



win hjalmarson <hjalmar275@gmail.com>

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## Your 2010 report on Verde ditches.

10 messages

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**win hjalmarson** <hjalmar275@gmail.com>

Thu, Jan 22, 2015 at 11:08 AM

To: rross@usgs.gov

Hi Rob,

I'm a retired USGS WRD guy who is interested in water lost to ET along the cultivated land of the Verde Valley.

Do your measurements of your interesting report (2010 report, pp.121-127) provide an estimate of the percentage of irrigation diversions in the Verde Valley that return to the river?

I'm aware your study was between October 2008 and May 2010 and you measured the quantity of surface flow diverted into and directly returned to the Verde River along four ditches –Diamond S, Eureka, OK and Verde. You seem to have found that, on average, approximately 43% of the water diverted was directly returned to the river. The remaining 57% was either consumptively used or seeped back to the river via the subsurface.

Right? Or Wrong?

Anyhow, could your information be used to estimate losses of Verde River flow throughout the Verde Valley? In other words, could you apply what you learned on the 4 ditches to all the ditches? Why not? Along the same thoughts--could you reconstruct the natural flow in the river between, for example, 1910 and 1915? I think I know the answers but with your experience, I would appreciate any thoughts you would share.

Win Hjalmarson

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**Ross, Robert** <rross@usgs.gov>

Thu, Jan 22, 2015 at 12:03 PM

To: win hjalmarson <hjalmar275@gmail.com>

Hi Win,

I will look back through to confirm the estimates of return flow and usage/ET/seepage, and get back to you with a brief summary.

I would be very leery of trying to extend any of our data or results to try and estimate losses throughout the Verde Valley, simply because there is not a robust dataset for most of the ditches. The Alam report gives a general idea of diversion quantities, and I suppose the average return values for the four ditches I instrumented could be applied to these, along with historical discharge data from our gaging stations. This would involve making some very substantial assumptions, however, and it would be difficult to apply any sort of error estimate to the model.

As I review the data, I will try to come up with a method to extend the results both spatially and temporally, as well as to reconstruct the natural flow, and see if I can figure out any reasonable way to do this. I'll get back yo

you in a few days, if that's ok.

Thanks,  
Rob

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Rob Ross  
Hydrologist  
US Geological Survey  
Grand Canyon Monitoring and Research Center  
Office: [928-556-7335](tel:928-556-7335)  
Cell: [928-600-7355](tel:928-600-7355)

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**win hjalmarson** <[hjalmar275@gmail.com](mailto:hjalmar275@gmail.com)>  
To: "Ross, Robert" <[rross@usgs.gov](mailto:rross@usgs.gov)>

Thu, Jan 22, 2015 at 2:02 PM

Thanks Rob. I'm interested in your professional opinion more than anything. Please don't spend much time on this for my sake. Because you've studied ditches I'll trust your initial impressions/opinions. I lived in Camp Verde for several years and had a 25 ft wide easement for the Verde Ditch.

It seems to me that each ditch is unique but I don't have proof. Thus, why would you expect the Cottonwood ditch to have the same losses or whatever as the Verde Ditch? Also, over the past 150 years some farms have been subdivided with many homes and more irrigators than in the natural past. Thus, ditch losses are different in time and space. Anyhow, these are rather obvious thoughts that seem logical but unproven.

What do you mean by robust? I'm aware that 2009 was a rather dry year thus your study may reflect greater water demands than normal.

Win

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**Ross, Robert** <[rross@usgs.gov](mailto:rross@usgs.gov)>  
To: win hjalmarson <[hjalmar275@gmail.com](mailto:hjalmar275@gmail.com)>

Thu, Jan 22, 2015 at 3:12 PM

Yes, the expectation of similar behavior from unique ditches is exactly where my main concerns lie, in terms of extrapolating the results to describe even qualitative changes over the entire system of ditches - I just have no way of knowing whether the usage patterns of the four ditches I studied are representative of all of the other ditches. I suppose that taking a Swoffer out to the diversions, spillways, and return channels could probably give us a rough idea of the percent of flow diverted and directly returned, if anyone had the time, equipment, and skills to do so. There is the other side of the property and water rights subdivision as well, in cases where water rights have been sold to entities that choose not to use them (SRP, The Nature Conservancy, etc.). There has been an overall decline, if I remember correctly, of agricultural irrigation over the past few decades, but I believe there has also been an increase in residential water use.

