(3/3/15) Public Meeting
303(d) List of 2012 California Integrated Report
Deadline: 2/5/15 by 12:00 noon

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RECEIVED
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SWRCB Clerk

Via Electronic Mail
Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
P.O. Box 100, Sacramento, CA 95812-2000
commentletters@waterboards.ca.gov

Re: Comment Letter—303(d) List portion of the 2012 California Integrated Report

Dear State Water Board Members and State Water Board Staff:

Thank you for the opportunity to comment on the proposed federal Clean Water Act ("Clean Water Act" or "CWA") section 303(d) list of water quality limited segments ("303(d) list") portion of the 2012 California Integrated Report as well as the associated supporting draft Staff Report and fact sheets ("2012 Integrated Report").

Santa Barbara Channelkeeper ("Channelkeeper") is a non-profit public benefit corporation whose mission is to protect and restore the Santa Barbara Channel and its tributaries for the benefit of its ecosystems and the surrounding human communities, including the Ventura River. Channelkeeper has served as a lead advocate, community organizer, educator, scientist, and monitor in the Ventura River watershed for 15 years. Based on Channelkeeper's extensive knowledge and experience surrounding the quality and flow in the Ventura River, Channelkeeper submits the following comments on the 2012 Integrated Report for the Board Member's consideration. Channelkeeper also joins and incorporates herein by reference the comments submitted by California Coastkeeper Alliance and Earth Law Center.

In its Draft Staff Report for the 2012 Integrated Report dated December 31, 2014, the State Water Board states that the four listings on the existing 303(d) list due to flow related alterations in the Ballona Creek and Ventura River watersheds "will likely be proposed for delisting as part of the next Listing Cycle." As described in detail below, Reaches 3 and 4 of the Ventura River may not be delisted from the 303(d) list as impaired for flow by pumping and diversion. The existing listings for Reaches 3 and 4 of the Ventura River accurately reflect the current diminished flows and resulting impairments to designated beneficial uses in those Reaches. The listings are legally valid, and consistent with the State Water Board's Listing Policy. In contrast, delisting Reaches 3 and 4 from the 303(d) list as impaired for flows due to excessive pumping and diversion is inconsistent with the Listing Policy, the Clean Water Act, and facts on the ground. Channelkeeper references substantial and significant evidence supporting the existing impairment listings, and submits herewith a draft Line of Evidence. The State Water Board must take all of this information into consideration prior to making any decision – information that renders delisting unsupported and illegal.

I. Consistent with the Existing 303(d) Listing, Reaches 3 and 4 of the Ventura River Are Flow Impaired by Pumping and Diversion.

Since 1998, Reaches 3 and 4 of the Ventura River have been accurately identified on California's 303(d) list as impaired by excessive pumping and diversions. Such pumping and diversions are clearly linked to reduced surface flows. Reduced surface flows and the resulting water quality degradation prevents Reaches 3 and 4 from supporting their designated and potential beneficial uses, which include endangered species habitat. In fact, pumping and diversions in Reaches 3 and 4 continue to result in flows below recommended thresholds needed to protect endangered steelhead trout.

A. The Ventura River Watershed and the Reaches 3 and 4 303(d) Impairment Listings.

The Water Quality Control Plan for the Los Angeles Region ("Basin Plan") describes the Ventura River as consisting of five reaches, which, upstream from the Pacific Ocean, are: Reach 1 (Ventura River Estuary to Main Street), Reach 2 (Main Street to Weldon Canyon), Reach 3 (Weldon Canyon to Casitas Vista Road), Reach 4 (Casitas Vista Road to Camino Cielo Road) and Reach 5 (above Camino Cielo Road). Basin Plan, pp. 2-6. There are two major dams which affect surface flows in reaches 3 and 4, Matilija and Casitas. Two major river diversions are located within these reaches, Robles Diversion Facility and the Foster Park Subsurface Diversion. The City of Ventura operates the Foster Park Subsurface Diversion ("Foster Park"). Three major municipal well fields are located in Reaches 3 and 4. These are operated by Meiners Oaks Water District, the Ventura River Water District, and the City of Ventura. Groundwater from these reaches is also pumped for agricultural and domestic purposes. *See* U.S. EPA Draft Ventura River Reaches 3 and 4 Total Maximum Daily Loads For Pumping & Water Diversion-Related Water Quality Impairments ("EPA Draft TMDL").

The designated potential and existing beneficial uses of Reaches 3 and 4 are municipal and domestic supply, industrial service supply, agricultural supply, ground water recharge, freshwater replenishment, warm freshwater habitat, cold freshwater habitat, wildlife habitat, rare, threatened, or endangered species, migration of aquatic organisms, spawning, reproduction, and/or early development, and wetland habitat. *See* Basin Plan, Table 2-1.

In 1998, the U.S. EPA approved California's list of impaired water bodies identified pursuant to Clean Water Act section 303(d) (33 U.S.C. § 1313(d)), which first listed Reaches 3 and 4 as impaired for pumping and diversion. According to Los Angeles Regional Water Quality Control Board ("Regional Board") staff, the original listing referenced a 1996 Steelhead Restoration and Management Plan for California ("Steelhead Restoration Plan") as one basis for the listing decision. The plan states, "The major obstacle to steelhead restoration in this system is blocked access to headwaters and excessive water diversion." Steelhead Restoration Plan, p. 201. The plan describes several large-scale water diversions in the river including Foster Park and the City of Ventura's wells in the lower River, which, "ha[ve] resulted in dewatering portions of the lower river during summer and fall." Steelhead Restoration Plan, p. 203.

Most recently, on August 4, 2010, the State Water Resources Control Board ("State Water Board") approved California's 2010 303(d) list. Channelkeeper notes that the supporting fact sheets for these listings state that both the Regional Board and State Water Board staff reviewed the existing Ventura River watershed listings for pumping, water diversions, and fish barriers and decided to make no modifications to the list. On October 11, 2011, the U.S. EPA approved the State Water Board's triennial review and update to the 303(d) list, which maintained the pumping and diversion impairments for Reaches 3 and 4 of the Ventura River.

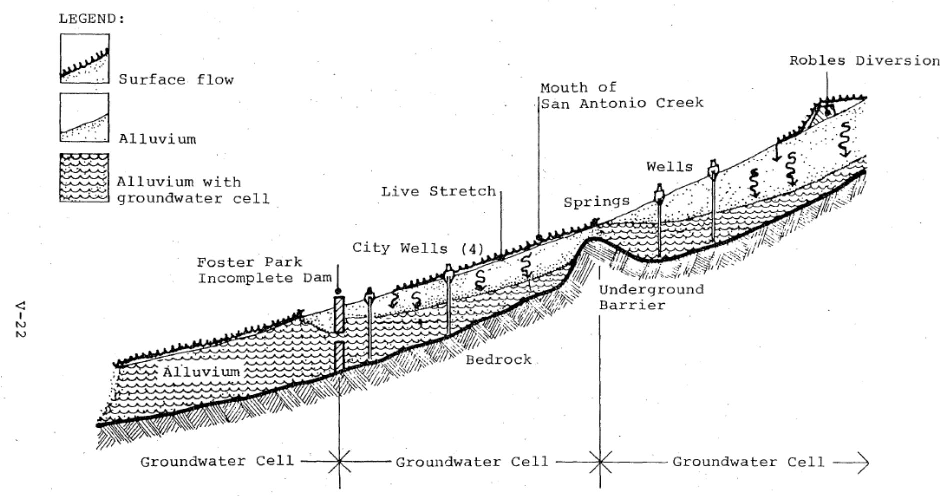
B. There is an Established Relationship Between Surface Flows, Groundwater, and Pumping and Diversions in the Ventura River.

The hydraulic communication between surface and groundwater in the Ventura River has been acknowledged by experts and government agencies for several decades. The significant contribution of groundwater pumping to dewatering of the River has been similarly acknowledged, though its full extent remains undetermined.

A 1978 a Draft Environmental Impact Report on the Conjunctive Use Agreement between Casitas Municipal Water District and the City of Ventura ("Draft EIR") included the following statement:

> *There is a relationship between the groundwater in storage and the presence of year-round springs and surface flows in the live stretch between San Antonio Creek and Foster Park, and also below Foster Park. It is evident from the figure (V-3) that if the groundwater in either of the cells (above San Antonio Creek, or between San Antonio Creek and Foster Park) were to fall to very low levels, then seepage in the form of springs at the surface would stop, and surface flow would also stop.*

Draft EIR, p. V-22. Figure 1 below provides a diagram of the River's surface flows, alluvium, and alluvium with ground water cells. *See also* Draft EIR, p. V-23 (providing an example of when and where the relationship between the groundwater and surface water occurs).



Ventura River at Casitas Springs

Schematic Diagram of Ventura River
at Casitas Springs - Summer Condition

Figure V-3

Figure 1: Excerpt figure from Draft Environmental Impact Report Ventura River Conjunctive Use Agreement. June 1978.

More recently, studies and reports continue to acknowledge the strong connection between groundwater pumping and diversions and the resulting loss of flows in the River.

For example, a National Marine Fisheries Service ("NMFS") 2007 Draft Biological Opinion ("Draft Biological Opinion") for the Army Corps of Engineers' permitting of the City of Ventura's proposed Foster Park Well Facility ("FPWF") repairs contains NMFS's summary of information available at the time and its determination that groundwater pumping and diversion at the FPWF detrimentally impacts downstream critical habitat for steelhead trout in Reach 3. On page 16 of the Draft Biological Opinion, NMFS states:

> *Water withdrawals from surface diversions and subsurface pumping have affected the timing and magnitude of the Ventura River flows in the action area* [6 miles downstream of the FPWF including Reaches 1, 2, and 3], *which has resulted in reduced surface flows. This has altered the natural hydrologic processes responsible for recharging the aquifer underlying the lower Ventura River Basin and the lower part of the action area, and has decreased the quantity and quality of critical habitat for steelhead, predominantly in the dry season.*

On page 25 of the Draft Biological Opinion, NMFS states:

> *Consequently, resumed well field operations are expected to substantially reduce, and at times eliminate surface flows in the action area, and could completely*

> *dewater the upper portion of the action area in the vicinity of the FPWF during most years.* (Emphasis added).

A Ventura River Natural Conditions Study further acknowledged loss of flow in the river (Reaches 3 and 4) due to ground water pumping in its model calibrations. TetraTech, 2009, p. A-3. In specific reference to Foster Park, lead authors of the Tetratech study responded to public comments by stating, “It is our understanding that water is withdrawn from pipes buried in the alluvium. Water entering these pipes comes from both flow in the river and from underlying groundwater. We agree that groundwater and surface water appear to be fully connected in this area… .” Jonathan Butcher, July 22, 2009 Memorandum to Scott Holder (VCWPD) Re: Ventura River Model Comment Response.

In December, 2012 the U.S. EPA, Region 9, released the EPA Draft TMDL. The EPA Draft TMDL clearly acknowledges the connection between surface flows, groundwater, and pumping and diversions. The EPA Draft TMDL states:

> *Flow in any particular reach of the* [Ventura] *River is additionally affected by the status of the underlying groundwater basin (whether full, filling, or emptying), the occurrence of natural recharge areas where surface flows will disappear at times, flow between groundwater basins, and the amount of surface or groundwater withdrawals for municipal, domestic, or agricultural uses. …The flow in the river is disrupted at Foster Park (which overlies the Upper Ventura River Groundwater Basin) due to subsurface diversions and groundwater extraction (p. 9).*

In June 2013, the City of Ventura conducted a preliminary hydrogeological and surface water/groundwater interaction study (Hopkins, 2013) for the City’s diversions at Foster Park. In its concluding remarks, the study states, “We conclude that groundwater production at Foster Park during the low-flow season is substantially supported by underflow.” In other words, the Ventura River itself accounts for a substantial proportion of the water produced by the City’s wells during the low-flow season.

In the summer of 2012, using time-lapse video and a deployable pressure transducer sensor Channelkeeper and local citizens documented dramatic and irregular fluctuations in river and pool surface levels in Reach 4 near private wells and wells operated by Meiners Oaks and the Ventura River Water Districts. These observations are compiled in a YouTube video (SBCK, Watchdog Diaries – Episode 6) available at https://www.youtube.com/watch?v=JrGMRITAqH4, and provide strong evidence of surface and groundwater interactions being affected by pumping and/or diversions in Reach 4. The fluctuations captured by camera and sensor data are abrupt, dramatic, and do not resemble any known naturally occurring patterns indicating that pumping and diversions in Reach 4 are directly impacting surface flows.

C. Reduced Surface Flows Impair the Beneficial Uses of Reaches 3 and 4, Including Endangered Species Habitat.

As surface flows, groundwater, and pumping and diversions are connected, excessive pumping and diversions resulting in significantly reduced surface flows degrade critical habitat for endangered steelhead trout and impair additional designated and potential beneficial uses of the River. These impairments are documented by NMFS, U.S. EPA, and the City of Ventura.

NFMS's 2012 Southern California Steelhead Recovery Plan ("Steelhead Recovery Plan") recently affirmed the 1996 Department of Fish and Wildlife Steelhead Restoration Plan findings by describing dams, surface water diversions, and groundwater extraction as a "very high threat" to steelhead recovery in the Ventura River. NMFS found the critical recovery actions to include providing fish passage around dams and diversions, and developing and implementing water management plans for diversion operations such as Foster Park. NMFS also found that diversions from the Ventura River at Foster Park contribute to the present or threatened destruction, modification or curtailment of steelhead habitat or range, and disease and predation of steelhead. *See* Steelhead Recovery Plan, p. 9-42.

In the Draft Biological Opinion, NMFS concluded that summer and fall withdrawals from the Foster Park degrade downstream (Reaches 1, 2, and 3) habitat and water quality and decrease the functional value of these areas as an over-summering area for juvenile steelhead. NMFS states:

> *The reduction in discharge volume resulting from well-field withdrawals is expected to affect water quality within the action area… Reducing discharge and thus depth, is expected to increase water temperatures in the action area because of increased surface area to depth ratio and increased insolation of the river. Decreased flow velocities can reduce water quality by causing stagnant conditions, especially in pools, which will result in low oxygen levels (p. 27).*
>
> *After reviewing the best available scientific and commercial information, the status of the Southern California steelhead DPS, the environmental baseline, expected effects of the proposed action, cumulative effects, and the combined effects of past and present activities, the proposed action, and actions that are reasonably certain to occur, NMFS concludes the proposed action* [resumption of City pumping] *is likely to jeopardize the continued existence of the Southern California DPS, and is <u>likely to destroy or adversely modify critical habitat for this species</u> (p. 33).* (Emphasis added).

