

## Arrowsmith Dam enhances healthy habitat

The Englishman River provides habitat and spawning runs for five species of salmon and three species of trout. It is also one of Vancouver Island's major steelhead rivers. Protecting and enhancing this fish habitat is important to Arrowsmith Water Service partners.

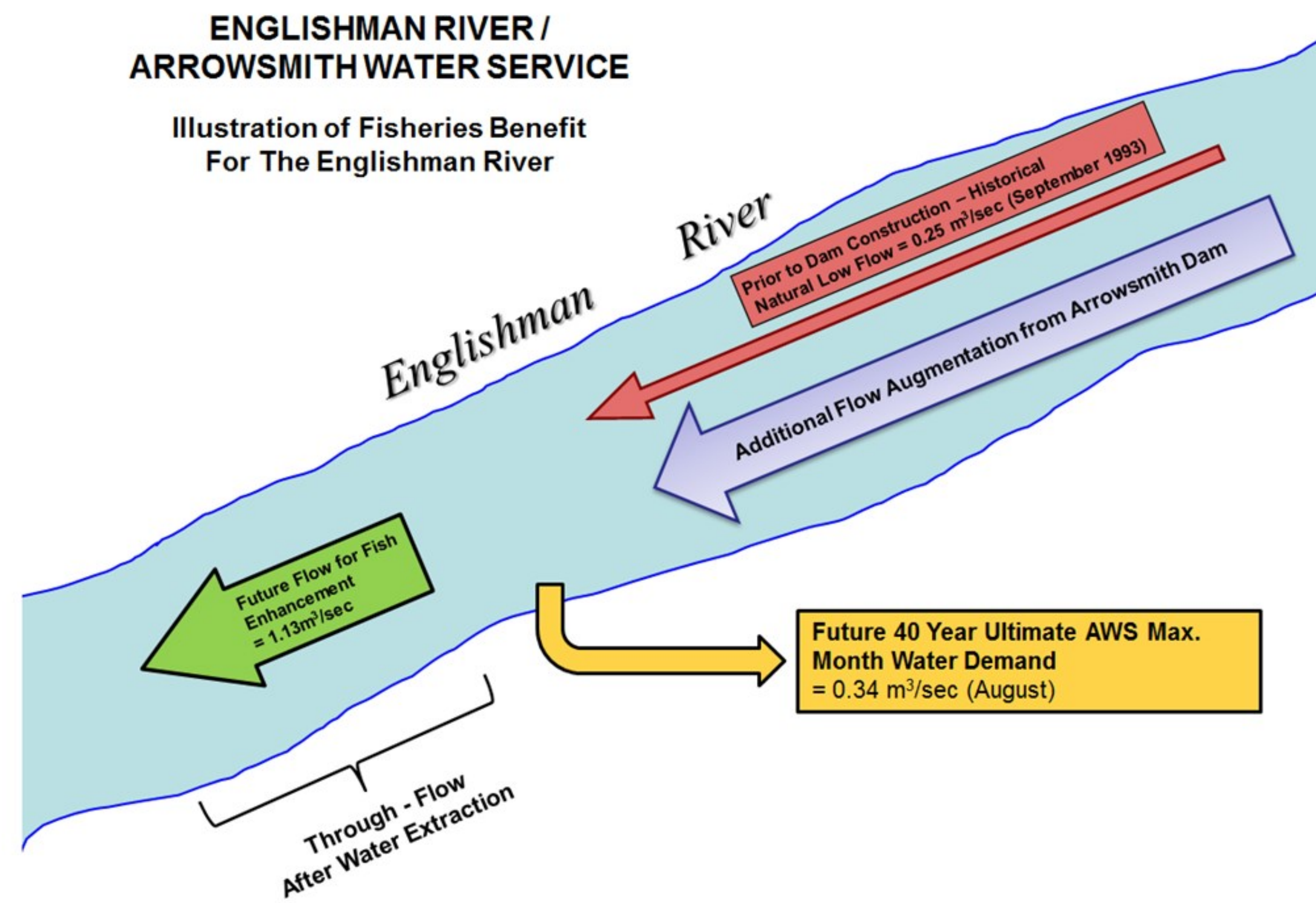
About half the water stored in the Arrowsmith Lake reservoir is for fisheries purposes to supplement low summer flows in the Englishman River. Along with the water released for consumption and domestic use, this additional water creates better spawning and migration conditions for the fish in the river. In accordance with the requirements of its water licence, the AWS works cooperatively with federal and provincial fisheries departments to manage the additional summer flows.

