August 1, 2012

TO: Rob Lindsay, Water Resources Manager
Spokane County Division of Utilities
WRIAs 54 and 57

FROM: Rusty Post, Watershed Planning
Department of Ecology, Eastern Regional Office

SUBJECT: Spokane River Minimum Instream Flow Recommendations

The Washington State Department of Ecology (Ecology), in consultation with the Washington State Department of Fish and Wildlife (WDFW) has the primary responsibility for establishing instream flows in the state of Washington. Chapter 90.82 RCW provides for Ecology and WDFW, as the state caucus, to collaborate with interested parties participating in the watershed planning process to develop instream flow recommendations.

The Spokane River flows through two Water Resource Inventory Areas (WRIAs), the Middle Spokane (WRIA 57) and the Lower Spokane (WRIA 54) watersheds. Both watershed planning units addressed instream flow in their approved watershed plans and hired consultants to conduct instream flow studies. They were able to present recommendations for instream flows, but were not able to achieve consensus through the watershed planning process (RCW 90.82.080).

As authorized by statute, the state may initiate rule making on instream flows for a watershed that did not achieve consensus. Since the planning unit did not reach consensus, Ecology and WDFW are presenting their final recommendations for instream flows on the Spokane River. The recommended flows presented in this document supersede any previously presented flow number proposals from the State Caucus during the watershed planning process. Our intent is to use the revised recommendations as the basis for instream flow rule-making for the Spokane River.

These recommendations are technically appropriate, legally defensible minimum instream flow values that protect and preserve instream resources as required under Chapters 90.22, 90.54, and 90.82 RCW. For additional detail regarding technical review of data used in the development of these minimum flows, please review the attached recommendations and description from Hal Beecher, Ph.D., WDFW Instream Flow Biologist.

A minimum instream flow is a state water right established to meet the minimum flows necessary to sustain fish and wildlife as well as to maintain the navigational values, recreation

and aesthetic values and water quality of the river. A minimum flow established by rule has a priority date, and does not affect the use, validity, extent, or priority of senior water rights.

During the watershed planning process and discussion of instream flows, uncertainty centered on the legal availability of municipal inchoate water and the technical information about fish spawning in certain areas. With the completion of the court proceedings on the municipal water law (Lummi Indian Nation v. State of Washington, Washington Supreme Court No. 81809-6) and the recent Avista rainbow trout spawning survey (Addley and Peterson, 2011), we believe thorough information is now available to support development of instream flow values year-round with certainty.

Summary of Recommended Flows

The recommended minimum instream flows for the Spokane River as measured at the "Spokane River at Spokane" gage (USGS #12422500, Figure 2) in cubic feet per second (cfs) are:

October 1 – March 31	1,700 cfs
April 1 – June 15	6,500 cfs
June 16 – September 30	850 cfs

The "at Spokane" gage is the control point proposed for the minimum instream flow to regulate surface water withdrawals from Sullivan Road Bridge to Seven Mile Bridge, and to regulate ground water withdrawals within the boundaries of the Spokane Valley-Rathdrum Prairie Aquifer in Washington State (Figure 2).

The recommended minimum instream flow for the Spokane River from the Idaho state line to Sullivan Road as measured at the Barker Road gage (USGS #12419000, Figure 2) in cubic feet per second (cfs) is:

June 16 – September 30	500 cfs

The Barker Road gage is the proposed control point for summertime minimum instream flows to regulate surface water withdrawals from the Idaho state line to the Sullivan Road Bridge.

Figure 1 is an exceedance curve hydrograph for the Spokane River with the recommended instream flows added for comparison. Figure 2 depicts the control points for implementing the minimum instream flows.

The State Caucus, composed of the Washington Departments of Ecology (Ecology) and Fish and Wildlife (WDFW), present these recommendations for minimum instream flows and the control points to implement those instream flows based on the following studies:

Addley, R.C. and N.P. Peterson. 2011. *Lower Spokane River Redband trout spawning habitat: Monroe Street Dam to Nine Mile Dam Pool. Spokane River Hydroelectric Project FERC Project No. 2545.* Prepared for Avista Corporation.

