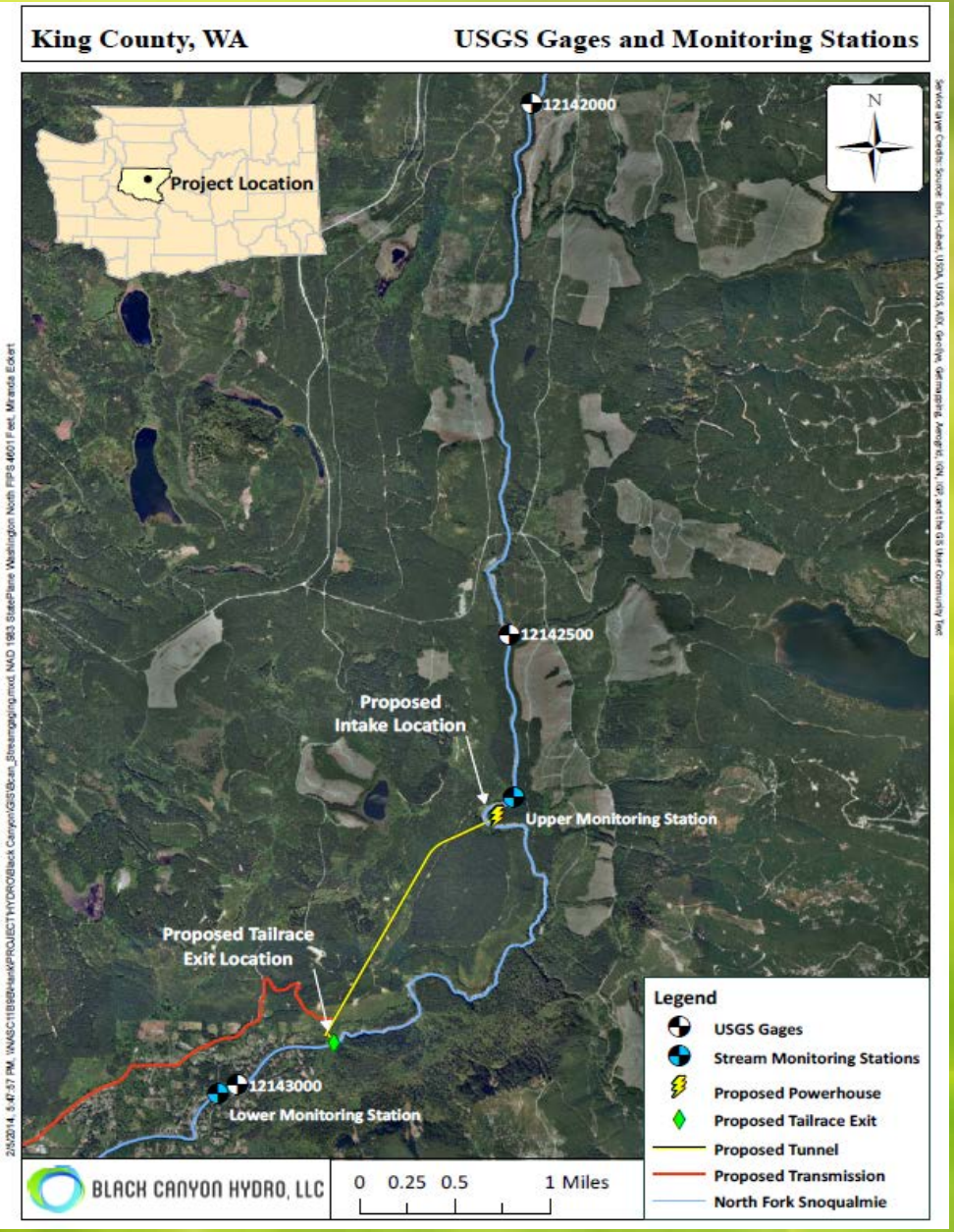
HYDROLOGY

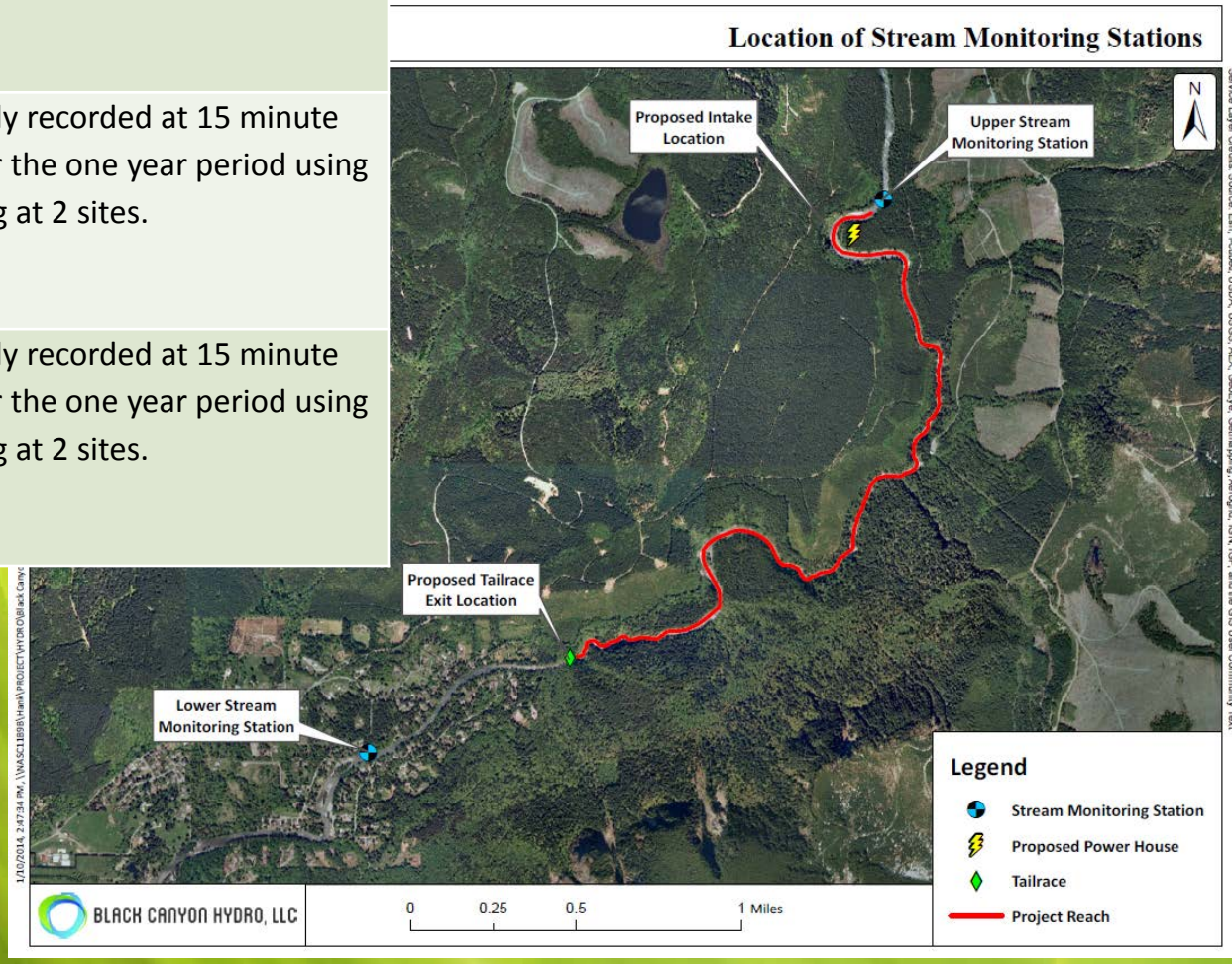
BLACK CANYON HYDROELECTRIC PROJECT

USGS Gauge Identifier	Period of Operation	Location
12142000	Discharge 10-1-1929 to Present Stage 08-10-1985 to Present	Lat: 47° 36' 54" Long:-121° 42' 44" Left bank 0.6 mi upstream of Calligan Creek at RM 9.2
12142500	Discharge 10-01-1913 to 9-30-1915	Lat:47° 34' 20" Long:-121° 42' 50" Approximately 600 feet upstream of confluence with Hancock Creek.
12143000	Discharge 08-01-1907 to 08-31-1971	Lat:47° 32' 15" Long:-121° 44' 26" Approximately 2 mi upstream of confluence with Snoqualmie River.



