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Task 1: Update NHD in IDWR Critical Areas – Water District 37 and American Falls Reservoir District #2/Big Wood Canal Company

COOPERATIVE AGREEMENT NO. G10AC00432

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REPORT TO THE UNITED STATES GEOLOGICAL SURVEY

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Introduction:

In Idaho, water resources management is critical to the State's agriculturally-based economy. Planners and engineers have a difficult task implementing water-related projects and need adequate tools for planning and design. In areas like southern Idaho, where agriculture is dominant, the current National Hydrography Dataset (NHD) often does not match the existing hydrography because of changes on the ground since the digital information was created. The expansion of agricultural land led to the construction of canals and the altering of waterways

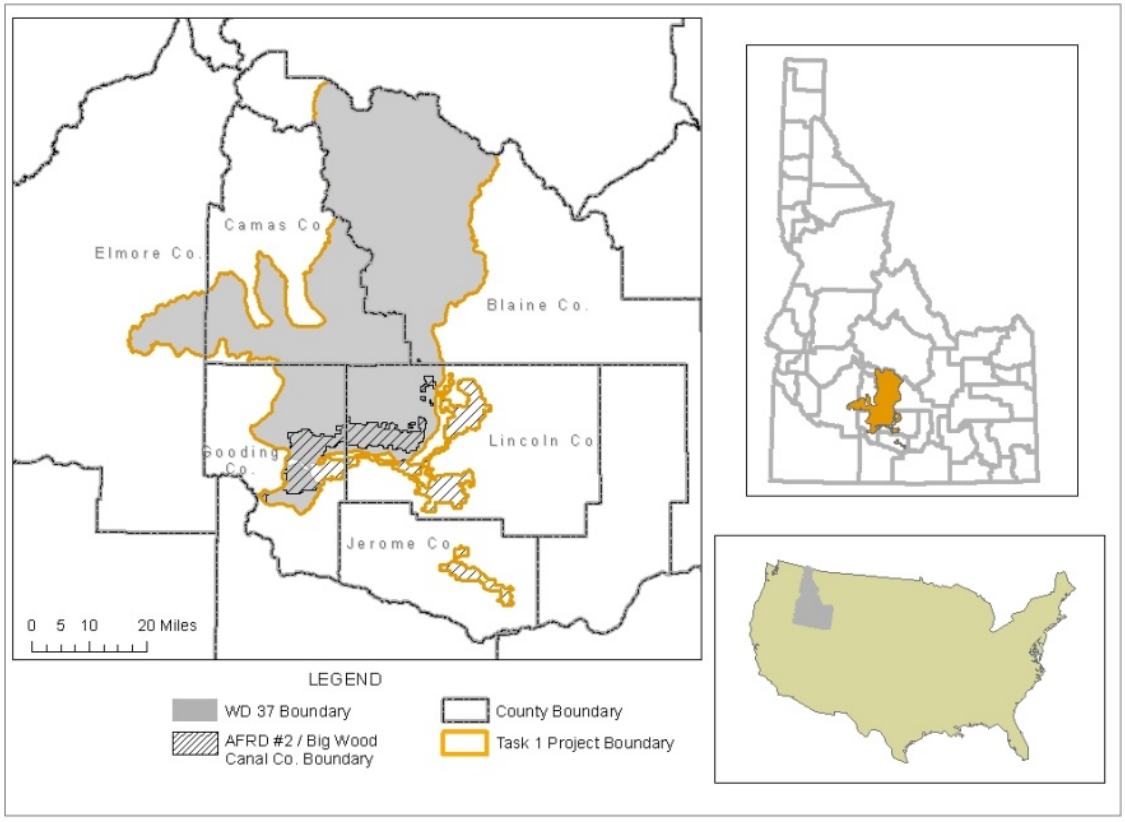
Accurate maps and digital data are the basic tools for planning and designing water projects, such as managed aquifer recharge, and are essential components of hydrologic modeling. Managed aquifer recharge projects return water to an aquifer. One method is to direct water through existing canals in the post-irrigation season with the intent of adding water to a zone of saturation below the water table. The Idaho Department of Water Resources (IDWR) is active in many managed aquifer recharge projects targeting the Eastern Snake Plain Aquifer (ESPA).

