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Dear Ms. Jones:

I am an ecologist and am the Founder and Executive Director of SAVE THE FROGS! (www.savethefrogs.com), the world's leading amphibian conservation organization. Our mission is to protect amphibian populations and to promote a society that respects and appreciates nature and wildlife. We work in California, across the USA, and around the world to prevent the extinction of amphibians, and to create a better planet for humans and wildlife.

I am writing in regards to the threatened amphibian species that live in Alameda Creek. The purpose of this letter is to provide facts related to the ecology of Alameda Creek and to formally appeal the San Francisco Planning Commission's determination that the Little Yosemite Fish Passage Project (Case No. 2014.0956E) will have no significant effect on the environment. SAVE THE FROGS! opposes the permanent destruction of habitat for California red-legged frogs (*Rana draytonii*) and foothill-yellow legged frogs (*Rana boylii*) in the Little Yosemite reach of Alameda Creek that will ensue if this project moves forward. Please find enclosed with this letter a check for $521 payable to the San Francisco Planning Department which formally initiates the appeal process.

The California Environmental Quality Act (CEQA) guidelines state that a Mitigated Negative Declaration is appropriate when there is no substantial evidence that a project or any of its aspects could result in significant adverse impacts. However, evidence *does* exist that both species of ranid frogs in this region of Alameda Creek are already at low population numbers and vulnerable to extirpation relative to unregulated reference reaches in the watershed free from the effects of Alameda Creek Diversion Dam and Calaveras Dam. We find that the Initial Study (IS) / Preliminary Mitigated Negative Declaration (PMND) is inadequate with respect to identifying the full suite of short term, long term, and cumulative negative effects of the fish passage project on the special status amphibians.

We question the validity of the biological resource surveys and habitat assessments that are cited as supporting information to analyze impacts. None of the sources cited on p. 95 include population data, yet section E.19.a (p. 156), Mandatory Findings of Significance, specifically asks whether the project has the potential to cause wildlife populations to drop below self-sustaining levels. Rarely are spatially explicit and temporally extensive records of population abundance available to address a question like this for a proposed project, but in this case, they are available. Amphibian breeding censuses have been conducted annually (2003-2014) at the site. East Bay Regional Park District Ecosystems Services coordinator Steven Bobzien and other biologists have published the results in a report (Bobzien and DiDonato 2007) and a rigorously peer-reviewed journal (Kupferberg et al. 2012). The data show that the frog populations downstream of Calaveras Creek confluence have had several years without recruitment (either no survival to hatching or no eggs laid 2003-2006) due to anthropogenic extremes of flow fluctuation. Subsequent recolonization has occurred either from the Little Yosemite populations or through Little Yosemite from further upstream because downstream population numbers had gone to zero breeding females detected. Permanent loss of the frog breeding habitat in Little Yosemite, temporary loss of one year's cohort of recruits, and disruption of connectivity collectively have the potential to push both the Little Yosemite frogs and the populations further downstream below self-sustaining levels. Population viability analyses developed using data from Alameda Creek also indicate significant increases in the 30 year extinction rate if recruitment is impaired (Kupferberg et al. 2009). If the full information available were considered, the box for potentially significant impact on p. 156 would have to be checked.

We also question the reliability of the field reconnaissance surveys with respect to the special status amphibians. The 2014 surveys by EBRPD (pers. comm with S. Bobzien) contradict the findings of the IS/PMND. An accurate report made by a careful and knowledgeable observer should have noted that breeding congregations of adult frogs, clutches of eggs and recently hatched tadpoles were present at the site of proposed construction at feature 9 on the date indicated for field reconnaissance (4/25/2014). Rather than confirming species presence and recognizing the unique importance of the site, the authors simply stated that *R. boylii* "has moderate to high potential" to be present but that there would be less than significant impacts. Permanent impacts from alteration of the pool morphology by upstream and downstream concrete weirs are over-looked, and the loss of breeding habitat is not mitigated for. The IS/PMND field reconnaissance surveyors must have walked past and not noticed flagged markers in the streambed near eggs and tadpoles of *R. boylii*. If the presence of this diurnally active special status species was missed, it is also likely that *R. draytonii* (a species for which daytime visits are notoriously poor for detection) was similarly missed.

