

Island County Water Resource Management Plan

2514 Watershed Planning - - - Adopted June 20, 2005

Appendix B: Estimation of Recorded Water Rights and Claims

DATE: April 18, 2002
TO: Island County Water Resource Advisory Committee
FROM: K-Y Su, Dave Nazy and Geoff Tallent, State Department of Ecology
SUBJECT: Estimation of Recorded ("Paper") Water Rights and Claims in WRIA 6

Purpose

The purpose of this memo is to provide an estimate of amount of water represented in the paper record of certificated, permitted, and claimed water rights (hereafter referred to as paper rights) in Island County/WRIA 6. These estimates are to be used in partial fulfillment of the requirements of the Watershed Planning Act (RCW 90.82).

Key Findings

The estimated paper record of water rights in Island County represents an annual quantity of 49,000 acre-feet per year (AF/yr). Just over half of this quantity of water has been allocated through certificated water rights. An estimated 45% of the quantity represented by the paper record is contained in claims.

The estimated paper record is 389% or almost four times greater than the Early Action Plan's estimated actual use of 12,600 AF/yr. The paper record also represents a significant portion (over 75%) of the EAP's estimated countywide recharge.

The paper record is of uncertain validity and precision, but must be considered by watershed planning efforts and the state when making decisions on water management and allocation. Regardless of the degree of accuracy of these documents, the paper record suggests that a significant portion of Island County's water resources have been allocated by Ecology or claimed by the public.

Background

Island County, as part of its required tasks under the Watershed Planning Act, RCW 90.82, must make: "an estimate of the water in the management area represented by claims in the water rights claims registry, water use permits, certificated rights... and any other rights to water." This estimate has been prepared by the Department of Ecology, with the Island County Planning Unit's concurrence, as technical assistance to the watershed planning effort.

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The paper water rights record is fragmented. Partial information is contained in an easily manipulated database. Other information is contained only in the original paper record. To develop a precise accounting of the paper record would require a time consuming review of the original records. For watershed planning purposes estimation, rather than precise accounting, is adequate. To that end, this analysis is comprised of a partial accounting of the actual record along with estimations based on sampling, analogous records, and professional judgment.

In addition to the fragmented record, paper water rights are known to overstate actual water use. The magnitude of the overstatement is not known. The purpose of this analysis is to reasonably estimate the quantity of water represented by paper rights, regardless of whether those quantities are being used. These estimates can then be compared against actual use estimates being prepared by the Island County Planning Unit. This study is not intended to verify the validity or accuracy of the reported quantities in the paper records.

Estimates

The principal data source for estimating the quantity of water represented by paper rights is the Department of Ecology's Water Rights Application Tracking System (WRATS) database. The most important information for making an estimate of water use is the quantity withdrawn annually (Q_a), which is usually defined in units of acre-feet per year (AF/yr). All Island County/WRIA 6 certificates, permits, and claims were queried out of the May 2001 WRATS database into a spreadsheet, which allowed sorting and grouping by various parameters including purpose, size (or absence) of Q_a , and document type.

The WRATS database does not contain a complete record of Q_a for all paper rights. For the complete records, it is assumed that the data in WRATS are a sufficiently accurate record of the paper documents. Occasional errors are known to occur in WRATS, but validating the accuracy of the Island County/WRIA 6 records is beyond the scope of this effort. For the incomplete records estimations must be made.

Different estimation techniques were used for the various categories of paper rights. Each is discussed below. Attachment 1 contains a summary spreadsheet of the estimation.

Permits and Certificates

Data Characteristics

Approximately 90 % of the permits and certificates in the WRATs database have Q_a values. The remaining 10% do not contain Q_a values in WRATs or the original paper record, but nearly all of these 10% had Q_i (instantaneous flow, typically as gallons per minute) data.

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Estimation Method

For the rights with Qa reported, the Qa's were summed. For the rights without Qa reported, the Qa was estimated from the reported Qi. The Qi tends to be closely related to Qa within use categories in the complete records (correlation coefficients in the .59 to .86 range). A Qa to Qi conversion factor was calculated by use category from the complete records. To be conservative, a higher than average conversion factor (at the 95% confidence interval) was used. This conversion factor was then applied to the Qi of the incomplete records by use category to yield an estimated Qa for each record. These Qas were then added to the total sum of Qa.

