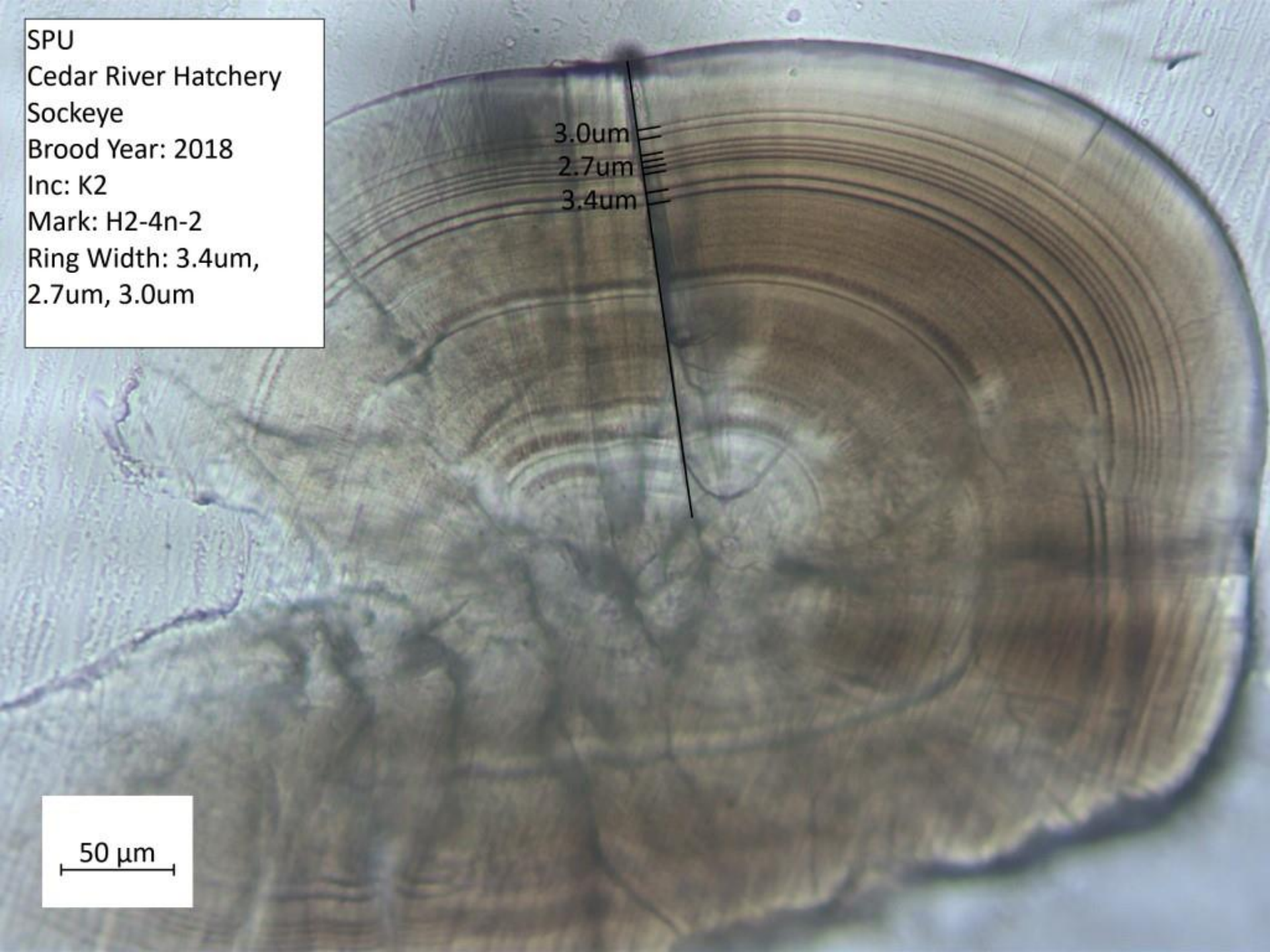




SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K2  
Mark: H2-4n-2  
Ring Width: 3.4um,  
2.7um, 3.0um

3.0um  
2.7um  
3.4um

50  $\mu\text{m}$



SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K8  
Mark: H2-4n-2  
Ring Width: 3.8 $\mu$ m,  
2.7 $\mu$ m, 3.1 $\mu$ m

