

## Review and Summary of Caulfield Notes on River Diversion Allowances

This is a summary of notes and observations made by Larry Caulfield, consultant to the Flathead Joint Board of Control (FJBC) during 2011-2013 comparing the CSKT/Water Use Agreement's recommended River Diversion Allowances (RDAs) with historic data of river diversion allowances. The key constraints on these data are:

1. The Bureau of Indian Affairs (BIA), "keeper" of the historic diversion records, never provided these data to the FJBC despite the Freedom of Information Act requests that were required due to their recalcitrance to share the data. As a result, the FJBC only had access to the Tribes' data and a few crop reports prepared by other state and federal agencies.
2. The lack of data raised serious concerns about the verification of the numbers proposed in the WUA, and time did not permit this consultant to fully assess the information.
3. Even if the RDA's are incrementally implemented, there are no reliable data showing what the actual water savings impact of proposed rehabilitation and betterment projects will be.
4. "There are some problems with the data that are now available to me. There are lots of gaps or holes in the data – in other words, during some years some diversions were not measured or the data seem to indicate that they were not measured (as indicated by a zero annual diversion). The data that are now available generally fall in the years from 1992 to 2010 although it is rare that there are complete diversion records that span this range".<sup>1</sup>

### Summary of 1969 Annual Report of the Project<sup>2</sup>

The following are excerpts from the 1969 Annual Report of the Project as identified by Mr. Caulfield:

- Non-Quota water was available during the entire month of May;
- The month of June recorded 5.03 inches of precipitation (which was exceeded only by 1916 with 5.24 inches); followed by 72 days of drought (during which only 0.11 inches of precipitation occurred)... it permitted the project reservoirs to be near capacity July 1 and delayed pumping operations for 30 days.
- Mission Valley quota "was set at 1.0 acre foot per acre from June 1 to the end of the irrigation season... (including non-quota)... a composite delivery of 1.30 acre feet per acre" was reported.
- Water supply to lands of the Moiese part was again excellent because of the large quantity of return flow..delivered an average of 4.35 acre feet per acre.
- On the Camas Division All demands were met from runoff supplies. Delivery was 1.06 acre feet per acre.
- Full water deliveries were made to lands of the Jocko Division to near September 1...during the 72 day drought period". Delivery was an average of 2.54 acre feet per acre.

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<sup>1</sup> Communication of Larry Caulfield to Jon Metropoulos, July 29, 2013

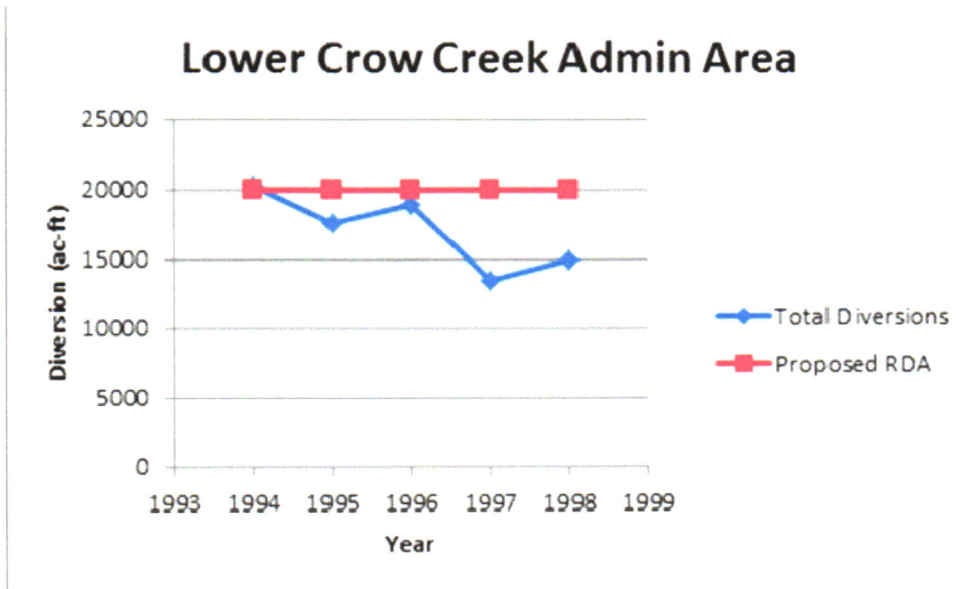
<sup>2</sup> This year was before the 1985 establishment of interim instream flows on the project, so is more reflective of historic uses and water availability.

