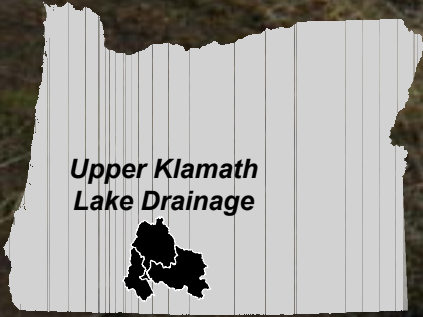
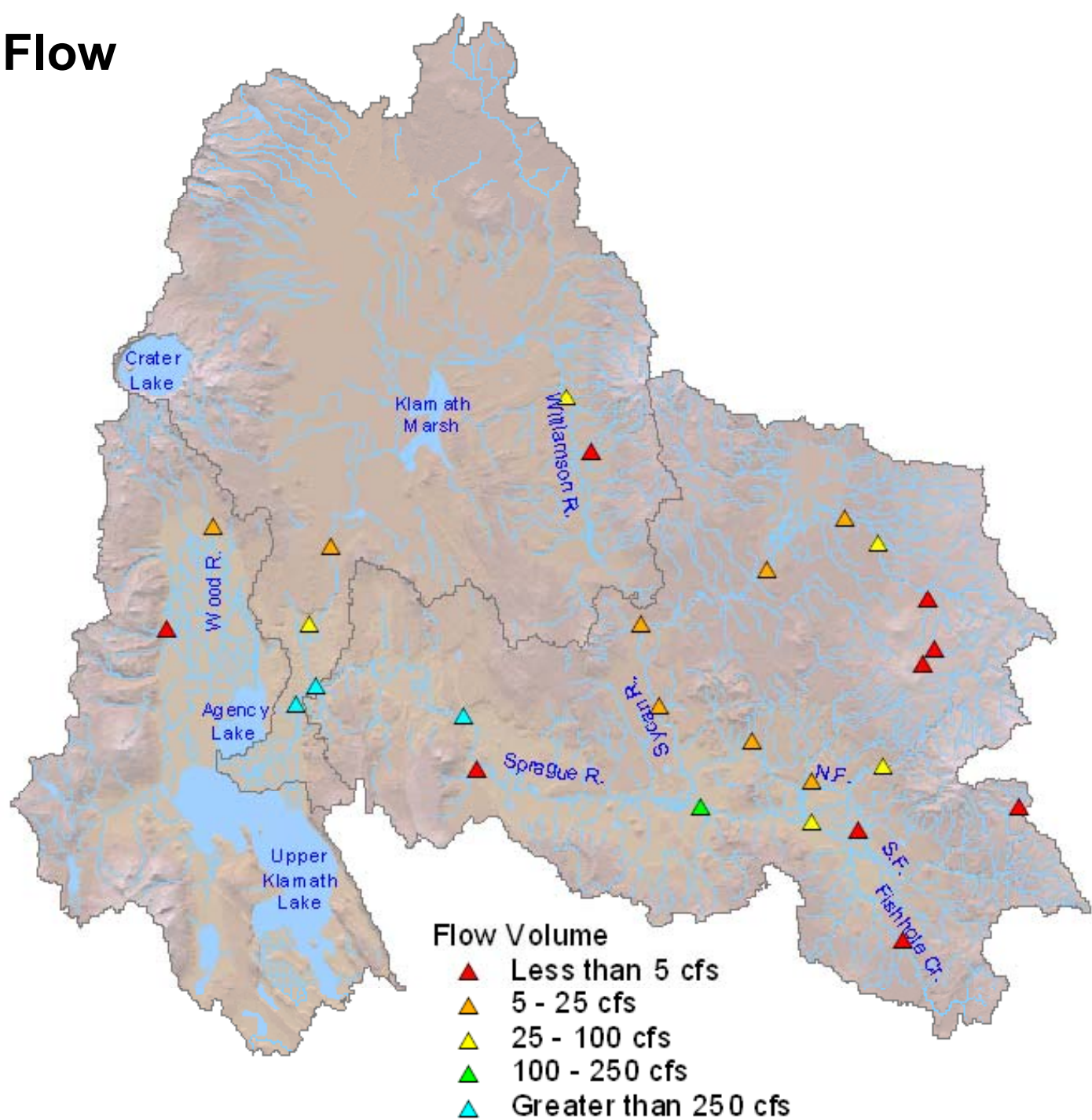


Overview of the Upper Klamath Lake Drainage Hydrology Analysis



Ground Level Flow Data



Mass Balance Derivations

Q_{up} : Stream flow rate upstream from mass transfer process

Q_{in} : Inflow volume or flow rate

Q_{mix} : Resulting volume or flow rate from mass transfer process ($Q_{up} + Q_{in}$)

