POTTER VALLEY PROJECT BLOCKWATER SUMMER/FALL RELEASE (RPA D.1) REQUEST 2014

NOAA's National Marine Fisheries Service (NMFS) and California Department of Fish and Wildlife (CDFW) jointly request Pacific Gas and Electric Company (PG&E) to implement a blockwater release from Scott Dam. The purpose of the release is to evaluate the extent increased flows during drought conditions will enhance physical habitat conditions for listed salmonids in the Eel River. This request is pursuant to Reasonable and Prudent Alternative (RPA) D.1 within the NMFS 2002 Biological Opinion that was incorporated into the Federal Energy Regulatory Commission 2004 amended License for the Potter Valley Project (PVP). D.1 of the RPA states that *"2,500 ac-ft are reserved for release at the discretion of resource agencies each water year".*

Operational Details of this Requested RPA D.1 Blockwater Release:

Beginning August 15, 2014, or as soon after this date when operationally feasible, PG&E shall implement the following blockwater release schedule to augment flows below Scott and Cape Horn dams. PG&E will accomplish the increased flow requirement by releasing additional water through the Scott Dam needle valve. NMFS and CDFW will work collaboratively with PG&E and will evaluate, in a timely manner, the need to continue this prescribed blockwater release if natural precipitation events or other unforeseen circumstances occur. Release of blockwater will be implemented under the following criteria:

1. From August 15 to September 15 PG&E shall release 22 cubic feet per second (cfs) of blockwater below Cape Horn Dam. The release will be in addition to the required 3 cfs summer flow, for a total release of 25 cfs.

2. From September 16 to September 30 PG&E shall release 17 cfs of blockwater below Cape Horn Dam. The release will be in addition to the required 3 cfs summer flow, for a total release of 20 cfs.

3. From October 1 to October 11 PG&E shall release the amount of blockwater necessary to ensure flow below Cape Horn Dam meets or exceeds 20 cfs.

The total amount of blockwater released during the 2013/14 and 2014/2015 water years would be 1,960 acre-feet (ac-ft) and 179 ac-ft, respectively, for a total of 2,085 ac-ft (**Table 1**).

Table 1. 2014 summer/fall blockwater release schedule.

Date	Scott Dam Releases[1]	RPA required flow below Cape Horn	Blockwater release	Total flow (E-11)	Blockwater used	Water year
Aug. 15 – Sept. 15	78 cfs	3 cfs	22 cfs	25 cfs[3]	1,350 ac-ft	2013/14
Sept. 16 – Sept. 30	78-88 cfs	3 cfs	17 cfs	20 cfs[3]	610 ac-ft	2013/14
Oct. 1 – Oct. 11	88-110 cfs	3 cfs to 20 cfs[2]	1 cfs to 16 cfs	20 cfs[3]	179 ac-ft	2014/15

[1] Equals required minimum flows to Eel River, East Branch Russian River, and 50 cfs allocation to the PVID.
[2] Required minimum flow increases incrementally from 3 cfs on Oct. 1 to 25 cfs on Oct. 15 (NMFS 2002).
[3] Buffer water not required with total flow (E-11).

1. Biological Rationale for a RPA D.1 Blockwater Summer/Fall Release:

When compared to the past decade, steelhead spawner abundance at the Van Arsdale Fish Station was above average during the two most recent spawning seasons (935 spawners in 2012/13, 628 spawners in 2013/14). In addition, drought conditions during the 2013/14 spawning season may have prevented spawners from accessing tributaries in the upper Eel River. Therefore, a higher proportion of juvenile steelhead are likely rearing in the mainstem Eel River than in most years.

This blockwater summer/fall release seeks to enhance water quality (*i.e.*, temperature) conditions between Scott and Cape Horn dams and increase habitat availability and quality below Cape Horn Dam to Tomki Creek for rearing juvenile steelhead. The prescribed flows (**Table 1**) utilize existing information to guide these biological objectives in consideration of the current drought and availability of adequate reservoir storage in Lake Pillsbury. However, given the variation within and among past hydrologic years, the annual variability of Lake Pillsbury storage, and inconsistent biological responses observed under past streamflow scenarios; NMFS and CDFW recognize that the magnitude and extent of benefits to rearing steelhead pertaining to this blockwater release are uncertain. Therefore, NMFS and CDFW will closely monitor the implementation of this blockwater release to better inform future PVP streamflow scenarios.