- The Crow pumping System operated during the period of July 22 to September 15.
- The Flathead System operated August 4 through September 19.
- The Revais Pump was operated continuously from July 22 through September 19.
- A total of 23,996 acres of project land was under sprinkler irrigation in 1969.

**Caulfield Remarks:**

*I'm sure the numbers are typical summaries of project records during that era. However, even at that time the ditch riders had very few means for water measurement. Most of them were older, seasoned employees who were reasonably good at estimating, but because they were estimates their records should be considered to be less than actual in order for them to avoid any possible disagreement with an irrigator. Figures like these in a year like this emphasize a real concern for verification of the WUA water delivery proposal.*

**Comparison of RDAs in Lower Crow Creek Administrative Area:**

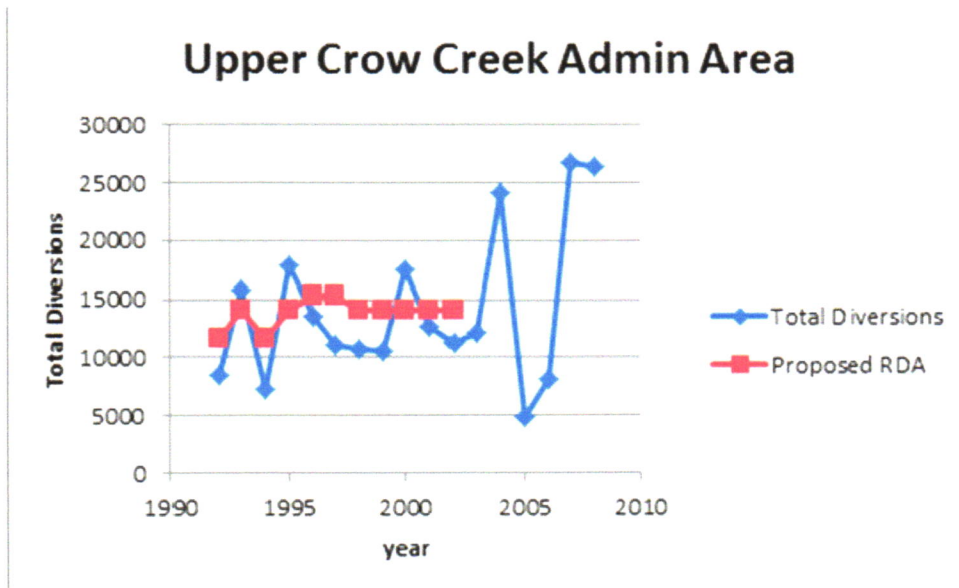


**Notes:**

*The Lower Crow Creek Admin Area includes diversions from the Moiese A canal and the Hillside Ditch. The only years during which there are measurements for both of these ditches are 1994-1998. During this period, historic diversions were generally about equal to or less than the proposed RDAs. I can't tell for certain but I think this pattern would be similar to other longer periods if complete diversion records were available for both ditches. This admin area is somewhat unique (as you will see) in that the RDAs appear to be more than sufficient to exceed historic diversions. The tribe as I recall has never shown much concern for this area. As the low point in the system there is always lots of water in this area.*

### Comparison of RDAs in Upper Crow Creek Administrative Area:

The next example is from the Upper Crow Creek Admin Area. There are three diversions within this area are subject to RDAs (South Crow Feeder Canal, Crow Pump Canal, and Ronan B Canal). The diversion record for these locations is spotty. There are only two years in which diversion records for all three sources in this admin area are available. Nonetheless, data is presented for the period from 1992 through 2008.

