

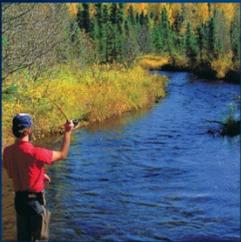


South Side Groundwater Contributions to Snake River, Milner to King Hill

Presented by Jennifer Sukow, P.E., P.G.

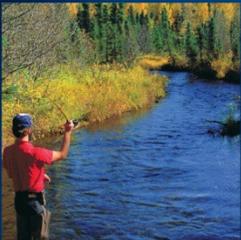
November 22, 2010





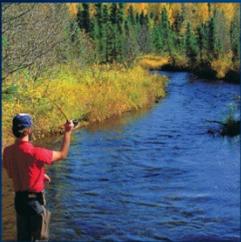
Review Prior Discussions

- September 2009 ESHMC meeting
 - Committee agreed to abandon the steady state river and spring targets used in version 1.1 and subtract out 10% assumed underflow from the south side to calculate ESPA contribution to reach gains.
- April 2010 ESHMC meeting
 - Committee decided to revisit the 10% assumption and IDWR agreed to perform a water budget on the Twin Falls tract.



Review Prior Discussions

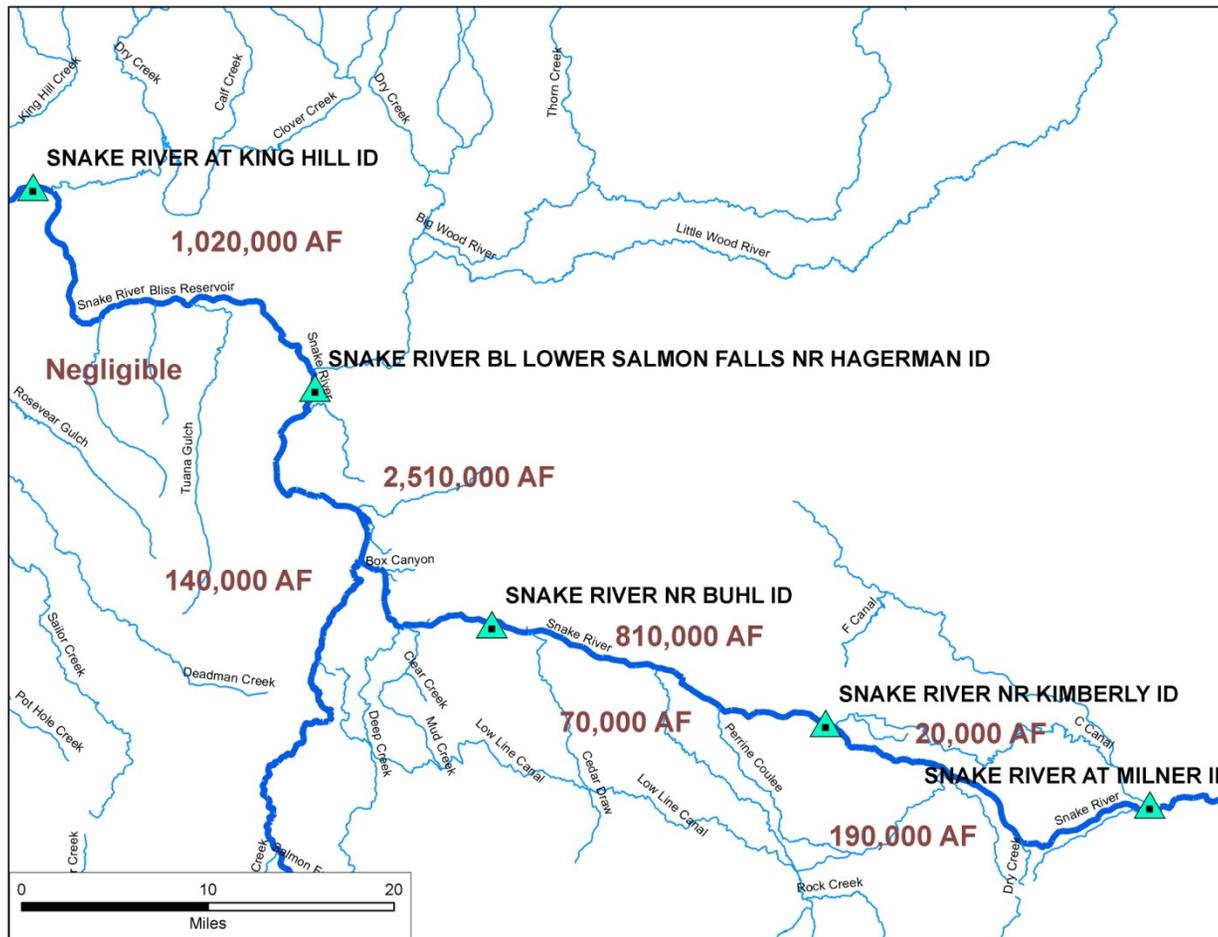
- June 2010 ESHMC meeting
 - Allan Wylie presented a literature review and Twin Falls tract water budget for 2000 to 2008.
 - Committee requested IDWR perform additional analysis including:
 - Twin Falls tract water budget for 1980-2008 using ET Idaho data
 - Estimate tributary underflow from Salmon Falls Creek basin, based on Crosthwaite (1969)
 - Develop annual time series for south side contribution
 - Prepare draft spreadsheet and design document for Committee review



