IN THE SUPREME COURT OF NEVADA

Electronically Filed
Jul 09 2014 02:05 p.m.
Tracie K. Lindeman
Clerk of Supreme Court

In Re: Rotation Schedule In the Matter of the Determination of the Relative Rights in and to the Waters of Mott Creek, Taylor Creek, Cary Creek (aka Carey Creek), Monument Creek, And Bulls Canyon, Stutler Creek (aka Stattler Creek), Sheridan Creek, Gansberg Spring, Sharpe Spring, Wheeler Creek No. 2, Miller Creek, Beers spring, Luther Creek and Various Unnamed Sources in Carson Valley, Douglas County, Nevada	Supreme Court Case No. 64773 District Court Consolidated Case No: 08-CV-0863-D1

JOY SMITH, DANIEL BRANDEN and ELAINE BARDEN, J.W. BENTLEY and MARY ANN BENTLEY, TRUSTEES OF THE BENTLEY FAMILY 1995 TRUST,

Appellants,

v.

STATE OF NEVADA, OFFICE OF THE STATE ENGINEER,

Respondent.

RESPONDENTS, JASON KING, P.E., in his official capacity by and through his counsel Attorney General CATHERINE CORTEZ MASTO and Senior Deputy Attorney General BRYAN L. STOCKTON, along with Intervenors by and through their counsel of record, THOMAS HALL, Esq., hereby submit their Supplemental Joint Appendix.

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Nevada Office of the Attorney General
100 North Carson Street
Carson City, NV 89701-4717

Docket 64773 Document 2014-22286

SUPPLEMENTAL JOINT APPENDIX

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Report of Field Investigation No. 1130	June 28, 2010	SJA 01-015
Report of Field Investigation No. 1130-A	September 14, 2010	SJA 016-021

DATED this 9th day of July, 2014.

CATHERINE CORTEZ MASTO
Attorney General

By: /s/ Bryan L. Stockton
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CERTIFICATE OF SERVICE

I, Sandra Geyer hereby certify that on this 9th day of July, 2014, I electronically filed the foregoing SUPPLEMENTAL JOINT APPENDIX with the Clerk of the Court using the CM/ECF system, which will send notification of such filing to the email addresses that are registered for this case.

/s/ Sandra Geyer
Sandra Geyer, Legal Secretary II

Nevada Office of the Attorney General
100 North Carson Street
Carson City, NV 89701-4717

IN THE OFFICE OF THE STATE ENGINEER
OF THE STATE OF NEVADA

IN THE MATTER OF THE COURT ORDER OF MAY 17, 2010, ISSUED BY THE 6TH JUDICIAL DISTRICT COURT OF THE STATE OF NEVADA IN AND FOR THE COUNTY OF DOUGLAS UNDER CASE NO. 08-CV-0363-D FOR SHERIDAN CREEK LOCATED WITHIN CARSON VALLEY, DOUGLAS COUNTY, NEVADA.

REPORT OF FIELD INVESTIGATION NO. 1130

GENERAL

Sheridan Creek and tributaries is in the process of being adjudicated *IN THE MATTER OF THE DETERMINATION OF THE RELATIVE RIGHTS IN AND TO THE WATERS OF MOTT CREEK, CANYON CREEK, TAYLOR CANYON CREEK, CARY CREEK (AKA CAREY CREEK), MONUMENT CREEK, BULLS CANYON, STUTLER CREEK (AKA STATTLER CREEK), SHERIDAN CREEK, GANSBERG SPRING, SHARPE SPRING, WHEELER CREEK NO. , 1 WHEELER CREEK NO. 2, MILLER CREEK, BEERS SPRING, LUTHER CREEK AND VARIOUS UNNAMED SOURCES IN CARSON VALLEY, DOUGLAS COUNTY, NEVADA.*

A hearing was held on Monday, May 17, 2010, at 9:00 A.M. in the Ninth Judicial District Court of the State of Nevada In and For the County of Douglas before the Honorable David Gamble, District Court Judge, regarding the exceptions to the Order of Determination. The hearing was in regard to Subpart D, with respect to water distribution from the northern split of Sheridan Creek. In this hearing the court ordered the State Engineer's Office to conduct a 48 hour seepage test on both ponds located within the confines of the Bentley Property, Douglas County APN 1219-14-001-013.

FINDINGS

Staff[1] of the Nevada Division of Water Resources conducted a reconnaissance investigation on May 22, 2010, in the matter regarding the water distribution from the north split of Sheridan Creek located in the Carson Valley. The meeting convened at 9:00 A.M. in the driveway of the Bentley residence. The purpose of the investigation was to gather preliminary information of the physical layout of the water distribution system that feeds the two (2) ponds on Douglas County APN 1219-14-001-013. After meeting with Mr. Bentley we proceeded to the north side of the driveway that enters his property from Sheridan Lane.

At this point we observed the original diversion constructed by the previous owner, Ted Weber, to the pond, hereafter "lower pond", located to the east of the Bentley residence. In the past this

[1] Steve Walmsley, Staff Engineer III, Reed Cozens, Engineering Technician III and Adam Sullivan, Hydrologist.

small ditch was observed to flow approximately 0.05 cfs, 22 gpm, continuously, to maintain the lower pond. The ditch appeared to be flowing at or about this rate at the time of the investigation.

From this point we proceeded north along the Sheridan Lane right-of-way to a new diversion box located at the northwest corner of the Bentley property. After Mr. Bentley explained the piping system in this box, as illustrated in the following photograph (Figure 1), we walked to the upper pond inlet located in the northwest corner of the pond.

