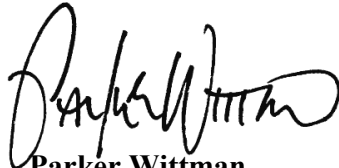


MEMORANDUM

Project No.: 180620

March 19, 2019

To: Methow Watershed Foundation



From: **Parker Wittman**
Director of Professional Services
pwittman@aspectconsulting.com

Re: **2019 WRIA 48 IFR Database Update**

In 2011, Aspect Consulting, LLC (Aspect) received authorization from the Methow Watershed Foundation (MWF) under Washington State Department of Ecology (Ecology) Grant No. G0900100 to develop an Instream Flow Reservation tracking database (IFR Database) for use by the Methow Watershed Council (MWC). The primary objective of the IFR Database was to identify existing and potential future developable parcels in each of seven stream management reaches (reaches) subject to the Methow River Instream Flow Rule (Rule) established by WAC 173-548. The Rule established a reservation of two cubic feet per second (cfs) of water in each reach for future single domestic and stockwater uses (Reserve).

In practice, the IFR Database system functions like an analytical model, processing several input datasets in conjunction with one another to make an estimate of existing and potential future developable parcels.

Since the 2011 release of the IFR Database, nearly all these input datasets have changed, both in content and in form. Changes in data content lead to changes in estimates and interpretation. Changes in data format or content/organization in the input datasets rendered some of the automated components in the IFR Database non-functional, without some modification. To perform this update, MWC contracted Aspect to:

1. Conduct a refresh of the underlying data
2. Make minor modifications to the IFR Database system itself, as required to support changes to the input data
3. Update the summary Reserve accounting for each of the seven stream management reaches under current and buildout development conditions
4. Provide recommendations for future improvements or modifications to the IFR Database.

Aspect did not make changes to the underlying assumptions or logic built in to the IFR Database system.

This memorandum summarizes the results of the four work elements noted above.

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Data Update

Aspect Consulting updated most of the critical data sources in the IFR system, as outlined in the following table.

Data Set	Update	Source	Source Data Date	Processing Steps or notable changes/modifications
Parcels	Yes	Okanogan County Assessor (GIS Website)	1/14/2019	<ul style="list-style-type: none"> Extracted parcels in Methow Basin (using IFR System Tools)
Public Water System Service Areas	Yes	WA DOH (via public records request https://sft.wa.gov/)	1/7/2019	<ul style="list-style-type: none"> Extracted service areas in Methow Basin Reviewed system source records to look for new or removed Group A or larger Group B (> 6 connections) systems Add delineations of Group B Systems based on parcel and/or water right records Reviewed 2011-vintage service area boundaries against updates data sources (parcels, source locations, water rights) Reprojected data from NAD83 HARN State Plane Washington South to NAD27 State Plane Washington North.
Public Water System Source Locations	Yes	WA DOH (via public records request https://sft.wa.gov/)	1/7/2019	<ul style="list-style-type: none"> Extracted sources in Methow Basin Reprojected data from NAD83 HARN State Plane Washington South to NAD27 State Plane Washington North.
Well Logs	Yes	WA Ecology (GIS Website)	1/17/2019	<ul style="list-style-type: none"> Extracted well log locations in Methow Basin Reprojected data from NAD83 HARN State Plane Washington South to NAD27 State Plane Washington North
Reaches	No			
Closed Basins	Yes	"Methow Groundwater Restricted Areas". Email from Nicholas Riddle (WA Ecology)	1/15/2019	None
Irrigation Districts	Yes	MVID/Aspect Consulting	2017	<ul style="list-style-type: none"> Updated Methow Valley Irrigation District Parcels from MVID fee roll (which was updated by Aspect in 2015 and 2017)
Town Areas	No			
Zoning/Zoning Codes	Yes	Okanogan County Assessor (GIS) - via Gene Wylson email	7/26/2016	<ul style="list-style-type: none"> Extracted data in Methow Basin. Zoning codes within the basin had been updated considerably in the subsequent eight years since the original IFR database update. Aspect conducted a brief (but necessary) review of the Okanogan County Code Title 17A (Final Draft Adopted on July 26, 2016 by Ordinance 2016-4) to update the Zoning Code lookup table in the IFR Database to reflect the updated zones in the basin. This review included an updated interpretation of minimum lot size and equivalent residential units (ERU) by zone.
Water Bodies	No			

