11. WATER RIGHTS

This chapter provides an assessment of the degree of allocation of water in the Methow Basin estimated from claims and administratively-issued water rights. Historical water right adjudications within the basin are also described. Finally, regulatory baseflow regulations are reviewed.

Administrative water rights issued by Ecology or its predecessors have existed in Washington State since 1917 for surface water and 1945 for groundwater. These take the form of permits and certificates. Legal water use since these dates requires application to, and approval from, Ecology. Water rights are valid only as long as they are used, and except under specific conditions, cease to exist if they are not used for a continuous period of five years (i.e., they are relinquished).

Water use before 1917 (for surface water) or 1945 (for groundwater) is "grandfathered in" and establishes a water right, subject to conditions. These rights are sometimes referred to as "vested rights". These rights, or claims (as referred to by Ecology), must have been registered with Ecology. There have been four claim registration periods. Claims for water use may have been registered multiple times resulting in duplicate or triplicate records for a single water right. Claims do not necessarily represent a valid water right, and Ecology does not have the authority to determine their validity.

An adjudication must be conducted to determine the validity of claims, and to resolve conflicts between water rights holders. An adjudication is a court process that may be initiated by petition by a person claiming a right to water, by Ecology, or by planning units.

Water rights may be established for instream flow values under the Water Resources Act of 1971 (Ch. 173-500 WAC). Regulated instream flow quantity (regulatory baseflow) is a water right with a corresponding priority date and period of use. The purpose of establishing such flows is typically for the maintenance and/or protection of aquatic biota/fish, although other values may also be considered, such as water quality and recreational uses. Water may also be reserved or set aside for future use. Ecology must initiate a review of such regulations whenever new information, changing conditions, or statutory modifications make it necessary.

No other forms of water rights are addressed in this chapter including, but not limited to, tribal rights. A groundwater right for the withdrawal of up to 5,000 gallons per day of groundwater for prescribed uses may be established without application to Ecology, and are referred to as "exempt wells." Exempt well use is addressed in the chapter assessing actual use.

11.1 Allocation

This section describes water rights allocated by the Washington Department of Ecology (Ecology) and its predecessors over the entire Methow Basin and in the eight sub-basins (Figure 11-1). The characterization of water rights was based on:

- Document type (certificate, permit, claim, etc.);
- Purpose of use (irrigation, domestic, municipal, etc.);
- Source type (groundwater or surface water); and
- Subbasin.

Ecology maintains a database to track and store water rights information, called the Water Rights Application Tracking System (WRATS) database. An abbreviated version of the WRATS database, called "WRATS On a Bun" or WOB (Ecology 2001) that is current as of August 2001 was used for the characterization. The Central Regional Office of Ecology has developed a second database, GWIS (2002) that is based on WRATS. GWIS contains additional information on the place of use and is used for mapping of water rights in GIS.

The WOB and GWIS databases contain a similar number of documents. The differences in the number of documents are summarized on Table 11-1. The significant differences between the databases are:

- The WOB database contains claims that were registered during the last claim registration period (September 1, 1997 through June 30, 1998). These documents are not included in the GWIS database. These documents are noted in the WOB database as "Claim/" documents; and
- The GWIS database contains certificates of change that supersede the original documents contained in the WRATS database. The changes include changes in the permitted annual or instantaneous withdrawals or irrigated acres. These changes total about 3,934 AF/yr. The certificates of change are not included in the WOB database.

Based on discussions with Ecology staff, the WOB database was selected to evaluate water rights in the Methow Valley (Ron Dixon, personal communication February 11 and February 19, 2002). The GWIS database was also reviewed to evaluate the certificates of change.

11.1.1 Approach

The WOB database was initially queried to exclude those documents listed in the database as relinquished, rejected, cancelled, or otherwise not in good standing. The extracted data were placed in a new database for further analysis. Table 11-1 summarizes the number of records in the WOB database for WRIA 48. Certificates make up about 26 percent of the total number of documents. Claims (long form, short form, and claims without a designation) make up about 54 percent of the total documents. Claims registered during the last registration period (September 1, 1997 through June 30, 1998) are not designated long form or short form, and make up about 5 percent of the records in the database (Table 11-1). Water right applications and applications to change an existing water right or claim make up 13 percent. Change applications that have been approved and are in the permit phase account for 2 percent of the total records.

The WOB database lists the location of water rights and claims by Township, Range, and Section (TRS). Sections and associated water rights and claims were assigned to subbasins based on the subbasin in which the centroid of the section was located. If the centroid of a particular section fell within the defined subbasin boundary, all water rights in that section were included in that subbasin regardless of whether portions of that section were located in other subbasins (Figure 11-1).

It is therefore possible that some water rights that were located within a particular subbasin were assigned into a different subbasin as the centroid of that section was in the different subbasin. Using this method, water rights in the Early Winters subbasin were delineated within the Methow Headwaters subbasin. This included a claim for 3,165 AF/yr. Because water rights tend to be concentrated along the axes of valleys, any errors will tend to be concentrated at the downstream extents of subbasins. Additional quality control/quality assurance efforts will be most productive if concentrated in these areas. Any detailed evaluation of water rights in these locations would benefit from a more detailed analysis than conducted here.

11.1.2 Characterization by Purpose of Use

For each subbasin, the database was queried to extract the distribution of documents by purpose of use for both groundwater and surface water. The order of extraction was as follows:

- All documents including the "IR" (irrigation) purpose of use;
- All documents including all other purposes of use (municipal, domestic, stock, etc); and
- All documents including non-consumptive purposes of use (power, fish propagation, and fire).

After each query, the records were removed from the database.

