

**Kimball Reservoir Interim Bypass Plan
August 19, 2011¹**

¹ The City will present a revised version of this Draft Bypass Plan with non-substantive changes to the appendix references to the City Council on August 23, 2011.

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I. Introduction and Executive Summary

Calistoga uses water from Kimball Creek pursuant to water rights confirmed in Amended License 9615 and Amended License 9616 (“Amended Licenses”) which were issued on August 30, 2007 by the California State Water Resources Control Board (“SWRCB”); these rights have priority dates of August 10, 1938 and May 14, 1954. (Appendix A to May 27, 2011 Draft Bypass Plan [Amended Licenses].)² The Amended Licenses state that Calistoga’s use of water does not injure the public trust resources of the state. Calistoga has previously considered its public trust obligations to be satisfied so long as the City complied with the terms of the Amended Licenses.

In May of 2010, Calistoga learned that SWRCB and the Department of Fish and Game (“DFG”) had a different view. Although the Napa County Superior Court had initially dismissed a public trust claim filed against the City, in an *amicus curiae* (“friend of the court”) brief filed in support of a motion for reconsideration of that decision, the Attorney General, on behalf of SWRCB and DFG, stated that in their view SWRCB had not, in fact, evaluated the public trust implications of Calistoga’s use of water under the Amended Licenses. (Appendix B to May 27, 2011 Draft Bypass Plan [AG Amicus and Reply].) The two state agencies took no position on whether Calistoga’s use of water comported with the public trust doctrine, and instead, asserted that Calistoga had an independent responsibility to ensure that its use of water from Kimball Creek complied with the public trust doctrine. (*Id.*) But the brief emphatically asserted that responsibility for the public trust falls on all “public agencies,” and that the City in its operation of Kimball Reservoir acted in the same manner as other “trustee” agencies, such as the SWRCB. (*Id.*)

The City has heeded the Attorney General’s explanation of the doctrine, and since May of 2010, the City has been discharging its responsibility as a trustee agency by conducting a detailed analysis of the current operation of Kimball Reservoir, the hydrology of the Kimball Creek watershed, the biological needs of fish in Kimball Creek, and possible operational changes to Kimball Reservoir. On May 27, 2011 the City released a Draft Bypass Plan, which was circulated to potentially interested parties.³ (Appendix 2 [Draft Bypass Plan Service List].) The City also conducted a public hearing on June 29th to hear public comment on the Draft Bypass Plan. The City received three sets of written comments to the Draft Bypass Plan. (Appendix 3 [Written Comments from SWRCB, DFG and Grant Reynolds].) The City received additional oral comments at the June 29th hearing. (Appendix 4 [Transcript of June 29th, 2011 Public Hearing on

² The Amended Licenses were issued pursuant to a Change in Use Petition filed by the City on January 11, 2002. (Appendix C to May 27, 2011 Draft Bypass Plan [Jan. 11 2002 Petition for Change].) The City submitted the change in use petition in order to resolve an Administrative Civil Liability Complaint filed which charged the City with providing water outside its place of use. (Appendix D to May 27, 2011 Draft Bypass Plan [ACL Complaint].) On September 6, 2007 SWRCB approved the Change in Use Petition, and issued the Amended Licenses to the City. (Appendix A to May 27, 2011 Draft Bypass Plan [Amended Licenses].)

³ The Draft Kimball Reservoir Bypass Plan is included as Appendix 1 and sent under separate cover.

the Draft Bypass Plan].) The City has considered analyzed all the comments received.⁴ The City has also had extensive discussions with the Department of Fish & Game (“DFG”) about the Draft Bypass Plan. As a result of these efforts, the City has developed this Bypass Plan, which includes the following elements:

1. A description of the process used to develop the Bypass Plan.
2. A discussion of the City’s water supply sources.
3. A discussion of Kimball Creek biology.
4. A discussion of the hydrology model used to evaluate consequences of alternative Kimball Dam operation.
5. A biological assessment of six proposed Bypass Schedules for Kimball Reservoir.
6. A water supply assessment of six proposed Bypass Schedules for Kimball Reservoir.
7. A commitment to adopt the following schedule for bypassing Inflow (“Bypass Schedule”):
 - a. From July 2 – September 14, the City will Bypass all Inflow.
 - b. From September 15 – October 31, the City will directly divert Inflow, within the limitations of the direct diversion right under License 9615 (i.e., the 0.74 cfs direct diversion right). The City will Bypass all Inflow that cannot be diverted under the direct diversion right.
 - c. From November 1 – July 1, the City will divert, store, and use water in accordance with the rates and quantities allowed under the water rights confirmed in water right Licenses 9615 and 9616. However, from the date that water first spills over the concrete spillway until July 1, the City will bypass the greater of: i) the Uncontrolled Bypass; and ii) 60 percent of the Inflow up to a maximum of 3.2 cfs.⁵
8. A commitment to make modifications to infrastructure sufficient to bypass up to 3.2 cfs of water.