6.1 $\mu$ m  
10.7 $\mu$ m  
7.5 $\mu$ m

50  $\mu$ m



SPU

Cedar River Hatchery

Sockeye

Brood Year: 2018

Inc: K14

Mark: H2-4n-2

Ring Width: 3.9 $\mu$ m, 2.8 $\mu$ m, 3.4 $\mu$ m

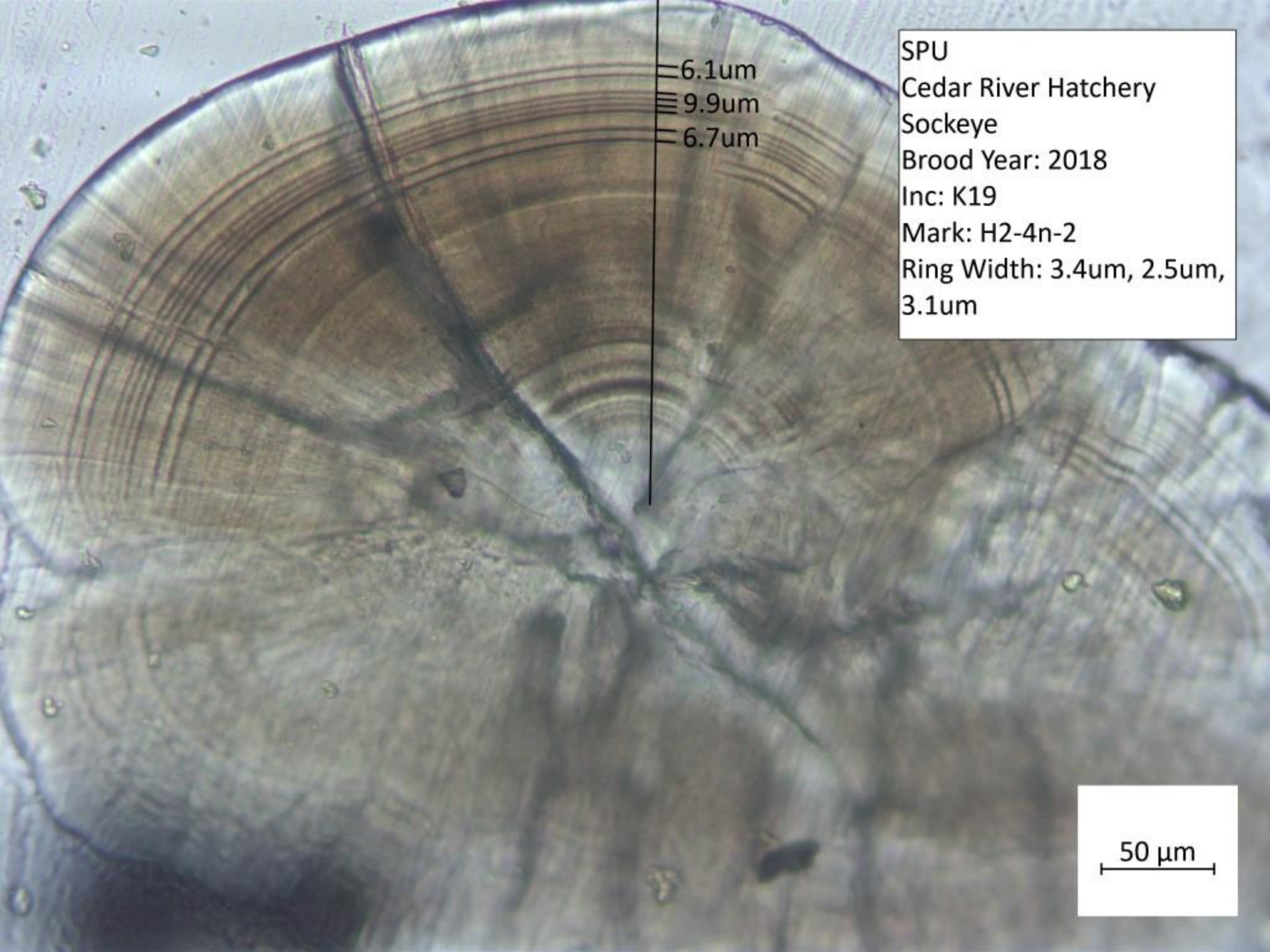
6.8 $\mu$ m

11.0 $\mu$ m

7.8 $\mu$ m

50  $\mu$ m



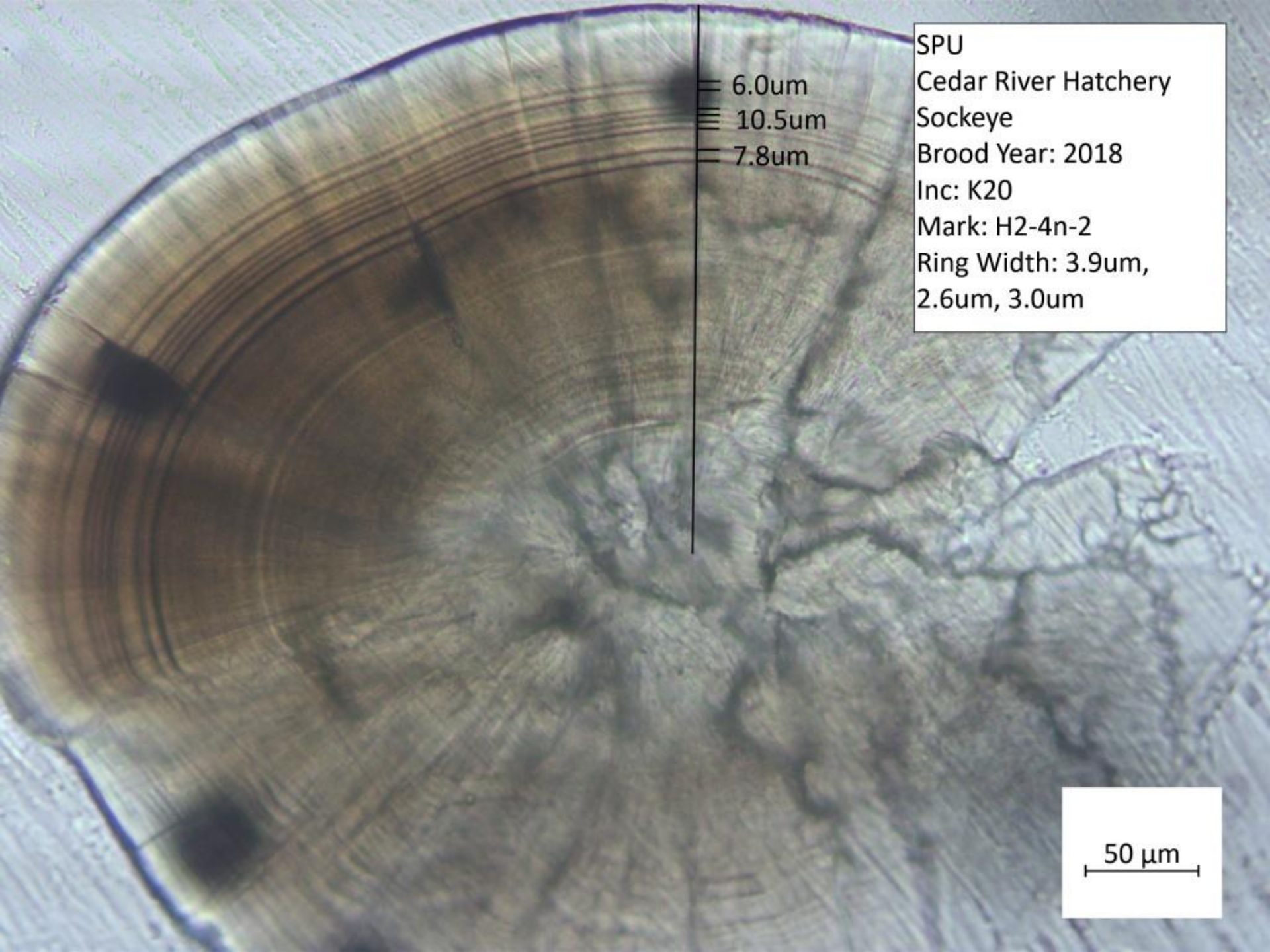


6.1um  
9.9um  
6.7um

SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K19  
Mark: H2-4n-2  
Ring Width: 3.4um, 2.5um,  
3.1um

50  $\mu$ m





6.0um  
10.5um  
7.8um

SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K20  
Mark: H2-4n-2  
Ring Width: 3.9um,  
2.6um, 3.0um

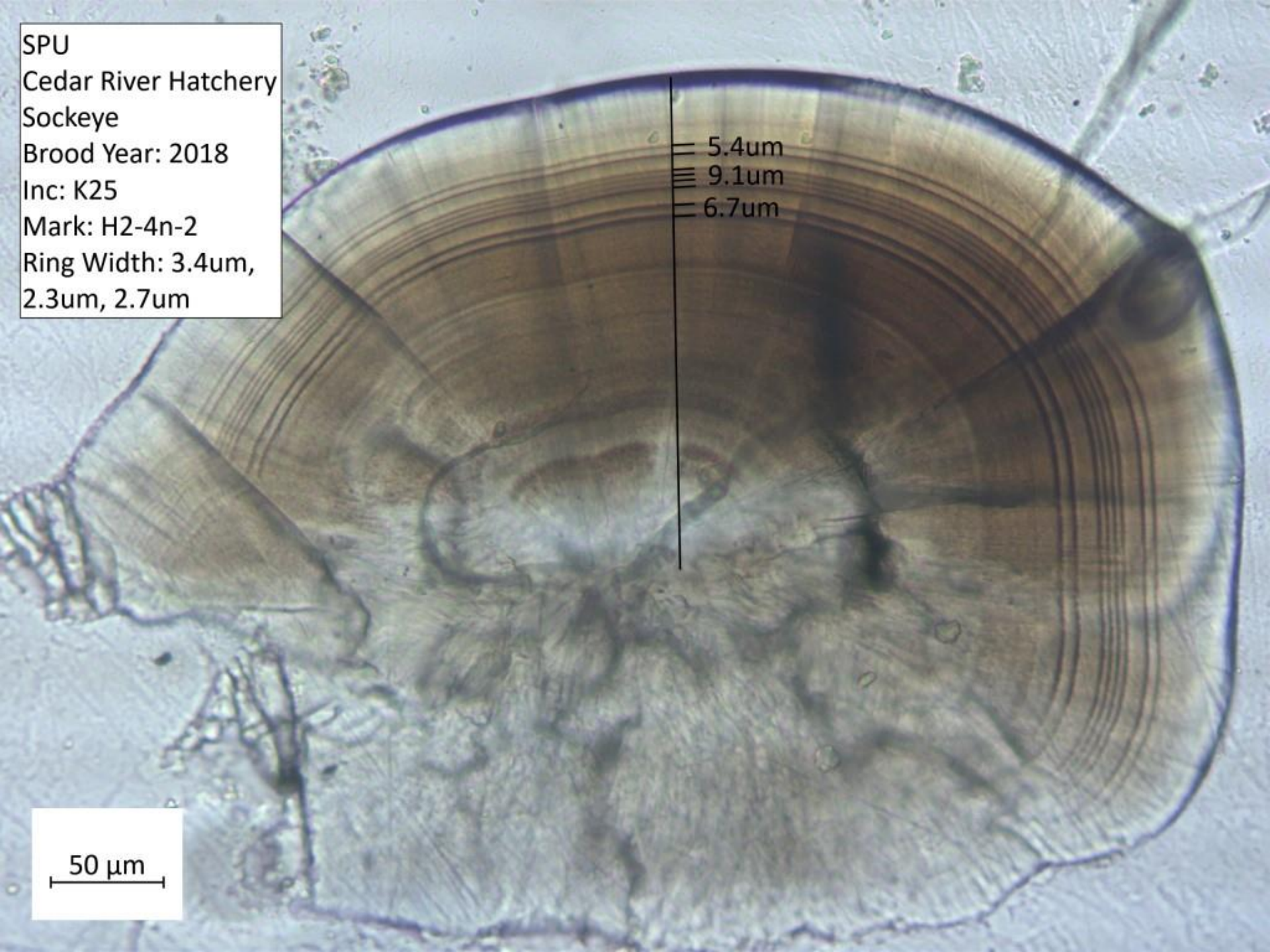
50 μm



SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K25  
Mark: H2-4n-2  
Ring Width: 3.4um,  
2.3um, 2.7um