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Data Set	Update	Source	Source Data Date	Processing Steps or notable changes/modifications
Methow Conservancy Conservation Easements	Partial	Okanogan County - via Gene Wyllson email	1/22/2019	
Pre-1994 Building Permits	No			
Post-1994 Building Permits	Yes	Okanogan County - via Gene Wyllson email	1/22/2019	<ul style="list-style-type: none">Manually imported data from Access database provided by Okanogan County ("Table1") into the IFR Database, overwriting the older version.
DOR Code Lookup Table	No			
Water Right Places of Use	Yes	WA Ecology (GIS Website/GWIS)	1/31/2019	<ul style="list-style-type: none">Extracted POUs in Methow BasinReprojected data from NAD83 HARN State Plane Washington South to NAD27 State Plane Washington NorthDownloaded WRTS data from Secure Access Washington (via special, non-public access) to join in full water right table data to POUs.
Water Right Points of Diversion/Withdrawal	Yes	WA Ecology (GIS Website/GWIS)	1/31/2019	<ul style="list-style-type: none">Extracted points in Methow BasinReprojected data from NAD83 HARN State Plane Washington South to NAD27 State Plane Washington NorthDownloaded WRTS data from Secure Access Washington (via special, non-public access) to join in full water right table data to PODs.
On-Site Septic Parcels	No			
Parcels with Water Adequacy Certificates	No			

Changes to the IFR Database System

No major changes were needed or warranted in the IFR database system to support refreshing the underlying IFR Data. In general—and where possible—data sets were updated (modified) to be consistent with the formats expected by the IFR system. However, several small modifications were necessary to support changes to field names in underlying datasets. Noteworthy changes are listed below.

1. The IFR system included a number of non-critical links to website references or other online resource. Where possible, URLs were updated to reflect the new locations of these reference or resources. In some cases (such as links to Water Rights or Well Log records on Washington State Department of Ecology (Ecology) websites), these links were removed, since no viable replacement was possible—at least within the budgetary constraints of this project.
2. Closed Basins provided by Ecology used “BasinName” rather than “Name” for each basin record. The IFR Esri ArcGIS Toolbox tool “02 Analysis - Assign Closed Basins to Parcels” was updated to reflect this change.
3. The field names in Water Rights data (WRTS) provided by Ecology were drastically different than the similar data in 2011. The IFR database system interface (fifth tab: “Water Rights”) had to be rebuilt/modified to conform to these changes. Relatedly, the Esri ArcGIS

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Toolbox tool “07 Analysis - Associate Water Rights to Parcels” had to be rebuilt to support these changes. Since an updated Reserve accounting did not rely explicitly on this water rights data, further possible updates/refinements we’re not undertaken.

Update of Reserve Accounting

Results of the IFR Database update are shown in Tables 1 through 5.

1. Table 1 - Development Years from Building Permit Database by Subbasin

It is notable that—per the updated building permit database from the Okanogan County Assessor—the number of relevant building permits identified in the seven subbasins *went down* for the years 1995 to 2010 (by 49 parcels). Presumably, this is due to data refinements and cleanup on the part of data stewards at the County, but further detailed scrutiny would be required to better interpret this change.

2. Table 2 - Estimated Existing Exempt Well Parcels Subject to the Instream Flow Rule

In total, the IFR Database system identifies 2,749 parcels estimated to have exempt wells subject to the Instream Flow Rule. This is only an increase of 19 parcels (+0.7%) from the 2011 update. This small net change is likely the result of improvements and refinements to the underlying dataset (particularly parcels), correcting for a slight *overestimate* in 2011.