## Conservation costs you less

The Englishman River water which the AWS provides is not intended to be a replacement water source for residents. Instead, it is a supplemental source to existing groundwater supplies. The AWS partners all promote water conservation through metering, pricing and public education. For example, the recently-launched WaterSmart program encourages water conservation throughout the region.

In all AWS communities, water utility billing is structured to encourage conservation, help the environment and make financial sense. Water conservation is one means of deferring the demand for bulk water and the associated tax increases that will be necessary to pay for new infrastructure.

Water conservation and water use reduction will help meet water supply demands for drinking, fire protection and irrigation. Water conservation provides benefits to taxpayers, including reductions in the size of water bills. Limiting water use also makes more water available to maintain riparian habitats and aquatic ecosystems.



The above is a scaled graphical illustration of flow in the Englishman River showing:

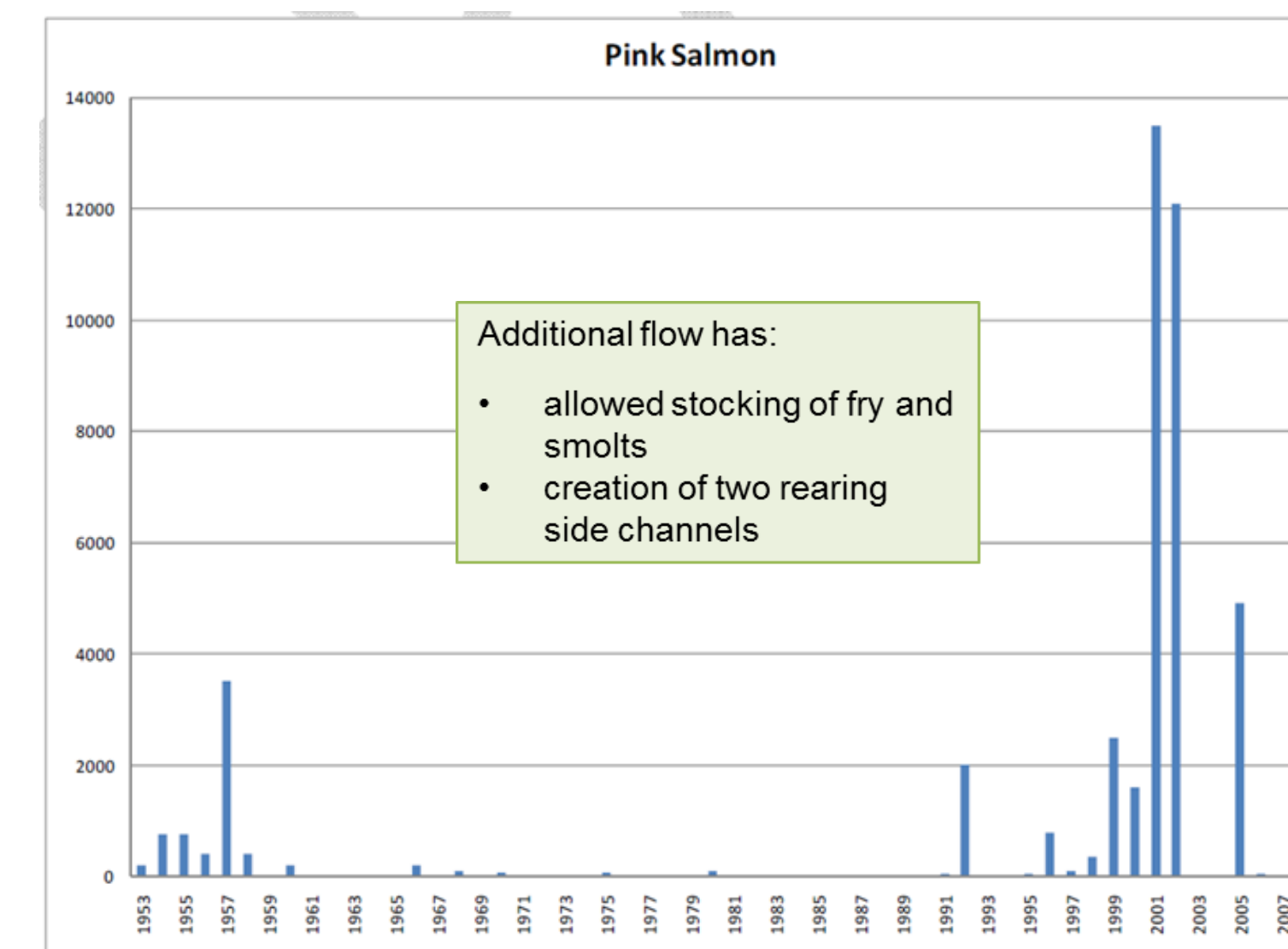
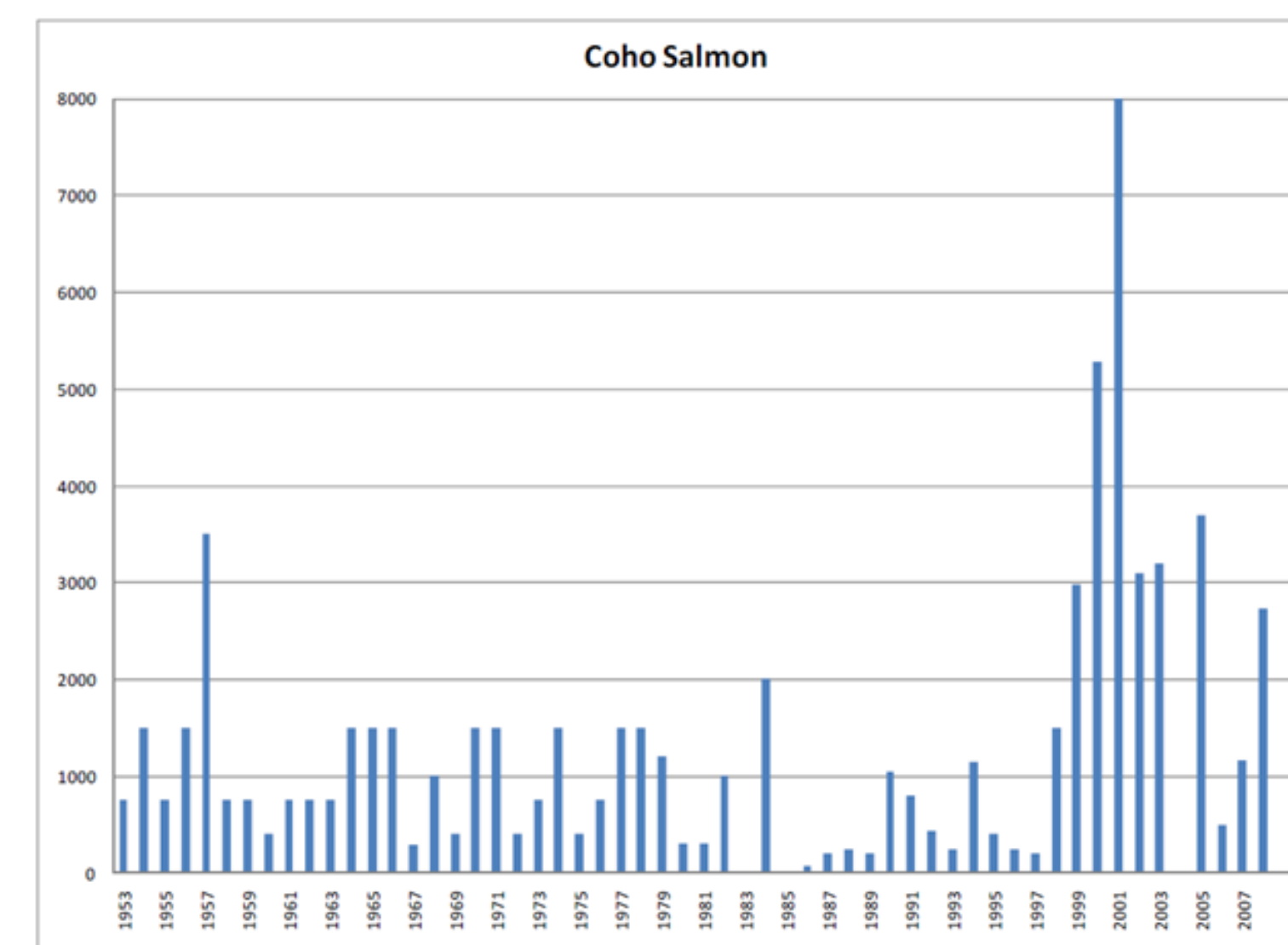
- In red, the flows in the Englishman River (0.25m³/s) during critical summer months prior to the Arrowsmith Dam construction,
- In blue, additional flows from the Arrowsmith Dam reservoir (1.35m³/s) for low flow summer base flow augmentation and future licensed potable water extraction (40 year horizon),
- In yellow, future ultimate water extraction,
- In green, flow available after the ultimate water extraction (1.13m³/s) - 40 year horizon, for improved fish enhancement.