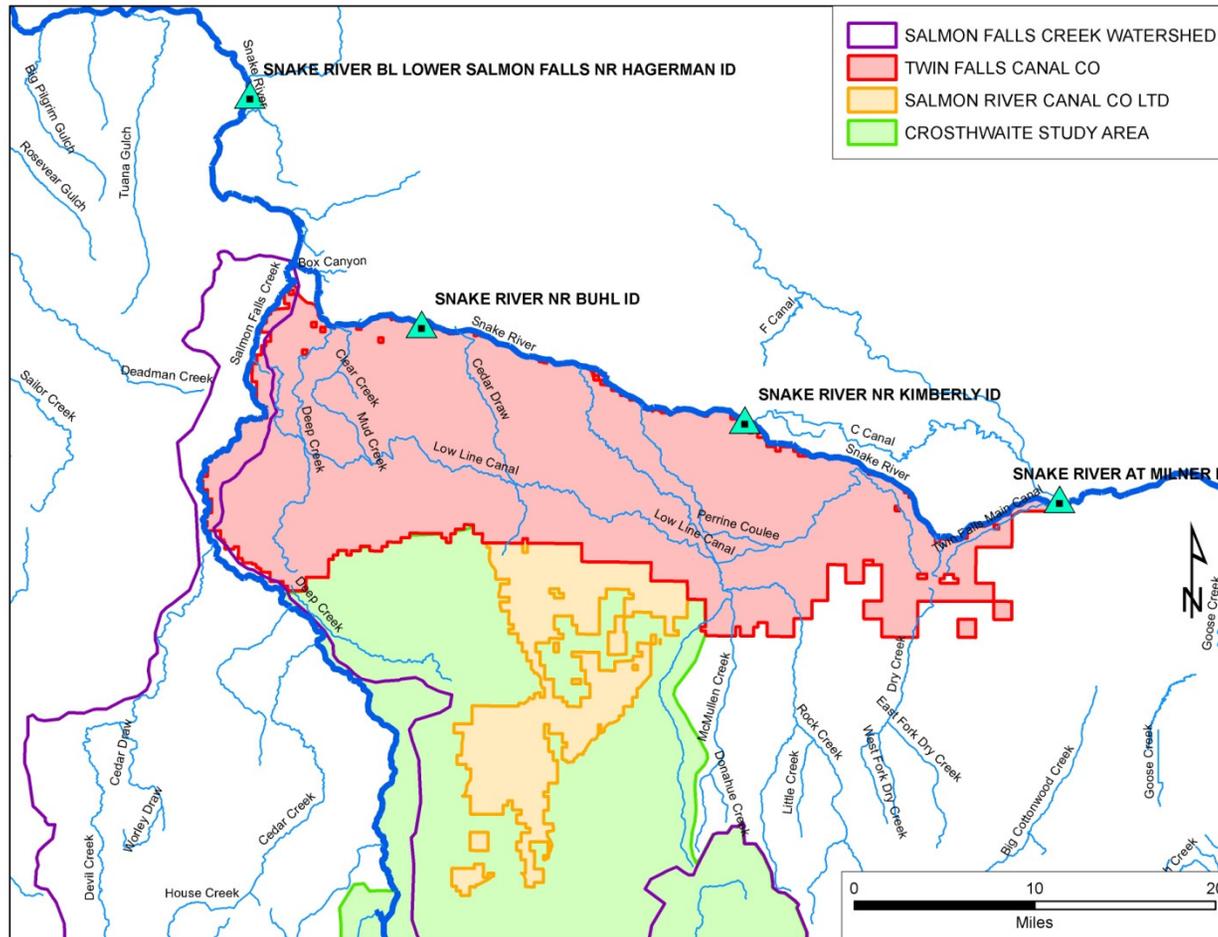
Review Prior Discussions

- September 2010
 - IDWR posted design document and spreadsheet on ESPAM website for Committee review and comment
- Today
 - Present results of additional analysis and proposed “adjusted reach gain” data set, which represents the ESPA contribution to the Kimberly to Lower Salmon Falls (Hagerman) reach
 - Measured surface water inflows and estimated groundwater underflow from the Twin Falls tract and Salmon Falls basin have been deducted to obtain the adjusted reach gain