T_{up} : Stream temperature directly upstream from mass transfer process

T_{in} : Temperature of inflow

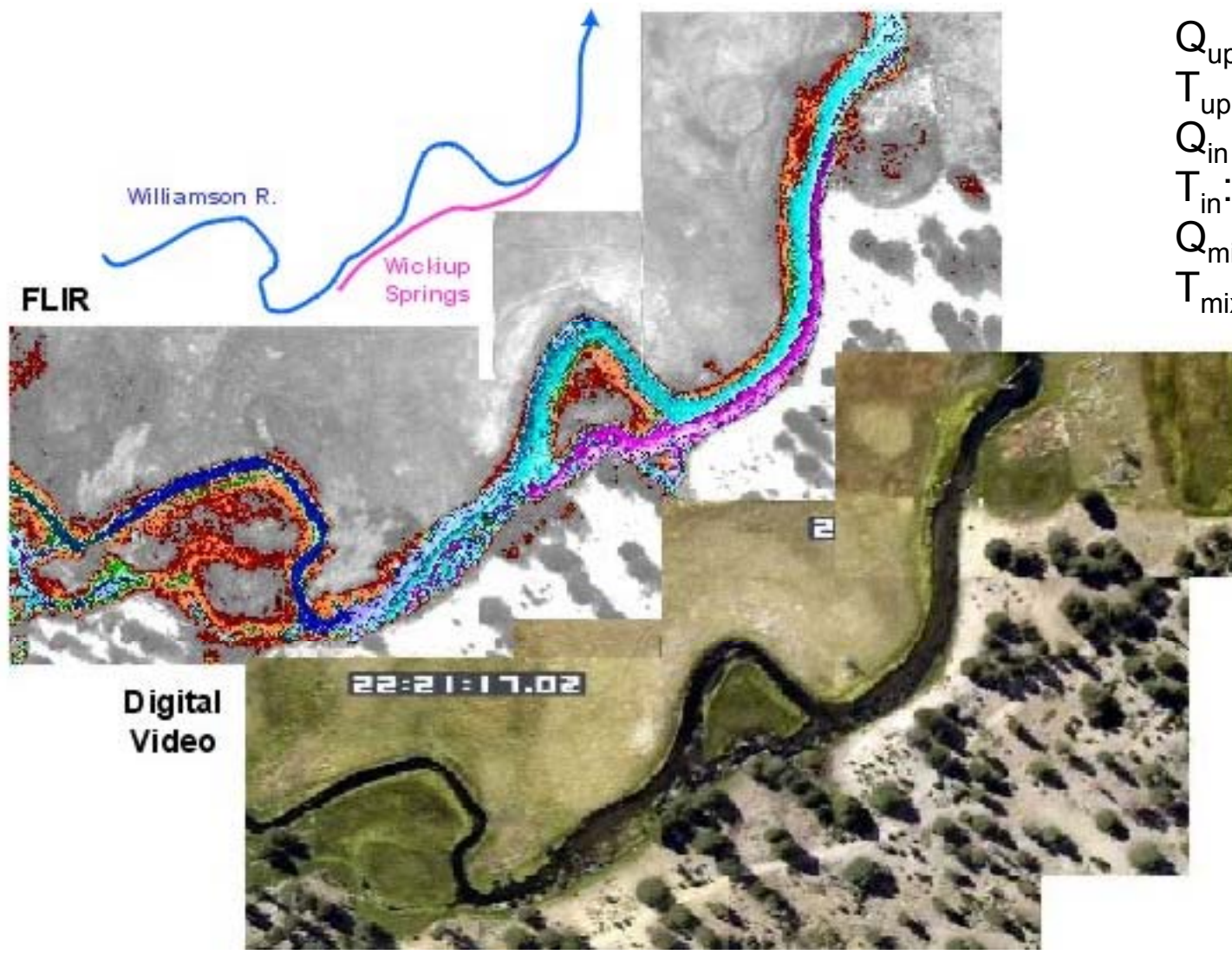
T_{mix} : Resulting stream temperature from mass transfer process assuming complete mix

$$T_{mix} = \frac{(Q_{up} \cdot T_{up}) + (Q_{in} \cdot T_{in})}{(Q_{mix})} = \frac{(Q_{up} \cdot T_{up}) + (Q_{in} \cdot T_{in})}{(Q_{up} + Q_{in})}$$

All water temperatures (i.e. T_{up} , T_{in} and T_{mix}) are apparent in the FLIR sampled stream temperature data. Provided that one instream flow rate is known, the other flow rates can be calculated.

	Number of Mass Transfer Processes					Mass Transfer Process Flow Rates (cfs)					
	Tributary Inflows	Agriculture Return Flows	Subsurface Inflows	Water Withdrawals	Total	Upstream Boundary Condition ¹	Tributary Inflows ²	Agriculture Return Flows ³	Subsurface Inflows ⁴	Water Withdrawals ⁵	Total Flow per Drainage ⁶
N.F. Sprague R.	10	6	9	6	31	15	29	9	11	-28	35
S.F. Sprague R.	6	7	4	5	22	4	24	12	7	-15	31
Sycan R.	1	2	11	11	25	5	4	13	41	-33	29
Sprague R.	6	11	23	47	87	0 ⁷	116	101	358	-226	349
Williamson R.	9	12	14	47	82	16 ⁸ 23 ⁹	394	55	274	-572	181
Totals	32	38	61	116	247	40	567	190	690	-874	

Upper Williamson River - Confluence of Williamson River and Wickiup Springs - River Miles 80.65 to 80.41