Water rights granted for power, fish propagation and fire are defined by Ecology as "non-consumptive water rights", and contributed less than 1 percent of all documents, and were not considered following initial extraction from the database. The surface water diversions for non-consumptive use are summarized as follows:

- Applications: 6.11 cfs
- Permits: 15.66 cfs
- Certificates: 104.46 cfs

Groundwater withdrawals for non-consumptive use are summarized as follows:

- Applications: 4,860 gpm
- Certificates: 7,570 gpm

Water rights including the irrigation purpose of use make up about 95 percent of the total number of records. The remaining consumptive uses make up about 5 percent of the total number of documents.

11.1.3 Assignment of Annual Withdrawals or Diversions

The WOB database includes annual withdrawal or diversion (Qa) for most records with a consumptive purpose of use and an instantaneous withdrawal or diversion (Qi) for all records. Qa can be defined as the permitted total annual withdrawal or diversion from a groundwater or surface water source (in acre feet per year). Qi is defined as the maximum instantaneous withdrawal or diversion from a groundwater or surface water source (in gpm or cfs). For most permits and certificates and many long form claims, the Qa is included in the database. Most short form claims do not include Qa information. The following summarizes the number and percentage of each document type in the WOB database without Qa:

- Certificates: 173 records (27%);
- Permits: All records have Qa
- Claim/S: 287 records (98%);
- Claim/L: 83 records (9%); and
- Claim/: 6 records (6%).

For the records that do not include Qa, the Qa is assigned to provide a better representation of water allocation.

Annual Quantities of Certificates and Permits

Irrigation Use: For those certificates and permits without Qa but with irrigated acreage information, the Qa was calculated by multiplying the irrigated acres for that record by a duty, or annual use per acres. The duty was estimated by dividing the Qa for certificates by the number of irrigated acres for both groundwater and surface water. The median duty for surface water was 4 feet per acre, and the median duty for groundwater was 4.1 feet per acre. Therefore, for those records without Qa but with irrigated acreage information, the number of irrigated acres was multiplied by the median duty for groundwater or surface water (based on use as indicated on records with Qa) to estimate the Qa. All certificates had either Qa or irrigated acreage information. Note that the 4.1 feet per acre duty assigned for water rights purposes includes transmission losses. The consumptive use estimate of 3.3 to 4.6 feet per acre described in Section 10 includes on-farm consumptive losses from evapotranspiration and application efficiency, but does not include canal losses.

Other Uses: For those certificates and permits without Qa, the Qa was estimated from the ratio of permitted instantaneous withdrawal (or diversion) (Qi) to Qa. Qi/Qa was estimated from groundwater and surface water certificates that contained both Qi and Qa data. The median Qi/Qa ratio for both groundwater and surface water certificates

was 0.1 cfs/AF (44.8 gpm/AF). Therefore, for those records without Qa, the Qi was multiplied by the appropriate Qi/Qa ratio to estimate Qa.

All certificates had either Qa or Qi information.

Annual Quantities of Claims

Long Form Claims: Long form claims are typically filed for irrigation, multiple domestic or municipal, or stock use. Many of the long form claims contained information on Qa.

For those long form claims with irrigation for the purpose of use and without Qa, but with irrigated acreage information, the Qa was assigned in a manner similar to the assignment of Qa for certificates. The number of irrigated acres was multiplied by a duty of 4 or 4.1 feet for surface water or groundwater, respectively. For the long form claims for irrigation without Qa or irrigated acres, the median Qa value of groundwater or surface water certificated rights was assigned (52 AF/yr, and 47 AF/yr).

For non-irrigation long form claims without Qa, the Qa was assigned based on the mean Qa of non-irrigation purpose of use groundwater and surface water certificates and permits. The median Qa for non-irrigation groundwater certificates is 5.6 AF/yr, and 1 AF/yr for non-irrigation surface water certificates.

Short Form Claims: Short form claims are generally used for non-irrigation water use (i.e. single domestic) typical of an exempt well (less than 5,000 gallons per day). Groundwater and surface water short form claims were assigned a uniform Qa of 0.5 AF/yr (450 gpd).

New Claims: The WOB database contains information on claims filed during the last claim registration period (September 1, 1997 through June 30, 1998). These claims have not been assigned as long or short form. The new claims include Qa for all documents.

One surface water claim registered during the last registration period contained a Qi of 0.3 cfs and a Qa of 410,000 AF/yr in the database. The claim form was requested from Ecology (R. Johnson, written communication February 19, 2002) to determine if an error was made in transcribing the information to the database.

The claim form indicated the following information:

Qi: 0.3cfs
Qa: 410,000 AF/yr
Purpose of Use: Irrigation for 1.5 acres (1 acre in WOB database)
Period of Use: May 1 to September 30

Based on the information presented on the claim form, it appears that the Qa is likely in error. The Qa for this claim was adjusted to avoid skewing the data. The Qa was adjusted by assuming a continuous use of 0.3 cfs for an irrigation season period of use of 152 days, or a Qa of 90.5 AF/yr.

11.1.4 Allocation Analysis Results – General

The results of the water rights analysis are depicted graphically on Figures 11-2 through 11-11 and summarized on Tables 11-2 through 11-4. All results are graphically presented by aggregating quantities by section. The distribution of water rights by type is shown as follows:

- Figure 11-2 depicts the distribution of permits, certificates and claims by sub-basin.
- Figures 11-3 and 11-4 depict the distribution of groundwater and surface water certificates and permits by Qa;
- Figures 11-5 and 11-6 depict the distribution of groundwater and surface water claims by Qa;
- Figure 11-7 and 11-8 depict the distribution of non-irrigation use groundwater and surface water rights and claims by Qa;
- Figure 11-9 and 11-10 depict the distribution of irrigation use groundwater and surface water rights and claims by Qa;
- Figure 11-11 depicts the distribution of applications for change and new applications by Qi and number of change applications;
- Table 11-2 summarizes total irrigation and non-irrigation allocations by subbasin;
- Table 11-3 summarizes the certificate and permit allocations by subbasin; and
- Table 11-4 summarizes the claim allocation by subbasin.