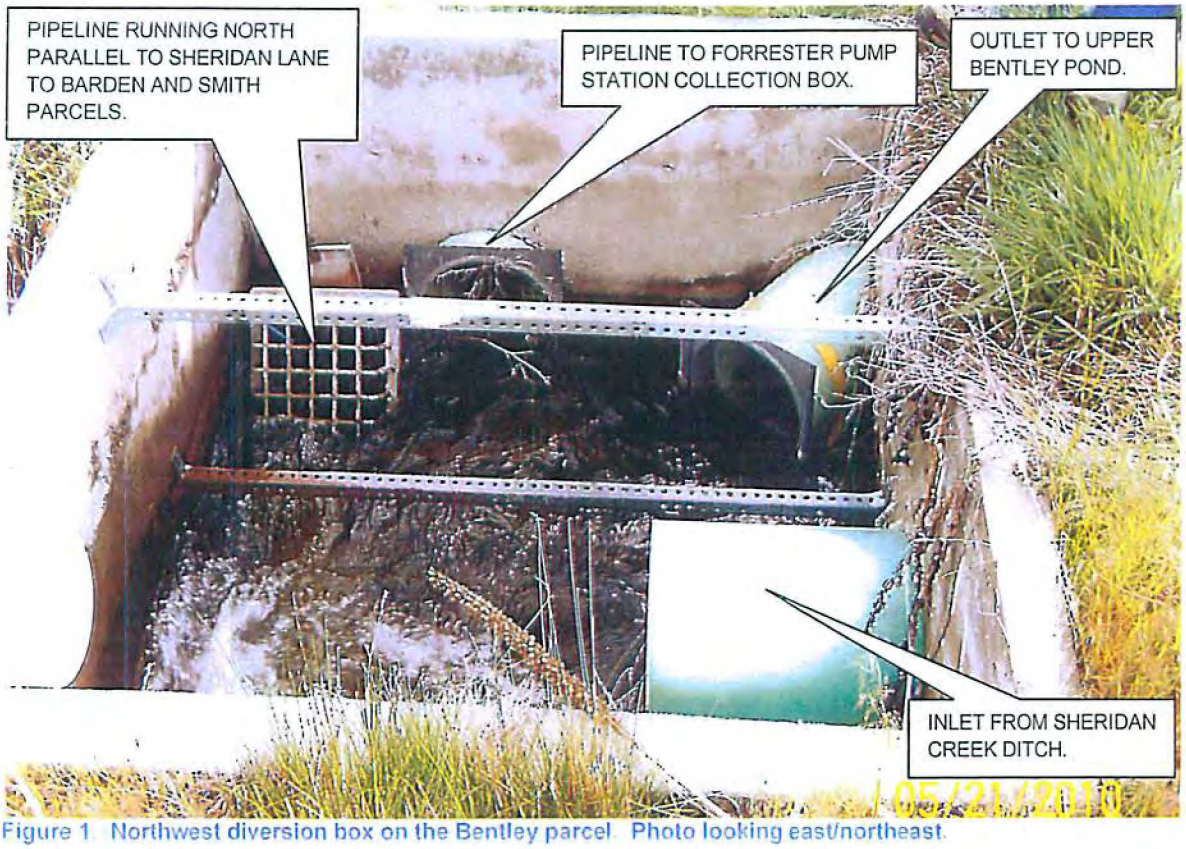


Figure 1. Northwest diversion box on the Bentley parcel. Photo looking east/northeast.

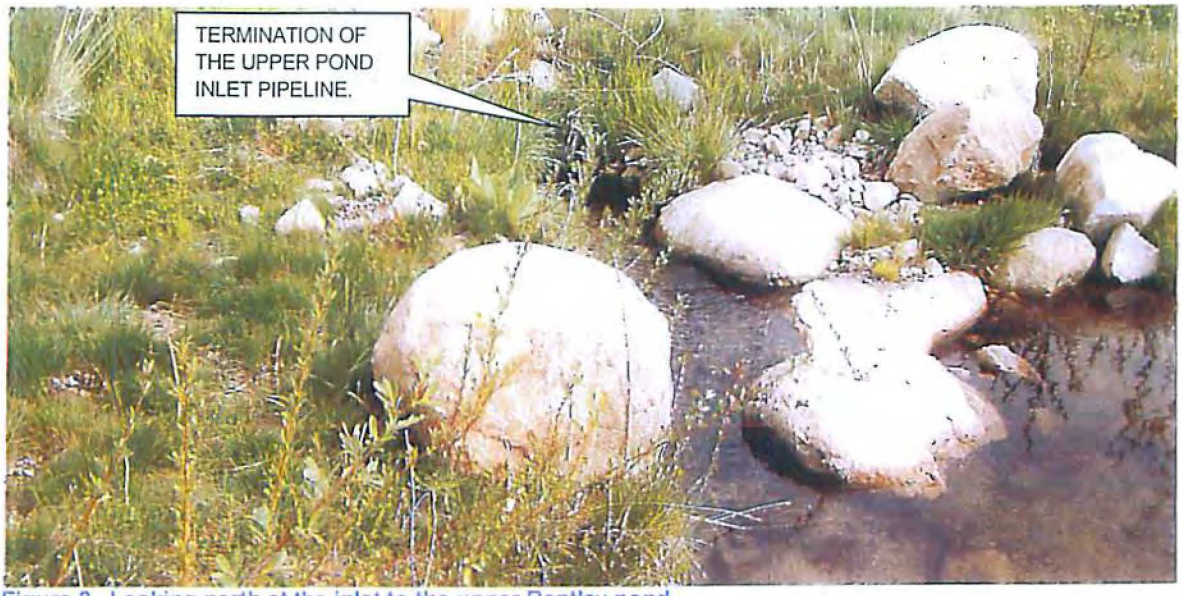


Figure 2. Looking north at the inlet to the upper Bentley pond.

At the outlet of the upper pond diversion we viewed the inlet to the pond. From here we walked around the north end of the upper pond and stopped in an area just north/northwest of the shop building. We noted that the diameter of the pond near a large ornamental boulder had decreased by approximately ten (10) feet at this location from the ponds maximum level. Mr. Bentley explained that he was better able to maintain the water level in the pond at this elevation, than at the original depth which was approximately one (1) foot higher in 2008. A grass and clover mix had been planted in the newly exposed (2008-09) bottom and currently forms a solid lawn/meadow area around the perimeter of the pond. Based on this observation we stated that the pond surface should be surveyed in conjunction to our upcoming water level measurements in order to come up with an accurate estimation of seepage.

The difference in pond diameter is not uniform around the perimeter of the pond. The slope of the bottom is gentle at the location that we observed to the northwest of the shop. The slope is vertical at the deck in front of the shop and the slope increases as one travels from the pond outlet in the southeast corner of the pond, around the south end and north up the west side to the inlet. The physical difference of the slope of the land around the perimeter of the pond makes it impossible to apply a uniform surface area reduction from the 2008 aerial photography.

Our next stop was at the outlet from the upper pond near the southwest corner of the shop building and at the southeast corner of the pond. Mr. Bentley pointed out the flashboards that are now being maintained at a lower level (approximately 1 foot) than when the pond was initially completed.

