Groundwater Application Review Summary Form

Application # G- 18557

GW Reviewer DENNIS ORLOWSKI **Date Review Completed:** 12/04/2017

Summary of GW Availability and Injury Review:

[ ] Groundwater for the proposed use is either over appropriated, will not likely be available in the amounts requested without injury to prior water rights, OR will not likely be available within the capacity of the groundwater resource per Section B of the attached review form.

Summary of Potential for Substantial Interference Review:

[X] There is the potential for substantial interference per Section C of the attached review form.

Summary of Well Construction Assessment:

[ ] The well does not appear to meet current well construction standards per Section D of the attached review form. Route through Well Construction and Compliance Section.

This is only a summary. Documentation is attached and should be read thoroughly to understand the basis for determinations and for conditions that may be necessary for a permit (if one is issued).

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date 12/04/2017

FROM: Groundwater Section Dennis Orlowski
Reviewer's Name

SUBJECT: Application G- 18557 Supersedes review of _____
Date of Review(s)

PUBLIC INTEREST PRESUMPTION; GROUNDWATER

OAR 690-310-130 (1) *The Department shall presume that a proposed groundwater use will ensure the preservation of the public welfare, safety and health as described in ORS 537.525.* Department staff review groundwater applications under OAR 690-310-140 to determine whether the presumption is established. OAR 690-310-140 allows the proposed use be modified or conditioned to meet the presumption criteria. **This review is based upon available information and agency policies in place at the time of evaluation.**

A. GENERAL INFORMATION: Applicant's Name: Mike Cereghino County: Multnomah

A1. Applicant(s) seek(s) 1.22 cfs from one well(s) in the Willamette Basin, _____ subbasin

A2. Proposed use Primary (14.9 ac) & Supplemental (98.8 ac) Irrigation Seasonality: March 1 – October 31

A3. Well and aquifer data **(attach and number logs for existing wells; mark proposed wells as such under logid)**:

Well	Logid	Applicant's Well #	Proposed Aquifer*	Proposed Rate(cfs)	Location (T/R-S QQ-Q)	Location, metes and bounds, e.g. 2250' N, 1200' E fr NW cor S 36
1	**Proposed**	**1**	**Alluvium**	**1.22**	**T3N/R1W-35 SW-NW**	**1900' S, 350' E fr NW cor S 35**

* Alluvium, CRB, Bedrock

Well	Well Elev ft msl	First Water ft bls	SWL ft bls	SWL Date	Well Depth (ft)	Seal Interval (ft)	Casing Intervals (ft)	Liner Intervals (ft)	Perforations Or Screens (ft)	Well Yield (gpm)	Draw Down (ft)	Test Type
1	**20**	**TBD**	**Est 5-10**	**TBD**	**Est 200**	**Est 0-40**	**--**	**--**	**Est 150-200**	**TBD**	**TBD**	**TBD**

Use data from application for proposed wells.

A4. **Comments:** The location for this proposed POA is on Sauvie Island, about 3 miles downstream of the Willamette River's confluence with the Columbia River.

This application was submitted to replace expired permit G-16372 (application G-16688). That permit expired in 2012 because the proposed well was not constructed within the allowable timeframe. Many specifics of permit G-16372 (i.e., proposed well location, type and place of use) are common to this current application.

Planned construction details for the proposed well ("Well 1") were not included with this application; estimated completion depths in Table A3 are the same as those used for the previous groundwater review of application G-16688/expired permit G-16372. From that prior information, a well at this location completed to an approximate total depth of 200 ft will obtain groundwater from the Unconsolidated Sedimentary Aquifer (USA) (Swanson and others, 1993; Conlon and others, 2005).

A5. ☒ **Provisions of the** Willamette Basin rules relative to the development, classification and/or management of groundwater hydraulically connected to surface water ☐ **are**, *or* ☒ **are not**, activated by this application. (Not all basin rules contain such provisions.)
Comments: The proposed POA/well is not located within an identified Willamette River Basin WAB, and thus the pertinent basin rules (OAR 690-502-0240) do not apply to this application.

