



A Brief Consideration of Some Ecological Flow Regimes, Water Supply Systems, and Planning:

The “Big River” Watershed Scenario

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EFlow Science Advisory Board Meeting
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Rocky River, Siler City site - Percentage (weighted equally for each season) of Guilds/Species with Less Than 80% of Unregulated Index B Value

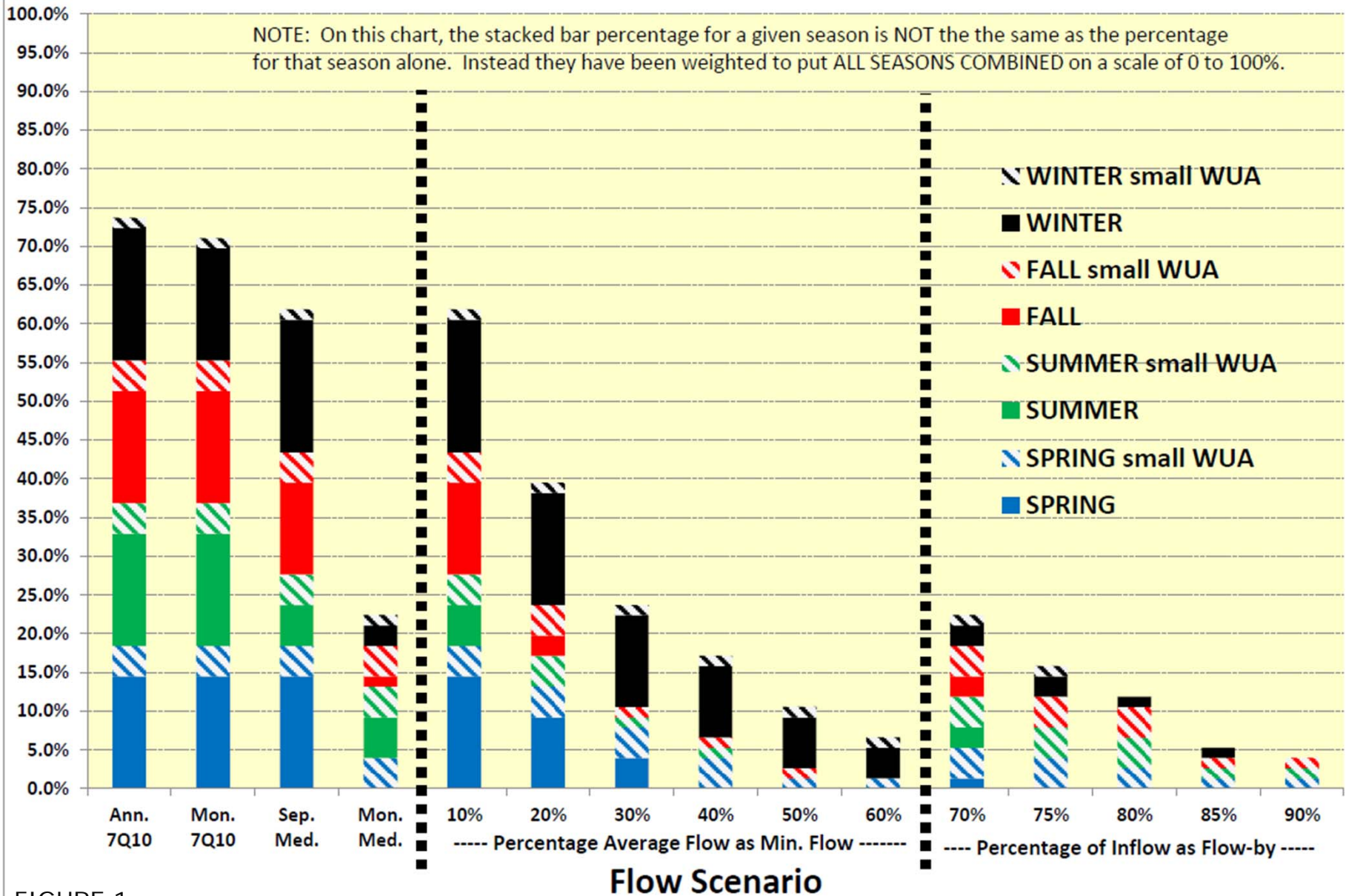


FIGURE 1

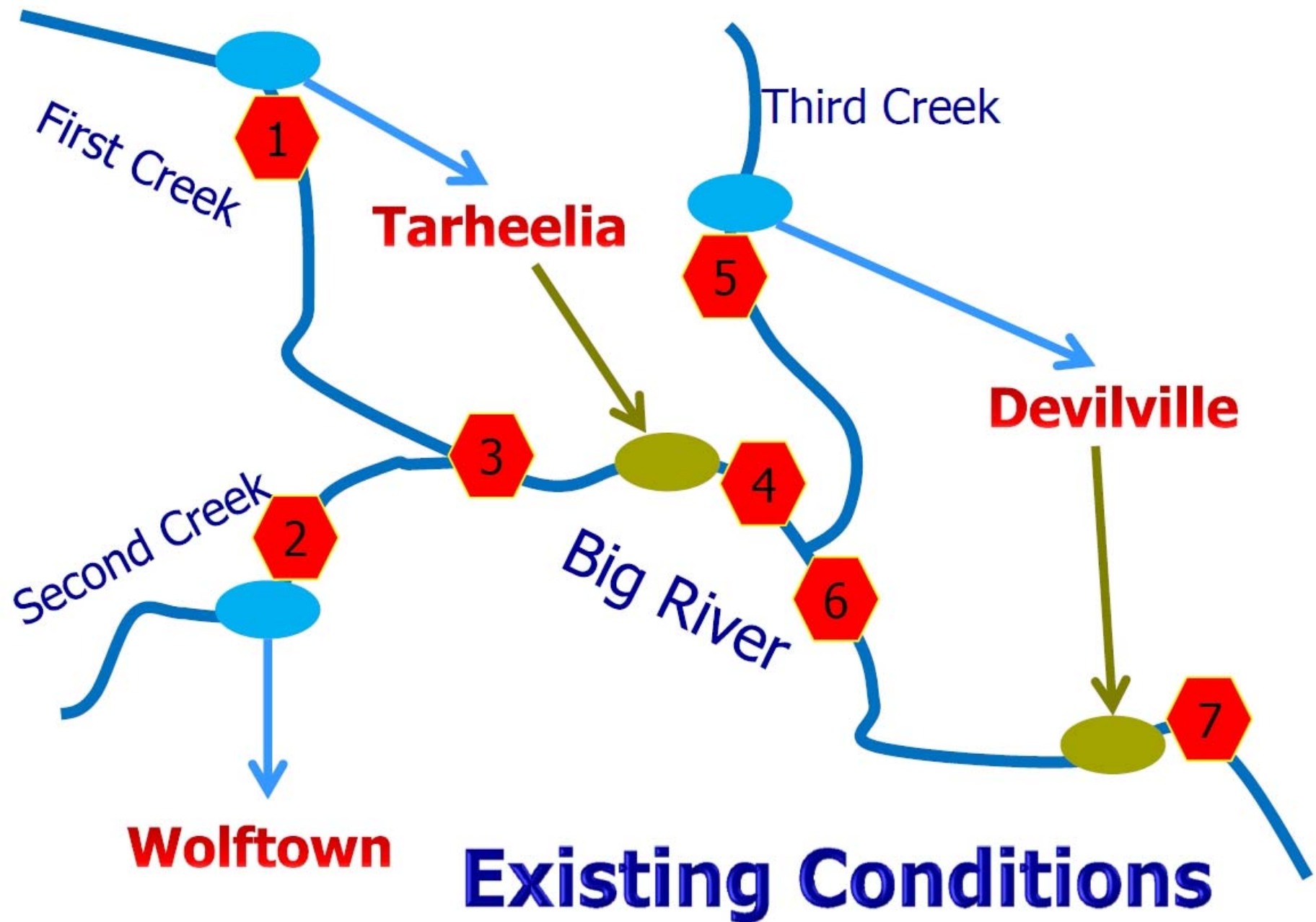


FIGURE 2

Scenario	“Tarheelia”	“Wolftown”	“Devilville”
Present Demand (Vol. Equivalent to 20% 7Q10)	3.6 cfs (2.3 mgd)	2.8 cfs (1.8 mgd)	2.0 cfs (1.2 mgd)
50-YR Demand	15.5 cfs (10 mgd)	12.3 cfs (7.9 mgd)	6.0 cfs (3.8 mgd)
Present Wastewater Return (86%)	3.0 cfs (1.9 mgd)	0.0	1.7 cfs (1.0 mgd)
Future Wasterwater Return (86%)	13.3 cfs (8.5 mgd)	0.0	5.1 cfs (3.2 mgd)

