MEMORANDUM

Project No.: 140129

January 12, 2015

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From: Dan Haller, Carl Einberger, Jason McCormick of Aspect Consulting, LLC and Cynthia Carlstad of Carlstad Consulting

Re: **Little Spokane Water Banking Demand Evaluation, Supply Assessment, and Water Transfer Framework Considerations**

Introduction

Spokane County (the County), in conjunction with Stevens and Pend Oreille County, is considering setting up a water bank to address existing and potential regulatory constraints on existing and new water use in Water Resource Inventory Area (WRIA) 55, the Little Spokane Watershed. As part of this process, the County has convened a Policy Advisory Group (PAG) to allow interagency and stakeholder coordination and evaluation of alternatives for water banking in the watershed.

Aspect Consulting LLC (Aspect) has been engaged by the County to provide consulting services for the Little Spokane Water Banking Feasibility Study. Prior to this memorandum, a previous memorandum entitled *Legal, Regulatory, and Policy Framework for Water Banking in Washington* was submitted to the PAG on September 30, 2014 (Aspect, 2014), followed by the first PAG meeting on October 15, 2014. This memorandum follows that initial memorandum and focuses on evaluations of future water demand in WRIA 55, potential existing water rights that could seed the water bank, and water transfer framework considerations. Carlstad Consulting, with support from Spokane County, contributed the Demand Evaluation component of this memorandum.

In this Memorandum, Aspect provides discussions of:

- Incentives for water bank participation
- An evaluation of potential water demand in WRIA 55, including:
    - Future self-supplied residential water needs
    - Public water system future demand
    - Potential water bank demand from existing water uses, including interruptible water rights and existing permit exempt wells
- Overview of the surface water and groundwater framework in WRIA 55.
- Water bank management and seeding approaches, including:
    - Examples of Ecology basin management approaches relevant to water banking
    - Consumptive use equivalents and bank debits
    - Temporal considerations for bank management
    - In-kind versus out-of kind mitigation/seeding
    - Potential acquisition of existing water rights
    - Other potential bank seeding opportunities, including surface water storage, groundwater storage, intra-basin diversion from the Pend Oreille watershed, habitat restoration, and conservation.
- Key PAG decisions are necessary to facilitate Water Bank Seeding implementation.

Summary of Findings

Water Bank Incentives

Considerable uncertainty exists regarding the future legal, regulatory, and policy environment that regulation of water resources in WRIA 55 will be subject to, given a number of factors that are discussed in detail in Aspect's first memorandum on water banking in WRIA 55 (Aspect, 2014)

Incentives for stakeholder participation in the Water Bank include:

- Ecology is not issuing new water rights in WRIA 55 under current conditions.
- A water bank could potentially address ramifications from ongoing Ecology interpretation of statewide instream flow rules, including potential regulation of exempt wells in WRIA 55.
- Existing surface water users with water rights junior to the 1976 Little Spokane River Instream Flow Rule (WAC 173-555; the Rule) have been and continue to be curtailed through notification by Ecology.
- Preliminary plats were approved that pre-date the 2002 legal decision *Department of Ecology v. Campbell & Gwinn* and may not conform to the standards therein.

Potential Demand and Bank Sizing

A major component of assessing the feasibility of establishing a water bank in WRIA 55 is understanding the magnitude and characteristics of the potential demand for water. This includes both future water demand and also potentially existing water uses that are junior to the instream flow rule. Timing and quantity of demand is important to balance the magnitude of water rights needed to seed the water bank, the expense of establishing the water bank administrative systems, and the need for the water by the water bank customer.

The types of water uses most likely to utilize a water bank if one were available include the following:

- Future residential development. Future water demand for self-supplied, single-family homes in WRIA 55 is forecasted to increase by 2,862 acre-feet per year (afy) by 2040.
- Water rights issued after the 1976 Basin Plan was adopted, which placed instream flow provisions on all surface water rights. A total of 693 acre-feet per year of water is appropriated through these interruptible water rights.
- Pending water right applications that have been on hold since 1987 (surface water and groundwater). Pending municipal purveyor applications in particular, which have an annual quantity on the order of 4,000 to 5,000 afy.
- Groundwater rights issued after the Basin Plan was adopted were compiled and considered, but these are not currently considered to be strong potential customers because the rights contain no restrictions. This situation could change if impairments to senior rights, including the instream flow, become an elevated regulatory concern.

Prospective Bank Management Frameworks

A range of water bank basin management approaches have been applied in Washington and supported by Ecology that are discussed in detail in this memorandum. These include:

- The simplest approach in terms of the level of effort involved in bank management is to manage the water bank as "One Bucket", requiring that a new use be mitigated so that there is no net decrease at the Dartford gage.
- Bank management could be tied to the limiting factor(s) of WRIA 55, ensuring those functions and values are preserved.
- Bank management could consider groundwater withdrawal impacts with simplifying conservative assumptions or managed permit-by-permit.

Water Bank Seeding

The establishment of a water bank requires the input of some form of credit (seeding) for water use resulting from an action that adds to the overall condition of the basin. Seeding can come from several sources, with the most common being the retirement of an existing senior water right and placement of it in Washington State's Trust Water Right Program. Potential seeding sources include:

Pre-Rule Irrigation Water Rights. Aspect conducted a screening-level analysis of selected irrigation rights and claims predating the Rule for potential bank seeding. A tiered ranking structure was applied based on whether strong evidence of water use (Rank 1), some evidence of water use (Rank 2), or limited or no evidence of water use (Rank 3) was observed. In addition, some water rights with purposes in addition to irrigation and stock water were flagged for additional study (Rank 4). The most reliable water right estimates, based on the screening-level analysis total 4,189 afy, with higher totals from other ranked rights.

Surface Storage. Surface storage is another potential alternative that could support mitigation and bank seeding. Previous studies of water storage in WRIA 55 have been conducted as part of the Watershed Planning process and are discussed in this memorandum. Groundwater storage projects could contribute to water bank seeding and instream flow mitigation through passive surface aquifer recharge (SAR) or more active aquifer storage and recovery (ASR). The options considered as part of the WRIA 55 watershed planning included constructing new infiltration galleries and restoration of existing natural wetland sites for the purposes of augmenting groundwater and increasing storage.

Pend Oreille River Diversion. A unique opportunity exists to potentially divert surplus water from the Pend Oreille River into the upper headwaters of the Little Spokane River, near the town of Newport. A review of water rights decisions and Ecology regulation of the mainstem of the Pend Oreille River indicates that water is potentially available for a project of this nature.

Habitat Restoration and Conservation. Restoration of instream and near channel habitat, and fish migration barriers consistent with scientific and resource agency guidance on the sustainability of critical fish species in the Little Spokane Basin could provide out-of-kind mitigation. Conservation is also a possibility for developing water supply in the Little Spokane, through incentivizing conservation within existing water users (permitted and exempt) to potentially free up water for other uses.

Incentives for Water Bank Participation

There are a number of reasons why existing and future water users in the Little Spokane Basin would potentially participate in a water bank. Considerable uncertainty exists regarding the future legal, regulatory, and policy environment that regulation of water resources in WRIA 55 will be subject to, given a number of factors that are discussed in detail in Aspect's first memorandum on water banking in WRIA 55 (Aspect, 2014)

Incentives for participation include:

- **Current hold on new water right permits.** The Washington State Department of Ecology (Ecology) has stated that it does not intend to issue new unmitigated water rights in the basin under the current conditions. A water bank could provide a mitigated source of water for new permits.

- **Potential changes to Ecology interpretation of statewide instream flow rules**. Ecology is currently reviewing and formulating an interpretation of existing instream flow rules statewide in the context of current understanding of hydraulic continuity and new Washington State Supreme Court decisions. While they have not yet communicated their interpretation, it is possible that new restrictions could result.

- **Potential regulation of exempt wells in WRIA 55**. If Ecology's interpretation does not lead to new restrictions, uncertainty will still exist. Pending litigation (*Hirst v Whatcom County*) in the Washington State Court of Appeals may provide clarity on the application of instream flow rules similar to the 1976 Little Spokane River Basin Instream Flow rule (WAC 173-555; hereafter referred to as "the Rule") to new exempt wells[1]. If property owners and/or building permit applicants are aware of the risks associated with their water supply, including potential ramifications for property transfers, they may opt to participate in a water bank even without explicit restrictions or regulation of exempt wells

- **Source of permitted water for new rural subdivision/cluster development projects.** Development served by permit-exempt wells is constrained by the 2002 legal case *Department of Ecology v. Campbell & Gwinn Decision*, which limits a development project to one permit exemption thereby limiting the number of residences and the allowable area of irrigated landscape. Some plats in WRIA 55 were approved before 2002 when Campbell & Gwinn clarified exempt authorizations, which bear some risk that their water supply may not be viewed as adequate in the future. Since Ecology is not issuing new water rights in WRIA 55 under current conditions, a water bank could provide a permitted source of water for these types of development and other water right applicants seeking water for beneficial use.

[1] Under existing law (RCW 90.44.050), the groundwater permit exemption allows, for a limited number of purposes, water users to construct and develop groundwater wells for small quantities of groundwater without obtaining a permit. For residential water use purposes, permit-exempt wells are wells that supply home and garden, and specified small uses up to 5,000 gallons per day.

- **Source of water during curtailment periods for water rights junior to the Little Spokane River Instream Flow Rule.** Water is frequently unavailable to fully meet adopted instream flows in WRIA 55. Existing surface water users with water rights junior to the Rule have been and continue to be curtailed through notification by Ecology. Groundwater right holders have not historically been curtailed, but could be in the future based on Ecology's and the Court's evolving interpretation of the law, the Rule, and standards for protection of existing water rights. A water bank could provide water for use during the curtailment periods.

Evaluation of Potential Water Demand

Need and Approach for Demand Evaluation

A major component of assessing the feasibility of establishing a water bank in WRIA 55 is understanding the magnitude and characteristics of the potential demand for water. The demand includes both future water demand and also potentially existing water uses that are junior to the instream flow rule. Figure 1 shows the subbasins within WRIA 55 evaluated in this demand analysis. The evaluation includes the quantity, timing, and geographic distribution of demand. These are all essential components to matching supply and demand. The geographic distribution is important because a water bank can be constrained to sell water within specified geographic boundaries based on attributes of the water right(s) used to fund the bank. Timing and quantity of demand is important to balance the magnitude of water right needed to seed the water bank, expense of establishing the water bank administrative systems, and need for the water by the water bank customer.

This evaluation utilized the following information sources and tools:

- Washington Department of Ecology water rights database to compile and assess records for new water right applications, change applications, and water right permits and certificates;
- Recent and historical orthophoto coverage was used to help characterize land use and development patterns;
- Spokane Regional Transportation Council housing unit growth projections and distribution;
- Washington State Office of Financial Management (OFM) growth projections;
- Input from Pend Oreille and Stevens County Planning Division directors regarding growth patterns and trends;
- Spokane County Water Demand Forecast Model (Spokane County, 2013) to estimate future water demand; and
- Water System Plans for major public water supply purveyors in WRIA 55.

Categories of potential demand are discussed below, organized relative to existing and future water needs.

Water Use Sectors

The framework for water use sectors considered for water banking potential demand is shown in Figure 2, and corresponds to the Spokane County Water Demand Forecast Model used to develop future demand estimates. This framework divides water use broadly into public supplied uses and self-supplied uses that include residential, industry and agriculture. Within each of these broad groupings, the types of water uses are further specified according to the types of uses that occur in WRIA 55.

Self-supplied residential and public supplied residential uses are the primary potential water bank customers. Self-supplied industries and agricultural operations typically need greater quantities of water than would be economically feasible to acquire through a water bank, and are more likely to seek outright purchase and transfer of individual water rights.

Self-supplied residential uses are those homes that are not served by a public water system. They typically utilize a well, typically permit exempt, to provide water to their home. In some cases they may use a spring or surface water diversion, such as lakefront homes on Sacheen, Diamond, and Eloika Lakes. These homes tend to be located in more rural areas, and usually have irrigated landscaping. A few livestock are also commonly associated with these homes. The methodology for estimating the number of self-supplied homes and water usage rates associated with these homes is fully described in the Water Demand Forecast Model Report (Spokane County, 2013).

The major public water supply agencies in WRIA 55 are Whitworth Water District No. 2, Spokane County Water District No. 3, City of Deer Park, and Stevens County PUD. The City of Spokane also provides water within WRIA 55; however, this system draws all of its water from the Spokane Valley Rathdrum Prairie Aquifer, and is managed separately from the Little Spokane River watershed. All of these municipal water purveyors operate systems that use multiple wells and piped conveyance networks to provide water to customers within their defined service areas. Some of these are interconnected, but several operate as separate subsystems within the purveyor's service area. They could be potential water bank customers if additional water right authorizations were needed.

Numerous smaller Group A and Group B water systems exist in WRIA 55. For the purposes of this feasibility study, the potential demand from these systems has been captured through the self-supplied residential category.

WRIA 55 Potential Future Water Needs

Estimates for potential future demand were primarily developed through the Spokane County Water Demand Forecast Model (Spokane County, 2013). This model was created for Spokane County in 2010, and updated in 2013 with demographics, population growth projections, climate, and land use characteristics linked to water use. Stevens and Pend Oreille County areas of WRIA 55 were added to the model by Mike Hermanson of Spokane County, and water use estimates were generated that can be applied to all of WRIA 55. A parcel-based build out analysis completed by Spokane County is also provided for comparison.

Future self-supplied residential water needs

Future self-supplied, single-family homes are a large category of potential water bank customers. If restrictions were to be placed on new permit-exempt wells in WRIA 55 as they have been in the

Skagit and Kittitas watersheds, this category of water user would not have a secure water supply. Lending institutions have responded to a similar situation in the Skagit with additional proof of water supply requirements for home loans. Without a water bank option to secure a mitigated water supply, these self-supplied homes would likely be faced with trucking in and storing water from an off-site source; the Washington State Department of Health has expressed public water reliability concerns over trucking in the past, which may further limit this option. The Spokane Regional Health District does not currently approve building permits for residences that will rely on water stored in a tank or cistern. It should be noted though that some residences that were approved with a well now rely on stored water during portions of the year.

Two methods of estimating potential demand from future self –supplied users are presented here. The first utilizes the Spokane County Water Demand Forecast Model, considered to be the most accurate because the model was developed and tailored to regional water use patterns. The second method utilizes build-out analysis, based on zoning and presence of critical areas. Build-out analysis provides a likely upper limit for development density under current zoning and does not factor in the likelihood of that development actually occurring.

Demand Forecast Estimates

The Spokane County Water Demand Forecast Model was updated to add Stevens and Pend Oreille County areas within WRIA 55. It provides water use estimates in five-year increments, beginning in 2010 when the model was created, and ending in 2040. The geographic distribution of data and results are classified by major subbasin within WRIA 55, using the Washington Department of Natural Resources Watershed Administrative Unit (WAU) delineations in the rural areas and the Spokane Regional Transportation Council Transportation Analysis Zones (TAZ) in the more populated areas of Spokane County.

As discussed above, new self-supplied single-family residential water users are a major potential water bank customer category. New homes outside public water system service areas commonly rely on permit-exempt wells for water, which could require mitigation in the future.

Table 1 summarizes the predicted growth of water use by self-supplied residences in WRIA 55 between 2010 and 2040. In bulk, the water use created by new demand for single-family residences in WRIA 55 is 2,862 acre-feet annually by the year 2040. This represents a 27% increase over single-family residential demand in 2015. This demand will be created by a population increase that increases self-supplied, single-family homes from 12,122 to 15,247 or 3,247 new homes relying primarily on permit-exempt wells to supply water to their homes. The distribution of these forecasted new homes throughout WRIA 55 is shown in Table 2. As a comparison in the 35 year period between 1972-2007 9,369 water wells were drilled in WRIA 55.

Table 1. Estimated Monthly Increase in Water Use for New Single-Family, Self-Supplied Residences in WRIA 55, 2010 - 2040 (Acre-Feet)													
Year	**Jan**	**Feb**	**March**	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total**
2010	217	196	217	210	1,025	1,271	1,743	1,744	1,220	815	210	217	9,081
2015	254	229	254	246	1,207	1,497	2,053	2,055	1,437	959	246	254	10,692
2020	269	243	269	260	1,278	1,585	2,175	2,177	1,522	1,015	260	269	11,321
2025	284	256	284	274	1,351	1,676	2,300	2,302	1,609	1,073	274	284	11,966
2030	298	269	298	288	1,422	1,765	2,422	2,424	1,694	1,129	288	298	12,596
2035	309	279	309	299	1,477	1,833	2,516	2,517	1,759	1,172	299	309	13,077
2040	320	289	320	310	1,531	1,900	2,608	2,610	1,823	1,215	310	320	13,553
Total New Demand Forecasted Between 2015 and 2040													
	66	**59**	**66**	**64**	**323**	**403**	**555**	**555**	**386**	**256**	**64**	**66**	**2,862**

Single-family residential water use ranges widely from winter to summer months because of outdoor water use during summer months. Water use during July and August is over nine times higher than during the months of November through April. This results in a predicted peak new demand of 555 acre-feet during July and August in 2040. This new demand equates to a streamflow of approximately 9 cubic feet per second (cfs) during peak months, and approximately 1.1 cfs during the lowest-demand months.

