Dissolved Oxygen 2020

In part of reporting for FES Project 19-036 – Recreational Fisheries Enhancement and Youth Angling Opportunities in the Northern Parkland

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Summary:

SVSFE technicians collected dissolved oxygen readings on West Watjask Lake and Black Beaver Lake in the late winter of 2020. Objectives were simply to monitor dissolved oxygen levels to determine risk of winterkill in these two select waterbodies.

West Watjask is a muskellunge fishery in development, and one that SVSFE has significantly invested in over the past 5+ years. Historically, late winter DO monitoring has been collected in the late 1980's and mid 1990's. More recently DO testing has occurred annually since 2016. Past dissolved oxygen readings have never reached levels that would be considered lethal. However, on select years there have been areas/depths where dissolved oxygen readings are considered stressful to select game fish species. For this reason, annual monitoring is critical while establishing this muskellunge fishery.

Black Beaver Lake is a stocked trout (brook and rainbow) fishery in the Duck Mountains with a history of occasional winterkill. In fact, Black Beaver is arguably the most popular winter trout fishery in Swan Valley area. In late winter 2020, reports of very poor fishing quality had SVSFE convinced it may be a winterkill year for the fishery. Simultaneously, due to the current health situation the Province had expressed backcountry lakes would not be stocked in the spring of 2020 to limit human contact and spread of the novel coronavirus. This situation had SVSFE concerned for the short-term success of the fishery. If the lake did in fact winterkill, and no stocking was possible for the spring of 2020, it would compromise the winter fishery for the 2020/2021 hard water season. Monitoring DOs ultimately determined dissolved oxygen levels to be low, and likely very stressful to stocked trout populations, but not lethal. For this reason, SVSFE did not have to lobby the Province to determine a safe way to stock Black Beaver Lake in spring 2020. Ultimately, by June 2020 health restrictions were updated, and Black Beaver did receive stock with the help of local volunteers. This winter (2020/2021) Black Beaver Lake is again a very popular stocked trout fishery, with anglers reporting multiple age classes of stocked brook and rainbow trout.

In summary, both West Watjask and Black Beaver historically have dissolved oxygen on the lower end of the spectrum. However, both lakes appear to display stressful, but not lethal levels of dissolved oxygen for the resident fish populations in the late ice season of 2020. Dissolved oxygen was checked on West Watjask on March 31st, and Black Beaver on April 15th. Results are as follows:

West Watjask Lake:

Dissolved oxygen profiles were collected at 3 predetermined sites; site #1, #3 and #4. The average snow depth was 4 cm with an average ice thickness of 66 cm with a moderate amount of opaque ice (10-15cm). DO levels were fair for the late ice-season with an average of 4.67 mg/l at 2 m depth. The lowest recorded level was 2.03 mg/l at the very bottom of a shallow part of the lake.

Dissolved Oxygen Monitoring			
Waterbody	**West Watjask**		
Date (Y M D)	**3/31/2020**		
Time	**11:42 AM**	**12:17:00 PM**	**12:41:00 PM**
Station (#)	**1**	**3**	**4**
Coordinate	**330202** **5725092**	**330229** **5725309**	**330507** **5724890**
Total Ice Thickness (cm)	**64**	**63**	**71**
Opaque Ice Thickness(cm)	**15**	**11**	**10**
Average Snow Depth(cm)	**5**	**4**	**4**
Snow Cover (%)	**100**	**100**	**100**
Maximum Water Depth (m)	**11.5**	**11**	**4.5**

Oxygen Profile						
	mg/L	**°C / %sat**	**mg/L**	**°C / %sat**	**mg/L**	**°C / %sat**
Surface (just under ice)	**15.3**	**0.6**	**10.33**	**0.6**	**9.07**	**0.6**
1.0 m depth	**10.79**	**1.5**	**7.62**	**1.5**	**6.3**	**1.8**
1.5 m depth			**6.8**	**2.2**	**4.88**	**2.3**
2.0 m depth	**6.82**	**2.8**	**4.05**	**2.9**	**3.14**	**2.7**
3.0 m depth	**5.22**	**3.1**	**3.17**	**3.1**	**2.25**	**2.8**
4.0 m depth	**5**	**3.2**	**2.77**	**3.2**	**2.03**	**3.1**
5.0 m depth	**4.94**	**3.2**	**2.72**	**3.2**		
6.0 m depth	**4.55**	**3.2**	**2.69**	**3.2**		
7.0 m depth	**4.3**	**3.3**	**2.67**	**3.2**		
8.0 m depth	**4.1**	**3.3**	**2.62**	**3.1**		
9.0 m depth	**4.03**	**3.3**	**2.56**	**3.1**		
10 m depth	**3.8**	**3.4**	**2.53**	**3.1**		
10.5 m depth			**2.5**	**3.1**		
11 m depth	**3.94**	**3.6**				
12 m depth						

Black Beaver Lake:

Dissolved oxygen profiles were collected at 4 sites that have been checked by SVSFE in previous years. The average snow depth was 15 cm with an average ice thickness of 67 cm with a moderate amount of opaque ice (15-20cm). DO levels were fair for the late ice-season with an average of 2.99 mg/l at 2 m depth. The lowest recorded level was 2.2 mg/l at the very bottom of the deepest part of the lake.

Dissolved Oxygen Monitoring								
Waterbody	Black Beaver Lake							
Date (Y M D)	2020-04-15							
Time	10:00 AM		10:15 AM		10:41:00 PM		10:55 AM	
Station (#)	North Shore 1		Palmer's Point 2		Deep Hole 3		North Shore #2 4	
Coordinate	369709 6E+06		369890 5737718		369757 5737529		369651 5738010	
Total Ice Thickness (cm)	70		68		64		67	
Thickness(cm)	15		20		Surface 10 Slush 24		22	
Average Snow Depth(cm)	15		18		10		15	
Snow Cover (%)	100		100		100		100	
Maximum Water Depth (m	2		2.8		4.5		2.1	
Oxygen Profile								
	mg/L	°C	mg/L	°C	mg/L	°C	mg/L	°C
Surface (just under ice)	5.56	1.4	7.04	1.2	6.23	1	6.12	0.9
1.0 m depth	4.47	2.6	6.3	2.2	5.05	1.9	4.84	2.1
1.5 m depth	3	3	4.68	3.4	3.66	3.4	3.66	3
2.0 m depth			3.74	4.2	2.48	4.1	2.74	3.4
2.5 m depth			3.72	4.3				
3.0 m depth					2.3	4.9		
4.0 m depth					2.2	5.2		
4.5 m depth								
5.0 m depth								
6.0 m depth								