TABLE 1

NODE	DA (mi²)	“EFLOW” Flow-By Regime
1	40	Monthly Median or Inflow, whichever’s less
2	92	60 Percent Annual Average or Inflow, whichever’s less
3	109	75 Percent Inflow
4	189	80 Percent Inflow
5	158	70 Percent Inflow
6	356	50 Percent Annual Average or Inflow, whichever’s less
7	366	85 Percent Inflow

TABLE 2

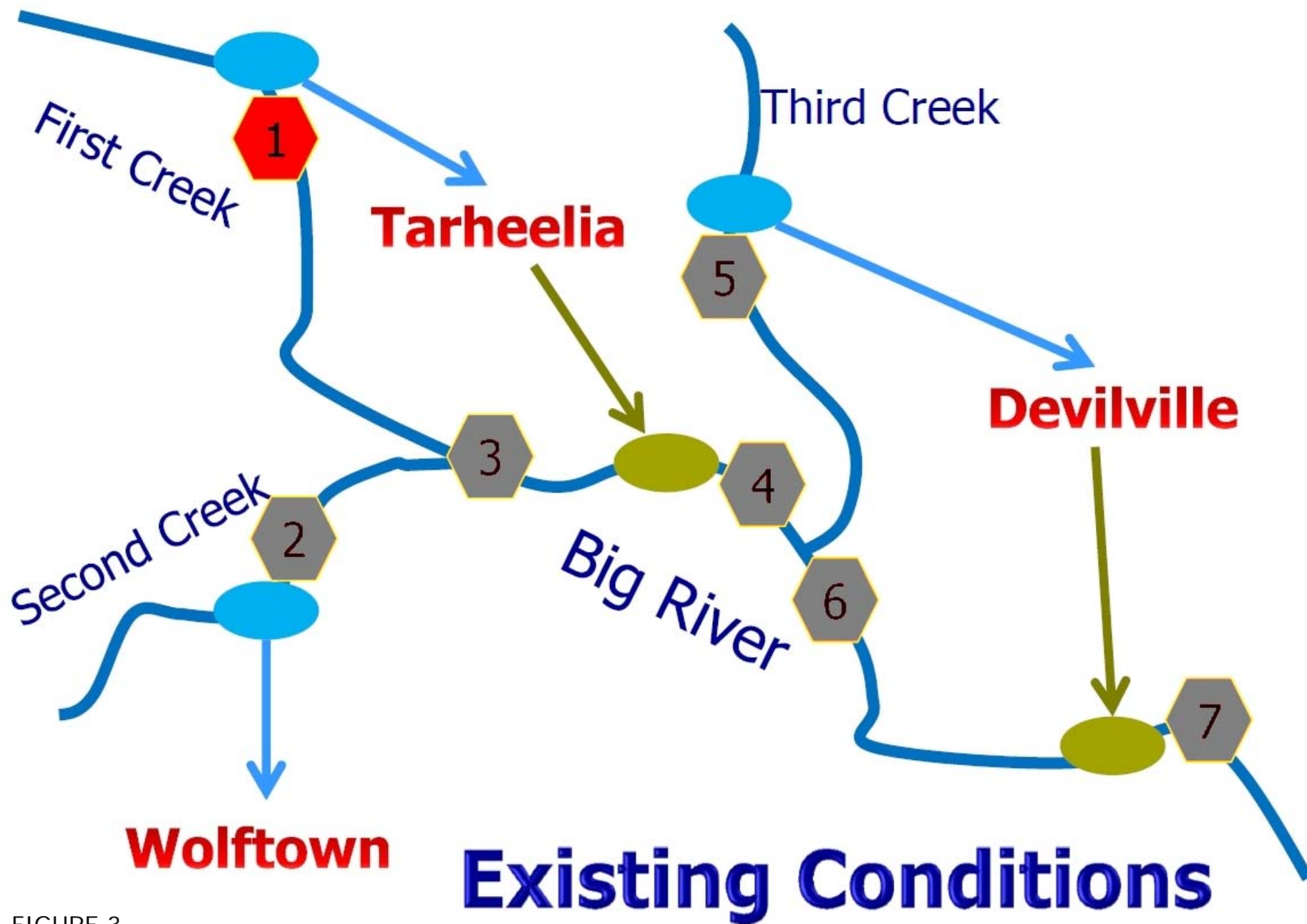


FIGURE 3

TOWN OF "TARHEELIA" FLOW REGIME, NODE 1, "FIRST CREEK"

"EFLOW" = LESSER OF MONTHLY MEDIAN, OR INFLOW (UNALTERED)
 PRESENT DEMAND = VOL. EQUIVALENT TO 20% 7Q10 = 3.6 CFS (2.3 MGD)
 FUTURE DEMAND = 50-YR PROJECTION = 15.5 CFS (10 MGD)

