

# **ESTIMATING IRRIGATION ENTITY DIVERSIONS: SNAKE RIVER**

Idaho Water Resources  
Research Institute

University of Idaho

Brenda K. Gilliland  
April 2003  
Revised July 2003

Idaho Water Resources Research Institute  
Technical Report 04-012

Eastern Snake Plain Aquifer Model Enhancement Project  
Scenario Document Number DDW-012

## **DESIGN DOCUMENT OVERVIEW**

Design documents are a series of technical papers addressing specific design topics on the Eastern Snake Plain Aquifer Model (ESPAM) Enhancement Project. Each design document will contain the following information: topic of the design document, how that topic fits into the whole project, which design alternatives were considered and which design alternative is proposed. In draft form, design documents are used to present proposed designs to reviewers. Reviewers are encouraged to submit suggested alternatives and comments to the design document. Reviewers include all members of the Eastern Snake Hydrologic Modeling (ESHM) Committee as well as selected experts outside of the committee. The design document author will consider all suggestions from reviewers, update the draft design document, and submit the design document to the ESPAM Enhancement Program Manager. The Program Manager will make a final decision regarding the technical design of the described component. The author will modify the design document and publish the document in its final form in .pdf format on the ESPAM Enhancement web site.

The goal of a draft design document is to allow all of the technical groups interested in the design of the ESPAM Enhancement Project to voice opinions on the upgrade design. The final design document serves the purpose of documenting the final design decision. Once the final design document has been published for a specific topic, that topic will no longer be open for reviewer comment. Many of the topics addressed in design documents are subjective in nature. It is acknowledged that some design decisions will be controversial. The goal of the Program Manager and the modeling team is to deliver a well-documented, defensible model, which is as technically representative of the physical system as possible, given the practical constraints of time, funding and manpower. Through the mechanism of design documents, complicated design decisions will be finalized and documented.

Final model documentation will include all of the design documents, edited to ensure that the “as-built” condition is appropriately represented.

## **INTRODUCTION**

Percolation from surface water irrigation is the largest component of recharge to the eastern Snake Plain Aquifer. In order to effectively and accurately estimate this recharge component of the system, irrigation diversions from the river must be estimated with the highest degree of accuracy as possible. Return flow to the river and evapotranspiration are also components of calculating percolation from surface water irrigation, and are discussed in design documents DDW-005, DDW-006, DDW-007, and DDW-010.

This paper summarizes and analyzes the method of estimating irrigation entity diversions from the Snake River within the boundaries of the ESPAM study area. Non-Snake River diversions are discussed in DDW-025. The related topics of aggregating surface water canal companies into surface water irrigation entities and calculating return flow lag factors are discussed in design documents DDW-008 and DDW-005, respectively.

## **AVAILABLE DATA**

Two sources of data were considered for use in estimating surface water irrigation diversions. The first source is diversion and return flow 'raw' daily data from the water districts, and the second source is 'processed' monthly data that is used in the Idaho Department of Water Resources' (IDWR) Reach Gain and Loss Program. For consistency with the IDWR Reach Gain and Loss Program calculations that will be used for model calibration, the 'processed' monthly data were used to estimate irrigation diversions.

As described in design document DDW-008, "Aggregating Surface Water Canal Companies into Surface Water Irrigation Entities", there are more than 100 surface water irrigation companies and numerous private surface water irrigators that were aggregated, or grouped, into a smaller number of irrigation entities. This aggregation resulted in a more accurate depiction of the delivery of surface water to the irrigated acres by maintaining a level of resolution consistent with available diversion and return flow data, as described in ESPAM design document DDW-008. The final aggregation is listed in Appendix 1.

Using both the data from the IDWR Reach Gain and Loss Program and the aggregated surface water irrigation entities, a spreadsheet was created in Microsoft Excel to calculate surface water irrigation diversions for each surface water irrigation entity. This spreadsheet was also used to perform the calculations to estimate return flows to the Snake River, using monthly diversion data and return flow percentages (see design document DDW-005).

## **SPREADSHEET DESCRIPTION**

A Microsoft Excel spreadsheet was created to calculate total surface water irrigation diversions for each surface water aggregated entity. The spreadsheet contains a separate worksheet for each irrigation entity. Each worksheet contains diversion data and return flow data for all of the irrigation companies and private irrigators that comprise the associated irrigation entity. See Figure 1.