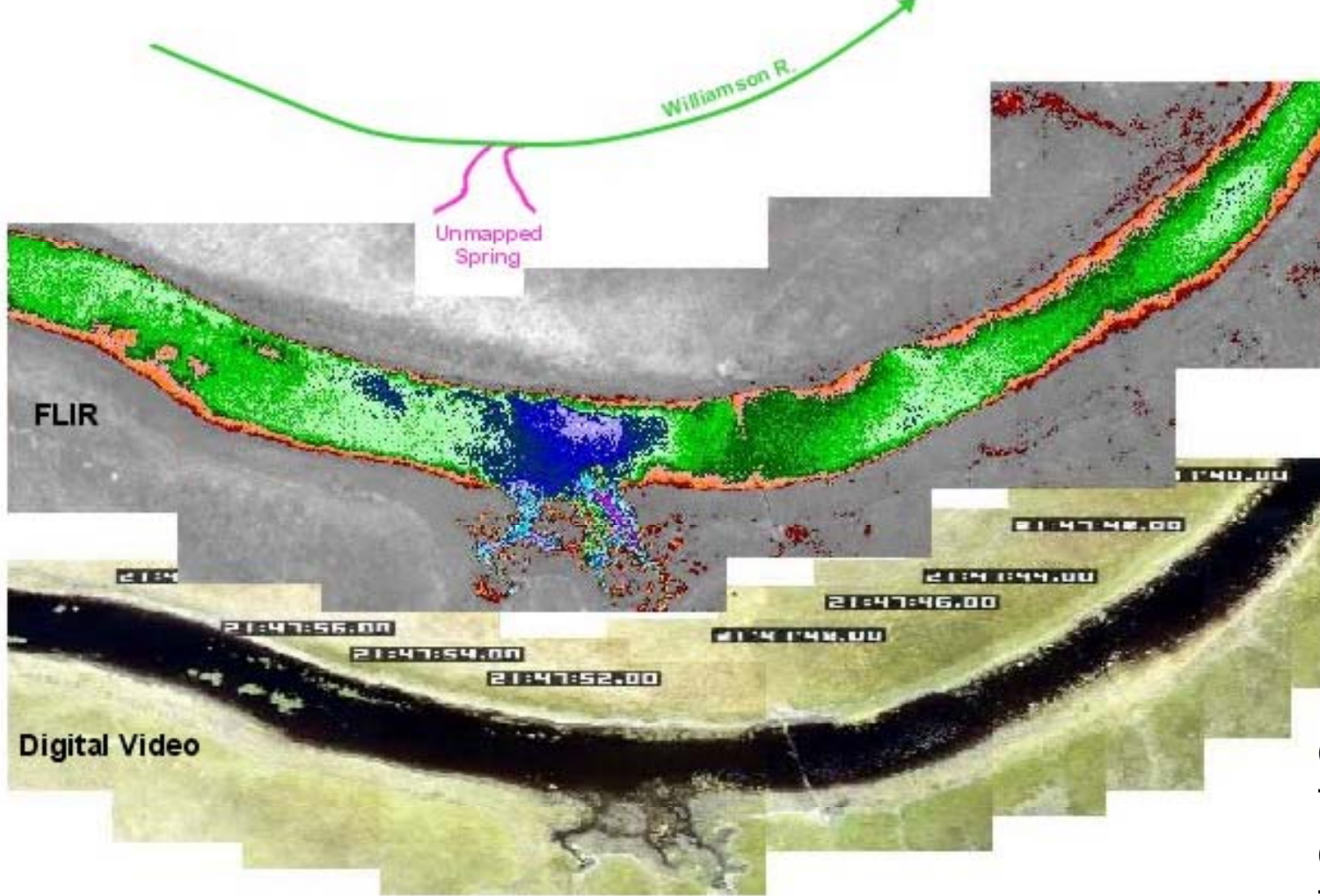


Q_{up} : 11.5 cfs
 T_{up} : 72.1°F
 Q_{in} : 21.0 cfs
 T_{in} : 46.4°F
 Q_{mix} : 32.6 cfs
 T_{mix} : 55.6°F

FLIR Derived Temperature (°F)



Lower Williamson River - Unmapped Spring River Miles 37.97 to 37.46



Q_{up} : 27.3 cfs
 T_{up} : 74.7°F
 Q_{in} : 0.7 cfs
 T_{in} : 48.2°F
 Q_{mix} : 28.0 cfs
 T_{mix} : 74.0°F