After NMFS issued its Draft Biological Opinion, Ventura dropped its permit application submitted to the Corps. However, repairs to water production facilities were completed outside of Corps jurisdiction. Therefore the diversions examined by NMFS – determined to be detrimental to critical habitat and the survival of Southern California steelhead in the River – continue unabated or unmitigated to present time.

NMFS findings were later affirmed by the City of Ventura's hydrological study (Hopkins, 2013), which included a steelhead habitat assessment examining the relationship between low flow conditions caused by pumping and steelhead habitat suitability. Surveys and data collected as part of the assessment generally support NMFS determination that the pumping at the Foster

Park well field results in degradation of downstream critical habitat and water quality. The City's study concludes:

> *The findings of this study indicate a flow threshold exists whereby when flows decrease below the threshold, the steelhead habitat suitability declines significantly…We conclude that the steelhead habitat is generally degraded throughout the low-flow season because the declining river flow results in shallower thalweg depths in pools, runs, and riffles which allows the hotter atmospheric temperatures to increase the surface water temperatures (p. 26).*

The EPA Draft TMDL further supports these findings:

> *Excess nutrients and eutrophic conditions are present in the Ventura River system. Low and intermittent flows exacerbate the nutrient-related problems (too much algae) and lead to low dissolved oxygen concentrations in the River. The cumulative impacts of these conditions result in the failure to attain several beneficial uses, as described throughout the remainder of this section (p. 11).*

Though the U.S. EPA ultimately decided to approve the State Water Board's Ventura River Algae TMDL as an alternative to its own Pumping and Diversions TMDL, a June 28, 2013 approval letter to the State Water Resources Control Board from the Executive Director of the U.S. EPA, states, "EPA found that the effects of pumping and water diversions in these reaches were correlated with the impairment of aquatic life and cold water habitat beneficial uses due to nutrient loading and algae growth."

As described above, both the U.S. EPA and NMFS have established linkages between pumping and diversions in the Ventura River and impairment of water quality standards, as pumping and diversions reduce surface flows such that Reaches 3 and 4 cannot support their beneficial uses. The City of Ventura's hydrological study of the River also confirms that surface flows and pumping and diversions are linked, and that beneficial uses are being degraded by low flows caused by pumping and diversions (Hopkins, 2013).

Channelkeeper has also conducted additional monitoring in 2013 and 2014 that demonstrates that reduced flows caused by pumping and diversion from Reaches 3 and 4 contribute to non-attainment of water quality objectives for water quality parameters indicative of low flows. As detailed in Section II.C., below, Channelkeeper's monitoring data for dissolved oxygen and temperature show that Reaches 3 and 4 are not attaining water quality objectives and/or criteria for these parameters. Specifically, Reach 3 exceeded the 7 mg/L water quality objective for dissolved oxygen on 558 occasions out of 574 samples from 2013-2014. For the 5 mg/L dissolved oxygen water quality objective Reach 3 exceeded on 459 occasions out of 574 samples from 2013-2014. Reach 4 exceeded the 7 mg/L dissolved oxygen water quality objective on 63 occasions out of 174 samples from 2013-2014. For temperature, Reach 3 exceeded the numeric criteria used for temperature by the State Water Board in prior 303(d) listings on 501 occasions out of 649 samples from 2013-2014, and Reach 4 exceeded the temperature criteria on 227 occasions out of 250 samples from 2013-2014. These exceedances of water quality objectives and/or criteria for dissolved oxygen and temperature are well above the minimum number of exceedances warranting 303(d) listing, indicate that reduced flows due to excessive pumping and diversions have and continue to degrade water quality in Reaches 3 and 4, and show that the water quality standards for these segments of the Ventura River are impaired by pumping and diversions.

D. Surface Flows in Reaches 3 and 4 Consistently Fall Below Recommended Flow Thresholds Needed to Protect Beneficial Uses.

To avoid jeopardizing steelhead existence and destruction or adverse modification of critical steelhead habitat, NMFS found that flows in the Ventura River at the Foster Park USGS gauge no. 111185000 should not fall below 11 to 12 cfs. *See* Draft Biological Opinion, p. 33. NMFS states: "This flow rate is based on past studies, which indicate that flows of 12 cfs and above will allow for natural rates of growth and high rates of survival of steelhead within the action area (Moore 1980), and essential features of critical habitat and PCEs within the action area will be preserved." *Id.*, p. 33.

The City of Ventura's hydrology study (Hopkins, 2013) also identified a protective threshold of 2 cfs at the Foster Park USGS gauge based on habitat suitability data. The study further recommended that the City consider reducing its diversion rates during the dry-season when river flows fell below this threshold.

> *We also recommend that during low flow conditions, the City observe streamflows documented by the USGS gage and consider reducing its diversion rates during the dry season as the River flow rate declines to 2 cfs. While the City has no control on how much water will seasonally flow into the Foster Park reach of the River, the reduction and eventual cessation of pumping will serve to maintain the steelhead habitat as long as it will last while the main stem of the River dries out (p. 28).*

Attachment A to Channelkeeper's draft Line of Evidence provides a summary of Foster Park well field production totals in comparison with flow thresholds recommended by NMFS and the City hydrology studies (12 and 2 cfs, respectively). As Attachment A clearly depicts, major withdrawals take place monthly despite the River being well below recommended thresholds at the USGS Foster Park Gage and even dry in many sections.

Figure 2. Dry Ventura River at the Foster Park subsurface dam and diversion on November 22, 2013. Dry conditions at Foster Park were prevalent throughout the 2013 - 2014 dry seasons.

For example, as seen in Figure 2 and as documented at the USGS gage, the River was completely dry at Foster Park throughout much of the 2013-2014 dry seasons.

Data from monitoring stations maintained by Channelkeeper further demonstrate that recommended flow thresholds needed to protect beneficial uses have not been achieved in recent years. Figure 3 identifies SBCK monitoring site locations in relation to water diversion facilities and designated Reaches of the Ventura River, and Table 1 provides the flow data at Channelkeeper's monitoring sites.

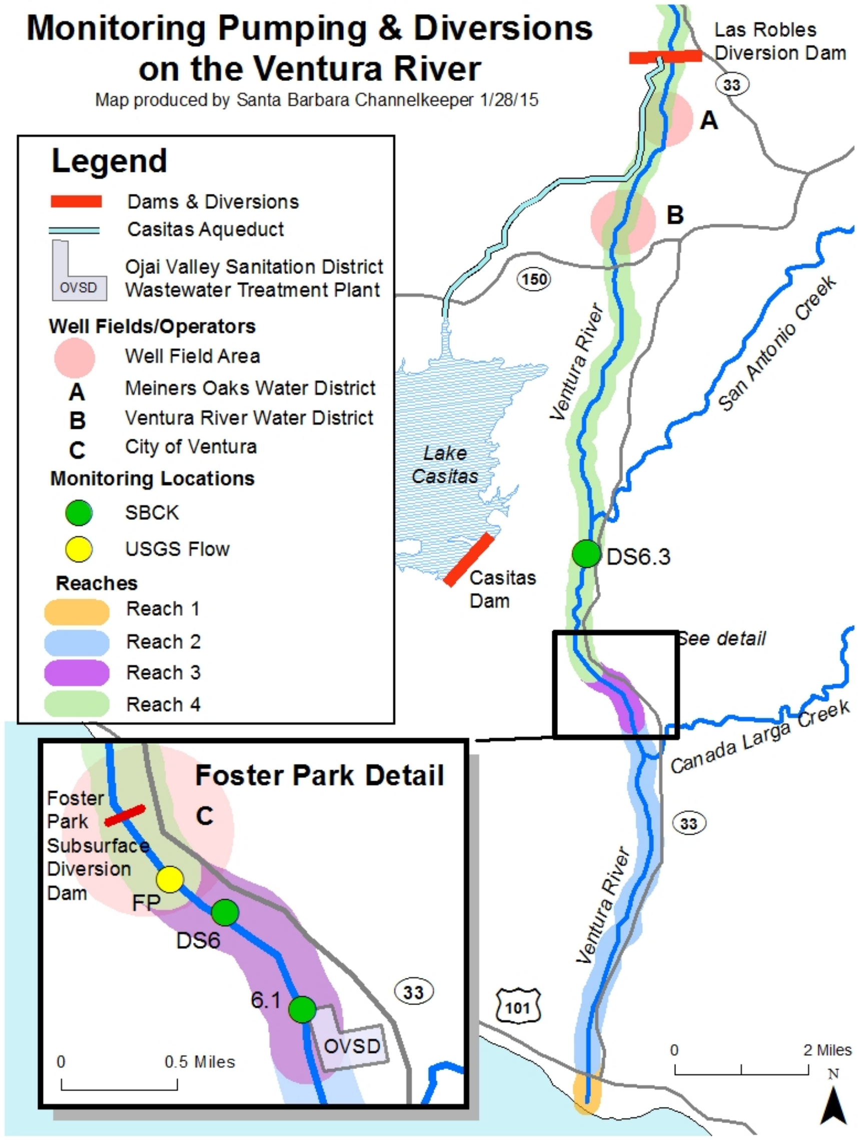


Figure 3. Monitoring sites, pumping and diversion facilities, and designated Reaches of the Ventura River

Most of Reach 4 ran dry through 2013 and 2014 including at Foster Park. Some sections of Reach 4 are known to consistently run dry during the dry season. However, additional sections such as Foster Park characterized as perennial (Beller et al., 2011) also experienced total loss of surface flows in these years. Reach 3 (downstream of Foster Park) is the primary reach for which the recommended thresholds were developed. But as shown in Figure 3 and Table 1, measurements indicate that flow levels of 11 or 2 cfs were not observed at sites in Reach 3 (6.1 and DS6. Attachment B provides a summary of flow rates at the USGS Foster Park gage from 2007 through 2014. As demonstrated in Attachment B to Channelkeeper's Line of Evidence and Table 1, Channelkeeper notes that flows have consistently fallen and remained below the recommended protective thresholds for many years.

Table 1: Flow on the Ventura River (cfs) – SBCK Monitoring

SBCK Monitoring Sites				
Reaches		**Reach 3**		**Reach 4**
Year	**Date**	**6.1**	**DS6**	**DS6.3**
	6/6/13			
	6/13/13	1.1		
	6/14/13			2.8
	7/10/13	0.6		2.3
	7/11/13			
2013	7/26/13	0.3	Flow not measured in 2013	0.6
	8/16/13	0.3		0.3
	9/6/13	0.2		0.1
	9/24/13	0.1		0
	10/17/13	0.1		0
	11/22/13	0.1		0
	6/5/14	0.4		3.6
	6/24/14	0.6	0.3	3.3
	7/15/14	0.6	0.3	2.4
2014	7/31/14	0.5	0.5	1.1
	8/21/14	0.3		0.7
	9/16/14	0.1	0.4	0.3
	10/21/14	0.2	0.3	

* Immediately downstream of OVSD Outfall

II. The Existing 303(d) Listings for Reaches 3 and 4 Are Valid Though the Listings Were Approved Before the Listing Policy Was Adopted.

In reference to the existing 303(d) listings for Reaches 3 and 4 of the Ventura River, the 2012 Integrated Report states:

> California has not considered the direct assessment of flow data since the adoption of the Listing Policy. There are four listings on the existing 303(d) List due to flow related alterations in the Ballona Creek and Ventura River watersheds. These decisions were made prior to adoption of the Listing Policy and before guidance was developed on the method to inventory waters impaired by pollution, and not pollutants. **Those four listings waters [sic] will likely be proposed for delisting as part of the next Listing Cycle**.

2012 Integrated Report, pp. 9-10 (emphasis added). The State Water Board's "likely" proposal to delist Reaches 3 and 4 of the Ventura River as flow impaired by pumping and diversion is improper for at least four reasons. First, the Clean Water Act as well as long-standing U.S. EPA Guidance provide for 303(d) listings for flow-impaired waters such as Reaches 3 and 4. Second, that Reaches 3 and 4 were listed as flow-impaired prior to adoption of a formal listing policy has no bearing on the validity of the listings. Third, the existing 303(d) listings for Reaches 3 and 4 meet the several listing factors in the State Water Board's Water

Quality Control Policy for Developing California's Clean Water act Section 303(d) List in September 2004 ("Listing Policy"). Fourth, Reaches 3 and 4 of the Ventura River must remain 303(d) listed as impaired for flow caused by pumping and diversions because no Listing Policy delisting factors can be met.

A. The Clean Water Act and U.S. EPA Guidance Provide for Flow-Impairment Listings.

Under the Clean Water Act, when effluent limitations are insufficient to ensure compliance with water quality objectives and a water body can no longer be put to its designated beneficial uses (collectively "water quality standards"), that water body's water quality standards have not been attained and its beneficial uses are impaired. The State must identify that water body on the list of impaired waters. 33 U.S.C. § 1313(d)(1). An impairment listing is required whether the impairment is caused by "pollutants" or "pollution." *See* 33 U.S.C. § 1313(d)(1)(A); *see also Pronsolino v. Nastri*, 291 F.3d 1123, 1137-38 (9th Cir. 2002), cert. denied, 123 S. Ct. 2573 (2003) ("Water quality standards reflect a state's designated *uses* for a water body and do not depend in any way upon the source of pollution").

Compliance with the Clean Water Act section 303(d), the Act's "safety net," requirements is a crucial element in achieving the Clean Water Act's goal of restoring the chemical, physical, and biological integrity of the nation's waters so that they are safe for swimming, fishing, drinking, and other "beneficial uses" that citizens enjoy, or used to be able to enjoy. It is the bedrock component of the Clean Water Act; the backstop to ensure that the goals of the Act can be achieved when initial efforts fail. Moreover, section 303(d) requires states to address comprehensively all human activities that affect the chemical, physical, and biological integrity of the nation's waters.

