Is road salt killing your fish?

Burnaby Mountain Conservation Area

SFU campus

Old salt shed

A **Contaminated**

B **Clean**

Stoney Creek

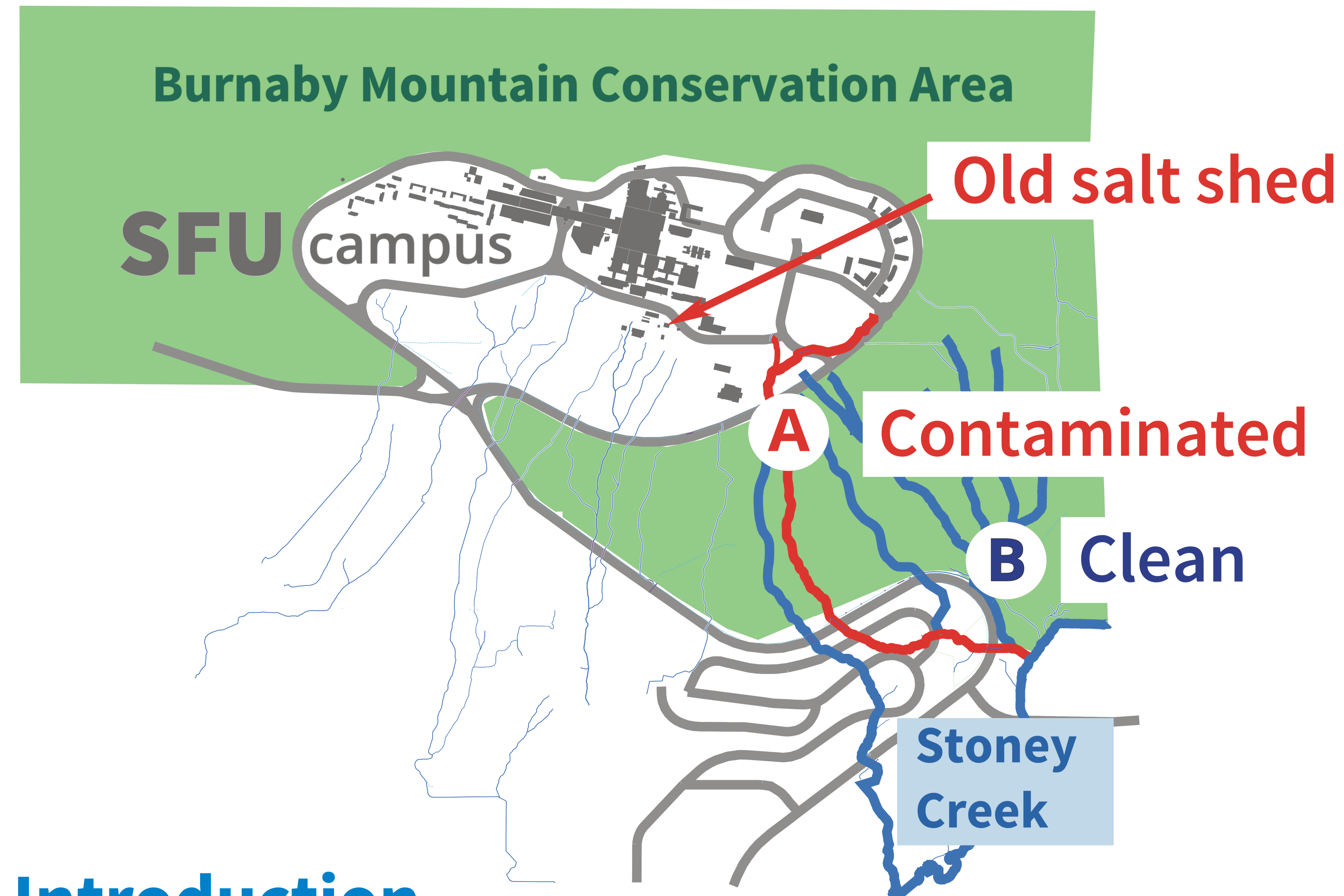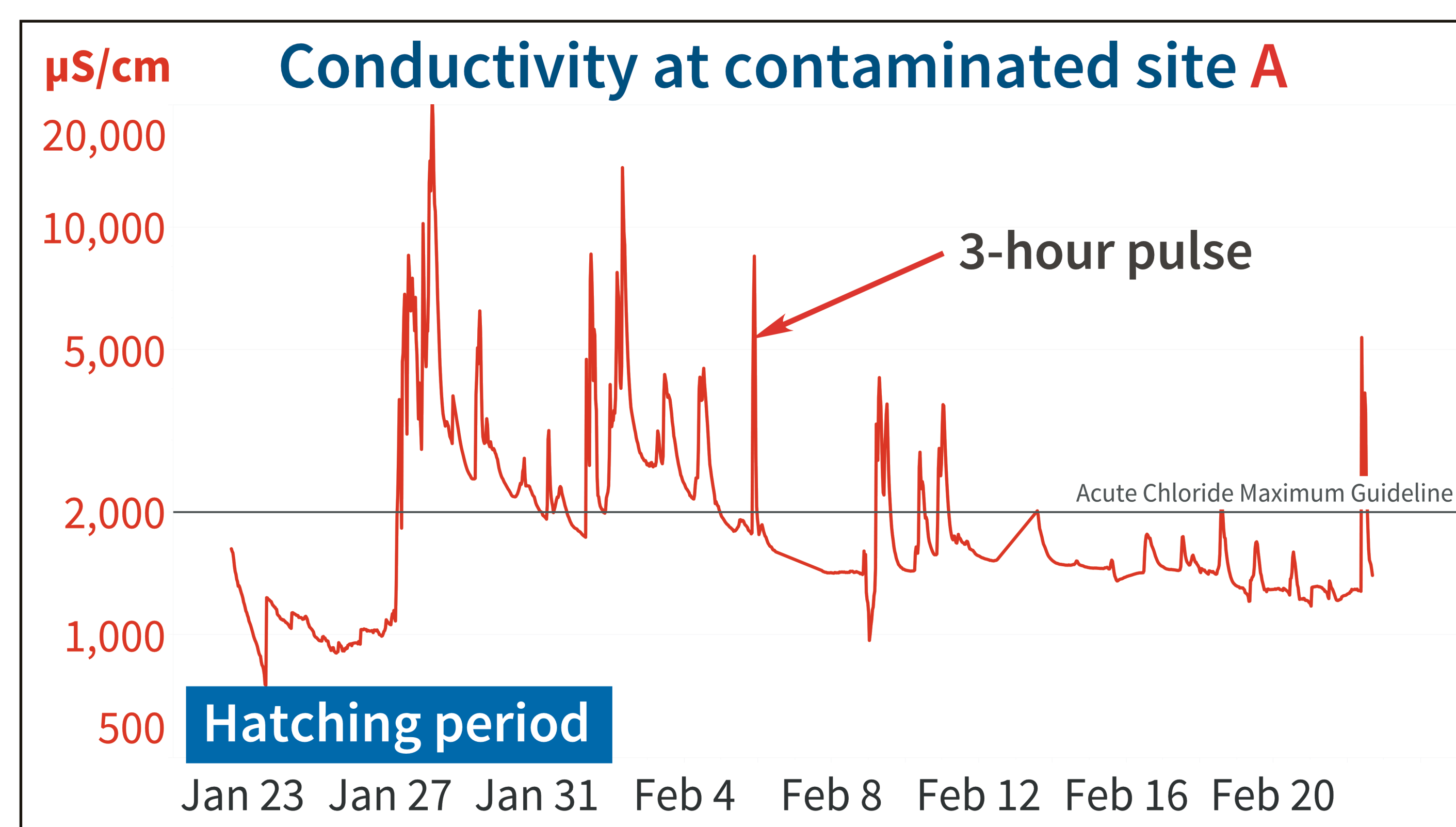## Introduction