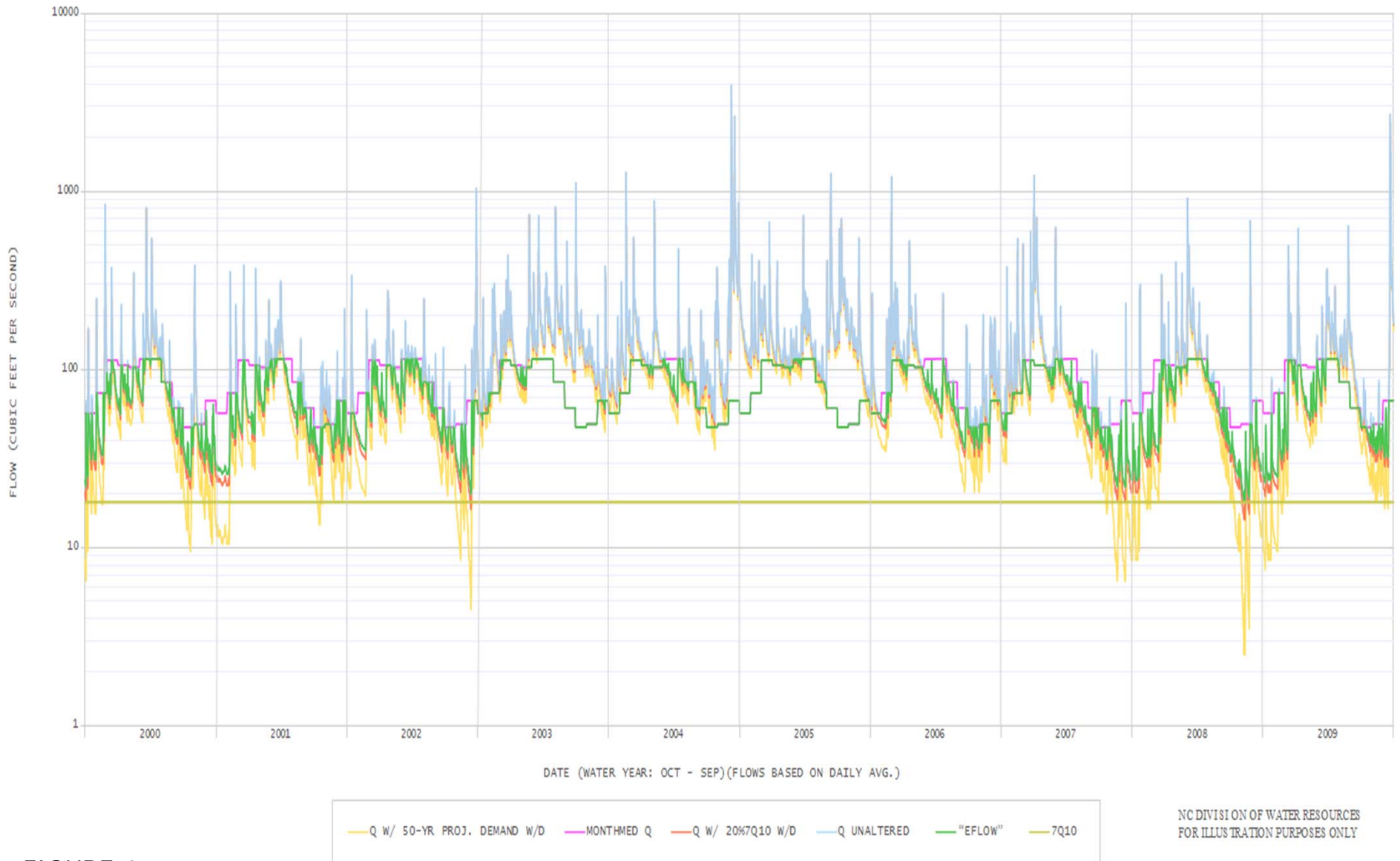


FIGURE 4

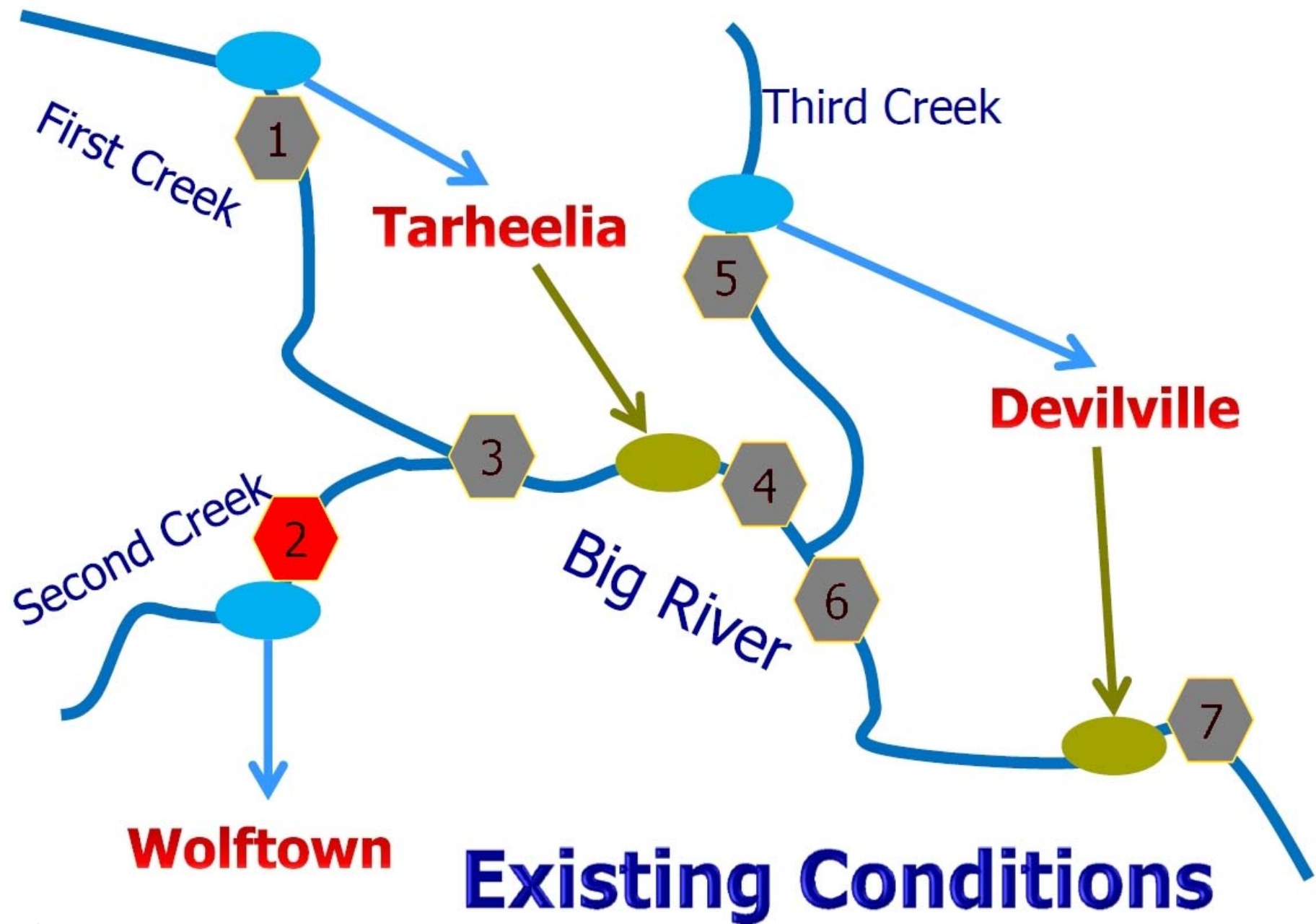
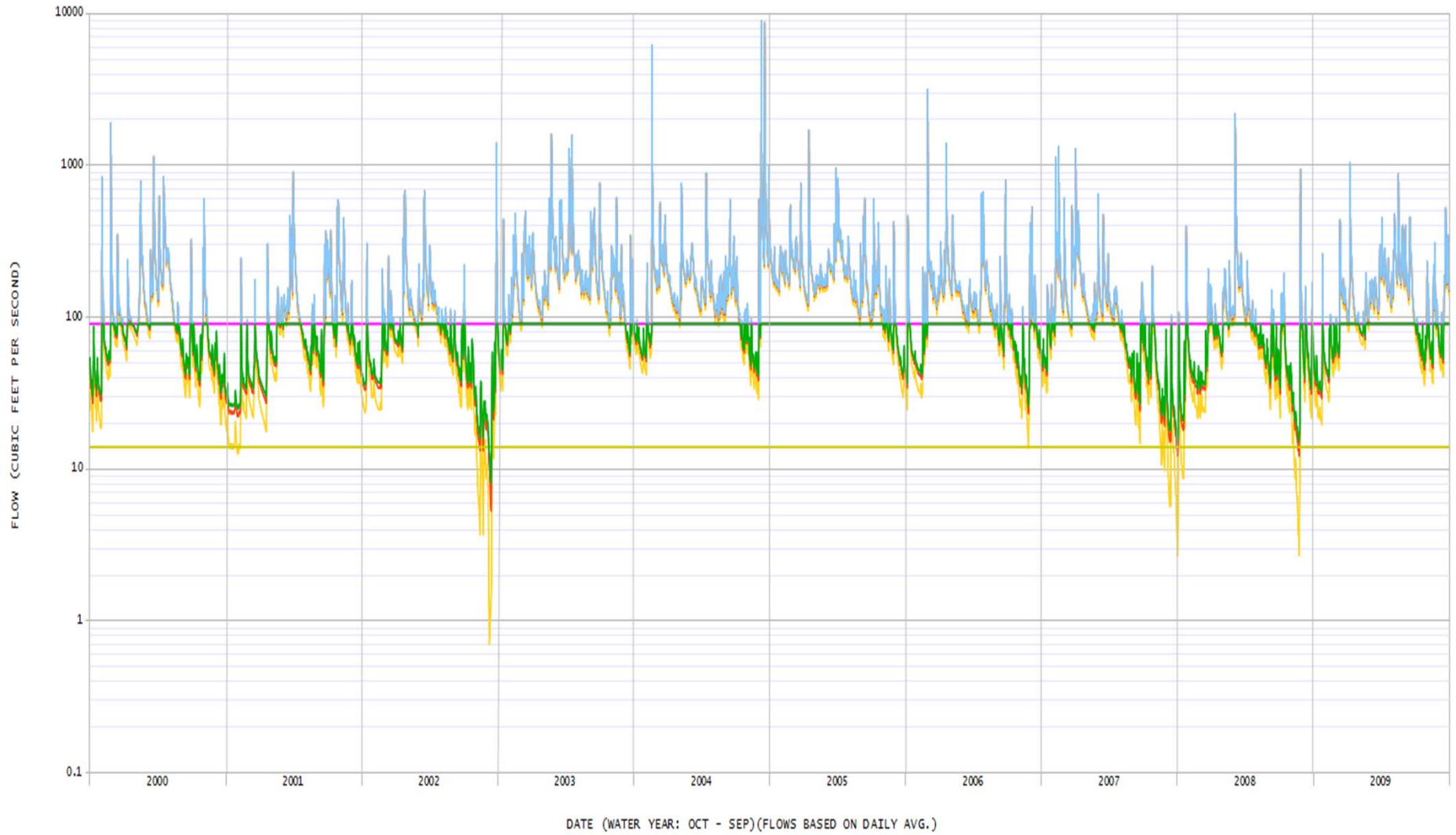


FIGURE 5

TOWN OF "WOLFTOWN" FLOW REGIME, NODE 2, "SECOND CREEK"

"EFLOW" = LESSER OF 60% OF YEAR AVG. FOR PERIOD, OR INFLOW (UNALTERED)
 PRESENT DEMAND = VOL. EQUIVALENT TO 20% 7Q10 = 2.8 CFS (1.8 MGD)
 FUTURE DEMAND = 50-YEAR PROJECTION = 12.3 CFS (7.9 MGD)