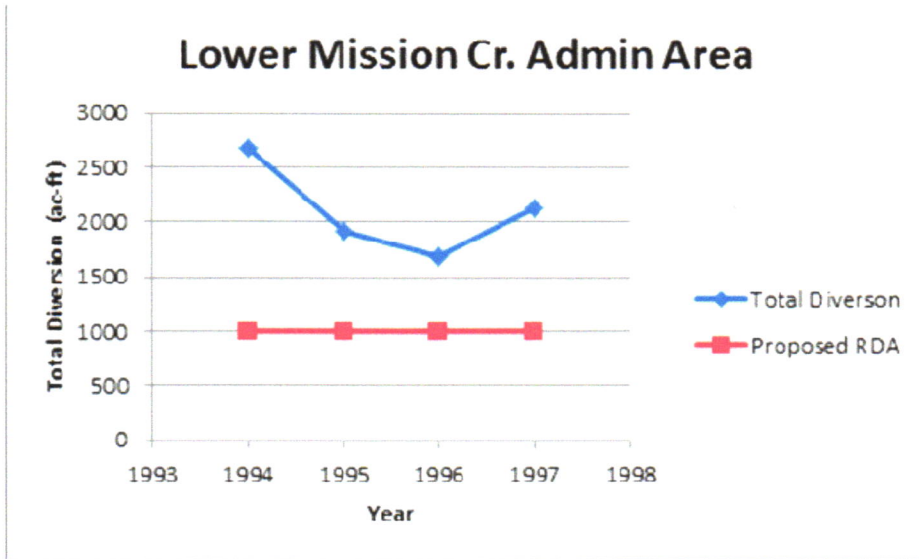


#### Notes:

The most valid data for this admin area are probably during 1994, 1996, 2007 and 2008. Proposed RDAs are only shown through 2002 on the graph above because the tribes' modeling effort determined if a year were wet, dry or average only for the period through 2002. Actual diversions in 2007 and 2008 far exceeded the RDAs. So if RDAs are to be implemented in this admin area, irrigation would have to become much, much more efficient. **If it is possible to become efficient enough to meet the RDAs at some point in the future is uncertain.**

### Comparison of RDAs for the Lower Mission Creek Administrative Area

The next example is for the Lower Mission Creek Admin Area which includes only one canal – the Mission H canal. Unfortunately there are only four years of recorded diversions for this canal as shown below:

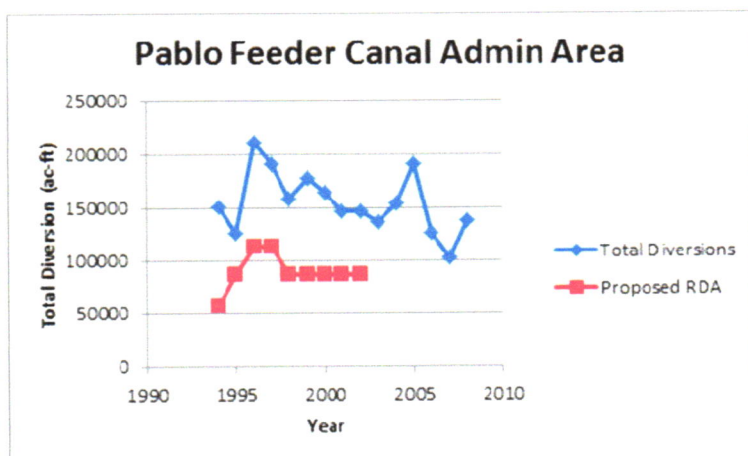


Notes:

*During the four years of record, historic diversions greatly exceeded the proposed RDA. Consequently irrigation at this location would have to become much, much more efficient if RDAs had to be met. **If it is possible to improve enough to meet the RDAs is uncertain.***

### Comparison of RDAs for Pablo Feeder Canal

*The next example is the Pablo Feeder Canal Admin Area. This area included the Mission DA canal, Mission A Canal and five locations on the Pablo Feeder Canal. The diversions in this area are on the order of 150,000 -200,000 acre-feet per year so by volume this is one of the more important areas to consider. Unfortunately, two of the Pablo Feeder Canal locations in this admin area don't have any diversion records. I attempted to put a lower bound on these locations by using the diversion from an upstream location as an estimate of the flow at the unknown location but this frankly is little more than a guess. Here is the comparison:*