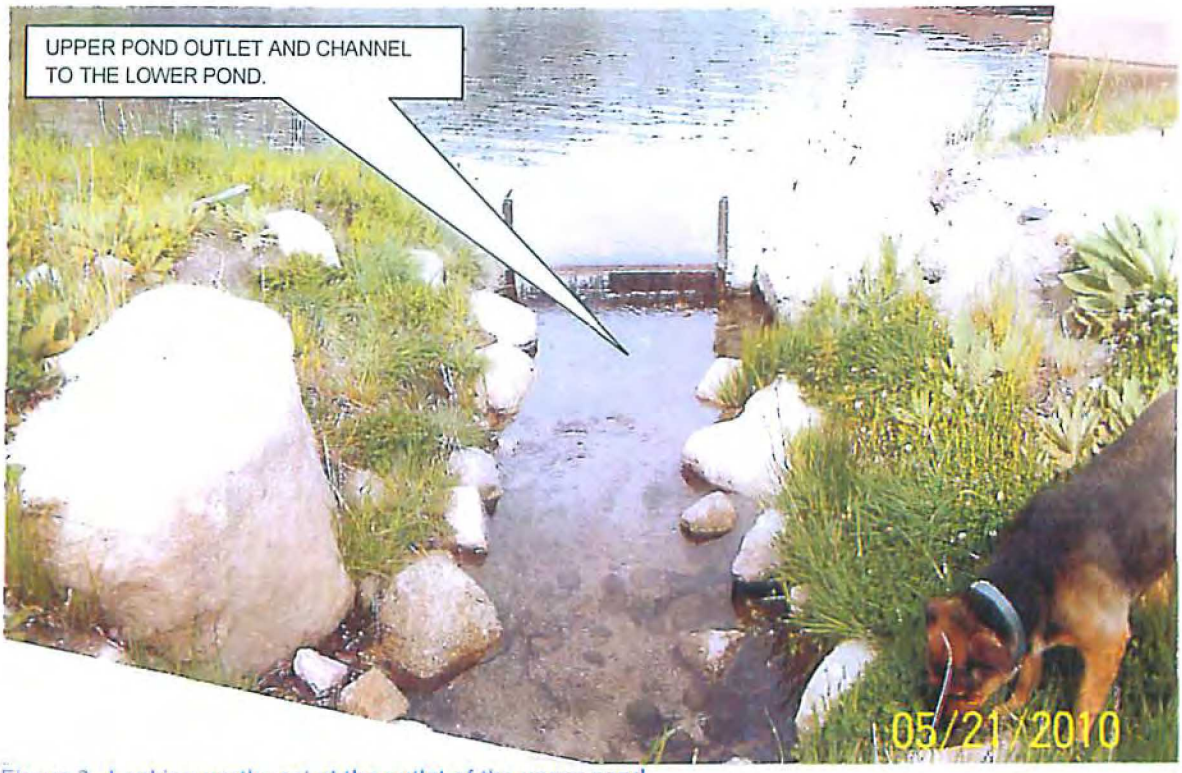


Figure 3 Looking northwest at the outlet of the upper pond.

The channel from the upper pond flows into the lower (easterly) pond near the lower ponds northwest corner. The original diversion (circa Ted Weber) to the lower pond begins on the north side of the Bentley driveway and flows parallel to the driveway and to the north of the Bentley residence through a curve to the south/southeast behind the house where it enters said pond near its southwest corner.

The lower pond is somewhat smaller than the upper pond and has two separate outlets. The northern outlet is comprised of a concrete drop inlet (Figure 4) that transfers water by pipeline to the north/northwest to a concrete diversion box located approximately 300 feet east of the northwest corner of APN 1219-14-001-013 along the north property line of said parcel. This box (Figure 5) directs water to a sub-grade storage tank and pump station on the Forrester parcel, Douglas County APN 1219-14-001-012. The diversion box to the Forrester pump station is located along the northern

Figure 4. Northern outlet from lower (eastern) pond on the Bentley property. Photo taken looking to the northeast

boundary of the Bentley property at GPS location, NAD 83, N.38.90392°, W.119.82309° and approximately 200 feet south of the Forrester residence.

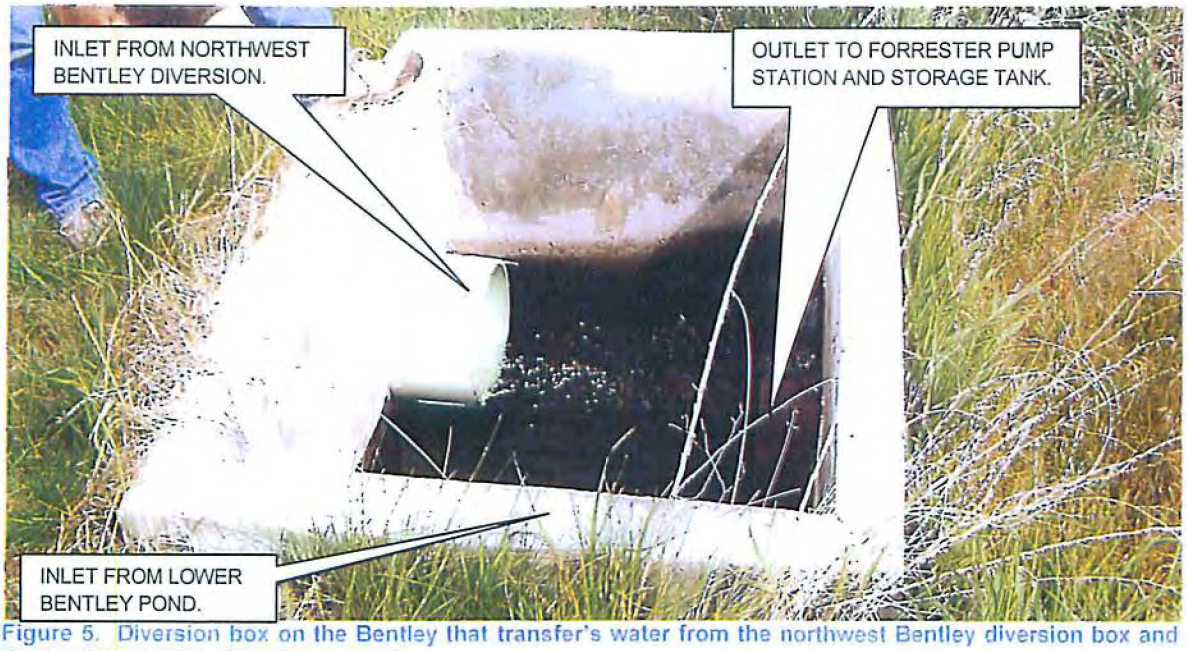


Figure 5. Diversion box on the Bentley that transfer's water from the northwest Bentley diversion box and the northern outlet of the lower pond.

After viewing the northern outlet from the lower pond we walked to the easterly outlet from the pond. This second outlet is controlled by flashboards and is located at GPS location, NAD 83, N.38.90325°, W.119.82222°. Water from this outlet flows into a ditch (Figure 6) in an easterly direction toward the Park and Bull Ditch through the parcel owned by Forrester, APN 1219-14-001-012, and along the south boundary of the Mitchell parcel, APN 1219-14-001-011.

Figure 6. Looking east from the eastern diversion from the lower Bentley pond

After viewing the eastern outlet of the pond and discussing the possible problems of sealing the outlet we walked around the remaining perimeter of the pond to a newly constructed (2008-09?) dock that extends into the pond from the west side. We determined that this would be the optimum location for a tape-down to the water surface for our seepage test.

From the lower pond we walked to the first diversion point below (east of) the Sapp parcel, APN 1219-14-002-003, and located to the north of the Bentley driveway from Sheridan Lane. We discussed possible sources for dark colored organic matter and the primary source of the water in Sheridan Creek.

At approximately 11:00 A.M. the field investigation was concluded.

POND SEEPAGE TEST

Three staff[2] members of the State Engineer's Office arrived at the Bentley property at approximately 8:15 a.m. on the morning of Tuesday, June 1, 2010. After assessing the current conditions we proceeded with our plan for conducting the seepage test on the two (2) ponds located within the confines of Douglas County APN 1219--14-001-013. The ponds are referenced as the "Upper Pond", located within the northwest corner of the parcel adjacent to Sheridan Lane and the "Lower Pond", located on the east side of the Bentley residence and down-gradient from the Upper Pond.