The total allocated consumptive withdrawals and diversions in the basin are about 380,729 AF/yr (Table 11-2). Surface water accounts for about 95 percent of the allocated water in the basin, with groundwater comprising the remaining five percent. Certificates and permits comprise 50,926 AF/yr, or about 13 percent of the allocated water in the basin (Table 11-3). Claims comprise 329,804 AF/yr of the allocated water in the basin (Table 11-4), or about 87 percent of the allocated water. Short form claims comprise about 133 AF/yr and long form claims about 229,110 AF/yr. Claims registered during the last registration period (September 1, 1997 through June 30, 1998) comprise 100,560 AF/yr. One claim for 90,000 AF/yr of surface water accounts for most of the new claim allocation.

Irrigation use accounts for the majority of allocated water use in the basin. The Qa of water rights documents listing irrigation as one of the purposes of use account for about 97 percent of the total Qa. For surface water, irrigation use accounts for about 99 percent of the allocated use. Irrigation accounts for about 63 percent of the groundwater allocation.

It should be noted that of the 329,804 AF/yr in claims 264,896 AF/yr (75% of all claimed use) is assigned to four claims from what appears to be two applicants. There are two claims for 42,448 AF/yr in the Middle Methow and two claims for 90,000 AF in Twisp.

Assuming these are duplicates, reconciliation of these two claims alone would reduce total claimed use by 132,448 AF/yr. These two original claims would still represent about 60% of the total adjusted claimed use in the Basin.

11.1.5 Allocation Analysis Results – Subbasins

This section discusses the water allocation in the individual subbasins (Figure 11-1).

Chewuch: Approximately 10,680 AF/yr are allocated in the Chewuch subbasin, or about three percent of the allocated water in the Methow basin. Surface water accounts for 9,536 AF/yr of the allocated water. All but 130 AF/yr of the total allocation is for irrigation use. Certificates and permits comprise 972 AF/yr (nine percent) of the allocated water.

Early Winters: The water rights in the Early Winters subbasin are aggregated with the Methow Headwaters subbasin. This includes a surface water claim of 3,165 AF/yr for irrigation.

Methow Headwaters: Approximately 9,240 AF/yr are allocated in the Methow Headwaters subbasin, representing about two percent of the allocated water in the Methow Basin. The allocation for the Methow Headwaters subbasin includes the allocations for the Early Winters subbasin. Certificates and permits comprise 1,992 AF/yr (22 percent) of the allocated water Approximately 92 percent of the allocated water is surface water. Irrigation use accounts for approximately 99 percent of the allocated water.

East Lower Methow: Approximately 50,109 AF/yr are allocated in the East Lower Methow subbasin, or about 13 percent of the allocated water in the Methow basin. Certificates and permits comprise 23,967 AF/yr, or about 48 percent of the allocated water. Irrigation use accounts for about 42,927 AF/yr, 86 percent of the allocated water.

West Lower Methow: Approximately 15,200 AF/yr are allocated in the West Lower Methow subbasin, or about four percent of the allocated water in the basin. Irrigation use accounts for 89 percent of the allocated water (13,514 AF/yr). The surface water allocation is 12,196 AF/yr, or about 80 percent of the allocated water. Certificates and permits account for 10,568 AF/yr, 70 percent of the allocated water.

Middle Methow: Allocated water in the Middle Methow subbasin totals 95,220 AF/yr, or about 25 percent of the allocated water in the Methow Basin. 7,088 AF/yr of the allocated water (seven percent) is either certificates or permits. Irrigation use accounts for almost 100 percent of the allocated water (94,930 AF/yr). Surface water accounts for 93,548 AF/yr, or 98 percent of the allocated water.

Upper Methow: A total of 14,615 AF/yr of water is allocated in the Upper Methow subbasin. This allocation represents about four percent of the allocated water in the Methow basin. Irrigation use accounts for 14,364 AF/yr, or about 98 percent of the allocated water. Surface water accounts for 13,278 AF/yr, 91 percent of the total allocated water. Certificates and permits comprise 33 percent (4,798 AF/yr) of the allocated water.

Twisp: The Twisp subbasin includes about 49 percent of the total allocated water in the Methow Basin (185,665 AF/yr). Irrigation use accounts for 185,263 AF/yr, or over 99 percent of the allocated water. Surface water accounts for 99 percent of the allocated water (184,387 AF/yr). Certificates and permits comprise 1,510 AF/yr, or about one percent of the allocated water.

11.2 Adjudications

Both the WRATS/WOB and GWIS databases contain records of adjudicated surface water claims. Eight adjudications have taken place in the Methow Basin (Table 11-5; Figure 11-12). All of these occurred before the establishment of the groundwater code in 1945 except for Wolf Creek. The Wolf Creek adjudication was petitioned in 1922, and initiated in 1925. Although a Report of Referee was completed in 1926, the findings were, without explanation, never filed. The adjudication resumed in 1971 and was completed in 1984. A duty of 50 acres/cfs is used in all adjudications.

11.3 Claims

Because such a large proportion of allocation in the Methow is represented by claims, a discussion of the claims registry is provided here for background. This information was provided by Steve Herchey at Ecology.