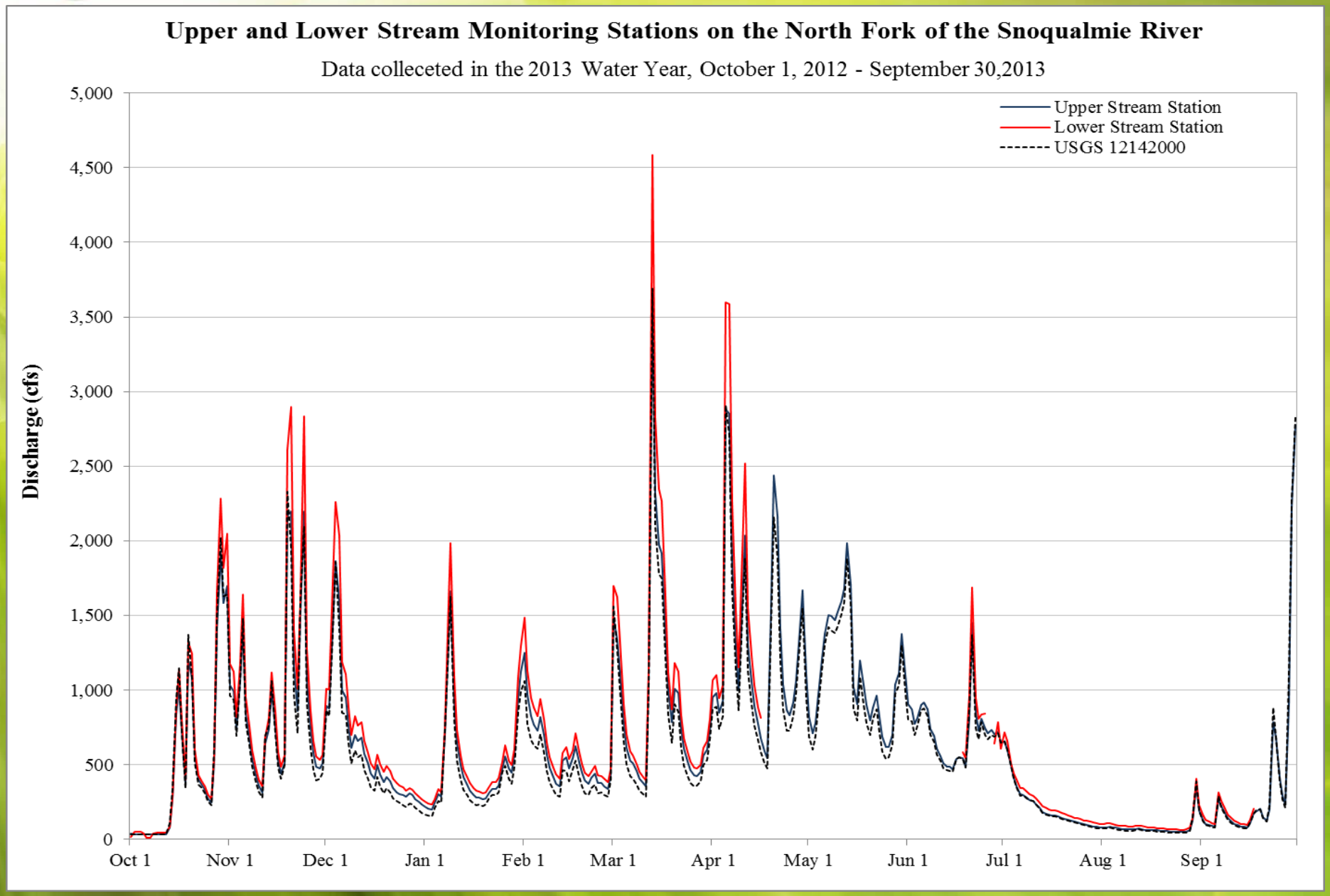
BCH GAGES

Parameters	Type	Sampling Technique
Stage (water depth)	Continuous	Continuously recorded at 15 minute intervals for the one year period using stage gaging at 2 sites.
Water Temperature	Continuous	Continuously recorded at 15 minute intervals for the one year period using stage gaging at 2 sites.
Air Temperature	Continuous	Continuously recorded at 15 minute intervals for the one year period using stage gaging at 2 sites.



STAGE, DISCHARGE, AND RATING CURVES

- Stage measurements are converted to discharge (flow) using relationships between stage and discharge known as rating curves
- To measure the discharge a RD Instruments Acoustic Doppler Current Profiler (ADCP) is mounted in a small craft and towed from one side of the river to the other on a tagline.