EES Consulting. 2007. *Final Technical Report – Spokane River Instream Flow Studies.* Prepared for Spokane County Public Works Department and WRIA 54 & 57 Watershed Planning Units. Bellingham, WA.

(NHC and HD) Northwest Hydraulic Consultants and Hardin-Davis, Inc. 2004. *Instream flow and fish habitat assessment – FERC Project No. 2545*, Avista Corporation. Corvallis, OR.

Parametrix. 2003a. Rainbow *trout radio-tracking survey 2003 – Interim Report. Spokane Hydroelectric Project, FERC Project No. 2545.* Prepared for Fisheries Work Group, Spokane River Project Relicensing, under contract to Avista Corporation, Spokane, WA. Parametrix, Kirkland, WA.

Parametrix. 2003b. Rainbow *trout spawning survey, 2003 – Final Report. Spokane Hydroelectric Project, FERC Project No. 2545.* Prepared for Fisheries Work Group, Spokane River Project Relicensing, under contract to Avista Corporation, Spokane, WA. Parametrix, Kirkland, WA.

Poff, N.L., J.D Allan, M.B. Bain, J.R. Karr, K.L. Prestergaard, B. Richter, R. Sparks, and J. Stromberg. 1997. *The natural flow regime: a paradigm for river conservation and restoration.* Bioscience 47: 769-784.

Taylor, S. L., B. A. Contor, G. S. Johnson, and G. Moore, 2008: *Developing Zones of Homogeneous Response for the Spokane Valley-Rathdrum Prairie Aquifer Model*; Idaho Water Resources Research Institute, University of Idaho.

Wydoski, R.S., and R.L. Whitney. 2003. *Inland fishes of Washington.* American Fisheries Society and University of Washington Press, Seattle and London. 322 pp.

Again, for a thorough discussion of the data and analysis underlying the flow/habitat relationships leading to the numerical values, see the attached memorandum (Beecher, 2012).

Combined Weighted Usable Area (WUA) curve

We reviewed the lower Spokane River instream flow study results and compiled WUA results as depicted in the combined WUA graphics (Figures 3 & 4). The combined WUA curves were derived by:

- Giving 80% weight to the "Gun Club" site and 20% weight to the "at Spokane" gage site;
- Giving equal weighting to juvenile/adult rainbow trout and adult whitefish;
- Allowing for 200 cfs more stream flow at the "Gun Club" site than at the "at Spokane" gage site (due to inflow between the two stations).

Summer minimum instream flows: June 16-September 30
The weighted combination of rainbow trout and whitefish WUA peaked at 900 cfs. This was 87% of the maximum rainbow trout WUA (peak at 400 cfs) and 89% of maximum whitefish WUA (peak at 1,700 cfs, Figure 3). To achieve similar WUA levels for both species (about 88% of peak WUA), a flow of 850 cfs should be protected. Thus, we recommend 850 cfs as the summer (June 16-September 30) instream flow measured at the "at Spokane" gage.

Fall and winter minimum instream flows: October 1-March 31
In fall and winter (October 1-March 31), we prioritized whitefish over rainbow trout with a minimum instream flow of 1,700 cfs. Rainbow trout juvenile and adult WUA were analyzed with whitefish for fall and winter, rather than using only winter rainbow trout WUA. While rainbow trout juvenile and adult response is appropriate through October and some of November, rainbow trout winter fish habitat criteria were developed in small, steep mountain streams and are not directly applicable to the Spokane River. We do not believe that winter flow-dependent habitat is a major limiting factor for rainbow trout in the Spokane River, nor that decreasing winter stream flows would result in significant benefits for trout. The winter instream flow thus emphasizes protection of whitefish spawning. In most Washington streams higher flows that are suitable for mountain whitefish do not appear to adversely impact rainbow trout.

Mountain whitefish support a sport fishery during winter. They feed actively in winter. They are the most numerous fish in larger streams in Washington, including the Spokane River. Consequently, WDFW emphasizes mountain whitefish winter habitat in recommending winter flows. Whitefish adult WUA peaks at 1700 cfs (Figure 4), and therefore the State Caucus recommends 1700 cfs as a suitable instream flow during winter months.