5.4um  
9.1um  
6.7um

50  $\mu$ m





SPU

Cedar River Hatchery

Sockeye

Brood Year: 2018

Inc: K26

Mark: H2-4n-2

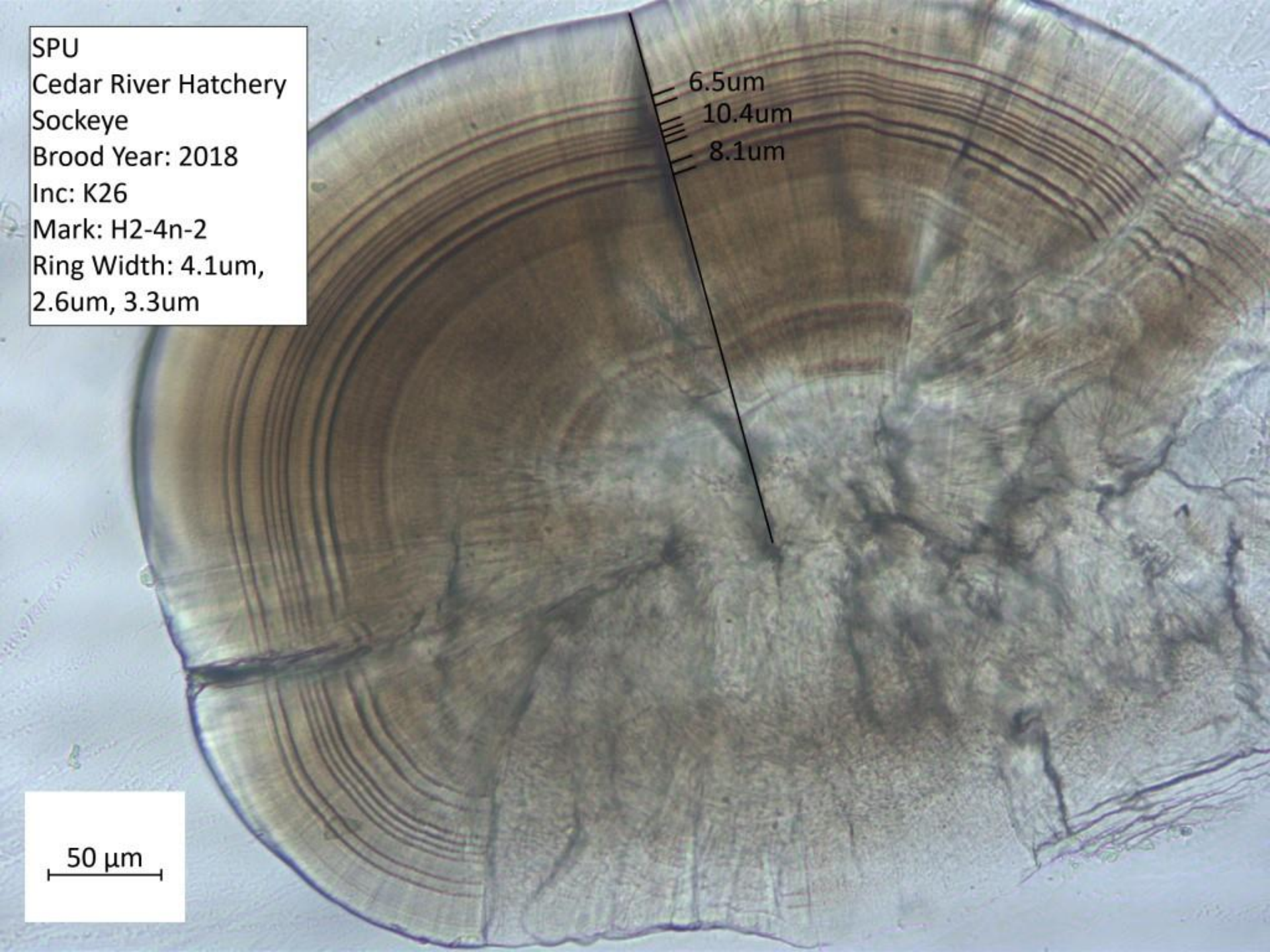
Ring Width: 4.1um,  
2.6um, 3.3um

6.5um

10.4um

8.1um

50  $\mu\text{m}$

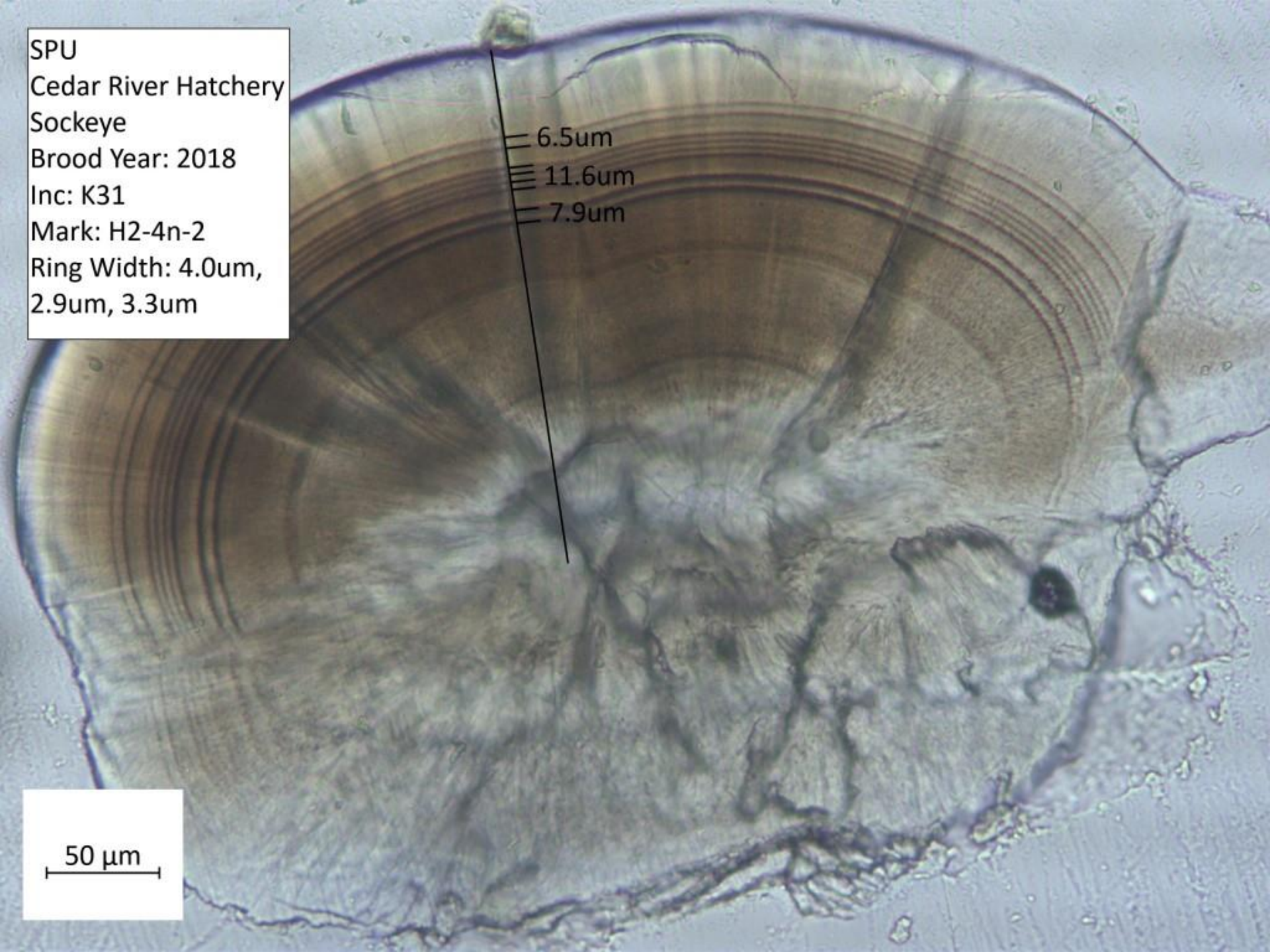




SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K31  
Mark: H2-4n-2  
Ring Width: 4.0um,  
2.9um, 3.3um

6.5um  
11.6um  
7.9um

50  $\mu$ m

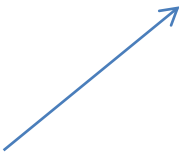




SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K32  
Mark: H2-4n-2  
Ring Width: 3.8um,  
2.8um, 3.8um

7.5um  
11.1um  
7.6um

50  $\mu$ m


$$4H2-4n-2$$

The pre-hatch band was added to test an efficiency mark using micro-rings. The term efficiency mark was chosen over micro-mark because efficiency marks should look like the hatch code marks currently used by most hatcheries originating from NPAFC member nations. Efficiency marks have similar band widths to hatch code marks and are easily viewed under 200x magnification. Micro-marks, which are very narrow, need higher magnification.



SPU  
Cedar River Hachery  
Sockeye  
Brood Year: 2018  
Inc: K37  
Mark: 4H2-4n-2  
Ring Width: 6um,  
3.8um, 2.7um, 3.0um  
Note: Prehatch band  
was marked with 4hr  
micro-rings.