Modeled indoor water use ranges from 135 to 259 gallons per day per residential dwelling unit. This range is primarily driven by household income, which was found to correlate closely with water use when the demand model was developed. Outdoor water use estimates were based on estimated area of irrigated landscape (ranging from 5,405 to 12,609 square feet) and accounting for a small number of livestock at a percentage of homes based on analysis conducted when the demand forecast model was developed. Other factors that the model uses to calculate outdoor water use estimates are assessed value, lot size, temperature and precipitation, location of home in forested or water short area, and presence of livestock.

Table 2. Estimated Distribution of New Single Family, Self-Supplied Residence Water Demand, 2015-2040

Watershed Administrative Unit	Forecasted New Demand (ac-ft /yr)	New Single Family Residences
Beaver Creek	305	392
Dartford Creek	332	403
Deadman Creek/ Peone Creek	457	582
Dragoon Creek	557	573
Little Deep Creek	200	205
Little Spokane/ Deer Creek	323	385
Otter Creek	367	351
West Branch	320	235
Total	2862	3126

Parcel-based Build out Estimates

Spokane County completed a parcel-based build out analysis in its 2009 Little Spokane River Groundwater Inventory and Mapping Project. It evaluated the number of residences that could be built, based on parcel size, comprehensive plan allowable density, and critical areas limitations on building in certain areas. It also considered privately-owned forest land that could be converted to residential use.

The parcel-based build out estimate totaled 12,738 new residences that could be built outside of identified future public water service areas. In contrast, the Demand Model estimates 3,125 new self-supplied residences between 2015 and 2040. While the built out analysis informs us to what magnitude of growth is possible under current land use regulations, it does not provide a realistic picture of the magnitude of growth that is likely to occur, given historical and project population increase projections.

Public Water System Future Demand

Public water system uses are a potential water bank demand. Municipal purveyors could look to a water bank if they need additional water rights to serve new customers within the urban growth area, or to add smaller failing community systems that may currently be operating as Group B systems under a permit-exempt well.

Table 3 provides a high-level summary of current and projected water right volume capacity for the major public water systems in WRIA 55. Based on this data, no major water right volume deficiencies are apparent. However, it is important to note that most municipal purveyors operate under an interrelated suite of water rights and water sources, which are not always completely interconnected. Individual purveyors may have needs not shown in Table 3 for specific portions of their system.

Table 3. Summary of Current and Projected Water Right Capacity for Public Water Systems

Public Water System	Water Right Annual Excess/Deficiency Based on Existing Consumption (acre feet)	Projected Water Right Annual Excess/Deficiency by 2030 (acre feet)	Date of Water System Plan
Spokane County Water District No. 3			
Pine River Park	182	Not available	2007
Riverview Hills	-11	Not available	2007
Chattaroy Hills[1]	233	Not available	2007
Stevens PUD			
Clayton	239	224	2011
Chattaroy Springs West	28.9	26.9	2011
Riverside	296.2	282.2	2011
Halfmoon Ranchos	25	20	2011
River Park Estates[2]	31	21	2011
Denison	16	12	2011
Deer Park	1654	961 [3]	
Riverside Village Mobile Home Park	29.07	0.23	2009
Whitworth Water District #2[4]	13,132	12,336 [5]	2008
Diamond Lake Water and Sewer District	Request pending	Request pending	-
Sacheen Lake Water and Sewer District	Request pending	Request pending	-

Notes:
[1]This system transferred to Whitworth Water District in 2014.
[2]The source for this system is Spokane Valley Rathdrum Prairie aquifer groundwater.
[3]Projection is for 2026.
[4]Total for 27 different water rights as reported in the Water System Plan.
[5]Projection is for 2028.

In Pend Oreille County, water and sewer improvements within the Granite Shores Water System around Sacheen Lake may create an interest for new homes to seek water service because of setback requirements that will make it more difficult to locate a well on individual properties (from Cynthia Carlstad's personal communications with Mike Lithgow of Pend Oreille County Community Development; Carlstad, 2014).

Water Right Applications

Requests for new water appropriation through a water right application indicates an interest in obtaining authorization to use water, and these could be water bank customers. There are currently seven active water right applications on file with Ecology, and an additional nine change

applications that request some sort of change to an existing water right. These applications are summarized in Table 4 (attached).

The active applications are all for new groundwater withdrawals, and range in priority date from 1987 to 2014. All but one are for municipal supply; the remaining application is for golf course irrigation and domestic supply for associated commercial and residential buildings.

One of the new applications (priority date 2/28/2006) and one of the change applications (priority date 11/24/2014) relate to a community water system for the River Bluff Estates development. According the 2007 River Bluff Estates Water System Plan, the allowable density of one home to ten acres within their service area would accommodate 260 homes; however, the water system is sized to service up to 150 homes under its proposed water right. The water system plan notes that system capacity could be increased to serve up to 498 homes if water rights and zoning were not limiting.

All but one of the change applications relate to municipal or domestic multiple supply and relate to existing groundwater rights. One change application requests moving a point of diversion on the Little Spokane River and place of use for irrigation. Change applications cannot request new water to be appropriated.

Applicants in both groups could be water bank customers. Considerations such as cost, timing of availability, required infrastructure modifications for water withdrawal and distribution system are likely to determine whether a water bank would be a good option for their particular situation.

Potential Water Bank Demand from Existing Water Uses

In theory, existing water uses would have no reason to seek water from a water bank. However there may be cases where existing users would use this option. A few of such cases are discussed in the following sections.

Surface Water Rights Provisioned with Instream Flow Restrictions

The Rule was filed on January 6, 1976 (WAC 173-555), and surface water rights issued after that date contain provisions that restrict water use when river flows drop below specified levels. Only indoor domestic supply, stock water, and fire suppression uses may continue during restricted flow periods.

Little Spokane River flows regularly drop below the regulatory minimum flows specified in the Rule. The uncertainties associated with the ability to use water authorized by instream flow provisioned surface water rights may lead the water right holder to be interested in obtaining a more secure authorization, for example by purchasing water through a water bank. Table 5 shows the percentage of times during the period 1993 to 2013 that instream flows fell below baseflows during each month at the Dartford Gage (based on a seven day average) to provide an indication of when curtailment could occur, since Ecology has managed curtailment to this gage. This chance of interruptibility over the course of a year is important to consider when seeding a water bank, as ideally banks will match supply and demand to eliminate risk of curtailment.

Table 5. Total and Percentage of Days below Baseflows at Dartford by Month, 1993-2013.

Month	Number of Days Below Established Baseflows, 1993-2013	Percentage of Days Below Established Baseflows, 1993-2013
January	25	4%
February	30	5%
March	20	3%
April	6	1%
May	33	5%
June	33	6%
July	112	18%
August	322	52%
September	329	55%
October	222	36%
November	118	20%
December	47	8%

1 - Flow provided by USGS from gauge station 12-4310.00 Little Spokane River at Dartford, WA
2 - Baseflow Established in WAC 173-555 for Little Spokane River at Dartford
3 - Based on a 7-day moving average, consistent with Ecology's management of curtailment in WRIA 55

Table 6 summarizes the instream flow provisioned surface water rights in WRIA 55. The table summarizes surface water rights according to their location along the mainstem Little Spokane River or one its tributaries. Watershed Administrative Units (WAUs) are subbasin areas used in the Water Demand Forecast Model (Spokane County, 2013) used to estimate future water needs. In some cases, these WAUs contain both mainstem and tributary areas; these are separated in the table below.

A total of 129 surface water rights have been issued with instream flow provisions in the Little Spokane watershed, and an additional 17 rights issued subsequent to the Rule that do not carry instream flow provisions. The majority of these are single-family domestic supply that include a small amount of irrigation and stock water. Most of the rights without instream flow provisions are for in-house domestic and/or stock water only.

Sacheen Lake, located in the West Branch WAU, is the source for 34 water rights, the largest number from a single source in the watershed. The West Branch WAU has the greatest number of water rights (52), however it ranks third in terms of instantaneous authorized quantity (1.05 cfs / 473 gpm) and fourth in terms of authorized annual quantity (91.8 acre-feet). This is caused by the large number of small rights overall in the West Branch WAU; there are only 4.1 total irrigated acres authorized by these water rights.

The Dartford Creek WAU, located along the lower mainstem and including Dartford Creek, has the highest instantaneous (1.36 cfs / 608 gpm) and annual (178.14 acre-feet) authorized quantity, with only eleven water rights. These rights are primarily for irrigation, with a total of 66.5 acres authorized. Based on a review of report of examination documents developed for these rights during the application review, it appears that these properties obtain domestic supply from

Whitworth Water District, and choose to pull irrigation water from the Little Spokane River, probably for cost savings during periods of allowable flows.

The Otter Creek WAU, which is the headwaters of the Little Spokane River in Pend Oreille County, contains a mixture of domestic supply, irrigation, recreational uses and wildlife enhancement rights. With 24 water rights in this basin authorizing combined instantaneous quantity of 1.23 cfs/574 gpm and an annual limit of 95.28 acre-feet, this WAU has a significant interruptible water demand.

Table 6. Summary Of Water Rights With Instream Flow Provisions In The Little Spokane Watershed

Stream Segment	Watershed Administrative Unit	Number of Water Rights[1]	Total Instantaneous Quantity		Total Annual Quantity (Acre-Feet)	Irrigated Acreage
			CFS	GPM		
Mainstem	Otter Creek	24	1.28	574	95.28	20.5
	Little Spokane / Deer Creek - Little Spokane drainage	5	0.43	193	59.05	12.5
	Little Deep Creek - Little Spokane drainage	8	0.81	365	170	43
	Dartford Creek	11	1.36	608	178.14	66.52
Tributaries	West Branch WAU	52	1.05	473	91.8	4.1
	Little Spokane / Deer Creek - Deer Creek drainage	10	0.10	45	14	1.75
	Beaver Creek	7	0.81	365	121.8	32
	Dragoon Creek	5	0.20	90	44	0
	Little Deep Creek - Deep Creek drainage	0	0.00	0	0	0
	Deadman Creek / Peone Creek	7	0.15	67	13.9	1
	Totals	129	6.19	2779	787.97	181.37

[1]Water rights include surface water certificates and two permits that were issued after the Rule was adopted. These rights are provisioned with instream flow restrictions.

A summary of the ten largest instream flow provisioned water rights is shown in Table 7 (attached). Two multiple domestic rights are in this category (PUD No. 1 of Pend Oreille County and A & A Properties). The remaining water rights list irrigation, stock water, and recreation for purpose of use. Like domestic single rights, the two community water systems are required to cease lawn and garden irrigation when river flows are below the regulatory minimum flows. The ten largest

instream flow provisioned rights capture 525.9 acre-feet of annual interruptible appropriation, which is 67% of the total annual interruptible right appropriation.

The potential interest of these water right holders in securing a noninterruptible water right through a water bank is hard to predict. If they have adapted to regular limitations on their access to water for outdoor uses, they may not be inclined to purchase through a water bank unless the price was very low. The level of compliance to low flow curtailments is unknown, as Ecology has focused on curtailment notifications but not enforcement. If curtailment periods have been largely disregarded by property owners, a more active enforcement effort would raise awareness, and likely generate significant interest in a water bank among these users. The two community water systems may be attracted to the concept of being able to offer this additional water service to their customers; however, the practicalities of accounting for and regulating the variable service may be a disincentive.

Groundwater Water Rights Issued after Instream Flow Rule Adopted

Groundwater rights issued after the Rule was adopted do not contain instream flow provisions. However, these rights are subject to prior appropriation impairment regulation, including impairment of instream flows, and could be subject to curtailment or reduction based on future Ecology management decisions.

There are 179 groundwater certificates and permits in this category, including all of the major WRIA 55 water purveyors:

- City of Deer Park
- Diamond Lake Water & Sewer District
- Spokane County Water District No. 3
- Stevens County PUD #1
- Whitworth Water District #2

Limited analysis was conducted on these water rights; however, in bulk, they appear to appropriate approximately 26,051 acre-feet per year. The source for some of these rights is likely to be the SVRP aquifer, which would not be likely be connected to the Little Spokane Instream Flow Rule. Whitworth Water District #2, Spokane County Water District No. 3, and City of Deer Park hold the largest of these rights.

Existing Permit-Exempt Wells

Permit-exempt wells are wells that provide water for domestic, lawn and garden, stock watering and small industrial use (see RCW 90.54.050 for specific limits) and are not required to go through the water right permitting process. They are the most common way for self-supplied residential homes to obtain water.

Using a permit-exempt well is considered a secure water source, and permit-exempt well users have never been asked to curtail usage in WRIA 55. However, a growing awareness of regulatory uncertainties associated with permit-exempt wells may make the water source unreliable in the

future in the eyes of a lending institution, even without active restrictions on exempt wells. If a water bank were available, there may be a percentage of permit-exempt well users who would choose to purchase water to eliminate the risk of any possible future regulation of their permit-exempt well. This could be encouraged (or required) by their home lending institution.

Permit-exempt wells are sometimes used to supply water to small subdivisions, with the number of homes limited by the 5,000 gallon per day legal limit for a permit-exempt well. In this case, a single well serves as the source for a small community water system. As with individual home permit-exempt wells, the risk tolerance for lending institutions to consider this a secure water source appears to be decreasing.

Based on the analysis of self-supplied homes done by Spokane County for the Water Demand Model, there are approximately 11,741 permit-exempt wells in WRIA 55. The relative numbers of these wells between the three WRIA 55 counties is shown in Figure 3, as well as the estimated number drilled before and after the Rule was adopted.

The distinction between permit-exempt wells drilled before and after the Rule was adopted is shown to illustrate the magnitude of permit-exempt wells that are junior to the priority date for the Rule, and carry some level of regulatory risk associated with streamflow impairment. Utilizing the water use rates for self-supplied homes from the Demand Model (annual average of 703 gallons per day per home that includes indoor and outdoor use), the 7916 permit-exempt wells drilled subsequent to the Rule adoption use approximately 6,123 acre-feet of water annually. As stated earlier, these wells have not historically been regulated under the Rule, and there are no policies in place for future regulation of these wells.

Water Demand Evaluation Conclusions

This evaluation focused on the types of water uses most likely to utilize a water bank if one were available. These include the following:

- Future residential development
- Water rights issued after the 1976 Basin Plan (Basin Plan) was adopted, which placed instream flow provisions on all surface water rights
- Pending water right applications that have been on hold since 1987 (surface water and groundwater)

Agricultural and industrial water uses were not examined, as these uses are unreliable to forecast, and as larger single source uses, are considered more likely to seek water through a specific water right transfer. Table 8 summarizes the total estimated potential water bank demand in WRIA 55, and Figure 4 shows the geographic distribution of this demand by subbasins used in the analysis.

Table 8. Total Estimated Potential Water Bank Demand in WRIA 55									
Category / Watershed Subbasin	**Dartford Creek**	**Deadman Creek/ Peone Creek**	**Little Deep Creek**	**Little Spokane / Deer Creek**	**Dragoon Creek**	**Beaver Creek**	**West Branch**	**Otter Creek**	**Total**
Forecasted New Demand (ac-ft /yr) from Self Supplied Homes (2015-2040)	332	457	200	323	557	305	320	367	2861
Possible Demand from Interruptible Surface Water Rights	178	14	170	73	44	122	92	95	788
Possible Demand from Pending Water Right Applications	All pending new applications are located in these two WAUs. Annual quantities not determined, but may likely 4000-5000 ac-ft / year								
Totals without new applications	**510**	**471**	**370**	**396**	**601**	**427**	**412**	**462**	**3649**
Totals with new applications									**7555-8555**

Future Residential Water Uses Served by Municipal Purveyors

Municipal purveyors in WRIA 55 have indicated a need to obtain increased water right authorization to serve the customers expected within their service areas. Spokane County Water District No. 3, Whitworth Water District, and Stevens County PUD have filed applications for new water rights within the Little Spokane River reach from Chattaroy downstream. Although requested annual quantities are not indicated on most applications, the intended number of connections indicates an annual quantity of 4,000-5,000 acre-feet associated with pending new applications. This is the most significant potential water demand component examined in this evaluation.

Ecology has not yet acted on these applications. Without some action, these purveyors will at some point be in a position to reduce their service connection capacity or seek water through another mechanism (such as purchasing a water right, accessing Spokane Valley Rathdrum Prairie Aquifer water, or purchasing water through a potential water bank.) Under the current regulatory framework in the Little Spokane River watershed, reducing connection capacity would likely cause

homeowners to drill permit-exempt wells, the net effect of which would still potentially affect the groundwater resource.

Each of these purveyors holds a number of interrelated water rights and wells, and it is currently unknown whether they would be inclined to purchase water through a water bank.