Various irrigation districts have been identified to be ideal candidates for ESPA managed recharge projects because canals can be used for the recharge process. Managers at IDWR agreed that the lands managed by the American Falls Reservoir District #2/Big Wood Canal Company and Water District #37 are areas that are important for recharge to the ESPA .

Area of Interest – Water District 37 & American Falls Reservoir District #2/ Big Wood Canal Company:

The Task 1 Project Area consists primarily of Water District 37 (WD37). A Water District is created by order of the Director of IDWR for purposes of water right administration, specifically distribution of water from public or natural water sources in accordance with water right priority dates.[i] WD 37 is located in South-Central Idaho and is composed of the entire Wood River drainage basin excluding the portion of the Little Wood River drainage basin from the mouth of Silver Creek to the Big Wood River including the Silver Creek drainage basin as well as Corral Creek and Soldier Creek.[ii] The largest irrigation company within WD 37 is the jointly administered American Falls Reservoir District #2 / Big Wood Canal Company (AFRD#2). AFRD#2 is currently cooperating with IDWR on a managed recharge project. Because approximately 50% of AFRD#2 is within WD37, the project area was modified to include all of WD37 and AFRD#2.

Figure 1: Task 1 Project Boundary

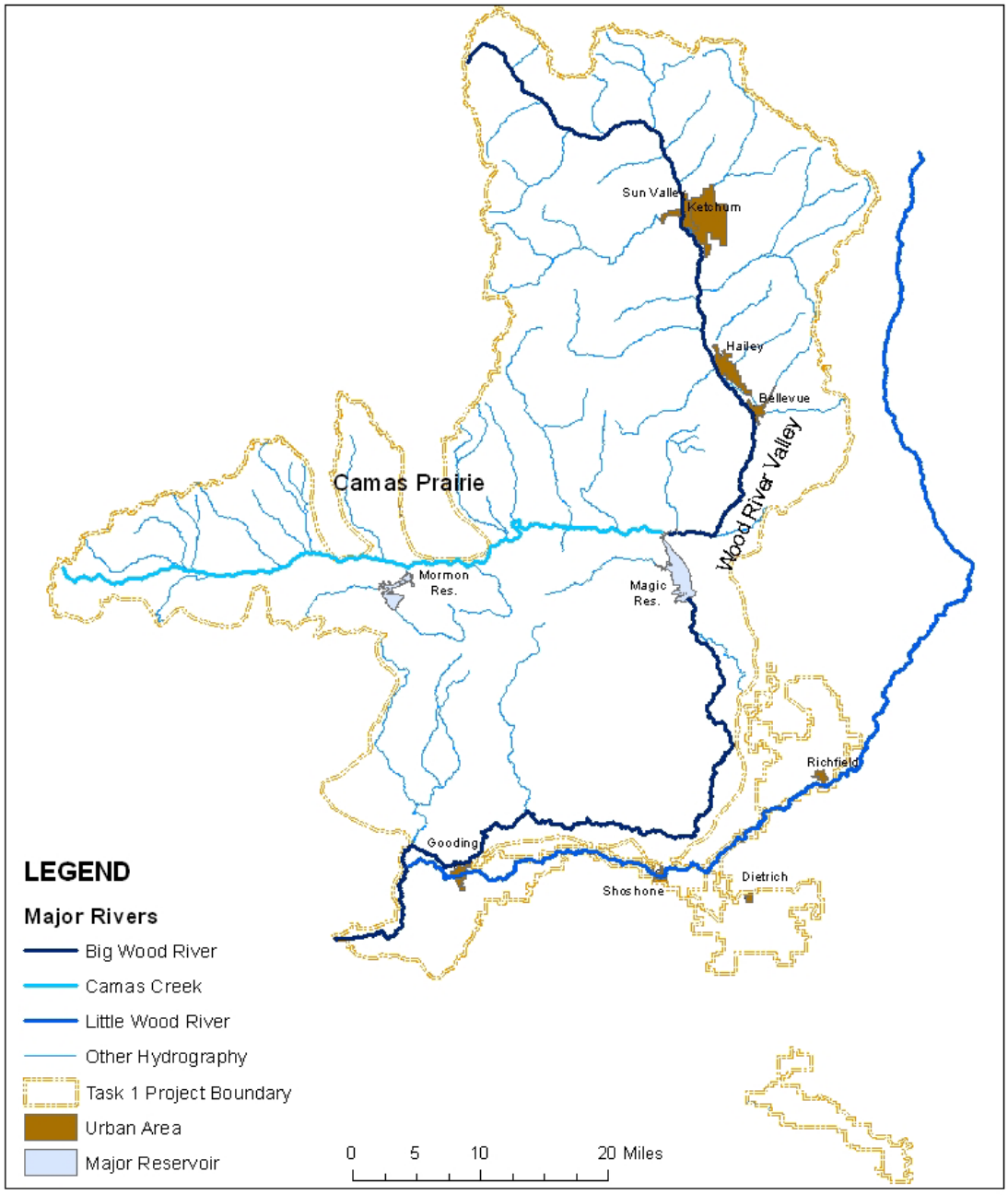


Most of the population within the project area is within the towns of Sun Valley, Hailey, Ketchum, and Gooding. Sun Valley, Hailey, and Ketchum are in the northern portion of the project area, while Gooding is in the southern part (Figure 2). From 2010 Census data Hailey has a population of 7960, followed by the town of Gooding with 3567 residents. Sun Valley and Ketchum have a combined population of 4095. [iii] About 38% of the project area is privately owned. Other significant land owners include the Bureau of Land Management (~33% of the project area) and US Forest Service (~26% of the project area).[iv]

There are three major rivers in the Task 1 Project Area; the Big Wood River, the Little Wood River, and Camas Creek. There are two major reservoirs in the project area; Mormon Reservoir and Magic Reservoir. Mormon Reservoir is approximately 1384 acres and is tributary to Camas Creek.[v] Camas Creek and the Big Wood River flow into

the 3566 acre Magic Reservoir.[vi] The Big Wood River then continues southward until it meets the Little Wood River and then flows into the Snake River (Figure 2).

Figure 2: Task 1 Hydrography



There is significant agricultural activity in the project area primarily in the Camas Prairie, the Wood River Valley, and the service area of AFRD#2. Shrubland dominates the southern 2/3 of the project area. The Northern elevations are forested.[vii] (Figure 3)

