

MEMORANDUM

TO: Water Right File 63-34334

FROM: Daniel Nelson – Analyst 3

DATE: August 26, 2019

SUBJECT: Licensing Review of Water Right 63-34334

The field exam for this right was performed by Certified Field Examiner Scott King of SPF Water Engineering.

History and Overlap:

Permits 63-34333 and 63-34334 were field by the permit holder to allow for field flooding to attract ducks and geese and other wildlife to their property during the non-irrigation season. Both permits were approved on August 1, 2018. The headgate for permit 63-34333 washed out, so they were not able to provide proof of beneficial use at this time. However, they did file proof of beneficial use on permit 63-34334. Permit 63-34334 did require proof to be submitted until August 1, 2023, but they decided to submit proof on this single right. This will limit this permit to what was accomplished during their single season of use, and water use will be adjusted accordingly.

Place of Use:

During my review of the place of use supplied by Mr. King, I struggled in finding the area Mr. King recommended to be totally flooded. There was one field in the southwest corner of the property that didn't appear to have been flooded. I checked the Sentinel Imagery from December 5, 2018, to January 1, 2019, and the imagery suggested that southwest field was not actually irrigated.

I contacted Mr. King on this issue, and he confirmed that field was not flooded. The permit holder then request that we allow them to have a permissible place of use for this permit, but we cannot allow a permissible place of use for these uses. Mr. King confirmed that the permit holder was alright with the adjusted place of use. Please see the email string starting June 27, 2019. The second aerial image supplied shows that place of use and point of diversion associated with this permit. The legal listing for the place of use will not change as the result of the southwest field not being irrigated, but it will change the amount of storage this license can authorize.

Point of Diversion:

Mr. King placed the point of diversion for this permit in the SWSE of Section 16, Township 5 North, Range 5 West. The permit listed the same point of diversion, but the application for permit also stated that the water would be delivered through the Island Highline Ditch. You can clearly see a diversion from the Boise River into a ditch at the location listed on the permit, but there doesn't appear to be a ditch at the point of diversion listed in the Island Highline Ditch Company water rights. With the information available to me, it appears as though the Island Highline Ditch point of diversion has either been moved or was decreed incorrectly. The point of diversion listed in the field examination appears to be correct.

Diversion Rate:

Mr. King recommended a diversion rate of 13.1 cfs. I couldn't confirm the rates through water district records, since they are only kept during the irrigation season. However, we did receive an affidavit from the permit holder and the canal company that water was diverted under this permit.

The rating table for the ramped flume on this ditch is listed in 3 cfs increments, so it isn't very helpful. However, Mr. King did provide a measurement using an Acoustic Doppler measuring device. This device determined that the flow rate at the time of the measurement was 29.5 cfs, which is well above the 13.1 cfs authorized by the permit. Mr. King stated that he measured a head on the flume of 0.88 feet, which would equal 30 cfs based on the table. Therefore, I believe the measurement was accurate, but it considerably over what was authorized by the permit. I agree with Mr. King's recommendation of 13.1 cfs for a diversion rate.

Diversion Volume:

The volumes for this storage component were based on the amounts authorized by the permits, which are not acceptable, because the area and the time was reduced based due to the reduced use during the development period.

I ran a pond spreadsheet on this water use. I used the same soils that were used in the permit, but with the reduced area. The ponds were only full for 123 days, so I reduced the number of days that seepage would occur to 123 (please see Scott King's email dated June 13, 2019). For the evaporation, I used the time Mr. King discussed in his June 13, 2019, email and used "0" to avoid exceeding the volume amounts for this system during the development period. The estimated depth of the ponds was $\frac{1}{2}$ or 0.5 feet, and 58 acres were flooded during the development period. Using the reduced area, I determined that the total storage use would need to be limited to 668 af, with 29 af for the capacity of the storage and 639 af for seepage and evaporation. Please see the attached pond sheet for these changes.