Consistent with the language and the purpose of Clean Water Act section 303(d), the U.S. EPA has found that "pollution" must result in a 303(d) listing if it results in impairment. *See* U.S. EPA, "Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act," p. 56 ("2006 Guidance").[1] In describing categories of impairment listings, EPA specifically uses "lack of adequate flow" as an example of a cause an impairment to a water segment. *Id*.

Accordingly, a water body that cannot support its designated beneficial uses due to altered flow must be included on the State Water Board's 303(d) list as impaired. Altered flows in Reaches 3 and 4 of the Ventura River caused by pumping and diversions impair those Reaches' beneficial uses, as described in detail in Section I above. Thus, as provided by the Clean Water Act, in 1998 the State Water Board included Reaches 3 and 4 on the 303(d) list as impaired by pumping and diversion. Not only are these listings valid under the Clean Water Act, they are in line with relevant U.S. EPA Guidance.

[1] Available at: http://www.epa.gov/owow/tmdl/2006IRG/report/2006irg-report.pdf, last visited February 5, 2015.

B. A Formal Listing Policy or Guidance Are Not Prerequisites to an Impairment Listing.

As its reason for the likely proposal to delist Reaches 3 and 4 as flow-impaired, the State Water Board cites the timing of those listing decisions, which came before the adoption of the State Water Board's Listing Policy and "before guidance was developed on the method to inventory waters impaired by pollution, and not pollutants." The State Water Board's stated reason does not support delisting, however. A formal listing policy or guidance are not prerequisites to an impairment listing.

As discussed in Section II.A. above, the Clean Water Act requires that the State Water Board include all impaired water segments on the 303(d) list. The requirement to identify impaired waters on the 303(d) list is not conditioned on the existence of a *formal* listing policy. In fact, the State Water Board has issued multiple California 303(d) lists prior to the adoption of the Listing Policy. For example, in 1998 and 2003 the State Water Board issued 303(d) lists that identified numerous impaired water segments, including the pumping and diversion impairments of Reaches 3 and 4 of the Ventura River, without a formal listing policy. Because a formal listing policy had not been adopted, the State Water Board made listing determinations based on an assessment of all readily available data and facts relating to individual water bodies. *See, e.g.*, Staff Report, Vol. I, Revision of The Clean Water Act Section 303(d) List of Water Quality Limited Segments. U.S. EPA approved each of these 303(d) lists. As such, the State Water Board need not have had a formal listing policy in place to make these valid listing decisions. Channelkeeper further notes that the 2012 Integrated Report does not indicate that water segments other than the segments of the Ventura River and Ballona Creek identified as flow-impaired in 1998 and/or 2003 lists will likely be delisted on the ground that those listings were made prior to adoption of the Listing Policy.

The State Water Board also bases its likely proposal to delist Reaches 3 and 4 on its statement that those listings were made "before guidance was developed on the method to inventory waters impaired by pollution, and not pollutants." Channelkeeper understands the State Water Board to be referring to the U.S. EPA 2006 Guidance. *See* 2012 Integrated Report, pp. 9-10. As with the Listing Policy, formal guidance from U.S. EPA is not a prerequisite to impairment listings and listings issued and approved predating the 2006 Guidance are entirely valid. The State Water Board refers to no authority otherwise. In any event, as explained in Section I.A., U.S. EPA's 2006 Guidance, including the portion cited in the 2012 Integrated Report, supports the listing of Reaches 3 and 4 as flow-impaired due to pumping and diversion. *See* 2012 Integrated Report, p. 10 (explaining that water segments impaired solely by pollution should be included in category 4c of the 303(d) list, and in no way suggesting such waters not be identified as impaired on the 303(d) list).

C. Reaches 3 and 4 of the Ventura River Meet Multiple Listing Policy Factors.

Whether or not a listing policy is some how required for compliance with section 303(d) of the Clean Water Act, the pumping and diversions listings of Reaches 3 and 4 of the Ventura River meet the listing policy factors. The Listing Policy provides several different factors to use to determine whether a water segment should be identified as impaired on the 303(d) list. A water segment that meets any one of the listing factors should be included on the 303(d) list. As discussed below, Reaches 3 and 4 meet Listing Policy factors 3.2 (Numeric Water Quality Objectives for Conventional or Other Pollutants in Water), 3.9 (Degradation of Biological Populations and Communities), and 3.11 (Situation-Specific Weight of Evidence Listing Factor).

1. Reaches 3 and 4 are Impaired for Pumping and Diversions Based on the "Numeric Water Quality Objectives for Conventional or Other Pollutants in Water" Listing Factor.

Section 3.2 of the Listing Policy states that "using a binomial distribution, waters shall be placed on the 303(d) list if the number of measured exceedances supports rejection of the null hypothesis," as provided in Table 3.2 of the Listing Policy. Listing Policy, p. 4. "When continuous monitoring data are available, the seven-day average of daily minimum measurements shall be assessed." *Id*. As explained below, monitoring data for dissolved oxygen and temperature demonstrate that Reaches 3 and 4 meet the listing factor for exceedances of numeric water quality objectives or criteria. Because dissolved oxygen and temperature are parameters indicative of reduced flows, and given the connection between pumping and diversions and reduced surface flows, this listing factor supports the pumping and diversions impairment listings for Reaches 3 and 4.

<u>Dissolved Oxygen</u>

Channelkeeper deployed Onset dissolved oxygen sensors (model U26) and pressure transducers (model U20) at the Channelkeeper monitoring stations listed above from May-November in 2013 and May-October in 2014. Sensors were calibrated to collect measurements every ten minutes, 24 –hours a day, during the 2013 dry season and every 30 minutes, 24-hours a day during the 2014 dry season.

The Basin Plan states:

The dissolved oxygen content of all surface waters designated as WARM shall not be depressed below 5 mg/L as a result of waste discharges.

The dissolved oxygen content of all surface waters designated as COLD shall not be depressed below 6 mg/L as a result of waste discharges.

The dissolved oxygen content of all surface waters designated as both COLD and SPWN shall not be depressed below 7 mg/L as a result of waste discharges.

Tables 2 and Table 3 below evaluate the 2013-2014 dissolved oxygen data using this method based on the 7 mg/L and 5 mg/L dissolved oxygen water quality objectives ("WQO") set forth in the Basin Plan designated to protect Cold Water and Spawning Habitats and Warm Water Habitat beneficial uses, respectively. Based on the Listing Policy, Reach 3 and Reach 4 meet the 303(d) listing criteria for the 7 mg/L dissolved oxygen WQO to protect Cold Water and

Spawning Habitats. Reach 3 meets the listing criteria for the 5 mg/L WQO to protect Warm Water Habitat.

Table 2: Measurements Below the 7 mg/L Dissolved Oxygen Water Quality Objective

7 Day Average of Minimum DO Measurements					
Site	**Year**	**Total n**	**n <7 mg/L**	**Min n for listing**	**Meets Listing Criteria?**
Reach 3					
6.1	2013	173	157		
	2014	155	155		
	Sub Total	328	312		
DS6	2013	140	140		
	2014	106	106		
	Sub Total	246	246		
	Grand Total	574	558	93	**Yes**
Reach 4					
DS6.3	2013	106	8		
	2014	68	55		
	Grand Total	174	63	29	**Yes**

Table 3: Measurements Below the 5 mg/L Dissolved Oxygen Water Quality Objective

7 Day Average of Minimum DO Measurements					
Site	**Year**	**Total n**	**n <5 mg/L**	**Min n for listing**	**Meets Listing Criteria?**
Reach 3					
6.1	2013	173	100		
	2014	155	143		
	Sub Total	328	243		
DS6	2013	140	118		
	2014	106	98		
	Sub Total	246	216		
	Grand Total	574	459	93	**Yes**
Reach 4					
DS6.3	2013	106	0		
	2014	68	2		
	Grand Total	174	2	29	**No**

<u>Temperature</u>

The 2010 Integrated Report (CWA Section 303(d) list) includes listings of temperature water quality impairments for water bodies in Region 3, citing an evaluation guideline of 21°C maximum temperature to protect rainbow trout. This evaluation guideline was applied to Channelkeeper sensor data from 2013 and 2014. Daily maximums were used to evaluate measurements based on a binomial distribution as applied in Section 3.2 and Table 3.2 of the Listing Policy where minimum number of samples needed for listing was calculated based on the total number of seven day averages of the daily minimum dissolved oxygen concentration. Application of this evaluation method indicates that Reach 3 and Reach 4 for meet these 303(d) listing evaluation criteria.

Table 4: Measurements Above the 21° Temperature 303(d) Listing Evaluation Criteria

Daily Maximum Temperature Measurements					
Site	**Year**	**Total n**	**n > 21° *C***	**Min n for listing**	**Meets Listing Criteria?**
Reach 3					
6.1	2013	179	125		
	2014	161	152		
	Sub Total	340	277		
DS6	2013	149	84		
	2014	160	140		
	Sub Total	309	224		
	Grand Total	649	501	108	**Yes**
Reach 4					
DS6.3	2013	124	114		
	2014	126	113		
	Grand Total	250	227	42	**Yes**

2. Reaches 3 and 4 are Impaired for Pumping and Diversions Based on the "Degradation of Biological Populations and Communities" Listing Factor.

Section 3.9 of the Listing Policy states that "[a] water segment shall be placed on the section 303(d) list if the water segment exhibits significant degradation in biological populations and/or communities as compared to reference site(s) and is associated with water or sediment concentrations of pollutants including but not limited to chemical concentrations, temperature, dissolved oxygen, and trash." Listing Policy, p. 7. Given the biological populations and communities of steelhead in Reaches 3 and 4 of the Ventura River, this listing factor is met.

Specifically, the Ventura River watershed is home to at least 11 endangered or threatened species, including steelhead trout. *See* U.S. Fish & Wildlife Service, Listing and Occurrence for California.[2] Reaches 3 and 4 of the Ventura River are occupied by steelhead and are rated as

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[2] Available at:
http://ecos.fws.gov/tess_public/pub/stateListingAndOccurrenceIndividual.jsp?state=CA&s8fid=112761032792&s8fid=112762573902, and http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEAnimals.pdf, last visited February 5, 2015.

having high conservation value. *See* Draft Biological Opinion, pp. 355-56; *see also* Section I., above. These reaches of the River provide spawning and rearing habitat and serve as a migratory corridor for steelhead to upstream reaches. Draft Biological Opinion, pp. 356-57. The Ventura River (including Reaches 3 and 4), Ventura River Estuary, San Antonio Creek, Cañada Larga, Matilija Creek and North Fork Matilija Creek, among other tributaries, have been designated as critical habitat for the remaining population of the southern California Steelhead, which is estimated at less than 500 spawning adults. *See* EPA Draft TMDL, p. 104; Draft Biological Opinion, p. 354.

Before dams were constructed in the Ventura River Watershed, during normal to wet years the steelhead run was estimated at 4,000-5,000 individuals. EPA Draft TMDL, p. 100. Following the construction of Matilija Dam (located upstream of Reach 3), which cut off access to about half of the prime spawning habitat, and coincident with a drought in the late 1940s, steelhead runs dropped to about 2,000-2,500 individuals. EPA Draft TMDL, p. 101. By the 1990s there had been a 96% decline in the steelhead population in the Ventura River, prompting its listing as an endangered species in 1997. Draft Biological Opinion, p. 352; *see also* Steelhead Recovery Plan, p. 437 (describing declines in steelhead run sizes of 90% or more).

During dry years, juvenile fish unable to transit back downstream to the ocean due to low flows must survive in pools in the mainstem, i.e., Reaches 3 and 4. EPA Draft TMDL, p. 101. The fish are subjected to elevated temperatures, endure competition with other fish for a decreasing food supply, and are exposed to predators. EPA Draft TMDL, p. 101. Additional evidence of elevated temperatures is shown in Section II.C.1., above.

Since southern California steelhead were listed as endangered in 1997, the impacts leading to the listing remain prevalent and widespread. Steelhead Recovery Plan, p. 447. These impacts include present or threatened destruction, modification or curtailment of habitat or range, over-utilization of the steelhead population for commercial, recreational, scientific, or educational purposes, disease and predation, inadequacy of existing regulatory mechanisms, and other natural or human-made factors affecting continued existence. *Id*. at 448-453. As to the steelhead population in the Ventura River, NMFS found that diversions from the Ventura River at Foster Park contribute to the present or threatened destruction, modification or curtailment of steelhead habitat or range and disease and predation of steelhead. *See id.*, p. 514. The inadequacy of existing regulatory mechanisms for diversions at Foster Park contributed to the listing and continuing impacts to endangered steelhead. *See id.*, p. 514.

3. Reaches 3 and 4 are Impaired for Pumping and Diversions Based on the "Situation-Specific Weight of Evidence" Listing Factor.

The situation-specific weight of evidence listing factor provides that when information indicates non-attainment of applicable water quality standards that water segment is to be evaluated to determine whether the situation-specific weight of the evidence demonstrates that the water quality standard is not attained. *See* Listing Policy, Section 3.11, p. 8. A situation-specific weight of evidence impairment determination is to be justified by: (1) data or information including current conditions supporting the decision, (2) description of how that data or information affords a substantial basis in fact from which the impairment decision can be reasonably inferred, (3) demonstration that the weight of the evidence of the data and information indicate that the water quality standard is not attained, and (4) demonstration that the approach used is scientifically defensible and reproducible. *See id*.

Reaches 3 and 4 each meet the situation-specific weight of evidence listing factor. Current conditions show that Reaches 3 and 4 are impaired for flow, and that the impairment is caused by pumping and diversions. *See* Section I., above; *see also* Attachments A and B. The available information and data supporting impairment listing is scientifically defensible and reproducible. Further, in approving the State Water Board's TMDL for the Ventura River, U.S. EPA recognized need for further action to address flow impairment.