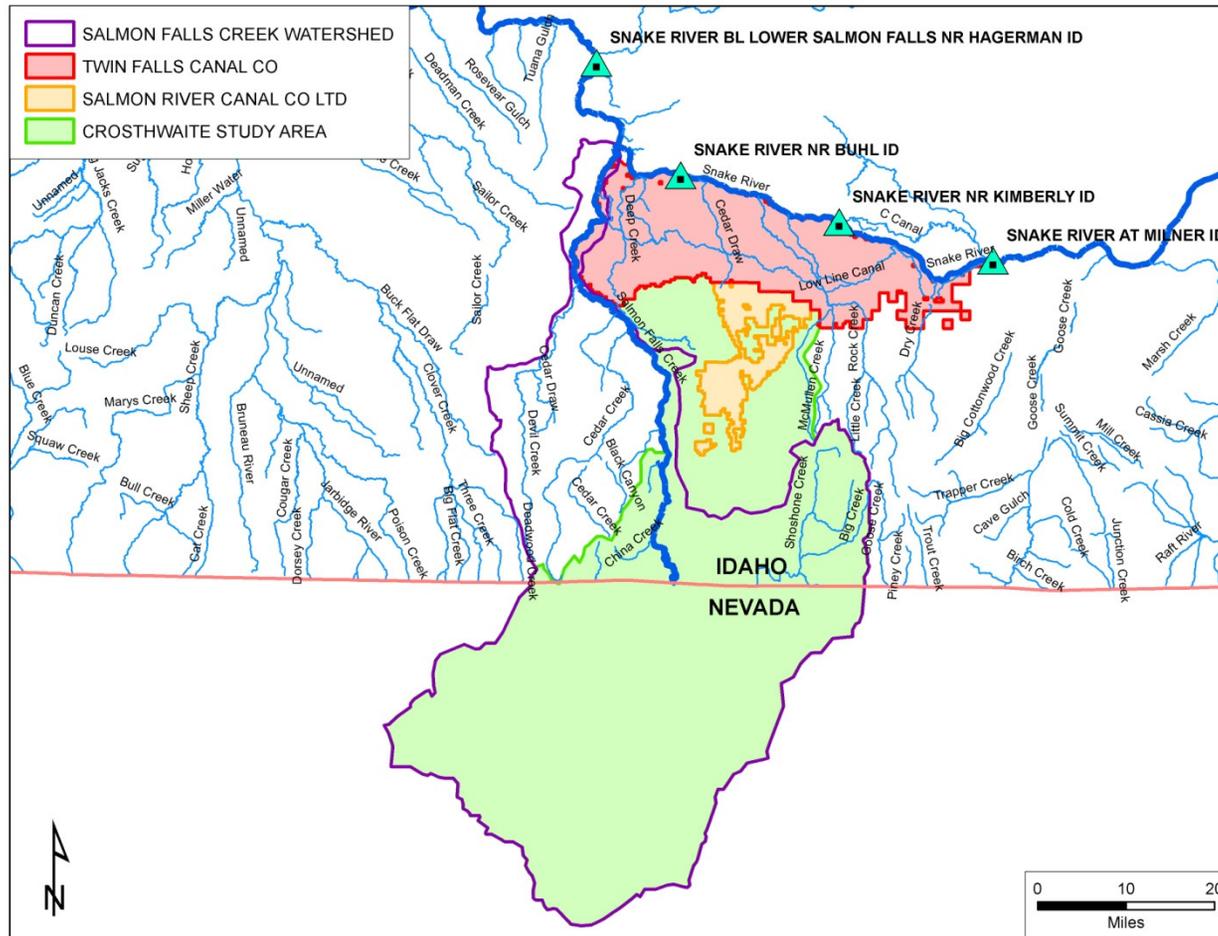
KJELSTROM (1995) ESTIMATED GROUNDWATER CONTRIBUTIONS TO RIVER REACHES IN 1980

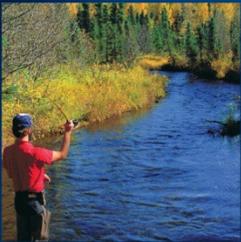


AREAS INCLUDED IN WATER BUDGET



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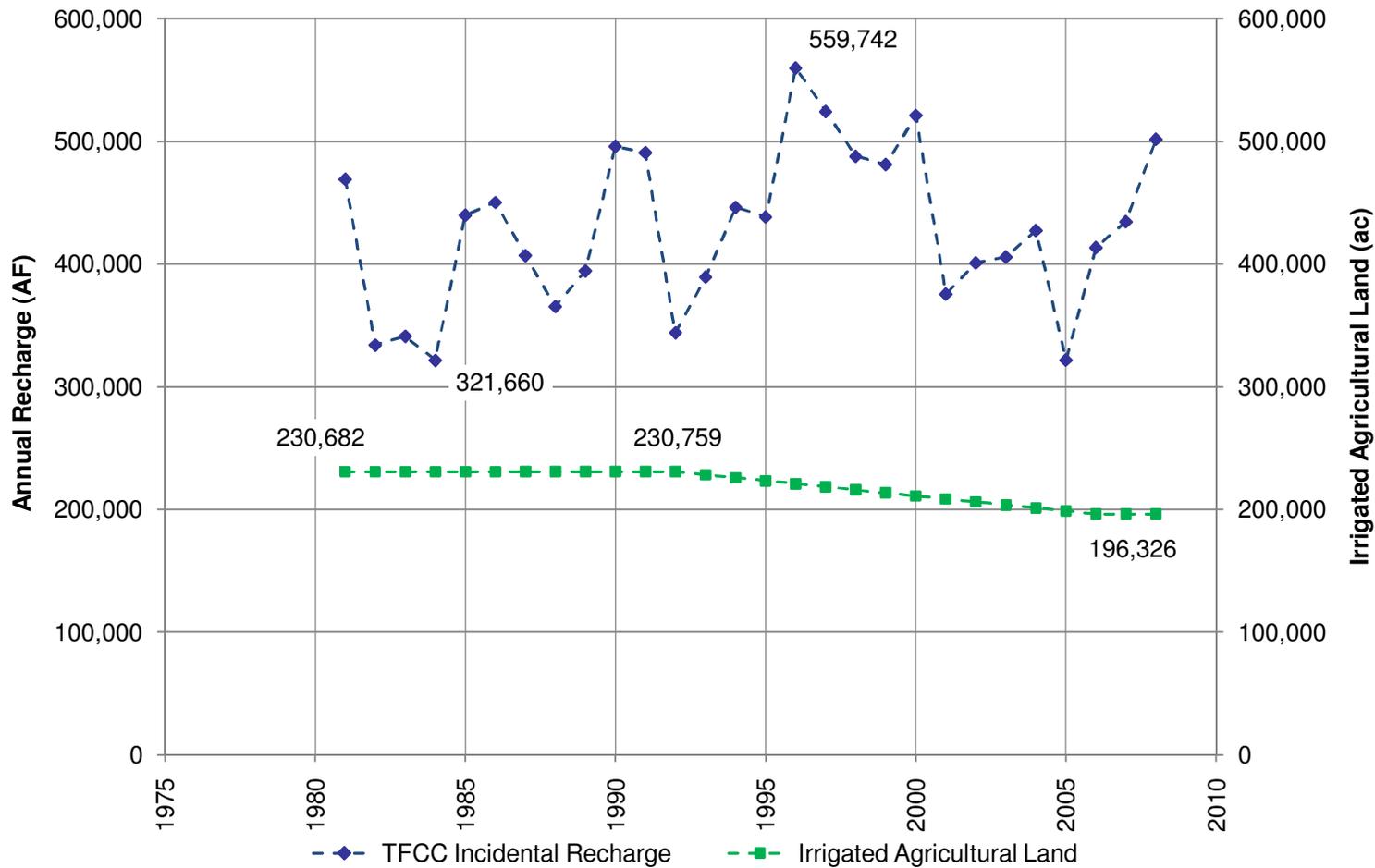


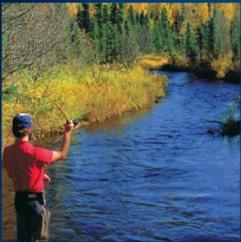


Water Balance for Twin Falls Canal Co

- Annual incidental recharge from TFCC estimated for water years 1981 to 2008
 - Recharge = $TFCC\ Div - TFCC\ Ret + P_{eff} - ET_{act}$
 - Data sources
 - Snake River Planning Model
 - ET Idaho (effective precipitation at Twin Falls WSO)
 - IWRRRI ESPAM2 files (ET and crop mix data for Twin Falls County)
 - 1980, 1992, and 2006 irrigated lands files
 - Irrigated lands reduction factors (Contor, 2009b)
 - Includes only agricultural land (neglects landscape irrigation within TFCC)

