

Teanaway River Baseline Assessment

Purpose

The current trend of development is toward residential water use - domestic use and noncommercial lawn and garden irrigation. Purchase of existing irrigation water rights has been looked to as a primary means to offset the consumptive loss arising from the new residential uses. But questions remain about whether the consumptive use offset during the irrigation season is sufficient to prevent adverse effects to resident and anadromous fish using Teanaway habitat - particularly during the low-flow period following the irrigation season.

Lawn and garden watering occurs at much the same time as the historic agricultural irrigation practices that dominated the valley floor landscape for the past 125 years. Domestic use within a residential setting, on the other hand, is a year-round water use and would affect the Teanaway River outside the period of time that can be directly mitigated by acquiring and fallowing formerly irrigated land. Under certain circumstances, even small losses of flow immediately after the end of the irrigation season could potentially be adverse to fish.

The purpose of this analysis is to quantify the consumptive impacts to Teanaway River flows resulting from the current level of development and to establish the hydrologic conditions so that we may judge whether loss of flow is a concern during that period and what might be the best mitigation strategy to respond to the concern.

Method of Analysis - Flow Impacts due to Existing Uses

The approach taken to estimate the consumptive use associated with current levels of domestic water is to use existing data to identify the expected lowest flows during the September 15 to November 15 period, to calculate the consumptive use associated with current levels of residential and stock water uses, and then to compare the expected lowest flows with the calculated impacts. Also, an analysis of the past 10 years of flow data was performed to identify when the lowest daily flow occurred. These tables are contained in the Appendices.

Fisheries Use of the Teanaway River

Fish Life

The Teanaway supports spring Chinook, steelhead, coho, and bull trout, as well as other salmonids and non-salmonid species. Resident and fluvial bull trout are present; the status of Teanaway River bull trout is ESA threatened. Fluvial bull trout were identified upstream of DeRoux Campground in the NF in 1997. Bull trout juveniles have been found in Jack Creek and Jungle Creek; bull trout spawning has been observed in De Roux Creek.

The Teanaway was historically one of the top producers of spring chinook, steelhead, and coho in the Yakima watershed. With correction of a number of significant habitat problems, which includes flow, the physical diversity and size of the Teanaway guarantee it could still be a major producer.

Fish Life History

See the attached chart that describes all the salmon stock life histories. Fall Chinook and sockeye do not exist in the Teanaway River. Coho adults move into the Teanaway drainage starting in September, peak in October, and finish upstream migration as late as December. Juvenile phases of Chinook, steelhead, coho, and bull trout rear throughout the basin year round. In all cases, the summer-early fall low flow period is the critical time frame for all of the respective cohort productions (i.e., juvenile survival).

All the stocks incur fluvial migrations into and out of the Yakima River with their juvenile or sub adult stages. This can occur at any time of year and is very dependent on flow. Flow restoration is important throughout the Teanaway

basin but has an added benefit of encompassing almost all the stocks respective life history stages in the lower reaches of the drainage; juveniles, sub adults, and adults.

As noted above the Teanaway River Basin fish stock production is not even close to its potential. Salmon recovery will continue throughout this basin with the continued emphasis on flow, instream habitat, riparian, and floodplain restoration.

Limiting Factors

In decreasing order of importance, the main factors limiting production of anadromous salmonids in the Teanaway have been identified as:

1. Low flows and associated high water temperatures during the summer and fall in the lower mainstem, the Middle Fork, and the West Fork;
2. Loss of natural floodplain function through the lower watershed; and,
3. A "flashy" runoff pattern (the Teanaway has a naturally high flow variation due to extent of watershed that is in the rain-on-snow zone; flow variation has been exacerbated by extensive logging in the upper watershed.

Results

Flow and habitat restoration priorities:

1. Improve streamflow in the lower Teanaway River through water efficiency improvements and purchases that provide permanent flow improvements that reduce water temperature and provide habitat for all life stages of anadromous and resident fish.
2. Improve floodplain function and habitat to reduce water temperatures and provide base flow improvement later in the year.
3. Improve watershed hydrologic function.



Appendices:

Teanaway River Flow Information:

USGS 12480000 TEANAWAY RIVER BELOW FORKS NEAR CLE ELUM, WA

Available data for this site

| | |
|--|--|
| Kittitas County, Washington Hydrologic Unit Code 17030001 Latitude 47°14'48", Longitude 120°51'36" NAD27 Drainage area 172.00 square miles Gage datum 2,160.00 feet above NGVD29 | Output formats |
| | HTML table of all data |
| | Tab-separated data |
| | Reselect output format |