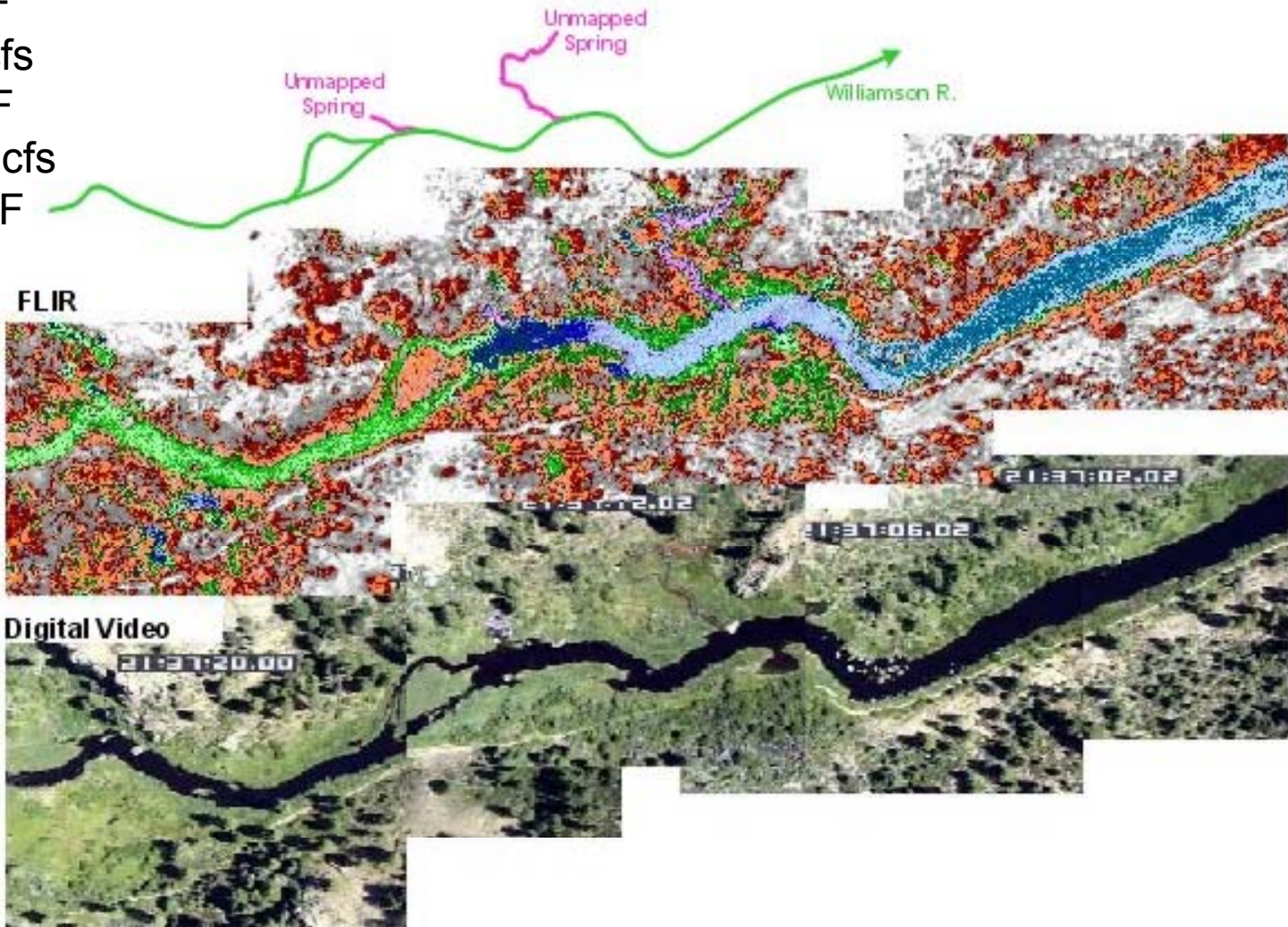
FLIR Derived Temperature (°F)



Lower Williamson River - Unmapped Spring

River Miles 22.09 to 21.57

Q_{up} : 68.8 cfs
 T_{up} : 75.0°F
 Q_{in} : 11.3 cfs
 T_{in} : 48.2°F
 Q_{mix} : 80.1 cfs
 T_{mix} : 64.5°F

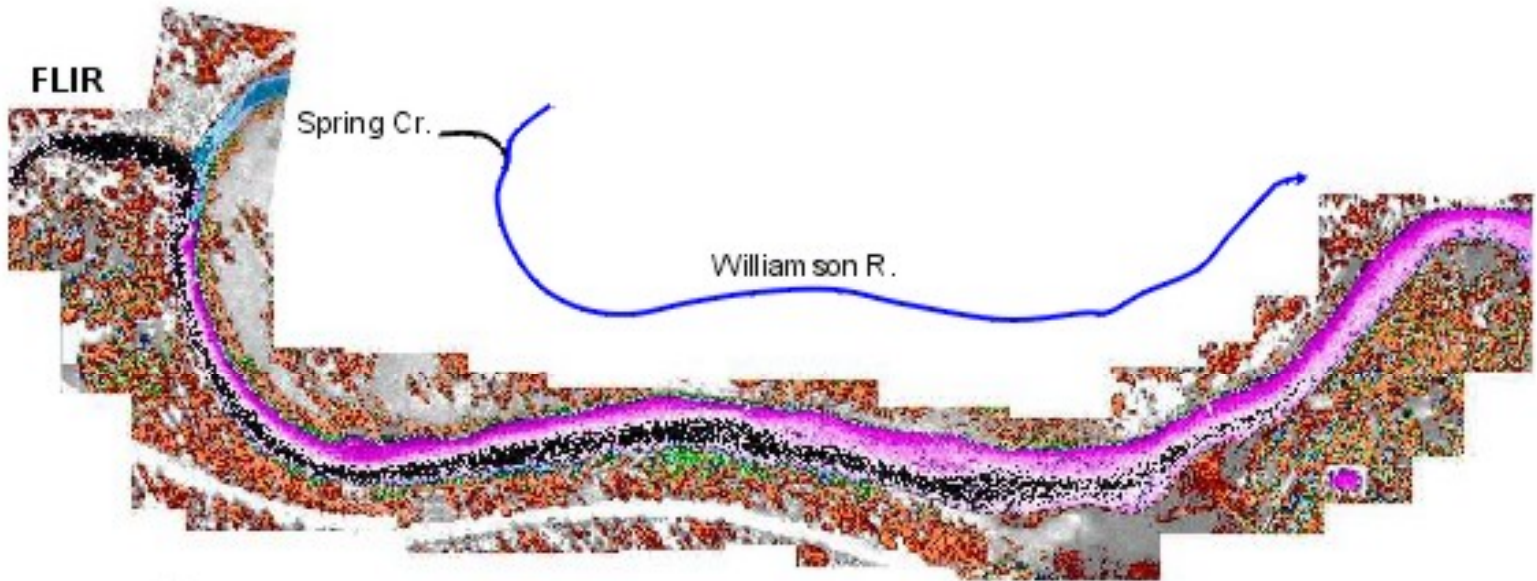


FLIR Derived Temperature (°F)