The inlet to the Upper Pond was blocked by closing the inlet to the sluice-gate equipped pipeline at 8:30 a.m. The direct diversion to the Lower Pond, located on the north side of the entrance of the paved driveway serving the residence, was closed shortly thereafter. At this point we began waiting for the inflow to cease and for both ponds to come to equilibrium with the lowest points on their outlet structures.

[2] Steve Walmsley, Staff Engineer III; Adam Sullivan, P.E., Hydrologist; and Reed Cozens, Engineering Technician III.

The first outlet to cease flowing water over its crest was the east outlet of the lower pond. Once water quit flowing over the top of this structure staff of the State Engineer's Office sealed the pond side of the flashboards with plastic sheeting and sand bags to prevent any leakage from this gate from affecting any probable decline of the relative level of the pond. The outlet on the north side of the lower pond was the next to be sealed with the plastic sheeting and sand bags.

The northern outlet proved to be more problematic in achieving an instantaneous water tight seal. After adding an additional section of 1" x 1½" board to the top of the flash boards and closing the sluice gates to the outlet pipes we were able to stem the leakage from this drop-outlet structure. Worst case scenario was that this outlet continued to leak less than a pint a minute throughout the seepage test. This would only yield a volume of 360 gallons over the entire 48-hour period of the test.

Discharge from the Upper Pond to the lower pond was noted to have diminished when observed at 9:05 a.m. At approximately 10:30 a.m. flow from the Upper Pond into the channel connecting the two ponds had ceased and this outlet was effectively sealed prior to our first measurement at 11:00 a.m.

The tape-down point to monitor the Upper Pond surface elevation was established at the southwest corner of the deck that overhangs the pond. The deck is located on the west side of the large shop building that resides on the east side of the pond.

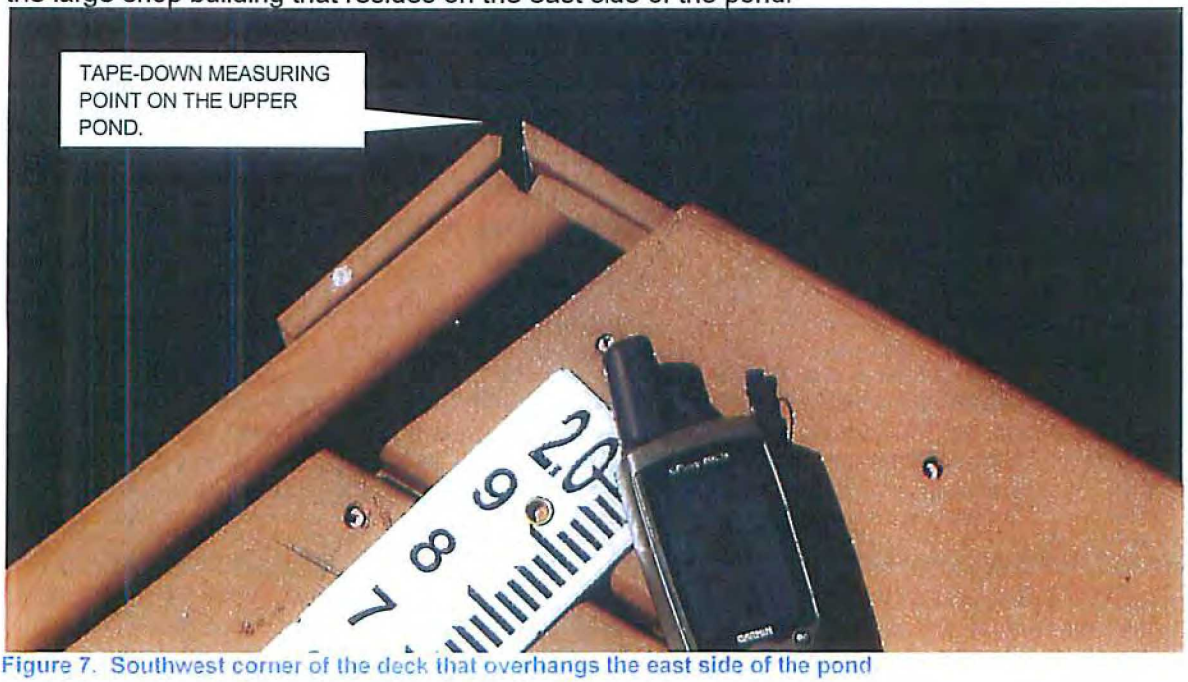


Figure 7. Southwest corner of the deck that overhangs the east side of the pond

During this process we ran levels to reference points at the southwest corner of the shop driveway (Ref. 1)(6.492'), the high point of the large boulder on the east side of the Upper Pond outlet (Ref. 2)(4.795'), the east side of the outlet flash board (Ref. 3)(7.876'), the west side of the outlet flash board (Ref. 4)(7.889'), measuring point being the outside top corner of the southeast facing trim (M.P.)(6.008') and the top of the deck at the southwest corner of same (Ref. 5)(5.900'). All of the points were measured with a Topcon AT-G3 Auto-Level paired with a Philadelphia rod.

At 9:45 a.m. we moved the level to point within the roadway to the north of the Lower Pond. The first reference point is the bolt in the concrete on the south side of the east pond outlet (Ref. 1)(4.795"), the northwest outside corner of the north outlet box (Ref.2)(3.740'), the southwest outside corner of the north outlet box (Ref. 3)(3.709'), west end of the flash boards on the north outlet box (Ref. 4)(5.507'), east end of the flash boards on the north outlet box (Ref. 5)(5.485'), and the measuring point at the southwest corner of the north pond outlet (M.P.)(3.709')(Same as Ref. 3, Lower Pond). Refer to Figure 4 for a visual description of the measuring point for the lower pond.

These reference points will be used again during the late-July/early-August, 2010, measurements.

Measurements of the lower pond level began at 12:55 p.m. on June 1, 2010. The initial level was measured at 1.755 feet below the measuring point on the southwest outer corner of the concrete drop-inlet box (See Figure 4). The final measurement of the day was conducted at 6:55 p.m. with a level of 1.775 feet below the measuring point. At this point we suspended measurements for the evening.

The beginning measurement for Wednesday, June 2, 2010 for the lower pond was made at 8:17 a.m. and the final measurement for this day was made at 6:53 p.m. At 10:50 a.m. we began making back-up measurements from the pier that juts into the pond from its west bank. In general these water level declines measured off of the end of the pier paralleled our primary measuring point.

Our final set of measurements for the lower pond began at 8:31 a.m. on June 3, 2010 and concluded at 12:00 p.m. with a level of 2.090 feet below the measuring point, marking the end of the 48 hour seepage test for the lower pond. The actual hourly and half hour water levels are represented in the data and analysis section of this report.

The initial water level measurement for the upper pond was conducted at 11:00 a.m. on June 1, 2010. Water was measured at 1.822 feet below the measuring point, being the southwest corner of the deck that overhangs the pond (See Figure 7). The final level measurement for this day was made at 6:47 p.m. at 1.871 feet below the measuring point before ending data collection for the evening.