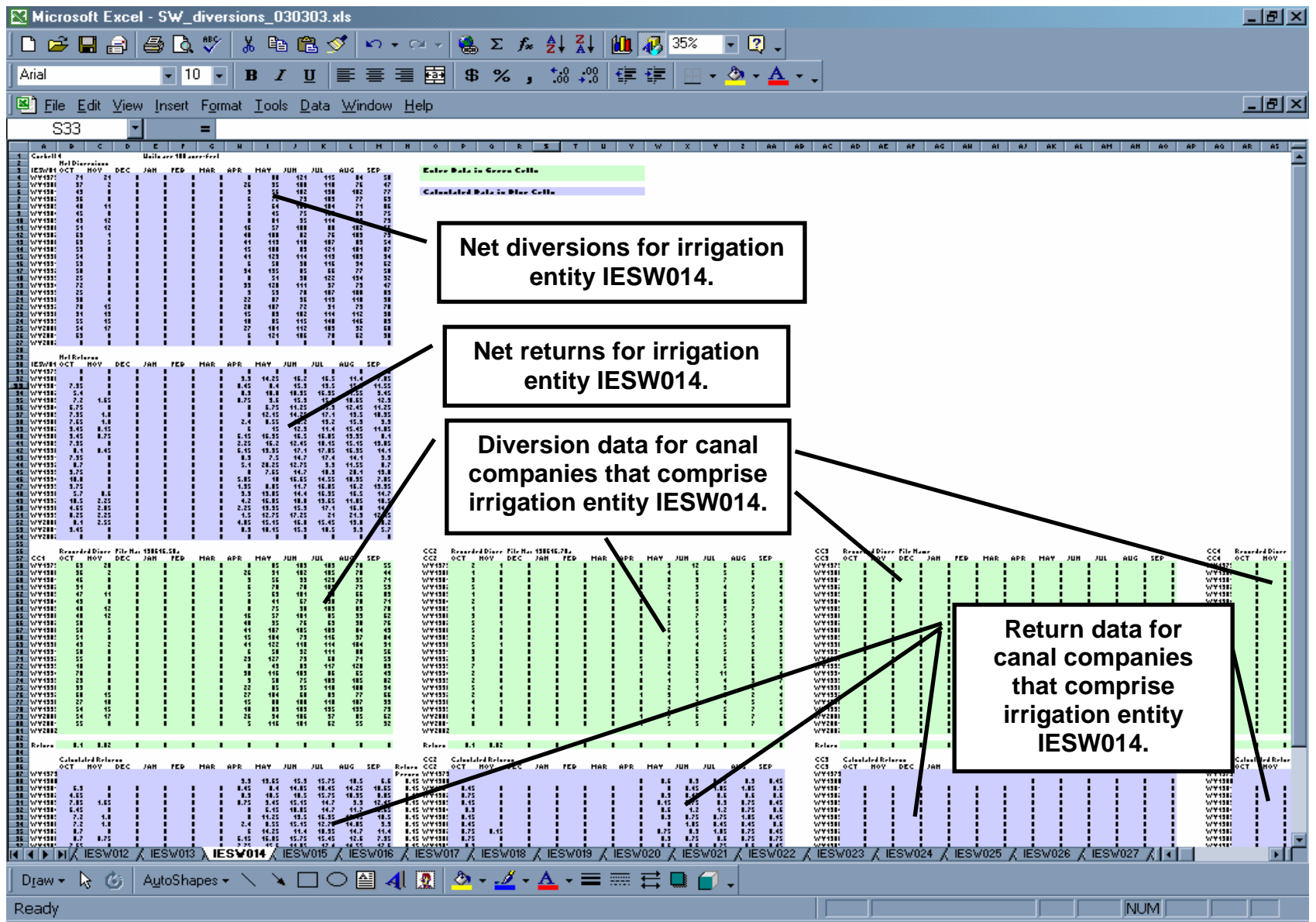


Figure 1. Diversion and return flow spreadsheet.

Many of the diversion files that are assigned to an irrigation entity also have return flow percentages associated with the diversion file. Return flow percentages are applied to the respective diversion data on each worksheet of the spreadsheet file. The monthly diversions and returns for each irrigation company and private irrigator are summed to yield the monthly diversions and returns for the irrigation entity. Diversion and return flow data are in units of 100 acre-feet.

## **RESULTS**

The diversion and return flow spreadsheet uses the same monthly diversion data that are used for calculation in the IDWR Reach Gain and Loss Program. This monthly diversion data is used to calculate total monthly diversions and return flows within each surface water aggregated irrigation entity discussed in design document DDW-008.