D. Reaches 3 and 4 of the Ventura River Must Remain 303(d) Listed as Impaired for Flow Caused by Pumping and Diversions.

If the Listing Policy applies, then it applies equally for listing and *delisting*. *See* Listing Policy, Section 4, pp. 11-13. In addition to satisfying the delisting factors, which it cannot, to remove Reaches 3 and 4 from the 303(d) list the responsible Regional Water Quality Control Board (here Region 4) must document the list change in a fact sheet and hold a public hearing to approve the change, respond in writing to all public comments, approve a resolution in support of the decision, and submit supporting fact sheets, responses to comments, documentation of the hearing process, and a copy of all data and information considered to the State Water Board. The State Water Board must also assemble supporting fact sheets and provide advance notice and opportunity for public comment on the listing decision. *See* Listing Policy, Section 6.3, p. 26. The 2012 Integrated Report makes no reference to the delisting factor, and Channelkeeper is unaware of any efforts by Region 4 or the State Water Board to comply with these delisting requirements.

Accordingly, unless the delisting factors and additional requirements are met, Reaches 3 and 4 must remain listed as flow-impaired due to pumping and diversions.

Because the existing pumping and diversion impairment listings for Reaches 3 and 4 are entirely consistent with the Clean Water Act, U.S. EPA Guidance, and the State Water Board's Listing Policy, that the impairments were identified on California's 303(d) list before the State Water Board adopted the Listing Policy or U.S. EPA adopted the 2006 Guidance in no way invalidates those listings.

III. The State Board Must Consider All Readily Available Information About Impairments to Reaches 3 and 4 Resulting from Pumping and Diversions Prior to Making a Listing Decision.

The body of regulations and guidance that bear on 303(d) listings are unambiguous about the information that should be considered in making listing decisions: *all of it*. Federal regulations state clearly that "[e]ach State shall assemble and evaluate all existing and readily available water quality-related data and information to develop the [303(d)] list." 40 C.F.R. § 130.7(b)(5). The regulations further mandate that local, state and federal agencies, members of the public, and academic institutions "should be *actively* solicited for research they may be conducting or reporting." 40 C.F.R. § 130.7(b)(5)(iii) (emphasis added). Furthermore, U.S. EPA's 2006 Guidance explicitly states that U.S. EPA's review of California's list will include an "assess[ment of] whether the state conducted an adequate review of all existing and readily available water quality-related information." 2006 Guidance, p. 29. To that end, the 2006 Guidance also requires states to provide "[r]ationales for any decision to not use any existing and readily available data and information." *Id.*, p. 18. Accordingly, any and all existing and readily available data and information must be considered to determine the health of the state's increasingly-degraded water bodies.

To provide the State Water Board with available data and information about the impairments to Reaches 3 and 4 of the Ventura River resulting from pumping and diversions described in Section I., Channelkeeper attaches hereto a draft Line of Evidence as Exhibit A. The Line of Evidence summarizes the existing flow-impairment to Reaches 3 and 4, relies on scientifically defensible and reproducible data and information,[3] and includes analysis of that data and information supporting the decision to identify Reaches 3 and 4 as flow-impaired on California's 303(d) list.

IV. Conclusion.

When Reaches 3 and 4 of the Ventura River were identified as flow-impaired by pumping and diversions on California's 1998 303(d) list, the State Water Board took an important first step towards restoring the chemical, physical, and biological integrity of these waters. However, there is ongoing documentation that flow alterations from pumping and diversions continue to degrade Reaches 3 and 4 such that these waters cannot support their designated beneficial uses and water quality standards are not attained.

Removing the impairment listings for Reaches 3 and 4 as the State Water Board says it will likely propose may impede existing and future efforts to remedy the ongoing flow-impairments of Reaches 3 and 4. Thus Channelkeeper strongly urges the State Water Board to comply with its Clean Water Act duty to continue to identify Reaches 3 and 4 on the 303(d) list as flow-impaired by pumping and diversions.

Respectfully,

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[3] Data collected by Channelkeeper followed quality assurance protocols for continuous monitoring and flow measurements. *See* Attachment C. Additional data and findings referenced were produced by and for government agencies including the California Department of Fish and Game, the National Marine Fisheries Service, the City of Ventura, Ventura County, the United States Geologic Survey, the Los Angeles Regional Water Quality Control Board, the State Water Resources Control Board, and the United States Environmental Protection Agency.

Ben Pitterle
Watershed and Marine Program Director

Kira Redmond
Executive Director

Reference List

1. Water Quality Control Plan for the Los Angeles Region ("Basin Plan").
2. California Department of Fish and Wildlife 1996 Steelhead Restoration and Management Plan for California ("Steelhead Restoration Plan").
3. U.S. EPA Draft Ventura River Reaches 3 and 4 Total Maximum Daily Loads For Pumping & Water Diversion-Related Water Quality Impairments ("EPA Draft TMDL").
4. Draft Environmental Impact Report on the Conjunctive Use Agreement between Casitas Municipal Water District and the City of Ventura ("Draft EIR").
5. National Marine Fisheries Service 2007 Draft Biological Opinion ("Draft Biological Opinion").
6. Ventura River Natural Conditions Study, TetraTech, 2009.
7. Jonathan Butcher, July 22, 2009 Memorandum to Scott Holder (VCWPD) Re: Ventura River Model Comment Response.
8. City of Ventura Preliminary Hydrogeological and Surface Water/Groundwater Interaction Study (Hopkins, 2013).
9. NMFS 2012 Southern California Steelhead Recovery Plan ("Steelhead Recovery Plan").
10. Beller, EE et al., Historical Ecology of the lower Santa Clara River, Ventura River, and Oxnard Plain: an analysis of terrestrial, riverine, and coastal habitats, San Francisco Estuary Institute, 2011.
11. 2010 California 303(d) List of Water Quality Limited Segments ("2010 Integrated Report").

Ventura River Reaches 3 and 4 Listing Line of Evidence

Pollution: Pumping and Diversions

Beneficial Uses Being Impaired: Cold Freshwater Habitat; Warm Freshwater Habitat; Rare, Threatened, or Endangered Species; Migration of Aquatic Organisms; Spawning, Reproduction, and/or Early Development; Contact and Non-Contact Water Recreation

Conclusion: Available data demonstrates that pumping and diversions are impairing the beneficial uses of Reaches 3 and 4 of the Ventura River, and that conditions in Reaches 3 and 4 meet Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (September 2004) listing factors 3.1, 3.9, and 3.11.

Summary of Evidence: In 1998, the United States Environmental Protection Agency (EPA) approved California's list of impaired water bodies identified pursuant to section 303(d) (303(d) list) of the Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. § 1313(d), which first listed Reaches 3 and 4 of the Ventura River as impaired for pumping and diversion. The original listing referenced findings in a 1996 Steelhead Restoration and Management Plan for California as one basis for the listing decision. Over the last several decades, additional Lines of Evidence (LOE) have been produced, which verify and support the listing decision.

The hydraulic communication between surface and groundwater in the Ventura River and the contribution of groundwater pumping to dewatering of the river has been acknowledged by experts and government agencies for several decades. These relationships were clearly evaluated and established in numerous studies and reports including: (1) a Draft Environmental Impact Report on the Conjunctive Use Agreement between Casitas Municipal Water District and the City of Ventura (EDAW, Inc. et al. 1978); (2) a National Marine Fisheries Service (NMFS) 2007 Draft Biological Opinion (Draft Biological Opinion) for the Army Corps of Engineers' permitting of the City of Ventura's proposed Foster Park Well Facility repairs; (3) a Ventura River Natural Conditions Study (TetraTech, 2009); (4) the United States Environmental Protection Agency, Region 9, Draft Ventura River Reaches 3 and 4 Total Maximum Daily Loads For Pumping & Water Diversion-Related Water Quality Impairments (EPA Draft TMDL); and (5) the City of Ventura's Preliminary Hydrogeological and Surface Water/Groundwater Interaction Study (Hopkins, 2013).

Linkages have also been established between reduced surface flows caused by pumping and diverting and impairment of designated and potential beneficial uses of the River. The Draft Biological Opinion concluded that summer and fall withdrawals from Foster Park are, "likely to destroy or adversely modify critical habitat" through dewatering, reduction of water depth, and subsequent degradation of water quality (pp. 27, 33). Hopkins, 2013 concludes that pumping at Foster Park results in degradation of downstream critical habitat and water quality (p. 26). The EPA Draft TMDL found that low and intermittent flows result in, "failure to attain several beneficial uses" (p.11). During dry years, juvenile fish unable to transit back downstream to the ocean due to low flows must survive in pools in the mainstem, i.e., Reaches 3 and 4 (EPA Draft TMDL, p.

101). These oversummering fish are subjected to elevated temperatures, endure competition with other fish for a decreasing food supply, and are exposed to predators (EPA Draft TMDL, p.101).

Continuous dissolved oxygen and temperature monitoring conducted by Santa Barbara Channelkeeper through the 2013 and 2014 dry seasons confirms Reaches 3 and 4 consistently fail to meet Water Quality Objectives established in the Basin Plan to protect beneficial uses and/or criteria used in prior 303(d) listings (see Tables 1, 2, and 3 below).

To avoid jeopardizing steelhead existence and destruction or adverse modification of critical steelhead habitat, flow thresholds measured at the USGS Foster Park Gage were established by Hopkins (p. 28) and the National Marine Fisheries Service in the Draft Biological Opinion (p. 33). A comparison of Foster Park Well Field production totals with flow measurements at the USGS Foster Park Gage (Attachments A and B) clearly illustrates that pumping and diversion activities continued despite surface flows in Reaches 3 and 4 consistently falling below recommended flow thresholds. Flow monitoring in Reaches 3 and 4 conducted by Santa Barbara Channelkeeper in 2013 and 2014 further demonstrates that flows consistently fell below recommended protective thresholds through the dry seasons (see Table 4 below).

Finally, degradation of biological populations and communities has occurred and has been documented for southern California steelhead trout. By the 1990s there had been a 96% decline in the steelhead population in the Ventura River observed, prompting its listing as an endangered species in 1997 (Draft Biological Opinion, p. 352; *see also* National Marine Fisheries Service 2012 Southern California Steelhead Recovery Plan, p. 437) (Steelhead Recovery Plan) (describing declines in steelhead run sizes of 90% or more). The Steelhead Recovery Plan describes dams, surface water diversions, and groundwater extraction (including at Foster Park) as contributing to the present or threatened destruction, modification or curtailment of steelhead habitat or range and disease and predation of steelhead and as a "very high threat" to steelhead recovery in the Ventura River (p. 514).

Data Referenced:

1. Water Quality Control Plan for the Los Angeles Region ("Basin Plan").
2. California Department of Fish and Wildlife 1996 Steelhead Restoration and Management Plan for California ("Steelhead Restoration Plan").
3. U.S. EPA Draft Ventura River Reaches 3 and 4 Total Maximum Daily Loads For Pumping & Water Diversion-Related Water Quality Impairments ("EPA Draft TMDL").
4. Draft Environmental Impact Report on the Conjunctive Use Agreement between Casitas Municipal Water District and the City of Ventura ("Draft EIR").
5. National Marine Fisheries Service 2007 Draft Biological Opinion ("Draft Biological Opinion").
6. Ventura River Natural Conditions Study, TetraTech, 2009.
7. Jonathan Butcher, July 22, 2009 Memorandum to Scott Holder (VCWPD) Re:

Ventura River Model Comment Response.

8. City of Ventura Preliminary Hydrogeological and Surface Water/Groundwater Interaction Study (Hopkins, 2013).
9. NMFS 2012 Southern California Steelhead Recovery Plan ("Steelhead Recovery Plan").
10. Beller, EE et al., Historical Ecology of the lower Santa Clara River, Ventura River, and Oxnard Plain: an analysis of terrestrial, riverine, and coastal habitats, San Francisco Estuary Institute, 2011.
11. 2010 California 303(d) List of Water Quality Limited Segments ("2010 Integrated Report").
12. Santa Barbara Channelkeeper Continuous Monitoring Data for Dissolved Oxygen, Ventura River Monitoring Program 2013 - 2014.
13. Santa Barbara Channelkeeper Continuous Monitoring Data for Temperature, Ventura River Monitoring Program 2013 - 2014.
14. USGS Foster Park Stream Gage Data, Gage 11118500. Data downloaded from nwis.waterdata.usgs.gov/nwis on August 18, 2014.
15. Ventura Water Calendar Year source Report 2013 – 2014. City of Ventura Water Department.
16. Santa Barbara Channelkeeper Ventura River Monitoring Program; Methods and QAQC Description, March 1, 2013. Santa Barbara Channelkeeper

Table 1: Measurements Below the 7 mg/L Dissolved Oxygen Water Quality Objective – Santa Barbara Channelkeeper Ventura River Monitoring Program

7 Day Average of Minimum DO Measurements					
Site	**Year**	**Total n**	**n <7 mg/L**	**Min n for listing**	**Meets Listing Criteria?**
Reach 3					
6.1	2013	173	157		
	2014	155	155		
	Sub Total	328	312		
DS6	2013	140	140		
	2014	106	106		
	Sub Total	246	246		
	Grand Total	574	558	93	**Yes**
Reach 4					
DS6.3	2013	106	8		
	2014	68	55		
	Grand Total	174	63	29	**Yes**

Table 2: Measurements Below the 5 mg/L Dissolved Oxygen Water Quality Objective - Santa Barbara Channelkeeper Ventura River Monitoring Program

7 Day Average of Minimum DO Measurements					
Site	**Year**	**Total n**	**n <5 mg/L**	**Min n for listing**	**Meets Listing Criteria?**
Reach 3					
6.1	2013	173	100		
	2014	155	143		
	Sub Total	328	243		
DS6	2013	140	118		
	2014	106	98		
	Sub Total	246	216		
	Grand Total	574	459	93	**Yes**
Reach 4					
DS6.3	2013	106	0		
	2014	68	2		
	Grand Total	174	2	29	**No**

Table 3: Measurements Above the 21° Temperature 303(d) Listing Evaluation Criteria - Santa Barbara Channelkeeper Ventura River Monitoring Program

Daily Maximum Temperature Measurements					
Site	**Year**	**Total n**	**n > 21° *C***	**Min n for listing**	**Meets Listing Criteria?**
Reach 3					
6.1	2013	179	125		
	2014	161	152		
	Sub Total	340	277		
DS6	2013	149	84		
	2014	160	140		
	Sub Total	309	224		
	Grand Total	649	501	108	**Yes**
Reach 4					
DS6.3	2013	124	114		
	2014	126	113		
	Grand Total	250	227	42	**Yes**

Table 4: Flow on the Ventura River (cfs) – Santa Barbara Channelkeeper Ventura River Monitoring Program

SBCK Monitoring Sites				
Reaches		**Reach 3**		**Reach 4**
Year	**Date**	**6.1**	**DS6**	**DS6.3**
2013	6/6/13		Flow not measured in 2013	
	6/13/13	1.1		
	6/14/13			2.8
	7/10/13	0.6		2.3
	7/11/13			
	7/26/13	0.3		0.6
	8/16/13	0.3		0.3
	9/6/13	0.2		0.1
	9/24/13	0.1		0
	10/17/13	0.1		0
	11/22/13	0.1		0
2014	6/5/14	0.4		3.6
	6/24/14	0.6	0.3	3.3
	7/15/14	0.6	0.3	2.4
	7/31/14	0.5	0.5	1.1
	8/21/14	0.3		0.7
	9/16/14	0.1	0.4	0.3
	10/21/14	0.2	0.3	

Attachment A

USGS Foster Park Stream Gage Data
Gage 11118500

Data downloaded from nwis.waterdata.usgs.gov/nwis on August 18, 2014

A	Approved for publication -- Processing and review completed.
P	Provisional data subject to revision.
e	Value has been estimated.