The first measurement for the upper pond on June 2, 2010 was conducted at 8:11 a.m. with a reading of 1.920 feet below the measuring point. We noted some variation in measurements during the morning of June 2nd. This was attributed to variations in wind speed and direction throughout the morning. Our measurement at 11:36 a.m. revealed a marked increase in water at 1.935 feet below the measuring point. We also noted that the water level had visibly risen along the south shore of the pond just west of the outlet. At this time we attributed the rise to high velocity winds from the west.

Later in the afternoon we noted that Don Forrester was walking in an easterly direction along the north boundary line of APN 1219-14-001-012 about 200 feet west of Sheridan Lane. We decided to talk to Mr. Forrester and let him know that we were in the process of conducting the court ordered seepage test. During our conversation Mr. Forrester went silent and then told us that he had opened the inlet gate to the upper pond sometime around noon on June 2nd. He said that Glenn Roberson , owner of APN 1219-12-001-008, had requested the delivery of water

in his rotation schedule. Mr. Forrester said that he had partially closed his diversion and fully opened the sluice-gate into Bentley's upper pond in order to transfer water through the upper and lower ponds and eventually down the east to west centerline of Section 14 ditch to the Roberson property. He said that he was unaware that we were conducting the seepage test. At this point we ended our conversation at set about closing the inlet to the upper pond.

The inlet to the upper pond was closed at 4:10 p.m. and the inlet pipe was posted with a Water Commissioner Notice from the State Engineer's Office. The final measurement of June 2nd was made at 6:51 p.m. with a level of 1.875 feet below the measuring point

The first measurement of the final day of measurements on the upper pond was conducted at 8:40 a.m. with a water level of 1.945 feet below the measuring point. The final measurement of the 48 hour test occurred at 11:08 a.m. with a level of 1.960 feet.

At 11:12 a.m. on June 3rd the headgate to the upper pond was opened along with the headgate to the lower pond shortly thereafter. Sandbags and plastic sheeting were removed from the outlets of both ponds by approximately 12:00 p.m. at the conclusion of the measurements.

In order to avoid measuring errors on both of the ponds water levels were measured with a tape measure in engineering scale and verified with a 2' length porcelain coated steel staff gage also marked in engineer's scale.

In order to confirm the surface area of the upper pond from 2008 aerial photography and obtain an accurate estimate of the surface area of the lower pond we returned to the Bentley property on the morning of Wednesday, June 9, 2010. The State Engineer had retained the services of Joe Cyphers, P.E., of the Division of State Parks to conduct a survey of both of the ponds using a Topcon GTS235W total station laser surveying instrument.

Upon completion of the survey and calculation of area we found that the area measured from the 2008 aerial photography for the upper pond was nearly identical to the surveyed area. The estimated acreage of the upper pond using one-foot-resolution aerial imagery was 0.568 acres; and the surveyed area of the upper pond was 0.571 acres.

The only way to obtain an accurate surface area for the lower pond was by the survey conducted on June 9th. The vegetation comprised of shrubs and trees around the ponds perimeter precluded our ability to precisely plot the ponds perimeter from the 2008 aerial photography. Using this same imagery as mentioned above the estimated acreage of the lower pond was 0.364 acres; while the surveyed area of the lower pond was found to be 0.419 acres.

The surface area for both the upper and lower ponds obtained by virtue of this survey is utilized in the hydrologic analysis section of this report.

Please refer to the attached schematic for a better understanding of the water delivery and distribution system.


Box A
Box B
4" Pipe
Box C

Water Level Measurement Data

Water level measurements over the period of measurement are shown in Figure 8 and Figure 9. Points represent actual measured values. Lines are drawn through the data points from the highest measured water surface to the lowest measured water surface to show cumulative loss rates for each test. These cumulative loss rates are summarized in Table 1.

In the upper pond two distinct periods of measurement were defined to account for a 4-hour period (approximately hr 25 to hr 29) during which the inflow gate to the pond was accidentally opened by a neighbor. Though this interruption prevented a constant 48-hour test, data from the two measurement periods is advantageous because the actual water surface during the test period is closer to where the pond surface is routinely maintained, and the measurements provide a replication of the analysis.

The lower pond shows a consistent decrease in water surface over the period of measurement with the exception of the first two data points. This initial rise in the measured water surface may be due to bank storage draining into the pond in response to the abrupt drop in water surface required to lower the pond elevation below the weir crest, or other initial adjustments to water surface as the pond came to an equilibrium state. Regardless of the actual cause, these two initial data points do not accurately represent seepage and were not included in the analysis. No water flowed into the lower pond during the four-hour period when the gate to the upper pond was accidentally opened.

Figure 8: Water Level in Upper Pond
Bentley Pond Seepage Test at Sheridan, NV

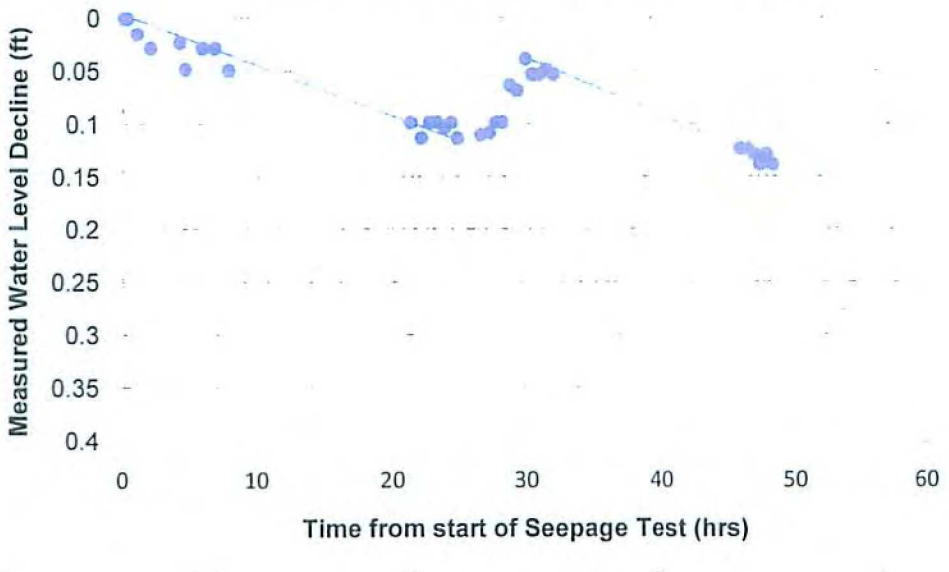
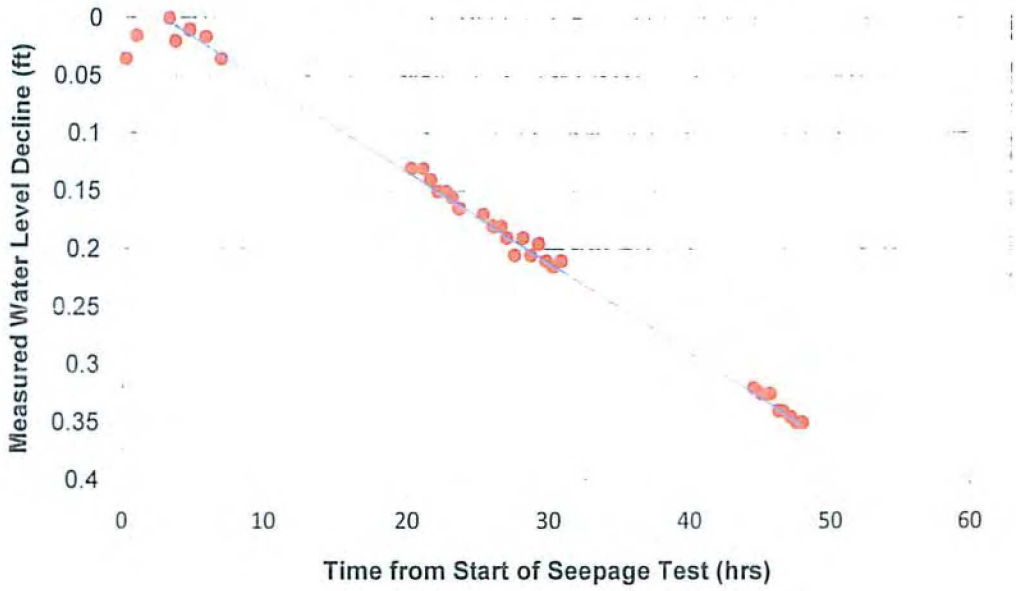