Approximately 177,000 claims were filed statewide in the initial opening to the water right claims registry (July 1, 1969 through June 30, 1974) in response to Ch. 90.14.041 RCW. A list of the information that the claimant had to provide was specified in Ch. 90.14.041 RCW. In 1973, Ch. 90.14.041 RCW was amended to allow a less extensive list of information – a "short form" filing. The short form only requires inclusion of sufficient data to identify the claimant, source of water, purpose of use and legal description of the land upon which the water is used and is of limited evidentiary value in adjudications. With the amendment to RCW 90.14.051 in 1973, there are long forms (exclusively used prior to 1973, and selectively used after 1973) and short forms.

The intent was that short forms were supposed to be used only by those who were diverting water pursuant to Ch. 90.44.050 RCW (exempt wells), but that is not what happens in practice. The language of the statute is as follows: "Except, however, that any claim for diversion or withdrawal of surface or ground water for those uses described in the exemption from the permit requirements of Ch. 90.44.050 RCW may be filed on a short form to be provided by the department." This language is confusing because there is no exemption for the diversion of surface water under Ch. 90.44.050 RCW.

The second opening was in 1979, was short, and was created by Ch. 90.14.043 RCW. That section of the code was amended in 1985.

The third opening was July 1, 1985 through September 1, 1985. In those cases the claimant first had to petition the Pollution Control Hearings Board for a certificate and make a showing to the PCHB regarding their water use. A certification was issued by the Pollution Control Hearings Board if, upon petition to the board, it was shown to the satisfaction of the board that:

(a) Waters of the state have been applied to beneficial use continuously (with no period of nonuse exceeding five consecutive years) in the case of surface water beginning not later than June 7, 1917, and in the case of ground water beginning not later than June 7, 1945; or,

(b) Waters of the state have been applied to beneficial use continuously (with no period of nonuse exceeding five consecutive years) from the date of entry of a court decree confirming a water right and any failure to register a claim resulted from a reasonable misinterpretation of the requirements as they related to such court decreed rights.

If the claimant received a certificate from the Board, then Ecology accepted the filing of the claim and entered it into the claims registry.

The fourth opening was September 1, 1997 through June 30, 1998.

Each of the openings came with limitations and differences from the other claim openings and most of that information can only be gleamed by reading the various laws that created/limited the openings. For example, filings in the September 1, 1997 through June 30, 1998, opening have a water right priority date of as of the date the statement of claim is filed with Ecology – even though to be a valid claim the water use needed to start prior to 1917 for surface water and 1945 for ground water.

11.4 Water Management Policies in Ch. 173-548 WAC

Instream flows in the Methow Basin (WRIA 48) are regulated under Chapter 173-548 of the Washington Administrative Code (WAC). These regulatory baseflows were established as part of the instream resource protection program authorized by the state legislature under the water resources Act of 1971 (Ch. 90.54 RCW).

The purpose of the program is to:

a) Protect existing rights;

b) Set forth “baseflows” necessary for preserving instream values;

c) Establish beneficial use priorities;

d) "Closes" certain streams and natural lakes in the basin to further consumptive appropriation with certain exceptions for single domestic and stock-watering uses;

e) Establishes quantities of public water available for future appropriation by stream management unit, subject to the beneficial use priorities; and,

f) Sets forth water resources administrative procedures.

The regulatory baseflows were established in the Methow Basin in 1976, and modified in 1978, by Ecology with contributions from the Methow Basin Citizen's Advisory Committee, local and state agencies, and the general public, including the Methow River Basin Steering Committee. This document is referred to as the Methow River Basin Water Resources Management Program (1976).

The priorities of use were established as follows:

Existing allocation:
Priority I: Existing rights;
Future Allocation:
Priority II: Single domestic and stock use;
Priority III: Baseflows; and,
Priority IV: Public water supply, irrigation, and other uses.

This order of priorities allows the unrestricted use of water with respect to streamflows for single domestic and stock watering (excluding commercial feed lots), subject to prior rights.

11.4.1 Basis and Establishment of Regulatory Baseflows

Minimum instream flow requirements (regulatory baseflows) have been established for seven points in the Methow Basin (Table 11-6; Figure 11-13; Ecology, 1976 and 1978). The availability of water for the various priorities has been estimated in the Methow Basin Instream Resource Protection Program (IRPP; Ecology, 1976, 1978). However, such estimates of availability are subject to regulatory baseflow requirements and water supply for Priority IV uses will be interruptible every other year, on average. Availability may be increased with new storage capacity.

The director of Ecology is allowed to authorize appropriations of water without the restriction of instream flows where it is clear that overriding considerations of public interest will be served (Ch. 173-548-020(5)).

The regulatory baseflows have an effective date of December 28, 1976. The priority of later water rights is determined by use category priority regardless of the date of the water right (i.e., Priority II: Single domestic and stock watering uses, are superior to Priority III: Instream flows, which are in turn superior to Priority IV: other uses). Within each use of category, the water right with an earlier date will be superior to those rights with later dates.

No consumptive uses are allowed of waters of streams and lakes listed in Table 11-7 or of groundwater in hydraulic continuity with the listed streams and lakes. This includes use category Priority II, described above, and exempt wells (per Ch. 90.44.050 RCW) that are not proven to not be in hydraulic continuity with the listed steams and lakes.

Construction of wells in the vicinity of streams and lakes listed in Table 11-7 must meet one of the following conditions and require the written approval Ecology:

- A valid water right permit recognized by Ecology is held;
- The proponent has obtained a valid surface or groundwater right through transfer;
- The proponent is modifying or replacing an existing well (per Ch. 90.44.050 RCW); or,
- The groundwater to be withdrawn is shown not to be in hydraulic continuity with the closed surface water bodies.

