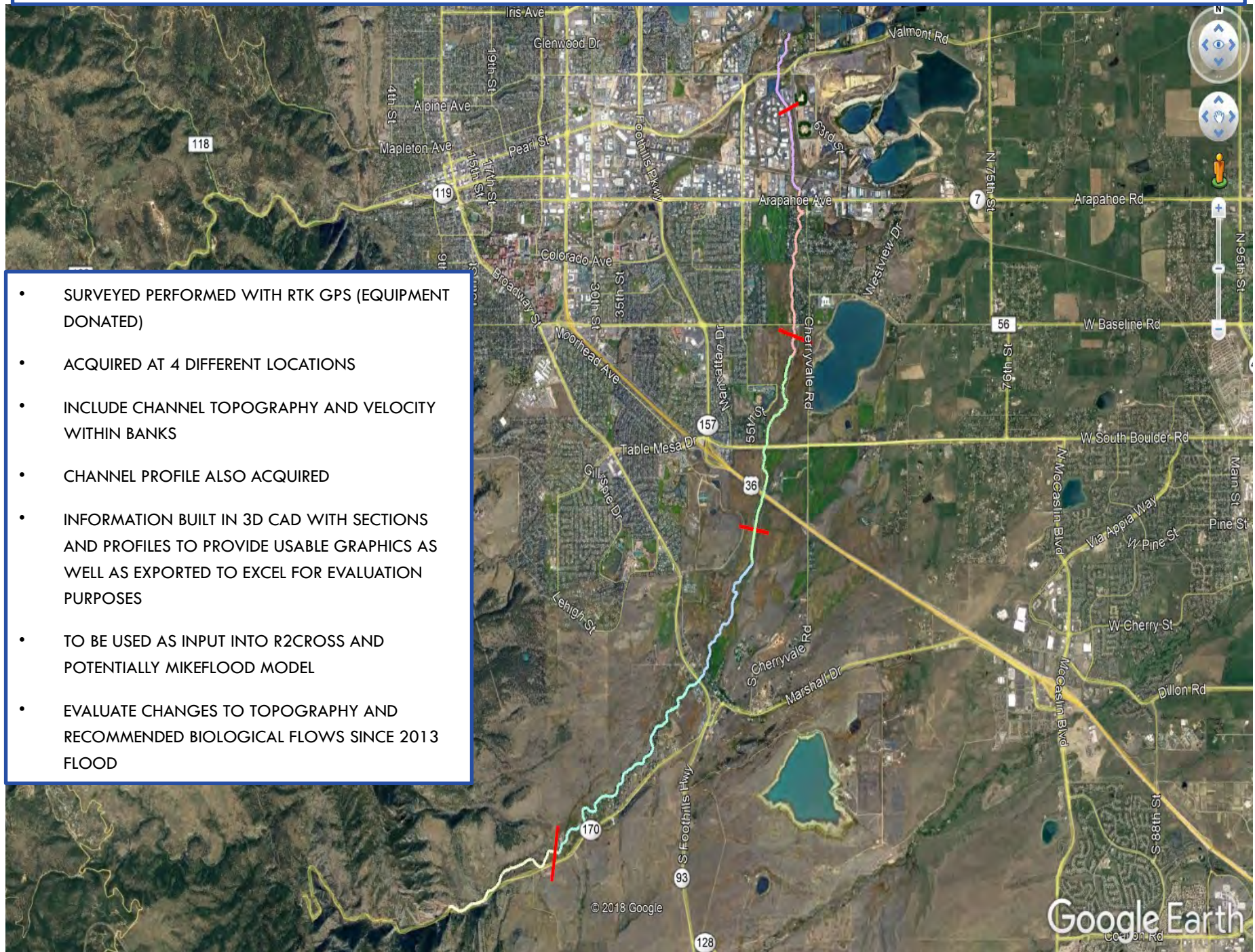


**COLORADO TROUT UNLIMITED AND BOULDER FLYCASTERS  
SOUTH BOULDER CREEK STREAM MANAGEMENT PLAN PHASE I  
FINAL REPORT**

**E: CROSS SECTION SURVEY LOCATIONS MAP**



- SURVEY PERFORMED WITH RTK GPS (EQUIPMENT DONATED)
- ACQUIRED AT 4 DIFFERENT LOCATIONS
- INCLUDE CHANNEL TOPOGRAPHY AND VELOCITY WITHIN BANKS
- CHANNEL PROFILE ALSO ACQUIRED
- INFORMATION BUILT IN 3D CAD WITH SECTIONS AND PROFILES TO PROVIDE USABLE GRAPHICS AS WELL AS EXPORTED TO EXCEL FOR EVALUATION PURPOSES
- TO BE USED AS INPUT INTO R2CROSS AND POTENTIALLY MIKEFLOOD MODEL
- EVALUATE CHANGES TO TOPOGRAPHY AND RECOMMENDED BIOLOGICAL FLOWS SINCE 2013 FLOOD

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**E: Flow Assessment**

**Overview**

Minimum flows necessary to support fish populations have been evaluated using R2Cross methods several different times over the last 40 years. Examples of these efforts include CDOW’s work that led to in-stream flow recommendations in 1980 and Hydrosphere’s 1994 re-analysis of the CDOW data along with newer information from a 1992 study. As part of Phase I of the South Boulder Creek Stream Management Plan (SBC SMP), there was interest in checking how those past results might compare to more recent conditions, particularly considering that the channel experienced a significant flood event in 2013. This analysis was meant to be a check on past results, not a re-analysis to update or replace past results.

**Methods**

During the spring of 2019, the consultant team for the SBC SMP performed cross sectional surveys at four locations along South Boulder Creek using RTK GPS equipment with sub-centimeter accuracy and a USGS wading rod with velocimeter. This information provided the cross-sectional area and velocity to allow calculation of the flow rate on that day for each cross-section location. The team also surveyed the channel’s profile. The USGS wading rod and velocimeter data were entered and evaluated in Excel, and cross sections and profiles developed in a computer-aided drafting program. Following previous studies, the lowest flow to meet two of the parameters (depth, wetted perimeter, and velocity) was considered the winter minimum while the lowest flow to meet three of the parameters was considered the summer minimum. We grouped results by location, with South Boulder Road forming the border for the upper and lower reaches, as defined in the earlier studies. In developing findings we are comparing measurements to CDOW established criteria for depth, wetted perimeter, and velocity.

**Results**

The table below, provided by the City of Boulder, compares past studies. We added the bottom row showing results from the SMP. Considering the potential variability possible with R2Cross, particularly regarding the selection of a representative critical riffle, which sets the channel geometry and bank-full top width (the big drivers of the model), the estimated flows from the different studies are similar. In particular, the R2Cross results that we completed as part of this SMP fall within the range already established by past efforts."

