

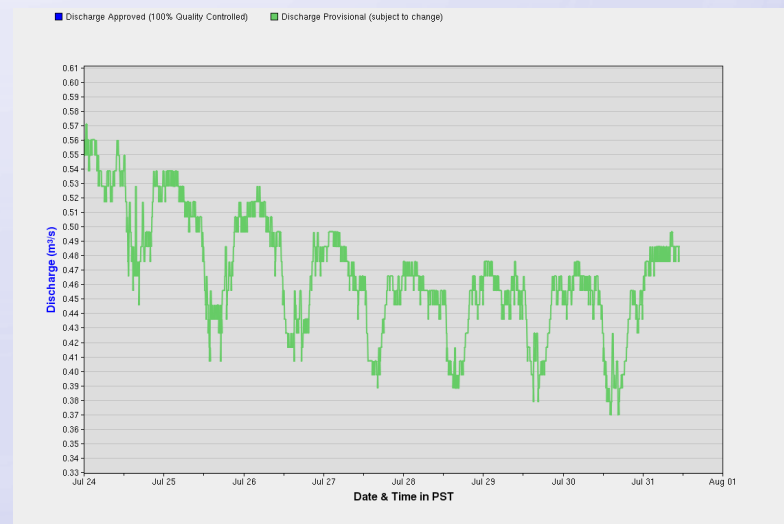


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2017 Koksilah River Drought Summary



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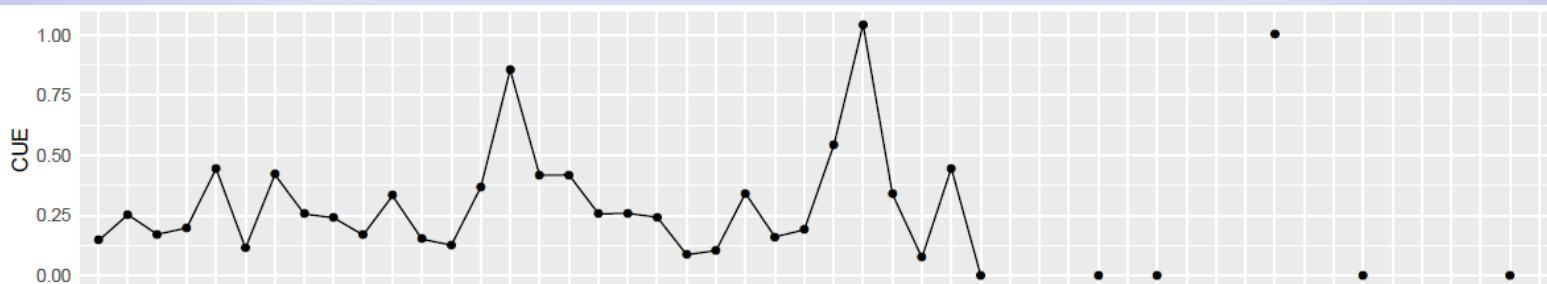


Koksilah River

- Regionally significant stocks of anadromous salmon, steelhead and resident trout spp.
- Traditional use of fish, wildlife and water resources by members of local First Nations
- Heavy domestic and agricultural run-of-river demands in the middle and lower reaches of the watershed that lacks storage
- Rain-dominated watershed (209 sq.km) with historical low summer flows and high temperatures