Figure 3: Task 1 General Land Use

Figure 4: Task 1 Subbasins

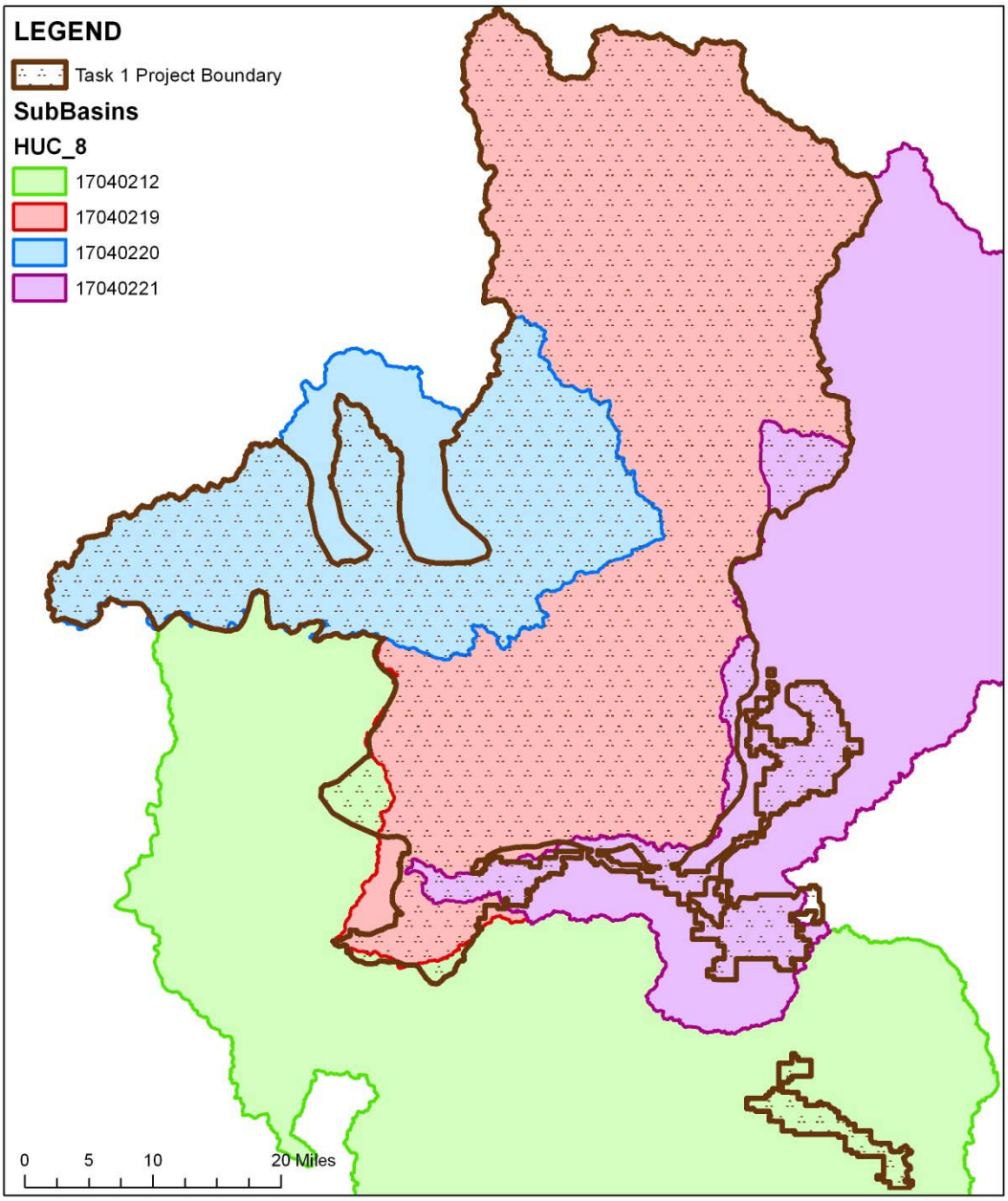


Table 1: Percent of Subbasin in Task 1 Project Area	
Subbasin	**%** of Subbasin
17040212	2%
17040219	98%
17040220	81%
17040221	14%

Methods:

The Idaho NHD Technical Point of Contact downloaded the appropriate SubBasins from the NHD website (http://nhd.usgs.gov/data.html). The project area consists of portions of Hydrologic units (HU) 17040212, 17040219, 17040220 and 17040221 (Figure 4). Maps of hydrography over NAIP imagery and geodatabases of the project area were supplied to the cooperators.

The next step was to collect locally available data from cooperators within the project area. AFRD#2 provided a shapefile that illustrated the location of many laterals within the company. The Watermaster of WD37 provided canal data for the Big Wood River south of Ketchum and the Little Wood River within the project area.

The existing NHDFlowlines were photorectified using 2009 NAIP imagery. The data provided by the local cooperators were used to update names for unnamed flowlines. This data was also used to clarify flowline direction and connectivity in areas where it could not be determined through imagery or existing maps. The modified NHDflowlines were then returned to the local cooperators in the form of an ESRI Geodatabase for review.

The staff at AFRD#2 and the WD37 Watermaster reviewed the updated ESRI Geodatabase for correct placement of hydrography, flow direction, connectivity, and naming. The AFRD#2 company staff and the Watermaster edited the revised NHDFlowlines using the IDWR NHD Editing Tool. (For a description of the IDWR NHD Editing Tool, please see Appendix A.) The edited information was then returned to IDWR for incorporation. A series of meetings were held to address areas where the imagery and/or cooperator input were unclear or to clarify confusing hydrology or attribution.

The USGS NHD GeoEdit Tools were used to incorporate changes for submittal to the USGS for inclusion into the NHD.

Results:

Updates Provided to USGS for Incorporation into the NHD

During this process, 143 names were submitted to GNIS, 4623 NHDFlowlines were inserted, updated, or deleted. In addition, there were 127 Waterbody edits, 12 NHD Area edits, and 3 NHDLine edits (Table 2). Updates were submitted to USGS for incorporation into the NHD, and the final dataset was posted on 10/18/2011. As a result of this project, there are 3900+ additional edits received late in the timeframe of this

grant that need to be submitted to the NHD, primarily within the AFRD#2 boundary. These subbasins will be checked out in the future to incorporate those changes. See Figure 5 for a representation of all the updated linework as a result of this project.