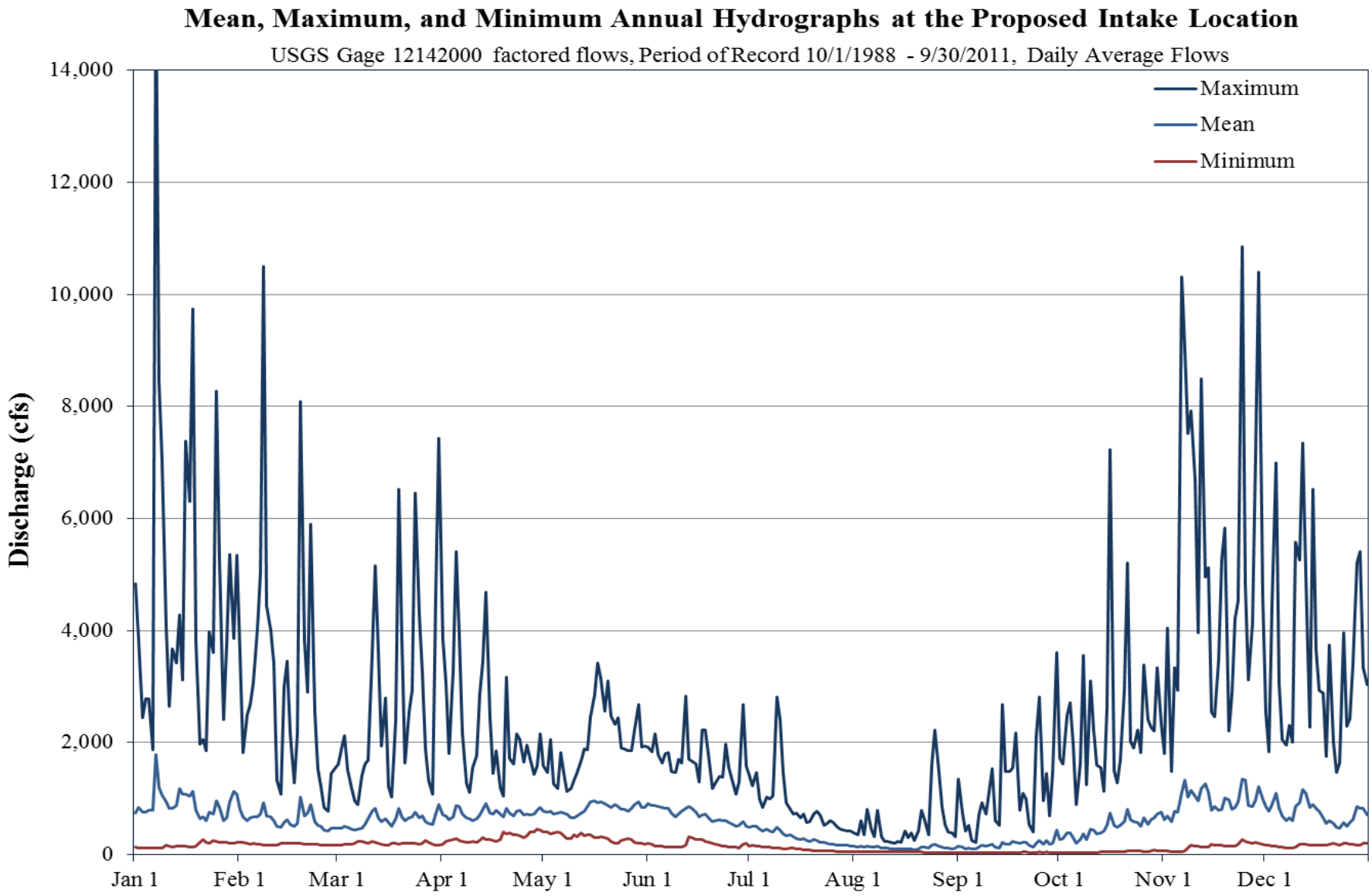

Upper and Lower Stream Monitoring Stations on the North Fork of the Snoqualmie River
Data colleceted in the 2013 Water Year, October 1, 2012 - September 30,2013
Discharge (cfs)
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Oct 1
Nov 1
Dec 1
Jan 1
Feb 1
Mar 1
Apr 1
May 1
Jun 1
Jul 1
Aug 1
Sep 1
Upper Stream Station
Lower Stream Station
USGS 12142000

DATA ANALYSIS

- Hydrology for the intake was synthesized by scaling data from the USGS 12142000 gage. A daily scale factor was developed by comparing daily flows from the BCH upper gage installed at the intake with the USGS 12142000 gauge data.