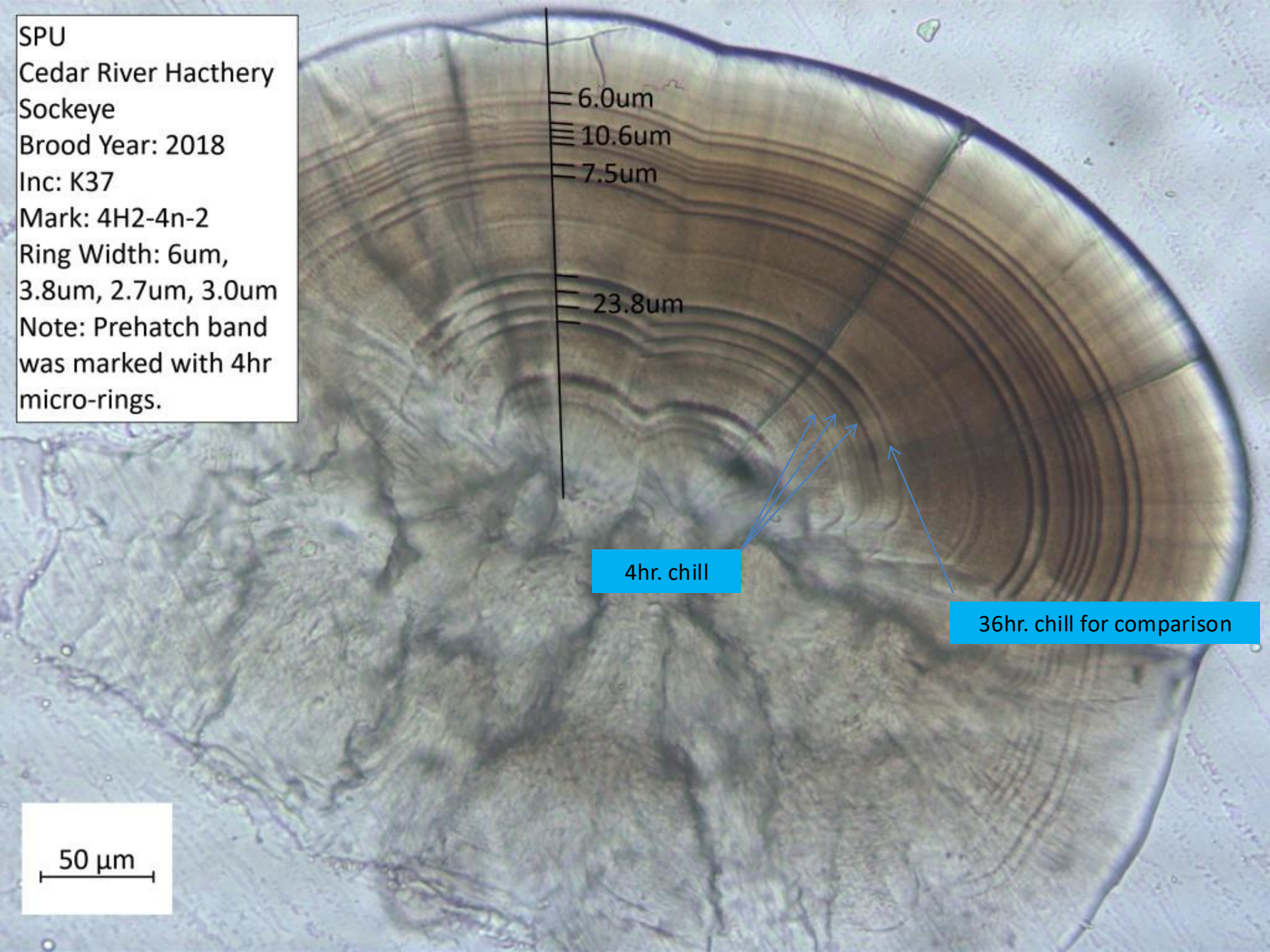
6.0um  
10.6um  
7.5um

23.8um

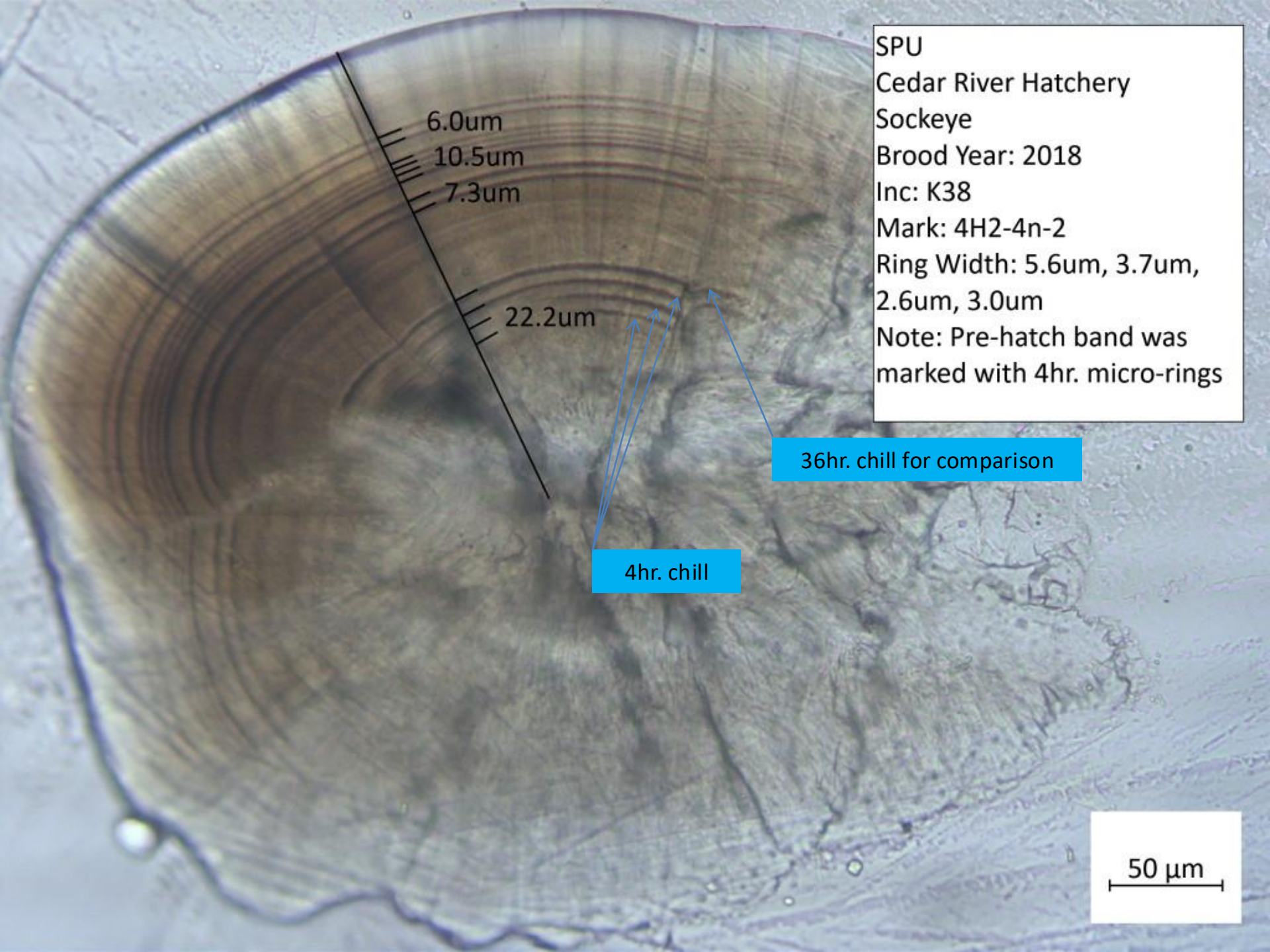
4hr. chill

36hr. chill for comparison

50  $\mu$ m







SPU

Cedar River Hatchery

Sockeye

Brood Year: 2018

Inc: K38

Mark: 4H2-4n-2

Ring Width: 5.6um, 3.7um,  
2.6um, 3.0um

Note: Pre-hatch band was  
marked with 4hr. micro-rings

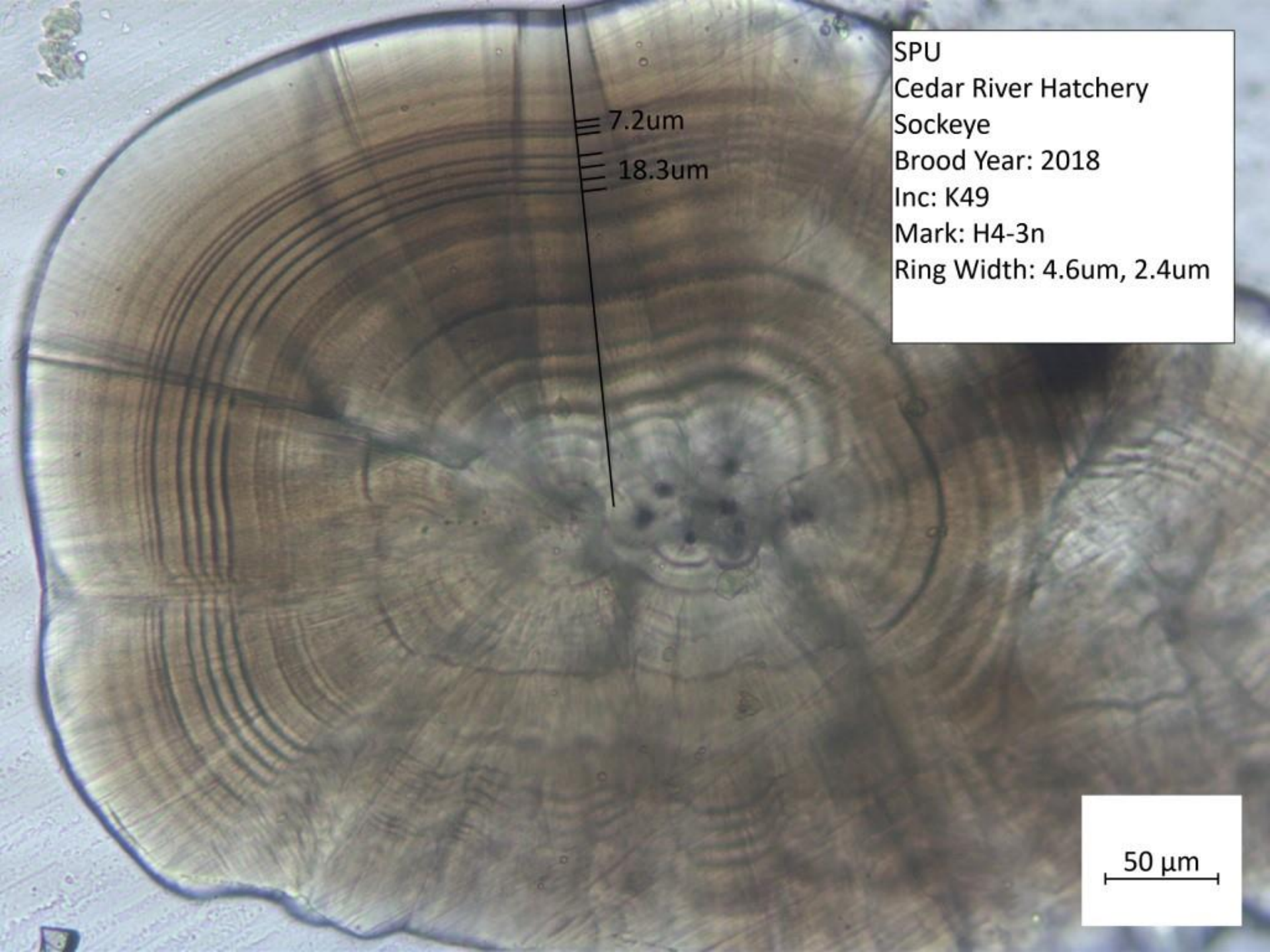
36hr. chill for comparison

4hr. chill

50  $\mu$ m



H4-3n



SPU

Cedar River Hatchery

Sockeye

Brood Year: 2018

Inc: K49