Spring minimum instream flows: April 1 to June 15
Instream flows for spring should not result in lower incubation success than during the 1986-2011 period. As a general guideline, incubation success should average around 80-81% and, more importantly, have a median of no less than 85% and preferably 90%. From Addley and Peterson's (2011) Table 5, an incubation flow of about 6,500 cfs would equate to about 85% incubation success on average with a median incubation success of about 90%. Addley and Peterson (2011) also tabulated spawning area with flow in the highest quality spawning grounds where they observed spawning trout and that also peaked around 6,500 cfs (Figure 5). The convergence of these two indicators of suitable spawning and incubation habitat as a function of flow support the State Caucus recommendation of 6,500 cfs for April 1-June 15.

Spawning and incubation are important to continued populations of rainbow trout in the Spokane River and could be adversely impacted by lowering of the flow during spawning and incubation seasons (spring). The combination of localized concentration of spawning and apparent flow sensitivity of spawning and incubation suggest that reproduction may be a significant limiting factor for the lower Spokane River trout population. Thus, each reach of the river must have suitable spawning and incubation habitat in order to support a self-sustaining trout population. Stream flows for spawning habitat and incubation need to be protected. A limit on junior water rights provides protection for rainbow trout from large, new diversions of water that would cause the incubation success to go even lower than it is now.

General Considerations in Evaluating Potential Instream Flows
Native fish have survived natural flows for thousands of years. We should be very cautious about expectations of improvement (increased fish production) through flow reduction. Where

several species and life stages coexist, all must be considered. Much like the physicians' rule, "First, do no harm," we need to consider individual responses and avoid conditions that sharply reduces habitat for any one species or life stage or stream segment.

Figure 1 is an exceedance curve hydrograph for the Spokane River with the recommended instream flows added for comparison.

Control Point for Regulation of Ground Water in the Spokane Area

Ground water withdrawals from the Spokane Valley - Rathdrum Prairie (SVRP) Aquifer affect surface water flows in the Spokane River. Future withdrawals within the boundaries of the SVRP Aquifer in Washington will be assessed against their influence on the Spokane River at Spokane gaging station (USGS# 12422500).

Once equilibrium (steady state) is reached between pumping and sources, most water withdrawn from the aquifer system significantly affects river flow as reported at the "at Spokane" gage (Taylor et. al, 2008.) Figure 6 illustrates the percentage of impact per unit of production from wells at various places in the aquifer.

Ecology has identified eight undeveloped parcels within the boundaries of the SVRP aquifer that do not have wells and are not within the current service area of a water purveyor. Six of these are at the far northwest end of the aquifer. Ecology does not intend to manage these parcels separately under an instream flow rule.

We look forward to presenting our findings to the watershed planning groups and receiving any comments or feedback about our findings. Please let me or one of the other Ecology staff know if you have any questions.

Cc:
Hal Beecher, WDFW
Brad Caldwell, Ecology
John Covert, Ecology
Guy Gregory, Ecology
Mike Hermanson, Spokane County
Sara Hunt, Ecology
Doug Robison, WDFW
Keith Stoffel, Ecology
Mark Wachtel, WDF
Bill Zachmann, Ecology