- Annual and monthly flow duration curves were prepared using the standard error method applied to the scaled hydrology.

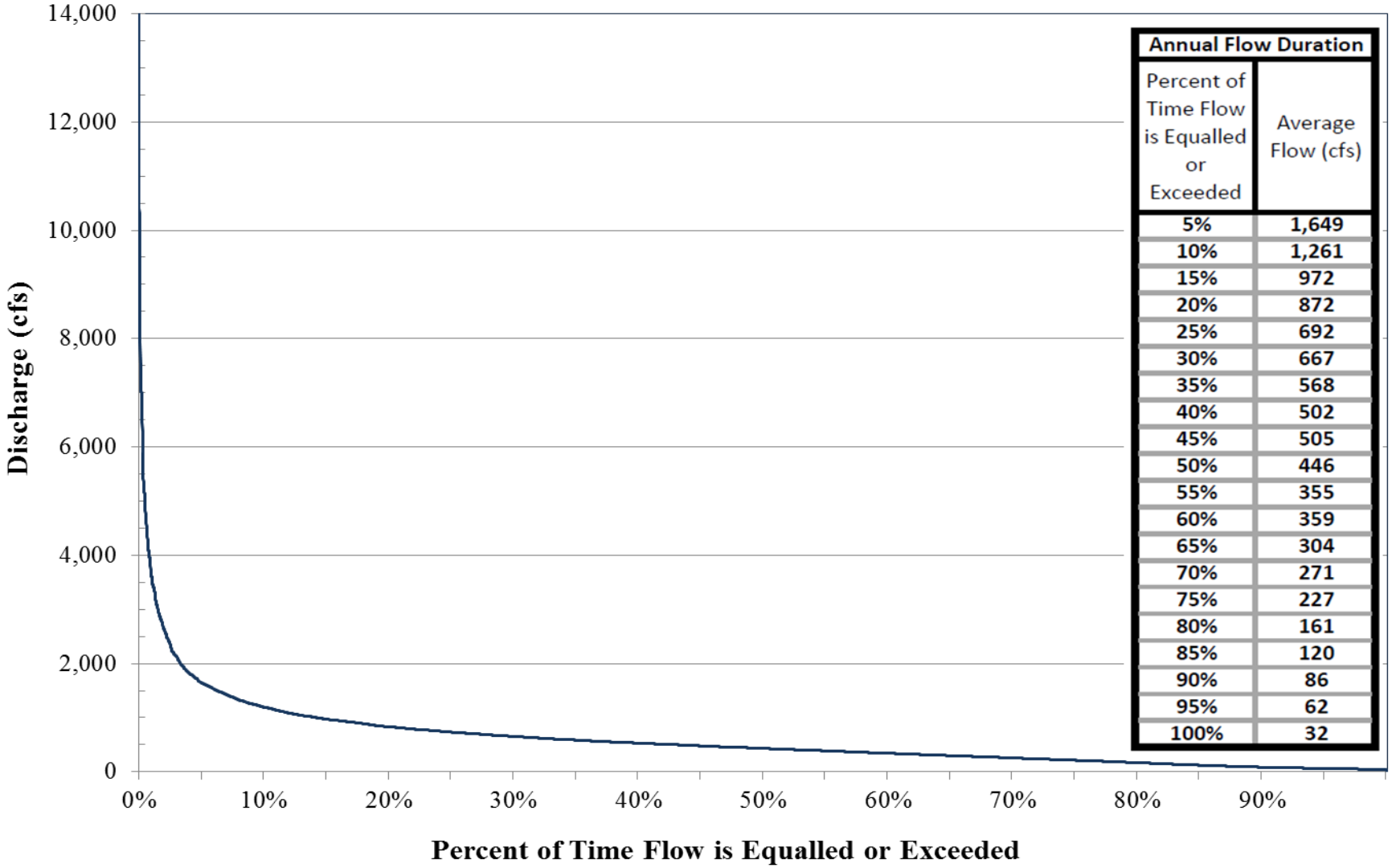
- Extreme events were calculated using the Log Pearson Type III probability density function as specified in the USGS Bulletin 17B. Extreme events were calculated with peak discharge statistics from the USGS 12142000 gauge.