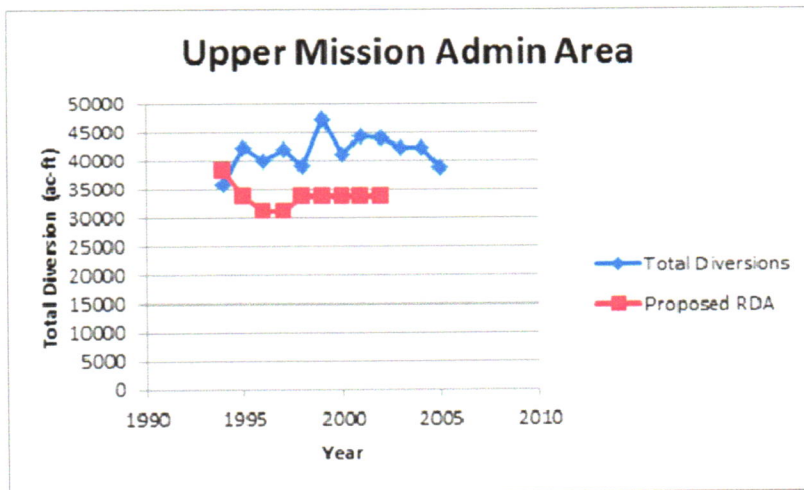


Notes:

As you can see, the historic diversions exceed the proposed RDAs substantially. Whether irrigation efficiency can be improved enough to meet the RDAs is uncertain.

### Comparison of RDAs for Upper Mission Administrative Area

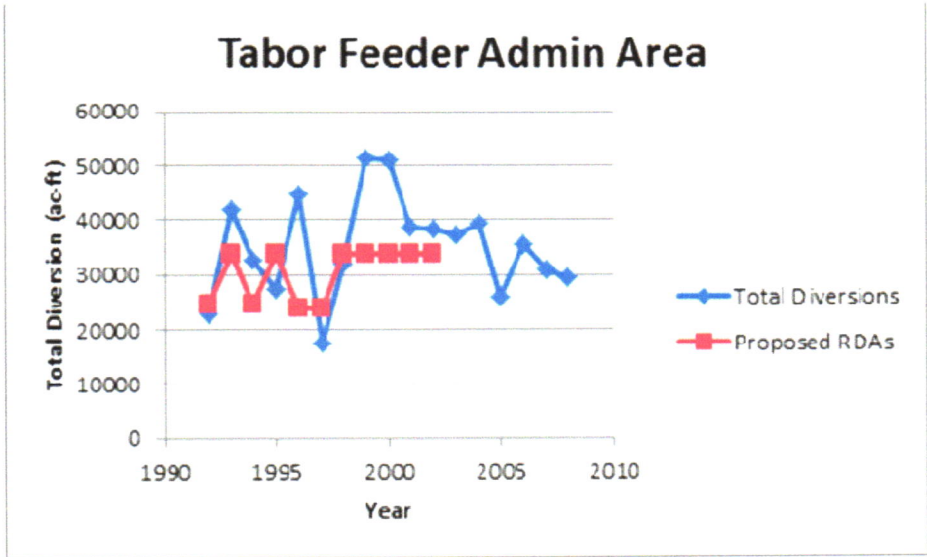
The final example is the Upper Mission Admin Area which includes the DC-2 lateral, Cold Creek Ditch, Mission F, Mission B and C, Kicking Horse Feeder and the Post F canal. The first three of these ditches have no diversion records available. The DC-2 lateral and the Cold Creek ditch are both really small so their overall impact on this analysis is negligible. The Mission F canal is substantial (27 cfs or thereabouts). To estimate the flow in the Mission F ditch I assumed it flowed at capacity (27 cfs) for six months of the year. As such this is probably an upper bound to this diversion. With this assumption, the graph below shows the comparison:



In general, irrigation would have to become slightly more efficient for total diversions to be reduced to the proposed RDAs.