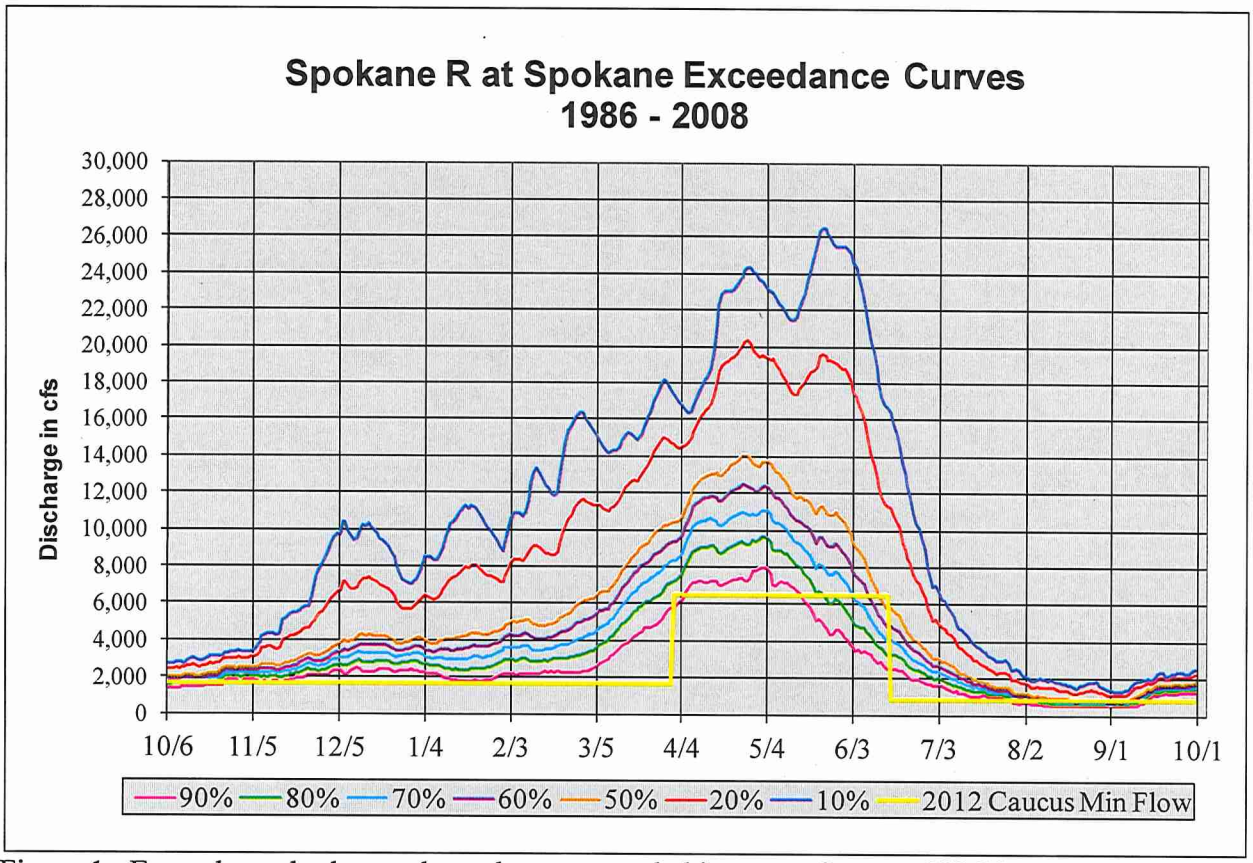

Figure 1. Exceedance hydrographs and recommended instream flows at USGS gauge 12422500 (Spokane River at Spokane).