Future Self-Supplied Residential Uses

Future water demand for self-supplied, single-family homes in WRIA 55 is forecasted to increase by 2,862 acre-feet per year by 2040. Most of these homes will drill a permit-exempt well for water supply. Under current regulations, there are no restrictions on permit-exempt wells in WRIA 55, as long as the well use complies with usage restrictions. It is unlikely that owners of these new homes would choose to purchase water from a water bank unless the homeowner (or potentially their lending institution) understands and is motivated by the uncertainties of future regulation of permit-exempt wells and can purchase water through a water bank at a reasonable price. Of course, either the State or Counties could modify the regulatory environment, either through a rule amendment (State) or water availability determinations associated with platting and building permits (County), which would create a regulatory requirement for banking that does not exist today.

Water Rights Issued After the 1976 Basin Plan was Adopted

Surface water rights issued after the Basin Plan was adopted require curtailment of outdoor water use (except stock watering) when flows drop below the regulatory minimum flows stated in the Basin Plan. Use curtailment has been a common occurrence, as described earlier.

It is likely that a portion of these water right holders would purchase an uninterruptible water use authorization through a water bank if the price was reasonable. Such security would allow more permanent landscaping and gardening choices, and would also enhance property value and/or property resale assets.

A total of 693 acre-feet per year of water is appropriated through these interruptible water rights. Of particular note, the West Branch contains many small interruptible rights associated with homes around Sacheen and Eloika Lakes. These right holders are likely to be more favorably inclined toward purchasing water from a water bank. With most existing water banks in Washington, the cost of the water increment relative to the home value is a strong indicator of customer willingness to buy; for lakefront properties this ratio tends to be favorable.

Groundwater rights issued after the Basin Plan was adopted were compiled and considered, but these are not currently considered to be strong potential customers because the rights contain no restrictions. This situation could change if impairments to senior rights, including the instream flow, were shown to exist.

Potential Water Bank Influences on Water Demand

All of the water use estimates described above are based on existing water use practices that includes indoor uses and outdoor uses (lawn, garden, small amount of stock watering). Obtaining water use authorization through a water bank may influence water use through the following scenarios:

- Many water banks offer a tiered rate structure for indoor use, limited outdoor use, and more extensive outdoor use. When faced with the reality of paying for the outdoor use,

homeowners are likely to choose limited landscaping and outdoor water use. One example of a tiered rate structure is the Dungeness Water Exchange in Jefferson County (Table 9) which offers packages for indoor, limited outdoor, extended outdoor, and three stock water options.

Table 9. Dungeness Water Exchange Tiered Water Bank Packages

Package Description	Indoor Use[1]	Outdoor Use	Price
Indoor Only Package	150 gpd (average)	-	$1,000
Indoor with Basic Outdoor Package	150 gpd (average)	2,500 square feet of lawn (approx. 50 x 50 feet)	$2,000
Indoor with Extended Outdoor Package	150 gpd (average)	5,625 square feet of lawn (approx. 75 x 75 feet)	$3,000
Stock Water – 5 Animal Limit	-	60 gpd (average)	$1,300
Stock Water – 10 Animal Limit	-	120 gpd (average)	$1,800
Stock Water – 15 Animal Limit	-	180 gpd (average)	$2,200

[1]Indoor water use increments are based on consumptive use for homes served by a sanitary sewer system.

Notes: gpd – gallons per day

- Availability and supply certainty could increase certain types of use. For example, higher priced homes where the cost of purchasing water is minor relative to home value and family income may be more likely to absorb the additional cost for obtaining water. Because of this, patronage of a water bank is likely to be higher in areas with higher land/home values.

- Although most private landowners are not well informed about water law issues, risk-adverse landowners may currently be delaying site development because of water supply uncertainties.

- If the cost of water increases through implementation of a water bank, residents and utilities are likely to implement conservation measures for both indoor and outdoor uses. Larger scale implementation of low water landscaping could influence community perceptions of what defines attractive, well maintained landscaping, which would support greater expansion of such water conserving landscaping.

Water Bank Management and Seeding Approaches

The establishment of a water bank requires the input of some form of credit (seeding) for water use resulting from an action that adds to the overall condition of the basin. Seeding can come from several sources, including:

- Retiring an existing senior water right and placing it in Washington State's Trust Water Right Program (TWRP);

- Building in-basin surface water storage;
- Importing water through inter-basin transfers;
- Water conservation (usually related to agricultural irrigation);
- Implementing a shallow aquifer recharge (SAR) or aquifer storage and recovery project (ASR);
- Reserves in instream flow rules;
- Restoring habitat or wetlands that improve conditions addressing the functions and values of critical fish species or water quality; and
- Other watershed improvement activities.

Before understanding what type of seeding will work for a water bank, there must be agreement on basin management structures, such as bank accounting, and the areas that bank-seeding components can be allocated to. For example, will consumptive use be the standard for bank accounting, and to what geographic extent can water rights used for bank seeding be distributed? Depending on how coarse or fine of an administrative structure is adopted for basin management, it can incentivize or discourage opportunities for bank seeding. The following sections describe examples where Ecology has adopted varying administrative structures, such as consumptive use equivalents, that are being co-managed with water banks. Then, we provide a discussion bank seeding opportunities for WRIA 55.

Water Bank Management Approaches

Washington's TWRP (authorized in RCW 90.42) provides the fundamental regulatory authority for water banking, and serves as a type of escrow account for banking. A water bank is a mechanism that facilitates transfer of senior water rights between sellers and buyers. The source water right that is "banked" is typically held in the TWRP, protected from relinquishment, until its diversion authority is formally conveyed to the buyer.

To date, water banks have operated under four general water bank formational, operational, and managerial structures. The operational structures include: Public, Quasi-Government, Nongovernmental Organizations (NGO), and Private. A water bank can be formed, operated, and managed by a single entity or different entities, while achieving the goals of providing reliable and legally defensible water transfers to the customer base. Examples of these structures were provided in detail in the memorandum, *Legal, Regulatory, and Policy Framework for Water Banking in Washington,* submitted to the PAG on September 30, 2014 (Aspect, 2014).

A range of water bank basin management approaches have been applied in Washington and supported by Ecology. Establishing where and when in-kind mitigation (and potentially out-of-kind mitigation) will need to occur to offset new uses is critical to establishing mitigation water supply options. For example, the approach that would incentivize water banking the most is if the Little Spokane River Basin were managed as "One Bucket" at the Dartford gage (or the Confluence gage, the most downstream gage in WRIA 55). In essence, this approach only requires that a new

use be mitigated so that there is no net decrease at the Dartford gage. For example if a new use was proposed in the Dragoon Basin and the mitigation was from the Little Deep Creek Basin, but there was no net change at Dartford, the mitigation would be acceptable even though there could be a net decrease in the Dragoon Basin. This approach is clearly preferable with regard to the level of effort involved in bank management, given the simplicity of the approach, and is consistent with Ecology's use of the Dartford gage to determine periods of curtailment. Utilizing a "One Bucket" model can provide for more flexibility and allow the conjunctive use of a variety of mitigation offsets, allowing purchased water rights that seed the bank to be used over a broad area of the watershed.

Another tool for bank management could be a modification to the Rule (WAC 173-555) so that exempt well use is expressly addressed including a legal framework for water bank mitigation approaches, as has occurred in the Dungeness and Walla Walla watersheds. Based on discussions between the County, Aspect, and Ecology, it is our understanding that there are no plans for a rule amendment at this time given the existing moratorium on rule making, and Ecology does not currently consider this necessary to implement water banking in WRIA 55.

Examples of Ecology Basin Management Approaches

Basin management approaches previously accepted by Ecology that could apply in WRIA 55 include:

- In the Yakima Basin, water is generally managed in "One Bucket" to meet Total Water Supply Available (TWSA), measured at a key location in the basin (Parker Dam). Any consumptive use of water cannot impact TWSA, as measured at Parker Dam. A local advisory group, called the Water Transfer Working Group, determines impacts to TWSA and assesses local impacts and impairments on a case-by-case basis.

- In the Wenatchee Basin, a reservation of water for future uses was established under WAC 173-545-080[2]. Ecology made the following management decisions for reservation administration:

    - Reserve debits are based on consumptive use, rather than total diversions or withdrawals.

    - Reserve accounting is based on the critical low flow month of September, with presumed availability outside that time period.

    - Habitat projects and instream flow augmentation was assumed to be sufficient for basin-wide management of the reserve, rather than permit specific evaluations. For example, lag times associated with individual groundwater permits under the reserve are not evaluated.

- In some water rights decisions, Ecology has used the "one molecule" approach, requiring drop for drop mitigation at the specific points of withdrawal or diversion associated with individual

[2] Ecology recently notified that the Wenatchee Reserve may not represent a secure water source given procedurally-similar rule adoption procedures between the Wenatchee Rule and the Skagit Rule, which was overturned in the Swinomish Decision. Ecology and Chelan County are working collaboratively on procedural and substantive remedies to ensure the Wenatchee Rule is reliable in the future.

water right applications. This stems from the 2000 case *Postema v. Pollution Control Hearings Board*, which defined the "one molecule" standard for instream flow impairment (i.e., impairment can be established through mathematical and/or conceptual models and de minimus impacts constitute impairment.). This has been applied in Kittitas County, for example, where a "water budget neutral" determination is required prior to any approval of water bank transfers that could affect certain closed tributaries.

- In circumstances where Ecology, other state agencies, tribes, and Federal Government are managing water use as "One Bucket," inclusion of out-of-kind water supply has been successful. For example, in the Teanaway River, a tributary to the Yakima River, Ecology agreed to establish an in-lieu mitigation fund for the construction and monitoring of habitat projects to solve out-of-time water supply needs. On the mainstem Columbia River, Ecology issued a new water right permit to the Quad Cities on the basis of a 50/50 (consumptive use water/habitat restoration) mitigation offset for new water supplies. The pending Kennewick General Hospital case at the PCHB also relies on an out-of-kind component to the mitigation plan.

Consumptive Use Equivalents and Bank Debits

As noted above, Ecology has supported management of water banks using consumptive use equivalents (i.e., accounting for return flows from septic systems and lawn irrigation) to determine the bank debit for individual users. For example, one transaction from the Suncadia private water bank in Kittitas County will convey 0.137-acre feet per year (122 gpd) for a single residence with an on-site septic system for indoor use and 500 ft^2 of outdoor use (Figure 5). Lawn sizes under the Suncadia water bank are limited to 1,500 ft^2, which result in a consumptive use increase to 0.176-acre-feet per year (157 gpd). A similar approach can be tailored to WRIA 55, with appropriate modifications to account for differences in consumptive use from irrigation based on local climatic conditions.

Note that the Demand Evaluation previously discussed does not factor in consumptive use equivalents, which could reduce bank demand significantly. For example, total indoor use in the Kittitas Basin is considered only 20 to 30% consumptive, and irrigation is considered 90% consumptive. If water banking moves forward in WRIA 55, agreements on consumptive use equivalents with Ecology will be a key component of balancing bank seeding and water demand.

Temporal Considerations for Bank Management

In addition to incorporating consumptive use equivalents, other temporal considerations for bank management include:

- **The amount and nature of non-irrigation season bank seeding.** As noted previously, this could be accomplished through water storage projects such as reservoirs or aquifer storage and recovery, inter-basin transfers (from the Pend Oreille River, for example), or through habitat improvement activities.

- **Lag effects associated with groundwater/surface water interaction.** Groundwater withdrawals and return flows from irrigation and septic affect streamflows with a varying degree of time lag, depending on a number of factors including distance from surface water, depth of pumping, and hydraulic properties of the subsurface. Evaluation of lag effects can

significantly complicate bank management and transfers. In many cases, such as Wenatchee basin water reservation discussed previously, lag effects are not evaluated, but in other cases (Dungeness Water Bank), lag effects have been considered through numerical groundwater modeling.

Surface Water Framework in WRIA 55

Streamflow closures and baseflows have significant ramifications for the seeding, water demand, management, and structure of a water bank in WRIA 55. Surface water in the Little Spokane Basin has been subject to the Little Spokane River instream flow rule, Chapter 173-555 WAC, since January 06, 1976. Baseflows have been established for four stream management units in WRIA 55, based on the stream gage locations shown on Figure 1. Three of the four gages are currently operational (the Chattaroy gage is not operational). At the present time, Ecology manages curtailment of interruptible permitted rights based on flows at the Dartford gage (Figure 6). When seven-day-average flows fall below the established baseflow, Ecology sends a letter to junior water right holders requesting that they curtail water use.

Tributaries to the Little Spokane River do not have continuous gauging records but are cited to have critical flows in the Watershed Plan. All tributaries are closed by the Rule to further consumptive appropriations from June 1st to October 31st, with the apparent exception of the West Branch of Little Spokane River from the outlet of Eloika Lake to the mouth. According to Ecology's water right records, the most recent new consumptive use appropriations in the Little Spokane Basin were in 1996.

In addition to establishing baseflows, the Rule also established reservations of surface water for beneficial uses. Ecology's *"Focus on Water Availability, Little Spokane Watershed, WRIA 55"* noted that a significant number of surface water rights were issued after the date of the Rule, and that these have been regulated almost every year during low flow periods. Ecology concluded that all of the water has been appropriated and no water is available for consumptive uses.

Groundwater Framework in WRIA 55

Groundwater sources in WRIA 55 are derived from a combination of unconsolidated basin fill, and isolated basalt layers overlying crystalline bedrock. Figure 7 shows the distribution of surficial bedrock and the depth of basin fill in the watershed, based on a recent USGS Study: *Hydrogeology of the Little Spokane River Basin, Spokane, Stevens, and Pend Oreille Counties, Washington* (2013). Groundwater movement in the basin generally follows surface topography, moving from high to low elevation areas. The USGS identified several key hydrogeologic units that serve as water sources, including:

- **Upper Aquifer.** This unit is unconsolidated basin fill and serves as a common water source over much of the watershed. Its distribution is widespread in the northeast (Little Spokane headwaters), the west central (Dragoon Creek), and south (mainstem and other tributaries) portions of the basin. Its distribution generally overlaps with the extent of basin fill on Figure 7. Some of the outlying areas of basin fill were not considered of sufficient production by the USGS to be an 'aquifer', but do, in some cases, produce water sufficient for residential use.

- **Lower Aquifer.** This unit is also unconsolidated basin fill, and is separated in some cases from the Upper Aquifer by a confining unit. The Lower Aquifer occurs in highly localized areas, generally along the mainstem of the Little Spokane River and is not widespread in the watershed.

- **Isolated basalt units of the Columbia River Basalt Group (Wanapum and Grand Rhonde).** Basalt occurrences are generally limited to the west central portion of the basin, in the Dragoon Creek drainage.

- **Bedrock.** Crystalline bedrock underlies all of the watershed, but tends to be exposed in the upland, outlying areas of WRIA 55. Bedrock in WRIA 55 typically produces small quantities of water, but is relied upon by a number of users as a residential water source.

Basin fill thicknesses (primarily Upper Aquifer) of over several hundred feet are present across significant portions of the watershed, and may allow opportunities for aquifer recharge through surficial infiltration or aquifer storage and recovery (ASR). This could provide a pathway for supporting instream flow mitigation, by capture of surface water during high flow periods and allowing a buffered release of the infiltrated groundwater over time back to surface water. Additional study, beyond the scope of this study, would need to be conducted to evaluate if feasible alternatives for such an approach exist.

The Rule (WAC 173-555) does not address groundwater and is ambiguous on the application of exemptions for domestic use[3]. Groundwater right holders have not historically been curtailed, but could be in the future based on Ecology's and the Court's evolving interpretation of the law, the Rule, and standards for protection of existing water rights.

Groundwater and surface water in WRIA 55 are assumed to be hydraulically connected, and as such additional groundwater appropriations have not been authorized by Ecology since 1996, based on associated reductions of instream flows expected from newly authorized withdrawals. The 1975 Ecology WRIA 55 Basin Program Report on which the Rule is based states: "Surface water and/or ground water appropriation permits that will allow direct diversion from, or have measurable effect on, streams where base flows have been established, shall be subject to the base flow limitations, and any such permits or certificates shall be appropriately conditioned to assure maintenance of said base flows". Ecology has denied new groundwater rights on the basis of hydraulic continuity with the river and impairment of instream flows. These denials have been upheld by the Pollution Control Hearings Board.

Spokane Valley - Rathdrum Prairie Aquifer

The Spokane Valley-Rathdrum Prairie Aquifer (SVRP) is a significant and prolific aquifer in the Spokane region, and extends into a relatively small area in the southern portion of WRIA 55. In this area, the aquifer has shallow and deeper units separated by a confining layer. The northern

[3] The Rule does include a reference to 173-500, general provisions for instream flow rules, and that does include a connection to groundwater. These provisions include: (5) Base flow provisions for water rights.
(a) Surface water and/or groundwater appropriation permits, issued subsequent to the effective dates of chapters 173-501 through 173-599 WAC, that will allow either direct diversion from or have a measurable effect on streams where base flow limitations of this chapter, and any such permits or certificates shall be appropriately conditioned to assure maintenance of said base flows.

shallower portions of the SVRP discharge to the Little Spokane River, downstream of the Dartford gage, while the deeper portions (and shallower portions on the southern edge of WRIA 55) discharge directly to the mainstem Spokane River.