⁴ State Agencies and Public’s Written Comments and City’s Responses as Appendix 5.

⁵ In the event of a “Critically Dry Year” the City reserves the right to suspend the Bypass Schedule. As noted above, for purposes of this plan, a “Critically Dry Year” exists if DWR Table A SWP allocation to Napa County is at or below 40 percent on February 1.

9. A commitment to implement the recommendations contained in the May 26, 2011 Technical Memorandum from MBK Engineers on Kimball Reservoir Inflow Measurement, attached as Appendix GG to the May 27, 2011 Draft Bypass Plan.
10. A commitment to adopt Adaptive Management Protocols.
11. A commitment to conduct an Instream Flow Study.

II. Discussion and Analysis

A. Definitions

For purposes of this Bypass Plan, the following definitions shall apply:

Bypass

Bypass means the passing of water over, around, under or through Kimball Dam. Bypass does not include storage releases, but to the extent such release occurs, Bypass commitments will be reduced by an equivalent amount.

Bypass Schedule

Bypass Schedule means a schedule for bypassing Inflow.

Direct Diversion

Direct Diversion means water diverted and used immediately (or after a short period of regulatory control).

Factors Beyond the Reasonable Control of the City

Factors Beyond the Reasonable Control of the City means: a need to obtain or act(s) of obtaining permit(s), any determination that permits(s) are not required, and/or any challenges to an activity related to or arising therefrom; the need to obtain or act(s) of obtaining environmental clearance (including under the California Environmental Quality Act, the National Environmental Policy Act, or other regulatory statutes), any determination(s) that exceptions or exemptions therefrom apply, and/or any challenges to the activity related to or arising therefrom; third party acts or legal challenges to the activity; unforeseen conditions; construction (including contractor and subcontractor) disputes; inability to procure materials; labor disputes; lock outs; contract disputes; financial inability; governmental laws or regulations; governmental entity or regulatory agency acts or omissions; fire or other casualty; adverse weather conditions; and any other causes beyond the direct control of the City.

Inflow

Inflow means the best available estimate, measurement, or calculation of water flowing directly into Kimball Reservoir.

Instream Flow Study

Instream Flow Study means a scientific investigation of the relationship between various levels of flow and fish habitats.

Kimball Creek

Kimball Creek is an ephemeral stream located in the upper reach of the Napa River. A picture of Kimball Creek is attached as Appendix E.

Kimball Dam

Kimball Dam means the earthen dam with a concrete spillway that is owned and managed by the City. A picture of Kimball Dam is attached as Appendix F.

Kimball Reservoir

Kimball Reservoir is the lake of water behind Kimball Dam which is used to collect and store water for the City of Calistoga. A picture of Kimball Reservoir is attached as Appendix G.

Kimball WTP

Kimball WTP refers to the water treatment plant that is owned and managed by the City and is used to store and treat the City's water supply, including the water that the City appropriates from Kimball Creek.

Northern Napa River Watershed

Northern Napa River Watershed means the upper reaches of the Napa River from Kimball Dam to the confluence of Mill Creek, as well as several northern tributaries. The drainage area of the northern sub-watershed is approximately 50 square miles and contains 12 tributary blue line streams.

Spillway

A spillway is a channel for an overflow of water from a reservoir. A picture of the Kimball Reservoir spillway is attached as Appendix H.

Storage

Storage means the impoundment of water for later use, through diversion or collection of water in a storage facility such as Kimball Reservoir.

SWP

State Water Project (or SWP) means that system of dams, diversions, conduits and other facilities operated primarily by the California Department of Water Resources ("DWR").

Table A SWP Allocation

Table A SWP Allocation refers to the Table released by the State Water Project identifying the percentage allocation of water for State Water Project Contractors.

Uncontrolled Bypass

“Uncontrolled Bypass” means Bypass resulting from circumstances other than controlled City operation of facilities. Uncontrolled Bypass would include inflow over spillway or boards, leakage through boards, or seepage through the dam.