Monthly Average Discharge Volumes  
Englishman River 1913 - 2010

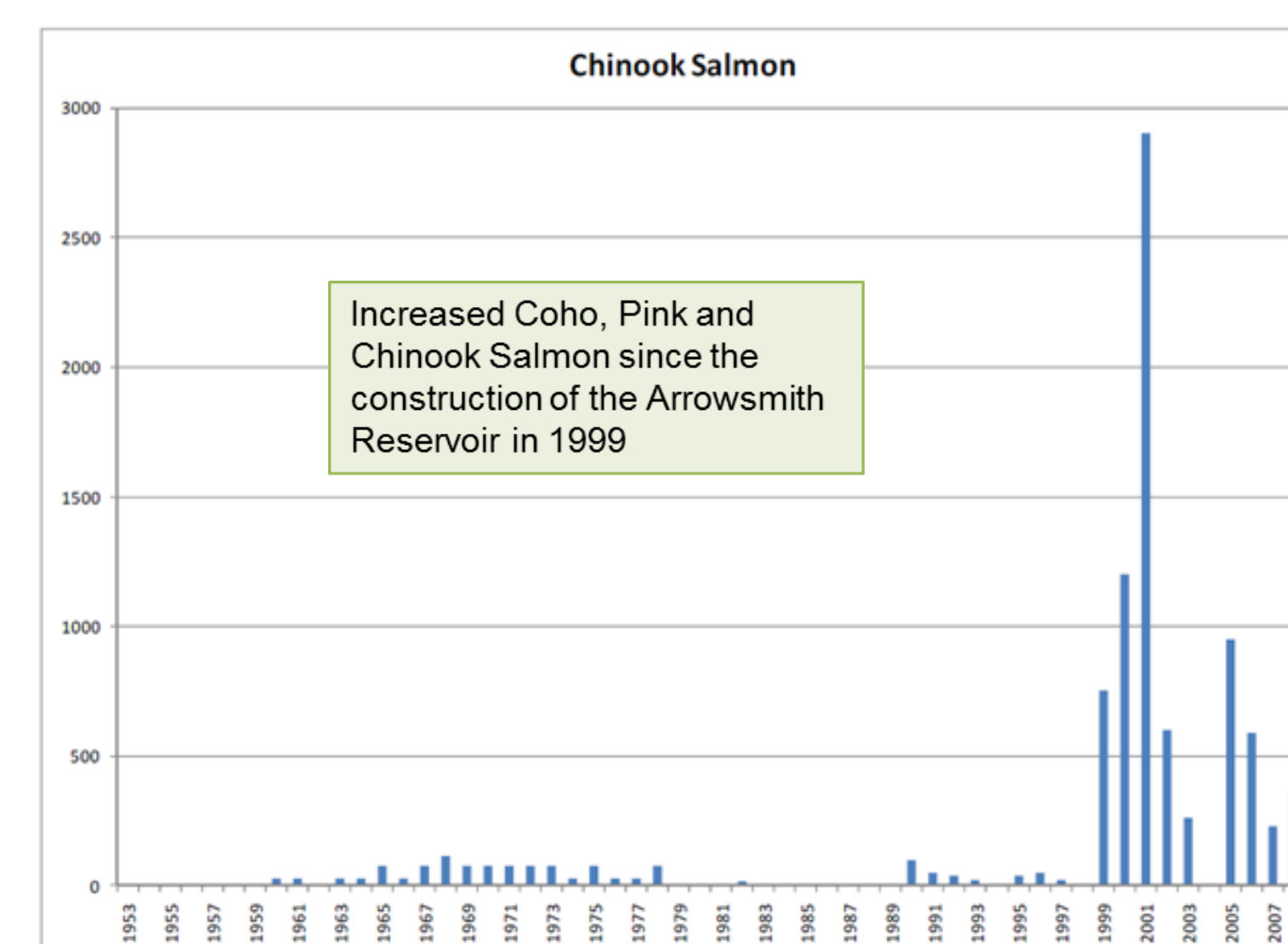
Year	June	July	August	September	October
1913	9.25	5.43	1.01		7.94
1914	7.24	2.42	0.63		
1915	3.04	1.24	0.78	0.68	17.50
1916	17.30	9.11	3.04	1.15	2.18
1917	11.70	4.60	1.24	1.42	
1970	6.38	1.43	0.65	0.88	
1971	13.30	7.11	2.06	2.04	
1979	2.85	2.40	0.65	6.06	12.90
1980	5.94	3.39	0.84	1.21	1.61
1981	4.95	1.75	0.65	2.84	21.50
1982	12.00	3.50	1.03	0.71	22.80
1983	6.59	5.16	1.04	0.97	2.96
1984	7.33	2.84	0.72	1.21	17.20
1985	4.64	1.29	0.50	0.85	10.30
1986	4.88	1.79	0.53	0.42	1.29
1987	5.94	1.55	0.58	0.34	0.29
1988	8.32	3.07	0.87	0.70	1.84
1989	4.32	1.93	0.87	0.40	6.79
1990	6.65	1.32	0.38	1.02	21.60
1991	2.15	0.89	7.10	3.10	0.64
1992	1.31	1.04	0.42	0.84	6.87
1993	6.17	1.34	0.50	0.25	1.13
1994	4.06	1.14	0.48	0.46	3.36
1995	4.09	1.62	0.91	0.35	7.49
1996	3.41	1.16	0.33	0.50	8.29
1997	9.48	5.37	1.98	5.62	28.40
1998	4.00	1.63	0.39	0.34	2.34
1999	18.01	10.5	4.38	2.11	4.87
2000	8.51	2.59	2.29	1.58	8.58
2001	3.51	1.52	2.51	1.72	3.27
2002	6.83	2.14	1.72	1.58	1.11
2003	3.6	1.34	1.23	1.57	31.7
2004	2.85	2.06	1.83	2.89	8.9
2005	3.55	1.85	1.74	1.76	10.3
2006	6.49	2.34	1.61	1.18	1.03
2007	3.41	3.91	1.77	1.79	11.21
2008	7.97	2.42	2.04	2.07	4.59
2009	3.06	1.27	1.26	1.50	5.39
2010	8.98	2.50	1.66	3.63	9.13