Lower Williamson River - Confluence of Spring Creek and Williamson River River Miles 16.67 to 15.40

Q_{up} : 67.9 cfs
 T_{up} : 66.0°F
 Q_{in} : 183.0 cfs
 T_{in} : 48.2°F
 Q_{mix} : 250.9 cfs
 T_{mix} : 64.9°F

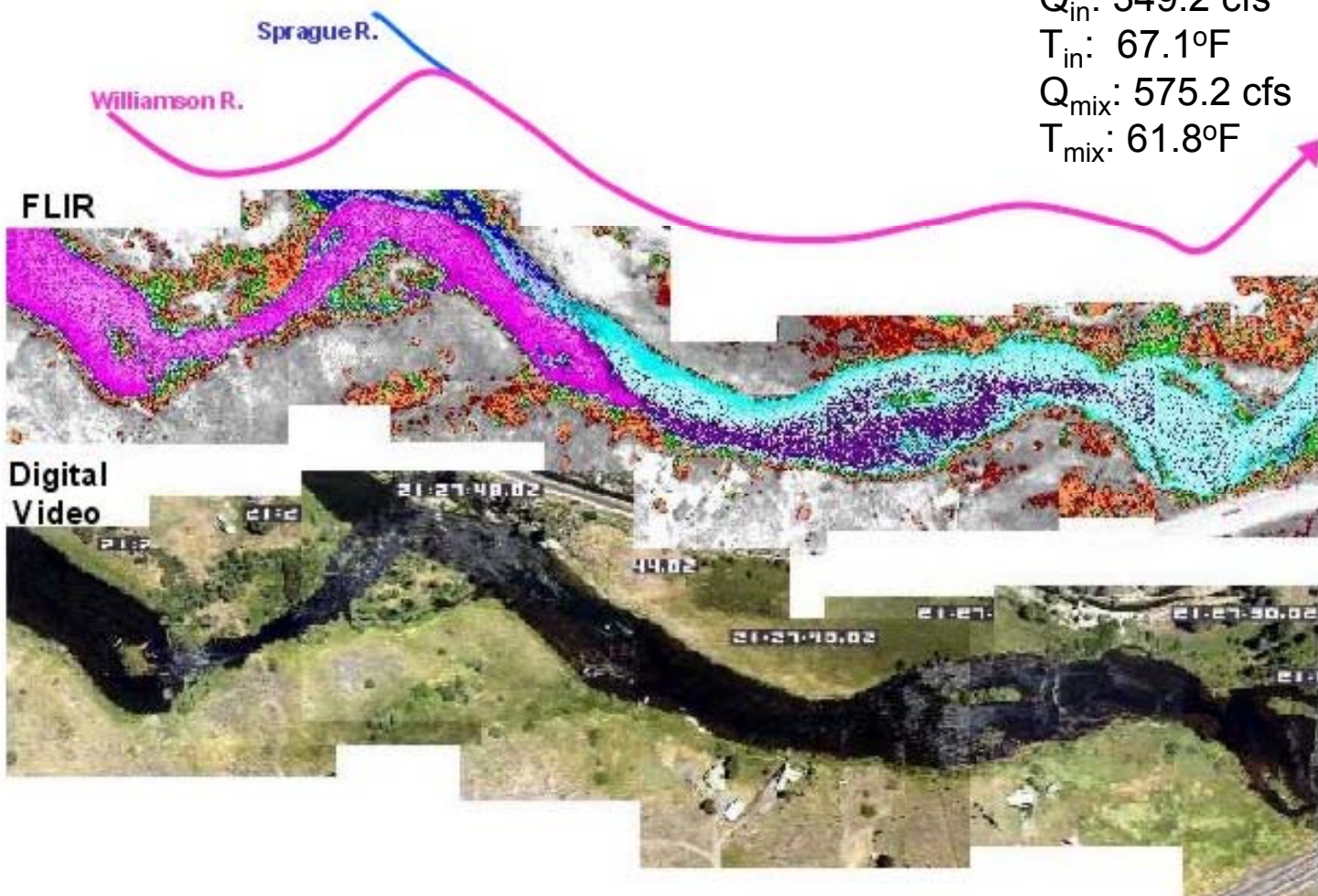


FLIR Derived Temperature (°F)

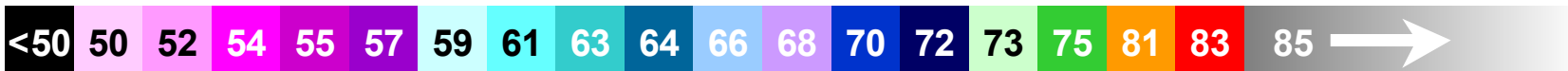


Lower Williamson River - Confluence of Sprague River and Williamson River River Miles 11.38 to 10.41

Q_{up} : 226.0 cfs
 T_{up} : 53.6°F
 Q_{in} : 349.2 cfs
 T_{in} : 67.1°F
 Q_{mix} : 575.2 cfs
 T_{mix} : 61.8°F



FLIR Derived Temperature (°F)



