

MEMO

STATE OF IDAHO

DEPARTMENT OF WATER RESOURCES

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DATE: AUGUST 21, 2009
TO: Jeff Peppersack
FROM: Mat Weaver *MW*

SUBJECT: TECHNICAL REVIEW OF THE PROPOSED FISH CREEK
RESERVOIR RECHARGE PLAN DATED JUNE 15, 2009

This memo summarizes my hydrological assessment and review of the subject recharge plan. In general the plan is well researched, thought out, and presented. There are a few details that require additional discussion and/or modification. Following the resolution of these remaining items, I would recommend that the Idaho Department of Water Resources (the Department) approve the recharge plan and accept the application and mitigation plan proposed in the recharge plan for processing. The following review comments will require a response from Brockway Engineering, PLLC (BEP) and/or modification to the recharge plan prior to final approval.

1. *General Comment:* It is the Department's position that the recharge credit, at most, is equal to the component of the foregone storage associated with the historical crop consumption and other minor historical consumptive losses such as reservoir evaporation. Crop consumption is equal to foregone storage less reservoir evaporation, reservoir seepage, conveyance losses, and application efficiency losses, as all these factors historically detracted from the volume of water that was available for complete consumption by crop development. In addition to these historical losses, it might be warranted to consider additional losses that represent conveyance losses (channel to recharge site) and evaporative losses (from surface of recharge pond) that did not exist historically. The following comments are specific to the proposed recharge plan and address the means in which the proposed plan handles the relationship to each of the components of the fundamental water balance described above.
2. *H.2.1. Seepage Losses (pg. 11-12):* The recharge proposal seeks to gain credit for seepage water "*that would not have occurred but for the lowering of the spillway*". The position of the Department is that while the timing of conveyance losses will likely be altered by a change from irrigation use to recharge, the actual seepage associated with the foregone storage would occur regardless of the

lowering of the spillway. It is just a matter of whether the seepage occurs in the spring or early summer during runoff, or later in the irrigation season at the time storage water was historically released for irrigation. BEP should remove this component from recharge volume considerations or provide a stronger argument as to why it should be considered.

3. *H.2.2. Historic Irrigation Recharge (pg. 15, paragraph 1):* In the first paragraph the report states "*Lands in the southern portion of the Fish Creek service area...*", perhaps suggesting that lands in the northern portion (above the reservoir) of the service area were not considered in the approach. The irrigation of lands above the reservoir from the diversion of natural flows from Fish Creek is afforded by the exchange and release of storage water from Fish Creek Reservoir down stream of the reservoir. Because the release of exchange storage water is required for the diversion of natural flows upstream of the reservoir, and these diversions can only take place if an equal volume of storage water is released, upstream diversion should be included in any consideration of historical irrigation recharge. BEP should clarify whether all lands in the service area were considered (not just lands below the reservoir) , if they were not, the recharge plan should be updated to include the evaluation of historical recharge on all of the lands within the service area - north and south, above and below.
4. *H.2.2. Historic Irrigation Recharge (pg. 15, paragraph 4):* The report states the following, "*The total consumptive use for 6,746 acres is 16,489 acre-feet...A review of the annual delivery records since 1994 indicates that the total storage and natural flow deliveries never exceeded this value...This finding alone suggests that irrigation infiltration is minimal.*" I'm not sure the Department can accept the logical inference implied in these statements as no consideration is given to application efficiencies. The fact that the volume of historically delivered water is less than the volume of water required for optimal crop consumption requirement may indicate that less than optimal growth occurred historically but does not provide a definitive comment on application efficiency one way or another. A short water supply may result in adequate application of water for a shortened season (suggesting reasonable application efficiencies) or reduced application of water for a longer season (suggesting deficit irrigation with higher utilization of applied water). An effort should be made to estimate historical application efficiencies within the Carey Valley Reservoir Company service area and to include these in estimations of historical irrigation recharge. The following reported values of application efficiencies for various sprinkler irrigation systems were published by the Department in a report to the SRBA District Court titled Regarding Evaluation of Irrigation Diversion Rates, dated January 14, 1999.

<u>Sprinkler System</u>	<u>Application Efficiency</u>
Stationary Lateral	60-75%
Solid Set Lateral	60-85%
Center Pivot Lateral	75-85%

BEP should address this concern and if appropriate modify the approach outlined in H.2.2. to estimate historical ground water recharge to include application efficiency considerations.

