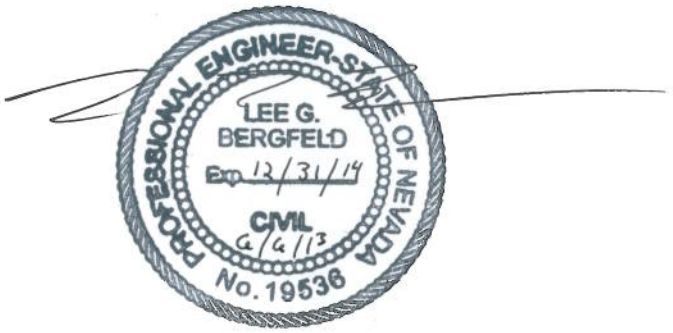
WRID, Lyon County and Bowman Protestants

EXHIBIT

197

Report of Lee G. Bergfeld entitled “Rebuttal Report to National Fish and Wildlife Foundation Exhibits 115 and 116 in Support of Application 80700”
dated June 6, 2013

Rebuttal Report to National Fish and Wildlife Foundation Exhibits 115 and 116 in Support of Application 80700



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I. EXECUTIVE SUMMARY

After review of National Fish & Wildlife Foundation (NFWF) Exhibit 116, "Walker River Decision Support Tool (version 2.0): Application and Analysis of National Fish & Wildlife Foundation Application No. 80700" and supporting model input and output files contained in NFWF Exhibit 115, "Walker River Basin Decision Support Tool," I conclude the Decision Support Tool does not address, and is currently not able to address, the potential for NFWF Application 80700 to conflict with existing rights. The following reasons provide the basis for my conclusion.

The Decision Support Tool (DST or model) does not simulate the necessary components of the Walker River Decree, the water right priority system, decisions of the Watermaster to administer the Walker River Decree, nor demands for water at the level of detail necessary to evaluate potential conflict with existing rights. This includes not explicitly simulating water availability per the 1953 Rules and Regulations, not using demand to drive diversion of available surface water, nor simulating how available water and demand interact to determine priority for decreed natural flow rights. Additionally, the DST does not simulate the system on the same time-step as the water rights are administered, does not simulate operation of Walker River Irrigation District (WRID) reservoirs, and uses priorities for delivery of certificated rights that are not representative of actual priorities.

NFWF Exhibit 116 includes results from a scenario that attempts to simulate the water right changes proposed in NFWF Application 80700 (Application 80700 Scenario). However, DST assumptions on the delivery of surface water are overly general. The result of these assumptions is that this scenario does not correctly identify or simulate the water available to decreed natural flow rights identified in NFWF Application 80700. Model results from the NFWF Application 80700 Scenario presented in NFWF Exhibit 116 are not adequate to address potential conflict with existing rights and do not provide a basis for any conclusion regarding potential conflict with existing rights.

While the DST does not provide useful information to evaluate potential conflict with existing rights, the model does simulate the physical components of the Walker River Basin and maintains mass balance. Therefore, DST results demonstrate the fundamental physical reality that in order to increase flow in the Walker River and thus into Walker Lake, there must be a corresponding reduction in consumptive use in the basin. DST model results demonstrate that changes in simulated Walker River flows directly correspond to the reduction in upstream consumptive use. This is why the Nevada State Engineer must limit the change under NFWF Application 80700 to the consumptive use portion of the rights to avoid potential conflict with other rights.

The remainder of this report provides additional detail and support for these conclusions.

II. DST DOES NOT SIMULATE WALKER RIVER OPERATIONS AND WATER RIGHTS AT THE NECESSARY LEVEL OF DETAIL

The DST approximates delivery of decreed, stored, and certificated waters in order to replicate historical diversions. This approach is not adequate to evaluate potential conflict with existing rights. Specifically, the DST lacks the level of detail needed to simulate administration of the Walker River Decree as currently done by the Watermaster. The following sections describe several areas where this lack of detail severely limits the usefulness of model results to understand issues of potential conflict with existing rights.

DST Does Not Explicitly Simulate Administration of the Walker River Decree

The two primary factors that determine water right priority and administration of the Walker River Decree are the water available from the Walker River and demand for water (WRID Exhibit 196). The 1953 Rules and Regulations describe the formula to be used to determine the total water available, comprised of flow in natural channels and return flows. The Watermaster balances the water available with the demand for water to determine the priority that can be served in various parts of the system. The 1953 Rules and Regulations state that this determination shall be made daily.

NFWF Application 80700 has the potential to conflict with existing rights because it may change return flows from the West Hyland Ditch, thereby affecting water available, and it may change how and when water is called for, thereby affecting demand. Both of these changes can affect the daily priority as determined by the Watermaster. To evaluate these potential conflicts, the DST must explicitly simulate the water available and demand for water, and use these two parameters to determine the priority to be served.

The DST does not calculate the water available from the Walker River as the sum of natural flow and return flow per the 1953 Rules and Regulations. Additionally, the DST does not use crop demands to drive the diversion of surface water. Instead, the DST approximates administration of the Walker River Decree with the use of historical diversion data. Implicit in these historical data are the priority as a function of historical water availability and historical crop demand. The DST relies on these implicit relationships in the baseline run and structures other model inputs to ensure DST simulated diversions exactly match historical diversion records at each ditch. Diversions are simulated in the DST to match historical records, not to satisfy crop demands. This approach may be acceptable if the DST were used only to replicate what occurred historically. However, this approach is not adequate to evaluate potential changes in demand for water under the NFWF Application 80700 Scenario, and how those changes may affect water availability and priority for other water users. In order to understand potential conflict with existing rights, it is necessary to be able to change when and how water is called for

under NFWF Application 80700 and see how that affects water availability and priority. For example, what would occur if water were called for on a different pattern than occurred historically when decreed natural flow rights under NFWF Application 80700 were used for irrigation. Decreed natural flow rights used for wildlife purposes are not constrained by crop demands or irrigation practices. When used for wildlife purposes rights under NFWF Application 80700 may be called for continually while in priority, without reduction due to weather, irrigation rotation, or harvest. The DST is not able to simulate this type of scenario because it does not explicitly simulate administration of the Walker River Decree.

The DST also fails to simulate the different priorities that can exist throughout the Walker River System on the same day. Based on available flow and demands, the Watermaster may declare different priorities can be served on the East, West, and Main Walker River on the same day. Examples of this are seen in Appendix 1 of WRID Exhibit 196.

Monthly Time-step Does Not Represent How the Walker River Decree is Administered

Both water availability and demand can vary significantly from one day to the next. The interaction of these two factors cause decreed rights to be in or out of priority for fractions of months as shown in historical priorities as set by the Watermaster (WRID Exhibit 196). Daily Main Walker River historical priority data from Appendix 1 of WRID Exhibit 196 were analyzed to illustrate the range of priorities served throughout each month simulated in the DST. This information is presented in Table 1 with the most junior priority served on any day within the month listed first followed by the most senior priority served on any day. For example, during August of 1996 rights of priority 1890 or earlier were in priority on at least one day, while on at least one other day only rights of priority 1875 or earlier were being served. When only one entry is provided for a given month it indicates that priority did not change throughout the month. When all rights are in priority it is designated as "Full" in the table.

Information presented in Table 1 illustrates that the priority served during the month frequently changes and can cover a wide range of priorities within a single month. This is why the 1953 Rules and Regulations state, "…the year of priority to be served shall be determined daily…" and the Watermaster administers the Walker River Decree on a daily basis.

Table 1: Range of Historical Main Walker River Priority by Month

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
1996	Full	Full	Full	Full	Full-1890	1890-1875	1880-1870	Full-1880
1997	Full	Full	Full	Full	Full-1895	Full-1875	1880-1874	Full-1880
1998	Full	Full	Full	Full	Full	Full-1880	Full-1880	Full
1999	Full	Full-1875	Full	Full	Full-1875	1875-1870	1890-1870	Full-1890
2000	Full-1875	1885-1875	Full-1880	Full-1890	Full-1865	1865-1864	1865-1864	Full-1864
2001	Full-1870	1880-1870	Full-1880	Full-1865	1865-1862	1862-1859	1859	1865-1859
2002	Full-1870	1889-1870	Full-1872	Full-1890	1890-1865	1865-1859	1859	1865-1859
2003	Full-1870	1873-1867	Full-1866	Full-1897	1897-1869	1869-1864	1865-1859	1865
2004	Full-1874	Full-1872	Full-1885	Full-1880	1880-1865	1869-1859	1864-1859	Full-1859
2005	Full	Full-1877	Full-1880	Full	Full	Full-1870	1875-1873	1884-1875
2006	Full	Full	Full	Full	Full	Full-1873	1875-1873	Full-1875
2007	Full-1872	1879-1870	Full-1875	Full-1863	1863-1861	1863-1859	1862-1859	1864-1862
2008	Full-1872	1874-1869	Full-1878	Full-1879	1879-1863	1863-1860	1860-1859	1865-1859
2009	Full-1869	1884-1864	Full-1876	Full	Full-1869	1864-1862	1864-1861	Full-1864
2010	Full	Full-1874	Full-1874	Full	Full-1876	1876-1863	1867-1863	Full-1869
2011	Full	Full	Full	Full	Full	Full-1877	1880-1874	Full-1880

The DST simulates the Walker River system on a monthly time-step. Simulation on a monthly time-step requires several simplifying assumptions that can mask potential conflict with existing rights. These assumptions, necessary with a monthly time-step, can show more water diverted under more senior priority rights and less or even no water diverted under more junior priority rights when those rights may have been in priority for a portion of the month.