A6. ☐ **Well(s) #** _____, _____, _____, _____, _____, tap(s) an aquifer limited by an administrative restriction.
Name of administrative area: **Not applicable**
Comments: _____

B. GROUNDWATER AVAILABILITY CONSIDERATIONS, OAR 690-310-130, 400-010, 410-0070

B1. **Based upon available data**, I have determined that groundwater* for the proposed use:

a. ☐ **is** over appropriated, ☒ **is not** over appropriated, *or* ☐ **cannot be determined to be** over appropriated during any period of the proposed use. * This finding is limited to the groundwater portion of the over-appropriation determination as prescribed in OAR 690-310-130;

b. ☐ **will not** *or* ☐ **will** likely be available in the amounts requested without injury to prior water rights. * This finding is limited to the groundwater portion of the injury determination as prescribed in OAR 690-310-130;

c. ☐ **will not** *or* ☒ **will** likely to be available within the capacity of the groundwater resource; or

d. ☒ **will, if properly conditioned**, avoid injury to existing groundwater rights or to the groundwater resource:
   i. ☒ The permit should contain condition #(s) **7n (annual meas.), large water-used reporting**;
   ii. ☒ The permit should be conditioned as indicated in item 2 below.
   iii. ☐ The permit should contain special condition(s) as indicated in item 3 below;

B2. a. ☐ **Condition** to allow groundwater production from no deeper than _____ ft. below land surface;

b. ☐ **Condition** to allow groundwater production from no shallower than _____ ft. below land surface;

c. ☒ **Condition** to allow groundwater production only from the **alluvial** groundwater reservoir ~~between approximately _____ ft. and _____ ft. below land surface;~~

d. ☐ **Well reconstruction** is necessary to accomplish one or more of the above conditions. The problems that are likely to occur with this use and without reconstructing are cited below. Without reconstruction, I recommend withholding issuance of the permit until evidence of well reconstruction is filed with the Department and approved by the Groundwater Section.

Describe injury –as related to water availability– that is likely to occur without well reconstruction (interference w/ senior water rights, not within the capacity of the resource, etc): _____

B3. **Groundwater availability remarks:** The proposed POA will obtain groundwater from generally unconfined sand and gravel deposits of the Unconsolidated Sedimentary Aquifer (USA). The total thickness of the USA in this area is estimated to range from about 200-400 feet. The proposed POA location is ~ 200 ft from Dairy Creek, which discharges to the Columbia River ~2200 feet to the east. The general coincidence of local groundwater and surface water levels indicates hydraulic connection between the USA and the Columbia River system in this area. This high-permeability alluvial aquifer system, coupled with its highly-efficient hydraulic connection with the Columbia and other surface water features on Sauvie Island, results in reported yields for nearby production wells ranging from several hundred to several thousand gpm (Swanson and others, 1993).

Historic groundwater data for the area is extremely sparse. However, local recharge of the shallow, predominantly unconfined USA system is relatively high (Conlon and others, 2005). Also, an efficient hydraulic connection exists between the Columbia River system and the USA. These factors likely preclude over-appropriation of this aquifer system because many wells effectively obtain much water from the major river system. Despite this conclusion, and because local groundwater data is nearly non-existent, the permit conditions noted in B1(d)(i) are recommended to provide additional information to support future understanding and management of the groundwater resource in this area.

C. GROUNDWATER/SURFACE WATER CONSIDERATIONS, OAR 690-09-040

C1. **690-09-040 (1):** Evaluation of aquifer confinement:

Well	Aquifer or Proposed Aquifer	Confined	Unconfined
1	**Unconsolidated Sedimentary Aquifer (USA)**	☐	☒

Basis for aquifer confinement evaluation: Nearby well logs show water-bearing sand and gravel deposits overlain by 60-80 of low-permeability silt and clay. Locally, the aquifer tapped by some of these wells might be under semi-confined conditions. However, on Sauvie Island the overlying low-permeability deposits are not laterally extensive; this characteristic, coupled with the efficient hydraulic connection between the USA and the Columbia River system, suggests the USA is generally unconfined.

C2. **690-09-040 (2) (3):** Evaluation of distance to, and hydraulic connection with, surface water sources. All wells located a horizontal distance less than ¼ mile from a surface water source that produce water from an unconfined aquifer shall be assumed to be hydraulically connected to the surface water source. Include in this table any streams located beyond one mile that are evaluated for PSI.

Well	SW #	Surface Water Name	GW Elev ft msl	SW Elev ft msl	Distance (ft)	Hydraulically Connected? YES	NO	ASSUMED	Potential for Subst. Interfer. Assumed? YES	NO
1	1	**Dairy Creek**	**5-10**	**5-10**	**200**	☒	☐	☐	☒	☐
1	2	**Sturgeon Lake**	**5-10**	**5-10**	**1250**	☒	☐	☐	☒	☐
1	3	**Columbia River**	**5-10**	**5-10**	**1800**	☒	☐	☐	☐	☒

Basis for aquifer hydraulic connection evaluation: Estimated groundwater and surface water elevations are generally coincident. This fact indicates hydraulic connection between the USA and all three surface waters listed in Table C2.