5. *H.2.2. Table 5 (pg. 16):* BEP should clarify whether Table 5 contains Fish Creek delivery and ditch losses during the irrigation season. If they are not included BEP should provide an explanation as to why they were not considered.

6. *J.3. Equations (1), (2), and (3) (pg.22-23):* It appears as though equation (2), which estimates S, is substituted into equation (1) to arrive at equation (3), however, if this is the case should equation (3) have the following form?

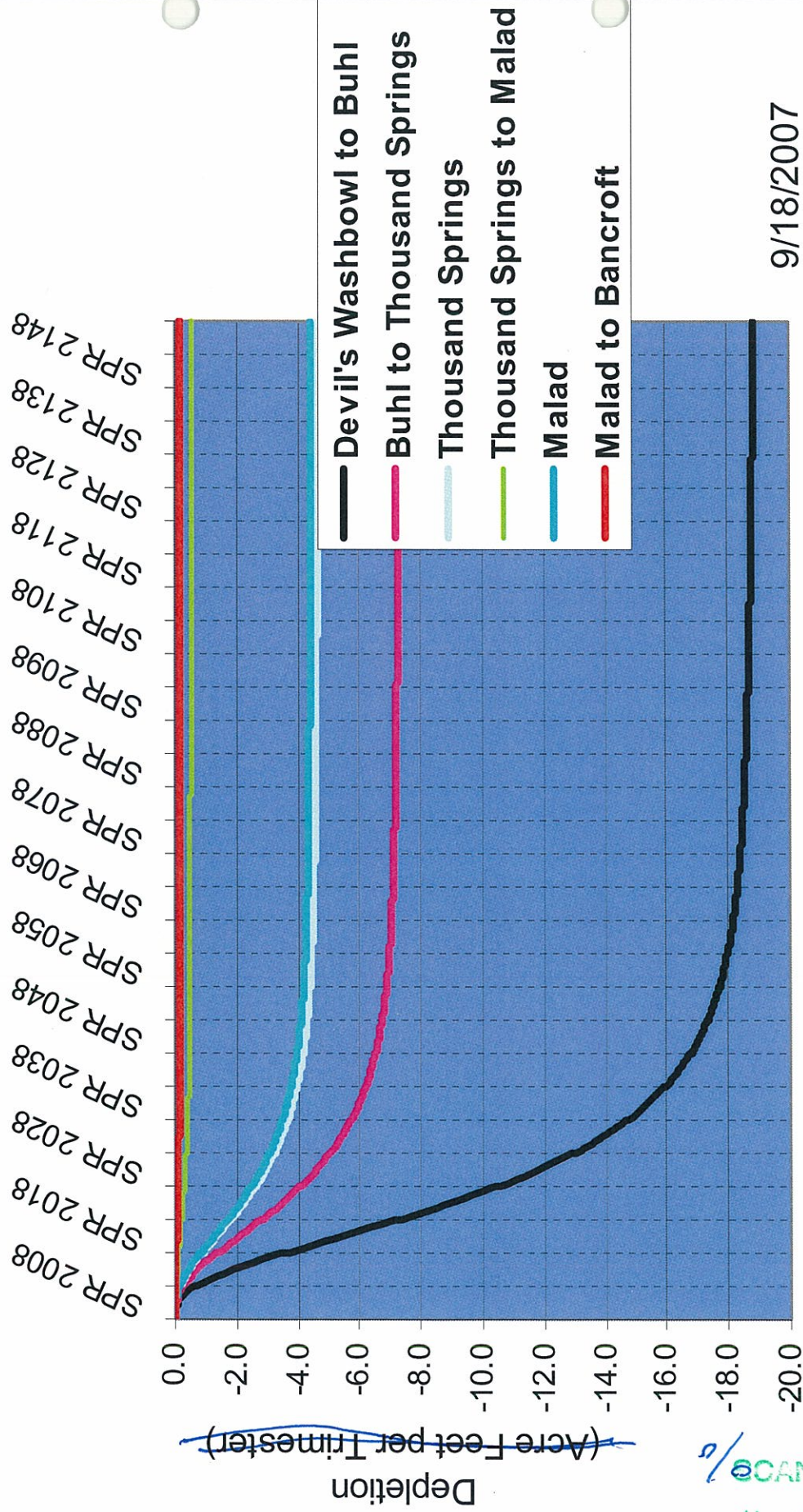
$$R_{adj} = V_m + \left(\frac{s}{1-s} V_m r \right) - R_i - E_{new}$$