When I referred to the robustness of data, I meant that we have estimated diversion rates from all of the ditches, and have single point-in-time measurements from some of them (from the Alam report, and some measurements taken by Dick Tinlin in the 1970s). The data I collected are fairly comprehensive for the four ditches I was able to study, and ASP has a fantastic monitoring system in place for the Hickey Ditch through Dead Horse Ranch state park. The Cottonwood, alas, was not meant to be for us - I managed to get on the wrong side of Andy Grosetta by exploring funding options for instrumenting it before seeking permission from him to do so. It was a misunderstanding that we were not able to resolve.

I'm going to look into this in part because I'm now interested in whether it's a feasible task. If it looks promising, I might send some ideas to Abe, in case he has a grad student in need of a project. This could be a useful exploration.

Thanks,  
Rob

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**win hjalmarson** <hjalmar275@gmail.com>  
To: "Ross, Robert" <rross@usgs.gov>

Thu, Jan 22, 2015 at 7:36 PM

Interesting. I've known Dick Tinlin for more than 50 years and I know Andy. Don't feel bad about Andy because I doubt if he would let anyone measure "his" ditch under any conditions. A couple of years ago he mentioned what you say but did not name you.

*I've never seen Alam, J. 1997. Irrigation in the Verde Valley—a report of the irrigation diversion improvement project. Verde Natural Resource Conservation District. 96 p.*

Is it digitized? If so, can you send a copy

Are you aware of the Hayden report of 1940?

Do you know Rich Burtell?

Win

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**Ross, Robert** <rross@usgs.gov>  
To: win hjalmarson <hjalmar275@gmail.com>

Thu, Jan 22, 2015 at 7:53 PM

I think I have a digital copy of the Alam report, and I've read the Hayden report. How is Dick? Rich Burtell sounds quite familiar, but I can't recall from where.

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**win hjalmarson** <hjalmar275@gmail.com>  
To: "Ross, Robert" <rross@usgs.gov>

Thu, Jan 22, 2015 at 8:13 PM

Dick is OK. I call him the nut man. He married the girl next door to me when I was a kid. we go way way back.

Burtell may have asked you about your Thesis. He has used your work on a legal case concerning the navigability of the Verde River. see attachment.

Win



**a 6.jpg**  
195K

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win hjalmarson <hjalmar275@gmail.com>

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## Your thesis

16 messages

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win hjalmarson <hjalmar275@gmail.com>  
To: Robert Ross <ross@usgs.gov>

Mon, Feb 9, 2015 at 7:37 PM

2/9/2015

Hi Rob,

Got a question about Figure 54 where in early 2010 there is no discharge for about 3 months but there is return flow of roughly 5 cfs. Is there other inflow that I've missed?

On Fig 55 the return is shown as about 1 cfs but on the previous page (page 125) the return is given as 8.38 cfs. What am I missing?

How did you determine the average discharge and the average return for the 4 canals. Did you simply compute using the periods shown in the Figure 53-56?"

If possible could you respond soon?

Win

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Ross, Robert <ross@usgs.gov>  
To: win hjalmarson <hjalmar275@gmail.com>

Mon, Feb 9, 2015 at 8:11 PM

Hi Win,

I apologize; I've been remiss in checking into this. I just arrived back in town, and am leaving again tomorrow. I will try to answer this in the morning, before leaving.

Thanks,

Rob

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Rob Ross  
Hydrologist  
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**win hjalmarson** <[hjalmar275@gmail.com](mailto:hjalmar275@gmail.com)>  
To: "Ross, Robert" <[rross@usgs.gov](mailto:rross@usgs.gov)>

Mon, Feb 9, 2015 at 8:22 PM

Rob,  
I need some idea what you did by tomorrow afternoon.