Monthly DST results for diversion of decreed natural flow rights on the West Hyland Ditch were analyzed to understand how monthly historical diversion records were simulated as diverted under various priority rights. There are decreed natural flow rights with 16 different priorities on the West Hyland Ditch. In the DST, there are separate variables for each of these 16 different priorities. The DST simulates diversion at the head of the West Hyland Ditch under each of these different model variables. Simulated monthly diversions of decreed natural flow rights are included in model variables, "D:West_Hyland_34_155_***" where the last three characters in the model variable name are numbers associated with a specific priority. Table 2 is a summary of each priority right, the decreed flow rate, acre-feet per month assuming diversion at the decreed flow rate for 30.5 days as done in the DST (Face Value), and the DST variable name.

Table 2: Summary of West Hyland Decreed Natural Flow Rights Simulated in DST

Priority	Decreed Flow Rate (cfs)	Face Value (acre-feet)	DST Variable Name
1873	3.00	181	D:West_Hyland_34_155_125
1874	21.13	1,278	D:West_Hyland_34_155_134
1877	0.86	52	D:West_Hyland_34_155_213
1880	10.41	630	D:West_Hyland_34_155_351
1881	0.48	29	D:West_Hyland_34_155_236
1887	0.78	47	D:West_Hyland_34_155_395
1888	0.96	58	D:West_Hyland_34_155_277
1891	1.656	100	D:West_Hyland_34_155_425
1894	0.18	11	D:West_Hyland_34_155_567
1896	1.10	67	D:West_Hyland_34_155_635
1899	0.14	8	D:West_Hyland_34_155_441
1900	1.68	102	D:West_Hyland_34_155_594
1901	0.18	11	D:West_Hyland_34_155_654
1904	0.31	19	D:West_Hyland_34_155_465
1905	0.48	29	D:West_Hyland_34_155_631
1906	0.24	15	D:West_Hyland_34_155_663

The DST simulates monthly diversions under each priority right by assuming the most senior right diverts the minimum of: 1) the decreed flow rate for the entire month (Face Value), or 2) the historical monthly diversion of decreed water for the ditch. Diversions to the most senior right are subtracted from the historical monthly diversion of decreed water for the ditch and the step is repeated for the next senior right until the entire historical diversion is accounted for as diverted under the various rights.

While theoretically this method makes sense in that senior rights are fully met prior to junior rights, applying the method to the historical diversion record creates several issues. Diversions at full Face Value do not consider periods when less than the full Face Value was necessary to meet crop demand. Diversions in the DST are not explicitly made to meet a simulated crop demand. Therefore, simulated diversions to senior priority rights are not limited by crop demand and do not consider soil moisture storage or periods when fields are not irrigated. This results in more water being simulated as diverted under senior rights and months when junior rights were historically in priority, but the DST does not simulate diversions to these junior rights. This can be demonstrated through the following example. Table 3 summarizes monthly DST simulated diversions under the 1873 priority, decreed natural flow rights on the West Hyland Ditch, DST variable D:West_Hyland_34_155_125.

Table 3 illustrates monthly diversions under this right are frequently the Face Value of 181 acre-feet. However, this assumption reduces the volume of the historical diversion available to more junior rights, even though those rights may have been in priority during all or a portion of the month.

Table 3: DST Simulated West Hyland Diversions under 1873 Priority Decreed Natural Flow Rights

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	181	181	181	181	181	181	181	1,270
1997	181	181	181	181	181	181	181	181	1,452
1998	181	181	181	181	181	181	181	181	1,452
1999	181	181	181	181	181	181	19	181	1,290
2000	181	181	181	181	181	0	0	0	907
2001	181	181	181	181	0	0	0	0	726
2002	181	181	181	181	181	0	0	0	907
2003	181	65	181	181	181	0	0	0	791
2004	181	181	181	181	181	0	0	0	907
2005	181	181	181	181	181	181	181	181	1,452
2006	181	181	181	181	181	181	181	181	1,452
2007	181	181	181	181	0	0	0	0	726
2008	181	48	181	181	181	0	0	0	774
2009	67	181	181	181	181	0	0	181	975
2010	181	181	181	181	181	143	0	79	1,130
2011	181	181	181	181	181	181	181	181	1,452

Table 4 summarizes monthly DST simulated diversions under the 1888 priority, decreed natural flow rights on the West Hyland Ditch, DST variable D:West_Hyland_34_155_277.

Table 4: DST Simulated West Hyland Diversions under 1888 Priority Decreed Natural Flow Rights

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	58	0	0	0	58
1998	0	0	0	0	58	58	0	0	116
1999	0	0	0	58	58	0	0	0	116
2000	0	0	58	58	0	0	0	0	116
2001	0	0	58	0	0	0	0	0	58
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	58	0	0	0	0	58
2004	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	58	0	0	0	58
2006	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	0	7	0	0	0	0	0	7
2010	0	0	0	58	0	0	0	0	58
2011	0	0	58	58	58	0	0	0	174
Shaded Months	**15**	**10**	**12**	**11**	**7**	**5**	**2**	**8**	**70**

Table 5: Summary of Months with Rights in Priority but Zero Simulated Diversion

Priority	Months in Priority with Zero Diversion	Percent of Simulation Period
1874	5	4%
1877	46	36%
1880	47	37%
1881	69	54%
1887	67	52%
1888	70	55%
1891	67	52%
1894	72	56%
1896	72	56%
1899	73	57%
1900	73	57%
1901	76	59%
1904	76	59%
1905	78	61%
1906	78	61%

Table 4 illustrates that monthly diversions under this right are frequently either the Face Value of 58 acre-feet or zero. Shaded months in Table 4 indicate months when, according to historical priority records, water was available to an 1888 priority right for a portion of the month (see Table 1), there were historical diversions on the West Hyland Ditch indicating a demand for water (see Table 3), but no water was simulated as diverted under the 1888 priority right. There are a total of 70 months out of 128 months simulated, or 55% of months, when this occurs for an 1888 priority right. Analysis of each priority right on the West Hyland Ditch demonstrates this is a common occurrence in the model results. Tables for each priority right on the West Hyland Ditch are included as Appendix 1. The number of months when a right was in priority but DST results show zero diversion are summarized in Table 5.

The combination of water right priority and DST assumptions that account for more water as diverted under more senior rights result in the number of months in priority with zero diversions increasing and decreasing through the range of priorities in NFWF Application 80700. For example, there are 10 Aprils wherein an 1888 priority right was in priority with zero simulated diversions (see Table 4). However, there are only 9 Aprils wherein this occurred for an 1891 priority right (see Table 22, Appendix 1), because 1891 rights were not in priority in April 2002 while 1888 rights were in priority. Comparing the same two priority rights in May shows 12 occurrences for 1888 priority rights and 13 occurrences for 1891 priority rights because the DST assumes the 7 acre-feet of historical diversion of decreed rights in May 2009 was diverted under 1888 priority rights creating an occurrence wherein 1891 priority rights were in priority but DST results show zero diversions.

Assumptions on what rights are served each month are necessary due to the monthly time-step, because the DST does not explicitly simulate administration of the Walker River Decree, nor use crop demand to drive surface water diversions in the model. DST results likely overestimate the volume of water historically diverted under more senior rights and underestimate the volume of water historically diverted under more junior water rights. In order to evaluate potential conflict with existing rights due to NFWF Application 80700, the DST must correctly identify water diverted under all priority rights.

DST does not Adequately Simulate the WRID's Storage Rights or Reservoirs

Reservoir operations and delivery of stored water is "fixed" in the DST to replicate historical operations (NFWF Exhibit 116, pages 21-22). Therefore, the DST by its very construct will not show any potential conflict with the WRID's storage rights. NFWF Exhibit 116 states, "This setting is ideal to evaluate water rights transfer scenarios without adding the additional complexity of changes in storage or floodwater operations." (page 28). I disagree this is "ideal" when trying to understand potential conflict with existing rights. This statement fails to recognize the relationship among decreed natural flow rights, storage rights, and floodwater operations and how a change in one area has the potential to affect the other areas.

The change of decreed natural flow rights as proposed in NFWF Application 80700 has the potential to conflict with both the WRID's storage rights, including the right to store water and the subsequent delivery of stored water, and the availability and delivery of certificated flood waters. As stated in WRID Exhibit 196, "Under a condition in which the NSE approved a change encompassing both the consumptive and non-consumptive uses under NFWF Application 80700, the WRID would be the first to curtail diverting, in this case diverting to storage…" For example, a change in when or how water is called for under NFWF Application 80700 can affect the Watermaster's determination of priority, by changing either or both the available water or the demand. Changes in priority can affect the WRID's ability to store water because during the irrigation season the WRID can only store water in excess of the demand for decreed natural flow, i.e. excess water when the river is in full priority. A change in priority can also affect the availability and delivery of certificated flood waters. Certificated flood waters are also excess water when the river is in full priority. Therefore, any change that reduces this excess water has the potential to conflict with the WRID's ability to store water and delivery of certificated flood waters.