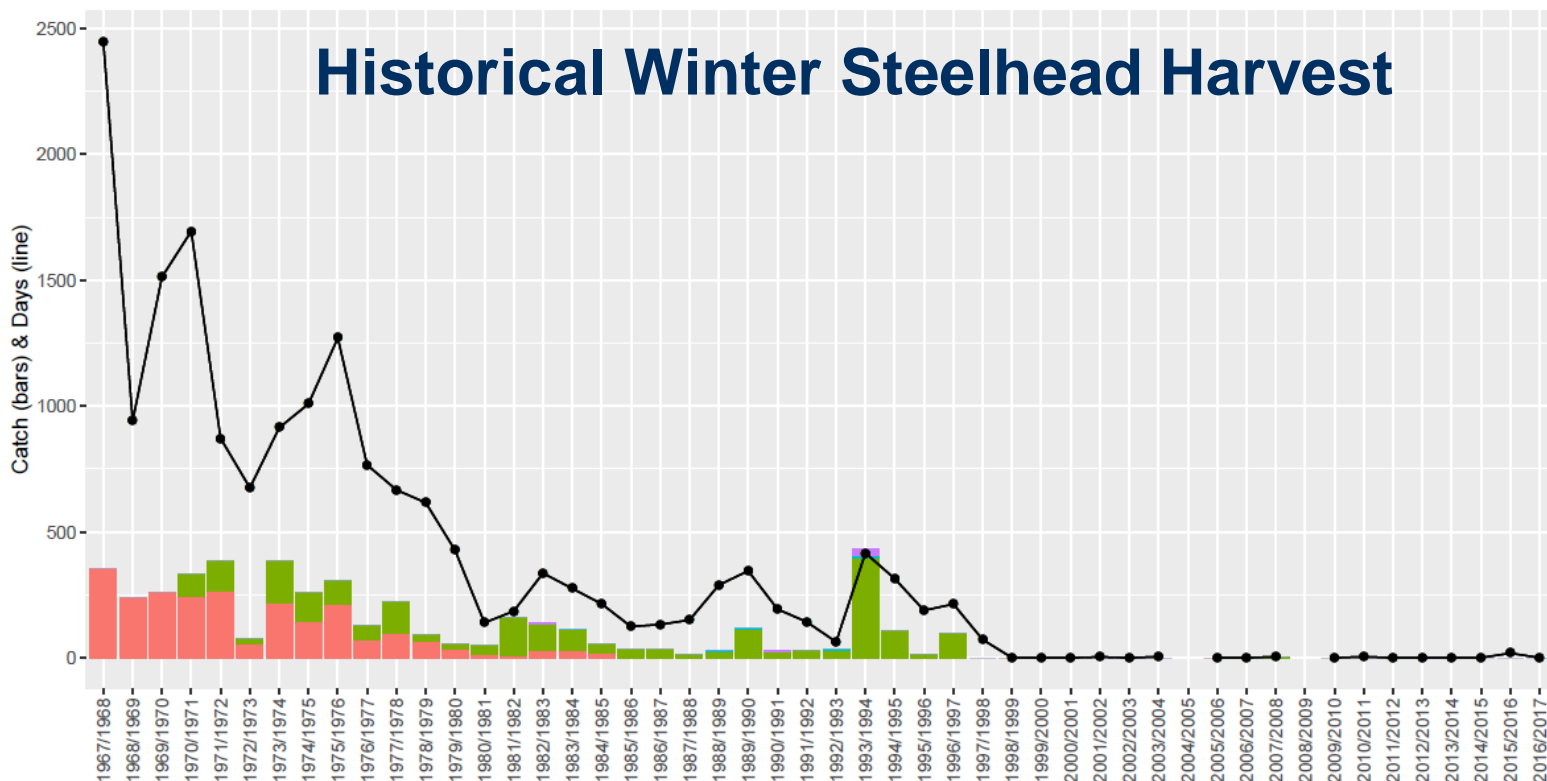


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KOKSILAH RIVER

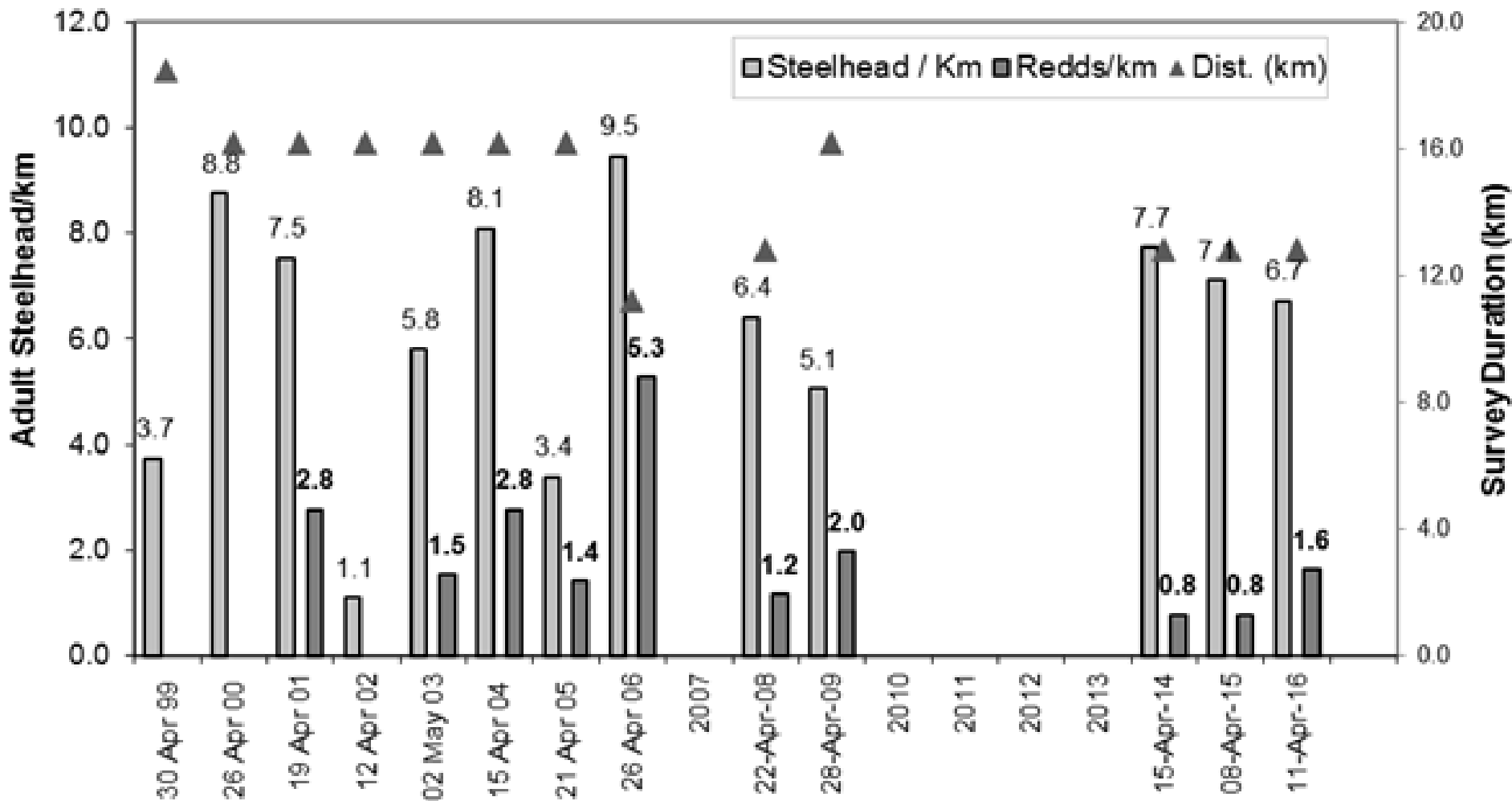
Wild_Kept Wild_Rel Hatch_Kept Hatch_Rel





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Koksilah River Snorkel Survey Results 1999-2016