The modest *total* increase is due, almost exclusively, to a notable reduction in the number of exempt well parcels estimated in the Lower Methow Reach (17% decrease, -64 parcels). It appears that this discrepancy has something to do with the refinements/changes to the building permit database and DOR/land use codes in the parcel database. There are 182 *fewer* parcels in the Reach with unknown development dates. This suggests that either building permit data was updated with improved date data or (more likely) that parcel that had been flagged as developed, based on (exclusively) their land use codes, are no longer flagged as such. This suggests an improved estimate.

It is also possible that wild fires in the basin over the past eight years—and the subsequent cycle of redevelopment—have something to do with these discrepancies. For example, parcels with pre-Rule development dates may now have post-Rule development dates as a result of a new building permit.

3. Table 3 - Estimated Exempt Well Parcels Subject to the Instream Flow Rule at Full Buildout

4. Table 4 - Estimated Exempt Well Parcels Subject to the Instream Flow Rule at Buildout with Current Parcel Size (Reduced Buildout)

5. Table 5 - Estimated Exempt Well Parcels Subject to the Instream Flow Rule at Full Buildout - Assuming No Additional Development within Closed Basins

Tables 3 through 5 above show a notable reduction in the estimated number of exempt well parcels at buildout. In “full buildout” conditions, the IFR system is now estimating 24,894 exempt well parcels basin-wide (down from 32,625 in the 2011 estimate). In particular, the Lower Methow Reach full buildout estimate is down by about 9,000 parcels, while estimates in the Headwaters (+100) and Upper Methow (+2000) have increased. These changes are likely the result of two key factors: (1) updated zoning boundaries/zoning codes and (2) updated land use codes (DOR Codes) that change whether a parcel is considered developable by the IFR database.

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Without further refinement to the input assumptions around what is or is not developable land—and further review of county zoning regulations as they relate to buildout—these buildout estimates should be evaluated further. They are reflective, quite conservatively, of what is *allowable* under zoning code, not what is likely under present and future economic conditions.

6. Table 6 - Estimated Maximum Consumptive Use Rate under the Reservation, Current Conditions

This table provides an accounting of water use debiting the Reserve. It is an update of Table 1 from Aspect’s June 2011 *Evaluation of Reservation Quantities Established by Chapter 173-548 WAC under Current and Potential Future Buildout Scenarios*.

Reserve Accounting: Comparison to Other Methods of Estimating Change in Exempt Wells, 2011 to 2018

Ecology’s guidance document, *ESSB 6091 - Recommendations for Water Use Estimates* (April 2018), suggests three methods for estimating increases in exempt wells, by basin. The first method suggested is much like that employed by the IFR Database System: analysis by parcels/building permits/zoning/buildout. As a quality control step, Aspect conducted a limited analysis by the other two methods suggested by ESSB 6091: well logs records and population projection.

Increase in Well Log Records:

Aspect aggregated GIS water well records in Ecology’s Well Log Database by reach, comparing the number of records with a completion date before 1/1/2011 to the number after 1/1/2011. The results were as follows:

Reach	Number of New Water Well Log Records Since 1/1/2011	Water Well Log Records from Before 2011	% Change
Headwaters	14	309	5%
Early Winters	2	17	12%
Upper Methow	54	583	9%
Chewuch	40	437	9%
Middle Methow	41	427	10%
Twisp River	33	257	13%
Lower Methow	178	1165	15%
Total	362	3195	11%

Population Growth:

Washington State’s Office of Financial Management’s (OFM) Small Area Estimates Program (SAEP) provides detailed, year-over-year estimates of population and housing unit growth for census areas and other areas of statewide significance. This data can be used to make regional/area estimates of population or housing unit change between various years. This data suggests an overall increase of 353 housing units in the Methow Watershed between 2011 (4,947 units) and 2018 (5,299 units)—or an overall increase of 7%.

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Further work could be performed to refine these estimates by subbasin, both inside and outside of public water service area boundaries—which would provide a clearer picture of OFM estimates as they relate to Reserve accounting.