Additionally, changes in priority would likely create changes in the use of stored water. Stored water is typically used as supplemental to decreed natural flow rights when decreed rights are not in priority. Therefore, changes in priority of decreed natural flow rights change the availability of water to those rights and the timing of delivery of stored water.

The DST must simulate the actual operation of storage and certificated rights and how those operations may change under NFWF Application 80700 to provide useful information to understand these potential conflicts. By fixing reservoir operations and delivery of stored and certificated flood water, the DST eliminates any possibility of changes in these operations and therefore will not identify potential conflict with storage and certificated rights.

DST Priorities for Delivery of Certificated Water and Equal Priority Decreed Rights are Not Representative of System

In order to "fix" delivery of certificated water, the DST uses priorities for these diversions that do not reflect the actual water rights. As stated on page 21 of NFWF Exhibit 116, "For the flood and storage links, a very senior cost is assigned so that the historical flood and storage diversion is forced to be delivered to each demand."

The DST approximates Walker River water rights through the use of an optimization model and a cost structure. Optimization is a mathematical technique for making decisions within a model. In the DST, not meeting senior priority rights comes at a higher cost than not meeting junior priority rights. The DST attempts to deliver water with minimum cost and therefore when water supply is limited, water will be delivered to senior priority rights first. The DST cost structure was generally developed based on actual water right priorities for decreed natural flow rights. However, the DST gives a higher cost, and therefore priority, to delivery of certificated flood water than to decreed natural flow rights. This is contrary to actual water right

priorities on the Walker River. This is done to simplify the model and force the DST to divert certificated flood water as it has been diverted historically. However, these assumptions eliminate the potential for the DST to show conflict with these rights when analyzing NFWF Application 80700.

Additionally, decreed natural flow rights with the same priority were assigned different costs that prioritize meeting the same priority right further upstream in the system over meeting it further downstream in the system. NFWF Exhibit 116 states that this was done to avoid non-unique solutions for meeting rights of the same priority (page 21). However, it also introduces an artificial priority that does not exist in the administration of the Walker River Decree.

III. DST ASSUMPTIONS ON DELIVERY OF SURFACE WATER ARE OVERLY GENERAL

DST model logic attempts to identify the various priority of rights under which historical diversions were made at the point of diversion from the Walker River. However, this accounting does not extend to delivery and application of water within a ditch service area. DST assumptions on the delivery of surface water within ditch service areas are overly general and likely misidentify surface water delivered to any particular area. These errors can affect simulated groundwater pumping and have additional implications for evaluating the Application 80700 Scenario.

Irrigated lands in the Mason and Smith valleys are divided into subareas within the DST based on availability of surface and groundwater and ditches that supply water to the lands. These sub-areas are identified as Hydrologic Response Units (HRU) in the DST. An HRU is a set of fields served by a common diversion or source of water (NFWF Exhibit 116, page 7). For example, there is an HRU that represents all lands served by the West Hyland Ditch that are not managed by the Nevada Division of Wildlife (NDOW). Water balance calculations are performed at an HRU level to identify surface water applied to fields, primary and supplemental groundwater pumping, runoff or return flow, consumptive use, and deep percolation past the root zone. It was assumed during development of the DST that all surface water applied within an HRU was applied equally to all areas, regardless of the priority of the water rights associated with individual fields or parcels within the HRU. This assumption was made due to a limitation on available data (NFWF Exhibit 116, page 57). Therefore, while all decreed diversions are accounted for under various priorities at the head of each ditch, all surface water diverted into the ditch is applied equally across all fields served by the ditch.

This assumption is overly general for understanding the surface water actually diverted and delivered to any particular area within an HRU. This assumption leads to incorrectly identifying the volume of water historically available to lands associated with NFWF Application 80700, defined as Application No. 80700 Water (80700 Water) in NFWF

Exhibit 116. The implication of this assumption is described in the following section related to the Application 80700 Scenario.

The assumption of uniform application of surface water can also affect supplemental groundwater pumping in the DST. The DST includes information on supplemental groundwater rights associated with individual fields and parcels within an HRU. Supplemental pumping is calculated as the difference between the Net Irrigation Water Requirement (NIWRE) and the applied surface water for individual fields identified as having supplemental pumping rights. NIWRE is defined as the depth of water needed by the crop divided by the farm efficiency (NFWF Exhibit 116, page 31) and is equivalent to the demand for applied water at the field. The DST uses a constant farm efficiency of 53% (NFWF Exhibit 116, Table 5.1). The assumption that surface water is applied equally to all areas can create errors in the estimate of supplemental groundwater pumping. The following example illustrates how this can occur.

Table 6 summarizes an example for a hypothetical HRU of 100 acres, comprised of two fields of equal size, growing the same crop, and assuming that Field A does not have supplemental groundwater rights and Field B has supplemental groundwater rights. NIWRE for both fields is 3.0 feet divided by 53% farm efficiency.

Table 6: Hypothetical HRU Example of Supplemental Groundwater Pumping

	Field A	**Field B**	**HRU**
Area (acres)	50	50	100
NIWRE (ft)	5.66	5.66	5.66
NIWRE (acre-feet)	283	283	566
Supplemental Groundwater Right?	No	Yes	N/A
Simulated Results with DST Assumptions			
Applied Surface Water (acre-feet)	200	200	400
Supplemental Pumping (acre-feet)	0	83	83
Hypothetical Results Considering Priority for Fields			
Applied Surface Water by Priority	283	117	400
Supplemental Pumping (acre-feet)	0	166	166

If the historical seasonal surface water diversion, after accounting for ditch losses, were 400 acre-feet for this HRU, assumptions in the DST simulate 200 acre-feet of surface water applied to each field. Supplemental groundwater pumping for Field B would be 83 acre-feet, NIWRE minus applied surface water, and there would be no supplemental groundwater pumping for Field A. However, if surface water rights for Field A were senior to those for Field B, which may explain why Field A does not have supplemental groundwater rights, more surface water may be applied to Field A with less surface water applied to Field B. For example, if Field A applied 283 acre-feet of the 400 acre-feet historically applied in the HRU, then Field B would have applied 117 acre-feet of surface water and pumped 166 acre-feet. The combination of the assumption of uniform application of surface water to all fields within an HRU, and the fact that

some fields do not have supplemental groundwater rights may create errors in the estimate of supplemental groundwater pumping.

Additionally, according to NFWF Exhibit 116 a maximum annual pumping limit of 4 acre-feet per acre is applied to lands with supplemental groundwater rights (page 31). This assumption is inconsistent with the actual terms of these rights. Generally, the actual terms limit the total applied water from all sources to 4 acre-feet per acre when supplemental pumping occurs. This error would likely over-estimate supplemental pumping in the DST. Table 7 Continues the previous example for a hypothetical HRU of 100 acres. If the historical seasonal surface water diversion were 100 acre-feet then 50 acre-feet would be simulated as applied to each field. The simulated supplemental pumping for Field B would be 200 acre-feet, or 4.0 acre-feet per acre. However, the 4.0 acre-feet per acre limit should be applied to the total of surface and groundwater and thereby limit supplemental pumping to 150 acre-feet.

Table 7: Hypothetical HRU Example of Supplemental Groundwater Pumping with Pumping Limit

	Field A	**Field B**	**HRU**
Area (acres)	50	50	100
NIWRE (ft)	5.66	5.66	5.66
NIWRE (acre-feet)	283	283	566
Supplemental Groundwater Right?	No	Yes	N/A
Simulated Results with DST Pumping Limit			
Applied Surface Water (acre-feet)	50	50	100
Supplemental Pumping (acre-feet)	0	200	200
Hypothetical Results with Pumping Limit based on Total Applied Water			
Applied Surface (acre-feet)	50	50	100
Supplemental Pumping (acre-feet)	0	150	150

These errors in simulated groundwater pumping can affect results in the NFWF Application 80700 Scenario wherein supplemental groundwater pumping for lands identified in NFWF Application 80700 is turned off.

IV. DST NFWF APPLICATION 80700 SCENARIO DID NOT ACCURATELY EVALUATE THE PROPOSED CHANGE

NFWF Exhibit 116 describes assumptions made to simulate the change proposed in NFWF Application 80700 on pages 57 through 59. As described in NFWF Exhibit 116, these changes reflect “as closely as possible” the effects of the proposed change. However, these assumptions are not close enough to identify potential conflict with existing rights as a result of NFWF Application 80700. In addition to previously described limitations regarding simulation of the administration of the Walker River Decree, the DST did not adequately evaluate the proposed change and the volume of water historically available to decreed rights under NFWF Application 80700.

