Curiosity is Key – Engage your Senses

BCLSS AGM

October 2019

Chris Swan

Cariboo Region (BC Interior)

Province of BC 1991 - present

BCLSS Director 2018 - present

(all lake photos in this presentation are from the Cariboo Region)

A. The importance of observations

B. Be curious & ask questions

Engage your Senses - Examples

1. Sight
2. Smell
3. Touch
4. Listening (in nature/ from others)
5. Taste – skipping this one is recommended

C. Seasonal (time scale)

Record your Observations!

A. Observations……lead to……..Good QUALITY data…….better informed decisions

Field observations

Data entry/lab testing observations

Parameter	POLLEY FLATS SEEP 1	POLLEY FLATS SEEP 1	POLLEY FLATS SEEP 1	POLLEY FLATS SEEP 1	POLLEY FLATS SEEP 2	POLLEY FLATS SEEP 2	POLLEY FLATS SEEP 2	POLLEY FLATS SEEP 2	POLLEY FLATS SEEP 2
Sample Date	15/Mar/2016	20/Apr/2016	12/May/2016	12/Jul/2016	15/Mar/2016	20/Apr/2016	12/May/2016	16/Jun/2016	9/Aug/2016
pH	7.85	8.27	8.21	8.27	7.64	8.13	8.17	8.07	8.36
Conductivity	1400	1,378	1390	1250	863	366	1350	1110	1080
Turbidity	12.6	2.05	9.35	26.0	30.6	2.55	25.3	6.70	10.1
Dissolved Organic Carbon	6.89	8.63	8.25	8.59	30.7	8.62	32.6	36.9	58.3
Total Suspended Solids	14.9	1.4	7.6	36.2	62.0	2.8	17.3	4.0	10.2
Total Dissolved Solids	987	1060	1070	972	619	253	1040	863	875
Hardness - Dissolved	727	721	727	610	414	164	717	490	472
Sulphate	585	566	622	518	228	63.9	458	341	274
Copper - Total	106	63.2	55.8	77.1	118	26.3	63.2	63.0	75.5
Iron - Total	411	207	291	457	3700	185	1680	609	1310
Manganese*	1440	1330	921	795	1900	179	2380	770	1020
Selenium	3.64	1.96	1.53	1.61	1.30	0.872	0.722	1.03	1.13
Copper- dissolved	59.3	37.8	25.4	29.2	36.9	20.7	39.2	51.2	63.1
Iron - dissolved	7.2	9.8	13.7	3.8	1370	57.8	72.2	186	81.5

Field Observations: observe, be curious & ask questions?

Visual Observations:

Take lots of pictures

Quesnel Lk bottom out from Hazeltine Ck mouth – 12 days after the Mt Polley Mine - Tailings Storage Facility Breach

Visual Observations:

Take lots of pictures

Hazeltine Creek as observed from Quesnel Lake; Aug 6/14

Hazeltine Creek as observed from Quesnel Lake, Sept 4/14.

Visual Observations:

Take lots of pictures

Quesnel Lake water
colour photos

Visual Observations:

Take lots of pictures

36 m. (Turbidity: 21 NTU)

Quesnel Lk at deep site out from the Mouth of Hazeltine Ck, Aug 12/14

45 m. (Turbidity: 168 NTU)

60 m. (Turbidity: 240 NTU)

Lake Jackson's Hole @ Deepest Pt Crew: Chris Swan, Todd Gale

EMS Site E289791 Water Conditions calm

GPS Weather Sunny, slight wind

Secchi Depth (m) 7.4 m. Date 2012/May/29 (yy/mm/dd) Time 11:20 (24hr)