Recommendations for Future Improvements and/or Modifications

MWC may be interested in continuing to refine its exempt well accounting and forecasting/estimates in the Methow Basins. Additionally, MWC may consider changes to the underlying tracking system to match its contemporary business needs, constraints, or objectives. To that end, Aspect would recommend the following changes or follow-on efforts.

1. **Lock-in “modelled” estimates and begin refining interpretation, parcel-by-parcel.** At a certain point, the inherent uncertainty/error of a model-based approach (estimating parcel development/water source status based on ancillary data sets) will reach a point of limited usefulness compared to the scale of the Reserve and the overall rate of development. Aspect recommends that MWC consider refining the model assumptions and inputs to a certain satisfactory point—and then begin to review the data, parcel-by-parcel, to “lock-in” known exempt well parcels. After this period of review, only newly developed parcel would need to be tracked/added. Further, the overall complexity of the system would be greatly reduced.
2. **Move IFR Database system to preferred/modern software platforms.** Much has changed in the viable GIS/database technology offerings over the past eight years. It would now be possible—and likely preferable—to migrate the datasets, maps, and scripts, to an open data platform such as QGIS/PostGIS (or a fully web-based utility). This would unencumber the IFR system from its reliance on paid/proprietary software (ArcGIS/Access) and provide greater flexibility to MWC moving forward. Additionally, both ArcMap and Access are almost certain to be depreciated by Esri and Microsoft in the next 5 to 10 years (and perhaps sooner)—so to the extent MWC envisions using the IFR system beyond a 5-year horizon, a system migration would be imperative.

In this scenario, Aspect would recommend an overall simplification of the system in scope and complexity. This would be especially possible in conjunction with the recommendations in #1 above.

3. **Refine buildout assumptions and interpretation.** The future buildout estimates would benefit from increased scrutiny on assumptions in the zoning data. Further, it would be possible to exclude areas for buildout based on other physical considerations (steep slopes, hazards areas, etc.). Additionally, refined population estimates (such as those from OFM based on external socio-economic drivers and historic trends) could be incorporated to forecast estimated time horizons for constraints on the Reserve—which may help put the effort in refining contemporary estimates in perspective.
4. **Update consumptive use estimates per ESSB 6091.** Ecology’s guidance document, *ESSB 6091 - Recommendations for Water Use Estimates (April 2018)* suggests a value of 10% for indoor consumptive use (as opposed to the 30% used in prior Methow Basin estimates). This and other input assumptions around consumptive use estimates could be reevaluated to further refine MWC’s Reserve accounting.

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Limitations

Work for this project was performed for the Methow Watershed Foundation (Client), and this memorandum was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This memorandum does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Attachments

- Table 1 - Development Years from Building Permit Database by Subbasin
- Table 2 - Estimated Existing Exempt Well Parcels Subject to the Instream Flow Rule
- Table 3 - Estimated Exempt Well Parcels Subject to the Instream Flow Rule at Full Buildout
- Table 4 - Estimated Exempt Well Parcels Subject to the Instream Flow Rule at Buildout with Current Parcel Size (Reduced Buildout)
- Table 5 - Estimated Exempt Well Parcels Subject to the Instream Flow Rule at Full Buildout - Assuming No Additional Development within Closed Basins
- Table 6 - Estimated Maximum Consumptive Use Rate under the Reservation, Current Conditions

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TABLES

Table 1 - Development Years from Building Permit Database by Subbasin

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2011 Report: Building Permits by Reach/Year