Figure 5: Task 1 Updates

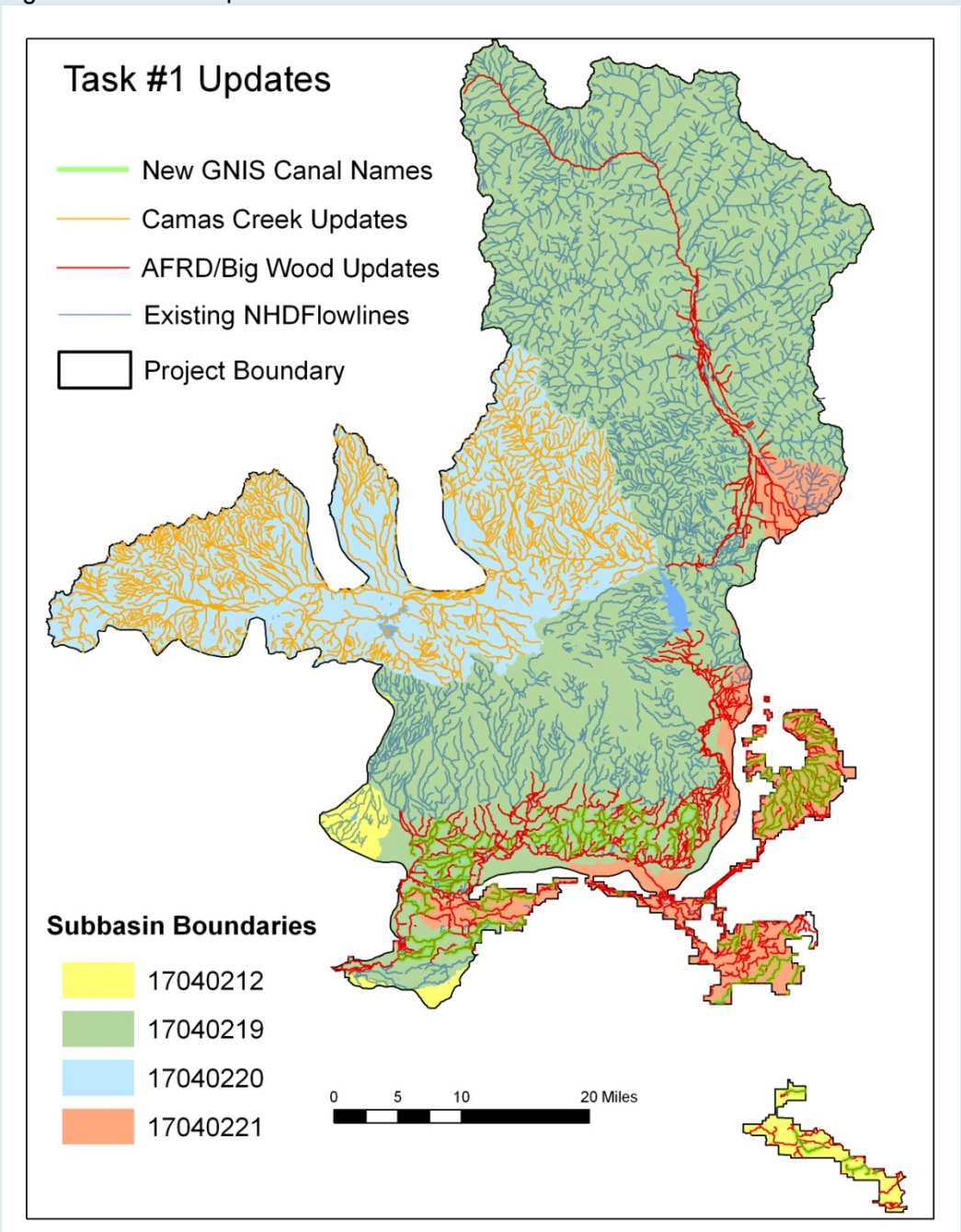


Table 2: Number of Edits per Subbasin			
NHDFlowline Edits	**Delete**	**Insert**	**Update**
17040212	18	13	94
17040219	22	25	72
17040220	1147	1243	1923
17040221	11	14	41
TOTAL	**1198**	**1295**	**2130**
NHDWaterbody Edits			
17040212			4
17040219	4		1
17040220	1		117
17040221			
TOTAL	**5**		**122**
NHDArea Edits			
17040212			2
17040219			2
17040220			7
17040221			1
TOTAL			**12**
NHDLine Edits			
17040212			
17040219			
17040220	2		1
17040221			
TOTAL	**2**		**1**