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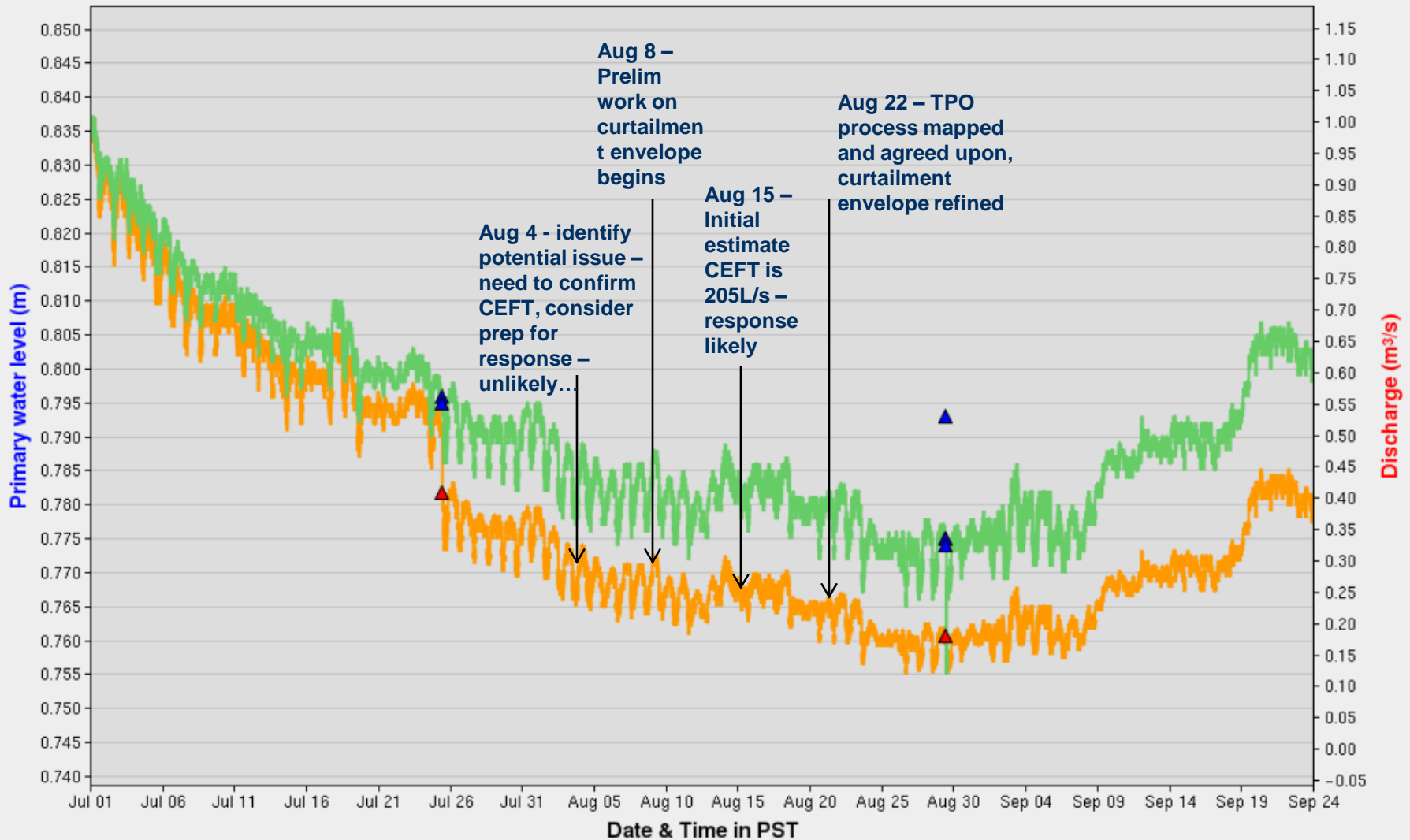
The problem

- Early August 2017- no appreciable rain for > 2 months, large diurnal fluctuations in flows at WSC station due to summer irrigation and industrial demands
- Flows in the lower river were 50% to 75% less than upstream of a number of agricultural/ industrial water users
- Flows were in the range of 200 – 300 L/s which is significantly less than a previously recommended environmental flow threshold for salmon in the mainstem Koksilah River (B.Tutty,1984) – 425L/s or 4.3% MAD
- Needed to redefine Critical Environmental Flow Thresholds to align with 2017 drought regime, current water demands and new WSA regulations