For over 15 years, volunteer citizen scientists have monitored water quality in Stoney Creek. Using conductivity measurements, we found chloride contamination coming from this open road salt storage area on the Simon Fraser University (SFU) campus.
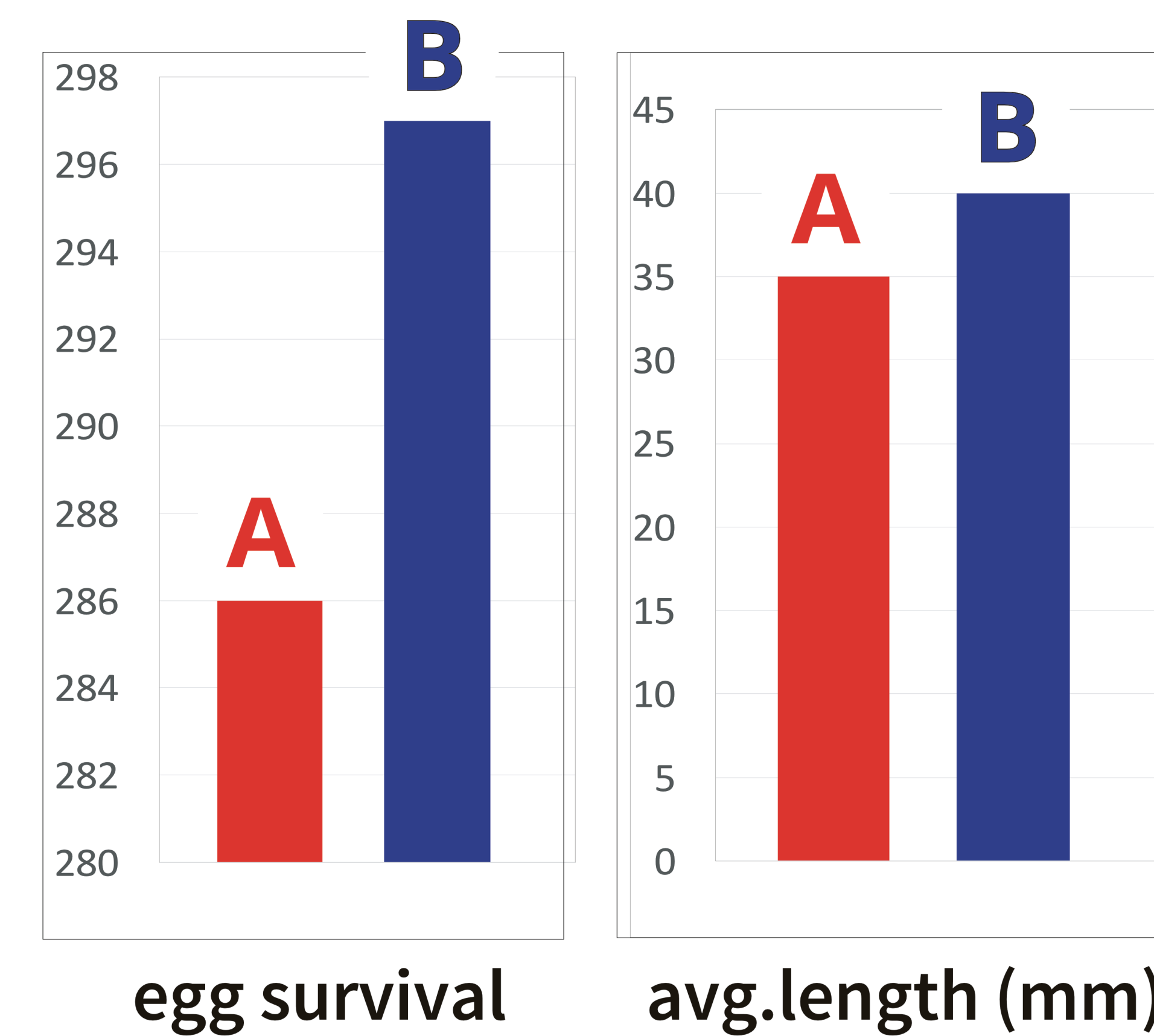
Does road salt harm salmon?

