



**Arrowsmith Water Service  
Operations Year in Review  
January 9, 2023**



# Arrowsmith Water Service

- In 1996, the City of Parksville, Regional District of Nanaimo, and Town of Qualicum Beach entered into a joint venture agreement known as Arrowsmith Water Service (AWS) to construct, operate, and maintain the Arrowsmith Dam.
- The AWS board and committee oversee the management of the dam with the City of Parksville as the operator.



# Catchment Areas

## Location of Snow Pillow Gauge, Dam and River Gauge



Qualicum



ARROWSMITH LAKE DAM  
ELV = 828.50m

NEARBY SNOW STATION  
ELV = 1,465m

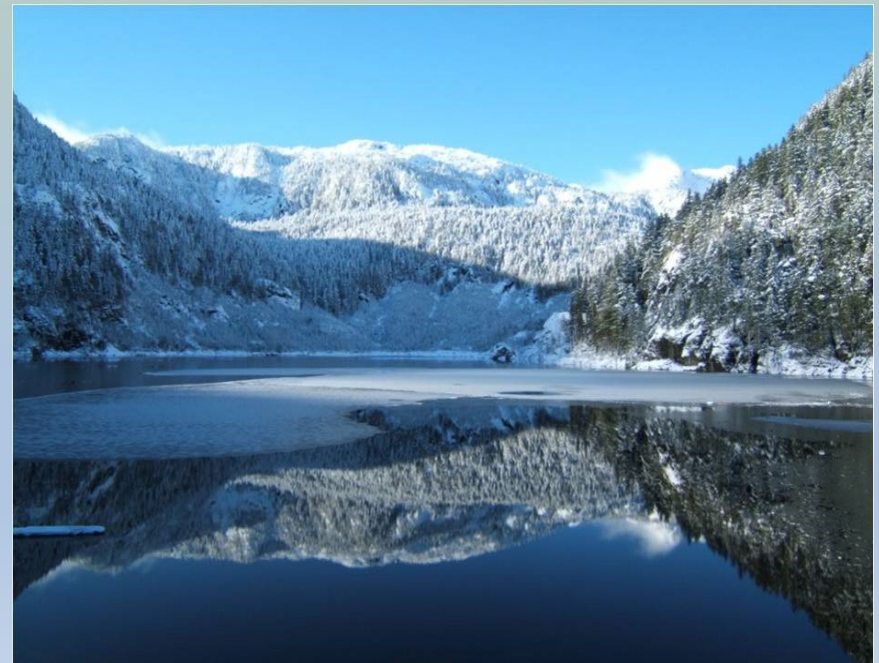


- Arrowsmith Lake catchment area: 5 square kilometers
- Englishman River catchment area: 391 square kilometers