Water Availability Basin the well(s) are located within: None established

C3a. **690-09-040 (4):** Evaluation of stream impacts for each well that has been determined or assumed to be **hydraulically connected and less than 1 mile** from a surface water source. Limit evaluation to instream rights and minimum stream flows that are pertinent to that surface water source, and not lower SW sources to which the stream under evaluation is tributary. Compare the requested rate against the 1% of 80% *natural* flow for the pertinent Water Availability Basin (WAB). If Q is not distributed by well, use full rate for each well. Any checked ☒ box indicates the well is assumed to have the potential to cause PSI.

Well	SW #	Well < ¼ mile?	Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
1	1	☒	☐	**NA**	**NA**	☐	**NA**	☐	**~1**	☒
1	2	☒	☐	**NA**	**NA**	☐	**NA**	☐	**~22**	☒
1	3	☐	☐	**NA**	**NA**	☐	**NA**	☐	**~7**	☐

C3b. **690-09-040 (4):** Evaluation of stream impacts by total appropriation for all wells determined or assumed to be **hydraulically connected and less than 1 mile** from a surface water source. **Complete only if Q is distributed among wells**. Otherwise same evaluation and limitations apply as in C3a above.

	SW #		Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
			☐			☐		☐		☐

Comments:

C3a: The Hunt 2003 analytical stream depletion model was used to estimate 30-day interference at SW1 (Dairy Creek), SW2 (Sturgeon Lake), and SW3 (Columbia River) caused by pumping Well 1 continuously at the maximum allowed allocation for 240 days. Model results indicate that interference is expected to range from low to moderate at 30 days. However, these estimates are conservatively high because each hydraulically-connected surface water feature was evaluated independently. In reality, in addition to water stored in the aquifer, flow to the well will also be contributed by all three surface water sources, each of which are connected to each other in close proximity to the proposed POA location.

C3b: Not applicable

C4a. **690-09-040 (5):** Estimated impacts on **hydraulically connected surface water sources greater than one mile** as a percentage of the proposed pumping rate. Limit evaluation to the effects that will occur up to one year after pumping begins. This table encompasses the considerations required by 09-040 (5)(a), (b), (c) and (d), which are not included on this form. Use additional sheets if calculated flows from more than one WAB are required.

Non-Distributed Wells Well SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS												
Interference CFS												
Distributed Wells Well SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS												
Interference CFS												
(A) = Total Interf.												
(B) = 80 % Nat. Q												
(C) = 1 % Nat. Q												
(D) = (A) > (C)												
(E) = (A / B) x 100	%	%	%	%	%	%	%	%	%	%	%	%

(A) = total interference as CFS; (B) = WAB calculated natural flow at 80% exceed. as CFS; (C) = 1% of calculated natural flow at 80% exceed. as CFS; (D) = highlight the checkmark for each month where (A) is greater than (C); (E) = total interference divided by 80% flow as percentage.

Basis for impact evaluation: Not applicable

C4b. **690-09-040 (5) (b) The potential to impair or detrimentally affect the public interest is to be determined by the Water Rights Section.**

C5. ☐ **If properly conditioned**, the surface water source(s) can be adequately protected from interference, and/or groundwater use under this permit can be regulated if it is found to substantially interfere with surface water:

i. ☐ The permit should contain condition #(s)_____;

ii. ☐ The permit should contain special condition(s) as indicated in "Remarks" below;

C6. **SW / GW Remarks and Conditions:**

PSI was determined because of the proposed POA's proximity to SW1, Dairy Creek, and SW 2, Sturgeon Lake. However, actual interference impacts to SW 1 and SW 2 will likely be negligible because these surface water sources are directly and proximally connected to the Columbia River. Also, as discussed in Section C3a of this review, stream interference impacts will be distributed to all nearby surface water sources.

Furthermore, Sauvie Island is in general a very water-rich environment, with the USA groundwater system replenished seasonally by direct infiltration of precipitation, and year-round by contributions from the adjacent Columbia River system. **Therefore, despite the PSI finding with SW1, it is unlikely that pumping of this proposed POA will adversely impact flow conditions in SW1.**

References Used:

Application G-18551 file

Conlon, T.D., Wozniak, K.C., Woodcock, D., Herrera, N.B., Fisher, B.J., Morgan, D.S., Lee, K.K., and Hinkle, S.R., 2005, Ground-water hydrology of the Willamette Basin, Oregon: U.S. Geological Survey Scientific Investigations Report 2005-5168.