# **APPENDIX 1**

## **Aggregated Surface Water Irrigation Entities**

<b>Entity ID</b>	<b>Entity Name</b>	<b>Irrigation Company(ies) Included in Entity</b>
IESW001	A & B 1	A & B Irrigation District
IESW002	Aberdeen Springfield 1	Aberdeen Springfield Canal Co
IESW005	Big Lost River 3 (with 5 mile buffer)	Big Lost River Irrigation District Moore Water Users Association Darlington Land & Irrigation Co
IESW007	Big Wood 4	Justice Ditch Co Thorpe Ditch Co Big Wood Canal Company
IESW008	Blaine 1	Blaine County Canal Co
IESW009	Burgess 5	Burgess Canal & Irrigating Co North Rigby Irrigation & Canal Co Inc Parks & Lewisville Irrigation Co Inc Rigby Canal & Irrigation Co Clark & Edwards Canal Company
IESW010	Burley 1	Burley Irrigation District
IESW011	Butte and Market 1	Butte & Market Lake Canal Co
IESW012	Canyon Creek 3	Enterprise Irrigation District Canyon Creek Lateral Ditch Assn Canyon Creek Canal Co Inc
IESW014	Corbett 4	Corbett Slough Ditch Company Eastern Idaho Water Co Little Butte Irrigation Co Ltd Younie Ditch Co
IESW015	Dewey 1	Dewey Canal Co
IESW016	Egin 2	Egin Bench Canals Inc St Anthony Union Canal Co
IESW018	Falls 2	Falls Irrigation District Warm Creek Irrigation Co
IESW019	Fort Hall 1	Fort Hall Indian Reservation
IESW020	Harrison 6	Butler Island Canal Co Enterprise Canal Co Ltd Harrison Canal & Irrigation Co Heise Canal Kite And Nord Ditch Rudy Irrigation Canal Co Ltd
IESW022	Idaho 2	Idaho Irrigation District Snake River Valley Irrigation District
IESW025	Little Wood 2 (with 5 mile buffer)	Fish Creek Reservoir Company Inc Little Wood River Canal Co
IESW027	Milner 1	Milner Irrigation District
IESW028	Minidoka 1	Minidoka Irrigation District
IESW029	Mud Lake 4	Level Canal Co Inc Holley Water Users Assn Mud Lake Water Users Inc Owsley Canal Company
IESW030	New Sweden 7	Smith-Maxwell Ditch Co New Sweden Irrigation District Shattuck Irrigation Co. Stattuck Irrigation Co

		Long Island Canal Co
		Blackfoot Irrigation Co
		Woodville Canal Co
IESW031	North Fremont 2	North Fremont Canal Systems Inc
		Arcadia Reservoir & Canal Co Ltd
IESW032	North Side 7	King Hill Irrigation District
		North Side Canal Company Ltd
		American Falls Reservoir Dist #2
		Dbas Farms & Irrigation Co
		Banbury Pipe Company, Inc.
		Big Spring Water Users Association
		Hagerman Water Users Association
IESW033	Osgood 4	Owners Mutual Irrigation Co
		Osgood Canal Co Inc
		H & W Water Users Association
		Bear Island Water Assn
IESW034	Peoples 8	Watson Slough Ditch And Irrigation Companies
		Peoples Canal & Irrigation Co
		Parsons Ditch Co
		Wearyrick Ditch Co
		Trego Ditch Co
		Danskin Ditch Company
		New Lavaside Ditch Company Limited
		Riverside Canal Co
IESW035	Progressive 2	Poplar Irrigation District
		Progressive Irrigation District
IESW036	Reid 6	Consolidated Feeder Canal Co
		Liberty Park Irrigation Co Inc
		Texas Slough Irrigating Canal Co
		Reid Canal Co
		Lenroot Canal Co
		Sunnydell Irrigation District
IESW037	Reno 1 (with 2 mile buffer)	Reno Ditch Company Inc
IESW038	Rexburg 1	Rexburg Irrigation Co C/O Keith Erikson
IESW039	Silky 2	Silky Lateral Ditch Water Users Assn
		Silky Irrigation District
IESW040	Southwest 2	Oakley Canal Co
		Southwest Irrigation District
IESW041	Twin Falls 1	Twin Falls Canal Co
IESW044	Jefferson 3 (with 2 mile buffer)	Jefferson Irrigation Co
		Producers Irrigation Co
		Monteview Canal Co Inc
IESW051	Private Basin 31 (with 5 mile buffer)	
IESW052	Private Basin 32 (with 5 mile buffer)	
IESW053	Private Basin 33 (with 5 mile buffer)	
IESW054	Richfield 1 (with 2 mile buffer)	(Richfield Tract)
IESW055	Long Island 8 (Dry Bed)	Lowder Slough Canal Co
		West Labelle Irrigation Co Ltd
		Dilts Irrigation Company



Ellis-Bramwell Ditch CO  
Independent Irrigation Co  
Labelle Irrigating Co  
Island Irrigation Co  
Long Island Irrigation Co

IESW056      Fall River 17  
                  (Henry's Fork)

Roxana Canal Co  
Consolidated Farmers Canal Co Ltd  
Saurey-Sommer Ditch  
Island Ward Canal Co  
Fall River Irrigation Co  
Wilford Irrigation And Mfg Co  
Pioneer Ditch Co Ltd  
Twin Groves Irrigation & Manufacturing  
Salem Union Canal Co Ltd  
Farmers Friend Irrigation Co Ltd  
North Salem Agr & Mill Canal Inc  
Woodmansee-Johnson Canal Company  
Teton Irrigation And Manufacturing Co  
Pincock Garner Ditch Association  
Pincock-Byington Ditch Co  
Wolf Ditch Company  
Teton Island Feeder Canal Co  
Basin 27 – Blackfoot River Basin

IESW057      Basin 27