# Watershed Updates

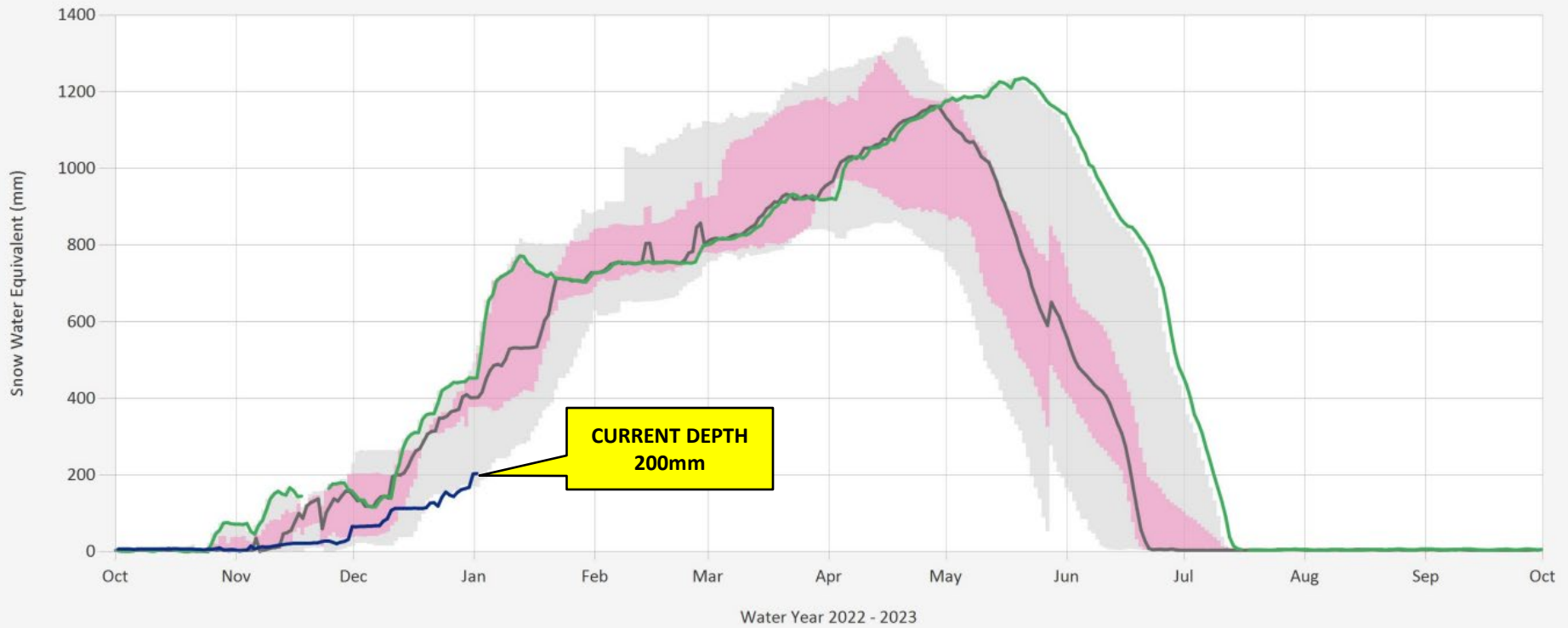
*“snow pillow, dam, river, and intake”*





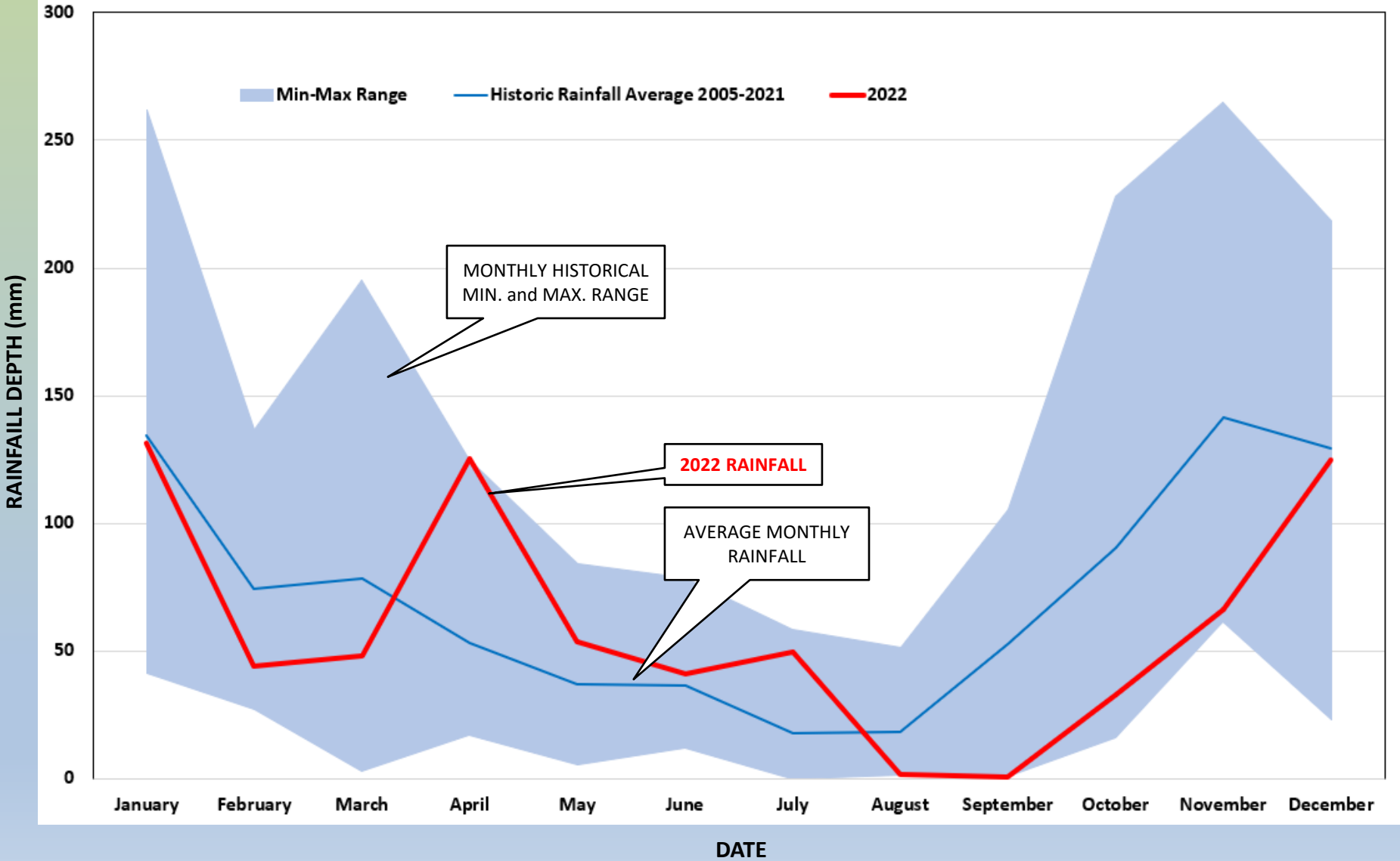
# Snow Pillow Gauge 3B26P Historical Records