For the Application 80700 Scenario, the DST simulated a portion of the historical monthly diversion into the West Hyland Ditch remaining in the Walker River at Yerington and flowing downstream to Wabuska. The volume of 80700 Water was defined in the DST as the volume of surface water applied to the approximately 640 acres associated with NFWF Application 80700 in the baseline DST run. However, the assumption that all surface water is applied equally throughout the West Hyland Ditch HRU means that this volume of water does not accurately reflect the volume of water that was historically applied to these 640 acres.

The 80700 Water was determined from the ratio of acres associated with decreed rights proposed for change under NFWF Application 80700 to the total Non-NDOW acres simulated as served by the West Hyland Ditch. This area ratio equates to 17.35% (NFWF Exhibit 116, Table 6.3). The area ratio was multiplied by the historical, monthly West Hyland diversion records, after subtracting water identified through NDOW records as diverted to NDOW lands, to define 80700 Water each month. The area ratio was multiplied by the historical, monthly diversions of decreed, stored, and certificated water. The basis for assuming that stored and certificated water would also be included in water changed under NFWF Application 80700 is unclear as the application does not propose to change the use of stored or certificated waters. The DST simulates that all 80700 Water, 17.35% of historical decreed, storage, and certificated water, remains in the Walker River at Yerington.

The primary issue in defining 80700 Water in this way is that it does not represent the water historically available to the decreed rights proposed for change under NFWF Application 80700. As described in NFWF Exhibit 116, the DST defines 80700 Water as "the sum of the decree, flood and storage water delivered to the same areas in the baseline run" (page 58). However, as described in the previous section of this report, the assumption of equal application of surface water to all irrigated areas of the HRU in the baseline model run is overly general and does not correctly identify water that was actually applied to the fields proposed for change under NFWF Application 80700. The following analysis explains and quantifies the <u>minimum</u> volume of these errors.

An analysis was performed to illustrate how this approach misidentifies water as 80700 Water by comparing model output and historical priorities as set by the Watermaster contained in Appendix 1 of WRID Exhibit 196. Model output for the NFWF Application 80700 Scenario was reviewed and summarized to develop the following tables of 80700 Water. Table 8 summarizes the DST output variable "West_Hyland_ToPurchased" from files contained in NFWF Exhibit 115 and shows the monthly break down of the cumulative volume of 29,500 acre-feet of 80700 Water for the entire 16-year simulation period. This is the volume of water illustrated in Figure 6.2 of NFWF Exhibit 116 as "App. 80700 Water."

Table 8: Monthly NFWF Application 80700 Water from DST Output

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	324	377	289	355	440	189	59	2,032
1997	94	219	408	280	365	280	167	153	1,966
1998	81	344	300	389	819	663	372	234	3,203
1999	53	299	378	476	603	399	81	157	2,446
2000	129	228	368	408	315	278	192	0	1,918
2001	119	99	488	289	88	102	52	30	1,267
2002	67	171	241	313	93	60	74	0	1,020
2003	104	11	162	379	314	171	71	7	1,219
2004	195	146	317	320	125	93	49	6	1,250
2005	101	271	371	545	567	420	292	209	2,777
2006	87	364	464	546	599	417	318	288	3,084
2007	155	87	323	212	83	43	31	0	932
2008	177	10	291	311	92	55	33	0	969
2009	12	64	304	242	222	139	74	33	1,090
2010	158	185	284	370	336	294	164	36	1,826
2011	91	336	448	365	398	371	282	212	2,501
Total	**1,624**	**3,158**	**5,524**	**5,735**	**5,372**	**4,225**	**2,441**	**1,423**	**29,500**

Volumes summarized in Table 8 include decreed, stored, and certificated water historically diverted into the West Hyland Ditch. However, because NFWF Application 80700 does not address stored and certificated water, and to focus this analysis on only decreed water, stored and certificated water from the DST output was subtracted from monthly volumes in Table 8. Table 9 summarizes the monthly volume of decreed natural flow diversion simulated as 80700 Water in the DST.

Table 9: Monthly Decreed Natural Flow 80700 Water from DST Output

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	275	310	245	292	224	33	57	1,437
1997	94	178	287	211	275	185	118	92	1,441
1998	75	276	237	260	409	433	322	232	2,244
1999	53	252	285	328	329	120	0	136	1,503
2000	129	228	359	397	247	0	0	0	1,360
2001	119	99	484	223	0	0	0	0	925
2002	67	171	241	300	59	0	0	0	838
2003	104	11	162	374	143	0	0	0	794
2004	195	141	311	313	51	0	0	0	1,012
2005	101	265	247	286	369	189	62	198	1,717
2006	76	251	303	301	315	154	152	273	1,826
2007	155	87	294	174	0	0	0	0	710
2008	177	8	282	309	51	0	0	0	828
2009	12	64	304	242	127	0	0	33	781
2010	158	185	284	327	301	25	0	14	1,293
2011	91	313	344	325	337	273	184	188	2,055
Total	**1,607**	**2,804**	**4,734**	**4,614**	**3,306**	**1,603**	**872**	**1,223**	**20,762**

Values in Table 9 are what the DST uses as the decreed portion of 80700 Water in the Application 80700 Scenario (see NFWF Exhibit 116, Figure 6.2). However, these volumes are not representative of the water available to the decreed rights identified in the application. For example, NFWF Application 80700 identifies a total decreed flow rate of 7.745 cfs as the sum of all decreed rights. This flow rate expanded to a monthly volume for a 31-day month is approximately 476 acre-feet. However, the volume of decreed 80700 Water in the DST for May 2001 is 484 acre-feet (see Table 9), exceeding the volume available to the rights if all rights were in priority for the entire month. Additionally, Table 1 shows that not all rights under NFWF Application 80700 were in priority for the entire month of May 2001. When considering only the NFWF Application 80700 rights that were in priority during this month, the volume available to these rights is 435 acre-feet (see Table 10).

An additional analysis to compare the volume of decreed water identified in the DST as 80700 Water with the volume of water historically available to the rights identified in NFWF Application 80700 was performed. Water historically available to each priority right in NFWF Application 80700 was calculated based on the decreed flow rate and the historical daily priority records and summed to monthly volumes. This analysis was performed for each of the 13 different priority rights in NFWF Application 80700. Monthly volumes for each individual priority right are contained in Appendix 2. Monthly volumes for the individual priority rights were summed to represent the total monthly water available to rights in NFWF Application 80700. These volumes are summarized in Table 10.

Table 10: Historical Water Available to All Decreed Rights in NFWF Application 80700

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	476	461	476	461	457	73	51	307	2,762
1997	476	461	476	461	424	324	44	467	3,133
1998	476	461	476	461	476	417	310	476	3,554
1999	476	219	476	461	367	19	18	383	2,419
2000	301	78	374	436	172	0	0	246	1,607
2001	312	23	435	155	0	0	0	0	925
2002	215	90	249	348	38	0	0	0	940
2003	280	0	154	457	83	0	0	0	976
2004	433	69	342	324	23	0	0	61	1,252
2005	476	351	454	461	476	133	6	97	2,454
2006	476	461	476	461	476	143	19	285	2,797
2007	180	24	271	132	0	0	0	0	607
2008	461	1	293	402	17	0	0	0	1,174
2009	92	40	362	461	132	0	0	138	1,225
2010	476	63	282	461	360	2	0	353	1,997
2011	476	461	476	461	476	291	56	351	3,048
Total	**6,084**	**3,262**	**6,074**	**6,403**	**3,978**	**1,401**	**505**	**3,165**	**30,871**

Monthly volumes in Table 10 reflect the total water available to the decreed rights in NFWF Application 80700. This volume is the upper limit of what could have been diverted

historically per the Walker River Decree and the Watermaster's determination of priority. It is expected that actual diversion would be less than total water available due to factors such as crop demand, soil moisture storage, irrigation rotation, and periods when fields are not irrigated such as during harvest. In several months the decreed 80700 Water in the Application 80700 Scenario exceeds this upper limit of the historical total water available to the decreed rights in NFWF Application 80700. This is illustrated by subtracting historical water available in Table 10 from decreed 80700 Water in Table 9 and reporting any positive values. These values are summarized in Table 11.

Table 11: DST 80700 Water in Excess of Historical Water Available to Rights in NFWF Application 80700

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	0	0	0	0	152	0	0	152
1997	0	0	0	0	0	0	73	0	73
1998	0	0	0	0	0	16	12	0	28
1999	0	32	0	0	0	101	0	0	133
2000	0	150	0	0	76	0	0	0	225
2001	0	77	48	68	0	0	0	0	192
2002	0	81	0	0	22	0	0	0	103
2003	0	11	7	0	59	0	0	0	78
2004	0	72	0	0	28	0	0	0	100
2005	0	0	0	0	0	56	57	100	213
2006	0	0	0	0	0	11	133	0	144
2007	0	63	23	41	0	0	0	0	128
2008	0	7	0	0	33	0	0	0	41
2009	0	24	0	0	0	0	0	0	24
2010	0	122	2	0	0	22	0	0	146
2011	0	0	0	0	0	0	128	0	128
Total	**0**	**639**	**81**	**109**	**218**	**359**	**403**	**100**	**1,909**

Results in Table 11 demonstrate that water identified as decreed 80700 water in the DST Application 80700 Scenario exceeds water historically available to decreed rights in NFWF Application 80700 in 33 months of the simulation or approximately 26% of the time. Volumes in Table 11 are the minimum potential error because actual diversions are expected to be less than total water available. This example illustrates why the DST does not correctly identify 80700 Water, and therefore why results of the NFWF Application 80700 Scenario do not accurately or adequately address the potential for NFWF Application 80700 to conflict with existing rights.