A proposed rule amendment for the Little Spokane Basin is linked with changes under consideration for the mainstem Spokane River. This provision is targeted to areas where the Spokane Valley Rathdrum Prairie Aquifer (SVRP) is within WRIA 55 but is considered hydraulically connected to the mainstem Spokane River. It is our understanding that a small group of exempt wells will be mitigated by purchased water rights by Ecology. These water rights will be used for exempt wells that will impact flows of the Spokane River. A key change in the rule is for the first time, groundwater is explicitly considered as being subject to WAC 173-555. However, the language only ties the "shallow aquifer associated with the Little Spokane River" to the rule, and not the deeper SVRP aquifer to WAC 173-555. Rather that would be covered under the new Spokane River rule. Ecology is not amending the portion of WAC 173-555 outside the SVRP footprint (which less than 5% of the WRIA).

In-Kind versus Out-of Kind Mitigation/Seeding

In this memo, our focus is on the physical transfer of water in WRIA 55 for in-kind (water for water) mitigation, where credit inputs are generally of the same consumptive water quantity equivalency as the conveyed mitigation; however, out-of-kind mitigation considerations should remain part of ongoing water bank planning and have been accepted elsewhere by Ecology. One critical reason for including out-of-kind mitigation bank seeding is to address temporal issues associated with bank seeding from irrigation rights, as the period of use for these is generally limited to the irrigation season and do not provide water for water mitigation outside of that timeframe. This leads to the potential need for non-irrigation season bank seeding, either through water storage or inter-basin transfers, through habitat improvement activities, or through adoption of a regulatory framework that does not require a narrow time step for regulatory compliance.

There is significant uncertainty at the present time regarding application of out-of-kind mitigation and seeding approaches, based on recent OCPI court outcomes and pending outcomes. Uncertainty stems from several pending court cases, including:

- *Foster v. Ecology* and *Okanogan Wilderness League v. Methow Valley*. These cases are focused on whether OCPI in the context of an individual permitting decision is appropriate, including relying in part on out-of-kind benefits (e.g. habitat, water quality, passage).

- *Okanogan Wilderness League and Center for Environmental Law and Policy v. Ecology and Kennewick General Hospital.* This case is evaluating under what standards OCPI can be used, and whether impairment exists if the functions and values of the instream flow are still met.

If out-of-kind mitigation ultimately becomes part of water bank management, the foundation for identifying potential mitigation areas and stream reaches has been developed through previous studies of habitat limiting factors identified in the WRIA 55/57 Watershed Management Plan (2005) and Ecology's TMDL (2010). Examples of determining the value of out-of-kind mitigation for water right allocation, such as recent water right decisions for the City of Yelm, are available to

draw upon for potential application in WRIA 55. Aquatic conditions that could be addressed include elevated temperature; fecal Coliform levels above water quality standards; and phosphorus concentrations that lead to low dissolved oxygen.

Potential Acquisition of Existing Water Rights

Aspect has conducted a screening-level analysis of selected irrigation rights and claims for potential bank seeding. We reviewed a selection of water right certificates, adjudicated certificates and claims with priority dates predating the Rule (prior to January 6, 1976), as they are not considered interruptible because they are senior water rights to the Rule. In total, 5,900 water right records in the Little Spokane Basin were identified, with 5,400 of those records having a priority date senior to the Rule (pre-Rule subset). The selection focused on water rights with a purpose of use containing irrigation and with an annual quantity equal to or greater than 200 acre-feet in the Little Spokane Basin, resulting in a total of 72 water rights and claims

Water rights limited to irrigation or irrigation/stock watering tend to historically be the most acquired water rights in active markets statewide. Aspect conducted a focused aerial imagery review on these pre-Rule water rights, consisting of 35 water right records. The remaining balance of 37 water rights included other categories in addition to irrigation, such as domestic/municipal, commercial, and were not specifically reviewed with the aerial photo analysis. These water rights, and other pre-rule water rights of significance, should ultimately be reviewed in a more comprehensive study as part of future water bank development.

The resulting assessment is a preliminary aerial image review of selected water rights in the Little Spokane Basin using GIS technologies and interpretation of aerial images. Field verification was not involved at this screen-level stage, and more detailed extent and validity analyses will need to be conducted as part of actual seeding of any water bank established in WRIA 55. Conclusions from the screening-level assessment are intended as a market snapshot of a portion of potential water rights that could be transferred to the water bank. Note that this does not constitute a complete water right due diligence review, or evaluations of market viability and water right holders' willingness to participate.

In addition to the aerial image review, we evaluated reported irrigation quantities in comparison to irrigated acreage. In cases were excessive water duty was reported relative to the acreage reportedly irrigated, a water duty of three feet was assumed. If annual quantities were below 200-acre-feet per year (afy) based on this calculation, the water rights were removed from further ranking at this time. Two irrigation water rights transferred to the Deer Park's municipal system were also removed from the ranking.

Figure 8 presents a map summary of the analysis, with supporting details provided in Table 10 (attached). The analysis evaluated the likelihood of active irrigation using three publicly available Geographic Information System (GIS) images sources, and applied a beneficial use ranking structure based on the GIS image review. The three aerial image sources are: 1) NASA Landsat images; 2) USDA NAIP images; and 3) Google Earth images. A tiered ranking structure was applied based on the following criteria:

- Rank 1 - Strong evidence of water use (irrigation apparent most of the time over a majority of the place of use)

- Rank 2 - Some evidence of water use (some evidence for irrigation, but not necessarily throughout the place of use or in each photo)

- Rank 3 - Limited or no evidence of water use

In addition, the remaining larger pre-Rule water rights with other purposes of use besides irrigation or irrigation/stock watering were categorized as:

- Rank 4: Purposes in addition to irrigation and stock water, requires further review

Older water rights, especially water right claims, tend to assert much more water use than can necessarily be established or reported quantities in units other than requested on the claim form (e.g. gallons instead of acre-feet). For the purposes of our review, claims with potentially overstated water use and minimal aerial imagery support for beneficial use are included in Rank 3. Rank 4 rights are also shown on Figure 8 to illustrate the extent of additional larger water rights in WRIA 55 with irrigation as a component.

Summary of Screening-Level Water Rights Assessment

Table 11 presents a summary of rankings and the number of associated water rights and claims resulting from our analysis:

Table 11. Summary of Pre-Rule Irrigation Water Right Ranking

Rank	Document Type	Number
1	Adjudicated Certificate	1
	Certificate	7
	Claim	3
Subtotal (Rank 1)		*11*
2	Certificate	3
	Claim	2
Subtotal (Rank 2)		*5*
3	Certificate	5
	Claim	5
Subtotal (Rank 3)		*10*
4	Certificate	9
	Claim	16
Subtotal (Rank 4)		*25*
Total		**51**

Of the 24 remaining water rights in Rank 1 through 3, 11 of those water rights exhibited strong evidence of water use under their respective places of use, five exhibited some evidence of water

use and 10 exhibited limited evidence of water use. Table 12 presents a summary of pre-Rule irrigation water right quantities resulting from this analysis.

Table 12. Summary of Pre-Rule Irrigation Water Right Quantities

Rank	Document Type	Acre-Feet/Year	Acres Irrigated
1	Adjudicated Certificate	210	70
	Certificate	2,389	745
	Claim	1,590	170
Subtotal (Rank 1)		*4,189*	*985*
2	Certificate	1,206	496
	Claim	660	165
Subtotal (Rank 2)		*1,866*	*661*
3	Certificate	2,400	690
	Claim	2,325	585
Subtotal (Rank 3)		*4,725*	*1,275*
4	Certificate	6,808	1,964
	Claim	7,477	1,206
Subtotal (Rank 4)		*14,285*	*3,170*
Total of Ranks 1 and 2		***6,055***	***1,646***
Total of Ranks 1, 2, and 3		***10,780***	***2,921***
Total of Ranks, 1, 2, 3 and 4		**25,065**	**6,091**

The most reliable water right estimates, based on the screening-level analysis (Rank 1) total 4,189 afy. This is a significant amount of water relative to the demand estimates for WRIA 55. Clearly, not all of these water rights can assumed to be available for seeding a water bank, and there is a public interest in having agricultural land continue to be cultivated in WRIA 55; however, some of the owners of these water rights may be interested in transferring their rights to a water bank. Addition of Rank 2 water rights raises this amount to 6,055 afy, although not all of the Rank 2 rights are likely to have their assumed quantity of water if a detailed extent and validity study were to be completed. Adding the least reliable, Rank 3 water rights, along with the Rank 4 water rights brings the total to 25,065 afy, which is considered to be an overestimate of the potential water availability

Comparison of Subbasin Demand vs. Potential Supply

Table 13 presents a summary of the ranking of pre-Rule irrigation water rights by subbasins with a comparison to estimates from the demand analysis. Total new demand in Table 13 is taken from Table 8, and represents the combination of forecasted new demand from self-supplied, single-family homes and possible demand from interruptible surface water rights. The totals exclude

possible demand from pending water right applications in the Dartford and Deadman/Peone Creek subbasins, which could be 4,000 to 5,000 afy.

Table 13. Summary of Pre-Rule Irrigation Water Right Quantities by Subbasin.

Subbasin	Volume (Acre-Feet/Year)						
	Rank 1	Rank 2	Rank 3	Rank 4	Total of Rank 1 and 2	Total of Ranks 1 through 4	Total New Demand (from Table 8)
Beaver Creek	270	344	2,365	4,897	614	7,876	510
Dartford Creek	210	280	0	488	490	978	471
Deadman Creek/Peone Creek	360	340	0	1,161	700	1,861	370
Dragoon Creek	0	0	0	1,588	0	1,588	396
Little Deep Creek	840	902	240	553	1,742	2,535	601
Little Spokane/Deer Creek	949	0	0	994	949	1,943	427
Otter Creek	960	0	560	1,856	960	3,376	412
West Branch	600	0	4,970	2,748	600	8,318	462
Total	4,189	1,866	8,135	14,285	6,055	28,474	3649

Note: Total New Demand is taken from Table 8, and excludes possible total demand from pending water right applications

Total available water rights from a combination of Ranks 1 and 2 have volumes that generally exceed estimated total demand from new self-supplied, single-family homes and interruptible surface water rights, with the exception of the Little Spokane/Deer Creek subbasin. Including all of the rankings in the volume estimates result in substantially more water than estimated demand. Although this information provides some measure of the potential for bank seeding, two important qualifiers must be emphasized:

- A rigorous extent and validity analysis on these water rights has not been completed, and has been limited to the screening approach discussed previously.
- Both owner interest in selling water rights and public interest considerations regarding fallowing of irrigated lands can be expected to limit the availability of irrigation water rights for bank seeding.

This screening-level water rights analysis is intended to provide an indication of the distribution and potential size of larger pre-Rule irrigation rights in WRIA. With water right certificates, the permitting and certification process conducted by Ecology under Chapters 90.03 and 90.44RCW is a rigorous appropriation procedure and generally results in beneficially used water rights that can be relied upon more than water right claims. As with water right claims, water right certificates can go extended periods of time without beneficial use or be effectively abandoned through land use changes. The historical use and fact pattern of each water right is important to estimate the validity of the right and resulting water bank seeding potential.

Geographic locations of the ranked water rights vary and a more defined water rights analysis should occur in the next phase of water bank development in order to assess the viability of those water rights as sources of supply for the water bank. This work should consider:

- Overall goals and regional management structure to be incorporated into the water bank
- Detailed extent and validity analyses on water rights of interest
- Evaluations of market viability

Performance of a detailed water rights evaluation within WRIA 55 focusing on review of individual pre-Rule water rights across the full spectrum of uses will proactively position a water acquisition program to purchase water to appropriately seed the water bank.

Other Potential Bank Seeding Opportunities

Surface Water Storage

Surface storage is another potential alternative that could support mitigation and bank seeding. Storage could create manageable blocks of water, retimed by surface water storage via in-channel or off-channel water storage facilities, as another tool to develop water sources in the Little Spokane Basin in support of water banking.

Previous studies of water storage in WRIA 55 have been conducted as part of the Watershed Planning process. Golder (2004) looked at a number of storage sites in WRIA 55, with the only options evaluated in detail being new dams at Buck Creek and Beaver Creek in the Beaver Creek subbasin. They concluded that additional storage from a Beaver Creek dam would cost from $3,500 to $8,600 per acre foot, based on potential storage ranging from 1,175 to 1,930 ac-ft. On Buck Creek, a costs ranging from $4,300 to $5,400 ac-ft were estimated for a 4,750 ac-ft reservoir.

PBS&J (2009) conducted additional storage investigations focused on the West Branch of the Little Spokane River. This study evaluated use of existing dams, natural lakes, and new dams, and infiltration using existing lakes or depressions. PBS&J concluded:

- Revising existing dams to increase storage is not feasible primarily because sufficient storage would not be obtained.
- Buck and Beaver Creek dams were reviewed, but not considered an option for further work at that time.
- Increasing storage in natural lakes is limited by the extent of development along the lakes, and associated effects on existing residential properties. Eloika Lake was considered the best opportunity for this, because of the support of the Eloika Lake Association (homeowners) and the lake was historically at a higher level.
- A number of wetland restoration opportunities were identified and further study was recommended.

Groundwater Storage

Groundwater storage projects could contribute to water bank seeding through passive surface aquifer recharge (SAR) or more active aquifer storage and recovery (ASR). The Watershed Management Plan: WRIA 55 and 57 discussed using a series of strategies to augment and mitigate for impacts in the Little Spokane Basin. The options considered generally include constructing new infiltration galleries or restoration of existing natural, albeit dry, wetland sites for the purposes of augmenting groundwater and increasing storage.

Inducing groundwater supplies and allowing it to passively return to surface water generally alters the timing of water availability in the surface water body. By altering the timing of groundwater recharge of surface water, improvement to surface water flow, at critical stages, can be specifically targeted for development of new water supplies and improvement of baseline conditions. Development of enhanced water supplies and water availability, at critical locations and during critical periods, has potential to create water available to seed mitigation activities.

Intra-Basin Diversion

A unique opportunity exists to potentially divert surplus water from the Pend Oreille River into the upper headwaters of the Little Spokane River, near the town of Newport (Figure 9). The watershed boundary, and the upper headwaters of the Little Spokane River, reaches within approximately three miles of the mainstem of the Pend Oreille River. According to Washington State's WRIA 55 boundary GIS layer, the drainage divide between the Little Spokane Basin and Pend Oreille Basin is approximately 200 feet higher than the Pend Oreille River shoreline, and a pipeline and pumping station would be required to convey water. Water thus conveyed could also serve as water for aquifer storage projects in WRIA 55 after transfer.

A review of water rights decisions and Ecology regulation of the mainstem of the Pend Oreille River indicates that water is potentially available for a project of this nature. Ecology has not closed the Pend Oreille River to further consumptive appropriations, but has provisioned recent water right decisions with a curtailment flows of 7,700 cfs at the Newport gage (USGS #12395500), based on recommendations from the Washington State Department of Fish and Wildlife. Figure 10 presents average and minimum daily mean discharges at the Newport gage, along with the curtailment flow of 7,700 cfs. As the graph indicates, there are periods where the minimum daily discharge has fallen below 7,700 cfs in drier years in spring and late summer to early fall, but there still appears to be opportunity for significant diversions to take place over much of the year, given the scale of flows in the mainstem. Issues of curtailment and seasonality would need to be addressed as part of evaluating project feasibility.

A cost/benefit analysis for the project would be a key component of any further study. Aspect has conduct a very preliminary screening-level analysis of potential costs using a base assumption of 1,500 homes served with a demand of 175 gpd of consumptive use. This would be a very small diversion (0.4 cfs) relative to the high flows that typically exceed the 7,700 cfs curtailment flow. We have assumed that a 6-inch-diameter pipeline running approximately two miles would need to be constructed, and estimated a total construction cost of approximately $5 million, and approximately $100,000 in annual operation and maintenance costs. This is equivalent to approximately $3,350 per residence for construction costs and $70 per residence in annual operation and maintenance costs. This estimate must be qualified as very preliminary, and there are numerous variables that could have a significant impact on the ultimate construction and operation

and maintenance costs, including permitting, obtaining easements, soil conditions, and multiple other considerations.

Pipeline size could be increased to meet additional out-of-stream demands, or to augment instream flows. Other demands identified earlier in this report (e.g., interruptibles, junior groundwater users, etc.) could be supplied in part from surplus waters from the Pend Oreille basin. Similarly, instream flows themselves could be augmented considerably through direct discharge, or by coupling the pipeline with a surface aquifer recharge or aquifer storage and recovery project.