Source Data: SW.Daily@3B26P Location: Mount Arrowsmith, Latitude: 49.207376, Longitude: -124.567776, Elevation: : 1465 m



— 2022 - 2023 — 2021 - 2022 — Historical Daily Median — Historical 25-75 — Range of Min & Max (Jul 14, 2017 - Sep 30, 2022)

# Public Works Yard Rain Gauge Rainfall Historical Records



# 2022 Drought Affecting Englishman River Base Flow

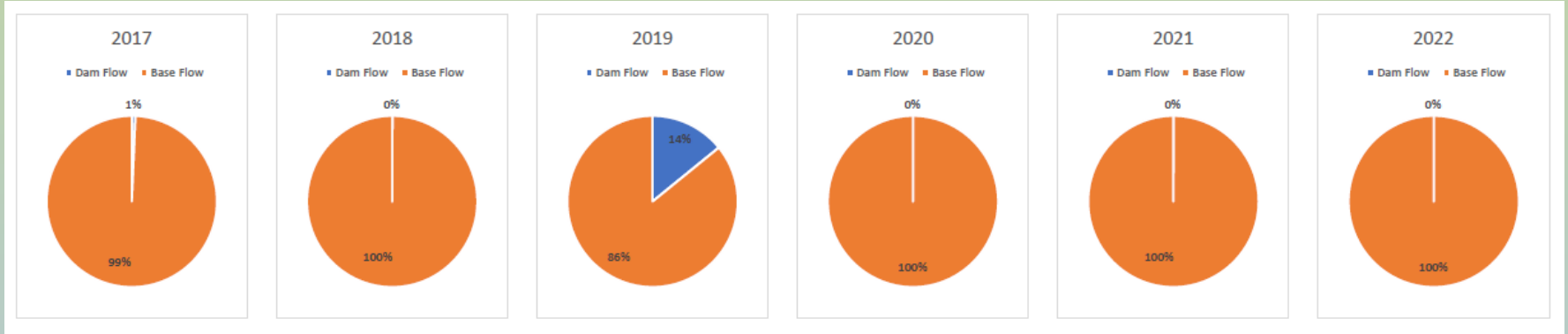
- June and July were filled with lots of rain and humidity. Total rainfall for June and July were 41mm and 49mm, respectively. It was above average.
- July 23<sup>rd</sup> was the first day that water was released from the dam to supplement the Englishman River and it extended to October 29<sup>th</sup>.
- The Englishman River baseflow is normally at:

	June	July	August	September	October
Historical (2017-2021)	2.0 m <sup>3</sup> /s 6.0 m <sup>3</sup> /s	0.5 m <sup>3</sup> /s 2.6 m <sup>3</sup> /s	0.2 m <sup>3</sup> /s 2.4 m <sup>3</sup> /s	0.3 m <sup>3</sup> /s 11.0 m <sup>3</sup> /s	1.2 m <sup>3</sup> /s 34.9 m <sup>3</sup> /s
2022	4.4 m <sup>3</sup> /s 20.6 m <sup>3</sup> /s	1.1 m <sup>3</sup> /s 8.2 m <sup>3</sup> /s	0.2 m <sup>3</sup> /s 1.0 m <sup>3</sup> /s	0.1 m <sup>3</sup> /s 0.2 m <sup>3</sup> /s	0.1 m <sup>3</sup> /s 0.2 m <sup>3</sup> /s

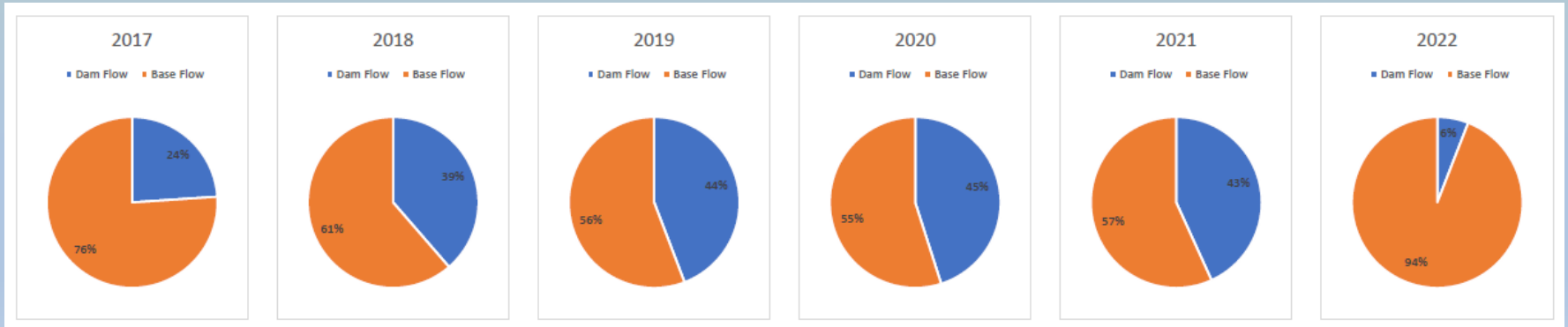
- September and October river baseflow was very abnormal. Arrowsmith Dam became the main supplier.
- Note: opposite 2021 Heat Dome with early heat and early rains