Year	Chewuch	Headwaters	Early Winters	Lower Methow	Middle Methow	Twisp River	Upper Methow	Total
1975	1	6	0	4	0	1	2	14
1976	5	2	0	11	6	0	3	27
1977	1	2	0	13	1	6	1	24
1978	3	2	0	13	6	4	7	35
1979	1	3	0	10	6	3	3	26
1980	3	3	0	10	9	1	6	32
1981	3	1	0	6	6	2	4	22
1982	2	1	0	12	6	3	6	30
1983	6	2	0	14	9	2	1	34
1984	6	2	0	10	12	1	5	36
1985	11	2	0	15	8	4	11	51
1986	5	4	0	13	10	1	8	41
1987	4	2	0	10	3	3	6	28
1988	3	0	0	9	4	5	10	31
1989	3	2	0	16	3	7	12	43
1990	5	3	0	19	12	2	12	53
1991	16	5	0	17	10	6	18	72
1992	15	3	0	19	15	5	15	72
1993	6	5	0	20	14	12	11	68
1994	6	11	0	11	12	3	22	65
1995	8	9	0	16	15	6	19	73
1996	13	7	0	17	14	6	18	75
1997	11	9	0	14	9	5	17	65
1998	7	10	0	11	8	7	15	58
1999	13	14	0	15	10	6	31	89
2000	10	14	0	11	16	6	27	84
2001	9	13	0	16	16	7	31	92
2002	5	10	0	20	6	9	14	64
2003	8	9	0	16	14	4	30	81
2004	21	13	0	16	10	1	29	90
2005	7	26	0	32	16	6	38	125
2006	11	15	0	23	15	7	26	97
2007	6	16	0	38	11	3	27	101
2008	7	12	0	25	18	8	19	89
2009	4	11	0	19	6	7	12	59
2010	6	9	0	14	8	4	23	64
No Date	11	12	0	18	6	10	13	70
Total	262	270	0	573	350	173	552	2180
Permits: 1995 to 2010	146	197	0	303	192	92	376	1306

Reaches/years shown in yellow shaded cells saw a REDUCTION in the number of building permits
 Reaches/years shown in blue shaded cells saw an INCREASE in the number of building permits

Table 1 - Development Years from Building Permit Database by Subbasin

WRIA 48 IFR Database Update Technical Memorandum 2019

Updated (2019) Building Permits by Reach/Year

Year	Chewuch	Headwaters	Early Winters	Lower Methow	Middle Methow	Twisp River	Upper Methow	Total
1975	1	6	0	4	0	1	2	14
1976	5	2	0	11	6	0	3	27
1977	1	2	0	13	1	6	1	24
1978	3	2	0	13	6	4	7	35
1979	1	3	0	10	6	3	3	26
1980	3	3	0	10	9	1	6	32
1981	3	1	0	6	6	2	4	22
1982	2	1	0	12	6	3	6	30
1983	6	2	0	14	9	2	1	34
1984	6	2	0	10	12	1	5	36
1985	11	2	0	15	8	4	11	51
1986	5	4	0	13	10	1	8	41
1987	4	2	0	10	3	3	6	28
1988	3	0	0	9	4	5	10	31
1989	3	2	0	16	3	7	12	43
1990	5	3	0	19	12	2	12	53
1991	16	5	0	17	10	6	18	72
1992	15	3	0	19	15	5	15	72
1993	6	5	0	20	14	12	11	68
1994	6	11	0	11	12	3	22	65
1995	8	8	0	15	14	6	18	69
1996	13	7	0	16	14	6	17	73
1997	10	8	0	13	9	5	17	62
1998	6	9	0	10	8	6	15	54
1999	13	14	0	15	8	4	29	83
2000	10	13	0	9	15	6	23	76
2001	9	13	0	16	16	7	31	92
2002	6	10	0	20	6	8	15	65
2003	9	9	0	17	14	3	28	80
2004	21	12	0	14	10	1	30	88
2005	5	26	0	32	16	5	37	121
2006	11	15	0	22	15	7	24	94
2007	6	18	0	37	11	3	25	100
2008	7	13	0	24	16	8	19	87
2009	4	10	0	16	5	6	12	53
2010	6	9	0	11	8	4	22	60
2011	5	7	1	16	10	4	10	53
2012	4	5	0	6	6	3	16	40
2013	7	7	0	14	11	1	11	51
2014	9	19	0	58	10	3	15	114
2015	3	12	0	44	11	6	14	90
2016	5	12	0	28	3	11	18	77
2017	1	24	0	19	12	2	23	81
2018	5	12	0	25	9	1	19	71
No Date	14	15	0	27	8	8	18	90
Total	288	353	1	749	409	187	651	2638