Additionally, the NFWF Application 80700 Scenario presented in NFWF Exhibit 116 may not accurately evaluate the proposed change because this scenario simulated not irrigating approximately 640 acres in the West Hyland Ditch service area. This may not depict what transpires if Application 80700 is approved. NFWF did not purchase the 640 acres identified in NFWF Application 80700 and there is no guarantee that these lands will be removed from

agricultural production. For example, it may be possible to continue irrigating these lands with primary groundwater rights or another source of water and thereby not reduce the consumptive use as simulated in the DST. Failure to reduce the consumptive use from these lands will similarly fail to produce the desired increase in Walker River flow, as illustrated in the following section.

V. DST RESULT OF 86% CANNOT BE USED TO ADMINISTER NFWF APPLICATION 80700 RIGHTS AFTER THE CHANGE

Results of the Application 80700 Scenario presented in NFWF Exhibit 116 indicate that, "within the assumptions and limitations of the DST and the scenario method, 86% of the NFWF Application 80700 water reaches the Wabuska Gage (80700 Wabuska water) over the sixteen-year time period" (page 66). It is unclear from NFWF Exhibit 116 how this information is to be interpreted or potentially used to evaluate NFWF Application 80700. However, it should not be used as support for approval of NFWF Application 80700 or the Watermaster's administration of the decreed rights if NFWF Application 80700 were approved.

The 86% value presented in NFWF Exhibit 116 is calculated from the simulated change in flow at the Wabuska gage (80700 Wabuska Water) divided by the simulated change in historical surface water diversion for irrigation purposes (Application 80700 Water). The following values are from Figure 6.2 of NFWF Exhibit 116 (page 60).

$$\frac{80700\ Wabuska\ Water}{Application\ 80700\ Water} = \frac{25{,}344}{29{,}500} = 86\%$$

There are several problems with the development of this equation and the resulting percentage. First, Application 80700 Water in the above equation includes the DST's representation of historical deliveries of stored water and certificated water to approximately 640 acres on the West Hyland Ditch. However, NFWF Application 80700 does not propose to change delivery of these waters. Second, as previously described the DST representation of the decreed portion of NFWF Application 80700 Water is in error because of the assumptions of uniform application of surface water throughout the West Hyland Ditch service area. Finally, the 86% is developed from the calculated flow at Wabuska divided by total water (decreed, stored, and certificated) not diverted at Yerington when the rights were historically used for irrigation purposes. Therefore, if attempting to administer these rights at Wabuska in the future, after a change from irrigation to wildlife purposes, to use this percentage it would be necessary to estimate how the right would have been used absent the change, i.e. as if the right were still used for irrigation purposes. The volume of water to be administered for wildlife purposes would be 86% of what would have been diverted for irrigation, not 86% of the decreed flow rate or face value of the changed rights because the face value was not continuously diverted, applied, and consumed when used historically for irrigation.

There are several reasons why the decreed flow rate is not continuously diverted, applied, and consumed when the rights are used for irrigation. Reasons include crop demand, soil moisture storage, irrigation scheduling, and periods when fields are cut or harvested and not irrigated. The fact that the face value was not continuously diverted is illustrated in the historical diversion records. The following tables illustrate the difference between the total water available and historical diversions of decreed water on the West Hyland Ditch.

Table 12 is a summary of the total water historically available each month to decreed rights on the West Hyland Ditch. Water historically available to each priority right was calculated based on the decreed flow rate and the historical daily priority records and summed to monthly volumes. Decreed rights on the West Hyland Ditch are as listed in Table 2 of WRID Exhibit 196 (page 15) and do not include any NDOW rights.

Table 12: Historical Water Available to Decreed Rights on the West Hyland Ditch

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	2,214	2,143	2,214	2,143	2,177	1,293	589	1,914	14,687
1997	2,214	2,143	2,214	2,143	2,140	1,877	1,198	2,198	16,127
1998	2,214	2,143	2,214	2,143	2,214	2,103	1,876	2,214	17,121
1999	2,214	1,603	2,214	2,143	1,996	904	118	2,030	13,223
2000	1,809	1,244	2,026	2,094	1,421	0	0	1,143	9,737
2001	1,654	479	2,146	1,077	0	0	0	0	5,358
2002	1,000	1,002	1,496	1,922	370	0	0	0	5,790
2003	1,480	65	898	2,137	755	0	0	0	5,336
2004	2,113	860	1,979	1,884	551	0	0	286	7,673
2005	2,214	1,922	2,173	2,143	2,214	953	400	1,389	13,409
2006	2,214	2,143	2,214	2,143	2,214	976	939	1,772	14,615
2007	1,319	533	1,777	1,023	0	0	0	0	4,652
2008	2,143	38	1,807	2,029	276	0	0	0	6,292
2009	429	410	1,974	2,143	816	0	0	643	6,414
2010	2,214	1,231	1,818	2,143	1,944	113	0	1,643	11,106
2011	2,214	2,143	2,214	2,143	2,214	1,768	1,174	1,988	15,858
Total	**29,660**	**20,102**	**31,379**	**31,452**	**21,303**	**9,987**	**6,295**	**17,219**	**167,396**

Table 13 is a record of historical monthly diversion of decreed water on the West Hyland Ditch under all decreed rights after accounting for decreed water diverted for NDOW.

Table 13: Historical Diversion of Decreed Waters on the West Hyland Ditch

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	1,585	1,786	1,414	1,684	1,293	189	330	8,281
1997	544	1,024	1,655	1,216	1,587	1,065	679	533	8,303
1998	435	1,590	1,365	1,499	2,360	2,492	1,857	1,334	12,933
1999	304	1,449	1,643	1,890	1,894	692	3	786	8,660
2000	741	1,311	2,068	2,291	1,426	0	0	0	7,836
2001	688	572	2,787	1,286	0	0	0	0	5,332
2002	384	985	1,389	1,729	343	0	0	0	4,830
2003	600	65	932	2,158	821	0	0	0	4,578
2004	1,126	814	1,793	1,803	295	0	0	0	5,831
2005	584	1,529	1,423	1,646	2,127	1,087	358	1,139	9,892
2006	441	1,444	1,749	1,733	1,817	890	875	1,573	10,521
2007	892	502	1,694	1,002	0	0	0	0	4,089
2008	1,023	48	1,625	1,780	294	0	0	0	4,769
2009	67	369	1,753	1,392	731	0	0	190	4,502
2010	911	1,068	1,634	1,882	1,734	143	0	79	7,451
2011	523	1,802	1,983	1,872	1,940	1,575	1,062	1,084	11,841
Total	**9,262**	**16,156**	**27,279**	**26,591**	**19,051**	**9,237**	**5,023**	**7,048**	**119,648**

Table 14 is the result of subtracting Table 13 from Table 12.

Table 14: Historical Water Available to Decreed Rights in Excess of Diversion on the West Hyland Ditch

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	2,214	558	428	729	493	0	400	1,584	6,406
1997	1,670	1,119	559	927	554	812	519	1,665	7,824
1998	1,779	553	849	643	-146	-390	19	880	4,188
1999	1,910	154	571	253	102	212	116	1,244	4,563
2000	1,068	-67	-42	-197	-5	0	0	1,143	1,901
2001	967	-92	-640	-208	0	0	0	0	26
2002	616	17	107	193	27	0	0	0	960
2003	879	0	-34	-21	-66	0	0	0	758
2004	987	47	186	81	256	0	0	286	1,842
2005	1,630	393	750	496	88	-134	42	251	3,516
2006	1,773	698	466	410	398	86	65	199	4,094
2007	427	31	83	22	0	0	0	0	562
2008	1,120	-10	182	250	-18	0	0	0	1,523
2009	361	41	221	750	85	0	0	453	1,912
2010	1,303	164	184	260	210	-30	0	1,564	3,656
2011	1,691	341	231	271	274	193	113	904	4,017
Total	**20,397**	**3,946**	**4,100**	**4,860**	**2,252**	**750**	**1,273**	**10,171**	**47,748**

Results presented in Table 14 show that historically, not all water available to decreed rights on the West Highland Ditch was diverted when the rights were exercised for irrigation purposes, particularly in March and October. Instances when historical diversions exceed water

available may be the result of temporary transfers from other ditches, measurement inaccuracies, or data errors.

All reasons why the decreed flow rate is not continuously diverted for irrigation would have to be considered for each priority right to administer the NFWF Application 80700 rights in the future based on 86%. This is because 86% is calculated from the change in historical surface water diversion for irrigation, not the decreed flow rate or face value. By comparison, the consumptive use fraction developed by Mr. Van Camp in WRID Exhibit 196 is based on the face value of the decreed right and can be applied anytime an individual right is in priority.