Mr. King recalculated the total volume based on the 123 days of use at 3,196 af (please see Scott King's email dated June 13, 2019). Mr. King's analysis was based on the total flow times the amount of time used, but he did not separate out the storage and the wildlife and recreational uses. The wildlife and recreational uses would be the flow through or the amount not used in the storage component. Therefore, the total volume for the flow through would be 2,528 af (3,196 total volume diverted – 668 af storage volume = 2,528 af flow through volume).

The volumes recommended for this permit will be 668 af of storage volume, 2,528 af of wildlife and recreation volume for a total volume of 3,196 af. I didn't follow the significant figure rule on these volumes, because it wouldn't make any sense due to the differences in volumes.

Conditions:

The majority of the conditions will be carried forward to licensing except for the standard permit conditions. Condition 26A, 01J and 121 will be removed at licensing. Condition 01J will be replaced with R43, and 121 will be replaced with 103. Conditions 219 and 220 will be updated with the correct volumes and acre amounts.

The X35 condition will also be removed, since we cannot include a combined limitation with a permit and water right. However, there is a condition that limits the diversion rate with irrigation rights on the place of use, which can be updated to include wildlife, wildlife storage, recreation, and recreation storage rights. At first I thought to change this condition to the standard language in an X35 condition, but there does seem to be a mix of irrigation rights from two ditch companies that could cause limitations or the illusion of additional water delivery requirements on the ditch company rights that are unintended if we list these rights. One ditch company supplies one half of the place of use and the other ditch company supplies the other half of the place of use.

Permit 63-34334 – Field Exam Map

The image below is a May 8, 2019 ESRI image of the place of use. The place of use is shown in the Yellow Border and the point of diversion is shown as a yellow dot. Please note the location of the Island Highline Ditch Company's point of diversion at the red box. You can clearly see the Island Highline Ditch, and that it is supplied at the point of diversion shown on the permit. It appears as though the point of diversion for the Island Highline Ditch Company was either decreed at the wrong location or that it has been moved.



Permit 63-34334

The following image is from the December 28, 2018 Sentinel imagery that shows that the field in the southwest corner is not flooded. The area enclosed in the yellow border does appear to have been flooded in this image.



Total Storage Calculations

FILE NUMBER	63-34334
REVIEWER	Dan Nelson
DATE	8/26/2019

This spreadsheet has been designed by Idaho Department of Water Resources to estimate the total seepage, evaporation and fill capacity required for a pond.

User Input
Calculated value
Formula Explanations

Surface Area (AC.)	58	"Surface Area" is automatically carried over from the "Seepage Loss" sheet.
Average Pond Depth (FT.)	0.5	"Average Pond Depth" depicts the actual depth of the pond either measured or estimated. Note: If you know the maximum depth and not the average depth, the Field Examiner's Handbook suggests multiplying the maximum depth by 0.4 to get the average depth, or you can use any method that seems reasonable to attain average depth.
Pond Capacity (AF)	29	Pond Capacity is calculated by multiplying the Pond Surface Area by the Average Pond Depth. If you know the capacity, divide the capacity by surface area and enter the average pond depth in the space above. Note: If pond capacity is determined using a method shown on the "Pond Capacity" sheet, the user may need to modify the value of "Pond Capacity" (cell B9) manually. Note that if the value is modified manually, the formula will be altered for future use.
Multiple Fill Volume Above Initial Fill to Fulfill From Storage Needs- "Multiple Fills" (AF)	0	The "Multiple Fill Volume Above Initial Fill" is the acre-feet of water required to meet a <i>from storage</i> component if the <i>from storage</i> component exceeds a one time fill. This section should not include the amount of water needed to fill the pond initially or the amount of water needed to maintain the pond level due to evaporation or seepage. For example: if a pond has a capacity of 5 acre feet and 2.5 acre feet of seepage and evaporation, but the pond is used for irrigation that requires 10 acre feet of from storage for the irrigation use, then you would insert 5 acre feet into this location (10 acre feet needed - 5 acre feet from the initial fill = 5 acre feet of additional storage needed). Note: You must have a "From Storage" component exceeding the initial fill on the permit to include a volume in this space.
Estimated Seepage Loss (AF)	629.8	The "Estimated Seepage Loss" is automatically carried over from the "Seepage Loss" sheet.
Estimated Evaporation Loss (AF)	8.8	The "Estimated Evaporation Loss" is automatically carried over from the "Evaporation Loss" sheet.
Total Volume Required (AF)	667.6	The "Total Volume Required" is calculated by adding the Pond Capacity, Multiple Fills, Seepage Loss, and Evaporation Loss amounts to determine the total amount of storage required.