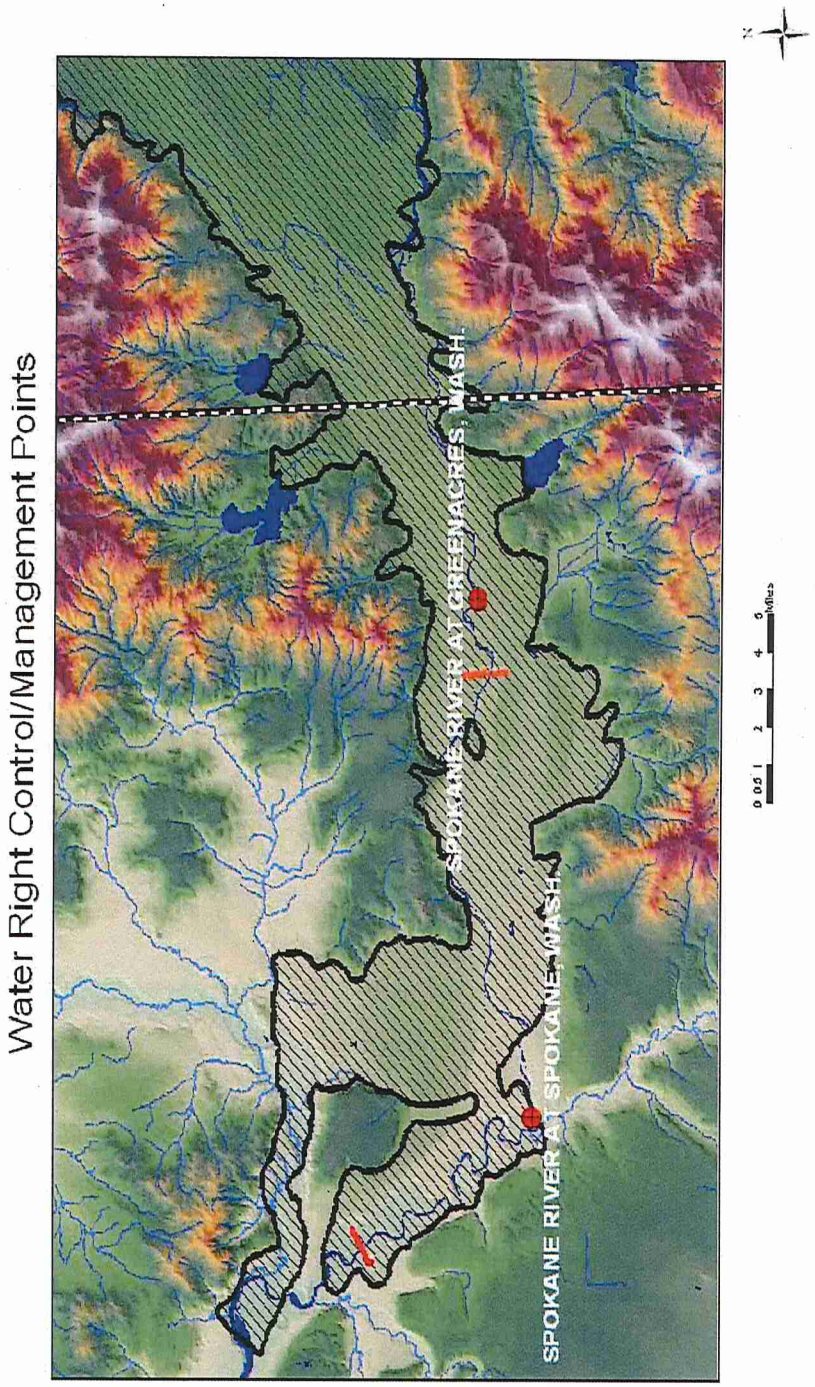

Figure 2. Spokane River Control Point Locations.