To find out, we placed 300 Chum salmon eggs in incubation trays in the contaminated tributary **A** and 300 more in clear tributary **B**. We monitored the hatching and developing fish in early 2009 and recorded mortalities and abnormalities.

We recorded conductivity with a data logger. High spikes are from road salt applied during snow events after January 27.
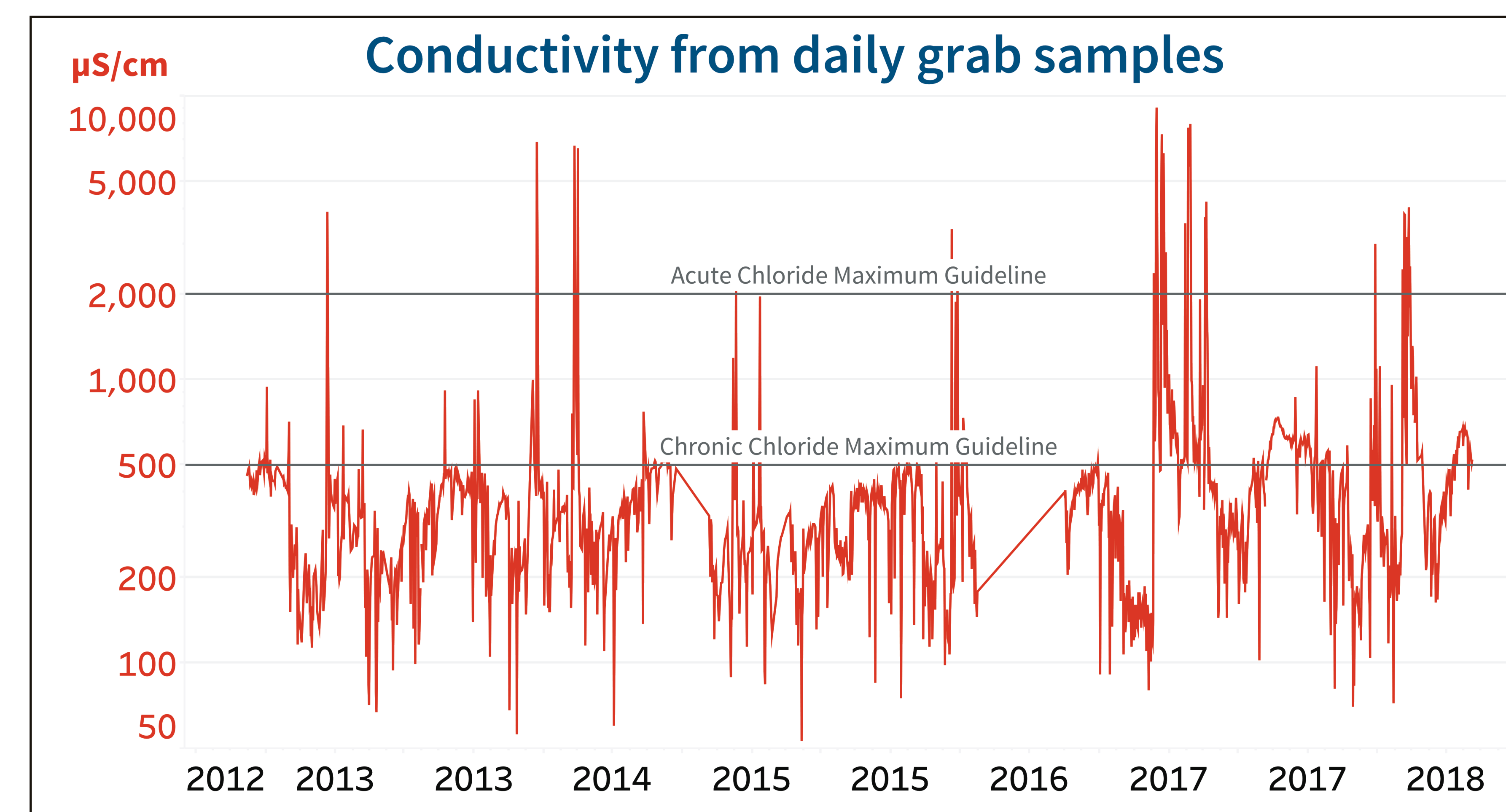
Conductivity at contaminated site A