6/20/2011

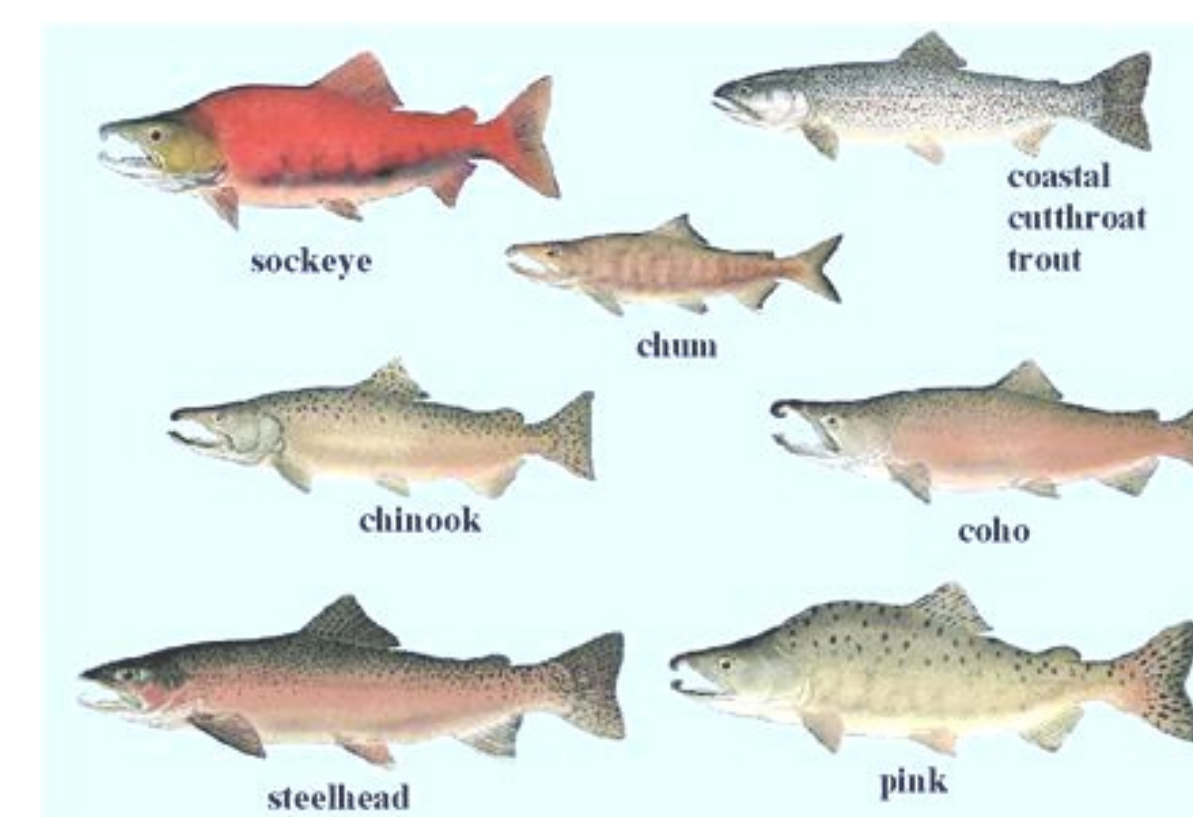
As part of the AWS exploring future water resources on a regional basis, it was determined by senior government that the best approach for the City of Parkville, Regional District of Nanaimo and the Town of Qualicum Beach to look toward the Englishman River for the main source of surface water supply rather than developing supplies on separate surface water sources. Given that all the water licences on the Englishman River were allocated at that time, the AWS would need to provide storage for bulk water extraction along with providing enhanced fisheries benefits. The current Water Licence No. 110050 in the name of the AWS joint venture reflects our current bulk water needs with the conditions of providing additional flows for fisheries benefits.



- Additional flow has:
- allowed stocking of fry and smolts
  - creation of two rearing side channels



Increased Coho, Pink and Chinook Salmon since the construction of the Arrowsmith Reservoir in 1999