Mean, Maximum, and Minimum Annual Hydrographs at the Proposed Intake Location
USGS Gage 12142000 factored flows, Period of Record 10/1/1988 - 9/30/2011, Daily Average Flows
Maximum
Mean
Minimum
Discharge (cfs)
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Jan 1
Feb 1
Mar 1
Apr 1
May 1
Jun 1
Jul 1
Aug 1
Sep 1
Oct 1
Nov 1
Dec 1

BLACK CANYON HYDROELECTRIC PROJECT

Annual Flow Duration Curve for Black Canyon Hydro Proposed Intake Location

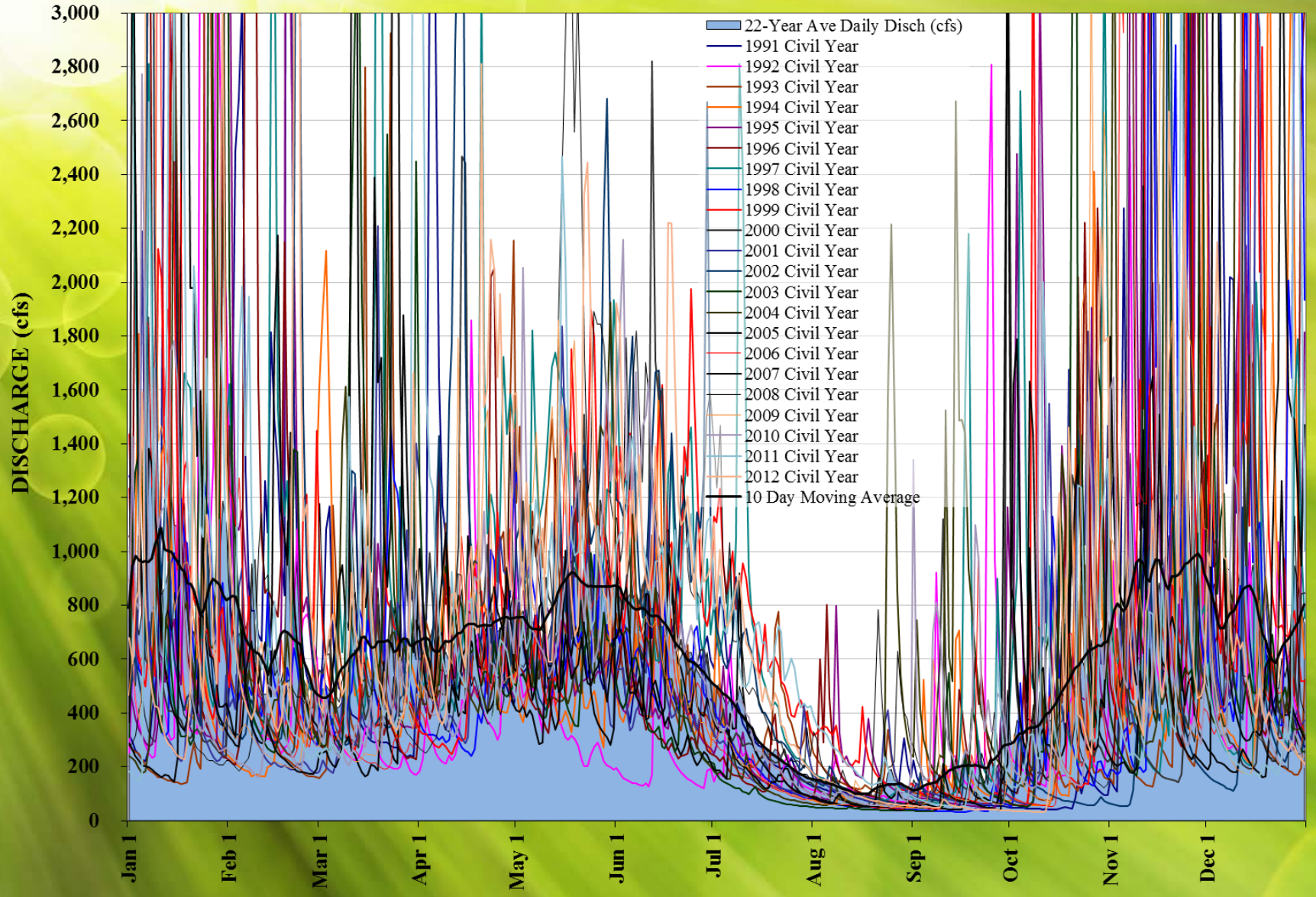
Factored flows from USGS 12142000 NF Snoqualmie River Near Snoqualmie Falls, WA - Water Years 1988 - 2013