III. Development of the Bypass Plan

In order to discharge its responsibilities as a trustee agency, the City has been engaged in a comprehensive evaluation of the public trust implications of its use of water under its Amended Licenses for the last fifteen months. The City's efforts center around the mandate of Fish & Game Code section 5937, which is a legislative expression of the public trust doctrine. (*California Trout v. State Water Resources Control Board* (1989) 207 Cal.App.3d 585, 626, 631.) Section 5937 provides, in relevant part, that "[t]he owner of any dam shall allow sufficient water at all times to pass through a fishway, or in the absence of a fishway, allow sufficient water to pass over, around or through the dam, to keep in good condition any fish that may be planted or exist below the dam. . . ." (Cite) While Section 5937 provides a "floor" that public agency dam operators such as the City may not dip below when balancing the needs of its municipal water users against the needs of fish, the public trust doctrine still requires trustee agencies to balance competing interests, and such balancing may lead to a resolution that results in at least some measure of "harm" to fish. (See *National Audubon Society v. Superior Court* (1983) 33 Cal.3d 419, 445-46 ("*National Audubon*").

The City began its efforts by working with the Center for Ecological Management ("CEMAR") From May of 2010-August of 2010, Mike Podlech, the City's consulting biologist, and City staff assisted CEMAR scientists in developing a preliminary analysis of the hydrology and biology along the Upper Napa River. CEMAR presented the results of its preliminary analysis on August 3, 2010, in a presentation entitled "Upper Napa River Fishery Conditions, Decline, and Rehabilitation Opportunities." (Appendix 6 [Transcript of August 3, 2010 CEMAR presentation].) The City sought to enter into a Consultant Services Agreement with CEMAR so that it could prepare a rehabilitation plan for Kimball Creek. Those efforts proved unsuccessful, and the City retained its own consultants to conduct an analysis of the hydrology and biology of Kimball Creek. After extensive work by its experts, the City developed a Draft Bypass Plan, and on May 27, 2011, it was distributed to interested parties for comment. The City also conducted a Public Hearing on June 29th so that it could receive additional feedback on the Draft Bypass Plan. The City received both written and oral comments, and City staff and their technical consultants have fully considered those comments. Where deemed appropriate, the Draft Bypass Plan has been revised. (Appendix 5 [State Agencies, Public Written Comments and City's Responses].)

The public trust also requires that responsible public agencies work together to develop a plan that balances the "economic and engineering problems involved in implementing water policy." (*National Audubon Society v. Superior Court* (1983) 33 Cal.3d 419, 451.) Since June 29, and through the time of release of this Bypass Plan, City representatives and technical consultants have discussed aspects of the Draft Bypass Plan and DFG's June 24 comments in various meetings and telephone calls with DFG staff on various occasions. These discussions have included: assisting DFG technical personnel in evaluating the hydrologic modeling tools used by the City, as well as water supply impacts of DFG's written recommendations; inquiry and discussion of the basis for the specific recommendations; providing evaluation of the frequency and duration of DFG's recommended migration flow under various scenarios; bypass plan alternatives;

bypass plan implementation alternatives; and other relevant matters. City staff and their technical consultants have extensively worked to evaluate and address DFG's views and input and, where appropriate, the Draft Bypass Plan has been modified based on DFG's feedback.

IV. Sources of City Water: Kimball Creek and the SWP

The City has long relied on its Kimball Creek water for a substantial part of its water supply. Water is taken at Kimball Dam by Direct Diversion or by diversion of water to Storage. When water levels reach the concrete Spillway, storage capacity is enhanced by the installation of wooden flashboards that increase water levels. An intake tower in the Kimball Reservoir pool diverts water to the treatment plant or to Bypass pipes that discharge to the Spillway during the limited period when the City must Bypass Inflow under the terms of its Licenses.

Under the water rights confirmed in Licenses 9615 and 9616, which were issued to the City in 1971, and which have priority as of August 10, 1938 and May 14, 1954,⁶ the City is entitled to put up to 536 acre-feet (approximately 174,656,366 gallons) of water per year from Kimball Creek to beneficial use. (Appendix I to May 27 Draft Bypass Plan [Original Licenses].) Generally, these Licenses permit Calistoga to directly divert 0.74 cubic feet per second (“cfs”) from Kimball Creek from September 15 through July 1, and to store up to 405 acre-feet per year in Kimball Reservoir from November 1 through June 15. (Appendix I to May 27 Draft Bypass Plan [Original Licenses].) From July 2 through September 14, the City is not authorized to divert or store water, and thus draws exclusively on previously-stored water during this period. The Licenses contain no other specific requirements for bypassing flows over, through, or around Kimball Dam.