11.4.2 Underlying Technical Relationships and Policies

The key technical relationships and resulting or implied water management "policies" for future allocation established in the IRPP are summarized as follows:

1. Ecology used the one in two year discharge (i.e. the median flow) to represent a maximum appropriation limit from which future allocation (after 1976) would be based. The median streamflows were determined from the available streamflow data at that time. "The appropriation limit is set forth to be an amount equal to the one in two year natural reach discharge on a monthly basis for all management reaches except Early Winters Creek. The appropriation limit for Early Winters Creek is set forth to be an amount equal to the estimated natural mean monthly streamflow for that stream" (WAC173-548-030). The maximum surface water available for future appropriation (i.e., "unappropriated water") is allocated as follows:

• Single Domestic And Stock use	2.0 cfs/month
• Baseflow	Varies per reach and month (see WAC 173-548)
• Public water supply, irrigation and other water uses	Remaining waters up to the appropriation limit set forth in WAC 173-548-030(1)(c)

The appropriation limits for each sub-basin are equivalent to the 1 in 2 year streamflows established through the statistical analyses by Milhouse and Sorlie (1976). Ecology's underlying allocation policy therefore appeared to be to allocate additional water only on years that are wetter than median conditions as established through statistical analysis.

2. The technical basis for the regulatory baseflow requirements established for the seven stream management reaches is not clearly established in the IRPP. However, the relationship between baseflow and the median streamflow could be used to conclude that Ecology wanted to preserve a greater proportion of "natural" streamflow during low flow periods. For example, the % difference between the regulatory baseflow requirement at Pateros and the median streamflow at Pateros based on the data available in 1976 ranges from 87% in January/February to 40% in April/May. In other words, Ecology wanted to preserve 87% of the median observed streamflow during January/February, and 40% of the median streamflow during April/May. During the summer season, these values are 42%, 50%, 70%, and 86% respectively for July, August, September, and October. Streamflow management at Pateros essentially manages to the cumulative effects of allocation in the entire basin.
3. Ecology established that single domestic and stock uses (II) are the highest priority future water use in the basin, and reserved 2 cfs per stream management reach for these purposes which would not be subject to the regulatory baseflow requirements. The rationale for establishing a 2 cfs reservation is not discussed. The 2 cfs reservation is applied as an instantaneous (Qi) quantity. There are 7 regulatory reaches subject to the 2 cfs reservation, for a total of 14 cfs in "domestic" reservation in the basin. Comparing 14 cfs to median streamflows at Pateros in 1976 suggests that, the underlying policy was to reserve no more than 3.5% of the median observed streamflow at Pateros for future (post-1976) single domestic and stock uses. This policy also favors domestic "exempt" uses over irrigation and municipal uses (which would require a water right).

11.5 Comparison of Water Use, Water Allocation and Regulatory Baseflow

This section compares actual water use, water allocation based on water rights, and regulatory baseflow.

11.5.1 Comparison Regulatory Baseflows with Current Streamflow Conditions

Comparison of current conditions with regulatory baseflow requirements is a simple approach to describing how often, how much, when and how long certain streamflows are below the regulatory baseflow.

Streamflow was compared to required regulatory baseflows for each control point in the basin (Table 11-8). Results are summarized in several ways.

- Days in Record - Total Days analyzed for Regulatory Baseflow excursions.
- Days of Regulatory Baseflow Excursions - Total number of days where regulatory baseflow limits exceeded measured instream flow within the period of record.
- Number of Continuous Excursions of Regulatory Baseflow Levels - Count of the number of sets of continuous days where instream flow excursions occurred.

- Percent of Record Below Regulatory Baseflow Levels - Number of days of instream flow excursions divided by the total days in record.
- Max Continuous Days Below Regulatory Baseflow Levels - The maximum number of continuous days that streamflows are below the regulatory baseflows.
- Average Continuous Days Below Regulatory Baseflow Levels - The average length of time, in days, that measured streamflows are below the regulatory baseflow.

The Methow near Pateros USGS gage (station 12449950) has the longest period of record and its location at the outlet of the basin shows the cumulative effect of all tributaries to the Methow River. Figure 11-14 displays the monthly distribution of instream flow excursions (where regulatory baseflows exceeded measured instream flow) at Methow near Pateros in terms of the average number of days per month with excursions and the average volume per month of instream flow excursions. The most excursions occur, on average, in the November to January time frame and the least during the spring freshet runoff in May and June. Conversely, the greatest volume of excursions occurs in June and July, with the rest of the year remaining relatively stable.

11.5.2 Comparison of Total Irrigation Water Allocation (Qa) with Current Irrigation Use

Since irrigation is the predominant purpose of use for water in the Methow, this section and Section 11.5.3 compare irrigation water allocations with current uses and observed streamflows at the basin scale.

Figure 11-15 shows the total annual irrigation allocation compared to current estimated irrigation use. This figure also shows irrigation allocation including an adjustment for one apparent duplicate claim for 90,000 AF (See Section 11.1.4). Current irrigation use is calculated based on actual crop irrigation requirements, a 60% on-farm efficiency, and 100 cfs of irrigation transmission loss (return flow). This figure shows that only a small fraction of current allocations for irrigation uses are being used.

Using the average water duty from the water rights database of 4.1 feet per acre indicates that the basin has been allocated for nearly 70,000 acres of irrigated agriculture.