Incidental Recharge from Twin Falls Canal Company, Milner to Lower Salmon Falls

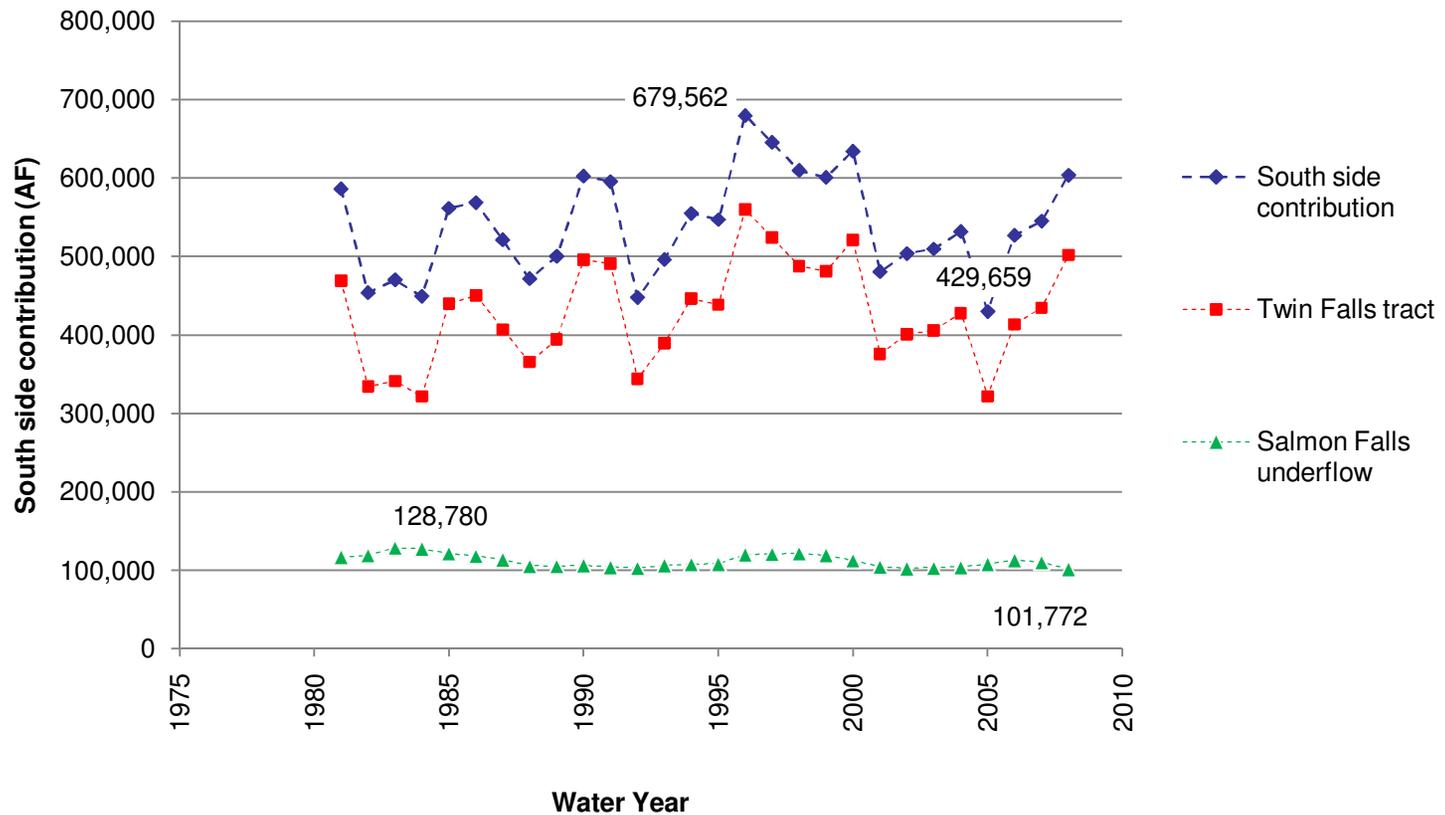




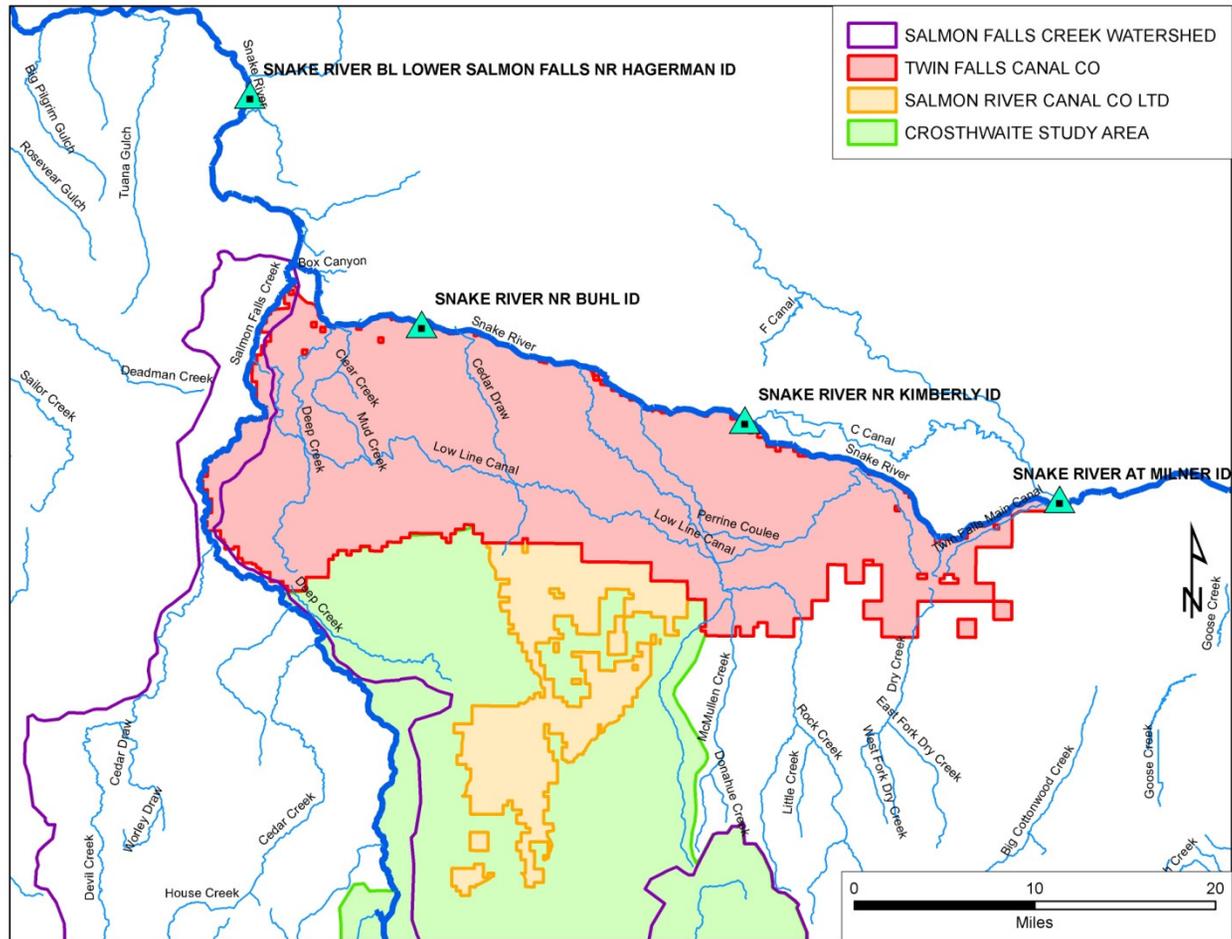
Estimate of Tributary Underflow from Salmon Falls Creek and Salmon River Canal Co. Area

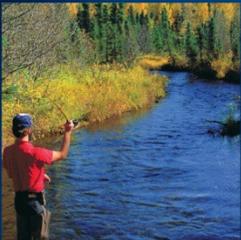
- Crosthwaite (1969) used to estimate average annual underflow of 111,000 AF, which includes:
 - 65,000 AF of incidental recharge associated with surface water storage and irrigation
 - 50,000 AF from infiltration of precipitation
 - -4,000 AF of consumptive groundwater use
 - For comparison, Garabedian (1992) estimated underflow of 100,000 AF from Salmon Falls Creek basin and 14,000 AF from Cottonwood, Rock, and Dry Creek basins – conveniently close!
- Normalized Silver Creek data series used to scale average annual value to ESPAM2 stress periods