The IS does not address long term impacts of pool deepening on the upstream expansion of non-native bullfrogs and crayfish by creating conditions more favorable to these species than the present conditions. These predators are well known for their deleterious effects on native amphibians and reptiles. Nor does the IS consider impact on the spread of the pathogenic fungus *Batrachochytrium* *dendrobatidis* (Bd) which is known to occur in the project site pools and within the greater Alameda Creek watershed (Padgett-Flohr and Hopkins 2010). Chytrid infection has been implicated in the decline of amphibians in California (Rachowitz et al. 2006, Vredenburg et al. 2010) and globally (Wake et al. 2008). Most importantly, the IS/PMND does not place the short term loss of production of young of the year frogs and the permanent loss of habitat in Little Yosemite within the context of the cumulative impacts of projects listed in Table 3 (p.29): (1) the pending cumulative loss of high productivity and densely occupied habitat in Arroyo Hondo when the Calaveras Dam Replacement Project is complete and Calaveras Reservoir is re-filled (SFPUC 2011; Peek 2012); (2) the destruction of frog breeding habitat at the Fish Ladder Construction Project site; (3) the negative thermal effects of cold summer hypolimnetic releases of water on amphibians and turtles that occurs in other rivers (Catenazzi and Kupferberg 2013, Wheeler et al. 2014, Ashton et al., in press) will ensue once Calaveras Dam Replacement Project is complete and proposed flow regimes enacted; and (4) pending loss of frog breeding habitat at the Geary Road Bridge Replacement project due to inappropriate over-planting of riparian trees in the active stream channel.

Habitat lost in Little Yosemite is particularly difficult to replace elsewhere. Stream dwelling populations of *R. draytonii* and turtles are distinct and separate from pond dwelling populations and the diversity of life-history strategies in the watershed need to be maintained. Although the pool at feature 9 has a relatively small footprint, its significance extends far beyond the total acreage of the pool. The location is unique for *R. boylii*, with the nearest other known breeding sites located 6,000 feet upstream and 1,000 feet downstream. The downstream site where several non-native predator taxa occur is less productive of new recruits. Because of this species' highly specialized habitat requirements in fluvial systems, and the need to migrate between tributaries and mainstem channels, off-site mitigation opportunities are extremely rare. Finding another dendritic stream network appropriate for reintroducing and re-establishing a population is highly unlikely. Preservation of existing habitat and populations is the most prudent way for the SFPUC to achieve its biodiversity goals. These modifications to a natural system in a regional wilderness enjoyed by many East Bay Regional Park District visitors are inconsistent with promoting biodiversity and people enjoying nature.

Rana boylii is currently protected as a Species of Special Concern in California, and populations in Central and southern California are in need of even greater protection because they are either in serious decline, highly isolated, or entirely extirpated (Drost and Fellers 1996, Lind 2005). The Alameda Creek metapopulation is an important part of the handful of extant populations of what has become the southern end of the species range. These frogs are genetically distinct from North Coast and Sierran clades. The Center for Biological Diversity is pursuing its 2012 petition for listing this species under the federal Endangered Species Act. Within the last 60 days, the Center has submitted a notice of intent to sue the US Fish and Wildlife Service regarding their failure to make a determination (Adkins Giese 2014). The fish passage project to benefit anadromous fish that are not currently present in the system - at the expense of the resident frogs and turtles that *are* currently present - is counter to the San Francisco Sustainability Plan to promote biodiversity.

In conclusion, we find that the potential harm and the aesthetic degradation of a beautiful rock canyon are sufficiently great to justify a full Environmental Impact Report which considers project alternatives as well as no project at all. We question the cost in dollars and disruption to the biota of Little Yosemite. While we support efforts to make artificial barriers such as the BART weir in Pleasanton passable by steelhead, we oppose destruction of amphibian habitat further upstream. Please find below a detailed list of issues we would like to see addressed in a forthcoming EIR. Inclusion of this project as well the fish ladder at Alameda Creek Diversion Dam as permit condition of Calaveras Dam reconstruction does not make ecological or fiscal sense.