Mark: H4-3n

Ring Width: 4.6um, 2.4um

50  $\mu\text{m}$



SPU

Cedar River Hatchery

Sockeye

Brood Year: 2018

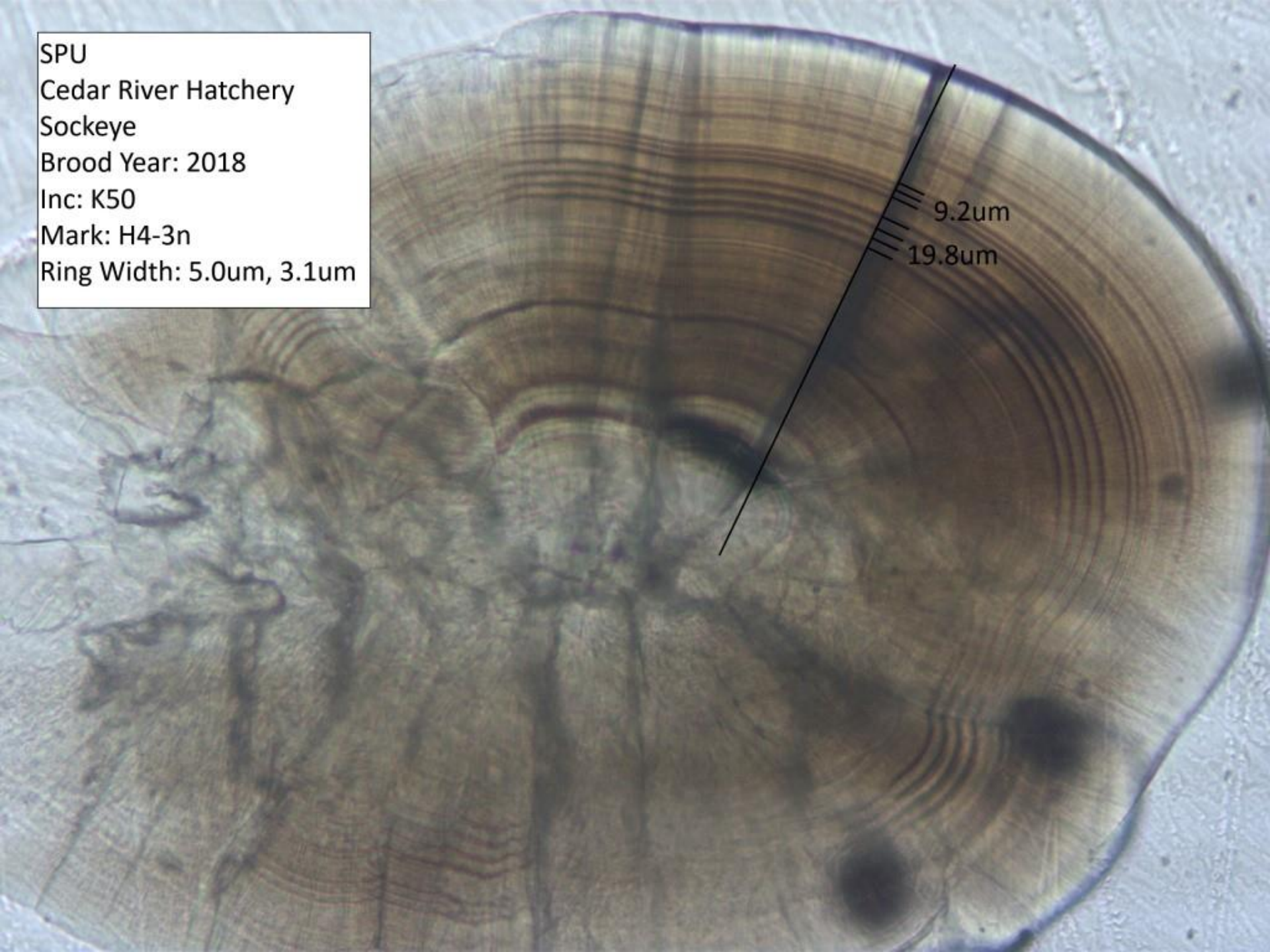
Inc: K50

Mark: H4-3n

Ring Width: 5.0um, 3.1um

9.2um

19.8um





SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K56  
Mark: H4-3n  
Ring Width: 4.4 $\mu$ m, 2.5 $\mu$ m

7.5 $\mu$ m  
17.4 $\mu$ m

50  $\mu$ m

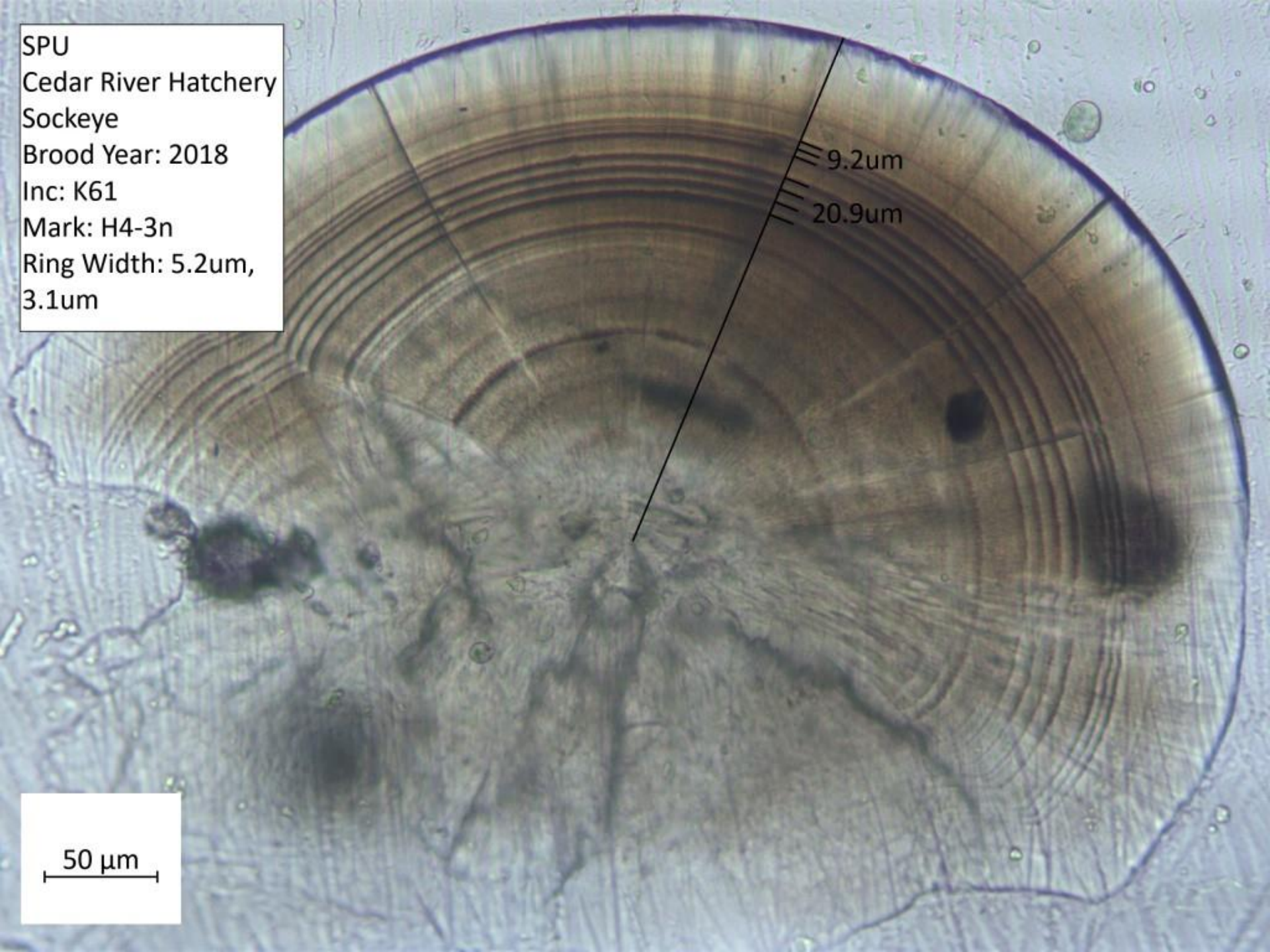


SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K61  
Mark: H4-3n  
Ring Width: 5.2um,  
3.1um