**Estimated Annual South Side Groundwater Discharge,
Milner to Lower Salmon Falls**



ASSIGNMENT OF SOUTH SIDE CONTRIBUTION TO RIVER REACHES

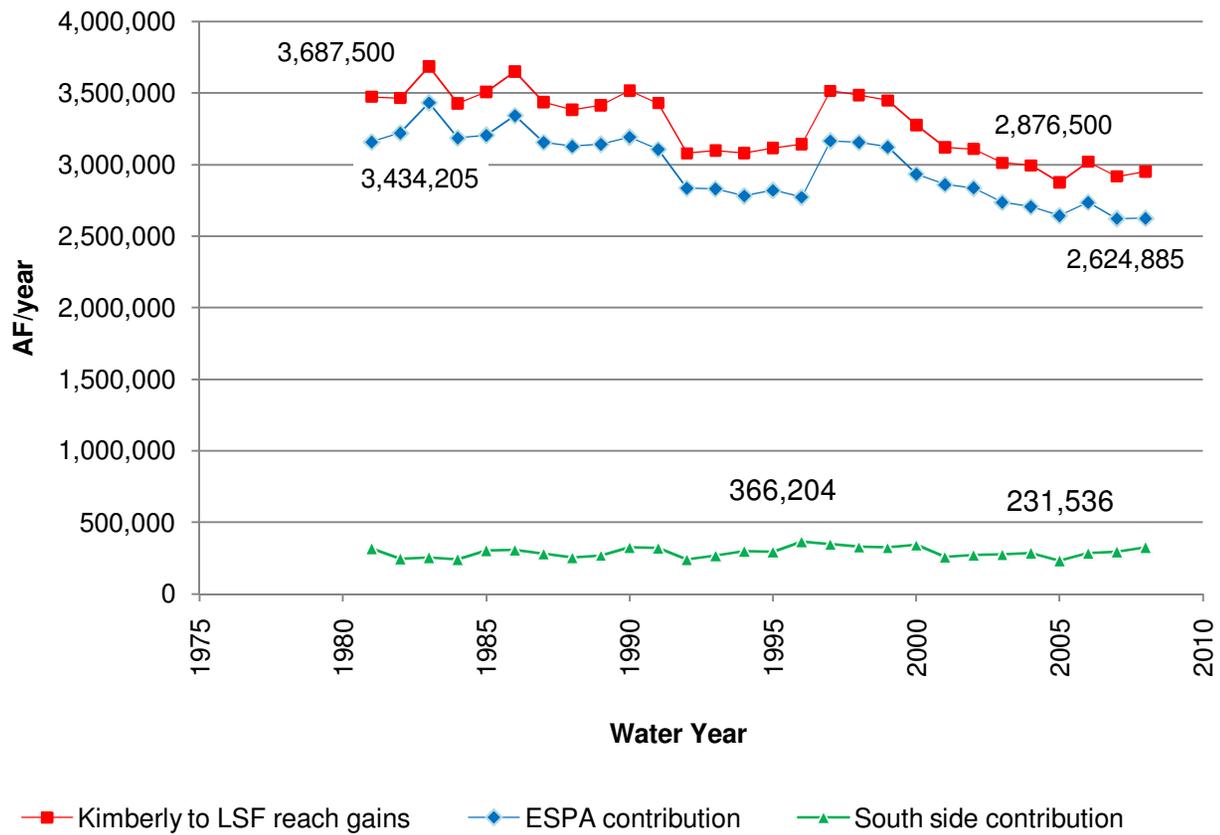




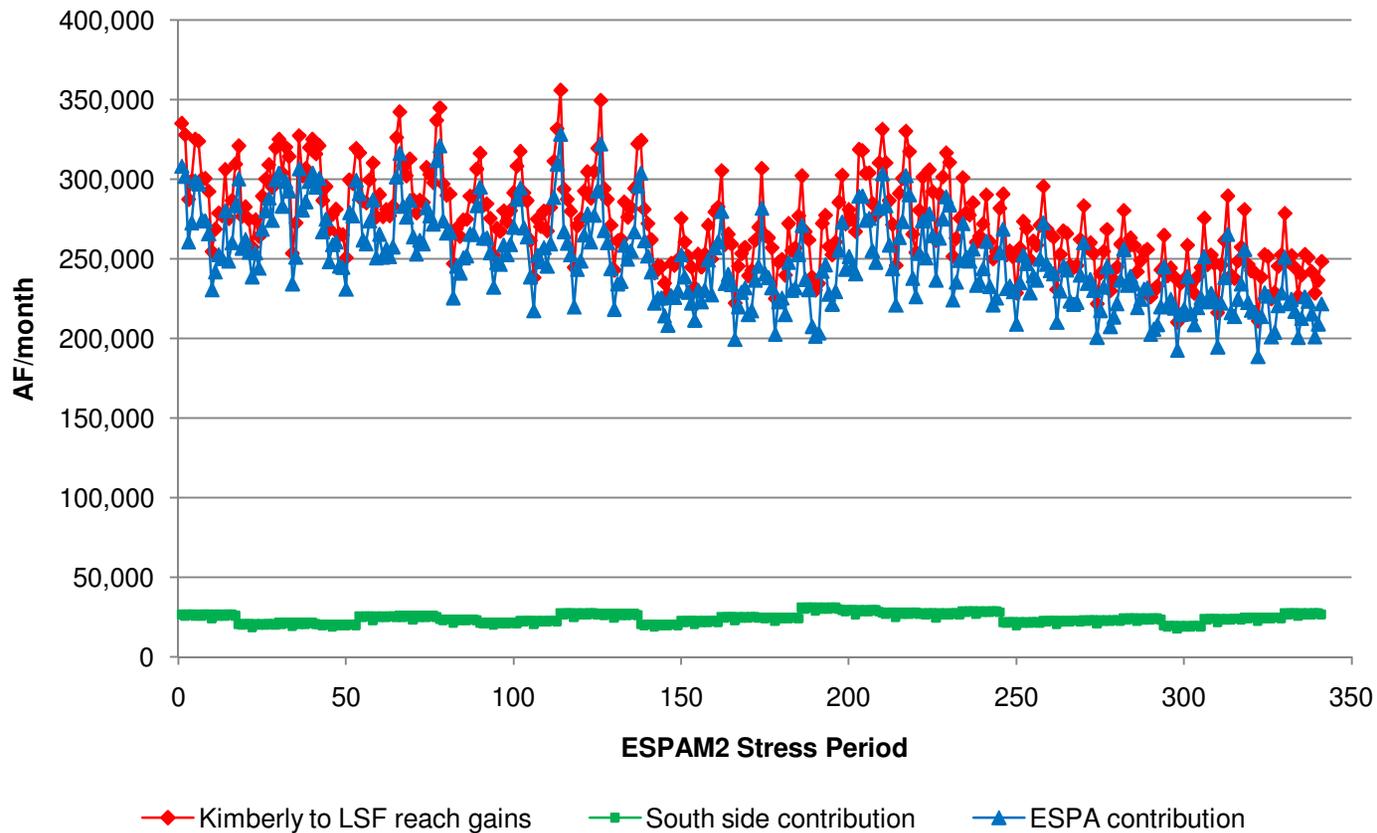
ASSIGNMENT OF SOUTH SIDE CONTRIBUTION TO RIVER REACHES

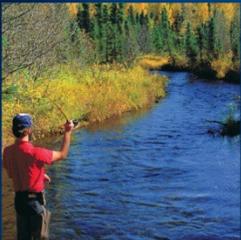
- Need estimate of south side groundwater contribution from ***Kimberly to Lower Salmon Falls*** to adjust reach gain for ESPAM2 calibration target
- Options for distributing south side contribution between Milner to Kimberly and Kimberly to Lower Salmon Falls
 - Use Kjelstrom estimates for 1980
 - 47.5% Milner to Kimberly
 - 52.5% Kimberly to Lower Salmon Falls
 - Attempted to deduct Milner to Kimberly reach gain from estimated south side contribution, gage error exceeds reach gains during wet years, resulting in unreasonable variability and negative south side contributions between Kimberly and Lower Salmon Falls in some years
 - Proposed option is to use average ratio of Milner to Kimberly reach gain to estimated south side contribution
 - 46% Milner to Kimberly
 - 54% Kimberly to Lower Salmon Falls

Estimated annual ESPA contribution, Kimberly to Lower Salmon Falls



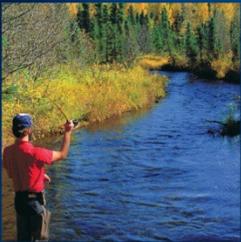
Estimated monthly ESPA contribution, Kimberly to Lower Salmon Falls