Sincerely,

Kerry Kriger

Kerry Kriger, Ph.D.

December 15, 2014

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ISSUES IDENTIFIED BY SAVE THE FROGS! REGARDING LITTLE YOSEMITE FISH PASSAGE PROJECT

1. **Permanent loss of habitat for California red legged frog and foothill yellow legged frog at low streamflows.** The hydrologic focus of the IS analyses is geared to streamflows between 14 and 150 cfs when fish might be migrating upstream. There is no analysis of how the pools will function or what the hydroperiod will be during the biologically active low flow seasons from spring through autumn when flows are considerably below that range. Permanent loss of habitat or ecosystem functionality at low flow needs to be acknowledged as an impact, and the assertion on p. 129 that post-project conditions "would still constitute suitable habitat" is wholly unsubstantiated by data and counter to all published research on the subject. Construction of concrete weirs at the upstream inflow and downstream outlet of the pool will cause changes to pool depth and flow velocities (as acknowledged later on p. 144) at historically used oviposition sites in the pool. There is a relatively narrow range of depth, velocity, substrate size, and channel shape conditions preferred by breeding frogs (Kupferberg 1996, Bondi et al. 2012). Changes to channel shape influence risk of scouring and stranding of embryos and larvae as streamflows fluctuate, and hence affect survival (Kupferberg 1996, Kupferberg et al. 2011, Yarnell et al. 2012). The IS/PMND acknowledges on p. 144 that the project "would reduce the velocity of flow in the vicinity of Features 9, 10 and 11 during small or moderate flow volumes"; thus on the receding limb of the hydrograph, deposition of fine sediment in the bottom of the deeper pools would occur and make the substrate unsuitable. The authors assert that deeper pools will be used for foraging by frogs (p.129) which illustrates a complete lack of understanding of their diet (Hothem et al. 2009). The frog species which would benefit from increased pool depth is the non-native bullfrog (Fuller et al. 2011).

· **Feature 9 is a perennially used breeding site by the foothill yellow-legged frog.** Clutches of *R. boylii* eggs have been observed in the pool at feature 9 most years since monitoring began at the site in 2003 by East Bay Regional Parks District. The parts of the pool that will be modified by the step weir at the upstream end of the pool and the tailwater weir are the exact locations where males establish mating territories and females oviposit their eggs. During the spring of 2014 East Bay Regional Park District noted on 4/2 there was one clutch of eggs at the site and it was marked with a stick and flagging and labeled. The clutch had hatched by 4/14, and tadpoles were present, and on 4/30 a second clutch was marked in the pool, and by its age it would have likely been present on 4/25. At least two adult male frogs had calling territories in the pool and were readily seen by trained observers. That three different life stages verified as being present in the pool, were missed on 4/25/14 by the field reconnaissance biologists undermines our confidence that Mitigation Measure M-BI-4 Amphibian Exclusion, Rescue and Removal, which requires finding animals, could be carried out effectively.

· **Creating impervious surface areas by pouring concrete in pools represents permanent loss of suitable amphibian rearing habitat because larvae rely on interstitial spaces.** In pools used for oviposition by *R. boylii* and other amphibians, larvae rely on the pore spaces in coarse sediment as refugia when flows fluctuate and velocities increase (Kupferberg et al 2011). Post-metamorphic amphibians also rely on interstices to avoid predation.

· **Plugging of holes between boulders with concrete represents loss of habitat for juvenile and adult frogs.** Crevices and moist cavernous spaces among large rocks provide refuge for amphibians from predators as well as refugia from extreme heat and drying during the summer and fall low flow seasons. Filling with concrete is habitat destruction.