The City’s second, and more recently acquired, source is the SWP, from which the City can obtain water up to specified amounts under various contracts. Water from the SWP is more costly to the City’s residents than water from Kimball Creek and is subject to annual allocation decisions of DWR such that the available supply is variable.⁷ In addition, some of the SWP water is diverted from the Sacramento-San Joaquin River Delta. Owing to ecological conditions in the Delta, competing demands on that source and other factors, state law directs the City to attempt to minimize reliance on water supplies diverted from the Delta and delivered through the SWP, and to rely instead on locally-developed supplies. In the Sacramento-San Joaquin Delta Reform Act of 2009, the Legislature expressed the policy of the state to reduce reliance on the Delta in meeting California’s future water needs, and provided: “Each region that depends on water from the Delta watershed shall improve its regional self-reliance for water through investment in water use efficiency, water recycling, advance water technologies, local and regional water supply projects, and improved regional coordination of local and regional water supply efforts.” (Wat. Code, § 85021.)

The City has over a considerable period conducted an investigation into ways to increase the amount of water available to it from Kimball Creek. That investigation began in August of 1960, when the City commissioned an engineering firm to evaluate whether there was additional water available from Kimball Creek. (Appendix L to the

⁶ Priority refers to the date used to determine who had the right first.

⁷ Appendix LL to the May 27, 2011 Draft Bypass Plan is an April 20, 2011 “Notice to State Water Project Contractors” which details the way that the SWP allocates water.

May 27, 2011 Draft Bypass Plan [Kennedy Jenks 1960 Report].) The Kennedy-Jenks Report concluded that there was water available, and in 1979 the City submitted an application to SWRCB to appropriate an additional 375 acre-feet per year from Kimball Creek and to embark on a reservoir expansion project which would increase the surface area of Kimball Reservoir from 20 acres to 36 acres so that the City could store additional water. (Appendix M to the May 27, 2011 Draft Bypass Plan [1979 Application].)

DFG, which has statutory responsibilities related to protection of natural resources, including birds, mammals, fish, amphibia, and reptiles, protested the City's application on the basis of concerns over impacts to fish. (Appendix N to the May 27, 2011 Draft Bypass Plan [DFG Protest to 1979 Application].) After consultation with the City, DFG agreed to dismiss its protest in exchange for the City's agreement to: (1) Bypass all surface flows from March 1-November 15; (2) Bypass a minimum of 5.0 cfs, or the total stream-flow, whichever is less, from November 16-February 29; and (3) install devices capable of measuring flows before taking any water above and beyond what was already appropriated. (Appendix O to the May 27, 2011 Draft Bypass Plan [DFG Protest to 1979 Application].) These limitations were incorporated as conditions of Permit No. 20395, which was issued to the City on November 27, 1989. (Appendix Q to the May 27, 2011 Draft Bypass Plan [Permit 20395].)

As of 1996, the City had not diverted any water pursuant to the authority of Permit No. 20395.⁸ In 1996, Summit Engineering prepared a detailed analysis of the City's available water supply and West Yost & Associates prepared a proposed plan for the City to increase its water supply ("West Yost Plan"). (Appendix P to the May 27, 2011 Draft Bypass Plan [Summit Engineering Report]; Appendix Q to the May 27, 2011 Draft Bypass Plan [West Yost Plan].) The West Yost Plan evaluated the cost per acre-foot of water supply enhancement options, and concluded that the cost to expand the reservoir was prohibitively high, and that it would be much less costly for the City to increase its allotment from the SWP. (Appendix Q to the May 27, 2011 Draft Bypass Plan, Table 6 [West Yost Plan].) Based on the conclusions of the West Yost Plan, the City took steps to increase its SWP allotment. As a result of those efforts, by 2001, Calistoga had obtained an entitlement to an additional 1,425 acre-feet of SWP water.⁹

⁸ In order to make a final determination about whether to activate Permit 20395, the City spent significant resources studying the feasibility of expanding Kimball Reservoir's capacity through the installation of an inflatable dam or through dredging. (Appendix X to the May 27, 2011 Draft Bypass Plan [Kimball Creek Dam Modifications]; Appendix Y to the May 27, 2011 Draft Bypass Plan [Maintenance Dredging Report].) But both those options proved infeasible due to high infrastructure costs which made the projects prohibitively expensive. [See Appendix X, Appendix Y.]