Hunt, B., 2003, Unsteady stream depletion when pumping from semiconfined aquifer: Journal of Hydrologic Engineering, January/February, 2003.

Swanson, R.D., McFarland, W.D., Gonthier, J.B., and Wilkinson, J.M., 1993, A description of hydrogeologic units in the Portland basin, Oregon and Washington: U.S.Geological Survey Water-Resources Investigations Report 90-4196, 56p.

D. WELL CONSTRUCTION, OAR 690-200

D1. **Well #:** _____ **Logid:** _____

D2. **THE WELL does not appear to meet current well construction standards based upon:**

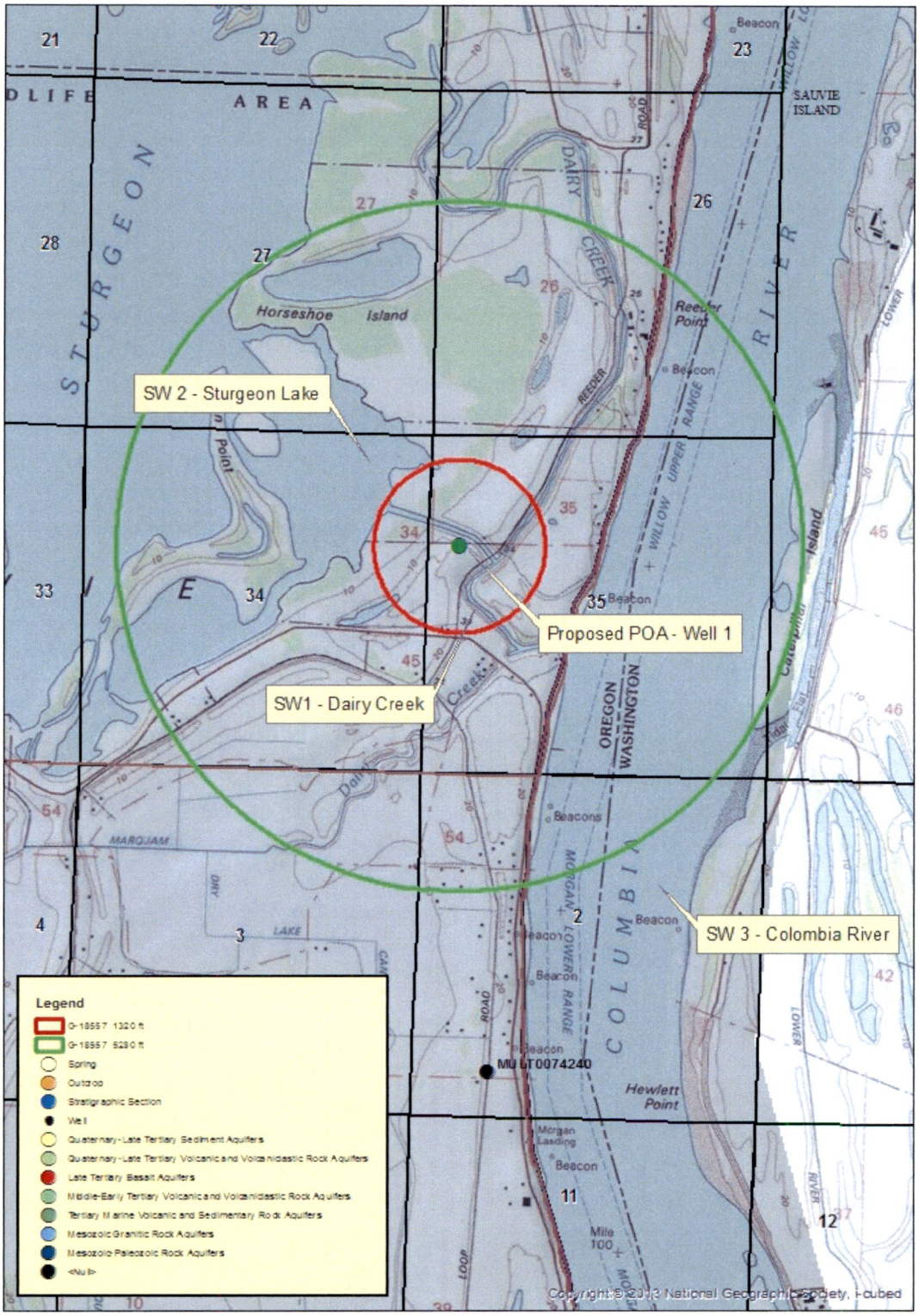
a. ☐ review of the well log;
b. ☐ field inspection by _____;
c. ☐ report of CWRE _____;
d. ☐ other: (specify) _____
_____