# 2017-2022 Englishman River Base Flow

## June 2017-2022



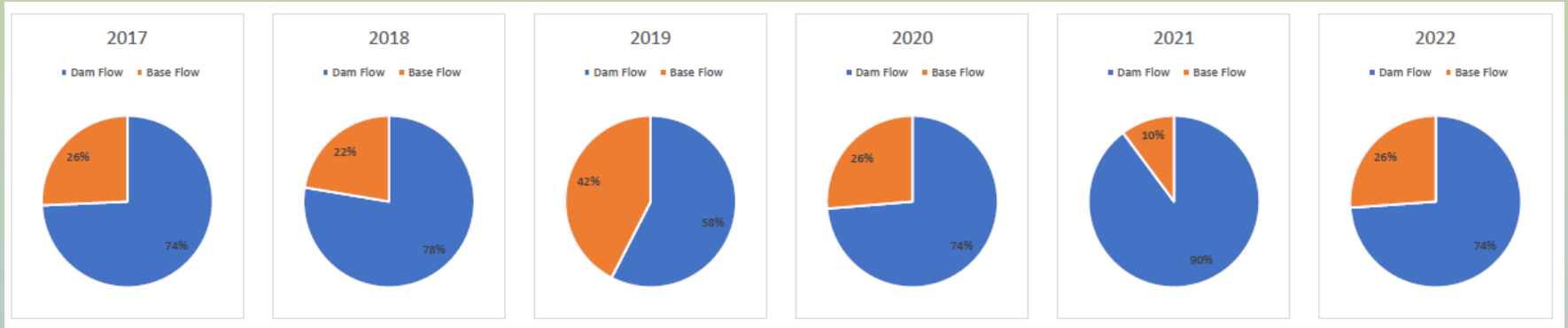
## July 2017-2022



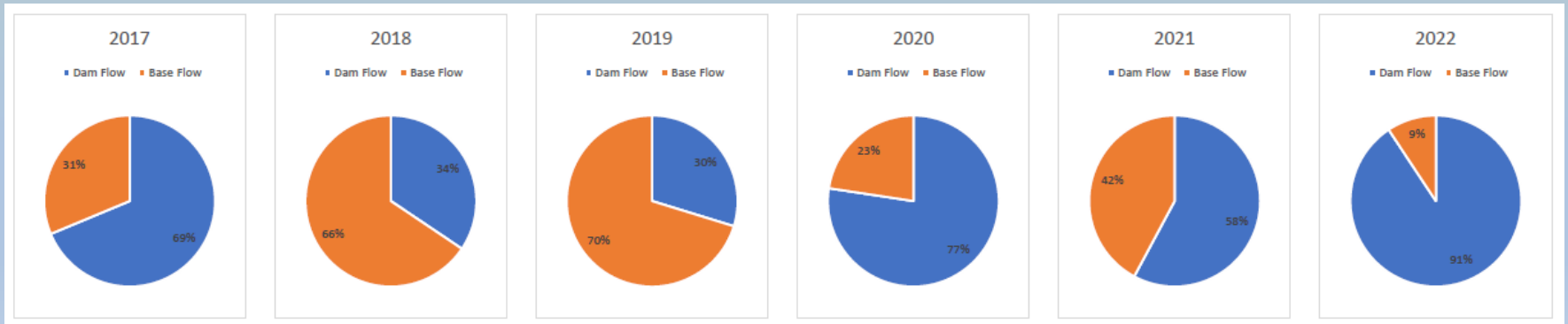


# 2017-2022 Englishman River Base Flow

## August 2017-2022

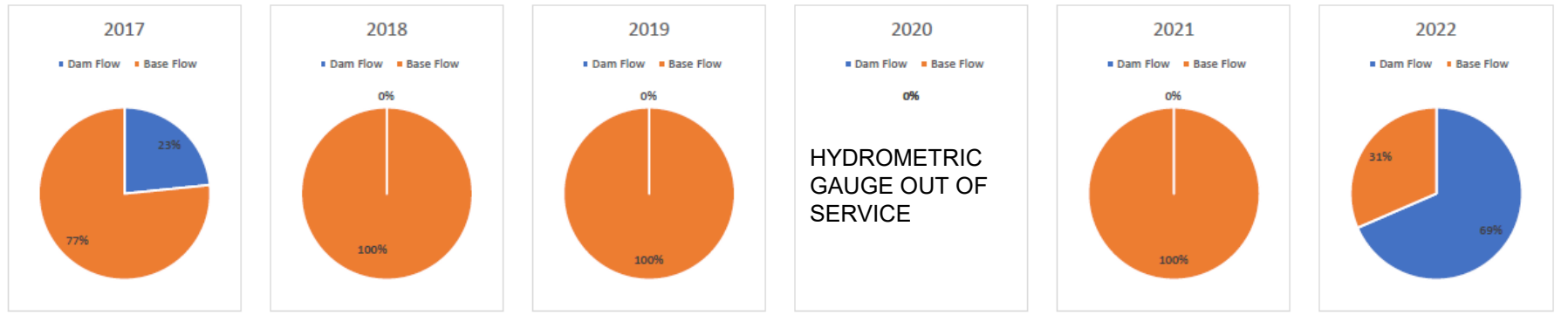


## September 2017-2022



# 2017-2022 Englishman River Base Flow

October 2017-2022



## 2022 Staff Actions

- Staff monitored daily weather predictions, water supply, water consumption etc.
- Staff has a good working relationship with the multiple ministries, regulatory authorities and partners, and contacted the Province in mid-September to review the reservoir volume and weather forecast as usual rains were not predicted.
- Beginning of October, as the reservoir volume was nearing the 25% volume mark, the Province issued an order to reduce the dam release rate to preserve, protect and prolong the available storage of water for later release through the fall months. This order was in place to protect fish habitat.
- Staff provided multiple projection figures.
- The order also required the implementation of Stage 4 water restrictions. The City and RDN supported the order by reducing and minimizing water drawing from the river and reverted to using more well sourced water.
- Well production increased.
- Working with the ministries, we were able to consistently release enough water to protect the river ecosystem during this unprecedented time.
- Set meetings with the Ministries and DFO to update the Provisional Operating Rule.



# **Annual Operation and Maintenance Activities**

# Annual Operating and Maintenance Activities

- Conduct monthly inspection of the dam consisting of piezometer readings (water seepage level through the dam).
- Refill fuel and conduct regular generator testing.
- Exercise and activate the valves in the spring and closeup the system for the fall/winter season.
- Retain a surveyor to complete a survey of the dam (movement assessment).
- Replace the sump pump in the valve chamber.
- Install new sign at the dam.
- Conduct site visits with the Fire Department as part of the safety rescue process and procedure for remote area.
- Coordinate with Mosaic Forest Management of road repairs where required.





# 2022 Projects

# Debris Removal and Log Boom Repair

- Major storm events damaged the log boom. Inspection and repair was completed in August/September 2022.
- Replacement will be required in the future as the logs are nearing their end of life.