VI. DST REPRESENTATION OF THE PHYSICAL SYSTEM

The DST provides some useful information on the Walker River Basin and illustrates one fundamental fact, that to increase flow in the Walker River at Wabuska it is necessary to decrease consumptive use upstream. Furthermore, only the previously consumed water is made available by NFWF Application 80700 to increase flow to Walker Lake. This is illustrated through review of the DST Global Water Budgets presented as Appendix A to NFWF Exhibit 116. These tables provide annual water budget summaries for each of the three models that comprise the DST; MODSIM, HRU Water Balance, and MODFLOW. Table A.1 provides water budgets for the calibration/baseline model run and Table A.2 provides water budgets for the Application 80700 Scenario.

Analysis of the change in the water budget components between the baseline and the Application 80700 Scenario illustrate that the increase in river outflow in the MODSIM model, or the change in the flow of the Walker River at Wabuska, is approximately equal to the change in crop evapotranspiration (ET or consumptive use) in the HRU Water Balance and non-ag. ET in the MODFLOW model plus the change in storage that occurs within the groundwater system as simulated in MODFLOW. Table 15 provides a summary of the annual change in these water budget components and the balance for each year of the DST simulation period.

Table 15: DST Change in Water Budget Terms - Scenario (A.2) Minus Baseline (A.1)

Year	MODSIM River Outflow (af)	HRU Water Balance Crop ET (af)	MODFLOW Non-Ag. ET (af)	MODFLOW Inflow Storage (af)	MODFLOW Outflow Storage (af)	MODFLOW Net Change in Storage[1] (af)	Balance[2] (af)
1996	1,884	-1,752	-57	-619	-693	-74	1
1997	1,738	-1,750	-142	-667	-511	156	2
1998	2,822	-1,779	-200	-296	-1,137	-841	2
1999	1,987	-1,764	-251	-413	-383	30	2
2000	1,463	-1,749	-237	-742	-218	524	1
2001	1,060	-1,731	-215	-1,389	-427	962	76
2002	848	-1,726	-193	-1,570	-494	1,076	5
2003	1,063	-1,729	-165	-1,361	-525	836	5
2004	1,146	-1,728	-159	-1,376	-631	745	4
2005	2,354	-1,772	-108	-331	-803	-472	2
2006	2,605	-1,779	-59	-139	-904	-765	2
2007	724	-1,689	-73	-1,482	-437	1,045	7
2008	850	-1,709	-87	-1,515	-565	950	4
2009	1,016	-1,695	-83	-1,264	-468	796	34
2010	1,592	-1,745	-59	-710	-496	214	2
2011	2,107	-1,765	12	-381	-735	-354	0
Total	**25,259**	**-27,862**	**-2,076**	**-14,255**	**-9,427**	**4,828**	**149**

[1] Net Change in Storage calculated as Outflow Storage minus Inflow Storage
[2] Balance calculated as River Outflow plus Crop ET plus Non-Ag. ET minus Net Change in Storage

Results summarized in Table 15 illustrate the balance is typically small and is at least partially explained by minor differences between the individual models. It is unclear what creates differences of 76 and 34 acre-feet annually in 2001 and 2009, respectively. Results in Table 15 demonstrate that changes in simulated Walker River flow are primarily the results of reductions in ET or consumptive use.

VII. REFERENCES

WRID Exhibit 196, Summary of Pertinent Water Rights and Conflict with Water Rights Resulting from the Proposed Changes under NFWF Application 80700, MBK Engineers.

APPENDIX 1:
DST Simulated Diversion under Various Priority Rights on the West Hyland Ditch

Table 16: DST Simulated West Hyland Diversions under 1874 Priority Decreed Natural Flow Rights

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	1,279	1,279	1,279	1,279	1,211	123	149	6,597
1997	459	1,279	1,279	1,279	1,279	1,279	1,146	1,011	9,009
1998	253	1,279	1,184	1,279	1,279	1,279	1,279	1,153	8,982
1999	123	1,279	1,279	1,279	1,279	691	0	1,224	7,152
2000	559	1,226	1,279	1,279	1,279	0	0	0	5,621
2001	506	390	1,279	1,104	0	0	0	0	3,279
2002	203	1,075	1,279	1,279	265	0	0	0	4,100
2003	419	0	1,019	1,279	855	0	0	0	3,571
2004	1,034	823	1,279	1,279	113	0	0	0	4,527
2005	525	1,279	1,279	1,279	1,279	973	274	1,088	7,973
2006	259	1,263	1,279	1,279	1,279	898	831	1,279	8,364
2007	930	485	1,279	1,019	0	0	0	0	3,713
2008	841	0	1,279	1,279	112	0	0	0	3,511
2009	0	307	1,279	1,279	754	0	0	9	3,627
2010	918	1,279	1,279	1,279	1,279	0	0	0	6,032
2011	579	1,279	1,279	1,279	1,279	1,279	1,261	1,279	9,511
Shaded Months	**1**	**1**	**0**	**0**	**0**	**1**	**1**	**1**	**5**

Table 17: DST Simulated West Hyland Diversions under 1877 Priority Decreed Natural Flow Rights

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	52	52	52	52	0	0	0	209
1997	0	30	52	52	52	52	0	0	239
1998	0	52	0	39	52	52	52	0	248
1999	0	52	52	52	52	0	0	0	209
2000	0	0	52	52	52	0	0	0	157
2001	0	0	52	0	0	0	0	0	52
2002	0	0	52	52	0	0	0	0	105
2003	0	0	0	52	0	0	0	0	52
2004	0	0	52	52	0	0	0	0	105
2005	0	52	52	52	52	0	0	0	209
2006	0	0	52	52	52	0	0	52	209
2007	0	0	52	0	0	0	0	0	52
2008	0	0	52	52	0	0	0	0	105
2009	0	0	52	52	0	0	0	0	105
2010	0	0	52	52	52	0	0	0	157
2011	0	52	52	52	52	52	0	17	279
Shaded Months	**15**	**8**	**2**	**2**	**5**	**3**	**4**	**7**	**46**

Table 18: DST Simulated West Hyland Diversions under 1880 Priority Decreed Natural Flow Rights

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	272	556	233	402	0	0	0	1,462
1997	0	0	630	240	630	547	0	0	2,047
1998	0	78	0	0	630	630	345	0	1,682
1999	0	136	545	630	630	0	0	0	1,941
2000	0	0	630	630	321	0	0	0	1,580
2001	0	0	630	0	0	0	0	0	630
2002	0	0	227	630	0	0	0	0	857
2003	0	0	0	630	0	0	0	0	630
2004	0	0	630	563	0	0	0	0	1,193
2005	0	275	21	312	630	0	0	0	1,237
2006	0	0	409	378	304	0	0	174	1,266
2007	0	0	403	0	0	0	0	0	403
2008	0	0	369	493	0	0	0	0	862
2009	0	0	630	179	0	0	0	0	809
2010	0	0	591	630	630	0	0	0	1,851
2011	0	604	630	630	630	514	0	0	3,008
Shaded Months	**15**	**8**	**2**	**3**	**4**	**3**	**4**	**8**	**47**

Table 19: DST Simulated West Hyland Diversions under 1881 Priority Decreed Natural Flow Rights

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	0	0	0	0	0	0	0	0
1997	0	0	29	0	29	0	0	0	58
1998	0	0	0	0	29	29	0	0	58
1999	0	0	0	29	29	0	0	0	58
2000	0	0	29	29	0	0	0	0	58
2001	0	0	29	0	0	0	0	0	29
2002	0	0	0	29	0	0	0	0	29
2003	0	0	0	29	0	0	0	0	29
2004	0	0	11	0	0	0	0	0	11
2005	0	0	0	0	29	0	0	0	29
2006	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	0	29	0	0	0	0	0	29
2010	0	0	0	29	29	0	0	0	58
2011	0	0	29	29	29	0	0	0	87
Shaded Months	**15**	**12**	**10**	**10**	**6**	**5**	**2**	**9**	**69**

Table 20: DST Simulated West Hyland Diversions under 1887 Priority Decreed Natural Flow Rights

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	0	0	0	0	0	0	0	0
1997	0	0	18	0	47	0	0	0	65
1998	0	0	0	0	47	47	0	0	94
1999	0	0	0	47	47	0	0	0	94
2000	0	0	47	47	0	0	0	0	94
2001	0	0	47	0	0	0	0	0	47
2002	0	0	0	14	0	0	0	0	14
2003	0	0	0	47	0	0	0	0	47
2004	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	47	0	0	0	47
2006	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	0	47	0	0	0	0	0	47
2010	0	0	0	47	14	0	0	0	61
2011	0	0	47	47	47	0	0	0	142
Shaded Months	**15**	**10**	**11**	**10**	**6**	**5**	**2**	**8**	**67**

Table 21: DST Simulated West Hyland Diversions under 1888 Priority Decreed Natural Flow Rights