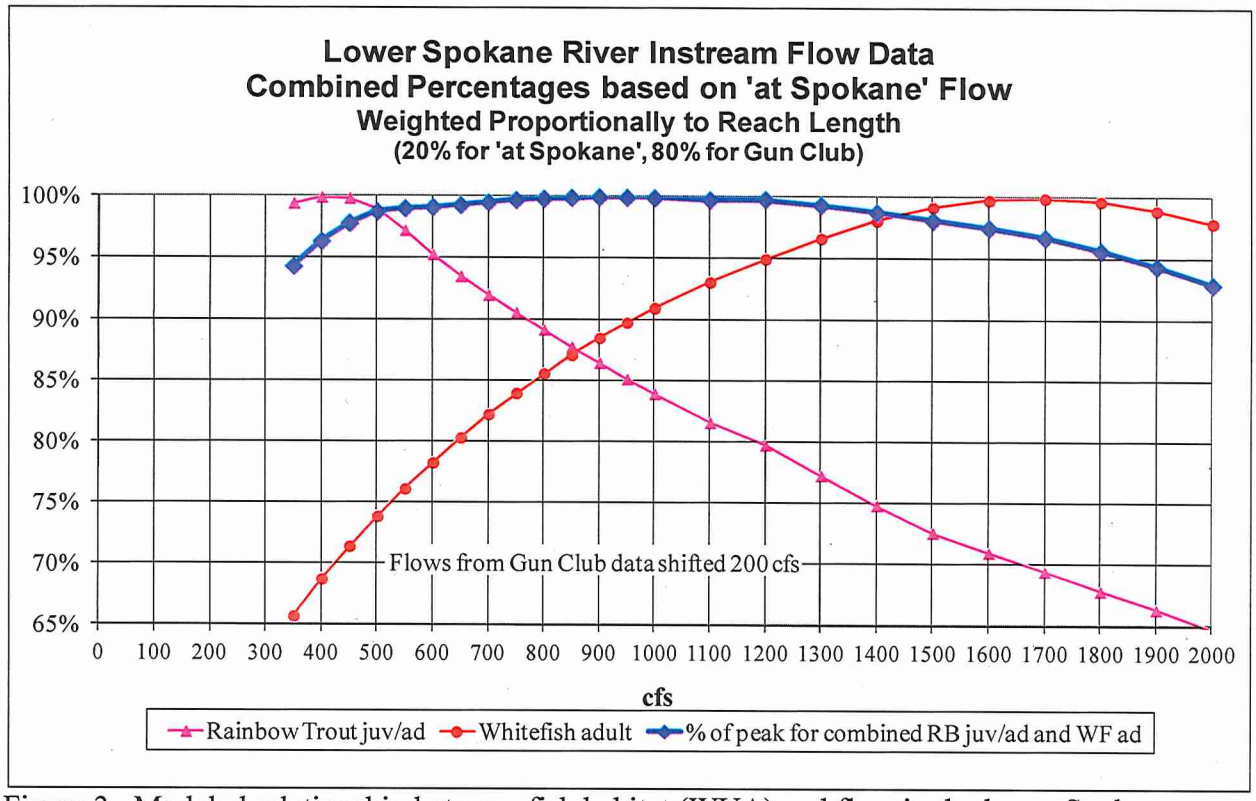

Figure 3. Modeled relationship between fish habitat (WUA) and flow in the lower Spokane River as determined by EES Consulting (2007) in a study commissioned by the Watershed Planning Unit. Juvenile and adult rainbow trout WUA, mountain whitefish WUA, and a combination of the two species were graphed in terms of percent maximum WUA. These relationships were used for recommending summer instream flow.