Local constituents and Ecology have been discussing the possibility of delivering water from the Pend Oreille River into the Little Spokane Basin for some time now. Further investigation into water rights permitting, water availability, environmental impacts, engineering design and construction costs would be required to fully assess the viability of this alternative.

Habitat or Other Aquatic Restoration

Restoration of instream and near channel habitat, and fish migration barriers consistent with scientific and resource agency guidance on the sustainability of critical fish species in the Little Spokane Basin could provide out-of-kind mitigation. Benefits from these activities are likely to be more significant when approaching creation of a consolidated mitigation package at the Basin scale. In other instances, out-of-kind mitigation has been acceptable solutions to buffering impacts to out-of-time and out-of-place mitigation, or providing additional quantities of consumptive water relative to the value of the habitat restored.

Floodplains and Function

In locations where degraded floodplain function exists and in-kind consumptive water supply options are limited, restoring floodplains and their function, as it relates to watershed health and groundwater storage, could be a viable out-of-kind mitigation option. Restoration of floodplains and incised channels can improve instream habitat conditions for aquatic species of concern. Additional potential exists to increase bank groundwater storage and alluvial aquifer groundwater recharge in the restored area. Stored and re-timed water might have the potential to deliver higher baseflows longer into the low-flow season and mitigate for impacts to flow targets.

Upland Restoration and Forest Management

Restoration of upland meadows, wetlands, and overall forest health can ease surface water runoff pressure in the spring and retain water further into the dry or low flow season. Utilization of upland restoration and forest management, as part of mitigation package, can ease out-of-time impacts from new water use. As with all restoration, the value of these efforts are in the context of a more significant program.

Conservation

Through a series of workshops starting on June 16, 2014, Ecology has been gathering input from the Identifying Rural Water Supply Strategies Workgroup (Workgroup). At the most recent meeting on January 05, 2015, Ecology and the Workgroup reviewed the Final Draft of Ecology's report titled, *Finding Rural Domestic Water Solutions While Protecting Instream Resources* (Final Draft) for accuracy and completeness. From Workgroup discussion and the Final Draft, one of the most applicable possibilities for developing water supply in the Little Spokane is incentivizing conservation within existing water users (permitted and exempt) to free up water withdrawn (pg.

12, Paragraph 2.4). This concept could prove useful in the Little Spokane when considering pre-rule exempt well use and post-rule exempt well uses in the reservations. Use of conservation in this manner is likely dependent on hydrogeology, spatial location in the basin and whether conserved water is consumptive or non-consumptive use.

For example, because lawn use is much more consumptive than indoor use (e.g., 90% vs. 30%), modest reductions in lawn size can seed a water bank for future indoor use. A WRIA or county-run bank that promoted xeriscaping with property covenants could work in rural areas where other bank seeding programs may struggle.

Next Steps

We will discuss this second memorandum on the water transfer framework, supply estimations and demand evaluation with the PAG at the meeting on January 15, 2014. We will take comments from the PAG on this second memorandum under advisement for our ongoing work. Our next focus will be on the third phase of the study, including a market evaluation and preparation of a draft summary Water Banking Feasibility Report in preparation for the third PAG meeting in May 2015. Key decisions for the PAG to engage in include the following:

1. What type of basin management structure is preferred?
    a. Bank accounting with consumptive use or total use?
    b. One-bucket or multi-bucket management?
    c. Management of temporal challenges in matching supply and demand?
    d. Inclusion of projects that enhance the functions and values of the basin in support for a coarser (easier, more water bank-friendly) management scheme?
2. What legal mechanism is appropriate to document the basin management structure (e.g., Trust Water Agreement, Memorandum of Agreement, 1976 Instream Flow Rule Amendment)?
3. What are the preferred methods for seeding a bank and preserving County values?
4. Which demand sectors, if any, does the PAG desire to prioritize in developing bank sizing guidelines?
5. Does the PAG have a geographic priority to bank service?

Limitations

Work for this project was performed for Spokane County (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.

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References

Aspect Consulting, LLC (Aspect), 2014, Legal, Regulatory, and Policy Framework for Water Banking in Washington Memorandum, Prepared for Little Spokane River Basin Water Banking Policy Advisory Group, September 30, 2014.

Carlstad Consulting, 2014, Personal Communication with Mike Lithgow of Pend Oreille County Community Development, October, 2014.

Golder, 2004, Storage Assessment for Little and Middle Spokane Watershed, Prepared for WRIA 55 and 57 Planning Unit, December 2004.

PBS&J, 2009, Surface Water Storage Investigation West Branch Little Spokane River Wetland Restoration & Recharge Opportunities – WRIA 55 &7 57, Prepared for Spokane County Division of Utilities, April 2009.

Spokane County, 2013, Spokane County Water Demand Forecast Model – Model 3.0 & 2013 Forecast Update, Spokane County Water Resources, June 2013.

Tables

Figures *(Attached)*

TABLES

TABLE 4. Pending Water Right Applications in WRIA 55

Record Number	Document Holder	Purpose of Use	Priority Date	Quantity Requested	Source	Comments
New Applications						
G3-28396	Spokane County Water District No 3	Domestic Multiple	10/01/1987	5500 gpm, 730 acre feet/year	Wells (5)	Intended to supersede other rights for Mead service area
G3-30073	Whitworth Water District 2	Municipal	10/11/1994	5000 gpm	Well	Well to be located in Home Acre Tract 1st Addition
G3-30313	Spokane County Water District No 3	Municipal	06/01/1995	2000 gpm	Wells (2)	Intended to serve 1585 homes
G3-30161	Whitworth Water District 2	Municipal	04/13/1998	5000 gpm	Well	To serve Systems 8 & 9; 3400 homes. Backup according to water system plan.
G3-30261	Leonard	Domestic Multiple, Irrigation	03/25/1999	1800 gpm	Existing well	Irrigation is for golf course; 8 homes or other commercial structures associated with golf course
G3-30508	Riverbluff Land Company LLC	Municipal	02/28/2006	600 gpm	Wells (4)	150 connections requested; related to superseding Groundwater Certificate No. G3-21440C.
G3-30714	Stevens County PUD 1	Municipal	07/28/2014	150 gpm	2 wells	Need additional instantaneous quantity for existing Chattaroy Springs Public Water System
Change Applications						
CG3-*01099S@1	NMC Mead LLC	Municipal	06/27/2011	1427 gpm	Wells	Proposed change of use from industrial to municipal to serve the North Kaiser Service area of Spokane County Water District #3.
CG3-*01098S@1	NMC Mead LLC	Municipal	06/27/2011	1250 gpm	Wells	
CG3-*06833C@1	NMC Mead LLC	Municipal	06/30/2011	2475 gpm	Wells	
CG3-*00734S	Whitworth University	Municipal	05/15/2013	550 gpm	Wells (2)	Expand place of use to new Whitworth facilities; Add a well
CS3-*20510C	Woodke	Irrigation	03/04/2014	0.18 cfs	Little Spokane River	Move Point of Diversion downstream, adjust Place of Use
CG3-25373C(A)@2	Dragoon Lake LLC & Short Road DP	Commercial / Industrial, Domestic Group, Irrigation	03/24/2014	128.25 gpm	Wells (3)	Change point of withdrawal and place of use location. Some relationship with Stevens County PUD.
CS3-23946C	Wimpy	Domestic Multiple, Fire Response	09/29/2014	0.02 cs, 2 acre feet/year	Diamond Lake	Add point of diversion to serve second home
CG3-24890C@1	RB Water Association	Municipal	11/24/2014	240 gpm	Wells (2?)	River Bluff Water System - move POW and Place of Use from San Dance Estates (Nine Mile Manor) to River Bluff Water System service area
CG3-28077C	Whitworth Water District 2	Domestic Single, Irrigation, Stock water	12/02/2014	75 gpm	Wells (6)	Change purpose of use - irrigation to municipal

Notes:
acre feet/year = acre feet per year
gpm = gallons per minute

Table 7. Largest Instream Flow Provisioned Water Rights In WRIA 55 Based on Annual Authorized Quantity										
File Number	Name of Record	Water Right Type	Water Source	Watershed Administrative Unit	Priority Date	Purpose of Use	Instantaneous Quantity Authorized		Annual Authorized Quantity (acre feet/year)	Authorized Acres for Irrigation
							cfs	gpm		
S3-29684	Severn, David R	Permit	Unnamed spring	Dartford Creek	4/13/1994	Irrigation, Stock water	1.00	449	128.1	43
S3-29144	Innes, Clyde	Certificate	Little Spokane River	Beaver Creek	2/4/1992	Irrigation	0.67	299	104	30
S3-28247GWRIS	Gatlin, Howard H	Certificate	Little Spokane River	Little Deep Creek	11/25/1986	Irrigation	0.27	120	78.5	20
S3-28248GWRIS	Gatlin, Howard H	Certificate	Little Spokane River	Little Deep Creek	11/25/1986	Irrigation	0.27	120	66.7	17
S3-25196C	A & A Properties	Certificate	Unnamed spring	Dragoon Creek	1/28/1977	Domestic Multiple	0.06	27	40	-
S3-26357GWRIS	Roening, Jack B	Certificate	Little Spokane River	Otter Creek	9/18/1979	Irrigation, Recreation	0.20	90	31.4	8
S3-28117GWRIS	Smart, Stephen B	Certificate	Little Spokane River	Little Spokane / Deer Creek	1/15/1986	Irrigation	0.11	49	19.6	5
S3-24985CWRIS	PUD No. 1 of Pend Oreille Cnty	Certificate	Sacheen Lake	West Branch	7/1/1976	Domestic Multiple	0.12	54	16.2	-
S3-25711C	Spokane County	Certificate	Little Spokane River	Otter Creek	10/26/1977	Irrigation	0.08	36	16	4
S3-28288C	Grizzly Bear Bluff Trust	Certificate	Little Spokane River	Otter Creek	3/9/1987	Irrigation, Stock water	0.04	20	12.7	3
S3-28339	Wahl, Herman	Certificate	Little Spokane River	Little Spokane / Deer Creek	6/1/1987	Irrigation, Stock water	0.1	44.88	12.7	3

Notes:
acre feet/year = acre feet per year gpm = gallons per minute
cfs = cubic feet per second

Table 10 - Summary and Ranking of Irrigation Rights Evaluated for Bank Seeding

Project # 140129 - Little Spokane Water Banking

Rank	WR_Doc	WR Doc File No.	Document Type	Priority Date	cfs	gpm	Acre feet/Year Recorded by Ecology	Acre feet/Year Assuming Water Duty of 3 ft	Acre feet/Year Used In Summary	Acres Irrigated	Purpose	Notes	Document Name	Source	Subbasin
1	2129818	S3-77083JWRIS	Adjct Cert	19660920	0.7		210.0	210.0	210.0	70.0	IR		O. B. and Frances M. Humphries	S	DEADMAN CREEK/PEONE CREEK
Subtotal (Adjudicated Certificates)					*0.7*	*0.0*	*210.0*		*210.0*	*70.0*					
1	2138274	G3-24214CWRIS	Cert	19750329		720.0	469.0	600.0	469.0	200.0	IR		Bruce H. Lauderdale	G	BEAVER CREEK
1	2143304	G3-*08507C	Cert	19670127		750.0	380.0	285.0	380.0	95.0	IR	Changed in 1995 to add fire protection purpose of use and a point of withdrawal.	John and Diane Galley	G	
1	2132366	S3-01083CWRIS	Cert	19650323	0.61		220.0	195.0	220.0	65.0	IR		Dale E. and Lylas N. Blair	S	OTTER CREEK
1	2141503	G3-*06089CWRIS	Cert	19611013		600.0	480.0	525.0	480.0	175.0	IR		Samuel K. McIlvanie	G	DRAGOON CREEK
1	2135563	S3-*16904CWRIS	Cert	19610918	1		360.0	270.0	360.0	90.0	IR		C. Hotchkiss	S	LITTLE DEEP CREEK
1	2141914	G3-*03978CWRIS	Cert	19550429		400.0	280.0	210.0	280.0	70.0	IR		Paul Bates	G	BEAVER CREEK
1	2142608	G3-*00759CWRIS	Cert	19480305		300.0	200.0	150.0	200.0	50.0	IR		Paul Bates	G	BEAVER CREEK
Subtotal (Certificates)					*1.6*	*2,770.0*	*2,389.0*		*2,389.0*	*745.0*					
1	2096219	S3-158794CL	Claim L	19740614	450.00		360.0	240.0	360.0	80.0	IR	"450" appears to be gpm per claim sheet.	Marvin E. Haskins	S	DRAGOON CREEK
1	2128096	S3-006189CL	Claim L	19250301		600.0	960.0		960.0		IR		Bernard L. Goble	S	WEST BRANCH
1	2109800	S3-094310CL	Claim L	19110501	1,720.00		547.0	270.0	270.0	90.0	IR	"1720" appears to be gpm per claim sheet.	Spokane Country Club	S	DARTFORD CREEK
Subtotal (Claims)					*2,170.0*	*600.0*	*1,867.0*		*1,590.0*	*170.0*					
Rank 1 Subtotal					**2,172.3**	**3,370.0**	**4,466.0**		**4,189.0**	**985.0**					
2	2138375	G3-24651CWRIS	Cert	19751028		620.0	581.6	558.0	581.6	186.0	IR		Paul M. Gilliland	G	DRAGOON CREEK
2	2141394	G3-*05554CWRIS	Cert	19600405		400.0	280.0	210.0	280.0	70.0	IR		Kathleen and Ethlyn DeCamp	G	DEADMAN CREEK/PEONE CREEK
2	2142417	G3-*02079CWRIS	Cert	19510810		215.0	344.0	720.0	344.0	240.0	IR		Leota Longmeier	G	DARTFORD CREEK
Subtotal (Certificates)					*0.00*	*1,235.0*	*1,205.6*		*1,205.6*	*496.0*					
2	2127921	S3-007284CL	Claim L	19150501	2,600.00		340.0	255.0	340.0	85.0	IR ST	"2600" appears to be gpm from claim sheet and presently used is much less. Legal is marked as undefined but within 1/4 1/4, mostly homes.	C. J. Pounder, Jr.	S	LITTLE DEEP CREEK
2	2106253	S3-112127CL	Claim L	19070401	4.00		320.0	240.0	320.0	80.0	IR	Pending change app from 1985.	Elmer Hdyes	S	DRAGOON CREEK
Subtotal (Claims)					*2,604.0*	*0.0*	*660.0*		*660.0*	*165.0*					
Rank 2 Subtotal					**2,604.0**	**1,235.0**	**1,865.6**		**1,865.6**	**661.0**					
3	2141140	G3-*07200CWRIS	Cert	19640602		400.0	320.0	450.0	320.0	150.0	IR		F. E. Parks	G	WEST BRANCH
3	2141669	G3-*04180CWRIS	Cert	19551212		1,200.0	840.0	630.0	840.0	210.0	IR		C. C. Calkins	G	DARTFORD CREEK
3	2141940	G3-*04077CWRIS	Cert	19550729		1,000.0	760.0	570.0	760.0	190.0	IR		C. C. Calkins	G	DARTFORD CREEK
3	2136076	S3-*13113CWRIS	Cert	19540903	1.00		240.0	240.0	240.0	80.0	IR		Charles C. Miller, et al	S	WEST BRANCH
3	2143016	G3-*00469CWRIS	Cert	19470305		150.0	240.0	180.0	240.0	60.0	IR		Alfred M. Root	G	DRAGOON CREEK
Subtotal (Certificates)					*1.0*	*2,750.0*	*2,400.0*	2,070.0	*2,400.0*	*690.0*					
3	2103790	S3-122247CL	Claim L	19480801	0.50		360.0	270.0	360.0	90.0	FR IR		Inland Empire Paper Co.	S	OTTER CREEK
3	2118458	S3-051129CL	Claim L	19240601	5.00		3,650.0	240.0	240.0	80.0	IR		Ruth I. Moran	S	OTTER CREEK
3	2126785	S3-012190CL	Claim L	19240601	450.00		720.0	240.0	720.0	80.0	IR	Same owner as S3-051129CL - 97-98 reg. "450" appears to be gpm per claim sheet.	Ruth I. Moran	S	OTTER CREEK
3	2109737	S3-094048CL	Claim L	19120801	50.00		36,500.0	240.0	240.0	80.0	IR	"Presently used" reflects a more accurate Qi and Qa proportionate to acres irrigated.	Larry A. Moran	S	OTTER CREEK
3	2123590	S3-028362CL	Claim L	19050601	5.10		765.0	765.0	765.0	255.0	IR		Eloise Lee	S	DARTFORD CREEK
Subtotal (Claims)					*510.6*	*0.0*	*41,995.0*		*2,325.0*	*585.0*					