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FIGURE 6

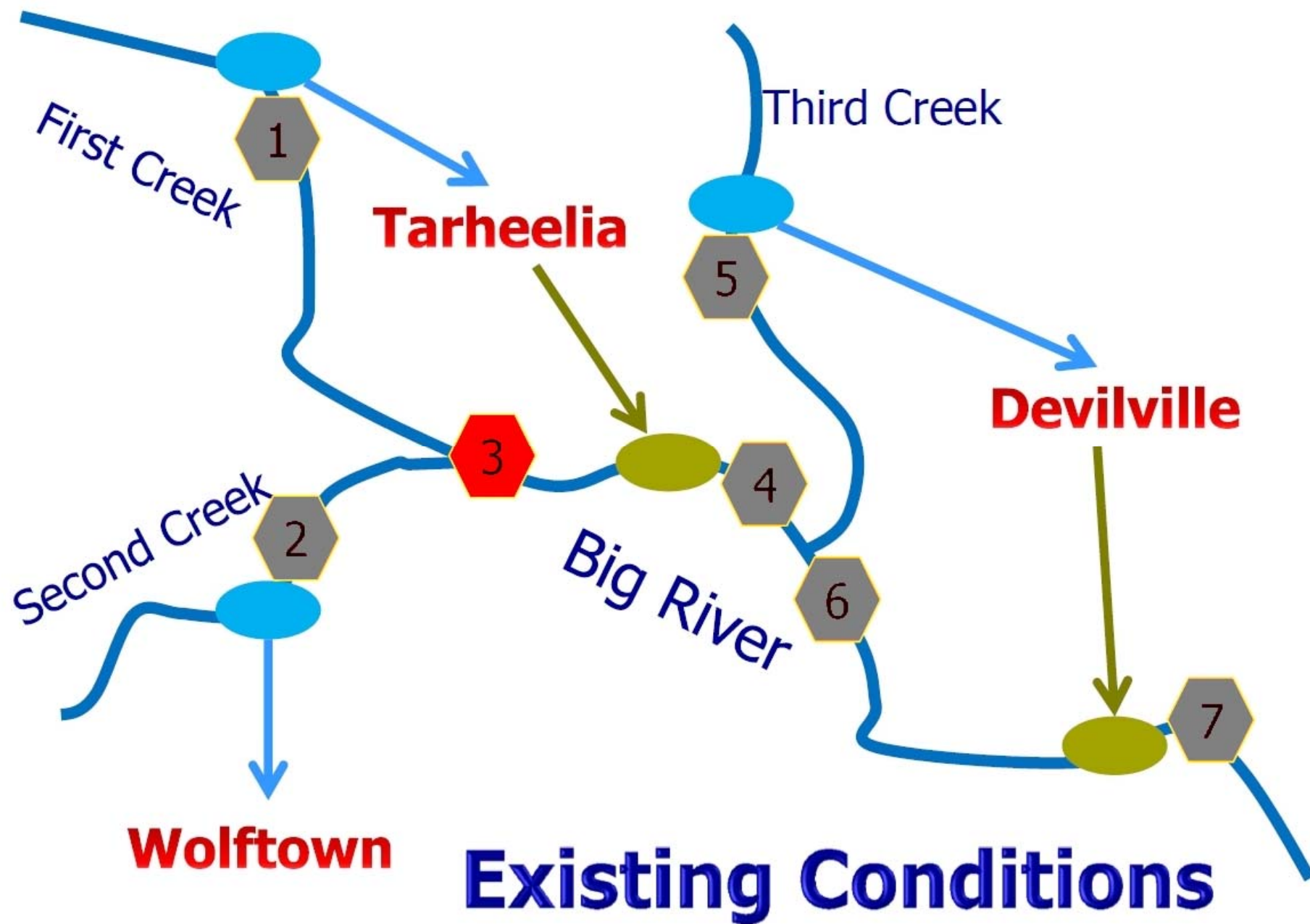
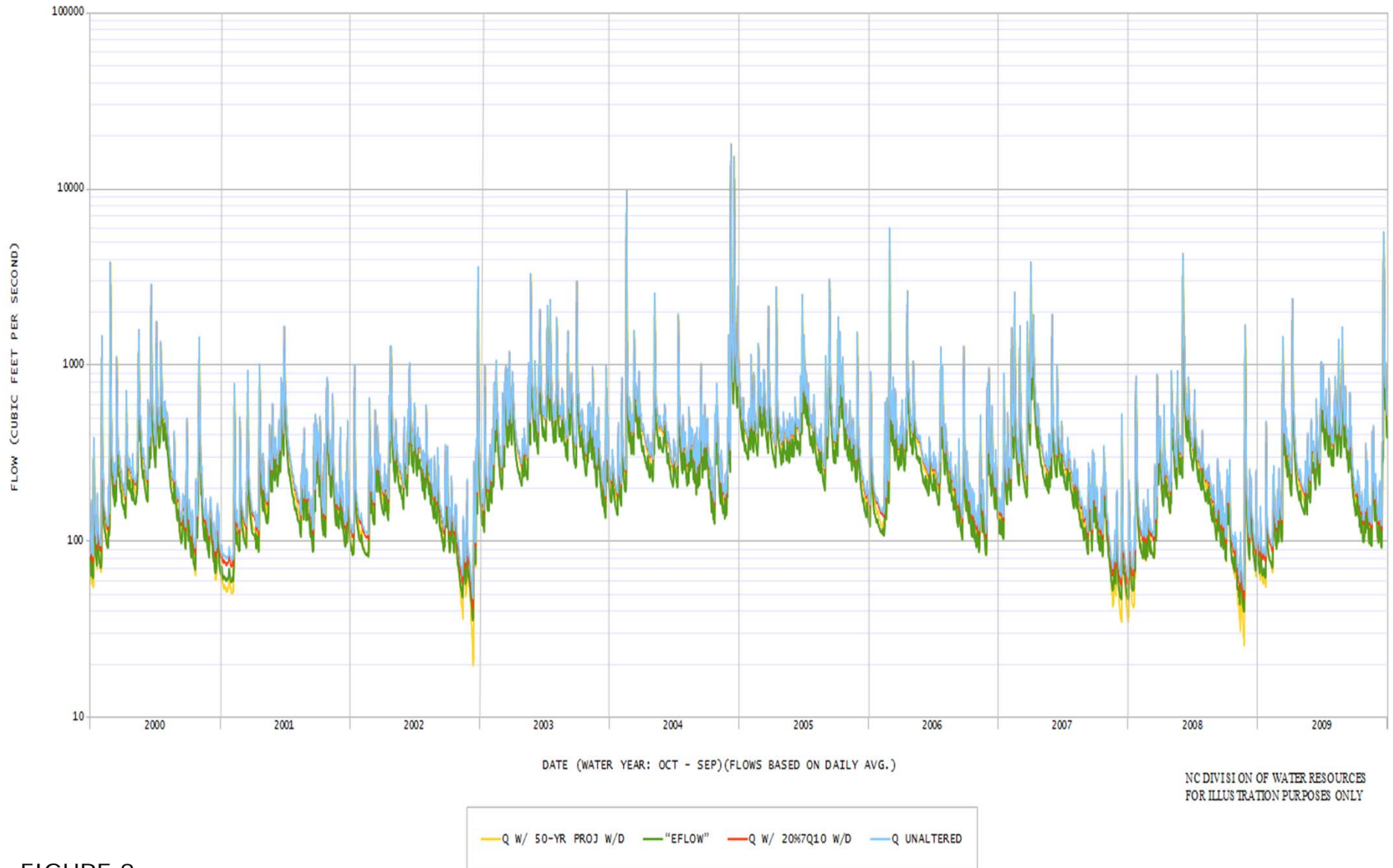


FIGURE 7

TOWNS OF "TARHEELIA"/"WOLFTOWN" FLOW REGIME, NODE 3, "BIG RIVER"

"EFLOW" = 75% OF INFLOW (UNALTERED)
PRESENT DEMAND = CUMULATIVE VOL. EQUIVALENT TO 20% 7Q10 = 6.4 CFS (4.13 MGD)
FUTURE DEMAND = CUMULATIVE 50-YEAR PROJECTION = 27.8 CFS (17.9 MGD)