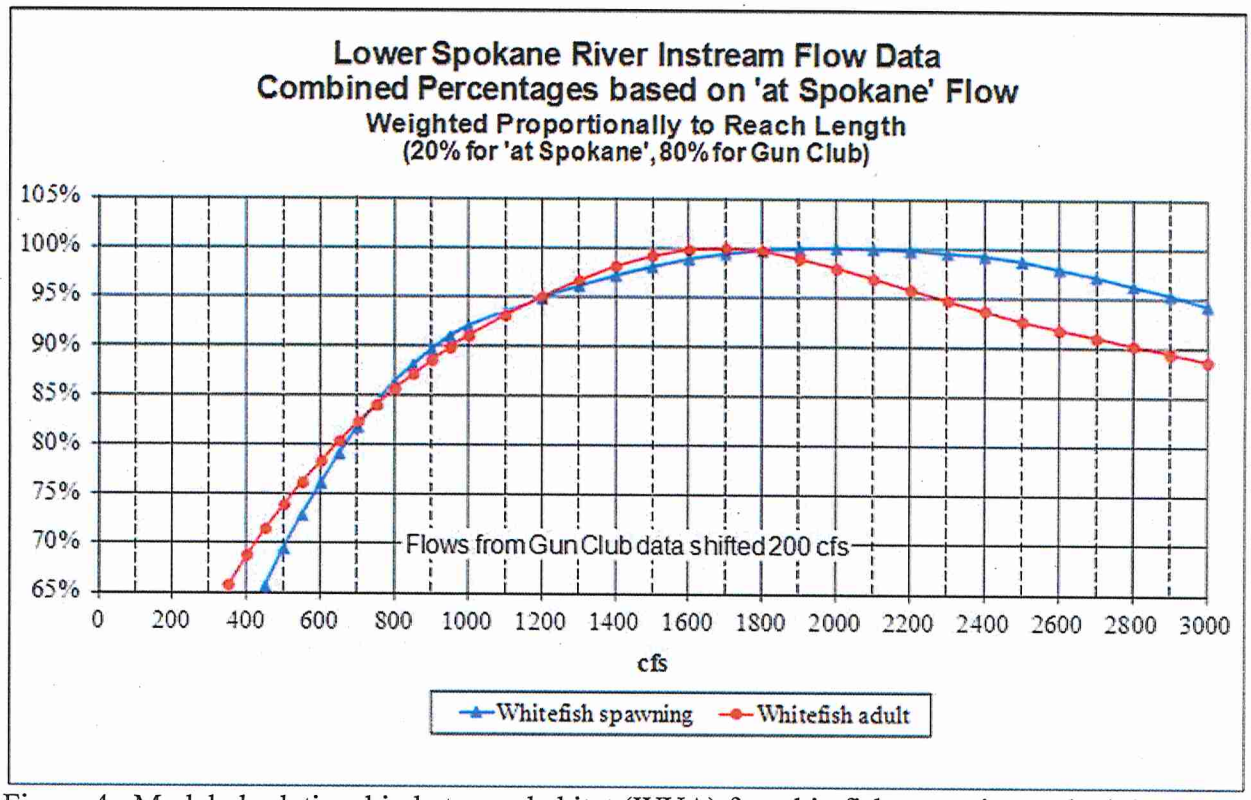

Figure 4. Modeled relationship between habitat (WUA) for whitefish spawning and adult use and flow in the lower Spokane River as determined by EES Consulting (2007) in a study commissioned by the Watershed Planning Unit. The modeled relationship is weighted 80% for the Gun Club site (WRIA 54) and 20% for the WRIA 57 site.

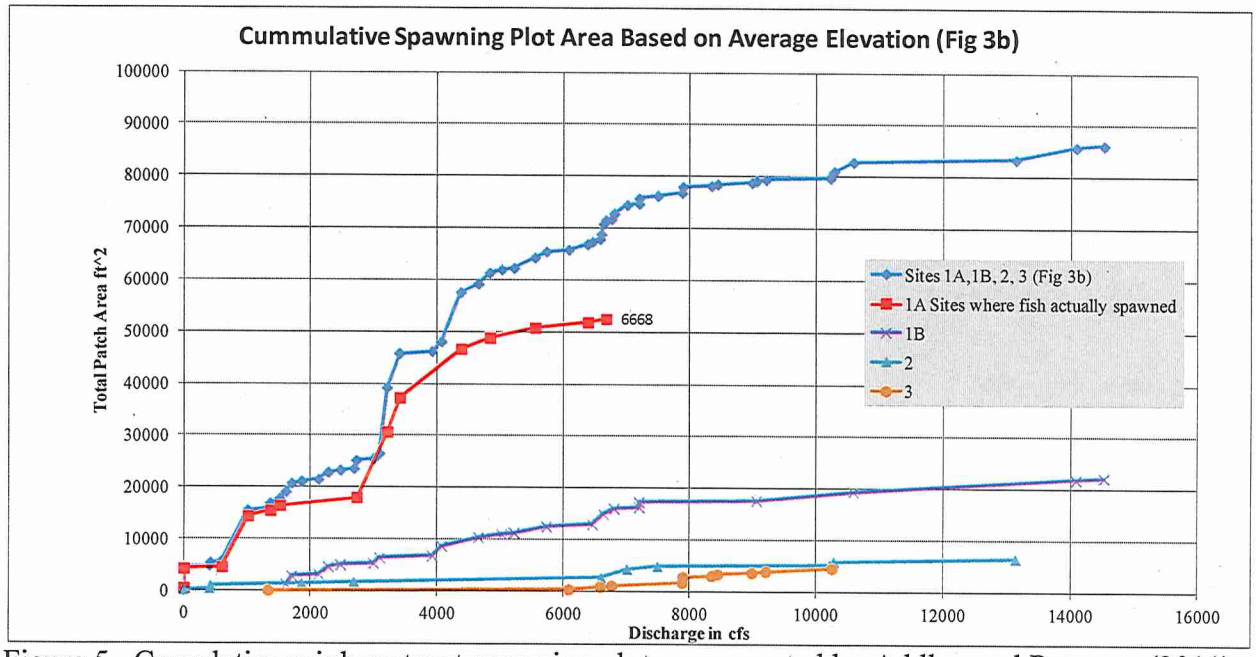

Figure 5. Cumulative rainbow trout spawning plot area reported by Addley and Peterson (2011) in their Figure 3b. Spawning areas were rated in quality from 1 (highest) to 3 (lowest) and highest quality sites were subdivided into those where trout spawned in 2010 (1A) and those where no spawning trout were seen in 2010 or 2003 (1B).