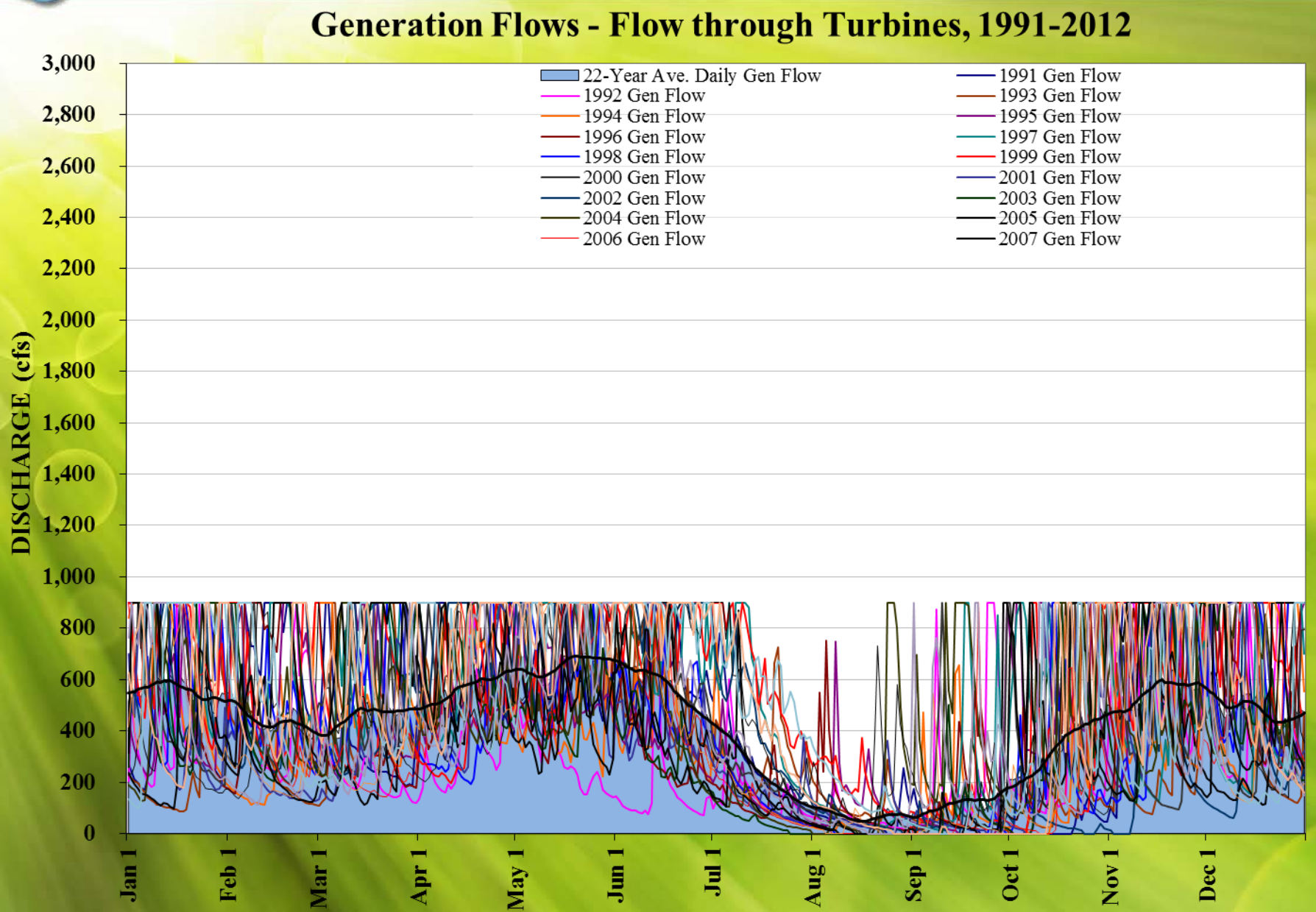
Annual Flow Duration	
Percent of Time Flow is Equalled or Exceeded	Average Flow (cfs)
5%	1,649
10%	1,261
15%	972
20%	872
25%	692
30%	667
35%	568
40%	502
45%	505
50%	446
55%	355
60%	359
65%	304
70%	271
75%	227
80%	161
85%	120
90%	86
95%	62
100%	32