µS/cm

20,000
10,000
5,000
2,000
1,000
500

3-hour pulse

Acute Chloride Maximum Guideline

Hatching period

Jan 23 Jan 27 Jan 31 Feb 4 Feb 8 Feb 12 Feb 16 Feb 20

Results

B
A

298
296
294
292
290
288
286
284
282
280

egg survival

45
40
35
30
25
20
15
10
5
0

A
B

avg.length (mm)
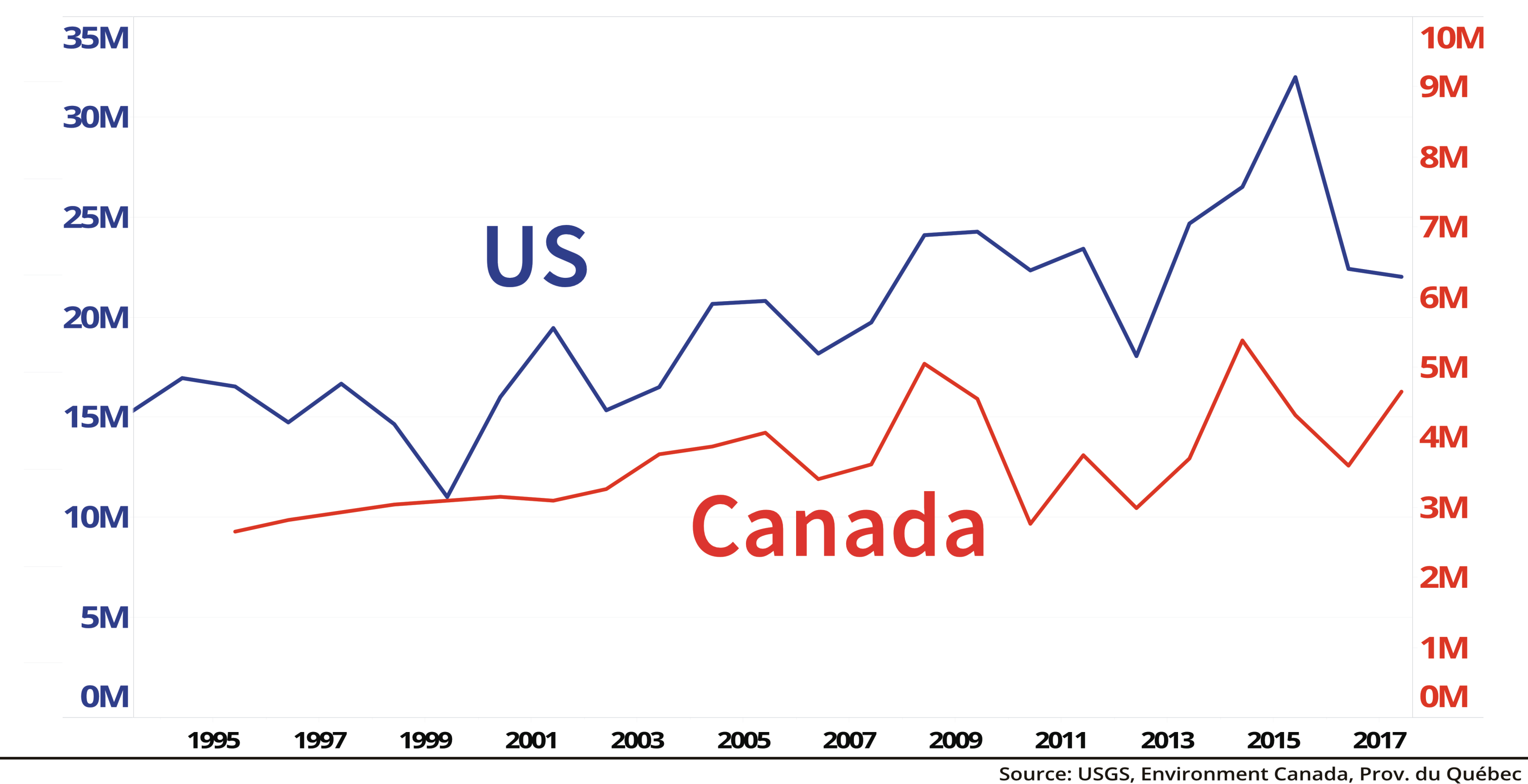
alevin yolk sac hemorrhages