⁹ The original SWP allotment of 500 acre-feet was acquired through the City of Napa in 1983. (Appendix U to the May 27, 2011 Draft Bypass Plan [Agreement No. 1926].) Calistoga purchased another 925 acre-feet SWP allotment from Kern County in 2001. (Appendix R to the May 27, 2011 Draft Bypass Plan [Amendment #3 to Agreement No. 1926].) In addition to these allotments, the City also purchased 500 acre-feet of Lindsey Slough water from the City of Vallejo in 1998. (See Appendix V to the May 27, 2011 Draft Bypass Plan [Agreement between American Canyon and Calistoga for Transfer of Water Entitlement].) Since Calistoga is outside the area of use for Lindsey Slough, Calistoga has a third party agreement with American Canyon, in which it trades the Lindsey Slough water for American Canyon's SWP water. (*Id.*)

(See Appendix T to the May 27, 2011 Draft Bypass Plan [Amendment #3 to Agreement No. 1926]; Appendix V to the May 27, 2011 Draft Bypass Plan [Agreement between American Canyon and Calistoga for Transfer of Water Entitlement].) Thus, the City is currently entitled to 1925 acre-feet of water from the SWP. (*Id.*) In many years, DWR imposes limitations on the water available from the SWP, and the limitations can be significant.¹⁰ Thus, the City is not entitled to the full allotment every year. However, even with those limitations, the City has not used all of its SWP allotment each year. Accordingly, based on experience to date and available information, the City has concluded that it can offset a loss in water from Kimball Reservoir by drawing a larger quantity of SWP water.

¹⁰ For example, in 2008, the Table A allocation was 35 percent and in 2009 it was 40 percent. (See Appendix W to the May 27, 2011 Draft Bypass Plan [Notices to SWP Contractors 08-03 and 09-07].)

V. Kimball Creek Biology

In his May 27, 2011 Technical Memorandum, Mr. Podlech provided background information on Kimball Creek biology. A copy of that Technical Memorandum is attached as Appendix FF to the May 27, 2011 Draft Bypass Plan. The following is a summary of Mr. Podlech's report on this subject.

Kimball Dam is located in the Northern Napa River Watershed. It is fed by Kimball Creek, which is located in the upper reach of the Napa River. It, like other streams in the upper reach of the Napa River flows for only part of the year. Little is currently known about the historic conditions of fisheries habitat within the northern Napa River watershed, but it is believed that prior to European-American settlement the northern Napa River watershed supported a number of fish species, including steelhead.

Steelhead return to spawn in their natal stream, usually in their fourth or fifth year of life. Winter-run steelhead generally enter spawning streams from fall through spring as sexually mature adults, and spawn a few months later in late winter or spring. Spawning occurs primarily from January through March, but may begin as early as late December and may extend through April. Female steelhead construct nests in suitable gravels. Adult steelhead need access to spawning gravel in areas free of heavy sedimentation with adequate flow and cool, clear water. Steelhead eggs incubate within the gravel for 3–14 weeks, depending on water temperatures. After hatching, alevin remain in the gravel for an additional 2–5 weeks while absorbing their yolk sacs, and then emerge in spring or early summer.

After emergence, steelhead fry move to shallow-water, low-velocity habitats, such as stream margins and low-gradient riffles, and forage in open areas lacking instream cover. As fry grow and improve their swimming abilities in late summer and fall, they increasingly use areas with cover and show a preference for higher velocity, deeper mid-channel areas near the deepest part of the channel. After their initial growth period, juvenile steelhead begin to occupy a wide range of habitats, preferring deep pools as well as higher velocity rapid and cascade habitats. During the winter period of inactivity, steelhead prefer low-velocity pool habitats with large rocky substrate or woody debris for cover.

The amount of suitable spawning habitat within a stream, the velocity of the stream, the presence of deep water pools, and water temperature all have a significant impact on the ability of a stream to support large populations of steelhead. These conditions have been adversely impacted on the northern Napa River by a variety of factors. These factors include: (1) dams and perched culverts which prevent steelhead from accessing upstream habitat; (2) undersized culverts which cause excessive water velocities which impede steelhead passage; and (3) shallow riffles and wide concrete-lined channels which have insufficient water depths to allow fish to remain submerged. Favorable steelhead conditions have been further eroded by the transformation of the Napa Valley into a vineyard landscape, where the majority of vineyards are planted along the Napa River and its tributaries and urban sprawl, which has brought roads and other changes into previously undisturbed areas of the watershed. These activities are

unrelated to the City's operation of Kimball Reservoir and have adversely affected aquatic habitat conditions in the upper Napa River and throughout most of the Northern Napa River watershed. Along with sufficient streamflows, restoration efforts aimed at remediating these factors are critical to the restoration of fisheries in the Northern Napa River Watershed.