Several questions related to the impacts of increased area of impervious surfaces in pools need to be addressed in a future EIR compliant with CEQA:

- How will the concrete change the pH of the water in the pools once there is little to no flow through the pools during summer and fall low flows and once leaf packs are decomposing on top of the concrete? Research indicates that leaf pack decomposition on impervious surfaces is altered relative to natural rates of decomposition (Hobbie et al. 2014).
- How will the hydroperiod of these pools change once they are lined with concrete and no longer exchanging water with the hyporheic zone?
- Will hydroperiod be shortened to the extent that organisms with aquatic larval stages may not be able to complete their life cycles?
- How will the diurnal temperature fluctuations change in the absence of hyporheic exchange? Will this be outside the range of thermal tolerances of the special status amphibians?
- How will the loss of interstitial spaces and hyporheic flow affect production of benthic macroinvertebrates from these pools? Bats, birds, lizards, spiders, and adult frogs in the surrounding riparian zone rely on benthic macroinvertebrate production of insects for food. What are the impacts to these consumers?

2. Spread of lethal pathogens.

The IS / MND contains no mention of chytrid fungus and how its spread will be prevented when frogs are captured and relocated.

- Site 9 was the epicenter of the chytrid outbreak observed in dead and dying *R. boylii* in Little Yosemite in the Fall 2013 by California Department of Fish and Wildlife, East Bay Regional Park District, and SFPUC biologists. Lethal zoospore concentrations on the skin of swabbed frogs was verified by the lab of Dr. Vance Vredenburg of San Francisco State University. Chytrid infection was also detected on frogs sampled at the locations of features 10 and 11 in Fall of 2013.
- In late summer of 2014, Andrea Adams, a student affiliated with UC Santa Barbara and the laboratory of Dr. Cherie Briggs, confirmed that chytrid fungus remained present in the stream on bullfrogs.
- There are no protective measures mentioned in Mitigation Measure M1-B1-4 with regard to disinfection and prevention of the spread of chytrid when it says that amphibians will be captured by hand or aquatic dip net. By relocating animals, the disease could easily be spread to animals in the receiving habitats.
- Because the lethality of the outbreak of Bd in Little Yosemite co-occurred with the concentration of juvenile frogs in pools when there was little flow circulation during the dry season, it is important that an environmental impact study analyzes how the exchange with the hyporheic zone will be affected by construction of concrete weirs and solid concrete channel bottoms. Key questions that should be addressed in the EIR are:

o Will the weirs function to concentrate zoospores in the pools during periods of low flow?
o Will thermal conditions is pools change to become more favorable to chytrid infection?
o How will plugging holes between boulders influence flow and circulation through the affected pools at the streamflow volumes which typically occur during summer and fall?

3. Risk of construction induced mortality and negative unintended consequences of proposed mitigation.

Capturing and moving amphibians as described in Mitigation Measure M1-B1-4 will be ineffective with respect to protecting amphibians from construction and dewatering mortality for several reasons.

- Twenty four hours is an insufficient period of time for complete clearing of an area, especially if the life stage present is tadpoles. Given the timing of the project initiation in April, and dewatering of the channel 3 weeks later (as estimated in Table 2 of the IS) the frog life stages present in the pools will be recently hatched larvae that are approximately only a centimeter long and which are very fragile. The pool at feature 9 usually has 2 or 3 clutches which can contain up to 3000 embryos each. With dewatering the small larvae will become inaccessible and trapped in the interstitial spaces in the coarse sediment on the stream bottom. It would take considerably more than one field day to collect larvae prior to dewatering.

· For post-metamorphic life stages, the majority of individuals could not be caught in one day. For juveniles through adults, a mark-recapture study of stationary *R. boylii* in their resident pools showed that detectability is low. In a similar stream system in the Coyote Creek watershed, Gonsolin (2010) quantified that the proportion of detections over multiple surveys equals an average of 32% (range 12-67%). Thus on any given single day many individuals would not be seen, much less protected using this mitigation measure.

· There are no nearby sites with equal suitability for moving captured animals. Just 500 feet downstream there are non-native crayfish predators present; further downstream there are both bullfrogs and crayfish present; below that at the confluence with Calaveras Creek bass (another non-native predator) are present. Vegetation encroachment downstream of the confluence has rendered much of that reach too shady to be suitable for tadpole rearing (Catenazzi and Kupferberg 2013). Upstream of site 11, for the next two stream miles, hydroperiod in most years is too short to allow for successful recruitment of tadpoles into frogs.