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FIGURE 8

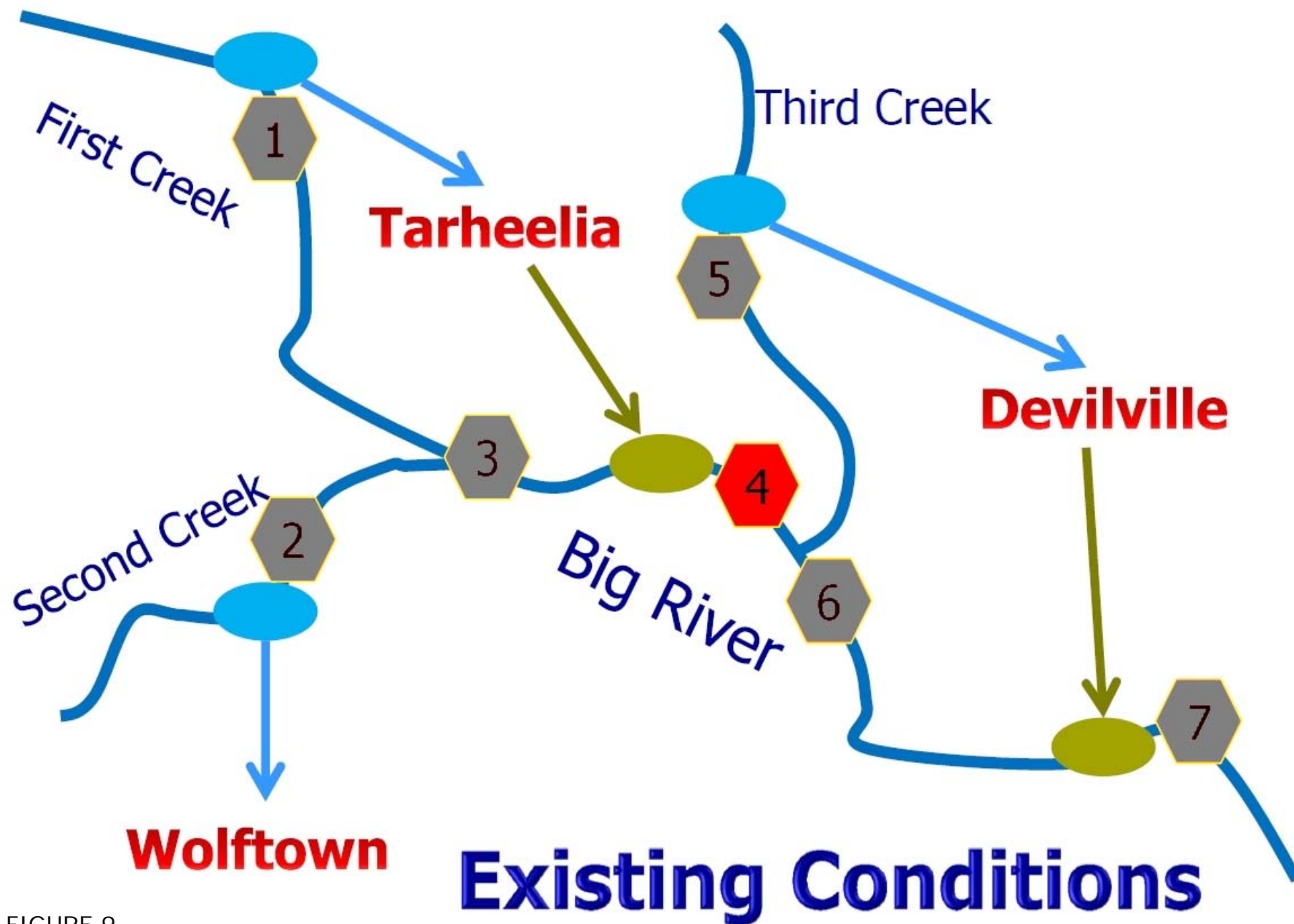
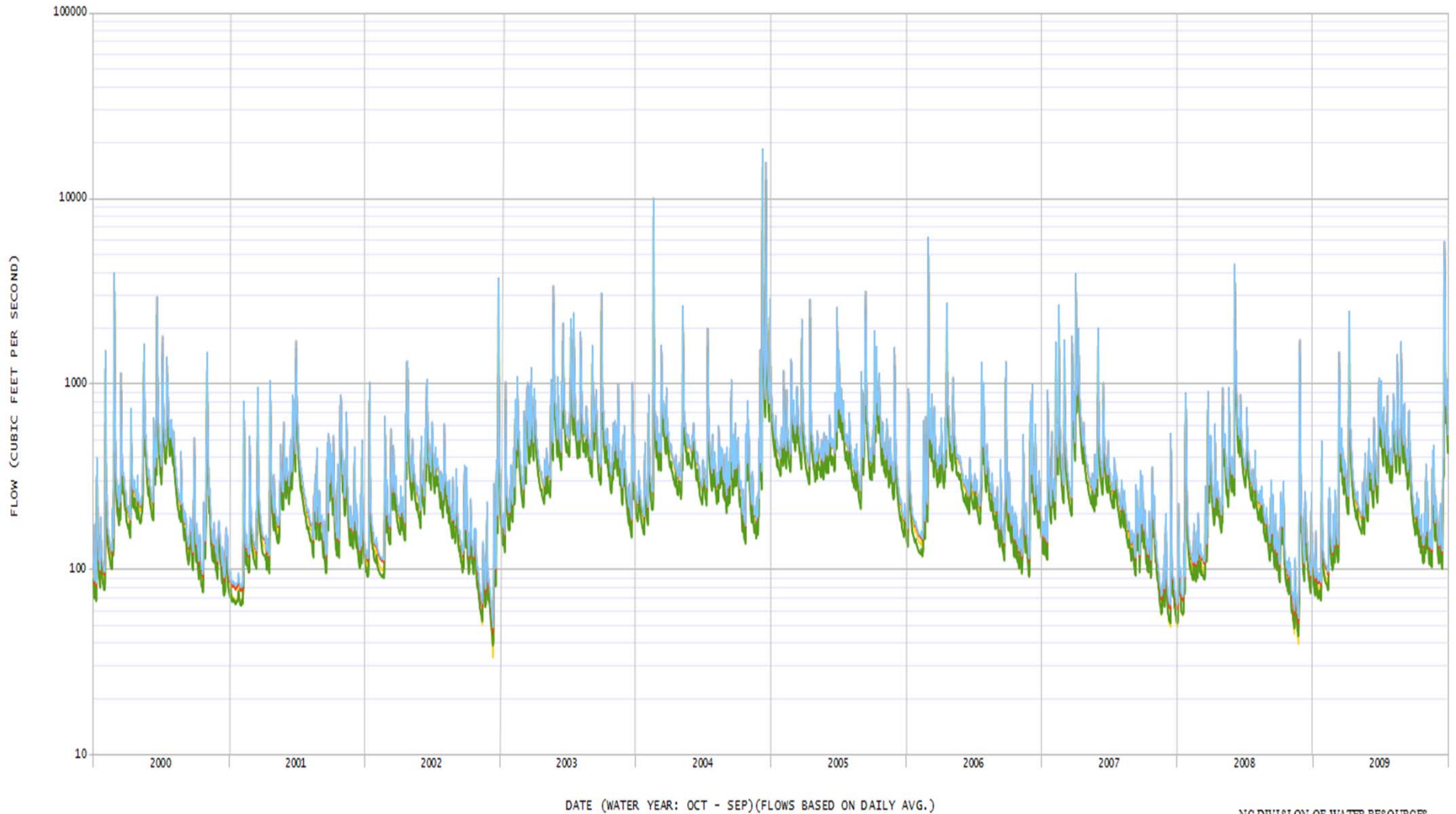


FIGURE 9

TOWNS OF "TARHEELIA"/"WOLFTOWN" FLOW REGIME, NODE 4, "BIG RIVER"

"EFLOW" = 80% OF INFLOW (UNALTERED)
 PRESENT DEMAND = CUMULATIVE VOL. EQUIVALENT TO 20% 7Q10 = 6.4 CFS (4.13 MGD)
 FUTURE DEMAND = CUMULATIVE 50-YEAR PROJECTION = 27.8 CFS (17.9 MGD)
 WASTEWATER RETURN = 86% OF "TARHEELIA" WITHDRAWAL



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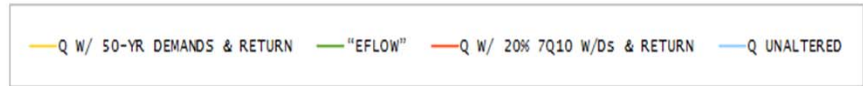