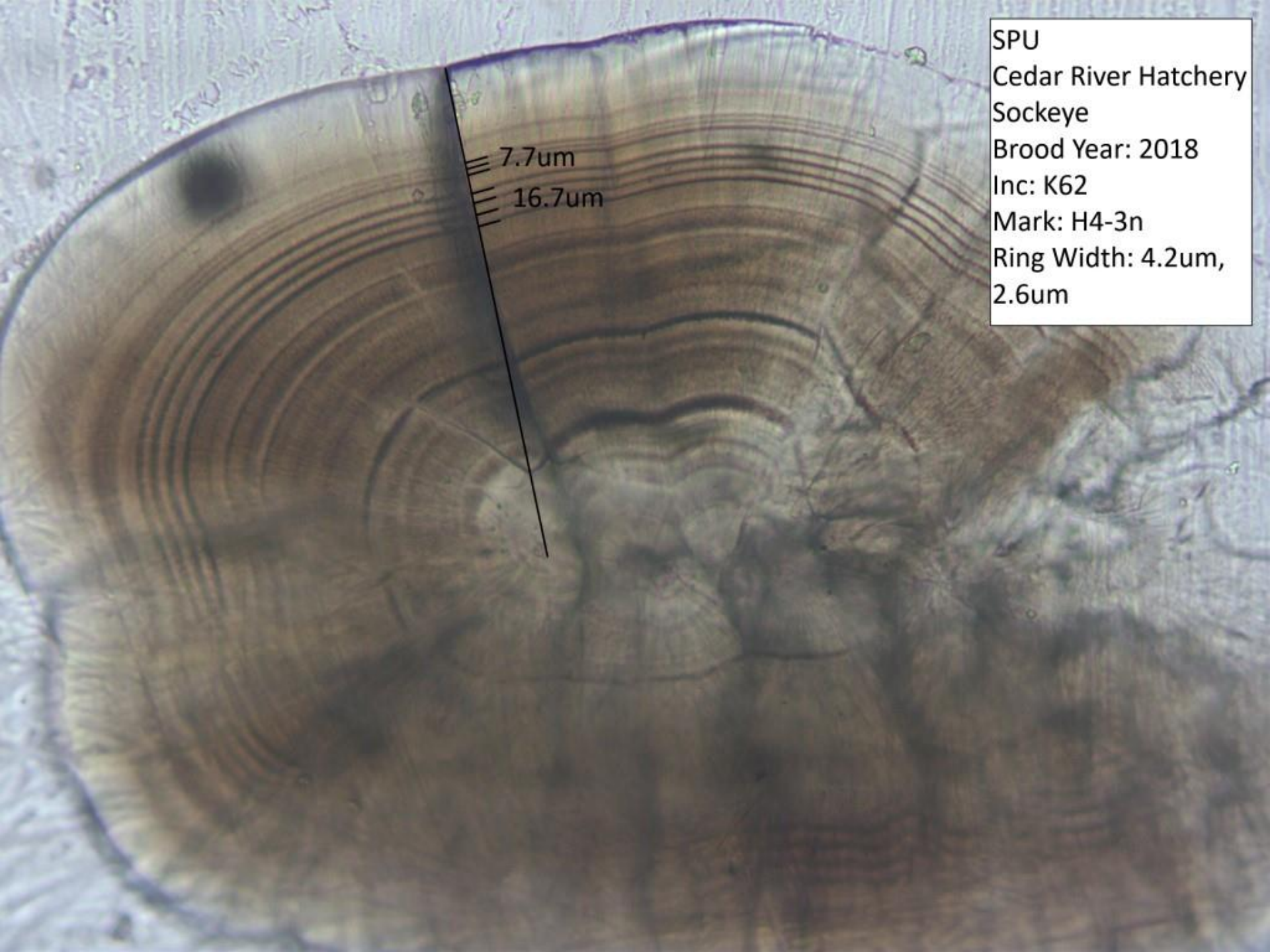
9.2um

20.9um

50  $\mu\text{m}$







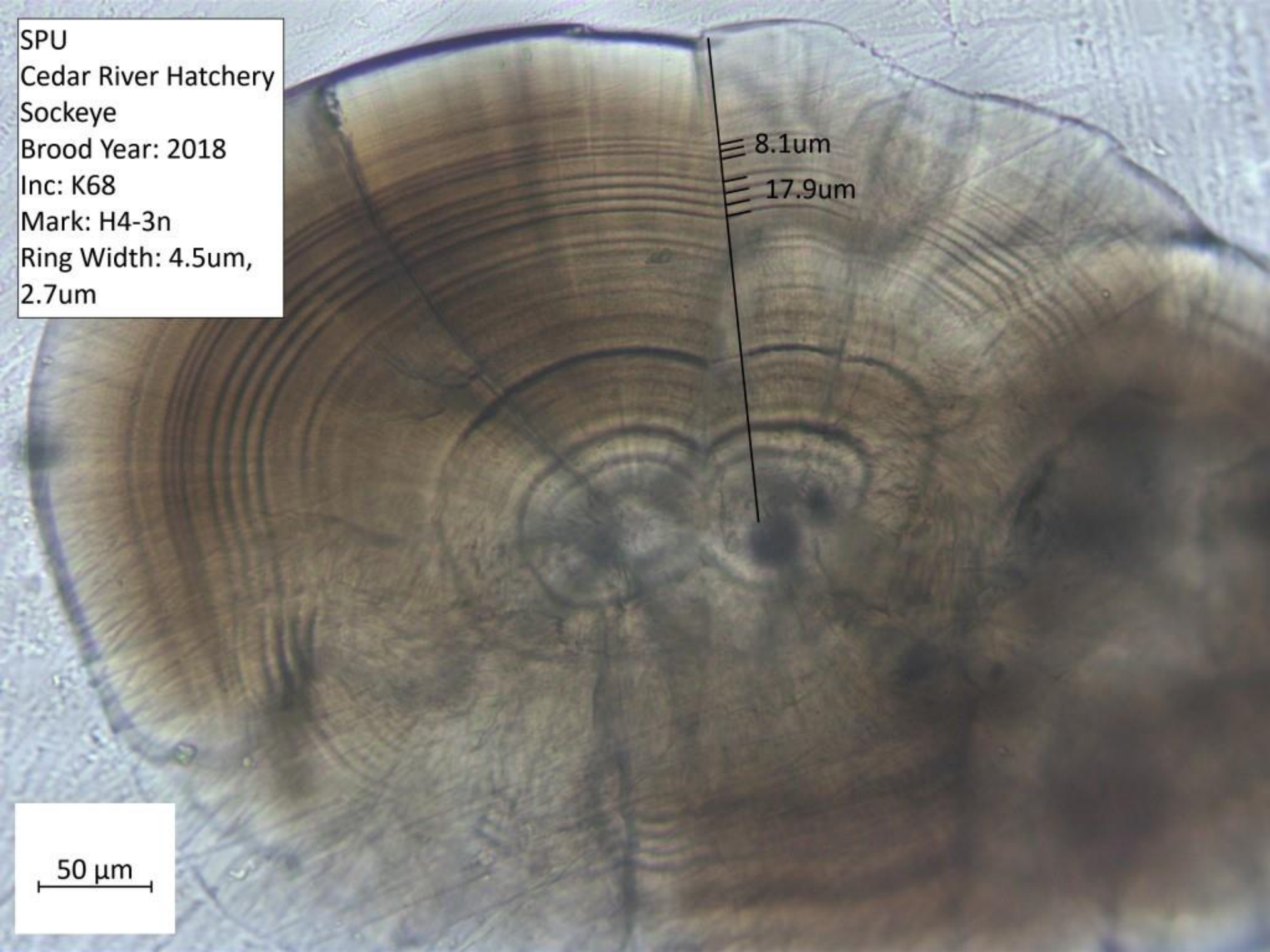
SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K62  
Mark: H4-3n  
Ring Width: 4.2um,  
2.6um



SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K68  
Mark: H4-3n  
Ring Width: 4.5um,  
2.7um

8.1um  
17.9um

50  $\mu$ m





SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K73  
Mark: H4-3n  
Ring Width: 4.5um,  
2.3um

6.8um  
17.8um

50  $\mu$ m



SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K74  
Mark: H4-3n  
Ring Width: 4.6um,  
2.8um

8.4um  
18.5um

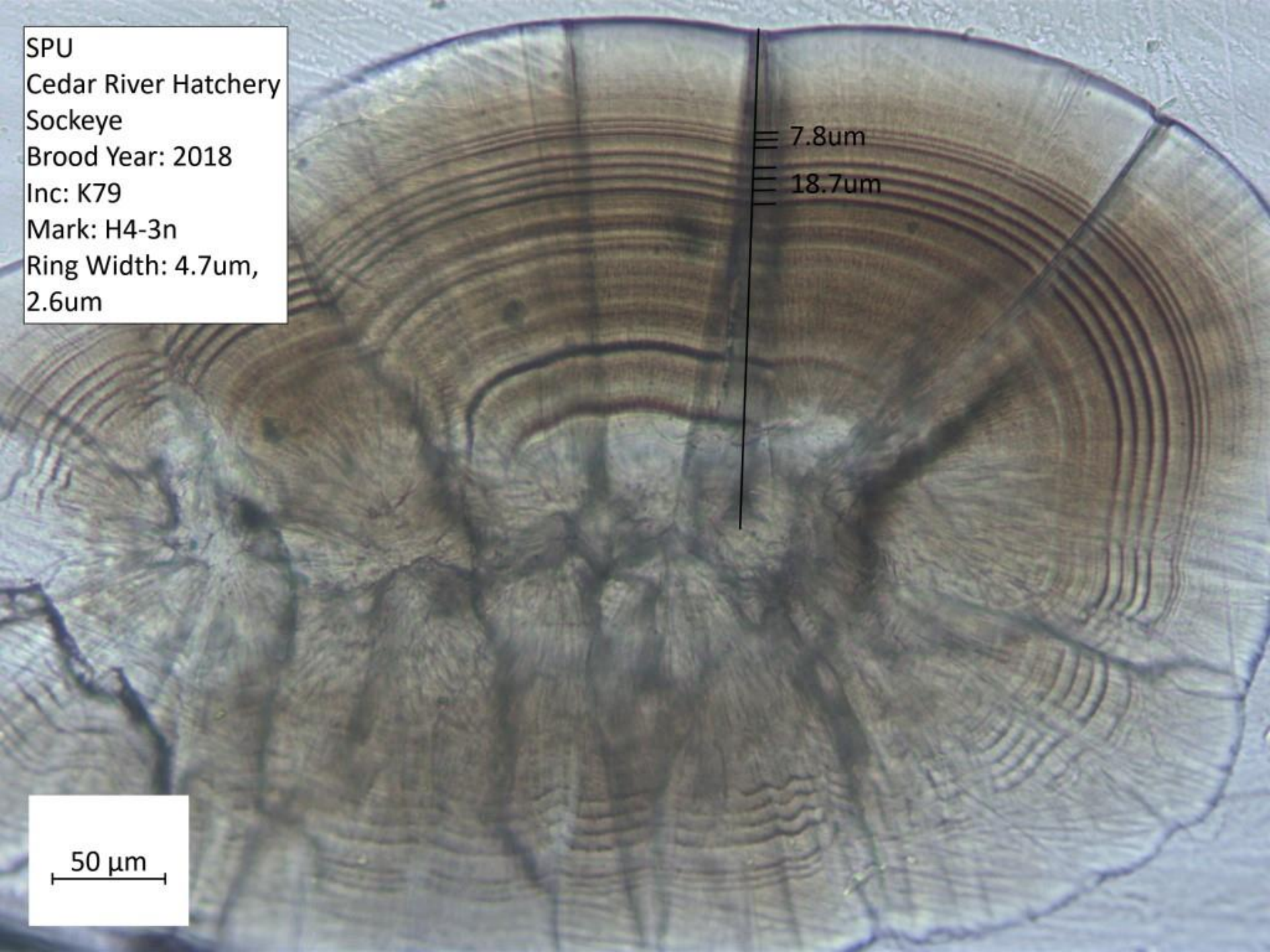
50  $\mu$ m



SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K79  
Mark: H4-3n  
Ring Width: 4.7 $\mu$ m,  
2.6 $\mu$ m