| 00060, Discharge, cubic feet per second, | | | | | | | | | | | | |
|--|--|-------|-------|-------|-------|-------|-------|------|------|-------|-------|-------|
| YEAR | Monthly mean in cfs (Calculation Period: 1967-10-01 -> 1973-06-30) | | | | | | | | | | | |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1967 | | | | | | | | | | 154.9 | 253.9 | 501.9 |
| 1968 | 631.0 | 679.9 | 568.3 | 281.2 | 520.4 | 290.5 | 63.6 | 34.0 | 51.2 | 94.2 | 231.5 | 185.6 |
| 1969 | 256.1 | 109.9 | 359.0 | 1,009 | 1,240 | 412.1 | 51.3 | 20.2 | 22.2 | 51.5 | 47.5 | 40.6 |
| 1970 | 53.9 | 122.7 | 312.0 | 484.7 | 1,012 | 531.6 | 74.3 | 23.0 | 17.2 | 22.6 | 85.7 | 86.6 |
| 1971 | 350.0 | 602.9 | 177.6 | 742.1 | 1,563 | 696.8 | 223.5 | 45.6 | 25.3 | 50.0 | 108.2 | 88.3 |
| 1972 | 222.5 | 530.3 | 1,307 | 1,029 | 2,030 | 1,099 | 322.8 | 90.1 | 64.1 | 55.8 | 103.9 | 365.7 |
| 1973 | 265.5 | 101.4 | 244.9 | 398.8 | 423.5 | 168.6 | | | | | | |
| Mean of monthly Discharge | 296 | 358 | 495 | 657 | 1,130 | 533 | 147 | 43 | 36 | 72 | 138 | 211 |

** No Incomplete data have been used for statistical calculation

In addition to identifying the lowest weekly flow, Ecology also reviewed data for the Teanaway River nr Forks to determine when the lowest daily average flow occurred. Based on the 2000-2010 water years, the lowest daily flow occurred between August 21 (earliest) and October 6 (latest). Four years had the lowest flow occur after the Sept 15 end of the irrigation season. The mean time for the lowest flow to occur following the end of the irrigation season for those four years was 14.5 days (Sept 30). Considering all 10 years, the mean date for the lowest flow to occur was 5 days prior (Sept 10) to the end of the irrigation season.

| Year | Lowest average daily cfs | Average 7 day low cfs |
|------|--------------------------|-----------------------|
| 2000 | 16 | 16.86 |
| 2001 | 11 | 11.88 |
| 2002 | 16 | 17 |
| 2003 | 9 | 9 |
| 2004 | 22 | 40.43 |
| 2005 | 12 | 19.78 |
| 2006 | 12 | 13.71 |
| 2007 | 14 | 15.29 |
| 2008 | 12.52 | 24.51 |
| 2009 | 19.25 | 20.71 |
| 2010 | 35.1 | 55.66 |

Compiled from historical USGS Forks Gage station data, Teanaway River.

| Year | Day | Avg. Daily Flow, cfs |
|------|---------|----------------------|
| | | |
| | | |
| 2001 | Oct 6 | 11.00 |
| 2002 | Sept 16 | 16.00 |
| 2003 | Oct 6 | 9.00 |
| 2004 | Aug 21 | 12.00 |
| 2005 | Aug 29 | 9.00 |
| 2006 | Sept 9 | 11.00 |
| 2007 | Sept 14 | 13.00 |
| 2008 | Oct 1 | 12.52 |
| 2009 | Sept 2 | 18.65 |
| 2010 | Aug 26 | 25.92 |

Population and Water Use for Domestic and Stock Water Use:

Kittitas County's voter database was used to determine the population that can be considered full time residential water users. Four voter precincts overlap the boundaries of the Teanaway basin. Ecology used both Kittitas County Assessor's GIS data and aerial photography to determine the number of homes/cabins in the Teanaway basin.

| Voter District Information | | | | |
|----------------------------|------------|-----------------------|----------------|------------|
| precinct_n | population | poll_locat | Shape_area | Shape_len |
| MOUNTAIN | 606 | Vote By Mail Precinct | 4473027217.130 | 333385.859 |
| RONALD | 0 | Vote By Mail Precinct | 227177188.062 | 72465.925 |
| ROSLYN OUTLYING | 347 | Vote By Mail Precinct | 335278655.762 | 98413.374 |
| SWAUK | 346 | Vote By Mail Precinct | 6582819787.490 | 450550.354 |
| TEANAWAY | 377 | Vote By Mail Precinct | 566200333.156 | 164751.659 |

Teanaway River Basin fall (9/15-11/15) consumptive use estimate

Known or estimated factors:

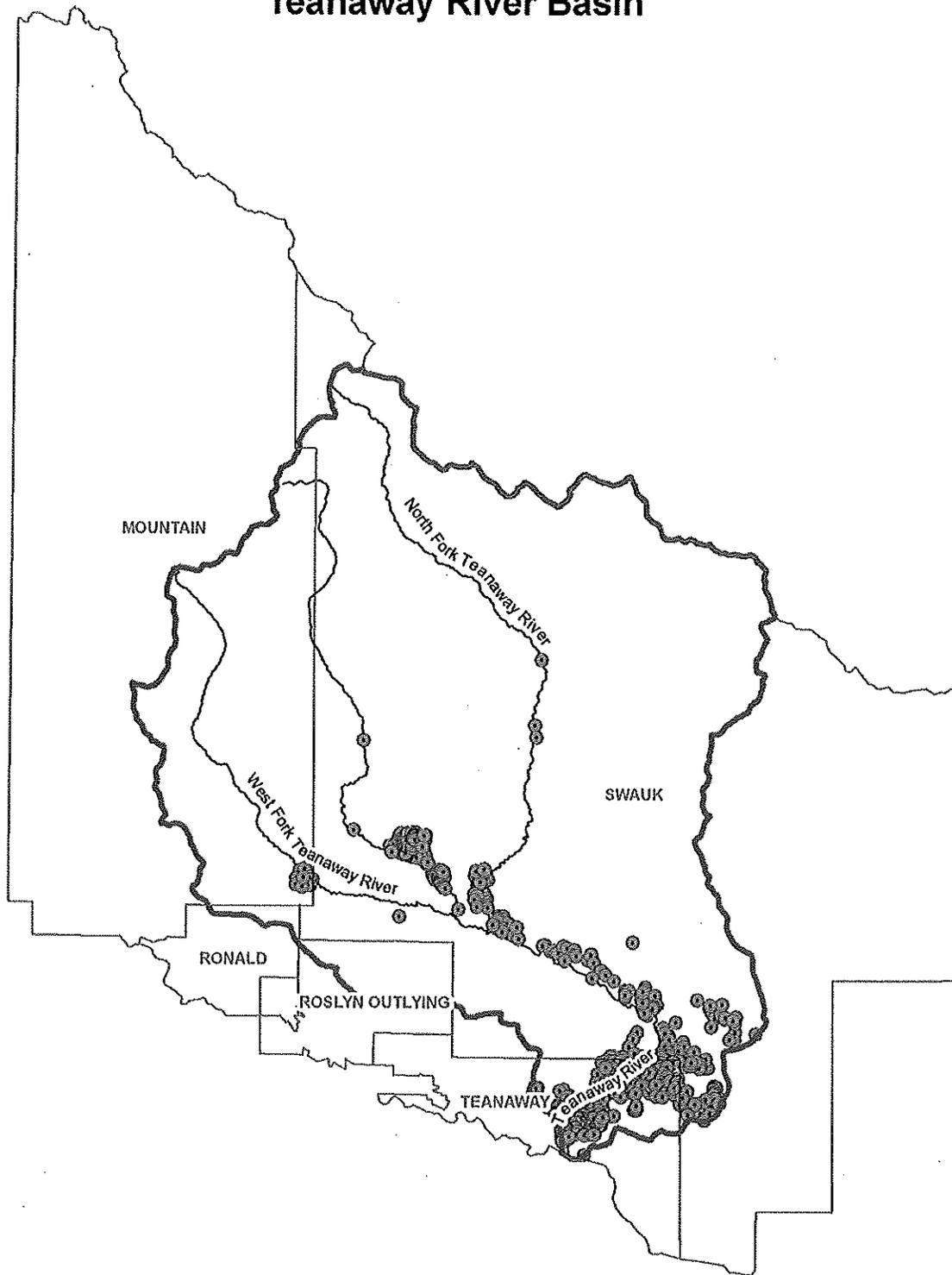
| | |
|--|-------|
| Total Residential Structures within TRB using GIS and Parcel information? ^a | 619 |
| Proportion of Population within TRB according to Voter District info? (perm resident) ^b | 359 |
| How many people per household? ^c | 2.22 |
| How many full-time residences? | 162 |
| How many seasonal homes? | 457 |
| Seasonal population? | 1015 |
| Gallons per day used per capita? ^c | 114.4 |
| Gallons per day used per capita by seasonal population? | 57.2 |
| Gallons per day used by grazing cattle? | 11 |

| Full-time residential: | | | | |
|--|-------------------------|---------------|--|--------|
| | 60 days (gal) | Per day (gal) | | cfs |
| How much water <i>consumed</i> * by full time residence from Sept 15-Nov15 (60 days)? | 739,726.42 | 12,328.77 | | 0.019 |
| <i>* Consumptive use = 30% of total use</i> | | | | |
| Seasonal Residential water use: | | | | |
| Population equivalent if present 2 of 7 weekdays? | 290 | | | |
| | 17 out of 60 days (gal) | Per day (gal) | | cfs |
| How much water consumed by seasonal residents based on visiting 2 out of 7 days in a week? | 84,598.80 | 1,409.98 | | 0.0022 |
| Continuous stock water use: | | | | |
| How much continuous stock water was confirmed, in ac-ft/yr? | 30.6 | | | |
| | 60 days (gal) | Per day (gal) | | cfs |
| How much water is consumed by stock? (assume 100% consumptive) | 1,661,840.10 | 27,697.34 | | 0.04 |

Sources:

- ^a 2011 Kittitas County Parcel GIS data and associated tables
- ^b Kittitas County Voter District GIS data layer
- ^c 2006 City of Cle Elum Water System plan
- ^d Teanaway River Subbasin No. 3 Reports of Referee, Draft Schedule of Rights

Teanaway River Basin



-  Selected Voting Districts
-  Teanaway River Basin
-  Residential_Commercial Structures
-  DNR Hydrology

