06/17/2021

## Location Map:

## 

## Summary:

* Safe yield of the intake is listed as 3.2 mgd from a study published in 2001 (3.2 mgd is equivalent to the permit annual withdrawal limit of 1168 mg/yr).
  + The data for the study was collected in 1997, which predates the drought period of 1999-2002.
* Under the current scenario (withdrawing around 2 mgd/day on average based on current reported withdrawals) they are okay in terms of storage days remaining (132 days) during the drought of record.
* Under the current maximum permitted scenario (withdrawing up to 3.2 mgd) storage days remaining drops to 0, and the model shows they are unable to meet all demand during the drought of record.
* Reducing the annual withdrawal limit from 1168 mg/yr to 949 mg/yr (3.2 mgd to 2.6 mgd) would likely be sufficient to increase the storage days remaining from 0 to 64 or more days during the drought of record.
  + Note that demand is projected to decline according to water supply plan.
  + The max daily withdrawal limit would remain 4.0 mgd
* DWR standard guidance for an intake not withdrawing more than 10% instantaneous flow (90% flowby) likely wouldn't work for this project (reservoir chronically drawn down).
  + In order to meet a 90% flowby, the annual withdrawal limit may need to be reduced from 3.2 mgd to around 0.68 mgd in order to preserve 47 days remaining storage in the reservoir during the drought of record.
* However a 40% flowby would likely be effective at maintaining storage levels and ensuring they can sustainably meet demand while better preserving the natural flow regime.
  + Changing the flowby from a static 0.5 mgd to a 40% of flow approach when combined with a 2.6 mgd annual withdrawal limit results in around 29 days of storage remaining and no days in which they're unable to meet demands at the intake during the drought of record.
  + Although the 40% flowby we tested results in fewer than 60 days remaining storage, emergency connections with neighboring towns would likely be sufficient to maintain supply during times of extreme drought. Additionally, this permit doesn't currently have drought triggers in place which could help maintain storage levels during dry periods.
  + Provided that conservation measures can be formulated that permit 60 days remaining storage, the 40% flowby would result in the same 2.6 mgd safe yield as the current 0.5 mgd flowby.

Plots of reservoir storage during drought period:

|  |  |  |
| --- | --- | --- |
| **Current permit limit at 3.2 mgd w/ 0.5 mgd flowby** | |  | | --- | | **Proposed limit at 2.6 mgd w/ 40% flowby** | |
|  |  |
| |  | | --- | | \*Reservoir runs dry during extreme drought period | | |  | | --- | | \*Reservoir retains around 29 days of storage during extreme drought period | |

|  |  |  |
| --- | --- | --- |
| **Alt: Permit limit at 3.2 mgd w/ 90% flowby** | |  | | --- | | **Alt: Limit at 0.68 mgd w/ 90% flowby** | |
|  |  |
| |  | | --- | | \*Reservoir runs dry for prolonged period during extreme drought period | | \*Reservoir retains around 47 days of storage during extreme drought period |

## Stats Comparison Table:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Description | Current Scenario | Full Permit Scenario | Scenario Alternatives | | | | |
| Proposed Limit | Proposed 90% Flowby | Proposed 40% Flowby | Proposed Limit & 40% Flowby | Proposed Limit & 90% Flowby |
| Withdrawal | Current Reported Use | Permit Annual Withdrawal Limit (1168 mg/yr = **3.2 mgd**) | Proposed Annual Withdrawal Limit (949 mg/yr = **2.6 mgd**) | Permit Annual Withdrawal Limit (1168 mg/yr = **3.2 mgd**) | Permit Annual Withdrawal Limit (1168 mg/yr = **3.2 mgd**) | Proposed Annual Withdrawal Limit (949 mg/yr = **2.6 mgd**) | Proposed Annual Withdrawal Limit (248.2 mg/yr = **0.68 mgd**) |
| Flowby | Current Permit Flowby = **0.5 mgd** | Current Permit Flowby = **0.5 mgd** | Current Permit Flowby = **0.5 mgd** | Proposed **90%** Flowby | Proposed **40%** Flowby | Proposed **40%** Flowby | Proposed **90%** Flowby |
| River Segment Model Statistics: |  |  |  |  |  |  |  |
| Flow Out (cfs) | 4.76 | 3.39 | 4.06 | 7.26 | 3.57 | 4.10 | 7.54 |
| Flow Baseline (cfs) | 8.95 | 10.46 | 9.70 | 6.82 | 10.33 | 9.70 | 6.73 |
| Minimum Days of Storage Remaining | 132.94 | 0.00 | 64.44 | 0.00 | 0.00 | 29.83 | 47.74 |
| 30 Day Low Flow (cfs) | 0.75 | 0.55 | 0.75 | 0.56 | 0.24 | 0.25 | 0.56 |
| 90 Day Low Flow (cfs) | 0.84 | 0.84 | 0.84 | 1.57 | 0.74 | 0.74 | 1.71 |
| Consumptive Use Fraction | 0.47 | 0.68 | 0.58 | -0.06 | 0.66 | 0.58 | -0.12 |
| Cumulative Withdrawal (mgd) | 2.11 | 3.09 | 2.60 | 0.74 | 3.01 | 2.60 | 0.68 |
| Cumulative Point Source (mgd) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Facility Model Statistics: |  |  |  |  |  |  |  |
| Withdrawal (mgd) | 2.11 | 3.09 | 2.60 | 0.74 | 3.01 | 2.60 | 0.68 |
| Point Source (mgd) | 1.69 | 2.47 | 2.08 | 0.61 | 2.40 | 2.08 | 0.54 |
| Maximum 30 day potential unmet demand (mgd) | 0.00 | 2.70 | 0.00 | 3.21 | 2.90 | 0.00 | 0.00 |
| Richness Change (abs) | -3.82 | -6.82 | -5.27 | 0.38 | -6.44 | -5.22 | 0.69 |
| Richness Change (%) | -16.44 | -29.34 | -22.69 | 1.64 | -27.73 | -22.45 | 2.98 |

Model Period 1/1/1998 - 12/31/2002

## Richness Change For Reference (elfgen):