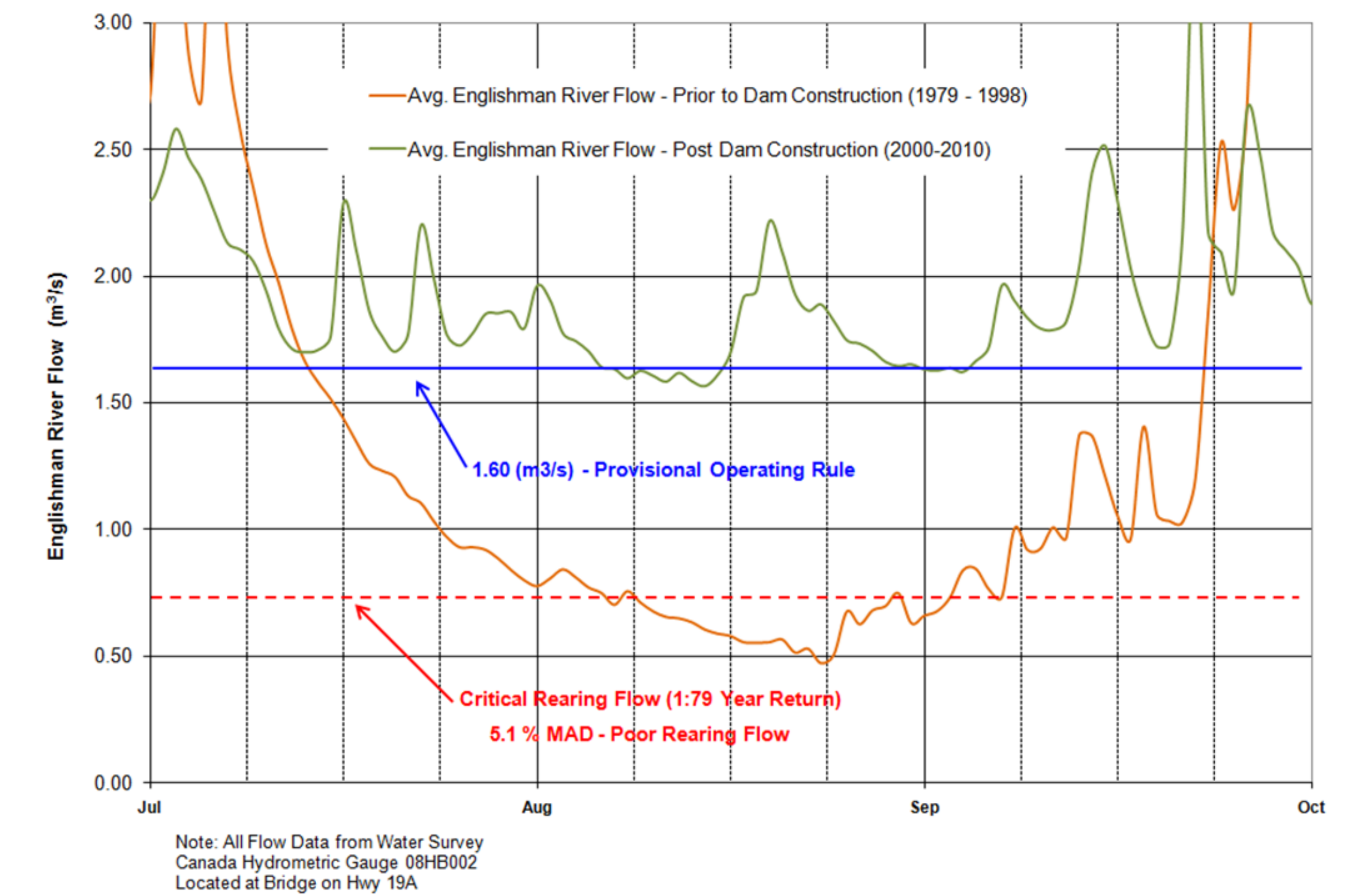
Note:  
This information was taken from the Water Survey of Canada Archived Hydrometric Data - Englishman River near Parksville site 08HB002 - Monthly Mean Discharge (m³/s) AWS Englishman River Historical.xls

- Values of below 1.0 cubic metres per second
- Values greater than or equal to 1.6 cubic metres per second

## Arrowsmith Dam – Fisheries Benefits

The figure below shows an average of daily flows in the Englishman River as measured above Highway 19A, before and after construction of the dam. Since construction of the dam, a significant increase in summer flows and fish enhancement flow can now be maintained in the river, even during dry summer periods.