11.5.3 Comparison of Allocated Irrigation Water Duty and Actual Irrigation Water Use

The average duty of 4.1 feet per acre assigned in the WRATS database is consistent with current estimated consumptive uses in the basin, including normal on-farm efficiencies of 50% to 70% (see Section 10). Transportation losses associated with canal leakage therefore may exceed the average per acre duty that is indicated in the WRATS database. However, canal losses appear to return to streams and could therefore be considered a non-consumptive loss.

11.5.4 Comparison of Instantaneous Irrigation Allocation (Qi) with Current Streamflow Conditions

Figure 11-16 shows the total instantaneous water allocation as a percentage of the mean September baseflow at Pateros of 450 cfs. For this analysis, the annual quantity (Qa) was converted to an equivalent instantaneous irrigation allocation (Qi) based on a 6-month growing season. It was assumed that the Qa would be used in equal proportions during each of the 6 months of irrigation. Figure 11-16 shows that more than 1,000 cfs (300%) of the currently observed median September baseflow is allocated to irrigation uses through claims, permits, and certificates. Adjusting for one apparent duplicate claim (See Section 11.1.4), Figure 11-16 indicates that more than 700cfs (250%) of the median observed September streamflow is allocated to irrigation uses.

The following limitations must be considered when comparing allocated water to streamflows:

- This comparison does not include the effects of return flows. As discussed in Section 6, up to 20% of current irrigation diversions may be present in the observed September streamflow as a result of leaking irrigation systems.
- This comparison does not account for all potential duplicate claims;
- Not all of the rights and claims used in the analysis are exercised to the paper or estimated Qa; and
- Not all of the rights and claims used in the analysis may be valid. No estimation of validity was made other than initial screening of the documents listed in the WOB database as not being in good standing.

11.5.5 Comparison of 2 cfs Reservation with Current and Projected Domestic Uses

The 2 cfs reservation is applied as an instantaneous (Qi) quantity on 7 regulatory reaches, for a total of 14 cfs total "domestic" reservation after 1976. A flow rate of 2 cfs is equivalent to about 900 gallons per minute, 470 million gallons per year, or about 1,450 AF/yr. Total domestic reservation in the Methow is therefore in excess of 10,000 AF/yr.

Current residential exempt well use is estimated to be 2,200 AF/yr, or about 22% of the total domestic reservation. Actual consumptive use is estimated to be about 1,340 AF/yr, which accounts for return flows. Actual water use, therefore, indicates that current domestic reservations appear adequate to sustain growth in exempt well use in the Methow basin. The per capita consumptive water use estimates discussed in Section 10, based on measured water use in Twisp, indicates peak August consumptive use of 358 gallons per day per capacity (gpdpc) or .0006 cfs per resident. Applying this use factor, the total domestic reservation of 14 cfs is equivalent to a total population of 25,275 people or 9,950 exempt wells. This is approximately three times the current combined permanent and seasonal resident population. Currently, there are an estimated 3,270 exempt wells in the Methow (see Table 10-12). Using estimates of actual water use, the current 2 cfs domestic reservation could support an additional 6,700 exempt wells.

Current regulatory policy for exempt wells is established at 5,000 gallons per day or 0.0077cfs per household well. Using the exempt well water use factors and applying them to the total domestic reservation of 14 cfs is equivalent to 1,818 exempt wells serving a population of 4,600 people. Currently, there are an estimated 3,270 exempt wells in the Methow (see Table 10-12) used by both permanent and seasonal populations. Using the current regulatory definition of water use, the current 2 cfs domestic reservation has been exceeded. Since there was no physical or technical rationale for the 2 cfs limitation, it is not possible to establish a scientific basis for resolving the discrepancy between the apparent capacity for additional exempt wells based on actual water use and the apparent exceedance in exempt wells based on "regulatory" water use.

Water Rights Database Comparison

GROUNDWATER				
	Number of Documents		Percent of Subtotal	
DOCUMENT TYPE	WOB[a]	GWIS[b]	WOB[a]	GWIS[b]
APPLICATION	134	na	13%	-
CERTIFICATE	205	200	20%	22%
CHANGE/APPLICATION	20	na	2%	-
CHANGE/PERMIT	4	na	0%	-
CLAIM/[c]	9	na	1%	-
CLAIM/L	422	430	40%	48%
CLAIM/S	232	236	22%	27%
PERMIT	25	24	2%	3%
Subtotal GW	**1,051**	**890**	100%	100%
SURFACE WATER				
	Number of Documents		Percent of Subtotal	
DOCUMENT TYPE	WOB[a]	GWIS[b]	WOB[a]	GWIS[b]
APPLICATION	38	na	3%	-
CERTIFICATE	433	412	30%	40%
CHANGE/APPLICATION	146	na	10%	-
CHANGE/PERMIT	126	na	9%	-
CLAIM/[c]	118	na	8%	-
CLAIM/L	513	558	35%	54%
CLAIM/S	60	57	4%	5%
PERMIT	16	15	1%	1%
Subtotal SW	1,450	1,042	100%	100%
TOTAL GW + SW	**2,501**	**1,932**	-	-

Note:
a. WOB Database provided by Ecology August 2001.
a. GWIS database provided by Ecology February 2002. The GWIS database also includes 77 certificates of change and 6 change/permit, without information on source (surface water or groundwater).
b. Claims registered from September 1, 1997 through June 30, 1998 that have not been assigned long or short form. Not included in GWIS database.

na: no records in database, however, most certificates of change in GWIS have source data that can be requested from Ecology.