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▲ Stage Measurements ▲ Discharge Measurements — Primary Water Level Approved (100% Quality Controlled)
— Primary Water Level Provisional (subject to change) — Discharge Approved (100% Quality Controlled) — Discharge Provisional (subject to change)





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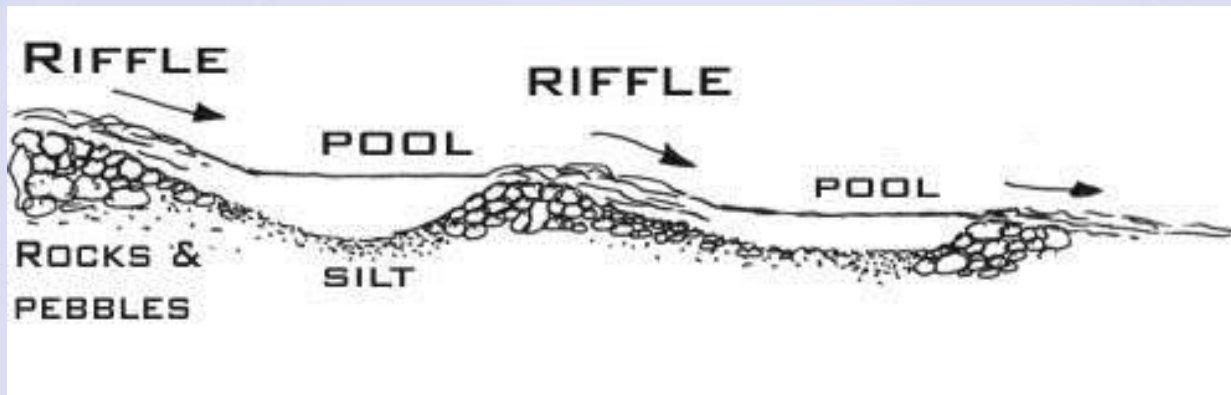
Setting the CEFT value

- CEFT - volume of water flow below which significant or irreversible harm to the aquatic ecosystem of the stream is likely to occur
- Significant impact on fish population for lower Koksilah River - defined as potential loss of 50% of ST fry from riffles
- Established a downstream flow monitoring station in addition to KOKSILAH RIVER AT COWICHAN STATION (08HA003)
- Picked a representative riffle in both sections
- Measured variables such as: riffle area, velocity, depth, substrate type and temperature
- Collected fish at each riffle at different flows to determine population density per 100 sq.m of riffle area



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Why are Riffles Important in the Summer?



- Riffles are the first areas that dry up once flows decrease
- They are the main source of food at low flows (insects)
- Preferred habitat for Steelhead and RT/CT juveniles
- Pools tend to be dominated by Coho salmon fry/fingerlings
- Trout species get out competed by Coho in pools



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Upstream Riffle (KRU): Fish Densities

08-Aug-17

Electrofishing Effort (2 passess) = 369 s Temperature @1500hrs = 20.75 deg C

Voltage = 600 V

Frequency = 60 Hz

Duty Cycle = 12%

Species	Number of fish	Average Length (mm)	Density (per 100 sq meters of riffle area)
Steelhad	105	64	154.8672566
Coastrange Sculpin	40	80	58.99705015
Coho Salmon	3	60	4.424778761
<i>Lampetra</i> sp.	1	115	1.474926254
TOTAL	149		219.7640118