VI. Hydrology Model

In order to understand the hydrological impact of Kimball Reservoirs, MBK Engineers developed a model to evaluate effects of different dam and diversion operations on both water available from Kimball Creek for use by the City, and flows below Kimball Dam (“Hydrology Model”). The Hydrology Model simulates operations on a daily basis for a continuous 70-year period. MBK also analyzed available data to estimate the daily Inflow to Kimball Reservoir from January 1, 1940, through December 31, 2010. These inflows were used in simulating alternative operations of Kimball Reservoir and resultant effects on water storage, streamflow, and water supply available to the City. A baseline operation, which represents the effects of the City’s current operation of Kimball Reservoir and patterns and volume of streamflow below Kimball Dam was simulated by the model. The baseline was then reviewed in light of known life-stage based habitat requirements of steelhead. A detailed discussion of MBK’s methodologies is outlined in MBK’s May 25, 2011 “Kimball Creek Hydrology and Operations Model” Technical Memorandum, attached as Appendix GG to the May 27, 2011 Draft Bypass Plan.

After the June 29, 2011 Public Hearing on the Draft Bypass Plan, MBK reviewed the assumptions of the model with City staff. As a result of this review, MBK refined the assumptions of the model that pertained to the quantity and timing of the City’s diversions to the City’s Water Treatment Plant (“WTP”) and created a Revised Hydrology Model. A complete copy of the Revised Hydrology Model based on the refinements is included as Appendix 7 and is sent under separate cover. A detailed discussion of MBK’s model revisions is contained in MBK’s August 18, 2011 “Revised Kimball Reservoir’s Operations Model” Technical Memorandum, attached as Appendix 8.

VII. Biological Assessment of Proposed Bypass Schedules

DFG proposed in writing that the City should implement the following Bypass Schedule:

1. From November 1-March 31, the City will bypass the first 13cfs of Inflow;
2. From April 1-July 1, the City will bypass the first 5cfs of Inflow.

The City used this as a starting point to create six Bypass Schedules for further evaluation. Those Bypass Schedules are identified in Table 1.

Table 1: Bypass Schedules Evaluated in Support of Final Bypass Plan

Bypass Schedule Number	Bypass Schedule Name	Bypass Schedule Description
1	DFG Proposal	Dec thru Mar bypass inflow up to 13 cfs; Apr thru Jun bypass inflow up to 5 cfs
2	Draft Bypass Plan	After fill and spill, bypass 60% of inflow when inflow > 3 cfs (max bypass of 3 cfs + uncontrolled spill) and 40% of inflow when inflow <= 3 cfs thru Jun
3	60% Bypass	After fill and spill, bypass 60% of inflow (max bypass of 3.2 cfs + uncontrolled spill)
4	Draft Plan & Portion of DFG Proposal	After fill and spill, bypass 60% of inflow thru Mar (max bypass of 5 cfs + uncontrolled spill); Apr thru Jun bypass inflow up to 5 cfs
5	Direct Diversion (“D/d”) with Bypass	Dec thru Feb D/d first 0.74 cfs, then bypass inflow up to 13 cfs; Mar thru Jun first 0.5 cfs bypassed, D/d next 0.74 cfs, then bypass inflow up to 5 cfs
6	Draft Plan & (“D/d”) with Bypass	After fill and spill, bypass 60% of inflow thru Mar (max bypass of 5 cfs + spill); Apr-Jun first 0.5 cfs bypassed, City D/d next 0.74 cfs, then 5 cfs or inflow

Schedule Number 2 above (“Draft Bypass Plan”) refers to the May 27, 2011 Draft Bypass Plan. Schedule Number 3 (“60% Bypass”) is the Schedule adopted in this plan.

Mike Podlech, the City’s fisheries biologist, evaluated each of these Bypass Schedules to determine whether they were likely to keep fish in good condition.¹¹

¹¹ Mr. Podlech also noted that DFG’s 13 cfs bypass flow recommendation was developed using a site-specific evaluation of passage conditions in general accordance with the Oregon method. This assessment methodology focuses on determining the streamflow rate that would be required to allow adult steelhead to migrate upstream across the most shallow riffles (i.e., critical riffles) within a given study reach. For each

Mr. Podlech determined that each of these proposed Bypass Schedules was likely to keep fish in good condition. Mr. Podlech's original analysis, which focused on Schedule 2, is contained in his technical memorandum of May 26, 2011, attached as Appendix *. Mr. Podlech's further analysis is contained in his August 18, 2011 Comparative Analysis of City of Calistoga and Department of Fish and Game Bypass Flow Recommendations for Kimball Reservoir Technical Memorandum, attached as Appendix 9. Both these analyses are relied upon in this Interim Plan.

riffle transect, the flow is selected which meets minimum depth and maximum velocity criteria on at least 25 percent of the total transect width and a continuous portion equaling at least 10 percent of its total width. Mr. Podlech pointed out that there is disagreement in the literature about what criteria should be used for both depth and maximum velocity, and he observed that DFG selected the most conservative criteria, which means that DFG's 13 cfs bypass flow recommendation is based on conservative assumptions.