Figure 9: Water Level in Lower Pond
Bentley Pond Seepage Test at Sheridan, NV



Scatter in the data that deviates from the trend line for both ponds may be caused by wind creating ripples and slight superelevation of the water surface from one side of the pond to the other, and/or precision in the data collection. For both ponds the diurnal pattern of evapotranspiration (ET) rates on cumulative loss is not apparent in the data, due to the relatively low proportion of ET losses and the precision of the measured data.

Table 1: Cumulative Loss from Ponds

Test #	Pond	Initial Conditions			Final Conditions			Total Loss in Water Elevation (ft)	Duration of Test (hr)	Cumulative Loss (gpm)
		Time (hrs)	Pond Surface Area (sf)	Water Elevation below Reference (ft)	Time (hrs)	Pond Surface Area (sf)	Water Elevation below Reference (ft)			
1	Lower	3.08	18237	0	47.41	17511	0.35	0.35	44.33	17.59
2a	Upper	0	24911	0	24.6	24500	0.113	0.113	24.60	14.15
2b	Upper	29.75	24800	0.038	48.13	24383	0.138	0.1	18.38	16.68

Data Analysis

Water level decline measured in the ponds is attributed to seepage, evaporation from the surface of the ponds, and transpiration from vegetation growing along the banks of the pond. Evaporation and transpiration were quantified using weather data during the period of measurement, and seepage was determined by subtracting evaporation and transpiration from the total measured loss in pond volume. Seasonal and annual consumptive use was determined by assuming seepage rates to be constant, and by using published values of mean annual weather conditions and reference ET.

Evaporation from the surface of the ponds was calculated using the Penman-Monteith equation for grass reference evapotranspiration with an hourly time step, consistent with FAO Irrigation and Drainage Paper No. 56 (FAO 56). Shallow open water evaporation was determined by multiplying reference ET by 1.05 following recommendations in FAO 56. Mean hourly data for wind speed, temperature and relative humidity were obtained from a weather station at the Bentley property, with adjustments made for anemometer height also consistent with FAO 56 recommendations. Mean hourly data for solar radiation was obtained from pyranometer data at Western Nevada College in Carson City. This site is geographically comparable to the Bentley property with regard to elevation and horizon angle. Computed hourly evaporation is shown on Figure 10. Cumulative evaporation over the duration of the testing periods accounts for approximately 8% of total measured loss from the lower pond and 14% from the upper pond.

Figure 10: Computed Open Water Evaporation
Bentley Pond Seepage Test at Sheridan, NV

Transpiration during the testing period was approximated by assigning reference ET rates as described above to canopy area of trees and shrubs growing on the banks of each pond. The volume of pond water that is consumed through transpiration by vegetation along the banks of the pond is difficult to accurately measure because of the contribution from sprinklers on the property and the potential for trees on the lower pond to grow roots below the water table. Total estimated transpiration accounts for 9% of total measured loss in the lower pond and less than 1% in the upper pond.

Summary of Findings

Measured loss rates for each testing period are shown in Table 2, fractioned into pond surface evaporation, transpiration, and seepage. Seepage is determined by subtracting computed evaporation and transpiration from total measured loss.

Table 2: Loss Rate Fractions

Test #	Pond	Total Measured Loss (gpm)	Depth of Surface Evaporation (ft)	Loss due to Surface Evaporation (gpm)	Canopy area of vegetation dependent on pond water (ft^2)	Loss due to Transpiration (gpm)	Loss due to Seepage (gpm)
1	Lower	17.59	0.029219144	1.47	13000	1.02	15.107
2a	Upper	14.15	0.017894783	2.24	1000	0.09	11.821
2b	Upper	16.68	0.012469439	2.08	1000	0.08	14.519

Cumulative annual consumptive use is shown in Table 3. Annual seepage volumes are determined by extrapolating seepage rates from the test period to the entire year. The two seepage rates for the upper pond determined in test 2a and 2b are averaged for Table 3. Seasonal Pond evaporation and approximate consumptive use by trees were obtained from the report Evapotranspiration and Net Irrigation Water Requirements for Nevada, published by the Nevada State Engineers office in 2009. This report identifies average evaporation from shallow ponds in the Carson Valley to be 4.5 feet annually, and approximate consumptive use by vegetation to be 3 feet annually.

Table 3: Consumptive Use

	Annual Seepage (Acre feet)	Annual Pond Evaporation (Acre feet)	Annual Transpiration of Pond Water (Acre feet)	Cumulative Annual Consumptive Use (Acre feet)
Lower Pond	24.4	1.9	0.9	27.1
Upper Pond	21.2	2.6	0.1	23.9

The planned replication of this field investigation in August 2010 will help refine seepage rates reported for this analysis, and provide further data regarding other variables that may affect pond dynamics.

Respectfully Submitted,

Steve Walmsley.

Hydraulic Engineer III

Concurring,

Reed Cozens,

Engineering Technician III

Concurring,

Adam Sullivan, P.E.

Hydrologist

SW/RC/AS

Attachments

Dated this 28th day of June, 2010.

IN THE OFFICE OF THE STATE ENGINEER
OF THE STATE OF NEVADA

IN THE MATTER OF THE COURT ORDER OF MAY 17, 2010, ISSUED BY THE 9TH JUDICIAL DISTRICT COURT OF THE STATE OF NEVADA IN AND FOR THE COUNTY OF DOUGLAS UNDER CASE NO: 08-CV-0363-D FOR SHERIDAN CREEK LOCATED WITHIN CARSON VALLEY, DOUGLAS COUNTY, NEVADA.