D3. **THE WELL construction deficiency or other comment is described as follows:** _____
_____
_____
_____
_____

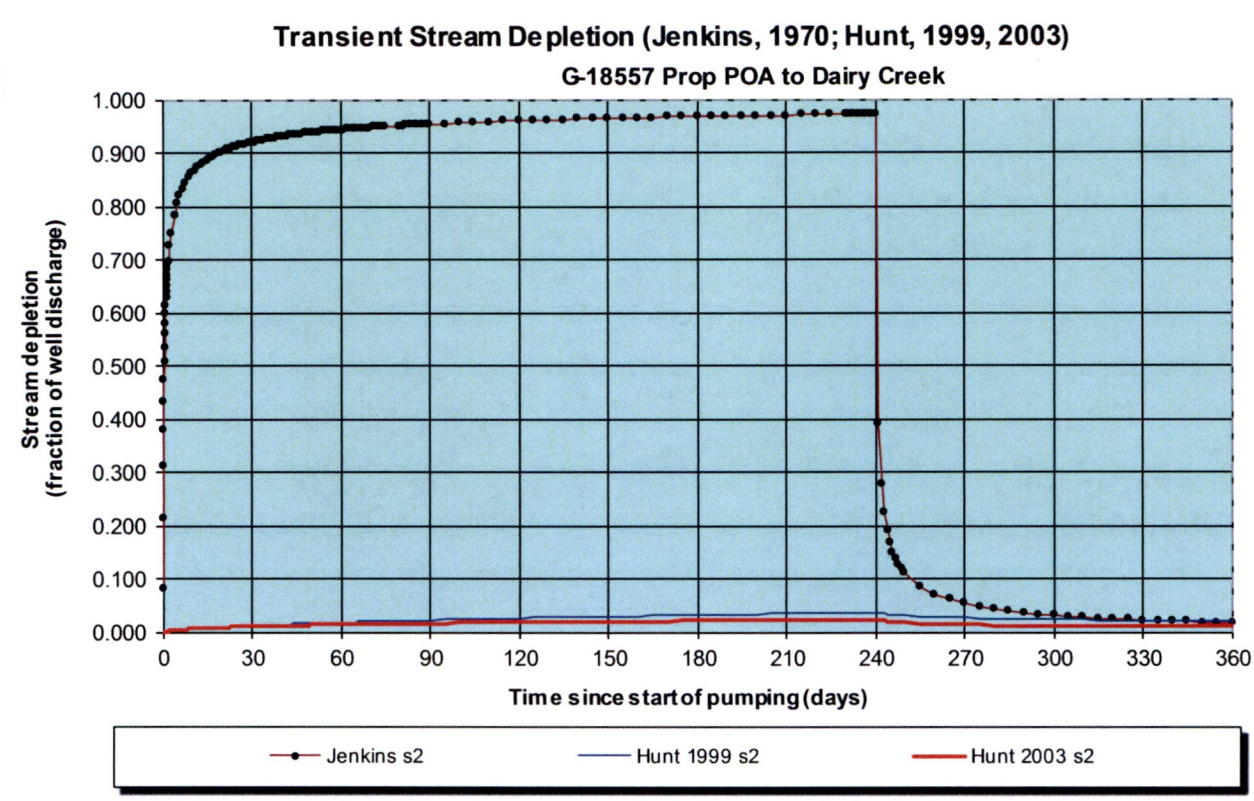
D4. ☐ **Route to the Well Construction and Compliance Section for a review of existing well construction.**