Equipment (Name / Model) YSI 6600

	Depth (m)	Temp (Celsius)	D.O (mg/L)	%	spec Cond µS/cm	Cond	pH	Turbidity
*	SURFACE	15.6	10.0	100	302	248	8.40	0.9
	1	15.5	10.0	100	302	247	8.47	0.3
	2	15.4	9.95	98.6	305	249	8.47	0.8
	3	13.9	9.56	92.5	309	244	8.37	0.7
	4	12.1	8.96	82.4	320	242	8.17	0.6
	5	9.8	8.29	73.1	334	238	8.11	0.5
*	REP 6	7.58	7.79	64.8	343	229	8.06	0.4
	7	6.7	7.32	58.6	347	225	7.99	0.3
	8	5.8	5.96	46.8	351	822	7.89	0.1
	9	5.1	3.35	26.4	353	219	7.78	0.1
	10	4.6	1.60	12.3	355	217	7.67	1.2
	11	4.43	1.09	7.7	357	217	7.61	17.0
*	12	4.35	0.44	3.1	359	217	7.59	20.2
	13	4.12	0.2	1.5	362	218	7.53	8.7
	14	4.03	0.16	1.2	364	218	7.5	7.3
	15	3.99	0.15	1.2	369	221	7.45	4.4
	16.4 bottom							

ALGAE RESULTS

Site Name	Jacksons Hole @ Deepest Pt.	
Site Number	E289791	
FES Sample Number	130017	130018
Sampling Date(s)	29-May-12	29-May-12
Sampling Time(s)	11:22	11:31
Depth (m)	0.5	12.0
Batch Identifier	002	002
units = cells/mL		
Order : Centrales		
Cyclotella sp./Stephanodiscus sp. ?	<1.4	
Cyclotella sp.	1.4	
Order : Chlorococcales		
Ankistrodesmus sp.	<1.4	
Botryococcus braunii	<1.4	
Closteriopsis sp.	<1.4	
Crucigenia rectangularis	<1.4	
Elakatothrix gelatinosa	<1.4	<35.6
Nephrocytium sp. ?	<1.4	
Oocystis cf lacustris	102.2	
Oocystis spp.	14.0	<35.6
Quadrigula lacustris		<35.6
Scenedesmus cf denticulatus	<1.4	
Sphaerocystis schroeteri	<1.4	
Order : Chroococcales		
Anacystis sp.	<1.4	
Order : Cryptomonadales		
Chroomonas acuta	5.6	
Cryptomonas sp. ?	1.4	
UID		35.6
Order : Dinokontae		
UID	<1.4	
Order : Nostocales		
Anabaena sp.	<1.4	
Order : Ochromonadales		
Dinobryon divergens	12.6	<35.6
Dinobryon spp.	12.6	<35.6
Kephyrion / Pseudokephyrion [1]	96.6	
Order : Oscillatoriales		
Lyngbya cf limnetica	14.0	
Oscillatoria cf limosa		16,198.0
Oscillatoria sp.	16.8	
Order : Pennales		
Cymbella cf minuta	1.4	
Cymbella spp.	<1.4	
UID	<1.4	
Order : Tetrasporales		

Smell & Visual Observations:

Take lots of pictures

Smell/Odour…..

Earthy vs Flowery

Earthy indicates high phosphorus

Flowery indicates a man-made substance (leaking septic field???)

Smell & Visual Observations:

Take lots of pictures

Lake: Till Lake @ Center
EMS Site: E 231797
GPS: 52° 02.869, 122° 21.694
Secchi Depth (m): 3.7 m.

Crew: Chris Swan, Rossell Bobrowski
Water Conditions: rippled
Weather: Sunny, slight wind
Date: Sept 5/13 (yy/mm/dd)
Time: 10.47 (24hr)