REPORT OF FIELD INVESTIGATION NO. 1130-A

GENERAL

Sheridan Creek and tributaries is in the process of being adjudicated *IN THE MATTER OF THE DETERMINATION OF THE RELATIVE RIGHTS IN AND TO THE WATERS OF MOTT CREEK, CANYON CREEK, TAYLOR CANYON CREEK, CARY CREEK (AKA CAREY CREEK), MONUMENT CREEK, BULLS CANYON, STUTLER CREEK (AKA STATTLER CREEK), SHERIDAN CREEK, GANSBERG SPRING, SHARPE SPRING, WHEELER CREEK NO. , 1 WHEELER CREEK NO. 2, MILLER CREEK, BEERS SPRING, LUTHER CREEK AND VARIOUS UNNAMED SOURCES IN CARSON VALLEY, DOUGLAS COUNTY, NEVADA.*

A hearing was held on Monday, May 17, 2010, at 9:00 A.M. in the Ninth Judicial District Court of the State of Nevada In and For the County of Douglas before the Honorable David Gamble, District Court Judge, regarding the exceptions to the Order of Determination. The hearing was in regard to Subpart D, with respect to water distribution from the northern split of Sheridan Creek. In this hearing the court ordered the State Engineer's Office to conduct a 48 hour seepage test on both ponds located within the confines of the Bentley Property, Douglas County APN 1219-14-001-013.

FINDINGS

Staff[1] of the Nevada Division of Water Resources conducted a second pond seepage test beginning on Monday, August 16th at 8:15 A.M. and concluding on Wednesday, August 18th at 9:00 A.M. After arriving at 8:15 A.M. we met with Mr. Bentley and then proceeded with our preparation for the seepage test on the ponds described earlier in Report of Field Investigation No. 1130.

Prior to the second seepage test an Email was sent to all of the respective parties to the adjudication of the North Split of Sheridan Creek informing them of the dates and time of the seepage test.

[1] Steve Walmsley, Staff Engineer III, Reed Cozens, Engineering Technician III and Adam Sullivan, Hydrologist (Data Analysis).

Initially, we inspected the inlet to the pond to insure that the sluice gates had been closed and that no leakage to the upper and lower pond was occurring at the time of the investigation. Upon determining that these gates were secure, we proceeded with the securing of the pond outlets to assure that no leakage was occurring through the flash boards that would adversely affect our data.

The water level of the upper pond was just slightly below the crest of the flash boards at the time of our investigation. No leakage was noted, but we installed plastic sheeting and sand bags on the pond side of the flash boards as an added precaution.

The outlets and the corresponding flash boards to the lower ponds had been outfitted with an angle-iron crosspiece above the flash boards. The northern outlet had a single threaded rod with an inverted-T channel iron welded to the base that could be tightened with a nut on the threaded shaft causing down-force on the flash boards. This aided in the tightness of the seal. After adding another short (1" approximate) board to the outlet we tightened the clamping mechanism and sealed the north outlet with plastic sheeting and sand bags. No measureable leakage was detected through the northern outlet after the plastic sheeting and sand bags were put in place.

A similar clamping mechanism had been installed on the easterly outlet to the lower pond. Upon inspection of this outlet we determined that there was no detectable seepage from this gate. Therefore, we did not find it necessary to seal this outlet with plastic sheeting and sand bags as we had done to the lower ponds north outlet and the upper ponds single outlet.

Before taking our first pond level measurements we conducted a set of level measurements using the same Topcon AT-G3 Auto-Level paired with a Philadelphia rod as utilized prior to the June 2010 seepage test. A comparison of readings indicated that there were no elevation changes between the measuring point on the upper pond and any of the reference points.

We did not take any level measurements for the east outlet from the lower pond, since we did not see any relevance in these points. The east and west sides of the northern outlet of the lower pond were surveyed and found to have a change in elevation between the two sides. We noted that some concrete repair work had been completed between the two seepage tests. This had no adverse affect on the measurements for the August 2010 test.

The initial measurements for the upper and lower ponds on the Bentley property were begun at 9:10 A.M. at and 9:13 A.M. on August 16, 2010, respectively. The initial water level for the upper pond was 1.880 feet below the measuring point located at the southwest corner of the deck and 1.885 feet below the top of the southwest corner of the north outlet of the lower pond.

Measurements were conducted on an hourly basis from the above-listed starting time through 7:00 P.M. on the evening of August 16, 2010. Measurements were resumed on August 17, 2010 at 8:43 A.M. and 8:46 A.M. for the upper and lower ponds, respectively. Again, we concluded measurements for the two ponds at 7:00 P.M. Water levels were resumed at 8:17 A.M. and 8:19 A.M. and concluded at 9:19 A.M. and 9:28 A.M., respectively, for the upper and lower ponds on August 18, 2010, thus concluding the 48-hour seepage test on the two ponds.

Final water level for the upper pond was 2.195 feet below the measuring point and 2.340 feet below the measuring point for the lower pond.

POND SEEPAGE TEST NO. 2.

Pond seepage tests were repeated on August 16-18, 2010. Methodology for the seepage test was the same as described for the June 1-3 test, including field methods, measuring points, and ET analysis. In the August seepage test, continuous data over a 48-hour period were collected for both ponds. Measured water level decline was roughly linear for both ponds, with a less rapid decline in the upper pond (Figure 1) than the lower pond (Figure 2).

Figure 1: Water Level in Upper Pond
Bentley Pond Seepage Test at Sheridan, NV

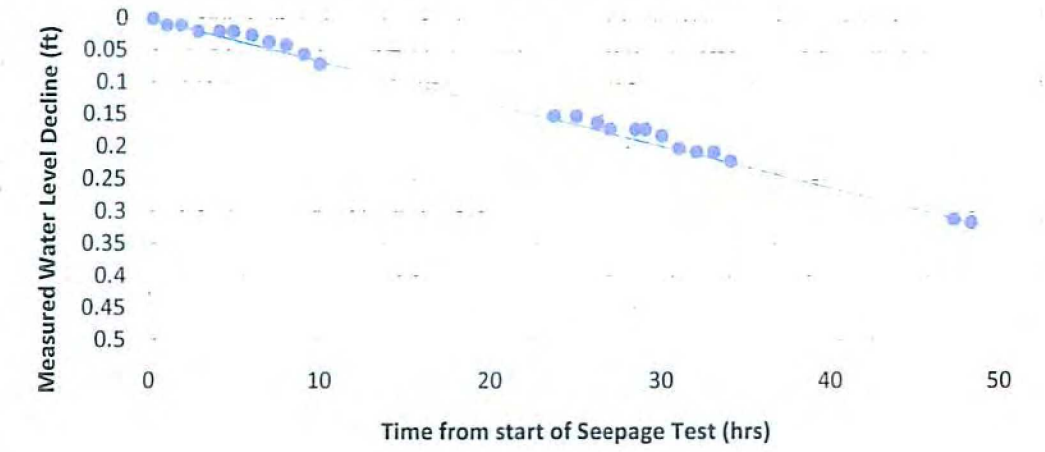
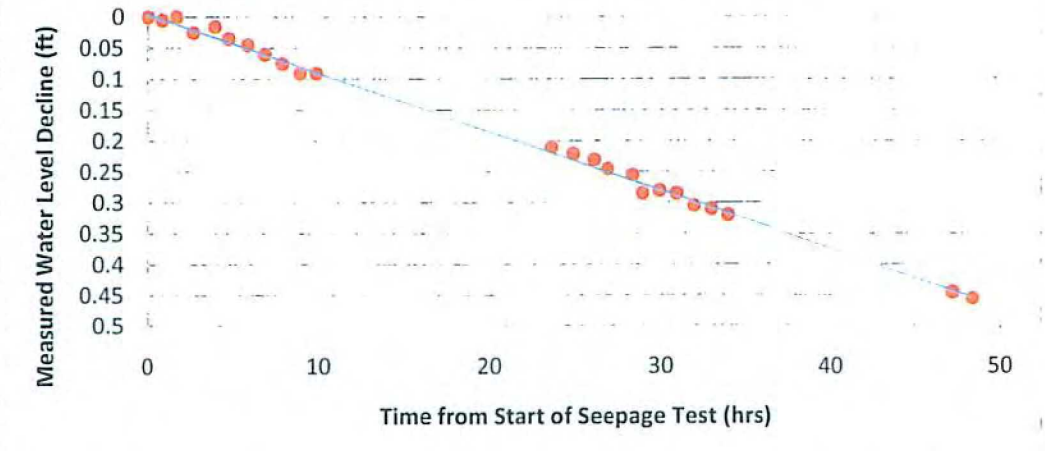


