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MEMORANDUM

TO: **Chris Rodden, Manager, Compliance and Licensing, Evolugen**
FROM: **Harlan Wright, Dip. Tech., and Pamela Dinn, M.Sc., R.P. Bio, Ecofish Research Ltd.**
DATE: **December 8, 2020**
FILE: **1085-34**

RE: **Summary of fisheries monitoring completed on the Kokish River in 2020 for the Kokish River Hydroelectric Project**

This memorandum summarizes the ongoing fisheries work carried out by Ecofish Research Ltd. (Ecofish) in 2020 for the Kokish River Hydroelectric Project (the Project), which is operated by Evolugen. Fisheries monitoring was required by the Project's Operational Environmental Monitoring Plan (OEMP) (Lewis *et al.* 2014) from 2013 to 2018 as summarized in five previous memos (Wright and Faulkner 2013; Wright 2014, 2015; Wright and Thornton 2016, Wright and Lewis 2017, and Wright and Thornton 2018) and presented in detail in annual OEMP reports. Fisheries monitoring was not required in 2019 therefore the 2019 memo (Wright and Dinn 2019) contained information only pertaining to flow compliance.

In 2019, an OEMP summary report was prepared in which data from five years of operational monitoring completed between 2014 and 2018 were compiled. Data from baseline (before) and operational (after) periods were compared using a Before-After-Control-Impact (BACI) analysis, where applicable, for seven parameters: water flow, water temperature, stream morphology, fish community, stream water quality, groundwater quality, and invertebrate drift.

The OEMP summary report was submitted to regulators in Fall 2019. No further monitoring is required under the OEMP for groundwater quality, water temperature, stream morphology, stream water quality, or invertebrate drift monitoring components. Monitoring will continue for flow, including instream flow compliance and ramping rate compliance. On-going monitoring of the Kokish spillway channel, headpond, powerhouse tailrace, fish stranding monitoring and salvage will also continue. One more year of fish community monitoring, in year 10 (2023), is prescribed by the OEMP.

The objective of this memo is to provide a summary of monitoring related to fisheries in the Kokish River in 2020. The OEMP did not require fisheries monitoring in Year 7 of operations, and therefore 2020 monitoring was restricted to flow compliance.

1. FLOW COMPLIANCE

Stage and flow data are continuously collected to assess Project compliance with the terms and conditions of the conditional water licence (CWL) and to evaluate changes in hydrological conditions

due to Project operations (as per the OEMP; Lewis *et al.* 2014). Instream Flow Requirements (IFR), which are detailed in the CWL were set following the Environmental Assessment Process for the Project. Furthermore, ramping rate criteria, which are the rate of stage changes allowable during Project ramp-downs, were established based on general criteria accepted by DFO (e.g., Cathcart 2005) to reduce potential fish stranding for fry at sensitive sites within the diversion and downstream reaches.

Hydrometric stations were established at three locations on the Kokish River to provide real-time, instantaneous stage and flow data for the life of the Project: downstream of the intake, upstream of the powerhouse and downstream of the powerhouse (Map 1). The uppermost site, located downstream of the intake, is the compliance point for monitoring IFR and diversion ramping rates. The station that was previously installed upstream of the powerhouse is not required for flow compliance monitoring and was therefore decommissioned in June 2018.

Station servicing and discharge measurements were collected at different flows during 2020 (Year 7 of the OEMP), as they have been in all monitoring years. Updates to the stage-discharge rating curves and sensor offsets were applied based on these results and an annual hydrology report will be produced to detail the status and present stage and discharge data for the flow compliance monitoring stations.

2. SUMMARY

This memorandum summarizes the ongoing fisheries work carried out by Ecofish in 2020 to meet the requirements for Year 7 of the Kokish River Hydroelectric Project OEMP.

The field study components in 2020 were restricted to instream flow. Field work scheduled to occur during the winter of 2020/2021 includes flow compliance monitoring, and maintenance of the hydrometric stations.

Yours truly,

Ecofish Research Ltd.

Prepared by:

Signed

Harlan Wright, Dip. Tech.

Environmental Technician/Task Manager

Signed

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Reviewed by:

Signed

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Project Director

Disclaimer:

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REFERENCES

Cathcart, J. 2005. Study of flow ramping rates for hydropower developments. Consultant's report prepared by Knight Piésold Ltd. (Ref. No. VA103-79/2-1) for the Department of Fisheries and Oceans Canada.

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Wright, H. and S. Faulkner. 2013. Summary of fisheries monitoring completed on the Kokish River in 2013. Consultant's memorandum prepared by Ecofish Research Ltd. And MJ Lough Environmental Consultants Ltd. For Kwagis Power Limited Partnership, December 20, 2013.