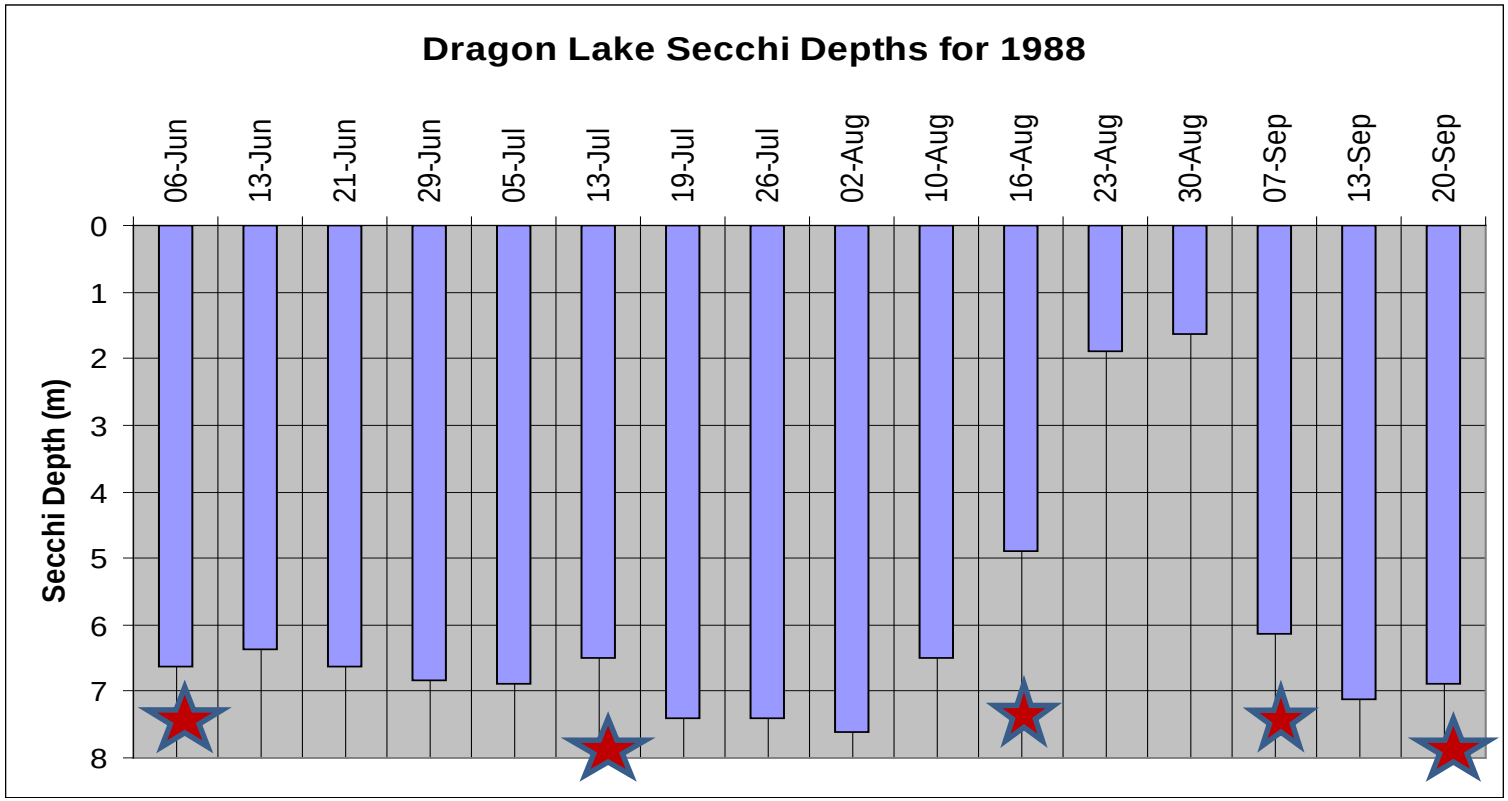
Equipment (Name / Model): YSI 6600 depth finder 19.5°C (Lowrance)