7.8 $\mu$ m  
18.7 $\mu$ m

50  $\mu$ m

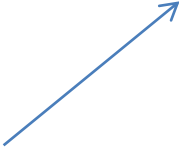




SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K80  
Mark: H4-3n  
Ring Width: 4.9um,  
2.8um

8.5um  
19.6um

50  $\mu\text{m}$



4H4-3n

The pre-hatch band was added to test an efficiency mark using micro-rings. The term efficiency mark was chosen over micro-mark because efficiency marks should look like the hatch code marks currently used by most hatcheries originating from NPAFC member nations. Efficiency marks have similar band widths to hatch code marks and are easily viewed under 200x magnification. Micro-marks, which are very narrow, need higher magnification.

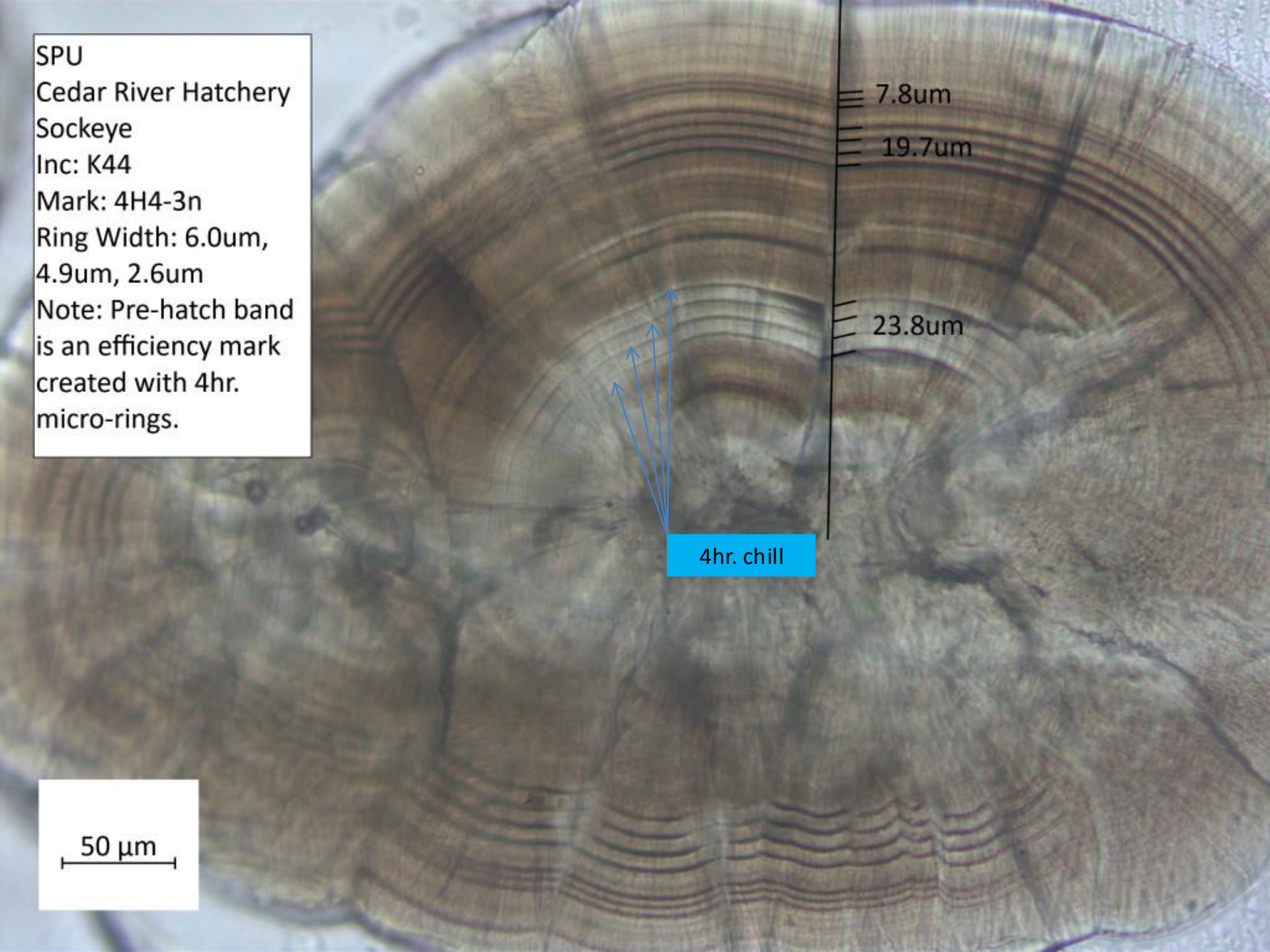


SPU  
Cedar River Hatchery  
Sockeye  
Inc: K44  
Mark: 4H4-3n  
Ring Width: 6.0um,  
4.9um, 2.6um  
Note: Pre-hatch band  
is an efficiency mark  
created with 4hr.  
micro-rings.

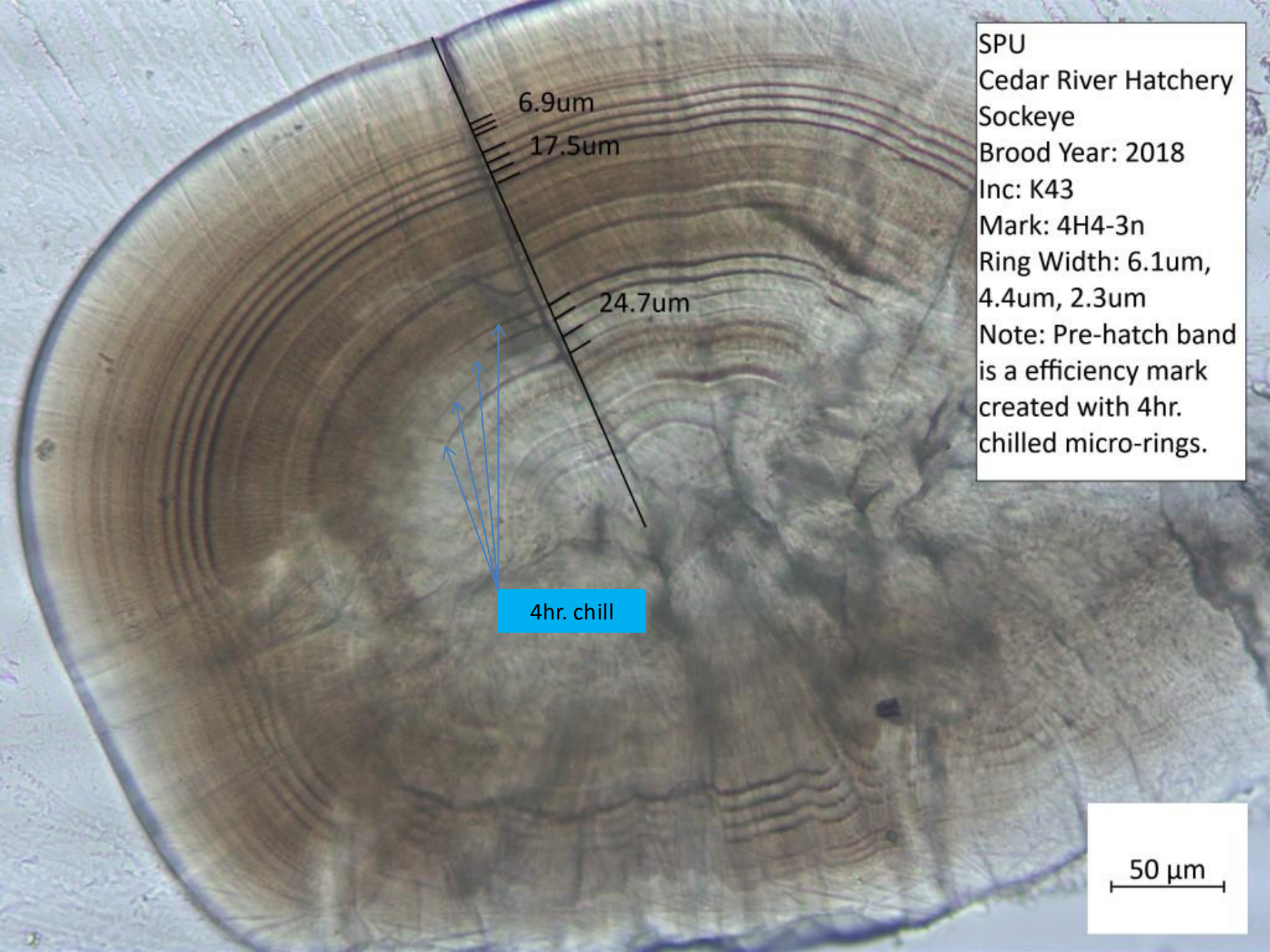
7.8um  
19.7um  
23.8um

4hr. chill

50  $\mu\text{m}$







SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K43  
Mark: 4H4-3n  
Ring Width: 6.1um,  
4.4um, 2.3um  
Note: Pre-hatch band  
is a efficiency mark  
created with 4hr.  
chilled micro-rings.