Well Location Map

Application G-18557, Cereghino, T3N, R1W Section 35



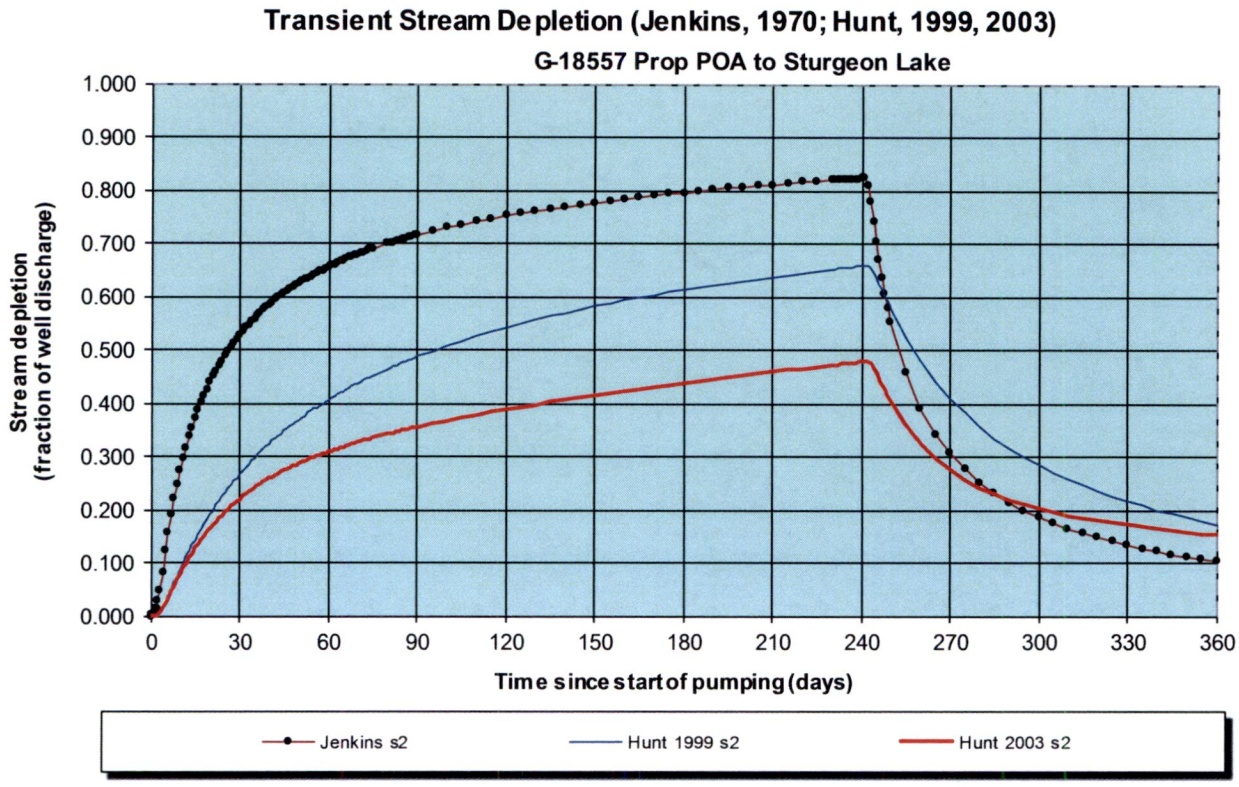
Stream Depletion Analytical Modeling Results (Hunt 2003) – POA to SW 1 (Dairy Creek)



Output for Stream Depletion, Scenerio 2 (s2):						Time pump on (pumping duration) = 240 days						
Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	91.9%	94.3%	95.3%	96.0%	96.4%	96.7%	96.9%	97.1%	5.4%	3.2%	2.2%	1.7%
H SD 1999	1.2%	1.8%	2.2%	2.6%	2.9%	3.2%	3.5%	3.7%	2.7%	2.4%	2.1%	2.0%
H SD 2003	1.07%	1.42%	1.65%	1.82%	1.97%	2.11%	2.23%	2.36%	1.40%	1.16%	1.04%	0.97%
Qw, cfs	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220
H SD 99, cfs	0.015	0.022	0.027	0.032	0.036	0.039	0.042	0.045	0.033	0.029	0.026	0.024
H SD 03, cfs	0.013	0.017	0.020	0.022	0.024	0.026	0.027	0.029	0.017	0.014	0.013	0.012