Daily Mean Discharge, cubic feet per second 2007

DATE	Jan 2007	Feb 2007	Mar 2007	Apr 2007	May 2007	Jun 2007	Jul 2007	Aug 2007	Sep 2007	Oct 2007	Nov 2007	Dec 2007
1	7.0 A	11 A	10 A	8.3 A	8.3 A	6.9 A	5.4 A	3.9 A	2.8 A	1.7 A	0.86 A	0.59 A
2	7.1 A	11 A	9.7 A	8.3 A	8.2 A	6.9 A	5.0 A	3.1 A	2.6 A	1.8 A	0.85 A	0.52 A
3	7.4 A	11 A	9.6 A	8.6 A	8.0 A	7.2 A	5.0 A	3.1 A	2.6 A	1.8 A	0.75 A	0.52 A
4	7.5 A	9.8 A	9.8 A	9.0 A	8.2 A	7.2 A	5.0 A	3.3 A	2.3 A	1.8 A	0.80 A	0.48 A
5	7.5 A	9.7 A	9.4 A	8.7 A	8.1 A	7.0 A	5.0 A	3.3 A	2.3 A	1.7 A	0.85 A	0.48 A
6	7.6 A	9.7 A	9.0 A	8.6 A	7.9 A	6.8 A	5.0 A	3.2 A	2.4 e A	1.5 A	0.86 A	0.49 A
7	7.6 A	9.8 A	9.0 A	8.7 A	7.9 A	6.7 A	5.1 A	3.4 A	2.4 e A	1.4 A	0.84 A	0.60 A
8	7.5 A	9.8 A	8.3 A	8.3 A	7.8 A	6.8 A	4.9 A	3.3 A	2.4 e A	1.4 A	0.78 A	0.52 A
9	7.5 A	9.7 A	8.3 A	8.3 A	8.1 A	6.9 A	5.1 A	3.3 A	2.5 e A	1.4 A	0.73 A	0.43 A
10	7.6 A	9.7 A	8.2 A	7.6 A	8.9 A	7.2 A	5.8 A	3.1 A	2.5 e A	1.5 A	0.73 A	0.43 A
11	7.6 A	10 A	7.7 A	7.6 A	8.2 A	7.3 A	4.7 A	2.8 A	2.5 e A	1.5 A	0.73 A	0.43 A
12	7.6 A	9.2 A	7.3 A	7.1 A	8.1 A	7.3 A	4.1 A	2.7 A	2.6 A	1.5 A	0.67 A	0.42 A
13	7.6 A	8.9 A	6.7 A	7.4 A	8.1 A	7.3 A	4.1 A	2.7 A	2.6 A	1.5 A	0.62 A	0.39 A
14	7.6 A	9.0 A	6.6 A	7.2 A	8.2 A	6.8 A	3.7 A	2.6 A	2.6 A	1.3 A	0.62 A	0.39 A
15	7.6 A	8.9 A	6.7 A	7.0 A	8.3 A	6.8 A	4.1 A	2.6 A	2.4 A	1.2 A	1.0 A	0.39 A
16	7.6 A	8.6 A	6.6 A	6.8 A	8.5 A	6.8 A	4.5 A	2.6 A	2.5 A	1.2 A	0.92 A	0.36 A
17	7.6 A	7.9 A	6.8 A	6.7 A	8.1 A	6.8 A	4.3 A	2.6 A	2.5 A	1.2 A	0.73 A	0.31 A
18	7.5 A	7.5 A	6.9 A	6.8 A	8.0 A	6.8 A	3.9 A	2.5 A	2.5 A	1.2 A	0.62 A	1.0 A
19	7.4 A	10 A	7.0 A	7.5 A	8.0 A	6.5 A	4.1 A	2.5 A	2.5 A	1.2 A	0.61 A	1.2 A
20	7.0 A	8.7 A	7.3 A	8.3 A	8.0 A	6.3 A	4.2 A	2.5 A	2.4 A	1.0 A	0.58 A	0.74 A
21	6.6 A	8.3 A	7.6 A	8.4 A	7.8 A	6.3 A	4.2 A	2.5 A	2.3 A	0.99 A	0.55 A	0.66 A
22	6.5 A	9.6 A	7.6 A	8.1 A	7.5 A	6.3 A	4.2 A	2.6 A	1.5 A	1.0 A	0.52 A	0.62 A
23	6.5 A	11 A	7.6 A	8.3 A	7.4 A	5.8 A	4.2 A	2.7 A	1.4 A	1.00 A	0.54 A	0.60 A
24	6.7 A	10 A	7.6 A	8.3 A	7.3 A	5.8 A	4.3 A	2.7 A	1.4 A	0.87 A	0.54 A	0.57 A
25	6.8 A	9.7 A	7.6 A	8.3 A	7.2 A	6.0 A	4.7 A	2.6 A	1.5 A	0.86 A	0.46 A	0.57 A
26	6.9 A	9.5 A	7.6 A	8.3 A	7.1 A	5.8 A	4.5 A	2.8 A	1.8 A	0.85 A	0.45 A	0.52 A
27	8.2 A	10 A	7.6 A	8.3 A	7.1 A	5.7 A	4.3 A	2.6 A	1.9 A	0.76 A	0.44 A	0.52 A
28	34 A	10 A	7.8 A	8.3 A	7.2 A	5.7 A	4.3 A	2.5 A	2.0 A	0.80 A	0.48 A	0.52 A
29	16 A		7.8 A	8.3 A	7.0 A	5.5 A	4.2 A	2.6 A	1.7 A	0.84 A	0.52 A	0.52 A
30	13 A		7.9 A	8.4 A	7.1 A	5.5 A	4.3 A	2.7 A	1.7 A	0.86 A	0.58 A	0.52 A
31	12 A		8.1 A		6.9 A		4.2 A	2.8 A		0.88 A		0.51 A
COUNT	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**
MAX	**34**	**11**	**10**	**9**	**8.9**	**7.3**	**5.8**	**3.9**	**2.8**	**1.8**	**1**	**1.2**
MIN	**6.5**	**7.5**	**6.6**	**6.7**	**6.9**	**5.5**	**3.7**	**2.5**	**1.4**	**0.76**	**0.44**	**0.31**

Daily Mean Discharge, cubic feet per second 2008

DATE	Jan 2008	Feb 2008	Mar 2008	Apr 2008	May 2008	Jun 2008	Jul 2008	Aug 2008	Sep 2008	Oct 2008	Nov 2008	Dec 2008
1	0.52 A	155 e A	85 A	40 A	25 A	16 A	14 A	10 A	6.7 A	5.4 A	8.2 A	5.1 A
2	0.51 A	130 A	82 A	40 A	23 A	16 A	15 A	9.8 A	6.7 A	5.4 A	7.3 A	5.0 A
3	0.56 A	158 A	78 A	40 A	22 A	17 A	15 A	9.5 A	6.9 A	5.4 A	6.1 A	4.7 A
4	1,300 A	112 e A	77 A	41 A	21 A	18 A	13 A	9.3 A	6.8 A	5.7 A	5.1 A	4.7 A
5	1,290 A	97 e A	75 A	41 A	19 A	19 A	13 A	8.8 A	6.8 A	5.3 A	4.0 A	4.7 A
6	32 A	96 e A	71 A	41 A	20 A	20 A	12 A	9.6 A	7.1 A	4.9 A	4.2 A	4.6 A
7	63 A	91 e A	71 A	41 A	20 A	20 A	12 A	9.5 A	7.3 A	4.7 A	5.4 A	4.8 A
8	17 A	86 e A	71 A	41 A	19 A	21 A	12 A	9.2 A	7.3 A	4.5 A	5.7 A	4.9 A
9	9.4 A	77 e A	66 A	40 A	18 A	22 A	13 A	9.1 A	7.6 A	4.6 A	5.5 A	4.8 A
10	6.9 A	74 e A	65 A	36 A	17 A	22 A	12 A	9.2 A	7.3 A	4.7 A	5.6 A	4.6 A
11	5.7 A	72 e A	61 A	36 A	17 A	20 A	12 A	9.5 A	7.3 A	4.9 A	5.6 A	4.4 A
12	5.1 A	66 e A	58 A	35 A	17 A	21 A	12 A	10 A	7.4 A	5.3 A	5.4 A	4.3 A
13	4.7 A	63 A	57 A	33 A	15 A	21 A	11 A	10 A	7.4 A	5.5 A	5.2 A	4.0 A
14	4.4 A	61 A	57 A	32 A	13 A	21 A	11 A	8.8 A	7.2 A	5.3 A	5.0 A	3.9 A
15	4.4 A	56 A	57 A	30 A	12 A	20 A	10 A	8.5 A	6.9 A	5.0 A	5.3 A	12 A
16	4.4 A	54 A	57 A	30 A	11 A	20 A	10 A	9.2 A	6.7 A	4.7 A	5.6 A	8.8 A
17	4.4 A	54 A	55 A	30 A	10 A	19 A	10 A	9.4 A	6.7 A	5.5 A	5.6 A	6.1 A
18	4.3 A	54 A	53 A	29 A	11 A	18 A	10 A	9.5 A	6.8 A	6.8 A	5.8 A	5.1 A
19	4.2 A	53 A	53 A	29 A	13 A	18 A	11 A	9.8 A	6.8 A	7.3 A	5.6 A	5.7 A
20	4.4 A	56 A	51 A	28 A	12 A	17 A	11 A	8.8 A	6.8 A	7.4 A	5.5 A	7.0 A
21	4.4 A	56 A	49 A	29 A	12 A	16 A	11 A	7.2 A	7.0 A	7.0 A	4.5 A	6.9 A
22	4.7 A	70 A	47 A	30 A	12 A	15 A	10 A	6.7 A	7.0 A	6.4 A	4.6 A	7.5 A
23	618 A	61 A	43 A	30 A	13 A	15 A	9.7 A	7.1 A	6.7 A	6.0 A	4.6 A	7.1 A
24	1,200 A	164 A	42 A	30 A	14 A	13 A	9.9 A	6.8 A	6.4 A	5.9 A	4.8 A	6.7 A
25	2,740 A	101 A	41 A	30 A	14 A	12 A	9.9 A	6.5 A	6.5 A	5.8 A	5.2 A	6.8 A
26	713 A	98 A	39 A	29 A	14 A	13 A	9.8 A	6.5 A	6.4 A	5.8 A	8.0 A	6.7 A
27	6,340 e A	93 A	39 A	27 A	13 A	13 A	10 A	6.8 A	6.2 A	5.8 A	7.1 A	7.0 A
28	3,630 e A	89 A	39 A	24 A	13 A	14 A	10 A	7.0 A	6.3 A	5.7 A	3.9 A	7.0 A
29	962 e A	85 A	39 A	25 A	14 A	16 A	11 A	6.5 A	6.3 A	6.0 A	3.6 A	6.8 A
30	354 e A		39 A	24 A	14 A	14 A	10 A	6.5 A	5.6 A	6.2 A	3.5 A	6.4 A
31	240 e A		38 A		15 A		10 A	6.6 A		6.3 A		6.1 A
COUNT	**31**	**29**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**
MAX	**6,340**	**164**	**85**	**41**	**25**	**22**	**15**	**10**	**7.6**	**7.4**	**8.2**	**12**
MIN	**0.51**	**53**	**38**	**24**	**10**	**12**	**9.7**	**6.5**	**5.6**	**4.5**	**3.5**	**3.9**