· Upstream sites with suitable habitat for relocation of adult frogs are already occupied and beyond average movement distances such that recolonization back to Little Yosemite would be poor. The perennial pools below Alameda Creek Diversion Dam (ACDD) are over two miles upstream and the maximum known movement distances for *R. boylii* in central California is 1.2 miles (Gonsolin 2010). Thus recolonization potential of Little Yosemite post-construction is low. The habitat downstream of ACDD is already currently occupied by a relatively dense population of animals compared to the density in the Little Yosemite Reach. Large females generally dominate the best habitats, and displace smaller individuals.

· Relocation could place upstream populations of *R. boylii* and *R. draytonii* at risk of chytrid infection through transfer of the pathogen to new habitats.

· Relocation has proven ineffective in the past. The biological observer at the Geary Road Bridge project during the construction season in 2013 reported that frogs which he relocated at short distances were philopatric and returned to the site repeatedly after relocation.

· If the site were effectively cleared and animals relocated upstream to the already fully occupied reach below ACDD, where suitable habitat for native frogs in the perennially flowing reach occurs (> 2 mi upstream), the period of time for recolonization could be quite prolonged. For *R. boylii*, the average maximum movement distance within a year in a similar stream system is approximately 0.34 miles (Gonsolin 2010). Recolonization could thus take 6 years, or longer, since much of the intervening distance is dry channel for most of the year. Animals would risk predation and suffer the high energetic costs of homing back to their resident pools.

· The authors also make the assertion (p.129) that the amphibians and turtles would be permitted to move through the dry portions of the channel when it is dewatered. Such movements would come at a high cost in terms of risk of desiccation and predation. This statement is contradicted by other mitigation measures involving fencing which would impede movement.

4. Genetic effects of loss of connectivity between upstream and downstream populations of frogs. The IS/PMND fails to cite SFPUC sponsored research (Peek 2012) which indicates there is already limited gene flow between upstream and downstream populations of *R. boylii* in Alameda Creek.

The potential effect of further disruption to gene flow may occur if breeding sites in Little Yosemite are lost and the gap between populated segments becomes wider.

5. Upstream expansion of crayfish. The IS/PMND does not evaluate or mitigate for the upstream movement of crayfish into the modified and deepened pools. Crayfish are implicated in the declines of native amphibians in California (Kats and Ferrer 2003). On p. 114 of the IS/PMND the importance of crayfish being absent for the well-being of *R. draytonii* populations is acknowledged, yet the document fails to mention their presence immediately downstream of the project site. Signal crayfish, *Pacifastacus leniusculus,* have been observed in the fall of 2014 in Little Yosemite approximately 500 feet downstream of feature 9. Natural gradient barriers have been shown to limit the upstream dispersal of signal crayfish in regulated rivers (Light 2003), and this project removes such barriers, placing upstream populations of all amphibians at further risk. Potential mitigation to limit upstream invasion of crayfish would be to manage flows and limit diversions through the Alameda Creek Diversion Dam so that bankfull or greater flows would occur more frequently in Little Yosemite and thus keep crayfish downstream of the confluence with Calaveras Creek.

6. Upstream invasion of bullfrogs. Bullfrogs have long been implicated in the decline of California red-legged frogs and foothiill yellow legged frogs (Moyle 1973). They have been observed in Little Yosemite, and are known to be reservoirs of chytrid fungus in the system (A. Adams, pers. communication). The pool deepening improves conditions for them.

7. Timing of the project maximizes risk. The estimated start of the project in April, when amphibians are at the height of their seasonal movement activity during the breeding season extends the negative impacts of construction beyond the limited footprint of the three instream sites. By establishing fencing at the upstream and downstream ends of the 0.4 miles of creek, and impeding movement through the reach, above and below construction, the impact zone is greatly elongated.