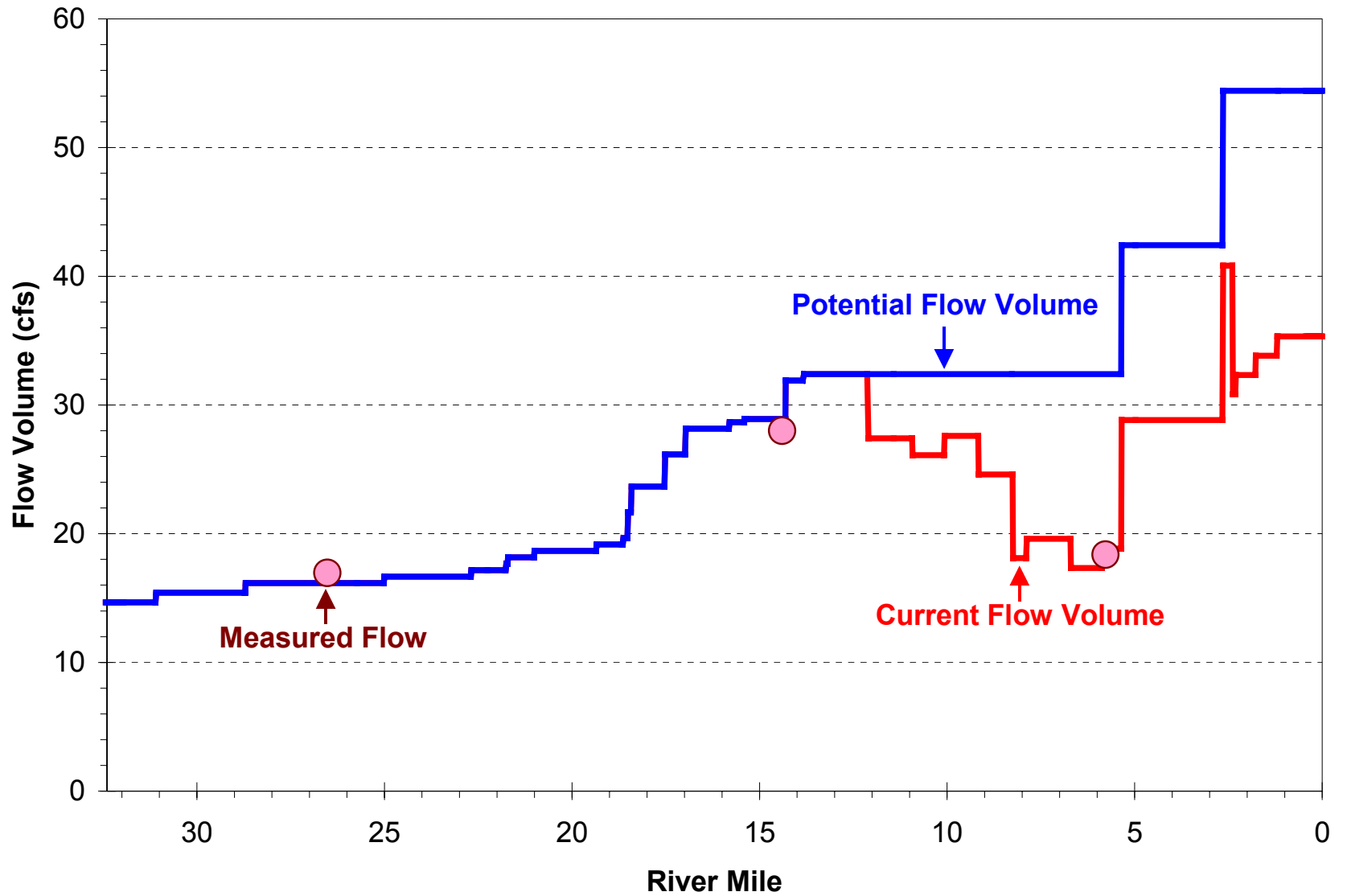
Overview of the Upper Klamath Lake Drainage Hydrology Analysis