Daily Mean Discharge, cubic feet per second 2009

DATE	Jan 2009	Feb 2009	Mar 2009	Apr 2009	May 2009	Jun 2009	Jul 2009	Aug 2009	Sep 2009	Oct 2009	Nov 2009	Dec 2009
1	6.1 A	4.8 A	16 A	12 A	9.1 A	8.2 A	7.0 A	2.2 A	3.3 A	2.1 A	2.5 A	2.3 A
2	6.3 A	4.7 A	16 A	12 A	8.7 A	7.2 A	7.1 A	2.4 A	3.3 A	2.0 A	1.6 A	2.3 A
3	6.4 A	4.7 A	15 A	12 A	8.5 A	7.1 A	5.4 A	2.6 A	3.1 A	1.9 A	1.8 A	2.4 A
4	6.6 A	4.6 A	16 A	12 A	8.4 A	6.1 A	5.5 A	2.0 A	3.1 A	2.0 A	2.2 A	2.3 A
5	6.5 A	5.3 A	16 A	11 A	7.8 A	6.6 A	5.5 A	1.8 A	3.3 A	2.3 A	2.6 A	2.3 A
6	6.1 A	8.2 A	16 A	11 A	7.2 A	6.5 A	4.8 A	2.1 A	3.2 A	2.3 A	2.7 A	2.3 A
7	6.0 A	13 A	15 A	11 A	6.7 A	6.0 A	4.7 A	2.4 A	3.2 A	2.2 A	2.7 A	3.1 A
8	6.2 A	12 A	15 A	11 A	6.6 A	6.2 A	4.7 A	2.9 A	3.1 A	2.2 A	2.7 A	3.0 A
9	6.1 A	12 A	15 A	11 A	6.8 A	6.2 A	4.4 A	3.1 A	3.0 A	2.1 A	2.7 A	2.8 A
10	6.1 A	11 A	15 A	11 A	7.0 A	7.2 A	4.3 A	3.3 A	2.8 A	2.0 A	2.6 A	2.7 A
11	5.9 A	10 A	15 A	11 A	7.2 A	6.1 A	4.0 A	3.5 A	2.9 A	2.1 A	2.6 A	3.4 A
12	5.6 A	10 A	14 A	11 A	7.4 e A	9.9 A	3.8 A	3.3 A	3.0 A	2.0 A	2.5 A	7.5 A
13	5.5 A	11 A	14 A	11 A	7.8 e A	11 A	3.8 A	3.0 A	2.9 A	2.5 A	2.7 A	23 A
14	5.3 A	11 A	14 A	10 A	8.2 A	11 A	3.9 A	2.6 A	2.9 A	36 A	2.8 A	5.7 A
15	5.3 A	11 A	14 A	10 A	8.1 A	12 A	3.9 A	2.4 A	2.9 A	6.7 A	2.7 A	4.1 A
16	5.3 A	65 A	14 A	10 A	8.2 A	12 e A	3.5 A	3.3 A	2.7 A	3.0 A	2.9 A	3.5 A
17	5.2 A	64 A	14 A	10 A	8.4 A	12 e A	3.6 A	3.5 A	2.5 A	2.9 A	2.4 A	3.4 A
18	5.1 A	35 A	14 A	10 A	8.8 A	12 e A	3.5 A	4.0 A	2.4 A	3.1 A	2.5 A	3.1 A
19	5.2 A	29 A	14 A	9.6 A	8.6 A	12 A	3.1 A	3.7 A	2.4 A	2.0 A	2.8 A	3.1 A
20	4.8 A	27 A	14 A	9.6 A	8.4 A	9.3 A	3.0 A	3.4 A	2.4 A	1.9 A	3.0 A	3.3 A
21	4.8 A	24 A	14 A	9.4 A	8.1 A	7.4 A	3.1 A	3.2 A	2.4 A	2.7 A	2.9 A	3.4 A
22	5.0 A	23 A	14 A	9.9 A	8.2 A	6.8 A	3.1 A	2.8 A	2.3 A	2.8 A	2.9 A	3.3 A
23	5.0 A	21 A	14 A	10 A	7.8 A	6.4 A	3.1 A	2.7 A	2.1 A	2.7 A	2.4 A	3.4 A
24	4.8 A	20 A	14 A	10 A	8.3 A	6.2 A	3.7 A	2.7 A	2.2 A	2.8 A	2.3 A	3.5 A
25	4.9 A	20 A	14 A	9.8 A	8.7 A	6.1 A	3.1 A	3.0 A	2.3 A	2.5 A	2.3 A	4.5 A
26	5.0 A	19 A	14 A	9.9 A	9.1 A	8.8 A	2.6 A	3.8 A	2.2 A	2.1 A	2.2 A	4.8 A
27	5.0 A	18 A	13 A	10 A	8.5 A	7.5 A	2.8 A	3.8 A	2.2 A	2.3 A	2.2 A	3.8 A
28	4.9 A	17 A	13 A	9.8 A	8.1 A	9.2 A	3.2 A	4.0 A	2.3 A	2.9 A	2.5 A	4.1 A
29	5.0 A		13 A	9.2 A	8.4 A	7.6 A	2.9 A	3.8 A	2.2 A	3.1 A	2.2 A	4.0 A
30	4.7 A		12 A	8.9 A	8.7 A	6.5 A	2.6 A	3.6 A	2.1 A	3.1 A	2.2 A	3.8 A
31	4.8 A		12 A		8.3 A		2.4 A	3.5 A		2.8 A		3.5 A
COUNT	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**
MAX	**6.6**	**65**	**16**	**12**	**9.1**	**12**	**7.1**	**4**	**3.3**	**36**	**3**	**23**
MIN	**4.7**	**4.6**	**12**	**8.9**	**6.6**	**6**	**2.4**	**1.8**	**2.1**	**1.9**	**1.6**	**2.3**

Daily Mean Discharge, cubic feet per second 2010

DATE	Jan 2010	Feb 2010	Mar 2010	Apr 2010	May 2010	Jun 2010	Jul 2010	Aug 2010	Sep 2010	Oct 2010	Nov 2010	Dec 2010
1	3.8 A	56 A	98 A	31 A	35 A	20 A	12 A	8.5 A	6.1 A	6.0 A	4.1 A	4.3 A
2	4.1 A	49 A	91 A	29 A	34 A	21 A	12 A	8.0 A	6.0 A	6.6 A	4.2 A	4.2 A
3	3.9 A	40 A	86 A	30 A	34 A	20 A	12 A	7.7 A	6.0 A	6.1 A	5.0 A	3.9 A
4	3.9 A	38 A	85 A	30 A	34 A	18 A	12 A	7.5 A	5.8 A	4.9 A	5.1 A	3.9 A
5	4.3 A	111 A	80 A	39 A	34 A	18 A	11 A	7.5 A	5.8 A	4.6 A	5.2 A	4.0 A
6	4.8 A	110 A	78 A	33 A	37 A	19 A	12 A	7.4 A	5.9 A	6.2 A	5.4 A	4.1 A
7	5.0 A	98 A	76 A	32 A	35 A	17 A	11 A	7.3 A	6.1 A	6.4 A	5.4 A	3.9 A
8	5.1 A	82 A	70 A	30 A	34 A	17 A	12 A	8.3 A	7.1 A	5.1 A	5.4 A	3.9 A
9	5.0 A	105 A	70 A	29 A	34 A	18 A	13 A	8.4 A	7.5 A	4.3 A	5.3 A	3.9 A
10	4.5 A	85 A	67 A	28 A	35 A	18 A	10 A	7.7 A	7.1 A	3.8 A	5.0 A	3.9 A
11	4.7 A	76 A	59 A	34 A	34 A	17 A	10 A	8.5 A	6.8 A	4.0 A	4.8 A	3.8 A
12	4.6 A	73 A	56 A	115 A	33 A	16 A	10 A	9.3 A	6.5 A	4.6 A	4.7 A	3.8 A
13	4.3 A	74 A	55 A	46 A	32 A	17 A	9.6 A	7.8 A	6.4 A	5.7 A	4.7 A	3.8 A
14	4.7 A	73 A	53 A	39 A	31 A	17 A	8.5 A	7.2 A	6.0 A	5.7 A	4.6 A	4.0 A
15	4.7 A	72 A	51 A	36 A	32 A	15 A	8.5 A	7.7 A	5.8 A	5.0 A	4.6 A	4.0 A
16	3.6 A	68 A	50 A	34 A	29 A	15 A	8.5 A	7.2 A	5.7 A	5.1 A	4.6 A	4.0 A
17	4.8 A	59 A	42 A	33 A	26 A	15 A	8.7 A	6.7 A	5.8 A	5.2 A	4.6 A	4.5 A
18	330 A	51 A	42 A	31 A	29 A	15 A	8.2 A	6.9 A	5.8 A	5.0 A	4.6 A	29 A
19	168 A	50 A	42 A	30 A	30 A	15 A	8.3 A	6.5 A	5.5 A	6.2 A	4.6 A	1,090 A
20	901 A	51 A	42 A	34 A	26 A	15 A	8.7 A	6.0 A	5.4 A	5.1 A	5.4 A	253 A
21	730 A	49 A	42 A	34 A	24 A	14 A	8.1 A	5.7 A	5.6 A	4.2 A	5.9 A	76 A
22	524 A	48 A	43 A	33 A	25 A	14 A	7.8 A	5.6 A	5.3 A	4.2 A	4.5 A	1,320 A
23	191 A	50 A	41 A	32 A	26 A	16 A	8.5 A	5.5 A	5.1 A	4.3 A	4.9 A	235 A
24	127 A	48 A	36 A	31 A	24 A	15 A	8.8 A	5.3 A	4.9 A	4.3 A	4.4 A	80 A
25	108 A	46 A	35 A	32 A	23 A	13 A	8.4 A	5.2 A	4.6 A	4.2 A	3.7 A	54 A
26	93 A	46 A	35 A	32 A	22 A	13 A	9.2 A	5.9 A	4.5 A	5.4 A	4.2 A	75 A
27	72 A	310 A	34 A	34 A	20 A	15 A	8.7 A	6.3 A	4.2 A	5.3 A	4.3 A	41 A
28	65 A	134 A	33 A	33 A	21 A	16 A	8.4 A	6.3 A	4.1 A	4.4 A	4.1 A	35 A
29	61 A		33 A	33 A	21 A	16 A	9.0 A	6.4 A	4.4 A	4.2 A	4.4 A	40 A
30	59 A		33 A	33 A	20 A	13 A	8.9 A	6.4 A	5.6 A	4.8 A	4.4 A	34 A
31	57 A		32 A		19 A		8.2 A	6.2 A		4.3 A		30 A
COUNT	31	28	31	30	31	30	31	31	30	31	30	31
MAX	901	310	98	115	37	21	13	9.3	7.5	6.6	5.9	1,320
MIN	3.6	38	32	28	19	13	7.8	5.2	4.1	3.8	3.7	3.8

Daily Mean Discharge, cubic feet per second 2011

DATE	Jan 2011	Feb 2011	Mar 2011	Apr 2011	May 2011	Jun 2011	Jul 2011	Aug 2011	Sep 2011	Oct 2011	Nov 2011	Dec 2011
1	28 A	24 A	75 A	130 A	42 A	37 A	27 A	19 A	13 A	11 A	7.7 A	7.9 A
2	32 A	24 A	73 A	112 A	42 A	38 A	25 A	16 A	11 A	9.7 A	7.4 A	6.2 A
3	42 A	24 A	74 A	100 A	43 A	39 A	26 A	16 A	11 A	8.6 A	6.2 A	5.8 A
4	33 A	24 A	71 A	89 A	43 A	41 A	27 A	16 A	12 A	9.1 A	7.1 A	5.7 A
5	29 A	23 A	69 A	80 A	42 A	41 A	27 A	16 A	12 A	14 A	7.6 A	5.6 A
6	29 A	23 A	69 A	77 A	42 A	43 A	24 A	16 A	10 A	16 A	6.9 A	6.4 A
7	30 A	23 A	68 A	75 A	43 A	43 A	23 A	17 A	9.9 A	13 A	7.6 A	6.4 A
8	28 A	22 A	67 A	74 A	42 A	43 A	22 A	17 A	10 A	12 A	7.4 A	5.7 A
9	27 A	24 A	62 A	72 A	43 A	41 A	22 A	16 A	9.6 A	12 A	7.9 A	5.3 A
10	27 A	24 A	56 A	68 A	42 A	40 A	22 A	16 A	9.4 A	11 A	7.2 A	5.3 A
11	27 A	22 A	54 A	66 A	41 A	43 A	24 A	16 A	9.5 A	11 A	7.6 A	5.5 A
12	29 A	20 A	54 A	65 A	41 A	40 A	26 A	16 A	11 A	12 A	8.9 A	5.6 A
13	31 A	21 A	55 A	65 A	40 A	38 A	24 A	15 A	13 A	11 A	8.1 A	7.0 A
14	27 A	21 A	56 A	63 A	39 A	38 A	23 A	14 A	12 A	8.8 A	7.8 A	8.2 A
15	26 A	21 A	56 A	58 A	38 A	36 A	22 A	15 A	11 A	8.0 A	6.4 A	6.8 A
16	27 A	32 A	56 A	57 A	39 A	38 A	21 A	17 A	11 A	7.9 A	7.8 A	6.9 A
17	27 A	30 A	56 A	57 A	48 A	38 A	20 A	18 A	12 A	7.6 A	8.6 A	8.4 A
18	27 A	62 A	58 A	55 A	49 A	36 A	19 A	16 A	9.9 A	7.5 A	8.3 A	9.0 A
19	26 A	118 A	60 A	54 A	40 A	36 A	18 A	14 A	9.7 A	8.5 A	7.0 A	6.8 A
20	25 A	82 A	6,270 A	51 A	40 A	38 A	22 A	13 A	9.1 A	9.3 A	13 A	6.5 A
21	26 A	73 A	2,670 A	51 A	39 A	37 A	22 A	14 A	9.3 A	9.4 A	12 A	7.1 A
22	26 A	69 A	490 A	50 A	40 A	35 A	19 A	15 A	11 A	9.4 A	11 A	8.7 A
23	24 A	67 A	300 A	49 A	39 A	31 A	18 A	13 A	9.5 A	7.4 A	10 A	9.0 A
24	24 A	66 A	277 A	48 A	38 A	33 A	18 A	12 A	10 A	7.4 A	8.5 A	6.6 A
25	25 A	126 A	1,260 A	48 A	38 A	32 A	17 A	11 A	11 A	9.9 A	8.4 A	6.9 A
26	24 A	221 A	430 A	47 A	38 A	31 A	18 A	12 A	11 A	9.7 A	8.1 A	6.9 A
27	23 A	96 A	319 A	45 A	38 A	31 A	21 A	12 A	9.4 A	7.4 A	7.3 A	6.7 A
28	24 A	80 A	257 A	44 A	38 A	31 A	17 A	11 A	9.3 A	6.6 A	6.3 A	6.5 A
29	23 A		212 A	43 A	39 A	29 A	16 A	11 A	9.0 A	7.0 A	5.9 A	7.4 A
30	23 A		180 A	42 A	39 A	29 A	18 A	10 A	9.0 A	7.3 A	7.0 A	7.9 A
31	23 A		158 A		38 A		19 A	11 A		6.3 A		7.6 A
COUNT	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**
MAX	**42**	**221**	**6,270**	**130**	**49**	**43**	**27**	**19**	**13**	**16**	**13**	**9**
MIN	**23**	**20**	**54**	**42**	**38**	**29**	**16**	**10**	**9**	**6.3**	**5.9**	**5.3**