Table 10 - Summary and Ranking of Irrigation Rights Evaluated for Bank Seeding

Project # 140129 - Little Spokane Water Banking

Rank	WR_Doc	WR Doc File No.	Document Type	Priority Date	cfs	gpm	Acre feet/Year Recorded by Ecology	Acre feet/Year Assuming Water Duty of 3 ft	Acre feet/Year Used In Summary	Acres Irrigated	Purpose	Notes	Document Name	Source	Subbasin
Rank 3 Subtotal					**511.6**	**2,750.0**	**44,395.0**		**4,725.0**	**1,275.0**					
4	2142855	G3-*00674SWRIS	Cert	19090101		1,000.00	2,114.00	1,701.0	2,114.0	567	CI DM FR IR		North Spokane Irrigation Dist 8	G	DARTFORD CREEK
4	2142856	G3-*00675SWRIS	Cert	19090101		1,000.00	2,114.00	1,701.0	2,114.0	567	CI DM FR IR		North Spokane Irrigation Dist 8	G	DARTFORD CREEK
4	2145728	G3-*10023C	Cert	19690213		900	487.5	585.0	487.5	195	IR		Kenneth Erks	G	DEADMAN CREEK/PEONE CREEK
4	2139437	G3-01363CWRIS	Cert	19701217		1,500.00	209	225.0	209.0	75	DS IR		Holy Cross Cemetary Association	G	DARTFORD CREEK
4	2088860	G3-01610C	Cert	19691126		1,375.00	693	600.0	693.0	200	DS IR ST		WA Natural Resources Department	G	LITTLE SPOKANE/DEER CREEK
4	2138618	G3-23099	Cert	19740501		1,410.00	453	420.0	453.0	140	DS IR		Duane May	G	LITTLE SPOKANE/DEER CREEK
4	2144605	G3-23977C	Cert	19741213		260	226	150.0	226.0	50	DM IR		Stevens County PUD 1	G	LITTLE DEEP CREEK
4	2135996	S3-*12860AWCWRIS	Cert	19540408	1.04		240	240.0	240.0	80	DS IR ST		RASQUE G M	S	LITTLE SPOKANE/DEER CREEK
4	2135068	S3-*20263C	Cert	19670525	0.79		271	270.0	271.0	90	FS IR ST		Clarence Dickinson	S	WEST BRANCH
Subtotal (Certificates)					*1.8*	*7,445.0*	*6,807.5*		*6,807.5*	*1,964.0*					
4	2124165	G3-023912CL	Claim L	19560301		10	250	75.0	250.0	25	DG IR ST		Frank Coram	G	LITTLE DEEP CREEK
4	2119881	G3-045904CL	Claim L	19731001		200	260	195.0	260.0	65	DG IR		James L. Shafer	G	LITTLE DEEP CREEK
4	2118527	G3-051439CL	Claim L	19240101		400	553	480.0	553.0	160	DG IR ST		Andrew Fisher	G	DRAGOON CREEK
4	2109376	G3-096733CL	Claim L	19330801		24.5	672	3.0	672.0	1	DG IR ST		Bruce H. Lauderdale	G	BEAVER CREEK
4	2108348	G3-102469CL	Claim L	19680101		150	240	120.0	240.0	40	DG IR		August G. Dreger	G	OTTER CREEK
4	2104977	G3-117886CL	Claim L	19400701		269	322	240.0	322.0	80	DG IR		Bonnie H. Clendon	G	BEAVER CREEK
4	2127730	G3-006416CL	Claim L	19710910		50	425	105.0	425.0	35	DG IR ST		Donald H. Bartlett	G	LITTLE DEEP CREEK
4	2129152	S3-000669CL	Claim L	19160101	0.501		360	45.0	360.0	15	FS IR WL		Green Meadows, Inc.	S	WEST BRANCH
4	2129153	S3-000670CL	Claim L	19160101	0.501		360	45.0	360.0	15	FS IR WL		Green Meadows, Inc.	S	WEST BRANCH
4	2128416	S3-003586CL	Claim L	19090101	1		365	60.0	365.0	20	DG IR ST		Harry L. Krogh	S	WEST BRANCH
4	2126694	S3-011696CL	Claim L	19100101	8		460	345.0	460.0	115	DG IR		Wandermere Company	S	DARTFORD CREEK
4	2120767	S3-041806CL	Claim L	19080401	1.01		202	150.0	202.0	50	DG IR		Kenneth E. Skjethaug	S	LITTLE SPOKANE/DEER CREEK
4	2104770	S3-118876CL	Claim L	19510501	1.67		500	375.0	500.0	125	DG IR ST		Warren L. Harter	S	WEST BRANCH
4	2104614	S3-120006CL	Claim L	19130816	6		2,028.00	900.0	2,028.0	300	DG IR		John Kopp	S	OTTER CREEK
4	2102619	S3-129239CL	Claim L	19750401	0.4		1,306,800.00	240.0	240.0	80	DG IR ST		James W. Culverwell	S	OTTER CREEK
4	2102620	S3-129240CL	Claim L	19750401	0.05		777,600.00	240.0	240.0	80	DG IR ST		James W. Culverwell	S	OTTER CREEK
Subtotal (Claims)					*19.1*	*1,103.5*	*2,091,397.0*		*7,477.0*	*1,206.0*					
Rank 4 Subtotal					**21.0**	**8,548.5**	**2,098,204.5**		**14,284.5**	**3,170.0**					
Total					**5,308.87**	**15,903.5**	**2,148,931.1**		**25,064.1**	**6,091.0**					

Water Rights Eliminated From Calculations (Below estimated 200 acre-feet/year or transferred to municipal rights)

1	2138352	G3-24591C	Cert	19750922		1,500.0	579.0	579.0		180.0	IR	Changed in 2003 to municipal use under Deer Park City.	Deer Park City	G
1	2144843	G3-22546C	Cert	19740214		1,600.0	1,104.0	1,104.0		320.0	IR	Changed in 2003 to municipal use under Deer Park City.	Deer Park City	G
2	2128378	S3-003475CL	Claim L	19660413	0.33		240.0	240.0		30.0	IR ST		Robert A. and Elaine M. Rushing	S
3	2128376	S3-003473CL	Claim L	19660413	150.00		240.0	240.0		30.0	IR ST	"150" appears to be gpm per claim sheet.	Robert A. and Elaine M. Rushing	S
3	2110548	G3-091982CL	Claim L	19730701		8.0	75,000.0	75,000.0		1.0	IR	Qa appears to be gallons.	Bert E. Smith	G
3	2108345	S3-102466CL	Claim L	19101011	30.00		9,000.0	9,000.0		40.0	IR ST	"Presently used" more accurately reflects water right. Would be a "1" if not for high Qi and Qa.	August G. Dreger	S
3	2105773	S3-113564CL	Claim L	18940917	1.00		238.0	238.0		41.0	IR		Clark Cordill	S
3	2101288	G3-135790CL	Claim L			125.0	400.0	400.0		30.0	IR		Eugene M. Jones	G
3	2146415	S3-300692CL	Claim	19030101	0.04		813,952.0	813,952.0		5.0	IR ST	97-98 Claim, 1903, Qa appears to be gallons	Larry and Judith Herrell	S
4	2123679	G3-028803CL	Claim L	19000101		5	325,850.00	870,000.0		290,000.00	DG IR ST		Richard C. Olsen	G
4	2121772	G3-036561CL	Claim L	19020101		15	1,153,400.00	1.5		0.5	DG IR ST		Robert L. Krick	G
4	2121773	G3-036562CL	Claim L	19330601		12	1,025,000.00	0.8		0.25	DG IR		Norma J. Calmes	G
4	2115493	G3-066972CL	Claim L	19590501		250	435,600.00	21.0		7	DG IR ST		William D. Lewis	G
4	2099117	G3-144885CL	Claim L	19630601		18	9,384,480.00	9.0		3	DG IR		John R. Riley	G
4	2096736	G3-156271CL	Claim L	19620701		15	87,120.00	6.0		2	DG IR ST		Dallas R. Brown	G
4	2128232	G3-004784CL	Claim L	19710401		10	488,775.00	0.8		0.25	DG IR		Lela M. Scribner	G
4	2119210	S3-048792CL	Claim L	19720101	0.2228		1,613.00	63.0		21	DG IR ST		Robert C. Wilson	S
4	2116431	S3-060145CL	Claim L	19660501	2.228		1,600.00	13.8		4.6	DG IR PO		Jack E. Vangelder	S
4	2103684	S3-123871CL	Claim L	19700501	0.03		144,000.00	7.5		2.5	DG IR		Chester E. Tachell	S
4	2096735	S3-156270CL	Claim L	19620701	0.0445		217,800.00	15.0		5	DG IR ST		Dallas R. Brown	S

Table 10 - Summary and Ranking of Irrigation Rights Evaluated for Bank Seeding

Project # 140129 - Little Spokane Water Banking

Purpose Code Legend

Code	Description
CI	Commercial/Industrial
DM	Domestic Multiple
DG	Domestic General
FR	Fire Protection
FS	Fish Propogation
IR	Irrigation
PO	Power
ST	Stockwater
WL	Wildlife

Rank
1 - Strong evidence of water use
2 - Some evidence of water use
3 - Limited evidence of water use
4 - Purposes in addition to irrigation and stock water, requires further review

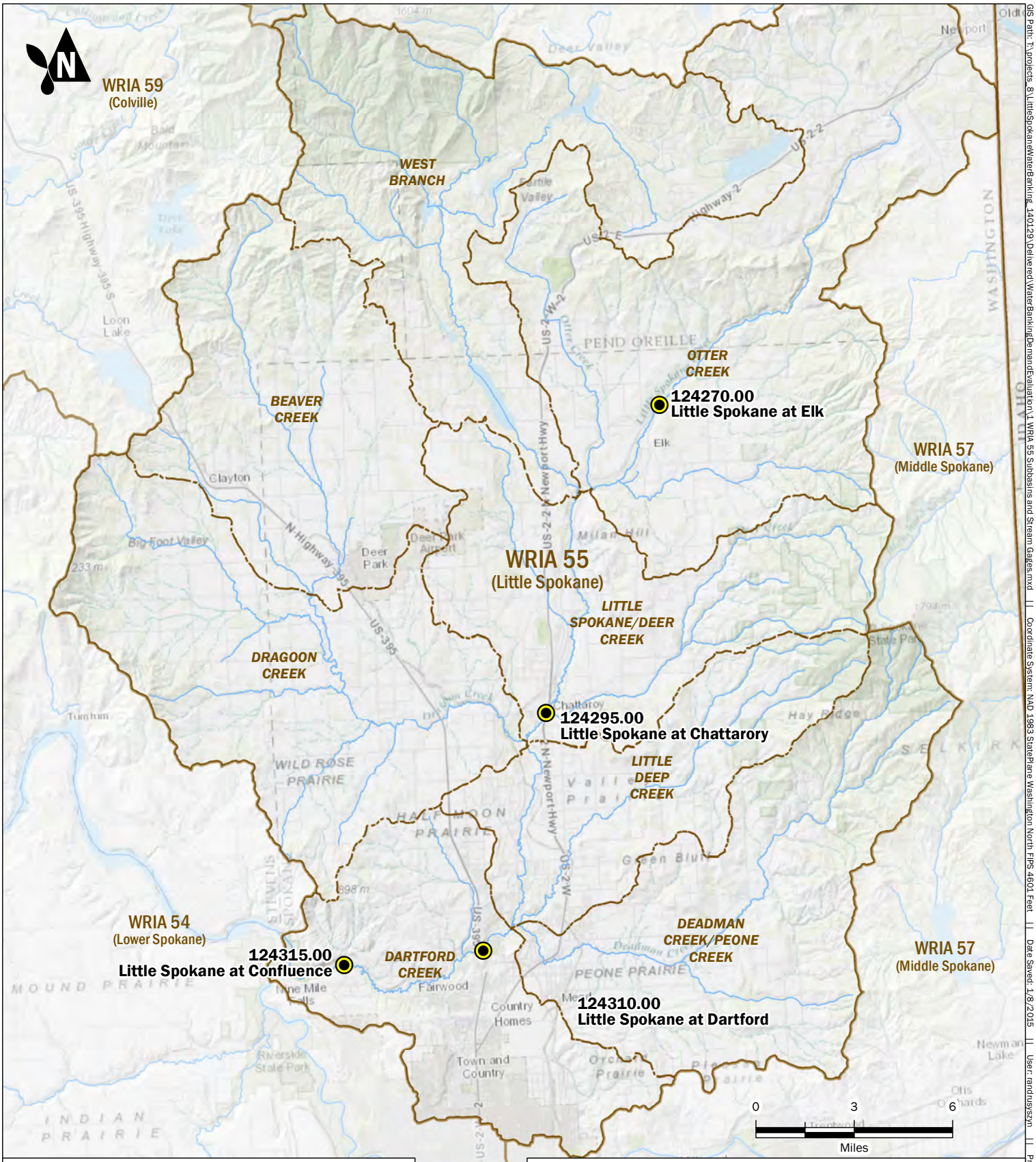
	Error in reported value considered likely.
	'Acre feet/year Used in Summary' was adjusted based on an assumed water duty of 3 feet in cases where the reported acre-feet/year was excessive relative to the reported acerage.

Notes:
cfs = cubic feet per second

gpm = gallons per minute

G = groundwater
S = surface water

FIGURES



USGS Gaging Station/Control Station

WRIA Boundary

WRIA 55 Subbasins

Named Watercourse

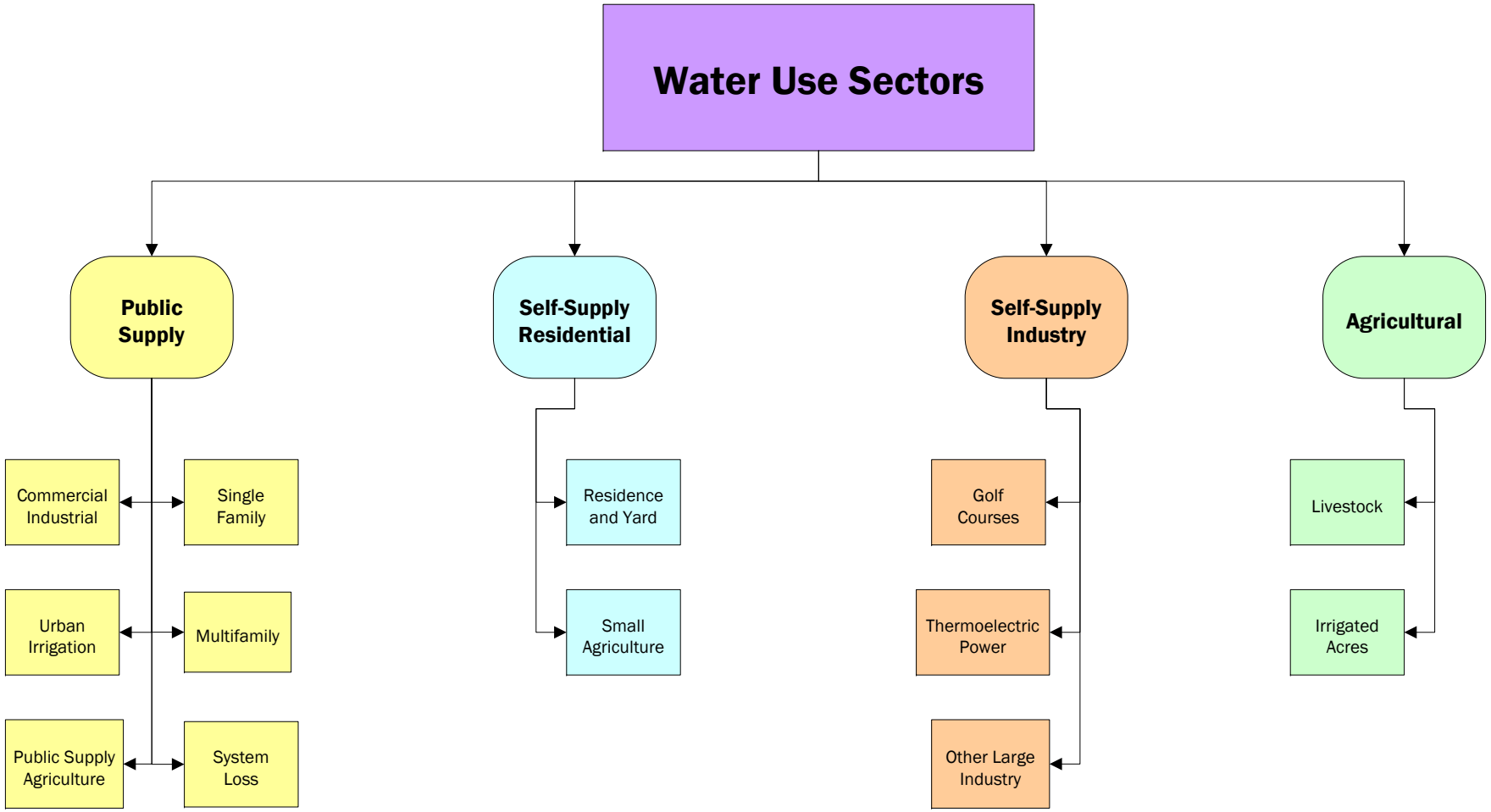
Notes:
-WRIA 55 Subbasin Source: Spokane County Water Resources Division of Utilities, 2015