Evaporation Loss Calculations

This spreadsheet has been designed by Idaho Department of Water Resources to estimate the annual evaporation losses from a pond.

FILE NUMBER	63-12601
REVIEWER	Dan Nelson
DATE	5/9/2018

User Input
Calculated value
Formula Explanations

The acronyms used on the Kimberly Research Center website are defined below:

P = Precipitation
ET= Evapotranspiration
P _d = Precipitation deficit
P _d =ET-P

USING THIS SPREADSHEET

Use the link below to access the Kimberly Research Center website. This website provides the Precipitation Deficit for a station most representative of the pond under examination. The Precipitation Deficit is the total amount of free water surface evaporation minus the precipitation for a given area, which gives the total amount of evaporative losses incurred by the pond. There are several weather sites that are used throughout the state. IDWR staff can find the nearest site using Arc Map. The shape file containing the sites can be found at <X:/Spatial/Climate/ETIdahostations.shp>.

Instructions:

1. Use the link below to navigate to ET Idaho 2012.
2. Select the station which is most representative to your pond location.
3. Click Submit Query.
4. Under "Land Covers with Evapotranspiration Estimates," select "Open Water - Shallow Systems (ponds, streams)" or "Open Water - small stock ponds" depending on the pond size.
5. Click the link to "Precipitation Deficit."
6. Reference and copy (ctrl + C) the first subheading "Mean" values.
7. Click the "Paste Values from ET Idaho" button. The table will automatically enter a zero (0) for any negative precipitation deficit values.

Found at: <http://data.kimberly.uidaho.edu/ETIdaho/>

Precipitation Deficit

Station: Parma Exp. Stn. (NWS -- USC00106844)

Month	mm/day ¹	Days per month	mm/Month
Jan	-0.59	31	0.00
Feb	0.00	28	0.00
March	0.00	31	0.00
April	0.00	30	0.00
May	0.00	31	0.00
June	0.00	30	0.00
July	0.00	31	0.00
August	0.00	31	0.00
September	0.00	30	0.00
October	1.49	31	46.19
November	-0.02	30	0.00
December	-0.61	31	0.00

PLEASE NOTE: The seasonal average for precipitation deficit should not be used for calculations because precipitation often exceeds evaporation during wetter months of the year. If the pond is kept full, excess precipitation during wetter months does not serve to refill the pond during drier months.

For example, see Sandpoint KSPT (NWS -- 108137), the annual precipitation deficit is -106 mm. However, April through September have positive precipitation deficit values. To properly estimate the annual volume of water necessary to refill a pond due to evaporation losses, the table will automatically enter a zero (0) for each month that the precipitation value is reported as a negative value.

As described above, precipitation offsets evaporation in winter months, so the net effect is that wintertime precipitation deficit is usually zero.

Total mm/year = 46.19

$[(\text{mm/yr}) \div (\text{convert to feet})] \times (\text{Surface area of pond, in acres}) = \text{Evaporation Loss in Acre Feet}$

$$(46.19 \div 304.8) \times 58.00 = 8.8 \text{ AFA}$$

Seepage Loss Calculations

This spreadsheet has been designed by Idaho Department of Water Resources to estimate the total annual seepage losses from a pond.

FILE NUMBER	63-34334
REVIEWER	Dan Nelson
DATE	8/26/2019

User Input
Calculated value
Formula Explanations

INPUTS

Pond Surface Area (AC.)	22	AC.
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Pond Surface Area (SQ. FT.)	958320	SQ. FT.
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I used the following method to obtain my Soil Classification information:	NRCS Web Soil Survey	
My Soil Classification is	SM	
Suggested Seepage Rate (FT./DAY)	0.2000	FT./DAY

Formula: (Surface Area X Seepage Rate) X 7.48 = Gallons Per Day Loss		
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Convert to GPD	1433647	GPD
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Total Seepage Loss (AFA)	541.2	AFA
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Though sand and gravel seepage rates may actually be higher, the maximum allowable rate is 0.2 ft/day, pursuant to Administrative Memo "Seepage Loss Standards for Ponds and Reservoirs."