Englishman River Flow - Before and After Dam Construction

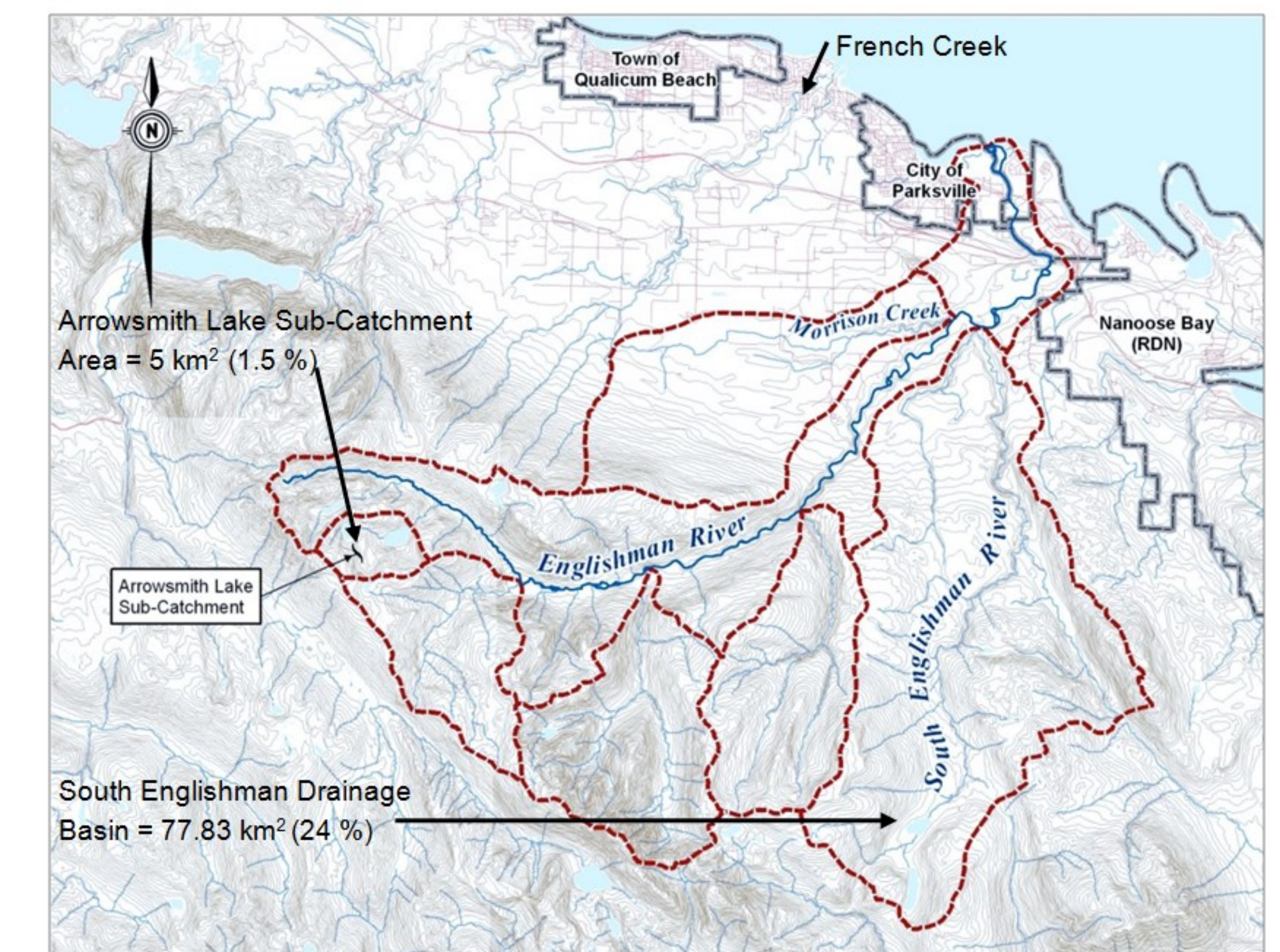


Note: All Flow Data from Water Survey Canada Hydrometric Gauge 08HB002 Located at Bridge on Hwy 19A

Of critical importance from both a fisheries and drinking water viewpoint is river hydrology. The watershed in general, is at a low elevation and only the upper areas receive a significant snow pack. As a result, river flow tends to be strongly influenced by rainfall patterns, as demonstrated by how, prior to construction of the Arrowsmith Dam, river flows would drop to very low levels during the driest periods of the summer.

The Englishman River is primarily used by the AWS partners to supplement their groundwater supplies. For treatment, Englishman River water supply is currently chlorinated for protection against microbial contamination. A low chlorine residual is maintained throughout the distribution system to ensure that the quality of the water supply is maintained.

## Arrowsmith Reservoir – Drainage Area



Total Englishman River Drainage Basin = 324 km²