7. *J.3. Equation (1) $R_{adj} = V_m + S - R_i - E_{new}$ (pg.21):* BEP should provide further explanation on the “incidental recharge from irrigation” term (R_i) in equation (1). Is this representative of the concept presented in H.2.2., the “annual irrigation recharge estimate”? On page 22 irrigation recharge is said to be equal to 271 ac-ft, this is the same value for the “difference in evaporation” as calculated in Table 6, is this coincidence, an outcome of my lack of complete understanding of the method, or a typo? BEP should provide further clarification and address accordingly.
8. *J.3. Equation (5) (pg. 22):* Equation (5) states that recharge credit (R_{credit}) should be equal to the larger of the two values R_{adj} or 9,167 ac-ft. However, if 9,167 is allowed to be the upper limit of the recharge credit than the maximum storage volume in the reservoir (5,515 ac-ft) plus the maximum recharge credit (9,167 ac-ft) will exceed the original storage volume limit of water right 37-1162 (14,682 > 14,411 ac-ft). This is not appropriate; the approach should be modified so that the combined volume of maximum reservoir storage and maximum recharge credit, at a minimum, can not exceed the volume limitation of the water right.
9. *Alternate Approach:* Given the uncertainty of estimated values and the goal to provide credit for recharge based on historical consumption, an alternate approach might be to estimate irrigated acres and application efficiencies based on published values and calculate the recharge credit as a percentage of recharged volume to be measured at the recharge site while ignoring other minor losses.

Recharge

~~Net Transfer Effect Below Milner~~

~~(Total Effect With Transfer - Total Effect Without Transfer)~~



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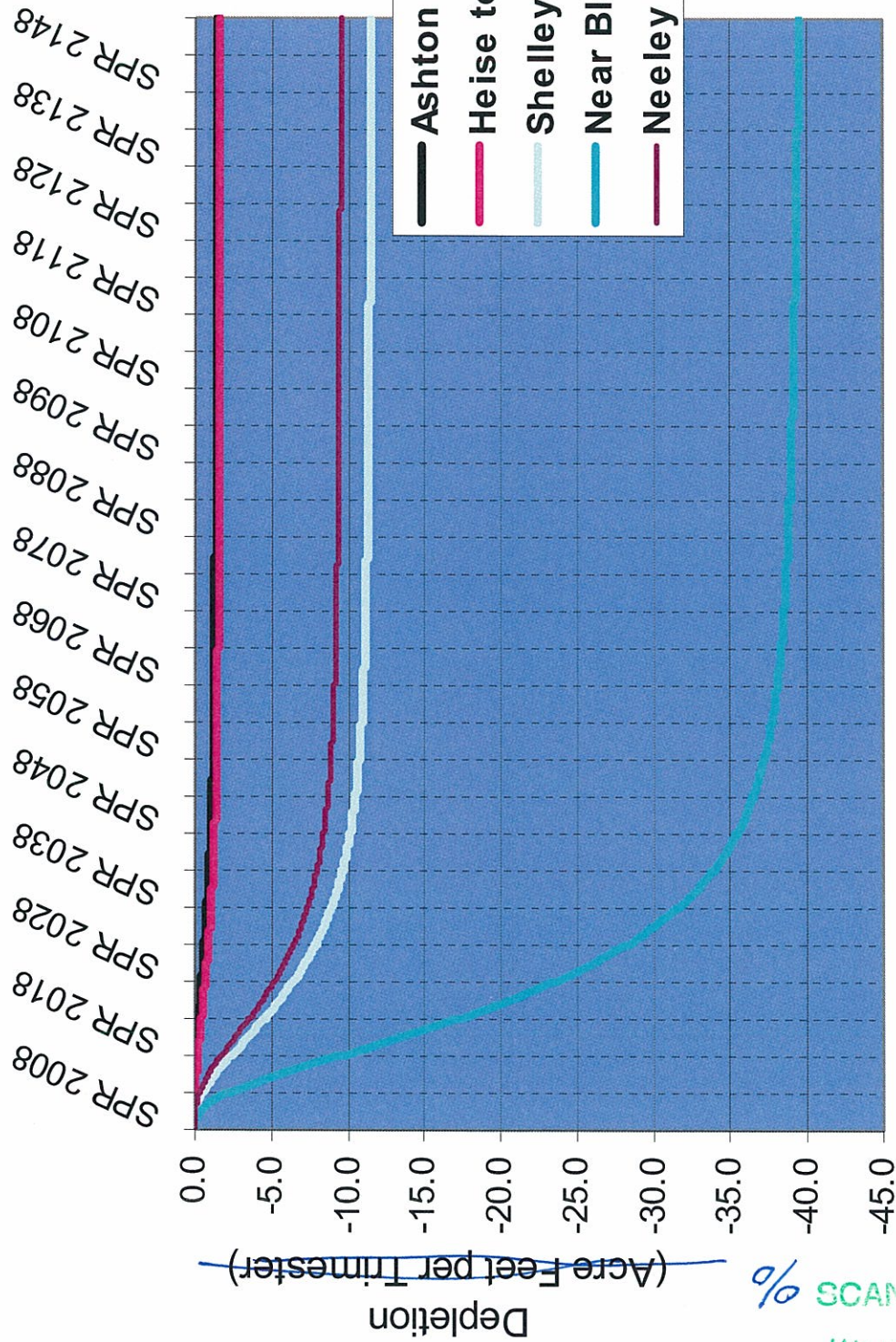
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Transfer No: Recharge