VIII. Water Supply Assessment of Proposed Interim Bypass Schedules

In consideration that the six proposed Bypass Schedules were likely to keep fish in good condition, City staff used the Revised Hydrology Model to project available water supply under each of the six proposed Bypass Schedules. First, the City developed a range of historical demand for water from 1970-2010. The City then used the Revised Hydrology Model to project how much water would have been available in each year from Kimball Reservoir under each of the proposed Bypass Schedules. The City evaluated the data to see whether or not the projected amount of water available under the proposed Bypass Schedule and the projected amount of water available from the NBA in a given year would have been enough to meet the lowest amount of historical demand. A detailed discussion of the City's water supply analysis can be found in City of Calistoga's Technical Memorandum on Calistoga Water Supply and Impacts on Proposed Kimball Reservoir Bypass Appendix 10.

Based on this analysis, it is concluded that proposed Bypass Schedules Nos. 1 and 4 would have the greatest impact on dry year reliability. It is further concluded that while proposed Bypass Schedules Nos. 2, 3, 5, and 6 would have failed to provide water supplies that meet the low end of the range of historical demands (775 acre-feet) in 1977, 1988, and 1990, the City would have likely been able to meet demands in those year through more aggressive conservation methods. It is therefore concluded that the water supply impacts of proposed Bypass Schedules Nos. 2, 3, 5, and 6 could be acceptable. The schedule with the least water supply impact is Schedule 2. Schedule 5 is not feasible absent major infrastructure modification, and would significantly defer the date of first spill in many years. Schedule 6 involves operational complexities and would be difficult to implement in practice. Schedule 3 can be implemented expeditiously with the infrastructure modification identified in this plan.

IX. Kimball Reservoir Interim Bypass Plan Commitments

A. Bypass Commitment

Based on the above analysis, the following Bypass Schedule will apply to the operation of Kimball Dam and Kimball Reservoir pending the completion of an Instream Flow Study and modification of this Interim Plan based on that study.

1. From July 2 to September 14, the City will Bypass all Inflow.
2. From September 15 – October 31 the City will directly divert up to 0.74 cfs of Inflow. The City will Bypass all Inflow in excess of 0.74 cfs.
3. From November 1 – July 1, the City will divert, store, and use water in accordance with the rates and quantities allowed under the water rights confirmed in water right Licenses 9615 and 9616. However, from the date that water first spills over the concrete spillway until July 1, the City will bypass the greater of: i) the uncontrolled Bypass; and ii) 60 percent of the Inflow up to a maximum of 3.2 cfs.¹²

¹² In the event of a “Critically Dry Year” the City reserves the right to suspend the Bypass Schedule. As noted above, for purposes of this plan, a “Critically Dry Year” exists if DWR Table A SWP allocation to Napa County is at or below 40 percent on February 1.

B. Infrastructure Commitment

The City is not able to implement this Bypass Schedule with its existing infrastructure. The City has carefully evaluated various infrastructure options, and has determined that the best infrastructure option is to install a tap off of the 12-inch raw water line into the City's Water Treatment Plant. The tap would be made at a hydraulically meaningful location; approximately 50-feet below the reservoir spillway allowing the head of the reservoir to provide an uninhibited supply for the bypass facility. This solution will allow for early implementation and minimize the impact to existing facility operation and the infrastructure constraints. The tap will be made to the existing 12-inch raw water supply pipeline near the location of the existing 2-inch PVC creek discharge pipes. A new 12-inch diameter pipeline would tee into the existing 12-inch diameter pipeline near the existing 2-inch diameter diversion pipelines downstream of the dam. A new water control valve and flow meter would be installed where the new 12-inch pipeline tees into the existing 12-inch pipeline. The City has analyzed this option, and believes that it will be capable of bypassing up to 3.2 cfs of Inflow. Detailed discussion of this option is provided in Dan Takasugi's August 18 Technical Memorandum on Kimball Reservoir Infrastructure Improvements, which is attached as Appendix 11.

The City will complete the necessary modifications of infrastructure on or before March 1, 2012. Beginning March 1, 2012, flashboards will not be installed unless the infrastructure modification is completed; provided, however that the March 1 date in this condition (and the March 1 deadline) will automatically be extended for the number of days, if any, that the infrastructure modification is not completed due to Factors Beyond the Reasonable Control of the City.

Until the infrastructure modification is completed, the Bypass Schedule will be implemented to the maximum extent practicable using the City's existing 2-inch Bypass Flow Pipes.