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	1.22	1.22	1.22	cfs
Time pump on (pumping duration)	tpon	240	240	240	days
Perpendicular from well to stream	a	200	200	200	ft
Well depth	d	200	200	200	ft
Aquifer hydraulic conductivity	K	1	50	100	ft/day
Aquifer saturated thickness	b	130	130	130	ft
Aquifer transmissivity	T	130	6500	13000	ft*ft/day
Aquifer storativity or specific yield	S	0.1	0.1	0.1	
Aquitard vertical hydraulic conductivity	Kva	0.1	0.1	0.1	ft/day
Aquitard saturated thickness	ba	70	70	70	ft
Aquitard thickness below stream	babs	60	60	60	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	70	70	70	ft
Streambed conductance (lambda)	sbc	0.116667	0.116667	0.116667	ft/day
Stream depletion factor	sdf	30.769231	0.615385	0.307692	days
Streambed factor	sbf	0.179487	0.003590	0.001795	
input #1 for Hunt's Q_4 function	t'	0.032500	1.625000	3.250000	
input #2 for Hunt's Q_4 function	K'	0.439560	0.008791	0.004396	
input #3 for Hunt's Q_4 function	epsilon'	0.500000	0.500000	0.500000	
input #4 for Hunt's Q_4 function	lamda'	0.179487	0.003590	0.001795	

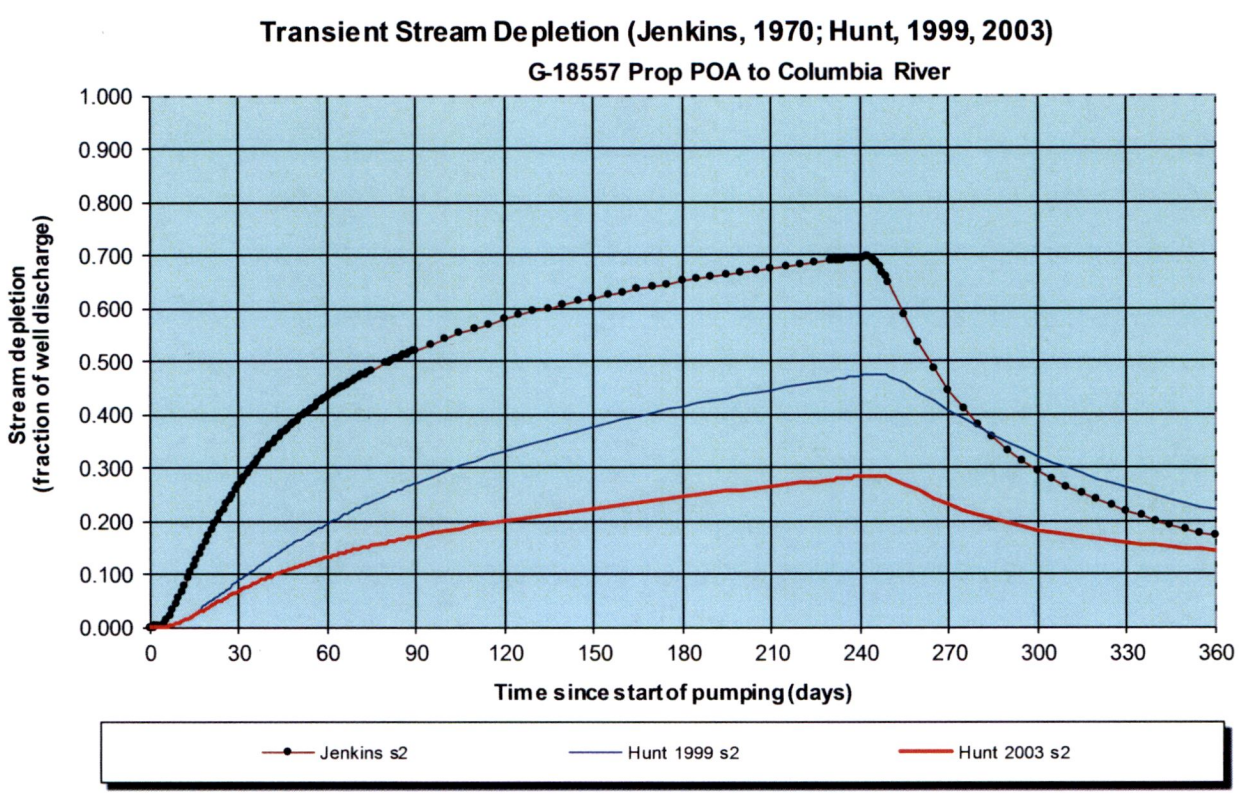
Stream Depletion Analytical Modeling Results (Hunt 2003) – POA to SW 2 (Sturgeon Lake)