Depth (m)	Temp (Celsius)	D.O (mg/L) mg/L	D.O (mg/L) %	Spec Cond	Cond	pH	Turbidity
SURFACE	18.32	9.93	106	1059	924	9.10	0.1
1	18.26	9.96	106	1059	923	"	"
2	18.18	9.99	106	1059	920	"	0.0
3	18.09	10.00	"	"	919	"	"
4	18.02	"	"	"	918	"	0.1
5	17.93	9.98	"	1058	916	9.11	0.6
6	17.85	9.86	104	"	913	9.11	1.0
7	16.28	8.90	106	1069	890	9.07	0.4
8	11.93	3.26	32	1091	819	9.01	2.2
9	9.14	0.89	7	1102	768	9.00	1.7
10	7.06	0.38	3	1112	731	9.00	0.6
11	5.97	0.35	2.8	1119	711	9.01	0
12	5.13	0.33	2.6	1118	694	9.02	3.5 ~~5.7~~
13	4.69	0.21	1.6	1126	689	9.00	3.8
14	4.52	0.18	1.3	1130	688	8.99	3.5
15	4.24	0.19	1.4	1135	685	8.97	3.1
16	4.18	0.10	1.0	1137	"	8.94	2.9
17	4.15	0.11	0.9	1140	686	8.96	3.0
18	4.11	0.08	0.8	"	685	"	3.1
19	4.07	0.10	0.7	1144	687	"	2.7
20	4.06	0.13	1.1	1145	687	8.95	2.8
20.8	21.6 bottom 4.03	0.10	0.8	1147	688	8.94	2.7

Smell & Texture Observations:

Take lots of pictures

Seasonal Observations…



1988 – Temperature (fully mixed)

June 6/88 15.9-15
July 13/88 19.8-19
Aug 16/88 20-19.7
Sept 7/88 19.1-18.7
Sept 22/88 14.8-14.2

Observations over years…… consistency helps

Bouchie Lake

Background info:
4 Celsius water holds ~ 12 mg/L

Date (spring readings)	Depth with no readings	Dissolved O2 (mg/L range; surface to 7 m)	Comments
1998- Apr 9		16.6-16.0	Suspect meter issues
2001-May 1	0.5m, 1m, 2m, 3m, 4m, 5m	20.1-17.3	Profile not taken – range recorded only
2003-May 1	1m, 2m	19.5-13.4	Recorded as off scale
2004-Apr 26	0.1m, 1 m	19.6-14.6	Recorded as off scale
2005-Apr 20	0.1m, 1m, 2m, 3m, 4m, 5m	19.5-19.2 (6m&7m)	Recorded as Error (top 5m)
2006-Apr 6		22.8-11.58	Newer style meter

Amphibians galore… good or bad?

Listening and pondering…. “there are lots of frogs and toads, the area is fine”

MOE Exploratory Sampling – Polley Flats – Spring – Summer 2016; Approximate locations