### Jocko Valley Comparisons—Tabor Feeder Administrative Area

The first example is the Tabor Feeder Admin Area. This area included diversions from seven sources. Unfortunately, four of the sources do not have any diversion records. The three that do have diversion records are sizeable so it is worth comparing their diversions to RDAs. The figure below illustrates this comparison.

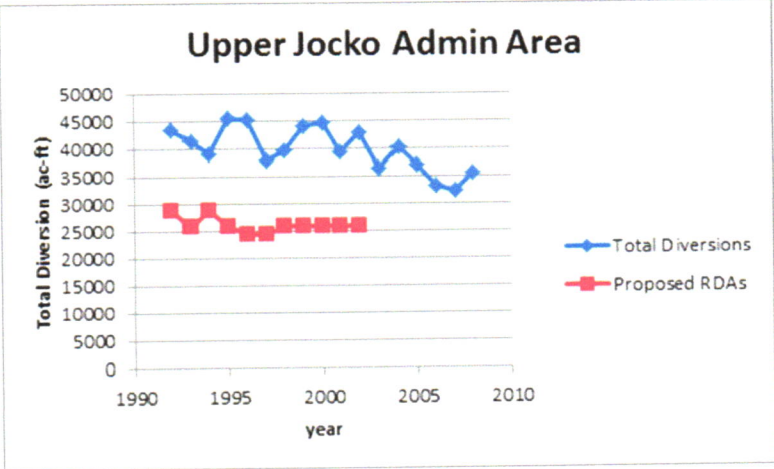


Notes:

*What is evident is that even with just diversions from 3 of the 7 sources in this admin area, historic diversions have been larger than the proposed RDAs. If irrigation can be improved enough to meet these RDAs is uncertain.*

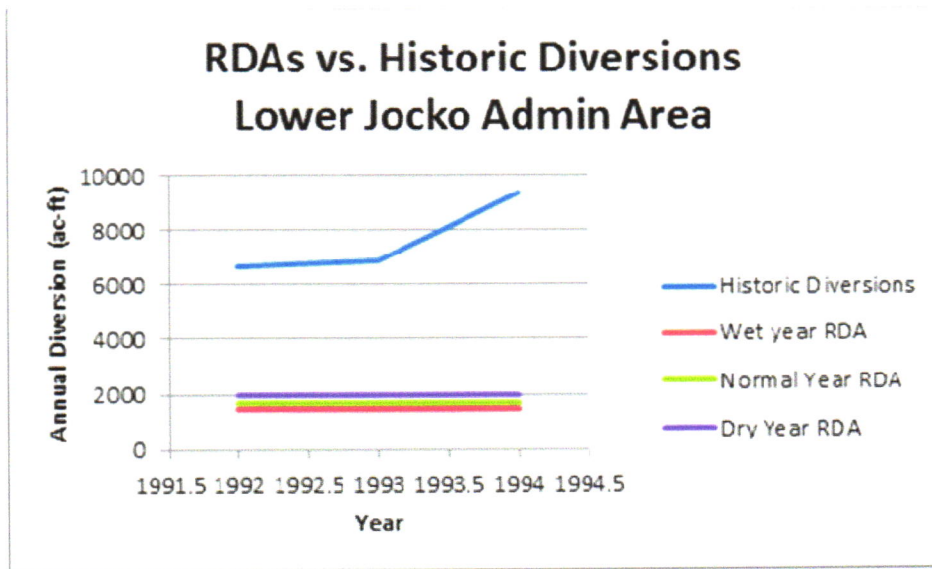
**Upper Jocko Administrative Area**

Another example is the Upper Jocko Admin Area. Here is how historic diversions compare to RDAs:



Notes: The diversions in this admin area include the Jocko S canal at two locations and the Jocko K canal. As you can see, historic diversions were considerably in excess of the RDAs. Whether irrigation can improve enough to meet these RDAs is questionable.

## Comparison of RDAs for Lower Jocko Administrative Area



Historic diversions are 3 times the RDA. It would be very difficult I think to find enough canal lining projects or other efficiency measures to save enough water that the RDAs can be implemented.