Figure 2: Water Level in Lower Pond
Bentley Pond Seepage Test at Sheridan, NV



Total loss in each pond was higher in the August test than the June test. Some of this is attributed to ET, because temperatures were higher and humidity was lower during the August test. Figure 3 shows computed open water evaporation during the August test. Table 1 shows loss fractions due to surface evaporation, plant transpiration and seepage. Table 2 shows consumptive use as computed from the August test.

Figure 3: Computed Open Water Evaporation
Bentley Pond Seepage Test at Sheridan, NV

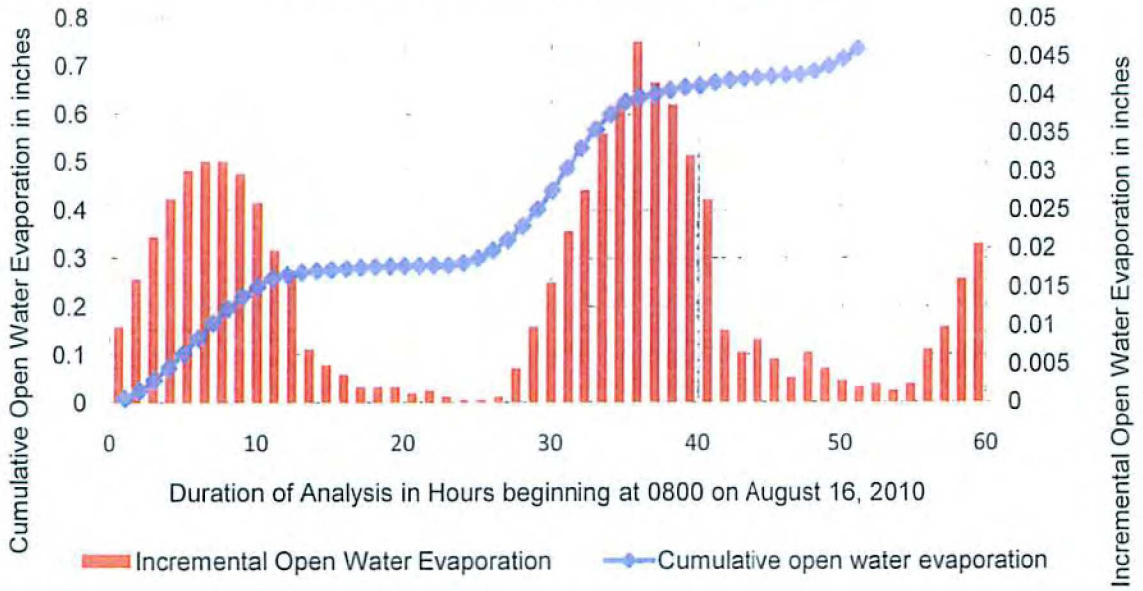


Table 1: Loss Rate Fractions

Test #	Pond	Total Measured Loss (gpm)	Depth of Surface Evaporation (ft)	Loss due to Surface Evaporation (gpm)	Canopy area of vegetation dependent on pond water (ft^2)	Loss due to Transpiration (gpm)	Loss due to Seepage (gpm)
1	Lower	20.88	0.058	2.68	13000	1.87	16.333
2	Upper	19.79	0.058	3.64	1000	0.14	16.009

Table 2: Consumptive Use derived from August Test				
	Annual Seepage (Acre feet)	Annual Pond Evaporation (Acre feet)	Annual Transpiration of Pond Water (Acre feet)	Cumulative Annual Consumptive Use (Acre feet)
Lower Pond	26.3	1.9	0.9	29.1
Upper Pond	25.8	2.6	0.1	28.5

Cumulative annual consumptive use associated with each pond is consistently higher computed from the 48-hour August test results than from the 48-hour June test results. To a small extent the error may be attributed to assumptions about transpiration rates and atmospheric conditions driving pond evaporation during the test periods, however these elements represent a small percentage of the total loss rate and would have to be substantially erroneous to explain the difference. More likely, seepage rates during the August test period were higher than seepage rates during the June test period. This explanation would be supported by lower soil moisture and lower groundwater levels expected in late summer conditions.

For the purposes of this analysis and in the absence of further data, the June test results represent a "wet" condition characterized by a seasonally high water table and high soil moisture, and the August test results represent a "dry" condition with a seasonally low water table and low soil moisture. An average of the two is a fair approximation of mean annual conditions.

The period of use for irrigation is typically considered to be April 1st to October 15th. Cumulative consumptive use for the Bentley ponds during this period can be estimated in the same way as annual consumptive use by adding seepage, plant transpiration and pond surface evaporation. Seepage is estimated as an average of the rates computed in June, 2010 and August 2010 as described above, totaled for the 198-day period April 1st –October 15th. Pond surface evaporation and transpiration rates between April 1st and October 15th are obtained from stat files available in the report Evapotranspiration and Net Irrigation Water Requirements for Nevada. In this report, data from Minden (265191) is used for the Carson Valley basin average. Consumptive use estimates for period of use is summarized in Table 3, along with annual consumptive use for both ponds.

Table 3: Consumptive Use Computed from All Data		
	Cumulative Annual Consumptive Use (Acre feet)	Cumulative Consumptive Use between April 1- October 15 (Acre feet)
Lower Pond	28.1	16.4
Upper Pond	26.2	15.2
TOTAL	**54.3**	**31.6**

Respectfully Submitted,

Steve Walmsley,

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Dated this 14th day of September, 2010.

SW/RC/AS