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	58	0	0	0	58
1998	0	0	0	0	58	58	0	0	116
1999	0	0	0	58	58	0	0	0	116
2000	0	0	58	58	0	0	0	0	116
2001	0	0	58	0	0	0	0	0	58
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	58	0	0	0	0	58
2004	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	58	0	0	0	58
2006	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	0	7	0	0	0	0	0	7
2010	0	0	0	58	0	0	0	0	58
2011	0	0	58	58	58	0	0	0	174
Shaded Months	**15**	**10**	**12**	**11**	**7**	**5**	**2**	**8**	**70**

Table 22: DST Simulated West Hyland Diversions under 1891 Priority Decreed Natural Flow Rights

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	100	0	0	0	100
1998	0	0	0	0	83	100	0	0	184
1999	0	0	0	100	82	0	0	0	182
2000	0	0	100	100	0	0	0	0	200
2001	0	0	100	0	0	0	0	0	100
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	100	0	0	0	0	100
2004	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	38	0	0	0	38
2006	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0
2010	0	0	0	78	0	0	0	0	78
2011	0	0	100	68	100	0	0	0	268
Shaded Months	**15**	**9**	**13**	**11**	**6**	**4**	**1**	**8**	**67**

Table 23: DST Simulated West Hyland Diversions under 1894 Priority Decreed Natural Flow Rights

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	11	0	0	0	11
1998	0	0	0	0	0	11	0	0	11
1999	0	0	0	11	0	0	0	0	11
2000	0	0	11	11	0	0	0	0	22
2001	0	0	11	0	0	0	0	0	11
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	11	0	0	0	0	11
2004	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0
2011	0	0	11	0	11	0	0	0	22
Shaded Months	**15**	**9**	**13**	**13**	**9**	**4**	**1**	**8**	**72**

Table 24: DST Simulated West Hyland Diversions under 1896 Priority Decreed Natural Flow Rights

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	67	0	0	0	67
1998	0	0	0	0	0	67	0	0	67
1999	0	0	0	10	0	0	0	0	10
2000	0	0	67	67	0	0	0	0	134
2001	0	0	67	0	0	0	0	0	67
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	67	0	0	0	0	67
2004	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0
2011	0	0	67	0	41	0	0	0	108
Shaded Months	**15**	**9**	**13**	**13**	**9**	**4**	**1**	**8**	**72**

Table 25: DST Simulated West Hyland Diversions under 1899 Priority Decreed Natural Flow Rights

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	9	0	0	0	9
1998	0	0	0	0	0	9	0	0	9
1999	0	0	0	0	0	0	0	0	0
2000	0	0	9	9	0	0	0	0	17
2001	0	0	9	0	0	0	0	0	9
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	9	0	0	0	0	9
2004	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0
2011	0	0	9	0	0	0	0	0	9
Shaded Months	**15**	**9**	**13**	**14**	**9**	**4**	**1**	**8**	**73**

Table 26: DST Simulated West Hyland Diversions under 1900 Priority Decreed Natural Flow Rights

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	3	0	0	0	3
1998	0	0	0	0	0	30	0	0	30
1999	0	0	0	0	0	0	0	0	0
2000	0	0	102	102	0	0	0	0	203
2001	0	0	102	0	0	0	0	0	102
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	102	0	0	0	0	102
2004	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0
2011	0	0	8	0	0	0	0	0	8
Shaded Months	**15**	**9**	**13**	**14**	**9**	**4**	**1**	**8**	**73**

Table 27: DST Simulated West Hyland Diversions under 1901 Priority Decreed Natural Flow Rights

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0
2000	0	0	11	11	0	0	0	0	22
2001	0	0	11	0	0	0	0	0	11
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	11	0	0	0	0	11
2004	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0
Shaded Months	**15**	**9**	**14**	**14**	**10**	**5**	**1**	**8**	**76**

Table 28: DST Simulated West Hyland Diversions under 1904 Priority Decreed Natural Flow Rights

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0
2000	0	0	1	19	0	0	0	0	20
2001	0	0	19	0	0	0	0	0	19
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	8	0	0	0	0	8
2004	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0
Shaded Months	**15**	**9**	**14**	**14**	**10**	**5**	**1**	**8**	**76**

Table 29: DST Simulated West Hyland Diversions under 1905 Priority Decreed Natural Flow Rights

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0
2000	0	0	0	29	0	0	0	0	29
2001	0	0	29	0	0	0	0	0	29
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0
Shaded Months	**15**	**9**	**15**	**15**	**10**	**5**	**1**	**8**	**78**

Table 30: DST Simulated West Hyland Diversions under 1906 Priority Decreed Natural Flow Rights

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0
2000	0	0	0	12	0	0	0	0	12
2001	0	0	15	0	0	0	0	0	15
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0
Shaded Months	**15**	**9**	**15**	**15**	**10**	**5**	**1**	**8**	**78**

APPENDIX 2:
Historical Water Availability to All Decreed Rights in NFWF Application 80700

Table 31: Historical Water Available to All Decreed Rights with Priority of 1874 in NFWF Application 80700

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	25	24	25	24	25	25	10	25	180
1997	25	24	25	24	25	25	24	25	194
1998	25	24	25	24	25	25	24	25	194
1999	25	24	25	24	25	19	2	25	167
2000	25	24	25	24	22	0	0	13	132
2001	21	7	25	15	0	0	0	0	67
2002	11	17	21	24	6	0	0	0	78
2003	18	0	12	24	12	0	0	0	66
2004	25	15	25	24	11	0	0	3	102
2005	25	24	25	24	25	13	6	25	165
2006	25	24	25	24	25	13	19	25	178
2007	20	10	25	16	0	0	0	0	71
2008	24	1	25	24	6	0	0	0	79
2009	5	6	25	24	11	0	0	7	78
2010	25	24	25	24	25	2	0	18	142
2011	25	24	25	24	25	25	24	25	194
Total	**344**	**271**	**377**	**364**	**264**	**146**	**107**	**213**	**2,087**

Table 32: Historical Water Available to All Decreed Rights with Priority of 1877 in NFWF Application 80700

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	53	51	53	51	53	14	14	53	341
1997	53	51	53	51	53	38	7	53	358
1998	53	51	53	51	53	53	51	53	418
1999	53	27	53	51	48	0	3	53	288
2000	32	36	53	51	29	0	0	27	229
2001	34	5	53	26	0	0	0	0	118
2002	24	24	36	51	9	0	0	0	143
2003	31	0	26	51	14	0	0	0	121
2004	48	20	53	51	9	0	0	7	188
2005	53	51	53	51	53	29	0	26	316
2006	53	51	53	51	53	27	0	43	331
2007	19	14	41	14	0	0	0	0	87
2008	51	0	53	51	12	0	0	0	167
2009	10	10	44	51	17	0	0	15	148
2010	53	7	43	51	39	0	0	39	232
2011	53	51	53	51	53	53	29	53	396
Total	**672**	**450**	**771**	**756**	**493**	**213**	**104**	**421**	**3,881**

Table 33: Historical Water Available to All Decreed Rights with Priority of 1880 in Application 80700

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	107	104	107	104	107	21	28	107	685
1997	107	104	107	104	107	76	14	107	727
1998	107	104	107	104	107	107	104	107	848
1999	107	55	107	104	97	0	7	107	585
2000	66	17	107	104	48	0	0	55	398
2001	69	10	107	52	0	0	0	0	239
2002	48	35	52	104	17	0	0	0	256
2003	62	0	38	104	28	0	0	0	232
2004	97	24	107	104	3	0	0	14	350
2005	107	97	107	104	107	24	0	42	588
2006	107	104	107	104	107	28	0	66	623
2007	38	0	80	28	0	0	0	0	145
2008	104	0	76	100	0	0	0	0	280
2009	21	21	90	104	31	0	0	31	298
2010	107	14	87	104	80	0	0	80	471
2011	107	104	107	104	107	66	3	107	706
Total	**1,364**	**793**	**1,495**	**1,530**	**948**	**322**	**156**	**824**	**7,431**

Table 34: Historical Water Available to All Decreed Rights with Priority of 1881 in Application 80700

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	15	14	15	14	15	3	0	6	82
1997	15	14	15	14	15	10	0	14	97
1998	15	14	15	14	15	13	7	15	108
1999	15	6	15	14	10	0	1	15	75
2000	9	1	12	14	5	0	0	8	50
2001	10	0	14	5	0	0	0	0	28
2002	7	4	7	14	1	0	0	0	33
2003	9	0	5	14	4	0	0	0	31
2004	13	0	15	12	0	0	0	2	42
2005	15	11	14	14	15	3	0	6	78
2006	15	14	15	14	15	4	0	9	86
2007	5	0	9	4	0	0	0	0	18
2008	14	0	9	12	0	0	0	0	36
2009	3	3	12	14	4	0	0	4	41
2010	15	1	7	14	11	0	0	11	59
2011	15	14	15	14	15	9	0	10	92
Total	**188**	**97**	**193**	**204**	**124**	**42**	**8**	**100**	**955**

Table 35: Historical Water Available to All Decreed Rights with Priority of 1887 in NFWF Application 80700