A. Enhance temperature conditions between Scott and Cape Horn dams:

Kubicek (1977) categorized maximum daily temperatures ≥ 28.0° Celsius (C) for at least 100 continuous minutes as lethal to steelhead trout; from 26.5° C up to, but not including, 28.0° C as marginal; 20.0° C to 26.5° C as sub marginal; and ≤ 20.0° C as optimum (VTN 1982). Reese and Harvey (2002) indicated that temperature-dependent interactions between juvenile steelhead and Sacramento pikeminnow (*Ptychocheilus grandis*) had the least influence on steelhead growth in water temperatures 15-18° C. Currently, water temperatures below Scott Dam (<18° C) are optimal for juvenile steelhead; however, recent information collected at the Van Arsdale Fish Station (VAFS; CDFW 2014) suggests that warming is occurring between the dams and water temperatures are exceeding optimal conditions (Kubicek 1977) for juvenile steelhead (**Figure 1**). However, at which point in the river water temperatures become submarginal (Kubicek 1977) is unknown. This blockwater release seeks to increase the volume of cooler water released from Scott Dam, thereby increasing the extent of favorable steelhead/pikeminnow temperature-dependent interaction conditions downstream. Additionally, the incremental increase in blockwater volume, as prescribed, will provide information on the extent of a coldwater zone (≤ 20.0° C) below Scott Dam under designated flows.

B. Increase habitat availability, and temperature implications below Cape Horn Dam to Tomki Creek:

The Potter Valley Project (FERC No.77) Fisheries Study Final Report (VTN 1982) indicates that relatively small increases in streamflow can significantly increase the amount of available habitat area (AHA) between Cape Horn Dam and Tomki Creek (**Figure 2**). However, Kubicek (1977) classified summer water temperatures in the mainstem Eel River for salmonids as marginal from Cape Horn Dam to Tomki Creek and lethal from Tomki Creek to Outlet Creek (NMFS 2002). This study was conducted in the summer of 1973 when flows released from Cape Horn Dam

were at approximately 3 cfs (NMFS 2002). VTN (1982) also recognized the effects of water temperature on habitat suitability and they modified their initial calculations of AHA to account for temperature. AHA was reduced the least by temperature increases in Reach Type IV, Cape Horn (VTN 1982) due to water temperatures holding within the submarginal category (Kubicek 1977) at all flows evaluated. However, marginal water temperatures (≥ 26.5° C) have been observed within this reach in subsequent years (VTN 1982, PG&E 2013, Kubicek pers. comm. 2014).