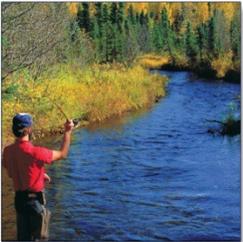


DISCUSSION

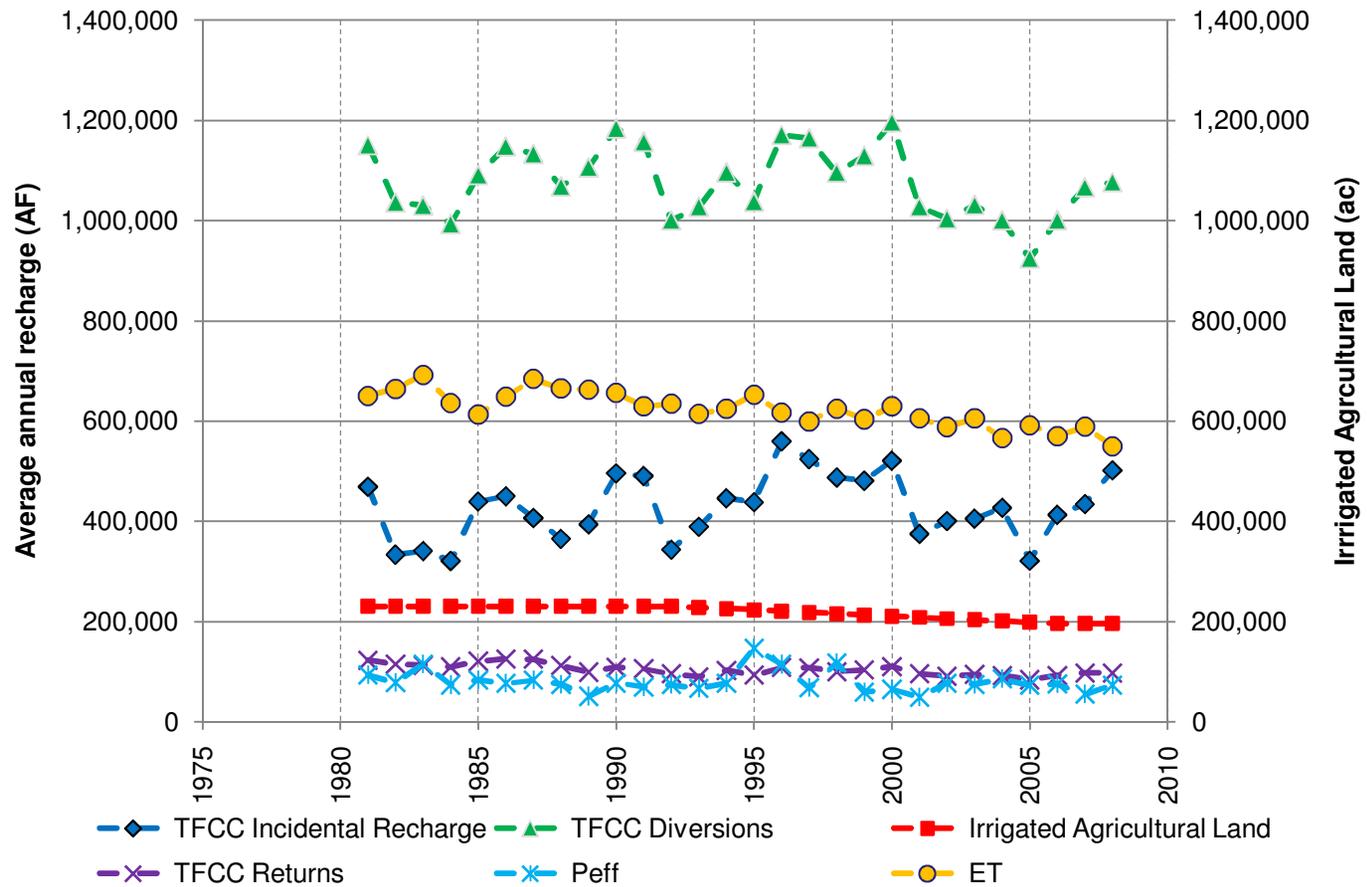
- Resulting estimates of south side contribution range from 7% to 12% of reach gain from Kimberly to Lower Salmon Falls, and have a slight increasing trend between 1981 and 2008
- Average annual value of 540,000 AF is higher than Kjelstrom estimate of 400,000 AF for year 1980; our estimate assumes all recharge results in discharge to Snake River (no change in storage, no flow beneath Snake River)
- Uncertainty in using Crosthwaite (1969) estimate for tributary underflow, but number is not significantly different from Garabedian (1992) estimate
- Uncertainty in number of irrigated acres in TFCC in a given year, however south side contribution is relatively small compared to ESPA contribution – relative error in calibration target will be smaller than error in south side contribution estimate
- Other discussion points?

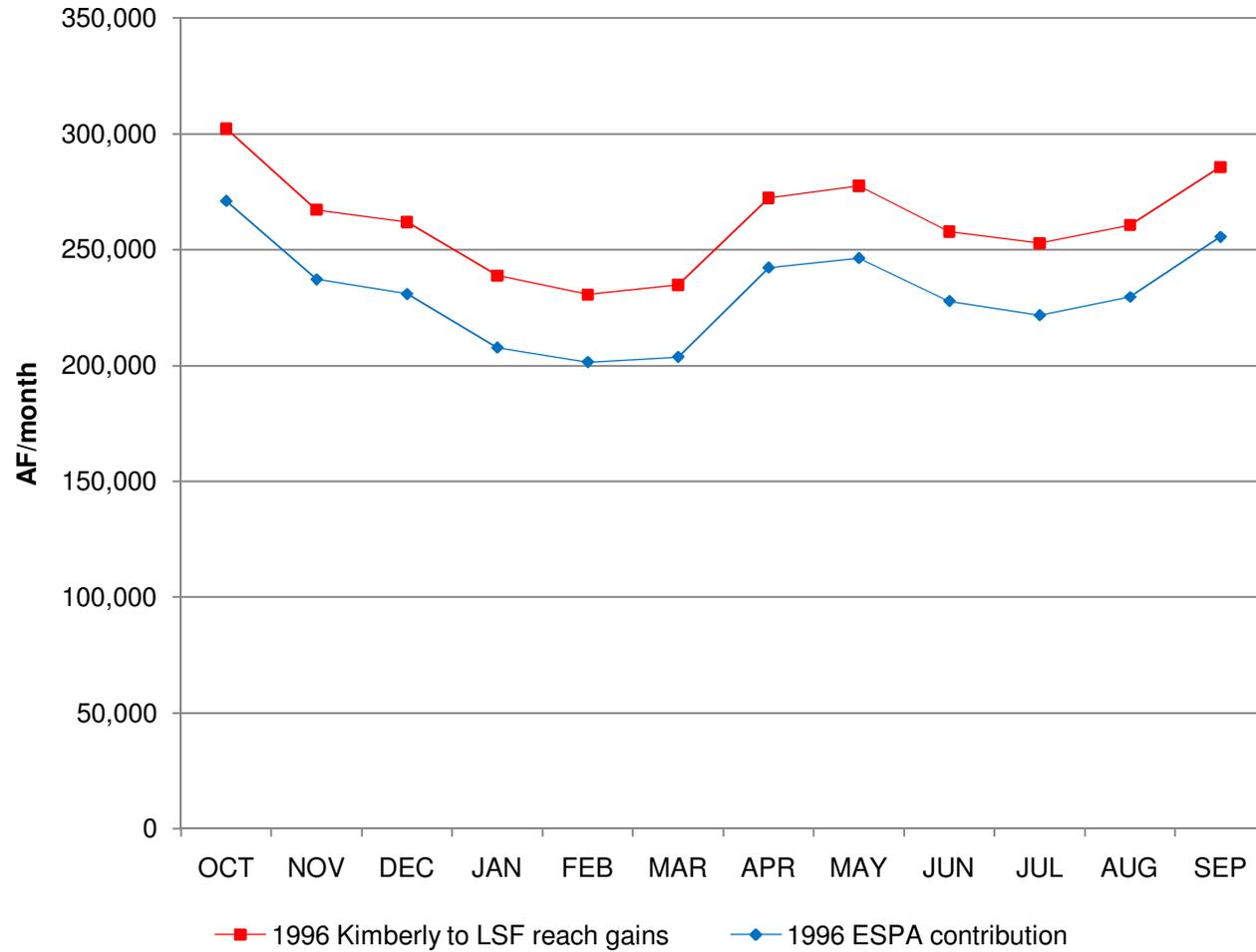
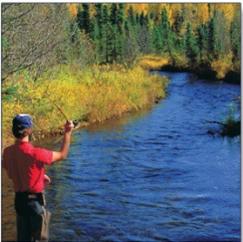