Daily Mean Discharge, cubic feet per second 2012

DATE	Jan 2012	Feb 2012	Mar 2012	Apr 2012	May 2012	Jun 2012	Jul 2012	Aug 2012	Sep 2012	Oct 2012	Nov 2012	Dec 2012
1	6.5 A	7.0 A	7.2 A	11 A	7.2 A	5.1 A	3.8 A	6.9 A	1.0 A	0.53 A	0.29 A	0.28 A
2	5.6 A	7.9 A	7.3 A	12 A	8.7 A	5.1 A	4.1 A	7.1 A	1.0 A	0.47 A	0.29 A	0.25 A
3	7.0 A	6.8 A	5.8 A	13 A	9.2 A	5.2 A	3.5 A	7.4 A	1.1 A	0.48 A	0.27 A	0.29 A
4	6.7 A	7.5 A	5.0 A	14 A	7.8 A	5.4 A	3.6 A	7.4 A	1.1 A	0.52 A	0.27 A	0.31 A
5	7.7 A	6.8 A	4.6 A	14 A	8.0 A	5.1 A	3.6 A	7.0 A	1.2 A	0.50 A	0.25 A	0.27 A
6	7.5 A	5.8 A	5.9 A	14 A	6.8 A	5.0 A	3.7 A	7.0 A	1.1 A	0.48 A	0.23 A	0.31 A
7	6.2 A	5.3 A	6.7 A	15 A	6.2 A	5.0 A	3.6 A	7.0 A	0.98 A	0.42 A	0.26 A	0.32 A
8	5.2 A	7.0 A	7.0 A	15 A	6.2 A	5.0 A	4.6 A	6.5 A	0.92 A	0.42 A	0.32 A	0.35 A
9	6.1 A	7.2 A	5.8 A	15 A	6.2 A	5.2 A	4.7 A	4.9 A	0.96 A	0.38 A	0.44 A	0.32 A
10	7.6 A	5.8 A	6.7 A	15 A	5.7 A	5.4 A	5.4 A	4.4 A	0.87 A	0.38 A	0.38 A	0.25 A
11	6.6 A	5.0 A	7.1 A	25 A	5.7 A	5.3 A	4.0 A	4.2 A	0.89 A	0.35 A	0.30 A	0.24 A
12	5.6 A	5.9 A	6.2 A	18 A	5.5 A	5.3 A	3.7 A	4.1 A	0.88 A	0.39 A	0.25 A	0.27 A
13	5.1 A	6.7 A	7.2 A	42 A	5.2 A	5.4 A	3.2 A	4.0 A	0.90 A	0.41 A	0.22 A	0.28 A
14	4.7 A	6.4 A	7.1 A	25 A	5.2 A	4.6 A	3.0 A	3.5 A	0.80 A	0.39 A	0.22 A	0.26 A
15	4.6 A	7.4 A	5.9 A	16 A	5.1 A	4.3 A	3.0 A	2.4 A	0.76 A	0.38 A	0.22 A	0.20 A
16	6.0 A	7.9 A	7.2 A	12 A	4.9 A	4.2 A	3.1 A	2.0 A	0.81 A	0.42 A	0.22 A	0.25 A
17	4.8 A	7.0 A	22 A	12 A	5.0 A	4.1 A	4.7 A	1.6 A	0.89 A	0.38 A	0.32 A	0.24 A
18	5.4 A	6.3 A	14 A	13 A	4.8 A	4.3 A	3.8 A	1.4 A	0.82 A	0.33 A	0.29 A	0.22 A
19	6.7 A	6.7 A	12 A	13 A	4.5 A	4.4 A	3.1 A	1.4 A	0.86 A	0.34 A	0.27 A	0.20 A
20	5.3 A	7.7 A	10 A	11 A	4.5 A	4.3 A	3.1 A	1.4 A	0.87 A	0.40 A	0.26 A	0.19 A
21	7.4 A	7.1 A	8.2 A	12 A	4.5 A	4.4 A	3.0 A	1.5 A	0.78 A	0.32 A	0.24 A	0.19 A
22	8.3 A	7.5 A	8.8 A	11 A	4.3 A	4.2 A	3.1 A	2.7 A	0.76 A	0.26 A	0.24 A	0.18 A
23	8.7 A	7.9 A	9.2 A	10 A	4.2 A	4.0 A	2.9 A	3.8 A	0.74 A	0.24 A	0.23 A	0.13 A
24	7.9 A	5.7 A	8.6 A	9.6 A	4.5 A	4.0 A	2.6 A	2.8 A	0.73 A	0.28 A	0.20 A	0.43 A
25	7.9 A	4.7 A	15 A	11 A	4.6 A	3.9 A	2.4 A	2.2 A	0.68 A	0.27 A	0.21 A	0.36 A
26	7.3 A	5.4 A	24 A	12 A	4.8 A	3.7 A	2.2 A	1.9 A	0.62 A	0.25 A	0.21 A	0.34 A
27	6.8 A	6.0 A	16 A	11 A	4.8 A	3.7 A	3.0 A	1.5 A	0.63 A	0.24 A	0.19 A	0.35 A
28	7.2 A	6.7 A	13 A	8.9 A	4.6 A	3.7 A	5.0 A	1.3 A	0.59 A	0.25 A	0.19 A	0.37 A
29	8.2 A	7.2 A	14 A	7.9 A	4.9 A	3.7 A	5.7 A	1.3 A	0.61 A	0.25 A	0.33 A	0.37 A
30	7.0 A		14 A	7.4 A	4.9 A	3.7 A	6.5 A	1.2 A	0.60 A	0.23 A	0.29 A	0.36 A
31	6.2 A		12 A		5.0 A		6.9 A	1.2 A		0.26 A		0.29 A
COUNT	**31**	**29**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**
MAX	**8.7**	**7.9**	**24**	**42**	**9.2**	**5.4**	**6.9**	**7.4**	**1.2**	**0.53**	**0.44**	**0.43**
MIN	**4.6**	**4.7**	**4.6**	**7.4**	**4.2**	**3.7**	**2.2**	**1.2**	**0.59**	**0.23**	**0.19**	**0.13**

Daily Mean Discharge, cubic feet per second 2013

DATE	Jan 2013	Feb 2013	Mar 2013	Apr 2013	May 2013	Jun 2013	Jul 2013	Aug 2013	Sep 2013	Oct 2013	Nov 2013	Dec 2013
1	0.21 A	0.15 A	0.50 A	0.77 A	1.4 A	0.73 A	0.46 A	0.32 e A	0.18 A	0.14 A	0.08 A	0.00 A
2	0.21 A	0.21 A	0.55 A	1.5 A	1.5 A	0.59 A	0.54 A	0.24 A	0.23 A	0.14 A	0.04 A	0.00 A
3	0.21 A	0.29 A	0.59 A	3.0 A	1.6 A	0.59 A	0.57 A	0.22 A	0.26 A	0.17 A	0.02 A	0.00 A
4	0.21 A	0.28 A	0.60 A	3.4 A	1.8 A	0.64 A	0.57 A	0.31 A	0.24 A	0.16 A	0.01 A	0.00 A
5	0.21 A	0.30 A	0.64 A	3.7 A	1.9 A	0.66 A	0.62 A	0.30 A	0.25 A	0.14 A	0.00 A	0.00 A
6	0.20 A	0.23 A	0.50 A	3.8 A	1.7 A	0.67 A	0.62 A	0.33 A	0.18 e A	0.12 A	0.00 A	0.00 A
7	0.19 A	0.20 A	0.64 A	3.8 A	1.3 A	0.64 A	0.66 A	0.30 A	0.11 A	0.12 A	0.00 A	0.00 A
8	0.18 A	0.29 A	1.1 A	4.2 A	1.2 A	0.67 A	0.61 A	0.32 A	0.16 A	0.12 A	0.00 A	0.00 A
9	0.18 A	0.34 A	0.91 A	4.4 A	1.3 A	0.74 A	0.50 A	0.43 A	0.20 e A	0.15 A	0.00 A	0.00 A
10	0.16 A	0.30 A	0.92 A	4.4 A	1.5 A	0.67 A	0.52 A	0.40 A	0.21 A	0.13 A	0.00 A	0.00 A
11	0.15 A	0.27 A	0.92 A	3.8 A	1.6 A	0.63 A	0.52 A	0.39 A	0.18 A	0.10 A	0.00 A	0.00 A
12	0.14 A	0.29 A	1.0 A	1.5 A	1.8 A	0.57 A	0.55 A	0.29 A	0.19 A	0.11 A	0.00 A	0.00 A
13	0.13 A	0.29 A	0.71 A	1.1 A	1.7 A	0.53 A	0.50 A	0.33 A	0.17 A	0.12 A	0.00 A	0.00 A
14	0.14 A	0.30 A	1.0 A	0.90 A	1.9 A	0.52 A	0.47 A	0.33 A	0.17 A	0.10 A	0.00 A	0.00 A
15	0.15 A	0.28 A	1.1 A	0.72 A	2.1 A	0.59 A	0.42 A	0.32 e A	0.15 A	0.09 A	0.00 A	0.00 A
16	0.11 A	0.33 A	1.1 A	0.72 A	2.1 A	0.48 A	0.39 A	0.33 e A	0.16 A	0.09 A	0.00 A	0.00 A
17	0.11 A	0.41 A	0.86 A	0.56 A	2.1 A	0.47 A	0.33 A	0.34 e A	0.14 A	0.07 A	0.00 A	0.00 P
18	0.17 A	0.36 A	0.75 A	0.41 A	2.3 A	0.52 A	0.32 A	0.36 A	0.15 e A	0.06 A	0.00 A	0.00 P
19	0.15 A	0.43 A	0.70 A	0.45 A	2.2 A	0.52 A	0.34 A	0.27 A	0.16 A	0.05 A	0.00 A	0.00 P
20	0.16 A	0.47 A	1.0 A	0.44 A	2.3 A	0.49 A	0.38 A	0.35 A	0.15 A	0.07 A	0.00 A	0.00 P
21	0.11 A	0.51 A	1.8 A	0.42 A	2.5 A	0.52 A	0.42 A	0.41 A	0.15 e A	0.08 A	0.00 A	0.00 P
22	0.08 A	0.46 A	2.5 A	0.48 A	2.7 A	0.51 A	0.41 A	0.44 A	0.14 e A	0.11 A	0.00 A	0.00 P
23	0.08 A	0.39 A	0.99 A	0.43 A	2.8 A	0.52 A	0.39 A	0.41 A	0.14 e A	0.12 A	0.00 A	0.00 P
24	0.21 A	0.42 A	0.89 A	0.42 A	2.8 A	0.54 A	0.41 A	0.35 e A	0.14 e A	0.12 A	0.00 A	0.00 P
25	0.19 A	0.49 A	0.70 A	0.45 A	2.5 A	0.51 A	0.36 A	0.33 e A	0.14 e A	0.14 A	0.00 A	0.00 P
26	0.13 A	0.49 A	0.65 A	0.50 A	2.0 A	0.56 A	0.39 A	0.30 e A	0.14 e A	0.14 A	0.00 A	0.00 P
27	0.14 A	0.42 A	0.57 A	0.58 A	1.7 A	0.51 A	0.36 e A	0.30 e A	0.14 e A	0.12 A	0.00 A	0.00 P
28	0.20 A	0.47 A	0.36 A	0.81 A	1.4 A	0.51 A	0.35 e A	0.29 A	0.14 A	0.12 A	0.00 A	0.00 P
29	0.24 A		0.48 A	1.1 A	1.1 A	0.49 A	0.35 e A	0.24 A	0.15 A	0.12 A	0.00 A	0.00 P
30	0.18 A		0.56 A	1.3 A	1.1 A	0.49 A	0.35 e A	0.21 A	0.13 A	0.13 A	0.00 A	0.00 P
31	0.14 A		0.63 A		0.91 A		0.33 e A	0.20 A		0.12 A		0.00 P
COUNT	**31**	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	
MAX	**0.24**	**0.51**	**2.5**	**4.4**	**2.8**	**0.74**	**0.66**	**0.44**	**0.26**	**0.17**	**0.08**	
MIN	**0.08**	**0.15**	**0.36**	**0.41**	**0.91**	**0.47**	**0.32**	**0.2**	**0.11**	**0.05**	**0**	

Daily Mean Discharge, cubic feet per second 2014

DATE	Jan 2014	Feb 2014	Mar 2014	Apr 2014	May 2014	Jun 2014	Jul 2014	Aug 2014
1	0.00 P	0.00 P	680 P	0.00 P	0.00 P	0.07 P	0.55 P	0.20 P
2	0.00 P	0.00 P	76 P	0.00 P	0.00 P	0.04 P	0.56 P	0.18 P
3	0.00 P	0.00 P	10 P	0.00 P	0.01 P	0.08 P	0.61 P	0.19 P
4	0.00 P	0.00 P	3.6 P	0.00 P	0.01 P	0.07 P	0.55 P	0.19 P
5	0.00 P	0.00 P	2.0 P	0.00 P	0.02 P	0.08 P	0.53 P	0.16 P
6	0.00 P	0.00 P	1.5 P	0.00 P	0.02 P	0.09 P	0.56 P	0.19 P
7	0.00 P	0.00 P	1.2 P	0.00 P	0.02 P	0.08 P	0.52 P	0.15 P
8	0.00 P	0.00 P	0.85 P	0.00 P	0.03 P	0.14 P	0.54 P	0.23 P
9	0.00 P	0.00 P	0.62 P	0.00 P	0.02 P	0.17 P	0.50 P	0.13 P
10	0.00 P	0.00 P	0.49 P	0.00 P	0.07 P	0.23 P	0.53 P	0.16 P
11	0.00 P	0.00 P	0.36 P	0.00 P	0.02 P	0.12 P	0.51 P	0.22 P
12	0.00 P	0.00 P	0.23 P	0.00 P	0.02 P	0.12 P	0.51 P	0.11 P
13	0.00 P	0.00 P	0.11 P	0.00 P	0.02 P	0.14 P	0.53 P	0.19 P
14	0.00 P	0.00 P	0.07 P	0.00 P	0.03 P	0.17 P	0.48 P	0.17 P
15	0.00 P	0.00 P	0.06 P	0.00 P	0.03 P	0.19 P	0.48 P	0.10 P
16	0.00 P	0.00 P	0.03 P	0.00 P	0.04 P	0.22 P	0.54 P	0.11 P
17	0.00 P	0.00 P	0.03 P	0.00 P	0.05 P	0.30 P	0.51 P	0.05 P
18	0.00 P	0.00 P	0.02 P	0.00 P	0.03 P	0.36 P	0.55 P	
19	0.00 P	0.00 P	0.03 P	0.00 P	0.03 P	0.26 P	0.50 P	
20	0.00 P	0.00 P	0.01 P	0.00 P	0.04 P	0.29 P	0.49 P	
21	0.00 P	0.00 P	0.01 P	0.00 P	0.04 P	0.29 P	0.43 P	
22	0.00 P	0.00 P	0.00 P	0.00 P	0.05 P	0.31 P	0.43 P	
23	0.00 P	0.00 P	0.00 P	0.00 P	0.06 P	0.38 P	0.38 P	
24	0.00 P	0.00 P	0.00 P	0.00 P	0.11 P	0.96 P	0.31 P	
25	0.00 P	0.00 P	0.00 P	0.00 P	0.09 P	1.3 P	0.31 P	
26	0.00 P	0.00 P	0.00 P	0.00 P	0.05 P	0.79 P	0.32 P	
27	0.00 P	0.00 P	0.00 P	0.00 P	0.06 P	0.67 P	0.32 P	
28	0.00 P	2.8 P	0.00 P	0.00 P	0.05 P	0.60 P	0.30 P	
29	0.00 P		0.00 P	0.00 P	0.11 P	0.54 P	0.26 P	
30	0.00 P		0.00 P	0.00 P	0.05 P	0.62 P	0.23 P	
31	0.00 P		0.00 P		0.06 P		0.22 P	
COUNT		28	31		31	30	31	17
MAX		2.8	680		0.11	1.3	0.61	0.23
MIN		0	0		0	0.04	0.22	0.05