05-Sep-17

Electrofishing Effort (2 passess) = 690s Temperature @1530hrs = 18.2 deg C

Voltage = 600 V

Frequency = 60 Hz

Duty Cycle = 12%

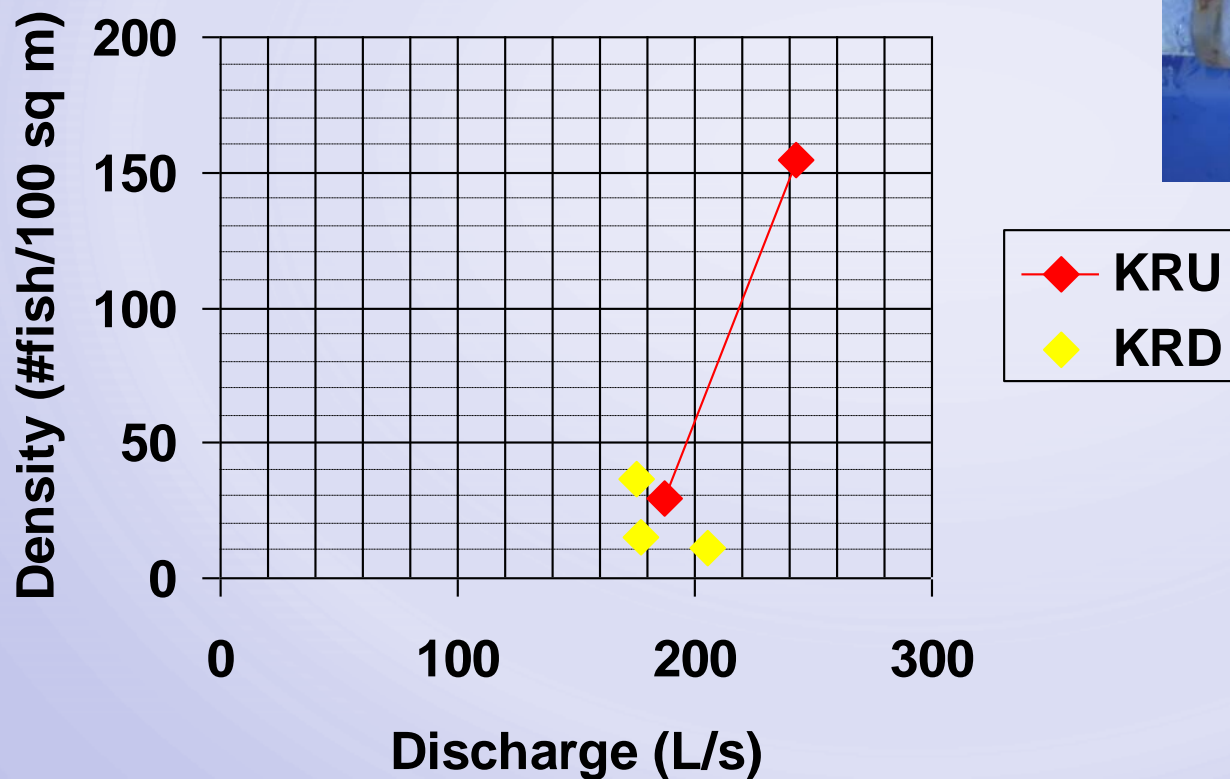
Species	Number of fish	Average Length (mm)	Density (per 100 sq meters of riffle area)
Steelhad	29	65	29.74358974
Coastrange Sculpin	29	74	29.74358974
Coho Salmon	4	57	4.102564103
<i>Lampetra</i> sp.	1	149	1.025641026
TOTAL	63		92.92035398





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- This occurred only at KRU at a density of 75 fish/100 sq m corresponding to a discharge of 210 L/s