Suggested Seepage Rates for Different Soil Types:

GW, GP, GM, GC, SW, SP and SM (silty sand, sand silt mixtures and gravel mixtures) = 0.2 ft per day

OL and ML (inorganic silts - very fine sands, silty, or clayey fine sands) = 0.02 ft per day

SC (clayey sands, sand clay mixtures) = 0.007 ft per day

CL (Low to medium plasticity clays) = 0.003 ft per day

MH, OH, PT and CH (high plasticity clays) = 0.0003 ft per day

LINED PONDS (liners can be chemical, fabric, or bentonite) = 0 ft per day

Ponds Intercepting Groundwater (excavated ponds filled by ground water) = 0 ft per day

PLEASE NOTE: The initial basis for the Suggested Seepage Rates in the table above is found on Page 16 of Seepage from Fish Ponds, Bulletin 599, August 1989 Alabama Agricultural experiment Station, Auburn University, Auburn University Alabama. If you don't know the soil type, please refer to the map provided at the NRCS Web Soil Survey (Tab #1), an ArcMap Soil Classification Map (Tab #1.1), or published NRCS Soil Survey (Tab #1.2). Use "0" if the pond fill relies on the water table.

Seepage Loss Calculations

This spreadsheet has been designed by Idaho Department of Water Resources to estimate the total annual seepage losses from a pond.

FILE NUMBER	63-34334
REVIEWER	Dan Nelson
DATE	8/26/2019

User Input
Calculated value
Formula Explanations

INPUTS

Pond Surface Area (AC.)	36	AC.
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Pond Surface Area (SQ. FT.)	1568160	SQ. FT.
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I used the following method to obtain my Soil Classification information:	NRCS Web Soil Survey	
My Soil Classification is	ML	
Suggested Seepage Rate (FT./DAY)	0.0200	FT./DAY

Formula: (Surface Area X Seepage Rate) X 7.48 = Gallons Per Day Loss		
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Convert to GPD	234597	GPD
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Total Seepage Loss (AFA)	88.6	AFA
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Though sand and gravel seepage rates may actually be higher, the maximum allowable rate is 0.2 ft/day, pursuant to Administrative Memo "Seepage Loss Standards for Ponds and Reservoirs."

Suggested Seepage Rates for Different Soil Types:
GW, GP, GM, GC, SW, SP and SM (silty sand, sand silt mixtures and gravel mixtures) = 0.2 ft per day
OL and ML (inorganic silts - very fine sands, silty, or clayey fine sands) = 0.02 ft per day
SC (clayey sands, sand clay mixtures) = 0.007 ft per day
CL (Low to medium plasticity clays) = 0.003 ft per day
MH, OH, PT and CH (high plasticity clays) = 0.0003 ft per day
LINED PONDS (liners can be chemical, fabric, or bentonite) = 0 ft per day
Ponds Intercepting Groundwater (excavated ponds filled by ground water) = 0 ft per day

PLEASE NOTE: The initial basis for the Suggested Seepage Rates in the table above is found on Page 16 of Seepage from Fish Ponds, Bulletin 599, August 1989 Alabama Agricultural experiment Station, Auburn University, Auburn University Alabama. If you don't know the soil type, please refer to the map provided at the NRCS Web Soil Survey (Tab #1), an ArcMap Soil Classification Map (Tab #1.1), or published NRCS Soil Survey (Tab #1.2). Use "0" if the pond fill relies on the water table.



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[Water Resources Program](#)

ETIdaho 2017

**[Evapotranspiration and Consumptive
Irrigation Water Requirements
for Idaho](#)**

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uidaho dot edu

2019-08-26 10:00

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[Parma Exp. Stn. \(NWS -- USC00106844\)](#)

Statistics based on thirty year normal spans 1981 to 2011 years

For a different land cover or crop click on the above link.