Results

Use Category	Total of Qa Reported in WRATS, AF/yr	Number of rights missing Qa	Factor used to convert Qi to Qa	Closeness of correlation (1.0= perfect)	Total of Estimated Qa, AF/Yr	Sum of Reported and Estimated Qa, AF/Yr
Domestic-Multiple	15764	26	0.72	0.654	520.4	16284.4
Irrigation	5833.5	22	0.577	0.862	736.7	6570.2
Municipal	3686.0	2	1.269	0.598	577.4	4263.4
Total (includes other minor uses)	26166.7	81	--	--	1908.2	28074.9

Discussion

The estimates for the incomplete records are based on other rights of similar use categories. This can yield a general sense of what the legal right may be, sufficient for planning purposes. However, the actual legal right would have to be derived from a detailed review of each individual application's paper record and observation of actual water put to beneficial use on an annual basis. The purpose of the estimation was not to estimate individual rights, but rather it was to more accurately estimate the total of rights by using available data.

In terms of actual water use, the accuracy of the reported certificates is uncertain. Recent experience with change requests for certificates reveals that actual usage is often 25-75% of the certificated amount. This is due to the Department of Ecology's past practice of issuing relatively large Qa values on certificates. For example, at times in the past, Ecology allocated 1 AF/yr per domestic connection. This has been lowered over time to more accurately reflect actual use. Today Ecology generally uses 1/3 AF/yr per domestic connection.

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Short Claims

Data Characteristics

Short claims were intended for small (exempt) quantities and uses of less than 5,000 gallons per day for domestic purposes and the irrigation of less than a half acre. Qa was not requested on the short form claim and thus not reported in the database or the paper record. Use categories of Domestic, Irrigation, and Stock watering (and combinations thereof) are reported.

Estimation Method

For each use category, a typical use value was assigned. The Qa values are based on the Qa's typically assigned by Ecology to similar uses.

Results

Use Category	Number of Claims	Typical Qa Value per Claim	Total Qa
Domestic	770	0.5	385
Domestic + Irrigation	270	2.0	540
Domestic + Stock	187	1.5	280.5
Dom. + Stock + Irr.	218	2.0	436
Irrigation	29	2.0	58
Irrigation + Stock	16	2.0	32
Stock watering	28	1.5	42
Unlisted	16	1.5	24
Totals	1534	--	1797.5

Discussion

The estimated Qa's are reasonable given the quantity limits associated with an exempt withdrawal and the typical use patterns. Overall, because of the small quantities represented, any error associated with these estimates is small compared to the total paper rights estimate for Island County.

Long Claims

Data Characteristics

The long-form claim was intended for non-exempt uses or quantities. Claimants were asked to state the anticipated Qi and Qa used. WRATS does not have this data entered, so Ecology staff reviewed a large sample of claim forms and entered these data into a database derived from WRATS.

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Estimation Method

A sampling comprised of the last 825 out of 1230 total long claims (as ranked by serial number, corresponding with chronological order of submission of the claim to the state claims registry) were entered into a database. Because of the high variability of Qa on claims, even a large sample cannot be used to make estimations with a high degree of statistical confidence. Nevertheless, a sample of over 66% of the claims was considered adequate for this estimation.

For the sampled claims the Qa was summed. For the unsampled claims, an average Qa was calculated from the sample with one very large claim removed as an outlier. The number of unsampled claims was multiplied by the average. This estimate was added to the sum of sampled claims.

Results

Claim Data-Entry Status	Number of Claims	Total Qa Observed	Average Qa per Claim	Total Qa Calculated
Entered	825	13645	16.54	n/a
Entered, less one large outlier	824	11445	13.89	n/a
Not Entered	405	n/a	Assume 13.89	5625
Total	1230	--	--	21070

Discussion

Because of the high variability, this category of claims is difficult to estimate with precision. For example, one large claim (a domestic use for 2200 AF/yr) out of a thousand has a large influence on the aggregate and average quantities. This claim was removed from the determination of an average Qa per claim.

Furthermore, claims are speculative and anticipatory. They were self reported by claimants, and have not been subject to technical or legal review. There is an unknown, but thought to be large, difference between the stated claimed amounts and actual usage.

Analysis

Relative Proportions of Allocations by Document Type

As shown in Figure 1, the estimation of paper rights shows certificates as the dominant type of paper right in WRIA 6, accounting for half the quantity. Long form claims are the next largest type of paper rights. Permits and short-form claims account for 5.5% and 3.6% respectively of the total.

