**Free software available for transportation & Fish Passage Design**

**Hydrological modeling Software**

1. **Flow Analysis with Stream Gage Data**
* Flood Frequency Analysis Software
	+ USGS PeakFQ: <https://water.usgs.gov/software/PeakFQ/>
	+ USACE HEC-SSP: <https://www.hec.usace.army.mil/software/hec-ssp/>
* Percent Exceedance Flow Analysis Software
	+ Microsoft Excel – Flow Duration Curve Analysis

(see Appendix IX-C from CDFW’S *California Salmonid Stream Habitat Restoration Manual, Fourth Edition* for an example of fish passage flow calculations)

* Online sites providing peak flow discharges and average daily stream flows at stream gages
	+ USGS Surface-Water Data for California: <https://waterdata.usgs.gov/ca/nwis/sw>
	+ CA Department of Water Resource’s California Data Exchange Center (CDEC): <http://cdec.water.ca.gov/cdecstation2/>
1. **Flow Analysis without Stream Gage Data**
* Regional Regression Analysis Software
	+ USGS StreamStats: <https://streamstats.usgs.gov/ss/>
	+ USGS – “Methods for Determining Magnitude and Frequency of Floods in California, Based on Data through Water Year 2006”: <https://pubs.usgs.gov/sir/2012/5113/>
1. **Precipitation-Runoff Hydrological Models**
	* Precipitation-Runoff Modeling Software
		+ USACE HEC-HMS: <https://www.hec.usace.army.mil/software/hec-hms/>
		+ NRCS WinTR-55 Small Water Hydrology: <https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/?cid=stelprdb1042901>
	* Meteorological Data – NOAA Atlas 14, Volume 6 for Point Precipitation Frequency Estimates for California: <https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ca>
2. **WMS – The Watershed Modeling System**
	* FHWA provides a free “pro” version of the license to all Caltrans employees. Contact Scott Hogan from FHWA at Scott.Hogan@dot.gov to request a license.
	* For everyone else there is a free “community” version that does not include advanced analysis and graphic features. Contact Aquaveo for this free version at <http://www.aquaveo.com/request-license?s=SMS&v=12.2>

**Hydraulic modeling Software**

1. **1-Dimensional Hydraulic Modeling Software**
	* FHWA HY-8 Culvert Hydraulic Analysis Program: <https://www.fhwa.dot.gov/engineering/hydraulics/software/hy8/>
	* USFS FishXing – Fish Passage Analysis through Culverts: <https://www.fs.fed.us/biology/nsaec/fishxing/>
	* FHWA Hydraulic Toolbox Program: <https://www.fhwa.dot.gov/engineering/hydraulics/software/toolbox404.cfm>
	* USACE HEC-RAS: <https://www.hec.usace.army.mil/software/hec-ras/>
2. **2-Dimensional Hydraulic Modeling Software**
	* SMS – The Surface-Water Modeling System with the Sedimentation and River Hydraulics 2-Dimensional Model (SRH-2D)
		+ FHWA provides a free “pro” version of the license to all Caltrans employees. Contact Scott Hogan from FHWA at Scott.Hogan@dot.gov to request a license.
		+ For everyone else there is a free “community” version that does not include advanced analysis and graphic features. Contact Aquaveo for this free version at <http://www.aquaveo.com/request-license?s=SMS&v=12.2>
	* USACE HEC-RAS 2D: <https://www.hec.usace.army.mil/software/hec-ras/>

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