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	24	23	24	23	24	3	0	10	132
1997	24	23	24	23	24	16	0	23	158
1998	24	23	24	23	24	22	11	24	175
1999	24	9	24	23	16	0	2	24	122
2000	15	0	19	23	9	0	0	12	77
2001	15	0	22	8	0	0	0	0	46
2002	11	3	12	23	2	0	0	0	50
2003	14	0	7	23	5	0	0	0	49
2004	22	1	12	19	0	0	0	3	56
2005	24	18	23	23	24	5	0	0	118
2006	24	23	24	23	24	6	0	12	137
2007	9	0	14	6	0	0	0	0	29
2008	23	0	12	19	0	0	0	0	53
2009	5	0	17	23	7	0	0	7	59
2010	24	2	12	23	18	0	0	18	96
2011	24	23	24	23	24	15	0	15	148
Total	**305**	**149**	**293**	**330**	**200**	**67**	**12**	**149**	**1,504**

Table 36: Historical Water Available to All Decreed Rights with Priority of 1888 in NFWF Application 80700

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	59	57	59	57	59	8	0	25	324
1997	59	57	59	57	59	40	0	57	388
1998	59	57	59	57	59	53	27	59	430
1999	59	23	59	57	40	0	4	59	301
2000	36	0	46	57	21	0	0	30	190
2001	38	0	55	19	0	0	0	0	112
2002	27	8	29	57	4	0	0	0	124
2003	34	0	17	57	11	0	0	0	120
2004	53	2	30	46	0	0	0	8	139
2005	59	44	57	57	59	13	0	0	289
2006	59	57	59	57	59	15	0	30	337
2007	21	0	34	15	0	0	0	0	70
2008	57	0	29	46	0	0	0	0	131
2009	11	0	42	57	17	0	0	17	145
2010	59	4	29	57	44	0	0	44	236
2011	59	57	59	57	59	36	0	36	364
Total	**750**	**366**	**722**	**811**	**491**	**166**	**30**	**366**	**3,702**

Table 37: Historical Water Available to All Decreed Rights with Priority of 1891 in NFWF Application 80700

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	7	7	7	7	6	0	0	3	36
1997	7	7	7	7	7	5	0	7	45
1998	7	7	7	7	7	5	3	7	48
1999	7	3	7	7	5	0	0	3	31
2000	4	0	4	6	1	0	0	3	19
2001	4	0	6	1	0	0	0	0	12
2002	3	0	3	3	0	0	0	0	9
2003	4	0	2	7	1	0	0	0	13
2004	6	0	3	2	0	0	0	1	13
2005	7	4	6	7	7	2	0	0	31
2006	7	7	7	7	7	2	0	3	39
2007	2	0	2	2	0	0	0	0	7
2008	7	0	3	5	0	0	0	0	15
2009	1	0	5	7	2	0	0	2	17
2010	7	0	3	7	5	0	0	5	27
2011	7	7	7	7	7	3	0	4	40
Total	**86**	**40**	**79**	**84**	**54**	**16**	**3**	**38**	**399**

Table 38: Historical Water Available to All Decreed Rights with Priority of 1894 in NFWF Application 80700

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	6	5	6	5	5	0	0	2	29
1997	6	5	6	5	6	4	0	5	36
1998	6	5	6	5	6	4	2	6	39
1999	6	2	6	5	4	0	0	3	25
2000	3	0	3	5	1	0	0	3	15
2001	4	0	5	1	0	0	0	0	10
2002	2	0	3	2	0	0	0	0	7
2003	3	0	1	5	1	0	0	0	11
2004	5	0	3	2	0	0	0	1	11
2005	6	3	5	5	6	1	0	0	26
2006	6	5	6	5	6	1	0	3	32
2007	2	0	2	1	0	0	0	0	5
2008	5	0	3	4	0	0	0	0	12
2009	1	0	4	5	1	0	0	2	13
2010	6	0	2	5	4	0	0	4	22
2011	6	5	6	5	6	2	0	3	33
Total	**70**	**32**	**64**	**69**	**44**	**13**	**2**	**31**	**326**

Table 39: Historical Water Available to All Decreed Rights with Priority of 1896 in NFWF Application 80700

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	68	65	68	65	61	0	0	28	356
1997	68	65	68	65	48	41	0	65	421
1998	68	65	68	65	68	50	31	68	482
1999	68	26	68	65	46	0	0	35	308
2000	41	0	39	57	13	0	0	35	185
2001	44	0	63	11	0	0	0	0	118
2002	31	0	33	26	0	0	0	0	89
2003	39	0	17	65	9	0	0	0	131
2004	61	2	35	24	0	0	0	9	131
2005	68	37	61	65	68	15	0	0	314
2006	68	65	68	65	68	17	0	35	386
2007	24	0	24	17	0	0	0	0	65
2008	65	0	33	52	0	0	0	0	151
2009	13	0	46	65	15	0	0	20	159
2010	68	4	28	65	50	0	0	50	266
2011	68	65	68	65	68	31	0	37	401
Total	**860**	**397**	**785**	**842**	**513**	**155**	**31**	**382**	**3,964**

Table 40: Historical Water Available to All Decreed Rights with Priority of 1900 in NFWF Application 80700

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	92	89	92	89	83	0	0	39	485
1997	92	89	92	89	65	57	0	89	574
1998	92	89	92	89	92	68	42	92	658
1999	92	36	92	89	62	0	0	48	420
2000	57	0	54	77	18	0	0	48	253
2001	60	0	68	15	0	0	0	0	143
2002	42	0	45	36	0	0	0	0	122
2003	54	0	24	86	0	0	0	0	164
2004	83	3	48	33	0	0	0	12	179
2005	92	51	83	89	92	21	0	0	428
2006	92	89	92	89	92	24	0	48	527
2007	33	0	33	24	0	0	0	0	89
2008	89	0	42	71	0	0	0	0	202
2009	18	0	62	89	21	0	0	27	217
2010	92	6	39	89	68	0	0	68	363
2011	92	89	92	89	92	42	0	51	547
Total	**1,172**	**541**	**1,050**	**1,145**	**687**	**211**	**42**	**521**	**5,370**

Table 41: Historical Water Available to All Decreed Rights with Priority of 1901 in NFWF Application 80700

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	11	11	11	11	10	0	0	5	58
1997	11	11	11	11	8	7	0	11	69
1998	11	11	11	11	11	8	5	11	79
1999	11	4	11	11	7	0	0	6	50
2000	7	0	6	9	2	0	0	6	30
2001	7	0	8	2	0	0	0	0	17
2002	5	0	5	4	0	0	0	0	15
2003	6	0	3	10	0	0	0	0	20
2004	10	0	6	4	0	0	0	1	21
2005	11	6	10	11	11	2	0	0	51
2006	11	11	11	11	11	3	0	6	63
2007	4	0	4	3	0	0	0	0	11
2008	11	0	5	9	0	0	0	0	24
2009	2	0	7	11	2	0	0	3	26
2010	11	1	4	11	8	0	0	8	43
2011	11	11	11	11	11	5	0	5	65
Total	**141**	**65**	**126**	**137**	**82**	**25**	**5**	**62**	**643**

Table 42: Historical Water Available to All Decreed Rights with Priority of 1904 in NFWF Application 80700

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	3	3	3	3	3	0	0	1	16
1997	3	3	3	3	2	2	0	3	19
1998	3	3	3	3	3	2	1	3	22
1999	3	1	3	3	2	0	0	2	14
2000	2	0	2	3	1	0	0	2	8
2001	2	0	2	0	0	0	0	0	5
2002	1	0	1	1	0	0	0	0	4
2003	2	0	1	3	0	0	0	0	5
2004	3	0	2	1	0	0	0	0	6
2005	3	2	3	3	3	1	0	0	14
2006	3	3	3	3	3	1	0	2	18
2007	1	0	1	1	0	0	0	0	3
2008	3	0	1	2	0	0	0	0	7
2009	1	0	2	3	1	0	0	1	7
2010	3	0	1	3	2	0	0	2	12
2011	3	3	3	3	3	1	0	1	18
Total	**39**	**18**	**35**	**38**	**23**	**7**	**1**	**17**	**179**

Table 43: Historical Water Available to All Decreed Rights with Priority of 1906 in NFWF Application 80700

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1996	7	7	7	7	7	0	0	3	39
1997	7	7	7	7	5	5	0	7	46
1998	7	7	7	7	7	5	3	7	53
1999	7	3	7	7	5	0	0	4	34
2000	5	0	4	6	1	0	0	4	20
2001	5	0	5	1	0	0	0	0	11
2002	3	0	4	3	0	0	0	0	10
2003	4	0	2	7	0	0	0	0	13
2004	7	0	4	3	0	0	0	1	14
2005	7	4	7	7	7	2	0	0	34
2006	7	7	7	7	7	2	0	4	42
2007	3	0	3	2	0	0	0	0	7
2008	7	0	3	6	0	0	0	0	16
2009	1	0	5	7	2	0	0	2	17
2010	7	0	3	7	5	0	0	5	29
2011	7	7	7	7	7	3	0	4	43
Total	**94**	**43**	**84**	**92**	**55**	**17**	**3**	**41**	**429**