C. Flow Measurement Commitment

Accurate Inflow calculation or measurement is a pre-requisite to the successful implementation of the recommended Bypass Schedule. MBK Engineers evaluated the City's options for accurate flow measurement. The details of that analysis can be found in MBK's May 27, 2011 Kimball Reservoir Inflow Measurement Technical Memorandum, attached as Appendix GG to the May 27, 2011 Draft Bypass Plan.

MBK recommended that the City use change in storage volume and the estimated or measured reservoir outflow to calculate Inflow. To accomplish, this, MBK recommended that the City do the following:

1. Read the staff gauge on a daily basis and document the result to arrive at a quantity of water held in storage.
2. Install electronic water level sensors to improve the accuracy of storage volume measurements. This should include sensors, telemetry equipment, a staff gauge, two submersible pressure transducers to measure the depth of water in the Kimball Reservoir, a rain gauge, and Class A automatic evaporimeter to measure evaporation.
3. Measure and record bypass releases from the existing two 2-inch diameter pipes.
4. Measure and record bypass releases from seepage through and under Kimball Dam.
5. Measure and record bypass releases from evaporation by using available evaporation data from a nearby location such as Lake Sonoma all bypass releases, including bypass from the existing two 2-inch diameter pipes, Kimball Reservoir spills, seepage through and under Kimball Dam, and evaporation from the reservoir surface area.
6. Measure and record spills from Kimball Reservoir by means of the staff gauge near the downstream end of the Spillway.
7. Use the collected data to calculate Kimball Reservoir Inflow through the equation of change in storage plus Outflow.

The City will implement these recommendations no later than November 1, 2011. In addition, the infrastructure modification implemented under this plan will have devices to measure Bypass flow, and such data will be treated in the same manner as "3" above. The City will also continue to evaluate other options for reliably measuring Inflow, and will work with interested parties to accomplish that objective. To that end, the City will seek the views of agencies and interested persons of the range of flows which other forms of measurement would seek to measure, in order to evaluate feasibility, CEQA compliance obligations, relative utility, and other related factors.

D. Instream Flow Study Commitment

The current understanding of both existing and historic fisheries and habitat conditions in the upper Napa River is based on a limited number of largely reconnaissance-level assessments, none of which pre-date the construction of Kimball Dam. To better understand the conditions required to maintain fish in “good condition” below Kimball Dam, the City needs to design and complete a detailed Instream Flow Study such as a Physical Habitat Simulation System (“PHABSIM”), to determine habitat quality and quantity for different life stage of steelhead at various streamflows. PHABSIM predicts physical microhabitat changes associated with flow alterations such as a reduction or increase in streamflow. It also provides a variety of simulation tools, which characterize the physical microhabitat structure of a stream and describe the flow-dependent characteristics of physical habitat relative to selected target species and life stages. Primary target life stages for the Kimball Reservoir Instream Flow Study should include adult steelhead migration and spawning, egg incubation and emergence, early season (spring) rearing, and juvenile outmigration. Conceptually, the study would consist of identifying appropriate study transects representative of habitat types within the upper Napa River reach extending from the dam downstream to Tubbs Lane (pending landowner access permission), surveying selected transects at 3-4 different flow regimes, and modeling Weighted Usable Area (“WUA”) at surveyed flows using the PHABSIM simulation software according to pre-determined Habitat Suitability Curves (“HSC”) for the different steelhead life stages. The study should be implemented as soon as possible (i.e., selection of transects during summer 2011) and would extend over approximately one year to allow for surveys at a wide range of streamflows.

The City will work with stakeholders familiar with Instream Flow Studies such as DFG, National Marine Fisheries Service, and the Napa County Resource Conservation District to develop a precise study design, though the City will retain discretion to make a final determination about study design. The City will complete an Instream Flow Study by July 1, 2013.

E. Adaptive Management Approach

This Bypass Plan is a step toward improving the condition of the fisheries in the Upper Napa River. Other local and regional effort will also be required. With respect to Kimball Reservoir operations, given the lack of site-specific data and the uncertainty of fish needs in the Upper Napa River, an adaptive management approach is needed to ensure that the City can be flexible, adjusting as new information becomes available. This Interim Plan is inherently consistent with principles of adaptive management, as it contemplates adjustment of the interim Schedule based on results of an Instream Flow Study. In addition, the City will welcome dialogue on other adoptive management techniques, including any that may be facilitated by the infrastructure modification completed under this Plan. As an example, while this Interim Plan is based on the conclusion that operation promoting early spill is desirable, the City will consult with DFG and other interested agencies as to their desire to test earlier commencement of Bypass operations beginning in the storage season that do not affect water supply availability.