As you may know I'm working of the navigability of the Verde--a legal issue--and I'm working with lawyers (e.g. AZ AG Office) and a guy has used your thesis as I mentioned previously. I need to know what the guy did--won't drag you into it--I just need to know. If convenient, appreciate a call tonight or in AM. Thanks

[928 634 0278](tel:928-634-0278)

Win

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**Ross, Robert** <[rross@usgs.gov](mailto:rross@usgs.gov)>  
To: win hjalmarson <[hjalmar275@gmail.com](mailto:hjalmar275@gmail.com)>

Tue, Feb 10, 2015 at 9:04 AM

Hi Win,  
In figure 54, there was some flow that entered the ditch even when the headgates were shut, likely from Grandpa Wash. It was a pretty small amount, but it was measurable. It could well have had some subflow contribution, too. As far as the average discharge from the Verde Ditch, there is either an error in the data input into the graph, or an error in my writing out the average return flow. I am taking my thesis with me on the road, and I should be able to clarify better in a few hours. I am also attaching an appendix of mean daily discharge. I'll get back to you shortly with more answers.  
Thanks,  
Rob

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Rob Ross  
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US Geological Survey  
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Office: [928-556-7335](tel:928-556-7335)  
Cell: [928-600-7355](tel:928-600-7355)

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 **Q\_verde\_ditches.zip**  
129K

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**win hjalmarson** <[hjalmar275@gmail.com](mailto:hjalmar275@gmail.com)>  
To: "Ross, Robert" <[rross@usgs.gov](mailto:rross@usgs.gov)>

Tue, Feb 10, 2015 at 9:30 AM

Thanks. Very useful!

For the Eureka Ditch you show an average consumption of 9.48 cfs that does not agree with the difference between the average discharge and average return (9.13 cfs – 3.70 cfs.). What am I reading wrong?

Win

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**Ross, Robert** <rross@usgs.gov>  
To: win hjalmarson <hjalmar275@gmail.com>

Tue, Feb 10, 2015 at 9:53 AM

I'm not sure why those values are different; I may have determined average consumption by subtracting individual 15 minute measurements, and taking the average of those. A few instances of large consumption may skew that metric away from the difference between mean daily values. If that is the case, I did a poor job of writing that part.

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**Ross, Robert** <rross@usgs.gov>  
To: win hjalmarson <hjalmar275@gmail.com>

Tue, Feb 10, 2015 at 10:02 AM

In a nutshell, I don't think these data are appropriate to use to reconstruct flow. They were gathered on a shoestring budget, and I don't think that they can be assumed to be representative of all ditches and all years. Plus now I'm quite concerned about the potential errors between mean daily consumption and whatever data I used to determine that metric for the Eureka and Diamond S. I don't necessarily disagree with Burtell's historical analysis of navigability, but using data from my thesis to model the entire system is reaching quite a bit.

Thanks,  
Rob

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**Ross, Robert** <rross@usgs.gov>  
To: win hjalmarson <hjalmar275@gmail.com>

Tue, Feb 10, 2015 at 10:17 AM

I apparently reported the difference between maximum discharge at the head gates and return flow at the Eureka. I'm not sure where I pulled the value from for the Diamond S, but in both cases, the average consumption should be recalculated from the average values at the beginning of the paragraphs. I hope this is helpful to you.

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**Ross, Robert** <rross@usgs.gov>  
To: win hjalmarson <hjalmar275@gmail.com>

Tue, Feb 10, 2015 at 10:21 AM

If you are using any of the input or data I've tried to provide, I would prefer it to be in the context of a former NAU grad student, and not have it involve my professional status. There are hoops to be jumped through if I were to become involved in that capacity, as I'm sure you well remember, and none of my professional work has been done on the Verde.

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**win hjalmarson** <hjalmar275@gmail.com>  
To: "Ross, Robert" <rross@usgs.gov>

Tue, Feb 10, 2015 at 10:24 AM

Very helpful. Can I quote you on this? Please respond.

Win

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**Ross, Robert** <ross@usgs.gov>  
To: win hjalmarson <hjalmar275@gmail.com>

Tue, Feb 10, 2015 at 10:31 AM

As long as it is clear that you are quoting me as a former NAU student who wrote the thesis used, and not in my official current capacity, then you may quote me as such: "I feel that the data gathered for four large ditches from 2008 to 2010 are neither temporally or spatially adequate to model historic flows for the Verde River."

Thanks,  
Rob

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Permission to present to ANSAC given by Robert Ross on April 2, 2015.  
Win Hjalmarson  
NOTE: Some limited communication between Win and Rob was by phone.