Summary of Allocated Water

	Subbasin								
	Chewuch	Early Winters[c]	Methow Headwaters	East Lower Methow	West Lower Methow	Middle Methow	Upper Methow	Twisp	Total Basin
Irrigation Surface Water Use (AF)									
Certificates	329	0	1,412	13,723	8,279	6,746	3,594	1,310	35,394
Permits	129	0	35	55	0	0	298	90	607
Long Form Claims	8,821	0	6,920	16,057	2,398	86,473	9,232	92,252	222,152
Short Form Claims	1	0	0	2	3	4	0	1	10
Claims 1998 Registry[a]	214	0	161	7,801	65	205	75	90,490	99,012
Subtotal (AF)	9,494	0	8,528	37,638	10,745	93,428	13,199	184,143	357,175
Percent of Subtotal	3%	0%	2%	11%	3%	26%	4%	52%	100%
Irrigation Groundwater Use (AF)									
Certificates	72	0	371	3,692	1,761	265	776	61	6,998
Permits	404	0	167	220	381	0	0	0	1,172
Long Form Claims	578	0	107	1,366	616	1,223	314	183	4,388
Short Form Claims	3	0	7	7	4	1	4	1	24
Claims 1998 Registry[a]	0	0	0	4	7	13	71	0	95
Subtotal (AF)	1,056	0	652	5,289	2,769	1,502	1,165	244	12,677
Percent of Subtotal	8%	0%	5%	42%	22%	12%	9%	2%	100%
Total Irrigation Use (AF)	**10,551**	**0**	**9,180**	**42,927**	**13,514**	**94,930**	**14,364**	**184,387**	**369,852**
Percent of Total Irrigation Use	**3%**	**0%**	**2%**	**12%**	**4%**	**26%**	**4%**	**50%**	**100%**
Non-Irrigation Surface Water Use (AF)[b]									
Certificates	19	0	3	114	22	17	23	29	228
Permits	0	0	0	4	0	0	0	0	4
Long Form Claims	18	0	2	342	64	101	51	1,088	1,665
Short Form Claims	4	0	2	14	2	1	1	3	26
Claims 1998 Registry[a]	2	0	2	83	1,363	0	5	0	1,454
Subtotal (AF)	42	0	9	556	1,451	120	79	1,120	3,377
Percent Subtotal	1%	0%	0%	16%	43%	4%	2%	33%	100%
Non-Irrigation Groundwater Use (AF)[b]									
Certificates	19	0	2	6,153	125	60	97	47	6,503
Permits	0	0	2	5	0	0	10	3	20
Long Form Claims	55	0	41	446	105	100	57	102	905
Short Form Claims	14	0	7	21	6	12	9	7	73
Claims 1998 Registry[a]	0	0	0	0	0	0	0	0	0
Subtotal (AF/yr)	88	0	51	6,625	236	171	172	158	7,500
Percent Subtotal	1%	0%	1%	88%	3%	2%	2%	2%	100%
Total Non-Irrigation Use (AF/yr)	**130**	**0**	**60**	**7,182**	**1,686**	**291**	**251**	**1,278**	**10,877**
Percent of Total Non-Irrigation Use	**1%**	**0%**	**1%**	**66%**	**16%**	**3%**	**2%**	**12%**	**100%**
TOTAL ALLOCATED USE (AF/yr)	**10,680**	**0**	**9,240**	**50,109**	**15,200**	**95,220**	**14,615**	**185,665**	**380,729**
PERCENT TOTAL ALLOCATED USE	**3%**	**0%**	**2%**	**13%**	**4%**	**25%**	**4%**	**49%**	**100%**

Notes:

a. New claims in the 1998 registry have not been assigned a long or short designation but have Qa designated on the claim form.

b. Includes domestic, municipal, stock watering, commercial-industrial, mining, and other consumptive uses. Does not include non-consumptive uses (fish propagation, fire suppression, or power).

c. Aggregated in Methow Headwaters.

Summary of Certificates and Permits

	Subbasin								
	Chewuch	Early Winters[b]	Methow Headwaters	East Lower Methow	West Lower Methow	Middle Methow	Upper Methow	Twisp	Total Basin
Groundwater Certificates (AF/yr)	91	0	373	9,845	1,886	325	873	108	13,501
Groundwater Permits (AF/yr)	404	0	169	225	381	0	10	3	1,192
Subtotal (AF/yr)	495	0	542	10,070	2,267	325	883	111	14,693
Surface Water Certificates (AF/yr)	348	0	1,415	13,837	8,301	6,763	3,618	1,340	35,622
Surface Water Permits (AF/yr)	129	0	35	59	0	0	298	90	611
Subtotal (AF/yr)	477	0	1,450	13,896	8,301	6,763	3,916	1,430	36,233
Total (AF/yr)	**972**	**0**	**1,992**	**23,967**	**10,568**	**7,088**	**4,798**	**1,540**	**50,926**

Note:

a. Includes domestic, municipal, stock watering, commercial-industrial, mining, and other consumptive uses. Does not include non-consumptive uses (fish propagation, fire suppression, or power).

b. Aggregated in Methow Headwaters.