## **Dam Safety Audit**

A routine audit was completed in October 2022 with the Province's Dam Safety Officer (DSO). Outcomes from the audit:

- Submission of updated Dam Emergency Plan and the Operation, Maintenance, and Surveillance Manual are required.
- Weekly site surveillance was determined. We're in the process of working with the DSO on the requirements as it may not be achievable during winter conditions (worker travelling safety concerns).

## **Dam Emergency Plan**

Major update and review is required every 7 years to meet regulatory requirements. The Plan has been completed and submitted to the Province and local emergency authorities for acceptance.

## **Operation, Maintenance, and Surveillance Manual**

It will be completed and submitted to the Province in spring of 2023.



# Camera Security, Communication, Solar Power Charging Station, and Piezometer Readout Unit Renewal

- Status: In progress
- Outcomes: The below items are required to meet safety and regulatory requirements in maintaining the water supply system.

## Camera Security and Communication Upgrade – Deferred Due to Inadequate Power Supply

Selection of high-definition cameras is completed. Purchased the Starlink to improve the communication signal.

## Power Supply Upgrade, Solar Charging Station – Deferred

In the process of assessing the overall power supply and demand with consultant/contractor as the proposed camera system will draw more power than existing ones.

## Piezometer Readout Unit – Completed

The unit is needed to upkeep with the regular monitoring work required per the Provincial Dam Regulation.





# Upcoming Projects

- Provisional Operation Rule Review
- Road Use Agreement with Island Timberlands / Mosaic Forest Management
- Hydrometric Flow Gauge Monitoring Agreement, Orange Bridge
- Future Bridge Replacement at the Arrowsmith Dam
- Continuation of the Dam Safety Review

# Dam Safety Review

- Status: awarded the contract to Stantec. Work in progress

Provincial Dam Safety Regulations require owners to conduct a comprehensive dam safety review every ten years. The review will focus on the design and performance of the dam as it relates to present conditions:

- Structural stability in meeting current regulations.
- Hazards and potential failure modes.
- Hydrotechnical analysis consisting of inflow design flood and freeboard assessment
- Safety of the dam and what actions are required to make the dam safe including review of downstream inundated areas.



# Questions