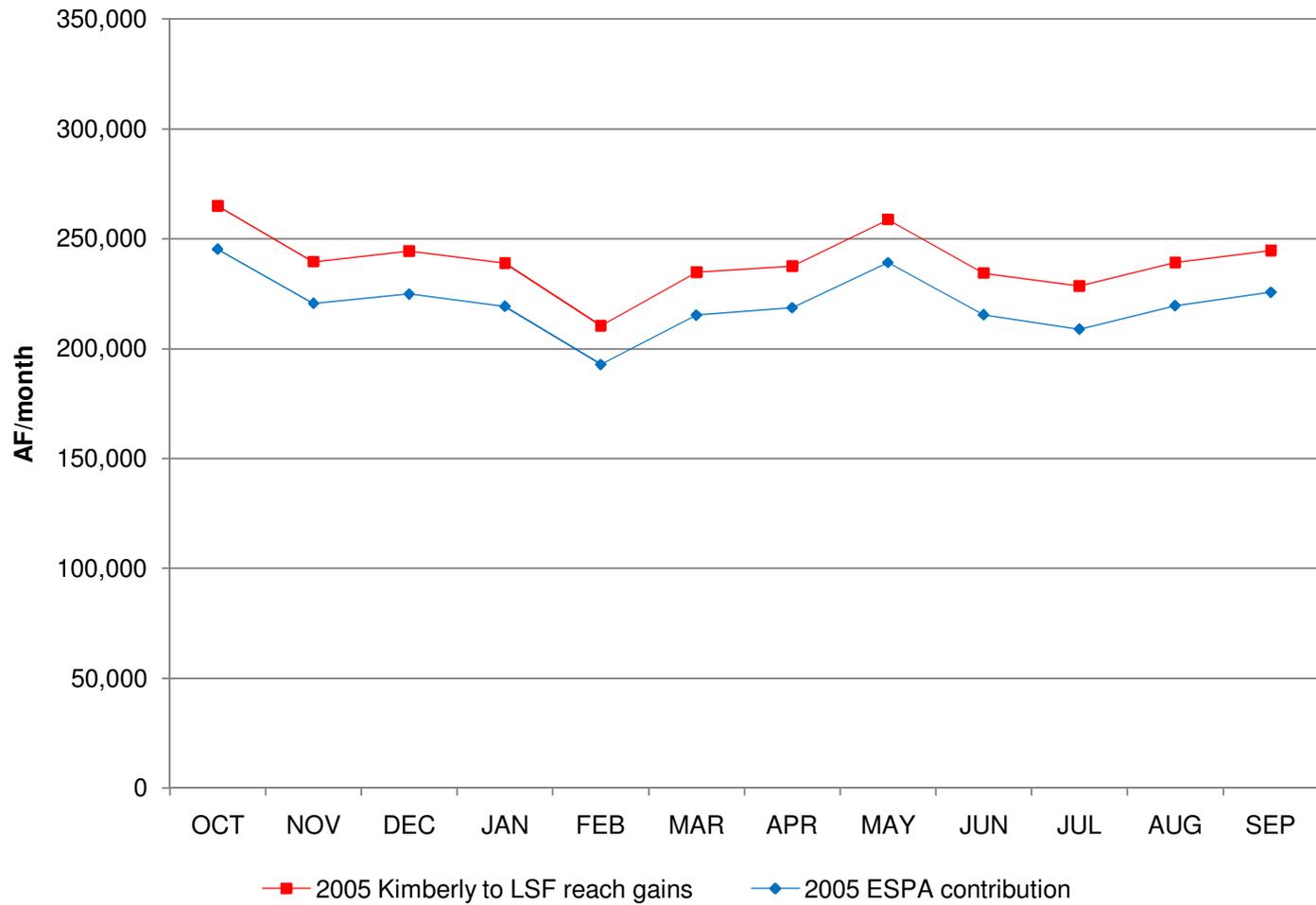
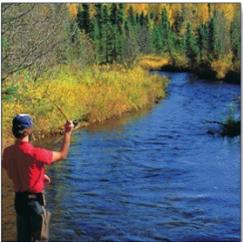
END PRESENTATION

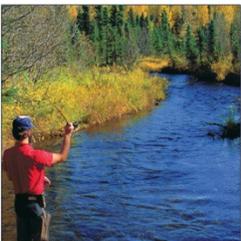
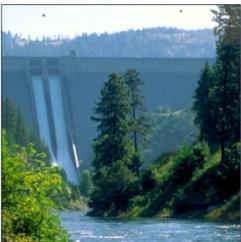