Attachment B

Foster Park Production (acre-feet)[1] at 12 CFS and 2 CFS Thresholds (2007 - 2014)

Daily mean flow[2] < or = 12 cfs for entire month

Daily mean flow[2] < or = 2 cfs for entire month

2007	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
FP Intake Subsurface Flow	155.15	141.6	157.76	153.87	160.67	155.2	155.3	156.01	147.45	146.65	126.5	120.85	1777.01
Nye Well #11	22.62	18.48	20.57	19.77	20.8	19.73	19.51	17.45	16.67	15.03	11.85	10.76	213.24
Nye Well #2	0	0	0	0	0	0	0	0	0	0	0	0	0
Nye Well #7	0	0	0	0	0	0	0	0	0	0	0	0	0
Nye Well#8	0	0	0	0	0	0	0	0.33	9.19	0	0	0	9.52
											Total Production		**1999.77**

2008	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
FP Intake Subsurface Flow	148.07	105.11	156.51	87.21	113.59	148.88	155.23	152.86	144.71	147.4	141.7	145.13	1646.4
Nye Well #11	17.12	13.23	20.82	19.75	19.54	16.99	19.67	20.88	19.18	15.08	9.33	21.81	213.4
Nye Well #2	0	0	0	0	0	0	0	0	0	0	0	0	0
Nye Well #7	0	0	0	0	0	0	0	0	0	0	0	0	0
Nye Well#8	14.88	38.01	95.74	102.27	100.57	87.48	120.51	96.99	103.79	51.33	25.23	14.76	851.56
											Total Production		**2711.36**

2009	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
FP Intake Subsurface Flow	143.19	131.02	137.89	143.71	141.04	102.01	147.97	144.75	139.44	142.56	141.67	139.37	1654.62
Nye Well #11	4.97	0	16.9	21.88	20.7	11.24	19.03	6.68	15.12	8.51	9.48	17.36	151.87
Nye Well #2	0	0	0	0	0	0	0	0	0	0	0	0	0
Nye Well #7	0	0	138.05	159.04	186.16	121.61	130.91	56.56	0	5.58	3.29	0.08	801.28
Nye Well#8	0	64.74	56.86	63.38	65.58	37.4	78.04	50.24	0	10.66	1.86	0.05	428.81
											Total Production		**3036.58**

2010	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
FP Intake Subsurface Flow	86.98	105.5	156.61	148.87	123.67	134.3	148.08	149.75	143.24	138.02	114.66	106.01	1555.69
Nye Well #11	14.62	2.55	21.68	21.23	17.23	18.25	19.56	17.3	4.38	0.91	0	0.12	137.83
Nye Well #2	0	0	0	0	0	0	0	0	0	0	0	0	0
Nye Well #7	0.02	4.2	72.79	127.18	53.71	0.35	118.08	209.25	214.96	55.79	0	42.56	898.89
Nye Well#8	0	28.99	54	83.53	49.74	68.62	93.23	54.35	3.47	69.79	18.4	44.31	568.43
											Total Production		**3160.84**

2011	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
FP Intake Subsurface Flow	88.3	107.98	125.68	145.83	150.69	110.48	124.22	129.25	128.93	128.86	129.88	129.26	1499.36
Nye Well #11	19.59	12.84	22.63	17.01	10.1	16.9	17.91	17.89	17.67	17.23	17.35	7.61	194.73
Nye Well #2	0	0	0	0	0	0	0	0	0	0	0	0	0
Nye Well #7	90.78	0	106.14	63.55	62.69	29.2	106.1	81.53	75.05	87.32	62.73	94.98	860.07
Nye Well#8	86.56	48.87	51.44	79.92	85.4	42.71	93.05	104.95	83.79	68.83	65.22	63.51	874.25
											Total Production		**3428.41**

2012	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
FP Intake Subsurface Flow	129.31	120.67	127.29	91.64	134.39	128.63	129.65	129.69	117.67	92.73	73.54	82.76	1357.97
Nye Well #11	0.02	15.63	5.05	12.44	17.66	15.61	9.88	0	0.02	0	0	0	76.31
Nye Well #2	0	0	0	0	0	0	0	0	0	0	0	0	0
Nye Well #7	121.97	74.95	73.4	71.83	164.22	168.8	138.19	85.58	159.65	137.89	19.72	0	1216.2
Nye Well#8	30.29	36.77	0.08	23.54	68.83	78.94	52.44	60.47	71.85	67.95	83.51	91.12	665.79
											Total Production		**3316.27**

2013	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
FP Intake Subsurface Flow	84.08	93.84	123.96	90.03	137.65	118.48	106.55	97.32	92.24	72.36	37.95	21.26	1075.72
Nye Well #11	0	0	0	0	2.67	2.96	0.08	0	0	0	0	0	5.71
Nye Well #2	0	0	0	0	0	0	0	0	0	0	0	0	0
Nye Well #7	0	0	32.68	72.18	59.9	178.58	161.57	134.3	96.92	61.11	34.79	23.93	855.96
Nye Well#8	65.36	11.33	0	0	0	0	0	0	0.04	21.97	75.52	67.47	241.69
											Total Production		**2179.08**

2014	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
FP Intake Subsurface Flow	16.72	17.65	80.32	79.02	122.03	115.78	106.02	N/A	N/A	N/A	N/A	N/A	537.54
Nye Well #11	0	0	0.28	0.01	0.16	0.67	0.18	N/A	N/A	N/A	N/A	N/A	1.3
Nye Well #2								N/A	N/A	N/A	N/A	N/A	0
Nye Well #7	2.14	0	128.39	165.9	168.55	162.09	163.46	N/A	N/A	N/A	N/A	N/A	790.53
Nye Well#8	65.43	50.19	96.34	98.08	106.06	103.22	106.37	N/A	N/A	N/A	N/A	N/A	625.69
											Total Production		**1955.06**

[1] City of Ventura Water Source Reports 2007 - 2014

[2] USGS Station 11118500 Ventura R NR Ventura nwis.waterdata.usgs.gov/nwis

N/A - Data not presently available

Attachment C

Channelkeeper Ventura River Monitoring Program: Methods and QAQC Description
March 1, 2013

LOGGERS

Continuous monitoring data are collected using Onset dissolved oxygen loggers (model U26). Specifications are found in Figure 1. All calibrations and uses are in accordance with Onset manual directives.[1]

Figure: 1 Dissolved Oxygen U26 Logger Specifications

Specifications

Dissolved Oxygen	
Sensor Type	Optical (dynamic luminescence quenching)
Measurement Range	0 to 30 mg/L
Calibrated Range	0 to 20 mg/L; 0 to 35°C (32 to 95°F)
Accuracy	0.2 mg/L up to 8 mg/L; 0.5 mg/L from 8 to 20 mg/L
Resolution	0.02 mg/L
Response Time	To 90% in less than 2 minutes
DO Sensor Cap Life	6 months (cap expires 7 months after initialization)
Temperature	
Temperature Measurement/ Operating Range	-5 to 40°C (23 to 104°F), non-freezing
Temperature Accuracy	0.2°C (0.36°F)
Temperature Resolution	0.02°C (0.04°F)
Response Time	To 90% in less than 30 minutes

Pre-deployment calibrations are performed for DO loggers using the "Lab Calibration Tool" and 100% saturation method as outlined on page 3 and 4 of the Onset U26 logger manual. Loggers will be deployed during the dry season, approximately May through October to minimize loss of instrument due to high flows.

Copper tape is applied to dissolved oxygen loggers to limit fouling. Additionally, zip ties are used to secure all loggers inside PVC piping with holes drilled at approximate 1" intervals to maintain water flow and limit fouling. The loggers and housing are mounted to the side of a 10-15 pound river rock using steel all-thread and epoxy. Rocks are carefully placed in the thalweg of the river (in flowing water) to collect representative measurements.

Data will be collected from the loggers approximately every 2-3 weeks. SBCK staff will collect dissolved oxygen calibration measurements upon arriving at each site using a Hach HQ3d portable meter, and ensuring that the meter probe is as close as possible to the dissolved oxygen logger sensor. Calibration measurements will be recorded at each site at a precise continuous sensor sampling interval (for comparison), in accordance with Ventura River Stream Team QAQC protocols with the time of calibration noted. After the field calibration is complete, the loggers will be removed from the rock. Data data will be uploaded to an Onset Hobo waterproof shuttle the dissolved oxygen coupler following procedures outlined in the shuttle manual.[2] Specifications for the shuttle are shown in Figure 2.

[1] Onset Dissolved Oxygen Logger Manual. http://www.onsetcomp.com/files/manual_pdfs/15603-E-MAN-U26x.pdf.

Figure 2: Waterproof Shuttle Specifications

Specifications

Compatibility	All HOBO U-Series loggers with optic USB. Not compatible with the HOBO U-Shuttle (U-DT-1).
Data Capacity	63 logger readouts of up to 64K each
Operating Temperature	0° to 50°C (32° to 122°F)
Storage Temperature	-20° to 50°C (-4° to 122°F)
Wetted Materials	Polycarbonate case, EPDM o-rings and retaining loop
Waterproof	To 20 m (66 feet)
Time Accuracy	±1 minute per month at 25°C (77°F); see Plot A
Logger-to-Shuttle Transfer Speed	Reads out one full 64K logger in about 30 seconds
Shuttle-to-Host Transfer Speed	Full shuttle offload (4 MB) to host computer in 10 to 20 minutes, depending on computer
Batteries	2 AA alkaline batteries required for remote operation
Battery Life	One year or at least 50 complete memory fills, typical use
Weight	150 g (4 oz)
Dimensions	15.2 x 4.8 cm (6.0 x 1.9 inches)

After data is transferred to the shuttle any fouling that has accumulated will be removed from the logger and logger housing using hands, water, and/or a toothbrush. Loggers will then be reattached to the PVC housing using zip ties and re-mounted on the rock in the flowing water. Upstream and downstream photos, as well as flow measurements (discussed below) will also be taken at each site.

After data from each site has been transferred to the shuttle, data will be transferred to an SBCK computer using Onset's Hoboware software. Recorded field calibration measurements for dissolved oxygen will be applied to the Hoboware Dissolved Oxygen Assistant for post-processing and calibration purposes. Data will be exported from Hoboware to Microsoft Excel for analysis.

[2] Onset Waterproof Shuttle Manual. http://www.onsetcomp.com/files/manual_pdfs/10264-I-MAN-U-DTW-1.pdf.

FLOW

Flow measurements will be taken by SBCK staff during each logger maintenance trip (approximately every 2-3 weeks) using a Glow Water flow meter. Specifications are shown in Figure 3.

Figure 3: Global Water Flow Meter Specifications

Flow Probe Specifications

Range: 0.3-19.9 FPS (0.1-6.1 MPS)
Accuracy: 0.1 FPS
Averaging: True digital running average. Updated once per second.
Display: LCD, Glare and UV Protected
Control: 4 button
Datalogger: 30 sets, MIN, MAX, and AVG
Features: Timer, Low battery warning
Sensor Type: Protected Turbo-Prop propeller with magnetic pickup.
Weight:
  Instrument: 2 lbs. (0.9 kg) (FP111), 3 lbs. (1.4 kg) (FP211), 2.8 lbs. (1.3 kg) (FP311)
  Shipping: 13 lbs. (5.9 kg) (FP111), 23 lbs. (10.4 kg) ((FP211), 19 lbs. (8.6 kg) ((FP311)
Expandable Length: 3.7 to 6 ft (1.1 to 1.8 m) (FP111); 5.5 to 15 ft (1.7 to 4.6 m) (FP211); 2.5 to 5.5 ft (0.76 to 1.7 m) (FP311)
Materials:
  Probe: PVC and anodized aluminum with stainless steel water bearing
  Computer: ABS/Polycarbonate housing with polyester overlay
Power: Internal Lithium Battery, Approx 5 year life with typical use, Non-Replaceable
Auto Shutoff: After 5 minutes of inactivity
Operating Temperature: -4° to 158° F (-20° to 70° C)
Storage Temperature: -22° to 176° F (-30° to 80° C)
Carrying Case: The Flow Probe is shipped in a padded carrying case.
Approvals: CE

Total width from bank to bank of the flowing water is recorded. Depth and velocity is then recorded at several (minimum of 3) equally-spaced intervals along the width. All measurements will be taken in accordance with procedures outlined in the Global Water flow meter manual.[3] Total stream flow will be calculated by adding the volume of water from each equal segment.

[3] Global Water Flow Meter Manual. http://www.globalw.com/downloads/flowprobe/FP111.pdf.