Output for Stream Depletion, Scenerio 2 (s2):						Time pump on (pumping duration) = 240 days						
Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	52.7%	65.4%	71.5%	75.2%	77.7%	79.6%	81.1%	82.3%	30.6%	18.7%	13.4%	10.3%
H SD 1999	26.6%	40.6%	48.7%	54.2%	58.2%	61.3%	63.7%	65.8%	40.9%	28.4%	21.6%	17.3%
H SD 2003	22.03%	30.91%	35.56%	38.84%	41.52%	43.85%	45.94%	47.85%	27.58%	20.34%	17.19%	15.33%
Qw, cfs	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220
H SD 99, cfs	0.325	0.496	0.594	0.661	0.710	0.747	0.778	0.803	0.499	0.346	0.264	0.212
H SD 03, cfs	0.269	0.377	0.434	0.474	0.507	0.535	0.560	0.584	0.337	0.248	0.210	0.187

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	1.22	1.22	1.22	cfs
Time pump on (pumping duration)	tpon	240	240	240	days
Perpendicular from well to stream	a	1250	1250	1250	ft
Well depth	d	200	200	200	ft
Aquifer hydraulic conductivity	K	1	50	100	ft/day
Aquifer saturated thickness	b	130	130	130	ft
Aquifer transmissivity	T	130	6500	13000	ft*ft/day
Aquifer storativity or specific yield	S	0.1	0.1	0.1	
Aquitard vertical hydraulic conductivity	Kva	0.1	0.1	0.1	ft/day
Aquitard saturated thickness	ba	70	70	70	ft
Aquitard thickness below stream	babs	60	60	60	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	6000	6000	6000	ft
Streambed conductance (lambda)	sbc	10.000000	10.000000	10.000000	ft/day
Stream depletion factor	sdf	1201.923077	24.038462	12.019231	days
Streambed factor	sbf	96.153846	1.923077	0.961538	
input #1 for Hunt's Q_4 function	t'	0.000832	0.041600	0.083200	
input #2 for Hunt's Q_4 function	K'	17.170330	0.343407	0.171703	
input #3 for Hunt's Q_4 function	epsilon'	0.500000	0.500000	0.500000	
input #4 for Hunt's Q_4 function	lamda'	96.153846	1.923077	0.961538	

Stream Depletion Analytical Modeling Results (Hunt 2003) – POA to SW 3 (Columbia River)



Output for Stream Depletion, Scenerio 2 (s2):						Time pump on (pumping duration) = 240 days						
Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	26.5%	43.1%	52.0%	57.8%	61.8%	64.9%	67.4%	69.4%	44.5%	29.4%	21.7%	17.0%
H SD 1999	8.8%	19.4%	27.2%	33.0%	37.6%	41.3%	44.5%	47.2%	40.7%	32.1%	26.1%	21.9%
H SD 2003	6.83%	13.22%	17.15%	20.02%	22.40%	24.51%	26.44%	28.24%	23.09%	18.29%	15.87%	14.42%
Qw, cfs	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220
H SD 99, cfs	0.107	0.237	0.331	0.403	0.459	0.504	0.543	0.575	0.496	0.391	0.319	0.267
H SD 03, cfs	0.083	0.161	0.209	0.244	0.273	0.299	0.323	0.344	0.282	0.223	0.194	0.176

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	1.22	1.22	1.22	cfs
Time pump on (pumping duration)	tpon	240	240	240	days
Perpendicular from well to stream	a	2200	2200	2200	ft
Well depth	d	200	200	200	ft
Aquifer hydraulic conductivity	K	1	50	100	ft/day
Aquifer saturated thickness	b	130	130	130	ft
Aquifer transmissivity	T	130	6500	13000	ft*ft/day
Aquifer storativity or specific yield	S	0.1	0.1	0.1	
Aquitard vertical hydraulic conductivity	Kva	0.1	0.1	0.1	ft/day
Aquitard saturated thickness	ba	70	70	70	ft
Aquitard thickness below stream	babs	60	60	60	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	3700	3700	3700	ft
Streambed conductance (lambda)	sbc	6.166667	6.166667	6.166667	ft/day
Stream depletion factor	sdf	3723.076923	74.461538	37.230769	days
Streambed factor	sbf	104.358974	2.087179	1.043590	
input #1 for Hunt's Q_4 function	t'	0.000269	0.013430	0.026860	
input #2 for Hunt's Q_4 function	K'	53.186813	1.063736	0.531868	
input #3 for Hunt's Q_4 function	epsilon'	0.500000	0.500000	0.500000	
input #4 for Hunt's Q_4 function	lamda'	104.358974	2.087179	1.043590	