FIGURE 10

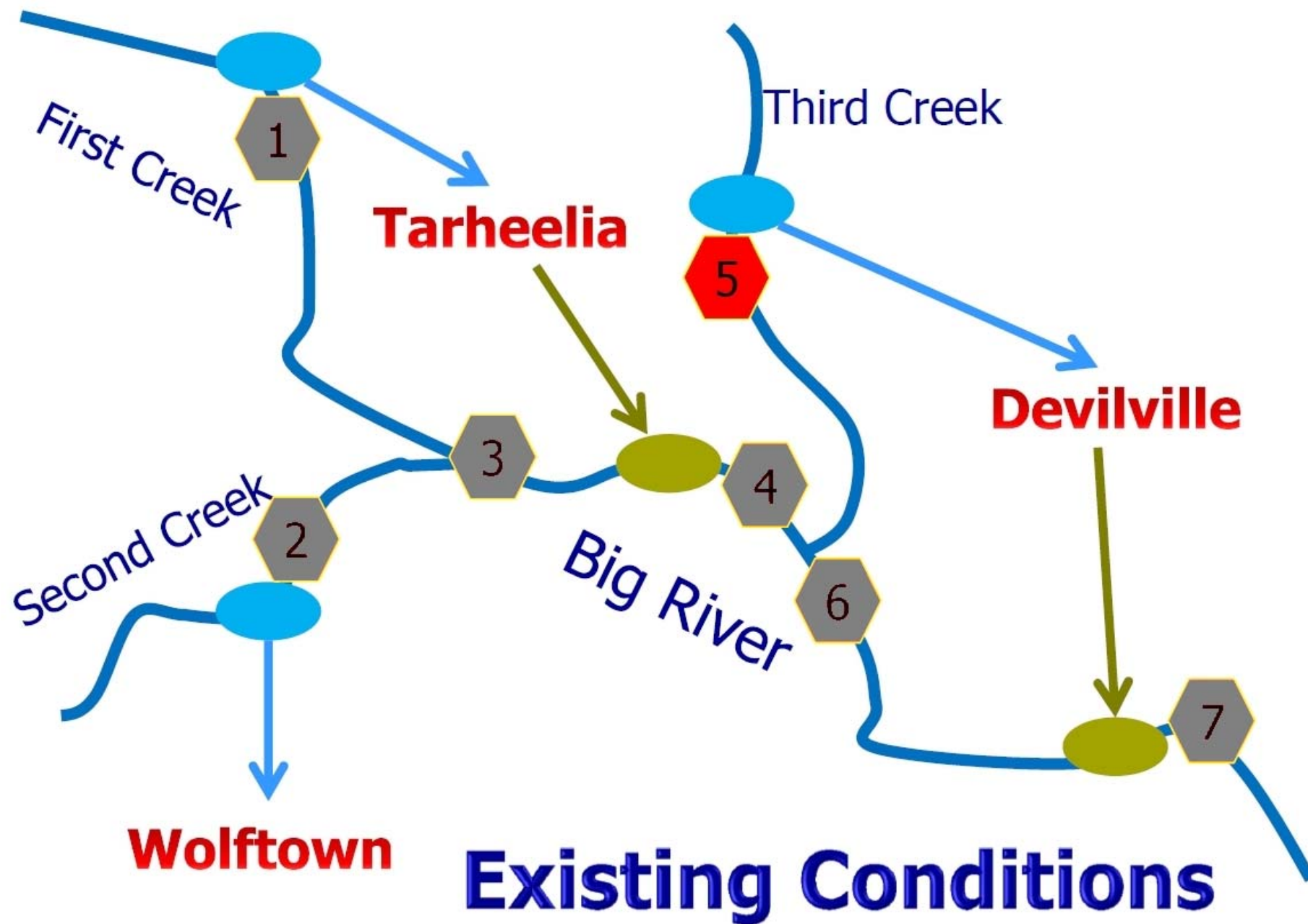
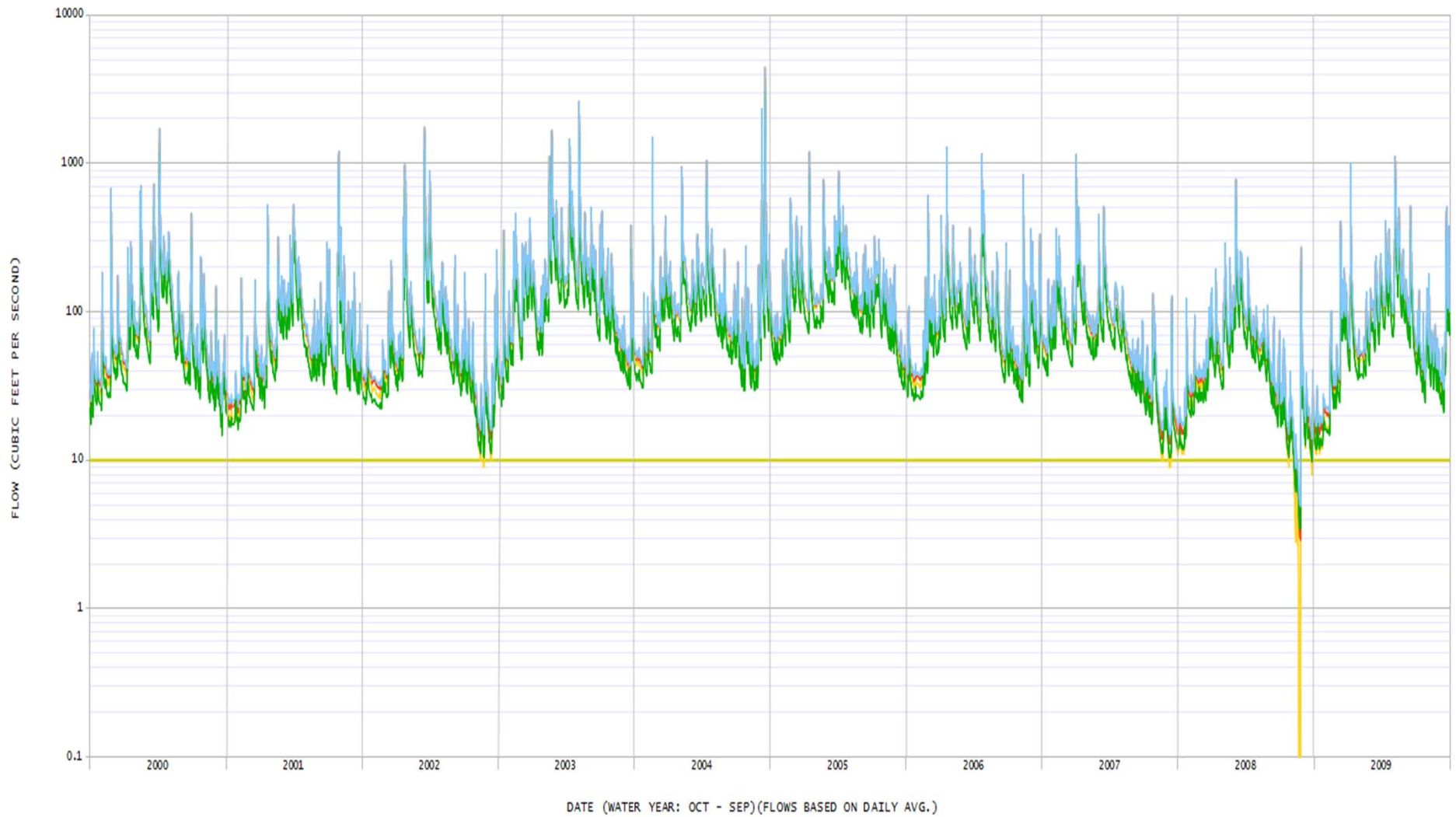


FIGURE 11

TOWN OF "DEVILVILLE" FLOW REGIME, NODE 5, "THIRD CREEK"

"EFLOW" = 70% OF INFLOW (UNALTERED)
 PRESENT DEMAND = VOL. EQUIVALENT TO 20% 7Q10 = 2.0 CFS (1.3 MGD)
 FUTURE DEMAND = 50-YEAR PROJECTION = 6.0 CFS (3.9 MGD)