4hr. chill

50  $\mu$ m

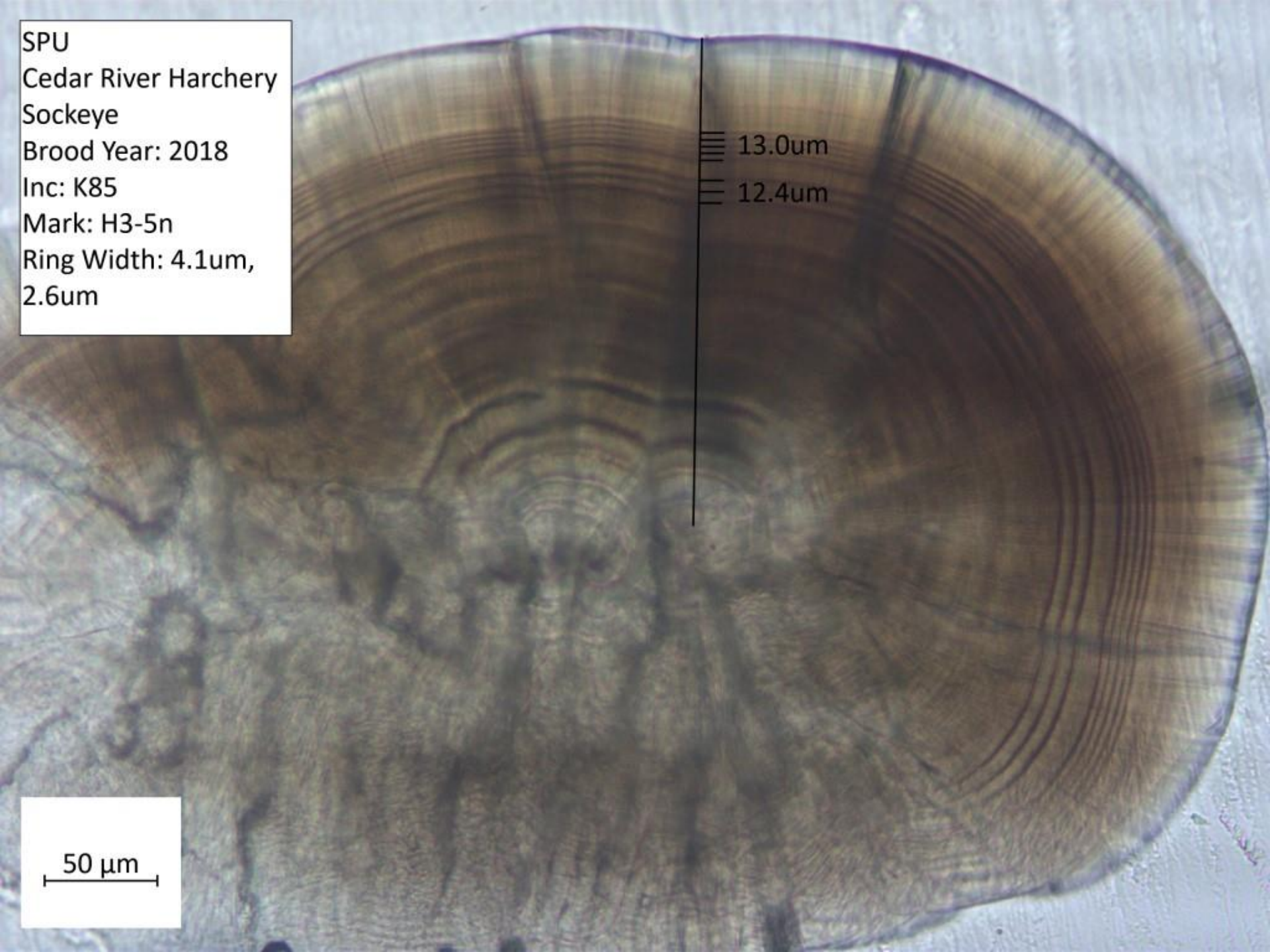


H3-5n

SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K85  
Mark: H3-5n  
Ring Width: 4.1um,  
2.6um

13.0um  
12.4um

50  $\mu\text{m}$





SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K86  
Mark: H3-5n  
Ring Width: 4.2um,  
2.6um

12.8um

12.7um

50  $\mu$ m



SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K91  
Mark: H3-5n  
Ring Width: 4.8um,  
3.2um

16.0um  
14.4um

50  $\mu\text{m}$



SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K92  
Mark: H3-5n  
Ring Width: 4.3um,  
2.8um

14.1um

12.8um

50  $\mu\text{m}$



SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K97  
Mark: H3-5n  
Ring Width: 4.3um,  
2.8um

14.2um

12.8um

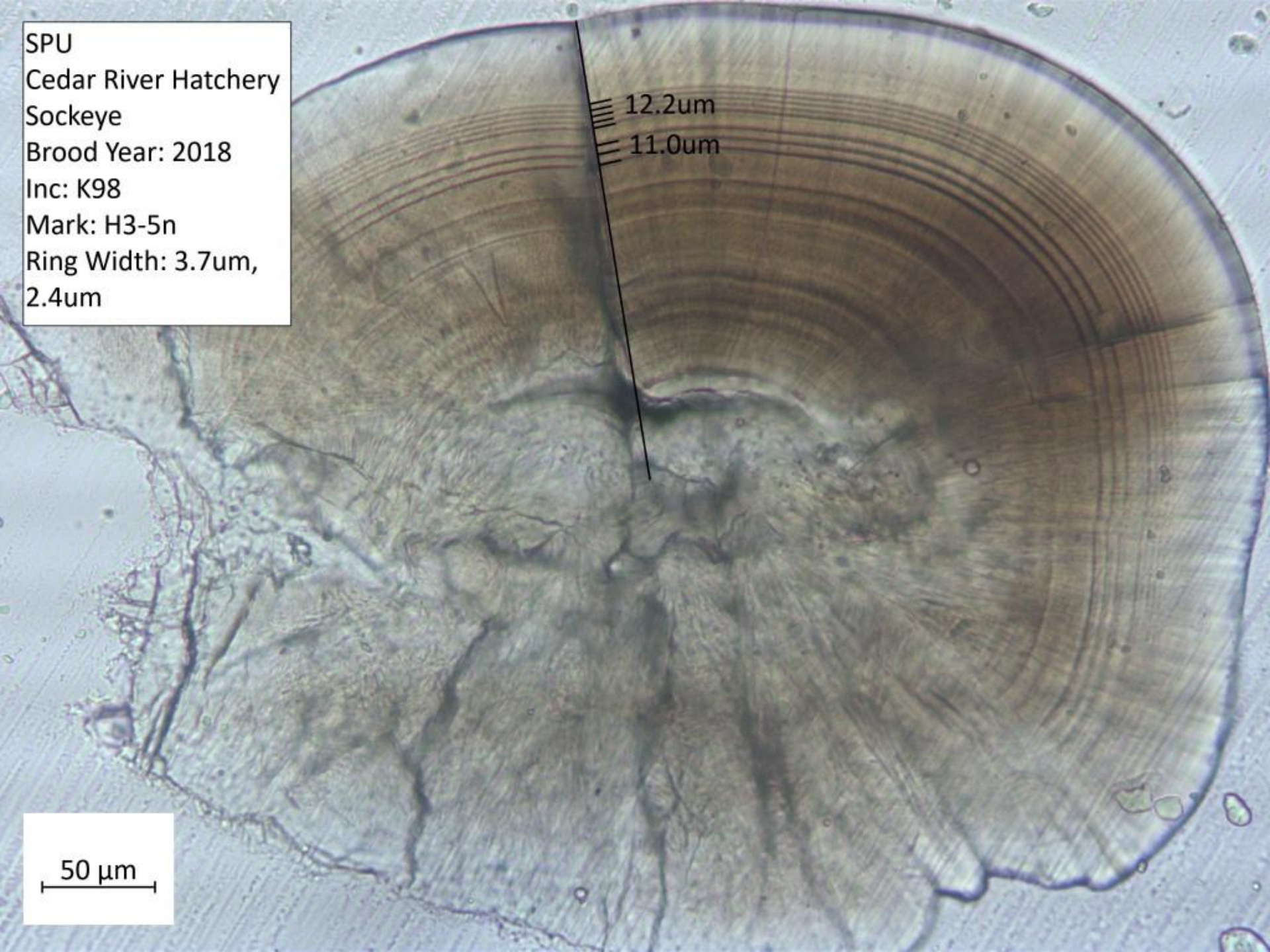
50  $\mu$ m



SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K98  
Mark: H3-5n  
Ring Width: 3.7um,  
2.4um

12.2um  
11.0um

50  $\mu\text{m}$





SPU  
Cedar River Hatchery  
Sockeye  
Brood Year: 2018  
Inc: K104  
Mark: H3-5n  
Ring Width: 4.2um,  
2.8um

14.2um

12.7um

50  $\mu\text{m}$