WRIA 55 Subbasins and Stream Gages

Little Spokane Water Banking Demand Evaluation,
Supply Assessment, and Water Transfer Framework Considerations
WRIA 55, Washington

Aspect CONSULTING	JAN-2015	BY: CME / RAA	FIGURE NO. 1
	PROJECT NO. 140129	REVISED BY: ---	

GIS Path: T:\projects_8\LittleSpokaneWaterBanking_140129\Delivered\WaterBankingDemandEvaluation\1 WRIA 55 Subbasins and Stream Gages.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 1/8/2015 || User: randrusyszyn || Print Date: 1/8/2015

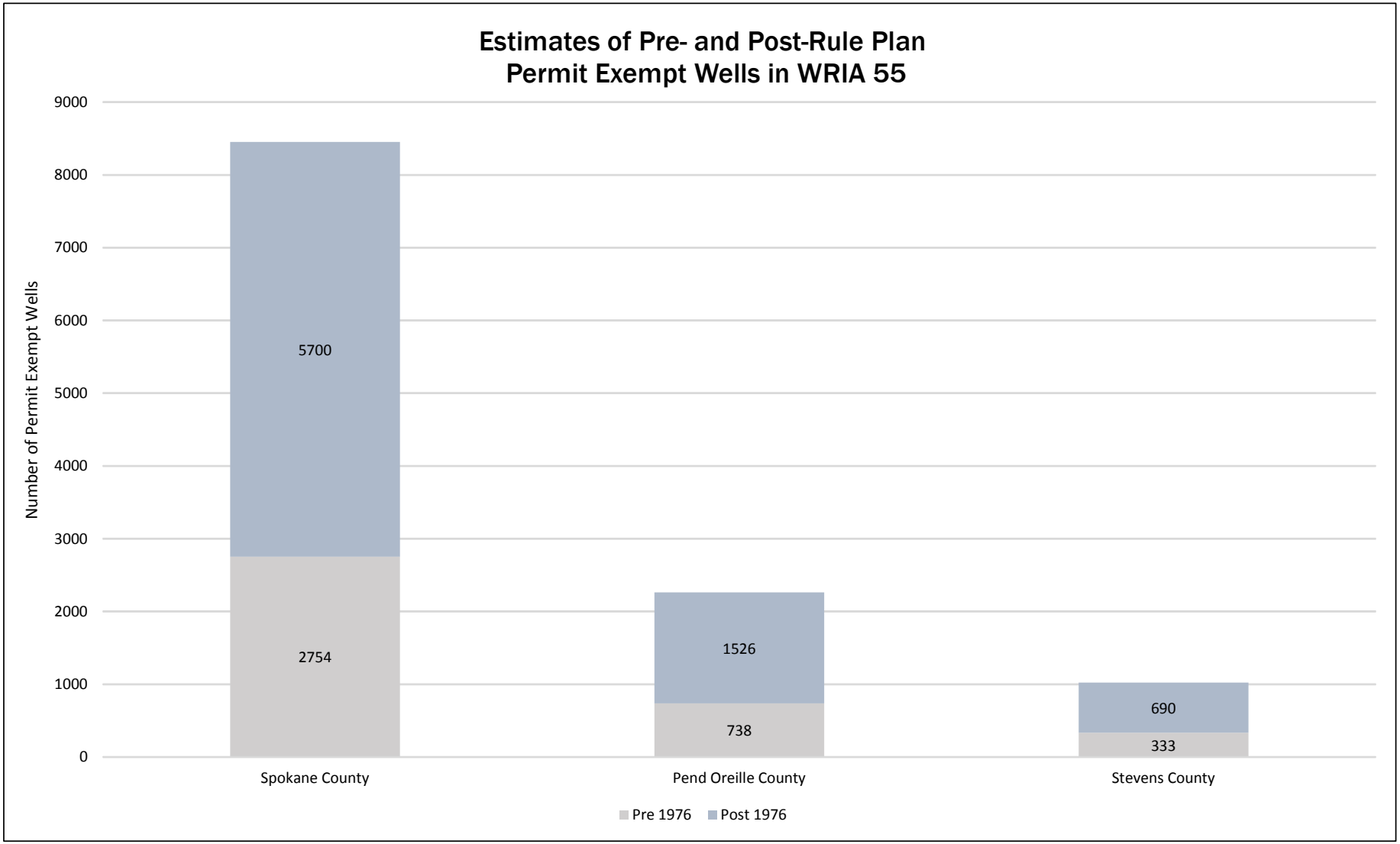


Water Use Sector Framework for Water Demand Evaluation

Little Spokane Water Banking Demand Evaluation,
Supply Assessment, and Water Transfer Framework Considerations
WRIA 55, Washington

Aspect CONSULTING	JAN-2015	BY: CME / RAA	FIGURE NO. 2
	PROJECT NO. 140129	REVISED BY: ---	

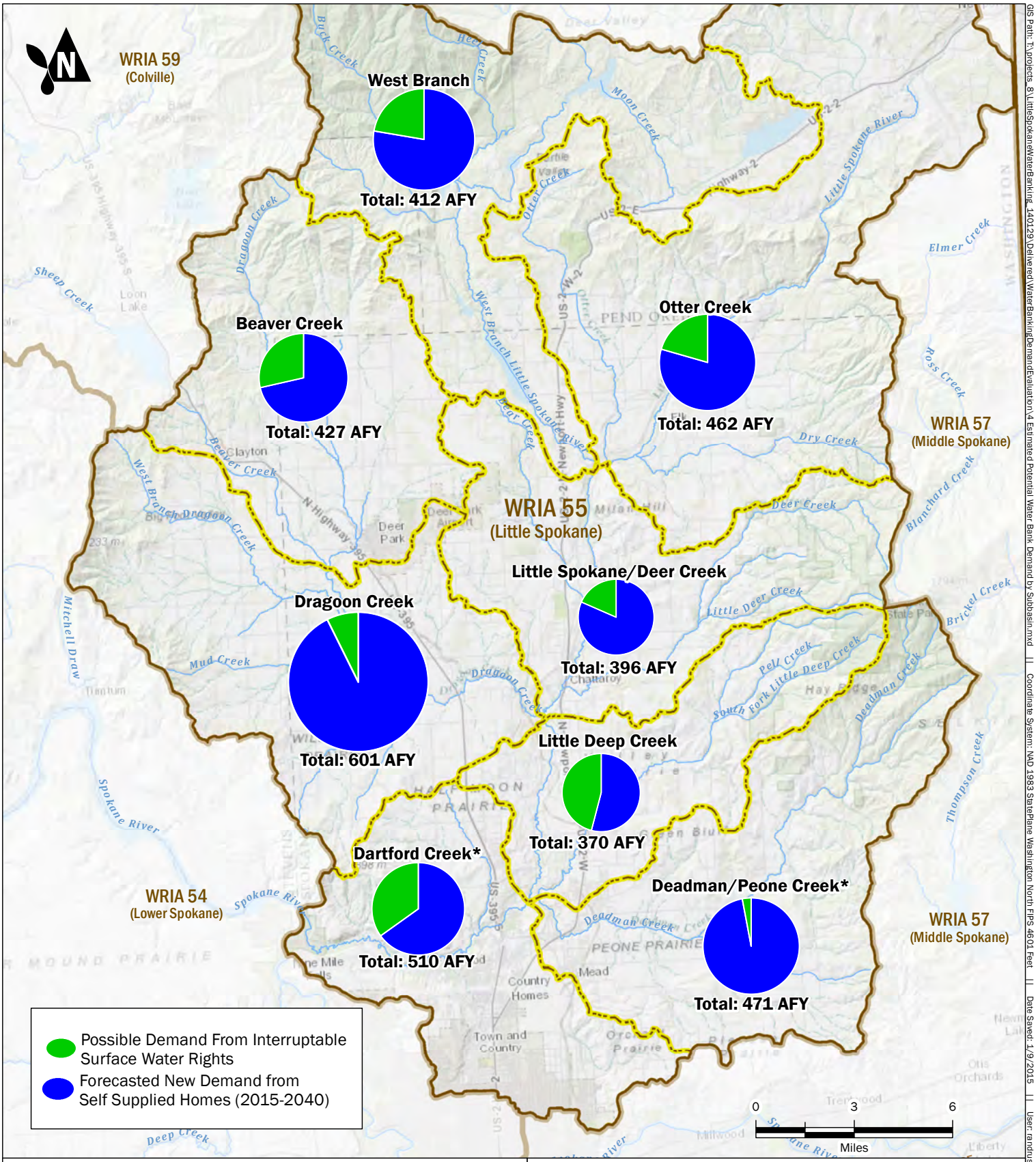
VISIO PATH: I:\projects_8\LittleSpokaneWaterBanking_140129\Delivered\WaterBankingDemandEvaluation\2 Water Use Sector Framework.vsd | 1/7/2015



Estimates of Pre- and Post-Rule Permit Exempt Wells in WRIA 55

Little Spokane Water Banking Demand Evaluation,
Supply Assessment, and Water Transfer Framework Considerations
WRIA 55, Washington

Aspect CONSULTING	JAN-2015	BY: CME / RAA	FIGURE NO. 3
	PROJECT NO. 140129	REVISED BY: ---	



WRIA 55 Demand Forecast Units

Named Watercourse

WRIA Boundary

Estimated Potential Water Bank Demand by Subbasin

Little Spokane Water Banking Demand Evaluation, Supply Assessment, and Water Transfer Framework Considerations
WRIA 55, Washington

Notes:
**Possible Demand for pending new water applications in Dartford Creek and Deadman/Peone Creeks may total 4000-5000 Acre-Feet/Year (AFY)*
-Water Demand values are in AFY
-Demand Forecast Unit Source: Spokane County Water Resources Division of Utilities, 2015

Aspect Consulting	JAN-2015	BY: CME / RAA	FIGURE NO. 4
	PROJECT NO. 140129	REVISED BY: ---	

GIS Path: T:\projects_8\LittleSpokaneWaterBanking_140129\DeliveredWaterBankingDemandEvaluation\4 Estimated Potential Water Bank Demand by Subbasin.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 1/9/2015 || User: randrusyszyn || Print Date: 1/9/2015

Consumptive Water Use Calculator

Percentage of Water Consumed by Rule	
Water Use	% Consumed
In-house Use with a On-site Septic System	30%
In-house Use Hooked up to a Sanitary Septic System	20%
Outdoor Use (Irrigation)	90%

How Much Water Do I need?

In-House Use	Number of Connections		Amount of water per Connection (gallons per day) *
In-house Use with a On-site Septic System	1		350
In-house Use Hooked up to a Sanitary Septic System	0		350

* This value is a default value based on Dept of Health minimum service requirements.

Outdoor Use	Number of Square Feet	Number of Acres	Amount of water per acre (ac-ft)**
Irrigation	500	0.011	1.89

** This value is based on an irrigation requirement for pasture/turf in the Cle Elum area and an irrigation efficiency of 80% consistent with WAC 173-539A.

TOTAL CONSUMED
Consumptive Water Use (ac-ft)
0.118
0.000
Consumptive Water Use (ac-ft)
0.019
Total Consumptive Water Use (ac-ft)
0.137

The total consumptive water use is based on the assumptions in WAC 173-539A

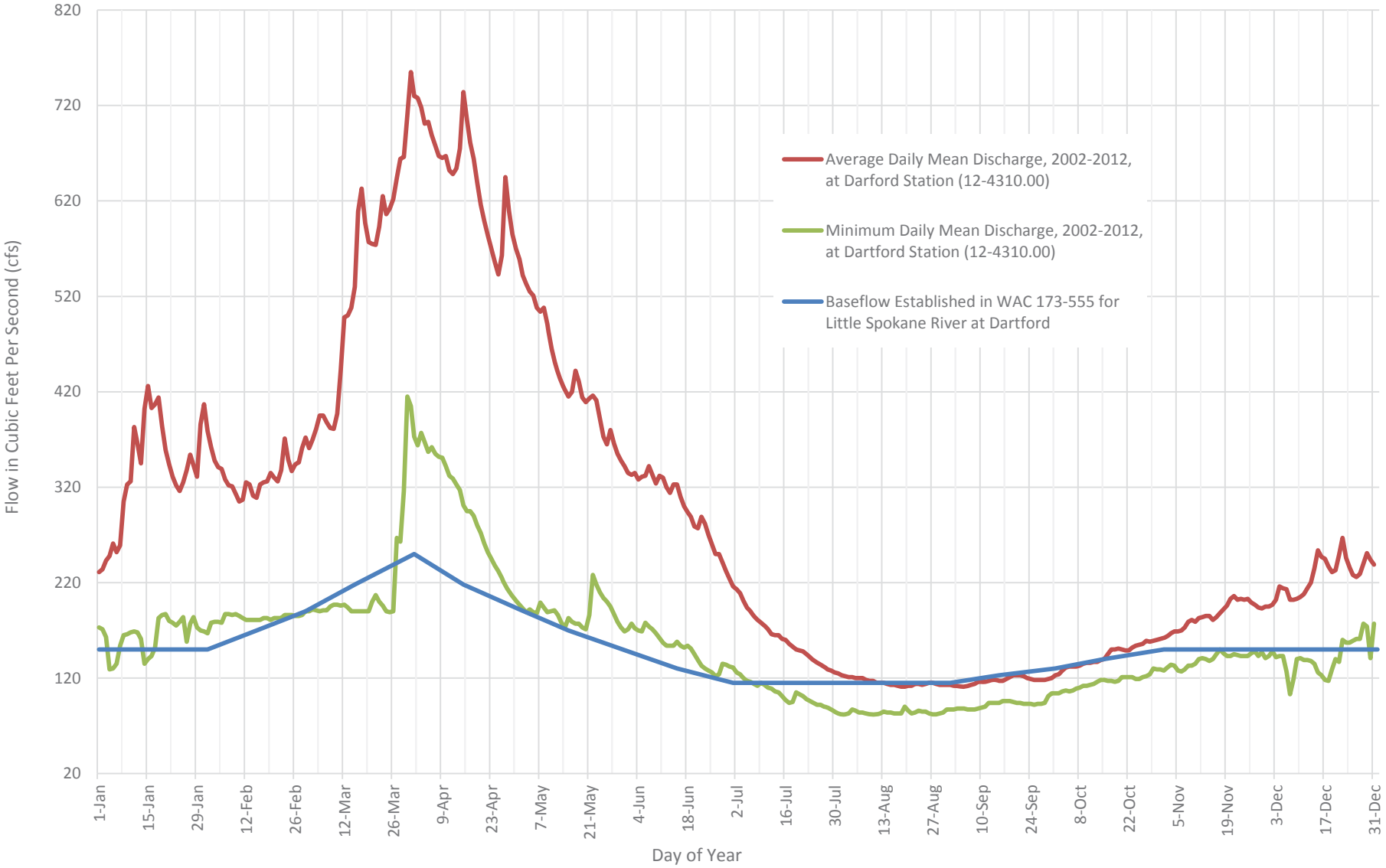
TOTAL USE
Water Use (ac-ft)
0.392
0.000
Water Use (ac-ft)
0.022
Total Water Use (ac-ft)
0.414

Total water use is the quantity of water required for the project.