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FIGURE 12

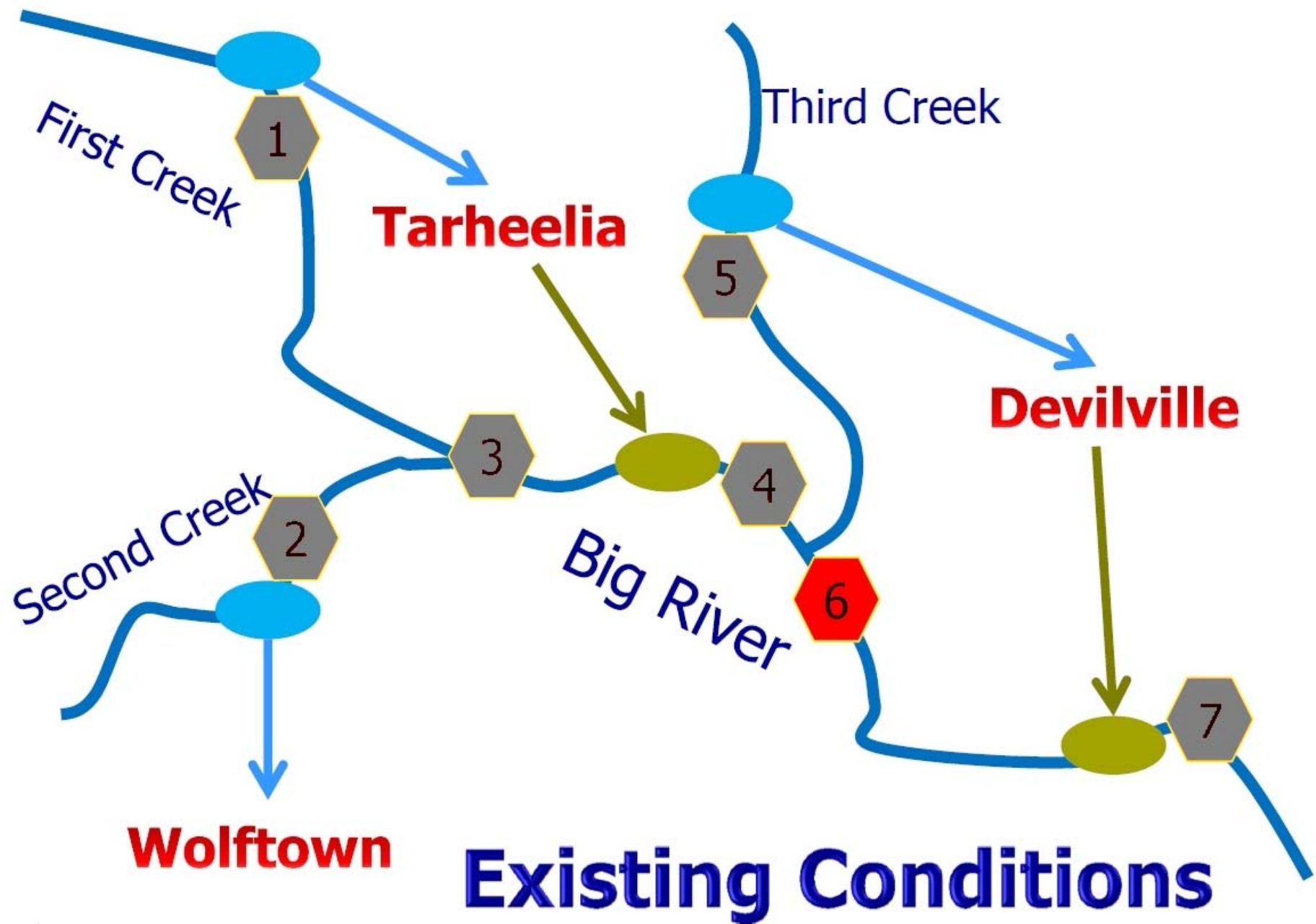
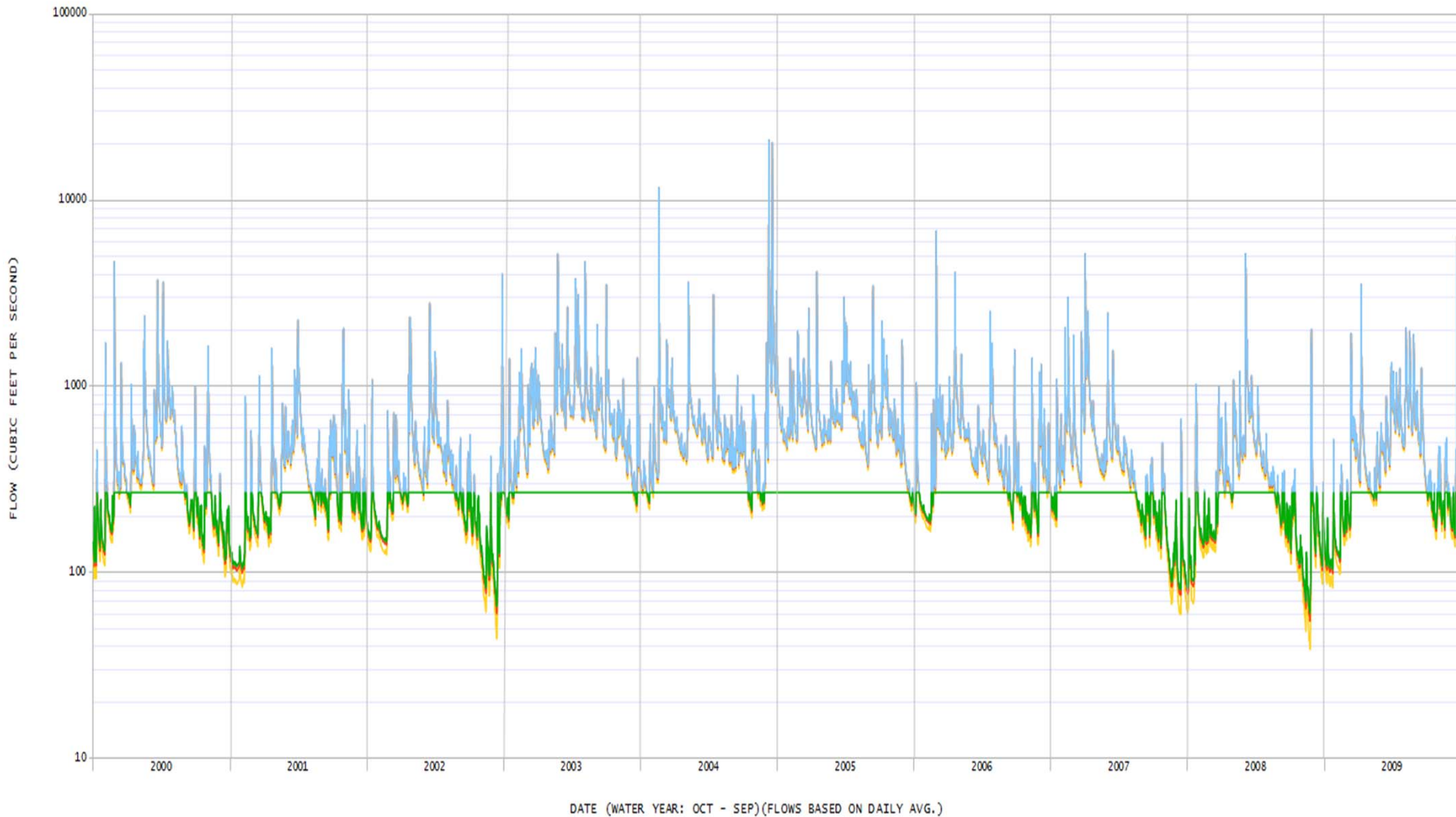


FIGURE 13

TOWNS OF "TARHEELIA"/"WOLFTOWN"/"DEVILVILLE" FLOW REGIME, NODE 6, "BIG RIVER"

"EFLOW" = LESSER OF 50% OF ANNUAL AVERAGE FOR PERIOD, OR INFLOW (UNALTERED)
 PRESENT DEMANDS = CUMULATIVE VOL. EQUIVALENT TO 20% OF 7Q10 = 8.4 CFS (5.4 MGD)
 FUTURE DEMANDS = 50-YEAR PROJECTION = 33.8 CFS (21.9 MGD)
 "TARHEELIA" WASTEWATER RETURN = 86% OF WITHDRAWAL = 3 CFS (1.9 MGD) // 13.3 CFS (8.5 MGD)