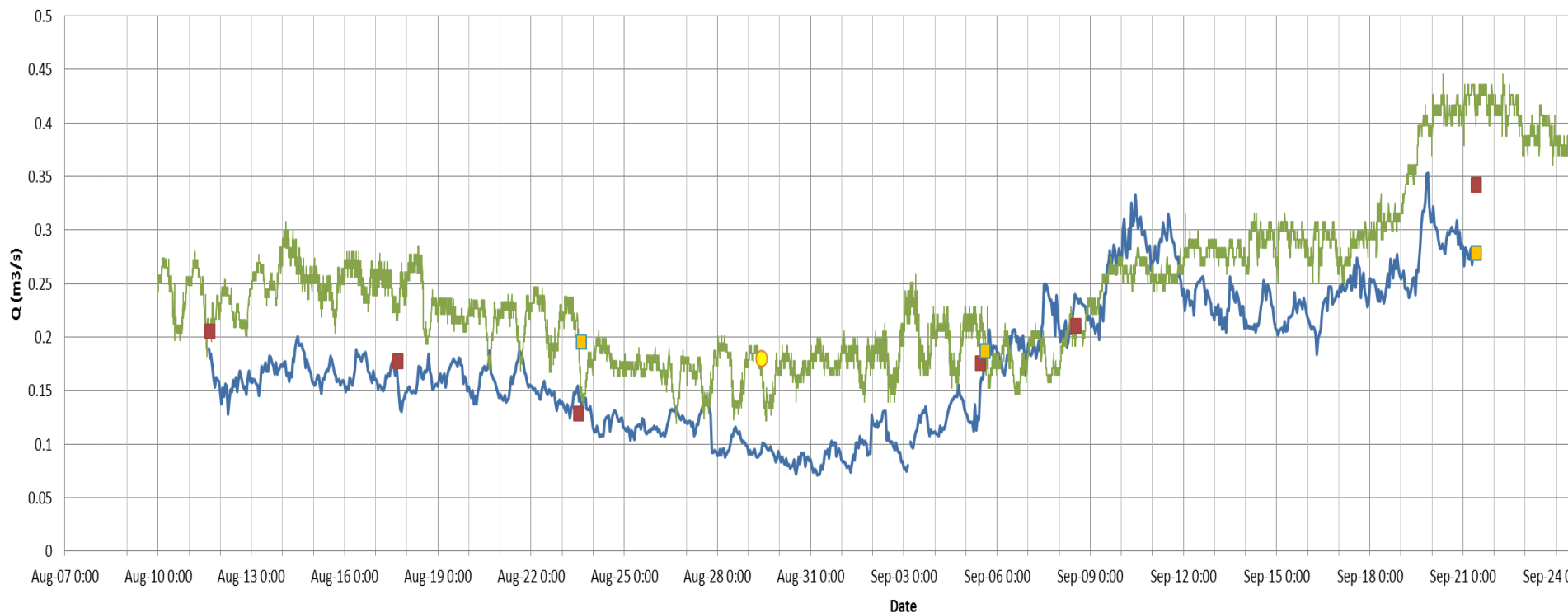




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The result – the voluntary reductions worked!