New Permits: 2011 to 2018

Permits: 1995 to 2010

39	98	1	210	72	31	126	577
144	194	0	287	185	85	362	1257

Table 2 - Estimated Existing Exempt Well Parcels Subject to the Instream Flow Rule

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<i>Reach</i>	<i>2011 Exempt Well Parcels with Known Post-Rule Development Date</i>	2019 Exempt Well Parcels with Known Post-Rule Development Date	<i>2011 Exempt Well Parcels with Unknown Development Date</i>	2019 Exempt Well Parcels with Unknown Development Date	Estimated Percent Developed After 1976	<i>2011 Total Estimate of Developed Exempt Well Parcels</i>	2019 Total Estimate of Developed Exempt Well Parcels	% Change
Headwaters	137	173	111	109	75%	220	255	26%
Early Winters	0	0	0	0	75%	0	0	NA
Upper Methow	271	312	261	253	75%	467	502	13%
Chewuch	213	234	270	250	75%	415	422	3%
Middle Methow	220	256	248	211	75%	406	414	4%
Twisp River	122	131	188	173	75%	263	261	-2%
Lower Methow	380	453	772	590	75%	959	895	-17%
TOTAL	1343	1559	1850	1586		2730	2749	1%

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Notes:

Does not account for permit-exempt stock watering wells on otherwise undeveloped parcels.

Table 3 - Estimated Exempt Well Parcels Subject to the Instream Flow Rule at Full Buildout

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<i>Reach</i>	<i>2011: Total Exempt Well Parcels at Full Buildout</i>	Total Exempt Well Parcels at Full Buildout¹	<i>2011: Exempt Well Parcels not in Public Water System Service Areas or Conservation Easements at Full Buildout</i>	Exempt Well Parcels not in Public Water System Service Areas or Conservation Easements at Full Buildout	<i>2011: Current Buildout Residences Agreed to in Conservation Easements</i>	Current Buildout Residences Agreed to in Conservation Easements²	<i>2011: Estimated Self-Supplied Parcels in Public Water System Service Areas³</i>	Estimated Self-Supplied Parcels in Public Water System Service Areas³
Headwaters	953	845	739	639	48	48	166	158
Early Winters	4	4	1	1	3	3	0	0
Upper Methow	1948	3800	1811	3591	25	52	112	157
Chewuch	1291	1151	1162	1117	30	31	99	3
Middle Methow	1618	1592	1280	1354	34	53	304	185
Twisp River	678	644	644	604	31	37	3	3
Lower Methow	26133	16858	25834	16502	10	23	289	333
TOTAL	32625	24894	31471	23808	181	247	973	839

Notes:

¹ Assumes existing zoning applies.

² Only existing conservation easements were addressed as the number and nature of future easements was not predicted.

³ Self-supplied parcels within water system service area boundaries address conditions when the number of parcels in a service area exceed the number of connections currently approved by WDOH. This conservatively assumes that water systems will not expand their number of approved connections leaving the balance to be self-supplied.

Table 4 - Estimated Exempt Well Parcels Subject to the Instream Flow Rule at Buildout with Current Parcel Size (Reduced Buildout)

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<i>Reach</i>	<i>2011: Total Exempt Parcels at Reduced Buildout (no parcel subdivision)</i>	Total Exempt Parcels at Reduced Buildout (no parcel subdivision)¹	<i>2011: Exempt Well Parcels not in Public Water System Service Areas or Conservation Easements at Reduced Buildout</i>	Exempt Well Parcels not in Public Water System Service Areas or Conservation Easements at Reduced Buildout	<i>2011: Current Buildout Residences Agreed to in Conservation Easements</i>	Current Buildout Residences Agreed to in Conservation Easements²	<i>2011: Estimated Self-Supplied Parcels in Public Water System Service Areas³</i>	Estimated Self-Supplied Parcels in Public Water System Service Areas³
Headwaters	697	705	483	499	48	48	166	158
Early Winters	4	4	1	1	3	3	0	0
Upper Methow	1069	1116	932	907	25	52	112	157
Chewuch	937	823	808	789	30	31	99	3
Middle Methow	1131	1011	793	773	34	53	304	185
Twisp River	512	507	478	467	31	37	3	3
Lower Methow	2913	2914	2614	2558	10	23	289	333
TOTAL	7263	7080	6109	5994	181	247	973	839

Notes:

¹ Assumes existing zoning applies.