Recharge

Net Transfer Effect Above Milner

(Total Effect With Transfer - Total Effect Without Transfer)



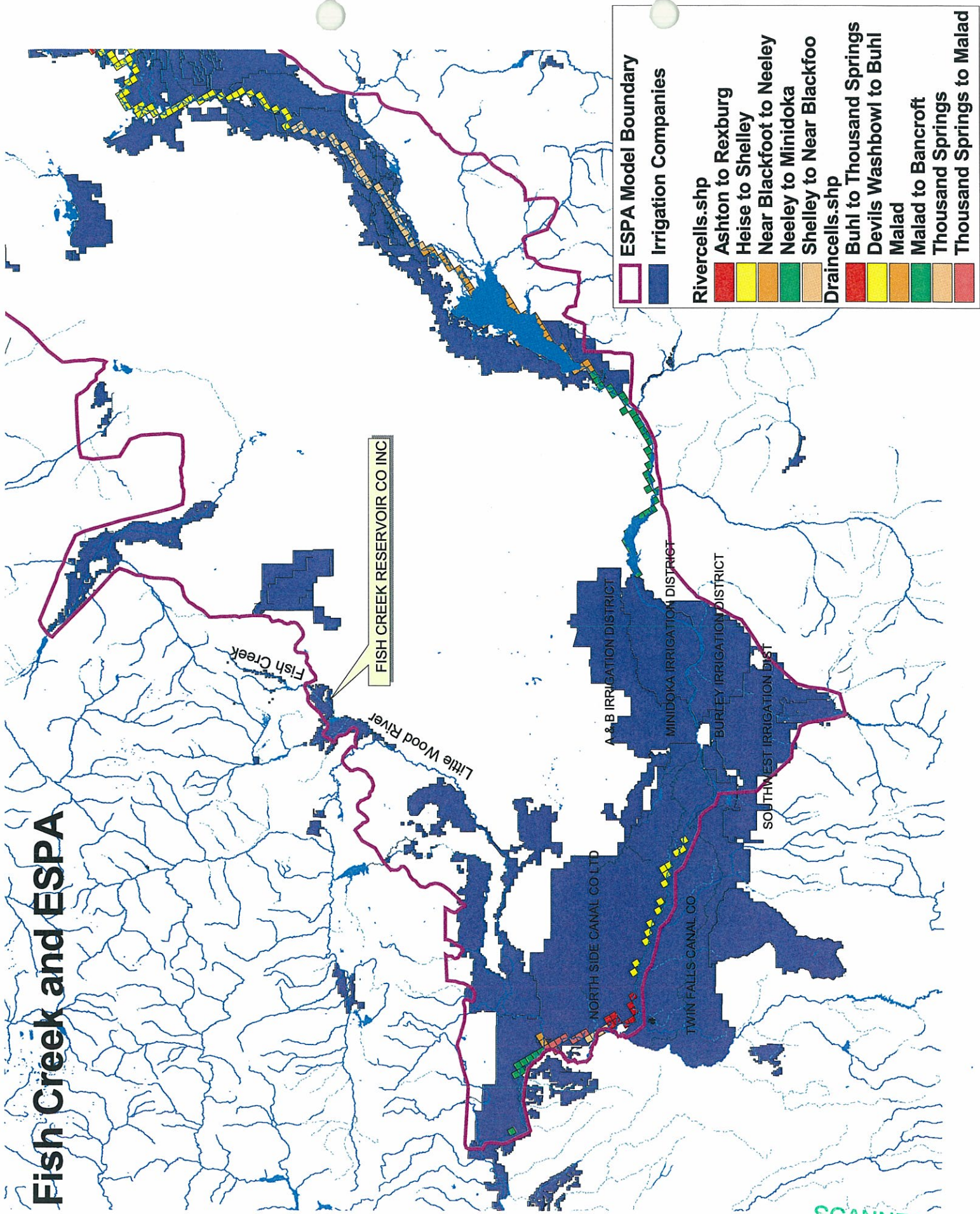
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