8. Construction, and its negative effects, would likely be repeated through time. Because of weathering and mass wasting of the rock, the cliffs on south side of the channel will periodically calve new boulders into the stream. The barriers to fish passage in the reach are not static.

9. Noise effects on wildlife. All discussion of impacts in the IS/PMND related to construction noise and vibrations and increased traffic on Geary Road which parallels Alameda Creek was narrowly focused on human ears as the receptors. However it is widely acknowledged that wildlife are adversely affected by noise in terms of physiological stress responses and changes in behavior (Barber et al. 2010; Kight et al. 2011, Krause 2012). The effects of increased road traffic noise and vibrations extend well beyond the footprint of the construction site and can mask acoustic signaling in frogs and birds and interfere with reproductive success (Halfwerk et al. 2011). The Avoidance and Minimization Measures for Special-Status Bats does not include any consideration that noise could make them abandon roost sites.

10. Project cost-effectiveness. There are too many improbabilities concerning the effectiveness of this project to justify its cost to other sensitive taxa and the monetary cost to the citizens of San Francisco. What is the statistical frequency of flow patterns and back to back storms that would allow steelhead to pass all the downstream barriers and those at Little Yosemite? Why couldn't an incremental approach to restoring anadromous salmonids be considered as an alternative to this project? If after the barrier at the BART weir is removed and steelhead are once again present in the system, why not wait until the populations reach carrying capacity in downstream habitats and there is demonstrated need for access to the watershed above Little Yosemite? If the returning fish spawn in other tributaries such as Arroyo de la Laguna, Stony Brook Creek, Calaveras Creek or downstream reaches of Alameda Creek in Niles

Canyon, or in between Calaveras Creek and Welch Creek, this project to alter a natural feature and to build a fish ladder may prove to have been unnecessary. Many millions of dollars will have been spent and populations of native amphibians hurt for naught.

Literature cited

Adkins Giese, Collette, to Sally Jewel, 7 October 2014, Center for Biological Diversity website. Available url [http://www.biologicaldiversity.org/campaigns/amphibian_conservation/pdfs/Mega_herp_petition-NOI_on_90_day_finding_Pacific_Southwest.pdf] (Accessed 12/7/14).

Ashton, D. T., J. B. Bettaso, and H. H. Welsh, Jr. (*in press*). Changes across a decade in growth, size, and body condition of western pond turtles (*Actinemys* [*Emys*] *marmorata*) on free-flowing and regulated forks of the Trinity River in northwest California. Copeia 2014(?):xx-xx.

Barber, J. R., K. R. Crooks, and K. M. Fristrup, 2010. The costs of chronic noise exposure for terrestrial organisms. Trends in ecology & evolution *25*:180-189.

Bobzien, S. and J. DiDonato. 2007. The Status of the California Tiger Salamander and California Red-legged Frog, Foothill Yellow-legged frog and other aquatic herpetofauna in the East Bay Regional Park District, California.

Bondi, C. A., S. M. Yarnell, and A. J. Lind, 2013. Transferability of habitat suitability criteria for a stream breeding frog (*Rana boylii*) in the Sierra Nevada, California. Herpetological Conservation and Biology 8: 88-103.

Catenazzi, A. and S. J. Kupferberg. 2013. The importance of thermal conditions to recruitment success in stream-breeding frog populations distributed across a productivity gradient. Biological Conservation 168:40-48.

Fuller, T. E., K. L. Pope, D. T. Ashton, and H. H. Welsh. 2011. Linking the distribution of an invasive amphibian (*Rana catesbeiana*) to habitat conditions in a managed river system in northern California. Restoration Ecology 19: 204–213

Gonsolin T. E. 2010. Ecology of foothill yellow-legged frogs in upper Coyote Creek, Santa Clara County, CA. State University of California, San Jose. MS Thesis.

Halfwerk, W., L. J. Holleman, C. K. Lessells, and H. Slabbekoorn. 2011. Negative impact of traffic noise on avian reproductive success. Journal of Applied Ecology *48*: 210-219.

Hobbie, S. E., Baker, L. A., Buyarski, C., Nidzgorski, D., and J. C. Finlay. 2014. Decomposition of tree leaf litter on pavement: implications for urban water quality. Urban Ecosystems 17: 369-385.