BLACK CANYON HYDROELECTRIC PROJECT

Black Canyon Intake, North Fork Snoqualmie River Historic Discharge 1991-2012



BLACK CANYON HYDROELECTRIC PROJECT



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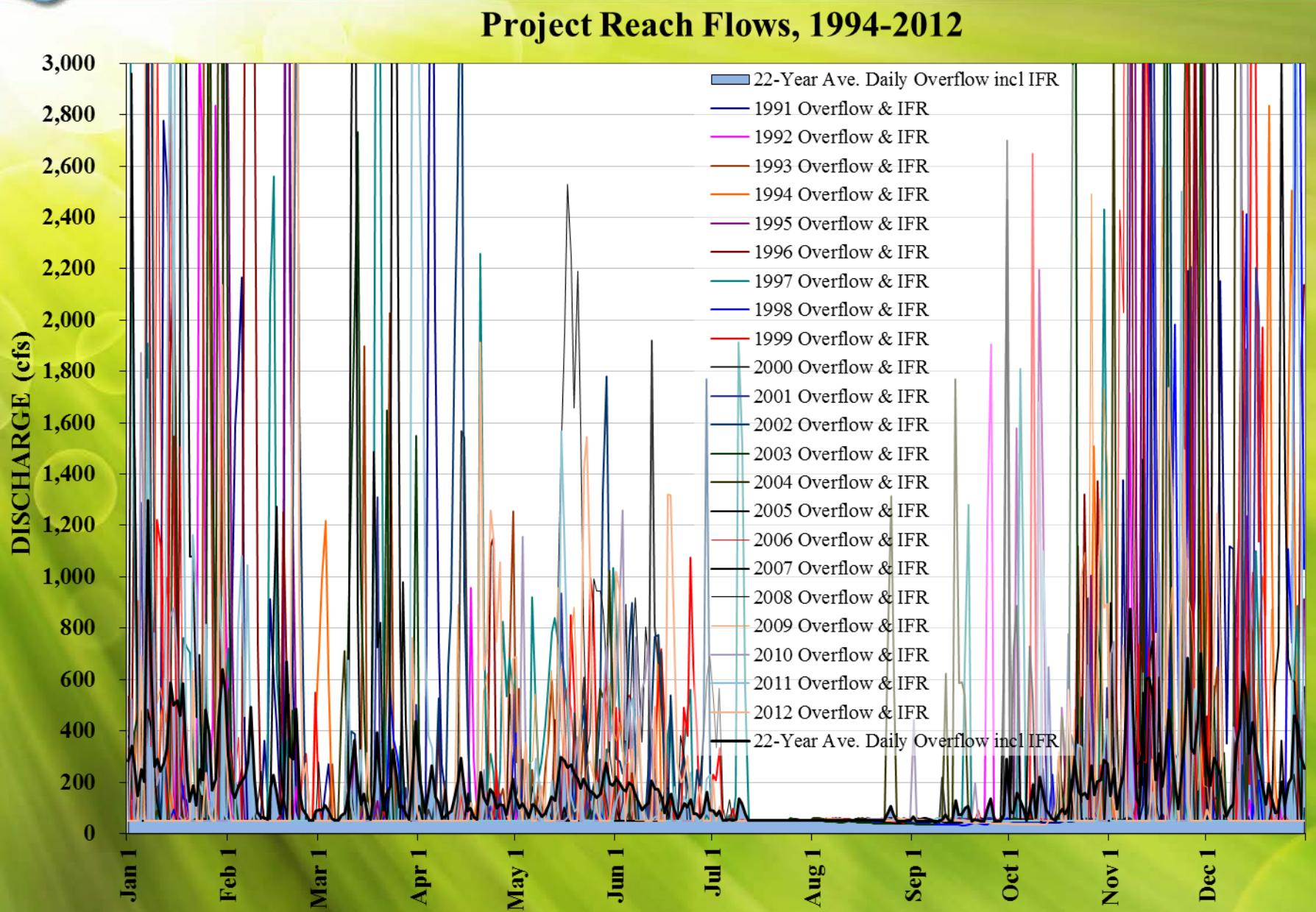
BLACK CANYON HYDROELECTRIC PROJECT



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