Maps provided to AFRD#2 and WD 37

IDWR provided maps and a Geodatabase of the updated flowlines to AFRD#2 illustrating the submitted updates to the flowlines in their service area.

IDWR provided maps and a Geodatabase of the updated flowlines to WD 37 illustrating the areas along the Big Wood and Little Wood Rivers where they provided updates to NHDflowlines.

Discussion and Conclusions:

Issues and Challenges

1) *Extensive photorevision was necessary*. Because of the large amount of agricultural activity in the project area as well as flooding along the Big Wood River in 2006, the existing NHDFlowlines did not reflect current ground conditions.
2) *Obtaining input from the local managers in a timely manner.* Although both the Watermaster and Canal Company staff were very cooperative, providing corrections was one of many priorities. Additionally, the company staff using the

GIS software wasn't necessarily the individuals familiar with the system. Often the ditch riders were only available early in the mornings or late in the evenings to provide information to company staff.

3) *Technology gaps.* Both WD37 and AFRD#2 have access to GIS software. Unfortunately, they have limited experience using the software. Even with the use of the IDWR NHD editing tool for simplified editing, obtaining corrections was slow. Because of the size of the project area, paper maps were not an effective option. (The project area intersects seventy-five 1:24000 quadrangles.)
4) *The complexity of the GeoEdit Tools.* Many major edits were required to both the NHDFlowline and NHDArea and/or Waterbody feature classes. This was time consuming for IDWR staff, as 4 subbasins had to be checked out for the entire project boundary area.

Conclusion

Although photorevision is an effective way to update hydrography, input from local sources is critical in accurately depicting connectivity, vertical relationships, and flow direction. Cooperation from local managers was achieved by providing maps and data products that they found useful in their business processes. AFRD#2 was very pleased to obtain a better digital and paper representation of their system.

Comment from AFRD#2:

"This program has been very helpful on numerous projects, for example; the Dietrich Pipeline, the Marley, the Lezamiz, the Lehmann, and a couple of other unnamed projects that are currently in progress. It is nice to have the various layers and options to get a truer picture of the overall projects. This program has provided a great tool to have for future changes that are made in our system."

IDWR was able to provide better data for development and monitoring of managed recharge projects and other water management projects. In working together, all the cooperators have a product that is better than what any one organization could have produced.

Acknowledgements:

Thank you to the staff at the Big Wood Canal Company/American Falls Reservoir District #2, in particular Lynn Harmon and Harvey Brauburger and to Kevin Lakey, Watermaster for Water District 37.

Appendix:

A. Description of the IDWR NHD Editing Tool: http://www.idwr.idaho.gov/GeographicInfo/NHD/Projects/PDF/NHD_Editing_Tool.pdf

End Notes:

[i] http://www.idwr.idaho.gov/WaterManagement/WaterRelatedDistricts/default.htm

[ii] http://www.idwr.idaho.gov/WaterManagement/WaterDistricts/Big_LittleWoodRivers/WD37_Big_Wood_River.htm

[iii] http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

[iv] GIS analysis of Idaho Land Management layer. http://www.idwr.idaho.gov/ftp/gisdata/GISScripts/downloadform.asp?path=Spatial/AdministrativeBoundaries/IdahoOwnership&package=idown.pkg

[v] http://iaspub.epa.gov/tmdl_waters10/attains_waterbody.control?p_list_id=ID17040220SK023L_0L

[vi] http://iaspub.epa.gov/waters10/attains_waterbody.control?p_au_id=ID17040219SK003L_0L

[vii] Visual analysis of GAP data. http://gapanalysis.usgs.gov/