Hothem, R. L., A. M. Meckstroth, K. E. Wegner, M. R. Jennings, and J. J. Crayon. 2009. Diets of three species of anurans from the Cache Creek Watershed, California, USA. Journal of Herpetology *43*: 275-283.

Kats, L. B., and R. P. Ferrer. 2003. Alien predators and amphibian declines: review of two decades of science and the transition to conservation. Diversity and Distributions 9: 99-110.

Kight, C. R., & Swaddle, J. P. 2011. How and why environmental noise impacts animals: an integrative, mechanistic review. Ecology Letters 14:1052-1061.

Krause, B. 2012. The Great Animal Orchestra: Finding the Origins of Music in the World's Wild Places, Little Brown (Hachette).

Kupferberg, S. J. 1996. Hydrologic and geomorphic factors affecting conservation of the Foothill yellow legged frog (*Rana boylii*). Ecological Applications 6:1332–1344.

Kupferberg, S. J., A. J. Lind, and W. J. Palen. 2009. Pulsed flow effects on the foothill yellow-legged frog (*Rana boylii*): Population modeling. Final Report to the California Energy Commission, PIER. 80pp. http://animalscience.ucdavis.edu/PulsedFlow/Kupferberg%20Sept2010.pdf

Kupferberg, S. J., A. J. Lind, V. Thill, and S. Yarnell. 2011. Water velocity tolerance in tadpoles of the foothill yellow-legged frog (*Rana boylii*): swimming performance, growth, and survival. Copeia 2011:141-152.

Kupferberg, S. J., W. J. Palen, A. J. Lind, S. Bobzien, A. Catenazzi, J. Drennan, and M. E. Power. 2012. Effects of flow regimes altered by dams on survival, population declines, and range-wide losses of California river-breeding frogs. Conservation Biology 26:513-524.

Moyle, P. B. 1973. Effects of introduced bullfrogs, *Rana catesbeiana*, on the native frogs of the San Joaquin Valley, California. Copeia 1973: 18-22.

Padgett-Flohr, G. E., and R. L. Hopkins. 2010. Landscape epidemiology of Batrachochytrium dendrobatidis in central California. Ecography 33: 688-697.

Peek, R. 2012. Analysis of long-term river regulation effects on genetic connectivity of foothill yellow-legged frogs (*Rana boylii*) in the Alameda Creek watershed. Prepared by Stillwater Sciences for San Francisco Public Utilities Commission.

Rachowicz, L. J., Knapp, R. A., Morgan, J. A., Stice, M. J., Vredenburg, V. T., Parker, J. M., & Briggs, C. J. (2006). Emerging infectious disease as a proximate cause of amphibian mass mortality. Ecology 87: 1671-1683.

San Francisco Public Utilities Commission (SFPUC). 2011. Final Environmental Impact Report, Vol.1, Calaveras Dam Replacement Project, San Francisco Public Utilities Commission.

Vredenburg, V. T., Knapp, R. A., Tunstall, T. S., and C. J. Briggs. 2010. Dynamics of an emerging disease drive large-scale amphibian population extinctions. Proceedings of the National Academy of Sciences 107: 9689-9694.

Wake, D. B., and V. T. Vredenburg. 2008. Are we in the midst of the sixth mass extinction? A view from the world of amphibians. Proceedings of the National Academy of Sciences 105(Supplement 1): 11466-11473.

Wheeler, C.A., J.B. Bettaso, D.T. Ashton, and H.H. Welsh, Jr. 2014. Effects of water temperature on breeding phenology, growth, and metamorphosis of foothill yellow-legged frogs (*Rana boylii*): A case study of the regulated mainstem and unregulated tributaries of California's Trinity River. River Research and Applications. Published online 25 August 2014. DOI: 10.1002/rra.2820.

Yarnell, S. M., A. J. Lind, and J. F. Mount. 2012. Dynamic flow modeling of riverine amphibian habitat with application to regulated flow management." River Research and Applications 28: 177-191.