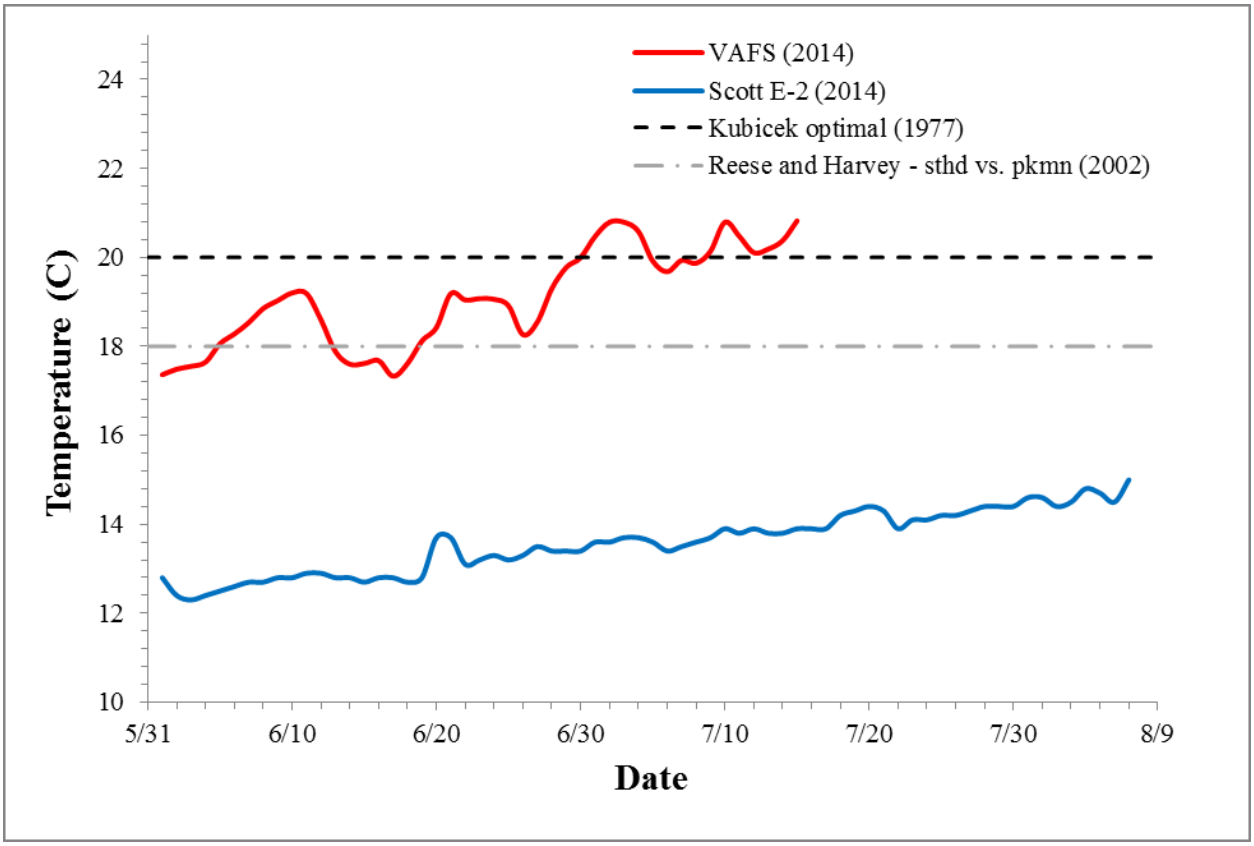

Figure 1. Water temperatures below Scott Dam (E-2) and at Van Arsdale Fish Station (VAFS), 2014. Kubicek (1977) represents the optimum temperature threshold (≤ 20.0° C) for juvenile steelhead in the Eel River. Reese and Harvey (2002) represents favorable steelhead temperature-dependent interaction conditions (≤ 18° C).

Summer/fall flow augmentation, as requested, has not occurred during the period of PG&E's summer temperature monitoring program. Therefore, to determine potential benefits to water temperature NMFS and CDFW analyzed the effect of a one-day 23 cfs increase (14 cfs to 37 cfs) in mean daily flow below Cape Horn Dam in the summer of 2008. The one-day increase in mean daily flow below Cape Horn dam on July 31, 2008, decreased mean daily temperatures downstream of Cape Horn Dam by up to 0.9° C (**Table 2**). The day following the flow increase, stream temperatures returned to or exceeded their July 30 levels. The mean daily temperature of water released from Scott Dam during the flow increase remained constant; therefore indicating a larger volume of water released from Scott Dam can influence temperatures downstream. NMFS and CDFW acknowledge the 2008 event was larger in magnitude and shorter in duration

than the requested flow augmentation. The ability of a prolonged release of colder water to influence stream temperature will be tested during the requested release.