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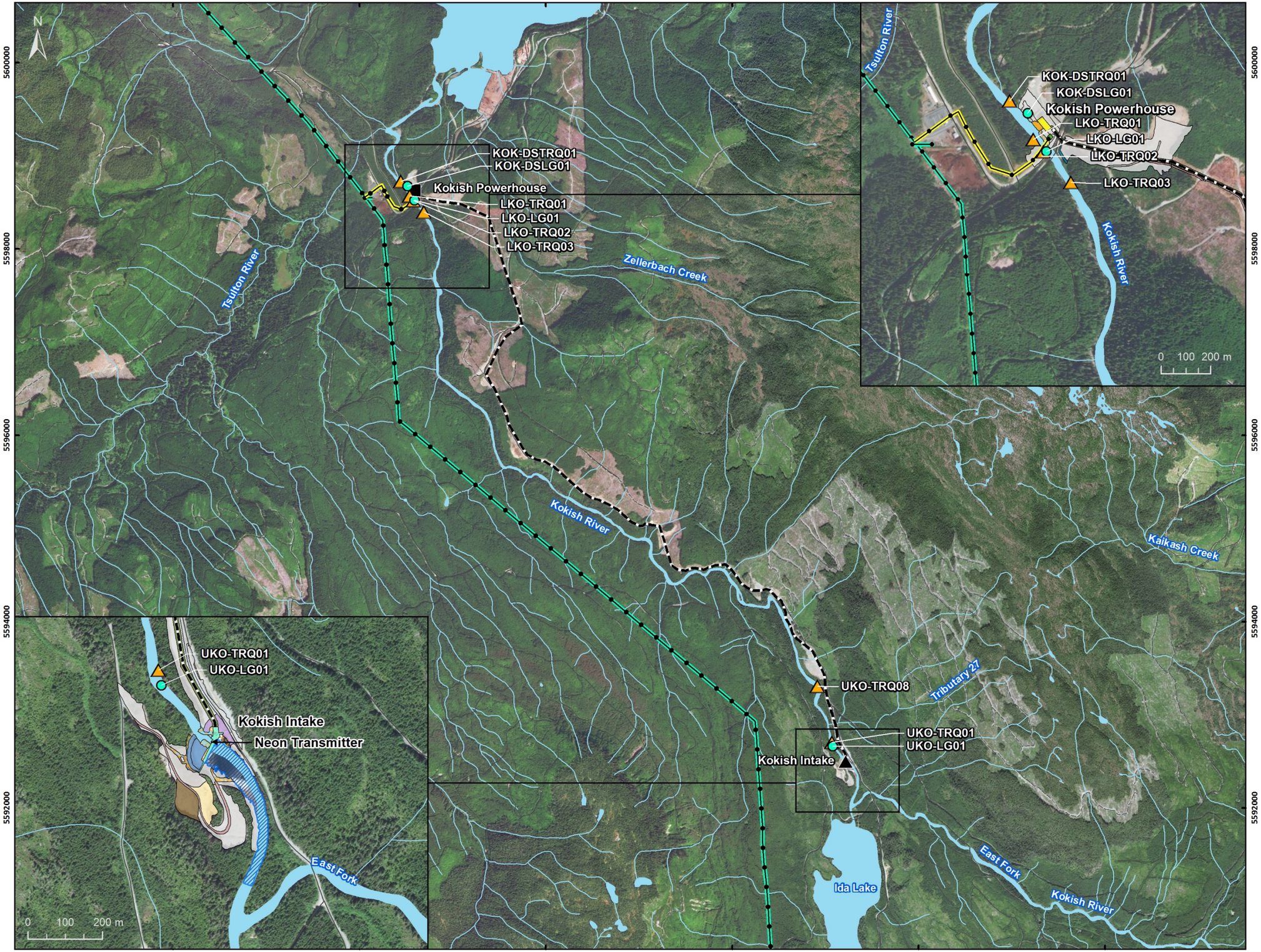
Wright, H. and M. Thornton. 2018. Summary of fisheries monitoring completed on the Kokish River in 2018 for the Kokish River Hydroelectric Project. Consultant's memorandum by Ecofish Research Ltd. for Brookfield Renewable Energy Group, December 6, 2018. 20 p.

Wright, H. and P. Dinn. 2019. Summary of fisheries monitoring completed on the Kokish River in 2019 for the Kokish River Hydroelectric Project. Consultant's memorandum by Ecofish Research Ltd. for Brookfield Renewable Energy Group, December 16, 2019. 6 p.

PROJECT MAPS

KOKISH RIVER HYDROELECTRIC PROJECT

Kokish River Hydrometric Gauge Locations



Legend

- Hydrometric Gauge
- Discharge Transect

Infrastructure

- Intake
- Powerhouse
- Penstock
- Transmission Line
- Existing Transmission Line
- Headpond
- Rip Rap
- Intake Structure
- Parking Area
- Temporary Diversion Channel
- Laydown Area
- Spoil Area
- Powerhouse
- Switchyard
- Tailrace
- Drainage Ditch
- Penstock
- Clearing Area
- New Road
- Existing Road
- Forest Service Road

MAP SHOULD NOT BE USED FOR LEGAL OR NAVIGATIONAL PURPOSES

0 0.5 1 2 km

Scale: 1:40,000

NO.	DATE	REVISION	BY
1	12/03/2019	1085_KOK_HydrometricGaugeLocations_2019May12	
2			
3			
4			
5			

Date Saved: 12/03/2019
Coordinate System: NAD 1983 UTM Zone 9N

ECOFISH RESEARCH

Map 1

File: M:\Projects-Active\1085-Kokish\MXD\Hydrology\1085_KOK_HydrometricGaugeLocations_2019May12.mxd