Results

Williamson River

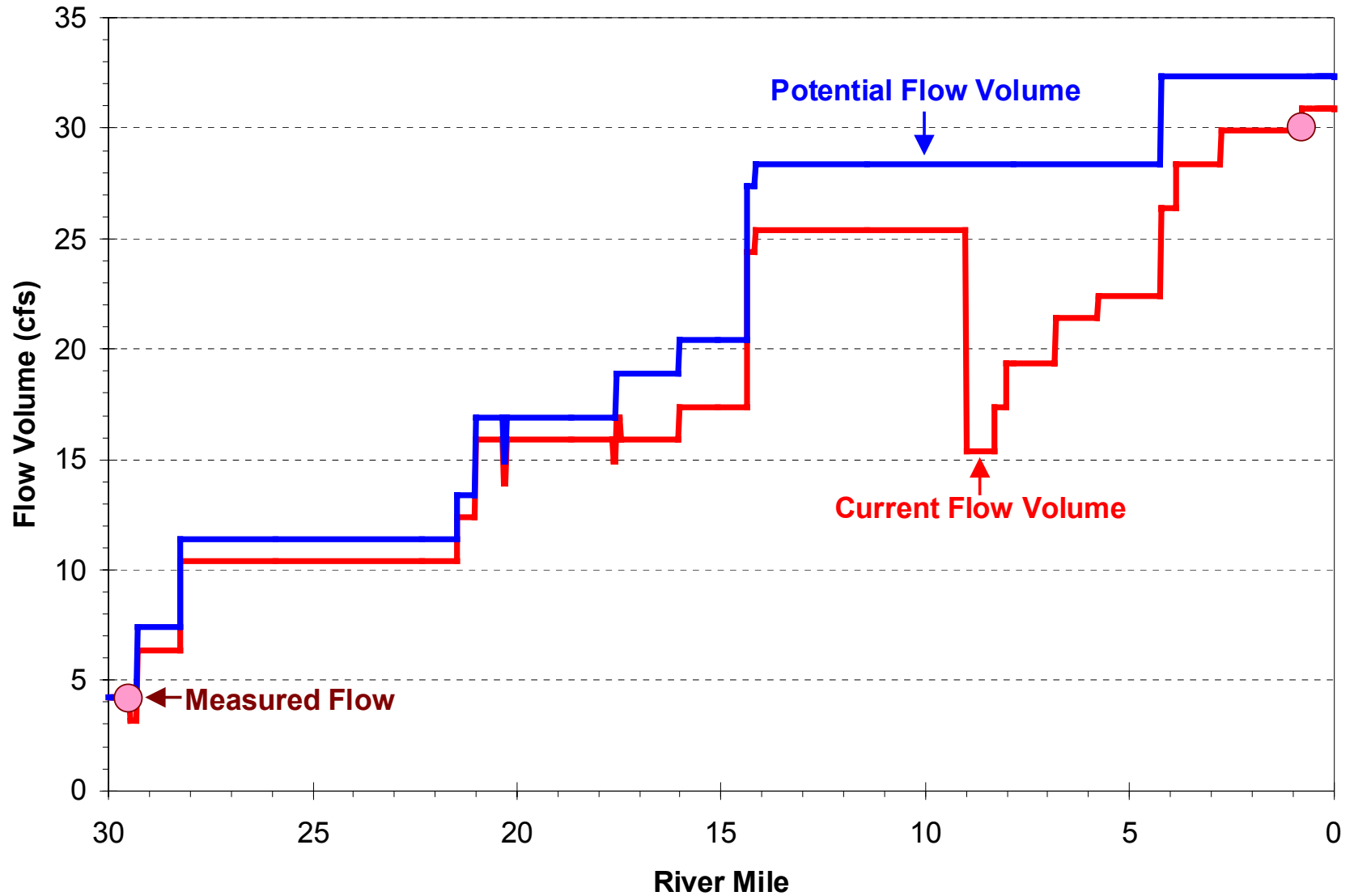
North Fork Sprague River Derived Mass Balance

Current Condition and Potential Condition



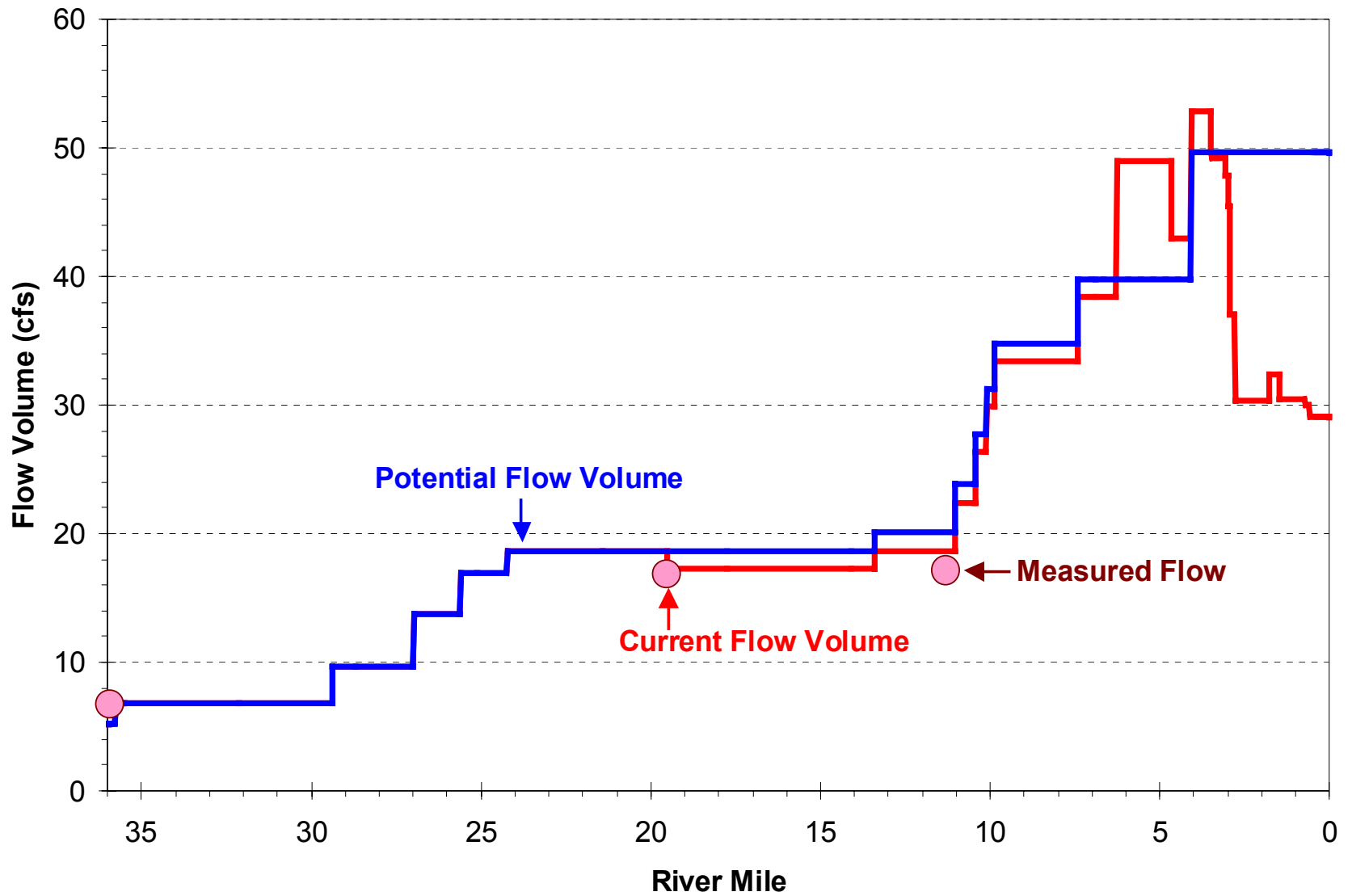
South Fork Sprague River Derived Mass Balance