Ecology Consumptive Use Equivalents Calculator

Little Spokane Water Banking Demand Evaluation,
Supply Assessment, and Water Transfer Framework Considerations
WRIA 55, Washington

Aspect CONSULTING	JAN-2015	BY: CME / RAA	FIGURE NO. 5
	PROJECT NO. 140129	REVISED BY: ---	

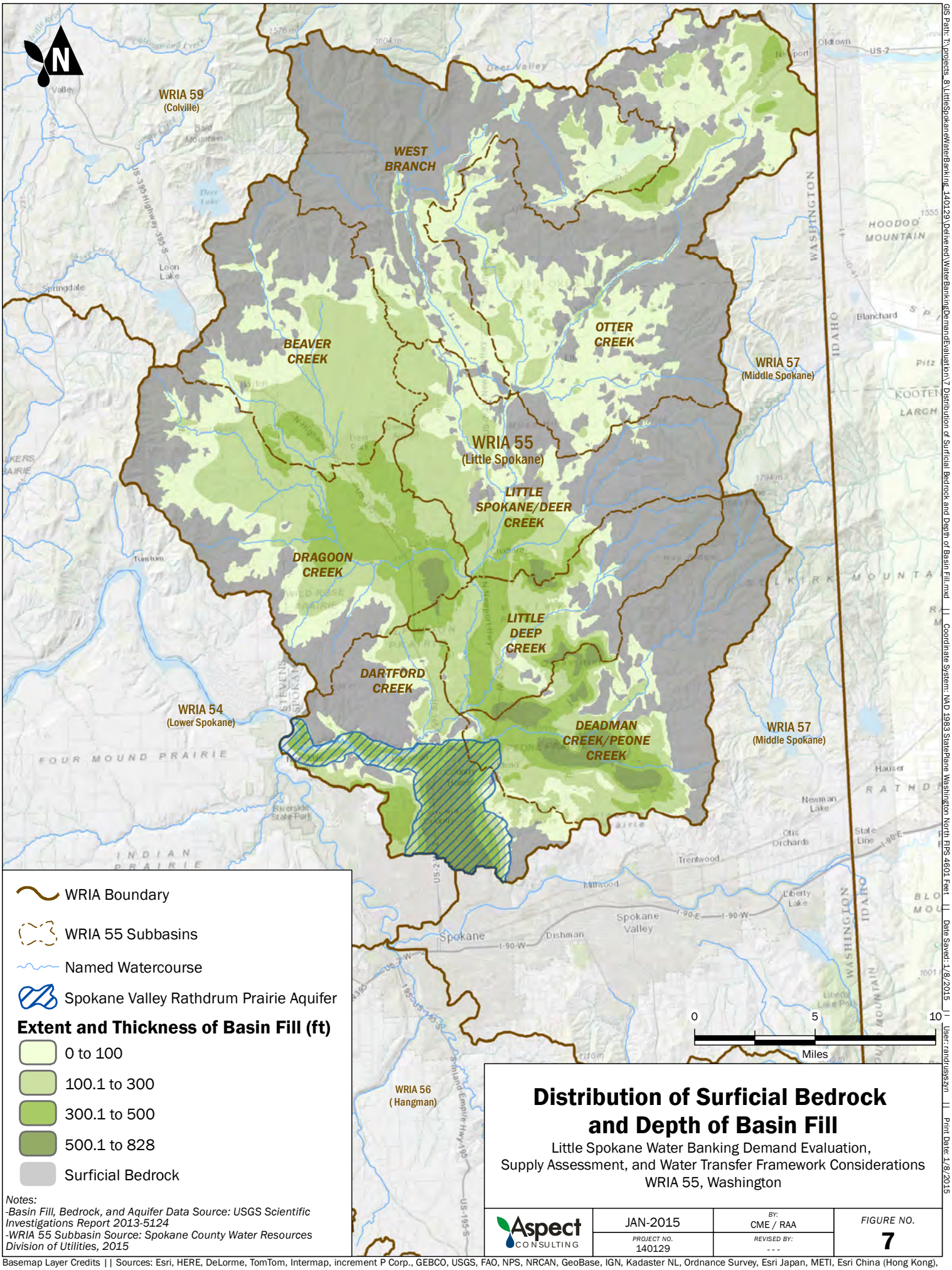


Established Baseflows vs. Gage Data (2002-2012)
Little Spokane River at Dartford

Little Spokane Water Banking Demand Evaluation,
Supply Assessment, and Water Transfer Framework Considerations
WRIA 55, Washington

Aspect Consulting	JAN-2015	BY: CME / RAA	FIGURE NO. 6
	PROJECT NO. 140129	REVISED BY: ---	

GIS Path: T:\projects_8\LittleSpokaneWaterBanking_140129\Delivered\WaterBankingDemandEvaluation\6 Established Baseflows vs Gage Data.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || User: randruszyn



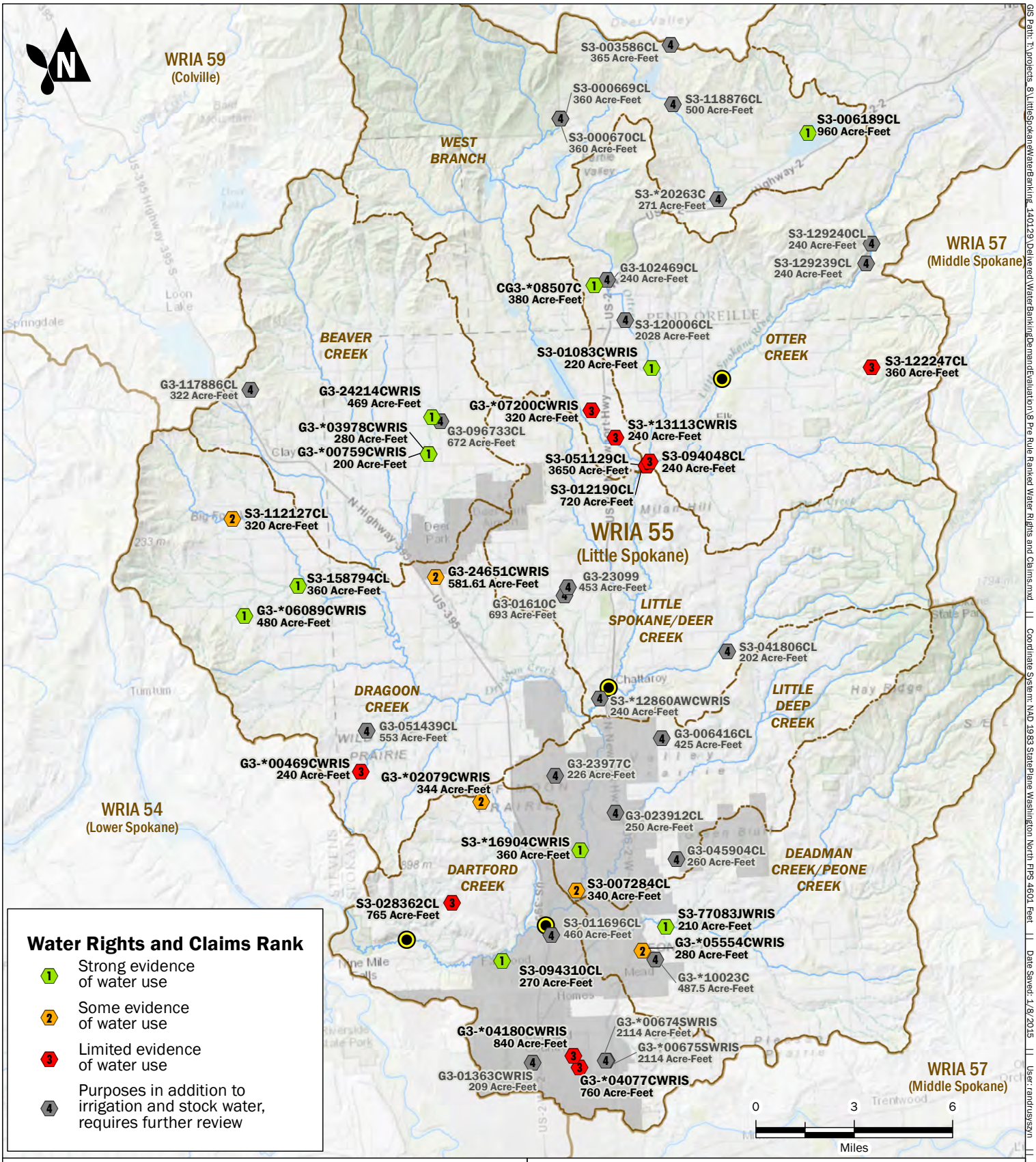
Notes:
-Basin Fill, Bedrock, and Aquifer Data Source: USGS Scientific Investigations Report 2013-5124
-WRIA 55 Subbasin Source: Spokane County Water Resources Division of Utilities, 2015

Distribution of Surficial Bedrock and Depth of Basin Fill

Little Spokane Water Banking Demand Evaluation,
Supply Assessment, and Water Transfer Framework Considerations
WRIA 55, Washington

Aspect Consulting	JAN-2015	BY: CME / RAA	FIGURE NO. 7
	PROJECT NO. 140129	REVISED BY: ---	

GIS Path: T:\projects_8\LittleSpokaneWaterBanking_140129\Delivered\WaterBankingDemandEvaluation\7 Distribution of Surficial Bedrock and Depth of Basin Fill.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 1/8/2015 || User: randrusszm || Print Date: 1/8/2015

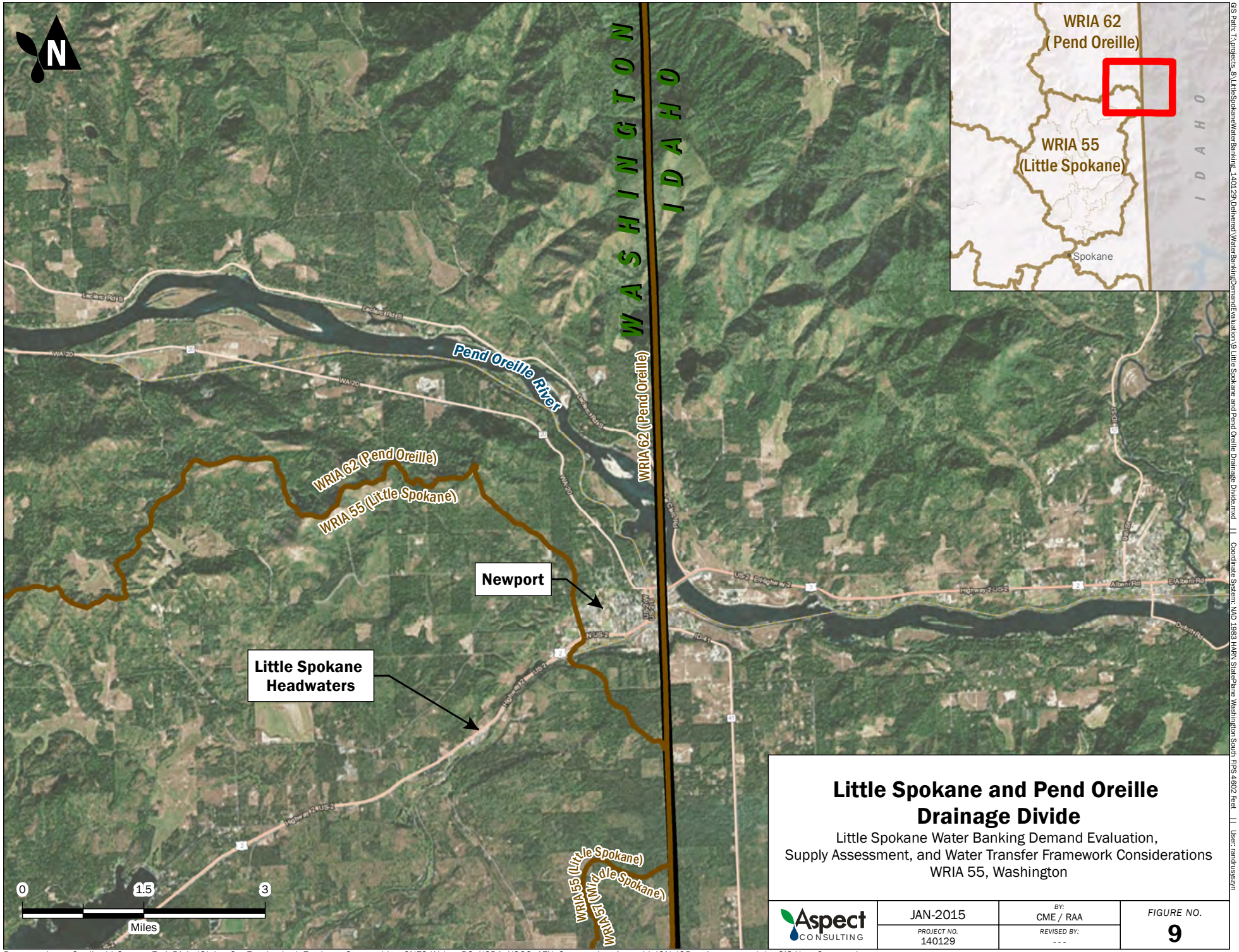


Notes:
-Evaluation based on preliminary screening of aerial and LandSat photography. Relinquishment exceptions under RCW 90.14.140 may excuse prolonged nonuse and change these rankings.
-Water Rights/Claims with multiple Point of Dispersion locations are displayed as an average location.
-WRIA 55 Subbasin Source: Spokane County Water Resources Division of Utilities, 2015

Pre-Rule Ranked Water Rights & Claims

Little Spokane Water Banking Demand Evaluation, Supply Assessment, and Water Transfer Framework Considerations
WRIA 55, Washington

Aspect CONSULTING	JAN-2015	BY: PPW	FIGURE NO. 8
	PROJECT NO. 140129	REVISED BY: CME / RAA	

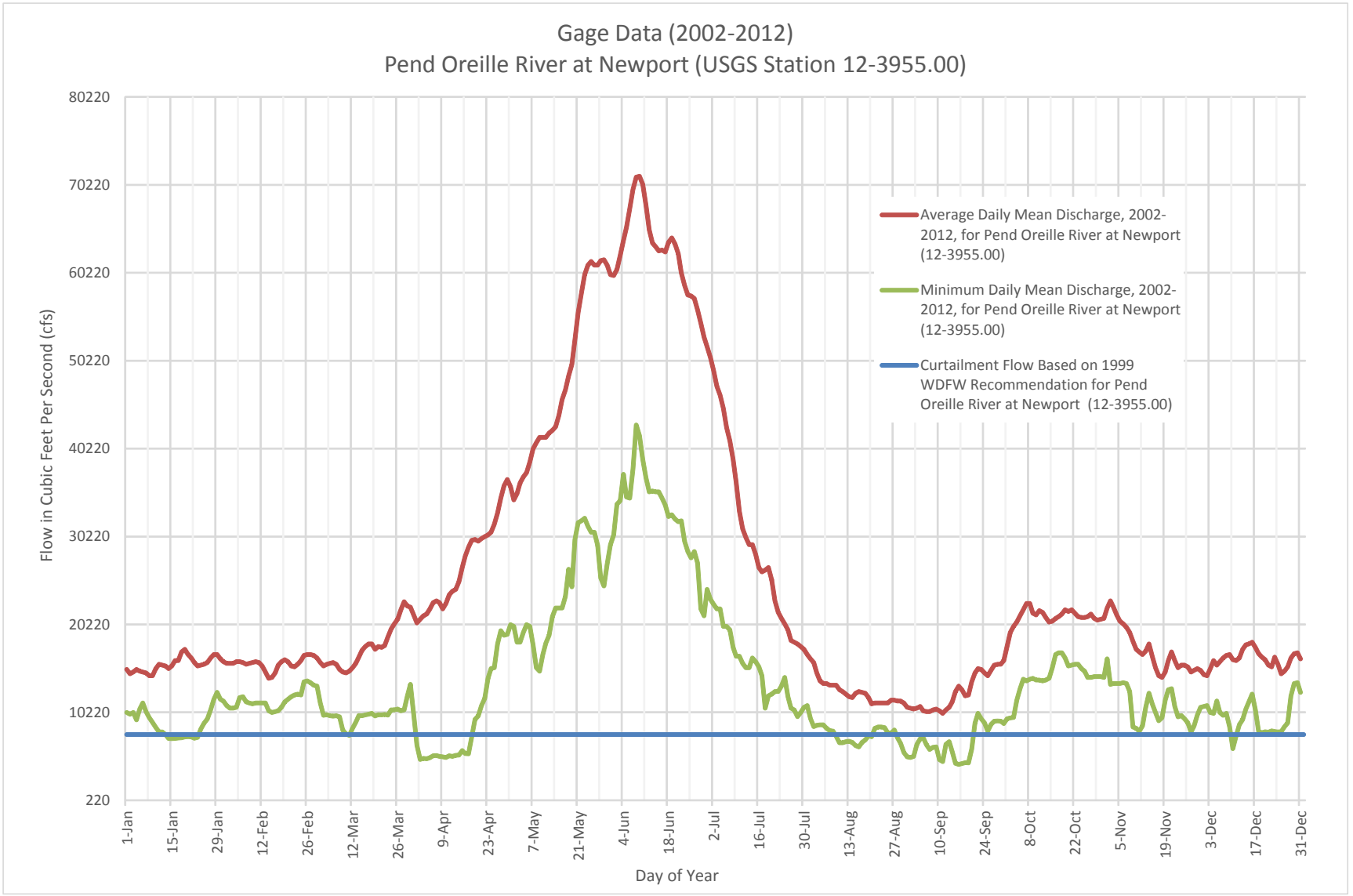


Little Spokane and Pend Oreille Drainage Divide

Little Spokane Water Banking Demand Evaluation,
Supply Assessment, and Water Transfer Framework Considerations
WRIA 55, Washington

Aspect CONSULTING	JAN-2015	BY: CME / RAA	FIGURE NO. 9
	PROJECT NO. 140129	REVISED BY: ---	

GIS Path: T:\projects_8\LittleSpokaneWaterBanking_140129\Delivered\WaterBankingDemandEvaluation\9_Little Spokane and Pend Oreille Drainage Divide.mxd || Coordinate System: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet || User: randrusszyn



Curtailment Flow vs. Gage Data (2002-2012)
Pend Oreille River at Newport

Little Spokane Water Banking Demand Evaluation,
Supply Assessment, and Water Transfer Framework Considerations
WRIA 55, Washington

Aspect CONSULTING	JAN-2015	BY: CME / RAA	FIGURE NO. 10
	PROJECT NO. 140129	REVISED BY: ---	