You can highlight this table and copy via the clipboard to a Microsoft Excel or OpenOffice spreadsheet to plot or otherwise work with this data.

Open water - small stock ponds Precipitation Deficit (Click here for a graph)															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Growing Season ^a	Non Growing Season ^b	Annual
Mean ⁱ	mm/day												mm		
Monthly ^c	-0.59	0.22	1.22	2.54	3.14	4.06	4.82	4.26	2.95	1.49	-0.02	-0.61	718	0	718
15-Day Moving Average ^d	-0.68	0.09	1.27	2.64	3.15	4.11	4.88	4.23	2.85	1.54	-0.01	-0.59			
7-Day Moving Average ^e	-0.65	0.18	1.24	2.62	3.14	4.09	4.85	4.25	2.89	1.50	-0.03	-0.59			
3-Day Moving Average ^f	-0.60	0.23	1.22	2.58	3.14	4.07	4.83	4.26	2.93	1.49	-0.01	-0.61			

Standard Deviation ^k	mm/day												mm		
Monthly ^c	0.93	0.62	1.32	0.58	1.54	0.75	0.63	0.59	0.70	0.88	0.71	1.10	91	0	91
15-Day Moving Average ^d	1.02	0.82	1.13	0.77	1.60	1.00	0.52	0.60	0.98	0.83	0.89	1.00			
7-Day Moving Average ^e	1.33	1.04	1.43	1.14	2.02	1.37	0.67	0.82	1.27	1.20	1.14	1.27			
3-Day Moving Average ^f	1.78	1.34	1.87	1.68	2.47	1.83	0.94	1.08	1.59	1.57	1.55	1.75			
20% Exceedance ^l	mm/day												mm		
Monthly ^c	-0.05	0.85	1.86	3.03	3.91	4.77	5.20	4.65	3.49	1.96	0.64	0.05	796	0	796
15-Day Moving Average ^d	0.32	1.00	2.73	3.83	5.14	5.46	5.49	4.92	3.93	2.56	1.10	0.38			
7-Day Moving Average ^e	0.55	1.54	3.02	4.53	5.71	5.73	5.68	5.24	4.24	2.98	1.47	0.60			
3-Day Moving Average ^f	0.67	1.85	3.44	5.30	6.28	6.19	6.00	5.44	4.58	3.27	1.62	0.72			
80% Exceedance ^m	mm/day												mm		
Monthly ^c	-1.22	-0.45	0.12	2.10	2.53	3.29	4.44	3.96	2.33	1.01	-0.83	-1.48	620	0	620
15-Day Moving Average ^d	-2.16	-1.40	-0.73	1.13	1.01	1.89	3.84	3.17	1.24	0.21	-1.62	-2.26			
7-Day Moving Average ^e	-3.24	-2.28	-2.62	-0.11	-0.98	0.22	2.91	2.25	-0.29	-1.01	-3.19	-3.35			
3-Day Moving Average ^f	-6.00	-4.87	-4.46	-2.56	-4.53	-2.99	0.93	-0.04	-2.38	-3.78	-5.06	-7.45			
Ave Highest P _{def}	mm/day												--		
15-Day Moving Average ^g	0.19	0.63	2.07	3.35	4.26	4.93	5.21	4.69	3.55	2.14	0.63	0.22			
7-Day Moving Average ^h	0.42	1.13	2.63	4.03	5.11	5.48	5.45	5.03	4.00	2.57	1.02	0.45			
3-Day Moving Average ⁱ	0.57	1.40	3.10	4.69	5.69	5.93	5.77	5.32	4.35	2.85	1.38	0.59			
Ave Lowest P _{def}	mm/day												--		
15-Day Moving Average ^g	-1.25	-0.27	0.48	1.84	2.00	3.21	4.47	3.77	2.24	0.88	-0.66	-1.29			
	-2.28	-0.99	-0.55	0.71	0.41	2.05	3.90	3.16	1.46	-0.02	-1.53	-2.21			