Conclusions

We believe the higher mortalities and hemorrhages in the alevins from the contaminated tributary were caused by the rapidly changing chloride concentrations immediately after the fish hatched. In 2011, as a result of this study, SFU moved road salt from the open shed to a closed storage facility and improved their winter road maintenance practices. But salt spread in the winter and salt still in the groundwater continue to impact Stoney Creek.
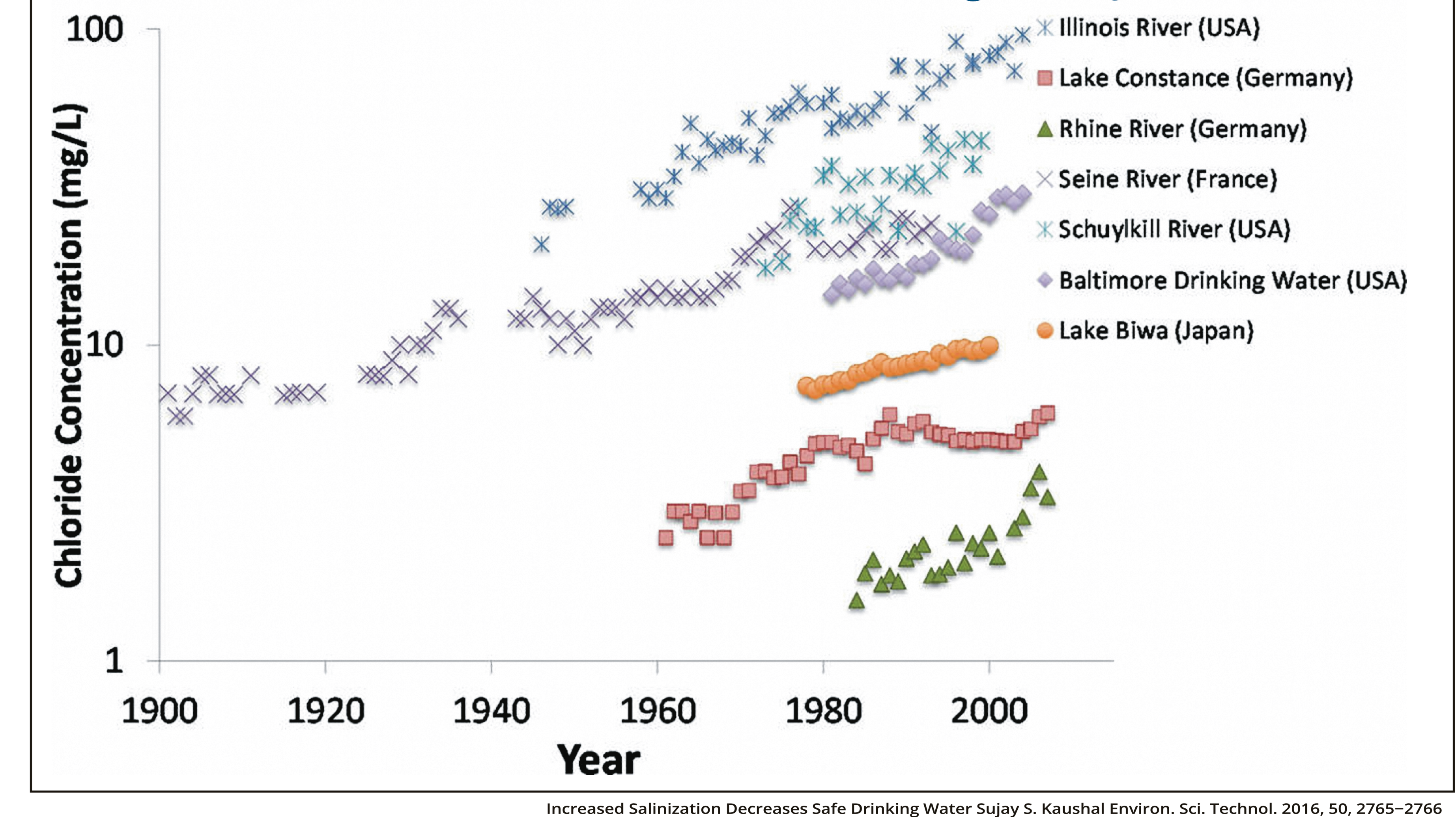
Conductivity from daily grab samples

µS/cm

10,000
5,000
2,000
1,000
500
200
100
50

Acute Chloride Maximum Guideline

Chronic Chloride Maximum Guideline

2012 2013 2013 2014 2015 2015 2016 2017 2017 2018

In 2001, Environment Canada and Health Canada determined:
... road salts that contain inorganic chloride salts … should be considered "toxic" under the Canadian Environmental Protection Act 1999 because of tangible threats of serious or irreversible environmental damage. But, for reasons of road safety and industry lobbying, the government declined to ban road salt outright. Its use is increasing in both Canada and the US.

Road salt use in metric tonnes

35M
30M
25M
20M
15M
10M
5M
0M

10M
9M
8M
7M
6M
5M
4M
3M
2M
1M
0M

US

Canada

1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017

Source: USGS, Environment Canada, Prov. du Québec

Increased salinization of fresh water globally

100

10

1

Chloride Concentration (mg/L)

Illinois River (USA)
Lake Constance (Germany)
Rhine River (Germany)
Seine River (France)
Schuylkill River (USA)
Baltimore Drinking Water (USA)
Lake Biwa (Japan)

1900 1920 1940 1960 1980 2000

Year

Increased Salinization Decreases Safe Drinking Water Sujay S. Kaushal Environ. Sci. Technol. 2016, 50, 2765–2766

What can you do?

Recommend research on
- effects of pulse contamination on other fish
- long-term survival of salmon with yolk sac hemorrhages induced by high concentrations of road salt

Advocate
- for stricter regulations on the use of road salt
- for certification for road salt applicators

Join
- a streamkeeping group

Full report:
scec.ca/salt

stoneycreek
ENVIRONMENT COMMITTEE
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