Summary of Claims

Document Type	Subbasin								Total Basin
	Chewuch	Early Winters[c]	Methow Headwaters	East Lower Methow	West Lower Methow	Middle Methow	Upper Methow	Twisp	
Groundwater Short Form Claims (AF/yr)	17	0	13	27	9	13	12	7	97
Groundwater Long Form Claims (AF/yr)	632	0	148	1,813	722	1,322	371	285	5,293
Groundwater Claims 1998 Registry[a] (AF/yr)	0	0	0	4	7	13	71	0	95
Subtotal (AF/yr)	649	0	161	1,844	738	1,348	454	292	5,484
Surface Water Short Form Claims (AF/yr)	5	0	2	16	5	5	1	3	36
Surface Water Long Form Claims (AF/yr)	8,839	0	6,922	16,399	2,462	86,574	9,282	93,340	223,818
Surface Water Claims 1998 Registry[a] (AF/yr)	216	0	163	7,884	1,428	205	80	90,490	100,466
Subtotal (AF/yr)	9,060	0	7,087	24,298	3,895	86,784	9,363	183,833	324,319
Total (AF/yr)	9,709	0	7,248	26,142	4,632	88,132	9,816	184,125	329,804

Notes:

a. New claims in the 1998 registry have not been assigned a long or short designation but have Qa designated on the claim form.

b. Includes domestic, municipal, stock watering, commercial-industrial, mining, and other consumptive uses. Does not include non-consumptive uses (fish propagation, fire suppression, or power).

c. Aggregated in Methow Headwaters.

TABLE 11-5

Methow Basin Adjudication Summary

Ecology Adjudication No.	Adjudication Name	State of Washington v.	County Cause Number	Completion Date	C = Complete I = Incomplete	Number of Settlements	Total (cfs)	Irrigated Acreage	Total Average Water Duty (acres/cfs) [a]
37	Bear Creek/Davis Lake	Oertel	7544	5/14/1930	C	11	5.27	270	n/a[b]
7	Beaver Creek	Thurlow		9/20/1921	C	42	-	1540.805	n/a
33	Black Canyon Creek	Logue	6934	6/20/1929	C	7	2.32	116	n/a
32	Gold Creek	Countryman	7076	5/7/1929	C	25	17.17	555	32
8	Libby Creek	Peterson	3934	11/18/1921	C	14	16.41	685.1	42
11	McFarland Creek	Stennis	4421	11/16/1922	C	9	4.76	184.2	39
e	Thompson Creek	T.D. Johnson	6410	--------	I	9	5.08	254	n/a
74	Wolf Creek (1984)	Holmes	18498	3/13/1984	C	10	66.52	4299.42	Variable

[a] Total duty inlcudes irrigation application duty of 50 acres/cfs plus average conveyance losses.

[b] No conveyance losses allocated.

All cases held in Okanogan County Court.

An irrigation application duty of 50 acres was assigned in all cases.

TABLE 11-6

Minimum Base Flow Requirements in the Methow River Basin (cfs)

Day/Month	Lower Methow	Middle Methow	Upper Methow	Methow Headwaters	Early Winters Creek	Chewuch River	Twisp River
1-Jan	350	260	120	42	10	56	34
15-Jan	350	260	120	42	10	56	34
1-Feb	350	260	120	42	10	56	34
15-Feb	350	260	120	42	10	56	34
1-Mar	350	260	120	42	10	56	34
15-Mar	350	260	120	42	10	56	34
1-Apr	590	430	199	64	14	90	60
15-Apr	860	650	300	90	23	140	100
1-May	1300	1000	480	130	32	215	170
15-May	1940	1500	690	430	108	290	300
1-Jun	2220	1500	790	1160	290	320	440
15-Jun	2220	1500	790	1160	290	320	440
1-Jul	2150	1500	694	500	125	292	390
15-Jul	800	500	240	180	45	110	130
1-Aug	480	325	153	75	20	70	58
15-Aug	300	220	100	32	8	47	27
1-Sep	300	220	100	32	8	47	27
15-Sep	300	220	100	32	8	47	27
1-Oct	360	260	122	45	11	56	35
15-Oct	425	320	150	60	15	68	45
1-Nov	425	320	150	60	15	68	45
15-Nov	425	320	150	60	15	68	45
1-Dec	390	290	135	51	12	62	39
15-Dec	350	260	120	42	10	56	34

Streams and Lakes Closed to Further Consumptive Use

Streams (including tributaries)	**Lakes**
Wolf Creek	Alta Lake
Bear Creek	Black Lake
Thompson Creek	Crater Lake
Beaver Creek	Davis Lake
Alder Creek	Eagle & Upper Eagle Lakes
Benson Creek	French Lake
Texas Creek	Libby Lake
Libby Creek	Louis Lake
Cow Creek	Middle & West Oval Lakes
Gold Creek	North Lake
McFarland Creek	Patterson Lake
Squaw Creek	Pearrygin Lake
Black Canyon Creek	Slate Lake
French Creek	Sunrise Lake

Note:
Includes groundwater in hydraulic continuity with listed surface water bodies.)

Regulatory Base Flow Excursion Summary

	Methow at Pateros	Methow at Twisp	Methow at Winthrop	Twisp nr Twisp	Cheuwch at Winthrop	Methow abv Goat Creek
Period of Record	01/04/1959 - 09/30/2000	06/01/1919 - 09/30/1929, 10/01/1933 - 09/30/1962, 4/10/1991-9/30/2000	01/01/1912 - 10/31-1912, 08/01/1971 - 06/30/1972, 11/10/1989 - 09/30/2000	05/01/1975 - 09/30/1979, 10/01/1989 - 09/30/2000	10/01/1991 - 09/30/2000	04/20/1991 - 09/30/2000
Days in Record	21576	17829	5085	6560	5081	3919
Days Below Regulatory Baseflow Levels	5534	4421	65	1515	775	1901
Number of Continuous Excursions of Regulatory Baseflow Levels	375	285	7	289	418	37
Percent of Record Below Regulatory Baseflow Levels	26%	25%	1%	23%	15%	49%
Max Continuous Days Below Regulatory Baseflow Levels	132	132	27	157	87	211
Average Continuous Days Below Regulatory Baseflow Levels	15	16	9	5	2	51