Tentative Real Time Q



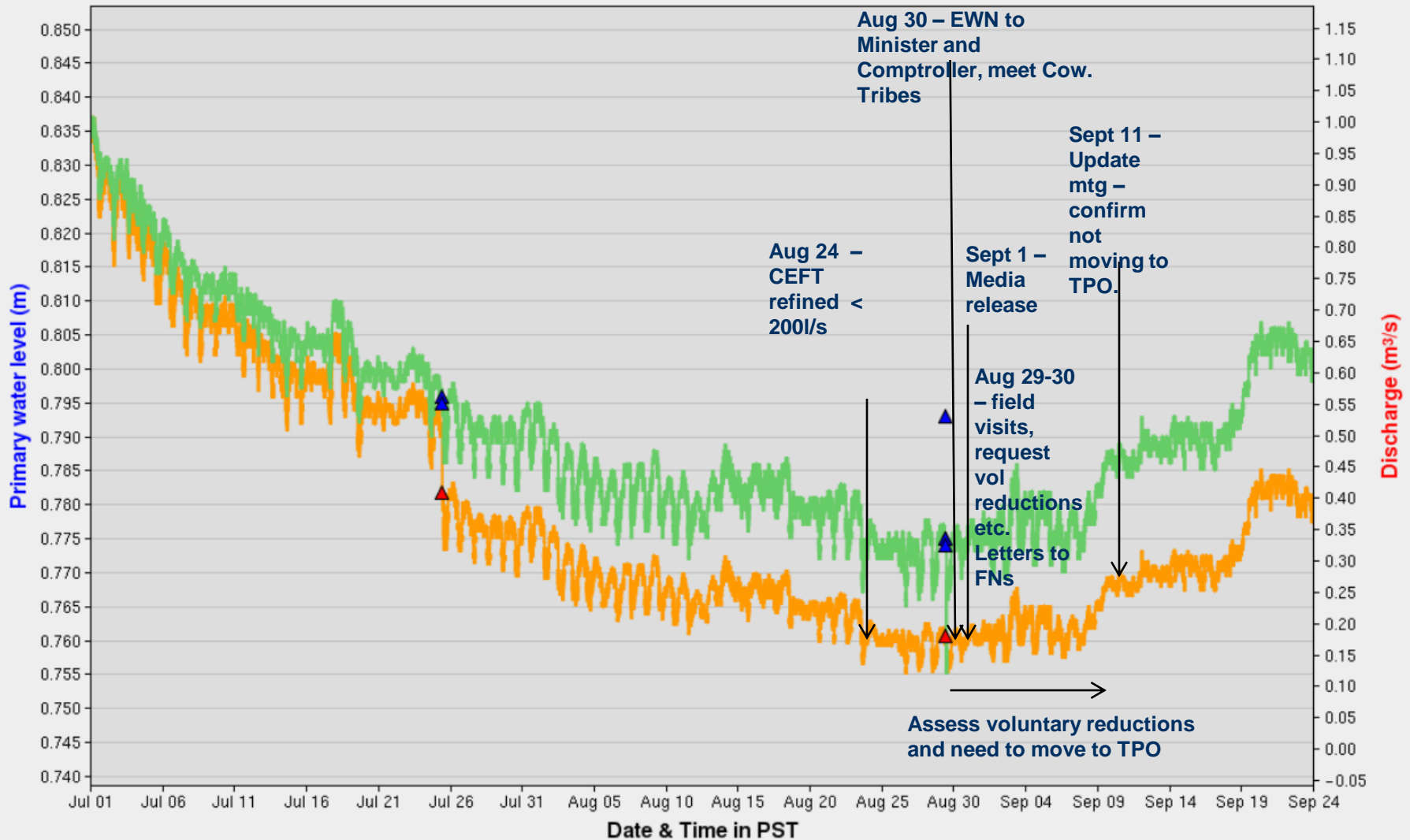


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▲ Stage Measurements ▲ Discharge Measurements — Primary Water Level Approved (100% Quality Controlled)

Provisional (subject to change)

The result – the voluntary reductions worked!

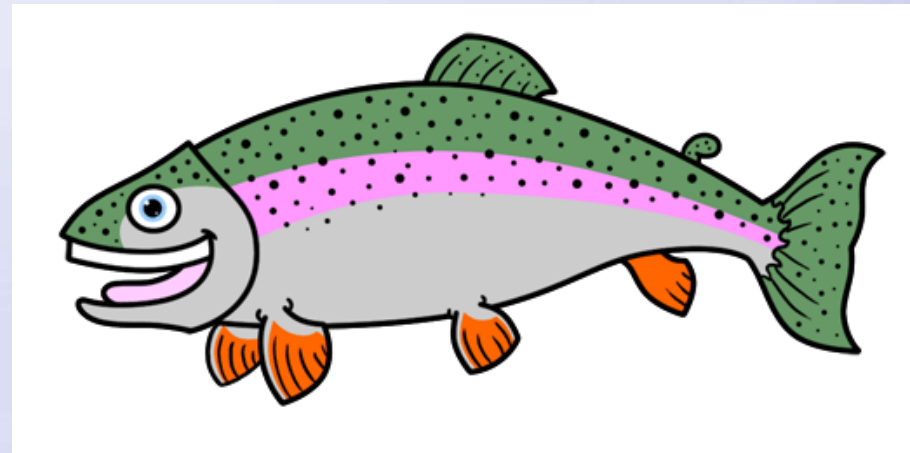




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Lessons Learned

- Issues with WSC station and reliability of historical data
- Personnel and resource intense (monitoring/ interviews)
- Earlier identification of problem = more effective voluntary conservation efforts
- Focus on water conservation measures for domestic, agricultural and industrial users in Koksilah Valley





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Questions ???