Current Condition and Potential Condition



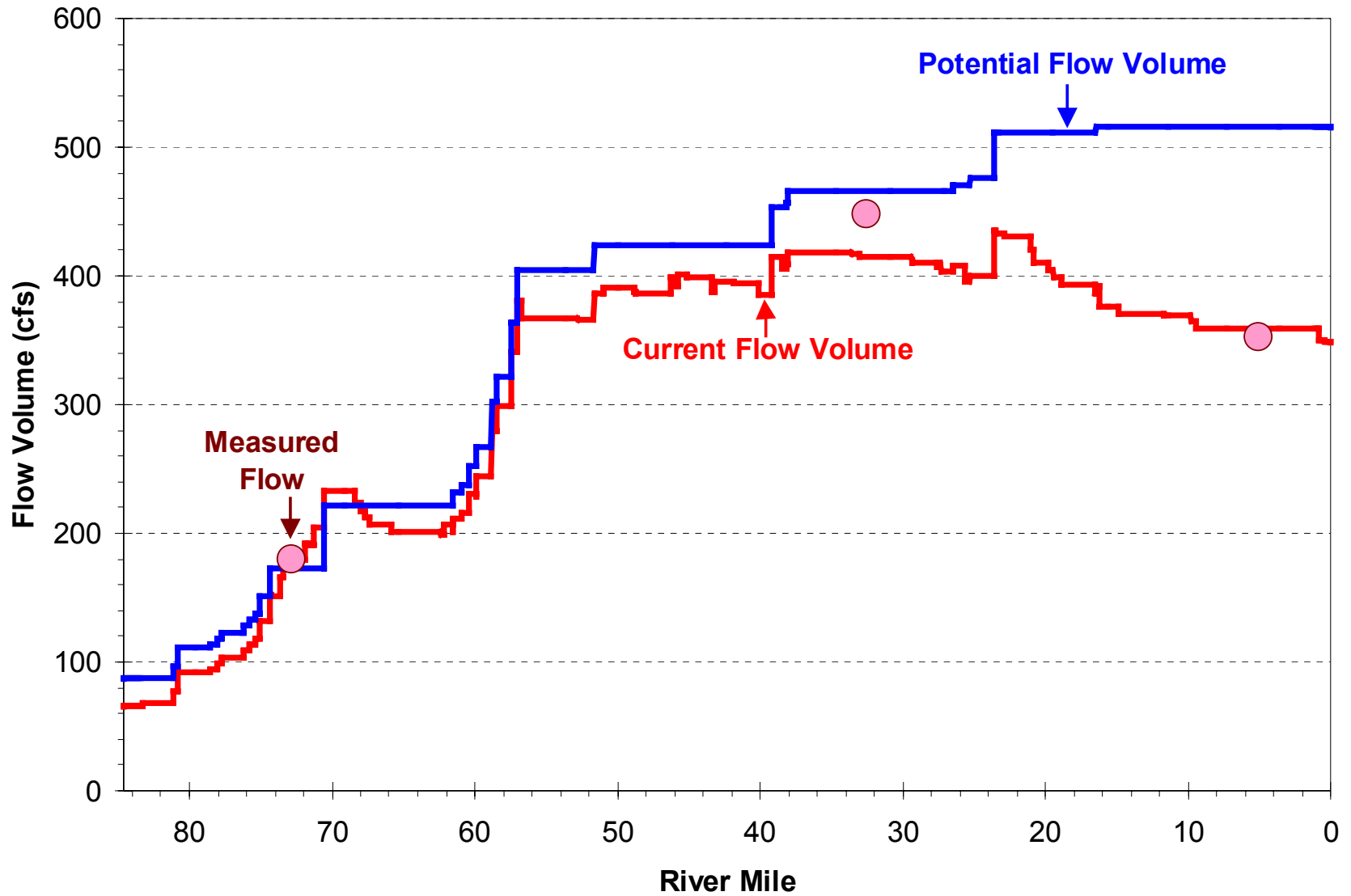
Sycan River Derived Mass Balance

Current Condition and Potential Condition



Sprague River Derived Mass Balance

Current Condition and Potential Condition



Williamson River Derived Mass Balance

Current Condition and Potential Condition