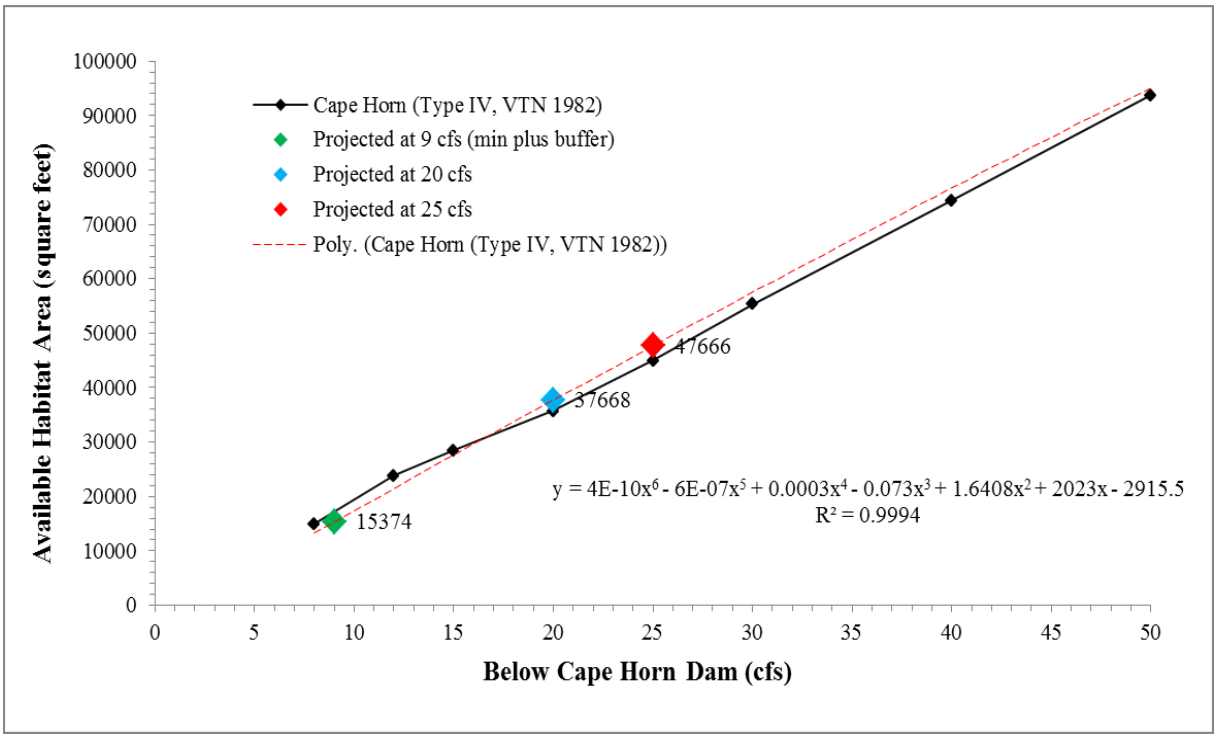

Figure 2. Projected Available Habitat Area (AHA) modified for water temperature using data presented in Table 3.6-4 (p. 175) of VTN (1982) for Reach Type IV (Cape Horn). Reach Type IV (Cape Horn) represents the stream reach between Cape Horn Dam and Tomki Creek.

Table 2. Mean daily temperatures before and after the July 31 increase in flow (2008).

Monitoring Locations on Mainstem Eel River (moving downstream)	Mean Daily Temperature		
	30-Jul	1-Aug	Change
Scott Dam	12.5	12.5	0
VAFS	21.0	21.0	0
Above Whitney Creek (bottom pool array)	21.7	20.8	-0.9
Above Whitney Creek (pool array 2/3 depth)	20.7	20.9	-0.8
Above Whitney Creek (pool array 1/3 depth)	22.4	21.6	-0.8
Above Whitney Creek (pool array - upper water column)	23.0	22.5	-0.5
Above Tomki Creek	22.8	22.5	-0.3
Below Tomki Creek	22.9	22.4	-0.5
Above Garcia Creek	23.8	23.4	-0.4
Below Emandal	24.4	23.8	-0.6

NMFS and CDFW acknowledge that the effect of increased flow on temperature below Cape Horn Dam in midsummer (*i.e.*, August) may be relatively small. However, as water temperatures naturally begin to cool with the onset of fall (September/October), the expanded AHA will likely provide beneficial seasonal rearing and growth opportunities for juvenile steelhead prior to the high flow season.

C. Hypotheses and Effectiveness Monitoring

This blockwater release will test the following hypotheses:

1) Increased releases from Lake Pillsbury through the Scott Dam needle valve will increase the extent of the optimal coldwater rearing zone (≤ 20°C) between Scott and Cape Horn dams.

2) Increased releases from Lake Pillsbury through the Scott Dam needle valve will decrease water temperature and increase habitat availability (using flow as indicator) downstream of Cape Horn Dam to Tomki Creek.

3) Sufficient reservoir storage will sustain a coldwater pool that effectively maintains favorable steelhead temperature-dependent interaction conditions between Scott and Cape Horn dams.

The following data will be gathered to test these hypotheses:

- Water temperature will continue to be monitored by PG&E at their Selected Temperature Monitoring Sites, as described in the Mainstem Water Temperature Monitoring Plan (2005).

- Water temperature will continue to be monitored by CDFW within the Cape Horn Dam fishway.

- NMFS and CDFW will provide a summary of the monitoring results in spring 2015.

References:

Kubicek, P.F. 1977. Summer water temperature conditions in the Eel River system, with reference to trout and salmon. M.S. Thesis, Humboldt State University. 200 pp.

NMFS (National Marine Fisheries Service). 2002. Biological opinion for the proposed license amendment for the Potter Valley Project (Federal Energy Regulatory Commission Project Number 77-110). 135 pp.

Reese, D.R. and B.C. Harvey. 2002. Temperature-dependent interactions between juvenile steelhead and Sacramento pikeminnow in laboratory streams. Transactions of the American Fisheries Society. 131: 599-606.

VTN (Venture Tech Network Oregon, Inc). 1982. Potter Valley Project (FERC Project Number 77-110) Fisheries Study. Final report volumes I & II. Prepared for the Pacific Gas and Electric Company, San Ramon, California.