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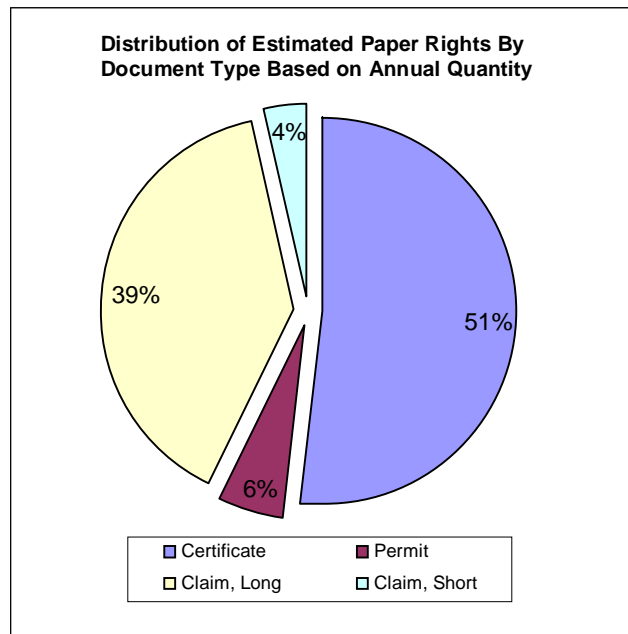


Figure 1

Uncertainty

This estimation contains a high degree of uncertainty based on both estimation and the source data. Estimation uncertainty is mostly due to the high degree of variability in the claims. As such, the confidence in the claims estimation is statistically low. The other estimations either required only a small amount of estimation (certificates and permits), or represent a small proportion of the total quantity (short form claims). In general, the estimation uncertainty should be acceptable for watershed planning purposes.

The uncertainty between the quantities in the paper rights themselves versus actual use is a much more important issue. As discussed above, certificates may overstate actual water use by 50-75%. Claims may overstate actual use by a greater but indeterminate amount. In addition, an indeterminate number of the claims may be invalid. No attempt was made in this estimation to review the validity of the paper rights.

Overall, this estimation likely overstates the actual use of water in Island County/WRIA 6. Nevertheless, this estimation likely presents the paper record of rights with a reasonable degree of accuracy.

Comparison to Other Studies

To provide context, the overall estimate can be compared with recent estimates of total recharge and actual water use in Island County/WRIA 6 contained in the Early Action Plan. As Figure 2 shows, paper rights represent a very significant portion of the total recharge. On the other hand, the comparison suggests that paper rights overstate actual use by a significant degree.

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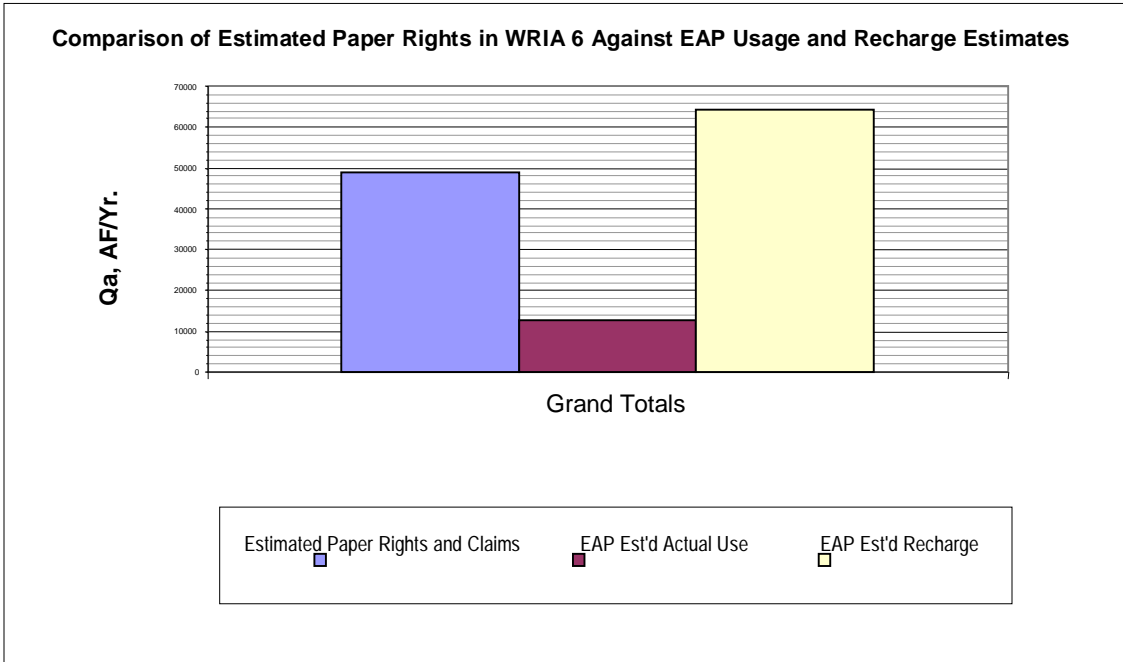


Figure 2