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FIGURE 14

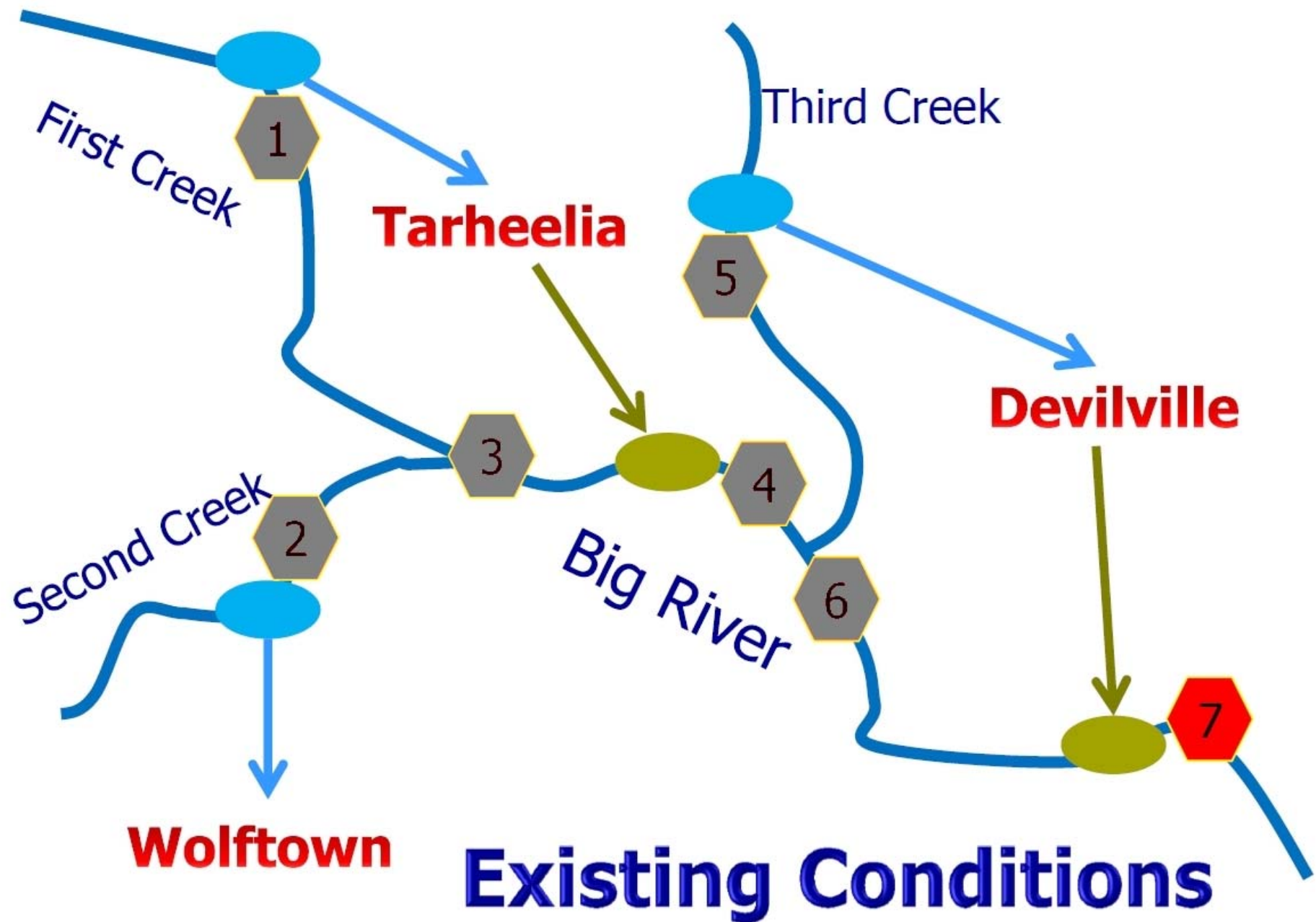
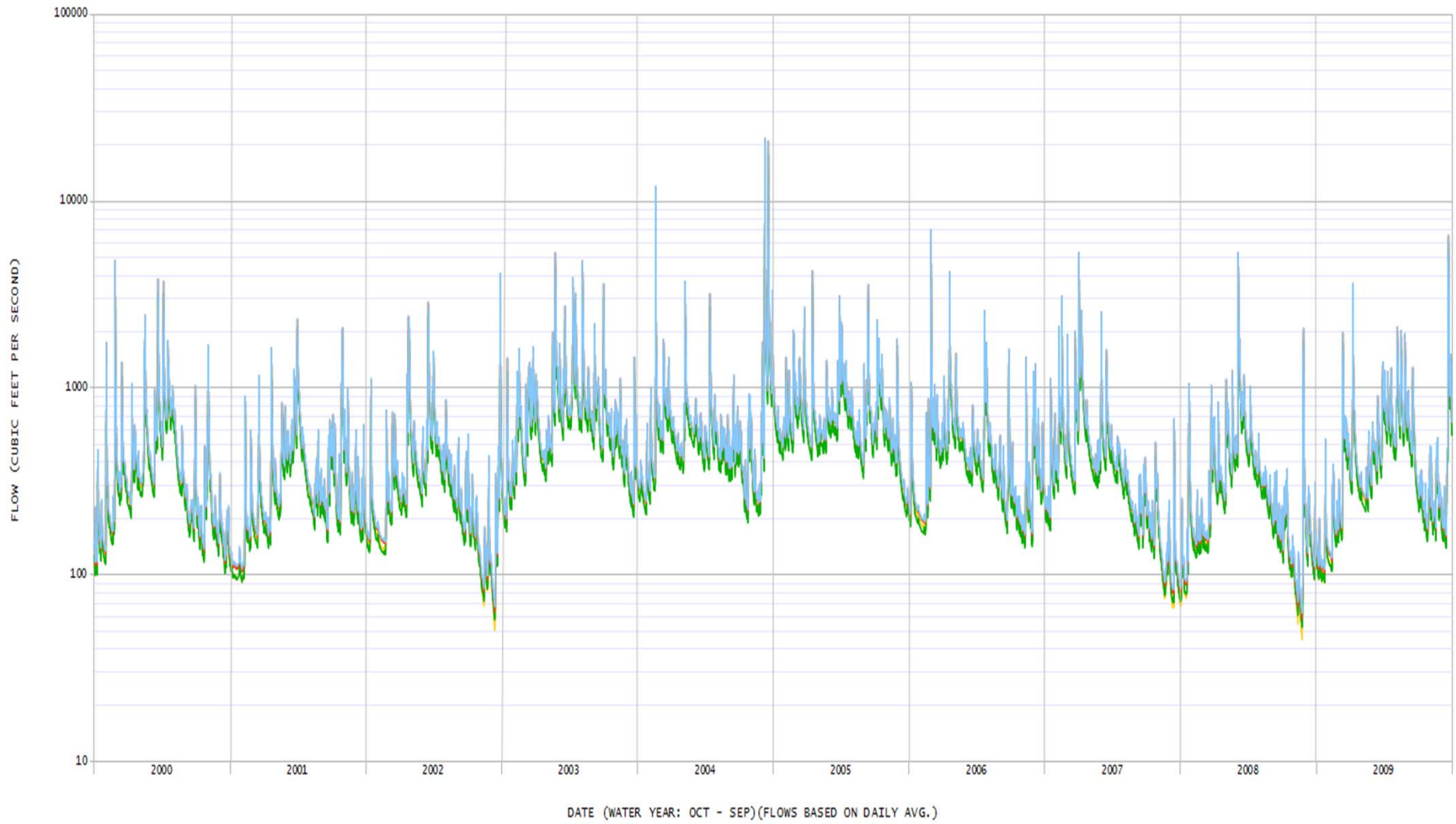


FIGURE 15

TOWNS OF "TARHEELIA"/"WOLFTOWN"/"DEVILVILLE" FLOW REGIME, NODE 7, "BIG RIVER"

"EFLOW" = 85% OF INFLOW (UNALTERED)
 PRESENT DEMANDS = CUMULATIVE VOL. EQUIVALENT TO 20% OF 7Q10 = 8.4 CFS (5.4 MGD)
 FUTURE DEMANDS = CUMULATIVE 50-YEAR PROJECTIONS = 33.8 CFS (21.9 MGD)
 "TARHEELIA"/"DEVILVILLE" CUMULATIVE WASTEWATER RETURNS = 86% OF WITHDRAWAL = 4.7 CFS (2.8 MGD) // 18.4 CFS (11.8 MGD)



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FIGURE 16

POINTS TO PONDER :

- Nodes on “unaltered” streams and protected watersheds?
- Alterations in the upper watershed are attenuated in the lower watershed by intervening drainage and discharges. Nodes in lower watershed may not raise a “red flag”.
- When is the “red flag” raised? Any time EFlow is breached? Frequency? Duration? %Q? Seasonal?
- Capturing Secondary & Cumulative Impacts?:
 - NC(S)EPA Minimum Criteria: “Improvements to water treatment plants that involve less than 1,000,000 gallons per day added capacity and total design withdrawal less than one-fifth of the 7-day, 10-year low flow of the contributing stream;”
 - Unregulated withdrawals;
 - Land use; etc.;
- High-flow skimming. There’s a lot of available water during high-flow events.
- Tidal waters?