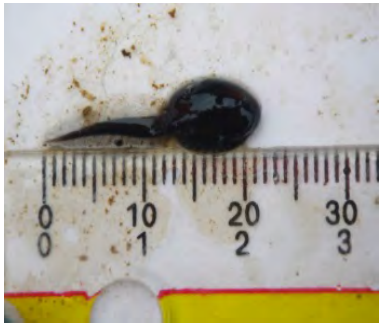
Reference

Impacted

Apr 20, 2016 Western Toad adults and eggs

Size matters for survival

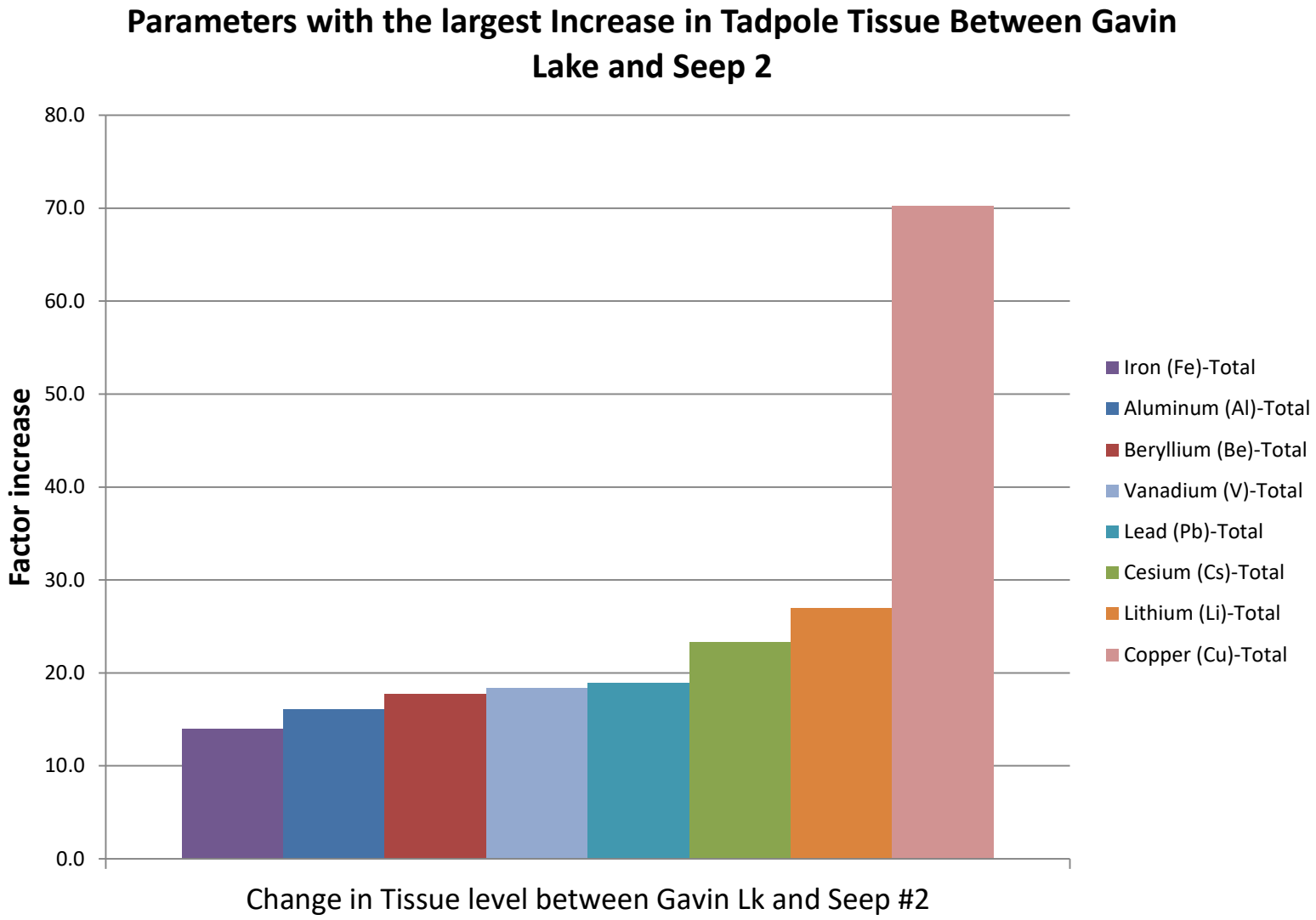
Tadpole from Seep #2



Toadlet from Seep 2 (Aug 9, 2016)

Tadpole from Gavin Lk

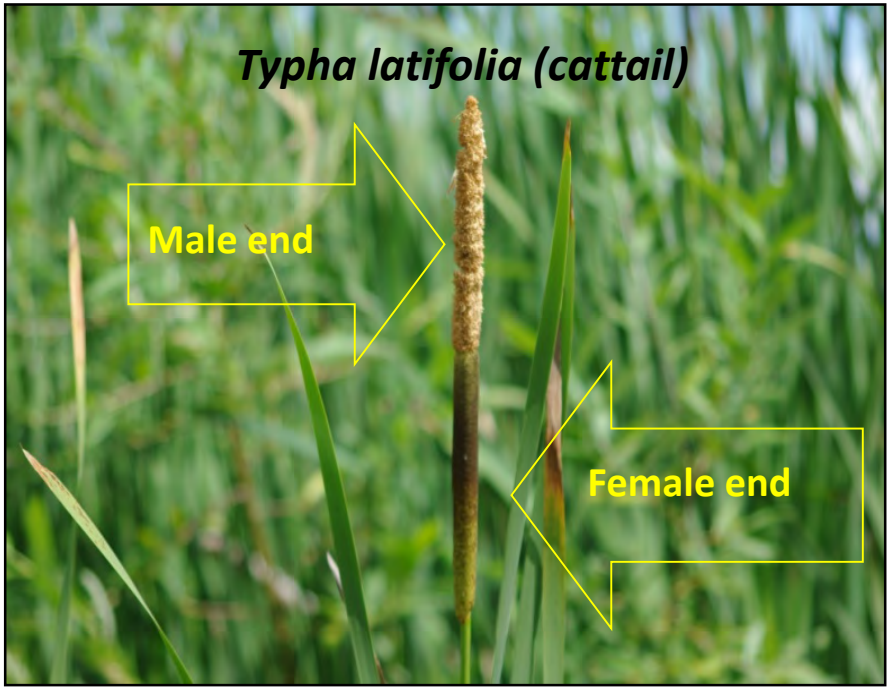
Toadlet from Gavin Lake (Aug 4, 2016)