² Only existing conservation easements were addressed as the number and nature of future easements was not predicted.

³ Self-supplied parcels within water system service area boundaries address conditions when the number of parcels in a service area exceed the number of connections currently approved by WDOH. This conservatively assumes that water systems will not expand their number of approved connections leaving the balance to be self-supplied.

Table 5 - Estimated Exempt Well Parcels Subject to the Instream Flow Rule at Full Buildout - Assuming No Additional Development within Closed Basins

WRIA 48 IFR Database Update Technical Memorandum 2019

<i>Reach</i>	<i>2011: Total Exempt Wells at Buildout</i>	Total Exempt Wells at Buildout¹	<i>2011: Exempt Well Parcels not in Public Water Service Areas or Conservation Easements at Buildout</i>	Exempt Well Parcels not in Public Water Service Areas or Conservation Easements at Buildout	<i>2011: Current Buildout Residences Agreed to in Conservation Easements</i>	Current Buildout Residences Agreed to in Conservation Easements²	<i>2011: Estimated Self-Supplied Parcels in Public Water System Service Areas</i>	Estimated Self-Supplied Parcels in Public Water System Service Areas³
Headwaters	953	845	739	639	48	48	166	158
Early Winters	4	4	1	1	3	3	0	0
Upper Methow	1887	3118	1766	3009	25	52	96	57
Chewuch	1290	1080	1161	1046	30	31	99	3
Middle Methow	1300	1009	992	953	34	53	274	3
Twisp River	678	644	644	604	31	37	3	3
Lower Methow	16912	12795	16622	12530	10	23	280	242
TOTAL	<i>23024</i>	19495	<i>21925</i>	18782	<i>181</i>	247	<i>918</i>	466

Notes:

¹ Assumes existing zoning applies.

¹ Only existing conservation easements were addressed as the number and nature of future easements was not predicted.

² Self-supplied parcels within water system service area boundaries address conditions when the number of parcels in a service area exceed the number of connections currently approved by WDOH. This conservatively assumes that water systems will not expand their number of approved connections leaving the balance to be self-supplied.

**Table 6 - Estimated Maximum Consumptive Use Rate under the Reservation,
Current Conditions¹**

WRIA 48 IFR Database Update Technical Memorandum 2019

Stream Management Reach	Estimated Developed Residential Parcels Currently Subject to the Rule	Estimated Maximum Month Consumptive Use Rate per Parcel (gpd)	Aggregate Maximum Month Consumptive Use Rate (gpd)	Aggregate Maximum Month Consumptive Use Rate Instantaneous (cfs)	Remaining Reservation (cfs)
Headwaters	255	710	181,050	0.28	1.72
Early Winters	0	710	0	0.00	2.00
Upper Methow	502	710	356,420	0.55	1.45
Chewuch	422	710	299,620	0.46	1.54
Middle Methow	414	710	293,940	0.45	1.55
Twisp River	261	710	185,310	0.29	1.71
Lower Methow	895	710	635,450	0.98	1.02
TOTAL	2,749	---	1,951,790	3.01	10.99

Notes:

Chapter 173-548 of the Washington Administrative Code (WAC) establishes reservation a 2 cfs of water per stream management reach for future single domestic and stock water uses.

Maximum month consumptive use is from the *Water Withdrawal Study* (Aspect, 2011a) and accounts for indoor, irrigation, and stock water uses.

gpd - gallons per day

cfs - cubic feet per second

¹ Parcels with exempt wells that serve water only for stock (without home) are not included.