Incidental Recharge from Twin Falls Canal Company

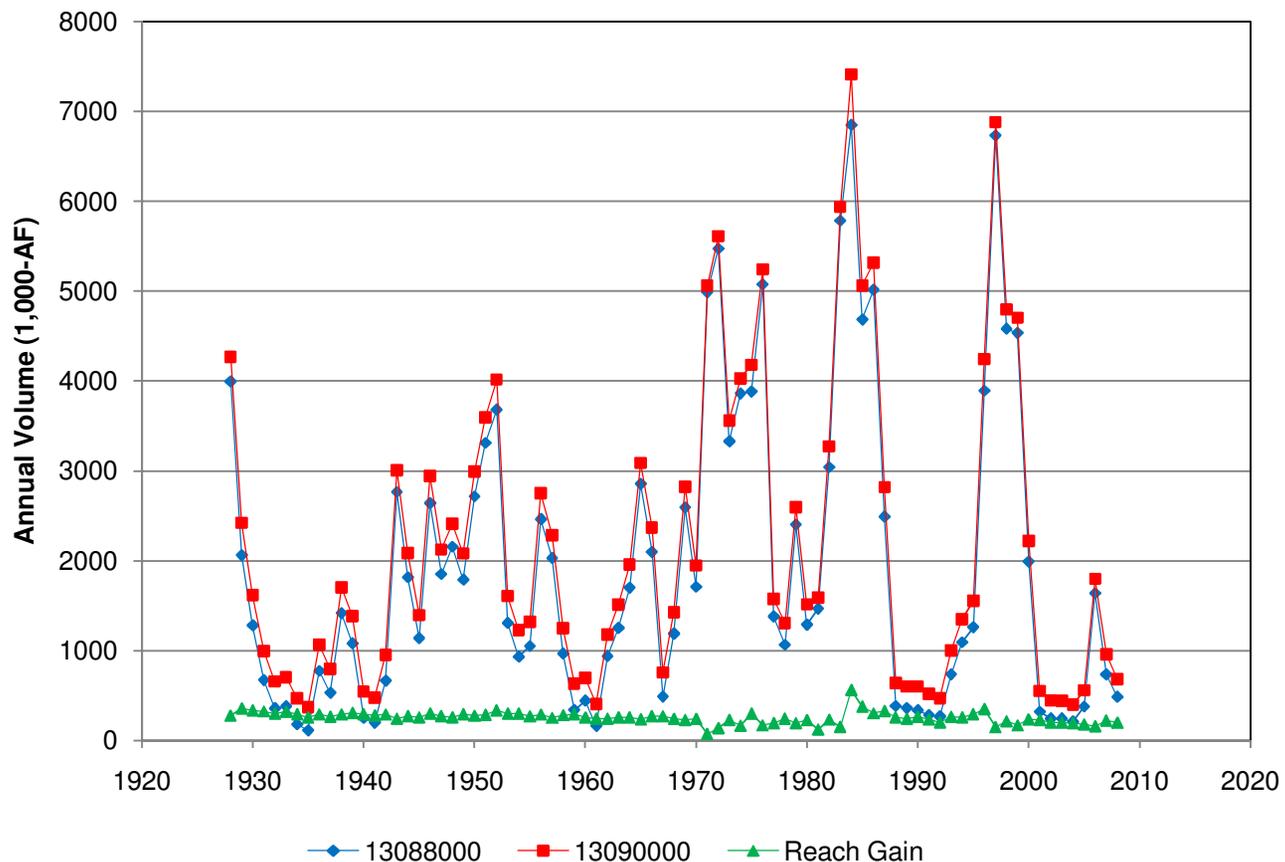


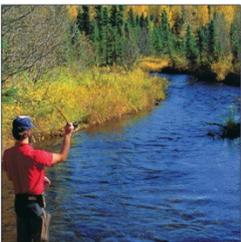
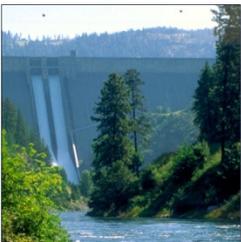




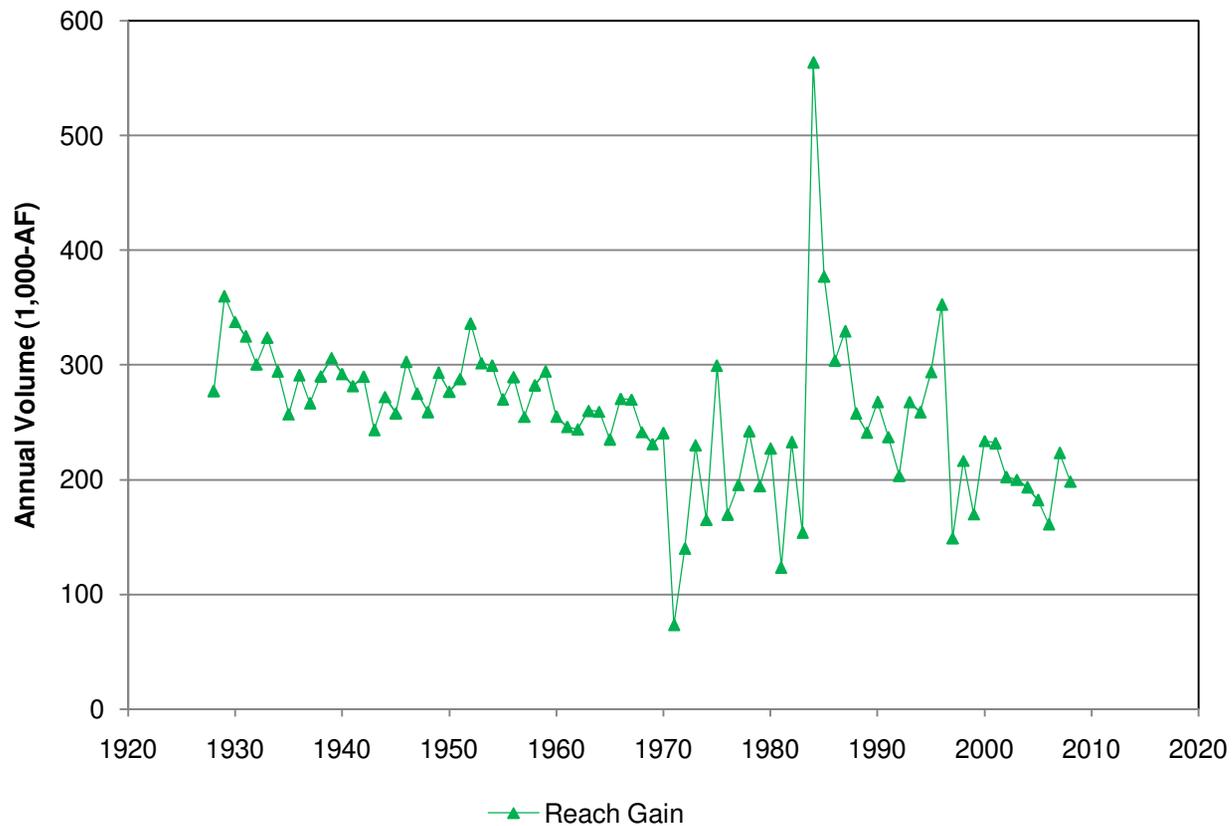


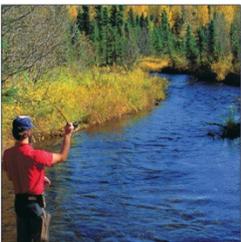
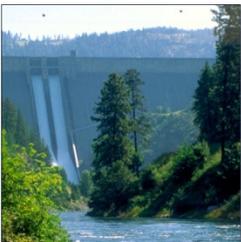
Milner to Kimberly reach gain and gaging station data





Milner to Kimberly reach gain variability





Kimberly to Lower Salmon Falls