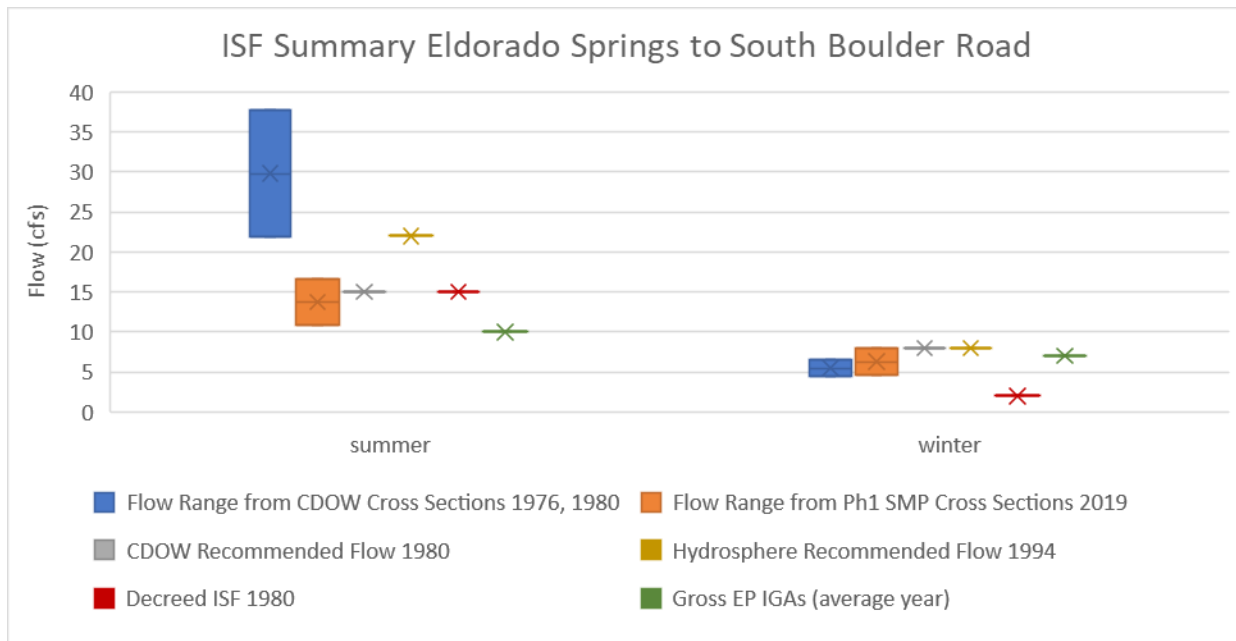
Stream Flow Studies, Recommendations and Targets <i>(see notes below; all values in cfs)</i>		SUMMER (May – Sept)		WINTER (Oct – Apr)	
		UPPER	LOWER	UPPER	LOWER
(1)	Range of instream flows indicated by CDOW R2 Cross studies.	22 - 38	1.6 - 5.8	4.5 - 6.3	1.5 - 2.5
(2)	1982 CDOW Instream Flow Recommendations	15	NA	8	NA
(3)	1992 Preliminary CDOW Minimum Flow Recommendations	17	4	9	2
(4)	CWCB Instream Flow Right	15	NA	2	NA
(5)	Gross Environmental Pool IGA average year target flows	10	4	7	2.5
(6)	2019 SMP Phase I R2 Cross Assessment	10.9 - 16.6	2.3	4.6 - 8.0	2.0

**Colorado Trout Unlimited and Boulder Flycasters  
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*Notes for Table:*

- (1) Results of CDOW R2 Cross analysis of South Boulder Creek at two Upper Reach locations: the Dunn Property (1976), and 200 yards above South Boulder Road (1980); and two Lower Reach locations: below South Boulder Road (1980), and 200 yards upstream of Baseline Road (1980). Summer flows meet all three CDOW-established criteria of average depth, wetted perimeter and average velocity. Winter flows meet two of the three criteria.
- (2) South Boulder Creek Stream Flow Report by Rex Taliaferro, November 10, 1982. These were the CDOW's flow recommendations to the CWCB in support of the CWCB's ISF appropriation in Case No. 80CW379. Flow recommendations were refined based on physical water availability.
- (3) Preliminary minimum instream flow recommendations provided by Jay Skinner and Greg Policky to Robert Weaver on April 2, 1992 as input to the South Boulder Creek Instream Flow Enhancement Study, prepared by Hydrosphere Resource Consultant. Inc., June 29, 1994.
- (4) CWCB appropriated instream flow rights for South Boulder Creek between Gross Dam and South Boulder Road, Case No. 80CW379. The 2 cfs ISF right during the winter season was due to limited water availability. Further, this ISF right is very junior and not administered. The ISF right does offer protection from future water rights development, and if it were to be administered in the future, it would offer protection.
- (5) 2010 IGA Gross Environmental Pool target flows.
- (6) New results estimated from cross sections measured during the summer of 2019 as part of the South Boulder Creek Stream Management Plan (Phase I) by Biohabitats, Wright Water Engineers, and GEI Consultants.

The graph below shows results for the upper reach. The largest scatter is in the summer flows ranging from 10 to 38 cfs. The values estimated for the lower reach (not shown) were even closer to one another.



**Conclusion**

These results suggest that current creek conditions indicate similar low-flow ranges as past work used to inform flow targets in the 2010 IGAs between Denver, Boulder and Lafayette.