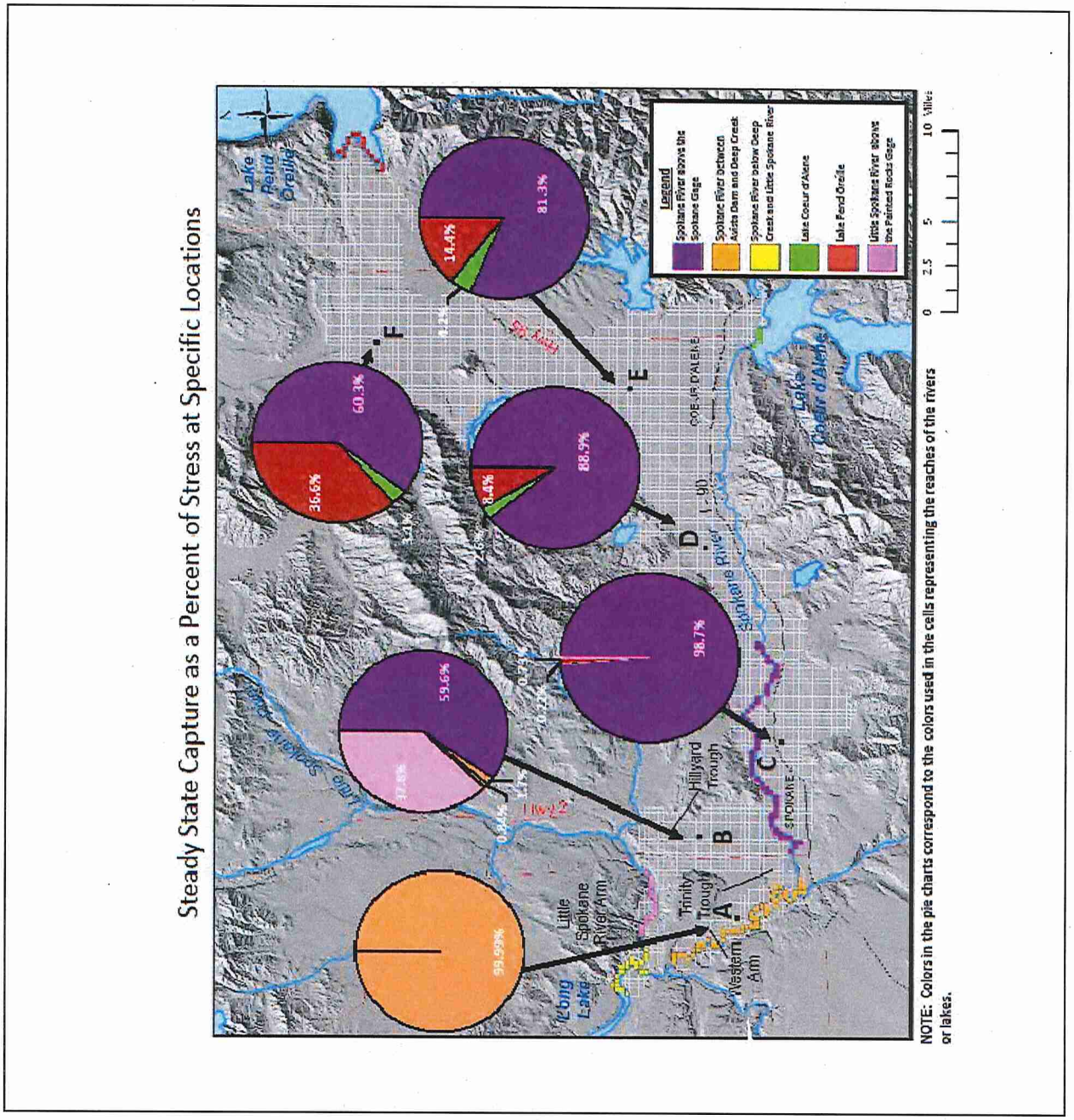

Figure 6. The percentage of impact per unit of production from wells. (after Johnson et. al., 2009).