Parameters with the largest Increase in Tadpole Tissue Between Gavin Lake and Seep 2
Factor increase
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Change in Tissue level between Gavin Lk and Seep #2
Iron (Fe)-Total
Aluminum (Al)-Total
Beryllium (Be)-Total
Vanadium (V)-Total
Lead (Pb)-Total
Cesium (Cs)-Total
Lithium (Li)-Total
Copper (Cu)-Total

Spring 2005: the ice went off the lake and this rolled up on shore…..

Elodea canadensis mats on shore - North end of Bowron Lake, June 2005

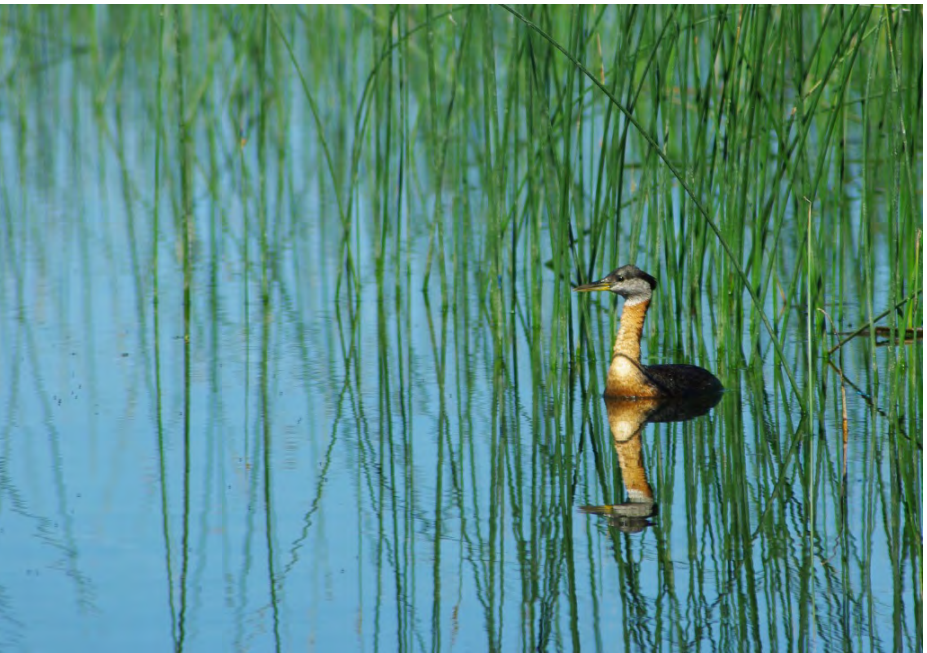
Bowron Lake *Elodea canadensis*


Typha latifolia (cattail)
Male end
Female end

American White Pelican: The "horn" on its bill means that it is a breeding adult.

Hippuris vulgaris (Mares tail):
Upper and lower leaves

Caddis fly feeding nets attached to *P. robbinsii* in inlet river

Thank you. Questions?

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