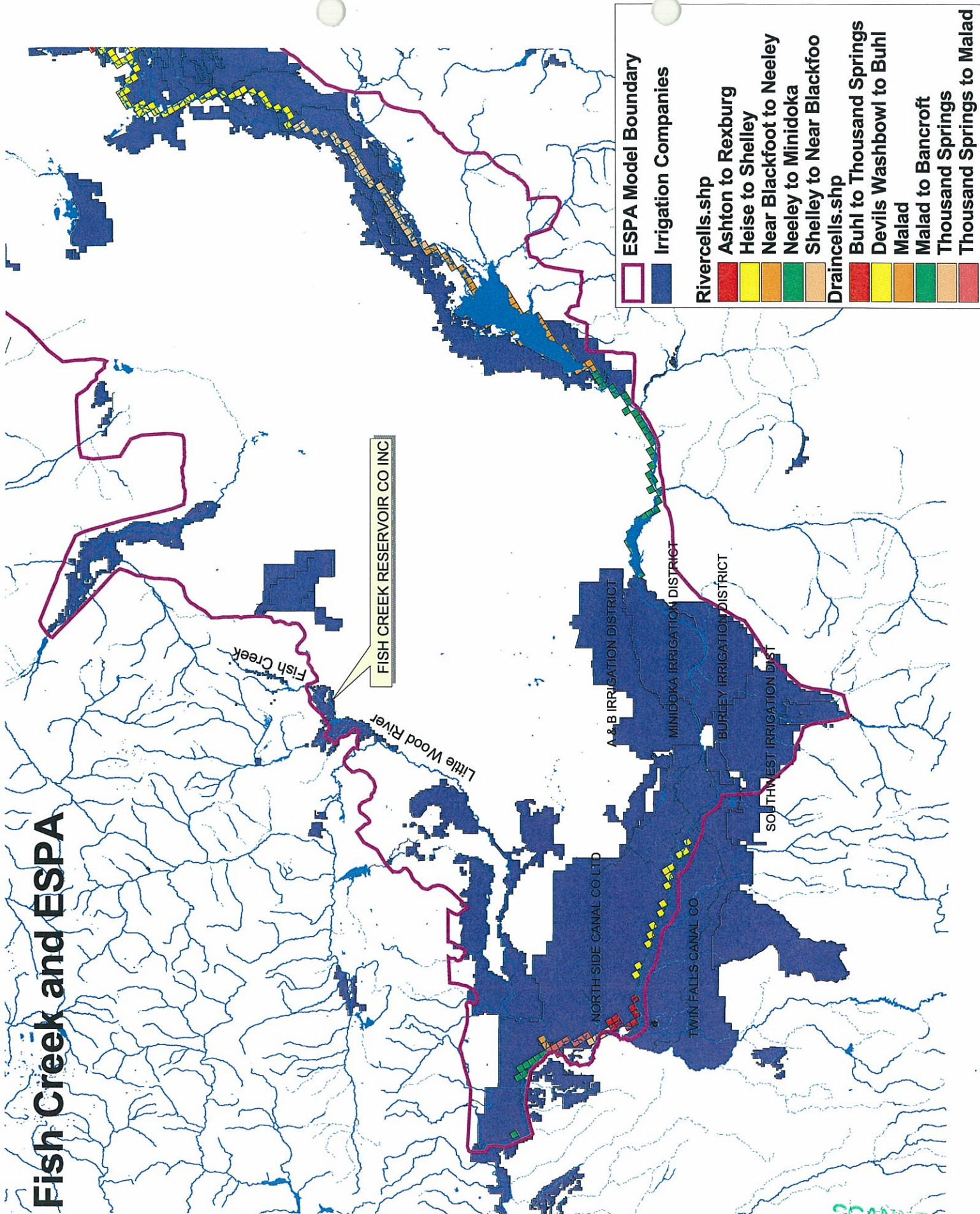
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Fish Creek and ESPA



Fish Creek and ESPA



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